70 Location Services

This sub clause contains test cases for Location Services (LCS).

70.1 Default conditions during LCS tests

During signalling tests in sub clause 70, default conditions from sub clause 26 shall apply, if not otherwise stated within the test descriptions, with the following exception.

SYSTEM INFORMATION TYPE 3:

as default except:

Information Element	value/remark
SI 3 rest octets - Early Classmark Sending Control	1 (perform early classmark sending)

70.1.1 Default conditions during EOTD tests

For EOTD testing the serving cell shall provide a BCCH for the duration of the test to enable the MS to make the required measurements.

70.1.2 Default conditions during A-GPS signalling tests

During A-GPS signalling tests defined in sub clause 70.7 to 70.9 the SS shall generate the six satellite signals and shall provide assistance data as defined in sub TS 51.010-7 subclasses 5.1.3 to 5.1.8. The levels of the simulated satellites shall all be at -125dBm +/- 6dB.

70.1.3 Default conditions during A-GNSS signalling tests

During A-GNSS signalling tests defined in sub clause 70.12 to 70.15 the SS shall generate all the MS supported GNSS satellite signals defined in TS 51.010-7 sub clause 6.1.2 and shall provide assistance data, dependent on the MS capabilities, defined in TS 51.010-7 sub clauses 6.1.3 and 6.1.4. The levels of the simulated satellites shall all be at -125dBm +/- 6dB.

70.2 EOTD Network Induced Location Request

The test cases in this sub clause focus on Network Induced Location requests. Although normally associated with Emergency Calls, it is possible for an MS to receive a NI-LR at any time during idle or dedicated mode by a PLMN operator LCS client.

70.2.1 LCS Network Induced Emergency Call on an SDCCH / idle, no IMSI for Mobiles supporting MS-Assisted EOTD

70.2.1.1 Conformance requirement

1. With the MS in the "idle, updated" state, the user shall initiate an emergency after the number 112 (for GSM 900 and 1800 MS), or 911 (for GSM 710, GSM 750, T_GSM 810, GSM 850, PCS 1 900 MS in the USA), or 08 (for GSM 710, GSM 750, T_GSM 810, GSM 850, PCS 1 900 MS in Mexico) has been entered by the user. The MS shall send a CHANNEL REQUEST message with correct establishment cause ("emergency call").

2. After assignment of a dedicated channel the first layer message sent by the MS on the assigned dedicated channel shall be a CM SERVICE REQUEST message specifying the correct IMEI and a non-available CKSN, with CM Service Type "emergency call establishment". The ES_IND bit in the Mobile Station Classmark 2 information element shall be set to "Controlled Early Classmark Sending is implemented".

3. After sending the CM SERVICE REQUEST message the MS shall send a CLASSMARK CHANGE message. The "Mobile Station Classmark 3" information element shall correctly specify the positioning methods supported by the MS.

4. After the CM SERVICE ACCEPT message is received form the network, the MS shall send an EMERGENCY SETUP message.

5. On receiving the RRLP MEASURE POSITION REQUEST message the MS will perform position measurements and respond with an RRLP MEASURE POSITION RESPONSE message. The RRLP Measure Position Response message shall contain either an EOTD Measurement Information element or a Location Information Error element.

6. After receipt of a CONNECT ACKNOWLEDGE message during correct establishment of the emergency call the MS shall indicate that the TCH is through connected in both directions.

References

3GPP TS 04.08 / 3GPP TS 44.018 sub clauses 3.3.1.1, 3.4.10
3GPP TS 04.08 / 3GPP TS 24.008 sub clauses 5.2.1, 4.5.1.5, 4.5.1.1, 5.2.1.1, and 5.2.1.6
3GPP TS 02.30 clause 4.
3GPP TS 04.31 Annex A sub clause 2.2.1.

70.2.1.2 Test Purpose

To verify when an emergency call is initiated by an MS which does not have a SIM fitted, the network instigates the LCS positioning procedure by sending RRLP (Measure Position Request) message and the mobile responds with RRLP (Measure Position Response) containing E-OTD measurement values.

70.2.1.3 Method of Test

Initial Conditions

System Simulator:

Serving cell: Default parameters.

Neighbor Cells: 2 neighbor cells are used with a minimum configuration of a BCCH. This is to allow the MS to perform the required timing measurements.

Mobile Station:

The MS is in MM-state "idle, no IMSI", no SIM inserted.

Specific PICS statements

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PIXIT statements

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Test Procedure

An Emergency Call is initiated with the MS, with no SIM inserted in the MS.

Directly after sending EMERGENCY SETUP the MS receives a RR APPLICATION INFORMATION message containing an RRLP Measure Position Request.

The MS then performs positioning measurements and responds with a RR APPLICATION INFORMATION message containing a RRLP Measure Position Response.

The emergency call is then established as normal with late assignment. Having reached the active state, the call is cleared by the SS.

Maximum duration of the test

3 minutes.

Expected Test Sequence

Step	Direction	Message	Comments
1	MS		The appropriate "emergency called number" is entered.
2	MS -> SS	CHANNEL REQUEST	Establishment cause is emergency call establishment.
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM. The CM service type IE indicates "emergency call establishment". The mobile identity IE specifies the IMEI of the MS. The cipher key sequence number IE indicates "no key is available".
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7 .
6	SS -> MS	CM SERVICE ACCEPT	
7	MS -> SS	EMERGENCY SETUP	
8	SS-> MS	RR APPLICATION INFORMATION	(RRLP Measure Position Request)
9	MS -> SS	RR APPLICATION INFORMATION	(RRLP Measure Position Response indicating either EOTD Measurement Information or a Location Information Error)
10	SS -> MS	CALL PROCEEDING	
11	SS -> MS	ALERTING	
12	SS -> MS	ASSIGNMENT COMMAND	
13	MS -> SS	ASSIGNMENT COMPLETE	
14	SS -> MS	CONNECT	
15	MS -> SS	CONNECT ACKNOWLEDGE	The MS indicates that the TCH is through connected in both directions.
16	SS -> MS	DISCONNECT	
17	MS -> SS	RELEASE	
18	SS -> MS	RELEASE COMPLETE	
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded (SS->MS) RRLP (Measure Position Request) , (MS->SS) RRLP (Measure Position Response), (MS->SS) RRLP (Protocol Error), (SS->MS) RRLP (Assistance Data) , (MS->SS) RRLP (Assistance Data Ack.),

RRLP Measure Position Request

Information element	Type	Value/remark
ASN.1 encoded	-	(20,A0,1e) Followed by EOTD Measure Assist Data
referenceNumber	Integer,0 to 7	1
component	msrPositionReq	1
methodType	msAssisted	0
positionMethod	Enumerated	eotd
MeasureResponseTime	Integer,0 to 7	7
useMultipleSets	Enumerated	oneSet
EOTD Measure AssistData	SEQUENCE	Values of the data within the element is described in tables 70.2.1 – 1 and 70.2.1 - 2

**Table 70.2.1-1: RRLP Measure Position Request Field Values,
E-OTD Reference BTS for Assistance Data Element**

Field Name	Value	Comments
BCCH Carrier	Range 0-1023	ARFCN of Serving BCCH
BSIC	Range 0 to 65	BSIC of Serving BCCH
Time Slot Scheme	Either 0 or 1, as applicable	0=All time slots 156.25 bits long 1=Time slots 0 and 4 are 157 bits long, all other time slots are 156 bits long.

**Table 70.2.1-2: RRLP Measure Position Request Field Values,
E-OTD Measurement Assistance Data for System Information List Element**

Field Name	Value	Comments
Number of Neighbors	2	
E-OTD Neighbor Present	2	
BSIC	Range 0 to 63	BSIC of neighbor BCCH
Multiframe Offset	Range 0-51	The value of this field is specific to the test configuration, and shall be calculated according to 3GPP TS 04.31, Annex A, Section A.2.2.3.
Time Slot Scheme	Either 0 or 1, as applicable	0=All time slots 156.25 bits long 1=Time slots 0 and 4 are 157 bits long, all other time slots are 156 bits long.
Rough RTD	Range 0-1250	Set to rough RTD value for the specific test configuration

RRLP Measure Position Response

Information element	Type	Value/remark
ASN.1 encoded	-	
referenceNumber	Integer,0 to 7	1
component	msrPositionReq	1
EITHER		
Eotd MeasureInfo	SEQUENCE	Any value for these parameters is acceptable.
OR		
LocationInfoError	SEQUENCE	Any error value is acceptable

70.2.2 Void

70.2.3 Network Induced Location Request Emergency Call on an SDCCH for MS-Assisted EOTD Mobiles

For Mobiles supporting speech, emergency call establishment will be initiated by the MS whether location updating has been successful or not and whether a SIM is inserted into the MS or not.

A Network Induced Location Request could occur at any point during emergency call setup (Ref 3GPP TS 03.71 sub clause 7.6.4.1). This could occur during an emergency setup before connection to a traffic channel.

70.2.3.1 Conformance requirements:

The following requirements apply for this test:

1. With the MS in the "idle, updated" state, the user shall initiate an emergency after the number 112 (for GSM 900 and 1800 MS), or 911 (for GSM 710, GSM 750, T_GSM 810, GSM 850, PCS 1 900 MS in the USA), or 08 (for GSM 710, GSM 750, T_GSM 810, GSM 850, PCS 1 900 MS in Mexico) has been entered by the user. The MS shall send a CHANNEL REQUEST message with correct establishment cause ("emergency call").

2. After assignment of a dedicated channel, the MS shall send a CM SERVICE REQUEST message specifying the correct CKSN and TMSI with CM Service Type "emergency call establishment". The ES_IND bit in the Mobile Station Classmark 2 information element shall be set to "Controlled Early Classmark Sending is implemented".

3. After sending the CM SERVICE REQUEST message the MS shall send a CLASSMARK CHANGE message. The "Mobile Station Classmark 3" information element shall correctly specify the positioning methods supported by the MS.

4. After the CM SERVICE ACCEPT message is received from the network, the MS shall send an EMERGENCY SETUP message.

5. On receiving the RRLP Measure Position Request message the MS will perform position measurements and respond with an RRLP Measure Position Response message. The RRLP Measure Position Response message shall contain either an EOTD Measurement Information element or a Location Information Error element.

6. After receipt of a CONNECT ACKNOWLEDGE message during correct establishment of the emergency call the MS shall indicate that the TCH is through connected in both directions.

References

3GPP TS 04.08 / 3GPP TS 44.018 sub clauses 3.3.1.1, 3.4.10, 9.1.11, 10.5.1.7.

3GPP TS 04.08 / 3GPP TS 24.008 sub clauses 5.1.3, 5.2.1, 4.5.1.1, 4.5.1.5, 5.2.1.1, 5.2.1.6, 9.2.9.

3GPP TS 02.30 clause 4.

3GPP TS 04.31 Annex A sub clause 2.2.1.

70.2.3.3 Test Purpose

To verify when an emergency call is initiated by the MS, the network instigates the LCS positioning procedure by sending RRLP (Measure Position Request) message and the mobile responds with RRLP (Measure Position Response) containing E-OTD measurement values.

Specific PICS statements

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PIXIT statements

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70.2.3.4 Method of Test

Initial Conditions:

System Simulator:

Serving cell: Default parameters

Neighbor Cells: 2 neighbor cells are used with a minimum configuration of a BCCH. This is to allow the MS to perform the required timing measurements.

Mobile Station:

The MS is in MM-state "idle, updated" with valued TMSI and CKSN.

Test Procedure:

An Emergency Call is initiated with the MS. SIM card is included in the MS.

Directly after sending EMERGENCY SETUP the MS receives a RR APPLICATION INFORMATION message containing an RRLP Measure Position Request.

The MS then performs positioning measurements and responds with a RR APPLICATION INFORMATION message containing a RRLP Measure Position Response.

The emergency call is then established as normal with late assignment. Having reached the active state, the call is cleared by the SS.

Maximum duration of the test:

3 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		The appropriate "emergency call number" is entered.
2	MS -> SS	CHANNEL REQUEST	Establishment cause is emergency call establishment.
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM. The CM service type IE indicates "emergency call establishment".
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7 .
6	SS -> MS	CM SERVICE ACCEPT	
7	MS -> SS	EMERGENCY SETUP	
8	SS-> MS	RR APPLICATION INFORMATION	(RRLP Measure Position Request)
9	MS -> SS	RR APPLICATION INFORMATION	(RRLP Measure Position Response indicating either EOTD Measurement Information or a Location Information Error)
10	SS -> MS	CALL PROCEEDING	
11	SS -> MS	ALERTING	
12	SS -> MS	ASSIGNMENT COMMAND	
13	MS -> SS	ASSIGNMENT COMPLETE	
14	SS -> MS	CONNECT	
15	MS -> SS	CONNECT ACKNOWLEDGE	The MS indicates that the TCH is through connected in both directions.
16	SS -> MS	DISCONNECT	
17	MS -> SS	RELEASE	
18	SS -> MS	RELEASE COMPLETE	
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded (SS->MS) RRLP (Measure Position Request) , (MS->SS) RRLP (Measure Position Response), (MS->SS) RRLP (Protocol Error), (SS->MS) RRLP (Assistance Data) , (MS->SS) RRLP (Assistance Data Ack.),

RRLP Measure Position Request

Information element	Type	Value/remark
ASN.1 encoded	-	(20,A0,1e) Followed by EOTD Measure Assist Data
referenceNumber	Integer,0 to 7	1
component	msrPositionReq	1
methodType	msAssisted	0
positionMethod	Enumerated	eotd
MeasureResponseTime	Integer,0 to 7	7
useMultipleSets	Enumerated	oneSet
EotdMeasureAssistData	SEQUENCE	Values of the data within the element as described in Tables 70.2.3 – 1 and 70.2.3 – 2

**Table 70.2.3-2: RRLP Measure Position Request Field Values,
E-OTD Reference BTS for Assistance Data Element**

Field Name	Value	Comments
BCCH Carrier	Range 0-1023	ARFCN of Serving BCCH
BSIC	Range 0 to 65	BSIC of Serving BCCH
Time Slot Scheme	Either 0 or 1, as applicable	0=All time slots 156.25 bits long 1=Time slots 0 and 4 are 157 bits long, all other time slots are 156 bits long.

Table 70.2.3-2: RRLP Measure Position Request Field Values,
E-OTD Measurement Assistance Data for System Information List Element

Field Name	Value	Comments
Number of Neighbors	2	
E-OTD Neighbor Present	2	
BSIC	Range 0 to 63	BSIC of neighbor BCCH
Multiframe Offset	Range 0-51	The value of this field is specific to the test configuration, and shall be calculated according to 3GPP TS 04.31, Annex A, Section A.2.2.3.
Time Slot Scheme	Either 0 or 1, as applicable	0=All time slots 156.25 bits long 1=Time slots 0 and 4 are 157 bits long, all other time slots are 156 bits long.
Rough RTD	Range 0-1250	Set to rough RTD value for the specific test configuration

RRLP Measure Position Response

Information element	Type	Value/remark
ASN.1 encoded	-	
referenceNumber	Integer,0 to 7	1
component	msrPositionReq	1
EITHER		
Eotd MeasureInfo	SEQUENCE	Any value for these parameters is acceptable.
OR		
LocationInfoError	SEQUENCE	Any error value is acceptable

70.2.4 Emergency Call NI-LR while Voice is Through Connected for Mobiles supporting MS-Assisted EOTD

A Network Induced Location Request could occur at any point during emergency call setup (Ref 3GPP TS 03.71 sub clause 7.6.4.1). In this case the voice call is established before the MS receives the location request.

70.2.4.1 Conformance requirements:

The following requirements apply for this test:

1. With the MS in the "idle, updated" state, the user shall initiate an emergency call after the number 112 (GSM 900 and 1800 MSs), or 911 (for GSM 710, GSM 750, T_GSM 810, GSM 850, PCS 1 900 in the USA), or 08 (for GSM 710, GSM 750, T_GSM 810, GSM 850, PCS 1 900 in Mexico) has been entered by the user. The MS shall end a CHANNEL REQUEST message with correct establishment cause ("emergency call").

2. After assignment of a dedicated channel, the MS shall send a CM SERVICE REQUEST message specifying the correct CKSN and TMSI with CM Service Type "emergency call establishment". The ES_IND bit in the Mobile Station Classmark 2 information element shall be set to "Controlled Early Classmark Sending is implemented".

3. After sending the CM SERVICE REQUEST message the MS shall send a CLASSMARK CHANGE message. The "Mobile Station Classmark 3" information element shall correctly specify the positioning methods supported by the MS.

4. After the CM SERVICE ACCEPT message is received from the network, the MS shall send an EMERGENCY SETUP message.

5. After receipt of a CONNECT ACKNOWLEDGE message during correct establishment of the emergency call, the MS shall indicate that the TCH is through connected in both directions.

6. On receiving the RRLP Measure Position Request message the MS will perform position measurements and respond with an RRLP Measure Position Response message. The RRLP Measure Position Response message shall contain either an EOTD Measurement Information element or a Location Information Error element.

References

3GPP TS 04.08 / 3GPP TS 44.018 sub clauses 3.3.1.1, 3.4.10, 9.1.11, 10.5.1.7

3GPP TS 04.08 / 3GPP TS 24.008 sub clauses 5.1.3, 5.2.1, 4.5.1.5, 4.5.1.1, 5.2.1.1, 5.2.1.6, 9.2.9

3GPP TS 02.30 clause 4.

3GPP TS 04.31 Annex A sub clause 2.2.1.

70.2.4.2 Test Purpose

To verify when a network instigates the LCS positioning procedure by sending RRLP (Measure Position Request) message, after a traffic channel has been established during an emergency call, the mobile responds with RRLP (Measure Position Response) containing E-OTD measurement values.

Specific PICS statements

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PIXIT statements

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70.2.4.3 Method of Test

Initial Conditions

System Simulator:

Serving cell: Default parameters.

Neighbor Cells: 2 neighbor cells are used with a minimum configuration of a BCCH. This is to allow the MS to perform the required timing measurements.

Mobile Station:

The MS is in MM-state "idle, updated" with valued TMSI and CKSN.

Test Procedure:

An Emergency Call is initiated by the MS. SIM card is present in the MS.

The emergency call is established with a late assignment.

After receiving the CONNECT ACKNOWLEDGE message from the MS, the SS sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request on the FACCH.

The MS then performs positioning measurements and responds with a RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The call is then cleared by the SS.

Maximum duration of the test:

1 minute.

Expected Sequence

Step	Direction	Message	Comments
1	MS		The appropriate Emergency Called number is entered.
2	MS -> SS	CHANNEL REQUEST	Establishment cause is emergency call establishment.
3	SS -> MS	IMMEDIATE ASSIGNMENT	

4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM. The CM service type IE indicates "emergency call establishment".
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7 .
6	SS -> MS	CM SERVICE ACCEPT	
7	MS -> SS	EMERGENCY SETUP	
8	SS -> MS	CALL PROCEEDING	
9	SS -> MS	ALERTING	
10	SS -> MS	ASSIGNMENT COMMAND	
11	MS -> SS	ASSIGNMENT COMPLETE	
12	SS -> MS	CONNECT	
13	MS -> SS	CONNECT ACKNOWLEDGE	The MS indicates that the TCH is through connected in both directions.
14	SS-> MS	RR APPLICATION INFORMATION	(RRLP Measure Position Request)
15	MS -> SS	RR APPLICATION INFORMATION	(RRLP Measure Position Response indicating either EOTD Measurement Information or a Location Information Error)
16	SS -> MS	DISCONNECT	
17	MS -> SS	RELEASE	
18	SS -> MS	RELEASE COMPLETE	
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator Skip Indicator Message Type APDU ID APDU Flags	RR Management Protocol (0110) Application Information Message type APDU ID -> RRLP => 0000 Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded (SS->MS) RRLP (Measure Position Request) , (MS->SS) RRLP (Measure Position Response), (MS->SS) RRLP (Protocol Error), (SS->MS) RRLP (Assistance Data) , (MS->SS) RRLP (Assistance Data Ack.),

RRLP Measure Position Request

Information element	Type	Value/remark
ASN.1 encoded	-	(20,A0,1e) Followed by EOTD Measure Assist Data
ReferenceNumber	Integer,0 to 7	1
Component	msrPositionReq	1
MethodType	msAssisted	0
PositionMethod	Enumerated	eotd
MeasureResponseTime	Integer,0 to 7	7
UseMultipleSets	Enumerated	oneSet
EOTD Measurement Assistance	SEQUENCE	Values of the data within the element as described in Tables 70.2.4 - 1 and 70.2.4 – 2

Table 70.2.4-3: RRLP Measure Position Request Field Values,
E-OTD Reference BTS for Assistance Data Element

Field Name	Value	Comments
BCCH Carrier	Range 0-1023	ARFCN of Serving BCCH
BSIC	Range 0 to 65	BSIC of Serving BCCH
Time Slot Scheme	Either 0 or 1, as applicable	0=All time slots 156.25 bits long 1=Time slots 0 and 4 are 157 bits long, all other time slots are 156 bits long.

Table 70.2.4-2: RRLP Measure Position Request Field Values,
E-OTD Measurement Assistance Data for System Information List Element

Field Name	Value	Comments
Number of Neighbors	2	
E-OTD Neighbor Present	2	
BSIC	Range 0 to 63	BSIC of neighbor BCCH
Multiframe Offset	Range 0-51	The value of this field is specific to the test configuration, and shall be calculated according to 3GPP TS 04.31, Annex A, Section A.2.2.3.
Time Slot Scheme	Either 0 or 1, as applicable	0=All time slots 156.25 bits long 1=Time slots 0 and 4 are 157 bits long, all other time slots are 156 bits long.
Rough RTD	Range 0-1250	Set to rough RTD value for the specific test configuration

RRLP Measure Position Response

Information element	Type	Value/remark
ASN.1 encoded	-	
referenceNumber	Integer,0 to 7	1
component	msrPositionReq	1
EITHER		
Eotd MeasureInfo	SEQUENCE	Any value for these parameters is acceptable.
OR		
LocationInfoError	SEQUENCE	Any error value is acceptable

70.3 Mobile Originating Location Request

The test cases in this sub clause focus on Mobile Originating Location Request. A MO_LR could occur by a MS to request the network to start location procedure, which is used for either its own location, location assistance data or deciphering keys for broadcast assistance data message.

70.3.1 MO_LR Basic Self Location Request

Basic Self Location Request is only applicable for requesting its own location by using MS Assisted E-OTD positioning..

70.3.1.1 MO_LR Basic Self Location Request In Idle Mode (Normal Case)

70.3.1.1.1 Conformance requirements:

The MS sends a DTAP LCS MO-LR invoke to the VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component with MO_LR TYPE set to LocationEstimate, LCS QoS value and other optional field if it is needed.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References

3GPP TS 03.71, sub clause 7.6.6.

3GPP TS 04.30 sub clause 5.1.1.

3GPP TS 04.80 sub clauses 2.4, 2.5 and 4.

70.3.1.1.2 Test Purpose

Verifies that a MS sends a correct LCS-MOLR Invoke message with the component MO_LR TYPE set to Location Estimate and LCS_QoS value on the initiation of MOLR. On receipt of a RRLP Measure position request from SS to start the measurement, MS shall send back RRLP Measure Position Response to SS after finishing the measurement.

70.3.1.1.3 Method of Test

Initial Conditions

System Simulator:

Serving cell: Default parameters, in SYSTEM INFORMATION TYPE 3 (SI3 Rest Octet) the early classmark sending control is implemented in the SS.

Neighbor Cells: at least 2 neighbor cells are used with a minimum configuration of a BCCH. This is to allow the MS to perform the required timing measurements.

Mobile Station:

The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

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PIXIT statements

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Test Procedure:

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to LCS-MOLR Invoke. The SS sends RRLP Request to start the measurement. Once the measurement is done, RRLP response is sent back to SS with the measurement data. The SS returns location estimate to MS through LCS-MOLR Return Result. The MS terminates the dialogue by sending RELEASE COMPLETE message.

Maximum duration of the test:

3 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure (Basic Self Location Request)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "call independent supplementary Services"".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the IMSI. "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7. This includes support of LCS VA Capability.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.
8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	SS -> MS	CM SERVICE ACCEPT	
11	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR MOLR-Type set to LocationEstimate
12	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST
13	MS -> SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE
14	SS -> MS	FACILITY	LCS MO-LR RETURE RESULT (locationEstimate)
15	MS -> SS	RELEASE COMPLETE	Terminates the session
16	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

FACILITY

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier	XX
Message type	FACILITY (0x11 1010)
Facility	Return Result = lcs-MOLR LocationEstimate LCS-MOLRRes ->locationEstimate

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded (SS->MS) RRLP (Measure Position Request) , (MS->SS) RRLP (Measure Position Response), (MS->SS) RRLP (Protocol Error), (SS->MS) RRLP (Assistance Data) , (MS->SS) RRLP (Assistance Data Ack.),

RRLP Measure Position Request

Information element	Type	Value/remark
ASN.1 encoded	-	(20,00,1e)
referenceNumber	Integer,0 to 7	1
component	msrPositionReq	1
methodType	msAssisted	0
positionMethod	Enumerated	eotd
MeasureResponseTime	Integer,0 to 7	7
useMultipleSets	Enumerated	oneSet

70.3.1.2   MO_LR Basic Self Location Request In Dedicated Mode (Normal case)

70.3.1.2.1   Conformance Requirement:

The MS sends a DTAP LCS MO-LR invoke to the VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component with MO_LR TYPE set to LocationEstimate, LCS QoS value and other optional field if it is needed.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References:

    3GPP TS 03.71 sub clause 7.6.6

    3GPP TS 04.30 sub clause 5.1.1

    3GPP TS 04.80 sub clauses 2.4, 2.5 & 4

70.3.1.2.2   Test Purpose

Verifies that a MS sends a correct LCS-MOLR Invoke message on already established speech call related SACCH with the component MO_LR TYPE sets to LocationEstimate and LCS_QoS value on the initiation of MO_LR. On receipt of a RRLP Measure position request from SS to start the measurement, MS shall send back RRLP Measure Position Response to SS after finishing the measurement.

70.3.1.2.3   Method of Test

Initial Conditions:

    System Simulator:

Serving Cell: Default parameters.

Neighbor Cells: 2 neighbor cells are used with a minimum configuration of a BCCH. This is to allow the MS to perform the required timing measurements.

Mobile Station:

The MS has valid TMSI and CKSN.

The MS is brought into the state U10 by using table 26.8.1.2/3.

Specific PICS statements

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PIXIT statements

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Test Procedure:

A MOLR procedure as call independent supplementary services is initiated from the MS on the existing SACCH channel. After received CM SERVICE ACCEPT message, MS sends a REGISTER message with Facility IE containing a component set to a LCS-MOLR Invoke. The SS sends RRLP Request to start the measurement. Once the measurement is done, RRLP Response is sent back to SS with the measurement data. The SS returns location estimate to MS through LCS-MOLR Return Result. The MS terminates the dialogue by sending RELEASE COMPLETE message.

Maximum duration of the test:

3 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure ((Basic Self Location Request)
2	MS -> SS	CM SERVICE REQUEST	"Mobile identity" IE contains the IMSI. "mobile station classmark 2" including settings for ES IND and CM3 supported.
3 (optional step)	MS -> SS	CLASSMARK CHANGE	This message is optional does not have to be sent by the MS.
4	SS -> MS	CM SERVICE ACCEPT	
5	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR MOLR-Type set to LocationEstimate
6	SS->MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST
7	MS->SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE
8	SS->MS	FACILITY	LCS MO-LR RETURE RESULT (locationEstimate
9	MS->SS	RELEASE COMPLETE	Terminates the session
10	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents:

FACILITY

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier	XX
Message type	FACILITY (0x11 1010)
Facility	Return Result = lcs-MOLR LocationEstimate LCS-MOLRRes ->locationEstimate

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded (SS->MS) RRLP (Measure Position Request), (MS->SS) RRLP (Measure Position Response), (MS->SS) RRLP (Protocol Error), (SS->MS) RRLP (Assistance Data), (MS->SS) RRLP (Assistance Data Ack.),

RRLP Measure Position Request

Information element	Type	Value/remark
ASN.1 encoded	-	(20,00,1e)
referenceNumber	Integer,0 to 7	1
component	msrPositionReq	1
methodType	msAssisted	0
positionMethod	Enumerated	eotd
MeasureResponseTime	Integer,0 to 7	7
useMultipleSets	Enumerated	oneSet

70.3.2   MO_LR Transfer to 3rd Party

70.3.2.1   Conformance requirements:

The MS sends a DTAP LCS MO-LR invoke to the VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time). If the MS is requesting that its location be sent to another LCS client, the message shall include the identity of the LCS client and may include the address of the GMLC through which the LCS client should be accessed

The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component with MO_LR TYPE set to LocationEstimate, LCS QoS value, LCS-ClientExternalID and MLC_Number if it is available.

Test References

3GPP TS 03.71, sub clause 7.6.6,

3GPP TS 04.030 sub clause 5.1.1,

3GPP TS 04.80 sub clauses 2.4, 2.5 & 4

70.3.2.2   Test Purpose

Verifies that a MS sends a correct LCS-MOLR Invoke message with the component MO_LR TYPE set to LocationEstimate, LCS_QoS value, LCS-ClientExternalID and MLC_Number (if available) on the initiation of MOLR. On receipt of a RRLP Measure position request from SS to start the measurement, MS shall send back RRLP Measure Position Response to SS after finishing the measurement.

70.3.2.3 Method of Test

Initial Conditions

System Simulator:

Serving cell: Default parameters, in SYSTEM INFORMATION TYPE 3 (SI3 Rest Octet) the early classmark sending control is implemented in the SS.

Neighbor Cells: at least 2 neighbor cells are used with a minimum configuration of a BCCH. This is to allow the MS to perform the required timing measurements.

Mobile Station:

The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

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PIXIT statements

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Test Procedure:

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to a LCS-MOLR Invoke. The SS sends RRLP Request to start the measurement. Once the measurement is done, RRLP response is sent back to SS with the measurement data. The SS may then transfer the location information to the internal or external LCS client.

Maximum duration of the test:

3 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure (Transfer to 3rd Party)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "call independent supplementary Services"".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the IMSI. "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7. This includes support of LCS VA Capability.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.

8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	SS -> MS	CM SERVICE ACCEPT	
11	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR MOLR-Type set to LocationEstimate LCSClientExternalID present
12	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST
13	MS -> SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE
14	SS		SS may return the location estimate result to the LCS client as MAP subscriber location report
15	SS -> MS	RELEASE COMPLETE	Confirmation of successful transfer to 3rd Party
16	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

FACILITY

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier	XX
Message type	FACILITY (0x11 1010)
Facility	Return Result = lcs-MOLR LocationEstimate LCS-MOLRRes ->locationEstimate

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded (SS->MS) RRLP (Measure Position Request) , (MS->SS) RRLP (Measure Position Response), (MS->SS) RRLP (Protocol Error), (SS->MS) RRLP (Assistance Data) , (MS->SS) RRLP (Assistance Data Ack.),

RRLP Measure Position Request

Information element	Type	Value/remark
ASN.1 encoded	-	(20,00,1e)
referenceNumber	Integer,0 to 7	1
component	msrPositionReq	1
methodType	msAssisted	0
positionMethod	Enumerated	eotd
MeasureResponseTime	Integer,0 to 7	7
useMultipleSets	Enumerated	oneSet

70.3.3 MO_LR Autonomous Location

70.3.3.1 Conformance Requirement

The MS sends a DTAP LCS MOLR invoke to VMSC. If the MS is requesting location assistance data, the message specifies the type of assistance data and the positioning method for which the assistance data applies.

The MS invokes a MO_LR by sending a REGISTER message to network containing a LCS-MOLR invoke component with MO_LR TYPE set to AssistanceData, Location-Method set to MS-AssistedEOTD, LCS QoS value and other optional field if it is needed.

The MS acknowledges the reception of each assistance data component to network with a RRLP ASSISTANCE DATA Ack before the next Assistance Data component is received.

References

3GPP TS 03.71 sub clause 7.6.6, 10.4, 10.5

3GPP TS 04.30 sub clause 5.1.1

3GPP TS 04.31 sub clause 2.3

3GPP TS 04.80 sub clauses 2.4, 2.5 and 4

70.3.3.2 Test Purpose

Verifies that a MS sends a correct LCS-MOLR Invoke message with the component MOLR Type set to Assistance Data, Location-Method sets to MS-Assisted EOTD, and LCS-QoS on the initiation of MO_LR. The MS shall acknowledge the reception of each assistance data component.

70.3.3.3 Method of Test

Initial Conditions:

System Simulator:

Serving Cell: Default parameters, in SYSTEM INFORMATION TYPE 3 (SI3 Rest Octet) the early classmark sending control is implemented in the SS.

Mobile Station:

The MS is in MM-state "idle, updated" with valued TMSI and CKSN.

Specific PICS statements

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PIXIT statements

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Test Procedure:

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to LCS-MOLR Invoke. The SS determines the exact location assistance data to transfer according to the type of data specified by the MS, the MS location capabilities and the current cell ID and sends RRLP Assistance Data to MS. The MS acknowledges each assistance data components by sending RRLP Assistance Data Ack.

Maximum duration of the test:

3 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure(assistance data)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "call independent supplementary Services"".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the IMSI. "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7. This includes support of LCS VA Capability.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.
8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	SS -> MS	CM SERVICE ACCEPT	
11	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR MOLR-Type set to AssistanceData LocationMethod set to MSAssistedEOTD
12	SS -> MS	RR APPLICATION INFORMATION	RRLP ASSISTANCE DATA
13	MS -> SS	RR APPLICATION INFORMATION	RRLP ASSISTANCE DATA ACK.
14	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded (SS->MS) RRLP (Measure Position Request) , (MS->SS) RRLP (Measure Position Response), (SS->MS) RRLP (Assistance Data), (MS->SS) RRLP (Assistance Data Ack.), (MS->SS) RRLP (Protocol Error),

RRLP Assistance Data

Information element	Type	Value/remark
ASN.1 encoded	-	
ReferenceNumber	Integer 0 to 7	1
Component	assistanceData	
referenceAssistanceData	ReferenceAssistData	See below
MsrAssistData	MsrAssistData	See below
systemInfoAssistData	SystemInfoAssistData	See below
moreAssDataToBeSent	Enumerated	0

RRLP Assistance Data Field Values: Reference Assistance Data

Field Name	Value	Comments
BCCH Carrier	Range 0 - 1023	ARFCN of Serving BCCH
BSIC	Range 0 - 63	BSIC of Serving BCCH
Time Slot Scheme	Either o or 1, as applicable	0=All time slot 156.25 bits long 1=Time slot 0 and 4 are 157 bits long, all other time slots are 156 bits long
BTS Position	None	Not applicable

RRLP Assistance Data Field Values: Measure Assistance Data

Field Name	Value	Comments
Number of Neighbors	1	
BCCH Carrier	Range 0 - 1023	ARFCN of neighbour BCCH
BSIC	Range 0 - 63	BSIC of neighbour BCCH
Multiframe Offset	Range 0 - 51	The value of this field is specific to the test configuration, and shall be calculated according to 3GPP TS 04.31, Annex A, section A.2.2.3
Time Slot scheme	Either 0 or 1, as applicable	0=All time slots 156.25 bits long 1=Time slot 0 and 4 are 157 bits long, all other time slots are 156 bits long.
Rough RTD	Range 0 - 1250	Set to rough RTD value for the specific test configuration
Expected OTD	None	Not Applicable
Uncertainty of Expected OTD	None	Not Applicable
Fine RTD	None	Not Applicable
Relative North	None	Not Applicable
Relative East	None	Not Applicable

RRLP Assistance Data Field Values: System Info Assistance Data

Field Name	Value	Comments
Number of Neighbours	1	
E-OTD Neighbour Present	1	
BSIC	Range 0 - 63	BSIC of neighbour BCCH
Multiframe Offset	Range 0 - 51	The value of this field is specific to the test configuration, and shall be calculated according to 3GPP TS 04.31, Annex A, section A.2.2.3
Time Slot scheme	Either 0 or 1, as applicable	0=All time slots 156.25 bits long 1=Time slot 0 and 4 are 157 bits long, all other time slots are 156 bits long.
Rough RTD	Range 0 - 1250	Set to rough RTD value for the specific test configuration
Expected OTD	None	Not Applicable
Uncertainty of Expected OTD	None	Not Applicable
Fine RTD	None	Not Applicable
Relative North	None	Not Applicable
Relative East	None	Not Applicable

70.3.4   MO_LR Positioning Measurement

70.3.4.1   MO_LR Positioning Measurement / Protocol Error

70.3.4.1.1   Conformance requirement:

The MS sends a DTAP LCS MOLR invoke to VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO_LR by sending a REGISTER message to network containing a LCS-MOLR invoke component with MO_LR TYPE set to Location Estimate, LCS QoS value and other optional field if it is needed.

The MS sends a RRLP PROTOCOL ERROR message to network if there is a problem that prevents the MS to receive a complete and understandable RRLP MEASURE POSITION REQUEST component.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

References

> 3GPP TS 03.71 sub clause 7.6.6
>
> 3GPP TS 04.30 sub clause 5.1.1
>
> 3GPP TS 04.31 sub clause 2.2, 2.5
>
> 3GPP TS 04.80 sub clause 2.4, 2.5 & 4

70.3.4.1.2   Test Purpose:

Verifies that a MS sends a correct positioning capability via control classmark sending. The MS shall send a RRLP PROTOCOL ERROR message to SS with specific error code if RRLP MEASURE POSITION REQUEST is incomplete. On receipt of second RRLP MEASURE POSITION REQUEST from SS to start the measurement, MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.3.4.1.3   Method of Test

Initial Conditions:

> System Simulator:
>
>> Serving Cell: Default parameters, in SYSTEM INFORMATION TYPE 3 (SI3 Rest Octet) the early classmark sending control is implemented in the SS.
>>
>> Neighbor Cells: At least 2 neighbor cells are used with a minimum configuration of a BCCH. This is to allow the MS to perform the required timing measurements.
>
> Mobile Station:
>
>> The MS is MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

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PIXIT statements

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Test Procedure

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to a DTAP LCS-MOLR Invoke. The SS determines the positioning method and instigates the particular message sequence by sending RRLP MEASURE POSITION REQUEST with missing information element. The MS shall send RRLP PROTOCOL ERROR as it fails to decode RRLP MEASURE POSITION REQUEST. The SS repeats RRLP MEASURE POSITION REQUEST with correct message contents. Once the measurement is done, RRLP MEASURE POSITION RESPONSE is sent back to SS with the measurement data. The SS returns location estimate to MS through DTAP LCS-MOLR Return Result. The MS terminates the dialogue by sending RELEASE COMPLETE message after receiving location estimate.

Maximum duration of the test

3 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure (location estimate)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates " call independent supplementary Services"".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the IMSI. "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7. This includes support of LCS VA Capability.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.
8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	SS -> MS	CM SERVICE ACCEPT	
11	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR
12	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST (with missing information element)
13	MS->SS	RR APPLICATION INFORMATION	RRLP PROTOCOL ERROR
14	SS->MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST
13	MS -> SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE (otd_measureInfo)
14	SS -> MS	FACILITY	LCS MO-LR RETURE RESULT (locationEstimate)
15	MS -> SS	RELEASE COMPLETE	Terminates the session
16	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

FACILITY

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier	XX
Message type	FACILITY (0x11 1010)
Facility	Return Result = lcs-MOLR LocationEstimate LCS-MOLRRes ->locationEstimate

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment
	Bit2=0 -> First or only segment
	Bit3=0 -> Command or Final Response
	Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded
	(SS->MS) RRLP (Measure Position Request) ,
	(MS->SS) RRLP (Measure Position Response),
	(MS->SS) RRLP (Protocol Error),
	(SS->MS) RRLP (Assistance Data) ,
	(MS->SS) RRLP (Assistance Data Ack.),

RRLP Measure Position Request (Step 12)

Information element	Type	Value/remark
ASN.1 encoded	-	(00100000, 00000000, 000111)
ReferenceNumber	Integer 0 to 7	1
Component	msrPositionReq	
MethodType	msAssisted	0
PositionMethod	Enumerated	EOTD
MeasureResponseTime	Integer 0 to 7	7

RRLP Measure Position Request (Step 14)

Information element	Type	Value/remark
ASN.1 encoded	-	(20,00,1e)
ReferenceNumber	Integer 0 to 7	1
Component	msrPositionReq	
MethodType	msAssisted	0
PositionMethod	Enumerated	eotd
MeasureResponseTime	Integer 0 to 7	7
UseMultipleSets	Enumerated	oneSet

70.3.4.2 MO_LR Positioning Measurement /Location Error

70.3.4.2.1 Conformance requirement

The MS sends a DTAP LCS MOLR invoke to VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO_LR by sending a REGISTER message to network containing a LCS-MOLR invoke component with MO_LR TYPE set to LocationEstimate, LCS QoS value and other optional field if it is needed.

The MS sends a RRLP MEASURE POSITION RESPONSE to network containing a Location Error component with an error indication if the measurement is not possible.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

References

3GPP TS 03.71 subclause7.6.6

3GPP TS 04.30 sub clause 5.1.1

3GPP TS04.31 sub clause 2.2

3GPP TS 04.80 sub clause 2.4, 2.5 & 4

70.3.4.2.2 Test Purpose

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall send back RRLP MEASURE POSITION RESPONSE message with Location Error component if the MS does not support the requested method. On receipt of second RRLP MEASURE POSITION REQUEST from SS to start the measurement, the MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.3.4.2.3 Method of Test

Initial Conditions:

System Simulator:

Serving Cell: Default parameters, in SYSTEM INFORMATION TYPE 3 (SI3 Rest Octet) the early classmark sending control is implemented in the SS.

Neighbor Cells: At least 2 neighbor cells are used with a minimum configuration of a BCCH. This is to allow the MS to perform the required timing measurements.

Mobile Station:

The MS is MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

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PIXIT statements

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Test Procedure

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to a DTAP LCS-MOLR Invoke. The SS determines the positioning method and instigates the particular message sequence by sending RRLP MEASURE POSITION REQUEST with a method type not supported by the mobile. The MS sends RRLP MEASURE POSITION RESPONSE to network containing a Location Error component (Request Method not Supported) as the requested method is not supported. The SS repeats RRLP MEASURE POSITION REQUEST with correct message contents. Once the measurement is done, RRLP MEASURE POSITION RESPONSE is sent back to SS with the measurement data. The SS returns location estimate to MS through LCS-MOLR Return Result. The MS terminates the dialogue by sending RELEASE COMPLETE message after receiving location estimate.

Maximum duration of the test:

3 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure (location estimate)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates " call independent supplementary Services"".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the IMSI. "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7. This includes support of LCS VA Capability.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.

8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	SS -> MS	CM SERVICE ACCEPT	
11	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR
12	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST (Request method not supported)
13	MS->SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE (location error)
14	SS->MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST
13	MS -> SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE (otd_measureInfo)
14	SS -> MS	FACILITY	LCS MO-LR RETURE RESULT (locationEstimate)
15	MS -> SS	RELEASE COMPLETE	Terminates the session
16	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

FACILITY

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier	XX
Message type	FACILITY (0x11 1010)
Facility	Return Result = lcs-MOLR LocatibonEstimate LCS-MOLRRes ->locationEstimate

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded (SS->MS) RRLP (Measure Position Request) , (MS->SS) RRLP (Measure Position Response), (MS->SS) RRLP (Protocol Error), (SS->MS) RRLP (Assistance Data) , (MS->SS) RRLP (Assistance Data Ack.),

RRLP Measure Position Request (Step 12)

Information element	Type	Value/remark
ASN.1 encoded	-	(20,00,3e)
ReferenceNumber	Integer 0 to 7	1
Component	msrPositionReq	
MethodType	msAssisted	0
PositionMethod	Enumerated	GPS
MeasureResponseTime	Integer 0 to 7	7
UseMultipleSets	Enumerated	oneSet

RRLP Measure Position Request (Step 14)

Information element	Type	Value/remark
ASN.1 encoded	-	(20,00,1e)
ReferenceNumber	Integer 0 to 7	1
Component	msrPositionReq	
MethodType	msAssisted	0
PositionMethod	Enumerated	eotd
MeasureResponseTime	Integer 0 to 7	7
UseMultipleSets	Enumerated	oneSet

70.3.4.3 MO_LR Positioning Measurement / Multiple RRLP REQUEST with same Reference Number

70.3.4.3.1 Conformance requirement

The MS sends a DTAP LCS MOLR invoke to VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO_LR by sending a REGISTER message to network containing a LCS-MOLR invoke component with MO_LR TYPE set to Location Estimate, LCS QoS value and other optional field if it is needed.

The MS ignores the later component if the old and new RRLP MEASURE POSITION REQUEST components have the same Reference Number.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

References

3GPP TS 03.71 subclause 7.6.6

3GPP TS 04.30 sub clause 5.1.1

3GPP TS 04.31 sub clause 2.5.5

3GPP TS 04.80 sub clause 2.4, 2.5 & 4

70.3.4.3.2 Test Purpose:

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall ignore the second RRLP MEASURE POSITION REQUEST if the second RRLP MEASURE POSITION REQUEST has the same REFERENCE NUMBER as in the previous one. The MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the current measurement.

70.3.4.3.3 Method of Test

Initial Conditions

System Simulator:

Serving cell: Default parameters, in SYSTEM INFORMATION TYPE 3 (SI3 Rest Octet) the early classmark sending control is implemented in the SS.

Neighbor Cells: at least 2 neighbor cells are used with a minimum configuration of a BCCH. This is to allow the MS to perform the required timing measurements.

Mobile Station:

The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

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PIXIT statements

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Test Procedure

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to a DTAP LCS-MOLR Invoke. The SS determines the positioning method and instigates the particular message sequence by sending RRLP MEASURE POSITION REQUEST to start the measurement. Before the current positioning measurement finishes, the SS sends the second RRLP MEASURE POSITION REQUEST with the same REFERENCE NUMBER as the first one. The MS shall ignore the second RRLP MEASURE POSITION REQUEST. The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement. The SS returns location estimate to MS through DTAP LCS-MOLR Return Result. The MS terminates the dialogue by sending RELEASE COMPLETE message after receiving location estimate.

Maximum duration of the test:

3 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure (location estimate)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates " call independent supplementary Services"".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the IMSI. "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7. This includes support of LCS VA Capability.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.
8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	SS -> MS	CM SERVICE ACCEPT	
11	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR
12	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 1
13	MS		MS is performing the measurement
14	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 2 (with same reference number as in Request 1)
15	MS -> SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE 1 (otd-measureInfo - msAssisted)
16	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT (locationEstimate)
17	MS -> SS	RELEASE COMPLETE	Terminates the session
18	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

FACILITY

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier	XX
Message type	FACILITY (0x11 1010)
Facility	Return Result = lcs-MOLR LocatibonEstimate
	LCS-MOLRRes ->locationEstimate

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment
	Bit2=0 -> First or only segment
	Bit3=0 -> Command or Final Response
	Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded
	(SS->MS) RRLP (Measure Position Request) ,
	(MS->SS) RRLP (Measure Position Response),
	(MS->SS) RRLP (Protocol Error),
	(SS->MS) RRLP (Assistance Data) ,
	(MS->SS) RRLP (Assistance Data Ack.),

RRLP Measure Position Request (Step 12)

Information element	Type	Value/remark
ASN.1 encoded	-	(20,00,1e)
ReferenceNumber	Integer 0 to 7	1
Component	msrPositionReq	
MethodType	msAssisted	0
PositionMethod	Enumerated	eotd
MeasureResponseTime	Integer 0 to 7	7
UseMultipleSets	Enumerated	oneSet

RRLP Measure Position Request (Step 14)

Information element	Type	Value/remark
ASN.1 encoded	-	(20,00,3e)
ReferenceNumber	Integer 0 to 7	1
Component	msrPositionReq	
MethodType	msBased	1
PositionMethod	Enumerated	eotd
MeasureResponseTime	Integer 0 to 7	7
UseMultipleSets	Enumerated	oneSet

70.3.4.4 MO_LR Positioning Measurement / Multiple RRLP REQUEST with different Reference Number

70.3.4.4.1 Conformance requirement

The MS sends a DTAP LCS MOLR invoke to VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO_LR by sending a REGISTER message to network containing a LCS-MOLR invoke component with MO_LR TYPE set to LocationEstimate, LCS QoS value and other optional field if it is needed.

The MS aborts activity for the former RRLP MEASURE POSITION REQUEST component and starts to act according to the later RRLP MEASURE POSITION REQUEST component if the old and new RRLP MEASURE POSITION REQUEST components have different Reference Number.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References:

3GPP TS 03.71 subclause7.6.6

3GPP TS 04.30 sub clause 5.1.1

3GPP TS 04.31 sub clause 2.5.5

3GPP TS 04.80 sub clause 2.4, 2.5 & 4

70.3.4.4.2 Test Purpose

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall terminate the current location measurement if the second RRLP MEASURE POSITION REQUEST is received with a different REFERENCE NUMBER. The MS shall perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST. The MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.3.4.4.3 Method of Test

Initial Conditions

System Simulator:

Serving cell: Default parameters, in SYSTEM INFORMATION TYPE 3 (SI3 Rest Octet) the early classmark sending control is implemented in the SS.

Neighbor Cells: at least 2 neighbor cells are used with a minimum configuration of a BCCH. This is to allow the MS to perform the required timing measurements.

Mobile Station:

The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

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PIXIT statements

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Test Procedure

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to a DTAP LCS-MOLR Invoke. The SS determines the positioning method and instigates the particular message sequence by sending RRLP MEASURE POSITION REQUEST to start the measurement. Before the current positioning measurement finishes, the MS receives the second RRLP MEASURE POSITION REQUEST with a different REFERENCE NUMBER as in the first one. The MS shall terminate the current location measurement and perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST. The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement. The SS returns location estimate to MS through DTAP LCS-MOLR Return Result. The MS terminates the dialogue by sending RELEASE COMPLETE message after receiving location estimate.

Maximum duration of the test:

3 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure (location estimate)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates " call independent supplementary Services"".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the IMSI. "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7. This includes support of LCS VA Capability.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.
8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	SS -> MS	CM SERVICE ACCEPT	
11	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR
12	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 1
13	MS		MS is performing the measurement
14	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 2 (with different reference number as in Request 1)
13	MS -> SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE 2 (otd-measureInfo) Check reference number is 2
14	SS -> MS	FACILITY	LCS MO-LR RETURE RESULT (locationEstimate)
15	MS -> SS	RELEASE COMPLETE	Terminates the session
16	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

FACILITY

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier	XX
Message type	FACILITY (0x11 1010)
Facility	Return Result = lcs-MOLR LocatibonEstimate LCS-MOLRRes ->locationEstimate

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment
	Bit2=0 -> First or only segment
	Bit3=0 -> Command or Final Response
	Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded
	(SS->MS) RRLP (Measure Position Request) ,
	(MS->SS) RRLP (Measure Position Response),
	(MS->SS) RRLP (Protocol Error),
	(SS->MS) RRLP (Assistance Data) ,
	(MS->SS) RRLP (Assistance Data Ack.),

RRLP Measure Position Request 1 (Step 12)

Information element	Type	Value/remark
ASN.1 encoded	-	(20,00,1e)
ReferenceNumber	Integer 0 to 7	1
Component	msrPositionReq	
MethodType	msAssisted	0
PositionMethod	Enumerated	eotd
MeasureResponseTime	Integer 0 to 7	7
UseMultipleSets	Enumerated	oneSet

RRLP Measure Position Request 2 (Step 14)

Information element	Type	Value/remark
ASN.1 encoded	-	(40,00,1e)
ReferenceNumber	Integer 0 to 7	2
Component	msrPositionReq	
MethodType	msAssisted	0
PositionMethod	Enumerated	eotd
MeasureResponseTime	Integer 0 to 7	7
UseMultipleSets	Enumerated	oneSet

70.3.4.5 MO_LR Positioning Measurement / RR Management Commands

70.3.4.5.1 Conformance requirement

The MS sends a DTAP LCS MOLR invoke to VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO_LR by sending a REGISTER message to network containing a LCS-MOLR invoke component with MO_LR TYPE set to LocationEstimate, LCS QoS value and other optional field if it is needed.

The MS aborts the measurement procedure and starts on the RR MANAGEMENT procedure if a RR MANAGEMENT command is received during the measurement procedure. The MS sends RR MANAGEMENT RESPONSE message upon completion.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

References

3GPP TS 03.71 sub clauses 7.6.6, 10.6

3GPP TS 04.30 sub clause 5.1.1

3GPP TS 04.80 sub clauses 2.4, 2.5 & 4

70.3.4.5.2 Test Purpose

Verifies that a MS sends a correct positioning capability via control class mark sending. MS shall terminate the current location measurement if a RR MANAGEMENT command is received during the measurement procedure. The MS shall send a RR MANAGEMENT RESPONSE message to SS when the RR MANAGEMENT procedure is complete. The MS shall perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST and send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.3.4.5.3 Method of Test

Initial Conditions

System Simulator:

Serving cell: Default parameters, in SYSTEM INFORMATION TYPE 3 (SI3 Rest Octet) the early classmark sending control is implemented in the SS.

Neighbor Cells: at least 2 neighbor cells are used with a minimum configuration of a BCCH. This is to allow the MS to perform the required timing measurements.

Mobile Station:

The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

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PIXIT statements

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Test Procedure

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to a DTAP LCS-MOLR Invoke. The SS determines the positioning method and instigates the particular message sequence by sending RRLP MEASURE POSITION REQUEST to start the measurement. Before the current positioning measurement finishes, the MS receives a RR MANAGEMENT command. The MS shall terminate the current location measurement and perform the RR MANAGEMENT command. The MS sends a RR MANAGEMENT RESPONSE message to SS when the RR MANAGEMENT procedure is complete. The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data finishing the measurement according to the newly received RRLP MEASUREMENT POSITION REQUEST. The SS returns location estimate to MS through DTAP LCS -MOLR Return Result. The MS terminates the dialogue by sending RELEASE COMPLETE message after receiving location estimate.

Maximum duration of the test

3 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure (location estimate)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates " call independent supplementary Services"".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the IMSI. "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7. This includes support of LCS VA Capability.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.
8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	SS -> MS	CM SERVICE ACCEPT	
11	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR
12	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 1
13	MS		MS is performing the measurement
14	SS -> MS	RR MANAGEMENT COMMAND	
15	MS -> SS	RR MANAGEMENT COMPLETE	MS terminates the measurement procedure and act on the RR management command
16	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 2
17	MS -> SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE 2 (otd-measureInfo)
18	SS -> MS	FACILITY	LCS MO-LR RETURE RESULT (locationEstimate)
19	MS -> SS	RELEASE COMPLETE	Terminates the session
20	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

FACILITY

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier	XX
Message type	FACILITY (0x11 1010)
Facility	Return Result = lcs-MOLR LocatibonEstimate LCS-MOLRRes ->locationEstimate

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment
	Bit2=0 -> First or only segment
	Bit3=0 -> Command or Final Response
	Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded
	(SS->MS) RRLP (Measure Position Request) ,
	(MS->SS) RRLP (Measure Position Response),
	(MS->SS) RRLP (Protocol Error),
	(SS->MS) RRLP (Assistance Data) ,
	(MS->SS) RRLP (Assistance Data Ack.),

RRLP Measure Position Request

Information element	Type	Value/remark
ASN.1 encoded	-	(20,00,1e)
ReferenceNumber	Integer 0 to 7	1
Component	msrPositionReq	
MethodType	msAssisted	0
PositionMethod	Enumerated	eotd
MeasureResponseTime	Integer 0 to 7	7
UseMultipleSets	Enumerated	oneSet

RR Management Command (Classmark Enquiry)

Information element	Value/remark
Encoded	(06 13)
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Classmark Enquiry Message Type	0001 0011

70.4 Mobile Terminated Location Request for Mobiles supporting MS-Assisted EOTD

The test cases in this sub clause focus on Mobile Terminated Location Request. A MT-LR occurs when an external LCS client requests the position of an MS by sending the SS REGISTER message. This may be sent to request verification for a particular MT-LR or simply to notify the user about an MT-LR that has already been authorized.

70.4.1 MT-LR Location Notification for MS-Assisted EOTD

Location notification takes place to inform the MS user that a particular LCS client is requesting their position without seeking the user's permission.

70.4.1.1 Conformance requirements:

The following requirements apply for this test:

1. On receipt of a REGISTER message containing the LCS Notification Invoke component with notificationType set to notifyLocationAllowed. The MS shall notify the MS user of the location request using the method defined in the manufacturers' specification.

2. The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

Test References

3GPP TS 03.71, sub clause 7.6.1,

3GPP TS 04.30, sub clause 4.1.1,

3GPP TS 04.80, sub clauses 2.4 and 2.5.

70.4.1.2 Test Purpose

Verifies that when the MS receives a REGISTER message, containing a LCS Location Notification Invoke component set to notifyLocationAllowed, the MS displays information about the LCS client correctly (as defined by the individual manufacturer) and sends a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

Specific PICS statements

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PIXIT statements

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70.4.1.3 Method of Test

Initial Conditions

System Simulator:

Serving cell: Default parameters, in SYSTEM INFORMATION TYPE 3 (SI3 Rest Octet) the early classmark sending control is implemented in the SS.

Mobile Station:

The MS is in MM-state "idle, updated" with valued TMSI and CKSN.

Test Procedure:

The MS is paged with a PAGING REQUEST TYPE 1 message. After sending the CIPHERING MODE COMPLETE message the MS receives an SS REGISTER message containing a Facility IE containing a DTAP LCS Location Notification Invoke message set to notifyLocationAllowed. The LCS Client Name contained in the USSD text string of the lcs-LocationNotification shall be displayed as defined by the Manufacturer. The MS then responds with a RELEASE COMPLETE message containing a LocationNotification return to terminate the dialogue.

Maximum duration of the test:

1 minute.

Expected Sequence

Step	Direction	Message	Comments
1	SS -> MS	PAGING REQUEST TYPE 1	Sent on the correct paging subchannel
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	PAGING RESPONSE	Message is contained in SABM "Mobile identity" IE contains the IMSI. "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7. This includes support of LCS VA Capability.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.

8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	SS		SS starts ciphering.
11	SS -> MS	REGISTER	Call Independent SS containing Facility IE Location Notification Invoke message set to notifyLocationAllowed
12	MS -> SS	RELEASE COMPLETE	Contains a LocationNotification return result to terminate the dialogue
13	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

PAGING RESPONSE

Information element	Value/remark
Protocol Discriminator	RR management
Ciphering Key Sequence number - Key Sequence	Key sequence number previously allocated to MS, or "111" if no key is available

Mobile station Classmark 2
    - ES IND
 	
CM3
 	
Mobile Identity
    - odd/even
    - Type of identity
    - Identity digits
	"Controlled Early Classmark Sending" option is implemented in the MS.
	The MS Supports options that are indicated in classmark 3 IE in the Classmark Change message
	
	Even
	TMSI
	TMSI previously allocated to MS

REGISTER

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)

Transaction identifier
Message type
Facility
	XX
	REGISTER (0x11 1011)
	Invoke = lcs-LocationNotification
	LocationNotificationArg
	    notificationType -> notifyLocationAllowed,
	    locationType -> current Location ,
	    lcsClientExternalID -> externalAddress
	    lcsClientName ->dataCodingScheme
	        nameString

RELEASE COMPLETE

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type Facility	XX RELEASE COMPLETE (0x10 1010) Return result = lcs-LocationNotification verificationResponse -> permissionGranted

70.4.2   MT-LR Privacy Options for Mobiles supporting MS-Assisted EOTD

Privacy options are used in conjunction with the MS subscription profile on the VLR. They give the MS user the option to grant or withhold permission for individual location requests as they occur.

70.4.2.1 MT-LR Privacy Options/ Verification – Location Allowed If No Response for mobiles supporting MS-Assisted EOTD

The case occurs when the target MS subscription profile on the VLR is set to location allowed if no response is sent. This is the default option if the VMSC does not receive verification from the target MS within a predetermined time.

70.4.2.1.1 Conformance requirements

The following requirements apply for this test:

1. On receipt of a REGISTER message containing the LCS Notification Invoke component with notificationType set to notifyAndVerify-LocationAllowedIfNoResponse. The MS a) notifies the user of the request and b) indicates the default is location allowed if no response is received within a predetermined period, while c) providing the opportunity to accept or deny the request by the method defined in the manufacturer's specification.

2.

    Option 1:

       The user accepts the location request using the method specified by the manufacturer.
       The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

    Option 2:

       The user denies the location request using the method defined by the manufacturer.
       The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

    Option 3:

       The user takes no action and the verification process times-out.
       The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

Test References

For conformance requirement 1:

       3GPP TS 03.71, sub clause 7.6.1.

       3GPP TS 24.030 sub clause 4.1.1.

       3GPP TS 24.080 sub clause 2.4, 2.5.

70.4.2.1.2 Test Purpose

Verifies that when the MS receives a REGISTER message, containing a LCS Location Notification Invoke component set to notifyAndVerify-LocationAllowedIfNoResponse, the MS displays information about the LCS client correctly and indicates that the default response is location allowed if no response is sent. Gives the user the option to accept or reject the request and sends a RELEASE COMPLETE message containing a LocationNotification return result with the verificationResponse set to permissionDenied or permissionGranted as appropriate.

Specific PICS statements

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PIXIT statements

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70.4.2.1.3 Method of Test

Initial Conditions

  System Simulator:

Serving cell: Default parameters, in SYSTEM INFORMATION TYPE 3 (SI3 Rest Octet) the early classmark sending control is implemented in the SS.

Mobile Station:

The MS is in MM-state "idle, updated" with valued TMSI and CKSN.

Test Procedure:

The MS is paged with a PAGING REQUEST TYPE 1 message. After sending the CIPHERING MODE COMPLETE message the MS receives an SS REGISTER message with a Facility IE containing a LCS Location Notification Invoke set to notifyAndVerify-LocationAllowedIfNoResponse. The LCS Client Name contained in the USSD text string of the lcs-LocationNotification shall be displayed with the option to accept or deny the request, as defined by the Manufacturer. The MS also indicates that location will be allowed if a response is not received within a predetermined time.

