26.16   Adaptive Multi Rate Signalling

This section only applies to MS supporting the multi rate speech codec in the GSM 400, GSM 900, DCS 1800 and PCS 1900 band.

As the multi-rate mobile station necessarily supports the speech full rate version 1 or both speech full rate version 1 and speech half rate version 1, conformance requirements of section 26 fully apply to this mobile.

If the handset also supports the EFR speech codec this section does not alter the testing that is completed in section 26.12.

The purpose of this section is to test the different procedures, which may be impacted by the multi rate codec.

26.16.1 Inband Signalling, Downlink Codec Adaptation

26.16.1.1   Conformance Requirement

Ideal frequency hopping without DTX is activated, the MS shall produce Codec Mode Requests with the following accuracy

- When a carrier to interferer ratio 4 dB higher than a defined upper threshold is applied to the antenna connector, the MS shall request a higher mode with a probability exceeding 90%. This shall be measured immediately after a settling-time of 200 ms.

- When a carrier to interferer ratio 4 dB lower than a defined lower threshold is applied to the antenna connector, the MS shall request a lower mode with a probability exceeding 90%. This shall be measured immediately after a settling-time of 200 ms.

This test is not intended to verify these conformance requirements, but to verify the correctness of the involved layer 1 and layer 3 signalling.

References:

TS GSM 05.09 sub-clauses: 3.3, 3.4

26.16.1.2   Test Purpose

This test is concerned with the downlink link adaptation for AMR and the related inband signalling. The test shall verify that the MS can monitor the downlink quality of the dedicated channel and generate Codec Mode Requests according to the thresholds provided by the network at call setup, with an allowance for the statistical significance of the test.

   NOTE 1:   The test is performed under static conditions, since the power variation under TU50 during the measurement time of 200ms can be neglected.

   NOTE 2:   The inband signals are L1 signalling transmitted every speech frame, as defined in GSM 05.09: In uplink directions Codec Mode Requests and Codec Mode Indications are transmitted alternately, whereas downlink signalling contains of alternate Codec Mode Commands and Codec Mode Indications.

26.16.1.3   Method of Test

Initial Conditions

The MS is "idle updated", with TMSI allocated.

Related PICS/PIXIT Statements

The MS supports the multi-rate speech codec.

Forseen Final State of MS

"Idle, updated", with TMSI allocated.

Test Procedure

a) A mobile originated call is initiated, following the CHANNEL REQUEST received from the MS the SS sends an IMMEDIATE ASSIGNMENT to the MS commanding it to go to a SDCCH. The MS indicates to the SS that it supports the multi-rate speech codec. The SS allocates the MS a TCH/AFS and signals the allowed codec subset and adaptation thresholds as part of the ASSIGNMENT COMMAND. DTX shall not be activated. Hopping is activated. The hopping band is centred around an ARFCN in the Mid ARFCN range. The hopping frequencies are chosen from those defined in section 6.

The following active codec mode subset shall apply:

Codec Mode	TCH/AFS in kbit/s
CODEC_MODE_1	4,75
CODEC_MODE_2	5,9
CODEC_MODE_3	7,95
CODEC_MODE_4	12,2

The following decision threshold and hysteresis values in terms of normalized carrier to interference ratio (C/I_{norm}), shall apply for Codec Mode Command / Request (MC', MR'):

MC'/MR'	THR_MC_Dn(MC')/ THR_MR_Dn(MR')	THR_MC_Up(MC')/ THR_MR_Up(MR')
CODEC_MODE_4	16,5 dB	$+ \infty$
CODEC_MODE_3	11,5 dB	18,5 dB
CODEC_MODE_2	6,5 dB	13,5 dB
CODEC_MODE_1	$- \infty$	8.5 dB

b) In addition to the wanted signal, the SS produces an independent, uncorrelated interfering signal, Standard Test Signal I1 (unwanted signal).

The unwanted signal is continuous and has no fixed relationship with the bit transitions of the wanted signal. Its amplitude is 64 dB below that of the wanted signal.

c), d) The downlink radio environment is altered by changing the carrier to interference ratio. When the radio condition crosses an adaptation threshold the MS changes the Codec Mode Request to reflect the changed signal quality. The SS will change the downlink codec to the requested mode and change the downlink Codec Mode Indication accordingly..This is continued for all thresholds given for the Active Codec Set.

e) The SS sends a HANDOVER_COMMAND allocating the MS a TCH/AHS and signals the allowed codec subset and adaptation thresholds as part of the HANDOVER_COMMAND. DTX shall not be activated. Hopping is activated. The hopping band is centred around an ARFCN in the Mid ARFCN range. The hopping frequencies are chosen from those defined in section 6.

The following active codec mode subset shall apply:

Codec Mode	TCH/AHS in kbit/s
CODEC_MODE_1	5.15
CODEC_MODE_2	6.7
CODEC_MODE_3	7.95

The following decision threshold and hysteresis values in terms of normalized carrier to interference ratio (C/I_{norm}), shall apply for Codec Mode Command / Request (MC', MR'):

MC'/MR'	THR_MC_Dn(MC')/ THR_MR_Dn(MR')	THR_MC_Up(MC')/ THR_MR_Up(MR')
CODEC_MODE_3	12,5 dB	+∞
CODEC_MODE_2	11,0 dB	15,0 dB
CODEC_MODE_1	− ∞	13,0 dB

f)   step b) to d) are repeated for the settings given in step e)

Maximum Duration of Test

2 minutes

Expected Sequence in step c)

NOTE: Inband signalling is transmitted every frame, but are mentioned only where changes occur. If no new Codec Mode Indications or Codec Mode Commands are to be sent, previous indication respectively request is being repeated. If Active Codec Set contains less than 4 codecs, the steps corresponding to nonassigned codecs shall be ignored.

Step	Direction	Message	Comments
1	MS->SS	Channel Request	
2	SS->MS	Immediate Assignment	
3	MS->SS	Set Up SDCCH	MS indicates which speech codecs it can support
4	SS->MS	Assignment Command SDCCH	Network allocates TCH/AFS / TCH/AHS and allowed codec subset and adaptation thresholds
5	MS->SS	Assignment Complete	SS simulates good radio conditions (C/I_{norm}= 64dB)
A6	SS->MS		Lower radio conditions tobelow codec mode 4 threshold
A7	MS->SS	Codec Mode Request changes	
A8	SS->MS	Codec Mode Indication changes to requested mode	The downlink codec is changed so that first frame with requested codec is transmitted with the first changed Codec Mode Indication.
9	SS->MS		Lower radio conditions to below codec mode 3 threshold
10	MS->SS	Codec Mode Request changes	
11	SS->MS	Codec Mode Indication changes to requested mode	The downlink codec is changed so that first frame with requested codec is transmitted with the first changed Codec Mode Indication.
12	SS->MS		Lower radio conditions to below codec mode 2 threshold
13	MS->SS	Codec Mode Request changes	
14	SS->MS	Codec Mode Indication changes to requested mode	The downlink codec is changed so that first frame with requested codec is transmitted with the first changed Codec Mode Indication.
15	SS->MS		Improve radio conditions to above codec mode 1 threshold
16	MS->SS	Codec Mode Request changes	
17	SS->MS	Codec Mode Indication changes to requested mode	The downlink codec is changed so that first frame with requested codec is transmitted with the first changed Codec Mode Indication.
18	SS->MS		Improve radio conditions to above codec mode 2 threshold
19	MS->SS	Codec Mode Request changes	
20	SS->MS	Codec Mode Indication changes to requested mode	The downlink codec is changed so that first frame with requested codec is transmitted with the first changed Codec Mode Indication.
A21	SS->MS		Improve radio conditions to above codec mode 3 threshold
A22	MS->SS	Codec Mode Request changes	
A23	SS->MS	Codec Mode Indication changes to requested mode	The downlink codec is changed so that first frame with requested codec is transmitted with the first changed Codec Mode Indication.
24	SS->MS	CHANNEL RELEASE	

In TCH/AHS the Active Codec Set contains only three of four possible codecs, thus steps prefixing A are not implemented in this case.

