29 Testing of bearer services

29.1 General

In GSM 07.01, section 2 the reference configurations for access to the data services of a GSM PLMN are described. For testing purposes only the following classifications are used:

- MT2 configuration (Um- and R-interface available for testing)

- Configurations (only Um-interface available for testing) where it is possible to enable the MS to issue or accept a data call and send data over the Um-interface. An MT1 connected to an ISDN TE belongs to this type.

  For efficient testing it is essential that such configurations have some means to specifically activate every function towards the Um-interface the MS will perform during operation.

  The correctness of the data bits transferred to the Um-interface will not be tested in these configurations. However the correctness of the GSM 04.21 frames sent by the MS will be tested.

Testing the S-interface for the MT1 configuration is for further study.

For some tests it is of no importance whether the call is MO or MT. However, there might be configurations allowing the call to be established only from one side. In this case the appropriate actions shall be taken to establish the call.

In all other cases the data call shall be set up by the SS (i.e. MT) with an appropriate BC-IE which is supported by the MS.

At the beginning of all tests the MS shall be in the idle updated state.

29.2 Testing of transparent data services

During all the tests the GSM 04.21 frames received as output of the channel coder in the SS shall be checked for correctness against GSM 04.21; this means checking that:

- S bits are coded as zeroes unless otherwise specified;

- the E bits have the correct value (for the synchronous services);

- the data bits correctly include the start and stop bits (for the asynchronous services).

29.2.1 Verification of synchronization

29.2.1.1 Definition and applicability

This test applies to Mobile Stations supporting data services in transparent mode.

29.2.1.2 Conformance requirement

A Mobile Stations in MT2 configuration has to comply with all requirements whilst for other configurations some of the requirements are not relevant. These restrictions are explicitly indicated in subclause 29.2.1.5.

29.2.1.3 Test purpose

This test verifies the correct synchronization procedure of user data and status information which are mapped on modified CCITT V.110 frames (as per GSM 04.21).

As V-series interfaces are supported in full duplex mode, it will test the capability to synchronize these frames in the direction from the TAF to the IWF and vice versa.

29.2.1.4 Method of test

The test shall be carried out under ideal radio conditions for all bearer services and user rates in transparent mode that are supported by the MS in case of mobile originated and terminated calls and in-call modification. The setting of Bearer Capability Information Elements in signalling messages sent to the MS by the SS must be supported by the MS for the bearer service(s) to be tested.

NOTE 1: Since "steady state" is implementation dependent, there is no means to define a test "steady state detected". However, the whole testing procedure is limited to 1s. This includes an implicit upper time limit for the MS to detect a steady state. A MS failing this test is highly estimated to never detect a steady state under real radio conditions.

NOTE 2: ti, as used in the description of the test procedures, are points of time, not timers.

29.2.1.4.1 Procedure for Mobile Originated Calls

a) The MS is connected to the System Simulator at the Um interface and to the LTE using the appropriate R interface in case of MT2 only.

b) The MS is configured for data transmission. In the case of MT2 configurations, the LTE shall set the signalling lines of the R interface Ct 105, Ct 108.2 for V-series interface to ON.

c) A mobile originated call shall be set up.

d) At the reception of the SETUP message sent by the MS the SS shall send a CONNECT message and starts sending "1/OFF". t1 is at the completion of the CONNECT message.

e) The reception of "1/OFF" at the SS side (see table 29-1) defines t2. t2 will be reset at the reception of again "1/OFF" after an interruption of continuous "1/OFF" pattern.

f) The SS checks bits S1, S3, S6 and S8 of the modified CCITT V.110 frames (as described in GSM 04.21). Let t3 be the time when all four bits change from OFF to ON (i.e. if t<t3, (S1,S3,S6,S8) <> (0,0,0,0) and t>=t3,(S1,S3,S6,S8) = (0,0,0,0)).

29.2.1.4.2 Procedure for Mobile Terminated Calls

a) The MS is connected to the System Simulator at the Um interface and to the LTE using the appropriate R interface in case of MT2 only.

b) The MS is configured for data transmission. In the case of MT2 configurations, The LTE shall set the signalling lines of the R interface Ct. 105, Ct 108.2 for V-series interface to ON.

c) A mobile terminated call shall be set up.

d) At the reception of CONNECT the SS sends CONNECT ACKNOWLEDGE. t1 is at the completion of the CONNECT ACKNOWLEDGE message.

e) The reception of "1/OFF" at the SS side (see table 29-1) defines t2. t2 will be reset at the reception of again "1/OFF" after an interruption of continuous "1/OFF" pattern.

f) The SS checks bits S1, S3, S6 and S8 of the modified CCITT V.110 frames (as described in GSM 04.21). Let t3 be the time when all four bits change from OFF to ON (i.e. if t<t3, (S1,S3,S6,S8) <> (0,0,0,0) and t>=t3,(S1,S3,S6,S8) = (0,0,0,0)).

29.2.1.4.3 Procedure for In Call Modification

a) The MS is connected to the System Simulator at the Um interface and to the LTE using the appropriate R interface in case of MT2 only.

b) The MS is configured for data transmission. In the case of MT2 configurations, the LTE shall set the signalling lines of the R interface Ct. 105, Ct 108.2 for V-series interface to ON.

c) A speech call shall be established with a SETUP message containing two bearer capabilities for speech and the bearer service to be tested.

d) The MS shall start the ICM procedure with a bearer capability information element supporting the bearer service to be tested.

e) At the reception of the MODIFY message sent by the MS the SS shall send a CHANNEL MODE MODIFY message.

f) At the reception of the CHANNEL MODE MODIFY ACKNOWLEDGE message the SS shall send a MODIFY COMPLETE message. t1 is at the completion of the MODIFY COMPLETE message.

g) The reception of "1/OFF" (see table 29-1) defines t2. t2 will be reset at the reception of again "1/OFF" after an interruption of continuous "1/OFF" pattern.

h) The SS checks bits S1, S3, S6 and S8 of the modified CCITT V.110 frames (as described in GSM 04.21). Let t3 be the time when all four bits change from OFF to ON (i.e. if $t<t3$, $(S1,S3,S6,S8) <> (0,0,0,0)$ and $t>=t3$, $(S1,S3,S6,S8) = (0,0,0,0)$).

29.2.1.5   Test requirements

29.2.1.5.1   Test requirements for Mobile Originated Calls

1) After step b) Cts 106, 107, 109 must be in the "OFF" condition, dataline 104 shall be set to "1".

2) At t1 + 500 ms Ct 107 must still be in the "OFF" condition.

3) Between t1 + 500ms and t1 + 1000ms Ct 107 must switch to the "ON" condition. This indicates successful synchronization of TAF towards IFE.

4) Between t2 and t3 the SS must receive continuous "1/OFF" frames.

5) The time between t2 and t3 must be more than 450ms.

6) At t1 +1000ms the SS must check GSM 04.21 frames sent by the MS with SA and SB bits (i.e. bits S1, S3, S4, S6, S8 and S9) set to "ON". This indicates successful synchronization of IFE towards TAF. At this point of time the whole synchronization procedure has been completed successfully.

NOTE 3: If the MS is not MT2, only requirements 4 to 6 apply.

29.2.1.5.2   Test requirements for Mobile Terminated Calls

1) After step b) Cts 106, 107, 109 must be in the "OFF" condition, dataline 104 shall be set to "1".

2) At t1 + 500 ms Ct 107 must still be in the "OFF" condition.

3) Between t1 + 500 ms and t1 + 1000 ms Ct 107 must switch to the "ON" condition. This indicates successful synchronization of TAF towards IFE.

4) Between t2 and t3 the SS must receive continuous "1/OFF" frames.

5) The time between t2 and t3 must be more than 450 ms.

6) At t1 +1000 ms the SS must check GSM 04.21 frames sent by the MS with SA and SB bits (i.e. bits S1, S3, S4, S6, S8 and S9) set to "ON". This indicates successful synchronization of IFE towards TAF. At this point of time the whole synchronization procedure has been completed successfully.

NOTE 4: If the MS is not MT2, only requirements 4 to 6 apply.

29.2.1.5.3   Test requirements for In Call Modification

1) After step b) Cts 106, 107, 109 must be in the "OFF" condition, dataline 104 shall be set to "1".

2) At t1 + 500 ms Ct 107 must still be in the "OFF" condition.

3) Between t1 + 500 ms and t1 + 1 000 ms Ct 107 must switch to the "ON" condition. This indicates successful synchronization of TAF towards IFE.

4) Between t2 and t3 the SS must receive continuous "1/OFF" frames.

5) The time between t2 and t3 must be more than 450 ms.

6) At t1 +1 000 ms the SS must check GSM 04.21 frames sent by the MS with SA and SB bits (i.e. bits S1, S3, S4, S6, S8 and S9) set to "ON". This indicates successful synchronization of IFE towards TAF. At this point of time the whole synchronization procedure has been completed successfully.

NOTE 5: If the MS is not MT2, only requirements 4 to 6 apply.

Table 29-1: Definition of synchronization pattern "1/OFF"

Synch-Frame							Data-Frame						
1	1	1	1	1	1	1	D1	D2	D3	D4	D5	D6	S1
1	1	1	1	1	1	1	D7	D8	D9	D10	D11	D12	X
1	1	1	1	1	1	1	D13	D14	D15	D16	D17	D18	S3
1	1	1	1	1	1	1	D19	D20	D21	D22	D23	D24	S4
1	1	1	1	1	1	1	E4	E5	E6	E7	D25	D26	S27
1	1	1	1	1	1	1	D28	D29	D30	S6	D31	D32	S33
1	1	1	1	1	1	1	D34	D35	D36	X	D37	D38	S39
1	1	1	1	1	1	1	D40	D41	D42	S8	D43	D44	S45
1	1	1	1				D46	D47	D48	S9			

GSM 04.21 60 bits frame

Synch-Frame								Data-Frame							
1	1	1	1	1	1	1	1	D1	D2	D3	S1	D4	D5	D6	X
1	1	1	1	1	1	1	1	D7	D8	D9	S3	D10	D11	D12	S4
1	1	1	1	1	1	1	1	E4	E5	E6	E7	D13	D14	D15	S6
1	1	1	1	1	1	1	1	D16	D17	D18	X	D19	D20	D21	S8
1	1	1	1	1				D22	D23	D24	S9				

GSM 04.21 36 bits frame

29.2.2 Filtering of channel control information for transparent BCs

29.2.2.1 Definition and applicability

This test is only applicable to the MT2 configuration.

29.2.2.2 Conformance requirement

An MS supporting data services shall decode and filter channel control information received over the Um-interface.

1 GSM 04.21, section 7;

2 GSM 07.01, section 8.2.2;

3 GSM 07.02, section 3.2.1 (for asynchronous bearer services only);

4 GSM 07.03, sections 4.2.1 and 4.2.2 (for synchronous bearer services only).

29.2.2.3 Test purpose

The purpose of this test is to verify the correct decoding and filtering of channel control information from the GSM 04.21 frames to the V.24/X.21 interface circuits. The tests apply after synchronization has been completed.

29.2.2.4   Method of test

The Test shall be carried out for all user data rates supported by the MS (see below) and the circuits CT106 (V.24) (interface circuit bit X) and CT109 (V.24) (interface circuit bit SB) and I (X.21) (S-bits). The test shall be carried out only for those frame formats and circuits which are supported by the MS. The test is to be repeated for all circuits.

Let T(ON-OFF) and T(OFF-ON) be the timers to integrate the ON-OFF and the OFF-ON transition respectably for the circuit to be tested as stated in GSM 07.01, section 8.2.2.

Procedure:

a) A data call shall be set up between the SS and the MS with a combination of BCIEs (see below) supported by the MS. The interface circuit bit(s) in the GSM 04.21 frame shall be set to OFF. The next step shall be entered 6 s after CT107 has been set to ON by the MS.

b) The SS shall set the interface circuit bit(s) to continuously ON, wait half of T(OFF-ON) and then set the interface circuit bit(s) again to continuously OFF. The SS shall wait 6 s before entering the next step.

c) The SS shall set the interface circuit bit(s) to continuously ON, wait twice T(OFF-ON) and then set the interface circuit bit(s) again to continuously OFF. The SS shall wait 6 s before entering the next step.

d) The SS shall set interface circuit bit(s) to continuously ON and wait 6 s before entering the next step

e) The SS shall set the interface circuit bit(s) to continuously OFF, wait half of T(ON-OFF) and then set the interface circuit bit(s) again to continuously ON. The SS shall wait 6 s before entering the next step.

f) The SS shall set the interface circuit bit(s) to continuously OFF, wait twice T(ON-OFF) and then set the interface circuit bit(s) again to continuously ON. The SS shall wait 6 s before entering the next step.

29.2.2.5   Test requirements

1) After step a) the interface circuit at the R-interface shall be OFF.

2) During step b) the interface circuit at the R-interface shall not change.

3) During step c) the interface circuit at the R-interface shall change to ON and then again to OFF.