Option 1:

The user then accepts the location request by the method defined by the manufacturer. The MS responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

Option 2:

The user then denies the location request by the method defined by the manufacturer. The MS responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

Option 3:

The user ignores the location request by taking no action, allowing the verification process timer to time-out. The MS responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

Maximum duration of the test:

1 minute.

Expected Sequence

Step	Direction	Message	Comments
1	SS -> MS	PAGING REQUEST TYPE 1	Sent on the correct paging subchannel
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	PAGING RESPONSE	Message is contained in SABM "Mobile identity" IE contains the IMSI. "mobile station classmark 2" including settings for ES IND, CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7. This includes support for LCS VA Capability.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.

8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	SS		SS starts ciphering.
11	SS -> MS	REGISTER	Call Independent SS containing Facility IE LCS Location Notification Invoke set to notifyAndVerify-LocationAllowedIfNoResponse
12A k=1	MS		MS displays location request and info about LCS client. The MS accepts location request.
13A k=1	SS -> MS	RELEASE COMPLETE	Containing a LocationNotification return result with verificationResponse set to permissionGranted.
12B k=2	MS		MS displays location request and info about LCS client. The MS rejects location request.
13B k=2	SS -> MS	RELEASE COMPLETE	Containing a LocationNotification return result with verificationResponse set to permissionDenied
12C k=3	MS		MS displays location request and info about LCS client. The MS does not reply
13C k=3	SS -> MS	RELEASE COMPLETE	Containing a LocationNotification return result with verificationResponse set to permissionGranted
14	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

PAGING RESPONSE

Information element	Value/remark
Protocol Discriminator	RR management
Ciphering Key Sequence number - Key Sequence	 Key sequence number previously allocated to MS, or "111" if no key is available
Mobile station Classmark 2 - ES IND CM3	 "Controlled Early Classmark Sending" option is implemented in the MS. The MS Supports options that are indicated in classmark 3 IE in the Classmark Change message.

Mobile Identity
    - odd/even
    - Type of identity
    - Identity digits
	
	Even
	TMSI
	TMSI previously allocated to MS

REGISTER

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)

Transaction identifier
Message type
Facility
	Xx
	REGISTER (0x11 1011)
	invoke = lcs-LocationNotification
	locationNotificationArg
	  notificationType ->notifyAndVerify-LocationAllowedIfNoResponse,
	  locationType -> current Location,
	  lcsClientExternalID -> externalAddress
	  <u>*lcsClientName*</u> ->dataCodingScheme
	               nameString

RELEASE COMPLETE (options 1 and 3)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type Facility	Xx RELEASE COMPLETE (0x10 1010) return result = lcs-LocationNotification locationNotificationRes *verificationResponse* -> permissionGranted

RELEASE COMPLETE (option 2)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type Facility	Xx RELEASE COMPLETE (0x10 1010) return result = lcs-LocationNotification locationNotificationRes *verificationResponse* -> permissionDenied

70.4.2.2 MT-LR Privacy Options/ Verification – Location Not Allowed If No Response for Mobiles supporting MS-Assisted EOTD

This case occurs when the target MS subscription profile on the VLR is set to location not allowed if no response is sent. This is the default option if the VMSC does not receive verification from the target MS within a predetermined time.

70.4.2.2.1 Conformance requirements:

The following requirements apply for this test:

1. On receipt of a REGISTER message containing the LCS Notification Invoke component with notificationType set to notifyAndVerify-LocationAllowedIfNoResponse. The MS a) notifies the user of the request and b) indicates that the default is location not allowed if no response is received within a predetermined period, while c) providing the opportunity to accept or deny the request by the method defined in the manufacturer's specification.

2.

   Option 1:

      The user accepts the location request using the method specified by the manufacturer.
      The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

   Option 2:

The user denies the location request using the method defined by the manufacturer.
The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

Option 3:

The user takes no action and the verification process times-out.
The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

Test References

For conformance requirement 1:

3GPP TS 03.71, sub clause 7.6.1.

3GPP TS 24.030 sub clause 4.1.1.

3GPP TS 24.080 sub clause 2.4, 2.5.

70.4.2.2.2 Test Purpose

Verifies that when the MS receives a REGISTER message, containing a LCS Location Notification Invoke component set to notifyAndVerify-LocationNotAllowedIfNoResponse, the MS displays information about the LCS client correctly and indicates that the default response is location not allowed if no response is sent. Gives the user the option to accept or reject the request and sends a RELEASE COMPLETE message containing a LocationNotification return result with the verificationResponse set to permissionDenied or permissionGranted as appropriate.

Specific PICS statements

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PIXIT statements

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70.4.2.2.3 Method of Test

Initial Conditions

System Simulator:

Serving cell: Default parameters, in SYSTEM INFORMATION TYPE 3 (SI3 Rest Octet) the early classmark sending control is implemented in the SS.

Mobile Station:

The MS is in MM-state "idle, updated" with valued TMSI and CKSN.

Test Procedure

The MS is paged with a PAGING REQUEST TYPE 1 message. After sending the CIPHERING MODE COMPLETE message the MS receives an SS REGISTER message with a Facility IE containing a LCS Location Notification Invoke set to notifyAndVerify-LocationNotAllowedIfNoResponse. The LCS Client Name contained in the USSD text string of the lcs-LocationNotification shall be displayed with the option to accept or deny the request, as defined by the Manufacturer. The MS also indicates that location will not be allowed if a response is not received within a predetermined time.

Option 1:

The user then accepts the location request by the method defined by the manufacturer. The MS responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

Option 2:

The user then denies the location request by the method defined by the manufacturer. The MS responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

Option 3:

The user ignores the location request by taking no action, allowing the verification process timer to time-out. The MS responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

Maximum duration of the test:

1 minute.

Expected Sequence

Step	Direction	Message	Comments
1	SS -> MS	PAGING REQUEST TYPE 1	Sent on the correct paging subchannel
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	PAGING RESPONSE	Message is contained in SABM "Mobile identity" IE contains the IMSI. "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7. This includes support of LCS VA Capability.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.
8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	SS		SS starts ciphering.
11	SS -> MS	REGISTER	Call Independent SS containing Facility IE LCS Location Notification Invoke set to notifyAndVerify-LocationNotAllowedIfNoResponse
12	MS -> SS	RELEASE COMPLETE	Containing a LocationNotification return result with verificationResponse set to permissionGranted or permissionDenied as appropriate.
12A k=1	MS		MS displays location request and info about LCS client. The MS accepts location request.
13A k=1	SS -> MS	RELEASE COMPLETE	Containing a LocationNotification return result with verificationResponse set to permissionGranted.
12B k=2	MS		MS displays location request and info about LCS client. The MS rejects location request.
13B k=2	SS -> MS	RELEASE COMPLETE	Containing a LocationNotification return result with verificationResponse set to permissionDenied
12C k=3	MS		MS displays location request and info about LCS client. The MS does not reply
13C k=3	SS -> MS	RELEASE COMPLETE	Containing a LocationNotification return result with verificationResponse set to permissionGranted
14	SS->MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

PAGING RESPONSE

Information element	Value/remark
Protocol Discriminator	RR management
Ciphering Key Sequence number - Key Sequence	Key sequence number previously allocated to MS, or "111" if no key is available
Mobile station Classmark 2 - ES IND CM3 Mobile Identity - odd/even - Type of identity - Identity digits	"Controlled Early Classmark Sending" option is implemented in the MS. The MS Supports options that are indicated in classmark 3 IE in the Classmark Change message. Even TMSI TMSI previously allocated to MS

REGISTER

Information element	Value/remark
Protocol Discriminator	Call independent SS message (1011)
Transaction identifier Message type Facility	Xx REGISTER (0x11 1011) invoke = lcs-LocationNotification locationNotificationArg *notificationType* ->notifyAndVerify-LocationNotAllowedIfNoResponse, *nocationType* -> current Location, *lcsClientExternalID* -> externalAddress <u>*lcsClientName*</u> ->dataCodingScheme nameString

RELEASE COMPLETE (option 1)

Information element	Value/remark
Protocol Discriminator	Call independent SS message (1011)
Transaction identifier Message type Facility	Xx RELEASE COMPLETE (0x10 1010) return result = lcs-LocationNotification locationNotificationRes *verificationResponse* -> permissionGranted

RELEASE COMPLETE (options 2 and 3)

Information element	Value/remark
Protocol Discriminator	Call independent SS message (1011)
Transaction identifier Message type Facility	Xx RELEASE COMPLETE (0x10 1010) return result = lcs-LocationNotification locationNotificationRes *verificationResponse* -> permissionDenied

70.5 Void

70.6 E-OTD Timing Measurement Accuracy

Scope of Tests

This test procedure plan is intended verify the operation of Enhanced Observed Timing Difference (E-OTD) measurement functionality from an E-OTD capable GSM Mobile Station (MS).

The scope of this test plan is limited to verification of the MS physical layer against 3GPP TS 05.05, Release 1999, version 8.7.1, annex I. Specifically, this includes validation of MS observed timing measurement accuracy only.

The recommended measurement test environment is shown in the present document annex 6.

70.6.1 E-OTD Accuracy, Sensitivity Performance Tests using GMSK Signals

70.6.1.1 Definition

Enhanced Observed Timing Difference is a mechanism intended to provide location information from an MS within a GSM network. E-OTD measures the burst timing alignment between the serving cell for the MS and a minimum of two neighbor cells. The observed timing difference, along with the BSIC or Cell ID of each neighbor cell that can be received and measured by the MS, is reported to the network. Using this information, an E-OTD capable network can calculate the location of the MS using triangulation techniques.

Although an E-OTD capable MS must receive a minimum of two neighbors in order to provide the network with useable data for E-OTD positioning, only one neighbor is required for the timing measurement tests described in this procedure.

70.6.1.2 Conformance requirement

The RMS_{90} measurement error of an E-OTD capable MS receiving a neighbor shall not exceed 100 nanoseconds and 300 nanoseconds at a minimum neighbor carrier signal strength relative to relative sensitivity levels of 12 dB and −8 dB respectively, as specified in 3GPP TS 05.05, annex I, sub clause I.2.1, table I.2.1

70.6.1.3 Test purpose

E-OTD measurement accuracy is heavily influenced by the type of RF environment available to the MS at the time a Measure Position Request is received from the network. Nearby neighbor stations that provide a relatively high C/N to the MS receiver should result in greater measurement accuracy than those further away with a low C/N.

The purpose of this test case is to verify that an E-OTD capable MS can provide an observed timing difference (OTD) measurement of sufficient accuracy when measuring against a GMSK neighbor. During this test, there shall be no co-, adjacent-, or alternate-channel interference.

Specific PICS statements

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PIXIT statements

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70.6.1.4 Method of Test

Initial Configuration

Neighbor Cell: One neighbor cells with a minimum configuration of a BCCH in order to allow the MS to perform the required measurements. The neighbor BCCH shall be included in the serving BCCH System Information Neighbor List.

Assistance Data: The assistance data listed in Table 70.6.1-1 and Table 70.6.1-2 shall be provided by the serving base station simulator. Without assistance data, successful validation of the MS physical layer may be impossible due to limitations imposed by the device's upper protocol layers.

**Table 70.6.1-4: RRLP Measure Position Request Field Values,
E-OTD Reference BTS for Assistance Data Element**

Field Name	Value	Comments
BCCH Carrier	Range 0-1023	ARFCN of Serving BCCH
BSIC	Range 0 to 65	BSIC of Serving BCCH
Time Slot Scheme	Either 0 or 1, as applicable	0=All time slots 156.25 bits long 1=Time slots 0 and 4 are 157 bits long, all other time slots are 156 bits long.
BTS Position	None	Not applicable for timing accuracy measurements

**Table 70.6.1-2: RRLP Measure Position Request Field Values,
E-OTD Measurement Assistance Data for System Information List Element**

Field Name	Value	Comments
Number of Neighbors	1	
E-OTD Neighbor Present	1	
BSIC	Range 0 to 63	BSIC of neighbor BCCH
Multiframe Offset	Range 0-51	The value of this field is specific to the test configuration, and shall be calculated according to 3GPP TS 04.31, Annex A, Section A.2.2.3.
Time Slot Scheme	Either 0 or 1, as applicable	0=All time slots 156.25 bits long 1=Time slots 0 and 4 are 157 bits long, all other time slots are 156 bits long.
Rough RTD	Range 0-1250	Set to rough RTD for the specific test configuration
Expected OTD	None	Not Applicable
Uncertainty of Expected OTD	None	Not Applicable
Fine RTD	None	Not Applicable
Relative North	None	Not Applicable
Relative East	None	Not Applicable

70.6.1.5   Test procedure

a) Configure serving base station simulator to transmit GMSK dummy bursts in time slots 1 through 7.

b) Establish RF connectivity between the E-OTD compatible MS and its serving base station simulator, verify RSSI of -80 dB.

c) Disable the interfering signal generator.

d) Configure the neighbor base station simulator such that its power (as measured at the antenna terminal of the E-OTD MS under test) is -90 dBm, and that it is transmitting GMSK dummy bursts in time slots 1 through 7.

e) The serving base station SS initiates a Measure Position Request RRLP message. Begin logging E-OTD Measure Position Response RRLP message from the MS under test. The Measure Position Request is repeated a minimum of 250 times at 5 s intervals and the response RRLP messages are logged.

f) The SS calculates each trial's error relative to the known RTD, sort the data in ascending order, develop the 90 % subset M and calculate the RMS_{90} error.

g) Disable the interfering signal generator.

h) Configure the neighbor base station simulator such that its power (as measured at the antenna terminal of the E-OTD MS under test) is -110 dBm, and that it is transmitting GMSK dummy bursts in time slots 1 through 7.

i) The serving base station SS initiates a Measure Position Request RRLP message. Begin logging E-OTD Measure Position Response RRLP message from the MS under test. The Measure Position Request is repeated a minimum of 250 times at 5 second intervals and the response RRLP messages are logged.

j) After transmitting 250 Measure Position Request RRLP messages to the MS under test, calculate each trial's error relative to the known RTD, sort the data in ascending order, develop the 90 % subset M and calculate the RMS_{90} error.

70.6.1.6 Test Requirements

Verify that the RMS_{90} error calculated for each procedure in 70.6.1.5 is within the test conformance requirements listed in Table 70.6.1-3

Table 70.6.1-3, Test Conformance Requirements

Procedure	RMS_{90} error, 3GPP TS 05.05, Annex I, Minimum Performance Requirement	RMS_{90} error, 3GPP TS 51.010, 70.6.1, Test Conformance Requirement
Step f	≤ 100 nanoseconds	≤ 110 nanoseconds
Step j	≤ 300 nanoseconds	≤ 310 nanoseconds

70.6.2 E-OTD Accuracy, Interference Performance Tests

70.6.2.1 Definition

Enhanced Observed Timing Difference is a mechanism intended to provide location information from an MS within a GSM network. E-OTD measures the burst timing alignment between the serving cell for the MS and a minimum of two neighbor cells. The observed timing difference, along with the BSIC or Cell ID of each neighbor cell that can be received and measured by the MS, is reported to the network. Using this information, an E-OTD capable network can calculate the location of the MS using triangulation techniques.

Although an E-OTD capable MS must receive a minimum of two neighbors in order to provide the network with useable data for E-OTD positioning, only one neighbor is required for the timing measurement tests described in this procedure.

70.6.2.2 Conformance requirement

The RMS_{90} measurement error of an E-OTD capable MS receiving a neighbor with a co-channel interference ratio of 0 dB shall not exceed 300 nanoseconds, 10dB not exceeding 100 nanoseconds, adjacent channel interference ratio of – 18dB not exceeding 500 nanoseconds, -8 dB not exceeding 200 nanoseconds, as well as an adjacent channel (400 kHz) interference ratio of –41dB not exceeding 100 nanoseconds, as specified in 3GPP TS 05.05, Release 99, Annex I, Section I.2.1, Table I.2.2

70.6.2.3 Test purpose

E-OTD measurement accuracy is heavily influenced by the type of RF environment available to the MS at the time a Measure Position Request is received from the network. As the C/I ratio due to neighbor cell co-channel interference is reduced, E-OTD measurement accuracy may be reduced as well.

The purpose of this test case is to verify that an E-OTD capable MS can provide an observed timing difference (OTD) measurement of sufficient accuracy when measuring against a GMSK neighbor in the presence of a channel interference with a 0 dB, 10dB, -18dB, -8dB, and –41dB C/I.

Specific PICS statements

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PIXIT statements

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70.6.2.4 Method of Test

Initial Configuration

Neighbor Cells: at least two neighbor cells with a minimum configuration of a BCCH in order to allow the mobile to perform the required accuracy measurements. The neighbor BCCH shall be included in the serving BCCH System Information Neighbor List.

70.6.2.5 Test procedure

Co-Channel test procedure at 0dB C/I:

a) Configure serving base station simulator to transmit GMSK dummy bursts in time slots 1 through 7

b) Establish RF connectivity between the E-OTD compatible MS and its serving base station simulator, verify RSSI of -80 dBm

c) Enable the interfering signal generator on the frequency of the neighbor cell at a power (at the antenna connection of the EOTD-capable MS) of -80 dBm

d) Configure the neighbor base station simulator such that its power (as measured at the antenna terminal of the E-OTD MS under test) is -80 dBm, and that it is transmitting GMSK dummy bursts in time slots 1 through 7.

e) The SS initiates a Measure Position Request RRLP messages and begins logging E-OTD Response messages from the MS under test. The Measure Position Request message is repeated 250 times at 5-second intervals and the response RRLP messages are recorded.

f) After transmitting 250 Measure Position Request RRLP messages to the MS under test, calculate each trial's error relative to the known RTD, sort the data in ascending order, develop the 90% subset M and calculate the RMS_{90} error.

Co-Channel test procedure at 10dB C/I:

g) Establish RF connectivity between the E-OTD compatible MS and its serving base station simulator, verify RSSI of -80 dBm

h) Enable the interfering signal generator on the frequency of the neighbor cell at a power (at the antenna connection of the EOTD-capable MS) of -90 dBm

i) Configure the neighbor base station simulator such that its power (as measured at the antenna terminal of the E-OTD MS under test) is -80 dBm, and that it is transmitting GMSK dummy bursts in time slots 1 through 7.

j) The SS initiates a Measure Position Request RRLP messages and begins logging E-OTD Response messages from the MS under test. The Measure Position Request message is repeated 250 times at 5-second intervals and the response RRLP messages are recorded.

k) Repeat Step f) and calculate the results.

Adjacent channel test procedure at -18dB C/I:

l) Establish RF connectivity between the E-OTD compatible MS and its serving base station simulator, verify RSSI of -70 dBm

m) Enable the interfering signal generator on either of the channels adjacent to the frequency of the neighbor cell at a power (at the antenna connection of the EOTD-capable MS) of -62 dBm. The RF channel used by the interfering signal generator during this test must not be the same as that used by the serving base station simulator.

n) Configure the neighbor base station simulator such that its power (as measured at the antenna terminal of the E-OTD MS under test) is -80 dBm, and that it is transmitting GMSK dummy bursts in time slots 1 through 7.

o) The SS initiates a Measure Position Request RRLP messages and begins logging E-OTD Response messages from the MS under test. The Measure Position Request message is repeated 250 times at 5-second intervals and the response RRLP messages are recorded.

p) Repeat Step f) and calculate the results.

Adjacent channel test procedure at - 8dB C/I:

q) Establish RF connectivity between the E-OTD compatible MS and its serving base station simulator, verify RSSI of -70 dBm

r) Enable the interfering signal generator on either of the channels adjacent to the frequency of the neighbor cell at a power (at the antenna connection of the EOTD-capable MS) of -72 dBm. The RF channel used by the interfering signal generator during this test must not be the same as that used by the serving base station simulator.

s) Configure the neighbor base station simulator such that its power (as measured at the antenna terminal of the E-OTD MS under test) is -80 dBm, and that it is transmitting GMSK dummy bursts in time slots 1 through 7.

t) The SS initiates a Measure Position Request RRLP messages and begins logging E-OTD Response messages from the MS under test. The Measure Position Request message is repeated 250 times at 5-second intervals and the response RRLP messages are recorded.

u) Repeat Step f) and calculate the results.

Adjacent channel (400kHz) test procedure at -41dB C/I:

v) Establish RF connectivity between the E-OTD compatible MS and its serving base station simulator, verify RSSI of -70 dBm

w) Enable the interfering signal generator on either of the channels alternate (400 kHz offset) to the frequency of the neighbor cell at a power (at the antenna connection of the EOTD-capable MS) of -39 dBm. The RF channel used by the interfering signal generator during this test must not be the same as that used by the serving base station simulator.

x) Configure the neighbor base station simulator such that its power (as measured at the antenna terminal of the E-OTD MS under test) is -80 dBm, and that it is transmitting GMSK dummy bursts in time slots 1 through 7.

y) The SS initiates a Measure Position Request RRLP messages and begins logging E-OTD Response messages from the MS under test. The Measure Position Request message is repeated 250 times at 5-second intervals and the response RRLP messages are recorded.

z) Repeat Step f) and calculate the results.

70.6.2.6 Test Requirements

Verify that the RMS_{90} error calculated for each procedure in 70.6.2.5 is within the test conformance requirements listed in Table 70.6.2-1.

Table 70.6.2-1, Test Conformance Requirements

Procedure	RMS_{90} error, 3GPP TS 05.05, Annex I, Minimum Performance Requirement	RMS_{90} error, 3GPP TS 51.010, 70.6.2, Test Conformance Requirement
Step f	≤ 300 nanoseconds	≤ 310 nanoseconds
Step k	≤ 100 nanoseconds	≤ 110 nanoseconds
Step p	≤ 500 nanoseconds	≤ 510 nanoseconds
Step u	≤ 200 nanoseconds	≤ 210 nanoseconds
Step z	≤ 100 nanoseconds	≤ 110 nanoseconds

70.6.3 E-OTD Accuracy, Multipath Performance Test using GMSK Modulated Signals.

70.6.3.1 Definition

Enhanced Observed Timing Difference is a mechanism intended to provide location information from an MS within a GSM network. E-OTD measures the burst timing alignment between the serving cell for the MS and a minimum of two neighbor cells. The observed timing difference, along with the BSIC or Cell ID of each neighbor cell that can be received and measured by the MS, is reported to the network. Using this information, an E-OTD capable network can calculate the location of the MS using triangulation techniques.

Although an E-OTD capable MS must receive a minimum of two neighbors in order to provide the network with useable data for E-OTD positioning, only one neighbor is required for the timing measurement tests described in this procedure.

70.6.3.2 Conformance requirement

The RMS_{90} measurement error of an E-OTD capable MS receiving a TU3 Rayleigh-faded neighbor shall not exceed 1.5 microseconds, as specified in 3GPP TS 05.05, Release 99, Version 8.7.1, Annex I, Clause I.2.3, Table I.2.3

70.6.3.3 Test purpose

E-OTD measurement accuracy is heavily influenced by the type of RF environment available to the MS at the time a Measure Position Request is received from the network. Rayleigh fading to the neighbor cell will reduce E-OTD measurement accuracy.

The purpose of this test case is to verify that an E-OTD capable MS can provide an observed timing difference (OTD) measurement of sufficient accuracy when measuring against a TU3 Rayleigh fading GMSK distant neighbor. During this test, there shall be no co-, adjacent-, or alternate-channel interference.

Specific PICS statements

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PIXIT statements

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70.6.3.4 Method of Test

Initial Configuration

Neighbor Cell: at least one neighbor cell with a minimum configuration of a BCCH in order to allow the mobile to perform the required accuracy measurements. The neighbor BCCH shall be included in the serving BCCH System Information Neighbor List.

Assistance Data: The assistance data listed in Table 70.6.3-1 and Table 70.6.3-2 shall be provided by the serving base station simulator. Without assistance data, successful validation of the MS physical layer may be impossible due to limitations imposed by the device's upper protocol layers.

**Table 70.6.3-5: RRLP Measure Position Request Field Values,
E-OTD Reference BTS for Assistance Data Element**

Field Name	Value	Comments
BCCH Carrier	Range 0-1023	ARFCN of Serving BCCH
BSIC	Range 0 to 65	BSIC of Serving BCCH
Time Slot Scheme	Either 0 or 1, as applicable	0=All time slots 156.25 bits long 1=Time slots 0 and 4 are 157 bits long, all other time slots are 156 bits long.
BTS Position	None	Not applicable for timing accuracy measurements

Table 70.6.3-2: RRLP Measure Position Request Field Values,
E-OTD Measurement Assistance Data for System Information List Element

Field Name	Value	Comments
Number of Neighbors	1	
E-OTD Neighbor Present	1	
BSIC	Range 0 to 63	BSIC of neighbor BCCH
Multiframe Offset	Range 0-51	The value of this field is specific to the test configuration, and shall be calculated according to 3GPP TS 04.31, Annex A, Section A.2.2.3.
Time Slot Scheme	Either 0 or 1, as applicable	0=All time slots 156.25 bits long 1=Time slots 0 and 4 are 157 bits long, all other time slots are 156 bits long.
Rough RTD	Range 0-1250	Set to rough RTD for the specific test configuration
Expected OTD	None	Not Applicable
Uncertainty of Expected OTD	None	Not Applicable
Fine RTD	None	Not Applicable
Relative North	None	Not Applicable
Relative East	None	Not Applicable

70.6.3.5 Test procedure

a) Configure serving base station simulator to transmit GMSK dummy bursts in time slots 1 through 7

b) Establish RF connectivity between the E-OTD compatible MS and its serving base station simulator, verify RSSI of -80 dBm

c) Disable the interfering signal generator

d) Configure the neighbor base station simulator such that its power (as measured at the antenna terminal of the EOTD MS under test) is -110 dBm with Rayleigh fading disabled. The neighbor shall be transmitting GMSK dummy bursts in time slots 1 through 7

e) Configure the fading simulator for Rayleigh fading corresponding to a velocity of 3 kph, with a 12-tap delay and amplitude spread in accordance with 3GPP TS 05.05, Release 99, Rev. 8.7.1, Annex C, Section C.3.3.

f) With the carrier from the serving base station simulator disabled, enable TU3 Rayleigh fading on the neighbor cell, and verify an average RSSI (at the antenna connection of the MS) of -110 dBm

g) Re-enable the serving base station simulator carrier, verify an RSSI (at the antenna connection of the MS) of -80 dBm

h) The SS initiates a Measure Position Request RRLP messages and begins logging E-OTD Response messages from the MS under test. The Measure Position Request message is repeated 250 times at 5-second intervals and the response RRLP messages are recorded.

i) After transmitting 250 Measure Position Request RRLP messages to the MS under test, calculate each trial's error relative to the known RTD, sort the data in ascending order, develop the 90% subset M and calculate the RMS_{90} error.

70.6.3.6 Test Requirements

Verify that the RMS_{90} error calculated in Step i) is < 1.5 microseconds

70.6.4 E-OTD Accuracy, Interference Performance Tests, 8PSK BCCH

70.6.4.1 Definition

Enhanced Observed Timing Difference is a mechanism intended to provide location information from an MS within a GSM network. E-OTD measures the burst timing alignment between the serving cell for the MS and a minimum of two neighbor cells. The observed timing difference, along with the BSIC or Cell ID of each neighbor cell that can be received and measured by the MS, is reported to the network. Using this information, an E-OTD capable network can calculate the location of the MS using triangulation techniques.

Although an E-OTD capable MS must receive a minimum of two neighbors in order to provide the network with useable data for E-OTD positioning, only one neighbor is required for the timing measurement tests described in this procedure.

70.6.2.2 Conformance requirement

The RMS_{90} measurement error of an E-OTD capable MS receiving an 8PSK neighbor with a co-channel interference ratio of 0 dB shall not exceed 300 nanoseconds, 10dB not exceeding 300 nanoseconds, adjacent channel interference ratio of -18dB not exceeding 500 nanoseconds, -8 dB not exceeding 200 nanoseconds, as well as an adjacent channel (400 kHz) interference ratio of
-41dB not exceeding 100 nanoseconds, as specified in 3GPP TS 05.05, Release 99, Annex I, Section I.2.1, Table I.2.2

70.6.2.3 Test purpose

E-OTD measurement accuracy is heavily influenced by the type of RF environment available to the MS at the time a Measure Position Request is received from the network. As the C/I ratio due to neighbor cell co-channel interference is reduced, E-OTD measurement accuracy may be reduced as well.

The purpose of this test case is to verify that an E-OTD capable MS can provide an observed timing difference (OTD) measurement of sufficient accuracy when measuring against a neighbor modulated with 8PSK in time slots 1-7, in the presence of a channel interference with a 0 dB, 10dB, -18dB, -8dB, and -41dB C/I.

Specific PICS statements

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PIXIT statements

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70.6.4.4 Method of Test

Initial Configuration

Neighbor Cells: at least one neighbor cell with a minimum configuration of a BCCH in order to allow the mobile to perform the required accuracy measurements. The neighbor BCCH shall be included in the serving BCCH System Information Neighbor List.

70.6.4.5 Test procedure

Co-Channel 8PSK test procedure at 0dB C/I:

a) Configure serving base station simulator to transmit in time slots 1 through 7

b) Establish RF connectivity between the E-OTD compatible MS and its serving base station simulator, verify RSSI of -80 dBm

c) Enable the interfering signal generator on the frequency of the neighbor cell at a power (at the antenna connection of the EOTD-capable MS) of -80 dBm

d) Configure the neighbor base station simulator such that its power (as measured at the antenna terminal of the E-OTD MS under test) is -80 dBm, and that it is transmitting 8PSK bursts modulated with pseudo-random data in time slots 1 through 7.

e) The SS initiates a Measure Position Request RRLP messages and begins logging E-OTD Response messages from the MS under test. The Measure Position Request message is repeated 250 times at 5-second intervals and the response RRLP messages are recorded.

f) After transmitting 250 Measure Position Request RRLP messages to the MS under test, calculate each trial's error relative to the known RTD, sort the data in ascending order, develop the 90% subset M and calculate the RMS_{90} error.

Co-Channel 8PSK test procedure at 10dB C/I:

g) Establish RF connectivity between the E-OTD compatible MS and its serving base station simulator, verify RSSI of -80 dBm

h) Enable the interfering signal generator on the frequency of the neighbor cell at a power (at the antenna connection of the EOTD-capable MS) of -90 dBm

i) Configure the neighbor base station simulator such that its power (as measured at the antenna terminal of the E-OTD MS under test) is -80 dBm, and that it is transmitting 8PSK bursts modulated with pseudo-random data in time slots 1 through 7.

j) The SS initiates a Measure Position Request RRLP messages and begins logging E-OTD Response messages from the MS under test. The Measure Position Request message is repeated 250 times at 5-second intervals and the response RRLP messages are recorded.

k) Repeat Step f) and calculate the results.

Adjacent channel 8PSK test procedure at -18dB C/I:

l) Establish RF connectivity between the E-OTD compatible MS and its serving base station simulator, verify RSSI of -70 dBm

m) Enable the interfering signal generator on either of the channels adjacent to the frequency of the neighbor cell at a power (at the antenna connection of the EOTD-capable MS) of -62 dBm. The RF channel used by the interfering signal generator during this test must not be the same as that used by the serving base station simulator.

n) Configure the neighbor base station simulator such that its power (as measured at the antenna terminal of the E-OTD MS under test) is -80 dBm, and that it is transmitting 8PSK bursts modulated with pseudo-random data in time slots 1 through 7.

o) The SS initiates a Measure Position Request RRLP messages and begins logging E-OTD Response messages from the MS under test. The Measure Position Request message is repeated 250 times at 5-second intervals and the response RRLP messages are recorded.

p) Repeat Step f) and calculate the results.

Adjacent channel 8PSK test procedure at - 8dB C/I:

q) Establish RF connectivity between the E-OTD compatible MS and its serving base station simulator, verify RSSI of -70 dBm

r) Enable the interfering signal generator on either of the channels adjacent to the frequency of the neighbor cell at a power (at the antenna connection of the EOTD-capable MS) of -72 dBm. The RF channel used by the interfering signal generator during this test must not be the same as that used by the serving base station simulator.

s) Configure the neighbor base station simulator such that its power (as measured at the antenna terminal of the E-OTD MS under test) is -80 dBm, and that it is transmitting 8PSK bursts modulated with pseudo-random data in time slots 1 through 7.

t) The SS initiates a Measure Position Request RRLP messages and begins logging E-OTD Response messages from the MS under test. The Measure Position Request message is repeated 250 times at 5-second intervals and the response RRLP messages are recorded.

u) Repeat Step f) and calculate the results.

Adjacent channel (400kHz) 8PSK test procedure at -41dB C/I:

v) Establish RF connectivity between the E-OTD compatible MS and its serving base station simulator, verify RSSI of -70 dBm

w) Enable the interfering signal generator on either of the channels alternate (400 kHz offset) to the frequency of the neighbor cell at a power (at the antenna connection of the EOTD-capable MS) of -39 dBm. The RF channel used by the interfering signal generator during this test must not be the same as that used by the serving base station simulator.

x) Configure the neighbor base station simulator such that its power (as measured at the antenna terminal of the E-OTD MS under test) is -80 dBm, and that it is transmitting 8PSK bursts modulated with pseudo-random data in time slots 1 through 7.

y) The SS initiates a Measure Position Request RRLP messages and begins logging E-OTD Response messages from the MS under test. The Measure Position Request message is repeated 250 times at 5-second intervals and the response RRLP messages are recorded.

z) Repeat Step f) and calculate the results.

70.6.4.6 Test Requirements

Verify that the RMS_{90} error calculated for each procedure in 70.6.4.5 is within the test conformance requirements listed in Table 70.6.4-1

Table 70.6.4-1, Test Conformance Requirements

Procedure	RMS_{90} error, 3GPP TS 05.05, Annex I, Minimum Performance Requirement	RMS_{90} error, 3GPP TS 51.010, 70.6.4, Test Conformance Requirement
Step f	≤ 300 nanoseconds	≤310 nanoseconds
Step k	≤ 100 nanoseconds	≤110 nanoseconds
Step p	≤ 500 nanoseconds	≤510 nanoseconds
Step u	≤ 200 nanoseconds	≤210 nanoseconds
Step z	≤ 100 nanoseconds	≤110 nanoseconds

70.6.5 E-OTD Accuracy, Multipath Performance Test, 8PSK BCCH

70.6.5.1 Definition

Enhanced Observed Timing Difference is a mechanism intended to provide location information from an MS within a GSM network. E-OTD measures the burst timing alignment between the serving cell for the MS and a minimum of two neighbor cells. The observed timing difference, along with the BSIC or Cell ID of each neighbor cell that can be received and measured by the MS, is reported to the network. Using this information, an E-OTD capable network can calculate the location of the MS using triangulation techniques.

Although an E-OTD capable MS must receive a minimum of two neighbors in order to provide the network with useable data for E-OTD positioning, only one neighbor is required for the timing measurement tests described in this procedure.

70.6.5.2   Conformance requirement

The RMS_{90} measurement error of an E-OTD capable MS receiving a TU3 Rayleigh-faded 8PSK-modulated neighbor shall not exceed 1.5 microseconds, as specified in 3GPP TS 05.05, Release 99, Annex I, Clause I.2.3, Table I.2.3

70.6.5.3   Test purpose

E-OTD measurement accuracy is heavily influenced by the type of RF environment available to the MS at the time a Measure Position Request is received from the network. Rayleigh fading to the neighbor cell will reduce E-OTD measurement accuracy.

The purpose of this test case is to verify that an E-OTD capable MS can provide an observed timing difference (OTD) measurement of sufficient accuracy when measuring against a TU3 Rayleigh fading distant neighbor modulated with 8PSK in time slots 1-7. During this test, there shall be no co-, adjacent-, or alternate-channel interference.

Specific PICS statements

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PIXIT statements

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70.6.5.4   Method of Test

Initial Configuration

Neighbor Cells: At least one neighbor cell with a minimum configuration of a BCCH in order to allow the mobile to perform the required accuracy measurements. The neighbor BCCH shall be included in the serving BCCH System Information Neighbor List.

Assistance Data: The assistance data listed in Table 70.6.5-1 and Table 70.6.5-2 shall be provided by the serving base station simulator. Without assistance data, successful validation of the MS physical layer may be impossible due to limitations imposed by the device's upper protocol layers.

**Table 70.6.5-6: RRLP Measure Position Request Field Values,
E-OTD Reference BTS for Assistance Data Element**

Field Name	Value	Comments
BCCH Carrier	Range 0-1023	ARFCN of Serving BCCH
BSIC	Range 0 to 65	BSIC of Serving BCCH
Time Slot Scheme	Either 0 or 1, as applicable	0=All time slots 156.25 bits long 1=Time slots 0 and 4 are 157 bits long, all other time slots are 156 bits long.
BTS Position	None	Not applicable for timing accuracy measurements

Table 70.6.5-2: RRLP Measure Position Request Field Values,
E-OTD Measurement Assistance Data for System Information List Element

Field Name	Value	Comments
Number of Neighbors	1	
E-OTD Neighbor Present	1	
BSIC	Range 0 to 63	BSIC of neighbor BCCH
Multiframe Offset	Range 0-51	The value of this field is specific to the test configuration, and shall be calculated according to 3GPP TS 04.31, Annex A, Section A.2.2.3.
Time Slot Scheme	Either 0 or 1, as applicable	0=All time slots 156.25 bits long 1=Time slots 0 and 4 are 157 bits long, all other time slots are 156 bits long.
Rough RTD	Range 0-1250	Set to rough RTD value for the specific test configuration
Expected OTD	None	Not Applicable
Uncertainty of Expected OTD	None	Not Applicable
Fine RTD	None	Not Applicable
Relative North	None	Not Applicable
Relative East	None	Not Applicable

70.6.5.5   Test procedure

a) Configure serving base station simulator to transmit 8PSK bursts modulated with pseudo-random data in time slots 1 through 7

b) Establish RF connectivity between the E-OTD compatible MS and its serving base station simulator, verify RSSI of -80 dBm

c) Disable the interfering signal generator

d) Configure the neighbor base station simulator such that its power (as measured at the antenna terminal of the EOTD MS under test) is -110 dBm with Rayleigh fading disabled. The neighbor shall be transmitting 8PSK bursts modulated with pseudo-random data in time slots 1 through 7

e) Configure the fading simulator for Rayleigh fading corresponding to a velocity of 3 kph, with a 12-tap delay and amplitude spread in accordance with 3GPP TS 05.05, Release 99, Rev. 8.7.1, Annex C, Section C.3.3.

f) With the carrier from the serving base station simulator disabled, enable TU3 Rayleigh fading on the neighbor cell, and verify an average RSSI (at the antenna connection of the MS) of -110 dBm

g) Re-enable the serving base station simulator carrier, verify an RSSI (at the antenna connection of the MS) of -80 dBm

h) The SS initiates a Measure Position Request RRLP messages and begins logging E-OTD Response messages from the MS under test. The Measure Position Request message is repeated 250 times at 5-second intervals and the response RRLP messages are recorded.

i) After transmitting 250 Measure Position Request RRLP messages to the MS under test, calculate each trial's error relative to the known RTD, sort the data in ascending order, develop the 90% subset M and calculate the RMS_{90} error.

70.6.5.6   Test Requirements

Verify that the RMS_{90} error calculated in Step i) is < 1.5 microseconds

70.6.6 E-OTD Accuracy, Sensitivity Performance Tests for 8PSK Modulated signals

70.6.6.1 Definition

Enhanced Observed Timing Difference is a mechanism intended to provide location information from an MS within a GSM network. E-OTD measures the burst timing alignment between the serving cell for the MS and a minimum of two neighbor cells. The observed timing difference, along with the BSIC or Cell ID of each neighbor cell that can be received and measured by the MS, is reported to the network. Using this information, an E-OTD capable network can calculate the location of the MS using triangulation techniques.

Although an E-OTD capable MS must receive a minimum of two neighbors in order to provide the network with useable data for E-OTD positioning, only one neighbor is required for the timing measurement tests described in this procedure.

70.6.6.2 Conformance requirement

The RMS_{90} measurement error of an E-OTD capable MS receiving a neighbor shall not exceed 100 nanoseconds and 300 nanoseconds at a minimum neighbor carrier signal strength relative to relative sensitivity levels of 12 dB and −8 dB respectively, as specified in 3GPP TS 05.05, annex I, sub clause I.2.1, table I.2.1

70.6.6.3 Test purpose

E-OTD measurement accuracy is heavily influenced by the type of RF environment available to the MS at the time a Measure Position Request is received from the network. Nearby neighbor stations that provide a relatively high C/N to the MS receiver should result in greater measurement accuracy than those further away with a low C/N.

The purpose of this test case is to verify that an E-OTD capable MS can provide an observed timing difference (OTD) measurement of sufficient accuracy when measuring against an 8PSK neighbor. During this test, there shall be no co-, adjacent-, or alternate-channel interference.

Specific PICS statements

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PIXIT statements

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70.6.6.4 Method of Test

Initial Configuration

Neighbor Cell: One-neighbor cells with a minimum configuration of a BCCH in order to allow the MS to perform the required measurements. The neighbor BCCH shall be included in the serving BCCH System Information Neighbor List.

Assistance Data: The assistance data listed in Table 70.6.6-1 and Table 70.6.6-2 shall be provided by the serving base station simulator. Without assistance data, successful validation of the MS physical layer may be impossible due to limitations imposed by the device's upper protocol layers.

**Table 70.6.6-7: RRLP Measure Position Request Field Values,
E-OTD Reference BTS for Assistance Data Element**

Field Name	Value	Comments
BCCH Carrier	Range 0-1023	ARFCN of Serving BCCH
BSIC	Range 0 to 65	BSIC of Serving BCCH
Time Slot Scheme	Either 0 or 1, as applicable	0=All time slots 156.25 bits long 1=Time slots 0 and 4 are 157 bits long, all other time slots are 156 bits long.
BTS Position	None	Not applicable for timing accuracy measurements

**Table 70.6.6-2: RRLP Measure Position Request Field Values,
E-OTD Measurement Assistance Data for System Information List Element**

Field Name	Value	Comments
Number of Neighbors	1	
E-OTD Neighbor Present	1	
BSIC	Range 0 to 63	BSIC of neighbor BCCH
Multiframe Offset	Range 0-51	The value of this field is specific to the test configuration, and shall be calculated according to 3GPP TS 04.31, Annex A, Section A.2.2.3.
Time Slot Scheme	Either 0 or 1, as applicable	0=All time slots 156.25 bits long 1=Time slots 0 and 4 are 157 bits long, all other time slots are 156 bits long.
Rough RTD	Range 0-1250	Set to rough RTD value for the specific test configuration
Expected OTD	None	Not Applicable
Uncertainty of Expected OTD	None	Not Applicable
Fine RTD	None	Not Applicable
Relative North	None	Not Applicable
Relative East	None	Not Applicable

70.6.6.5 Test procedure

a) Configure serving base station simulator to transmit 8PSK bursts in time slots 1 through 7.

b) Establish RF connectivity between the E-OTD compatible MS and its serving base station simulator, verify RSSI of -80 dBm.

c) Disable the interfering signal generator.

d) Configure the neighbor base station simulator such that its power (as measured at the antenna terminal of the E-OTD MS under test) is -90 dBm, and that it is transmitting 8PSK bursts in time slots 1-7.

e) The serving base station SS initiates a Measure Position Request RRLP message. Begin logging E-OTD Measure Position Response RRLP messages from the MS under test. The Measure Position Request is repeated a minimum of 250 times at 5-second intervals and the response RRLP messages are logged.

f) The SS calculates each trial's error relative to the known RTD, sort the data in ascending order, develop the 90 % subset M and calculate the RMS_{90} error.

g) Disable the interfering signal generator.

h) Configure the neighbor base station simulator such that its power (as measured at the antenna terminal of the E-OTD MS under test) is -110 dBm, and that it is transmitting 8PSK bursts in time slots 1-7.

i) The serving base station SS initiates a Measure Position Request RRLP message. Begin logging E-OTD Measure Position Response RRLP messages from the MS under test. The Measure Position Request is repeated a minimum of 250 times at 5 s intervals and the response RRLP messages are logged.

j) After transmitting 250 Measure Position Request RRLP messages to the MS under test, calculate each trial's error relative to the known RTD, sort the data in ascending order, develop the 90 % subset M and calculate the RMS_{90} error.

70.6.6.6 Test Requirements

Verify that the RMS_{90} error calculated for each procedure in 70.6.6.5 is within the test conformance requirements listed in Table 70.6.6-3

Table 70.6.6-3, Test Conformance Requirements

Procedure	RMS$_{90}$ error, 3GPP TS 05.05, Annex I, Minimum Performance Requirement	RMS$_{90}$ error, 3GPP TS 51.010, 70.6.6, Test Conformance Requirement
Step f	≤ 100 nanoseconds	≤110 nanoseconds
Step j	≤ 300 nanoseconds	≤310 nanoseconds

70.7 Assisted GPS Network Induced Tests

70.7.1 Void

70.7.2 Void

70.7.3 Void

70.7.4 Network Induced Location Request Emergency Call on TCH Radio Channel

70.7.4.1 Network Induced Location Request Emergency Call on TCH Radio Channel for Mobiles Supporting MS-Based GPS

70.7.4.1.1 Conformance requirements

1. With the MS in the "idle, updated" state, the user shall initiate an emergency after the number 112 (for GSM900 and 1800 MS), or 911 (for PCS 1900 MS in the USA), or 08 (for PCS 1900 MS in Mexico) has been entered by the user. The MS shall send a CHANNEL REQUEST message with correct establishment cause ("emergency call").

2. When a user requests an emergency call establishment the mobile station will send a CM SERVICE REQUEST message to the network with a CM service type information element indicating emergency call establishment and the correct CKSN and TMSI. A mobile station which implements the "LCS" option shall also implement the "Controlled Early Classmark Sending" option. A mobile station which implements the "Controlled Early Classmark Sending" option shall indicate it in the classmark (ES IND bit).

3. After sending the CM SERVICE REQUEST message the MS shall send a CLASSMARK CHANGE message. The "Mobile Station Classmark 3" information element shall correctly specify the positioning methods supported by the MS.

4. After the CM SERVICE ACCEPT message is received from the network, the MS shall send an EMERGENCY SETUP message.

5. After receipt of a CONNECT ACKNOWLEDGE message during correct establishment of the emergency call the MS shall indicate that the TCH is through connected in both directions.

6. On receiving the MEASURE POSITION REQUEST message the MS tries to perform the requested location measurements, and calculates its own position. It sends the results in the RRLP MEASURE POSITION RESPONSE message.

References

3GPP TS 04.08/44.018 sub clauses 3.3.1.1 and 9.1.11.

3GPP TS 04.08/24.008 sub clauses 4.5.1.5, 5.2.1, 9.2.9, 10.5.1.6, 10.5.1.7.

3GPP TS 02.30 sub clause 4.

3GPP TS 04.31 sub clause 2.2.

70.7.4.1.2   Test Purpose

To verify when a network instigates the LCS positioning procedure by sending RRLP (Measure Position Request) message, after a traffic channel has been established during an emergency call, the mobile responds with RRLP (Measure Position Response) containing MS location estimate.

70.7.4.1.3   Method of Test

Initial Conditions

System Simulator (SS):

   Serving Cell: default parameters.

   Satellite signals: default conditions.

Mobile Station (MS):

   The MS is in MM-state "idle, updated" with valued TMSI and CKSN.

SIM:

   Normal SIM

Specific PICS statements

   - TSPC_MS_RRLP_RELEASE

PIXIT statements

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Test Procedure

An Emergency Call is initiated with the MS. SIM card is included in the MS.

The emergency call is established with a late assignment.

After receiving the CONNECT ACKNOWLEDGE message from the MS, the SS sends RR APPLICATION INFORMATION messages containing RRLP Assistance Data messages.

The SS then sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request on FACCH including assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The call is cleared by the SS.

Maximum duration of the test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		The appropriate "emergency call number" is entered.
2	MS -> SS	CHANNEL REQUEST	Establishment cause is emergency call establishment.
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM. The CM service type IE indicates "emergency call establishment". "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 2 is set to 1 (MS-Based GPS)
6	SS -> MS	CM SERVICE ACCEPT	
7	MS -> SS	EMERGENCY SETUP	
8	SS -> MS	CALL PROCEEDING	
9	SS -> MS	ALERTING	
10	SS -> MS	ASSIGNMENT COMMAND	
11	MS -> SS	ASSIGNMENT COMPLETE	
12	SS -> MS	CONNECT	
13	MS -> SS	CONNECT ACKNOWLEDGE	The MS indicates that the TCH is through connected in both directions.
14	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
15	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
16	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
17	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
18	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request
19	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: locationInfo (Option 1) or locationError with gpsAssDataMissing and additionalAssistanceData (Option 2)
19a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 19 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
19b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 19a, the MS acknowledges the received assistance data.
19c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 19 that is available in the SS, this message may include further assistance data.
19d	MS-> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 19, this message contains locationInfo.

20	SS -> MS	DISCONNECT	
21	MS -> SS	RELEASE	
22	SS -> MS	RELEASE COMPLETE	
23	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

RR APPLICATION INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Steps 18 and 19c: RRLP Measure Position Request Steps 19 and 19d: RRLP Measure Position Response Steps 14, 16, 19a: RRLP Assistance Data Steps 15, 17, 19b: RRLP Assistance Data Ack.

RRLP Assistance Data (Step 14):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 4,6,9. See TS 51.010-7 sub clause 5.1.5
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Steps 15, 17, 19b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 19b)
component	CHOICE	assistanceDataAck

RRLP Assistance Data (Step 16):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 10,13,22. See TS 51.010-7 sub clause 5.1.5
ionosphericModel	SEQUENCE	See TS 51.010-7 sub clause 5.1.6
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 0. Rel 5 and later: 1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request (Step 18):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
refLocation	SEQUENCE	See TS 51.010-7 sub clause 5.1.4
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 19 (Option 1) or 19d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 19d)
component	CHOICE	msrPositionRsp (A valid response will contain LocationInfo otherwise LocationError will be returned)
locationInfo	SEQUENCE	Any value is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Measure Position Response (Step 19 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 19a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 19 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request (Step 19c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 as requested by the MS in step 19 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

70.7.4.2 Network Induced Location Request Emergency Call on TCH Radio Channel for mobiles supporting MS-Assisted GPS

70.7.4.2.1 Conformance requirements

1. With the MS in the "idle, updated" state, the user shall initiate an emergency after the number 112 (for GSM900 and 1800 MS), or 911 (for PCS 1900 MS in the USA), or 08 (for PCS 1900 MS in Mexico) has been entered by the user. The MS shall send a CHANNEL REQUEST message with correct establishment cause ("emergency call").

2. When a user requests an emergency call establishment the mobile station will send a CM SERVICE REQUEST message to the network with a CM service type information element indicating emergency call establishment and the correct CKSN and TMSI. A mobile station which implements the "LCS" option shall also implement the "Controlled Early Classmark Sending" option. A mobile station which implements the "Controlled Early Classmark Sending" option shall indicate it in the classmark (ES IND bit).

3. After sending the CM SERVICE REQUEST message the MS shall send a CLASSMARK CHANGE message. The "Mobile Station Classmark 3" information element shall correctly specify the positioning methods supported by the MS.

4. After the CM SERVICE ACCEPT message is received from the network, the MS shall send an EMERGENCY SETUP message.

5. After receipt of a CONNECT ACKNOWLEDGE message during establishment of the emergency call the MS shall indicate that the TCH is through connected in both directions.

6. On receiving the RRLP MEASURE POSITION REQUEST the MS tries to perform the requested location measurements. It sends the results in the MEASURE POSITION RESPONSE message.

References

3GPP TS 04.08/44.018 sub clauses 3.3.1.1 and 9.1.11.

3GPP TS 04.08/24.008 sub clauses 4.5.1.5, 5.2.1, 9.2.9 and 10.5.1.6, 10.5.1.7.

3GPP TS 02.30 sub clause 4.

3GPP TS 04.31 sub clause 2.2.

70.7.4.2.2 Test Purpose

To verify when a network instigates the LCS positioning procedure by sending RRLP (Measure Position Request) message, after a traffic channel has been established during an emergency call, the mobile responds with RRLP (Measure Position Response) containing A-GPS measurement values.

70.7.4.2.3 Method of Test

Initial Conditions

System Simulator (SS):

Serving Cell: default parameters

Satellite signals: default conditions.

Mobile Station (MS):

The MS is in MM-state "idle, updated" with valued TMSI and CKSN.

Specific PICS statements

- TSPC_MS_RRLP_RELEASE

PIXIT statements

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Test Procedure

An Emergency Call is initiated with the MS. SIM card is included in the MS.

The emergency call is established with a late assignment.

After receiving the CONNECT ACKNOWLEDGE message from the MS, the SS sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request on FACCH including assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance

data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The call is cleared by the SS.

Maximum duration of the test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		The appropriate "emergency call number" is entered.
2	MS -> SS	CHANNEL REQUEST	Establishment cause is emergency call establishment.
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM. The CM service type IE indicates "emergency call establishment". "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 3 is set to 1 (MS-Assisted GPS)
6	SS -> MS	CM SERVICE ACCEPT	
7	MS -> SS	EMERGENCY SETUP	
8	SS -> MS	CALL PROCEEDING	
9	SS -> MS	ALERTING	
10	SS -> MS	ASSIGNMENT COMMAND	
11	MS -> SS	ASSIGNMENT COMPLETE	
12	SS -> MS	CONNECT	
13	MS -> SS	CONNECT ACKNOWLEDGE	The MS indicates that the TCH is through connected in both directions.
14	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request
15	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: gps-MeasureInfo (Option 1) or locationError with gpsAssDataMissing (Option 2)
15a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 15 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
15b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 15a, the MS acknowledges the received assistance data.
15c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 15 that is available in the SS, this message may include further assistance data.
15d	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 15, this message contains gps-MeasureInfo.
16	SS -> MS	DISCONNECT	
17	MS -> SS	RELEASE	
18	SS -> MS	RELEASE COMPLETE	
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

RR APPLICATION INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 14 and 15c: RRLP Measure Position Request Step 15 and 15d: RRLP Measure Position Response Step 15a: RRLP Assistance Data Step 15b: RRLP Assistance Data Ack.

RRLP Measure Position Request (Step 14):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 5.1.8
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 15 (Option 1) or Step 15d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 15d)
component	CHOICE	msrPositionRsp (A valid response will contain gps-MeasureInfo otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Measure Position Response (Step 15 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 15a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 15 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Step 15b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceDataAck

RRLP Measure Position Request (Step 15c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8 as requested by the MS in step 15 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

70.7.4.3 Network Induced Location Request Emergency Call on TCH Radio Channel, no IMSI for Mobiles Supporting MS-Based GPS

70.7.4.3.1 Conformance requirements

1. With the MS (no SIM inserted) in the "idle, no IMSI" state, the user shall initiate an emergency call by dialling the number 112 (for GSM 900 and 1 800 MSs), or 911 (for GSM 710, GSM 750, T_GSM 810, GSM 850, PCS 1 900 MS in the USA 1 900 MS), or 08 (for GSM 710, GSM 750, T_GSM 810, GSM 850, PCS MS in Mexico). The MS shall send a CHANNEL REQUEST message with correct establishment cause ("emergency call").

2. When a user requests an emergency call establishment the mobile station will send a CM SERVICE REQUEST message to the network with a CM service type information element indicating emergency call establishment and the correct CKSN and TMSI. A mobile station which implements the "LCS" option shall also implement the "Controlled Early Classmark Sending" option. A mobile station which implements the "Controlled Early Classmark Sending" option shall indicate it in the classmark (ES IND bit).

3. After sending the CM SERVICE REQUEST message the MS shall send a CLASSMARK CHANGE message. The "Mobile Station Classmark 3" information element shall correctly specify the positioning methods supported by the MS.

4. After the CM SERVICE ACCEPT message is received form the network, the MS shall send an EMERGENCY SETUP message.

5. After receipt of a CONNECT ACKNOWLEDGE message during correct establishment of the emergency call the MS shall indicate that the TCH is through connected in both directions.

6. On receiving the RRLP MEASURE POSITION REQUEST message the MS tries to perform the requested location measurements, and calculates its own position. It sends the results in the RRLP MEASURE POSITION RESPONSE message.

References

3GPP TS 04.08 / 3GPP TS 44.018 sub clauses 3.3.1.1, 3.4.10.

3GPP TS 04.08 / 3GPP TS 24.008 sub clauses 5.2.1, 5.2.1.1, 5.2.1.6, 4.5.1.1 and 4.5.1.5.

3GPP TS 02.30 sub clause 4.

3GPP TS 04.31 sub clause 2.2.

70.7.4.3.2 Test Purpose

To verify when an emergency call is initiated by an MS that does not have a SIM fitted, the network instigates the LCS positioning procedure by sending RRLP (Measure Position Request) message and the mobile responds with RRLP (Measure Position Response) containing MS location.

70.7.4.3.3 Method of Test

Initial Conditions

System Simulator (SS):

Serving Cell: default parameters.

Satellite signals: default conditions.

Mobile Station (MS):

The MS is in MM-state "idle, no IMSI", no SIM inserted.

SIM:

No SIM.

Specific PICS statements

- TSPC_MS_RRLP_RELEASE

PIXIT statements

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Test Procedure

An Emergency Call is initiated by the MS, with no SIM inserted in the MS.

The emergency call is established with a late assignment.

After receiving the CONNECT ACKNOWLEDGE message from the MS, the SS sends RR APPLICATION INFORMATION messages containing RRLP Assistance Data messages.

The SS then sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request on FACCH including assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The call is cleared by the SS.

Maximum duration of the test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		The appropriate "emergency call number" is entered.
2	MS -> SS	CHANNEL REQUEST	Establishment cause is emergency call establishment.
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM. The CM service type IE indicates "emergency call establishment". "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 2 is set to 1 (MS-Based GPS)
6	SS -> MS	CM SERVICE ACCEPT	
7	MS -> SS	EMERGENCY SETUP	
8	SS -> MS	CALL PROCEEDING	
9	SS -> MS	ALERTING	
10	SS -> MS	ASSIGNMENT COMMAND	
11	MS -> SS	ASSIGNMENT COMPLETE	
12	SS -> MS	CONNECT	
13	MS -> SS	CONNECT ACKNOWLEDGE	The MS indicates that the TCH is through connected in both directions.
14	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
15	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
16	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
17	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
18	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request
19	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: locationInfo (Option 1) or locationError with gpsAssDataMissing and additionalAssistanceData (Option 2)
19a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 19 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
19b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 19a, the MS acknowledges the received assistance data.
19c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 19 that is available in the SS, this message may include further assistance data.
19d	MS-> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 19, this message contains locationInfo.

20	SS -> MS	DISCONNECT	
21	MS -> SS	RELEASE	
22	SS -> MS	RELEASE COMPLETE	
23	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

RR APPLICATION INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Steps 18 and 19c: RRLP Measure Position Request Steps 19 and 19d: RRLP Measure Position Response Steps 14, 16, 19a: RRLP Assistance Data Steps 15, 17, 19b: RRLP Assistance Data Ack.

RRLP Assistance Data (Step 14):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 4,6,9 of TS 51.010-7 sub clause 5.1.5
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Steps 15, 17, 19b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 19b)
component	CHOICE	assistanceDataAck

RRLP Assistance Data (Step 16):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 10,13,22. See TS 51.010-7 sub clause 5.1.5
ionosphericModel	SEQUENCE	See TS 51.010-7 sub clause 5.1.6
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 0. Rel 5 and later: 1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request (Step 18):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
refLocation	SEQUENCE	See TS 51.010-7 sub clause 5.1.4
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 19 (Option 1) or 19d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 19d)
component	CHOICE	msrPositionRsp (A valid response will contain LocationInfo otherwise LocationError will be returned)
locationInfo	SEQUENCE	Any value is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Measure Position Response (Step 19 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 19a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 19 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request (Step 19c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8 as requested by the MS in step 19 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

70.7.4.4 Network Induced Location Request Emergency Call on TCH Radio Channel, no IMSI for mobiles supporting MS-Assisted GPS

70.7.4.4.1 Conformance requirements

1. With the MS (no SIM inserted) in the "idle, no IMSI" state, the user shall initiate an emergency call by dialling the number 112 (for GSM 900 and 1 800 MSs), or 911 (for GSM 710, GSM 750, T_GSM 810, GSM 850, PCS 1 900 MS in USA and Canada), or 08 (for GSM 710, GSM 750, T_GSM 810, GSM 850, PCS 1 900 MS in Mexico). The MS shall send a CHANNEL REQUEST message with correct establishment cause ("emergency call").

2. When a user requests an emergency call establishment the mobile station will send a CM SERVICE REQUEST message to the network with a CM service type information element indicating emergency call establishment and the correct CKSN and TMSI. A mobile station which implements the "LCS" option shall also implement the

"Controlled Early Classmark Sending" option. A mobile station which implements the "Controlled Early Classmark Sending" option shall indicate it in the classmark (ES IND bit).

3. After sending the CM SERVICE REQUEST message the MS shall send a CLASSMARK CHANGE message. The "Mobile Station Classmark 3" information element shall correctly specify the positioning methods supported by the MS.

4. After the CM SERVICE ACCEPT message is received form the network, the MS shall send an EMERGENCY SETUP message.

5. After receipt of a CONNECT ACKNOWLEDGE message during correct establishment of the emergency call the MS shall indicate that the TCH is through connected in both directions.

6. On receiving the RRLP MEASURE POSITION REQUEST message the MS tries to perform the requested location measurements. It sends the results in the RRLP MEASURE POSITION RESPONSE message.

References

3GPP TS 04.08 / 3GPP TS 44.018 sub clauses 3.3.1.1, 3.4.10.

3GPP TS 04.08 / 3GPP TS 24.008 sub clauses 5.2.1, 5.2.1.1, 5.2.1.6, 4.5.1.1 and 4.5.1.5.

3GPP TS 02.30 sub clause 4.