Specific Message Contents

ASSIGNMENT COMMAND

Information Element	Value/remark
Assignment Command	In step 4: codec mode 4 selected (codec mode 3 for AHS) (ref: GSM 04.08 section 9.1.2)

Codec Mode Requests, uplink inband signalling

Information Element	Value/remark
Requesting preferred downlink mode	In step 6: Codec Mode 4 requested In step 7: Change to Codec mode 3 latest 4dB below THR_MR_Dn(Codec_Mode_4) In step 10:Change to Codec Mode 2 latest 4dB below THR_MR_Dn(Codec_Mode_3) In step 13:Change to Codec Mode 1 latest 4dB below THR_MR_Dn(Codec_Mode_2) In step 16:Change to Codec Mode 2 latest 4dB above THR_MR_Up(Codec_Mode_1) In step 19:Change to Codec Mode 3 latest 4dB above THR_MR_Up(Codec_Mode_2) In step 22:Change to Codec Mode 4 latest 4dB above THR_MR_Up(Codec_Mode_3)

Codec Mode Indications, downlink inband signalling

Information Element	Value/remark
Indicating mode used at downlink	In step 6-7: Codec Mode 4 is indicated In step 8-10: Codec Mode 3 is indicated In step 11-13:Codec Mode 2 is indicated In step 14-16:Codec Mode 1 is indicated In step 17-19:Codec Mode 2 is indicated In step 20-22:Codec Mode 3 is indicated In step 23: Codec Mode 4 is indicated

26.16.1a   Inband Signalling, Uplink Codec Adaptation

26.16.1a.1   Conformance Requirement

The MS shall after reception of a Codec Mode Command apply the corresponding codec mode in the uplink direction for the next possible speech frame and no more than three speech frames later.This test is not intended to verify these conformance requirements, but to verify the correctness of the involved layer 1 and layer 3 signalling.

References:

TS GSM 05.09 sub-clauses: 3.3, 3.4

26.16.1a.2   Test Purpose

This test is concerned with the link adaptation for AMR uplink and the related inband signalling. The test shall verify that the MS in the uplink direction applies the codec mode indicated by the network transmitted Codec Mode Commands, and that the MS correctly signals the used codec as Codec Mode Indication in the uplink inband signalling.

   NOTE: The inband signals are L1 signalling transmitted every speech frame, as defined in GSM 05.09: In uplink directions Codec Mode Requests and Codec mode indications are transmitted alternatelly, whereas downlink signalling contains of alternately Codec Mode Commands and Codec Mode Indications.

26.16.1a.3	Method of Test

Initial Conditions

The MS is "idle updated", with TMSI allocated.

Related PICS/PIXIT Statements

The MS supports the multi-rate speech codec.

Forseen Final State of MS

"Idle, updated", with TMSI allocated.

Test Procedure

a)	A mobile originated call is initiated, following the CHANNEL REQUEST received from the MS the SS sends an IMMEDIATE ASSIGNMENT to the MS commanding it to go to a SDCCH. The MS indicates to the SS that it supports the multi-rate speech codec. The SS allocates the MS a TCH/AFS and signals the allowed codec subset and adaptation thresholds as part of the ASSIGNMENT COMMAND. DTX shall not be activated. Hopping is activated. The hopping band is centred around an ARFCN in the Mid ARFCN range. The hopping frequencies are chosen from those defined in section 6.

The following active codec mode subset shall apply:

Codec Mode	TCH/AFS in kbit/s
CODEC_MODE_1	4,75
CODEC_MODE_2	5,9
CODEC_MODE_3	7,95
CODEC_MODE_4	12,2

The following decision threshold and hysteresis values in terms of normalized carrier to interference ratio (C/I_{norm}), shall apply for Codec Mode Command / Request (MC', MR'):

MC'/MR'	THR_MC_Dn(MC')/ THR_MR_Dn(MR')	THR_MC_Up(MC')/ THR_MR_Up(MR')
CODEC_MODE_4	16,5 dB	$+ \infty$
CODEC_MODE_3	11,5 dB	18,5 dB
CODEC_MODE_2	6,5 dB	13,5 dB
CODEC_MODE_1	$- \infty$	8.5 dB

b)	In addition to the wanted signal, the SS produces an independent, uncorrelated interfering signal, Standard Test Signal I1 (unwanted signal).

The unwanted signal is continuous and has no fixed relationship with the bit transitions of the wanted signal. Its amplitude is 64 dB below that of the wanted signal.

c)	The SS signals that a new codec is wanted in uplink direction by changing the value of the Codec Mode Command. The MS shall apply the commanded mode in uplink by changing the mode and correspondingly the value of the Codec Mode Indication to match the used codec. This is repeated for all neighbouring mode transitions in the Active Codec Set.

d)	The SS sends a HANDOVER_COMMAND allocating the MS a TCH/AHS and signals the allowed codec subset and adaptation thresholds as part of the HANDOVER_COMMAND. DTX shall not be activated. Hopping is activated. The hopping band is centred around an ARFCN in the Mid ARFCN range. The hopping frequencies are chosen from those defined in section 6.

The following active codec mode subset shall apply:

Codec Mode	TCH/AHS in kbit/s
CODEC_MODE_1	5.15
CODEC_MODE_2	6.7
CODEC_MODE_3	7.95

The following decision threshold and hysteresis values in terms of normalized carrier to interference ratio (C/I_{norm}), shall apply for Codec Mode Command / Request (MC', MR'):

MC'/MR'	THR_MC_Dn(MC')/ THR_MR_Dn(MR')	THR_MC_Up(MC')/ THR_MR_Up(MR')
CODEC_MODE_3	12,5 dB	$+ \infty$
CODEC_MODE_2	11,0 dB	15,0 dB
CODEC_MODE_1	$- \infty$	13,0 dB

c) step b) to d) are repeated for the settings given in step e)

Maximum Duration of Test

2 minutes

Expected Sequence in step c)