4) After step d) the interface circuit at the R-interface shall be ON.

5) During step e) the interface circuit at the R-interface shall not change.

6) During step f) the interface circuit at the R-interface shall change to OFF and then again to ON.

29.2.2.6   BCIE

The following combinations shall be considered (ref. GSM 07.01, annex 2):

a) User Rate = 9,6 kbit/s;

b) User Rate = 4,8 kbit/s;

c) User Rate = 2,4 kbit/s;

d) User Rate = 1,2 kbit/s;

e) User Rate = 1 200/75 bit/s (only with asynchronous Bearer Services);

f) User Rate = 300 bit/s (only with asynchronous Bearer Services).

The remaining parameters of the BCIE and the channel type (FR/HR) shall be set to a value supported by the MS.

29.2.3 Correct Terminal Compatibility Decision

29.2.3.1 Negotiation of Radio Channel Requirement (RCR)

29.2.3.1.1 Test purpose

To verify that the MS ignores the RCR field in a mobile terminating setup and negotiates according to its capabilities and to the service requested. A Dual Rate support MS shall accept the channel rate chosen be the network in the ASSIGNMENT COMMAND message.

29.2.3.1.2 Initial conditions

For an MS with an external interface, the interface shall be setup in such a way that the MS is able to successfully receive the call for the service in question. The manufacturer shall state how this is done in a PIXIT statement. The same applies to features which must be activated by MMI before an incoming call can be accepted.

29.2.3.1.3 Test method

a) The SS transmits a SETUP message containing a BC-IE among those declared as supported by the MS and with the RCR field set to "01".

b) The SS sends a ASSIGNMENT COMMAND message with a channel type set to "Full Rate" unless the CALL CONFIRM message indicates "dual rate mobile station/full rate preferred". In that case, the channel type is set to "Half Rate".

c) The call is released and steps a) and b) are repeated with RCR field set to "00".

d) The call is released and steps a) and b) are repeated with RCR field set to "10".

e) The call is released and steps a) and b) are repeated with RCR field set to "11".

29.2.3.1.4 Test requirements

1) After step a), the MS shall send a CALL CONFIRM message. If present, the BC-IE shall be coded according to GSM 07.01. If any other parameters than those listed below have different values than those of the BC-IE included in the SETUP, then the test shall be failed:

   - Number of stop bits, number of data bits, parity;

   - Connection Element, Structure, Intermediate rate, User Information Layer 2 Protocol, Modem Type, NIRR;

   - Radio Channel Requirement.

2) After step b), the MS shall answer to the ASSIGNMENT COMMAND message with an ASSIGNMENT COMPLETE message.

29.2.3.2 Negotiation of Connection Element (CE)

29.2.3.2.1 Test purpose

To verify that the MS accepts a CE equal to "Both, Transparent Preferred" or "Both Non Transparent Preferred" and indicates its choice in the CALL CONFIRM message.

29.2.3.2.2 Initial condition

For an MS with an external interface, the interface shall be setup in such a way that the MS is able to successfully receive the call for the service in question. The manufacturer shall state how this is done in a PIXIT statement. The same applies to features which must be activated by MMI before an incoming call can be accepted.

29.2.3.2.3   Test method

a) The SS transmits a SETUP message containing a BC-IE among those declared as supported by the MS and with the CE field set to "Both Transparent Preferred". The RCR parameter shall be set to "Full Rate". The UIL2P is not included (i.e. octet 7 is absent). The NIRR is set to "no meaning" (i.e. 0). The IR is set to "16 kbit/s". The modem type is any according to declared capabilities. The user rate is any according to declared capabilities and modem type.

b) The call is released and step a) is repeated with CE field set to "Both Non Transparent Preferred".

29.2.3.2.4   Test requirements

After step a), the MS shall send a CALL CONFIRM message. The BC-IE shall be present and shall be coded according to GSM 07.01 and shall correspond to a Bearer Service or Teleservice supported by the MS. The CE shall be set to either "Transparent" or "Non Transparent" If any other parameters than those listed bellow have different values than those of the BC-IE included in the SETUP, then the test shall be failed:

- number of stop bits, number of data bits, parity;

- Connection Element, Structure, Intermediate rate, User Information Layer 2 Protocol, Modem Type, NIRR;

- Radio Channel Requirement.

29.2.3.3   Negotiation of Number of Stop Bits, Number of Data bits, and Parity

29.2.3.3.1   Test purpose

To verify that the MS accepts any value for the parameters Number of Stop Bits, Number of Data bits, and Parity in a mobile terminating Setup and negotiates according to its capabilities and to the service requested.

This test only applies to Mobile Stations supporting asynchronous services.

29.2.3.3.2   Initial condition

For an MS with an external interface, the interface shall be setup in such a way that the MS is able to successfully receive the call for the service in question. The manufacturer shall state how this is done in a PIXIT statement. The same applies to features which must be activated by MMI before an incoming call can be accepted.

29.2.3.3.3   Test method

a) The SS transmits a SETUP message containing a BC-IE among those declared as supported by the MS and corresponding to an asynchronous Bearer Service, and with the Number of Stop Bits (NSB) field set to "1 bit", the Number of Data Bits (NDB) field set to "8 bits", and the Parity field set to "none".

b) The call is released and step a) is repeated with the Number of Stop Bits (NSB) field set to "2 bit", the Number of Data Bits (NDB) field set to "7 bits", and the Parity field set to "odd".

29.2.3.3.4   Test requirements

After steps a) and b), the MS shall send a CALL CONFIRMED message. If present, the BC-IE shall be coded according to GSM 07.01 and shall correspond to a Bearer Service supported by the MS. If any other parameters than those listed bellow have different values than those of the BC-IE included in the SETUP, then the test shall be failed:

- Number of stop bits, number of data bits, parity;

- Connection Element, Structure, Intermediate rate, User Information Layer 2 Protocol, Modem Type, NIRR;

- Radio Channel Requirement.

29.2.3.4 Negotiation of Modem Type

29.2.3.4.1 Test purpose

To verify that the MS accepts the value "autobauding type 1" for the parameter Modem Type in a mobile terminating Setup and negotiates according to its capabilities and to the service requested.

This test only applies to Mobile Stations supporting non transparent services.

> NOTE 6: It is not clear if the MS should also accept any possible value for the Modem Type field.

29.2.3.4.2 Initial condition

For an MS with an external interface, the interface shall be setup in such a way that the MS is able to successfully receive the call for the service in question. The manufacturer shall state how this is done in a PIXIT statement. The same applies to features which must be activated by MMI before an incoming call can be accepted.

29.2.3.4.3 Test method

a) The SS transmits a SETUP message containing a BC-IE among those declared as supported by the MS and corresponding to a non transparent Bearer Service (the Connection Element field is coded "Non transparent"), and with the Modem Type field set to "autobauding type 1".

b) The call is released and step a) is repeated with the same BC in the SETUP message, but with the Connection Element set to "both, non-transparent preferred".

29.2.3.4.4 Test requirements

After steps a) and b), the MS shall send a CALL CONFIRMED message. If present, the BC-IE shall be coded according to GSM 07.01 and shall correspond to a Bearer Service or Teleservice supported by the MS. If any other parameters than those listed bellow have different values than those of the BC-IE included in the SETUP, then the test shall be failed:

- Number of stop bits, number of data bits, parity;

- Connection Element, Structure, Intermediate rate, User Information Layer 2 Protocol, Modem Type, NIRR;

- Radio Channel Requirement.

29.2.3.5 Negotiation of Intermediate Rate

29.2.3.5.1 Test purpose

To verify that the MS responds correctly to a request for a negotiation of the Intermediate Rate parameter in a mobile terminating Setup and negotiates according to its capabilities and to the service requested.

This test only applies to Mobile Stations supporting non transparent services with a full rate channel at a user rate of 4,8 kbit/s or lower.

> NOTE 7: The MS may support these services with a 6 Kbit/s or (non exclusive) 12 Kbit/s radio interface rate.

29,2,3.5.2 Initial condition

For an MS with an external interface, the interface shall be setup in such a way that the MS is able to successfully receive the call for the service in question. The manufacturer shall state how this is done in a PIXIT statement. The same applies to features which must be activated by MMI before an incoming call can be accepted.

29.2.3.5.3 Test method

a) The SS transmits a SETUP message containing a BC-IE among those declared as supported by the MS and corresponding to a non transparent Bearer Service (the Connection Element field is coded "Non transparent") with the user rate lower to or equal 4,8 kbit/s, and with the NIRR field set to "No meaning". The RCR field is set to "full rate", and the Intermediate Rate field is set to "16 kbit/s".

b) The call is released and step a) is repeated with the same BC in the SETUP message, but with the Connection Element set to "both, non-transparent preferred".

c) The call is released and steps a) and b) are repeated with the NIRR field of the SETUP message set to "6 kbit/s".

29.2.3.5.4 Test requirements

1) After steps a), b) and c), the MS shall send a CALL CONFIRMED message. If present, the BC-IE shall be coded according to GSM 07.01 and shall correspond to a Bearer Service or Teleservice supported by the MS. If any other parameters than those listed bellow have different values than those of the BC-IE included in the SETUP, then the test shall be failed:

   - Number of stop bits, number of data bits, parity;

   - Connection Element, Structure, Intermediate rate, User Information Layer 2 Protocol, Modem Type, NIRR;

   - Radio Channel Requirement.

2) If the BC-IE is present in the CALL CONFIRMED message after step c) and if the Connection Element field contains the value "non transparent", the Intermediate Rate field shall indicate:

   - 8 kbit/s if the NIRR field is set to "6 kbit/s";

   - 16 kbit/s if the NIRR field is set to "no meaning".

29.2.3.6 Negotiation of User Information Layer 2 Protocol

29.2.3.6.1 Test purpose

To verify that the MS accepts any value (including the absence of) the UIL2P parameter in a mobile terminating Setup and negotiates according to its capabilities and to the service requested.

This test only applies to Mobile Stations supporting asynchronous bearer services in non transparent mode.

29.2.3.6.2 Initial condition

For an MS with an external interface, the interface shall be setup in such a way that the MS is able to successfully receive the call for the service in question. The manufacturer shall state how this is done in a PIXIT statement. The same applies to features which must be activated by MMI before an incoming call can be accepted.

29.2.3.6.3 Test method

a) The SS transmits a SETUP message containing a BC-IE among those declared as supported by the MS and corresponding to a non transparent Bearer Service (the Connection Element field is coded "Non transparent") and with no UIL2P parameter (i.e. octet 7 of the BC IE is absent).

b) The call is released and step a) is repeated with the same BC in the SETUP message, but with the value "ISO6429, codeset 0 (DC1/DC3)" in the UIL2P parameter.

c) The call is released and step b) is repeated with the same BC in the SETUP message, but with the value "COPnoFLCt" in the UIL2P parameter.

d) The call is released and steps a), b) and c) are repeated with the same BC in the SETUP message, but with the Connection Element set to "both, non-transparent preferred".

29.2.3.6.4 Test requirements

1) After steps a), b) and c), the MS shall send a CALL CONFIRMED message. If present, the BC-IE shall be coded according to GSM 07.01 and shall correspond to a Bearer Service or Teleservice supported by the MS. If any other parameters than those listed bellow have different values than those of the BC-IE included in the SETUP, then the test shall be failed:

   - Number of stop bits, number of data bits, parity;

   - Connection Element, Structure, Intermediate rate, User Information Layer 2 Protocol, Modem Type, NIRR;

   - Radio Channel Requirement.

2) If the BC-IE is present in the CALL CONFIRMED message, and if the Connection Element is set to "transparent", octet 7 (containing the UIL2P parameter) shall be absent.

29.2.3.7 Negotiation between TS 61 and TS 62: Mobile Originated call

29.2.3.7.1 Test purpose

To verify that the MS accepts a negotiation from TS 61 to TS 62.

This test only applies to Mobile Stations supporting TS 61.

29.2.3.7.2 Initial condition

For an MS with an external interface, the interface shall be setup in such a way that the MS is able to successfully set up a call for TS 61. The manufacturer shall state how this is done in a PIXIT statement. The same applies to features which must be activated by MMI before an outgoing call can be set up.

29.2.3.7.3 Test method

a) The MS is made to set up a call for TS 61. If the MS supports it, the first phase of the call is speech.

b) The SS responds to the SETUP message with a CALL PROCEEDING message containing a BC-IE coded according to GSM 07.01 and corresponding to TS 62.

c) The SS sends an ALERTING message followed by a CONNECT message.

d) If the MS supports it, steps a), b) and c) are repeated with a call setup for TS 61 with the first phase of the call being fax.

29.2.3.7.4 Test requirements

1) After step b), the MS shall accept the call (i.e. it shall not reject the call with a DISCONNECT message).

2) After step c), the MS shall answer with a CONNECT ACKNOWLEDGE message.

29.2.3.8 Negotiation between TS 61 and TS 62: Mobile Terminated call

29.2.3.8.1 Test purpose

To verify that an MS that does not support TS 61 accepts a Mobile Terminated call setup request for TS 61 and negotiates the demand to TS 62.