3GPP TS 04.31 sub clause 2.2.

70.7.4.4.2 Test Purpose

To verify when an emergency call is initiated by an MS that does not have a SIM fitted, the network instigates the LCS positioning procedure by sending RRLP (Measure Position Request) message and the mobile responds with RRLP (Measure Position Response) containing A-GPS measurement values.

70.7.4.4.3 Method of Test

Initial Conditions

System Simulator (SS):

Serving Cell: default parameters.

Satellite signals: default conditions.

Mobile Station (MS):

The MS is in MM-state "idle, no IMSI", no SIM inserted.

SIM:

No SIM.

Specific PICS statements

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PIXIT statements

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Test Procedure

An Emergency Call is initiated by the MS, with no SIM inserted in the MS.

The emergency call is established with a late assignment.

After receiving the CONNECT ACKNOWLEDGE message from the MS, the SS sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request on FACCH including assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The call is cleared by the SS.

Maximum duration of the test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		The appropriate "emergency call number" is entered.
2	MS -> SS	CHANNEL REQUEST	Establishment cause is emergency call establishment.
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM. The CM service type IE indicates "emergency call establishment". "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 3 is set to 1 (MS-Assisted GPS)
6	SS -> MS	CM SERVICE ACCEPT	
7	MS -> SS	EMERGENCY SETUP	
8	SS -> MS	CALL PROCEEDING	
9	SS -> MS	ALERTING	
10	SS -> MS	ASSIGNMENT COMMAND	
11	MS -> SS	ASSIGNMENT COMPLETE	
12	SS -> MS	CONNECT	
13	MS -> SS	CONNECT ACKNOWLEDGE	The MS indicates that the TCH is through connected in both directions.
14	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request
15	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: gps-MeasureInfo (Option 1) or locationError with gpsAssDataMissing (Option 2)
15a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 15 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
15b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 15a, the MS acknowledges the received assistance data.
15c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 15 that is available in the SS, this message may include further assistance data.
15d	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 15, this message contains gps-MeasureInfo.
16	SS -> MS	DISCONNECT	
17	MS -> SS	RELEASE	
18	SS -> MS	RELEASE COMPLETE	
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

RR APPLICATION INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 14 and 15c: RRLP Measure Position Request Step 15 and 15d: RRLP Measure Position Response Step 15a: RRLP Assistance Data Step 15b: RRLP Assistance Data Ack.

RRLP Measure Position Request (Step 14):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 5.1.8
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 15 (Option 1) or Step 15d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 15d)
component	CHOICE	msrPositionRsp (A valid response will contain gps-MeasureInfo otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Measure Position Response (Step 15 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 15a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 15 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Step 15b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceDataAck

RRLP Measure Position Request (Step 15c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8 as requested by the MS in step 15 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

70.8 Assisted GPS Mobile Originated Tests

70.8.1 Basic Self Location

70.8.1.1 Conformance requirements

1) The MS sends CM SERVICE REQUEST to network for call independent supplementary service.

2) The MS invokes self-location request by sending REGISTER message containing Facility IE LCS MO-LR with MOLR-TYPE set to locationEstimate.

3) The MS needs to interact with the network for each separate location request.

4) On receiving an RRLP MEASURE POSITION REQUEST message the MS tries to perform the requested location measurements. It sends the results in an RRLP MEASURE POSITION RESPONSE message.

5) The network returns an LCS result to the MS carrying location estimate requested by the MS in FACILITY message.

6) The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

References

3GPP TS 03.71, sub clause 7.6.6.

3GPP TS 04.30, sub clause 5.1.1.

3GPP TS 04.80 / 3GPP TS 24.080, sub clauses 2.4, 2.5, 3.4 and 4.

70.8.1.2 Test Purpose

To verify that the MS invokes a self-location request by sending the network a REGISTER message containing the Facility IE LCS MO-LR. When the MS receives a FACILITY message containing a Facility IE MO-LR LCS result carrying the requested location estimate, it clears the transaction by sending a RELEASE COMPLETE message.

70.8.1.3 Method of Test

Initial Conditions

System Simulator (SS):

Serving Cell: default parameters

Satellite signals: default conditions.

Mobile Station (MS):

The MS is in MM-state "idle, updated" with valid TMSI and CSKN.

Specific PICS statements

- TSPC_MS_RRLP_RELEASE

PIXIT statements

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Test Procedure

The MS invokes call independent supplementary service through a CM SERVICE REQUEST. The SS initiates authentication and ciphering. Then the MS invokes an MO-LR request.

The SS sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request including assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The SS responds with a FACILITY message containing an MO-LR result. When MS receives FACILITY message, it clears the transaction by sending a RELEASE COMPLETE message.

Maximum duration of the test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate LCS MOLR Procedure (location estimation)
2	MS -> SS	CHANNEL REQUEST	establishment cause "Other procedures which can be completed with an SDCCH"
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	The CM service type IE indicates "Supplementary service activation". "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 3 is set to 1 (MS-Assisted GPS)
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering
11	MS -> SS	REGISTER	Call Independent SS containing Facility IE with LCS-MOLR request with MOLR-Type set to locationEstimate
12	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request
13	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: gps-MeasureInfo (Option 1) or locationError with gpsAssDataMissing (Option 2)
13a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 13 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
13b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 13a, the MS acknowledges the received assistance data.
13c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 13 that is available in the SS, this message may include further assistance data.
13d	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 13, this message contains gps-MeasureInfo.
14	SS -> MS	FACILITY	LCS MO-LR result message containing location estimate
15	MS -> SS	RELEASE COMPLETE	MS terminates the dialogue
16	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 11):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg Molr-Type -> locationEstimate
SS version indicator	Value 1 or above

RR APPLICATION INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 12 and 13c: RRLP Measure Position Request Step 13 and 13d: RRLP Measure Position Response Step 13a: RRLP Assistance Data Step 13b: RRLP Assistance Data Ack.

RRLP Measure Position Request (Step 12):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 5.1.8
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 13 (Option 1) or Step 13d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 13d)
component	CHOICE	msrPositionRsp (A valid response will contain gps-MeasureInfo otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Measure Position Response (Step 13 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 13a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 13 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Step 13b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceDataAck

RRLP Measure Position Request (Step 13c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8 as requested by the MS in step 13 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

FACILITY (Step 14):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	FACILITY (0011 1010)
Facility	Return Result = LCS-MOLR LCS-MOLRRes -> locationEstimate (Note)
Note: Any value for locationEstimate may be used. The SS shall not be required to calculate the value from the returned gps-MeasureInfo values.	

RELEASE COMPLETE (Step 15):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.8.2 Basic Self Location in Dedicated Mode

70.8.2.1 Conformance requirements

The MS sends a DTAP LCS MO-LR invoke to the VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component with MO_LR TYPE set to LocationEstimate, LCS QoS value and other optional field if it is needed.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

References

    3GPP TS 03.71, sub clause 7.6.6.

    3GPP TS 04.30, sub clause 5.1.1.

    3GPP TS 04.80 / 3GPP TS 24.080, sub clauses 2.4, 2.5, 3.4 and 4.

70.8.2.2 Test Purpose

To verify that the MS invokes a self-location request by sending the network a REGISTER message containing the Facility IE LCS MO-LR on an already established speech call related main DCCH (FACCH). When the MS receives a FACILITY message containing a Facility IE MO-LR LCS result carrying the requested location estimate, it clears the transaction by sending a RELEASE COMPLETE message.

70.8.2.3 Method of Test

Initial Conditions

System Simulator (SS):

    Serving Cell: default parameters

    Satellite signals: default conditions.

Mobile Station (MS):

    The MS has valid TMSI and CSKN.

    The MS is brought into the state U10 by using table 26.8.1.2/3.

Specific PICS statements

    - TSPC_MS_RRLP_RELEASE

PIXIT statements

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Test Procedure

The MS invokes call independent supplementary service on an existing FACCH channel. After receiving a CM SERVICE ACCEPT message, the MS invokes a self-location request by sending a REGISTER message containing the Facility IE LCS MO-LR.

The SS sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request including assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The SS responds with a FACILITY message containing an MO-LR result. When the MS receives a FACILITY message, it clears the transaction by sending a RELEASE COMPLETE message.

Maximum duration of the test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate LCS MOLR Procedure (location estimation) on existing FACCH channel
2	MS -> SS	CM SERVICE REQUEST	The CM Service Type IE indicates "Supplementary service activation". "mobile station classmark 2" includes settings for ES_IND.
3	SS -> MS	CM SERVICE ACCEPT	
4	MS -> SS	REGISTER	Call Independent SS containing Facility IE with LCS-MOLR request with MOLR-Type set to locationEstimate
5	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request
6	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: gps-MeasureInfo (Option 1) or locationError with gpsAssDataMissing (Option 2)
6a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 6 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
6b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 6a, the MS acknowledges the received assistance data.
6c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 6 that is available in the SS, this message may include further assistance data.
6d	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 6, this message contains gps-MeasureInfo.
7	SS -> MS	FACILITY	LCS MO-LR result message containing location estimate
8	MS -> SS	RELEASE COMPLETE	MS terminates the dialogue
9	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 4):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg Molr-Type -> locationEstimate
SS version indicator	Value 1 or above

RR APPLICATION INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 5 and 6c: RRLP Measure Position Request Step 6 and 6d: RRLP Measure Position Response Step 6a: RRLP Assistance Data Step 6b: RRLP Assistance Data Ack.

RRLP Measure Position Request (Step 5):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 5.1.8
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 6 (Option 1) or Step 6d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 6d)
component	CHOICE	msrPositionRsp (A valid response will contain gps-MeasureInfo otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Measure Position Response (Step 6 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 6a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 6 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Step 6b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceDataAck

RRLP Measure Position Request (Step 6c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8 as requested by the MS in step 6 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

FACILITY (Step 7):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	FACILITY (0011 1010)
Facility	Return Result = LCS-MOLR LCS-MOLRRes -> locationEstimate (Note)
Note: Any value for locationEstimate may be used. The SS shall not be required to calculate the value from the returned gps-MeasureInfo values.	

RELEASE COMPLETE (Step 8):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.8.3 Transfer to 3rd Party

70.8.3.1 Conformance requirements

The MS sends a DTAP LCS MO-LR invoke to the VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time). If the MS is requesting that its location be sent to another LCS client, the message shall include the identity of the LCS client and may include the address of the GMLC through which the LCS client should be accessed.

The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component with MO_LR TYPE set to LocationEstimate, LCS QoS value, LCS-ClientExternalID and MLC_Number if it is available.

References

3GPP TS 03.71, sub clause 7.6.6.

3GPP TS 04.30, sub clause 5.1.1.

3GPP TS 04.80 / 3GPP TS 24.080, sub clauses 2.4, 2.5, 3.4 and 4.

70.8.3.2 Test Purpose

To verify that the MS invokes a transfer of its own location to a 3rd party LCS Client by sending the network a REGISTER message containing the Facility IE LCS MO-LR with LCSClientExternalID present. The network sends location information of the MS to another LCS Client, and then it clears the transaction by sending a RELEASE COMPLETE message.

70.8.3.3 Method of Test

Initial Conditions

System Simulator (SS):

Serving Cell: default parameters

Satellite signals: default conditions.

Mobile Station (MS):

The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

- TSPC_MS_RRLP_RELEASE

PIXIT statements

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Test Procedure

The MS invokes call independent supplementary service for an LCS MO-LR. After receiving a CM SERVICE ACCEPT message, the MS invokes a transfer to 3rd party location request by sending a REGISTER message containing the Facility IE LCS MO-LR with LCSClientExternalID present.

The SS sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request including assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The SS sends location information of the MS to another LCS Client, and then it clears the transaction by sending a RELEASE COMPLETE message.

Maximum duration of the test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate LCS MOLR Procedure (location estimation) with transfer to 3rd party
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates, "Other procedures which can be completed with an SDCCH"
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	The CM Service Type IE indicates "Supplementary service activation" "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 3 is set to 1 (MS-Assisted GPS)
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	MS -> SS	REGISTER	Call Independent SS containing Facility IE with LCS-MOLR request with MOLR-Type set to locationEstimate with LCSClientExternalID present
11	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request
12	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: gps-MeasureInfo (Option 1) or locationError with gpsAssDataMissing (Option 2)
12a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 12 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
12b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 12a, the MS acknowledges the received assistance data.
12c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 12 that is available in the SS, this message may include further assistance data.
12d	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 12, this message contains gps-MeasureInfo.
13	SS		SS may return the location estimate result to the LCS Client as identified by the LCSClientExternalID provided in the REGISTER message

14	SS -> MS	FACILITY	LCS MO-LR Return Result message as confirmation that the position estimate was transferred to the requested LCS client.
15	MS -> SS	RELEASE COMPLETE	MS terminates the dialogue
16	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 10):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg Molr-Type -> locationEstimate lcsClientExternalID -> externalAddress
SS version indicator	Value 1 or higher

RR APPLICATION INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 11 and 12c: RRLP Measure Position Request Step 12 and 12d: RRLP Measure Position Response Step 12a: RRLP Assistance Data Step 12b: RRLP Assistance Data Ack.

RRLP Measure Position Request (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 5.1.8
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 12 (Option 1) or Step 12d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 12d)
component	CHOICE	msrPositionRsp (A valid response will contain gps-MeasureInfo otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Measure Position Response (Step 12 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 12a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 12 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Step 12b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceDataAck

RRLP Measure Position Request (Step 12c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8 as requested by the MS in step 12 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

FACILITY (Step 14):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	FACILITY (0011 1010)
Facility	Return Result = LCS-MOLR
	LCS-MOLRRes -> locationEstimate (Note)
Note: Any value for locationEstimate may be used. The SS shall not be required to calculate the value from the returned gps-MeasureInfo values.	

RELEASE COMPLETE (Step 15):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.8.4 MO-LR Positioning Measurement

70.8.4.1 MO-LR Positioning Measurement / Protocol Error

70.8.4.1.1 Conformance requirement:

The MS sends a DTAP LCS MOLR invoke to VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO-LR by sending a REGISTER message to network containing a LCS-MOLR invoke component with MO-LR TYPE set to LocationEstimate, LCS QoS value and other optional field if it is needed.

The MS sends a RRLP PROTOCOL ERROR message to network if there is a problem that prevents the MS to receive a complete and understandable RRLP MEASURE POSITION REQUEST component.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References

3GPP TS 03.71 sub clause 7.6.6

3GPP TS 04.30 sub clause 5.1.1

3GPP TS 04.31 sub clause 2.2, 2.5

3GPP TS 04.80 / 3GPP TS 24.080 sub clause 2.4, 2.5, 3.4 & 4

70.8.4.1.2 Test Purpose

Verifies that a MS sends a correct positioning capability via control classmark sending. The MS shall send a RRLP PROTOCOL ERROR message to SS with specific error code if RRLP MEASURE POSITION REQUEST is incomplete. On receipt of second RRLP MEASURE POSITION REQUEST from SS to start the measurement, MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.8.4.1.3 Method of Test

Initial Conditions:

System Simulator:

Serving Cell: default parameters.

Satellite signals: default conditions.

Mobile Station:

The MS is MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

  - TSPC_MS_RRLP_RELEASE

PIXIT statements

  -

Test Procedure:

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to a DTAP LCS-MOLR Invoke.

The SS determines the positioning method and instigates the particular message sequence by sending RRLP MEASURE POSITION REQUEST with missing information element. The MS shall send RRLP PROTOCOL ERROR as it fails to decode RRLP MEASURE POSITION REQUEST. The SS repeats RRLP MEASURE POSITION REQUEST with correct message contents including assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The SS returns location estimate to MS through DTAP LCS-MOLR Return Result. The MS terminates the dialogue by sending RELEASE COMPLETE message after receiving location estimate.

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure (location estimate)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "Other procedures which can be completed with an SDCCH".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the TMSI. The CM Service Type IE indicates "Supplementary service activation" "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" including settings for ES IND and CM3 supported. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.

8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR request with MOLR-Type set to locationEstimate
11	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 1 (with missing final octet)
12	MS->SS	RR APPLICATION INFORMATION	RRLP PROTOCOL ERROR
13	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 2
14	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: gps-MeasureInfo (Option 1) or locationError with gpsAssDataMissing (Option 2)
14a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 14 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
14b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 14a, the MS acknowledges the received assistance data.
14c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 14 that is available in the SS, this message may include further assistance data.
14d	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 14, this message contains gps-MeasureInfo.
15	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT (locationEstimate)
16	MS -> SS	RELEASE COMPLETE	Terminates the session
17	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 10):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg Molr-Type -> locationEstimate
SS version indicator	Value 1 or above

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment
	Bit2=0 -> First or only segment
	Bit3=0 -> Command or Final Response
	Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded
	Step 11, 13 and 14c: RRLP Measure Position Request
	Step 14 and 14d: RRLP Measure Position Response
	Step 14a: RRLP Assistance Data
	Step 14b: RRLP Assistance Data Ack
	Step 12: RRLP Protocol Error

RRLP Measure Position Request 1 (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	ENUMERATED	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
Note: Final octet of ASN.1 stream is not included in the APDU Data information element of the RR Application Information L3 message.		

RRLP Protocol Error (Step 12):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	0 or 1
component	CHOICE	protocolError
errorCause	ENUMERATED	missingIEorComponentElement messageTooShort or Incorrect Data

RRLP Measure Position Request 2 (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 5.1.8
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 14 (Option 1) or Step 14d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2 or 3 (Option 2, Step 14d)
component	CHOICE	msrPositionRsp (A valid response will contain gps-MeasureInfo otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Measure Position Response (Step 14 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 14a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	3
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 14 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Step 14b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	3
component	CHOICE	assistanceDataAck

RRLP Measure Position Request (Step 14c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	3
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8 as requested by the MS in step 14 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

FACILITY (Step 15):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction Identifier	
Message Type	FACILITY (0011 1010)
Facility	Return Result = LCS-MOLR
	LCS-MOLRRes ->locationEstimate (Note)
Note: Any value for locationEstimate may be used. The SS shall not be required to calculate the value from the returned gps-MeasureInfo values.	

RELEASE COMPLETE (Step 16):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.8.4.2 MO-LR Positioning Measurement / Location Error

70.8.4.2.1 Location Error: Requested Method not Supported

70.8.4.2.1.1 Conformance requirement:

The MS sends a DTAP LCS MOLR invoke to VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO-LR by sending a REGISTER message to network containing a LCS-MOLR invoke component with MO-LR TYPE set to LocationEstimate, LCS QoS value and other optional field if it is needed.

The MS sends a RRLP MEASURE POSITION RESPONSE to network containing a Location Error component with an error indication if the measurement is not possible.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References:

3GPP TS 03.71 sub clause 7.6.6

3GPP TS 04.30 sub clause 5.1.1

3GPP TS04.31 sub clause 2.2

3GPP TS 04.80 / 3GPP TS 24.080 sub clause 2.4, 2.5, 3.4 and 4

70.8.4.2.1.2 Test Purpose:

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall send back RRLP MEASURE POSITION RESPONSE message with Location Error component if the MS does not support the requested method. On receipt of second RRLP MEASURE POSITION REQUEST from SS to start the measurement, the MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.8.4.2.1.3 Method of Test

Initial Conditions:

System Simulator:

Serving Cell: default parameters.

Satellite signals: default conditions.

Mobile Station:

The MS is MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

   - TSPC_MS_RRLP_RELEASE

PIXIT statements

   -

Test Procedure:

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to a DTAP LCS-MOLR Invoke. The SS determines the positioning method and instigates the particular message sequence by sending RRLP MEASURE POSITION REQUEST with a method type not supported by the mobile. (Type not supported to be EOTD).

The MS sends RRLP MEASURE POSITION RESPONSE to SS containing a Location Error component (Request Method not Supported) as the requested method is not supported. The SS repeats RRLP MEASURE POSITION REQUEST with correct message contents including assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The SS returns location estimate to MS through LCS-MOLR Return Result. The MS terminates the dialogue by sending RELEASE COMPLETE message after receiving location estimate.

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure (location estimate)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "Other procedures which can be completed with an SDCCH"
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the TMSI. The CM Service Type IE indicates "Supplementary service activation" "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" including settings for ES IND and CM3 supported. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.

8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR request with MOLR-Type set to locationEstimate
11	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 1 (Request method not supported)
12	MS->SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE 1 (location error)
13	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 2
14	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response 2: gps-MeasureInfo (Option 1) or locationError with gpsAssDataMissing (Option 2)
14a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 14 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
14b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 14a, the MS acknowledges the received assistance data.
14c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 14 that is available in the SS, this message may include further assistance data.
14d	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 14, this message contains gps-MeasureInfo.
15	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT (locationEstimate)
16	MS -> SS	RELEASE COMPLETE	Terminates the session
17	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 10):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg Molr-Type -> locationEstimate
SS version indicator	Value 1 or above

RR_APPLICATION_INFORMATION:

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment
	Bit2=0 -> First or only segment
	Bit3=0 -> Command or Final Response
	Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded
	Step 11, 13 and 14c: RRLP Measure Position Request
	Step 12, 14 and 14d: RRLP Measure Position Response
	Step 14a: RRLP Assistance Data
	Step 14b: RRLP Assistance Data Ack.

RRLP Measure Position Request 1 (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
ReferenceNumber	Integer 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	eotd
measureResponseTime	Integer 0 to 7	7
useMultipleSets	ENUMERATED	oneSet
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response 1 (Step 12):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRes
locationError	SEQUENCE	
locErrorReason	ENUMERATED	methodNotSupported
extended-reference	SEQUENCE	Rel5 and later
		The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Measure Position Request 2 (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 5.1.8
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response 2 (Step 14 (Option 1) or Step 14d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2 or 3 (Option 2, Step 14d)
component	CHOICE	msrPositionRsp (A valid response will contain gps-MeasureInfo otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Measure Position Response (Step 14 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 14a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	3
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 14 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Step 14b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	3
component	CHOICE	assistanceDataAck

RRLP Measure Position Request (Step 14c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	3
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8 as requested by the MS in step 14 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

FACILITY (Step 15):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction Identifier Message Type Facility	FACILITY (0011 1010) Return Result = LCS-MOLR LCS-MOLRRes ->locationEstimate (Note)
Note: Any value for locationEstimate may be used. The SS shall not be required to calculate the value from the returned gps-MeasureInfo values.	

RELEASE COMPLETE (Step 16):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.8.4.2.2 Location Error: GPS Assistance Data Missing

70.8.4.2.2.1 Conformance requirement:

The MS sends a DTAP LCS MOLR invoke to VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO-LR by sending a REGISTER message to network containing a LCS-MOLR invoke component with MO-LR TYPE set to LocationEstimate, LCS QoS value and other optional field if it is needed.

The MS sends a RRLP MEASURE POSITION RESPONSE to network containing a Location Error component with an error indication if the measurement is not possible.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References:

    3GPP TS 03.71 subclause7.6.6

    3GPP TS 04.30 sub clause 5.1.1

    3GPP TS04.31 sub clause 2.2

    3GPP TS 04.80 / 3GPP TS 24.080 sub clause 2.4, 2.5, 3.4 & 4

70.8.4.2.2.2 Test Purpose:

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall send back RRLP MEASURE POSITION RESPONSE message with Location Error component if GPS assistance data is missing. On receipt of second RRLP MEASURE POSITION REQUEST (with GPS assistance data included) from SS to start the measurement, the MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.8.4.2.2.3 Method of Test

Initial Conditions:

    System Simulator:

        Serving Cell: default parameters.

        Satellite signals: default conditions.

    Mobile Station:

        The MS is MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

- TSPC_MS_RRLP_RELEASE

PIXIT statements

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Test Procedure:

The A-GPS assistance data stored in the MS is reset.

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to a DTAP LCS-MOLR Invoke.

The SS determines the positioning method and instigates the particular message sequence by sending RRLP MEASURE POSITION REQUEST without GPS assistance data.

The MS requests additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. The SS provides the requested assistance data that is available in the SS in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data.

The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The SS returns location estimate to MS through LCS-MOLR Return Result. The MS terminates the dialogue by sending RELEASE COMPLETE message after receiving location estimate.

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Reset all stored A-GPS assistance data
2	MS		Initiate MOLR Procedure (location estimate)
3	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "Other procedures which can be completed with an SDCCH".
4	SS -> MS	IMMEDIATE ASSIGNMENT	
5	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the TMSI. The CM Service Type IE indicates "Supplementary service activation" "mobile station classmark 2" including settings for ES IND and CM3 supported.
6	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" including settings for ES IND and CM3 supported. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7.
7	SS -> MS	AUTHENTICATION REQUEST	
8	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.

9	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
10	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
11	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR request with MOLR-Type set to locationEstimate
12	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 1 (without GPS assistance data)
13	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response 1: locationError with gpsAssDataMissing
14	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. The SS provides the requested data from step 13 that is available in the SS in zero, one or more RRLP Assistance Data delivery messages.
15	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 14, the MS acknowledges the received assistance data.
16	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 2. This message may include further assistance data.
17	MS -> SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE 2 (gps-measureInfo)
18	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT (locationEstimate)
19	MS -> SS	RELEASE COMPLETE	Terminates the session
20	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 11):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg Molr-Type -> locationEstimate
SS version indicator	Value 1 or above

RR_APPLICATION_INFORMATION:

Information element	Value/remark
Protocol Discriminator Skip Indicator Message Type APDU ID APDU Flags	RR Management Protocol (0110) Application Information Message type APDU ID -> RRLP => 0000 Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 12 and 16: RRLP Measure Position Request Step 13 and 17: RRLP Measure Position Response Step 14: RRLP Assistance Data Step 15: RRLP Assistance Data Ack.

RRLP Measure Position Request 1 (Step 12):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPostionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response 1 (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 14):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data requested in step 13, if available from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceDataAck

RRLP Measure Position Request 2 (Step 16):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 as requested by the MS in step 13
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response 2 (Step 17):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp A valid response will contain gps-MeasureInfo otherwise LocationError will be returned
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

FACILITY (Step 18):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction Identifier	
Message Type	FACILITY (0011 1010)
Facility	Return Result = LCS-MOLR LCS-MOLRRes ->locationEstimate (Note)
Note:	Any value for locationEstimate may be used. The SS shall not be required to calculate the value from the returned gps-MeasureInfo values.

RELEASE COMPLETE (Step19):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.8.4.3 MO-LR Positioning Measurement / Multiple RRLP Requests with Same Reference Number

70.8.4.3.1 Conformance requirement:

The MS sends a DTAP LCS MOLR invoke to VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO-LR by sending a REGISTER message to network containing a LCS-MOLR invoke component with MO-LR TYPE set to LocationEstimate, LCS QoS value and other optional field if it is needed.

The MS ignores the later component if the old and new RRLP MEASURE POSITION REQUEST components have the same Reference Number.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References:

3GPP TS 03.71 subclause7.6.6

3GPP TS 04.30 sub clause 5.1.1

3GPP TS04.31 sub clause 2.5.5

3GPP TS 04.80 / 3GPP TS 24.080 sub clause 2.4, 2.5, 3.4 & 4

70.8.4.3.2 Test Purpose:

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall ignore the second RRLP MEASURE POSITION REQUEST if the second RRLP MEASURE POSITION REQUEST has the same REFERENCE NUMBER as in the previous one. The MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the current measurement.

70.8.4.3.3 Method of Test

Initial Conditions

System Simulator:

Serving Cell: default parameters.

Satellite signals: No GPS signal available.

Mobile Station:

The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

- TSPC_MS_RRLP_RELEASE

PIXIT statements

-

Test Procedure

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to a DTAP LCS-MOLR Invoke. The SS determines the positioning method and instigates the particular message sequence by sending RRLP MEASURE POSITION REQUEST including assistance data to start the measurement.

Option 1: The MS then performs positioning measurements. After a delay of 8 seconds, the SS sends the second RRLP MEASURE POSITION REQUEST with the same REFERENCE NUMBER as the first one (this delay shall be cancelled in the event of option 2). The MS shall ignore the second RRLP MEASURE POSITION REQUEST. The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

Option 2: The MS may request additional assistance data by immediately sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by a second RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS sends the second RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements and the SS sends the third RRLP MEASURE POSITION REQUEST with the same REFERENCE NUMBER as the second one. The MS shall ignore the third RRLP MEASURE POSITION REQUEST. The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

The satellite signals should be made available after sending the second Measure Position request (in case of option 1) and third Measure Position request (in case of option 2)

The SS returns location estimate to MS through DTAP LCS-MOLR Return Result. The MS terminates the dialogue by sending RELEASE COMPLETE message after receiving location estimate.

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure (location estimate)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "Other procedures which can be completed with an SDCCH".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the TMSI. The CM Service Type IE indicates "Supplementary service activation" "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" including settings for ES IND and CM3 supported. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.

8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR with MOLR-Type set to locationEstimate.
11	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 1
12	MS (Option 1) or MS ->SS (Option 2)	- or RR APPLICATION INFORMATION	If no message is received from the MS within 8 seconds, then the SS shall assume that the MS is performing the measurement (Option 1). The SS continues to step 13. If the MS sends RRLP Measure Position Response: locationError with gpsAssDataMissing (Option 2) within 8 seconds, then the SS continues to step 12a.
12a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 12 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
12b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 12a, the MS acknowledges the received assistance data.
12c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 2. If the MS requested additional assistance data in step 12 that is available in the SS, this message may include further assistance data.
12d	MS (Option 2)		MS is performing the measurement (Option 2)
13	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 2 with same reference number as in Request 1 (Option 1) or RRLP MEASURE POSITION REQUEST 3 with same reference number as in Request 2 (Option2) Note: The satellite signals should be made available to MS after sending this message
14	MS -> SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE (gps-measureInfo)
15	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT (locationEstimate)
16	MS -> SS	RELEASE COMPLETE	Terminates the session
17	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 10):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg Molr-Type -> locationEstimate
SS version indicator	Value 1 or above

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment
	Bit2=0 -> First or only segment
	Bit3=0 -> Command or Final Response
	Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded
	Steps 11, 12c and 13: RRLP Measure Position Request
	Steps 12, 14: RRLP Measure Position Response
	Step 12a: RRLP Assistance Data
	Step 12b: RRLP Assistance Data Ack.

RRLP Measure Position Request 1 (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 5.1.8
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 12 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 12a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 12 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Step 12b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

RRLP Measure Position Request 2 (Step 12c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 as requested by the MS in step 12 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request 2 (Option 1) or Request 3 (Option 2) (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	Enumerated	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	Enumerated	oneSet
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 14):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp A valid response will contain gps-MeasureInfo
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

FACILITY (Step 15):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction Identifier Message Type Facility	 FACILITY (0011 1010) Return Result = LCS-MOLR LCS-MOLRRes ->locationEstimate (Note)
Note: Any value for locationEstimate may be used. The SS shall not be required to calculate the value from the returned gps-MeasureInfo values.	

RELEASE COMPLETE (Step 16):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.8.4.4   MO-LR Positioning Measurement / Multiple RRLP Requests with Different Reference Number

70.8.4.4.1   Conformance requirement

The MS sends a DTAP LCS MOLR invoke to VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO-LR by sending a REGISTER message to network containing a LCS-MOLR invoke component with MO-LR TYPE set to LocationEstimate, LCS QoS value and other optional field if it is needed.

The MS aborts activity for the former RRLP MEASURE POSITION REQUEST component and starts to act according to the later RRLP MEASURE POSITION REQUEST component if the old and new RRLP MEASURE POSITION REQUEST components have different Reference Number.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References:

3GPP TS 03.71 subclause7.6.6

3GPP TS 04.30 sub clause 5.1.1

3GPP TS 04.31 sub clause 2.5.5

3GPP TS 04.80 / 3GPP TS 24.080 sub clause 2.4, 2.5, 3.4 & 4

70.8.4.4.2 Test Purpose

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall terminate the current location measurement if the second RRLP MEASURE POSITION REQUEST is received with a different REFERENCE NUMBER. The MS shall perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST. The MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.8.4.4.3 Method of Test

Initial Conditions

System Simulator:

Serving Cell: default parameters.

Satellite signals: No GPS signal available.

Mobile Station:

The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

- TSPC_MS_RRLP_RELEASE

PIXIT statements

-

Test Procedure

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to a DTAP LCS-MOLR Invoke. The SS determines the positioning method and instigates the particular message sequence by sending RRLP MEASURE POSITION REQUEST including assistance data to start the measurement.

Option 1: The MS then performs positioning measurements. After a delay of 8 seconds, the SS sends the second RRLP MEASURE POSITION REQUEST with a different REFERENCE NUMBER from the first one (this delay shall be cancelled in the event of option 2). The MS shall terminate the current location measurement and perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST. The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

Option 2: The MS may request additional assistance data by immediately sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by a second RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS sends the second RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements and the SS sends the third RRLP MEASURE POSITION REQUEST with a different REFERENCE NUMBER from the second one. The MS shall terminate the current location measurement and perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST,

including the possibility of repeating the request for more assistance data (Option 2b). The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

The satellite signals should be made available after sending the second Measure Position request (in case of option 1) and third Measure Position request (in case of option 2)

The SS returns location estimate to MS through DTAP LCS-MOLR Return Result. The MS terminates the dialogue by sending RELEASE COMPLETE message after receiving location estimate.

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure (location estimate)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "Other procedures which can be completed with an SDCCH".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the TMSI. The CM Service Type IE indicates "Supplementary service activation" "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" including settings for ES IND and CM3 supported. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.

8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR with MOLR-Type set to locationEstimate.
11	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 1
12	MS (Option 1) or MS ->SS (Option 2)	- or RR APPLICATION INFORMATION	If no message is received from the MS within 8 seconds, then the SS shall assume that the MS is performing the measurement (Option 1) The SS continues to step 13. If the MS sends RRLP Measure Position Response: locationError with gpsAssDataMissing (Option 2) within 8 seconds, then the SS continues to step 12a.
12a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 12 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
12b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 12a, the MS acknowledges the received assistance data.
12c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 2. If the MS requested additional assistance data in step 12 that is available in the SS, this message may include further assistance data.
12d	MS (Option 2)		MS is performing the measurement (Option 2)
13	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 2 with different reference number from Request 1 (Option 1) or RRLP MEASURE POSITION REQUEST 3 with different reference number from Request 2 (Option2) Note: The satellite signals should be made available to MS after sending this message
14	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: gps-MeasureInfo (Option 1 or 2a) Check reference number is 2 or locationError with gpsAssDataMissing (Option 2b) Check reference number is 2
14a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 14 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
14b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 14a, the MS acknowledges the received assistance data.
14c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 14 that is available in the SS, this message may include further assistance data.
14d	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 14, this message contains gps-MeasureInfo.
15	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT (locationEstimate)

| 16 | MS -> SS | RELEASE COMPLETE | Terminates the session |
| 17 | SS -> MS | CHANNEL RELEASE | The main signalling link is released. |

Specific Message Contents

REGISTER (Step 10):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg Molr-Type -> locationEstimate
SS version indicator	Value 1 or above

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Steps 11, 12c, 13 and 14c: RRLP Measure Position Request Steps 12, 14 and 14d: RRLP Measure Position Response Steps 12a and 14a: RRLP Assistance Data Steps 12b and 14b: RRLP Assistance Data Ack.

RRLP Measure Position Request 1 (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 5.1.8
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 12 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 12a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 12 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Step 12b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

RRLP Measure Position Request 2 (Step 12c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 as requested by the MS in step 12 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request 2 (Option 1) or Request 3 (Option 2) (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 5.1.8
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 14 (Option 1 or 2a) or Step 14d (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp (A valid response will contain gps-MeasureInfo otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Measure Position Response (Step 14 (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 14a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 14 (Option 2b) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (14b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceDataAck

RRLP Measure Position Request (Step 14c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 as requested by the MS in step 14 (Option 2b).
extended-reference	SEQUENCE	Rel 5 and later

FACILITY (Step 15):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction Identifier Message Type Facility	FACILITY (0011 1010) Return Result = LCS-MOLR LCS-MOLRRes ->locationEstimate (Note)
Note: Any value for locationEstimate may be used. The SS shall not be required to calculate the value from the returned gps-MeasureInfo values.	

RELEASE COMPLETE (Step 16):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.8.4.5 MO-LR Positioning Measurement / RR Management Commands

70.8.4.5.1 Conformance requirement

The MS sends a DTAP LCS MOLR invoke to VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO-LR by sending a REGISTER message to network containing a LCS-MOLR invoke component with MO-LR TYPE set to LocationEstimate, LCS QoS value and other optional field if it is needed.

The MS aborts the measurement procedure and starts on the RR MANAGEMENT procedure if a RR MANAGEMENT command is received during the measurement procedure. The MS sends RR MANAGEMENT RESPONSE message upon completion.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References:

3GPP TS 03.71 sub clauses 7.6.6, 10.6

3GPP TS 04.30 sub clause 5.1.1

3GPP TS 04.80 / 3GPP TS 24.080 sub clauses 2.4, 2.5, 3.4 & 4

70.8.4.5.2 Test Purpose

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall terminate the current location measurement if a RR MANAGEMENT command is received during the measurement procedure. The MS shall send a RR MANAGEMENT RESPONSE message to SS when the RR MANAGEMENT procedure is complete. The MS shall perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST and send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.8.4.5.3 Method of Test

Initial Conditions

System Simulator:

Serving Cell: default parameters.

Satellite signals: No GPS signal available.

Mobile Station:

The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

- TSPC_MS_RRLP_RELEASE

PIXIT statements

-

Test Procedure

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to a DTAP

LCS-MOLR Invoke. The SS determines the positioning method and instigates the particular message sequence by sending RRLP MEASURE POSITION REQUEST including assistance data to start the measurement.

Option 1: The MS then performs positioning measurements. After a delay of 8 seconds, the SS sends an RR MANAGEMENT command. The MS shall terminate the current location measurement and perform the RR MANAGEMENT command. The MS sends an RR MANAGEMENT RESPONSE message to SS when the RR MANAGEMENT procedure is complete. The SS sends a new RRLP MEASURE POSITION REQUEST including assistance data and the MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data finishing the measurement according to the newly received RRLP MEASUREMENT POSITION REQUEST.

Option 2: The MS may request additional assistance data by immediately sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by a second RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS sends the second RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements and the SS sends a RR MANAGEMENT command. The MS shall terminate the current location measurement and perform the RR MANAGEMENT command. The MS sends a RR MANAGEMENT RESPONSE message to SS when the RR MANAGEMENT procedure is complete. The SS sends a new RRLP MEASURE POSITION REQUEST including assistance data and the MS either sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data finishing the measurement according to the newly received RRLP MEASUREMENT POSITION REQUEST or requests more assistance data and then sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data.

The satellite signals should be made available after sending the second Measure Position request (in case of option 1) and third Measure Position request (in case of option 2)

The SS returns location estimate to MS through DTAP LCS-MOLR Return Result. The MS terminates the dialogue by sending RELEASE COMPLETE message after receiving location estimate.

Maximum duration of the test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure (location estimate)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "Other procedures which can be completed with an SDCCH".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the TMSI. The CM Service Type IE indicates "Supplementary service activation" "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" including settings for ES IND and CM3 supported. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.

8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR with MOLR-Type set to locationEstimate.
11	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 1
12	MS (Option 1) or MS ->SS (Option 2)	- or RR APPLICATION INFORMATION	If no message is received from the MS within 8 seconds, then the SS shall assume that the MS is performing the measurement (Option 1). The SS continues to step 13. If the MS sends RRLP Measure Position Response: locationError with gpsAssDataMissing (Option 2) within 8 seconds, then the SS continues to step 12a.
12a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 12 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
12b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 12a, the MS acknowledges the received assistance data.
12c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 2. If the MS requested additional assistance data in step 12 that is available in the SS, this message may include further assistance data.
12d	MS (Option 2)		MS is performing the measurement (Option 2)
13	SS -> MS	RR MANAGEMENT COMMAND	
14	MS -> SS	RR MANAGEMENT COMPLETE	MS terminates the measurement procedure and act on the RR management command
15	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 2 (Option 1) or RRLP MEASURE POSITION REQUEST 3 (Option 2) Note: The satellite signals should be made available to MS after sending this message
16	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: gps-MeasureInfo (Option 1 or 2a) or locationError with gpsAssDataMissing (Option 2b)
16a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 16 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
16b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 16a, the MS acknowledges the received assistance data.
16c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 16 that is available in the SS, this message may include further assistance data.
16d	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 16, this message contains gps-MeasureInfo.
17	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT (locationEstimate)
18	MS -> SS	RELEASE COMPLETE	Terminates the session
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 10):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg Molr-Type -> locationEstimate
SS version indicator	Value 1 or above

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator Skip Indicator Message Type APDU ID APDU Flags	RR Management Protocol (0110) Application Information Message type APDU ID -> RRLP => 0000 Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Steps 11, 12c, 15 and 16c: RRLP Measure Position Request Steps 12, 16 and 16d: RRLP Measure Position Response Steps 12a and 16a: RRLP Assistance Data Steps 12b and 16b: RRLP Assistance Data Ack.

RRLP Measure Position Request 1 (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 5.1.8
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 12 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 12a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 12 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Step 12b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

RRLP Measure Position Request 2 (Step 12c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 as requested by the MS in step 12 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

RR Management Command (Classmark Enquiry) (Step 13):

Information element	Value/remark
Encoded	(06 13)
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Classmark Enquiry Message Type	0001 0011

RRLP Measure Position Request 2 (Option 1) or Request 3 (Option 2) (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 5.1.8
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 16 (Option 1 or 2a) or Step 16d (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp (A valid response will contain gps-MeasureInfo otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Measure Position Response (Step 16 (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 16a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 16 (Option 2b) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (16b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceDataAck

RRLP Measure Position Request (Step 16c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 as requested by the MS in step 16 (Option 2b).
extended-reference	SEQUENCE	Rel 5 and later

FACILITY (Step 17):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction Identifier Message Type Facility	FACILITY (0011 1010) Return Result = lcs-MOLR LCS-MOLRRes ->locationEstimate (Note)
Note: Any value for locationEstimate may be used. The SS shall not be required to calculate the value from the returned gps-MeasureInfo values.	

RELEASE COMPLETE (Step 18):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.8.5 MO_LR Basic Self Location Request for MS-Based AGPS

The test cases in this sub clause focus on Mobile Originating Location Request using MS-Based AGPS method. A MO-LR procedure could occur for requesting assistance data for mobile's own location.

70.8.5.1 MO_LR Basic Self Location Request in Idle Mode (Normal Case)

70.8.5.1.1 Conformance requirements:

The following requirements apply for this test:

1. The MS sends CM SERVICE REQUEST to network for call independent supplementary service.

2. The MS invokes self-location request by sending a REGISTER message containing a LCS-MOLR invoke component with MO_LR TYPE set to ASSISTANCE DATA, LOCATION_METHOD TYPE set ASSISTEDGPS, and GPS_ASSISTANCE_DATA TYPE set to the type of ASSISTANCE_DATA requested.

3. The MS sends RRLP ASSISTANCE DATA ACK. for each RRLP ASSISTANCE DATA component.

4. The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References

3GPP TS 03.71, sub clause 7.6.6,

3GPP TS 04.30 sub clause 5.1.1,

3GPP TS 04.80 / 3GPP TS 24.080 sub clause 2.4, 2.5, 3.4 and 4

70.8.5.1.2 Test Purpose

To verify that a MS invokes a self-location request by sending the network a REGISTER message containing FACILITY IE LCS-MOLR REQ. On receipt of each of RRLP ASSISTANCE DATA from SS with the requested assistance data, MS shall send RRLP ASSISTANCE ACK for each component to SS. When the MS receives a FACILITY message containing a FACILITY IE LCS-MOLR return result for the acknowledgement of completing assistance data delivery, it clears the transaction by sending a RELEASE COMPLETE message.

Specific PICS statements

- TSPC_MS_RRLP_RELEASE

PIXIT statements

-

70.8.5.1.3 Method of Test

Initial Conditions

System Simulator:

Serving cell: default parameters.

Satellite signals: default conditions.

Mobile Station:

The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Test Procedure:

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to a DTAP LCS-MOLR Invoke for Assistance Data. The SS sends a number of RRLP Assistance Data components and MS sends RRLP Assistance Data Ack for each component. SS sends DTAP LCS-MOLR Return Result for acknowledgement of completion of assistance data delivery. The MS performs the measurement and calculates the position fix using the assistance data delivered. The MS terminates the dialogue by sending RELEASE COMPLETE message.

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate LCS MOLR Procedure (assistance data request)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "Other procedures which can be completed with an SDCCH"
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Establishment cause indicates "Supplementary service activation". "mobile station classmark 2" includes settings for ES_IND.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" including settings for ES IND and CM3 supported. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7. Position method Capability is set to 1 and Bit 2 is set to 1 (MS-Based GPS)
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.
8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR with MOLR-Type set to assistanceData.
11n	SS -> MS	RR APPLICATION INFORMATION	RRLP ASSISTANCE DATA The number of instances of this message depends on the amount of assistance data requested in step 10
12n	MS -> SS	RR APPLICATION INFORMATION	RRLP ASSISTANCE DATA ACK Each instance of RRLP ASSISTANCE DATA message in step 11 is acknowledged
13	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT
14	MS -> SS	RELEASE COMPLETE	Terminates the session
15	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

CLASSMARK CHANGE

Information element	Value/remark
as default except: Mobile station Classmark 2 -ES_IND CM3	 "Controlled Early Classmark Sending" option is implemented in the MS. The MS Supports options that are indicated in classmark 3 IE

Mobile station Classmark 3
  MS Positioning Method Capability
 	
  Positioning Method(s) support, 5 bit field
	See below
	This bit indicates that the MS supports Positioning Method for the provision of Location Services.
	Support of certain positioning method (3GPP TS 24.008, table 10.5.1.7), Bit 2 set to 1.

REGISTER (Step 10):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)

Transaction Identifier
Message Type
Facility
	
	REGISTER (xx11 1011)
	Invoke = LCS-MOLR
	LCS-MOLRArg
	    MOLR-Type->assistanceData
	    Location Method->assistedGPS
	    GPSAssistanceData-> any value is acceptable

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Steps 11n: RRLP Assistance Data Steps 12n: RRLP Assistance Data Ack.

RRLP Assistance Data (Step 11n):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	The assistance data requested by the MS in Step 10 that is available in the SS, shall be sent in zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly.
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Step 12n):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

FACILITY (Step 13):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction Identifier Message Type Facility	 FACILITY (0011 1010) Return Result = LCS-MOLR LCS-MOLRRes -> empty (Note)
Note: For acknowledgement of assistance data delivery procedure, SS shall send LCS-MOLR Facility return result to MS, there is no parameter for this.	

RELEASE COMPLETE (Step 14):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (0011 1010)

70.8.5.2 MO_LR Basic Self Location Request in Dedicated Mode (Normal case)

70.8.5.2.1 Conformance Requirement:

The following requirements apply for this test:

1. The MS sends CM SERVICE REQUEST to network for call independent supplementary service.

2. The MS invokes self-location request by sending a REGISTER message containing a LCS-MOLR invoke component with MO_LR TYPE set to ASSISTANCE DATA, LOCATION_METHOD TYPE set ASSISTEDGPS, and GPS_ASSISTANCE_DATA TYPE set to the type of ASSISTANCE_DATA requested.

3. The MS sends RRLP ASSISTANCE DATA ACK. for each RRLP ASSISTANCE DATA component.

4. The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References:

3GPP TS 03.71 sub clause 7.6.6

3Gpp TS 24.30 sub clause 5

3GPP TS 24.80 sub clause 4

70.8.5.2.2 Test Purpose

To verify that the MS invokes a self-location request by sending the network a REGISTER message containing the FACILITY IE LCS-MOLR REQ on an already established speech call related main DCCH (FACCH). On receipt of a RRLP ASSISTANCE DATA from SS with the requested assistance data, MS shall send back RRLP ASSISTANCE ACK for each component to SS. When the MS receives a FACILITY message containing a FACILITY IE LCS-MOLR return result for the acknowledgment of completing assistance data delivery, it clears the transaction by sending a RELEASE COMPLETE message.

Specific PICS statements

- TSPC_MS_RRLP_RELEASE

PIXIT statements

-

70.8.5.2.3 Method of Test

Initial Conditions:

System Simulator:

Serving Cell: default parameters.

Satellite signals: default conditions.

Mobile Station:

The MS has valid TMSI and CSKN.

The MS is brought into the state U10 by using table 26.8.1.2/3

Test Procedure:

A MOLR procedure as call independent supplementary services is initiated from the MS on the existing FACCH channel. After received CM SERVICE ACCEPT message, MS sends a REGISTER message with Facility IE containing a component set to a DTAP LCS-MOLR Invoke for Assistance Data. The SS sends a number of RRLP ASSISTANCE DATA components and MS sends acknowledgement of RRLP ASSISTANCE DATA ACK for each component. SS sends DTAP LCS-MOLR Return Result for acknowledgement of completion of assistance data delivery procedure. MS performs the measurement and calculates the location estimate using the assistance data delivered. The MS terminates the dialogue by sending RELEASE COMPLETE message.

Maximum duration of the test:

5 minutes.

Expected Sequence:

Step	Direction	Message	Comments
1	MS		Initiate LCS MOLR Procedure (assistance data request) on existing FACCH channel
2	MS -> SS	CM SERVICE REQUEST	"Mobile identity" IE contains the TMSI. Establishment cause indicates "Supplementary service activation" "mobile station classmark 2" including settings for ES IND and CM3 supported.
3	SS -> MS	CM SERVICE ACCEPT	
4	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR with MOLR-Type set to assistanceData.
5n	SS->MS	RR APPLICATION INFORMATION	RRLP ASSISTANCE DATA The number of instances of this message depends on the amount of assistance data requested in step 4
6n	MS -> SS	RR APPLICATION INFORMATION	RRLP ASSISTANCE DATA ACK Each instance of RRLP ASSISTANCE DATA message in step 5 is acknowledged
7	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT
8	MS->SS	RELEASE COMPLETE	Terminates the session
9	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents:

REGISTER (Step 4):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction Identifier Message Type Facility	REGISTER (xx11 1011) Invoke = LCS-MOLR LCS-MOLRArg MOLR-Type->assistanceData Location Method->assistedGPS GPSAssistanceData-> any value is acceptable

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 5n: RRLP Assistance Data Step 6n: RRLP Assistance Data Ack.

RRLP Assistance Data (Step 5n):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	The assistance data requested by the MS in Step 4 that is available in the SS, shall be sent in zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly.
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Step 6n):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

FACILITY (Step 7):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction Identifier Message Type Facility	FACILITY (0011 1010) Return Result = LCS-MOLR LCS-MOLRRes ->empty (note)
Note: For acknowledgement of assistance data delivery procedure, SS shall send LCS-MOLR Facility return result to MS, there is no parameter for this.	

RELEASE COMPLETE (Step 8):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.8.5.3 MO_LR Basic Self Location Request in Idle Mode (Alternative Case)

70.8.5.3.1 Conformance requirements:

The following requirements apply for this test:

1. If the MS is in idle mode, the MS requests an SDCCH and sends a DTAP CM service request indicating a request for call independent supplementary services to the BSC.

2. The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component. SS Version Indicator value 1 or above shall be used.

3. On receiving an RRLP MEASURE POSITION REQUEST message, the MS tries to perform the requested location measurements, and possibly calculates it own position. When the MS has location measurements, location estimate, or an error indication (measurements/location estimation not possible), it sends the results in the Measure Position Response component to the SMLC.

5. The network shall pass the result of the location procedure to the MS by sending a FACILITY message to the MS containing a LCS-MOLR return result component.

6. After the last location request operation the MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References

3GPP TS 03.71 sub clause 7.6.6

3GPP TS 04.30 sub clause 5.1.1

3GPP TS 04.31 sub clause 2.2

70.8.5.3.2 Test Purpose

To verify that the MS invokes a self-location request by sending the network a REGISTER message containing an MO-LR Request of type "locationEstimate". When the MS receives a FACILITY message containing a MO-LR return result carrying the requested location estimate, it clears the transaction by sending a RELEASE COMPLETE message.

Specific PICS statements

- TSPC_MS_RRLP_RELEASE

PIXIT statements

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70.8.5.3.3 Method of Test

Initial Conditions

System Simulator:

Serving cell: default parameters.

Satellite signals: default conditions.

Mobile Station:

The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Test Procedure:

The MS invokes call independent supplementary service through a CM SERVICE REQUEST. The SS initiates authentication and ciphering. Then the MS invokes an MO-LR request of type "locationEstimate".

The SS orders an A-GPS positioning measurement by sending RR APPLICATION INFORMATION messages containing RRLP Assistance Data messages followed by an RRLP Measure Position Request including further assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The SS responds with a FACILITY message containing an MO-LR result. When the MS receives the FACILITY message, it clears the transaction by sending a RELEASE COMPLETE message.

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure (location estimation)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "Other procedures which can be completed with an SDCCH"
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	The CM Service Type IE indicates "Supplementary service activation".
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method support. In the position method support (5 bit filed), bit 2 is set to 1 (MS-based GPS).
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	

8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering
11	MS -> SS	REGISTER	Call Independent SS containing Facility IE with LCS-MOLR request and MO-LR Type set to "locationEstimate".
12	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
13	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
14	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
15	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
16	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request
17	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: locationInfo (Option 1) or locationError with gpsAssDataMissing and additionalAssistanceData (Option 2)
17a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 17 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
17b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 17a, the MS acknowledges the received assistance data.
17c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 17 that is available in the SS, this message may include further assistance data.
17d	MS-> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 17, this message contains locationInfo.
18	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT message containing location estimate
19	MS -> SS	RELEASE COMPLETE	MS terminates the dialogue
20	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 11):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg MOLR-Type->locationEstimate
SS version indicator	Value 1 or above

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment
	Bit2=0 -> First or only segment
	Bit3=0 -> Command or Final Response
	Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded
	Steps 16 and 17c: RRLP Measure Position Request
	Steps 17 and 17d: RRLP Measure Position Response
	Steps 12, 14, 17a: RRLP Assistance Data
	Steps 13, 15, 17b: RRLP Assistance Data Ack.

RRLP Assistance Data (Step 12):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 4,6,9. See TS 51.010-7 sub clause 5.1.5
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Steps 13, 15, 17b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 17b)
component	CHOICE	assistanceDataAck

RRLP Assistance Data (Step 14):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 10,13,22. See TS 51.010-7 sub clause 5.1.5
ionosphericModel	SEQUENCE	See TS 51.010-7 sub clause 5.1.6
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 0. Rel 5 and later: 1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request (Step 16):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
refLocation	SEQUENCE	See TS 51.010-7 sub clause 5.1.4
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 17 (Option 1) or 17d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 17d)
component	CHOICE	msrPositionRsp (A valid response will contain LocationInfo otherwise LocationError will be returned)
locationInfo	SEQUENCE	Any value is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Measure Position Response (Step 17 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements

RRLP Assistance Data (Step 17a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 17 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request (Step 17c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 as requested by the MS in step 17 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

FACILITY (Step 18):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	FACILITY (0011 1010)
Facility	Return Result = LCS-MOLR LCS-MOLRRes -> locationEstimate

RELEASE COMPLETE (Step 20):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.8.5.4 MO_LR Basic Self Location Request in Dedicated Mode (Alternative Case)

70.8.5.4.1 Conformance requirements:

The following requirements apply for this test:

1. The MS sends CM SERVICE REQUEST to network for call independent supplementary service.

2. The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component. SS Version Indicator value 1 or above shall be used.

3. On receiving an RRLP MEASURE POSITION REQUEST message, the MS tries to perform the requested location measurements, and possibly calculates it own position. When the MS has location measurements, location estimate, or an error indication (measurements/location estimation not possible), it sends the results in the Measure Position Response component to the SMLC.

5. The network shall pass the result of the location procedure to the MS by sending a FACILITY message to the MS containing a LCS-MOLR return result component.

6. After the last location request operation the MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References

3GPP TS 03.71 sub clause 7.6.6

3GPP TS 04.30 sub clause 5.1.1

3GPP TS 04.31 sub clause 2.2

70.8.5.4.2 Test Purpose

To verify that the MS invokes a self-location request by sending the network a REGISTER message containing an MO-LR Request of type "locationEstimate" on an already established speech call related SACCH. When the MS receives a FACILITY message containing a MO-LR return result carrying the requested location estimate, it clears the transaction by sending a RELEASE COMPLETE message.

Specific PICS statements

- TSPC_MS_RRLP_RELEASE

PIXIT statements

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70.8.5.4.3 Method of Test

Initial Conditions

System Simulator:

Serving cell: default parameters.

Satellite signals: default conditions.

Mobile Station:

The MS has valid TMSI and CKSN.

The MS is brought into state U10 by using table 26.8.1.2/3.

Test Procedure:

The MS invokes call independent supplementary service on an existing SACCH channel. After receiving a CM SERVICE ACCEPT message, the MS invokes a self location request by sending a REGISTER message containing an MO-LR request of type "locationEstimate".

The SS orders an A-GPS positioning measurement by sending RR APPLICATION INFORMATION messages containing RRLP Assistance Data messages followed by an RRLP Measure Position Request including further assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The SS responds with a FACILITY message containing an MO-LR result. When the MS receives the FACILITY message, it clears the transaction by sending a RELEASE COMPLETE message.

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MO-LR procedure (location estimation) on existing SACCH channel
2	MS -> SS	CM SERVICE REQUEST	The CM Service Type IE indicates "Supplementary service activation".
3	SS -> MS	CM SERVICE ACCEPT	
4	MS -> SS	REGISTER	Call Independent SS containing Facility IE with LCS-MOLR request and MO-LR Type set to "locationEstimate".
5	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
6	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
7	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
8	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
9	SS -> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request
10	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: locationInfo (Option 1) or locationError with gpsAssDataMissing and additionalAssistanceData (Option 2)
10a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 10 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
10b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 10a, the MS acknowledges the received assistance data.
10c	SS -> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 10 that is available in the SS, this message may include further assistance data.
10d	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 10, this message contains locationInfo.
11	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT message containing location estimate
12	MS -> SS	RELEASE COMPLETE	MS terminates the dialogue
13	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 4):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg MOLR-Type->locationEstimate
SS version indicator	Value 1 or above

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Steps 9 and 10c: RRLP Measure Position Request Steps 10 and 10d: RRLP Measure Position Response Steps 5, 7, 10a: RRLP Assistance Data Steps 6, 8, 10b: RRLP Assistance Data Ack.

RRLP Assistance Data (Step 5):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 4,6,9. See TS 51.010-7 sub clause 5.1.5
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Steps 6, 8, 10b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 10b)
component	CHOICE	assistanceDataAck

RRLP Assistance Data (Step 7):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 10,13,22. See TS 51.010-7 sub clause 5.1.5
ionosphericModel	SEQUENCE	See TS 51.010-7 sub clause 5.1.6
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 0. Rel 5 and later: 1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request (Step 9):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
refLocation	SEQUENCE	See TS 51.010-7 sub clause 5.1.4
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 10 (Option 1) or 10d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 10d)
component	CHOICE	msrPositionRsp (A valid response will contain LocationInfo otherwise LocationError will be returned)
locationInfo	SEQUENCE	Any value is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Measure Position Response (Step 10 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 10a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 10 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request (Step 10c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 as requested by the MS in step 10 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

FACILITY (Step 11):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	FACILITY (0011 1010)
Facility	Return Result = LCS-MOLR LCS-MOLRRes -> locationEstimate

RELEASE COMPLETE (Step 12):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.8.6 MO-LR Transfer to 3rd Party for MS-Based A-GPS

70.8.6.1   Conformance requirements

The following requirements apply for this test:

1. If the MS is in idle mode, the MS requests an SDCCH and sends a DTAP CM service request indicating a request for call independent supplementary services to the BSC.

2. The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component. SS Version Indicator value 1 or above shall be used.

3. If the MS is requesting that its location be sent to another LCS client, the message shall include the identity of the LCS client and may include the address of the GMLC through which the LCS client should be accessed.

4. On receiving an RRLP MEASURE POSITION REQUEST message, the MS tries to perform the requested location measurements, and possibly calculates it own position. When the MS has location measurements, location estimate, or an error indication (measurements/location estimation not possible), it sends the results in the Measure Position Response component to the SMLC.

5. The VMSC returns a DTAP LCS MO-LR Return Result to the MS carrying any location estimate requested by the MS, ciphering keys or a confirmation that a location estimate was successfully transferred to the GMLC serving an LCS client.

6. The network shall pass the result of the location procedure to the MS by sending a FACILITY message to the MS containing a LCS-MOLR return result component.

7. After the last location request operation the MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References

3GPP TS 03.71 sub clause 7.6.6

3GPP TS 04.30 sub clause 5.1.1

3GPP TS 04.31 sub clause 2.2

70.8.6.2   Test Purpose

To verify that the MS invokes a transfer of its own location to a 3rd party LCS Client by sending the network a REGISTER message containing the Facility IE LCS MO-LR with LCSClientExternalID present. After receiving a FACILITY message as confirmation that the location estimate has been transferred to the requested LCS client, the MS terminates the dialogue by sending a RELEASE COMPLETE message.

70.8.6.3   Method of Test

Initial Conditions

System Simulator (SS):

Serving Cell: default parameters

Satellite signals: default conditions.

Mobile Station (MS):

The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

- TSPC_MS_RRLP_RELEASE

PIXIT statements

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Test Procedure

The MS invokes call independent supplementary service through a CM SERVICE REQUEST. The SS initiates authentication and ciphering. Then the MS invokes an MO-LR request of type "locationEstimate" with "LCSClientExternalID" present.

The SS orders an A-GPS positioning measurement by sending RR APPLICATION INFORMATION messages containing RRLP Assistance Data messages followed by an RRLP Measure Position Request including further assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The SS responds with a FACILITY message containing an MO-LR result to confirm that the location estimate has been transferred to the LCS client. When the MS receives the FACILITY message, it clears the transaction by sending a RELEASE COMPLETE message.