Step	Direction	Message	Comments
1	MS->SS	Channel Request	
2	SS->MS	Immediate Assignment	
3	MS->SS	Set Up SDCCH	MS indicates which speech codecs it can support
4	SS->MS	Assignment Command SDCCH	Network allocates TCH/AFS / TCH/AHS and allowed codec subset and adaptation thresholds
5	MS->SS	Assignment Complete	SS simulates good radio conditions (C/I_{norm}= 64dB)
A6	SS->MS	Codec Mode Command change	Codec Mode 3 is commanded by inband signalling
A7	MS->SS	Codec Mode Indication change	Codec Mode Indication shows current active mode in uplink, thus changed when mode changes
8	SS->MS	Codec Mode Command change	Codec Mode 2 is commanded by inband signalling
9	MS->SS	Codec Mode Indication change	Codec Mode 2 is indicated in inband signalling with first frame using Codec Mode 2
10	SS->MS	Codec Mode Command change	Codec Mode 1 is commanded by changing inband signal
11	MS->SS	Codec Mode Indication change	Codec Mode 1 is indicated in inband signalling with first frame using Codec Mode 1.
12	SS->MS	Codec Mode Command change	Codec Mode 2 is commanded by changing inband signal
13	MS->SS	Codec Mode Indication change	Codec Mode 2 is indicated in inband signalling with first frame using Codec Mode 2.
14	SS->MS	Codec Mode Command change	Codec Mode 3 is commanded by changing inband signal
15	MS->SS	Codec Mode Indication change	Codec Mode 3 is indicated in inband signalling with first frame using Codec Mode 3.
A16	SS->MS	Codec Mode Command change	Codec Mode 4 is commanded by changing inband signal
A17	MS->SS	Codec Mode Indication change	Codec Mode 4 is indicated in inband signalling with first frame using Codec Mode 4
18	SS->MS	CHANNEL RELEASE	

In TCH/AHS the Active Codec Set contains only three of four possible codecs, thus steps prefixing A are not implemented in this case.

Specific Message Contents

ASSIGNMENT COMMAND

Information Element	Value/remark
Assignment Command	In step 4: codec mode 4 selected (codec mode 3 for TCH/AHS) (ref: GSM 04.08 section 9.1.2)

Codec mode commands, downlink inband signalling

Information Element	Value/remark
Channel Mode to be used for uplink	In step 5: Codec Mode 4 commanded in AFS and Codec Mode 3 in AHS In step 6-7: Codec Mode 3 commanded In step 8-9: Codec Mode 2 commanded In step 10-11: Codec Mode 1 commanded In step 12-13: Codec Mode 2 commanded In step 14-15: Codec Mode 3 commanded In step 16-17: Codec Mode 4 commanded

Codec mode indications, **uplink inband signalling**

Information Element	Value/remark
Indicating Codec Mode currently used uplink	In step 5: Codec Mode 4 indicated in AFS and Codec Mode 3 in AHS In step 6: Codec Mode 4 indicated in AFS (step ignored in AHS) In step 7-8: Codec Mode 3 indicated In step 9-10: Codec Mode 2 indicated In step 11-12: Codec Mode 1 indicated In step 13-14: Codec Mode 2 indicated In step 15-16: Codec Mode 3 indicated In step 17: Codec Mode 4 indicated

26.16.2   Structured procedures / MS terminated call / early assignment / no initial codec mode

This test applies to mobiles supporting the AMR speech codec.

Note: this test is derived from the one described in section 26.12 and entitled: "Structured procedures / MS terminated call / early assignment"

26.16.2.1   Conformance requirement

1) In acceptance to a SETUP message indicating speech, the MS shall indicate and include in the CALL CONFIRMED message all the speech versions that it supports.

2) Upon receipt of the ASSIGNMENT COMMAND message specifying using CHx-FR or CHx/HR the Mobile Station continues a mobile terminating call establishment with early assignment of traffic channel

   a) by replying to the ASSIGNMENT command with an ASSIGNMENT COMPLETE message and,

   b) by continuing the call establishment by through connecting TCH in both directions if it supports immediate connect or by sending an ALERTING message otherwise,

3) The ASSIGNMENT command will not specify which of the codec modes the MS should use, but allow the handset to select the default codec mode

4) For speech calls, the mobile station shall attach the user connection at latest when sending the connect message, except if there is no compatible radio resource available at this time. In this case the attachment shall be delayed until such a resource becomes available.

CHx – identifies any of the Channel Codec mode

FR – full rate channel

HR – half rate channel

References:

GSM 04.08 sub-clauses: 9.12, 9.1.5

GSM 05.09 sub-clauses: 3.4

26.16.2.2 Test purpose

1) To verify that, in acceptance to a SETUP message indicating speech, the MS indicates and includes in the CALL CONFIRMED message all the speech versions that it supports.

2) To verify that upon receipt of the ASSIGNMENT COMMAND message specifying using CHx-FR or CHx/HR the Mobile Station continues a mobile terminating call establishment with early assignment of traffic channel

   a) by replying to the ASSIGNMENT command with an ASSIGNMENT COMPLETE message and ,

   b) by continuing the call establishment by through connecting TCH in both directions if it supports immediate connect or by sending an ALERTING message otherwise,

3) The ASSIGNMENT command will not specify which of the codec modes the MS should use, but allow the handset to select the default codec mode

4) To verify that for speech calls, the mobile station shall attach the user connection at latest when sending the connect message, except if there is no compatible radio resource available at this time. In this case the attachment shall be delayed until such a resource becomes available.

26.16.2.3 Method of Test

Initial Conditions

SS   1 cell, default parameters

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

Related PICS/PIXIT Statements

Way to indicate alerting.

Way to make the MS accept an incoming call after alerting.

Speech supported for MR version 1 and full rate version1.

Foreseen Final State of MS

"Idle, updated", with TMSI allocated.

Test Procedure

The following test is performed for both channel modes of the multi-rate codec, ie full rate and half rate:

A teleservice is selected that is supported by the MS; if the MS supports speech, the selected teleservice is speech. If necessary, the MS is configured for that teleservice.

The MS is paged and the resulting call is established. Having reached the active state, the MS is made to clear the call.

Maximum Duration of Test

3 minutes

Expected Sequence

This test is repeated for M=1,2,3,4 for an MS supporting different codec modes.

This test is repeated for HR and FR channel assignment.

Step	Direction	Message	Comments
1	SS->MS	PAGING REQUEST TYPE 1	Sent on the correct paging sub-channel
2	MS->SS	CHANNEL REQUEST	
3	SS->MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	PAGING RESPONSE	Message is contained in the SABM
5	SS->MS	AUTHENTICATION REQUEST	
6	MS->SS	AUTHENTICATION RESPONSE	SRES specifies correct value
7	SS->MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message
8	MS->SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
9	SS		SS starts ciphering
10	SS->MS	SETUP	
11	MS->SS	CALL CONFIRMED	
			If the MS supports an Immediate connection then branch A applies. If the MS doesn't support an immediate connection then branch B applies.
A12	MS->SS	CONNECT	sent on the old channel
A13	SS->MS	ASSIGNMENT COMMAND	SS allocates allowed subset codec modes, but does not identify a mode for immediate operation.
A14	MS->SS	ASSIGNMENT COMPLETE	
B12	SS->MS	ASSIGNMENT COMMAND	
B13	MS->SS	ASSIGNMENT COMPLETE	Sent on the new channel. SS allocates allowed subset codec modes, but does not identify a mode for immediate operation.
B14	MS->SS	ALERTING	
B15	MS		An alerting indication as defined in the PICS/PIXIT statement is given by the MS.
B16	MS		The MS is made to accept the call.
B17	MS->SS	CONNECT	
18	MS		The TCH shall be through connected by both directions in the dedicated mode, using the default codec mode specified.
19	SS->MS	CONNECT ACK	
20	MS		The MS is made to release the call.
21	MS->SS	DISCONNECT	
22	SS->MS	RELEASE	
23	MS->SS	RELEASE COMPLETE	
24	SS->MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Content

M=1

Assignment Command

Use octet 4 only to define the one and only allowed codec mode

ETSI

M=2

Assignment Command

Use octets 4,5 and 6 to define the 2 allowed codec modes and the threshold values

M=3

Assignment Command

Use octets 4,5,6 and 7 to define the 3 allowed codec modes and the threshold values

M=4

Assignment Command

Use octets 4,5,6,7 and 8 to define the 4 allowed codec modes and the threshold values

26.16.3 Structured procedures / MS originated call / late assignment / specified initial codec mode

This test applies to mobiles supporting the AMR speech codec.