This test only applies to Mobile Stations supporting TS 62 and not supporting TS 61.

29.2.3.8.2 Initial condition

For an MS with an external interface, the interface shall be setup in such a way that the MS is able to successfully receive the call for the service in question. The manufacturer shall state how this is done in a PIXIT statement. The same applies to features which must be activated by MMI before an incoming call can be accepted.

29.2.3.8.3 Test method

a) The SS transmits a SETUP message containing two BC-IEs: the first BC shall indicate speech, the second BC shall indicate fax group 3.

b) The call is released, and the SS transmits a SETUP message containing two BC-IEs: the first BC shall indicate fax group 3, the second BC shall indicate speech.

29.2.3.8.4 Test requirements

After steps a) and b), the MS shall send a CALL CONFIRMED message with one and only one BC-IE. The BC-IE shall be coded according to GSM 07.01 and shall correspond to TS 62.

29.2.4 Data Rate Adaptation for Synchronous Transparent Bearer Capabilities

29.2.4.1 Definition and applicability

This test is applicable to the MT2 configuration and, in a restricted way, to other configurations where the MS is able to send data over the Um-interface.

29.2.4.2 Conformance requirement

An MS supporting synchronous transparent bearer capabilities shall perform data rate adaptation and support the frames at the Um-interface according to the following specifications:

1 GSM 04.21, sections 5 and 7.

29.2.4.3 Test purpose

The purpose of these tests is to verify

- that the format and the data bits of the GSM 04.21 frames sent by the MS are consistent with the data input and data rate at the R-interface and

- that the data bits output by the MS at the R-interface are consistent with the received GSM 04.21 frames.

29.2.4.4 Method of test

The Test shall be carried out for all possible user data rates which are supported by the MS (see below). In case of an MT2 configuration, the interface circuits CT105 and CT108 shall be set to the ON condition from the start.

Procedure:

a) A data call shall be set up between the SS and the MS with a BCIE (see below) supported by the MS. The next step shall be entered immediately after TCH synchronization has been completed at the SS side.

b) The interface circuit bit(s) in the GSM 04.21 frame shall be set to ON and the SS shall start to transmit pseudo random data bits in the GSM 04.21 frames over the Um-interface to the MS.

c) MT2 configuration: The SS shall input pseudo random data over the R-interface of the MS.

MT0 configuration: the transmission of data from the MS over the Um-interface shall be stimulated (if it does not start automatically).

d) Approximately 5 s after the data have been received by the SS over the Um-interface the test shall be stopped.

29.2.4.5 Test requirements

1) During the test no GSM 04.21 frame with incorrect format (i.e. format not compliant to GSM 04.21 (see conformance requirement) or not corresponding to the user data rate currently under test) shall have been received by the SS.

2) Only MT2 configuration: the user data stream input to the R-interface shall match bit-exactly the user data stream sent to the SS over the Um-interface and the user data stream output from the R-interface shall match bit-exactly the user data stream sent by the SS over the Um-interface.

29.2.4.6 BCIE

The following combinations shall be considered (ref. GSM 07.01, annex 2):

a) User Rate = 9,6 kbit/s

b) User Rate = 4,8 kbit/s

c) User Rate = 2,4 kbit/s

d) User Rate = 1,2 kbit/s

The remaining parameters of the BCIE and the channel type (FR/HR) shall be set to a value supported by the MS.

29.2.5 Network Independent Clocking

For further study.

29.2.6 Asynchronous Transparent Bearer Capabilities

29.2.6.1 Data Rate Adaptation

29.2.6.1.1 Definition and applicability

This test is applicable to the MT2 configuration and, in a restricted way, to the MT0 configuration where the MS is able to send data over the Um-interface and to use the Bearer Services for asynchronous data.

29.2.6.1.2 Conformance requirement

An MS supporting asynchronous transparent bearer capabilities shall perform data rate adaptation and support the frames at the Um-interface according to the following specifications:

1 GSM 04.21, sections 4.1, 4.4, 5 and 7.

29.2.6.1.3 Test purpose

The purpose of these tests is to verify the conversion between an asynchronous data stream at the R-interface and the GSM 04.21 frames at the Um-interface.

29.2.6.1.4 Method of test

The Test shall be carried out for all possible user data rates which are supported by the MS in asynchronous mode (see below).

Procedure:

a) A data call shall be set up between the SS and the MS with a BCIE (see below) supported by the MS. The next step shall be entered immediately after TCH synchronization has been completed at the SS side.

b) The interface circuit bit(s) in the GSM 04.21 frame shall be set to ON and the SS shall start to transmit pseudo random characters as described below to the MS.

c) MT2 configuration: The SS shall input pseudo random characters as described below over the R-interface to the MS.

MT0 configuration: the transmission of data from the MS over the Um-interface shall be stimulated (if it does not start automatically).

d) Approximately 5 s after the data have been received by the SS over the Um-interface the test shall be stopped.

29.2.6.1.5 Test requirements

1) During the test no GSM 04.21 frame with incorrect format (i.e. format not compliant to GSM 04.21 (see conformance requirement) or not corresponding to the user data rate currently under test) shall have been received by the SS.

2) MT2 configuration only: the user data stream input to the R-interface shall match character by character the user data stream sent to the SS over the Um-interface and the user data streams output from the R-interface shall match character by character the user data stream sent by the SS over the Um-interface.

29.2.6.1.6 Generation of the asynchronous pseudo random characters

Downlink direction:

The GSM 04.21 frames shall contain a bit stream which consists of repeating:

- a character which is generated pseudo randomly every time:

- n stop bits, where n is drawn pseudo randomly from the interval 1..15 every time.

Uplink direction:

The data stream at the R-interface consists of repeating:

- a character which is generated pseudo randomly every time;

- 1 stop bit;

- 1,13 +/- 1 % bit frames (i.e. 1/nominal data rate) of stop polarity.

29.2.6.1.7 BCIE

Same as 29.2.3.

The Number of Data Bits per character (excl. parity) shall be 8. No parity bit shall be used. The Number of Stop Bits shall be 1. If the MS does not support these values different ones shall be chosen.

The remaining parameters of the BCIE shall and the channel type (FR/HR) be set to a value supported by the MS.

29.2.6.2   Passage of the Break Signal

29.2.6.2.1   Definition and applicability

This test is applicable to the MT2 configuration only.

29.2.6.2.2   Conformance requirement

An MS supporting asynchronous transparent bearer capabilities shall perform passage of the break signal in uplink and downlink direction according to:

1   GSM 04.21, sections 4.1, 4.2, 4.4, 5 and 7.

29.2.6.2.3   Test purpose

The purpose of these tests is to verify the ability of the MS to transfer a Break Signal to the R-interface and vice versa.

29.2.6.2.4   Method of test

The Test shall be carried out for all possible user data rates which are supported by the MS in asynchronous mode (see below).

Procedure:

a)   A data call shall be set up between the SS and the MS with a BCIE (see below) supported by the MS. The next step shall be entered immediately after TCH synchronization has been completed at the SS side.

b)   The interface circuit bit(s) in the GSM 04.21 frame shall be set to ON.

c)   The SS shall send pseudo random characters with start and stop bit(s) (as selected by the BCIE) in the GSM 04.21 frames to the MS for approximately 5 s. Then it shall send the following bit sequence in the GSM 04.21 frames:

-    2M+3 bits of start polarity;

-    2M bits of stop polarity.

d)   The SS shall send pseudo random characters with start and stop bit(s) (as selected by the BCIE) in the GSM 04.21 frames to the MS for approximately 2 s. Then it shall send the following bit sequence in the GSM 04.21 frames:

-    for 1 s bits of start polarity;

-    2M bits of stop polarity,

where M is as defined in GSM 04.21, section 4.2, and then again pseudo random characters as above.

e)   The SS shall input pseudo random characters with start and stop bit(s) (as selected by the BCIE) over the R-interface to the MS for approximately 2 s. Then it shall input the following bit sequence to the R-interface:

-    M bits of start polarity;

-    2M bits of stop polarity.

f)   The SS shall input pseudo random characters with start and stop bit(s) (as selected by the BCIE) over the R-interface to the MS for approximately 2 s. Then it shall input the following bit sequence to the R-interface:

-    for 1 s bits of start polarity;

-    2M bits of stop polarity,

where M is as defined in GSM 04.21, section 4.2, and then again pseudo random characters as above.

g)   the test shall be stopped 2 s later.

29.2.6.2.5 Test requirements

1) During the test no GSM 04.21 frame with incorrect format (i.e. format not compliant to GSM 04.21 (see conformance requirement) or not corresponding to the user data rate currently under test) shall have been received by the SS.

2) The user data stream sent over the Um-interface by the SS shall match character by character the user data stream output at the R-interface.

3) The two Break Signals shall be detectable at the R-interface between the same characters as having been sent.

4) The user data stream received over the Um-interface by the SS shall match character by character the user data stream input at the R-interface.

5) The two Break Signals shall be detectable at the Um-interface between the same characters as having been input.

29.2.6.2.6 BCIE

Same as 29.2.2.6.

29.2.6.3 Overspeed/Underspeed Handling (Local Terminal)

29.2.6.3.1 Definition and applicability

This test is applicable to the MT2 configuration only.

29.2.6.3.2 Conformance requirement

An MS supporting asynchronous transparent bearer capabilities shall handle overspeed and underspeed of the local terminal according to:

1 GSM 04.21, sections 4.1, 4.3, 4.4, 5 and 7.

29.2.6.3.3 Test purpose

The purpose of these tests is to verify the ability of the MS to deal with plesiosynchronous bit clocks in the MS and the TE in case of asynchronous Bearer Capabilities.

29.2.6.3.4 Method of test

The Test shall be carried out for all possible user data rates supported by the MS in asynchronous mode (see below).

Procedure:

a) A data call shall be set up between the SS and the MS with a BCIE (see below) supported by the MS. The next step shall be entered immediately after CT107 has been set to on by the MS.

b) The interface circuit bit(s) in the GSM 04.21 frame shall be set to ON.

c) The SS shall input continuously pseudo random characters with a bit clock of:

   - nominal user data rate + 2,5 % bit/s in case of less than 600 bit/s user data rate;

   - nominal user data rate + 1 % in the other cases.

   (ref. GSM 04.21, section 4.3) to the R-interface of the MS for approximately 5 s.

d) The SS shall input continuously pseudo random characters with a bit clock of nominal user rate - 2,5 % (ref. CCITT V.14, section 3) to the R-interface of the MS for approximately 5 s.

e) The test shall be stopped.

29.2.6.3.5   Test requirements

1) During the test no GSM 04.21 frame with incorrect format (i.e. format not compliant to GSM 04.21 (see conformance requirement) or not corresponding to the user data rate currently under test) shall have been received by the SS.

2) The user data stream input to the R-interface shall match character by character the user data stream sent to the SS over the Um-interface.

29.2.6.3.6   BCIE

Same as 29.2.2.6.

The Number of Data Bits per character (excl. parity) shall be 8. No parity bit shall be used. The Number of Stop Bits shall be 1. If the MS does not support these values different ones shall be chosen.

The remaining parameters of the BCIE and the channel type (FR/HR) shall be set to a value supported by the MS.

29.2.6.4   Overspeed/Underspeed Handling (Remote Terminal)

29.2.6.4.1   Definition and applicability

This test is applicable to the MT2 configuration only.

29.2.6.4.2   Conformance requirement

An MS supporting asynchronous transparent bearer capabilities shall handle overspeed and underspeed of the remote terminal (which shows in the structure of the GSM 04.21 frames received over the Um-interface) according to:

1   GSM 04.21, sections 4.1, 4.3, 4.4, 5 and 7.

29.2.6.4.3   Test purpose

The purpose of these tests is to verify the ability of the MS to deal with plesiosynchronous bit clocks in the MS and the remote Terminal in case of asynchronous Bearer Capabilities.

The case of underspeed is covered by 29.6.1. The case of overspeed shall be tested as follows.

29.2.6.4.4   Method of test

The Test shall be carried out for all possible user data rates supported by the MS in asynchronous mode (see below).

Procedure:

a) A data call shall be set up between the SS and the MS with a BCIE (see below) supported by the MS. The next step shall be entered immediately after CT107 has been set to on by the MS.

b) The interface circuit bit(s) in the GSM 04.21 frame shall be set to ON.

c) The SS shall start sending pseudo random characters in the GSM 04.21 frames over the Um-interface with minimal number of stop bits between the characters and where one stop bit is omitted every 8th character.

e) The test shall be stopped 5 s later.

29.2.6.4.5   Test requirements

1) During the test no GSM 04.21 frame with incorrect format (i.e. format not compliant to GSM 04.21 (see conformance requirement) or not corresponding to the user data rate currently under test) shall have been received by the SS.

2) The user data stream sent by the SS over the Um-interface shall match character by character the user data stream sent by the MS over the R-interface.

29.2.6.4.6 BCIE

Same as 29.2.6.3.6.