Maximum duration of the test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Transfer to 3rd Party Procedure
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates, "Other procedures which can be completed with an SDCCH"
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	The CM Service Type IE indicates "Supplementary service activation" "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 2 is set to 1 (MS-Based GPS)
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering
11	MS -> SS	REGISTER	Call Independent SS containing Facility IE with LCS-MOLR request with MOLR-Type set to locationEstimate with LCSClientExternalID present
12	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
13	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
14	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
15	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
16	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request
17	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: locationInfo (Option 1) or locationError with gpsAssDataMissing and additionalAssistanceData (Option 2)
17a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 17 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
17b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 17a, the MS acknowledges the received assistance data.
17c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 17 that is available in the SS, this message may include further assistance data.
17d	MS-> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 17, this message contains locationInfo.

18	SS		SS may return the location estimate result to the LCS Client as identified by the LCSClientExternalID provided in the REGISTER message
19	SS -> MS	FACILITY	LCS MO-LR Return Result message as confirmation that the position estimate was transferred to the requested LCS client.
20	MS -> SS	RELEASE COMPLETE	MS terminates the dialogue
21	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 11):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg Molr-Type -> locationEstimate lcsClientExternalID -> externalAddress
SS version indicator	Value 1 or above

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Steps 16 and 17c: RRLP Measure Position Request Steps 17 and 17d: RRLP Measure Position Response Steps 12, 14, 17a: RRLP Assistance Data Steps 13, 15, 17b: RRLP Assistance Data Ack.

RRLP Assistance Data (Step 12):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 4,6,9. See TS 51.010-7 sub clause 5.1.5
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Steps 13, 15, 17b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 17b)
component	CHOICE	assistanceDataAck

RRLP Assistance Data (Step 14):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 10,13,22. See TS 51.010-7 sub clause 5.1.5
ionosphericModel	SEQUENCE	See TS 51.010-7 sub clause 5.1.6
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 0. Rel 5 and later: 1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request (Step 16):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
refLocation	SEQUENCE	See TS 51.010-7 sub clause 5.1.4
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 17 (Option 1) or 17d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 17d)
component	CHOICE	msrPositionRsp (A valid response will contain LocationInfo otherwise LocationError will be returned)
locationInfo	SEQUENCE	Any value is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Measure Position Response (Step 17 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 17a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 17 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request (Step 17c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 as requested by the MS in step 17 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

FACILITY (Step 19):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	FACILITY (0011 1010)
Facility	Return Result = LCS-MOLR LCS-MOLRRes -> locationEstimate

RELEASE COMPLETE (Step 20):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.9 Assisted GPS Mobile Terminated Tests

70.9.1 MT-LR Location Notification

70.9.1.1 MT-LR Location Notification for Mobiles Supporting MS-Based GPS

70.9.1.1.1 Conformance requirements

1. The network invokes a location notification procedure by sending a REGISTER message containing a LCS-LocationNotification invoke component to the MS with notificationType set to notifyLocationAllowed. The MS shall notify the MS user of the location request.

2. The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

References

3GPP TS 03.71 sub clause 7.6.1.

3GPP TS 04.30 sub clause 4.1.1.

3GPP TS 04.80 / 3GPP TS 24.080 sub clauses 2.4, 2.5, and 3.4.

70.9.1.1.2 Test Purpose

To verify that when the MS receives a REGISTER message, containing a LCS Location Notification Invoke component set to NotifyLocationAllowed, the MS displays information about the LCS client correctly and sends a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

70.9.1.1.3 Method of Test

Initial Conditions

System Simulator (SS):

Serving Cell: default parameters

Mobile Station (MS):

The MS is in MM-state "idle, updated" with valued TMSI and CKSN.

Specific PICS statements

-

PIXIT statements

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Test Procedure

The MS is paged with a PAGING REQUEST TYPE 1 message. After sending the CIPHERING MODE COMPLETE message the MS receives an SS REGISTER message containing a Facility IE containing a DTAP LCS Location Notification Invoke message set to notifyLocationAllowed. The LCS Client Name contained in the USSD text string of the lcs-LocationNotification shall be displayed. The MS then responds with a RELEASE COMPLETE message containing a LocationNotification return to terminate the dialogue.

Maximum duration of the test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 2 is set to 1 (MS-Based GPS)
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS -> MS	REGISTER	Call Independent SS containing Facility IE Location Notification Invoke message set to notifyLocationAllowed
12	MS		MS displays information about LCS client
13	MS -> SS	RELEASE COMPLETE	
14	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

PAGING RESPONSE

Information element	Value/remark
Protocol Discriminator	RR management
Ciphering Key Sequence number 　- Key Sequence	Key sequence number previously allocated to MS, or "111" if no key is available
Mobile station Classmark 2 　- ES IND	Shall indicate early autonomous sending of CLASSMARK CHANGE
Mobile Identity 　- odd/even 　- Type of identity 　- Identity digits	Even TMSI TMSI previously allocated to MS

REGISTER

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type Facility	REGISTER (0011 1011) Invoke = lcs-LocationNotification LocationNotificationArg 　　notificationType -> notifyLocationAllowed, 　　locationType -> current Location , 　　lcsClientExternalID -> externalAddress 　　lcsClientName ->dataCodingScheme 　　　　　　nameString

RELEASE COMPLETE

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type Facility	RELEASE COMPLETE (xx10 1010) Return result = lcs-LocationNotification 　verificationResponse -> permissionGranted

70.9.1.2　　MT-LR Location Notification for Mobiles Supporting MS-Assisted GPS

70.9.1.2.1　　Conformance requirements

1. The network invokes a location notification procedure by sending a REGISTER message containing a LCS-LocationNotification invoke component to the MS with notificationType set to notifyLocationAllowed. The MS shall notify the MS user of the location request.

2. The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

References

3GPP TS 03.71 sub clause 7.6.1.

3GPP TS 04.30 sub clause 4.1.1.

3GPP TS 04.80 / 3GPP TS 24.080 sub clauses 2.4, 2.5, and 3.4.

70.9.1.2.2　　Test Purpose

To verify that when the MS receives a REGISTER message, containing a LCS Location Notification Invoke component set to NotifyLocationAllowed, the MS displays information about the LCS client correctly and sends a RELEASE

COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

70.9.1.2.3 Method of Test

Initial Conditions

System Simulator (SS):

   Serving Cell: default parameters

Mobile Station (MS):

   The MS is in MM-state "idle, updated" with valued TMSI and CKSN.

Specific PICS statements

   -

PIXIT statements

   -

Test Procedure

The MS is paged with a PAGING REQUEST TYPE 1 message. After sending the CIPHERING MODE COMPLETE message the MS receives an SS REGISTER message containing a Facility IE containing a DTAP LCS Location Notification Invoke message set to notifyLocationAllowed. The LCS Client Name contained in the USSD text string of the lcs-LocationNotification shall be displayed. The MS then responds with a RELEASE COMPLETE message containing a LocationNotification return to terminate the dialogue.

Maximum duration of the test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 3 is set to 1 (MS-Assisted GPS)
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS -> MS	REGISTER	Call Independent SS containing Facility IE Location Notification Invoke message set to notifyLocationAllowed
12	MS		MS displays information about LCS client
13	MS -> SS	RELEASE COMPLETE	
14	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

PAGING RESPONSE

Information element	Value/remark
Protocol Discriminator	RR management
Ciphering Key Sequence number - Key Sequence	Key sequence number previously allocated to MS, or "111" if no key is available
Mobile station Classmark 2 - ES IND	Shall indicate early autonomous sending of CLASSMARK CHANGE
Mobile Identity - odd/even - Type of identity - Identity digits	 Even TMSI TMSI previously allocated to MS

REGISTER

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)

Transaction identifier
Message type
Facility
	
	REGISTER (0011 1011)
	Invoke = lcs-LocationNotification
	LocationNotificationArg
	    notificationType -> notifyLocationAllowed,
	    locationType -> current Location,
	    lcsClientExternalID -> externalAddress
	    lcsClientName ->dataCodingScheme
	        nameString

RELEASE COMPLETE

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier	
Message type	RELEASE COMPLETE (xx10 1010)
Facility	Return result = lcs-LocationNotification verificationResponse -> permissionGranted

70.9.2 MT-LR Privacy Options/Verification – Location Allowed If No Response

70.9.2.1 MT-LR Privacy Options/Verification– Location Allowed If No Response for mobiles supporting MS-Based GPS

70.9.2.1.1 Conformance requirements

1. On receipt of a REGISTER message containing the LCS Notification Invoke component with notificationType set to notifyAndVerify-LocationAllowedIfNoResponse. The MS: a) notifies the user of the request, b) indicates the default is location allowed if no response is received within a predetermined period, and c) providing the opportunity to accept or deny the request if allowed by subscription or if barred by subscription.

2.

   Option 1: The user accepts the location request. The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

   Option 2: The user denies the location request.
   The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

   Option 3: The user takes no action and the verification process times-out. The SS shall terminate the dialogue.

References

   3GPP TS 03.71 sub clause 7.6.1.

   3GPP TS 04.30 / 3GPP TS 24.030 Rel-6 sub clause 4.1.1.

   3GPP TS 04.80 / 3GPP TS 24.080 sub clauses 2.4, 2.5, and 3.4.

70.9.2.1.2 Test Purpose

To verify that the MS receives a REGISTER message, containing a LCS Location Notification Invoke component set to notifyAndVerify-LocationAllowedIfNoResponse, the MS displays information about the LCS client correctly and indicates that the default response is location allowed if no response is sent. Gives the user the option to accept or reject the request and sends a RELEASE COMPLETE message containing a LocationNotification return result with the verificationResponse set to permissionDenied or permissionGranted as appropriate.

70.9.2.1.3 Method of Test

Initial Conditions

System Simulator (SS):

   Serving Cell: default parameters.

Mobile Station (MS):

   The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

   -

PIXIT statements

- MS LCS Notification timeout timer

Test Procedure

The MS is paged with a PAGING REQUEST TYPE 1 message. After sending the CIPHERING MODE COMPLETE message the MS receives an SS REGISTER message with a Facility IE containing a LCS Location Notification Invoke set to notifyAndVerify-LocationAllowedIfNoResponse. The LCS Client Name contained in the USSD text string of the lcs-LocationNotification shall be displayed with the option to accept or deny the request, if allowed by subscription or if barred by subscription respectively. The MS also indicates that location will be allowed if a response is not received within a predetermined time.

Option 1:

The user then accepts the location request. The MS responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

Option 2:

The user then denies the location request. The MS responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

Option 3:

The user ignores the location request by taking no action, allowing the verification process timer to time-out. The SS responds with RELEASE COMPLETE.

Maximum duration of the test

5 minutes.

Expected Sequence

The test sequence is repeated for k = 1 … 3.

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 2 is set to 1 (MS-Based GPS)
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS -> MS	REGISTER	Call Independent SS containing Facility IE LCS Location Notification Invoke set to notifyAndVerify-LocationAllowedIfNoResponse
12	SS		SS starts timer T(LCSN) set to 90% of MS LCS Notification timeout timer
13A (k=1)	MS		The MS displays the location request and information about LCS Client. The user accepts location request before timer T(LCSN) expires.
14A (k=1)	MS -> SS	RELEASE COMPLETE	Containing a LocationNotification return result with verificationResponse set to permissionGranted.
13B (k=2)	MS		The MS displays the location request and information about LCS Client. The user rejects location request before timer T(LCSN) expires.
14B (k=2)	MS -> SS	RELEASE COMPLETE	Containing a LocationNotification return result with verificationResponse set to permissionDenied.
13C (k=3)	MS		The MS displays the location request and information about LCS Client. The user does not reply and waits for T(LCSN) to expire.
14C (k=3)	SS->MS	RELEASE COMPLETE	SS terminates the dialogue after T(LCSN) expiry
15	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

PAGING RESPONSE (Step 4)

Information element	Value/remark
Protocol Discriminator	RR management
Ciphering Key Sequence number - Key Sequence	Key sequence number previously allocated to MS, or "111" if no key is available
Mobile station Classmark 2 - ES IND Mobile Identity - odd/even - Type of identity - Identity digits	Shall indicate early autonomous sending of CLASSMARK CHANGE Even TMSI TMSI previously allocated to MS

REGISTER (Step 11)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)

Transaction identifier
Message type
Facility
	
	REGISTER (0011 1011)
	Invoke = lcs-LocationNotification
	LocationNotificationArg
	    notificationType ->notifyAnd Verify-LocationAllowedIfNoResponse,
	    locationType -> current Location ,
	    lcsClientExternalID -> externalAddress
	    lcsClientName ->dataCodingScheme
	                nameString

RELEASE COMPLETE (Option k=1 Step14A)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type Facility	 RELEASE COMPLETE (xx10 1010) Return result = lcs-LocationNotification LocationNotificationRes verificationResponse -> permissionGranted

RELEASE COMPLETE (Option k=2 Step 14B)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type Facility	 RELEASE COMPLETE (xx10 1010) Return result = lcs-LocationNotification LocationNotificationRes verificationResponse -> permissionDenied

RELEASE COMPLETE (Option k=3, Step 14C)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type	 RELEASE COMPLETE (0010 1010)

70.9.2.2   MT-LR Privacy Options/Verification– Location Allowed If No Response for Mobiles Supporting MS-Assisted GPS

70.9.2.2.1   Conformance requirements

1.   On receipt of a REGISTER message containing the LCS Notification Invoke component with notificationType set to notifyAndVerify-LocationAllowedIfNoResponse. The MS: a) notifies the user of the request, b) indicates the default is location allowed if no response is received within a predetermined period, and c) providing the opportunity to accept or deny the request if allowed by subscription or if barred by subscription.

2.

   Option 1: The user accepts the location request. The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

   Option 2: The user denies the location request.
   The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

   Option 3: The user takes no action and the verification process times-out.
   The SS shall terminate the dialogue.

References

   3GPP TS 03.71 sub clause 7.6.1.

   3GPP TS 04.30 / 3GPP TS 24.030 Rel-6 sub clause 4.1.1.

   3GPP TS 04.80 / 3GPP TS 24.080 sub clauses 2.4, 2.5, and 3.4.

70.9.2.2.2   Test Purpose

To verify that the MS receives a REGISTER message, containing a LCS Location Notification Invoke component set to notifyAndVerify-LocationAllowedIfNoResponse, the MS displays information about the LCS client correctly and indicates that the default response is location allowed if no response is sent. Gives the user the option to accept or reject the request and sends a RELEASE COMPLETE message containing a LocationNotification return result with the verificationResponse set to permissionDenied or permissionGranted as appropriate.

70.9.2.2.3   Method of Test

Initial Conditions

System Simulator (SS):

   Serving Cell: default parameters

Mobile Station (MS):

   The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

   -

PIXIT statements

   - MS LCS Notification timeout timer

Test Procedure

The MS is paged with a PAGING REQUEST TYPE 1 message. After sending the CIPHERING MODE COMPLETE message the MS receives an SS REGISTER message with a Facility IE containing a LCS Location Notification Invoke set to notifyAndVerify-LocationAllowedIfNoResponse. The LCS Client Name contained in the USSD text string of the lcs-LocationNotification shall be displayed with the option to accept or deny the request, if allowed by subscription or if

barred by subscription . The MS also indicates that location will be allowed if a response is not received within a predetermined time.

Option 1:

The user then accepts the location request. The MS responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

Option 2:

The user then denies the location request. The MS responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

Option 3:

The user ignores the location request by taking no action, allowing the verification process timer to time-out. The SS responds with RELEASE COMPLETE.

Maximum duration of the test

5 minutes.

Expected Sequence

The test sequence is repeated for k = 1 … 3.

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 3 is set to 1 (MS-Assisted GPS)
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS -> MS	REGISTER	Call Independent SS containing Facility IE LCS Location Notification Invoke set to notifyAndVerify-LocationAllowedIfNoResponse
12	SS		SS starts timer T(LCSN) set to 90% of MS LCS Notification timeout timer
13A (k=1)	MS		The MS displays the location request and information about LCS Client. The user accepts location request before timer T(LCSN) expires.
14A (k=1)	MS -> SS	RELEASE COMPLETE	Containing a LocationNotification return result with verificationResponse set to permissionGranted.
13B (k=2)	MS		The MS displays the location request and information about LCS Client. The user rejects location request before timer T(LCSN) expires.
14B (k=2)	MS -> SS	RELEASE COMPLETE	Containing a LocationNotification return result with verificationResponse set to permissionDenied.
13C (k=3)	MS		The MS displays the location request and information about LCS Client. The user does not reply and waits for T(LCSN) to expire.
14C (k=3)	SS->MS	RELEASE COMPLETE	SS terminates the dialogue after T(LCSN) expiry
15	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

PAGING RESPONSE (Step 4)

Information element	Value/remark
Protocol Discriminator	RR management
Ciphering Key Sequence number - Key Sequence	Key sequence number previously allocated to MS, or "111" if no key is available

Mobile station Classmark 2
   - ES IND
 	
Mobile Identity
   - odd/even
   - Type of identity
   - Identity digits
	Shall indicate early autonomous sending of CLASSMARK CHANGE
	
	Even
	TMSI
	TMSI previously allocated to MS

REGISTER (Step 11)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)

Transaction identifier
Message type
Facility
	
	REGISTER (0011 1011)
	Invoke = lcs-LocationNotification
	LocationNotificationArg
	   notificationType ->notifyAnd Verify-LocationAllowedIfNoResponse,
	   locationType -> current Location,
	   lcsClientExternalID -> externalAddress
	   lcsClientName ->dataCodingScheme
	               nameString

RELEASE COMPLETE (Option k=1 Step14A)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type Facility	 RELEASE COMPLETE (xx10 1010) Return result = lcs-LocationNotification LocationNotificationRes verificationResponse -> permissionGranted

RELEASE COMPLETE (Option k=2 Step14B)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type Facility	 RELEASE COMPLETE (xx10 1010) Return result = lcs-LocationNotification LocationNotificationRes verificationResponse -> permissionDenied

RELEASE COMPLETE (Option k=3, Step 14C):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type	 RELEASE COMPLETE (0010 1010)

70.9.3 MT-LR Privacy Options/Verification – Location Not Allowed If No Response

70.9.3.1 MT-LR Privacy Options/Verification– Location Not Allowed If No Response for Mobiles Supporting MS-Based GPS

70.9.3.1.1 Conformance requirements

1. On receipt of a REGISTER message containing the LCS Notification Invoke component with notificationType set to notifyAndVerify-LocationNotAllowedIfNoResponse, the MS: a) notifies the user of the request, b) indicates the default is location not allowed if no response is received within a predetermined period, and c) providing the opportunity to accept or deny the request if allowed by subscription or if barred by subscription.

2.

   Option 1: The user accepts the location request. The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

   Option 2: The user denies the location request.
   The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

   Option 3: The user takes no action and the verification process times-out.
   The SS shall terminate the dialogue.

References

   3GPP TS 03.71 sub clause 7.6.1.

   3GPP TS 04.30 / 3GPP TS 24.030 Rel-6 sub clause 4.1.1.

   3GPP TS 04.80 / 3GPP TS 24.080 sub clauses 2.4, 2.5, and 3.4.

70.9.3.1.2 Test Purpose

To verify that if the MS receives a REGISTER message, containing a LCS Location Notification Invoke component set to notifyAndVerify-LocationNotAllowedIfNoResponse, then the MS displays information about the LCS client correctly and indicates that the default response is location not allowed if no response is sent. Gives the user the option to accept or reject the request and sends a RELEASE COMPLETE message containing a LocationNotification return result with the verificationResponse set to permissionDenied or permissionGranted as appropriate.

70.9.3.1.3 Method of Test

Initial Conditions

System Simulator (SS):

   Serving Cell: default parameters

Mobile Station (MS):

   The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

   -

PIXIT statements

   - MS LCS Notification timeout timer

Test Procedure

The MS is paged with a PAGING REQUEST TYPE 1 message. After sending the CIPHERING MODE COMPLETE message the MS receives an SS REGISTER message with a Facility IE containing a LCS Location Notification Invoke

set to notifyAndVerify-LocationNotAllowedIfNoResponse. The LCS Client Name contained in the USSD text string of the lcs-LocationNotification shall be displayed with the option to accept or deny the request, if allowed by subscription or if barred by subscription respectively. The MS also indicates that location will be allowed if a response is not received within a predetermined time.

Option 1:

The user then accepts the location request. The MS responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

Option 2:

The user then denies the location request. The MS responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

Option 3:

The user ignores the location request by taking no action, allowing the verification process timer to time-out. The SS responds with RELEASE COMPLETE.

Maximum duration of the test

5 minutes.

Expected Sequence

The test sequence is repeated for k = 1 … 3.

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 2 is set to 1 (MS-Based GPS)
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS -> MS	REGISTER	Call Independent SS containing Facility IE LCS Location Notification Invoke set to notifyAndVerify-LocationNotAllowedIfNoResponse
12	SS		SS starts timer T(LCSN) set to 90% of MS LCS Notification timeout timer
13A (k=1)	MS		The MS displays the location request and information about LCS Client. The user accepts location request before timer T(LCSN) expires.
14A (k=1)	MS -> SS	RELEASE COMPLETE	Containing a LocationNotification return result with verificationResponse set to permissionGranted.
13B (k=2)	MS		The MS displays the location request and information about LCS Client. The user rejects location request before timer T(LCSN) expires.
14B (k=2)	MS -> SS	RELEASE COMPLETE	Containing a LocationNotification return result with verificationResponse set to permissionDenied.
13C (k=3)	MS		The MS displays the location request and information about LCS Client. The user does not reply and waits for T(LCSN) to expire.
14C (k=3)	SS->MS	RELEASE COMPLETE	SS terminates the dialogue after T(LCSN) expiry
15	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

PAGING RESPONSE (Step 4)

Information element	Value/remark
Protocol Discriminator	RR management
Ciphering Key Sequence number - Key Sequence	Key sequence number previously allocated to MS, or "111" if no key is available
Mobile station Classmark 2 - ES IND	Shall indicate early autonomous sending of CLASSMARK CHANGE
Mobile Identity - odd/even - Type of identity - Identity digits	Even TMSI TMSI previously allocated to MS

REGISTER (Step 11)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)

Transaction identifier
Message type
Facility
	REGISTER (0011 1011)
	Invoke = lcs-LocationNotification
	LocationNotificationArg
	    notificationType ->notifyAnd Verify-LocationNotAllowedIfNoResponse,
	    locationType -> current Location,
	    lcsClientExternalID -> externalAddress
	    lcsClientName ->dataCodingScheme
	                        nameString

RELEASE COMPLETE (Option k=1 Step14A)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type Facility	RELEASE COMPLETE (xx10 1010) Return result = lcs-LocationNotification LocationNotificationRes verificationResponse -> permissionGranted

RELEASE COMPLETE (Option k=2 Step14B)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type Facility	RELEASE COMPLETE (xx10 1010) Return result = lcs-LocationNotification LocationNotificationRes verificationResponse -> permissionDenied

RELEASE COMPLETE (Option k=3, Step 14C)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type	RELEASE COMPLETE (0010 1010)

70.9.3.2 MT-LR Privacy Options/Verification– Location Not Allowed If No Response for mobiles supporting MS-Assisted GPS

70.9.3.2.1 Conformance requirements

1. On receipt of a REGISTER message containing the LCS Notification Invoke component with notificationType set to notifyAndVerify-LocationNotAllowedIfNoResponse, the MS: a) notifies the user of the request, b) indicates the default is location not allowed if no response is received within a predetermined period, and c) providing the opportunity to accept or deny the request if allowed by subscription or if barred by subscription respectively.

2.

> Option 1: The user accepts the location request. The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

> Option 2: The user denies the location request.
> The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

> Option 3: The user takes no action and the verification process times-out.
> The SS shall terminate the dialogue.

References

> 3GPP TS 03.71 sub clause 7.6.1.

> 3GPP TS 04.30 / 3GPP TS 24.030 Rel-6 sub clause 4.1.1.

> 3GPP TS 04.80 / 3GPP TS 24.080 sub clauses 2.4, 2.5, and 3.4.

70.9.3.2.2 Test Purpose

To verify that the MS receives a REGISTER message, containing a LCS Location Notification Invoke component set to notifyAndVerify-LocationNotAllowedIfNoResponse, the MS displays information about the LCS client correctly and indicates that the default response is location not allowed if no response is sent. Gives the user the option to accept or reject the request and sends a RELEASE COMPLETE message containing a LocationNotification return result with the verificationResponse set to permissionDenied or permissionGranted as appropriate.

70.9.3.2.3 Method of Test

Initial Conditions

System Simulator (SS):

> Serving Cell: default parameters

Mobile Station (MS):

> The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

> -

PIXIT statements

> - MS LCS Notification timeout timer

Test Procedure

The MS is paged with a PAGING REQUEST TYPE 1 message. After sending the CIPHERING MODE COMPLETE message the MS receives an SS REGISTER message with a Facility IE containing a LCS Location Notification Invoke set to notifyAndVerify-LocationNotAllowedIfNoResponse. The LCS Client Name contained in the USSD text string of the lcs-LocationNotification shall be displayed with the option to accept or deny the request, if allowed by subscription

or if barred by subscription respectively. The MS also indicates that location will not be allowed if a response is not received within a predetermined time.

Option 1:

The user then accepts the location request. The MS responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

Option 2:

The user then denies the location request. The MS responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

Option 3:

The user ignores the location request by taking no action, allowing the verification process timer to time-out. The SS responds with RELEASE COMPLETE.

Maximum duration of the test

5 minutes.

Expected Sequence

The test sequence is repeated for k = 1 … 3.

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 3 is set to 1 (MS-Assisted GPS)
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS -> MS	REGISTER	Call Independent SS containing Facility IE LCS Location Notification Invoke set to notifyAndVerify-LocationNotAllowedIfNoResponse
12	SS		SS starts timer T(LCSN) set to 90% of MS LCS Notification timeout timer
13A (k=1)	MS		The MS displays the location request and information about LCS Client. The user accepts location request before timer T(LCSN) expires.
14A (k=1)	SS -> MS	RELEASE COMPLETE	Containing a LocationNotification return result with verificationResponse set to permissionGranted.
13B (k=2)	MS		The MS displays the location request and information about LCS Client. The user rejects location request before timer T(LCSN) expires.
14B (k=2)	MS -> SS	RELEASE COMPLETE	Containing a LocationNotification return result with verificationResponse set to permissionDenied.
13C (k=3)	MS		The MS displays the location request and information about LCS Client. The user does not reply and waits for T(LCSN) to expire.
14C (k=3)	SS->MS	RELEASE COMPLETE	SS terminates the dialogue after T(LCSN) expiry
15	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

PAGING RESPONSE (Step 4)

Information element	Value/remark
Protocol Discriminator	RR management
Ciphering Key Sequence number - Key Sequence	Key sequence number previously allocated to MS, or "111" if no key is available
Mobile station Classmark 2 - ES IND	Shall indicate early autonomous sending of CLASSMARK CHANGE
Mobile Identity - odd/even - Type of identity - Identity digits	Even TMSI TMSI previously allocated to MS

REGISTER (Step 11)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)

Transaction identifier
Message type
Facility
	REGISTER (0011 1011)
	Invoke = lcs-LocationNotification
	LocationNotificationArg
	   notificationType ->notifyAnd Verify-LocationNotAllowedIfNoResponse,
	   locationType -> current Location ,
	   lcsClientExternalID -> externalAddress
	   lcsClientName ->dataCodingScheme
	           nameString

RELEASE COMPLETE (Option k=1 Step 14A)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type Facility	RELEASE COMPLETE (xx10 1010) Return result = lcs-LocationNotification LocationNotificationRes verificationResponse -> permissionGranted

RELEASE COMPLETE (Option k=2 Step 14B)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type Facility	RELEASE COMPLETE (xx10 1010) Return result = lcs-LocationNotification LocationNotificationRes verificationResponse -> permissionDenied

RELEASE COMPLETE (Option k=3, Step 14C)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type	RELEASE COMPLETE (0010 1010)

70.9.4 MT-LR / RRLP Error Handling for MS-Based A-GPS

70.9.4.1 RRLP Protocol Error

70.9.4.1.1 Conformance requirement:

The MS sends an RRLP PROTOCOL ERROR message to the network if there is a problem that prevents the MS to receive a complete and understandable RRLP MEASURE POSITION REQUEST component.

Test References

3GPP TS 04.31 sub clause 2.2, 2.5

70.9.4.1.2 Test Purpose

To verify that the MS sends the correct positioning capability via controled early classmark sending. The MS shall send a RRLP PROTOCOL ERROR message to SS with specific error code if RRLP MEASURE POSITION REQUEST is incomplete. On receipt of second RRLP MEASURE POSITION REQUEST from SS to start the measurement, MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.9.4.1.3 Method of Test

Initial Conditions:

System Simulator:

Serving Cell: default parameters.

Satellite signals: default conditions.

Mobile Station:

The MS is MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

- TSPC_MS_RRLP_RELEASE

PIXIT statements

-

Test Procedure:

The MS is paged with a PAGING REQUEST TYPE 1 message. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS receives RR APPLICATION INFORMATION messages containing RRLP Assistance Data messages.

The SS then sends an RRLP MEASURE POSITION REQUEST message with missing information element.

The MS shall send RRLP PROTOCOL ERROR as it fails to decode RRLP MEASURE POSITION REQUEST. The SS repeats RRLP MEASURE POSITION REQUEST with correct message contents.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 2 is set to 1 (MS-Based GPS)
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
12	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
13	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
14	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
15	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 1 (with missing final octet)
16	MS -> SS	RR APPLICATION INFORMATION	RRLP PROTOCOL ERROR
17	SS -> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 2
18	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: locationInfo (Option 1) or locationError with gpsAssDataMissing and additionalAssistanceData (Option 2)
18a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 18 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
18b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 18a, the MS acknowledges the received assistance data.
18c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 18 that is available in the SS, this message may include further assistance data.
18d	MS-> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 18, this message contains locationInfo.
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released

Specific Message Contents

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment
	Bit2=0 -> First or only segment
	Bit3=0 -> Command or Final Response
	Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded
	Step 15, 17 and 18c: RRLP Measure Position Request
	Step 18 and 18d: RRLP Measure Position Response
	Step 11, 13, 18a: RRLP Assistance Data
	Step 12, 14, 18b: RRLP Assistance Data Ack
	Step 16: RRLP Protocol Error

RRLP Assistance Data (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 4,6,9. See TS 51.010-7 sub clause 5.1.5
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Steps 12, 14, 18b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 3 (Option 2, Step 18b)
component	CHOICE	assistanceDataAck

RRLP Assistance Data (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 10,13,22. See TS 51.010-7 sub clause 5.1.5
ionosphericModel	SEQUENCE	See TS 51.010-7 sub clause 5.1.6
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 0. Rel 5 and later: 1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request 1 (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy*	Integer (0-127)	127
useMultipleSets*	ENUMERATED	oneSet
Note*: Final octet of data shall be disgarded. E.g if encoded data is [0x20, 0x01, 0xFE, 0xD8] this shall be transmitted as [0x20, 0x01, 0xFE].		

RRLP Protocol Error (Step 16):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	0 or 1
component	CHOICE	protocolError
errorCause	ENUMERATED	missingIEorComponentElement, messageTooShort or Incorrect Data

RRLP Measure Position Request 2 (Step 17):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
refLocation	SEQUENCE	See TS 51.010-7 sub clause 5.1.4
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 18 (Option 1) or 18d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2 or 3 (Option 2, Step 18d)
component	CHOICE	msrPositionRsp (A valid response will contain LocationInfo otherwise LocationError will be returned)
locationInfo	SEQUENCE	Any value is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Measure Position Response (Step 18 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 18a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	3
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 18 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request (Step 18c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	3
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 as requested by the MS in step 18 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

70.9.4.2 RRLP Location Error – Requested Method Not Supported

70.9.4.2.1 Conformance requirement:

The MS sends an RRLP MEASURE POSITION RESPONSE message to the network containing a Location Error component with an error indication if the measurement is not possible.

Test References

3GPP TS 04.31 sub clause 2.2, A.3.2.6

70.9.4.2.2 Test Purpose

To verify that the MS sends the correct positioning capability via controled early classmark sending. The MS shall send a RRLP MEASURE POSITION RESPONSE message with Location Error component if the MS does not support the requested method. On receipt of second RRLP MEASURE POSITION REQUEST from SS to start the measurement, the MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.9.4.2.3 Method of Test

Initial Conditions:

System Simulator:

Serving Cell: default parameters.

Satellite signals: default conditions.

Mobile Station:

The MS is MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

- TSPC_MS_RRLP_RELEASE

PIXIT statements

-

Test Procedure:

The MS is paged with a PAGING REQUEST TYPE 1 message. The MS performs control early classmark sending to provide LCS positioning method capability.

The SS sends an RRLP MEASURE POSITION REQUEST message with a method type not supported by the mobile (type not supported to be E-OTD).

The MS sends RRLP MEASURE POSITION RESPONSE to SS containing a Location Error component (Requested Method not Supported) as the requested method is not supported.

The MS receives RR APPLICATION INFORMATION messages containing RRLP Assistance Data messages followed by a new RRLP MEASURE POSITION REQUEST with correct message contents including assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 2 is set to 1 (MS-Based GPS)
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 1 (Request method not supported)
12	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response 1 (location error)
13	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
14	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
15	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
16	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
17	SS -> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 2
18	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response 2: locationInfo (Option 1) or locationError with gpsAssDataMissing and additionalAssistanceData (Option 2)
18a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 18 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
18b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 18a, the MS acknowledges the received assistance data.
18c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 18 that is available in the SS, this message may include further assistance data.
18d	MS-> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 18, this message contains locationInfo.
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released

Specific Message Contents

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment
	Bit2=0 -> First or only segment
	Bit3=0 -> Command or Final Response
	Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded
	Step 11, 17 and 18c: RRLP Measure Position Request
	Step 12, 18 and 18d: RRLP Measure Position Response
	Step 13, 15, 18a: RRLP Assistance Data
	Step 14, 16, 18b: RRLP Assistance Data Ack

RRLP Measure Position Request 1 (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	eotd
measureResponseTime	Integer 0 to 7	7
useMultipleSets	ENUMERATED	oneSet
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response 1 (Step 12):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRes
locationError	SEQUENCE	
locErrorReason	ENUMERATED	methodNotSupported
extended-reference	SEQUENCE	Rel5 and later
		The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 4,6,9. See TS 51.010-7 sub clause 5.1.5
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Steps 14, 16, 18b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2 or 3 (Option 2, Step 18b)
component	CHOICE	assistanceDataAck

RRLP Assistance Data (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 10,13,22. See TS 51.010-7 sub clause 5.1.5
ionosphericModel	SEQUENCE	See TS 51.010-7 sub clause 5.1.6
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 0. Rel 5 and later: 1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request 2 (Step 17):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
refLocation	SEQUENCE	See TS 51.010-7 sub clause 5.1.4
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 18 (Option 1) or 18d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2 or 3 (Option 2, Step 18d)
component	CHOICE	msrPositionRsp (A valid response will contain LocationInfo otherwise LocationError will be returned)
locationInfo	SEQUENCE	Any value is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Measure Position Response (Step 18 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 18a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	3
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 18 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request (Step 18c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	3
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 as requested by the MS in step 18 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

70.9.4.3 RRLP Location Error – GPS Assistance Data Missing

70.9.4.3.1 Conformance requirement

The MS sends an RRLP MEASURE POSITION RESPONSE message to the network containing a Location Error component with an error indication if the measurement is not possible.

Test References

3GPP TS 04.31 sub clause 2.2, A.3.2.6

70.9.4.3.2 Test Purpose

To verify that the MS sends the correct positioning capability via controled early classmark sending. The MS shall send a RRLP MEASURE POSITION RESPONSE message with Location Error component if some GPS assistance data are missing. On receipt of second RRLP MEASURE POSITION REQUEST (with all necessary GPS assistance data to obtain a location estimate included) from SS to start the measurement, the MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.9.4.3.3 Method of Test

Initial Conditions

System Simulator:

Serving Cell: default parameters.

Satellite signals: default conditions.

Mobile Station:

The MS is MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

- TSPC_MS_RRLP_RELEASE

PIXIT statements

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Test Procedure

The A-GPS assistance data stored in the MS is reset.

The MS is paged with a PAGING REQUEST TYPE 1 message. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS receives an RRLP MEASURE POSITION REQUEST message with Reference Time GPS assistance data.

The MS requests additional assistance data by sending an RRLP MEASURE POSITION RESPONSE message to SS containing a Location Error component with IE LocErrorReason set to gpsLocCalAssDataMissing or gpsAssDataMissing.

The SS provides the requested assistance data that is available in the SS in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data.

The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Maximum duration of the test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Reset all stored A-GPS assistance data
2	SS->MS	PAGING REQUEST TYPE I	
3	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
4	SS -> MS	IMMEDIATE ASSIGNMENT	
5	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
6	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 2 is set to 1 (MS-Based GPS)
7	SS -> MS	AUTHENTICATION REQUEST	
8	MS -> SS	AUTHENTICATION RESPONSE	
9	SS -> MS	CIPHERING MODE COMMAND	
10	MS -> SS	CIPHERING MODE COMPLETE	
11	SS		SS starts ciphering.
12	SS -> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 1 (with Reference Time GPS assistance data)
13	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response 1 (location error with gpsLocCalAssDataMissing or gpsAssDataMissing)
14	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. The SS provides the requested data from step 13 that is available in the SS in zero, one or more RRLP Assistance Data delivery messages.
15	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 14, the MS acknowledges the received assistance data.
16	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 2. This message may include further assistance data.
17	MS-> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response 2. (LocationInfo)
18	SS -> MS	CHANNEL RELEASE	The main signalling link is released

Specific Message Contents

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment
	Bit2=0 -> First or only segment
	Bit3=0 -> Command or Final Response
	Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded
	Step 12 and 16: RRLP Measure Position Request
	Step 13 and 17: RRLP Measure Position Response
	Step 14: RRLP Assistance Data
	Step 15: RRLP Assistance Data Ack

RRLP Measure Position Request 1 (Step 12):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	Assistance Data Reference Time
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response 1 (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsLocCalAssDataMissing or gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 14):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data requested in step 13, if available from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceDataAck

RRLP Measure Position Request 2 (Step 16):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 as requested by the MS in step 13
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response 2 (Step 17):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp A valid response will contain LocationInfo otherwise LocationError will be returned
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

70.9.4.4 Multiple RRLP Requests with same Reference Number

70.9.4.4.1 Conformance requirement:

When after reception of a Measure Position Request component, but before responding with a Measure Position Response or Protocol Error Component, the MS receives a new RRLP message with the Measure Position Request component, the MS ignores the latter component if the old and new RRLP Measure Position Request components have the same Reference Number.

The SMLC may use the same Reference Number or different Reference Numbers for different RRLP components within the same pseudo-segmentation sequence.

Test References

3GPP TS04.31 sub clause 2.5.5

3GPP TS04.31 sub clause 3.2

70.9.4.4.2 Test Purpose

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall ignore the second RRLP MEASURE POSITION REQUEST if the second RRLP MEASURE POSITION REQUEST has the same REFERENCE NUMBER as in the previous one. The MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the current measurement.

70.9.4.4.3 Method of Test

Initial Conditions:

System Simulator:

Serving Cell: default parameters.

Satellite signals: No GPS signal available.

Mobile Station:

The MS is MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

- TSPC_MS_RRLP_RELEASE

PIXIT statements

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Test Procedure:

The MS is paged with a PAGING REQUEST TYPE 1 message. The MS performs control early classmark sending to provide LCS positioning method capability.

After sending CIPHERING MODE COMPLETE message the MS receives RR APPLICATION INFORMATION messages containing RRLP Assistance Data messages.

The SS then sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request including further assistance data to start the measurement.

Option 1: The MS then performs positioning measurements. After a delay to of 8 seconds, the SS sends the second RRLP MEASURE POSITION REQUEST with the same REFERENCE NUMBER as the first one (this delay shall be cancelled in the event of option 2). The MS shall ignore the second RRLP MEASURE POSITION REQUEST. The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

Option 2: The MS may request additional assistance data by immediately sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by a second RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS sends the second RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements and the SS sends the third RRLP MEASURE POSITION REQUEST with the same REFERENCE NUMBER as the second one. The MS shall ignore the third RRLP MEASURE POSITION REQUEST. The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

The satellite signals should be made available after sending the second Measure Position request (in case of option 1) and third Measure Position request (in case of option 2)

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 2 is set to 1 (MS-Based GPS)
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
12	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
13	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
14	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
15	SS -> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 1
16	MS (Option 1) or MS->SS (Option 2)	- or RR APPLICATION INFORMATION	If no message is received from the MS within 8 seconds, then the SS shall assume that the MS is performing the measurement (Option 1). The SS continues to step 17. If the MS sends RRLP Measure Position Response: locationError with gpsAssDataMissing (Option 2) within 8 seconds, then the SS continues to step 16a.
16a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 16 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
16b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 16a, the MS acknowledges the received assistance data.
16c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 2. If the MS requested additional assistance data in step 16 that is available in the SS, this message may include further assistance data.
16d	MS (Option 2)		MS is performing the measurement (Option 2)
17	SS -> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 2 with same reference number as in Request 1 (Option 1) or RRLP Measure Position Request 3 with same reference number as in Request 2 (Option 2) Note: The satellite signals should be made available to MS after sending this message

18	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: locationInfo
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released

Specific Message Contents

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment
	Bit2=0 -> First or only segment
	Bit3=0 -> Command or Final Response
	Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded
	Step 15, 16c, 17: RRLP Measure Position Request
	Step 16, 18: RRLP Measure Position Response
	Step 11, 13, 16a: RRLP Assistance Data
	Step 12, 14, 16b: RRLP Assistance Data Ack

RRLP Assistance Data (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 4,6,9. See TS 51.010-7 sub clause 5.1.5
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Steps 12, 14, 16b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

RRLP Assistance Data (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 10,13,22. See TS 51.010-7 sub clause 5.1.5
ionosphericModel	SEQUENCE	See TS 51.010-7 sub clause 5.1.6
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 0. Rel 5 and later: 1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request 1 (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
refLocation	SEQUENCE	See TS 51.010-7 sub clause 5.1.4
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 16 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 16a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 16 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request 2 (Step 16c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 as requested by the MS in step 16 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request 2 (Option 1) or Request 3 (Option 2) (Step 17):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 18):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp (A valid response will contain LocationInfo)
locationInfo	SEQUENCE	Any value is acceptable.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

70.9.4.5 Multiple RRLP Requests with different Reference Number

70.9.4.5.1 Conformance requirement:

When after reception of a Measure Position Request component, but before responding with a Measure Position Response or Protocol Error Component, the MS receives a new RRLP message with the Measure Position Request component, the MS aborts activity for the former component, and starts to act according to the latter component, if the old and new RRLP Measure Position Request components have different Reference Numbers.

The SMLC may use the same Reference Number or different Reference Numbers for different RRLP components within the same pseudo-segmentation sequence.

Test References

    3GPP TS04.31 sub clause 2.5.5

    3GPP TS04.31 sub clause 3.2

70.9.4.5.2 Test Purpose

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall terminate the current location measurement if the second RRLP MEASURE POSITION REQUEST is received with a different REFERENCE NUMBER. The MS shall perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST. The MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.9.4.5.3 Method of Test

Initial Conditions:

    System Simulator:

        Serving Cell: default parameters.

        Satellite signals: No GPS signal available.

    Mobile Station:

        The MS is MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

    - TSPC_MS_RRLP_RELEASE

PIXIT statements

    -

Test Procedure:

The MS is paged with a PAGING REQUEST TYPE 1 message. The MS performs control early classmark sending to provide LCS positioning method capability.

After sending CIPHERING MODE COMPLETE message the MS receives RR APPLICATION INFORMATION messages containing RRLP Assistance Data messages.

The SS then sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request including further assistance data to start the measurement.

Option 1: The MS then performs positioning measurements. After a delay of 8 seconds, the SS sends the second RRLP MEASURE POSITION REQUEST with a different REFERENCE NUMBER from the first one (this delay shall be cancelled in the event of option 2). The MS shall terminate the current location measurement and perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST. The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

Option 2: The MS may request additional assistance data by immediately sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by a second RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS sends the second RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements and the SS sends the third RRLP MEASURE POSITION REQUEST with a different REFERENCE NUMBER from the second one. The MS shall terminate the current location measurement and perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST, including the possibility of repeating the request for more assistance data (Option 2b). The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

The satellite signals should be made available after sending the second Measure Position request (in case of option 1) and third Measure Position request (in case of option 2)

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 2 is set to 1 (MS-Based GPS)
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
12	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
13	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
14	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
15	SS -> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 1
16	MS (Option 1) or MS->SS (Option 2)	- or RR APPLICATION INFORMATION	If no message is received from the MS within 8 seconds, then the SS shall assume that the MS is performing the measurement (Option 1). The SS continues to step 17. If the MS sends RRLP Measure Position Response: locationError with gpsAssDataMissing (Option 2) within 8 seconds, then the SS continues to step 16a.
16a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 16 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
16b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 16a, the MS acknowledges the received assistance data.
16c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 2. If the MS requested additional assistance data in step 16 that is available in the SS, this message may include further assistance data.
16d	MS (Option 2)		MS is performing the measurement (Option 2)
17	SS -> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 2 with different reference number as in Request 1 (Option 1) or RRLP Measure Position Request 3 with different reference number as in Request 2 (Option 2) Note: The satellite signals should be made available to MS after sending this message

18	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: locationInfo (Option 1 or 2a) Check reference number is 2 or locationError with gpsAssDataMissing (Option 2b) Check reference number is 2
18a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 18 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
18b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 18a, the MS acknowledges the received assistance data.
18c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 18 that is available in the SS, this message may include further assistance data.
18d	MS-> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 18 this message contains locationInfo.
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released

Specific Message Contents

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 15, 16c, 17, 18c: RRLP Measure Position Request Step 16, 18, 18d: RRLP Measure Position Response Step 11, 13, 16a, 18a: RRLP Assistance Data Step 12, 14, 16b, 18b: RRLP Assistance Data Ack

RRLP Assistance Data (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 4,6,9. See TS 51.010-7 sub clause 5.1.5
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Steps 12, 14, 16b and 18b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

RRLP Assistance Data (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 10,13,22. See TS 51.010-7 sub clause 5.1.5
ionosphericModel	SEQUENCE	See TS 51.010-7 sub clause 5.1.6
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 0. Rel 5 and later: 1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request 1 (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
refLocation	SEQUENCE	See TS 51.010-7 sub clause 5.1.4
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 16 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later. The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 16a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 16 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request 2 (Step 16c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 as requested by the MS in step 16 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request 2 (Option 1) or Request 3 (Option 2) (Step 17):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
refLocation	SEQUENCE	See TS 51.010-7 sub clause 5.1.4
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 18 (Option 1 or 2a) or Step 18d (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp (A valid response will contain LocationInfo otherwise LocationError will be returned)
locationInfo	SEQUENCE	Any value is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Measure Position Response (Step 18 (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 18a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 18 (Option 2b) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request (Step 18c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 as requested by the MS in step 18 (Option 2b).
extended-reference	SEQUENCE	Rel 5 and later

70.9.4.6 RR Management Commands

70.9.4.6.1 Conformance requirement

A target MS shall terminate any positioning procedure or the transfer of RRLP positioning assistance data without sending any response to the SMLC if any RR message is received from the BSC that starts some other RR management procedure, including a new positioning procedure. The new RR procedure shall then be executed by the MS.

Upon receiving the HO or other RR management command, the MS will stop the location procedure and start on handover or other RR management procedure, since this has higher priority than location. The MS will then send the HO complete or other RR management response message to BSC.

The SMLC may use the same Reference Number or different Reference Numbers for different RRLP components within the same pseudo-segmentation sequence.

Test References

3GPP TS 03.71 sub clause 7.11.5,

3GPP TS 03.71 sub clause 10.6

3GPP TS 04.31 sub clause 3.2

70.9.4.6.2 Test Purpose

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall terminate the current location measurement if an RR MANAGEMENT command is received during the measurement procedure. The MS shall send an RR MANAGEMENT RESPONSE message to SS when the RR MANAGEMENT procedure is complete. The MS shall perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST and send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.9.4.6.3 Method of Test

Initial Conditions:

System Simulator:

Serving Cell: default parameters.

Satellite signals: No GPS signal available.

Mobile Station:

The MS is MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

- TSPC_MS_RRLP_RELEASE

PIXIT statements

-

Test Procedure:

The MS is paged with a PAGING REQUEST TYPE 1 message. The MS performs control early classmark sending to provide LCS positioning method capability.

After sending CIPHERING MODE COMPLETE message the MS receives RR APPLICATION INFORMATION messages containing RRLP Assistance Data messages.

The SS then sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request including further assistance data to start the measurement.

Option 1: The MS then performs positioning measurements. After a delay of 8 seconds the SS sends an RR MANAGEMENT command. The MS shall terminate the current location measurement and perform the RR MANAGEMENT command. The MS sends an RR MANAGEMENT RESPONSE message to SS when the RR MANAGEMENT procedure is complete. The SS sends a new RRLP MEASURE POSITION REQUEST including assistance data and the MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data finishing the measurement according to the newly received RRLP MEASUREMENT POSITION REQUEST (possibly by requesting additional assistance data first).

Option 2: The MS may request additional assistance data by immediately sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by a second RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS sends the second RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements and the SS sends a RR MANAGEMENT command. The MS shall terminate the current location measurement and perform the RR MANAGEMENT command. The MS sends a RR MANAGEMENT RESPONSE message to SS when the RR MANAGEMENT procedure is complete. The SS sends a

new RRLP MEASURE POSITION REQUEST including assistance data and the MS either sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data finishing the measurement according to the newly received RRLP MEASUREMENT POSITION REQUEST or requests more assistance data and then sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data.

The satellite signals should be made available after sending the second Measure Position request (in case of option 1) and third Measure Position request (in case of option 2)

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 2 is set to 1 (MS-Based GPS)
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
12	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
13	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
14	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
15	SS -> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 1
16	MS (Option 1) or MS->SS (Option 2)	- or RR APPLICATION INFORMATION	If no message is received from the MS within 8 seconds, then the SS shall assume that the MS is performing the measurement (Option 1). The SS continues to step 17. If the MS sends RRLP Measure Position Response: locationError with gpsAssDataMissing (Option 2) within 8 seconds, then the SS continues to step 17a.
16a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 16 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
16b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 16a, the MS acknowledges the received assistance data.
16c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 2. If the MS requested additional assistance data in step 16 that is available in the SS, this message may include further assistance data.
16d	MS (Option 2)		MS is performing the measurement (Option 2)
17	SS -> MS	RR MANAGEMENT COMMAND	
18	MS -> SS	RR MANAGEMENT COMPLETE	MS terminates the measurement procedure and act on the RR management command
19	SS -> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 2 (Option 1) or RRLP Measure Position Request 3 (Option 2) Note: The satellite signals should be made

			available to MS after sending this message
20	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: locationInfo (Option 1 or 2a) or locationError with gpsAssDataMissing (Option 2b)
20a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 20 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
20b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 20a, the MS acknowledges the received assistance data.
20c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 20 that is available in the SS, this message may include further assistance data.
20d	MS-> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 20 this message contains locationInfo.
21	SS -> MS	CHANNEL RELEASE	The main signalling link is released

Specific Message Contents

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 15, 16c, 19, 20c: RRLP Measure Position Request Step 16, 20, 20d: RRLP Measure Position Response Step 11, 13, 16a, 20a: RRLP Assistance Data Step 12, 14, 16b, 20b: RRLP Assistance Data Ack

RRLP Assistance Data (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 4,6,9. See TS 51.010-7 sub clause 5.1.5
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Assistance Data Ack (Steps 12, 14, 16b, 20b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

RRLP Assistance Data (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
navigationModel	SEQUENCE	PRNs 10,13,22. See TS 51.010-7 sub clause 5.1.5
ionosphericModel	SEQUENCE	See TS 51.010-7 sub clause 5.1.6
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 0. Rel 5 and later: 1
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request 1 (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
refLocation	SEQUENCE	See TS 51.010-7 sub clause 5.1.4
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 16 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 16a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 16 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)

RRLP Measure Position Request 2 (Step 16c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 as requested by the MS in step 16 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later

RR Management Command (Classmark Enquiry) (Step 17):

Information element	Value/remark
Encoded	(06 13)
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Classmark Enquiry Message Type	0001 0011

RRLP Measure Position Request 2 (Option 1) or Request 3 (Option 2) (Step 19):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
refLocation	SEQUENCE	See TS 51.010-7 sub clause 5.1.4
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Response (Step 20 (Option 1 or 2a) or Step 20d (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp (A valid response will contain LocationInfo otherwise LocationError will be returned)
locationInfo	SEQUENCE	Any value is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Measure Position Response (Step 20 (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 20a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 20 (Option 2b) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	R98, R99, Rel 4: 1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Rel 5 and later: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	Rel 5 and later

RRLP Measure Position Request (Step 20c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8 as requested by the MS in step 20 (Option 2b).
extended-reference	SEQUENCE	Rel 5 and later

70.10 Conventional GPS Network Induced Tests

70.10.1 Void

70.10.2 Network Induced Location Request Emergency Call on TCH Radio Channel

70.10.2.1 Network Induced Location Request Emergency Call on TCH Radio Channel for Mobiles Supporting Conventional GPS

70.10.2.1.1 Conformance requirements

1. With the MS in the "idle, updated" state, the user shall initiate an emergency after the number 112 (for GSM900 and 1800 MS), or 911 (for PCS 1900 MS in the USA), or 08 (for PCS 1900 MS in Mexico) has been entered by

the user. The MS shall send a CHANNEL REQUEST message with correct establishment cause ("emergency call").

2. When a user requests an emergency call establishment the mobile station will send a CM SERVICE REQUEST message to the network with a CM service type information element indicating emergency call establishment and the correct CKSN and TMSI. A mobile station which implements the "LCS" option shall also implement the "Controlled Early Classmark Sending" option. A mobile station which implements the "Controlled Early Classmark Sending" option shall indicate it in the classmark (ES IND bit).

3. After sending the CM SERVICE REQUEST message the MS shall send a CLASSMARK CHANGE message. The "Mobile Station Classmark 3" information element shall correctly specify the positioning methods supported by the MS.

4. After the CM SERVICE ACCEPT message is received from the network, the MS shall send an EMERGENCY SETUP message.

5. After receipt of a CONNECT ACKNOWLEDGE message during correct establishment of the emergency call the MS shall indicate that the TCH is through connected in both directions.

6. On receiving the MEASURE POSITION REQUEST message the MS tries to perform the requested location measurements, and calculates its own position. It sends the results in the RRLP MEASURE POSITION RESPONSE message.

70.10.2.1.2 References

3GPP TS 04.08/44.018 sub clauses 3.3.1.1 and 9.1.11.

3GPP TS 04.08/24.008 sub clauses 4.5.1.5, 5.2.1, 9.2.9, 10.5.1.6, 10.5.1.7.

3GPP TS 02.30 sub clause 4.

3GPP TS 04.31 sub clause 2.2.

70.10.2.1.3 Test Purpose

To verify when a network instigates the LCS positioning procedure by sending RRLP (Measure Position Request) message, after a traffic channel has been established during an emergency call, the mobile responds with RRLP (Measure Position Response) containing MS location estimate.

70.10.2.1.4 Method of Test

70.10.2.1.5 Initial Conditions

System Simulator (SS):

Serving Cell: default parameters.

Satellite signals: default conditions.

Mobile Station (MS):

The MS is in MM-state "idle, updated" with valued TMSI and CKSN.

SIM:

Normal SIM

Specific PICS statements

- TSPC_MS_RRLP_RELEASE

PIXIT statements

-

70.10.2.1.6   Void

70.10.2.1.7   Test Procedure

An Emergency Call is initiated with the MS. SIM card is included in the MS.

The emergency call is established with a late assignment.

After receiving the CONNECT ACKNOWLEDGE message from the MS, the SS sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request on FACCH.

The MS then performs positioning measurements, and responds with a RR APPLICATION INFORMATION message containing a RRLP Measure Position Response.

The call is cleared by the SS.

70.10.2.1.8   Maximum duration of the test

5 minutes.

70.10.2.1.9   Expected Sequence

Step	Direction	Message	Comments
1	MS		The appropriate "emergency call number" is entered.
2	MS -> SS	CHANNEL REQUEST	Establishment cause is emergency call establishment.
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM. The CM service type IE indicates "emergency call establishment". "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 1 is set to 1 (Conventional GPS) and Bit 2 is set to 0 (no support for MS-based GPS)
6	SS -> MS	CM SERVICE ACCEPT	
7	MS -> SS	EMERGENCY SETUP	
8	SS -> MS	CALL PROCEEDING	
9	SS -> MS	ALERTING	
10	SS -> MS	ASSIGNMENT COMMAND	
11	MS -> SS	ASSIGNMENT COMPLETE	
12	SS -> MS	CONNECT	
13	MS -> SS	CONNECT ACKNOWLEDGE	The MS indicates that the TCH is through connected in both directions.
14	SS-> MS	RR APPLICATION INFORMATION	(RRLP Measure Position Request)
15	MS -> SS	RR APPLICATION INFORMATION	(RRLP Measure Position Response)
16	SS -> MS	DISCONNECT	
17	MS -> SS	RELEASE	
18	SS -> MS	RELEASE COMPLETE	
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

70.10.2.1.10 Specific Message Contents

70.10.2.1.10.1 RR APPLICATION INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded RRLP (Measure Position Request), RRLP (Measure Position Response)

70.10.2.1.10.2 RRLP Measure Position Request

Information element	Type	Value/remark
ASN.1 encoded	-	
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	7
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
extended-reference	SEQUENCE	Rel 5 and later

70.10.2.1.10.3 RRLP Measure Position Response

Information element	Type	Value/remark
ASN.1 encoded	-	
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp A valid response will contain locationInfo otherwise locationError will be returned
locationInfo	SEQUENCE	Any value is acceptable.
locationError	SEQUENCE	Any error value is acceptable.
extended-reference	SEQUENCE	Rel5 and later The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

70.11   A-GPS Minimum Performance tests

This sub clause specifies the measurement procedures for the conformance test of the minimum performance requirements for GSM user equipment (MS) where the only Assisted Global Navigation Satellite System (A-GNSS) supported is Assisted Global Positioning System (A-GPS) L1 C/A. The procedures for MSs that support other or additional A-GNSSs are specified in sub clause 70.16.

70.11.1 Abbreviations

A-GPS	Assisted - Global Positioning System
A-GNSS	Assisted Global Navigation Satellite System
C/A	Coarse/Acquisition
ECEF	Earth Centred, Earth Fixed
GPS	Global Positioning System
GSS	GPS System Simulator

HDOP   Horizontal Dilution Of Precision
LOS   Line Of Sight
WLS   Weighted Least Square

70.11.2 GPS test conditions

70.11.2.1   GPS signals

The GPS signal is defined at the A-GPS antenna connector of the MS. For MS with integral antenna only, a reference antenna with a gain of 0 dBi is assumed.

70.11.2.2   GPS frequency

The GPS signals shall be transmitted with a frequency accuracy of ± 0.025 PPM.

70.11.2.3   GPS static propagation conditions

The propagation for the static performance measurement is an Additive White Gaussian Noise (AWGN) environment. No fading and multi-paths exist for this propagation model.

70.11.2.4   GPS multi-path conditions

Doppler frequency difference between direct and reflected signal paths is applied to the carrier and code frequencies. The Carrier and Code Doppler frequencies of LOS and multi-path for GPS L1 signal are defined in table 70.11.2.1.

Table 70.11.2.1: Multi-path Conditions for GPS Signals

Initial relative Delay [GPS chip]	Carrier Doppler frequency of tap [Hz]	Code Doppler frequency of tap [Hz]	Relative mean Power [dB]
0	Fd	Fd / N	0
0.5	Fd - 0.1	(Fd-0.1) /N	-6
NOTE: Discrete Doppler frequency is used for each tap.			

$N = f_{GPSL1}/f_{chip}$, where f_{GPSL1} is the nominal carrier frequency of the GPS L1 signal (1575.42 MHz) and f_{chip} is the GPS L1 C/A code chip rate (1.023 Mchips/s).

The initial carrier phase difference between taps shall be randomly selected between 0 and 2 π radians. The initial value shall have uniform random distribution.

70.11.3 GSM test conditions

70.11.3.1   GSM frequency band and frequency range

The tests in this sub clause are performed on one of the mid range ARFCNs of the GSM operating frequency band of the MS. The ARFCNs to be used for mid range are defined in Table 3.3

If the MS supports multiple frequency bands then the Sensitivity tests in sub clause 70.11.5 shall be repeated in each supported frequency band.

70.11.3.2   GSM frequency

For all tests the GSM frequency shall be offset with respect to the nominal frequency by an amount equal to the sum of +0.025 PPM and the offset in PPM of the actual transmitted GPS carrier frequency with respect to the nominal GPS frequency.

70.11.4 A-GPS test conditions

70.11.4.1   General

This sub clause defines the minimum performance requirements for both MS based and MS assisted A-GPS terminals. If a terminal supports both modes then it shall be tested in both modes.

70.11.4.2   Measurement parameters

70.11.4.2.1   MS based A-GPS measurement parameters

In case of MS-based A-GPS, the measurement parameters are contained in the RRLP LOCATION INFORMATION IE. The measurement parameter is the horizontal position estimate reported by the MS and expressed in latitude/longitude.

70.11.4.2.2   MS assisted A-GPS measurement parameters

In case of MS-assisted A-GPS, the measurement parameters are contained in the RRLP GPS MEASUREMENT INFORMATION IE. The measurement parameters are the MS GPS Code Phase measurements. The MS GPS Code Phase measurements are converted into a horizontal position estimate using the procedure detailed in sub clause 70.11.4.3.

70.11.4.2.3   2D position error

The 2D position error is defined by the horizontal difference in meters between the ellipsoid point reported or calculated from the MS Measurement Report and the actual simulated position of the MS in the test case considered.