Note: This test is derived from the one described in section 26.12 and entitled: "Structured procedures / MS terminated call / early assignment"

26.16.3.1 Conformance requirement

1) The MS shall indicate and include in the mobile originating SETUP for speech call all the speech versions that it supports.

2) Upon receipt of the ASSIGNMENT COMMAND message using full rate version 1,2 or 3 or half rate version 1, the Mobile Station starts a normal channel assignment procedure. It means that the MS initiates a local end release of link layer connections, disconnects the physical channels, commands the switching to the assigned channels and initiates the establishment of lower layer connections (this includes the activation of the channels, their connection and the establishment of the data links). After the main signalling link is successfully established, the MS returns an ASSIGNMENT COMPLETE message, specifying cause 'normal event', to the network on the main DCCH.

3,4) The call control entity of the Mobile Station in the "call initiated" state, in the "mobile originating call proceeding" state or in the "call delivered" state, shall, upon receipt of a CONNECT message:

- attach the user connection to the radio path;

- return a CONNECT ACKNOWLEDGE message.

CHx – identifies any of the Channel Codec mode

FR – full rate channel

HR – half rate channel

References:

GSM 04.08 sub-clauses: 9.12, 9.1.5

GSM 05.09 sub-clauses: 3.4

26.16.3.2 Test purpose

1) To verify that the MS indicates and includes in the mobile originating SETUP for speech call all the speech versions that it supports.

2) To verify that subsequently after receipt of an IMMEDIATE ASSIGNMENT message allocating an SDCCH, after completion of establishment of the main signalling link, after having sent a CM SERVICE REQUEST message, after having successfully performed authentication and cipher mode setting procedures, after having sent a SETUP message, after having received a CALL PROCEEDING message followed by an ALERTING message and an ASSIGNMENT COMMAND message allocating using speech full rate version 1, 2 or 3 or speech half rate version 1, the MS sends an ASSIGNMENT COMPLETE message. The ASSIGNMENT COMMAND message will also identify which codec mode the MS is allowed to use for the call, the threshold values and the initial codec mode for immediate use.

3) To verify that subsequently, after the suite of actions specified in test purposes 1 and 2, the MS after receiving a CONNECT message returns a CONNECT ACKNOWLEDGE message.

4) To verify that after the suite of actions specified in test purposes 1 and 2, the MS after receiving a CONNECT message attaches the user connection to the radio path. (This is checked by verifying that there is a point in time after transmission of the first L2 frame containing the (complete) CONNECT message, where the MS is sending

appropriate speech or data frames whenever it doesn't have to transmit or acknowledge an I frame on layer 2 of the FACCH.)

26.16.3.3 Method of Test

Initial Conditions

SS   1 cell, default parameters

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

Related PICS/PIXIT Statements

Way to indicate alerting.

Way to make the MS accept an incoming call after alerting.

Speech supported for MR version 1 and full rate version1.

Foreseen Final State of MS

The MS has a MO call in state U10, "active".

Test Procedure

The following test is performed for both channel modes of the multi-rate codec, ie full rate and half rate.

The MS is made to initiate a speech call. The call is established with a late assignment.

Maximum Duration of Test

3 minutes

Expected Sequence

This test is repeated for M=1,2,3,4 for an MS supporting different codec modes.

This test is repeated for HR and FR channel assignment.

Step	Direction	Message	Comments
1	MS		The "called number" is entered
2	MS->SS	CHANNEL REQUEST	
3	SS->MS	IMMEDIATE ASSIGNMENT	
4	MS->SS	CM SERVICE REQUEST	Message is contained in SABM
5	SS->MS	AUTHENTICATION REQUEST	
6	MS->SS	AUTHENTICATION RESPONSE	SRES specifies correct value
7	SS->MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message
8	MS->SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
9	SS		SS starts ciphering
10	SS->MS	SETUP	The MS indicates it supports the FR version 3 speech, and FR version 1, 2 speech and HR version 1 speech can be supported.
11	MS->SS	CALL CONFIRMED	
12	SS->MS	CALL PROCEEDING	
13	SS->MS	ALERTING	
14	MS		An alerting indication as defined in the PICS/PIXIT statement is given by the MS.
15	SS->MS	ASSIGNMENT COMMAND	SS allocates allowed subset codec modes, but does identifies a mode for immediate operation.
16	MS->SS	ASSIGNMENT COMPLETE	
17	MS->SS	CONNECT	
18	MS		The TCH shall be through connected by both directions in the dedicated mode, using the codec mode specified.
19	SS->MS	CONNECT ACK	

Specific Message Content

M=1

Assignment Command

Use octet 4 only to define the one and only allowed codec mode

M=2

Assignment Command

Use octets 4,5 and 6 to define the 2 allowed codec modes and the threshold values

M=3

Assignment Command
Use octets 4,5,6 and 7 to define the 3 allowed codec modes and the threshold values

M=4

Assignment Command

Use octets 4,5,6,7 and 8 to define the 4 allowed codec modes and the threshold values

26.16.4 Not used

26.16.5 AMR signalling / Handover / active call / successful case

A number of different parameters have been identified that may affect the call handover, these are:

- GSM900 or GSM1800

- Frequency hopping on, frequency hopping off

- Channel mode: TCH/F or TCH/H

- DTX on or DTX off

- Codec mode (TCH/F : CH1 – CH8 and TCH/H : CH9 – CH14)

This test applies to mobiles supporting the AMR speech codec.

This test applies only to MS supporting the R-GSM, E-GSM, P-GSM 900 or the GSM 1800 frequency band.

   Note: This test is derived from 26.12.2 – EFR Signalling/Handover/active call/successful case.

References:

TS GSM 04.08 sub-clauses: 3.4.3.1, 3.4.6, 9.1.2, 9.1.5, 9.1.15

26.16.5.1   Conformance requirements

The MS shall correctly apply the handover procedure in the non-synchronised case when :

- a call is in progress and,

- handover is performed from a TCH/F with/without frequency hopping towards a TCH/F with/without frequency hopping

- handover is performed from a cell with DTX on/off to a cell with DTX on/off

- handover is performed from a cell where the dedicated channel is TCH/F or H to a cell where the dedicated channel will be TCH/F or H

- handover is performed where the codec mode is set to any valid mode (dependant on the channel allocation) to a cell where codec mode will become any valid mode (dependant on the channel allocation)

26.16.5.2   Test Purpose

To ensure that the terminal handovers correctly, when the cells have different parameter settings. The call shall be established before the handover is made and verified that it is still active after the handover.

The tests below indicate the cell parameter settings from the cell that has the call established to the new cell parameter settings that will maintain the call.

26.16.5.3 Method of Test

Initial Conditions

MS   in call active state U10 on cell A.

SS   2 cells, A and B with same LAI, default parameters except:

GSM900 :

  Cell A has :   BCCH ARFCN = 20
          Cell Allocation = (10, 17, 20, 26, 34, 42, 45, 46, 52, 59, 66, 73, 74, 75, 76, 108, 114)

  Cell B has :   BCCH ARFCN = 40
          Cell Allocation = (14, 18, 22, 24, 30, 31, 38, 40, 60, 66, 73, 74, 75, 76, 108, 114)

The frame numbers of cells A and B shall be different by 100.