29.2.7 Interchange circuit mapping for transparent bearer capabilities

29.2.7.1 Definition and applicability

This test is applicable to the MT2 configuration only. However, it cannot be applied fully to MSs which support e.g.:

- CT108/2 for releasing the call (e.g. support of CCITT V.25bis) and/or

- similar use of the circuit C for CCITT X.21.

Therefore the test shall be applied only for those interchange circuits which do not influence Layer 3 signalling.

In case of circuit C the X.21-byte timing circuit B shall not be used.

29.2.7.2 Conformance requirement

1) An MS supporting transparent bearer capabilities with a V-series R-interface shall map the interchange circuits CT105 and CT108/2 to the GSM 04.21 frames sent over the Um-interface according to:

   1.1 GSM 04.21, sections 4.1, 4.4, 5 and 7.

   1.2 GSM 07.02, section 3.2.1.

2) An MS supporting transparent bearer capabilities with an X-series R-interface shall map the interchange circuit C to the GSM 04.21 frames sent over the Um-interface according to:

   2.1 GSM 04.21, sections 4.1, 4.4, 5 and 7.

   2.2 GSM 07.03, sections 4.2.1 and 4.2.2.

29.2.7.3 Test purpose

The purpose of these tests is to verify the ability of the MS to correctly convey changes of the interface circuits at the R-interface to the GSM 04.21 frame sent over the Um-interface in case of Transparent Bearer Capabilities.

29.2.7.4 Method of test

The Test shall be carried out for all user data rates supported by the MS (see below) and the circuits CT105 and CT108/2 (CCITT V.24) and C (CCITT X.21). The test shall be carried out only for those frame formats and circuits which are supported by the MS (exceptions see above).

Procedure:

a) A data call shall be set up between the SS and the MS with a BCIE (see below) supported by the MS. The next step shall be entered immediately after CT107 has been set to ON by the MS.

b) The interface circuit bit(s) in the GSM 04.21 frame shall be set to ON and the SS shall input continuously pseudo random data to the R-interface during the following steps. The SS shall wait for approximately 1 s before entering the next step.

c) The SS shall set the interchange circuit at the R-interface to OFF and wait for 2 s.

d) The SS shall again set the interchange circuit at the R-interface to ON.

e) After further 2 s the test shall be stopped.

29.2.7.5   Test requirements

1) During the test no GSM 04.21 frame with incorrect format (i.e. format not compliant to GSM 04.21 (see conformance requirement) or not corresponding to the user data rate currently under test) shall have been received by the SS.

2) The change of the interchange circuit signal level shall be indicated in the GSM 04.21 frames as required by GSM 04.21 and CCITT V.110 (i.e. OFF state shall start and end in the correct GSM 04.21 frame).

29.2.7.6   BCIE

Same as 29.2.2.5.

29.3   Testing of non transparent data services (RLP tests)

SS sends NULL (C/R=0, P/F=0) frames when it has nothing else to send in ADM mode.

SS does not use DTX if not explicitly indicated in the test and sends supervisory RR (C/R=0, P/F=0) frames when it has nothing else to send in ABM mode. N(R) is equal to N(R) of the previous frame. For the first frame N(R)=0.

The information field of the Supervisory frames sent by the SS is fully coded with "1".

The tolerance on timers or delays is +/- 10%.

The SS will check FSI (Frame Start Identifier) alignment in all received RLP frames. The information field of the Supervisory frames sent by the MS is never verified.

The SABM-UA exchange for RLP link establishment is initiated by the MS.

Immediately upon RLP link connection, the MS may send an I+S frame containing updated status bits SA, SB and X and the SS must send it.

29.3.1   Initialization

29.3.1.1   Normal initialization done by the MS

29.3.1.1.1   Test purpose

To test the normal establishment of multiple frame operation between the SS and the MS.

This test is performed twice for testing MO and MT data calls:

29.3.1.1.2   Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use default RLP parameters.

   MO data call:

      The MS is made to establish a MO non transparent data call, so that the initial conditions are that the MS is in call state U10 ("Call Active") after having sent a CONNECT ACKNOWLEDGE message.

MT data call:

> The SS establishes a MT non transparent data call, so that the initial conditions are that the MS is in call state U10 ("Call Active") after having received a CONNECT ACKNOWLEDGE message from the SS.

Case a: No negotiation will be initiated by the MS.

Case b: The MS initiates negotiation of RLP default parameters.

> NOTE: The MS is allowed to initiate the negotiation of the RLP default parameters, within allowed ranges, defined in GSM 04.22. The MS shall do this in the ADM, after having sent a CONNECT ACKNOWLEDGE message (MO-case) or after having received a CONNECT ACKNOWLEDGE message from the SS (MT-case). The SS shall accept and use the new RLP parameters till the end of the test.

Procedure

The MS shall send a SABM frame.

The SS responds with a correct UA frame (within T1).

The SS waits for 2*T1 after the UA to ensure the SABM frame is not repeated. This confirms that the UA has been received.

The MS shall be in ABM mode. After optional status bits exchange between the MS and the SS, this is verified by sending an I + S frame and waiting for the acknowledgement from the MS.

The MS is returned to the idle state by clearing the call.

Expected sequence

```
MS                                                                                    SS

1-----------------------------------------SABM------------------------------------------->
                                                                              Within T1
<------------------------------------- UA -----------------------------------------2
                                                                              Waits for 2*T1
(-----------------------------------------I+S ------------------------------------------ >)
-----------------------------------------------Optional
(<----------------------------------- I+S ------------------------------------------ )

<-------------------------------------------I+S -------------------------------------------3
4-----------------------------------------S or I+S------------------------------------------->
```
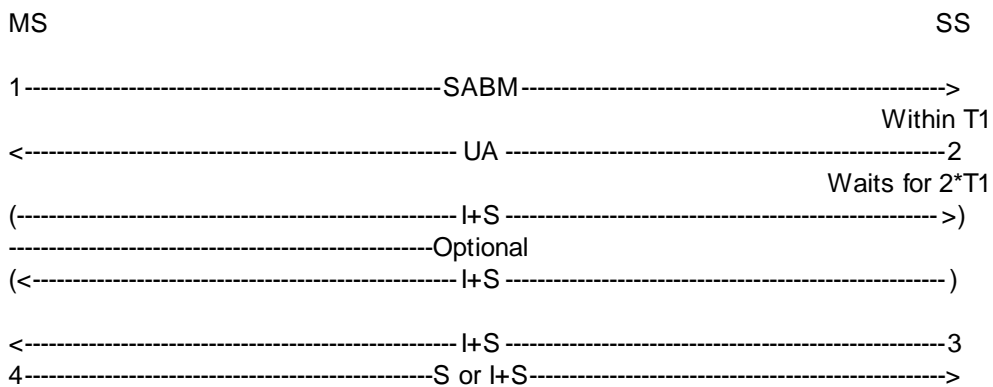
The frames from the SS will be:

2: One UA frame containing:

> R=0, F=1.

3: One correct I+S frame in a RR frame with N(S)=0.

29.3.1.1.3   Test requirements

The frames from the MS shall be:

1: One SABM frame containing:

> C=1, P=1.

> The SABM shall not be repeated.

4: One S or I+S frame with N(R)=1 acknowledging the I+S frame.

29.3.1.2 Initialization failure

29.3.1.2.1 Loss of UA frame

29.3.1.2.1.1 Test purpose

To test the MS response to the loss of an UA frame during initialization.

29.3.1.2.1.2 Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use default RLP parameters. The MS is made to establish a MO non transparent data call so that the initial conditions are that the MS is in call state U10 ("Call Active") after having sent a CONNECT ACKNOWLEDGE message.

Case a: No negotiation will be initiated by the MS.

Case b: The MS initiates negotiation of RLP default parameters.

   NOTE: The MS is allowed to initiate the negotiation of the RLP default parameters, within allowed ranges, defined in GSM 04.22. The MS shall do this in the ADM, after having sent a CONNECT ACKNOWLEDGE message (MO-case) or after having received a CONNECT ACKNOWLEDGE message from the SS (MT-case). The SS shall accept and use the new RLP parameters till the end of the test.

Procedure

The MS shall send an SABM frame.

The SS ignores the first SABM frame from the MS.

The MS shall wait for time-out of timer T1 and then send a second SABM frame.

The SS responds to the second SABM frame with an UA frame (within T1).

The MS enters in ABM mode. After optional status bits exchange between the MS and the SS, this is verified by sending an I+S frame and waiting for the acknowledgement from the MS.

The MS is returned to the idle state by clearing the call.

Expected sequence

```
MS                                                                              SS
1-------------------------------------------SABM------------------------------------------->
T1 time-out
2-------------------------------------------SABM------------------------------------------->
<------------------------------------------ UA -------------------------------------------3
(------------------------------------------ I+S ------------------------------------------>)
---------------------------------------------Optional
(<----------------------------------------- I+S ------------------------------------------ )

<------------------------------------------ I+S ------------------------------------------4
5-------------------------------------------S or I+S-------------------------------------->
```
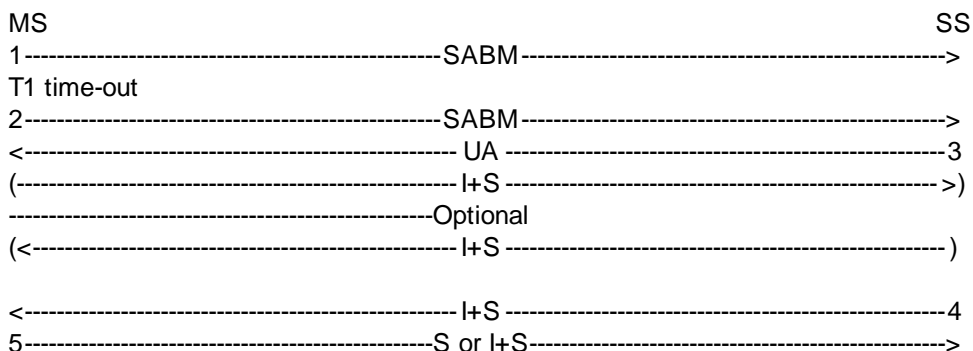
The frames from the the SS will be:

3: One UA frame containing:

R=0, F=1.

within T1 after the second SABM.

4: One correct I+S frame in a RR frame with N(S)=0.

29.3.1.2.1.3   Test requirements

The frames from the MS shall be:

1, 2: One SABM frame containing:

C=1, P=1.

The second SABM frame shall follow the first SABM frame after time-out of timer T1.

5: One S or I+S frame with N(R)=1 acknowledging the I+S frame.

29.3.1.2.2   Total loss of UA frame

29.3.1.2.2.1   Test purpose

To test the MS response to a total loss of UA frame during initialization.

29.3.1.2.2.2   Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use default RLP parameters.

The MS is made to establish a MO non transparent data call so that the initial conditions are that the MS is in call state U10 ("Call Active") after having sent a CONNECT ACKNOWLEDGE message.

Case a: No negotiation will be initiated by the MS.

Case b: The MS initiates negotiation of RLP default parameters.

NOTE: The MS is allowed to initiate the negotiation of the RLP default parameters, within allowed ranges, defined in GSM 04.22. The MS shall do this in the ADM, after having sent a CONNECT ACKNOWLEDGE message (MO-case) or after having received a CONNECT ACKNOWLEDGE message from the SS (MT-case). The SS shall accept and use the new RLP parameters till the end of the test.

Procedure

The MS shall send an SABM frame.

The SS ignores the SABM frame from the MS.

The MS shall wait for time-out of timer T1 and then send a new SABM frame.

The SS ignores the SABM frame sent by the MS. These 2 last steps are repeated N2 times.

The SS waits for 2 * T1 to ensure the SABM frame is not repeated.

The MS shall not enter in ABM mode. This is verified by sending an I+S frame. The MS shall ignore this frame.

The MS is returned to the idle state by clearing the call.

Expected sequence:

```
MS                                                                                    SS
1--------------------------------------------SABM-------------------------------------------->
T1 time-out

 SABM N2 times
.....................................................................................................................
.....--------------------------------------------SABM-------------------------------------------->
------------------------------------------------------------------------------------------ Wait 2*T1
<----------------------------------------------- I+S -----------------------------------------------8
```
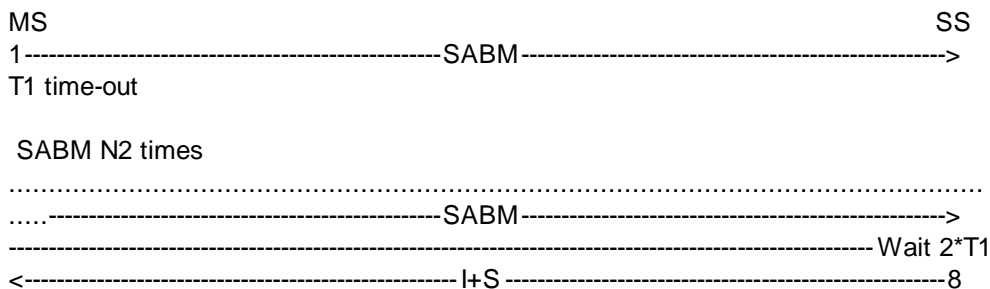
The frames from the SS will be:

8: One correct I+S frame in a RR frame containing with N(S)=0.