70.11.4.2.4   Response time

Max Response Time is defined as the time starting from the moment that the MS has received the final RRLP MEASURE POSITION REQUEST sent before the MS sends the MEASURE POSITION RESPONSE containing the Location Information or the GPS Measurement Information, and ending when the MS starts sending the MEASURE POSITION RESPONSE containing the Location Information or the GPS Measurement Information on the Air interface. The response times specified for all test cases are Time-to-First-Fix (TTFF), i.e. the MS shall not re-use any information on GPS time, location or other aiding data that was previously acquired or calculated and stored internally in the MS. A dedicated test message 'RESET MS POSITIONING STORED INFORMATION' has been defined in TS 44.014 for the purpose of deleting this information.

70.11.4.3   Converting MS-assisted measurement reports into position estimates

To convert the MS measurement reports in case of MS-assisted mode of A-GPS into position errors, a transformation between the "measurement domain" (code-phases, etc.) into the "state" domain (position estimate) is necessary. Such a transformation procedure is outlined in the following sub clauses. The details can be found in [ICD-GPS 200], [P. Axelrad, R.G. Brown] and [S.K. Gupta]

70.11.4.3.1   MS measurement reports

In case of MS-assisted A-GPS, the measurement parameters are contained in the RRLP GPS MEASUREMENT INFORMATION ELEMENT (sub clause A.3.2.5 in 3GPP TS 44.031). The measurement parameters required for calculating the MS position are:

   1) Reference Time: The MS has two choices for the Reference Time:

      a) "Reference Frame";

      b) "GPS TOW ".

   2) Measurement Parameters: 1 to <maxSat>:

      a) "Satellite ID (SV PRN)";

      b) "Whole GPS chips";

      c) "Fractional GPS Chips";

      d) "Pseudorange RMS Error".

Additional information required at the system simulator:

   1) "Reference Location" (sub clause A.4.2.4 in 3GPP TS 44.031):
      Used for initial approximate receiver coordinates.

   2) "Navigation Model" (sub clause A.4.2.4 in 3GPP TS 44.031):
      Contains the GPS ephemeris and clock correction parameters as specified in [ICD-GPS 200]; used for calculating the satellite positions and clock corrections.

3) "Ionospheric Model" (sub clause A.4.2.4 in 3GPP TS 44.031):
Contains the ionospheric parameters which allow the single frequency user to utilize the ionospheric model as specified in [ICD-GPS 200] for computation of the ionospheric delay.

70.11.4.3.2 WLS position solution

The WLS position solution problem is concerned with the task of solving for four unknowns; x_u, y_u, z_u the receiver coordinates in a suitable frame of reference (usually ECEF) and b_u the receiver clock bias. It typically requires the following steps:

Step 1: Formation of pseudo-ranges

The observation of code phase reported by the MS for each satellite SV_i is related to the pseudo-range/c modulo 1 ms (the length of the C/A code period). For the formation of pseudo-ranges, the integer number of milliseconds to be added to each code-phase measurement has to be determined first. Since 1 ms corresponds to a travelled distance of 300 km, the number of integer ms can be found with the help of reference location and satellite ephemeris. The distance between the reference location and each satellite SV_i is calculated and the integer number of milliseconds to be added to the MS code phase measurements is obtained.

Step 2: Formation of weighting matrix

The MS reported "Pseudorange RMS Error" values are used to calculate the weighting matrix for the WLS algorithm [P. Axelrad, R.G. Brown]. According to 3GPP TS 44.031, the encoding for this field is a 6 bit value that consists of a 3 bit mantissa, X_i and a 3 bit exponent, Y_i for each SV_i:

$$w_i = RMSError = 0.5 \times \left(1 + \frac{X_i}{8}\right) \times 2^{Y_i}$$

The weighting Matrix **W** is defined as a diagonal matrix containing the estimated variances calculated from the "Pseudorange RMS Error" values:

$$\mathbf{W} = \mathrm{diag}\left\{1/w_1^2, 1/w_2^2, \cdots, 1/w_n^2\right\}$$

Step 3: WLS position solution

The WLS position solution is described in reference [P. Axelrad, R.G. Brown] and usually requires the following steps:

1) Computation of satellite locations at time of transmission using the ephemeris parameters and user algorithms defined in [ICD-GPS 200], sub clause 20.3.3.4.3.

2) Computation of clock correction parameters using the parameters and algorithms as defined in [ICD-GPS 200], sub clause 20.3.3.3.3.1.

3) Computation of atmospheric delay corrections using the parameters and algorithms defined in [ICD-GPS 200], sub clause 20.3.3.5.2.5 for the ionospheric delay, and using the Gupta model in reference [S.K. Gupta], p. 121 equation (2) for the tropospheric delay.

4) The WLS position solution starts with an initial estimate of the user state (position and clock offset). The Reference Location is used as initial position estimate. The following steps are required:

   a) Calculate geometric range (corrected for Earth rotation) between initial location estimate and each satellite included in the MS measurement report.

   b) Predict pseudo-ranges for each measurement including clock and atmospheric biases as calculated in 1) to 3) above and defined in [ICD-GPS 200] and [P. Axelrad, R.G. Brown].

   c) Calculate difference between predicted and measured pseudo-ranges $\Delta\boldsymbol{\rho}$

d) Calculate the "Geometry Matrix" $\mathbf{G}$ as defined in [P. Axelrad, R.G. Brown]:

$$\mathbf{G} \equiv \begin{bmatrix} -\hat{\mathbf{1}}_1^T & 1 \\ -\hat{\mathbf{1}}_2^T & 1 \\ \vdots & \vdots \\ -\hat{\mathbf{1}}_n^T & 1 \end{bmatrix} \text{ with } \hat{\mathbf{1}}_i \equiv \frac{\mathbf{r}_{si} - \hat{\mathbf{r}}_u}{|\mathbf{r}_{si} - \hat{\mathbf{r}}_u|} \text{ where } \mathbf{r}_{si} \text{ is the Satellite position vector for SV}_i \text{ (calculated in 1)}$$

above), and $\hat{\mathbf{r}}_u$ is the estimate of the user location.

e) Calculate the WLS solution according to [P. Axelrad, R.G. Brown]:

$$\Delta\hat{\mathbf{x}} = \left(\mathbf{G}^T\mathbf{W}\mathbf{G}\right)^{-1}\mathbf{G}^T\mathbf{W}\Delta\boldsymbol{\rho}$$

f) Adding the $\Delta\hat{\mathbf{x}}$ to the initial state estimate gives an improved estimate of the state vector:

$$\hat{\mathbf{x}} \to \hat{\mathbf{x}} + \Delta\hat{\mathbf{x}}.$$

5) This new state vector $\hat{\mathbf{x}}$ can be used as new initial estimate and the procedure is repeated until the change in $\hat{\mathbf{x}}$ is sufficiently small.

Step 4: Transformation from Cartesian coordinate system to Geodetic coordinate system

The state vector $\hat{\mathbf{x}}$ calculated in Step 3 contains the MS position in ECEF Cartesian coordinates together with the MS receiver clock bias. Only the user position is of further interest. It is usually desirable to convert from ECEF coordinates x_u, y_u, z_u to geodetic latitude φ □, longitude λ and altitude h on the WGS84 reference ellipsoid.

Step 5: Calculation of "2-D Position Errors"

The latitude φ / longitude λ obtained after Step 4 is used to calculate the 2-D position error.

70.11.5 Sensitivity

70.11.5.1 Sensitivity Coarse Time Assistance

70.11.5.1.1 Definition

Sensitivity with coarse time assistance is the minimum level of GPS satellite signals required for the MS to make an A-GPS position estimate to a specific accuracy and within a specific response time when the network only provides coarse time assistance.

70.11.5.1.2 Conformance requirement

The first fix position estimates shall meet the accuracy and response time requirements in table 70.11.5.1.2 for the parameters specified in table 70.11.5.1.1.

Table 70.11.5.1.1: Test parameters for Sensitivity Coarse Time Assistance

Parameters	Unit	Value
Number of generated satellites	-	8
HDOP Range	-	1.1 to 1.6
Propagation conditions	-	AWGN
GPS Coarse Time assistance error range	seconds	±2
GPS Signal for one satellite	dBm	-142
GPS Signal for remaining satellites	dBm	-147

Table 70.11.5.1.2: Conformance requirement for Sensitivity Coarse Time Assistance

Success rate	2-D position error	Max response time
95 %	100 m	20 s

The reference for this requirement is 3GPP TS 45.005, sub clause M.2.1.1.

70.11.5.1.3 Test purpose

To verify the MS's first position estimate meets the Conformance requirement under GPS satellite signal conditions that represent weak signal conditions and with only Coarse Time Assistance provided by the SS.

70.11.5.1.4 Method of test

Initial conditions

Test environment: normal; see sub clause A1.2.2.

1. Connect SS and GSS to the MS antenna connector or antenna connectors.

2. Set the GPS test parameters as specified in table 70.11.5.1.3 for GPS scenario #1. Select the first satellite PRN defined in the table in sub clause 5.2.1.2.5 in TS 51.010-7 for the one satellite with the higher level.

3. Switch on the MS.

4. Set up a voice call according to the generic call set up procedure in sub clause 10.1, or for a device not supporting a voice call set up a signalling connection according to the generic call set up procedure in sub clause 10.1a, on a channel in the Mid ARFCN range.

Specific PICS statements

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PIXIT statements

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Procedure

1. Start GPS scenario #1 as specified in TS 51.010-7 sub clause 5.2.1.2 with the MS location randomly selected to be within 3 km of the Reference Location and the altitude of the MS randomly selected between 0 m to 500 m above WGS-84 reference ellipsoid using the method described in TS 51.010-7 sub clause 5.2.1.2.4.

2. Send a RESET MS POSITIONING STORED INFORMATION message followed by RRLP Assistance Data and RRLP Measure Position Request messages containing appropriate assistance data; as specified in TS 51.010-7 sub clauses 5.2.2 and 5.2.6 for MS based testing; or sub clauses 5.2.4 and 5.2.6 for MS assisted testing with the value of GPS TOW offset by a random value as specified in TS 51.010-7 sub clause 5.2.6.2; as required to obtain a fix.

3. If the MS returns a valid result in the Measure Position Response message within the Max response time specified in table 70.11.5.1.4 then record the result and process it as specified in step 4. If the MS does not return a valid result within the Max response time specified in table 70.11.5.1.4 or reports a MS positioning error in the Measure Position Response message then record one Bad Result.

4. For MS based testing compare the reported Location Information in the Measure Position Response message against the simulated position of the MS used in step 1, and calculate the 2D position error as specified in sub clause 70.11.4.2.3. Compare the 2D position error against the value in table 70.11.5.1.4 and record one Good Result or Bad Result as appropriate; or

   For MS assisted testing convert the GPS Measurement Information reported in the Measure Position Response message to a 2D position using the method described in sub clause 70.11.4.3 and then compare the result against the simulated position of the MS, used in step 1, and calculate the 2D position error as specified in sub clause 70.11.4.2.3. Compare the 2D position error against the value in table 70.11.5.1.4 and record one Good Result or Bad Result as appropriate.

5. Repeat steps 1 to 4 using GPS scenario #2 instead of #1 so that the reference location changes sufficiently such that the MS shall have to use the new assistance data. Select the first satellite PRN defined in the table in sub clause 5.2.1.2.5 in TS 51.010-7 for the one satellite with the higher level. Use new random values for the MS location and altitude in step 1 and for the GPS TOW offset in step 2.

6. Repeat steps 1 to 5 until the statistical requirements of sub clause 70.11.5.1.5 are met. Each time scenario #1 or #2 is used, the start time of the GPS scenario shall be advanced by 2 minutes from the time used previously for that scenario. Once a scenario reaches the end of its viable running time, restart it from its nominal start time again. Each time scenario #1 or #2 is used select the next satellite PRN from the one used previously, defined in the table in sub clause 5.2.1.2.5 in TS 51.010-7, for the one satellite with the higher level.

7. Terminate the call.

Minimum / Maximum duration of the test

Minimum duration approximately 1 hour, maximum duration approximately 20 hours

Specific Message Contents

MEASURE POSITION REQUEST (3GPP TS 44.031 sub clause A.2) to the MS

Information Element	Value/remark
Positioning Instructions Accuracy Required Response Time	 51.2m 20s

70.11.5.1.5 Test Requirements

For the parameters specified in table 70.11.5.1.3 the MS shall meet the requirements and the success rate specified in table 70.11.5.1.4 with a confidence level of 95% according to annex A7.2.

Table 70.11.5.1.3: Test parameters for Sensitivity Coarse Time Assistance

Parameters	Unit	Value
Number of generated satellites	-	8
HDOP Range	-	1.1 to 1.6
Propagation conditions	-	AWGN
GPS Coarse Time assistance error range	seconds	±1.8
GPS Signal for one satellite	dBm	-141
GPS Signal for remaining satellites	dBm	-146

Table 70.11.5.1.4: Test requirements for Sensitivity Coarse Time Assistance

Success rate	2-D position error	Max response time
95 %	101.3 m	20.3 s

NOTE: If the above Test Requirement differs from the Conformance requirement then the Test Parameter Relaxation applied for this test is non-zero. The Test Parameter Relaxation for this test is defined in sub clause A5.5.2 and the explanation of how the Conformance requirement has been relaxed by the Test Parameter Relaxation is given in sub clause A5.5.4.

70.11.5.2 Sensitivity Fine Time Assistance

70.11.5.2.1 Definition

Sensitivity with fine time assistance is the minimum level of GPS satellite signals required for the MS to make an A-GPS position estimate to a specific accuracy and within a specific response time when the network provides fine time assistance in addition to coarse time assistance.

70.11.5.2.2 Conformance requirement

The first fix position estimates shall meet the accuracy and response time requirements in table 70.11.5.2.2 for the parameters specified in table 70.11.5.2.1.

Table 70.11.5.2.1: Test parameters for Sensitivity Fine Time Assistance

Parameters	Unit	Value
Number of generated satellites	-	8
HDOP Range	-	1.1 to 1.6
Propagation conditions	-	AWGN
GPS Coarse time assistance error range	seconds	±2
GPS Fine Time assistance error range	μs	±10
GPS Signal for all satellites	dBm	-147

Table 70.11.5.2.2: Conformance requirement for Sensitivity Fine Time Assistance

Success rate	2-D position error	Max response time
95 %	100 m	20 s

The reference for this requirement is 3GPP TS 45.005, sub clause M.2.1.2.

70.11.5.2.3 Test purpose

To verify the MS's first position estimate meets the Conformance requirement under GPS satellite signal conditions that represent weak signal conditions and with Fine Time Assistance provided by the SS.

70.11.5.2.4 Method of test

Initial conditions

Test environment: normal; see sub clause A1.2.2.

1. Connect SS and GSS to the MS antenna connector or antenna connectors.

2. Set the GPS test parameters as specified in table 70.11.5.2.3 for GPS scenario #1.

3. Switch on the MS.

4. Set up a voice call according to the generic call set up procedure in sub clause 10.1, or for a device not supporting a voice call set up a signalling connection according to the generic call set up procedure in sub clause 10.1a, on a channel in the Mid ARFCN range.

Specific PICS statements

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PIXIT statements

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Procedure

1. Start GPS scenario #1 as specified in TS 51.010-7 sub clause 5.2.1.2 with the MS location randomly selected to be within 3 km of the Reference Location and the altitude of the MS randomly selected between 0 m to 500 m above WGS-84 reference ellipsoid using the method described in TS 51.010-7 sub clause 5.2.1.2.4.

2. Send a RESET MS POSITIONING STORED INFORMATION message followed by RRLP Assistance Data and RRLP Measure Position Request messages containing appropriate assistance data; as specified in TS 51.010-7 sub clauses 5.2.3 and 5.2.6 for MS based testing; or sub clauses 5.2.5 and 5.2.6 for MS assisted testing with the values of GPS TOW and BN offset by random values as specified in TS 51.010-7 sub clause 5.2.6.2; as required to obtain a fix.

3. If the MS returns a valid result in the Measure Position Response message within the Max response time specified in table 70.11.5.2.4 then record the result and process it as specified in step 4. If the MS does not return a valid result within the Max response time specified in table 70.11.5.2.4 or reports a MS positioning error in the Measure Position Response message then record one Bad Result.

4. For MS based testing compare the reported Location Information in the Measure Position Response message against the simulated position of the MS used in step 1, and calculate the 2D position error as specified in sub clause 70.11.4.2.3. Compare the 2D position error against the value in table 70.11.5.2.4 and record one Good Result or Bad Result as appropriate; or

    For MS assisted testing convert the GPS Measurement Information reported in the Measure Position Response message to a 2D position using the method described in sub clause 70.11.4.3 and then compare the result against the simulated position of the MS used in step 1, and calculate the 2D position error as specified in sub clause 70.11.4.2.3. Compare the 2D position error against the value in table 70.11.5.2.4 and record one Good Result or Bad Result as appropriate.

5. Repeat steps 1 to 4 using GPS scenario #2 instead of #1 so that the reference location changes sufficiently such that the MS shall have to use the new assistance data. Use new random values for the MS location and altitude in step 1 and for the GPS TOW and BN offsets in step 2.

6. Repeat steps 1 to 5 until the statistical requirements of sub clause 70.11.5.2.5 are met. Each time scenario #1 or #2 is used, the start time of the GPS scenario shall be advanced by 2 minutes from the time used previously for that scenario. Once a scenario reaches the end of its viable running time, restart it from its nominal start time again.

7. Terminate the call.

Minimum / Maximum duration of the test

Minimum duration approximately 1 hour, maximum duration approximately 20 hours

Specific Message Contents

MEASURE POSITION REQUEST (3GPP TS 44.031 sub clause A.2) to the MS

Information Element	Value/remark
Positioning Instructions Accuracy Required Response Time	 51.2m 20s

70.11.5.2.5 Test Requirements

For the parameters specified in table 70.11.5.2.3 the MS shall meet the requirements and the success rate specified in table 70.11.5.2.4 with a confidence level of 95% according to annex A7.2.

Table 70.11.5.2.3: Test parameters for Sensitivity Fine Time Assistance

Parameters	Unit	Value
Number of generated satellites	-	8
HDOP Range	-	1.1 to 1.6
Propagation conditions	-	AWGN
GPS Coarse time assistance error range	seconds	±1.8
GPS Fine Time assistance error range	μs	±9
GPS Signal for all satellites	dBm	-146

Table 70.11.5.2.4: Test requirements for Sensitivity Fine Time Assistance

Success rate	2-D position error	Max response time
95 %	101.3 m	20.3 s

NOTE: If the above Test Requirement differs from the Conformance requirement then the Test Parameter Relaxation applied for this test is non-zero. The Test Parameter Relaxation for this test is defined in sub clause A5.5.2 and the explanation of how the Conformance requirement has been relaxed by the Test Parameter Relaxation is given in sub clause A5.5.4.

70.11.6 Nominal Accuracy

70.11.6.1 Definition

Nominal accuracy is the accuracy of the MS's A-GPS position estimate under ideal GPS signal conditions.

70.11.6.2 Conformance requirement

The first fix position estimates shall meet the accuracy and response time requirements in table 70.11.6.2 for the parameters specified in table 70.11.6.1.

Table 70.11.6.1: Test parameters for Nominal Accuracy

Parameters	Unit	Value
Number of generated satellites	-	8
HDOP Range	-	1.1 to 1.6
Propagation conditions	-	AWGN
GPS Coarse Time assistance error range	seconds	±2
GPS Signal for all satellites	dBm	-130

Table 70.11.6.2: Conformance requirement for Nominal Accuracy

Success rate	2-D position error	Max response time
95 %	30 m	20 s

The reference for this requirement is 3GPP TS 45.005, sub clause M.2.2.

70.11.6.3 Test purpose

To verify the MS's first position estimate meets the Conformance requirement under GPS satellite signal conditions that represent ideal conditions.

70.11.6.4 Method of test

Initial conditions

Test environment: normal; see sub clause A1.2.2.

1. Connect SS and GSS to the MS antenna connector or antenna connectors.

2. Set the GPS test parameters as specified in table 70.11.6.3 for GPS scenario #1.

3. Switch on the MS.

4. Set up a voice call according to the generic call set up procedure in sub clause 10.1, or for a device not supporting a voice call set up a signalling connection according to the generic call set up procedure in sub clause 10.1a, on a channel in the Mid ARFCN range.

Specific PICS statements

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PIXIT statements

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Procedure

1. Start GPS scenario #1 as specified in TS 51.010-7 sub clause 5.2.1.2 with the MS location randomly selected to be within 3 km of the Reference Location and the altitude of the MS randomly selected between 0 m to 500 m above WGS-84 reference ellipsoid using the method described in TS 51.010-7 sub clause 5.2.1.2.4.

2. Send a RESET MS POSITIONING STORED INFORMATION message followed by RRLP Assistance Data and RRLP Measure Position Request messages containing appropriate assistance data; as specified in TS 51.010-

7 sub clauses 5.2.2 and 5.2.6 for MS based testing; or sub clauses 5.2.4 and 5.2.6 for MS assisted testing with the value of GPS TOW offset by a random value as specified in TS 51.010-7 sub clause 5.2.6.2; as required to obtain a fix.

3. If the MS returns a valid result in the Measure Position Response message within the Max response time specified in table 70.11.6.4 then record the result and process it as specified in step 4. If the MS does not return a valid result within the Max response time specified in table 70.11.6.4 or reports a MS positioning error in the Measure Position Response message then record one Good Result.

4. For MS based testing compare the reported Location Information in the Measure Position Response message against the simulated position of the MS used in step 1, and calculate the 2D position error as specified in sub clause 70.11.4.2.3. Compare the 2D position error against the value in table 70.11.6.4 and record one Good Result or Bad Result as appropriate; or

   For MS assisted testing convert the GPS Measurement Information reported in the Measure Position Response message to a 2D position using the method described in sub clause 70.11.4.3 and then compare the result against the simulated position of the MS used in step 1, and calculate the 2D position error as specified in sub clause 70.11.4.2.3. Compare the 2D position error against the value in table 70.11.6.4 and record one Good Result or Bad Result as appropriate.

5. Repeat steps 1 to 4 using GPS scenario #2 instead of #1 so that the reference location changes sufficiently such that the MS shall have to use the new assistance data. Use new random values for the MS location and altitude in step 1 and for the GPS TOW offset in step 2.

6. Repeat steps 1 to 5 until the statistical requirements of sub clause 70.11.6.5 are met. Each time scenario #1 or #2 is used, the start time of the GPS scenario shall be advanced by 2 minutes from the time used previously for that scenario. Once a scenario reaches the end of its viable running time, restart it from its nominal start time again.

7. Terminate the call.

Minimum / Maximum duration of the test

Minimum duration approximately 1 hour, maximum duration approximately 20 hours

Specific Message Contents

MEASURE POSITION REQUEST (3GPP TS 44.031 sub clause A.2) to the MS

Information Element	Value/remark
Positioning Instructions	
Accuracy	16m
Required Response Time	20s

70.11.6.5 Test Requirements

For the parameters specified in table 70.11.6.3 the MS shall meet the requirements and the success rate specified in table 70.11.6.4 with a confidence level of 95% according to annex A7.2.

Table 70.11.6.3: Test parameters for Nominal Accuracy

Parameters	Unit	Value
Number of generated satellites	-	8
HDOP Range	-	1.1 to 1.6
Propagation conditions	-	AWGN
GPS Coarse Time assistance error range	seconds	± 1.8
GPS Signal for all satellites	dBm	-130

Table 70.11.6.4: Test requirements for Nominal Accuracy

Success rate	2-D position error	Max response time
95 %	31.3 m	20.3 s

NOTE: If the above Test Requirement differs from the Conformance requirement then the Test Parameter Relaxation applied for this test is non-zero. The Test Parameter Relaxation for this test is defined in sub clause A5.5.2 and the explanation of how the Conformance requirement has been relaxed by the Test Parameter Relaxation is given in sub clause A5.5.4.

70.11.7 Dynamic Range

70.11.7.1 Definition

Dynamic Range is the maximum difference in level of the GPS signals from a number of satellites that allows the MS to make an A-GPS position estimate with a specific accuracy and a specific response time.

70.11.7.2 Conformance requirement

The first fix position estimates shall meet the accuracy and response time requirements in table 70.11.7.2 for the parameters specified in table 70.11.7.1.

Table 70.11.7.1: Test parameters for Dynamic Range

Parameters	Unit	Value
Number of generated satellites	-	6
HDOP Range	-	1.4 to 2.1
GPS Coarse Time assistance error range	seconds	±2
Propagation conditions	-	AWGN
GPS Signal for 1st satellite	dBm	-129
GPS Signal for 2nd satellite	dBm	-135
GPS Signal for 3rd satellite	dBm	-141
GPS Signal for 4th satellite	dBm	-147
GPS Signal for 5th satellite	dBm	-147
GPS Signal for 6th satellite	dBm	-147

Table 70.11.7.2: Conformance requirement for Dynamic Range

Success rate	2-D position error	Max response time
95 %	100 m	20 s

The reference for this requirement is 3GPP TS 45.005, sub clause M.2.3.

70.11.7.3 Test purpose

To verify the MS's first position estimate meets the Conformance requirement under GPS satellite signal conditions that have a wide dynamic range. Strong satellites are likely to degrade the acquisition of weaker satellites due to their cross-correlation products.

70.11.7.4 Method of test

Initial conditions

Test environment: normal; see sub clause A1.2.2.

1. Connect SS and GSS to the MS antenna connector or antenna connectors.

2. Set the GPS test parameters as specified in table 70.11.7.3 for GPS scenario #1. Select the first three satellite PRNs defined in the table in sub clause 5.2.1.2.5 in TS 51.010-7 for the three satellites with the higher levels.

3. Switch on the MS.

4. Set up a voice call according to the generic call set up procedure in sub clause 10.1, or for a device not supporting a voice call set up a signalling connection according to the generic call set up procedure in sub clause 10.1a, on a channel in the Mid ARFCN range.

Specific PICS statements

-

PIXIT statements

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Procedure

1. Start GPS scenario #1 as specified in TS 51.010-7 sub clause 5.2.1.2 with the MS location randomly selected to be within 3 km of the Reference Location and the altitude of the MS randomly selected between 0 m to 500 m above WGS-84 reference ellipsoid using the method described in TS 51.010-7 sub clause 5.2.1.2.4.

2. Send a RESET MS POSITIONING STORED INFORMATION message followed by RRLP Assistance Data and RRLP Measure Position Request messages containing appropriate assistance data; as specified in TS 51.010-7 sub clauses 5.2.2 and 5.2.6 for MS based testing; or sub clauses 5.2.4 and 5.2.6 for MS assisted testing with the value of GPS TOW offset by a random value as specified in TS 51.010-7 sub clause 5.2.6.2; as required to obtain a fix.

3. If the MS returns a valid result in the Measure Position Response message within the Max response time specified in table 70.11.7.4 then record the result and process it as specified in step 4. If the MS does not return a valid result within the Max response time specified in table 70.11.7.4 or reports a MS positioning error in the Measure Position Response message then record one Bad Result.

4. For MS based testing compare the reported Location Information in the Measure Position Response message against the simulated position of the MS used in step 1, and calculate the 2D position error as specified in sub clause 70.11.4.2.3. Compare the 2D position error against the value in table 70.11.7.4 and record one Good Result or Bad Result as appropriate; or

   For MS assisted testing convert the GPS Measurement Information reported in the Measure Position Response message to a 2D position using the method described in sub clause 70.11.4.3 and then compare the result against the simulated position of the MS used in step 1, and calculate the 2D position error as specified in sub clause 70.11.4.2.3. Compare the 2D position error against the value in table 70.11.7.4 and record one Good Result or Bad Result as appropriate.

5. Repeat steps 1 to 4 using GPS scenario #2 instead of #1 so that the reference location changes sufficiently such that the MS shall have to use the new assistance data. Select the first three satellite PRNs defined in the table in sub clause 5.2.1.2.5 in TS 51.010-7 for the three satellites with the higher levels. Use new random values for the MS location and altitude in step 1 and for the GPS TOW offset in step 2.

6. Repeat steps 1 to 5 until the statistical requirements of sub clause 70.11.7.5 are met. Each time scenario #1 or #2 is used, the start time of the GPS scenario shall be advanced by 2 minutes from the time used previously for that scenario. Once a scenario reaches the end of its viable running time, restart it from its nominal start time again. Each time scenario #1 or #2 is used, increment the set of three satellite PRNs by one from the ones used previously, defined in the table in sub clause 5.2.1.2.5 in TS 51.010-7, for the three satellites with the higher levels (i.e. if the set of satellites is a, b, c, d, e, f and the first set used was a, b, c, the second set shall be b, c, d and so on).

7. Terminate the call.

Minimum / Maximum duration of the test

Minimum duration approximately 1 hour, maximum duration approximately 20 hours

Specific Message Contents

MEASURE POSITION REQUEST (3GPP TS 44.031 sub clause A.2) to the MS

Information Element	Value/remark
Positioning Instructions	
Accuracy	51.2m
Required Response Time	20s

70.11.7.5 Test Requirements

For the parameters specified in table 70.11.7.3 the MS shall meet the requirements and the success rate specified in table 70.11.7.4 with a confidence level of 95% according to annex A7.2.

Table 70.11.7.3: Test parameters for Dynamic Range

Parameters	Unit	Value
Number of generated satellites	-	6
HDOP Range	-	1.4 to 2.1
GPS Coarse Time assistance error range	seconds	±1.8
Propagation conditions	-	AWGN
GPS Signal for 1st satellite	dBm	-128.2
GPS Signal for 2nd satellite	dBm	-134
GPS Signal for 3rd satellite	dBm	-140
GPS Signal for 4th satellite	dBm	-146
GPS Signal for 5th satellite	dBm	-146
GPS Signal for 6th satellite	dBm	-146

Table 70.11.7.4: Test requirements for Dynamic Range

Success rate	2-D position error	Max response time
95 %	101.3 m	20.3 s

NOTE: If the above Test Requirement differs from the Conformance requirement then the Test Parameter Relaxation applied for this test is non-zero. The Test Parameter Relaxation for this test is defined in sub clause A5.5.2 and the explanation of how the Conformance requirement has been relaxed by the Test Parameter Relaxation is given in sub clause A5.5.4.

70.11.8 Multi-Path scenario

70.11.8.1 Definition

Multi-path performance measures the accuracy and response time of the MS's A-GPS position estimate in a specific GPS signal multi-path environment.

70.11.8.2 Conformance requirement

The first fix position estimates shall meet the accuracy and response time requirements in table 70.11.8.2 for the parameters specified in table 70.11.8.1.

Table 70.11.8.1: Test parameters for Multi-Path scenario

Parameters	Unit	Value
Number of generated satellites (see note)	-	5
GPS Coarse Time assistance error range	seconds	±2
HDOP Range	-	1.8 to 2.5
GPS signal for Satellite 1, 2 (see note)	dBm	-130
GPS signal for Satellite 3, 4, 5 (see note)	dBm	LOS signal of -130 dBm, multi-path signal of -136 dBm
NOTE: Satellites 1, 2 no multi-path. Satellites 3, 4, 5 multi-path defined in sub clause 70.11.2.4.		

Table 70.11.8.2: Conformance requirement for Multi-Path scenario

Success rate	2-D position error	Max response time
95 %	100 m	20 s

The reference for this requirement is 3GPP TS 45.005, sub clause M.2.4.

70.11.8.3 Test purpose

To verify the MS's first position estimate meets the Conformance requirement under GPS satellite signal conditions that represent simple multi-path conditions.

70.11.8.4 Method of test

Initial conditions

Test environment: normal; see sub clause A1.2.2.

1. Connect SS and GSS to the MS antenna connector or antenna connectors.

2. Set the GPS test parameters as specified in table 70.11.8.3 for GPS scenario #1. Select the first two satellite PRNs defined in the table in sub clause 5.2.1.2.5 in TS 51.010-7 for the two satellites with the higher levels.

3. Switch on the MS.

4. Set up a voice call according to the generic call set up procedure in sub clause 10.1, or for a device not supporting a voice call set up a signalling connection according to the generic call set up procedure in sub clause 10.1a, on a channel in the Mid ARFCN range.

Specific PICS statements:

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PIXIT statements:

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Procedure

1. Start GPS scenario #1 as specified in TS 51.010-7 sub clause 5.2.1.2 with the MS location randomly selected to be within 3 km of the Reference Location and the altitude of the MS randomly selected between 0 m to 500 m above WGS-84 reference ellipsoid using the method described in TS 51.010-7 sub clause 5.2.1.2.4. The initial carrier phase difference between taps of the multi-path model shall be randomly selected between 0 and 2π radians by selecting the next random number from a standard uniform random number generator, in the range 0 to 2π, representing radians with a resolution of 0.1, representing 0.1 radians.

2. Send a RESET MS POSITIONING STORED INFORMATION message followed by RRLP Assistance Data and RRLP Measure Position Request messages containing appropriate assistance data; as specified in TS 51.010-7 sub clauses 5.2.2 and 5.2.6 for MS based testing; or sub clauses 5.2.4 and 5.2.6 for MS assisted testing with the value of GPS TOW offset by a random value as specified in TS 51.010-7 sub clause 5.2.6.2; as required to obtain a fix.

3. If the MS returns a valid result in the Measure Position Response message within the Max response time specified in table 70.11.8.4 then record the result and process it as specified in step 4. If the MS does not return a valid result within the Max response time specified in table 70.11.8.4 or reports a MS positioning error in the Measure Position Response message then record one Bad Result.

4. For MS based testing compare the reported Location Information in the Measure Position Response message against the simulated position of the MS used in step 1, and calculate the 2D position error as specified in sub clause 70.11.4.2.3. Compare the 2D position error against the value in table 70.11.8.4 and record one Good Result or Bad Result as appropriate; or

   For MS assisted testing convert the GPS Measurement Information reported in the Measure Position Response message to a 2D position using the method described in sub clause 70.11.4.3 and then compare the result against the simulated position of the MS used in step 1, and calculate the 2D position error as specified in sub clause 70.11.4.2.3. Compare the 2D position error against the value in table 70.11.8.4 and record one Good Result or Bad Result as appropriate.

5. Repeat steps 1 to 4 using GPS scenario #2 instead of #1 so that the reference location changes sufficiently such that the MS shall have to use the new assistance data. Select the first two satellite PRNs defined in the table in sub clause 5.2.1.2.5 in TS 51.010-7 for the two satellites with the higher levels. Use new random values for the MS location and altitude, and the initial carrier phase difference between taps of the multi-path model in step 1 and for the GPS TOW offset in step 2.

6. Repeat steps 1 to 5 until the statistical requirements of sub clause 70.11.8.5 are met. Each time scenario #1 or #2 is used, the start time of the GPS scenario shall be advanced by 2 minutes from the time used previously for that scenario. Once a scenario reaches the end of its viable running time, restart it from its nominal start time again. Each time scenario #1 or #2 is used, increment the set of two satellite PRNs by one from the ones used previously, defined in the table in sub clause 5.2.1.2.5 in TS 51.010-7, for the two satellites with the higher level (i.e. if the set of satellites is a, b, c, d, e and the first set used was a, b the second set shall be b, c and so on).

7. Terminate the call

Minimum / Maximum duration of the test

Minimum duration approximately 1 hour, maximum duration approximately 20 hours

Specific Message Contents

MEASURE POSITION REQUEST (3GPP TS 44.031 sub clause A.2) to the MS

Information Element	Value/remark
Positioning Instructions	
Accuracy	51.2m
Required Response Time	20s

70.11.8.5 Test Requirements

For the parameters specified in table 70.11.8.3 the MS shall meet the requirements and the success rate specified in table 70.11.8.4 with a confidence level of 95% according to annex A7.2.

Table 70.11.8.3: Test parameters for Multi-Path scenario

Parameters	Unit	Value
Number of generated satellites (see note)	-	5
GPS Coarse Time assistance error range	seconds	± 1.8
HDOP Range	-	1.8 to 2.5
GPS signal for Satellite 1, 2 (see note)	dBm	-130
GPS signal for Satellite 3, 4, 5 (see note)	dBm	LOS signal of -130 dBm, multi-path signal of -136.2 dBm
NOTE: Satellites 1, 2 no multi-path. Satellites 3, 4, 5 multi-path defined in sub clause 70.11.2.4.		

Table 70.11.8.4: Test requirements for Multi-Path scenario

Success rate	2-D position error	Max response time
95 %	101.3 m	20.3 s

NOTE: If the above Test Requirement differs from the Conformance requirement then the Test Parameter Relaxation applied for this test is non-zero. The Test Parameter Relaxation for this test is defined in sub clause A5.5.2 and the explanation of how the Conformance requirement has been relaxed by the Test Parameter Relaxation is given in sub clause A5.5.4.

70.12 Assisted GNSS General Procedures

70.12.1 Positioning Capability Transfer procedure

70.12.1.1 Conformance requirement:

When the MS receives a complete POSITIONING CAPABILITY REQUEST message, it shall send the POSITIONING CAPABILITY RESPONSE message. The message shall include the positioning capabilities of the MS and the types of supported assistance data. The message may include the types of assistance needed by the MS to obtain a location estimate or positioning measurements.

Test References

3GPP TS 43.059 sub clause 9.4.3a

3GPP TS 44.031sub clauses 2.3a, 4.6, 4.7, A.7 and A.8

70.12.1.2   Test Purpose

To verify that the MS sends the correct positioning capabilities and the types of supported assistance data in the POSITIONING CAPABILITY RESPONSE message. Note: no positioning procedure is performed.

70.12.1.3   Method of Test

Initial Conditions:

   System Simulator:

      Serving Cell: default parameters.

   Mobile Station:

      The MS is MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

   -

PIXIT statements

   -

Test Procedure:

The MS is paged with a PAGING REQUEST TYPE 1 message. The MS performs control early classmark sending to provide LCS positioning method capability.

After sending the CIPHERING MODE COMPLETE message the MS receives RR APPLICATION INFORMATION message containing an RRLP POSITIONING CAPABILITY REQUEST message.

The MS sends a POSITIONING CAPABILITY RESPONSE message. The message includes the positioning capabilities of the MS and the types of supported assistance data.

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability, Positioning Method Support and Additional Positioning Capabilities.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS -> MS	RR APPLICATION INFORMATION	RRLP Positioning Capability Request
12	MS -> SS	RR APPLICATION INFORMATION	RRLP Positioning Capability Response
13	SS -> MS	CHANNEL RELEASE	The main signalling link is released

Specific Message Contents

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 11, RRLP Positioning Capability Request Step 12: RRLP Positioning Capability Response

RRLP Positioning Capability Request (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
extended-reference	SEQUENCE	

RRLP Positioning Capability Response (Step 12):

Information element	Type	Value/remark
ASN.1 encoded		
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the Positioning Capability Request (Step 11).
posCapabilities	SEQUENCE	
nonGANSSpositionMethods	BIT STRING	May be included if the MS supports A-GPS L1 C/A in addition to A-GANSS
gANSSPositionMethods	SEQUENCE	Included for each MS supported GANSS
ganssID	INTEGER	Dependent on MS capabilities. Absence of this field indicates Galileo
gANSSPositioningMethodTypes	BIT STRING	Bit 0 is set to 1 (MS-Assisted) and/or Bit 1 is set to 1 (MS-Based) depending on the positioning method(s) supported by the MS for the GANSS
gANSSSignals	BIT STRING	Dependent on MS capabilities
sbasID	BIT STRING	Included if ganssID indicates support for SBAS. Dependent on MS capabilities
multipleMeasurementSets		Dependent on MS capabilities
assistanceSupported	SEQUENCE	
gpsAssistance	BIT STRING	Dependent on MS capabilities Included if the MS supports A-GPS L1 C/A in addition to A-GANSS
gANSSAssistanceSet	SEQUENCE	
commonGANSSAssistance	BIT STRING	Dependent on MS capabilities
specificGANSSAssistance	SEQUENCE	Included for each MS supported GANSS
ganssID	INTEGER	Dependent on MS capabilities. Absence of this field indicates Galileo
gANSSAssistance	BIT STRING	Dependent on MS capabilities
gANSSAdditionalAssistanceChoices	SEQUENCE	Included for each MS supported GANSS
ganssID	INTEGER	Dependent on MS capabilities. Absence of this field indicates Galileo
ganssClockModelChoice	BIT STRING	Dependent on MS capabilities
gannsOrbitModelChoice	BIT STRING	Dependent on MS capabilities
ganssAlmanacModelChoice	BIT STRING	Dependent on MS capabilities
ganssAdditionalUTCModelChoice	BIT STRING	Dependent on MS capabilities

70.13 Assisted GNSS Network Induced Location Request (NI-LR)

70.13.1 NI-LR / Emergency Call on TCH Radio Channel for Mobiles Supporting MS-Based GNSS

70.13.1.1 Conformance requirements

1. With the MS in the "idle, updated" state, the user shall initiate an emergency after the number 112 (for GSM900 and 1800 MS), or 911 (for PCS 1900 MS in the USA), or 08 (for PCS 1900 MS in Mexico) has been entered by the user. The MS shall send a CHANNEL REQUEST message with correct establishment cause ("emergency call").

2. When a user requests an emergency call establishment the mobile station will send a CM SERVICE REQUEST message to the network with a CM service type information element indicating emergency call establishment and the correct CKSN and TMSI. A mobile station which implements the "LCS" option shall also implement the

"Controlled Early Classmark Sending" option. A mobile station which implements the "Controlled Early Classmark Sending" option shall indicate it in the classmark (ES IND bit).

3. After sending the CM SERVICE REQUEST message the MS shall send a CLASSMARK CHANGE message. The "Mobile Station Classmark 3" information element shall correctly specify the positioning methods supported by the MS and shall indicate support for additional positioning capabilities which can be retrieved using RRLP.

7. After the CM SERVICE ACCEPT message is received from the network, the MS shall send an EMERGENCY SETUP message.

8. After receipt of a CONNECT ACKNOWLEDGE message during correct establishment of the emergency call the MS shall indicate that the TCH is through connected in both directions.

9. On receiving the POSITIONING CAPABILITY REQUEST message the MS responds with a POSITIONING CAPABILITY RESPONSE message indicating the positioning methods supported by the MS.

10. On receiving an ASSISTANCE DATA message the MS responds with an ASSISTANCE DATA ACKNOWLEDGEMENT message. The message contains the reference number of the ASSISTANCE DATA message received.

11. On receiving the MEASURE POSITION REQUEST message the MS tries to perform the requested location measurements, and calculates its own position. It sends the results in the RRLP MEASURE POSITION RESPONSE message.

References

3GPP TS 44.018 sub clauses 3.3.1.1 and 9.1.11.

3GPP TS 24.008 sub clauses 4.5.1.5, 5.2.1, 9.2.9, 10.5.1.6, 10.5.1.7.

3GPP TS 44.031.

70.13.1.2 Test Purpose

To verify when a network instigates the LCS positioning procedure using GNSS by sending RRLP (Measure Position Request) message, after a traffic channel has been established during an emergency call, the mobile responds with RRLP (Measure Position Response) containing MS location estimate.

70.13.1.3 Method of Test

Initial Conditions

System Simulator (SS):

Serving Cell: default parameters.

Satellite signals: default conditions.

Mobile Station (MS):

The MS is in MM-state "idle, updated" with valued TMSI and CKSN.

SIM:

Normal SIM

Specific PICS statements

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PIXIT statements

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Test Procedure

This test case includes sub test cases dependent on the GNSS supported by the MS. Each sub test case is identified by a Sub Test Case Number as defined below:

Sub Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

An Emergency Call is initiated with the MS. SIM card is included in the MS.

The emergency call is established with a late assignment.

After receiving the CONNECT ACKNOWLEDGE message from the MS, the SS sends RR APPLICATION INFORMATION messages containing a RRLP Positioning Capability Request message.

The MS responds with an RR APPLICATION INFORMATION message containing an RRLP Positioning Capability Response message indicating the GNSS(s) supported by the MS.

The SS sends one or more RR APPLICATION INFORMATION messages containing RRLP Assistance Data messages dependent on the GNSS positioning methods supported by the MS. The reception of each RRLP Assistance Data message is acknowledged by the MS by sending a RR APPLICATION INFORMATION message containing an RRLP Assistance Data Acknowledgement component.

The SS then sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request on FACCH including assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing or ganssAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The call is cleared by the SS.

Maximum duration of the test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		The appropriate "emergency call number" is entered.
2	MS -> SS	CHANNEL REQUEST	Establishment cause is emergency call establishment.
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM. The CM service type IE indicates "emergency call establishment". "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The Additional Positioning Capabilities (1 bit field) is set to 1 (the mobile station supports additional positioning capabilities which can be retrieved using RRLP).
6	SS -> MS	CM SERVICE ACCEPT	
7	MS -> SS	EMERGENCY SETUP	
8	SS -> MS	CALL PROCEEDING	
9	SS -> MS	ALERTING	
10	SS -> MS	ASSIGNMENT COMMAND	
11	MS -> SS	ASSIGNMENT COMPLETE	
12	SS -> MS	CONNECT	
13	MS -> SS	CONNECT ACKNOWLEDGE	The MS indicates that the TCH is through connected in both directions.
14	SS -> MS	RR APPLICATION INFORMATION	RRLP Positioning Capability Request
15	MS -> SS	RR APPLICATION INFORMATION	RRLP Positioning Capability Response
16	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data The SS provides assistance data in one or more RRLP assistance data delivery messages as defined in TS 51.010-7 sub clauses 6.1.3 and 6.1.4. Each message shall contain a maximum of 242 octets.
17	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck Each RRLP Assistance Data message is acknowledged by the MS.
18	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request May contain further assistance data as defined in TS 51.010-7 sub clauses 6.1.3 and 6.1.4.
19	MS -> SS	RR APPLICATION INFORMATION	Option 1: RRLP Measure Position Response: ganssLocationInfo Option 2: locationError with gpsAssDataMissing (Sub Tests 3 and 4) or ganssAssDataMissing and additionalAssistanceData including gpsAssistanceData (Sub Tests 3 and 4) and/or ganssAssistanceData

19a	SS -> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Assistance Data. If the MS requested additional assistance data in step 19 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
19b	MS -> SS	RR APPLICATION INFORMATION	Option 2 only: RRLP assistanceDataAck. If the SS sent additional assistance data in step 19a, the MS acknowledges the received assistance data.
19c	SS-> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Measure Position Request. If the MS requested additional assistance data in step 19 that is available in the SS, this message may include further assistance data.
19d	MS-> SS	RR APPLICATION INFORMATION	Option 2 only: RRLP Measure Position Response. If the MS requested additional assistance data in step 19, this message contains ganssLocationInfo.
20	SS -> MS	DISCONNECT	
21	MS -> SS	RELEASE	
22	SS -> MS	RELEASE COMPLETE	
23	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

RR APPLICATION INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Steps 18 and 19c: RRLP Measure Position Request Steps 19 and 19d: RRLP Measure Position Response Steps 16 and 19a: RRLP Assistance Data Steps 17 and 19b: RRLP Assistance Data Ack. Step 14: RRLP Positioning Capability Request Step 15: RRLP Positioning Capability Response

RRLP Positioning Capability Request (Step 14):

Information element	Type	Value/remark
ASN.1 encoded		
extended-reference	SEQUENCE	

RRLP Positioning Capability Response (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the Positioning Capability Request (Step 14).
posCapabilities	SEQUENCE	
nonGANSSpositionMethods	BIT STRING	May only be included for Sub Tests 3 and 4.
gANSSPositionMethods	SEQUENCE	Included for each MS supported GANSS
ganssID	INTEGER	Sub Test 1: value 3 Sub Test 2: absent Sub Test 3: value 1 Sub Test 4: value 3
gANSSPositioningMethodTypes	BIT STRING	Bit 1 (msBased) set to value 1
gANSSSignals	BIT STRING	Dependent on MS capabilities

RRLP Assistance Data (Step 16):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in TS 51.010-7 sub clauses 6.1.3 and 6.1.4.
moreAssDataToBeSent	ENUMERATED	If SS sends more than one RRLP assistance data delivery message at step 16 the moreAssDataToBeSent field shall be set accordingly: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in TS 51.010-7 sub clauses 6.1.3 and 6.1.4.

RRLP Assistance Data Ack (Step 17, 19b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 19b)
component	CHOICE	assistanceDataAck

RRLP Measure Position Request (Step 18):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in TS 51.010-7 sub clauses 6.1.3 and 6.1.4.
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub Test 1: bit 5 set to value 1 Sub Test 2: bit 1 set to value 1 Sub Test 3: bits 0 and 3 set to value 1 Sub Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in TS 51.010-7 sub clauses 6.1.3 and 6.1.4.

RRLP Measure Position Response (Step 19 (Option 1) or 19d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 19d)
component	CHOICE	msrPositionRsp (A valid response will contain ganssLocationInfo otherwise locationError will be returned)
locationError	SEQUENCE	Any error value is acceptable.
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request
ganssLocationInfo	SEQUENCE	Any value is acceptable

RRLP Measure Position Response (Step 19 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing or ganssAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing GPS assistance data elements. This field may only be present for Sub Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 19a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	This field may only be present for Sub Tests 3 and 4. If the MS requested further GPS assistance data in Step 19 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further GANSS assistance data in Step 19 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Measure Position Request (Step 19c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 19 (Option 2).
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub Test 1: bit 5 set to value 1 Sub Test 2: bit 1 set to value 1 Sub Test 3: bits 0 and 3 set to value 1 Sub Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 19 (Option 2).

70.13.2 NI-LR / Emergency Call on TCH Radio Channel for Mobiles Supporting MS-Assisted GNSS

70.13.2.1 Conformance requirements

1. With the MS in the "idle, updated" state, the user shall initiate an emergency after the number 112 (for GSM900 and 1800 MS), or 911 (for PCS 1900 MS in the USA), or 08 (for PCS 1900 MS in Mexico) has been entered by the user. The MS shall send a CHANNEL REQUEST message with correct establishment cause ("emergency call").

7. When a user requests an emergency call establishment the mobile station will send a CM SERVICE REQUEST message to the network with a CM service type information element indicating emergency call establishment and the correct CKSN and TMSI. A mobile station which implements the "LCS" option shall also implement the "Controlled Early Classmark Sending" option. A mobile station which implements the "Controlled Early Classmark Sending" option shall indicate it in the classmark (ES IND bit).

8. After sending the CM SERVICE REQUEST message the MS shall send a CLASSMARK CHANGE message. The "Mobile Station Classmark 3" information element shall correctly specify the positioning methods supported by the MS and shall indicate support for additional positioning capabilities which can be retrieved using RRLP.

9. After the CM SERVICE ACCEPT message is received from the network, the MS shall send an EMERGENCY SETUP message.

10. After receipt of a CONNECT ACKNOWLEDGE message during establishment of the emergency call the MS shall indicate that the TCH is through connected in both directions.

11. On receiving the POSITIONING CAPABILITY REQUEST message the MS responds with a POSITIONING CAPABILITY RESPONSE message indicating the positioning methods supported by the MS.

12. On receiving the RRLP MEASURE POSITION REQUEST the MS tries to perform the requested location measurements. It sends the results in the RRLP MEASURE POSITION RESPONSE message.

References

3GPP TS 44.018 sub clauses 3.3.1.1 and 9.1.11.

3GPP TS 24.008 sub clauses 4.5.1.5, 5.2.1, 9.2.9 and 10.5.1.6, 10.5.1.7.

3GPP TS 44.031.

70.13.2.2 Test Purpose

To verify when a network instigates the LCS positioning procedure using GNSS by sending RRLP (Measure Position Request) message, after a traffic channel has been established during an emergency call, the mobile responds with RRLP (Measure Position Response) containing A-GNSS measurement values.

70.13.2.3 Method of Test

Initial Conditions

System Simulator (SS):

Serving Cell: default parameters.

Satellite signals: default conditions.

Mobile Station (MS):

The MS is in MM-state "idle, updated" with valued TMSI and CKSN.

SIM:

Normal SIM

Specific PICS statements

-

PIXIT statements

-

Test Procedure

This test case includes sub test cases dependent on the GNSS supported by the MS. Each sub test case is identified by a Sub Test Case Number as defined below:

Sub Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

An Emergency Call is initiated with the MS. SIM card is included in the MS.

The emergency call is established with a late assignment.

After receiving the CONNECT ACKNOWLEDGE message from the MS, the SS sends RR APPLICATION INFORMATION messages containing a RRLP Positioning Capability Request message.

The MS responds with an RR APPLICATION INFORMATION message containing an RRLP Positioning Capability Response message indicating the GNSS(s) supported by the MS.

The SS sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request on FACCH including assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing or ganssAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The call is cleared by the SS.

Maximum duration of the test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		The appropriate "emergency call number" is entered.
2	MS -> SS	CHANNEL REQUEST	Establishment cause is emergency call establishment.
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM. The CM service type IE indicates "emergency call establishment". "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The Additional Positioning Capabilities (1 bit field) is set to 1 (the mobile station supports additional positioning capabilities which can be retrieved using RRLP).
6	SS -> MS	CM SERVICE ACCEPT	
7	MS -> SS	EMERGENCY SETUP	
8	SS -> MS	CALL PROCEEDING	
9	SS -> MS	ALERTING	
10	SS -> MS	ASSIGNMENT COMMAND	
11	MS -> SS	ASSIGNMENT COMPLETE	
12	SS -> MS	CONNECT	
13	MS -> SS	CONNECT ACKNOWLEDGE	The MS indicates that the TCH is through connected in both directions.
14	SS -> MS	RR APPLICATION INFORMATION	RRLP Positioning Capability Request
15	MS -> SS	RR APPLICATION INFORMATION	RRLP Positioning Capability Response
16	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request Contains assistance data as defined in TS 51.010-7 sub clauses 6.1.3 and 6.1.4.
17	MS -> SS	RR APPLICATION INFORMATION	Option 1: RRLP Measure Position Response: ganssMeasureInfo and gps-MeasureInfo (Sub Tests 3 and 4) Option 2: locationError with gpsAssDataMissing (Sub Tests 3 and 4) or ganssAssDataMissing and additionalAssistanceData including gpsAssistanceData (Sub Tests 3 and 4) and/or ganssAssistanceData
17a	SS -> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Assistance Data. If the MS requested additional assistance data in step 17 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
17b	MS -> SS	RR APPLICATION INFORMATION	Option 2 only: RRLP assistanceDataAck. If the SS sent additional assistance data in step 17a, the MS acknowledges the received assistance data.

17c	SS-> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Measure Position Request. If the MS requested additional assistance data in step 17 that is available in the SS, this message may include further assistance data.
17d	MS -> SS	RR APPLICATION INFORMATION	Option 2 only: RRLP Measure Position Response. If the MS requested additional assistance data in step 17, this message contains ganssMeasureInfo and gps-MeasureInfo (Sub Tests 3 and 4).
18	SS -> MS	DISCONNECT	
19	MS -> SS	RELEASE	
20	SS -> MS	RELEASE COMPLETE	
21	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

RR APPLICATION INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 16 and 17c: RRLP Measure Position Request Step 17 and 17d: RRLP Measure Position Response Step 17a: RRLP Assistance Data Step 17b: RRLP Assistance Data Ack. Step 14: RRLP Positioning Capability Request Step 15: RRLP Positioning Capability Response

RRLP Positioning Capability Request (Step 14):

Information element	Type	Value/remark
ASN.1 encoded		
extended-reference	SEQUENCE	

RRLP Positioning Capability Response (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the Positioning Capability Request (Step 14).
posCapabilities	SEQUENCE	
nonGANSSpositionMethods	BIT STRING	May only be included for Sub Tests 3 and 4.
gANSSPositionMethods	SEQUENCE	Included for each MS supported GANSS
ganssID	INTEGER	Sub Test 1: value 3 Sub Test 2: absent Sub Test 3: value 1 Sub Test 4: value 3
gANSSPositioningMethodTypes	BIT STRING	Bit 0 (msAssisted) set to value 1
gANSSSignals	BIT STRING	Dependent on MS capabilities

RRLP Measure Position Request (Step 16):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in TS 51.010-7 sub clauses 6.1.3 and 6.1.4.
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub Test 1: bit 5 set to value 1 Sub Test 2: bit 1 set to value 1 Sub Test 3: bits 0 and 3 set to value 1 Sub Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in TS 51.010-7 sub clauses 6.1.3 and 6.1.4.

RRLP Measure Position Response (Step 17 (Option 1) or Step 17d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 17d)
component	CHOICE	msrPositionRsp (A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub Tests 3 and 4); otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request
ganssMeasureInfo	SEQUENCE	Any value is acceptable

RRLP Measure Position Response (Step 17 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing or ganssAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing GPS assistance data elements. This field may only be present for Sub Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 17a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	This field may only be present for Sub Tests 3 and 4. If the MS requested further GPS assistance data in Step 17 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further GANSS assistance data in Step 17 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Assistance Data Ack (Step 17b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceDataAck

RRLP Measure Position Request (Step 17c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 17 (Option 2).
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub Test 1: bit 5 set to value 1 Sub Test 2: bit 1 set to value 1 Sub Test 3: bits 0 and 3 set to value 1 Sub Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 17 (Option 2).

70.14 Assisted GNSS Mobile Originated Location Request (MO-LR)

70.14.1 MO-LR / Idle mode for Mobiles Supporting MS-Assisted GNSS

70.14.1.1 Conformance requirements

1) The MS sends CM SERVICE REQUEST to network for call independent supplementary service.

2) The MS invokes self-location request by sending REGISTER message containing Facility IE LCS MO-LR with MOLR-TYPE set to locationEstimate.

3) The MS needs to interact with the network for each separate location request.

4) On receiving an RRLP MEASURE POSITION REQUEST message the MS tries to perform the requested location measurements. It sends the results in an RRLP MEASURE POSITION RESPONSE message.

5) The network returns an LCS result to the MS carrying location estimate requested by the MS in FACILITY message.

6) The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

References

3GPP TS 24.080, sub clauses 2.4, 2.5, 3.4 and 4.

3GPP TS 44.031

70.14.1.2   Test Purpose

To verify that the MS invokes a self-location request by sending the network a REGISTER message containing the Facility IE LCS MO-LR. When the MS receives a FACILITY message containing a Facility IE MO-LR LCS result carrying the requested location estimate, it clears the transaction by sending a RELEASE COMPLETE message.

70.14.1.3   Method of Test

Initial Conditions

System Simulator (SS):

    Serving Cell: default parameters

    Satellite signals: default conditions.

Mobile Station (MS):

    The MS is in MM-state "idle, updated" with valid TMSI and CSKN.

Specific PICS statements

    -

PIXIT statements

    -

Test Procedure

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined below:

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

The MS invokes call independent supplementary service through a CM SERVICE REQUEST.

The SS initiates authentication and ciphering. Then the MS invokes an MO-LR request.

The SS sends an RR APPLICATION INFORMATION messages containing a RRLP Positioning Capability Request message.

The MS responds with an RR APPLICATION INFORMATION message containing an RRLP Positioning Capability Response message indicating the GNSS(s) supported by the MS.

The SS sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request including assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing or ganssAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The SS responds with a FACILITY message containing an MO-LR result. When MS receives FACILITY message, it clears the transaction by sending a RELEASE COMPLETE message.

Maximum duration of the test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate LCS MOLR Procedure (location estimation)
2	MS -> SS	CHANNEL REQUEST	establishment cause "Other procedures which can be completed with an SDCCH"
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	The CM service type IE indicates "Supplementary service activation". "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The Additional Positioning Capabilities (1 bit field) is set to 1 (the mobile station supports additional positioning capabilities which can be retrieved using RRLP).
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering
11	MS -> SS	REGISTER	Call Independent SS containing Facility IE with LCS-MOLR request with MOLR-Type set to locationEstimate
12	SS -> MS	RR APPLICATION INFORMATION	RRLP Positioning Capability Request
13	MS -> SS	RR APPLICATION INFORMATION	RRLP Positioning Capability Response
14	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. Contains assistance data as defined in sub clause 70.1.3.
15	MS -> SS	RR APPLICATION INFORMATION	Option 1: RRLP Measure Position Response: ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4)

Option 2: locationError with gpsAssDataMissing (Sub-Tests 3 and 4) or ganssAssDataMissing and additionalAssistanceData including gpsAssistanceData (Sub-Tests 3 and 4) and/or ganssAssistanceData |
15a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 15 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
15b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 15a, the MS acknowledges the received assistance data.
15c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 15 that is available in the SS, this message may include further assistance data.

15d	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 15, this message contains ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4).
16	SS -> MS	FACILITY	LCS MO-LR result message containing location estimate
17	MS -> SS	RELEASE COMPLETE	MS terminates the dialogue
18	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 11):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg Molr-Type -> locationEstimate
SS version indicator	Value 1 or above

RR APPLICATION INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 12: RRLP Positioning Capability Request Step 13: RRLP Positioning Capability Response Step 14 and 15c: RRLP Measure Position Request Step 15 and 15d: RRLP Measure Position Response Step 15a: RRLP Assistance Data Step 15b: RRLP Assistance Data Ack.

RRLP Positioning Capability Request (Step 12):

Information element	Type	Value/remark
ASN.1 encoded		
extended-reference	SEQUENCE	

RRLP Positioning Capability Response (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the Positioning Capability Request (Step 12).
posCapabilities	SEQUENCE	
nonGANSSpositionMethods	BIT STRING	May only be included for Sub-Tests 3 and 4.
gANSSPositionMethods	SEQUENCE	Included for each MS supported GANSS
ganssID	INTEGER	Sub-Test 1: value 3 Sub-Test 2: absent Sub-Test 3: value 1 Sub-Test 4: value 3
gANSSPositioningMethodTypes	BIT STRING	Bit 0 (msAssisted) set to value 1
gANSSSignals	BIT STRING	Dependent on MS capabilities

RRLP Measure Position Request (Step 14):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.

RRLP Measure Position Response (Step 15 (Option 1) or Step 15d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 15d)
component	CHOICE	msrPositionRsp (A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request
ganssMeasureInfo	SEQUENCE	Any value is acceptable

RRLP Measure Position Response (Step 15 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing or ganssAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements This field may only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 15a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	This field may only be present for Sub-Tests 3 and 4. If the MS requested further GPS assistance data in Step 15 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further GANSS assistance data in Step 15 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Assistance Data Ack (Step 15b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceDataAck

RRLP Measure Position Request (Step 15c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 15 (Option 2).
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 15 (Option 2).