The timebase of cells A and B shall be such that the edges of their timeslots are not coincident at the antenna connector.

GSM1800 :

  Cell A has :   BCCH ARFCN = 747
          Cell Allocation = (734, 741, 747, 754, 759, 762, 766, 767, 773, 775, 779, 782, 791, 798, 829, 832, 844)

  Cell B has :   BCCH ARFCN = 764
          Cell Allocation = (739, 743, 746, 749, 756, 758, 761, 764, 771, 779, 782, 791, 798, 829, 832, 844)

The Cell Allocation of both Cell A and Cell B shall be coded using range 256 format.

The frame numbers of cells A and B shall be different by 100.

The timebase of cells A and B shall be such that the edges of their timeslots are not coincident at the antenna connector.

Related PICS/PIXIT Statements

Speech supported for MR version 1 and full rate version 1.

Support for state U10 of the Call Control protocol.

Support for the multi-rate speech version 1.

Type of Mobile Station (P-GSM or E-GSM or R-GSM or GSM1800).

Foreseen Final State of MS

The MS has a MO call in state U10, "active".

Maximum Duration of Test

10 minutes

Expected Sequence

The following test sequence shall be used for each of the test cases described below.

Step	Direction	Message	Comments
0	MS -> SS		The MS and SS are in the active state of a call on the channel described below.
1	SS -> MS	HANDOVER COMMAND	See Specific message contents
2	MS -> SS	HANDOVER ACCESS	Repeated on every burst of the uplink main DCCH until reception of PHYSICAL INFORMATION. Handover Reference as included in the HANDOVER COMMAND. If the HANDOVER COMMAND includes a starting time IE then the first HANDOVER ACCESS message shall be transmitted in the indicated frame (unless the indicated frame is not used by that channel, in which case the next frame used by that channel shall be used)
3	SS -> MS	PHYSICAL INFORMATION	Sent after reception of n HANDOVER ACCESS messages. See specific message contents.
4	MS -> SS	SABM	Sent without information field
5	SS -> MS	UA	
6	MS -> SS	HANDOVER COMPLETE	The message shall be ready to be transmitted before 'x' ms after the completion of step 3.
7	MS -> SS		The MS and SS are in the active state of a call on the TCH described below. The SS checks that the TCH is through connected in the correct mode.

Test Cases

Test 26.16.5.3.1

Cell Parameters	Cell A	Cell B
Frequency Hopping	ON	ON
900 or 1800	900	900
DTX	OFF	OFF
Traffic Channel	FR	FR
Speech Codec	AMR	AMR

Test 26.16.5.3.2

Cell Parameters	Cell A	Cell B
Frequency Hopping	ON	OFF
900 or 1800	900	900
DTX	ON	OFF
Traffic Channel	HR	FR
Speech Codec	AMR	AMR

Test 26.16.5.3.3

Cell Parameters	Cell A	Cell B
Frequency Hopping	ON	ON
900 or 1800	900	1800
DTX	ON	ON
Traffic Channel	FR	HR
Speech Codec	AMR	AMR

ETSI

Test 26.16.5.3.4

Cell Parameters	Cell A	Cell B
Frequency Hopping	OFF	ON
900 or 1800	900	1800
DTX	OFF	ON
Traffic Channel	HR	HR
Speech Codec	AMR	AMR

Test 26.16.5.3.5

Cell Parameters	Cell A	Cell B
Frequency Hopping	OFF	ON
900 or 1800	1800	1800
DTX	ON	ON
Traffic Channel	FR	FR
Speech Codec	AMR	AMR

Test 26.16.5.3.6

Cell Parameters	Cell A	Cell B
Frequency Hopping	ON	ON
900 or 1800	1800	900
DTX	ON	ON
Traffic Channel	FR	FR
Speech Codec	AMR	EFR

Note:

FR – indicates Full Rate traffic channel assigned for AMR use

HR – indicates Half Rate traffic channel assigned for AMR use

26.16.6 Structured procedures / emergency call

This test applies to mobiles supporting the AMR speech codec.

Note: this test is derived from section 26.15.5 - Structured procedures / emergency call

26.16.6.1 Conformance requirement

1) The MS in the "idle, updated" state, after a successful location update, the number 112 has been entered by user, 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 CKSN and TMSI , with CM Service Type "emergency call establishment".

3) Authentication and cipher mode setting shall be performed successfully.

4) After cipher mode setting acceptance by the network, the MS shall send an EMERGENCY SETUP message.

5) The AMR mobile station shall accept channel assignment to a TCH/F or TCH/H depending what the network signals to the mobile and also select the correct codec mode. The call shall be set up using the AMR codec.

6) After receipt of a CONNECT ACKNOWLEDGE message during correct establishment of the emergency call the TCH shall be through connected in both directions if an appropriate TCH is available.

7) The call shall be cleared correctly.

References:

TS GSM 04.08 sub-clauses: 3.4.3.1, 3.4.6, 9.1.2, 9.1.5

26.16.6.2 Test purpose

1) To verify that an MS supporting speech in the MM state "idle, updated", when made to call the number 112, sends a CHANNEL REQUEST message with establishment cause "emergency call".

2) To verify that after assignment of a dedicated channel the first layer message sent by the MS on the assigned dedicated channel is a CM SERVICE REQUEST message specifying the correct CKSN and TMSI, with CM Service Type "emergency call establishment".

3) To verify that authentication and cipher mode setting are performed successfully.

4) To verify that after cipher mode setting acceptance by the SS, the MS sends an EMERGENCY SETUP message.

5) To verify that the AMR mobile station shall both accept channel assignment to a TCH/F or TCH/H depending what the network signals to the mobile and also select the correct codec mode. The call shall be set up using the AMR codec.

6) To verify that subsequently the MS has through connected the TCH in both directions.

7) To verify the call is cleared correctly.

26.16.6.3 Method of Test

Initial Conditions

SS: 1 cell default parameters

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

Foreseen Final State of the MS

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

Related PICS/PIXIT Statements

Speech supported for MR version 1 and full rate version 1.

Test Procedure

The MS is made to initiate and emergency call. The call is established with late assignment. Having reached the active state, the call is cleared by the SS. This procedure is repeated so that the assignment is made with all the channel rates and speech versions supported by the MS.

Maximum Duration of Test

3 minutes

Expected Sequence

Step	Direction	Message	Comments
1	MS		The "called number" 112 is entered
2	SS->MS	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	SS->MS	AUTHENTICATION REQUEST	
6	MS->SS	AUTHENTICATION RESPONSE	SRES specifies correct value
7	SS->MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message
8	MS->SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
9	SS		SS starts ciphering
10	MS->SS	EMERGENCY SETUP	The MS indicates it which speech it supports.
11	SS->MS	CALL PROCEEDING	
12	SS->MS	ALERTING	
13	SS->MS	ASSIGNMENT COMMAND	See specific message contents.
14	MS->SS	ASSIGNMENT COMPLETE	
15	MS->SS	CONNECT	
16	SS->MS	CONNECT ACK	
17	MS		The TCH shall be through connected by both directions in the dedicated mode, using the codec mode specified.
18	SS->MS	DISCONNECT	
19	MS->SS	RELEASE	
20	SS->MS	RELEASE COMPLETE	
21	SS->MS	CHANNEL RELEASE	

Specific Message Contents:

ASSIGNMENT COMMAND

Mode of the first channel	
- Mode	Multi rate version 1

26.16.7 AMR Signalling / Directed Retry / Mobile Originated Call

This test is applicable to all MS which support AMR speech.