29.3.1.2.2.3 Test requirements:

The frames from the MS shall be:

1, ... N2: One SABM frame containing:

> C=1, P=1.

> An SABM frame follows the previous one after time-out of timer T1.

29.3.2 Data transfer

29.3.2.1 Default conditions

The initial conditions are that the MS is in call state U10 ("Call Active") and in RLP ABM mode.

During the synchronization of the traffic channel, the MS and the SS have transmitted I+S frames. Unless, other indication in the test, each test of this section will begin in the following conditions:

- the MS has previously sent I+S frames numbered N(S)=0,...,NMS-1 mod(62) and has previously sent a frame containing N(R) = Nss mod (62);

- the SS has previously sent I+S frames numbered N(S)=0,...,Nss-1 mod(62) and has previously sent a frame containing N(R) = NMS mod (62).

The first I+S frame that an MS will send in a test will be numbered N(S)= NMS and the first I+S frame that the SS will send will be numbered Nss.

29.3.2.2 MS sends I+S frames

29.3.2.2.1 N(S) sequence number

29.3.2.2.1.1 Test purpose

To test the correct handling of the N(S) sequence number.

29.3.2.2.1.2   Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use RLP default parameters except the window size from MS to IWF (SS), called KMI.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

Since some RLP parameters are different from the default parameters, a negotiation procedure will be initiated by the MS after the CONNECKT ACKNOWLEDGE message. The MS may negotiate the RLP default parameters within allowed ranges, defined in GSM 04.22, except the window size from MS to IWF (SS), called KMI, which has to be a non default value.

The SS shall accept and use the new RLP parameters till the end of the test.

After the negotiation procedure the ABM will be entered. This test is performed twice with 2 different values of KMI, randomly chosen.

Procedure

After optional status bits exchange between the MS and the SS, the MS is made to send continuously I+S frames (more than 2*64 frames). The MS shall send I+S frames with N(S) incremented by 1 mod(62) in each frame.

The SS acknowledges the I+S frames in RR frame in sequence.

The MS is returned to the idle state by clearing the call.

Expected sequence

```
MS                                                                          SS
0---------------------------------------------- I+S ---------------------------------------------->
<---------------------------------------------- RR -----------------------------------------------0'
...----------------------------------------------etc...---------------------------------------------- ...
i---------------------------------------------- I+S ---------------------------------------------->
<---------------------------------------------- RR -----------------------------------------------i'
```
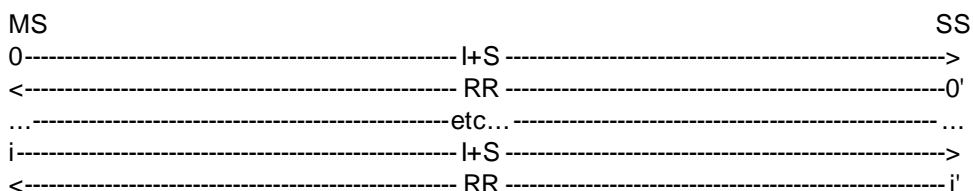
The frames from the SS will be:

0',...,i': One supervisory RR frame containing:

$N(R) = N_{MS}+1, ... , N_{MS}+i+1 \bmod(62)$.

29.3.2.2.1.3   Test requirements

The frames from the MS shall be:

0,...,i: One I+S frame containing:

$N(S) = N_{MS}, ... , N_{MS}+i \bmod(62)$

29.3.2.2.2   Transmission window

29.3.2.2.2.1   Test purpose

To test the correct handling of the transmission window.

29.3.2.2.2.2 Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use RLP default parameters except the window size from MS to IWF (SS), called KMI.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

Since some RLP parameters are different from the default parameters, a negotiation procedure will be initiated by the MS after the CONNECKT ACKNOWLEDGE message. The MS may negotiate the RLP default parameters within allowed ranges, defined in GSM 04.22, except the window size from MS to IWF (SS), called KMI, which has to be a non default value.

The SS shall accept and use the new RLP parameters till the end of the test.

After the negotiation procedure the ABM will be entered.

This test is performed twice with 2 different values of KMI, randomly chosen.

Procedure

The MS is made to send continuously I+S frames with a delay inferior to T1 between each frame.

The SS does not acknowledge the first KMI frames.

The MS stops sending I+S frames after having sent KMI frames, due to the window size.

The SS waits for 0,5*T1 after the last frame of the sequence (N(S)=NMS+KMI-1) to acknowledge the first j frames, with j<KMI.

The MS shall transmit j new I+S frames and stop sending I+S frames after having sent them, due to the window size.

The SS waits for 0,5*T1 after the last frame of the sequence (N(S)=NMS+KMI-1+j mod (62)) to acknowledge all frames transmitted by the MS.

The MS shall transmit all the following I+S frames.

The SS acknowledges the I+S frames sequentially (i.e. 1 after 1).

The MS is returned to the idle state by clearing the call.

Expected sequence

```
MS                                                                                    SS
0------------------------------------------- I+S ------------------------------------------->
<------------------------------------------- RR -------------------------------------------0'
...-----------------------------------------etc...----------------------------------------- ...
KMI-1 --------------------------------------- I+S --------------------------------------->
<------------------------------------------- RR -------------------------------------------KMI-1'
Stops sending I+S frames
KMI----------------------------------------- S --------------------------------------------->
<------------------------------------------- RR ------------------------------------------- KMI'
...-----------------------------------------etc...----------------------------------------- ...
i-1 ----------------------------------------- S ------------------------------------------->
<------------------------------------------- RR -------------------------------------------i-1'
i------------------------------------------- S ------------------------------------------->
                                                                                      After 0,5*T1
<------------------------------------------- RR ------------------------------------------- i'
i+1 ---------------------------------------- I+S ------------------------------------------->
<------------------------------------------- RR ------------------------------------------- i+1'
...-----------------------------------------etc...----------------------------------------- ...
i+j ---------------------------------------- I+S ------------------------------------------->
<------------------------------------------- RR -------------------------------------------i+j'
Stops sending I+S frames
i+j+1 -------------------------------------- S ------------------------------------------->
<------------------------------------------- RR -------------------------------------------i+j+1'
...-----------------------------------------etc...----------------------------------------- ...
n-1 ---------------------------------------- S ------------------------------------------->
<------------------------------------------- RR ------------------------------------------- n-1'
n------------------------------------------- S ------------------------------------------->
                                                                                      After 0,5*T1
<------------------------------------------- RR -------------------------------------------n'
n+1 ---------------------------------------- I+S ------------------------------------------->
<------------------------------------------- RR ------------------------------------------- n+1'
...-----------------------------------------etc...----------------------------------------- ...
```
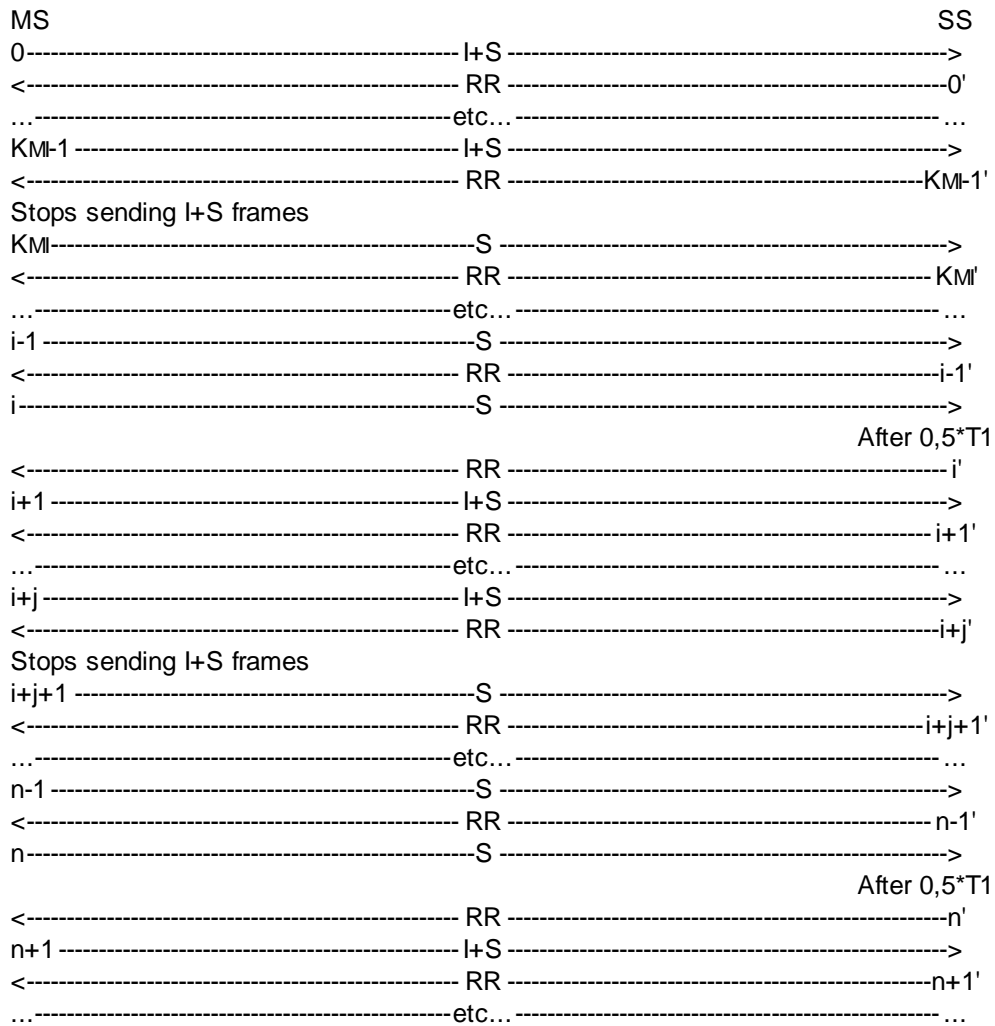
The frames from the SS will be:

0',...,i-1': One RR frame containing:

$N(R)=N_{MS} \bmod(62)$.

i': One RR frame containing:

$N(R)=N_{MS}+j \bmod(62)$ with $j < K_{MI}$,

after a delay of 0,5*T1 after the last received I+S frame.

i+1',...,n-1': One RR frame containing:

$N(R)=N_{MS}+j \bmod(62)$.

n': One RR frame containing:

$N(R)=N_{MS}+K_{MI}+j \bmod(62)$,

after a delay of 0,5*T1 after the last received I+S frame.

n+1', n+2',...: One RR frame containing:

$N(R) = N_{MS} + K_{MI} + j + 1 , N_{MS} + K_{MI} + j + 2 ,... \bmod(62)$.

29.3.2.2.2.3 Test requirements

The frames from the MS shall be:

0,...,KMI-1: One I+S frame containing:

$N(S) = NMS, ..., NMS + KMI - 1 \mod(62)$.

MS stops sending I+S frames until reception of an acknowledgement of at least one I+S frame.

KMI,...,i: One S frame.

i+1,...,i+j: One I+S frame containing:

$N(S)=NMS+KMI,...,NMS+KMI+j-1 \mod(62)$.

MS stops sending I+S frames until reception of an acknowledgement of at least one I+S frame.

i+j+1,...,n: One S frame.

n+1,n+2...: One I+S frame containing:

$N(S)=NMS+KMI+j,NMS+KMI+j+1,... \mod(62)$.

29.3.2.2.3 Busy condition

29.3.2.2.3.1 Test purpose

To test the correct handling of a RNR frame received.

29.3.2.2.3.2 Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use default RLP parameters.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

Case a: No negotiation will be initiated by the MS.

Case b: The MS initiates negotiation of RLP default parameters.

NOTE: The MS is allowed to initiate the negotiation of the RLP default parameters, within allowed ranges, defined in GSM 04.22. The MS shall do this in the ADM, after having sent a CONNECT ACKNOWLEDGE message (MO-case) or after having received a CONNECT ACKNOWLEDGE message from the SS (MT-case). The SS shall accept and use the new RLP parameters till the end of the test.

The ABM will be entered.

Procedure

The MS is made to send continuously I+S frames.

The SS acknowledges the received I+S frames in supervisory RR frames. After 1 second it acknowledged the received I+S frames in supervisory RNR frames.

After the first RNR frame, the MS shall stop sending I+S frames and shall start sending supervisory frames within T2.

After 1 second receiving supervisory frames, the SS sends RR frames instead of RNR.

After the first RR frame, the MS will restart the transmission of I+S frames within T2.

The MS is returned to the idle state by clearing the call.