FACILITY (Step 16):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	FACILITY (0011 1010)
Facility	Return Result = LCS-MOLR LCS-MOLRRes -> locationEstimate (Note)
Note: Any value for locationEstimate may be used. The SS shall not be required to calculate the value from the returned gps-MeasureInfo and/or ganssMeasureInfo values	

RELEASE COMPLETE (Step 17):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.14.2 MO-LR / Idle mode for Mobiles Supporting MS-Based GNSS / Assistance Data Request

70.14.2.1 Conformance requirements

The following requirements apply for this test:

1. The MS sends CM SERVICE REQUEST to network for call independent supplementary service.

2. The MS invokes self-location request by sending REGISTER message containing Facility IE LCS MO-LR with MOLR-TYPE set to assistance data.

3. The MS sends RRLP ASSISTANCE DATA ACK for each RRLP ASSISTANCE DATA component

4. The network shall returns an LCS result of the location procedure to the MS by sending a FACILITY message to the MS containing a LCS-MOLR return result component.

5. The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

References

3GPP TS 24.080, sub clauses 2.4, 2.5, 3.4 and 4.

3GPP TS 44.031

70.14.2.2   Test Purpose

To verify that a MS invokes a self-location request by sending the network a REGISTER message containing an LCS-MOLR REQ of type "Assistance data". On receipt of each RRLP ASSISTANCE DATA from SS with the requested assistance data, MS shall send RRLP ASSISTANCE ACK for each component to SS. When the MS receives a FACILITY message containing a LCS-MOLR return result for the acknowledgement of completing assistance data delivery, it clears the transaction by sending a RELEASE COMPLETE message.

70.14.2.3   Method of Test

Initial Conditions

System Simulator (SS):

Serving Cell: default parameters

Satellite signals: default conditions.

Mobile Station (MS):

The MS is in MM-state "idle, updated" with valid TMSI and CSKN.

Specific PICS statements

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PIXIT statements

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Test Procedure

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined below:

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

The MS invokes call independent supplementary service through a CM SERVICE REQUEST.

The SS initiates authentication and ciphering. Then the MS invokes an MO-LR request, with MOLR-TYPE set to assistance data.

The SS sends a number of RRLP Assistance Data components and MS sends RRLP Assistance Data Ack for each component.

SS sends LCS-MOLR Return Result for acknowledgement of completion of assistance data delivery.

The MS terminates the dialogue by sending RELEASE COMPLETE message.

Maximum duration of the test

10 minutes.

Expected Sequence

Normal Case:

Step	Direction	Message	Comments
1	MS		Initiate LCS MOLR Procedure (assistance data request)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "Other procedures which can be completed with an SDCCH"
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Establishment cause indicates "Supplementary service activation". "mobile station classmark 2" includes settings for ES_IND.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The Additional Positioning Capabilities (1 bit field) is set to 1 (the mobile station supports additional positioning capabilities which can be retrieved using RRLP).
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.
8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR with MOLR-Type set to assistanceData.
11n	SS -> MS	RR APPLICATION INFORMATION	RRLP ASSISTANCE DATA The number of instances of this message depends on the amount of assistance data requested in step 10
12n	MS -> SS	RR APPLICATION INFORMATION	RRLP ASSISTANCE DATA ACK Each instance of RRLP ASSISTANCE DATA message in step 11 is acknowledged
13	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT
14	MS -> SS	RELEASE COMPLETE	Terminates the session
15	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 10):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction Identifier Message Type Facility	REGISTER (xx11 1011) Invoke = LCS-MOLR LCS-MOLRArg MOLR-Type-> assistanceData Location Method-> assistedGANSS / assistedGPSandGANSS (Sub-Tests 3 and 4) gpsAssistanceData-> any value is acceptable ganssAssistanceData-> any value is acceptable

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 11: RRLP Positioning Capability Request Step 12: RRLP Positioning Capability Response Step 13n: RRLP Assistance Data Step 14n: RRLP Assistance Data Ack.

RRLP Assistance Data (Step 11n):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.
moreAssDataToBeSent	ENUMERATED	If SS sends more than one RRLP assistance data delivery message at step 11n the moreAssDataToBeSent field shall be set accordingly: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.

RRLP Assistance Data Ack (Step 12n):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
Component	CHOICE	assistanceDataAck

FACILITY (Step 13):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction Identifier Message Type Facility	 FACILITY (0011 1010) Return Result = LCS-MOLR LCS-MOLRRes -> empty (Note)
Note: For acknowledgement of assistance data delivery procedure, SS shall send LCS-MOLR Facility return result to MS, there is no parameter for this.	

RELEASE COMPLETE (Step 14):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (0011 1010)

70.14.3 MO-LR / Idle mode for Mobiles Supporting MS-Based GNSS / Location Estimate Request

70.14.3.1 Conformance requirements

The following requirements apply for this test:

1. The MS sends CM SERVICE REQUEST to network for call independent supplementary service.

2. The MS invokes self-location request by sending REGISTER message containing Facility IE LCS MO-LR with MOLR-TYPE set to locationEstimate.

3. On receiving the POSITIONING CAPABILITY REQUEST message the MS responds with a POSITIONING CAPABILITY RESPONSE message indicating the positioning methods supported by the MS.

4. On receiving an RRLP MEASURE POSITION REQUEST message, the MS tries to perform the requested location measurements, and possibly calculates it own position. When the MS has location measurements, location estimate, or an error indication (measurements/location estimation not possible), it sends the results in the Measure Position Response component to the SMLC.

5. The network shall returns an LCS result of the location procedure to the MS by sending a FACILITY message to the MS containing a LCS-MOLR return result component.

6. The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

References

3GPP TS 24.080, sub clauses 2.4, 2.5, 3.4 and 4.

3GPP TS 44.031

70.14.3.2 Test Purpose

To verify that the MS invokes a self-location request by sending the network a REGISTER message containing an MO-LR Request of type "locationEstimate". When the MS receives a FACILITY message containing a MO-LR return result carrying the requested location estimate, it clears the transaction by sending a RELEASE COMPLETE message.

70.14.3.3 Method of Test

Initial Conditions

System Simulator (SS):

Serving Cell: default parameters

Satellite signals: default conditions.

Mobile Station (MS):

The MS is in MM-state "idle, updated" with valid TMSI and CSKN.

Specific PICS statements

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PIXIT statements

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Test Procedure

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined below:

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

The MS invokes call independent supplementary service through a CM SERVICE REQUEST.

The SS initiates authentication and ciphering. Then the MS invokes an MO-LR request, with MOLR-TYPE set to locationEstimate.

The SS sends an RR APPLICATION INFORMATION messages containing a RRLP Positioning Capability Request message.

The MS responds with an RR APPLICATION INFORMATION message containing an RRLP Positioning Capability Response message indicating the GNSS(s) supported by the MS.

The SS sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request including assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing or ganssAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The SS responds with a FACILITY message containing an MO-LR result. When the MS receives the FACILITY message, it clears the transaction by sending a RELEASE COMPLETE message.

Maximum duration of the test

10 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure (location estimation)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "Other procedures which can be completed with an SDCCH"
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUES	The CM Service Type IE indicates "Supplementary service activation".
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The Additional Positioning Capabilities (1 bit field) is set to 1 (the mobile station supports additional positioning capabilities which can be retrieved using RRLP).
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering
11	MS -> SS	REGISTER	Call Independent SS containing Facility IE with LCS-MOLR request and MO-LR Type set to "locationEstimate".
12	SS -> MS	RR APPLICATION INFORMATION	RRLP Positioning Capability Request
13	MS -> SS	RR APPLICATION INFORMATION	RRLP Positioning Capability Response
14	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data The SS provides assistance data in one or more RRLP assistance data delivery messages as defined in sub clause 70.1.3. Each message shall contain a maximum of 242 octets.
15	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck Each RRLP Assistance Data message is acknowledged by the MS.
16	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request May contain further assistance data as defined in sub clause 70.1.3.
17	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: ganssLocationInfo (Option 1) or locationError with gpsAssDataMissing (Sub-Tests 3 and 4) or ganssAssDataMissing and additionalAssistanceData including gpsAssistanceData (Sub-Tests 3 and 4) and/or ganssAssistanceData
17a	SS -> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Assistance Data. If the MS requested additional assistance data in step 17 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
17b	MS -> SS	RR APPLICATION INFORMATION	Option 2 only: RRLP assistanceDataAck. If the SS sent additional assistance data in step 17a, the MS acknowledges the received assistance data.
17c	SS-> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Measure Position Request. If the MS requested additional assistance data in step 17 that is available in the SS, this message may include further assistance data.

17d	MS-> SS	RR APPLICATION INFORMATION	Option 2 only: RRLP Measure Position Response. If the MS requested additional assistance data in step 17, this message contains ganssLocationInfo.
20	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT message containing location estimate
21	MS -> SS	RELEASE COMPLETE	MS terminates the dialogue
22	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 11):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg MOLR-Type->locationEstimate
SS version indicator	Value 1 or above

RRLP Positioning Capability Request (Step 12):

Information element	Type	Value/remark
ASN.1 encoded		
extended-reference	SEQUENCE	

RRLP Positioning Capability Response (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the Positioning Capability Request (Step 14).
posCapabilities	SEQUENCE	
nonGANSSpositionMethods	BIT STRING	May only be included for Sub-Tests 3 and 4.
gANSSPositionMethods	SEQUENCE	Included for each MS supported GANSS
ganssID	INTEGER	Sub-Test 1: value 3 Sub-Test 2: absent Sub-Test 3: value 1 Sub-Test 4: value 3
gANSSPositioningMethodTypes	BIT STRING	Bit 1 (msBased) set to value 1
gANSSSignals	BIT STRING	Dependent on MS capabilities

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 12: RRLP Positioning Capability Request Step 13: RRLP Positioning Capability Response Steps 18 and 19c: RRLP Measure Position Request Steps 19 and 19d: RRLP Measure Position Response Steps 14, 16, 19a: RRLP Assistance Data Steps 15, 17, 19b: RRLP Assistance Data Ack.

RRLP Assistance Data (Step 14):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.
moreAssDataToBeSent	ENUMERATED	If SS sends more than one RRLP assistance data delivery message at step 14 the moreAssDataToBeSent field shall be set accordingly: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.

RRLP Assistance Data Ack (Steps 15, 17b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 17b)
component	CHOICE	assistanceDataAck

RRLP Measure Position Request (Step 16):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.

RRLP Measure Position Response (Step 17 (Option 1) or 17d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 17d)
component	CHOICE	msrPositionRsp (A valid response will contain ganssLocationInfo otherwise locationError will be returned)
locationError	SEQUENCE	Any error value is acceptable.
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request
ganssLocationInfo	SEQUENCE	Any value is acceptable

RRLP Measure Position Response (Step 17 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing or ganssAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing GPS assistance data elements. This field may only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 17a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	This field may only be present for Sub-Tests 3 and 4. If the MS requested further GPS assistance data in Step 17 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further GANSS assistance data in Step 17 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Measure Position Request (Step 17c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 17 (Option 2).
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 17 (Option 2).

FACILITY (Step 20):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	FACILITY (0011 1010)
Facility	Return Result = LCS-MOLR LCS-MOLRRes -> locationEstimate

RELEASE COMPLETE (Step 22):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.14.4 MO-LR / Dedicated Mode for Mobiles Supporting MS-Assisted GNSS

70.14.4.1 Conformance Requirement:

The MS sends a DTAP LCS MO-LR invoke to the VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component with MO_LR TYPE set to LocationEstimate, LCS QoS value and other optional field if it is needed.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

References

3GPP TS 03.71, sub clause 7.6.6.

3GPP TS 04.30, sub clause 5.1.1.

3GPP TS 24.080, sub clauses 2.4, 2.5, 3.4 and 4.

70.14.4.2 Test Purpose

To verify that the MS invokes a self-location request by sending the network a REGISTER message containing the Facility IE LCS MO-LR on an already established speech call related main DCCH (FACCH). When the MS receives a FACILITY message containing a Facility IE MO-LR LCS result carrying the requested location estimate, it clears the transaction by sending a RELEASE COMPLETE message.

70.14.4.3 Method of Test

Initial Conditions

System Simulator (SS):

Serving Cell: default parameters

Satellite signals: default conditions.

Mobile Station (MS):

The MS has valid TMSI and CSKN.

The MS is brought into the state U10 by using table 26.8.1.2/3.

Specific PICS statements

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PIXIT statements

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Test Procedure

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined below:

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

The MS invokes call independent supplementary service on an existing FACCH channel. After receiving a CM SERVICE ACCEPT message, the MS invokes a self-location request by sending a REGISTER message containing the Facility IE LCS MO-LR.

The SS sends an RR APPLICATION INFORMATION messages containing a RRLP Positioning Capability Request message.

The MS responds with an RR APPLICATION INFORMATION message containing an RRLP Positioning Capability Response message indicating the GNSS(s) supported by the MS.

The SS sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request including assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing or ganssAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero,

one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The SS responds with a FACILITY message containing an MO-LR result. When the MS receives a FACILITY message, it clears the transaction by sending a RELEASE COMPLETE message.

Maximum duration of the test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate LCS MOLR Procedure (location estimation) on existing FACCH channel
2	MS -> SS	CM SERVICE REQUEST	The CM Service Type IE indicates "Supplementary service activation". "mobile station classmark 2" includes settings for ES_IND.
3	SS -> MS	CM SERVICE ACCEPT	
4	MS -> SS	REGISTER	Call Independent SS containing Facility IE with LCS-MOLR request with MOLR-Type set to locationEstimate
5	SS -> MS	RR APPLICATION INFORMATION	RRLP Positioning Capability Request
6	MS -> SS	RR APPLICATION INFORMATION	RRLP Positioning Capability Response
7	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request Contains assistance data as defined in sub clause 70.1.3.
8	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: Option 1: ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4) Option 2: locationError with gpsAssDataMissing (Sub-Tests 3 and 4) or ganssAssDataMissing and additionalAssistanceData including gpsAssistanceData (Sub-Tests 3 and 4) and/or ganssAssistanceData
8a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 8 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
8b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 8a, the MS acknowledges the received assistance data.
8c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 8 that is available in the SS, this message may include further assistance data.
8d	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 8, this message contains ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4).
9	SS -> MS	FACILITY	LCS MO-LR result message containing location estimate
10	MS -> SS	RELEASE COMPLETE	MS terminates the dialogue
11	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 4):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg Molr-Type -> locationEstimate
SS version indicator	Value 1 or above

RR APPLICATION INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 5: RRLP Positioning Capability Request Step 6: RRLP Positioning Capability Response Step 7 and 8c: RRLP Measure Position Request Step 8 and 8d: RRLP Measure Position Response Step 8a: RRLP Assistance Data Step 8b: RRLP Assistance Data Ack.

RRLP Positioning Capability Request (Step 5):

Information element	Type	Value/remark
ASN.1 encoded		
extended-reference	SEQUENCE	

RRLP Positioning Capability Response (Step 6):

Information element	Type	Value/remark
ASN.1 encoded		
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the Positioning Capability Request (Step 5).
posCapabilities	SEQUENCE	
nonGANSSpositionMethods	BIT STRING	May only be included for Sub-Tests 3 and 4.
gANSSPositionMethods	SEQUENCE	Included for each MS supported GANSS
ganssID	INTEGER	Sub-Test 1: value 3 Sub-Test 2: absent Sub-Test 3: value 1 Sub-Test 4: value 3
gANSSPositioningMethodTypes	BIT STRING	Bit 0 (msAssisted) set to value 1
gANSSSignals	BIT STRING	Dependent on MS capabilities

RRLP Measure Position Request (Step 7):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
Component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	Gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in TS 51.010-7 sub clauses 5.1.3 and 5.1.8.
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 5.1.3
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 5.1.8
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in TS 51.010-7 sub clauses 6.1.3 and 6.1.4.

RRLP Measure Position Response (Step 8 (Option 1) or Step 8d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 8d)
Component	CHOICE	msrPositionRsp (A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing.
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request
ganssMeasureInfo	SEQUENCE	Any value is acceptable

RRLP Measure Position Response (Step 8 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
Component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing or ganssAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements This field may only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 8a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
Component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	This field may only be present for Sub-Tests 3 and 4. If the MS requested further GPS assistance data in Step 8 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. Except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further GANSS assistance data in Step 8 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Assistance Data Ack (Step 8b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
Component	CHOICE	assistanceDataAck

RRLP Measure Position Request (Step 8c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	Gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 8 (Option 2).
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 8 (Option 2).

FACILITY (Step 9):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	FACILITY (0011 1010)
Facility	Return Result = LCS-MOLR LCS-MOLRRes -> locationEstimate (Note)
Note: Any value for locationEstimate may be used. The SS shall not be required to calculate the value from the returned gps-MeasureInfo values and/or ganssMeasureInfo values	

RELEASE COMPLETE (Step 10):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.14.5 MO-LR / Dedicated Mode for Mobiles Supporting MS-Based GNSS / Assistance Data Request

70.14.5.1 Conformance Requirement:

The following requirements apply for this test:

1. The MS sends CM SERVICE REQUEST to network for call independent supplementary service.

2. The MS invokes self-location request by sending a REGISTER message containing a LCS-MOLR invoke component with MO_LR TYPE set to ASSISTANCE DATA, LOCATION_METHOD TYPE set ASSISTEDGPS, and GPS_ASSISTANCE_DATA TYPE set to the type of ASSISTANCE_DATA requested.

3. The MS sends RRLP ASSISTANCE DATA ACK. for each RRLP ASSISTANCE DATA component.

4. The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References:

3GPP TS 03.71 sub clause 7.6.6

3Gpp TS 24.30 sub clause 5

3GPP TS 24.80 sub clause 4

70.14.5.2 Test Purpose

To verify that the MS invokes a self-location request by sending the network a REGISTER message containing the FACILITY IE LCS-MOLR REQ on an already established speech call related main DCCH (FACCH). On receipt of a RRLP ASSISTANCE DATA from SS with the requested assistance data, MS shall send back RRLP ASSISTANCE ACK for each component to SS. When the MS receives a FACILITY message containing a FACILITY IE LCS-MOLR return result for the acknowledgment of completing assistance data delivery, it clears the transaction by sending a RELEASE COMPLETE message.

Specific PICS statements

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PIXIT statements

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70.14.5.3 Method of Test

Initial Conditions:

System Simulator:

Serving Cell: default parameters.

Satellite signals: default conditions.

Mobile Station:

The MS has valid TMSI and CSKN.

The MS is brought into the state U10 by using table 26.8.1.2/3

Specific PICS statements

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PIXIT statements

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Test Procedure:

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined below:

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

A MOLR procedure as call independent supplementary services is initiated from the MS on the existing FACCH channel.

After received CM SERVICE ACCEPT message, MS sends a REGISTER message with Facility IE containing a component set to a DTAP LCS-MOLR Invoke for Assistance Data.

The SS sends a number of RRLP ASSISTANCE DATA components and MS sends acknowledgement of RRLP ASSISTANCE DATA ACK for each component.

SS sends DTAP LCS-MOLR Return Result for acknowledgement of completion of assistance data delivery procedure.

The MS terminates the dialogue by sending RELEASE COMPLETE message.

Maximum duration of the test:

5 minutes.

Expected Sequence:

Step	Direction	Message	Comments
1	MS		Initiate LCS MOLR Procedure (assistance data request) on existing FACCH channel
2	MS -> SS	CM SERVICE REQUEST	"Mobile identity" IE contains the TMSI. Establishment cause indicates "Supplementary service activation" "mobile station classmark 2" including settings for ES IND and CM3 supported.
3	SS -> MS	CM SERVICE ACCEPT	
4	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR with MOLR-Type set to assistanceData.
5	SS -> MS	RR APPLICATION INFORMATION	RRLP Positioning Capability Request
6	MS -> SS	RR APPLICATION INFORMATION	RRLP Positioning Capability Response
7n	SS->MS	RR APPLICATION INFORMATION	RRLP ASSISTANCE DATA The number of instances of this message depends on the amount of assistance data requested in step 4
8n	MS -> SS	RR APPLICATION INFORMATION	RRLP ASSISTANCE DATA ACK Each instance of RRLP ASSISTANCE DATA message in step 7 is acknowledged
9	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT
10	MS->SS	RELEASE COMPLETE	Terminates the session
11	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents:

REGISTER (Step 4):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)

Transaction Identifier
Message Type
Facility
	
	REGISTER (xx11 1011)
	Invoke = LCS-MOLR
	LCS-MOLRArg
	    MOLR-Type-> assistanceData
	    Location Method-> assistedGANSS /
	assistedGPSandGANSS (Sub-Tests 3 and 4)
	    GPSAssistanceData-> any value is acceptable
	    ganssAssistanceData-> any value is acceptable

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 5: RRLP Positioning Capability Request Step 6: RRLP Positioning Capability Response Step 7n: RRLP Assistance Data Step 8n: RRLP Assistance Data Ack.

RRLP Positioning Capability Request (Step 5):

Information element	Type	Value/remark
ASN.1 encoded		
extended-reference	SEQUENCE	

RRLP Positioning Capability Response (Step 6):

Information element	Type	Value/remark
ASN.1 encoded		
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the Positioning Capability Request (Step 5).
posCapabilities	SEQUENCE	
nonGANSSpositionMethods	BIT STRING	May only be included for Sub-Tests 3 and 4.
gANSSPositionMethods	SEQUENCE	Included for each MS supported GANSS
ganssID	INTEGER	Sub-Test 1: value 3 Sub-Test 2: absent Sub-Test 3: value 1 Sub-Test 4: value 3
gANSSPositioningMethodTypes	BIT STRING	Bit 0 (msAssisted) set to value 1
gANSSSignals	BIT STRING	Dependent on MS capabilities

RRLP Assistance Data (Step 7n):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
Component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	This field may only be present for Sub-Tests 3 and 4. The GPS assistance data requested by the MS in Step 4 that is available in the SS, shall be sent in one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 5.1.3 to 5.1.8. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	1 or 0. If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly.
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	The GANSS assistance data requested by the MS in Step 4 that is available in the SS, SS shall send one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Assistance Data Ack (Step 8n):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
Component	CHOICE	assistanceDataAck

FACILITY (Step 9):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction Identifier Message Type Facility	FACILITY (0011 1010) Return Result = LCS-MOLR LCS-MOLRRes ->empty (note)
Note: For acknowledgement of assistance data delivery procedure, SS shall send LCS-MOLR Facility return result to MS, there is no parameter for this.	

RELEASE COMPLETE (Step 10):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.14.6 MO-LR / Dedicated Mode for Mobiles Supporting MS-Based GNSS / Location Estimate request

70.14.6.1 Conformance requirements:

The following requirements apply for this test:

1. The MS sends CM SERVICE REQUEST to network for call independent supplementary service.

2. The MS invokes a MO-LR by sending a REGISTER message to the network containing a LCS-MOLR invoke component.

3. On receiving the POSITIONING CAPABILITY REQUEST message the MS responds with a POSITIONING CAPABILITY RESPONSE message indicating the positioning methods supported by the MS.

4. On receiving an RRLP MEASURE POSITION REQUEST message, the MS tries to perform the requested location measurements, and possibly calculates it own position. When the MS has location measurements, location estimate, or an error indication (measurements/location estimation not possible), it sends the results in the Measure Position Response component to the SMLC.

5. The network shall pass the result of the location procedure to the MS by sending a FACILITY message to the MS containing a LCS-MOLR return result component.

6. After the last location request operation the MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References

3GPP TS 44.031

70.14.6.2 Test Purpose

To verify that the MS invokes a self-location request by sending the network a REGISTER message containing an MO-LR Request of type "locationEstimate" on an already established speech call related SACCH. When the MS receives a FACILITY message containing a MO-LR return result carrying the requested location estimate, it clears the transaction by sending a RELEASE COMPLETE message.

Specific PICS statements

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PIXIT statements

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70.14.6.3 Method of Test

Initial Conditions

System Simulator:

Serving cell: default parameters.

Satellite signals: default conditions.

Mobile Station:

The MS has valid TMSI and CKSN.

The MS is brought into state U10 by using table 26.8.1.2/3.

Test Procedure:

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined below:

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

The MS invokes call independent supplementary service on an existing SACCH channel. After receiving a CM SERVICE ACCEPT message, the MS invokes a self location request by sending a REGISTER message containing an MO-LR request of type "locationEstimate".

The SS sends an RR APPLICATION INFORMATION messages containing a RRLP Positioning Capability Request message.

The MS responds with an RR APPLICATION INFORMATION message containing an RRLP Positioning Capability Response message indicating the GNSS(s) supported by the MS.

The SS orders positioning measurement by sending RR APPLICATION INFORMATION messages containing RRLP Assistance Data messages followed by an RRLP Measure Position Request including further assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing or ganssAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The SS responds with a FACILITY message containing an MO-LR result. When the MS receives the FACILITY message, it clears the transaction by sending a RELEASE COMPLETE message.

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MO-LR procedure (location estimation) on existing SACCH channel
2	MS -> SS	CM SERVICE REQUEST	The CM Service Type IE indicates "Supplementary service activation".
3	SS -> MS	CM SERVICE ACCEPT	
4	MS -> SS	REGISTER	Call Independent SS containing Facility IE with LCS-MOLR request and MO-LR Type set to "locationEstimate".
5	SS -> MS	RR APPLICATION INFORMATION	RRLP Positioning Capability Request
6	MS -> SS	RR APPLICATION INFORMATION	RRLP Positioning Capability Response

7	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
8	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
9	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
10	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
11	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request
12	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response: ganssLocationInfo (Option 1) or locationError with gpsAssDataMissing (Sub-Tests 3 and 4) or ganssAssDataMissing and additionalAssistanceData including gpsAssistanceData (Sub-Tests 3 and 4) and/or ganssAssistanceData (Option 2)
12a	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. If the MS requested additional assistance data in step 12 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
12b	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 12a, the MS acknowledges the received assistance data.
12c	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request. If the MS requested additional assistance data in step 12 that is available in the SS, this message may include further assistance data.
12d	MS-> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response. If the MS requested additional assistance data in step 12, this message contains ganssLocationInfo.
13	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT message containing location estimate
14	MS -> SS	RELEASE COMPLETE	MS terminates the dialogue
15	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 4):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg MOLR-Type->locationEstimate
SS version indicator	Value 1 or above

RRLP Positioning Capability Request (Step 5):

Information element	Type	Value/remark
ASN.1 encoded		
extended-reference	SEQUENCE	

RRLP Positioning Capability Response (Step 6):

Information element	Type	Value/remark
ASN.1 encoded		
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the Positioning Capability Request.
posCapabilities	SEQUENCE	
nonGANSSpositionMethods	BIT STRING	May only be included for Sub-Tests 3 and 4.
gANSSPositionMethods	SEQUENCE	Included for each MS supported GANSS
ganssID	INTEGER	Sub-Test 1: value 3 Sub-Test 2: absent Sub-Test 3: value 1 Sub-Test 4: value 3
gANSSPositioningMethodTypes	BIT STRING	Bit 1 (msBased) set to value 1
gANSSSignals	BIT STRING	Dependent on MS capabilities

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Steps 11 and 12c: RRLP Measure Position Request Steps 12 and 12d: RRLP Measure Position Response Steps 7, 9, 12a: RRLP Assistance Data Steps 8, 10, 12b: RRLP Assistance Data Ack.

RRLP Assistance Data (Step 7):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
Component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.

RRLP Assistance Data Ack (Steps 8, 10, 12b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 12b)
Component	CHOICE	assistanceDataAck

RRLP Assistance Data (Step 9):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
Component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	
moreAssDataToBeSent	ENUMERATED	If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.

RRLP Measure Position Request (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
Component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	Gps
measureResponseTime	Integer 0 to 7	5
Accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.

RRLP Measure Position Response (Step 12 (Option 1) or 12d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1 or 2 (Option 2, Step 12d)
Component	CHOICE	msrPositionRsp (A valid response will contain ganssLocationInfo otherwise LocationError will be returned)
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing or ganssAssDataMissing.
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request
ganssLocationInfo	SEQUENCE	Any value is acceptable

RRLP Measure Position Response (Step 12 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
Component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing or ganssAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing GPS assistance data elements. This field may only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 12a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 12 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 6.1.3 to 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly. 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further GANSS assistance data in Step 12 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Measure Position Request (Step 12c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
Component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	Gps
measureResponseTime	Integer 0 to 7	5
Accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 as requested by the MS in step 12 (Option 2).
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 12 (Option 2).

FACILITY (Step 13):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	FACILITY (0011 1010)
Facility	Return Result = LCS-MOLR LCS-MOLRRes -> locationEstimate

RELEASE COMPLETE (Step 14):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.14.7

70.14.8 MO-LR / Location Error

70.14.8.1 MO-LR / Location Error / Requested Method not supported

70.14.8.1.1 Conformance requirement:

The MS sends a DTAP LCS MOLR invoke to VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO-LR by sending a REGISTER message to network containing a LCS-MOLR invoke component with MO-LR TYPE set to LocationEstimate, LCS QoS value and other optional field if it is needed.

The MS sends a RRLP MEASURE POSITION RESPONSE to network containing a Location Error component with an error indication if the measurement is not possible.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References:

3GPP TS 44.018 sub clauses 3.3.1.1 and 9.1.11.

3GPP TS 24.008 sub clauses 4.5.1.5, 5.2.1, 9.2.9 and 10.5.1.6, 10.5.1.7.

3GPP TS 44.031.

70.14.8.1.2 Test Purpose:

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall send back RRLP MEASURE POSITION RESPONSE message with Location Error component if the MS does not support the requested method. On receipt of second RRLP MEASURE POSITION REQUEST from SS to start the measurement, the MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.14.8.1.3 Method of Test

Initial Conditions:

System Simulator:

Serving Cell: default parameters.

Satellite signals: default conditions.

Mobile Station:

The MS is MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

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PIXIT statements

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Test Procedure:

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined below:

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to a DTAP LCS-MOLR Invoke.

The SS then instigates the particular message sequence by sending RRLP MEASURE POSITION REQUEST with a method type not supported by the mobile. (Type not supported to be GPS for sub-tests 1 and 2, Galileo for sub-tests 3 and 4). The MS sends RRLP MEASURE POSITION RESPONSE to SS containing a Location Error component (Request Method not Supported) as the requested method is not supported.

The SS then sends a RR APPLICATION INFORMATION message containing a RRLP Positioning Capability Request message, and the MS responds with an RR APPLICATION INFORMATION message containing an RRLP Positioning Capability Response message indicating the GNSS(s) supported by the MS.

The SS repeats RRLP MEASURE POSITION REQUEST with correct message contents including assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The SS returns location estimate to MS through LCS-MOLR Return Result. The MS terminates the dialogue by sending RELEASE COMPLETE message after receiving location estimate.

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure (location estimate)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "Other procedures which can be completed with an SDCCH"
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the TMSI. The CM Service Type IE indicates "Supplementary service activation" "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" including settings for ES IND and CM3 supported. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.

8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR request with MOLR-Type set to locationEstimate
11	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 1 (Request method not supported)
12	MS->SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE 1 (location_error)
13	SS -> MS	RR APPLICATION INFORMATION	RRLP POSITIONING CAPABILITY REQUEST
14	MS->SS	RR APPLICATION INFORMATION	RRLP POSITIONING CAPABILITY RESPONSE
15	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 2
16	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response 2: ganssMeasureInfo and gps-MeasureInfo, (Sub-Tests 3 and 4) (Option 1) or locationError with gpsAssDataMissing (Sub-Tests 3 and 4) or ganssAssDataMissing and additionalAssistanceData including gpsAssistanceData (Sub-Tests 3 and 4) and/or ganssAssistanceData (Option 2)
16a	SS -> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Assistance Data. If the MS requested additional assistance data in step 16 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
16b	MS -> SS	RR APPLICATION INFORMATION	Option 2 only: RRLP assistanceDataAck. If the SS sent additional assistance data in step 16a, the MS acknowledges the received assistance data.
16c	SS-> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Measure Position Request. If the MS requested additional assistance data in step 16 that is available in the SS, this message may include further assistance data.
16d	MS -> SS	RR APPLICATION INFORMATION	Option 2 only: RRLP Measure Position Response. If the MS requested additional assistance data in step 16, this message contains ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4).
17	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT (locationEstimate)
18	MS -> SS	RELEASE COMPLETE	Terminates the session
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 10):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg Molr-Type -> locationEstimate
SS version indicator	Value 1 or above

RR_APPLICATION_INFORMATION:

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment
	Bit2=0 -> First or only segment
	Bit3=0 -> Command or Final Response
	Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded
	Step 11, Step 15 and 16c: RRLP Measure Position Request
	Step 12, Step 16 and 16d: RRLP Measure Position Response
	Step 16a: RRLP Assistance Data
	Step 16b: RRLP Assistance Data Ack.
	Step 13: RRLP Positioning Capability Request
	Step 14: RRLP Positioning Capability Response

RRLP Measure Position Request 1 (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
ReferenceNumber	Integer 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	Sub-tests 1 and 2: gps
		Ssub-tests 3 and 4: galileo
measureResponseTime	Integer 0 to 7	7
useMultipleSets	ENUMERATED	oneSet
extended-reference	SEQUENCE	

RRLP Measure Position Response 1 (Step 12):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRes
locationError	SEQUENCE	
locErrorReason	ENUMERATED	methodNotSupported
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Positioning Capability Request (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
ReferenceNumber	Integer 0 to 7	1
component	CHOICE	posCapabilityReq
extended-reference	SEQUENCE	

RRLP Positioning Capability Response (Step 14):

Information element	Type	Value/remark
ASN.1 encoded		
ReferenceNumber	Integer 0 to 7	1
component	CHOICE	posCapabilityRsp
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the Positioning Capability Request (Step 13).
posCapabilities	SEQUENCE	
nonGANSSpositionMethods	BIT STRING	May only be included for Sub-Tests 3 and 4.
gANSSPositionMethods	SEQUENCE	Included for each MS supported GANSS
ganssID	INTEGER	Sub-Test 1: value 3 Sub-Test 2: absent Sub-Test 3: value 1 Sub-Test 4: value 3
gANSSPositioningMethodTypes	BIT STRING	Bit 0 (msAssisted) set to value 1
gANSSSignals	BIT STRING	Dependent on MS capabilities
methodType	CHOICE	msAssisted

RRLP Measure Position Request 2 (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
ReferenceNumber	Integer 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.

RRLP Measure Position Response 2 (Step 16 (Option 1) or Step 16d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2 or 3 (Option 2, Step 16d)
component	CHOICE	msrPositionRsp (A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request
ganssMeasureInfo	SEQUENCE	Any value is acceptable

RRLP Measure Position Response 2 (Step 16 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 16a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	This field may only be present for Sub-Tests 3 and 4. If the MS requested further GPS assistance data in Step 16 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further GANSS assistance data in Step 16 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Assistance Data Ack (Step 16b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceDataAck

RRLP Measure Position Request (Step 16c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	3
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 16 (Option 2).
extended-reference	SEQUENCE	Rel 5 and later
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 16 (Option 2).

FACILITY (Step 17):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction Identifier Message Type Facility	FACILITY (0011 1010) Return Result = LCS-MOLR LCS-MOLRRes ->locationEstimate (Note)
Note: Any value for locationEstimate may be used. The SS shall not be required to calculate the value from the returned gps-MeasureInfo values.	

RELEASE COMPLETE (Step 18):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.14.8.2   MO-LR / Location Error / GNSS Assistance Data Missing

70.14.8.2.1   Conformance requirement:

The MS sends a DTAP LCS MOLR invoke to VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO-LR by sending a REGISTER message to network containing a LCS-MOLR invoke component with MO-LR TYPE set to LocationEstimate, LCS QoS value and other optional field if it is needed.

The MS sends a RRLP MEASURE POSITION RESPONSE to network containing a Location Error component with an error indication if the measurement is not possible.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References:

   3GPP TS 44.018 sub clauses 3.3.1.1 and 9.1.11.

3GPP TS 24.008 sub clauses 4.5.1.5, 5.2.1, 9.2.9 and 10.5.1.6, 10.5.1.7.

3GPP TS 44.031.

70.14.8.2.2   Test Purpose:

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall send back RRLP MEASURE POSITION RESPONSE message with Location Error component if GNSS assistance data is missing. On receipt of second RRLP MEASURE POSITION REQUEST (with GNSS assistance data included) from SS to start the measurement, the MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.14.8.2.3   Method of Test

Initial Conditions:

System Simulator:

Serving Cell: default parameters.

Satellite signals: default conditions.

Mobile Station:

The MS is MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

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PIXIT statements

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Test Procedure:

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined below:

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

The A-GNSS assistance data stored in the MS is reset.

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to a DTAP LCS-MOLR Invoke.

On receiving the RR APPLICATION INFORMATION message containing a RRLP Positioning Capability Request message, the MS responds with an RR APPLICATION INFORMATION message containing an RRLP Positioning Capability Response message indicating the GNSS(s) supported by the MS.

The SS then instigates the particular message sequence by sending RRLP MEASURE POSITION REQUEST without GNSS assistance data (GPS or GANSS according to the receiver capabilities).

The MS requests additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to gpsAssDataMissing or ganssAssDataMissing for sub-test cases 3 and 4 and set to ganssAssDataMissing for sub-test cases 1 and 2. The SS provides the requested assistance data that is available in the SS in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data.

The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

The SS returns location estimate to MS through LCS-MOLR Return Result. The MS terminates the dialogue by sending RELEASE COMPLETE message after receiving location estimate.

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Reset all stored A-GNSS assistance data
2	MS		Initiate MOLR Procedure (location estimate)
3	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "Other procedures which can be completed with an SDCCH".
4	SS -> MS	IMMEDIATE ASSIGNMENT	
5	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the TMSI. The CM Service Type IE indicates "Supplementary service activation" "mobile station classmark 2" including settings for ES IND and CM3 supported.
6	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" including settings for ES IND and CM3 supported. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7.
7	SS -> MS	AUTHENTICATION REQUEST	
8	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.
9	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
10	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
11	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR request with MOLR-Type set to locationEstimate
12	SS -> MS	RR APPLICATION INFORMATION	RRLP Positioning Capability Request
13	MS -> SS	RR APPLICATION INFORMATION	RRLP Positioning Capability Response
14	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 1 (without GNSS assistance data)
15	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response 1: locationError with ganssAssDataMissing or gpsAssDataMissing (Sub-Tests 3 and 4)
16	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. The SS provides the requested data from step 15 that is available in the SS in zero, one or more RRLP Assistance Data delivery messages.
17	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 16, the MS acknowledges the received assistance data.
18	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 2. This message may include further assistance data.
19	MS -> SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE 2 (ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4))
20	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT (locationEstimate)
21	MS -> SS	RELEASE COMPLETE	Terminates the session
22	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 11):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg Molr-Type -> locationEstimate
SS version indicator	Value 1 or above

RR_APPLICATION_INFORMATION:

Information element	Value/remark
Protocol Discriminator Skip Indicator Message Type APDU ID APDU Flags	RR Management Protocol (0110) Application Information Message type APDU ID -> RRLP => 0000 Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 14 and 18: RRLP Measure Position Request Step 15 and 19: RRLP Measure Position Response Step 16: RRLP Assistance Data Step 17: RRLP Assistance Data Ack. Step 12: RRLP Positioning Capability Request Step 13: RRLP Positioning Capability Response

RRLP Positioning Capability Request (Step 12):

Information element	Type	Value/remark
ASN.1 encoded		
extended-reference	SEQUENCE	

RRLP Positioning Capability Response (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the Positioning Capability Request (Step 12).
posCapabilities	SEQUENCE	
nonGANSSpositionMethods	BIT STRING	May only be included for Sub-Tests 3 and 4.
gANSSPositionMethods	SEQUENCE	Included for each MS supported GANSS
ganssID	INTEGER	Sub-Test 1: value 3 Sub-Test 2: absent Sub-Test 3: value 1 Sub-Test 4: value 3
gANSSPositioningMethodTypes	BIT STRING	Bit 0 (msAssisted) set to value 1
gANSSSignals	BIT STRING	Dependent on MS capabilities

RRLP Measure Position Request 1 (Step 14):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPostionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1

RRLP Measure Position Response 1 (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	Sub-Tests 1 and 2 : ganssAssDataMissing Sub-Tests 3 and 4: ganssAssDataMissing or gpsAssDataMissing.
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements. This field shall only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 16):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	SS shall send zero, one or more RRLP Assistance Data messages containing the assistance data requested in step 15, if available from TS 51.010-7 sub clauses 6.1.3 and 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	SS shall send zero, one or more RRLP Assistance Data messages containing the assistance data requested in step 15, if available from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Assistance Data Ack (Step 17):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceDataAck

RRLP Measure Position Request 2 (Step 18):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 15
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 15.

RRLP Measure Position Response 2 (Step 19):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable.
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request
ganssMeasureInfo	SEQUENCE	Any value is acceptable

FACILITY (Step 20):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction Identifier	
Message Type	FACILITY (0011 1010)
Facility	Return Result = LCS-MOLR LCS-MOLRRes ->locationEstimate (Note)
Note: Any value for locationEstimate may be used. The SS shall not be required to calculate the value from the returned gps-MeasureInfo values.	

RELEASE COMPLETE (Step 21):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.14.9 MO-LR / Multiple RRLP Requests with Same Reference Number and Extended Reference Number

70.14.9.1 Conformance requirement:

The MS sends a DTAP LCS MOLR invoke to VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO-LR by sending a REGISTER message to network containing a LCS-MOLR invoke component with MO-LR TYPE set to LocationEstimate, LCS QoS value and other optional field if it is needed.

The MS ignores the later component if the old and new RRLP MEASURE POSITION REQUEST components have the same Reference Number.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References:

3GPP TS 44.018 sub clauses 3.3.1.1 and 9.1.11.

3GPP TS 24.008 sub clauses 4.5.1.5, 5.2.1, 9.2.9 and 10.5.1.6, 10.5.1.7.

3GPP TS 44.031.

70.14.9.2 Test Purpose:

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall ignore the second RRLP MEASURE POSITION REQUEST if the second RRLP MEASURE POSITION REQUEST has the same REFERENCE NUMBER and the same Extended Reference IE as in the previous one. The MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the current measurement.

70.14.9.3 Method of Test

Initial Conditions

System Simulator:

Serving Cell: default parameters.

Satellite signals: No GPS signal available.

Mobile Station:

The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

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PIXIT statements

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Test Procedure

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined below:

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to a DTAP LCS-MOLR Invoke.

On receiving the RR APPLICATION INFORMATION message containing a RRLP Positioning Capability Request message, the MS responds with an RR APPLICATION INFORMATION message containing an RRLP Positioning Capability Response message indicating the GNSS(s) supported by the MS.

The SS then instigates the particular message sequence by sending RRLP MEASURE POSITION REQUEST including assistance data to start the measurement.

Option 1: The MS then performs positioning measurements. After a delay of 8 seconds, the SS sends the second RRLP MEASURE POSITION REQUEST with the same REFERENCE NUMBER and the same EXTENDED REFERENCE IE as the first one (this delay shall be cancelled in the event of option 2). The MS shall ignore the second RRLP MEASURE POSITION REQUEST. The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

Option 2: The MS may request additional assistance data by immediately sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to ganssAssDataMissing, and gpsAssDataMissing for sub-test cases 3 and 4. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by a second RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS sends the second RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements and the SS sends the third RRLP MEASURE POSITION REQUEST with the same REFERENCE NUMBER and the same EXTENDED REFERENCE IE as the second one. The MS shall ignore the third RRLP MEASURE POSITION REQUEST. The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

The satellite signals should be made available after sending the second Measure Position request (in case of option 1) and third Measure Position request (in case of option 2)

The SS returns location estimate to MS through DTAP LCS-MOLR Return Result. The MS terminates the dialogue by sending RELEASE COMPLETE message after receiving location estimate.

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure (location estimate)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "Other procedures which can be completed with an SDCCH".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the TMSI. The CM Service Type IE indicates "Supplementary service activation" "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" including settings for ES IND and CM3 supported. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.

8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR with MOLR-Type set to locationEstimate.
11	SS -> MS	RR APPLICATION INFORMATION	RRLP Positioning Capability Request
12	MS -> SS	RR APPLICATION INFORMATION	RRLP Positioning Capability Response
13	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 1
14	MS (Option 1) or MS ->SS (Option 2)	- or RR APPLICATION INFORMATION	If no message is received from the MS within 8 seconds, then the SS shall assume that the MS is performing the measurement (Option 1). The SS continues to step 15. If the MS sends RRLP Measure Position Response: locationError (Option 2) with ganssAssDataMissing or gpsAssDataMissing (Sub-Tests 3 and 4) within 8 seconds, then the SS continues to step 14a.
14a	SS -> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Assistance Data. If the MS requested additional assistance data in step 14 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
14b	MS -> SS	RR APPLICATION INFORMATION	Option 2 only: RRLP assistanceDataAck. If the SS sent additional assistance data in step 14a, the MS acknowledges the received assistance data.
14c	SS-> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Measure Position Request 2. If the MS requested additional assistance data in step 14 that is available in the SS, this message may include further assistance data.
14d	MS (Option 2)		Option 2 only: MS is performing the measurement
15	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 2 with same reference number and same extended reference IE as in Request 1 (Option 1) or RRLP MEASURE POSITION REQUEST 3 with same reference number and same extended reference IE as in Request 2 (Option2) Note: The satellite signals should be made available to MS after sending this message
16	MS -> SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE (ganssMeasureInfo and gps-measureInfo for Sub-Tests 3 and 4)
17	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT (locationEstimate)
18	MS -> SS	RELEASE COMPLETE	Terminates the session
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 10):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR
	LCS-MOLRArg
	Molr-Type -> locationEstimate
SS version indicator	Value 1 or above

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment
	Bit2=0 -> First or only segment
	Bit3=0 -> Command or Final Response
	Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded
	Steps 13, 14c and 15: RRLP Measure Position Request
	Steps 14, 16: RRLP Measure Position Response
	Step 14a: RRLP Assistance Data
	Step 14b: RRLP Assistance Data Ack.
	Step 11: RRLP Positioning Capability Request
	Step 12: RRLP Positioning Capability Response

RRLP Positioning Capability Request (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
ReferenceNumber	Integer 0 to 7	1
component	CHOICE	posCapabilityReq
extended-reference	SEQUENCE	

RRLP Positioning Capability Response (Step 12):

Information element	Type	Value/remark
ASN.1 encoded		
ReferenceNumber	Integer 0 to 7	1
component	CHOICE	posCapabilityRsp
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the Positioning Capability Request (Step 11).
posCapabilities	SEQUENCE	
nonGANSSpositionMethods	BIT STRING	May only be included for Sub-Tests 3 and 4.
gANSSPositionMethods	SEQUENCE	Included for each MS supported GANSS
ganssID	INTEGER	Sub-Test 1: value 3 Sub-Test 2: absent Sub-Test 3: value 1 Sub-Test 4: value 3
gANSSPositioningMethodTypes	BIT STRING	Bit 0 (msAssisted) set to value 1
gANSSSignals	BIT STRING	Dependent on MS capabilities
methodType	CHOICE	msAssisted

RRLP Measure Position Request 1 (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262143
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.

RRLP Measure Position Response (Step 14 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	Sub-Tests 1 and 2 : ganssAssDataMissing Sub-Tests 3 and 4 : ganssAssDataMissing or gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements. This field shall only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 14a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 14 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further assistance data in Step 14 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the assistance data requested in step 14, if available data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Assistance Data Ack (Step 14b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

RRLP Measure Position Request 2 (Step 14c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 14 (Option 2).
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262143
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 14.

RRLP Measure Position Request 2 (Option 1) or Request 3 (Option 2) (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	Enumerated	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	Enumerated	oneSet
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262143
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1

RRLP Measure Position Response (Step 16):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp (A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request
ganssMeasureInfo	SEQUENCE	Any value is acceptable

FACILITY (Step 17):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction Identifier Message Type Facility	FACILITY (0011 1010) Return Result = LCS-MOLR LCS-MOLRRes ->locationEstimate (Note)
Note: Any value for locationEstimate may be used. The SS shall not be required to calculate the value from the returned gps-MeasureInfo values.	

RELEASE COMPLETE (Step 18):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.14.10 MO-LR / Multiple RRLP Requests with Different Reference Number

70.14.10.1 Conformance requirement:

The MS sends a DTAP LCS MOLR invoke to VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO-LR by sending a REGISTER message to network containing a LCS-MOLR invoke component with MO-LR TYPE set to LocationEstimate, LCS QoS value and other optional field if it is needed.

The MS aborts activity for the former RRLP MEASURE POSITION REQUEST component and starts to act according to the later RRLP MEASURE POSITION REQUEST component if the old and new RRLP MEASURE POSITION REQUEST components have different Reference Number.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References:

3GPP TS 44.018 sub clauses 3.3.1.1 and 9.1.11.

3GPP TS 24.008 sub clauses 4.5.1.5, 5.2.1, 9.2.9 and 10.5.1.6, 10.5.1.7.

3GPP TS 44.031.

70.14.10.2 Test Purpose:

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall terminate the current location measurement if the second RRLP MEASURE POSITION REQUEST is received with a different REFERENCE NUMBER and the same EXTENDED REFERENCE IE as the first one. The MS shall perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST. The MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.14.10.3 Method of Test

Initial Conditions

    System Simulator:

        Serving Cell: default parameters.

        Satellite signals: No GPS signal available.

    Mobile Station:

        The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

    -

PIXIT statements

    -

Test Procedure

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined below:

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to a DTAP LCS-MOLR Invoke.

On receiving the RR APPLICATION INFORMATION message containing a RRLP Positioning Capability Request message, the MS responds with an RR APPLICATION INFORMATION message containing an RRLP Positioning Capability Response message indicating the GNSS(s) supported by the MS.

The SS then instigates the particular message sequence by sending RRLP MEASURE POSITION REQUEST including assistance data to start the measurement.

Option 1: The MS then performs positioning measurements. After a delay of 8 seconds, the SS sends the second RRLP MEASURE POSITION REQUEST with a different REFERENCE NUMBER and the same EXTENDED REFERENCE IE as the first one (this delay shall be cancelled in the event of option 2). The MS shall terminate the current location measurement and perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST. The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

Option 2: The MS may request additional assistance data by immediately sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to ganssAssDataMissing, and gpsAssDataMissing for sub-test cases 3 and 4. If the MS requests additional assistance data that is available in the SS, then the SS provides the

requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by a second RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS sends the second RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements and the SS sends the third RRLP MEASURE POSITION REQUEST with a different REFERENCE NUMBER and the same EXTENDED REFERENCE IE as the second one. The MS shall terminate the current location measurement and perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST, including the possibility of repeating the request for more assistance data (Option 2b). The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

The satellite signals should be made available after sending the second Measure Position request (in case of option 1) and third Measure Position request (in case of option 2)

The SS returns location estimate to MS through DTAP LCS-MOLR Return Result. The MS terminates the dialogue by sending RELEASE COMPLETE message after receiving location estimate.

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure (location estimate)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "Other procedures which can be completed with an SDCCH".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the TMSI. The CM Service Type IE indicates "Supplementary service activation" "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" including settings for ES IND and CM3 supported. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.

8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR with MOLR-Type set to locationEstimate.
11	SS -> MS	RR APPLICATION INFORMATION	RRLP Positioning Capability Request
12	MS -> SS	RR APPLICATION INFORMATION	RRLP Positioning Capability Response
13	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 1
14	MS (Option 1) or MS ->SS (Option 2)	- or RR APPLICATION INFORMATION	If no message is received from the MS within 8 seconds, then the SS shall assume that the MS is performing the measurement (Option 1). The SS continues to step 15. If the MS sends RRLP Measure Position Response: locationError (Option 2) with ganssAssDataMissing or gpsAssDataMissing for Sub-Tests 3 and 4 within 8 seconds, then the SS continues to step 14a.
14a	SS -> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Assistance Data. If the MS requested additional assistance data in step 14 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
14b	MS -> SS	RR APPLICATION INFORMATION	Option 2 only: RRLP assistanceDataAck. If the SS sent additional assistance data in step 14a, the MS acknowledges the received assistance data.
14c	SS-> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Measure Position Request 2. If the MS requested additional assistance data in step 14 that is available in the SS, this message may include further assistance data.
14d	MS (Option 2)		Option 2 only: MS is performing the measurement
15	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 2 with different reference number and same extended reference IE as in Request 1 (Option 1) or RRLP MEASURE POSITION REQUEST 3 with different reference number and same extended reference IE as in Request 2 (Option2) Note: The satellite signals should be made available to MS after sending this message
16	MS -> SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE ganssMeasureInfo and gps-measureInfo for Sub-Tests 3 and 4 (Option 1 or 2a). Check reference number is 2 or locationError with gpsAssDataMissing (Sub-Tests 3 and 4) or ganssAssDataMissing and additionalAssistanceData including gpsAssistanceData (Sub-Tests 3 and 4) and/or ganssAssistanceData (Option 2b) Check reference number is 2

16a	SS -> MS	RR APPLICATION INFORMATION	Option 2b only : RRLP Assistance Data. If the MS requested additional assistance data in step 16 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
16b	MS -> SS	RR APPLICATION INFORMATION	Option 2b only : RRLP assistanceDataAck. If the SS sent additional assistance data in step 16a, the MS acknowledges the received assistance data.
16c	SS-> MS	RR APPLICATION INFORMATION	Option 2b only : RRLP Measure Position Request. If the MS requested additional assistance data in step 16 that is available in the SS, this message may include further assistance data.
16d	MS -> SS	RR APPLICATION INFORMATION	Option 2b only : RRLP Measure Position Response. If the MS requested additional assistance data in step 16, this message contains ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4).
17	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT (locationEstimate)
18	MS -> SS	RELEASE COMPLETE	Terminates the session
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 10):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg Molr-Type -> locationEstimate
SS version indicator	Value 1 or above

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator Skip Indicator Message Type APDU ID APDU Flags	RR Management Protocol (0110) Application Information Message type APDU ID -> RRLP => 0000 Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Steps 13, 14c, 15 and 16c: RRLP Measure Position Request Steps 14, 16 and 16d: RRLP Measure Position Response Step 14a and 16a: RRLP Assistance Data Step 14b and 16b: RRLP Assistance Data Ack. Step 11: RRLP Positioning Capability Request Step 12: RRLP Positioning Capability Response

RRLP Positioning Capability Request (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
ReferenceNumber	Integer 0 to 7	1
component	CHOICE	posCapabilityReq
extended-reference	SEQUENCE	

RRLP Positioning Capability Response (Step 12):

Information element	Type	Value/remark
ASN.1 encoded		
ReferenceNumber	Integer 0 to 7	1
component	CHOICE	posCapabilityRsp
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the Positioning Capability Request (Step 11).
posCapabilities	SEQUENCE	
nonGANSSpositionMethods	BIT STRING	May only be included for Sub-Tests 3 and 4.
gANSSPositionMethods	SEQUENCE	Included for each MS supported GANSS
ganssID	INTEGER	Sub-Test 1: value 3 Sub-Test 2: absent Sub-Test 3: value 1 Sub-Test 4: value 3
gANSSPositioningMethodTypes	BIT STRING	Bit 0 (msAssisted) set to value 1
gANSSSignals	BIT STRING	Dependent on MS capabilities
methodType	CHOICE	msAssisted

RRLP Measure Position Request 1 (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262143
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.

RRLP Measure Position Response (Step 14 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	Sub-Tests 1 and 2 : ganssAssDataMissing Sub-Tests 3 and 4 : ganssAssDataMissing or gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements. This field shall only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 14a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 14 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further assistance data in Step 14 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the assistance data requested in step 14, if available data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Assistance Data Ack (Step 14b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

RRLP Measure Position Request 2 (Step 14c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 14 (Option 2).
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262143
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 14.

RRLP Measure Position Request 2 (Option 1) or Request 3 (Option 2) (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	Enumerated	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	Enumerated	oneSet
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262143
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1

RRLP Measure Position Response (Step 16 (Option 1 or 2a) or Step 16d (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp (A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request
ganssMeasureInfo	SEQUENCE	Any value is acceptable

RRLP Measure Position Response (Step 16 (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp (A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned)
locationError	SEQUENCE	
locErrorReason	ENUMERATED	Sub-Tests 1 and 2 : ganssAssDataMissing Sub-Tests 3 and 4 : ganssAssDataMissing or gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements. This field shall only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 16a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 16 (Option 2b) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further assistance data in Step 16 (Option 2b) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Assistance Data Ack (Step 16b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceDataAck

RRLP Measure Position Request 2 (Step 16c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 16 (Option 2).
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262143
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clauses 6.1.3 and 6.1.4 as requested by the MS in step 16.

FACILITY (Step 17):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction Identifier Message Type Facility	 FACILITY (0011 1010) Return Result = LCS-MOLR LCS-MOLRRes ->locationEstimate (Note)
Note: Any value for locationEstimate may be used. The SS shall not be required to calculate the value from the returned gps-MeasureInfo values.	

RELEASE COMPLETE (Step 18):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.14.11 MO-LR / Multiple RRLP Requests with Different Extended Reference Number

70.14.11.1 Conformance requirements

The MS sends a DTAP LCS MOLR invoke to VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO-LR by sending a REGISTER message to network containing a LCS-MOLR invoke component with MO-LR TYPE set to LocationEstimate, LCS QoS value and other optional field if it is needed.

The MS aborts activity for the former RRLP MEASURE POSITION REQUEST component and starts to act according to the later RRLP MEASURE POSITION REQUEST component if the old and new RRLP MEASURE POSITION REQUEST components have different Extended Reference Number.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References:

3GPP TS 44.018 sub clauses 3.3.1.1 and 9.1.11.

3GPP TS 24.008 sub clauses 4.5.1.5, 5.2.1, 9.2.9 and 10.5.1.6, 10.5.1.7.

3GPP TS 44.031.

70.14.11.2 Test Purpose:

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall terminate the current location measurement if the second RRLP MEASURE POSITION REQUEST is received with the same REFERENCE NUMBER as the first one and a different EXTENDED REFERENCE IE. The MS shall perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST. The MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.14.11.3 Method of Test

Initial Conditions

System Simulator:

Serving Cell: default parameters.

Satellite signals: No GPS signal available.

Mobile Station:

The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

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PIXIT statements

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Test Procedure

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined below:

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to a DTAP LCS-MOLR Invoke.

On receiving the RR APPLICATION INFORMATION message containing a RRLP Positioning Capability Request message, the MS responds with an RR APPLICATION INFORMATION message containing an RRLP Positioning Capability Response message indicating the GNSS(s) supported by the MS.

The SS then instigates the particular message sequence by sending RRLP MEASURE POSITION REQUEST including assistance data to start the measurement.

Option 1: The MS then performs positioning measurements. After a delay of 8 seconds, the SS sends the second RRLP MEASURE POSITION REQUEST with the same REFERENCE NUMBER as the first one and a different EXTENDED REFERENCE IE (this delay shall be cancelled in the event of option 2). The MS shall terminate the current location measurement and perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST. The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

Option 2: The MS may request additional assistance data by immediately sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to ganssAssDataMissing or gpsAssDataMissing (sub-tests 3 and 4). If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by a second RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS sends the second RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements and the SS sends the third RRLP MEASURE POSITION REQUEST with the same REFERENCE NUMBER as the second one and a different EXTENDED REFERENCE IE. The MS shall terminate the current location measurement and perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST, including the possibility of repeating the request for more assistance data (Option 2b). The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

The satellite signals should be made available after sending the second Measure Position request (in case of option 1) and third Measure Position request (in case of option 2)

The SS returns location estimate to MS through DTAP LCS-MOLR Return Result. The MS terminates the dialogue by sending RELEASE COMPLETE message after receiving location estimate.

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure (location estimate)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "Other procedures which can be completed with an SDCCH".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the TMSI. The CM Service Type IE indicates "Supplementary service activation" "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" including settings for ES IND and CM3 supported. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.
8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR with MOLR-Type set to locationEstimate.
11	SS -> MS	RR APPLICATION INFORMATION	RRLP Positioning Capability Request
12	MS -> SS	RR APPLICATION INFORMATION	RRLP Positioning Capability Response
13	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 1
14	MS (Option 1) or MS ->SS (Option 2)	- or RR APPLICATION INFORMATION	If no message is received from the MS within 8 seconds, then the SS shall assume that the MS is performing the measurement (Option 1). The SS continues to step 15. If the MS sends RRLP Measure Position Response: locationError (Option 2) with ganssAssDataMissing or gpsAssDataMissing for Sub-Tests 3 and 4 within 8 seconds, then the SS continues to step 14a.
14a	SS -> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Assistance Data. If the MS requested additional assistance data in step 14 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
14b	MS -> SS	RR APPLICATION INFORMATION	Option 2 only: RRLP assistanceDataAck. If the SS sent additional assistance data in step 14a, the MS acknowledges the received assistance data.
14c	SS-> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Measure Position Request 2. If the MS requested additional assistance data in step 14 that is available in the SS, this message may include further assistance data.
14d	MS (Option 2)		Option 2 only: MS is performing the measurement

15	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 2 with same reference number as in Request 1 and different extended reference IE (Option 1) or RRLP MEASURE POSITION REQUEST 3 with same reference number as in Request 2 and different extended reference IE (Option2) Note: The satellite signals should be made available to MS after sending this message
16	MS -> SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE ganssMeasureInfo and gps-measureInfo for Sub-Tests 3 and 4 (Option 1 or 2a). Check extended reference IE is the equal to the one contained in the request of step 15 or locationError with ganssAssDataMissing or gpsAssDataMissing (Sub-Tests 3 and 4) and additionalAssistanceData including gpsAssistanceData (Sub-Tests 3 and 4) and/or ganssAssistanceData (Option 2b) Check extended reference IE is the equal to the one contained in the request of step 15
16a	SS -> MS	RR APPLICATION INFORMATION	Option 2b only : RRLP Assistance Data. If the MS requested additional assistance data in step 16 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
16b	MS -> SS	RR APPLICATION INFORMATION	Option 2b only : RRLP assistanceDataAck. If the SS sent additional assistance data in step 16a, the MS acknowledges the received assistance data.
16c	SS-> MS	RR APPLICATION INFORMATION	Option 2b only : RRLP Measure Position Request. If the MS requested additional assistance data in step 16 that is available in the SS, this message may include further assistance data.
16d	MS -> SS	RR APPLICATION INFORMATION	Option 2b only : RRLP Measure Position Response. If the MS requested additional assistance data in step 16, this message contains ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4).
17	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT (locationEstimate)
18	MS -> SS	RELEASE COMPLETE	Terminates the session
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 10):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg Molr-Type -> locationEstimate
SS version indicator	Value 1 or above

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Steps 13, 14c, 15 and 16c: RRLP Measure Position Request Steps 14, 16 and 16d: RRLP Measure Position Response Step 14a and 16a: RRLP Assistance Data Step 14b and 16b: RRLP Assistance Data Ack. Step 11: RRLP Positioning Capability Request Step 12: RRLP Positioning Capability Response

RRLP Positioning Capability Request (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
ReferenceNumber	Integer 0 to 7	1
component	CHOICE	posCapabilityReq
extended-reference	SEQUENCE	

RRLP Positioning Capability Response (Step 12):

Information element	Type	Value/remark
ASN.1 encoded		
ReferenceNumber	Integer 0 to 7	1
component	CHOICE	posCapabilityRsp
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the Positioning Capability Request (Step 11).
posCapabilities	SEQUENCE	
nonGANSSpositionMethods	BIT STRING	May only be included for Sub-Tests 3 and 4.
gANSSPositionMethods	SEQUENCE	Included for each MS supported GANSS
ganssID	INTEGER	Sub-Test 1: value 3 Sub-Test 2: absent Sub-Test 3: value 1 Sub-Test 4: value 3
gANSSPositioningMethodTypes	BIT STRING	Bit 0 (msAssisted) set to value 1
gANSSSignals	BIT STRING	Dependent on MS capabilities
methodType	CHOICE	msAssisted

RRLP Measure Position Request 1 (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262143
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.