This test applies only to MS supporting the R-GSM, E-GSM, P-GSM 900 or the GSM 1800 frequency band.

NOTE: This test is derived from the one defined in section 26.12.6 and entitled "EFR Signalling / Directed Retry / Mobile Originated Call "

26.16.7.1 Conformance requirements

The MS shall correctly apply the Directed Retry procedure from SDCCH/8 (no frequency hopping) to TCH/AMR with frequency hopping in the non-synchronized case during call establishment. The call control entity of the Mobile Station in the "mobile originating call proceeding" state shall, upon receipt of a CONNECT message, attach the AMR speech connection to the radio path and return a CONNECT ACKNOWLEDGE message to the SS.

References

GSM 04.08, sections 3.4.4, 5.2.1.6. and 9.1.15.

GSM 04.13, section 5.2.6.2.

26.16.7.2 Test purpose

To test that, when the MS is ordered to perform a non-synchronized handover after the CALL PROCEED message, it continuously sends access bursts on the main DCCH until it receives a PHYSICAL INFORMATION message from the SS. To test that the MS correctly takes the values of the Timing Advance information element in the PHYSICAL INFORMATION message into account. To test that the MS activates the new channel correctly and transmits the HANDOVER COMPLETE message without undue delay. To test that the call control entity of the Mobile Station in the "mobile originating call proceeding" state, upon receipt of a CONNECT message, attaches the AMR speech connection to the radio path and returns a CONNECT ACKNOWLEDGE message to the SS.

26.16.7.3 Method of test

Initial Conditions

System Simulator:

2 cells A and B with same LAI, default parameters, except:

GSM 900:

Cell A has:

BCCH ARFCN = 20.

Cell Allocation = (10, 17, 20, 26, 34, 42, 45, 46, 52, 59, 66, 73, 74, 75, 76, 108, 114).

PLMN colour code, NCC = as defaults.

BS colour code, BCC = as defaults.

PLMN_PERM = 00001010.

Cell B has:

BCCH ARFCN = 40.

Cell Allocation = (14, 18, 22, 24, 30, 31, 38, 40, 60, 66, 73, 74, 75, 76, 108, 114).

PLMN colour code, NCC = 3.

BS colour code, BCC = 0.

Both cells send SYSTEM INFORMATION TYPE 1 messages containing the complete Cell Allocation of the cell, using bit map 0 format.

The timebase of Cells A and B shall be such that the edges of their timeslots are not coincident at the antenna connector.

A non-combined SDCCH is used.

GSM 1 800:

Cell A has:

BCCH ARFCN = 747.

Cell Allocation = (734, 741, 747, 754, 759, 762, 766, 767, 773, 775, 779, 782, 791, 798, 829, 832, 844).

PLMN colour code, NCC = as defaults.

BS colour code, BCC = as defaults.

PLMN_PERM = 00001010.

Cell B has:

BCCH ARFCN = 764.

Cell Allocation = (739, 743, 746, 749, 756, 758, 761, 764, 771, 779, 782, 791, 798, 829, 832, 844).

PLMN colour code, NCC = 3.

BS colour code, BCC = 0.

Both cells send SYSTEM INFORMATION TYPE 1 messages containing the complete Cell Allocation of the cell, using Range 512 format.

The timebase of Cells A and B shall be such that the edges of their timeslots are not coincident at the antenna connector.

A non combined SDCCH is used.

Mobile Station:

The MS is in the "idle, updated" state, with a TMSI allocated and camped on cell A.

Related PICS/PIXIT Statements

Speech supported for MR version 1 and full rate version1.

Support for MO calls.

Way to indicate alerting (only applicable if the MS supports the feature).

Type of MS (P-GSM 900 or EGSM or RGSM or GSM 1 800).

Foreseen Final State of the MS

"Idle, updated" with TMSI allocated and camped on cell B.

Test Procedure

The MS is made to initiate a speech call on Cell A. After the SS has sent the CALL PROCEEDING message the SS sends a HANDOVER COMMAND message, ordering the MS to switch to cell B. The MS shall then begin to send access bursts on the new DCCH to cell B. The SS observes the access bursts and after receiving n (n being arbitrarily chosen between values according to table 26.6-2 of section 26.6.5) access bursts, the SS sends one PHYSICAL INFORMATION message with an arbitrarily chosen Timing Advance. The MS shall activate the channel in sending and receiving mode. The MS shall establish a signalling link. The MS shall be ready to transmit a HANDOVER COMPLETE message before x ms after the end of the PHYSICAL INFORMATION message, but not before a UA frame has been sent by the SS. After the successful handover procedure the SS sends the ALERTING message. The correct alerting indication shall be given to the user (only applicable if the MS supports this feature). The SS sends the CONNECT message indicating that the call has been answered. The AMR speech channel shall be through connected in both directions. The MS shall send then the CONNECT ACKNOWLEDGE message as the response on the CONNECT message. Having reached the active state, the call is cleared by the SS.

The term "ready to transmit" is defined in GSM 04.13. The value of "**x**" depends upon the target channel and is specified in the specific message contents section.

Maximum Duration of Test

1 minute, including 30 seconds for any necessary operator actions.

Expected Sequence

Step	Direction	Message	Comments
1	--------	--------	A MO call is initiated on cell A.
2	MS -> SS	CHANNEL REQUEST	Establishment cause is "originating call and the network does not set the NECI bit to 1".
3	SS -> MS	IMMEDIATE ASSIGNMENT	See specific message contents.
4	MS -> SS	CM SERVICE REQUEST	CM Service Type = Mobile Originating Call Establishment.
5	SS -> MS	AUTHENTICATION REQUEST	
6	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
7	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
8	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
9	SS		SS starts ciphering.
10	MS -> SS	SETUP	AMR speech
11	SS -> MS	CALL PROCEEDING	
12	SS -> MS	HANDOVER COMMAND	See specific message contents.
13	MS -> SS	HANDOVER ACCESS	Repeated on every burst of the uplink main DCCH until reception of PHYSICAL INFORMATION. Handover Reference as included in the HANDOVER COMMAND.
14	SS -> MS	PHYSICAL INFORMATION	Sent after reception of n HANDOVER ACCESS message. Timing Advance is arbitrarily chosen.
15	MS -> SS	SABM	Sent without information field.
16	SS -> MS	UA	
17	MS -> SS	HANDOVER COMPLETE	This message shall be ready to be transmitted before "x" ms after the completion of step 14.
18	SS -> MS	ALERTING	
19	MS		Depending on the PICS, an alerting indication is given.
20	SS -> MS	CONNECT	
21	MS -> SS	CONNECT ACKNOWLEDGE	
22	MS		The AMR speech channel is through connected in both directions.
23	SS -> MS	DISCONNECT	
24	MS -> SS	RELEASE	
25	SS -> MS	RELEASE COMPLETE	
26	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

For GSM 900:

IMMEDIATE ASSIGNMENT

Information Element	value/remark
As default message contents except:	
Channel Description	Channel Description.
- Channel Type	SDCCH/8
- TDMA offset	As default message contents.
- Timeslot number	As default message contents.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	Single RF Channel.
- ARFCN	Chosen arbitrarily from the Cell Allocation of Cell A.

HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	3
- Base Station Colour Code	0
- BCCH Carrier Number	40
Channel Description	
- Channel Type	TCH/F + ACCHs
- TDMA offset	Chosen arbitrarily.
- Timeslot number	Chosen arbitrarily but not zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Frequency List IE.
- HSN	Zero (this gives cyclic hopping).
Synchronization Indication IE is not included	
Frequency list after time	
- Frequency List	uses bit map 0 to allocate the following 15 frequencies (14, 18, 22, 24, 30, 31, 38, 60, 66, 73, 74, 75, 76, 108, 114).
Channel Mode IE	Speech (multi rate version 1).

Step 17: "**x**" = 500.

GSM 1 800:

IMMEDIATE ASSIGNMENT

Information Element	value/remark
As default message contents except:	
Channel Description	Channel Description.
- Channel Type	SDCCH/8
- TDMA offset	As default message contents.
- Timeslot number	As default message contents.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	Single RF Channel.
- ARFCN	Chosen arbitrarily from the Cell Allocation of Cell A.

HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	3
- Base Station Colour Code	0
- BCCH Carrier Number	764
Channel Description	
- Channel Type	TCH/F + ACCHs
- TDMA offset	Chosen arbitrarily.
- Timeslot number	Chosen arbitrarily but not zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Frequency Short List IE.
- HSN	Zero (this gives cyclic hopping).
Synchronization Indication IE not included.	
Frequency Short List after time	
- Frequency Short List	Use Range 128 to encode the following 2 frequencies (746, 779).
Mode of First Channel	Speech (multi rate version 1).

Step 17: "**x**" = 500.

26.16.8 AMR Signalling / Directed Retry / Mobile Terminated Call

This test is applicable to all MS which support AMR speech.

This test applies only to MS supporting the R-GSM, E-GSM, P-GSM 900 or the GSM 1800 frequency band.

> NOTE: This test is derived from the one defined in section 26.12.7 and entitled "EFR Signalling / Directed Retry / Mobile Terminated Call "

26.16.8.1 Conformance requirements

The MS shall correctly apply the Directed Retry procedure from SDCCH/8 with frequency hopping to TCH/AMR with frequency hopping and starting time in the non-synchronized case during call establishment. The call control entity of the Mobile Station in the "call delivered" state shall, if the MS supports immediate connect, continue the call establishment by through-connecting the AMR traffic channel in both directions, or if the MS does not support immediate connect, send an ALERTING message. The MS indicates acceptance of a MT call by sending CONNECT.

The mobile station shall attach the user connection at latest when sending the CONNECT message, except if there is no compatible radio resource available at this time. In this case the attachment shall be delayed until such a resource becomes available.

References

GSM 04.08, sections 3.4.4, 5.2.2.5, 5.2.2.6, 5.2.2.9 and 9.1.15.

GSM 04.13, section 5.2.6.2.

26.16.8.2 Test purpose

To test that when the MS is ordered to perform a non-synchronized handover after the CALL CONFIRM message, it continuously sends access bursts on the main DCCH until it receives a PHYSICAL INFORMATION message from the SS. To test that the MS correctly takes the values of the Timing Advance information element in the PHYSICAL INFORMATION message into account. To test that the MS activates the new channel correctly and transmits the HANDOVER COMPLETE message without undue delay. To test that the call control entity of the Mobile Station in the "call delivered" state, if the MS supports immediate connect, continues the call establishment by through-connecting the AMR traffic channel in both directions, or if the MS does not support immediate connect, sends an ALERTING message. To test that the MS indicates acceptance of a MT call by sending CONNECT.

To test that the mobile station attaches the user connection at latest when sending the CONNECT message, except if there is no compatible radio resource available at this time. To test that in this case the attachment is delayed until such a resource becomes available.

26.16.8.3 Method of test

Initial Conditions

System Simulator:

2 cells A and B with same LAI, default parameters, except:

GSM 900:

Cell A has:

BCCH ARFCN = 20.

Cell Allocation = (10, 17, 20, 26, 34, 42, 45, 46, 52, 59, 66, 73, 74, 75, 76, 108, 114).

PLMN colour code, NCC = as defaults.

BS colour code, BCC = as defaults.

PLMN_PERM = 00001010.

Cell B has:

BCCH ARFCN = 40.

Cell Allocation = (14, 18, 22, 24, 30, 31, 38, 40, 60, 66, 73, 74, 75, 76, 108, 114).

PLMN colour code, NCC = 3.

BS colour code, BCC = 0.

Both cells send SYSTEM INFORMATION TYPE 1 messages containing the complete Cell Allocation of the cell, using bit map 0 format.

The timebase of Cells A and B shall be such that the edges of their timeslots are not coincident at the antenna connector.

A non-combined SDCCH is used.

GSM 1 800:

Cell A has:

BCCH ARFCN = 747.

Cell Allocation = (734, 741, 747, 754, 759, 762, 766, 767, 773, 775, 779, 782, 791, 798, 829, 832, 844).

PLMN colour code, NCC = as defaults.

BS colour code, BCC = as defaults.

PLMN_PERM = 00001010.

Cell B has:

BCCH ARFCN = 764.

Cell Allocation = (739, 743, 746, 749, 756, 758, 761, 764, 771, 779, 782, 791, 798, 829, 832, 844).

PLMN colour code, NCC = 3.

BS colour code, BCC = 0.

Both cells send SYSTEM INFORMATION TYPE 1 messages containing the complete Cell Allocation of the cell, using Range 512 format.

The timebase of Cells A and B shall be such that the edges of their timeslots are not coincident at the antenna connector.

A non combined SDCCH is used.

Mobile Station:

The MS is in the "idle, updated" state, with a TMSI allocated and camped on cell A.

Related PICS/PIXIT Statements

Speech supported for MR version 1 and full rate version 1.

Support for MT calls.

Way to indicate alerting (only applicable if the MS supports the feature).

Way to make the MS accept an incoming call after alerting.

Immediate connect supported (Y/N).

Type of MS (P-GSM 900 or EGSM or RGSM or GSM 1 800).

Foreseen Final State of the MS

"Idle, updated" with TMSI allocated and camped on cell B.

Test Procedure

The MS is paged on Cell A. The MS responds to the PAGING REQUEST message and establishes a mobile terminated speech call on Cell A. If the MS supports immediate connect, it continues the call establishment by through-connecting the traffic channel in both directions, or if the MS does not support immediate connect, it sends an ALERTING message. The MS indicates acceptance of a MT call by sending CONNECT.

After the MS has sent the CALL CONFIRMED message (if the MS supports immediate connect then the MS sends the CONNECT message after the CALL CONFIRMED message on the old channel) the SS sends a HANDOVER COMMAND message, ordering the MS to switch to cell B. The MS shall then begin to send access bursts on the new DCCH to cell B. The SS observes the access bursts and after receiving n (n being arbitrarily chosen between values according to table 26.6-2 of section 26.6.5) access bursts, the SS sends one PHYSICAL INFORMATION message with an arbitrarily chosen Timing Advance. The MS shall activate the channel in sending and receiving mode. The MS shall establish a signalling link. The MS shall be ready to transmit a HANDOVER COMPLETE message before x ms after the end of the PHYSICAL INFORMATION message, but not before a UA frame has been sent by the SS. After the successful handover procedure the MS sends the ALERTING message (if the MS runs the immediate connect procedure then the MS does not send an ALERTING message). The correct alerting indication shall be given to the user (only applicable if the MS supports the feature or if the MS is not using the immediate connect procedure). After the MS sent the CONNECT message the AMR speech channel shall be through connected in both directions. The SS sends then the CONNECT ACKNOWLEDGE message as the response on the CONNECT message. Having reached the active state, the call is cleared by the SS.