Expected sequence

```
MS                                                                              SS
0------------------------------------------- I+S -------------------------------------------->
<------------------------------------------- RR -------------------------------------------0'
...------------------------------------------etc...-------------------------------------- ...
i-1 ------------------------------------------ I+S -------------------------------------------->
<------------------------------------------- RR -------------------------------------------i-1'
i-------------------------------------------- I+S -------------------------------------------->
<------------------------------------------- RNR -------------------------------------------i'
stops sending I+S frames within T2
i+1 -----------------------------------------S -------------------------------------------->
<------------------------------------------- RNR -------------------------------------------i+1'
...-----------------------------------------etc...-------------------------------------- ...
n+i-1 -----------------------------------------S -------------------------------------------->
<------------------------------------------- RNR -------------------------------------------n+i-1'
n+i -----------------------------------------S -------------------------------------------->
<------------------------------------------- RR -------------------------------------------n+i'
restarts sending I+S frames within T2
n+i+1 -----------------------------------------I+S -------------------------------------------->
<------------------------------------------- RR ------------------------------------------- n+i+1'
...-----------------------------------------etc...------------------------------------- ...
```
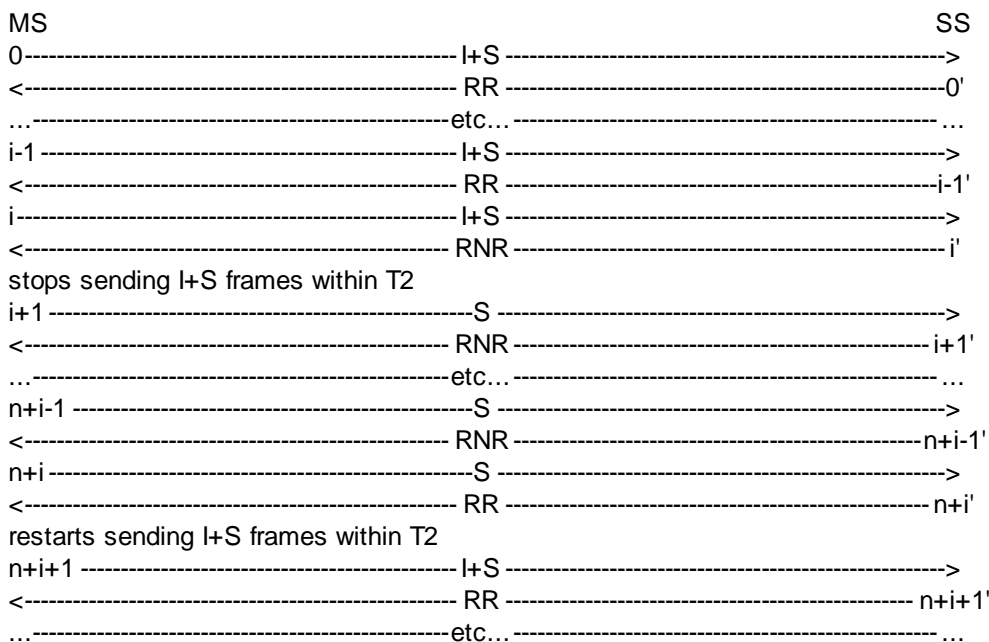
The frames from the SS will be:

0',...,i-1': One RR frame containing:

        $N(R)=NMS+1,...,NMS+i\ mod(62)$.

i',...,n+i-1': One RNR frame containing:

        $N(R)=NMS+i+1\ mod(62)$.

n+i': One RR frame containing:

        $N(R)=NMS+i+1\ mod(62)$.

n+i+1',n+i+2',...: One RR frame containing:

        $N(R)=NMS+i+2,NMS+i+3,...\ mod(62)$.

29.3.2.2.3.3 Test requirements

The frames from the MS shall be:

0,...,i: One I+S frame containing:

        $N(S)=NMS,...,NMS+i\ mod(62)$.

        MS stops sending I+S frames within T2 after the reception of the first RNR frame from the SS.

i+1,...,n+i: One S frame.

        MS restarts sending I+S frames within T2 after the reception of the first RR frame from the SS.

n+i+1,n+i+2,...: One I+S frame containing:

        $N(S)=NMS+i+1,NMS+i+2,...\ mod(62)$.

29.3.2.3 SS sends I+S frames

29.3.2.3.1 N(R) sequence number

29.3.2.3.1.1 Test purpose

To test the correct handling of the N(R) sequence number.

29.3.2.3.1.2 Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use RLP default parameters except the window size from IWF (SS) to MS, called KIM.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

Since some RLP parameters are different from the default parameters, a negotiation procedure will be initiated by the MS after the CONNECKT ACKNOWLEDGE message. The MS may negotiate the RLP default parameters within allowed ranges, defined in GSM 04.22, except the window size from IWF (SS) to MS, called KIM, which has to be a non default value.

The SS shall accept and use the new RLP parameters till the end of the test.

After the negotiation procedure the ABM will be entered. This test is performed twice with 2 different values of KIM, randomly chosen.

Procedure

The SS is made to send continuously I+S frames (more than 2*64 frames). The delay between two I+S frames shall be superior to T2 and inferior to T1.

The MS is made to send no data i.e. no I+S frame.

   NOTE 8:   The MS may have previously sent I+S frames.

The SS sends I+S frames in I+S RR frames.

The MS shall acknowledge the I+S frames in RR frame sequentially within T2.

The MS is returned to the idle state by clearing the call.

Expected sequence

```
    MS                                                                      SS
    <---------------------------------------- I+S ----------------------------------------0'
    Within T2
    0-----------------------------------------S --------------------------------------->
    ...----------------------------------------etc...----------------------------------------...
    <---------------------------------------- I+S ----------------------------------------i'
    Within T2
    i-----------------------------------------S --------------------------------------->
```
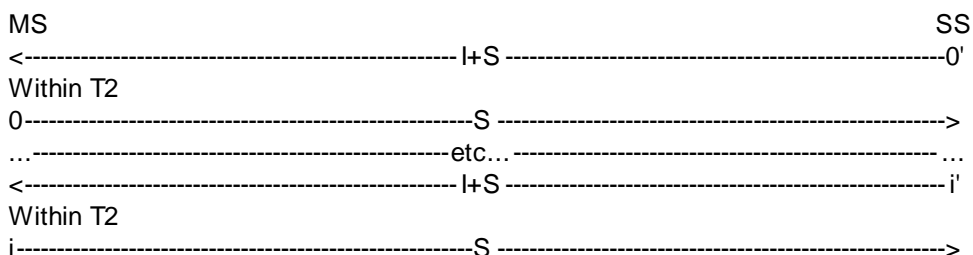
The frames from the SS will be:

0,...,i': One I+S frame containing

N(S)=Nss,...,Nss+i mod(62).

29.3.2.3.1.3 Test requirements

The frames from the MS shall be:

0,...,i: One S frame containing:

N(R)=Nss+1,...,Nss+i+1 mod (62).

The MS shall acknowledge the I+S frames sent by the SS within T2.

NOTE 9: If T2 parameter is equal to default T2 (<80 ms), the SS has to checked that the MS acknowledges an I+S frame within 80 ms.

29.3.2.3.2 Busy condition

29.3.2.3.2.1 Test purpose

To test the correct handling of a RNR frame with information received.

29.3.2.3.2.2 Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use default RLP parameters.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

Case a: No negotiation will be initiated by the MS.

Case b: The MS initiates negotiation of RLP default parameters.

NOTE: The MS is allowed to initiate the negotiation of the RLP default parameters, within allowed ranges, defined in GSM 04.22. The MS shall do this in the ADM, after having sent a CONNECT ACKNOWLEDGE message (MO-case) or after having received a CONNECT ACKNOWLEDGE message from the SS (MT-case). The SS shall accept and use the new RLP parameters till the end of the test.

The ABM will be entered.

Procedure

The SS is made to send continuously I+S frames. The delay between two consecutive I+S frames shall be inferior to T1.

The MS is made to send continuously I+S frames with a delay inferior to T1 between each frame.

The SS acknowledges the received I+S frames in I+S RR frames. After 1 second, it acknowledged the received I+S frames in supervisory RNR frames. The MS shall acknowledge the I+S frames in I+S RR frame sequentially.

After the first RNR frame, the MS shall stop sending I+S frames and shall acknowledge the I+S received frame in supervisory frames within T2.

After 1 second receiving supervisory frames, the SS sends I+S RR frames instead of RNR.

After the first RR frame, the MS will restart the transmission of I+S frames, it shall acknowledge the I+S received frame in I+S frame within T2.

The MS is returned to the idle state by clearing the call.
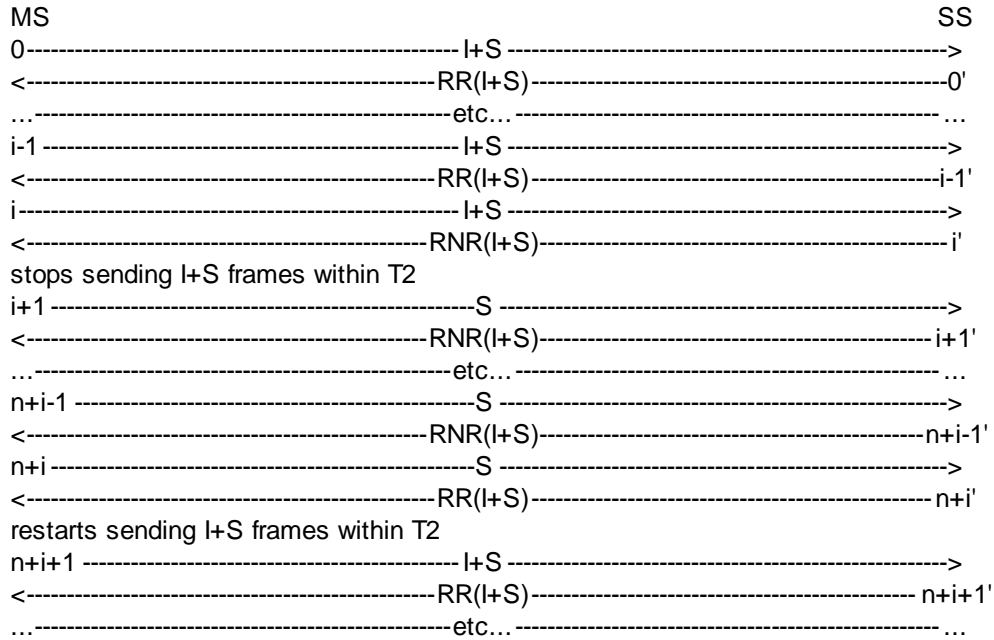
Expected sequence

```
MS                                                                                  SS
0------------------------------------------ I+S ------------------------------------->
<------------------------------------------RR(I+S)------------------------------------0'
...-----------------------------------------etc...------------------------------------ ...
i-1 ----------------------------------------- I+S ------------------------------------->
<------------------------------------------RR(I+S)------------------------------------i-1'
i------------------------------------------- I+S ------------------------------------->
<------------------------------------------RNR(I+S)------------------------------------i'
stops sending I+S frames within T2
i+1 -----------------------------------------S ------------------------------------->
<------------------------------------------RNR(I+S)------------------------------------i+1'
...-----------------------------------------etc...------------------------------------ ...
n+i-1 -----------------------------------------S ------------------------------------->
<------------------------------------------RNR(I+S)------------------------------------n+i-1'
n+i ------------------------------------------S ------------------------------------->
<------------------------------------------RR(I+S)------------------------------------ n+i'
restarts sending I+S frames within T2
n+i+1 ----------------------------------------- I+S ------------------------------------->
<------------------------------------------RR(I+S)------------------------------------ n+i+1'
...-----------------------------------------etc...------------------------------------ ...
```

The frames from the SS will be:

0',...,i-1': One I+S RR frame containing:

$N(S)=NSS,...,NSS+i-1 \mod(62)$,

$N(R)=NMS+1,...,NMS+i \mod(62)$.

i',...,n+i-1': One I+S RNR frame containing:

$N(S)=NSS+i,...,NSS+n+i-1 \mod(62)$,

$N(R)=NMS+i+1 \mod(62)$.

n+i',n+i+1',...: One I+S RR frame containing:

$N(S)=NSS+n+i,NSS+n+i+1,... \mod(62)$,

$N(R)=NMS+i+1,NMS+i+2,... \mod(62)$.

29.3.2.3.2.3   Test requirements

The frames from the MS shall be:

0,...,i: One I+S frame containing:

$N(S)=NMS,...,NMS+i \mod(62)$,

$N(R)=NSS,...,NSS+i \mod(62)$.

          MS stops sending I+S frames within T2 after the reception of the first RNR frame from the SS.

i+1,...,n+i: One S frame containing:

$N(R)=NSS+i+1,...,NSS+n+i \mod(62)$.

MS restarts sending I+S frames within T2 after the reception of the first RR frame from the SS.

n+i+1,n+i+2,...: One I+S frame containing:

N(S)=NMS+i+1,NMS+i+2,... mod(62),

N(R)=NSS+n+i+1,NSS+n+i+1... mod(62).

29.3.2.4 SS rejects I+S frames

29.3.2.4.1 REJ frame

29.3.2.4.1.1 Test purpose

To test the correct handling of a REJ frame received.