RRLP Measure Position Response (Step 14 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	Sub-Tests 1 and 2: ganssAssDataMissing Sub-Tests 3 and 4: ganssAssDataMissing or gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements. This field shall only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 14a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 14 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further assistance data in Step 14 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Assistance Data Ack (Step 14b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

RRLP Measure Position Request 2 (Step 14c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 14 (Option 2).
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262143
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 14.

RRLP Measure Position Request 2 (Option 1) or Request 3 (Option 2) (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	Enumerated	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	Enumerated	oneSet
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262142
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1

RRLP Measure Position Response (Step 16 (Option 1 or 2a) or Step 16d (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp (A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262142
ganssMeasureInfo	SEQUENCE	Any value is acceptable

RRLP Measure Position Response (Step 16 (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp (A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned)
locationError	SEQUENCE	
locErrorReason	ENUMERATED	Sub-Tests 1 and 2: ganssAssDataMissing Sub-Tests 3 and 4: ganssAssDataMissing or gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements. This field shall only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262142

RRLP Assistance Data (Step 16a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 16 (Option 2b) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further assistance data in Step 16 (Option 2b) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Assistance Data Ack (Step 16b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

RRLP Measure Position Request (Step 16c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 16 (Option 2b).
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262142
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 section 6.1.4 as requested by the MS in step 16.

FACILITY (Step 17):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction Identifier Message Type Facility	 FACILITY (0011 1010) Return Result = LCS-MOLR LCS-MOLRRes ->locationEstimate (Note)
Note: Any value for locationEstimate may be used. The SS shall not be required to calculate the value from the returned gps-MeasureInfo values.	

RELEASE COMPLETE (Step 18):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.14.12 MO-LR / RR Management Commands

70.14.12.1 Conformance requirement

The MS sends a DTAP LCS MOLR invoke to VMSC. If the MS is requesting its own location or that its own location be sent to another LCS client, this message carries LCS QoS information (e.g. accuracy, response time).

The MS invokes a MO-LR by sending a REGISTER message to network containing a LCS-MOLR invoke component with MO-LR TYPE set to LocationEstimate, LCS QoS value and other optional field if it is needed.

The MS aborts the measurement procedure and starts on the RR MANAGEMENT procedure if a RR MANAGEMENT command is received during the measurement procedure. The MS sends RR MANAGEMENT RESPONSE message upon completion.

The MS shall terminate the dialogue by sending a RELEASE COMPLETE message.

Test References:

3GPP TS 44.018 sub clauses 3.3.1.1 and 9.1.11.

3GPP TS 24.008 sub clauses 4.5.1.5, 5.2.1, 9.2.9 and 10.5.1.6, 10.5.1.7.

3GPP TS 44.031.

70.14.12.2   Test Purpose:

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall terminate the current location measurement if a RR MANAGEMENT command is received during the measurement procedure. The MS shall send a RR MANAGEMENT RESPONSE message to SS when the RR MANAGEMENT procedure is complete. The MS shall perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST and send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.14.12.3   Method of Test

Initial Conditions

System Simulator:

Serving Cell: default parameters.

Satellite signals: No GPS signal available.

Mobile Station:

The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

-

PIXIT statements

-

Test Procedure

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined below:

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

A MOLR procedure as call independent supplementary services is initiated from the MS. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS sends a REGISTER message with Facility IE containing a component set to a DTAP LCS-MOLR Invoke.

On receiving the RR APPLICATION INFORMATION message containing a RRLP Positioning Capability Request message, the MS responds with an RR APPLICATION INFORMATION message containing an RRLP Positioning Capability Response message indicating the GNSS(s) supported by the MS.

The SS then instigates the particular message sequence by sending RRLP MEASURE POSITION REQUEST including assistance data to start the measurement.

Option 1: The MS then performs positioning measurements. After a delay of 8 seconds, the SS sends an RR MANAGEMENT command. The MS shall terminate the current location measurement and perform the RR MANAGEMENT command. The MS sends an RR MANAGEMENT RESPONSE message to SS when the RR

MANAGEMENT procedure is complete. The SS sends a new RRLP MEASURE POSITION REQUEST including assistance data and the MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data finishing the measurement according to the newly received RRLP MEASUREMENT POSITION REQUEST.

Option 2: The MS may request additional assistance data by immediately sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to ganssAssDataMissing or gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by a second RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS sends the second RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements and, the SS sends a RR MANAGEMENT command. The MS shall terminate the current location measurement and perform the RR MANAGEMENT command. The MS sends a RR MANAGEMENT RESPONSE message to SS when the RR MANAGEMENT procedure is complete. The SS sends a new RRLP MEASURE POSITION REQUEST including assistance data and the MS either sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data finishing the measurement according to the newly received RRLP MEASUREMENT POSITION REQUEST or requests more assistance data and then sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data.

The satellite signals should be made available after sending the second Measure Position request (in case of option 1) and third Measure Position request (in case of option 2)

The SS returns location estimate to MS through DTAP LCS-MOLR Return Result. The MS terminates the dialogue by sending RELEASE COMPLETE message after receiving location estimate.

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	MS		Initiate MOLR Procedure (location estimate)
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "Other procedures which can be completed with an SDCCH".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS -> SS	CM SERVICE REQUEST	Message is contained in SABM "Mobile identity" IE contains the TMSI. The CM Service Type IE indicates "Supplementary service activation" "mobile station classmark 2" including settings for ES IND and CM3 supported.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" including settings for ES IND and CM3 supported. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.
8	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
9	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
10	MS -> SS	REGISTER	Call Independent SS containing Facility IE With the component of Invoke message set to LCS-MOLR with MOLR-Type set to locationEstimate.
11	SS -> MS	RR APPLICATION INFORMATION	RRLP Positioning Capability Request
12	MS -> SS	RR APPLICATION INFORMATION	RRLP Positioning Capability Response
13	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 1
14	MS (Option 1) or MS ->SS (Option 2)	- or RR APPLICATION INFORMATION	If no message is received from the MS within 8 seconds, then the SS shall assume that the MS is performing the measurement (Option 1). The SS continues to step 15. If the MS sends RRLP Measure Position Response: locationError (Option 2) with ganssAssDataMissing or gpsAssDataMissing for Sub-Tests 3 and 4 within 8 seconds, then the SS continues to step 14a.
14a	SS -> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Assistance Data. If the MS requested additional assistance data in step 14 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
14b	MS -> SS	RR APPLICATION INFORMATION	Option 2 only: RRLP assistanceDataAck. If the SS sent additional assistance data in step 14a, the MS acknowledges the received assistance data.
14c	SS-> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Measure Position Request 2. If the MS requested additional assistance data in step 14 that is available in the SS, this message may include further assistance data.
14d	MS (Option 2)		Option 2 only: MS is performing the measurement
15	SS -> MS	RR MANAGEMENT COMMAND	
16	MS -> SS	RR MANAGEMENT COMPLETE	MS terminates the measurement procedure and act on the RR management command

17	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 2 (Option 1) or RRLP MEASURE POSITION REQUEST 3 (Option2) Note: The satellite signals should be made available to MS after sending this message
18	MS -> SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE ganssMeasureInfo and gps-measureInfo for Sub-Tests 3 and 4 (Option 1 or 2a). or locationError with ganssAssDataMissing or gpsAssDataMissing (Sub-Tests 3 and 4) and additionalAssistanceData including gpsAssistanceData (Sub-Tests 3 and 4) and/or ganssAssistanceData (Option 2b)
16a	SS -> MS	RR APPLICATION INFORMATION	Option 2b only: RRLP Assistance Data. If the MS requested additional assistance data in step 16 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
16b	MS -> SS	RR APPLICATION INFORMATION	Option 2b only: RRLP assistanceDataAck. If the SS sent additional assistance data in step 16a, the MS acknowledges the received assistance data.
16c	SS-> MS	RR APPLICATION INFORMATION	Option 2b only: RRLP Measure Position Request. If the MS requested additional assistance data in step 16 that is available in the SS, this message may include further assistance data.
16d	MS -> SS	RR APPLICATION INFORMATION	Option 2b only: RRLP Measure Position Response. If the MS requested additional assistance data in step 16, this message contains ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4).
17	SS -> MS	FACILITY	LCS MO-LR RETURN RESULT (locationEstimate)
18	MS -> SS	RELEASE COMPLETE	Terminates the session
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

REGISTER (Step 10):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	REGISTER (xx11 1011)
Facility	Invoke = LCS-MOLR LCS-MOLRArg Molr-Type -> locationEstimate
SS version indicator	Value 1 or above

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Steps 13, 14c, 17 and 18c: RRLP Measure Position Request Steps 14, 18 and 18d: RRLP Measure Position Response Step 14a and 18a: RRLP Assistance Data Step 14b and 18b: RRLP Assistance Data Ack. Step 11: RRLP Positioning Capability Request Step 12: RRLP Positioning Capability Response

RRLP Positioning Capability Request (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
ReferenceNumber	Integer 0 to 7	1
component	CHOICE	posCapabilityReq
extended-reference	SEQUENCE	

RRLP Positioning Capability Response (Step 12):

Information element	Type	Value/remark
ASN.1 encoded		
ReferenceNumber	Integer 0 to 7	1
component	CHOICE	posCapabilityRsp
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the Positioning Capability Request (Step 11).
posCapabilities	SEQUENCE	
nonGANSSpositionMethods	BIT STRING	May only be included for Sub-Tests 3 and 4.
gANSSPositionMethods	SEQUENCE	Included for each MS supported GANSS
ganssID	INTEGER	Sub-Test 1: value 3 Sub-Test 2: absent Sub-Test 3: value 1 Sub-Test 4: value 3
gANSSPositioningMethodTypes	BIT STRING	Bit 0 (msAssisted) set to value 1
gANSSSignals	BIT STRING	Dependent on MS capabilities
methodType	CHOICE	msAssisted

RRLP Measure Position Request 1 (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.

RRLP Measure Position Response (Step 14 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	Sub-Tests 1 and 2 : ganssAssDataMissing Sub-Tests 3 and 4 : ganssAssDataMissing or gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements. This field shall only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 14a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 14 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further assistance data in Step 14 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Assistance Data Ack (Step 14b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

RRLP Measure Position Request 2 (Step 14c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 14 (Option 2).
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 14.

RR Management Command (Classmark Enquiry) (Step 15):

Information element	Value/remark
Encoded	(06 13)
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Classmark Enquiry Message Type	0001 0011

RRLP Measure Position Request 2 (Option 1) or Request 3 (Option 2) (Step 17):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	Enumerated	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	Enumerated	oneSet
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1

RRLP Measure Position Response (Step 18 (Option 1 or 2a) or Step 18d (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp (A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request
ganssMeasureInfo	SEQUENCE	Any value is acceptable

RRLP Measure Position Response (Step 18 (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp (A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned)
locationError	SEQUENCE	
locErrorReason	ENUMERATED	Sub-Tests 1 and 2: ganssAssDataMissing Sub-Tests 3 and 4 ganssAssDataMissing or gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements. This field shall only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 18a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 18 (Option 2b) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further assistance data in Step 18 (Option 2b) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Assistance Data Ack (Step 18b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceDataAck

RRLP Measure Position Request (Step 18c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 18 (Option 2b).
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 18.

FACILITY (Step 19):

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction Identifier Message Type Facility	 FACILITY (0011 1010) Return Result = LCS-MOLR LCS-MOLRRes ->locationEstimate (Note)
Note: Any value for locationEstimate may be used. The SS shall not be required to calculate the value from the returned gps-MeasureInfo values.	

RELEASE COMPLETE (Step 20):

Information element	Value/remark
Protocol Discriminator	Call Independent SS (1011)
Transaction Identifier	
Message Type	RELEASE COMPLETE (xx10 1010)

70.15 Assisted GNSS Mobile Terminated Location Request (MT-LR)

70.15.1 MT-LR / Location Notification

70.15.1.1 Conformance requirements

1. The network invokes a location notification procedure by sending a REGISTER message containing a LCS-LocationNotification invoke component to the MS with notificationType set to notifyLocationAllowed. The MS notifies the MS user of the location request.

2. The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result.

References

3GPP TS 23.271 sub clause 9.1.2.

3GPP TS 24.030 sub clause 4.1.1.

3GPP TS 24.080 sub clauses 2.4, 2.5, and 3.4.

70.15.1.2 Test Purpose

To verify that when the MS receives a REGISTER message, containing a LCS Location Notification Invoke component set to NotifyLocationAllowed, the MS notifies the MS user of the location request and sends a RELEASE COMPLETE message containing a LocationNotification return result.

70.15.1.3 Method of Test

Initial Conditions

System Simulator (SS):

   Serving Cell: default parameters

Mobile Station (MS):

   The MS is in MM-state "idle, updated" with valued TMSI and CKSN.

Specific PICS statements

   -

PIXIT statements

   -

Test Procedure

The MS is paged with a PAGING REQUEST TYPE 1 message. After sending the CIPHERING MODE COMPLETE message the MS receives an SS REGISTER message containing a Facility IE containing a DTAP LCS Location Notification Invoke message set to notifyLocationAllowed. The MS notifies the MS user of the location request. The MS then responds with a RELEASE COMPLETE message containing a LocationNotification return result to terminate the dialogue.

Maximum duration of the test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support and Additional Positioning Capabilities
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS -> MS	REGISTER	Call Independent SS containing Facility IE Location Notification Invoke message set to notifyLocationAllowed
12	MS		MS notifies the MS user of the location request
13	MS -> SS	RELEASE COMPLETE	
14	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

PAGING RESPONSE

Information element	Value/remark
Protocol Discriminator	RR management
Ciphering Key Sequence number - Key Sequence	Key sequence number previously allocated to MS, or "111" if no key is available
Mobile station Classmark 2 - ES IND	Shall indicate early autonomous sending of CLASSMARK CHANGE
Mobile Identity - odd/even - Type of identity - Identity digits	 Even TMSI TMSI previously allocated to MS

REGISTER

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier	
Message type	REGISTER (0011 1011)
Facility	Invoke = lcs-LocationNotification
	LocationNotificationArg
	notificationType -> notifyLocationAllowed,
	locationType -> current Location ,
	lcsClientExternalID -> externalAddress
	lcsClientName ->dataCodingScheme
	nameString
	lcsRequestorID ->dataCodingScheme
	requestorIDString
	lcsCodeword ->dataCodingScheme
	lcsCodewordString
	lcsServiceTypeID

RELEASE COMPLETE

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier	
Message type	RELEASE COMPLETE (xx10 1010)
Facility	Return result = lcs-LocationNotification

70.15.2 MT-LR / Notification and Verification / Location Allowed If No Response

70.15.2.1 Conformance requirements

1. On receipt of a REGISTER message containing the LCS Notification Invoke component with notificationType set to notifyAndVerify-LocationAllowedIfNoResponse. The MS: a) notifies the user of the location request, b) indicates the default is location allowed if no response is received within a predetermined period, and c) provides the opportunity for the user to grant or withhold permission.

2. Option 1: The user accepts the location request. The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

   Option 2: The user denies the location request.
   The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

   Option 3: The user takes no action and the verification process times-out. The SS shall terminate the dialogue.

References

   3GPP TS 23.271 sub clause 9.1.2.

   3GPP TS 24.030 sub clause 4.1.1.

   3GPP TS 24.080 sub clauses 2.4, 2.5, and 3.4.

70.15.2.2 Test Purpose

To verify that the MS receives a REGISTER message, containing a LCS Location Notification Invoke component set to notifyAndVerify-LocationAllowedIfNoResponse, the MS notifies the MS user of the location request, indicates that the default response is location allowed if no response is sent, gives the user the option to accept or reject the request and sends a RELEASE COMPLETE message containing a LocationNotification return result with the verificationResponse set to permissionDenied or permissionGranted as appropriate.

70.15.2.3 Method of Test

Initial Conditions

System Simulator (SS):

 Serving Cell: default parameters.

Mobile Station (MS):

 The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

 -

PIXIT statements

 - MS LCS Notification timeout timer

Test Procedure

The MS is paged with a PAGING REQUEST TYPE 1 message. After sending the CIPHERING MODE COMPLETE message the MS receives an SS REGISTER message with a Facility IE containing a LCS Location Notification Invoke set to notifyAndVerify-LocationAllowedIfNoResponse. The MS notifies the MS user of the location request, indicates that the default response is location allowed if no response is sent and gives the user the option to accept or reject the request.

Option 1:

The user then accepts the location request. The MS responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

Option 2:

The user then denies the location request. The MS responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

Option 3:

The user ignores the location request by taking no action, allowing the verification process timer to time-out. The SS responds with RELEASE COMPLETE.

Maximum duration of the test

5 minutes.

Expected Sequence

The test sequence is repeated for k = 1 … 3.

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support and Additional Positioning Capabilities.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS -> MS	REGISTER	Call Independent SS containing Facility IE LCS Location Notification Invoke set to notifyAndVerify-LocationAllowedIfNoResponse
12	SS		SS starts timer T(LCSN) set to 90% of MS LCS Notification timeout timer
13A (k=1)	MS		The MS notifies the MS user of the location request, indicates that the default response is location allowed if no response is sent and gives the user the option to accept or reject the request. The user accepts location request before timer T(LCSN) expires.
14A (k=1)	MS -> SS	RELEASE COMPLETE	Containing a LocationNotification return result with verificationResponse set to permissionGranted.
13B (k=2)	MS		The MS notifies the MS user of the location request, indicates that the default response is location allowed if no response is sent and gives the user the option to accept or reject the request. The user rejects location request before timer T(LCSN) expires.
14B (k=2)	MS -> SS	RELEASE COMPLETE	Containing a LocationNotification return result with verificationResponse set to permissionDenied.
13C (k=3)	MS		The MS notifies the MS user of the location request, indicates that the default response is location allowed if no response is sent and gives the user the option to accept or reject the request. The user does not reply and waits for T(LCSN) to expire.
14C (k=3)	SS->MS	RELEASE COMPLETE	SS terminates the dialogue after T(LCSN) expiry
15	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

PAGING RESPONSE (Step 4)

Information element	Value/remark
Protocol Discriminator	RR management
Ciphering Key Sequence number - Key Sequence	 Key sequence number previously allocated to MS, or "111" if no key is available

Mobile station Classmark 2
  - ES IND
 	
Mobile Identity
  - odd/even
  - Type of identity
  - Identity digits
	
	Shall indicate early autonomous sending of CLASSMARK CHANGE
	
	Even
	TMSI
	TMSI previously allocated to MS

REGISTER (Step 11)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)

Transaction identifier
Message type
Facility
	
	REGISTER (0011 1011)
	Invoke = lcs-LocationNotification
	LocationNotificationArg
	   notificationType ->notifyAnd Verify-LocationAllowedIfNoResponse,
	   locationType -> current Location ,
	   lcsClientExternalID -> externalAddress
	   lcsClientName ->dataCodingScheme
	          nameString
	   lcsRequestorID ->dataCodingScheme
	          requestorIDString
	   lcsCodeword ->dataCodingScheme
	          lcsCodewordString
	   lcsServiceTypeID

RELEASE COMPLETE (Option k=1 Step14A)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type Facility	 RELEASE COMPLETE (xx10 1010) Return result = lcs-LocationNotification LocationNotificationRes verificationResponse -> permissionGranted

RELEASE COMPLETE (Option k=2 Step 14B)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type Facility	 RELEASE COMPLETE (xx10 1010) Return result = lcs-LocationNotification LocationNotificationRes verificationResponse -> permissionDenied

RELEASE COMPLETE (Option k=3, Step 14C)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier	
Message type	RELEASE COMPLETE (0010 1010)

70.15.3 MT-LR / Notification and Verification / Location Not Allowed If No Response

70.15.3.1 Conformance requirements

1. On receipt of a REGISTER message containing the LCS Notification Invoke component with notificationType set to notifyAndVerify-LocationNotAllowedIfNoResponse, the MS: a) notifies the user of the location request, b) indicates the default is location not allowed if no response is received within a predetermined period, and c) provides the opportunity for the user to grant or withhold permission.

2. Option 1: The user accepts the location request. The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

   Option 2: The user denies the location request.
   The MS shall terminate the dialogue by sending a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

   Option 3: The user takes no action and the verification process times-out.
   The SS shall terminate the dialogue.

References

   3GPP TS 23.271 sub clause 9.1.2.

   3GPP TS 24.030 sub clause 4.1.1.

   3GPP TS 24.080 sub clauses 2.4, 2.5, and 3.4.

70.15.3.2 Test Purpose

To verify that if the MS receives a REGISTER message, containing a LCS Location Notification Invoke component set to notifyAndVerify-LocationNotAllowedIfNoResponse, then the MS notifies the MS user of the location request, indicates that the default response is location not allowed if no response is sent, gives the user the option to accept or reject the request and sends a RELEASE COMPLETE message containing a LocationNotification return result with the verificationResponse set to permissionDenied or permissionGranted as appropriate.

70.15.3.3 Method of Test

Initial Conditions

System Simulator (SS):

   Serving Cell: default parameters

Mobile Station (MS):

   The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

   -

PIXIT statements

   - MS LCS Notification timeout timer

Test Procedure

The MS is paged with a PAGING REQUEST TYPE 1 message. After sending the CIPHERING MODE COMPLETE message the MS receives an SS REGISTER message with a Facility IE containing a LCS Location Notification Invoke set to notifyAndVerify-LocationNotAllowedIfNoResponse. The MS notifies the MS user of the location request, indicates that the default response is location not allowed if no response is sent and gives the user the option to accept or reject the request.

Option 1:

The user then accepts the location request. The MS responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionGranted.

Option 2:

The user then denies the location request. The MS responds with a RELEASE COMPLETE message containing a LocationNotification return result with verificationResponse set to permissionDenied.

Option 3:

The user ignores the location request by taking no action, allowing the verification process timer to time-out. The SS responds with RELEASE COMPLETE.

Maximum duration of the test

5 minutes.

Expected Sequence

The test sequence is repeated for k = 1 … 3.

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support and Additional Positioning Capabilities.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESPONSE	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS -> MS	REGISTER	Call Independent SS containing Facility IE LCS Location Notification Invoke set to notifyAndVerify-LocationNotAllowedIfNoResponse
12	SS		SS starts timer T(LCSN) set to 90% of MS LCS Notification timeout timer
13A (k=1)	MS		The MS notifies the MS user of the location request, indicates that the default response is location not allowed if no response is sent and gives the user the option to accept or reject the request. The user accepts location request before timer T(LCSN) expires.
14A (k=1)	MS -> SS	RELEASE COMPLETE	Containing a LocationNotification return result with verificationResponse set to permissionGranted.
13B (k=2)	MS		The MS notifies the MS user of the location request, indicates that the default response is location not allowed if no response is sent and gives the user the option to accept or reject the request. The user rejects location request before timer T(LCSN) expires.
14B (k=2)	MS -> SS	RELEASE COMPLETE	Containing a LocationNotification return result with verificationResponse set to permissionDenied.
13C (k=3)	MS		The MS notifies the MS user of the location request, indicates that the default response is location not allowed if no response is sent and gives the user the option to accept or reject the request. The user does not reply and waits for T(LCSN) to expire.
14C (k=3)	SS->MS	RELEASE COMPLETE	SS terminates the dialogue after T(LCSN) expiry
15	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

PAGING RESPONSE (Step 4)

Information element	Value/remark
Protocol Discriminator	RR management
Ciphering Key Sequence number - Key Sequence	Key sequence number previously allocated to MS, or "111" if no key is available
Mobile station Classmark 2 - ES IND	Shall indicate early autonomous sending of CLASSMARK CHANGE

Mobile Identity
  - odd/even
  - Type of identity
  - Identity digits
	
	Even
	TMSI
	TMSI previously allocated to MS

REGISTER (Step 11)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)

Transaction identifier
Message type
Facility
	
	REGISTER (0011 1011)
	Invoke = lcs-LocationNotification
	LocationNotificationArg
	   notificationType ->notifyAnd Verify-LocationNotAllowedIfNoResponse,
	   locationType -> current Location,
	   lcsClientExternalID -> externalAddress
	   lcsClientName ->dataCodingScheme
	         nameString
	   lcsRequestorID ->dataCodingScheme
	         requestorIDString
	   lcsCodeword ->dataCodingScheme
	         lcsCodewordString
	   lcsServiceTypeID

RELEASE COMPLETE (Option k=1 Step14A)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type Facility	 RELEASE COMPLETE (xx10 1010) Return result = lcs-LocationNotification LocationNotificationRes verificationResponse -> permissionGranted

RELEASE COMPLETE (Option k=2 Step14B)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier Message type Facility	 RELEASE COMPLETE (xx10 1010) Return result = lcs-LocationNotification LocationNotificationRes verificationResponse -> permissionDenied

RELEASE COMPLETE (Option k=3, Step 14C)

Information element	Value/remark
Protocol Discriminator	Call Independent SS message (1011)
Transaction identifier	
Message type	RELEASE COMPLETE (0010 1010)

70.15.4 Void

70.15.5 MT-LR / Location Error

70.15.5.1 MT-LR / Location Error / Requested Method not Supported

70.15.5.1.1 Conformance requirements

The MS sends an RRLP MEASURE POSITION RESPONSE message to the network containing a Location Error component with an error indication if the measurement is not possible.

Test References

3GPP TS04.31 sub clause 2.2, A.3.2.6

70.15.5.1.2 Test Purpose

To verify that the MS sends the correct positioning capability via controled early classmark sending. The MS shall send a RRLP MEASURE POSITION RESPONSE message with Location Error component if the MS does not support the requested method. On receipt of second RRLP MEASURE POSITION REQUEST from SS to start the measurement, the MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.15.5.1.3 Method of Test

Initial Conditions:

System Simulator:

Serving Cell: default parameters.

Satellite signals: default conditions.

Mobile Station:

The MS is MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

-

PIXIT statements

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Test Procedure:

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined below:

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

The MS is paged with a PAGING REQUEST TYPE 1 message. The MS performs control early classmark sending to provide LCS positioning method capability.

The SS sends an RRLP MEASURE POSITION REQUEST message with a method type not supported by the mobile (Type not supported to be GPS for sub-tests 1 and 2, Galileo for sub-tests 3 and 4).

The MS sends RRLP MEASURE POSITION RESPONSE to SS containing a Location Error component (Requested Method not Supported) as the requested method is not supported.

The MS receives RR APPLICATION INFORMATION messages containing RRLP Assistance Data messages followed by a new RRLP MEASURE POSITION REQUEST with correct message contents including assistance data.

Option 1: The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Option 2: The MS may request additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to ganssAssDataMissing or gpsAssDataMissing (sub-tests 3 and 4). If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS repeats the RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" including settings for ES IND and CM3 supported. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	

8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 1 (Request method not supported)
12	MS->SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE 1 (location_error)
13	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
14	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
15	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
16	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
17	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 2
18	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response 2: ganssMeasureInfo and gps-MeasureInfo, (Sub-Tests 3 and 4) (Option 1) or locationError with ganssAssDataMissing or gpsAssDataMissing (Sub-Tests 3 and 4) and additionalAssistanceData including gpsAssistanceData (Sub-Tests 3 and 4) and/or ganssAssistanceData (Option 2)
18a	SS -> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Assistance Data. If the MS requested additional assistance data in step 18 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
18b	MS -> SS	RR APPLICATION INFORMATION	Option 2 only: RRLP assistanceDataAck. If the SS sent additional assistance data in step 18a, the MS acknowledges the received assistance data.
18c	SS-> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Measure Position Request. If the MS requested additional assistance data in step 18 that is available in the SS, this message may include further assistance data.
18d	MS -> SS	RR APPLICATION INFORMATION	Option 2 only: RRLP Measure Position Response. If the MS requested additional assistance data in step 18, this message contains ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4).
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 11, 17 and 18c: RRLP Measure Position Request Step 12, 18 and 18d: RRLP Measure Position Response Step 13, 15, 18a: RRLP Assistance Data Step 14, 16, 18b: RRLP Assistance Data Ack

RRLP Measure Position Request 1 (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
ReferenceNumber	Integer 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	ENUMERATED	Sub-tests 1 and 2: gps Sub-tests 3 and 4: galileo
measureResponseTime	Integer 0 to 7	7
useMultipleSets	ENUMERATED	oneSet
extended-reference	SEQUENCE	

RRLP Measure Position Response 1 (Step 12):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRes
locationError	SEQUENCE	
locErrorReason	ENUMERATED	methodNotSupported
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
navigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
ganssID	Integer	See TS 51.010-7 sub clause 6.1.4
ganssNavigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4

RRLP Assistance Data Ack (Step 14, 16, 18b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2 or 3 (Option 2, 18b)
component	CHOICE	assistanceDataAck

RRLP Assistance Data (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
navigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
ionosphericModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
ganssID	Integer	See TS 51.010-7 sub clause 6.1.4
ganssNavigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
ganssIonosphericModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4

RRLP Measure Position Request 2 (Step 17):

Information element	Type	Value/remark
ASN.1 encoded		
ReferenceNumber	Integer 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	Depends on sub-tests cases
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.

RRLP Measure Position Response 2 (Step 18 (Option 1) or Step 18d (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2 or 3 (Option 2, Step 18d)
component	CHOICE	msrPositionRsp (A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request
ganssMeasureInfo	SEQUENCE	Any value is acceptable

RRLP Measure Position Response 2 (Step 18 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	Sub-Tests 1 and 2 : ganssAssDataMissing Sub-Tests 3 and 4: gpsAssDataMissing.
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 18a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	3
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	This field may only be present for Sub-Tests 3 and 4. If the MS requested further GPS assistance data in Step 18 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	If SS sends more than one RRLP assistance data delivery message the moreAssDataToBeSent field shall be set accordingly: 1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further GANSS assistance data in Step 18 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Measure Position Request (Step 18c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	3
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 18 (Option 2).
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 18 (Option 2).

70.15.5.2 Location Error: GNSS Assistance Data Missing

70.15.5.2.1 Conformance requirement

The MS sends an RRLP MEASURE POSITION RESPONSE message to the network containing a Location Error component with an error indication if the measurement is not possible.

Test References

3GPP TS 44.031

70.15.5.2.2 Test Purpose

To verify that the MS sends the correct positioning capability via controlled early classmark sending and that the MS sends a RRLP MEASURE POSITION RESPONSE message with Location Error component because the GNSS assistance data is missing. On receipt of second RRLP MEASURE POSITION REQUEST (with all necessary GNSS assistance data to obtain a location estimate included) from SS to start the measurement, the MS sends back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.15.5.2.3 Method of Test

Initial Conditions

System Simulator:

Serving Cell: default parameters.

Satellite signals: default conditions.

Mobile Station:

The MS is MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

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PIXIT statements

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Test Procedure:

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined below:

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

The A-GNSS assistance data stored in the MS is reset.

The MS is paged with a PAGING REQUEST TYPE 1 message. The MS performs control early classmark sending to provide LCS positioning method capability. After sending the CIPHERING MODE COMPLETE message the MS receives an RRLP MEASURE POSITION REQUEST message with Reference Time GPS assistance data.

The MS requests additional assistance data by sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to ganssAssDataMissing or gpsAssDataMissing (sub-test cases 3 and 4). The SS provides the requested assistance data that is available in the SS in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data.

The SS provides the requested assistance data that is available in the SS in zero, one or more RRLP Assistance Data delivery messages followed by an RRLP Measure Position Request message which may include further assistance data.

The MS then performs positioning measurements, and responds with an RR APPLICATION INFORMATION message containing an RRLP Measure Position Response.

Maximum duration of the test

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
0	MS		Reset all stored A-GNSS assistance data
1	SS->MS	PAGING REQUEST TYPE I	
3	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
4	SS -> MS	IMMEDIATE ASSIGNMENT	
5	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
6	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" including settings for ES IND and CM3 supported. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7.
7	SS -> MS	AUTHENTICATION REQUEST	
8	MS -> SS	AUTHENTICATION RESP	

9	SS -> MS	CIPHERING MODE COMMAND	
10	MS -> SS	CIPHERING MODE COMPLETE	
11	SS		SS starts ciphering.
12	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 1 (without GNSS assistance data)
13	MS -> SS	RR APPLICATION INFORMATION	RRLP Measure Position Response 1: LocationError with ganssAssDataMissing or gpsAssDataMissing (Sub-Tests 3 and 4)
14	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data. The SS provides the requested data from step 13 that is available in the SS in zero, one or more RRLP Assistance Data delivery messages.
15	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck. If the SS sent additional assistance data in step 14, the MS acknowledges the received assistance data.
16	SS-> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 2. This message may include further assistance data.
17	MS -> SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE 2 (ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4))
18	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment
	Bit2=0 -> First or only segment
	Bit3=0 -> Command or Final Response
	Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded
	Step 12 and 16: RRLP Measure Position Request
	Step 13 and 17: RRLP Measure Position Response
	Step 14: RRLP Assistance Data
	Step 15: RRLP Assistance Data Ack

RRLP Measure Position Request 1 (Step 12):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPostionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1
		Sub-Test 2: bit 1 set to value 1
		Sub-Test 3: bits 0 and 3 set to value 1
		Sub-Test 4: bits 0 and 5 set to value 1

RRLP Measure Position Response 1 (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	Sub-Tests 1 and 2 : ganssAssDataMissing Sub-Tests 3 and 4 : ganssAssDataMissing or gpsAssDataMissing.
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements. This field shall only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 14):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	SS shall send zero, one or more RRLP Assistance Data messages containing the assistance data requested in step 15, if available from TS 51.010-7 subclause 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	SS shall send zero, one or more RRLP Assistance Data messages containing the assistance data requested in step 15, if available from TS 51.010-7 subclause 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Assistance Data Ack (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceDataAck

RRLP Measure Position Request 2 (Step 16):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 subclause 6.1.4 as requested by the MS in step 15
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 subclause 6.1.4 as requested by the MS in step 15.

RRLP Measure Position Response 2 (Step 17):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable.
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request
ganssMeasureInfo	SEQUENCE	Any value is acceptable

70.15.6 MT-LR / Multiple RRLP Requests with Same Reference Number and Extended Reference Number

70.15.6.1 Conformance requirement:

When after reception of a Measure Position Request component, but before responding with a Measure Position Response or Protocol Error Component, the MS receives a new RRLP message with the Measure Position Request component, the MS ignores the latter component if the old and new RRLP Measure Position Request components have the same Reference Number.

The SMLC may use the same Reference Number or different Reference Numbers for different RRLP components within the same pseudo-segmentation sequence.

Test References

3GPP TS04.31 sub clause 2.5.5

3GPP TS04.31 sub clause 3.2

70.15.6.2   Test Purpose:

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall ignore the second RRLP MEASURE POSITION REQUEST if the second RRLP MEASURE POSITION REQUEST has the same REFERENCE NUMBER as in the previous one. The MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the current measurement.

70.15.6.3   Method of Test

Initial Conditions

    System Simulator:

        Serving Cell: default parameters.

        Satellite signals: No GPS signal available.

    Mobile Station:

        The MS is in MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

    -

PIXIT statements

    -

Test Procedure

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined below:

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

The MS is paged with a PAGING REQUEST TYPE 1 message. The MS performs control early classmark sending to provide LCS positioning method capability.

After sending CIPHERING MODE COMPLETE message the MS receives RR APPLICATION INFORMATION messages containing RRLP Assistance Data messages.

The SS then sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request including further assistance data to start the measurement.

Option 1: The MS then performs positioning measurements. After a delay to of 8 seconds, the SS sends the second RRLP MEASURE POSITION REQUEST with the same REFERENCE NUMBER as the first one (this delay shall be cancelled in the event of option 2). The MS shall ignore the second RRLP MEASURE POSITION REQUEST. The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

Option 2: The MS may request additional assistance data by immediately sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to ganssAssDataMissing or gpsAssDataMissing (sub-tests 3 and 4). If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by a second RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS sends the second RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements and the SS sends the third RRLP MEASURE POSITION REQUEST with the same REFERENCE NUMBER as the second one. The MS

shall ignore the third RRLP MEASURE POSITION REQUEST. The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

The satellite signals should be made available after sending the second Measure Position request (in case of option 1) and third Measure Position request (in case of option 2).

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" including settings for ES IND and CM3 supported. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	SRES specifies correct value.

8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
12	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
13	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
14	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
15	SS -> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 1
16	MS (Option 1) or MS ->SS (Option 2)	- or RR APPLICATION INFORMATION	If no message is received from the MS within 8 seconds, then the SS shall assume that the MS is performing the measurement (Option 1). The SS continues to step 17. If the MS sends RRLP Measure Position Response: locationError (Option 2) with ganssAssDataMissing or gpsAssDataMissing (Sub-Tests 3 and 4) within 8 seconds, then the SS continues to step 16a.
16a	SS -> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Assistance Data. If the MS requested additional assistance data in step 16 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
16b	MS -> SS	RR APPLICATION INFORMATION	Option 2 only: RRLP assistanceDataAck. If the SS sent additional assistance data in step 16a, the MS acknowledges the received assistance data.
16c	SS-> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Measure Position Request 2. If the MS requested additional assistance data in step 16 that is available in the SS, this message may include further assistance data.
16d	MS (Option 2)		Option 2 only: MS is performing the measurement
17	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 2 with same reference number and same extended reference IE as in Request 1 (Option 1) or RRLP MEASURE POSITION REQUEST 3 with same reference number and same extended reference IE as in Request 2 (Option2) Note: The satellite signals should be made available to MS after sending this message
18	MS -> SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE (ganssMeasureInfo and gps-measureInfo for Sub-Tests 3 and 4)
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment
	Bit2=0 -> First or only segment
	Bit3=0 -> Command or Final Response
	Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded
	Step 15, 16c, 17: RRLP Measure Position Request
	Step 16, 18: RRLP Measure Position Response
	Step 11, 13, 16a: RRLP Assistance Data
	Step 12, 14, 16b: RRLP Assistance Data Ack

RRLP Assistance Data (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
navigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
ganssID	Integer	See TS 51.010-7 sub clause 6.1.4
ganssNavigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4

RRLP Assistance Data Ack (Steps 12, 14, 16b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

RRLP Assistance Data (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
navigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
ionosphericModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
ganssID	Integer	See TS 51.010-7 sub clause 6.1.4
ganssNavigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
ganssIonosphericModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4

RRLP Measure Position Request 1 (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msbased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262143
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
ganssID	Integer	See TS 51.010-7 sub clause 6.1.4
ganssReferenceTime	SEQUENCE	See TS 51.010-7 sub clause 6.1.4

RRLP Measure Position Response (Step 16 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	Sub-Tests 1 and 2: ganssAssDataMissing Sub-Tests 3 and 4: gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements. This field shall only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 16a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 16 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further assistance data in Step 16 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Assistance Data Ack (Step 16b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

RRLP Measure Position Request 2 (Step 16c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 16 (Option 2).
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262143
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 16 (Option 2).

RRLP Measure Position Request 2 (Option 1) or Request 3 (Option 2) (Step 17):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msAssisted
positionMethod	Enumerated	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	Enumerated	oneSet
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262143
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1

RRLP Measure Position Response (Step 18):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp (A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request
ganssMeasureInfo	SEQUENCE	Any value is acceptable

70.15.7 MT-LR / Multiple RRLP Requests with Different Reference Number

70.15.7.1   Conformance requirement:

When after reception of a Measure Position Request component, but before responding with a Measure Position Response or Protocol Error Component, the MS receives a new RRLP message with the Measure Position Request component, the MS aborts activity for the former component, and starts to act according to the latter component, if the old and new RRLP Measure Position Request components have different Reference Numbers.

The SMLC may use the same Reference Number or different Reference Numbers for different RRLP components within the same pseudo-segmentation sequence.

Test References

   3GPP TS04.31 sub clause 2.5.5

   3GPP TS04.31 sub clause 3.2

70.15.7.2   Test Purpose

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall terminate the current location measurement if the second RRLP MEASURE POSITION REQUEST is received with a different REFERENCE NUMBER. The MS shall perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST. The MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.15.7.3   Method of Test

Initial Conditions:

   System Simulator:

      Serving Cell: default parameters.

      Satellite signals: No GPS signal available.

   Mobile Station:

      The MS is MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

   -

PIXIT statements

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Test Procedure

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined below:

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

The MS is paged with a PAGING REQUEST TYPE 1 message. The MS performs control early classmark sending to provide LCS positioning method capability.

After sending CIPHERING MODE COMPLETE message the MS receives RR APPLICATION INFORMATION messages containing RRLP Assistance Data messages.

The SS then sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request including further assistance data to start the measurement.

Option 1: The MS then performs positioning measurements. After a delay of 8 seconds, the SS sends the second RRLP MEASURE POSITION REQUEST with a different REFERENCE NUMBER from the first one (this delay shall be cancelled in the event of option 2). The MS shall terminate the current location measurement and perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST. The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

Option 2: The MS may request additional assistance data by immediately sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to ganssAssDataMissing or gpsAssDataMissing (sub-tests 3 and 4). If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by a second RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS sends the second RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements and the SS sends the third RRLP MEASURE POSITION REQUEST with a different REFERENCE NUMBER from the second one. The MS shall terminate the current location measurement and perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST, including the possibility of repeating the request for more assistance data (Option 2b). The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

The satellite signals should be made available after sending the second Measure Position request (in case of option 1) and third Measure Position request (in case of option 2).

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 2 is set to 1 (MS-Based GPS)
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	

8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
12	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
13	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
14	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
15	SS -> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 1
16	MS (Option 1) or MS ->SS (Option 2)	- or RR APPLICATION INFORMATION	If no message is received from the MS within 8 seconds, then the SS shall assume that the MS is performing the measurement (Option 1). The SS continues to step 17. If the MS sends RRLP Measure Position Response: locationError (Option 2) with ganssAssDataMissing or gpsAssDataMissing (Sub-Tests 3 and 4) within 8 seconds, then the SS continues to step 16a.
16a	SS -> MS	RR APPLICATION INFORMATION	Option 2 only : RRLP Assistance Data. If the MS requested additional assistance data in step 16 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
16b	MS -> SS	RR APPLICATION INFORMATION	Option 2 only : RRLP assistanceDataAck. If the SS sent additional assistance data in step 16a, the MS acknowledges the received assistance data.
16c	SS-> MS	RR APPLICATION INFORMATION	Option 2 only : RRLP Measure Position Request 2. If the MS requested additional assistance data in step 16 that is available in the SS, this message may include further assistance data.
16d	MS (Option 2)		Option 2 only : MS is performing the measurement
17	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 2 with different reference number and same extended reference IE as in Request 1 (Option 1) or RRLP MEASURE POSITION REQUEST 3 with different reference number and same extended reference IE as in Request 2 (Option2) Note: The satellite signals should be made available to MS after sending this message
18	MS -> SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE ganssMeasureInfo and gps-measureInfo for Sub-Tests 3 and 4 (Option 1 or 2a). Check reference number is 2 or locationError with ganssAssDataMissing or gpsAssDataMissing (Sub-Tests 3 and 4) and additionalAssistanceData including gpsAssistanceData (Sub-Tests 3 and 4) and/or ganssAssistanceData (Option 2b) Check reference number is 2

18a	SS -> MS	RR APPLICATION INFORMATION	Option 2b only : RRLP Assistance Data. If the MS requested additional assistance data in step 18 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
18b	MS -> SS	RR APPLICATION INFORMATION	Option 2b only : RRLP assistanceDataAck. If the SS sent additional assistance data in step 18a, the MS acknowledges the received assistance data.
18c	SS-> MS	RR APPLICATION INFORMATION	Option 2b only : RRLP Measure Position Request. If the MS requested additional assistance data in step 18 that is available in the SS, this message may include further assistance data.
18d	MS -> SS	RR APPLICATION INFORMATION	Option 2b only : RRLP Measure Position Response. If the MS requested additional assistance data in step 18, this message contains ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4).
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 15, 16c, 17, 18c: RRLP Measure Position Request Step 16, 18, 18d: RRLP Measure Position Response Step 11, 13, 16a, 18a: RRLP Assistance Data Step 12, 14, 16b, 18b: RRLP Assistance Data Ack

RRLP Assistance Data (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
navigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
ganssID	Integer	See TS 51.010-7 sub clause 6.1.4
ganssNavigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4

RRLP Assistance Data Ack (Steps 12, 14, 16b and 18b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

RRLP Assistance Data (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
navigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
ionosphericModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
ganssID	Integer	See TS 51.010-7 sub clause 6.1.4
ganssNavigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
ganssIonosphericModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4

RRLP Measure Position Request 1 (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262143
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
ganssID	Integer	See TS 51.010-7 sub clause 6.1.4
ganssReferenceTime	SEQUENCE	See TS 51.010-7 sub clause 6.1.4

RRLP Measure Position Response (Step 16 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	Sub-Tests 1 and 2 : ganssAssDataMissing Sub-Tests 3 and 4 : gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements. This field shall only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 16a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 16 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further assistance data in Step 16 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Measure Position Request 2 (Step 16c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 16 (Option 2).
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262143
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 16 (Option 2).

RRLP Measure Position Request 2 (Option 1) or Request 3 (Option 2) (Step 17):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	Enumerated	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	Enumerated	oneSet
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262143
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1

RRLP Measure Position Response (Step 18 (Option 1 or 2a) or Step 18d (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp (A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing or ganssAssDataMissing
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request
ganssMeasureInfo	SEQUENCE	Any value is acceptable

RRLP Measure Position Response (Step 18 (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp (A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned)
locationError	SEQUENCE	
locErrorReason	ENUMERATED	Sub-Tests 1 and 2: ganssAssDataMissing Sub-Tests 3 and 4: gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements. This field shall only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 18a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 18 (Option 2b) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further assistance data in Step 18 (Option 2b) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Measure Position Request (Step 18c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 18 (Option 2b).
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262143
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 18 (Option 2b).

70.15.8 MT-LR / Multiple RRLP Requests with Different Extended Reference Number

70.15.8.1 Conformance requirement:

When after reception of a Measure Position Request component, but before responding with a Measure Position Response or Protocol Error Component, the MS receives a new RRLP message with the Measure Position Request component, the MS aborts activity for the former component, and starts to act according to the latter component, if the old and new RRLP Measure Position Request components have different Reference Numbers.

The SMLC may use the same Reference Number or different Reference Numbers for different RRLP components within the same pseudo-segmentation sequence.

Test References

3GPP TS 04.31 sub clause 2.5.5

3GPP TS 04.31 sub clause 3.2

70.15.8.2 Test Purpose

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall terminate the current location measurement if the second RRLP MEASURE POSITION REQUEST is received with a different REFERENCE NUMBER. The MS shall perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST. The MS shall send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.15.8.3 Method of Test

Initial Conditions:

System Simulator:

Serving Cell: default parameters.

Satellite signals: No GPS signal available.

Mobile Station:

The MS is MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

-

PIXIT statements

-

Test Procedure

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined below:

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

The MS is paged with a PAGING REQUEST TYPE 1 message. The MS performs control early classmark sending to provide LCS positioning method capability.

After sending CIPHERING MODE COMPLETE message the MS receives RR APPLICATION INFORMATION messages containing RRLP Assistance Data messages.

The SS then sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request including further assistance data to start the measurement.

Option 1: The MS then performs positioning measurements. After a delay of 8 seconds, the SS sends the second RRLP MEASURE POSITION REQUEST with a different EXTENDED REFERENCE IE and the same REFERENCE NUMBER as the first one (this delay shall be cancelled in the event of option 2). The MS shall terminate the current location measurement and perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST. The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

Option 2: The MS may request additional assistance data by immediately sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set to ganssAssDataMissing or gpsAssDataMissing (sub-tests 3 and 4). If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by a second RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS sends the second RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements and the SS sends the third RRLP MEASURE POSITION REQUEST with a different EXTENDED REFERENCE IE and the same REFERENCE NUMBER as the second one. The MS shall terminate the current location measurement and perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST, including the possibility of repeating the request for more assistance data (Option 2b). The MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data after finishing the measurement.

The satellite signals should be made available after sending the second Measure Position request (in case of option 1) and third Measure Position request (in case of option 2).

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS->SS	CLASSMARK CHANGE	"mobile station classmark 2" includes settings for ES_IND. "mobile station classmark 3" includes settings for Positioning. The setting for positioning specifies Positioning Method capability and Positioning Method Support. In the position method support (5 bit field), Bit 2 is set to 1 (MS-Based GPS)
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	

8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
12	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
13	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
14	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
15	SS -> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 1
16	MS (Option 1) or MS ->SS (Option 2)	- or RR APPLICATION INFORMATION	If no message is received from the MS within 8 seconds, then the SS shall assume that the MS is performing the measurement (Option 1). The SS continues to step 17. If the MS sends RRLP Measure Position Response: locationError (Option 2) with ganssAssDataMissing or gpsAssDataMissing for Sub-Tests 3 and 4 within 8 seconds, then the SS continues to step 16a.
16a	SS -> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Assistance Data. If the MS requested additional assistance data in step 16 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
16b	MS -> SS	RR APPLICATION INFORMATION	Option 2 only: RRLP assistanceDataAck. If the SS sent additional assistance data in step 16a, the MS acknowledges the received assistance data.
16c	SS-> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Measure Position Request 2. If the MS requested additional assistance data in step 16 that is available in the SS, this message may include further assistance data.
16d	MS (Option 2)		Option 2 only: MS is performing the measurement
17	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 2 with same reference number and different extended reference IE as in Request 1 (Option 1) or RRLP MEASURE POSITION REQUEST 3 with same reference number and different extended reference IE as in Request 2 (Option2) Note: The satellite signals should be made available to MS after sending this message
18	MS -> SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE ganssMeasureInfo and gps-measureInfo for Sub-Tests 3 and 4 (Option 1 or 2a). Check extended reference IE is the equal to the one contained in the request of step 17 or locationError with ganssAssDataMissing or gpsAssDataMissing (Sub-Tests 3 and 4) and additionalAssistanceData including gpsAssistanceData (Sub-Tests 3 and 4) and/or ganssAssistanceData (Option 2b) Check extended reference IE is the equal to the one contained in the request of step 17

18a	SS -> MS	RR APPLICATION INFORMATION	Option 2b only : RRLP Assistance Data. If the MS requested additional assistance data in step 18 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
18b	MS -> SS	RR APPLICATION INFORMATION	Option 2b only : RRLP assistanceDataAck. If the SS sent additional assistance data in step 18a, the MS acknowledges the received assistance data.
18c	SS-> MS	RR APPLICATION INFORMATION	Option 2b only : RRLP Measure Position Request. If the MS requested additional assistance data in step 18 that is available in the SS, this message may include further assistance data.
18d	MS -> SS	RR APPLICATION INFORMATION	Option 2b only : RRLP Measure Position Response. If the MS requested additional assistance data in step 18, this message contains ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4).
19	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 15, 16c, 17, 18c: RRLP Measure Position Request Step 16, 18, 18d: RRLP Measure Position Response Step 11, 13, 16a, 18a: RRLP Assistance Data Step 12, 14, 16b, 18b: RRLP Assistance Data Ack

RRLP Assistance Data (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
navigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
ganssID	Integer	See TS 51.010-7 sub clause 6.1.4
ganssNavigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4

RRLP Assistance Data Ack (Steps 12, 14, 16b and 18b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

RRLP Assistance Data (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
navigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
ionosphericModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
ganssID	Integer	See TS 51.010-7 sub clause 6.1.4
ganssNavigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
ganssIonosphericModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4

RRLP Measure Position Request 1 (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262143
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.
ganssID	Integer	See TS 51.010-7 sub clause 6.1.4
ganssReferenceTime	SEQUENCE	See TS 51.010-7 sub clause 6.1.4

RRLP Measure Position Response (Step 16 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	Sub-Tests 1 and 2: ganssAssDataMissing Sub-Tests 3 and 4: ganssAssDataMissing or gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements. This field shall only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 16a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 16 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further assistance data in Step 16 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Assistance Data Ack (Step 16b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

RRLP Measure Position Request 2 (Step 16c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 16 (Option 2).
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262143
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 16.

RRLP Measure Position Request 2 (Option 1) or Request 3 (Option 2) (Step 17):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	Enumerated	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	Enumerated	oneSet
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262142
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1

RRLP Measure Position Response (Step 18 (Option 1 or 2a) or Step 18d (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp (A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable except gpsAssDataMissing or ganssAssDataMissing
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request
ganssMeasureInfo	SEQUENCE	Any value is acceptable

RRLP Measure Position Response (Step 18 (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp (A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned)
locationError	SEQUENCE	
locErrorReason	ENUMERATED	Sub-Tests 1 and 2: ganssAssDataMissing Sub-Tests 3 and 4: ganssAssDataMissing or gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements. This field shall only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 18a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 18 (Option 2b) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further assistance data in Step 18 (Option 2b) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Measure Position Request (Step 18c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 18 (Option 2b).
extended-reference	SEQUENCE	
smlc-code	Integer, 0 to 63	63
transaction-ID	Integer, 0 to 262143	262142
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 18 (Option 2b).

70.15.9 MT-LR / RR Management Commands

70.15.9.1 Conformance requirement

A target MS shall terminate any positioning procedure or the transfer of RRLP positioning assistance data without sending any response to the SMLC if any RR message is received from the BSC that starts some other RR management procedure, including a new positioning procedure. The new RR procedure shall then be executed by the MS.

Upon receiving the HO or other RR management command, the MS will stop the location procedure and start on handover or other RR management procedure, since this has higher priority than location. The MS will then send the HO complete or other RR management response message to BSC.

The SMLC may use the same Reference Number or different Reference Numbers for different RRLP components within the same pseudo-segmentation sequence.

Test References

3GPP TS 03.71 sub clause 7.11.5,

3GPP TS 03.71 sub clause 10.6

3GPP TS04.31 sub clause 3.2

70.15.9.2 Test Purpose

Verifies that a MS sends a correct positioning capability via control classmark sending. MS shall terminate the current location measurement if an RR MANAGEMENT command is received during the measurement procedure. The MS shall send an RR MANAGEMENT RESPONSE message to SS when the RR MANAGEMENT procedure is complete. The MS shall perform the measurement according to the newly received RRLP MEASURE POSITION REQUEST and send back RRLP MEASURE POSITION RESPONSE to SS after finishing the measurement.

70.15.9.3 Method of Test

Initial Conditions:

System Simulator:

Serving Cell: default parameters.

Satellite signals: No GPS signal available.

Mobile Station:

The MS is MM-state "idle, updated" with valid TMSI and CKSN.

Specific PICS statements

-

PIXIT statements

-

Test Procedure:

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined below:

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

The MS is paged with a PAGING REQUEST TYPE 1 message. The MS performs control early classmark sending to provide LCS positioning method capability.

After sending CIPHERING MODE COMPLETE message the MS receives RR APPLICATION INFORMATION messages containing RRLP Assistance Data messages.

The SS then sends an RR APPLICATION INFORMATION message containing an RRLP Measure Position Request including further assistance data to start the measurement.

Option 1: The MS then performs positioning measurements. After a delay of 8 seconds the SS sends an RR MANAGEMENT command. The MS shall terminate the current location measurement and perform the RR MANAGEMENT command. The MS sends an RR MANAGEMENT RESPONSE message to SS when the RR MANAGEMENT procedure is complete. The SS sends a new RRLP MEASURE POSITION REQUEST including assistance data and the MS sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data finishing the measurement according to the newly received RRLP MEASUREMENT POSITION REQUEST (possibly by requesting additional assistance data first).

Option 2: The MS may request additional assistance data by immediately sending an RRLP Measure Position Response message containing a location error with IE LocErrorReason set ganssAssDataMissing or gpsAssDataMissing. If the MS requests additional assistance data that is available in the SS, then the SS provides the requested assistance data in zero, one or more RRLP Assistance Data delivery messages followed by a second RRLP Measure Position Request message which may include further assistance data. If the MS requests additional assistance data and the entire requested assistance data is not available in the SS, then the SS sends the second RRLP Measure Position Request message without assistance data. The MS then performs positioning measurements and the SS sends a RR MANAGEMENT command. The MS shall terminate the current location measurement and perform the RR MANAGEMENT command. The MS sends a RR MANAGEMENT RESPONSE message to SS when the RR MANAGEMENT procedure is complete. The SS sends a new RRLP MEASURE POSITION REQUEST including assistance data and the MS either sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data finishing the measurement according to the newly received RRLP MEASUREMENT POSITION REQUEST or requests more assistance data and then sends RRLP MEASURE POSITION RESPONSE to SS with the measurement data.

The satellite signals should be made available after sending the second Measure Position request (in case of option 1) and third Measure Position request (in case of option 2).

Maximum duration of the test:

5 minutes.

Expected Sequence

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE I	
2	MS -> SS	CHANNEL REQUEST	Establishment cause indicates "answer to paging".
3	SS -> MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in SABM. "mobile station classmark 2" includes settings for ES_IND.
5	MS -> SS	CLASSMARK CHANGE	"mobile station classmark 2" including settings for ES IND and CM3 supported. "mobile station classmark 3" includes settings for Positioning according to 3GPP TS 24.008, table 10.5.1.7.
6	SS -> MS	AUTHENTICATION REQUEST	
7	MS -> SS	AUTHENTICATION RESP	
8	SS -> MS	CIPHERING MODE COMMAND	
9	MS -> SS	CIPHERING MODE COMPLETE	
10	SS		SS starts ciphering.
11	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
12	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
13	SS -> MS	RR APPLICATION INFORMATION	RRLP Assistance Data
14	MS -> SS	RR APPLICATION INFORMATION	RRLP assistanceDataAck
15	SS -> MS	RR APPLICATION INFORMATION	RRLP Measure Position Request 1
16	MS (Option 1) or MS ->SS (Option 2)	- or RR APPLICATION INFORMATION	If no message is received from the MS within 8 seconds, then the SS shall assume that the MS is performing the measurement (Option 1). The SS continues to step 17. If the MS sends RRLP Measure Position Response: locationError (Option 2) with ganssAssDataMissing or gpsAssDataMissing for Sub-Tests 3 and 4 within 8 seconds, then the SS continues to step 16a.
16a	SS -> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Assistance Data. If the MS requested additional assistance data in step 16 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
16b	MS -> SS	RR APPLICATION INFORMATION	Option 2 only: RRLP assistanceDataAck. If the SS sent additional assistance data in step 16a, the MS acknowledges the received assistance data.
16c	SS-> MS	RR APPLICATION INFORMATION	Option 2 only: RRLP Measure Position Request 2. If the MS requested additional assistance data in step 16 that is available in the SS, this message may include further assistance data.
16d	MS (Option 2)		Option 2 only: MS is performing the measurement
17	SS -> MS	RR MANAGEMENT COMMAND	
18	MS -> SS	RR MANAGEMENT COMPLETE	MS terminates the measurement procedure and act on the RR management command

19	SS -> MS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION REQUEST 2 (Option 1) or RRLP MEASURE POSITION REQUEST 3 (Option2) Note: The satellite signals should be made available to MS after sending this message
20	MS -> SS	RR APPLICATION INFORMATION	RRLP MEASURE POSITION RESPONSE ganssMeasureInfo and gps-measureInfo for Sub-Tests 3 and 4 (Option 1 or 2a). or locationError with gpsAssDataMissing (Sub-Tests 3 and 4) or ganssAssDataMissing and additionalAssistanceData including gpsAssistanceData (Sub-Tests 3 and 4) and/or ganssAssistanceData (Option 2b)
20a	SS -> MS	RR APPLICATION INFORMATION	Option 2b only: RRLP Assistance Data. If the MS requested additional assistance data in step 20 that is available in the SS, then SS provides the requested data in zero, one or more RRLP Assistance Data delivery messages.
20b	MS -> SS	RR APPLICATION INFORMATION	Option 2b only: RRLP assistanceDataAck. If the SS sent additional assistance data in step 20a, the MS acknowledges the received assistance data.
20c	SS-> MS	RR APPLICATION INFORMATION	Option 2b only: RRLP Measure Position Request. If the MS requested additional assistance data in step 20 that is available in the SS, this message may include further assistance data.
20d	MS -> SS	RR APPLICATION INFORMATION	Option 2b only: RRLP Measure Position Response. If the MS requested additional assistance data in step 20, this message contains ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4).
21	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

RR_APPLICATION_INFORMATION

Information element	Value/remark
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Message Type	Application Information Message type
APDU ID	APDU ID -> RRLP => 0000
APDU Flags	Bit1=0 -> Last or only segment Bit2=0 -> First or only segment Bit3=0 -> Command or Final Response Bit4=spare
APDU Data	2-N Byte → ASN.1 Coded Step 15, 16c, 19, 20c: RRLP Measure Position Request Step 16, 20, 20d: RRLP Measure Position Response Step 11, 13, 16a, 20a: RRLP Assistance Data Step 12, 14, 16b, 20b: RRLP Assistance Data Ack

RRLP Assistance Data (Step 11):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
navigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
ganssID	Integer	See TS 51.010-7 sub clause 6.1.4
ganssNavigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4

RRLP Assistance Data Ack (Steps 12, 14, 16b, 20b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

RRLP Assistance Data (Step 13):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
navigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
ionosphericModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
moreAssDataToBeSent	ENUMERATED	1
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
ganssID	Integer	See TS 51.010-7 sub clause 6.1.4
ganssNavigationModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
ganssIonosphericModel	SEQUENCE	See TS 51.010-7 sub clause 6.1.4

RRLP Measure Position Request 1 (Step 15):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3
referenceTime	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
acquisAssist	SEQUENCE	See TS 51.010-7 sub clause 6.1.4
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	Dependent on MS capabilities and defined in sub clause 70.1.3.
ganssID	Integer	See TS 51.010-7 sub clause 6.1.4
ganssReferenceTime	SEQUENCE	See TS 51.010-7 sub clause 6.1.4

RRLP Measure Position Response (Step 16 (Option 2)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	msrPositionRsp
locationError	SEQUENCE	
locErrorReason	ENUMERATED	Sub-Tests 1 and 2 : ganssAssDataMissing Sub-Tests 3 and 4 : gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements. This field shall only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 16a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 16 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 section 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further assistance data in Step 16 (Option 2) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 section 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Assistance Data Ack (Step 16b):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	1
component	CHOICE	assistanceDataAck

RRLP Measure Position Request 2 (Step 16c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	1
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 section 6.1.4 as requested by the MS in step 16 (Option 2).
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 16 (Option 2).