The term "ready to transmit" is defined in GSM 04.13. The value of "x" depends upon the target channel and is specified in the specific message contents section.

Maximum Duration of Test

1 minute, including 30 seconds for any necessary operator actions.

Expected Sequence

Step	Direction	Message	Comments
1	SS -> MS	PAGING REQUEST TYPE 1	Sent on the correct paging subchannel on cell A.
2	MS -> SS	CHANNEL REQUEST	
3	SS -> MS	IMMEDIATE ASSIGNMENT	See specific message contents.
4	MS -> SS	PAGING RESPONSE	Message is contained in SABM.
5	SS -> MS	AUTHENTICATION REQUEST	
6	MS -> SS	AUTHENTICATION RESPONSE	SRES specifies correct value.
7	SS -> MS	CIPHERING MODE COMMAND	SS starts deciphering after sending the message.
8	MS -> SS	CIPHERING MODE COMPLETE	Shall be sent enciphered. All following messages shall be sent enciphered.
9	SS		SS starts ciphering.
10	SS -> MS	SETUP	AMR speech.
11	MS -> SS	CALL CONFIRMED	
			If the MS supports immediate connect then branch A applies. If the MS does not support immediate connect then branch B applies
A12	MS -> SS	CONNECT	sent on the old channel
A13	SS -> MS	HANDOVER COMMAND	See specific message contents.
A14	MS -> SS	HANDOVER ACCESS	Repeated on every burst of the uplink main DCCH until reception of PHYSICAL INFORMATION. Handover Reference as included in the HANDOVER COMMAND. The first HANDOVER ACCESS message shall be transmitted in the indicated frame (unless the indicated frame is not used by that channel, in which case the next frame used by that channel shall be used).
A15	SS -> MS	PHYSICAL INFORMATION	Sent after reception of n HANDOVER ACCESS message. Timing Advance is arbitrarily chosen.
A16	MS -> SS	SABM	Sent without information field.
A17	SS -> MS	UA	
A18	MS -> SS	HANDOVER COMPLETE	This message shall be ready to be transmitted before "x" ms after the completion of step A15.
B12	SS -> MS	HANDOVER COMMAND	See specific message contents.
B13	MS -> SS	HANDOVER ACCESS	Repeated on every burst of the uplink main DCCH until reception of PHYSICAL INFORMATION. Handover Reference as included in the HANDOVER COMMAND. The first HANDOVER ACCESS message shall be transmitted in the indicated frame (unless the indicated frame is not used by that channel, in which case the next frame used by that channel shall be used).
B14	SS -> MS	PHYSICAL INFORMATION	Sent after reception of n HANDOVER ACCESS message. Timing Advance is arbitrarily chosen.
B15	MS -> SS	SABM	Sent without information field.
B16	SS -> MS	UA	
B17	MS -> SS	HANDOVER COMPLETE	This message shall be ready to be transmitted before "x" ms after the completion of step B14.
B18	MS -> SS	ALERTING	
B19	MS		Gives an alerting indication as defined in a PICS/PIXIT statement is given by the MS
B20	MS		The MS is made to accept the call in the way described in a PICS/PIXIT statement
B21	MS -> SS	CONNECT	
22	MS		The TCH/AMR channel shall be through connected in both directions.
23	SS -> MS	CONNECT ACKNOWLEDGE	
24	SS -> MS	DISCONNECT	
25	MS -> SS	RELEASE	
26	SS -> MS	RELEASE COMPLETE	
27	SS -> MS	CHANNEL RELEASE	The main signalling link is released.

Specific Message Contents

For GSM 900:

IMMEDIATE ASSIGNMENT

Information Element	value/remark
As default message contents except:	
L2 pseudo length	14 octets (11 + contents of the MA).
Channel Description	
- Channel Type	SDCCH/8
- TDMA offset	As default message contents.
- Timeslot number	Arbitrary value, but not zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Mobile Allocation.
- HSN	Chosen arbitrarily from the set (1,2,..63).
Mobile Allocation	
- Length	3 octets.
- Contents	Indicates only three frequencies: (73, 74, 75).

HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	3
- Base Station Colour Code	0
- BCCH Carrier Number	40
Channel Description	
- Channel Type	TCH/F + ACCHs
- TDMA offset	Chosen arbitrarily.
- Timeslot number	Chosen arbitrarily, but not Zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Frequency List IE.
- HSN	Chosen arbitrarily from the set (1,2,..63).
Frequency List after time	
- Frequency List	use bit map 0 to allocates the following 12 frequencies: (14, 18, 22, 24, 60, 66, 73, 74, 75, 76,108, 114).
Synchronization Indication	
- Report Observed Time Difference	Shall not be included.
- Synchronization Indication	"Non synchronized".
- Normal Cell Indication	Ignore out of range timing advance.
Mode of First Channel	Speech (multi rate version 1).
Starting Time	Indicates the frame number of cell B. that will occur approximately 1,1 seconds (238 frames have elapsed) after the HANDOVER COMMAND is sent by cell A.

Step A 18 / B 17: "x" = 750.

GSM 1 800:

IMMEDIATE ASSIGNMENT

Information Element	value/remark
As default message contents except:	
L2 pseudo length	14 octets (11 + contents of the MA).
Channel Description	Channel Description.
- Channel Type	SDCCH/8
- TDMA offset	As default message contents.
- Timeslot number	Arbitrary value but not zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Mobile Allocation.
- HSN	Chosen arbitrarily from the set (1,2,..63).
Mobile Allocation	
- Length	3octets.
- Contents	Indicates only three frequencies: (773, 775, 779).

HANDOVER COMMAND

Information Element	value/remarks
As default message contents, except:	
Cell Description	
- Network Colour Code	3
- Base Station Colour Code	0
- BCCH Carrier Number	764
Channel Description	
- Channel Type	TCH/F + ACCHs
- TDMA offset	Chosen arbitrarily.
- Timeslot number	Chosen arbitrarily but not Zero.
- Training Sequence Code	Chosen arbitrarily.
- Hopping	RF hopping channel.
- MAIO	Chosen arbitrarily from the set (0, 1 to N-1), where N is the number of frequencies encoded in the Frequency List IE.
- HSN	Chosen arbitrarily from the set (1,2,..63).
Frequency List after time	
- Frequency List	Use Range 1024 to allocate the following 12 frequencies: (749, 758, 761, 764, 771, 779, 782, 791, 798, 829, 832, 844).
Synchronization Indication	
- Report Observed Time Difference	Shall not be included.
- Synchronization Indication	"Non synchronized".
- Normal Cell Indication	Ignore out of range timing advance.
Mode of First Channel	Speech (multi rate version 1)
Starting Time	Indicates the frame number of cell B that will occur approximately 1.1 seconds (238 frames have elapsed) after the HANDOVER COMMAND is sent by cell A..

Step A18 / B17: "x" = 750.

26.16.9 Default contents of layer 3 messages for AMR signalling tests

Same as section 26.6.14 for GSM900 MS, 26.6.15 for DCS1800 MS, 26.6.16 for GSM 450 MS and 26.6.17 for GSM 480.