29.3.2.4.1.2 Method of test

Initial Conditions

The window size from MS to IWF (SS) is called KMI.

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use default RLP parameters.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

Case a: No negotiation will be initiated by the MS.

Case b: The MS initiates negotiation of RLP default parameters.

NOTE: The MS is allowed to initiate the negotiation of the RLP default parameters, within allowed ranges, defined in GSM 04.22. The MS shall do this in the ADM, after having sent a CONNECT ACKNOWLEDGE message (MO-case) or after having received a CONNECT ACKNOWLEDGE message from the SS (MT-case). The SS shall accept and use the new RLP parameters till the end of the test.

The ABM will be entered.

Procedure

The MS is made to send continuously I+S frames with a delay inferior to T1 between each frame.

The SS acknowledges the i first I+S frames in supervisory RR frames.

The SS does not acknowledge the following I+S frames.

The SS rejects the 2 last I+S frames with a REJ and then send UI frames.

The MS shall retransmit the rejected I+S frames and the continue to send I+S frames.

The MS shall stop sending I+S frame when the transmission window is full.

The SS acknowledges all the received I+S frames with a RR frame after a delay of 0,5*T1 after the last received I+S frame.

The MS restarts sending I+S frame.

The SS acknowledges the received I+S frames.

The MS is returned to the idle state by clearing of the call.

Expected sequence

```
MS                                                                          SS
0------------------------------------------ I+S ------------------------------------------>
<------------------------------------------ RR ------------------------------------------0'
...----------------------------------------etc...------------------------------------------ ...
i-1 ------------------------------------------ I+S ------------------------------------------>
<------------------------------------------ RR ------------------------------------------i-1'
i------------------------------------------ I+S ------------------------------------------>
<------------------------------------------ RR ------------------------------------------i'
i+1 ------------------------------------------ I+S ------------------------------------------>
<------------------------------------------ RR ------------------------------------------i+1'
i+2 ------------------------------------------ I+S ------------------------------------------>
<------------------------------------------ RR ------------------------------------------i+2'
i+3 ------------------------------------------ I+S ------------------------------------------>
<------------------------------------------REJ------------------------------------------i+3'
i+4 ------------------------------------------ I+S ------------------------------------------>
<------------------------------------------ UI------------------------------------------i+4'
i+5 ------------------------------------------ I+S ------------------------------------------>
<------------------------------------------ UI ------------------------------------------i+5'
i+6 ------------------------------------------ I+S ------------------------------------------>
<------------------------------------------ UI------------------------------------------i+6'
...------------------------------------------etc...------------------------------------------ ...
i+3+K_MI ------------------------------------------ I+S ------------------------------------------>
<------------------------------------------ UI------------------------------------------i+3+K_MI'
Stops sending I+S frames
i+4+K_MI ------------------------------------------S ------------------------------------------>
<------------------------------------------ UI------------------------------------------i+4+K_MI'
...------------------------------------------etc...------------------------------------------ ...
n-1 ------------------------------------------S ------------------------------------------>
<------------------------------------------ UI------------------------------------------n-1'
n------------------------------------------S ------------------------------------------>
                                                                       After 0,5*T1
<------------------------------------------ RR ------------------------------------------n'
n+1 ------------------------------------------ I+S ------------------------------------------>
<------------------------------------------ RR ------------------------------------------n+1'
...------------------------------------------etc...------------------------------------------ ...
```

The frames from the SS will be:

0',...,i-1': One RR frame containing:

$N(R)=N_{MS}+1,...,N_{MS}+i \bmod(62)$.

i',...,i+2': One RR frame containing:

$N(R)=N_{MS}+i \bmod(62)$.

i+3': One REJ frame containing:

$N(R)=N_{MS}+i+2 \bmod(62)$.

i+4',...,n-1': One UI frame.

n': One RR frame containing:

$N(R)=N_{MS}+i+2+K_{MI} \bmod(62)$,

after a delay of 0,5*T1 after the last received I+S frame.

n+1',...: One RR frame containing

$N(R)=NMS+i+3+KMI,... \mod(62)$.

29.3.2.4.1.3　　　　Test requirements

The frames from the MS shall be:

0,...,i+3: One I+S frame containing

$N(S)=NMS,...,NMS+i+3 \mod(62)$.

i+4,i+5: One I+S frame containing

$N(S)=NMS+i+2,NMS+i+3 \mod(62)$.

i+6,...,i+3+KMI: One I+S frame containing:

$N(S)=NMS+i+4...,NMS+i+KMI+1 \mod(62)$.

i+4+KMI,...,n: One S frame.

MS stops sending I+S frames until reception of an acknowledging of at least 1 I+S frame of the window (received N(R) from NMS+i+3 to NMS+i+2+KMI mod(62)).

n+1,...: One I+S frame containing:

$N(S)=NMS+i+KMI,... \mod(62)$.

29.3.2.4.2　　　SREJ frame

29.3.2.4.2.1　　　　Test purpose

To test the correct handling of a SREJ frame received.

29.3.2.4.2.2　　　　Method of test

Initial Conditions

The window size from MS to IWF (SS) is called KMI.

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use default RLP parameters.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

Case a: No negotiation will be initiated by the MS.

Case b: The MS initiates negotiation of RLP default parameters.

NOTE:　The MS is allowed to initiate the negotiation of the RLP default parameters, within allowed ranges, defined in GSM 04.22. The MS shall do this in the ADM, after having sent a CONNECT ACKNOWLEDGE message (MO-case) or after having received a CONNECT ACKNOWLEDGE message from the SS (MT-case). The SS shall accept and use the new RLP parameters till the end of the test.

The ABM will be entered.

Procedure

The MS is made to send continuously I+S frames with a delay inferior to T1 between each frame.

The SS acknowledges the i first I+S frames in supervisory RR frames.

The SS does not acknowledge the following I+S frames.

The SS rejects one I+S frame with a SREJ and then send UI frames.

The MS shall retransmit the rejected I+S frame and the continue to send I+S frames.

The MS shall stop sending I+S frame when the transmission window is full.

The SS acknowledges all the received I+S frames with a RR frame after a delay of 0,5*T1 after the last received I+S frame.

The MS restarts sending I+S frame.

The SS acknowledges the received I+S frames.

The MS is returned to the idle state by clearing of the call.

Expected sequence

```
MS                                                                    SS
0------------------------------------- I+S ------------------------------------->
-----------------------------------------------------
<------------------------------------- RR --------------------------------------0'
-----------------------------------------------------
...------------------------------------etc...----------------------------------- ...
-----------------------------------------------------
i-1------------------------------------ I+S ------------------------------------->
-----------------------------------------------------
<------------------------------------- RR --------------------------------------i-1'
-----------------------------------------------------
i-------------------------------------- I+S ------------------------------------->
-----------------------------------------------------
<------------------------------------- RR --------------------------------------i'
-----------------------------------------------------
i+1----------------------------------- I+S ------------------------------------->
-----------------------------------------------------
<------------------------------------- RR -----------------------------------i+1'
-----------------------------------------------------
i+2----------------------------------- I+S ------------------------------------->
-----------------------------------------------------
<------------------------------------- RR -----------------------------------i+2'
-----------------------------------------------------
i+3----------------------------------- I+S ------------------------------------->
-----------------------------------------------------
<------------------------------------SREJ -----------------------------------i+3'
-----------------------------------------------------
i+4------------------------------------ I+S ------------------------------------->
-----------------------------------------------------
<-------------------------------------- UI -----------------------------------i+4'
-----------------------------------------------------
i+5------------------------------------ I+S ------------------------------------->
-----------------------------------------------------
<-------------------------------------- UI -----------------------------------i+5'
-----------------------------------------------------
...------------------------------------etc...----------------------------------- ...
-----------------------------------------------------
i+KMI----------------------------------- I+S ------------------------------------->
-----------------------------------------------------
<-------------------------------------- UI -----------------------------------i+KMI'
-----------------------------------------------------
Stops sending I+S frames
i+1+KMI----------------------------------S ------------------------------------->
-----------------------------------------------------
<-------------------------------------- UI ---------------------------------i+1+KMI'
-----------------------------------------------------
...------------------------------------etc...----------------------------------- ...
-----------------------------------------------------
n-1----------------------------------- S ------------------------------------->
-----------------------------------------------------
<-------------------------------------- UI ----------------------------------- n-1'
-----------------------------------------------------
n-------------------------------------- S ------------------------------------->
-----------------------------------------------------
                                                            After 0,5*T1
<------------------------------------- RR -----------------------------------n'
```

ETSI

```
n+1 --------------------------------------------- I+S --------------------------------------------->
    ----------------------------------------------------
    <------------------------------------------- RR ---------------------------------------------n+1'
    ----------------------------------------------------
    ...-------------------------------------------etc...----------------------------------------------- ...
    ----------------------------------------------------
```

The frames from the SS will be:

0',...,i-1': One RR frame containing:

> N(R)=NMS+1,...,NMS+i mod(62).

i',...,i+2': One RR frame containing:

> N(R)=NMS+i mod(62).

i+3': One SREJ frame containing:

> N(R)=NMS+i+2 mod(62).

i+4',...,n-1': One UI frame.

n': One RR frame containing:

> N(R)=NMS+i+KMI mod(62),

>> after a delay of 0,5*T1 after the last received I+S frame.

n+1',...: One RR frame containing:

> N(R)=NMS+i+1+KMI mod(62).

29.3.2.4.2.3 Test requirements

The frames from the MS shall be:

0,...,i+3: One I+S frame containing:

> N(S)=NMS,...,NMS+i+3 mod(62).

i+4: One I+S frame containing:

> N(S)=NMS+i+2 mod(62).

i+5,...,i+KMI: One I+S frame containing:

> N(S)=NMS+i+4...,NMS+i+KMI-1 mod(62).

i+1+KMI,...,n: One S frame.

> MS stops sending I+S frames until reception of an acknowledging of at least 1 I+S frame of the window (received N(R) from NMS+i+1 to NMS+i+KMI mod(62)).

n+1,...: One I+S frame containing:

> N(S)=NMS+i+KMI,... mod(62).

29.3.2.4.3 I+S reject frame

29.3.2.4.3.1 Test purpose

To test the correct handling of a I+S reject frame received.

29.3.2.4.3.2   Method of test

Initial Conditions

The window size from MS to IWF (SS) is called KMI.

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use default RLP parameters.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

> Case a: No negotiation will be initiated by the MS.

> Case b: The MS initiates negotiation of RLP default parameters.

NOTE: The MS is allowed to initiate the negotiation of the RLP default parameters, within allowed ranges, defined in GSM 04.22. The MS shall do this in the ADM, after having sent a CONNECT ACKNOWLEDGE message (MO-case) or after having received a CONNECT ACKNOWLEDGE message from the SS (MT-case). The SS shall accept and use the new RLP parameters till the end of the test.

The ABM will be entered.

Procedure

The MS is made to send continuously I+S frames with a delay inferior to T1 between each frame.

The SS acknowledges the i first I+S frames in supervisory RR frames.

The SS does not acknowledge the following I+S frames.

The SS rejects the 2 last I+S frames with a REJ.

The MS shall retransmit the 2 rejected I+S frames.

The SS acknowledges these 2 frames.

The MS shall continue sending I+S frames.

The SS does not acknowledge these frames.

The SS rejects one I+S frame with a SREJ.

The MS shall retransmit the rejected I+S frame and continue sending I+S frames.

The SS acknowledges the received I+S frames.

The MS is returned to the idle state by clearing of the call.