RR Management Command (Classmark Enquiry) (Step 17):

Information element	Value/remark
Encoded	(06 13)
Protocol Discriminator	RR Management Protocol (0110)
Skip Indicator	
Classmark Enquiry Message Type	0001 0011

RRLP Measure Position Request 2 (Option 1) or Request 3 (Option 2) (Step 19):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	Enumerated	gps
measureResponseTime	Integer 0 to 7	5
accuracy	Integer (0-127)	127
useMultipleSets	Enumerated	oneSet
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1

RRLP Measure Position Response (Step 18 (Option 1 or 2a) or Step 20d (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp (A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned)
gps-MeasureInfo	SEQUENCE	Any value of the parameters is acceptable.
locationError	SEQUENCE	Any error value is acceptable
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request
ganssMeasureInfo	SEQUENCE	Any value is acceptable

RRLP Measure Position Response (Step 20 (Option 2b)):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	msrPositionRsp (A valid response will contain ganssMeasureInfo and gps-MeasureInfo (Sub-Tests 3 and 4); otherwise locationError will be returned)
locationError	SEQUENCE	
locErrorReason	ENUMERATED	Sub-Tests 1 and 2 : ganssAssDataMissing Sub-Tests 3 and 4 : gpsAssDataMissing
additionalAssistanceData	SEQUENCE	
gpsAssistanceData	OCTET STRING	Indicates missing assistance data elements. This field shall only be present for Sub-Tests 3 and 4.
ganssAssistanceData	OCTET STRING	Indicates missing GANSS assistance data elements
extended-reference	SEQUENCE	The value returned by the MS shall equal the value received from the SS in the earlier Measure Position Request

RRLP Assistance Data (Step 20a):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer,0 to 7	2
component	CHOICE	assistanceData
gps-AssistData	SEQUENCE	If the MS requested further assistance data in Step 20 (Option 2b) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the requested assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.
moreAssDataToBeSent	ENUMERATED	1, except in the case of the final Assistance Data message when the following Measure Position Request contains no additional Assistance Data (in which case: 0)
extended-reference	SEQUENCE	
ganss-AssistData	SEQUENCE	If the MS requested further assistance data in Step 20 (Option 2b) that is available in the SS, SS shall send zero, one or more RRLP Assistance Data messages containing the assistance data from TS 51.010-7 sub clause 6.1.4. Each message shall contain a maximum of 242 octets.

RRLP Measure Position Request (Step 20c):

Information element	Type	Value/remark
ASN.1 encoded		
referenceNumber	Integer, 0 to 7	2
component	CHOICE	msrPositionReq
methodType	CHOICE	msBased
positionMethod	ENUMERATED	gps
measureResponseTime	Integer 0 to 7	5
useMultipleSets	ENUMERATED	oneSet
gps-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 20 (Option 2b).
extended-reference	SEQUENCE	
ganssPositionMethod	BIT STRING	Sub-Test 1: bit 5 set to value 1 Sub-Test 2: bit 1 set to value 1 Sub-Test 3: bits 0 and 3 set to value 1 Sub-Test 4: bits 0 and 5 set to value 1
ganss-AssistData	SEQUENCE	May contain further assistance data from TS 51.010-7 sub clause 6.1.4 as requested by the MS in step 20 (Option 2b).

70.16   A-GNSS Minimum Performance tests

This sub clause specifies the measurement procedures for the conformance test of the minimum performance requirements for GSM user equipment (MS) that supports Assisted Global Navigation Satellite Systems (A-GNSS). It

excludes performance requirements for MSs where the only A-GNSS supported is A-GPS L1C/A which are specified in sub clause 70.11

70.16.1 Abbreviations

A-GNSS	Assisted - Global Navigation Satellite Systems
A-GPS	Assisted - Global Positioning System
C/A	Coarse/Acquisition
ECI	Earth-Centered-Inertial
ECEF	Earth Centred, Earth Fixed
EGNOS	European Geostationary Navigation Overlay Service
FEC	Forward Error Correction
GAGAN	GPS Aided Geo Augmented Navigation
GANSS	Galileo and Additional Navigation Satellite Systems
GLONASS	GLObal'naya NAvigatsionnaya Sputnikovaya Sistema (Engl.: Global Navigation Satellite System)
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GSS	GNSS System Simulator
HDOP	Horizontal Dilution Of Precision
ICD	Interface Control Document
LOS	Line Of Sight
MSAS	Multi-functional Satellite Augmentation System
QZSS	Quasi-Zenith Satellite System
SBAS	Space Based Augmentation System
SV	Space Vehicle
SV ID	Space Vehicle Identification
WAAS	Wide Area Augmentation System
WLS	Weighted Least Square
WGS-84	World Geodetic System 1984

70.16.2 GNSS test conditions

70.16.2.1 GNSS signals

The GNSS signal is defined at the A-GNSS antenna connector of the MS. For MS with integral antenna only, a reference antenna with a gain of 0 dBi is assumed.

70.16.2.2 GNSS frequency

The GNSS signals shall be transmitted with a frequency accuracy of ± 0.025 PPM.

70.16.2.3 GNSS static propagation conditions

The propagation for the static performance measurement is an Additive White Gaussian Noise (AWGN) environment. No fading and multi-paths exist for this propagation model.

70.16.2.4 GNSS multi-path conditions

Doppler frequency difference between direct and reflected signal paths is applied to the carrier and code frequencies. The Carrier and Code Doppler frequencies of LOS and multi-path for GNSS signals are defined in table 70.16.2.1.

Table 70.16.2.1: Multi-path Conditions for GNSS Signals

Initial relative Delay [GNSS chip]	Carrier Doppler frequency of tap [Hz]	Code Doppler frequency of tap [Hz]	Relative mean Power [dB]
0	Fd	Fd / N	0
X	Fd - 0.1	(Fd-0.1) /N	Y
NOTE: Discrete Doppler frequency is used for each tap.			

Where the X and Y depends on the GNSS signal type and is shown in Table 70.16.2.2, and N is the ratio between the transmitted carrier frequency of the signals and the transmitted chip rate as shown in Table 70.16.2.3 (where k in Table 70.16.2.3 is the GLONASS frequency channel number).

Table 70.16.2.2

System	Signals	X [m]	Y [dB]
Galileo	E1	125	-4.5
	E5a	15	-6
	E5b	15	-6
GPS/Modernized GPS	L1 C/A	150	-6
	L1C	125	-4.5
	L2C	150	-6
	L5	15	-6
GLONASS	G1	275	-12.5
	G2	275	-12.5

Table 70.16.2.3

System	Signals	N
Galileo	E1	1540
	E5a	115
	E5b	118
GPS/Modernized GPS	L1 C/A	1540
	L1C	1540
	L2C	1200
	L5	115
GLONASS	G1	3135.03 + k · 1.10
	G2	2438.36 + k · 0.86

The initial carrier phase difference between taps shall be randomly selected between 0 and 2 π radians. The initial value shall have uniform random distribution.

70.16.2.5 Mobile stations supporting multiple GNSS signals

For mobile stations supporting multiple GNSS signals, different minimum performance requirements may be associated with different signals. The satellite simulator shall generate all signals supported by the MS. Signals not supported by the MS do not need to be simulated. The relative power levels of each signal type for each GNSS are defined in Table 70.16.2.4. The individual test scenarios define the reference signal power level for each satellite. The power level of each simulated satellite signal type shall be set to the reference signal power level defined in each test scenario plus the relative power level defined in Table 70.16.2.4.

Table 70.16.2.4: Relative signal power levels for each signal type for each GNSS

	Galileo		GPS/Modernized GPS		GLONASS		QZSS		SBAS	
Signal power levels relative to reference power levels	E1	0 dB	L1 C/A	0 dB	G1	0 dB	L1 C/A	0 dB	L1	0 dB
	E6	+2 dB	L1C	+1.5 dB	G2	-6 dB	L1C	+1.5 dB		
	E5	+2 dB	L2C	-1.5 dB			L2C	-1.5 dB		
			L5	+3.6 dB			L5	+3.6 dB		

NOTE 1: For test cases which involve "Modernized GPS", the satellite simulator shall also generate the GPS L1 C/A signal if the MS supports "GPS" in addition to "Modernized GPS".

NOTE 2: The signal power levels in the Test Parameter Tables represent the total signal power of the satellite per channel not e.g. pilot and data channels separately.

70.16.2.6 GNSS multi System Time Offsets

If more than one GNSS is used in a test, the accuracy of the GNSS-GNSS Time Offsets used at the system simulator shall be better than 3 ns.

70.16.3 GSM and other test conditions

70.16.3.1   GSM frequency band and frequency range

The tests in this sub clause are performed on one of the mid range ARFCNs of the GSM operating frequency band of the MS. The ARFCNs to be used for mid range are defined in Table 3.3.

If the MS supports multiple frequency bands then the Sensitivity tests in clause 70.16.5 shall be repeated in each supported frequency band.

70.16.3.2   Sensors

The minimum performances shall be met without the use of any data coming from sensors that can aid the positioning. A dedicated test message 'RESET MS POSITIONING STORED INFORMATION' has been defined in TS 44.014 for the purpose of disabling any such sensors.

70.16.4 A-GNSS test conditions

70.16.4.1   General

This sub clause defines the minimum performance requirements for both MS based and MS assisted A-GNSS terminals. If a terminal supports both modes then it shall be tested in both modes.

70.16.4.2   Measurement parameters

70.16.4.2.1   MS based A-GNSS measurement parameters

In case of MS-based A-GNSS, the measurement parameters are contained in the RRLP GANSS LOCATION INFORMATION IE. The measurement parameter is the horizontal position estimate reported by the MS and expressed in latitude/longitude.

70.16.4.2.2   MS assisted A-GNSS measurement parameters

In case of MS-assisted A-GNSS, the measurement parameters are contained in the RRLP GANSS MEASUREMENT INFORMATION IE, and in the RRLP GPS MEASUREMENT INFORMATION IE if GPS L1C/A is supported. The measurement parameters are the MS GANSS Code Phase measurements and the MS GPS Code Phase measurements (if supported). The MS GANSS Code Phase measurements and MS GPS Code Phase measurements are converted into a horizontal position estimate using the procedure detailed in clause 70.16.4.3.

70.16.4.2.3   2D position error

The 2D position error is defined by the horizontal difference in meters between the ellipsoid point reported or calculated from the MS Measurement Report and the actual simulated position of the MS in the test case considered.

70.16.4.2.4   Response time

Max Response Time is defined as the time starting from the moment that the MS has received the final RRLP MEASURE POSITION REQUEST sent before the MS sends the MEASURE POSITION RESPONSE containing the Location Information or the GPS and GANSS Measurement Information, and ending when the MS starts sending the MEASURE POSITION RESPONSE containing the Location Information or the GPS and GANSS Measurement Information on the Air interface. The response times specified for all test cases are Time-to-First-Fix (TTFF), i.e. the MS shall not re-use any information on GNSS time, location or other aiding data that was previously acquired or calculated and stored internally in the MS. A dedicated test message 'RESET MS POSITIONING STORED INFORMATION' has been defined in TS 44.014 for the purpose of deleting this information.

70.16.4.3   Converting MS-assisted measurement reports into position estimates

To convert the MS measurement reports in case of MS-assisted mode of A-GNSS into position errors, a transformation between the "measurement domain" (code-phases, etc.) into the "state" domain (position estimate) is necessary. Such a transformation procedure is outlined in the following clauses. The details can be found in [ICD-GPS 200], [IS-GPS-705], [IS-GPS-800], [SBAS], [IS-QZSS], [GLONASS-ICD], [Galileo-ICD], [P. Axelrad, R.G. Brown] and [S.K. Gupta]

70.16.4.3.1 MS measurement reports

In case of MS-assisted A-GANSS, the measurement parameters are contained in the RRLP GANSS MEASUREMENT INFORMATION ELEMENT (sub clause A.3.2.10 in 3GPP TS 44.031). In case the MS provides also measurements on the GPS L1 C/A signal, the measurement parameters are contained in the RRLP GPS MEASUREMENT INFORMATION ELEMENT (sub clause A.3.2.5 in 3GPP TS 44.031). The measurement parameters required for calculating the MS position are:

1) Reference Time: The MS has two choices for the Reference Time:

   a) "Reference Frame";

   b) "GANSS TOD" and/or "GPS TOW" if GPS L1 C/A signal measurements are also provided.

   NOTE: It is not expected that an MS will ever report both a GANSS TOD and a GPS TOW. However if two time stamps are provided and they derive from different user times, be aware that no compensation is made for this difference and this could affect the location accuracy.

2) Measurement Parameters for each GANSS and GANSS Signal: 1 to <maxSat>:

   a) "SV ID"; mapping according to Table A.10.14 in 3GPP TS 44.031;

   b) "Code Phase";

   c) "Integer Code Phase";

   d) "Code Phase RMS Error";

3) Additional Measurement Parameters in case of GPS L1 C/A signal measurements are also provided: 1 to <maxSat>:

   a) "Satellite ID (SV PRN)";

   b) "Whole GPS chips";

   c) "Fractional GPS Chips";

   d) "Pseudorange RMS Error".

Additional information required at the system simulator:

1) "Reference Location" (sub clause A.4.2.4 or A.4.2.6.1 in 3GPP TS 44.031):
   Used for initial approximate receiver coordinates.

2) "GANSS Navigation Model" (sub clause A.4.2.6.2 in 3GPP TS 44.031):
   Contains the ephemeris and clock correction parameters as specified in the relevant ICD of each supported GANSS; used for calculating the satellite positions and clock corrections.

3) "GANSS Ionospheric Model" (sub clause A.4.2.6.1 in 3GPP TS 44.031):
   Contains the ionospheric parameters which allow the single frequency user to utilize the ionospheric model as specified in [Galileo-ICD] for computation of the ionospheric delay.

4) "GANSS Additional Ionospheric Model" (sub clause A.4.2.6.1 in 3GPP TS 44.031):
   Contains the ionospheric parameters which allow the single frequency user to utilize the ionospheric model as specified in [QZSS-ICD] for computation of the ionospheric delay.

5) "GANSS Time Model" (sub clause A.4.2.6.2 in 3GPP TS 44.031):
   Contains the GNSS-GNSS Time Offset for each supported GANSS. Note, that "GANSS Time Model" IE contains only the sub-ms part of the offset. Any potential integer seconds offset may be obtained from "UTC Model" (sub clause A.4.2.4 in 3GPP TS 44.031), "GANSS UTC Model" (sub clause A.4.2.6.2 in 3GPP TS 44.031), or "GANSS Additional UTC Model" (sub clause A.4.2.6.2 in 3GPP TS 44.031).

6) "Navigation Model" (sub clause A.4.2.4 in 3GPP TS 44.031):
   Contains the GPS ephemeris and clock correction parameters as specified in [IS-GPS-200]; used for calculating the GPS satellite positions and clock corrections in case of GPS L1 C/A signal measurements are the only GPS measurements provided in addition to GANSS measurements.

7) "Ionospheric Model" (sub clause A.4.2.4 in 3GPP TS 44.031):
Contains the ionospheric parameters which allow the single frequency user to utilize the ionospheric model as specified in [IS-GPS 200] for computation of the ionospheric delay.

70.16.4.3.2 WLS position solution

The WLS position solution problem is concerned with the task of solving for four unknowns; x_u, y_u, z_u the receiver coordinates in a suitable frame of reference (usually ECEF) and b_u the receiver clock bias relative to the selected GNSS specific system time. It typically requires the following steps:

Step 1: Formation of pseudo-ranges

The observation of code phase reported by the MS for each satellite SV_i is related to the pseudo-range/c modulo the "GANSS Code Phase Ambiguity", or modulo 1 ms (the length of the C/A code period) in case of GPS L1 C/A signal measurements. For the formation of pseudo-ranges, the integer number of milliseconds to be added to each code-phase measurement has to be determined first. Since 1 ms corresponds to a travelled distance of 300 km, the number of integer ms can be found with the help of reference location and satellite ephemeris. The distance between the reference location and each satellite SV_i at the time of measurement is calculated, and the integer number of milliseconds to be added to the MS code phase measurements is obtained.

Step 2: Correction of pseudo-ranges for the GNSS-GNSS time offsets

In case the MS reports measurements for more than a single GNSS, the pseudo-ranges are corrected for the time offsets between the GNSSs relative to the selected reference time using the GNSS-GNSS time offsets available at the system simulator:

$$\rho_{GNSS_m,i} \equiv \rho_{GNSS_m,i} - c \cdot (t_{GNSS_k} - t_{GNSS_m}),$$

where $\rho_{GNSS_m,i}$ is the measured pseudo-range of satellite i of GNSS$_m$. The system time t_{GNSS_k} of GNSS$_k$ is the reference time frame, and $(t_{GNSS_k} - t_{GNSS_m})$ is the available GNSS-GNSS time offset, and c is the speed of light.

Step 3: Formation of weighting matrix

The MS reported "Code Phase RMS Error" and/or "Pseudorange RMS Error" values are used to calculate the weighting matrix for the WLS algorithm described in [P. Axelrad, R.G. Brown]. According to 3GPP TS 44.031, the encoding for these fields is a 6 bit value that consists of a 3 bit mantissa, X_i and a 3 bit exponent, Y_i for each SV_i of GNSS$_j$:

$$w_{GNSS_j,i} = RMSError = 0.5 \times \left(1 + \frac{X_i}{8}\right) \times 2^{Y_i}$$

The weighting Matrix **W** is defined as a diagonal matrix containing the estimated variances calculated from the "Code Phase RMS Error" and/or "Pseudorange RMS Error" values:

$$\mathbf{W} = \text{diag}\left\{1/w_{GNSS_1,1}^2, 1/w_{GNSS_1,2}^2, \cdots, 1/w_{GNSS_1,n}^2, \cdots, 1/w_{GNSS_m,1}^2, 1/w_{GNSS_m,2}^2, \cdots, 1/w_{GNSS_m,l}^2\right\}$$

Step 4: WLS position solution

The WLS position solution is described in e.g., [P. Axelrad, R.G. Brown] and usually requires the following steps:

1) Computation of satellite locations at time of transmission using the ephemeris parameters and user algorithms defined in the relevant ICD of the particular GNSS. The satellite locations are transformed into WGS-84 reference frame, if needed.

2) Computation of clock correction parameters using the parameters and algorithms as defined in the relevant ICD of the particular GNSS.

3) Computation of atmospheric delay corrections using the parameters and algorithms defined in the relevant ICD of the particular GNSS for the ionospheric delay, and using the Gupta model defined in [S.K. Gupta] p. 121 equation (2) for the tropospheric delay. For GNSSs which do not natively provide ionospheric correction models (e.g., GLONASS), the ionospheric delay is determined using the available ionospheric model adapted to the particular GNSS frequency.

4) The WLS position solution starts with an initial estimate of the user state (position and clock offset). The Reference Location is used as initial position estimate. The following steps are required:

   a) Calculate geometric range (corrected for Earth rotation) between initial location estimate and each satellite included in the MS measurement report.

   b) Predict pseudo-ranges for each measurement including clock and atmospheric biases as calculated in 1) to 3) above and defined in the relevant ICD of the particular GNSS and [P. Axelrad, R.G. Brown].

   c) Calculate difference between predicted and measured pseudo-ranges $\Delta\boldsymbol{\rho}$.

   d) Calculate the "Geometry Matrix" $\mathbf{G}$ as defined in [P. Axelrad, R.G. Brown]:

$$\mathbf{G} \equiv \begin{bmatrix} -\hat{\mathbf{1}}^T_{GNSS_1,1} & 1 \\ -\hat{\mathbf{1}}^T_{GNSS_1,2} & 1 \\ \vdots & \vdots \\ -\hat{\mathbf{1}}^T_{GNSS_1,n} & 1 \\ \vdots & \vdots \\ -\hat{\mathbf{1}}^T_{GNSS_m,1} & 1 \\ -\hat{\mathbf{1}}^T_{GNSS_m,2} & 1 \\ \vdots & \vdots \\ -\hat{\mathbf{1}}^T_{GNSS_m,l} & 1 \end{bmatrix} \text{ with } \hat{\mathbf{1}}_{GNSS_m,i} \equiv \frac{\mathbf{r}_{s_{GNSS_m,i}} - \hat{\mathbf{r}}_u}{\left| \mathbf{r}_{s_{GNSS_m,i}} - \hat{\mathbf{r}}_u \right|} \text{ where } \mathbf{r}_{s_{GNSS_m,i}} \text{ is the satellite position vector for SV}_i \text{ of GNSS}_m$$

   (calculated in 1) above), and $\hat{\mathbf{r}}_u$ is the estimate of the user location.

   e) Calculate the WLS solution according to [P. Axelrad, R.G. Brown]:

$$\Delta\hat{\mathbf{x}} = \left(\mathbf{G}^T\mathbf{W}\mathbf{G}\right)^{-1}\mathbf{G}^T\mathbf{W}\Delta\boldsymbol{\rho}$$

   f) Adding the $\Delta\hat{\mathbf{x}}$ to the initial state estimate gives an improved estimate of the state vector:

$$\hat{\mathbf{x}} \rightarrow \hat{\mathbf{x}} + \Delta\hat{\mathbf{x}}.$$

5) This new state vector $\hat{\mathbf{x}}$ can be used as new initial estimate and the procedure is repeated until the change in $\hat{\mathbf{x}}$ is sufficiently small.

Step 4: Transformation from Cartesian coordinate system to Geodetic coordinate system

The state vector $\hat{\mathbf{x}}$ calculated in Step 3 contains the MS position in ECEF Cartesian coordinates together with the MS receiver clock bias relative to the selected GNSS system time. Only the user position is of further interest. It is usually desirable to convert from ECEF coordinates x_u, y_u, z_u to geodetic latitude φ □, longitude λ and altitude h on the WGS84 reference ellipsoid.

Step 5: Calculation of "2-D Position Errors"

The latitude φ / longitude λ obtained after Step 4 is used to calculate the 2-D position error.

70.16.5 Sensitivity

70.16.5.1 Sensitivity Coarse Time Assistance

70.16.5.1.1a   Sub-tests

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined in Table 70.16.5.1.1.

Table 70.16.5.1.1: Sub-Test Case Number Definition

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

70.16.5.1.1 Definition

Sensitivity with coarse time assistance is the minimum level of GNSS satellite signals required for the MS to make an A-GNSS position estimate to a specific accuracy and within a specific response time when the network only provides coarse time assistance.

70.16.5.1.2 Conformance requirement

The first fix position estimates shall meet the accuracy and response time requirements in table 70.16.5.1.4 for the parameters specified in table 70.16.5.1.2.

Table 70.16.5.1.2: Test parameters for Sensitivity Coarse Time Assistance

System	Parameters	Unit	Value
	Number of generated satellites per system	-	See Table 70.16.5.1.3
	Total number of generated satellites	-	6
	HDOP range		1.4 to 2.1
	Propagation conditions	-	AWGN
	GNSS coarse time assistance error range	seconds	±2
Galileo	Reference high signal power level	dBm	-142
	Reference low signal power level	dBm	-147
GPS[1]	Reference high signal power level	dBm	-142
	Reference low signal power level	dBm	-147
GLONASS	Reference high signal power level	dBm	-142
	Reference low signal power level	dBm	-147
NOTE 1: "GPS" here means GPS L1 C/A, Modernized GPS, or both, dependent on MS capabilities.			

Table 70.16.5.1.3: Power level and satellite allocation

		Satellite allocation for each constellation		
		GNSS-1[1]	GNSS-2	GNSS-3
Single constellation	High signal level	1	-	-
	Low signal level	5	-	-
Dual constellation	High signal level	1	-	-
	Low signal level	2	3	-
Triple constellation	High signal level	1	-	-
	Low signal level	1	2	2
Note 1: For GPS capable receivers, GNSS-1, i.e. the system having the satellite with high signal level, shall be GPS.				

Table 70.16.5.1.4: Conformance requirement for Sensitivity Coarse Time Assistance

System	Success rate	2-D position error	Max response time
All	95 %	100 m	20 s

The reference for this requirement is 3GPP TS 45.005, clause O.2.1.1.

70.16.5.1.3   Test purpose

To verify the MS's first position estimate meets the Conformance requirement under GNSS satellite signal conditions that represent weak signal conditions and with only Coarse Time Assistance provided by the SS.

70.16.5.1.4   Method of test

Initial conditions

Test environment: normal; see clause A1.2.2.

1. Connect SS and GSS to the MS antenna connector or antenna connectors.

2. Set the GNSS test parameters as specified in table 70.16.5.1.5 for GNSS scenario #1. For GNSS-1, select the first satellite SV ID defined in the relevant table of Satellites to be simulated in clause 6.2.1.2 in TS 51.010-7 for the one satellite with the higher level.

3. Switch on the MS.

4. Establish a signalling connection according to the generic procedure in clause 10.1a on a channel in the Mid ARFCN range.

Specific PICS statements

-

PIXIT statements

-

Procedure

1. Start GNSS scenario #1 as specified in clause 6.2.1.2 of TS 51.010-7 with the MS location randomly selected to be within 3 km of the Reference Location and the altitude of the MS randomly selected between 0 m to 500 m above WGS-84 reference ellipsoid using the method described in clause 6.2.1.2.5 of TS 51.010-7

2. Send a RESET MS POSITIONING STORED INFORMATION message followed by RRLP Assistance Data and RRLP Measure Position Request messages containing appropriate assistance data; as specified in clauses 6.2.2 and 6.2.6 of TS 51.010-7 for MS based testing; or clauses 6.2.4 and 6.2.6 of TS 51.010-7 for MS assisted testing with the value of GNSS TOW offset by a random value as specified in clause 6.2.6.2 of TS 51.010-7; as required to obtain a fix.

3. If the MS returns a valid result in the Measure Position Response message within the Max response time specified in table 70.16.5.1.7 then record the result and process it as specified in step 4. If the MS does not return a valid result within the Max response time specified in table 70.16.5.1.7 or reports a MS positioning error in the Measure Position Response message then record one Bad Result.

4. For MS based testing compare the reported Location Information in the Measure Position Response message against the simulated position of the MS used in step 1, and calculate the 2D position error as specified in clause 70.16.4.3.2. Compare the 2D position error against the value in table 70.16.5.1.7 and record one Good Result or Bad Result as appropriate; or

    For MS assisted testing convert the GNSS Measurement Information reported in the Measure Position Response message to a 2D position using the method described in clause 70.16.4.5 and then compare the result against the simulated position of the MS, used in step 1, and calculate the 2D position error as specified in clause 70.16.4.3.2. Compare the 2D position error against the value in table 70.16.5.1.7 and record one Good Result or Bad Result as appropriate.

5. Repeat steps 1 to 4 using GNSS scenario #2 instead of #1 so that the reference location changes sufficiently such that the MS shall have to use the new assistance data. For GNSS-1, select the first satellite SV ID defined in the relevant table of Satellites to be simulated in clause 6.2.1.2 in TS 51.010-7 for the one satellite with the higher level. Use new random values for the MS location and altitude in step 1 and for the GNSS TOW offset in step 2.

6. Repeat steps 1 to 5 until the statistical requirements of clause 70.16.5.1.5 are met. Each time scenario #1 or #2 is used, the start time of the GNSS scenario shall be advanced by 2 minutes from the time used previously for that scenario. Once a scenario reaches the end of its viable running time, restart it from its nominal start time again.

Each time scenario #1 or #2 is used, for GNSS-1 select the next satellite SV ID from the one used previously, defined in the relevant table of Satellites to be simulated in clause 6.2.1.2 in TS 51.010-7, for the one satellite with the higher level.

7. Release the signalling connection.

Minimum / Maximum duration of the test

Minimum duration approximately 1 hour, maximum duration approximately 20 hours

Specific Message Contents

MEASURE POSITION REQUEST (3GPP TS 44.031 sub clause A.2) to the MS

Information Element	Value/remark
Positioning Instructions	
Accuracy	51.2m
Required Response Time	20s

70.16.5.1.5   Test Requirements

For the parameters specified in table 70.16.5.1.5 the MS shall meet the requirements and the success rate specified in table 70.16.5.1.7 with a confidence level of 95% according to annex A7.2.

Table 70.16.5.1.5: Test parameters for Sensitivity Coarse Time Assistance

System	Parameters	Unit	Value
	Number of generated satellites per system	-	See Table 70.16.5.1.6
	Total number of generated satellites	-	6
	HDOP range		1.4 to 2.1
	Propagation conditions	-	AWGN
	GNSS coarse time assistance error range	seconds	±1.8
Galileo	Reference high signal power level	dBm	-141
	Reference low signal power level	dBm	-146
GPS[(1)]	Reference high signal power level	dBm	-141
	Reference low signal power level	dBm	-146
GLONASS	Reference high signal power level	dBm	-141
	Reference low signal power level	dBm	-146
NOTE 1: "GPS" here means GPS L1 C/A, Modernized GPS, or both, dependent on MS capabilities.			

Table 70.16.5.1.6: Power level and satellite allocation

		Satellite allocation for each constellation		
		GNSS-1[(1)]	GNSS-2	GNSS-3
Single constellation	High signal level	1	-	-
	Low signal level	5	-	-
Dual constellation	High signal level	1	-	-
	Low signal level	2	3	-
Triple constellation	High signal level	1	-	-
	Low signal level	1	2	2
Note 1: For GPS capable receivers, GNSS-1, i.e. the system having the satellite with high signal level, shall be GPS.				

Table 70.16.5.1.7: Test requirements for Sensitivity Coarse Time Assistance

System	Success rate	2-D position error	Max response time
All	95 %	101.3 m	20.3 s

NOTE: If the above Test Requirement differs from the Conformance requirement then the Test Parameter Relaxation applied for this test is non-zero. The Test Parameter Relaxation for this test is defined in clause A5.5.2 and the explanation of how the Conformance requirement has been relaxed by the Test Parameter Relaxation is given in clause A5.5.4.

70.16.5.2 Sensitivity Fine Time Assistance

70.16.5.2.1a Sub-tests

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined in Table 70.16.5.2.1.

Table 70.16.5.2.1: Sub-Test Case Number Definition

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

70.16.5.2.1 Definition

Sensitivity with fine time assistance is the minimum level of GNSS satellite signals required for the MS to make an A-GNSS position estimate to a specific accuracy and within a specific response time when the network provides fine time assistance in addition to coarse time assistance.

70.16.5.2.2 Conformance requirement

The first fix position estimates shall meet the accuracy and response time requirements in table 70.16.5.2.4 for the parameters specified in table 70.16.5.2.2.

Table 70.16.5.2.2: Test parameters for Sensitivity Fine Time Assistance

System	Parameters	Unit	Value
	Number of generated satellites per system	-	See Table 70.16.5.2.3
	Total number of generated satellites	-	6
	HDOP range		1.4 to 2.1
	Propagation conditions	-	AWGN
	GNSS coarse time assistance error range	seconds	± 2
	GNSS fine time assistance error range	μs	± 10
Galileo	Reference signal power level	dBm	-147
GPS[1]	Reference signal power level	dBm	-147
GLONASS	Reference signal power level	dBm	-147
NOTE 1: "GPS" here means GPS L1 C/A, Modernized GPS, or both, dependent on MS capabilities.			

Table 70.16.5.2.3: Satellite allocation

	Satellite allocation for each constellation		
	GNSS-1	GNSS-2	GNSS-3
Single constellation	6	-	-
Dual constellation	3	3	-
Triple constellation	2	2	2

Table 70.16.5.2.4: Conformance requirement for Sensitivity Fine Time Assistance

System	Success rate	2-D position error	Max response time
All	95 %	100 m	20 s

The reference for this requirement is 3GPP TS 45.005, clause O.2.1.2.

70.16.5.2.3   Test purpose

To verify the MS's first position estimate meets the Conformance requirement under GNSS satellite signal conditions that represent weak signal conditions and with Fine Time Assistance provided by the SS.

70.16.5.2.4   Method of test

Initial conditions

Test environment: normal; see clause A1.2.2.

1. Connect SS and GSS to the MS antenna connector or antenna connectors.

2. Set the GNSS test parameters as specified in table 70.16.5.2.5 for GNSS scenario #1.

3. Switch on the MS.

4. Establish a signalling connection according to the generic procedure in clause 10.1a on a channel in the Mid ARFCN range.

Specific PICS statements

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PIXIT statements

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Procedure

1. Start GNSS scenario #1 as specified in clause 6.2.1.2 of TS 51.010-7 with the MS location randomly selected to be within 3 km of the Reference Location and the altitude of the MS randomly selected between 0 m to 500 m above WGS-84 reference ellipsoid using the method described in clause 6.2.1.2.5 of TS 51.010-7

2. Send a RESET MS POSITIONING STORED INFORMATION message followed by RRLP Assistance Data and RRLP Measure Position Request messages containing appropriate assistance data; as specified in clauses 6.2.2 and 6.2.6 of TS 51.010-7 for MS based testing; or clauses 6.2.4 and 6.2.6 of TS 51.010-7 for MS assisted testing with the values of GNSS TOW and BN offset by random values as specified in clause 6.2.6.2 of TS 51.010-7; as required to obtain a fix.

3. If the MS returns a valid result in the Measure Position Response message within the Max response time specified in table 70.16.5.2.7 then record the result and process it as specified in step 4. If the MS does not return a valid result within the Max response time specified in table 70.16.5.2.7 or reports a MS positioning error in the Measure Position Response message then record one Bad Result.

4. For MS based testing compare the reported Location Information in the Measure Position Response message against the simulated position of the MS used in step 1, and calculate the 2D position error as specified in clause 70.16.4.3.2. Compare the 2D position error against the value in table 70.16.5.2.7 and record one Good Result or Bad Result as appropriate; or

    For MS assisted testing convert the GNSS Measurement Information reported in the Measure Position Response message to a 2D position using the method described in clause 70.16.4.3 and then compare the result against the simulated position of the MS used in step 1, and calculate the 2D position error as specified in clause 70.16.4.3.2. Compare the 2D position error against the value in table 70.16.5.2.7 and record one Good Result or Bad Result as appropriate.

5. Repeat steps 1 to 4 using GNSS scenario #2 instead of #1 so that the reference location changes sufficiently such that the MS shall have to use the new assistance data. Use new random values for the MS location and altitude in step 1 and for the GNSS TOW and BN offsets in step 2.

6. Repeat steps 1 to 5 until the statistical requirements of clause 70.16.5.2.5 are met. Each time scenario #1 or #2 is used, the start time of the GNSS scenario shall be advanced by 2 minutes from the time used previously for that scenario. Once a scenario reaches the end of its viable running time, restart it from its nominal start time again.

7. Release the signalling connection.

Minimum / Maximum duration of the test

Minimum duration approximately 1 hour, maximum duration approximately 20 hours

Specific Message Contents

MEASURE POSITION REQUEST (3GPP TS 44.031 sub clause A.2) to the MS

Information Element	Value/remark
Positioning Instructions	
Accuracy	51.2m
Required Response Time	20s

70.16.5.2.5 Test Requirements

For the parameters specified in table 70.16.5.2.5 the MS shall meet the requirements and the success rate specified in table 70.16.5.2.7 with a confidence level of 95% according to annex A7.2.

Table 70.16.5.2.5: Test parameters for Sensitivity Fine Time Assistance

System	Parameters	Unit	Value
	Number of generated satellites per system	-	See Table 70.16.5.2.6
	Total number of generated satellites	-	6
	HDOP range		1.4 to 2.1
	Propagation conditions	-	AWGN
	GNSS coarse time assistance error range	seconds	± 1.8
	GNSS fine time assistance error range	μs	± 9
Galileo	Reference signal power level	dBm	-146
GPS[1]	Reference signal power level	dBm	-146
GLONASS	Reference signal power level	dBm	-146
NOTE 1: "GPS" here means GPS L1 C/A, Modernized GPS, or both, dependent on MS capabilities.			

Table 70.16.5.2.6: Satellite allocation

	Satellite allocation for each constellation		
	GNSS-1	GNSS-2	GNSS-3
Single constellation	6	-	-
Dual constellation	3	3	-
Triple constellation	2	2	2

Table 70.16.5.2.7: Test requirements for Sensitivity Fine Time Assistance

System	Success rate	2-D position error	Max response time
All	95 %	101.3 m	20.3 s

NOTE: If the above Test Requirement differs from the Conformance requirement then the Test Parameter Relaxation applied for this test is non-zero. The Test Parameter Relaxation for this test is defined in clause A5.5.2 and the explanation of how the Conformance requirement has been relaxed by the Test Parameter Relaxation is given in clause A5.5.4.

70.16.6 Nominal Accuracy

70.16.6.1a Sub-tests

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined in Table 70.16.6.1.

Table 70.16.6.1: Sub-Test Case Number Definition

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

70.16.6.1   Definition

Nominal accuracy is the accuracy of the MS's A-GNSS position estimate under ideal GNSS signal conditions.

70.16.6.2   Conformance requirement

The first fix position estimates shall meet the accuracy and response time requirements in table 70.16.6.4 for the parameters specified in table 70.16.6.2.

Table 70.16.6.2: Test parameters for Nominal Accuracy

System	Parameters	Unit	Value
	Number of generated satellites per system	-	See Table 70.16.6.3
	Total number of generated satellites	-	6 or 7[2]
	HDOP Range	-	1.4 to 2.1
	Propagation conditions	-	AWGN
	GNSS coarse time assistance error range	seconds	± 2
GPS[1]	Reference signal power level for all satellites	dBm	-128.5
Galileo	Reference signal power level for all satellites	dBm	-127
GLONASS	Reference signal power level for all satellites	dBm	-131
QZSS	Reference signal power level for all satellites	dBm	-128.5
SBAS	Reference signal power level for all satellites	dBm	-131
NOTE 1: "GPS" here means GPS L1 C/A, Modernized GPS, or both, dependent on MS capabilities. NOTE 2: 7 satellites apply only for SBAS case.			

If QZSS is supported, one of the GPS satellites will be replaced by a QZSS satellite with respective signal support.

If SBAS is supported, the SBAS satellite with the highest elevation will be added to the scenario.

Table 70.16.6.3: Satellite allocation

	Satellite allocation for each constellation			
	GNSS 1[1]	GNSS 2[1]	GNSS 3[1]	SBAS
Single constellation	6	--	--	1
Dual constellation	3	3	--	1
Triple constellation	2	2	2	1
NOTE1: GNSS refers to global systems i.e., GPS, Galileo, GLONASS				

Table 70.16.6.4: Conformance requirement for Nominal Accuracy

System	Success rate	2-D position error	Max response time
All	95 %	15 m	20 s

The reference for this requirement is 3GPP TS 45.005, clause O.2.2.

70.16.6.3   Test purpose

To verify the MS's first position estimate meets the Conformance requirement under GNSS satellite signal conditions that represent ideal conditions.

70.16.6.4   Method of test

Initial conditions

Test environment: normal; see clause A1.2.2.

1. Connect SS and GSS to the MS antenna connector or antenna connectors.

2. Set the GNSS test parameters as specified in table 70.16.6.5 for GNSS scenario #3.

3. Switch on the MS.

4. Establish a signalling connection according to the generic procedure in clause 10.1a on a channel in the Mid ARFCN range.

Specific PICS statements

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PIXIT statements

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Procedure

1. Start GNSS scenario #3 as specified in clause 6.2.1.2 of TS 51.010-7 with the MS location randomly selected to be within 3 km of the Reference Location and the altitude of the MS randomly selected between 0 m to 500 m above WGS-84 reference ellipsoid using the method described in clause 6.2.1.2.5 of TS 51.010-7

2. Send a RESET MS POSITIONING STORED INFORMATION message followed by RRLP Assistance Data and RRLP Measure Position Request messages containing appropriate assistance data; as specified in clauses 6.2.2 and 6.2.6 of TS 51.010-7 for MS based testing; or clauses 6.2.4 and 6.2.6 of TS 51.010-7 for MS assisted testing with the value of GNSS TOW offset by a random value as specified in clause 6.2.6.2 of TS 51.010-7; as required to obtain a fix.

3. If the MS returns a valid result in the Measure Position Response message within the Max response time specified in table 70.16.6.7 then record the result and process it as specified in step 4. If the MS does not return a valid result within the Max response time specified in table 70.16.6.7 or reports a MS positioning error in the Measure Position Response message then record one Good Result.

4. For MS based testing compare the reported Location Information in the Measure Position Response message against the simulated position of the MS used in step 1, and calculate the 2D position error as specified in clause 70.16.4.3.2. Compare the 2D position error against the value in table 70.16.6.7 and record one Good Result or Bad Result as appropriate; or

   For MS assisted testing convert the GNSS Measurement Information reported in the Measure Position Response message to a 2D position using the method described in clause 70.16.4.5 and then compare the result against the simulated position of the MS used in step 1, and calculate the 2D position error as specified in clause 70.16.4.3.2. Compare the 2D position error against the value in table 70.16.6.7 and record one Good Result or Bad Result as appropriate.

5. Repeat steps 1 to 4 using GNSS scenario #4 instead of #3 so that the reference location changes sufficiently such that the MS shall have to use the new assistance data. Use new random values for the MS location and altitude in step 1 and for the GNSS TOW offset in step 2.

6. Repeat steps 1 to 5 until the statistical requirements of clause 70.16.6.5 are met. Each time scenario #3 or #4 is used, the start time of the GNSS scenario shall be advanced by 2 minutes from the time used previously for that scenario. Once a scenario reaches the end of its viable running time, restart it from its nominal start time again.

7. Release the signalling connection.

Minimum / Maximum duration of the test

Minimum duration approximately 1 hour, maximum duration approximately 20 hours

Specific Message Contents

MEASURE POSITION REQUEST (3GPP TS 44.031 sub clause A.2) to the MS

Information Element	Value/remark
Positioning Instructions	
Accuracy	7.7m
Required Response Time	20s

70.16.6.5 Test Requirements

For the parameters specified in table 70.16.6.5 the MS shall meet the requirements and the success rate specified in table 70.16.6.7 with a confidence level of 95% according to annex A7.2.

Table 70.16.6.5: Test parameters for Nominal Accuracy

System	Parameters	Unit	Value
	Number of generated satellites per system	-	See Table 70.16.6.3
	Total number of generated satellites	-	6 or 7[2]
	HDOP Range	-	1.4 to 2.1
	Propagation conditions	-	AWGN
	GNSS coarse time assistance error range	seconds	±1.8
GPS[1]	Reference signal power level for all satellites	dBm	-128.5
Galileo	Reference signal power level for all satellites	dBm	-127
GLONASS	Reference signal power level for all satellites	dBm	-131
QZSS	Reference signal power level for all satellites	dBm	-128.5
SBAS	Reference signal power level for all satellites	dBm	-131
NOTE 1: "GPS" here means GPS L1 C/A, Modernized GPS, or both, dependent on MS capabilities.			
NOTE 2: 7 satellites apply only for SBAS case.			

If QZSS is supported, one of the GPS satellites will be replaced by a QZSS satellite with respective signal support.

If SBAS is supported, the SBAS satellite with the highest elevation will be added to the scenario.

Table 70.16.6.3: Satellite allocation

	Satellite allocation for each constellation			
	GNSS 1[1]	GNSS 2[1]	GNSS 3[1]	SBAS
Single constellation	6	--	--	1
Dual constellation	3	3	--	1
Triple constellation	2	2	2	1
NOTE1: GNSS refers to global systems i.e., GPS, Galileo, GLONASS				

Table 70.16.6.7: Test requirements for Nominal Accuracy

System	Success rate	2-D position error	Max response time
All	95 %	16.3 m	20.3 s

NOTE: If the above Test Requirement differs from the Conformance requirement then the Test Parameter Relaxation applied for this test is non-zero. The Test Parameter Relaxation for this test is defined in clause A5.5.2 and the explanation of how the Conformance requirement has been relaxed by the Test Parameter Relaxation is given in clause A5.5.4.

70.16.7 Dynamic Range

70.16.7.1a Sub-tests

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined in Table 70.16.7.1.

Table 70.16.7.1: Sub-Test Case Number Definition

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

70.16.7.1   Definition

Dynamic Range is the maximum difference in level of the GNSS signals from a number of satellites that allows the MS to make an A-GNSS position estimate with a specific accuracy and a specific response time.

70.16.7.2   Conformance requirement

The first fix position estimates shall meet the accuracy and response time requirements in table 70.16.7.4 for the parameters specified in table 70.16.7.2.

Table 70.16.7.2: Test parameters for Dynamic Range

System	Parameters	Unit	Value
	Number of generated satellites per system	-	See Table 70.16.7.3
	Total number of generated satellites	-	6
	HDOP Range	-	1.4 to 2.1
	Propagation conditions	-	AWGN
	GNSS coarse time assistance error range	seconds	±2
Galileo	Reference high signal power level	dBm	-127,5
	Reference low signal power level	dBm	-147
GPS[(1)]	Reference high signal power level	dBm	-129
	Reference low signal power level	dBm	-147
GLONASS	Reference high signal power level	dBm	-131.5
	Reference low signal power level	dBm	-147
NOTE 1: "GPS" here means GPS L1 C/A, Modernized GPS, or both, dependent on MS capabilities.			

Table 70.16.7.3: Power level and satellite allocation

		Satellite allocation for each constellation		
		GNSS 1[(1)]	GNSS 2[(1)]	GNSS 3[(1)]
Single constellation	High signal level	2	--	--
	Low signal level	4	--	--
Dual constellation	High signal level	1	1	--
	Low signal level	2	2	--
Triple constellation	High signal level	1	1	1
	Low signal level	1	1	1
NOTE1: GNSS refers to global systems i.e., GPS, Galileo, GLONASS				

Table 70.16.7.4: Conformance requirement for Dynamic Range

System	Success rate	2-D position error	Max response time
All	95 %	100 m	20 s

The reference for this requirement is 3GPP TS 45.005, clause O.2.3.

70.16.7.3   Test purpose

To verify the MS's first position estimate meets the Conformance requirement under GNSS satellite signal conditions that have a wide dynamic range. Strong satellites are likely to degrade the acquisition of weaker satellites due to their cross-correlation products.

70.16.7.4 Method of test

Initial conditions

Test environment: normal; see clause A1.2.2.

1. Connect SS and GSS to the MS antenna connector or antenna connectors.

2. Set the GNSS test parameters as specified in table 70.16.7.5 for GNSS scenario #1. Randomly select from the satellite SV IDs defined in the relevant table of Satellites to be simulated in clause 6.2.1.2 in TS 51.010-7 for the satellites with the higher levels.

3. Switch on the MS.

4. Establish a signalling connection according to the generic procedure in clause 10.1a on a channel in the Mid ARFCN range.

Specific PICS statements

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PIXIT statements

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Procedure

1. Start GNSS scenario #1 as specified in clause 6.2.1.2 of TS 51.010-7 with the MS location randomly selected to be within 3 km of the Reference Location and the altitude of the MS randomly selected between 0 m to 500 m above WGS-84 reference ellipsoid using the method described in clause 6.2.1.2.5 of TS 51.010-7

2. Send a RESET MS POSITIONING STORED INFORMATION message followed by RRLP Assistance Data and RRLP Measure Position Request messages containing appropriate assistance data; as specified in clauses 6.2.2 and 6.2.6 of TS 51.010-7 for MS based testing; or clauses 6.2.4 and 6.2.6 of TS 51.010-7 for MS assisted testing with the value of GNSS TOW offset by a random value as specified in clause 6.2.6.2 of TS 51.010-7; as required to obtain a fix.

3. If the MS returns a valid result in the Measure Position Response message within the Max response time specified in table 70.16.7.7 then record the result and process it as specified in step 4. If the MS does not return a valid result within the Max response time specified in table 70.16.7.7 or reports a MS positioning error in the Measure Position Response message then record one Bad Result.

4. For MS based testing compare the reported Location Information in the Measure Position Response message against the simulated position of the MS used in step 1, and calculate the 2D position error as specified in clause 70.16.4.3.2. Compare the 2D position error against the value in table 70.16.7.7 and record one Good Result or Bad Result as appropriate; or

   For MS assisted testing convert the GNSS Measurement Information reported in the Measure Position Response message to a 2D position using the method described in clause 70.16.4.5 and then compare the result against the simulated position of the MS used in step 1, and calculate the 2D position error as specified in clause 70.16.4.3.2. Compare the 2D position error against the value in table 70.16.7.7 and record one Good Result or Bad Result as appropriate.

5. Repeat steps 1 to 4 using GNSS scenario #2 instead of #1 so that the reference location changes sufficiently such that the MS shall have to use the new assistance data. Randomly select from the satellite SV IDs defined in the relevant table of Satellites to be simulated in clause 6.2.1.2 in TS 51.010-7 for the satellites with the higher levels. Use new random values for the MS location and altitude in step 1 and for the GNSS TOW offset in step 2.

6. Repeat steps 1 to 5 until the statistical requirements of clause 70.16.7.5 are met. Each time scenario #1 or #2 is used, the start time of the GNSS scenario shall be advanced by 2 minutes from the time used previously for that scenario. Once a scenario reaches the end of its viable running time, restart it from its nominal start time again. Each time scenario #1 or #2 is used, randomly select from the satellite SV IDs defined in the relevant table of Satellites to be simulated in clause 6.2.1.2 in TS 51.010-7, for the satellites with the higher levels.

7. Release the signalling connection.

Minimum / Maximum duration of the test

Minimum duration approximately 1 hour, maximum duration approximately 20 hours

Specific Message Contents

MEASURE POSITION REQUEST (3GPP TS 44.031 sub clause A.2) to the MS

Information Element	Value/remark
Positioning Instructions	
Accuracy	51.2m
Required Response Time	20s

70.16.7.5 Test Requirements

For the parameters specified in table 70.16.7.5 the MS shall meet the requirements and the success rate specified in table 70.16.7.7 with a confidence level of 95% according to annex A7.2.

Table 70.16.7.5: Test parameters for Dynamic Range

System	Parameters	Unit	Value
	Number of generated satellites per system	-	See Table 70.16.7.6
	Total number of generated satellites	-	6
	HDOP Range	-	1.4 to 2.1
	Propagation conditions	-	AWGN
	GNSS coarse time assistance error range	seconds	±1.8
Galileo	Reference high signal power level	dBm	-126,7
	Reference low signal power level	dBm	-146
GPS[1]	Reference high signal power level	dBm	-128.2
	Reference low signal power level	dBm	-146
GLONASS	Reference high signal power level	dBm	-130.7
	Reference low signal power level	dBm	-146
NOTE 1: "GPS" here means GPS L1 C/A, Modernized GPS, or both, dependent on MS capabilities.			

Table 70.16.7.6: Power level and satellite allocation

		Satellite allocation for each constellation		
		GNSS 1[1]	GNSS 2[1]	GNSS 3[1]
Single constellation	High signal level	2	--	--
	Low signal level	4	--	--
Dual constellation	High signal level	1	1	--
	Low signal level	2	2	--
Triple constellation	High signal level	1	1	1
	Low signal level	1	1	1
NOTE1: GNSS refers to global systems i.e., GPS, Galileo, GLONASS				

Table 70.16.7.7: Test requirements for Dynamic Range

System	Success rate	2-D position error	Max response time
All	95 %	101.3 m	20.3 s

NOTE: If the above Test Requirement differs from the Conformance requirement then the Test Parameter Relaxation applied for this test is non-zero. The Test Parameter Relaxation for this test is defined in clause A5.5.2 and the explanation of how the Conformance requirement has been relaxed by the Test Parameter Relaxation is given in clause A5.5.4.

70.16.8 Multi-Path scenario

70.16.8.1a Sub-tests

This test case includes sub-test cases dependent on the GNSS supported by the MS. Each sub-test case is identified by a Sub-Test Case Number as defined in Table 70.16.8.1.

Table 70.16.8.1: Sub-Test Case Number Definition

Sub-Test Case Number	Supported GNSS
1	MS supporting A-GLONASS only
2	MS supporting A-Galileo only
3	MS supporting A-GPS and Modernized GPS only
4	MS supporting A-GPS and A-GLONASS only

70.16.8.1 Definition

Multi-path performance measures the accuracy and response time of the MS's A-GNSS position estimate in a specific GNSS signal multi-path environment.

70.16.8.2 Conformance requirement

The first fix position estimates shall meet the accuracy and response time requirements in table 70.16.8.4 for the parameters specified in table 70.16.8.2.

Table 70.16.8.2: Test parameters for Multi-Path scenario

System	Parameters	Unit	Value
	Number of generated satellites per system	-	See Table 70.16.8.3
	Total number of generated satellites	-	6
	HDOP range		1.4 to 2.1
	Propagation conditions	-	AWGN
	GNSS coarse time assistance error range	seconds	±2
Galileo	Reference signal power level	dBm	-127
GPS[(1)]	Reference signal power level	dBm	-128.5
GLONASS	Reference signal power level	dBm	-131
NOTE 1: "GPS" here means GPS L1 C/A, Modernized GPS, or both, dependent on MS capabilities.			

Table 70.16.8.3: Channel model allocation

		Channel model allocation for each constellation		
		GNSS-1	GNSS-2	GNSS-3
Single constellation	One-tap channel (see note)	2	--	--
	Two-tap channel (see note)	4	--	--
Dual constellation	One-tap channel (see note)	1	1	--
	Two-tap channel (see note)	2	2	--
Triple constellation	One-tap channel (see note)	1	1	1
	Two-tap channel (see note)	1	1	1
NOTE: One-tap channel: no multi-path. Two-tap channel: multi-path defined in clause 70.16.2.4				

Table 70.16.8.4: Conformance requirement for Multi-Path scenario

System	Success rate	2-D position error	Max response time
All	95 %	100 m	20 s

The reference for this requirement is 3GPP TS 45.005, clause O.2.4.

70.16.8.3 Test purpose

To verify the MS's first position estimate meets the Conformance requirement under GNSS satellite signal conditions that represent simple multi-path conditions.

70.16.8.4 Method of test

Initial conditions

Test environment: normal; see clause A1.2.2.

1. Connect SS and GSS to the MS antenna connector or antenna connectors.

2. Set the GNSS test parameters as specified in table 70.16.8.5 for GNSS scenario #1. Randomly select from the satellite SV IDs defined in the relevant table of Satellites to be simulated in clause 6.2.1.2 in TS 51.010-7 for the satellites with one-tap channels.

3. Switch on the MS.

4. Establish a signalling connection according to the generic procedure in clause 10.1a on a channel in the Mid ARFCN range.

Specific PICS statements:

-

PIXIT statements:

-

Procedure

1. Start GNSS scenario #1 as specified in clause 6.2.1.2 of TS 51.010-7 with the MS location randomly selected to be within 3 km of the Reference Location and the altitude of the MS randomly selected between 0 m to 500 m above WGS-84 reference ellipsoid using the method described in clause 6.2.1.2.5 of TS 51.010-7. The initial carrier phase difference between taps of the multi-path model shall be randomly selected between 0 and 2π radians by selecting the next random number from a standard uniform random number generator, in the range 0 to 2π, representing radians with a resolution of 0.1, representing 0.1 radians.

2. Send a RESET MS POSITIONING STORED INFORMATION message followed by RRLP Assistance Data and RRLP Measure Position Request messages containing appropriate assistance data; as specified in clauses 6.2.2 and 6.2.6 of TS 51.010-7 for MS based testing; or clauses 6.2.4 and 6.2.6 of TS 51.010-7 for MS assisted testing with the value of GNSS TOW offset by a random value as specified in clause 6.2.6.2 of TS 51.010-7; as required to obtain a fix.

3. If the MS returns a valid result in the Measure Position Response message within the Max response time specified in table 70.16.8.8 then record the result and process it as specified in step 4. If the MS does not return a valid result within the Max response time specified in table 70.16.8.8 or reports a MS positioning error in the Measure Position Response message then record one Bad Result.

4. For MS based testing compare the reported Location Information in the Measure Position Response message against the simulated position of the MS used in step 1, and calculate the 2D position error as specified in clause 70.16.4.3.2. Compare the 2D position error against the value in table 70.16.8.8 and record one Good Result or Bad Result as appropriate; or

   For MS assisted testing convert the GNSS Measurement Information reported in the Measure Position Response message to a 2D position using the method described in clause 70.16.4.3 and then compare the result against the simulated position of the MS used in step 1, and calculate the 2D position error as specified in clause 70.16.4.3.2. Compare the 2D position error against the value in table 70.16.8.8 and record one Good Result or Bad Result as appropriate.

5. Repeat steps 1 to 4 using GNSS scenario #2 instead of #1 so that the reference location changes sufficiently such that the MS shall have to use the new assistance data. Randomly select from the satellite SV IDs defined in the relevant table of Satellites to be simulated in clause 6.2.1.2 in TS 51.010-7 for the satellites with the one-tap channels. Use new random values for the MS location and altitude, and the initial carrier phase difference between taps of the multi-path model in step 1 and for the GNSS TOW offset in step 2.

6. Repeat steps 1 to 5 until the statistical requirements of clause 70.16.8.5 are met. Each time scenario #1 or #2 is used, the start time of the GNSS scenario shall be advanced by 2 minutes from the time used previously for that scenario. Once a scenario reaches the end of its viable running time, restart it from its nominal start time again. Each time scenario #1 or #2 is used, randomly select from the satellite SV IDs defined in the relevant table of Satellites to be simulated in clause 6.2.1.2 in TS 51.010-7, for the satellites with the one-tap channels.

7. Release the signalling connection

Minimum / Maximum duration of the test

Minimum duration approximately 1 hour, maximum duration approximately 20 hours

Specific Message Contents

MEASURE POSITION REQUEST (3GPP TS 44.031 sub clause A.2) to the MS

Information Element	Value/remark
Positioning Instructions	
Accuracy	51.2m
Required Response Time	20s

70.16.8.5 Test Requirements

For the parameters specified in table 70.16.8.5 the MS shall meet the requirements and the success rate specified in table 70.16.8.8 with a confidence level of 95% according to annex A7.2.

Table 70.16.8.5: Test parameters for Multi-Path scenario

System	Parameters	Unit	Value
	Number of generated satellites per system	-	See Table 70.16.8.6
	Total number of generated satellites	-	6
	HDOP range		1.4 to 2.1
	Propagation conditions	-	AWGN
	GNSS coarse time assistance error range	seconds	±1.8
Galileo	Reference signal power level	dBm	-127
GPS[(1)]	Reference signal power level	dBm	-128.5
GLONASS	Reference signal power level	dBm	-131
NOTE 1: "GPS" here means GPS L1 C/A, Modernized GPS, or both, dependent on MS capabilities.			

Table 70.16.8.6: Channel model allocation

		Channel model allocation for each constellation		
		GNSS-1	GNSS-2	GNSS-3
Single constellation	One-tap channel(see note)	2	--	--
	Two-tap channel(see note)	4	--	--
Dual constellation	One-tap channel(see note)	1	1	--
	Two-tap channel(see note)	2	2	--
Triple constellation	One-tap channel(see note)	1	1	1
	Two-tap channel(see note)	1	1	1
NOTE: One-tap channel: no multi-path. Two-tap channel: multi-path defined in clause 70.16.2.4 with Relative mean Power (Y) defined in Table 70.16.8.7.				

Table 70.16.8.7: Relative mean Power (Y)for use in Table 70.16.2.1

System	Signals	Y [dB]
Galileo	E1	-4.7
	E5a	-6.2
	E5b	-6.2
GPS/Modernized GPS	L1 C/A	-6.2
	L1C	-4.7
	L2C	-6.2
	L5	-6.2
GLONASS	G1	-12.7
	G2	-12.7

Table 70.16.8.8: Test requirements for Multi-Path scenario

System	Success rate	2-D position error	Max response time
All	95 %	101.3 m	20.3 s

NOTE: If the above Test Requirement differs from the Conformance requirement then the Test Parameter Relaxation applied for this test is non-zero. The Test Parameter Relaxation for this test is defined in clause A5.5.2 and the explanation of how the Conformance requirement has been relaxed by the Test Parameter Relaxation is given in clause A5.5.4.