Expected sequence

```
  MS                                                                              SS
  0----------------------------------------- I+S ----------------------------------------->
  <----------------------------------------- RR -----------------------------------------0'
  ...----------------------------------------etc...---------------------------------------- ...
  i-1---------------------------------------- I+S ----------------------------------------->
  <----------------------------------------- RR -----------------------------------------i-1'
  i------------------------------------------ I+S ----------------------------------------->
  <----------------------------------------- RR ------------------------------------------ i'
  -----------------------------------------------
  i+1---------------------------------------- I+S ----------------------------------------->
  -----------------------------------------------
  <----------------------------------------- RR -----------------------------------------i+1'
  -----------------------------------------------
  i+2---------------------------------------- I+S ----------------------------------------->
  -----------------------------------------------
  <----------------------------------- REJ(I+S) -----------------------------------------i+2'
  -----------------------------------------------
  i+3---------------------------------------- I+S ----------------------------------------->
  -----------------------------------------------
  <----------------------------------------- RR -----------------------------------------i+3'
  -----------------------------------------------
  i+4---------------------------------------- I+S ----------------------------------------->
  -----------------------------------------------
  <----------------------------------------- RR -----------------------------------------i+4'
  -----------------------------------------------
  i+5---------------------------------------- I+S ----------------------------------------->
  -----------------------------------------------
  <----------------------------------------- RR -----------------------------------------i+5'
  -----------------------------------------------
  i+6---------------------------------------- I+S ----------------------------------------->
  -----------------------------------------------
  <----------------------------------- SREJ(I+S)-----------------------------------------i+6'
  -----------------------------------------------
  i+7---------------------------------------- I+S ----------------------------------------->
  -----------------------------------------------
  <----------------------------------------- RR -----------------------------------------i+7'
  -----------------------------------------------
  i+8---------------------------------------- I+S ----------------------------------------->
  -----------------------------------------------
  <----------------------------------------- RR -----------------------------------------i+8'
  -----------------------------------------------
  ...----------------------------------------etc...---------------------------------------- ...
  -----------------------------------------------
```
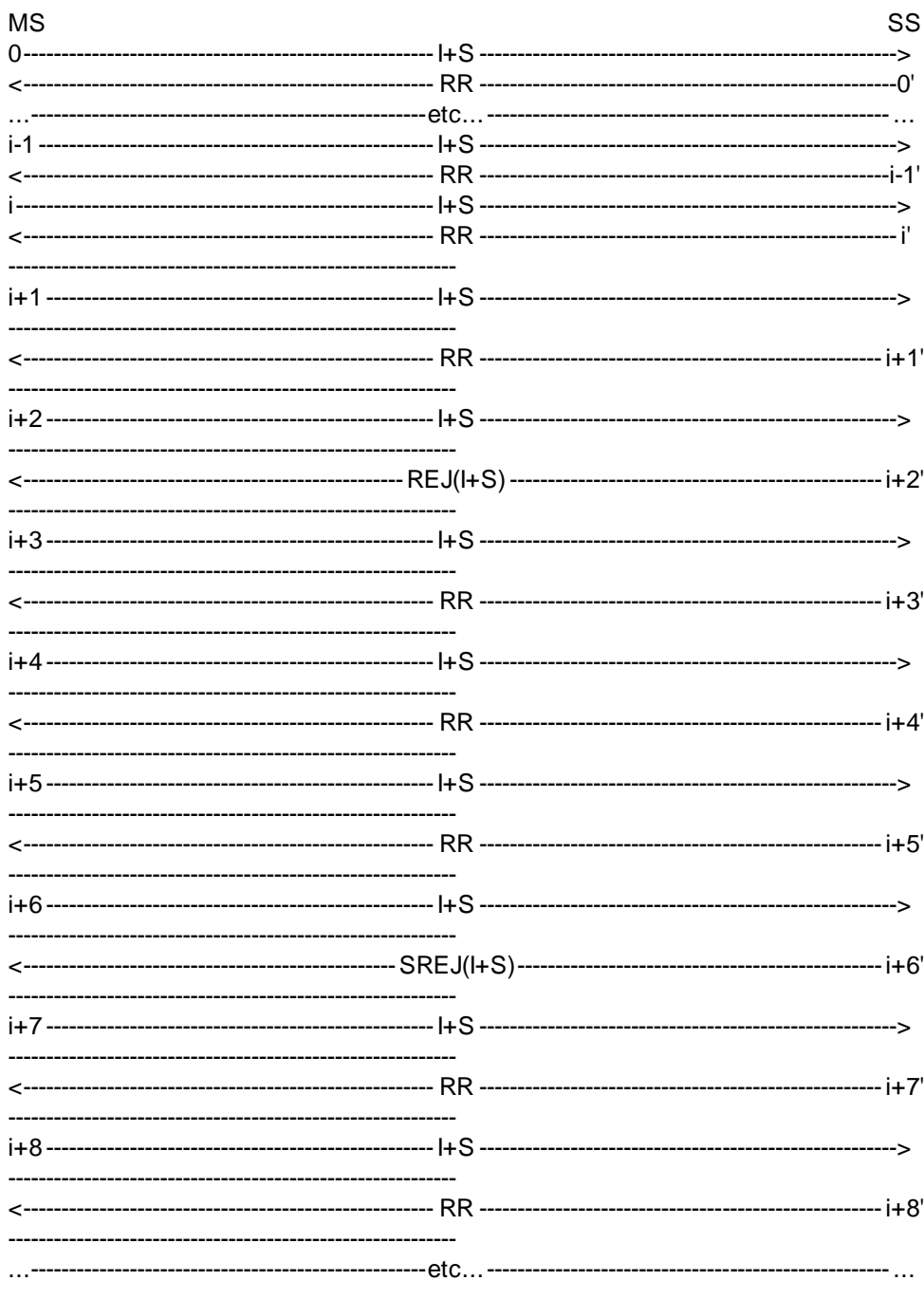
The frames from the SS will be:

0',...,i-1': One RR frame containing:

$N(R)=N_{MS}+1,...,N_{MS}+i \bmod(62).$

i',i+1': One RR frame containing:

$N(R)=N_{MS}+i \bmod(62).$

i+2': One I+S REJ frame containing:

$N(R)=N_{MS}+i+1 \bmod(62),$

$N(S)=N_{SS} \bmod (62).$

i+3',i+4': One RR frame containing:

N(R)=NMS+i+2,NMS+i+3 mod(62).

i+5': One RR frame containing:

N(R)=NMS+i+3 mod(62).

i+6': One I+S REJ frame containing:

N(R)=NMS+i+3 mod(62),

N(S)=NSS+1 mod (62).

i+7': One RR frame containing:

N(R)=NMS+i+3 mod(62).

i+8': One RR frame containing:

N(R)=NMS+i+6,... mod(62).

29.3.2.4.3.3 Test requirements

The frames from the MS shall be:

0,...,i+2: One I+S frame containing:

N(S)=NMS,...,NMS+i+2 mod(62).

i+3,i+4: One I+S frame containing:

N(S)=NMS+i+1,NMS+i+2 mod(62).

i+5,i+6: One I+S frame containing:

N(S)=NMS+i+3,NMS+i+4 mod(62).

i+7: One I+S frame containing:

N(S)=NMS+i+3 mod(62).

i+8,...: One I+S frame containing:

N(S)=NMS+i+5,... mod(62).

The MS shall acknowledge the I+S frames sent by the SS within T2.

29.3.2.5 MS rejects I+S frames

29.3.2.5.1 Rejection with REJ or SREJ supervisory frames

29.3.2.5.1.1 Conformance requirements

The MS shall be able to detect that an I+S frame is out of sequence, and to indicate to the network that some information needs to be retransmitted. This shall be done by using either a REJ or a SREJ RLP frame. The MS has the freedom to choose either one of these frames, but it shall correctly indicate which frames need to be retransmitted.

References

GSM 04.22 sections 5.2.3.4, 5.2.3.6 and 5.3.2.

29.3.2.5.1.2 Test purpose

To test that the MS is able to send correct REJ or SREJ supervisory frames to ask for the transmission of a sequence when an out of sequence information frame has been received.

29.3.2.5.1.3 Test method

Initial Conditions

The window size from IWF (SS) to MS is called K_{IM}.

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use default RLP parameters.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

Case a: No negotiation will be initiated by the MS.

Case b: The MS initiates negotiation of RLP default parameters.

NOTE: The MS is allowed to initiate the negotiation of the RLP default parameters, within allowed ranges, defined in GSM 04.22. The MS shall do this in the ADM, after having sent a CONNECT ACKNOWLEDGE message (MO-case) or after having received a CONNECT ACKNOWLEDGE message from the SS (MT-case). The SS shall accept and use the new RLP parameters till the end of the test.

The ABM will be entered.

Related PICS/PIXIT statements

Supported bearer services; characteristics of non-transparent services.

Foreseen final state of the MS

Idle.

Test procedure

The SS is made to send continuously I+S frames. The delay between two consecutive I+S frames shall be inferior to T1.

The MS is made to send no user data. It sends only supervisory frames.

The SS sends a I+S frame numbered Nss. The MS shall acknowledge this frame. Then the SS sends a I+S frame numbered Nss+2.

The MS shall ask for the retransmission of the missing frame numbered Nss+1. The MS may send a SREJ frame (see case a). If it cannot send SREJ, it shall send a REJ frame (see case b).

Case a: If the MS chooses to send a SREJ, it shall send a SREJ frame containing N(R)=Nss+1.

The SS sends a I+S frame numbered Nss+4.

The MS shall ask for the retransmission of the missing frame numbered Nss+3 The MS may send a SREJ frame (see case a/a If it cannot send SREJ, it shall send a REJ frame (see case a/b).

Case a/a: If the MS chooses to send a SREJ, it shall send a SREJ frame containing N(R)=Nss+3.

The SS sends a I+S frame numbered Nss+1 and the MS shall acknowledge this frame (N(R)=Nss+3).

The SS sends a I+S frame numbered Nss+3 and the MS shall acknowledge this frame (N(R)=Nss+5).

Case a/b: If the MS chooses to send a REJ, it shall send a REJ frame containing N(R)=Nss+1.

The SS sends I+S frames numbered Nss+1, ..., Nss+4 and the MS shall acknowledge these frames (N(R)=Nss+2, ... , Nss+5).

Case b: If the MS chooses to send a REJ, it shall send a REJ frame containing N(R)=Nss+1.

The SS sends I+S frames numbered Nss+1, Nss+2 and the MS shall acknowledge this frame (N(R)=Nss+2, Nss+3).

The SS sends a I+S frame numbered Nss+4.

The MS shall ask for the retransmission of the missing frame numbered Nss+3 The MS may send a SREJ frame (see case b/a If it cannot send SREJ, it shall send a REJ frame (see case b/b).

Case b/a: If the MS chooses to send a SREJ, it shall send a SREJ frame containing N(R)=Nss+3.

The SS sends a I+S frame numbered Nss+3 and the MS shall acknowledge this frame (N(R)=Nss+5).

Case b/b: If the MS chooses to send a REJ, it shall send a REJ frame containing N(R)=Nss+3.

The SS sends I+S frames numbered Nss+3, Nss+4 and the MS shall acknowledge these frames (N(R)=Nss+4, Nss+5).

The SS sends a I+S frame numbered Nss+5. The MS shall acknowledge this frame. Then the SS sends a I+S frame numbered Nss+5+K$_{IM}$.

The MS shall ask for the retransmission of the missing frame numbered Nss+6 to Nss+4+K$_{IM}$. The MS may send a SREJ frame (see sequence c with k=1). If it cannot send SREJ, it shall send a REJ frame (see sequence d with k=1).

Sequence c: If the MS chooses to send a SREJ, it shall send a SREJ frame containing N(R)=Nss+5+k.

The SS sends a I+S frame numbered Nss+5+k.

When using SREJ frames, the MS shall send RR frames to acknowledge the received I+S frames. The time when these RR frames are sent is not tested.

If k<K$_{IM}$-1, the MS shall ask for the retransmission of the missing frames numbered Nss+5+k+1 to Nss+4+K$_{IM}$. The MS may send a SREJ frame (see sequence c with k=k+1). If it cannot send SREJ, it shall send a REJ frame (see sequence d with k=k+1).

If k=K$_{IM}$-1, the MS has no more frame to reject. It shall acknowledge the frame numbered Nss+5+K$_{IM}$. with a frame containing N(R)=Nss+6+K$_{IM}$.,. The SS sends I+S frames numbered Nss+6+K$_{IM}$, etc... and the MS shall acknowledge these frames (N(R)=Nss+7+K$_{IM}$, etc.

Sequence d: If the MS chooses to send a REJ, it shall send a REJ frame containing N(R)=Nss+5+k.

The SS sends a I+S frame numbered Nss+5+k and the MS shall acknowledge this frame (N(R)=Nss+5+k+1).

The SS sends a I+S frame numbered Nss+5+K$_{IM}$.

If k<K$_{IM}$-1, the MS shall ask for the retransmission of the missing frames numbered Nss+5+k+1 to Nss+4+K$_{IM}$. The MS may send a SREJ frame (see sequence c with k=k+1). If it cannot send SREJ, it shall send a REJ frame (see sequence d with k=k+1).

If k=K$_{IM}$-1, the MS has no more frame to reject. It shall acknowledge the frame numbered Nss+5+K$_{IM}$. with a frame containing N(R)=Nss+6+K$_{IM}$.,. The SS sends I+S frames numbered Nss+6+K$_{IM}$, etc... and the MS shall acknowledge these frames (N(R)=Nss+7+K$_{IM}$, etc.

The MS is returned to the idle state by clearing of the call.

Maximum duration of test

1 minute.

Expected sequence

```
                MS                                        SS
                        <------  I+S     -------  0'
                0       -------  RR      ----->
                        <------  I+S     -------  1'
                1                SREJ(a) or REJ(b) ?
```

Case a

```
                a - 1   -------  SREJ    ----->
                        <------  I+S     -------  a - 2'
                a - 2            SREJ(a/a) or REJ(a/b) ?
```

Case a/a

```
                a/a - 1 -------  SREJ    ----->
                        <------  I+S     -------  a/a - 2'
                a/a - 2 -------  RR      ----->
                        <------  I+S     -------  a/a - 3'
                a/a - 3 -------  RR      ----->
```

Case a/b

```
                a/b - 1 -------  REJ     ----->
                        <------  I+S     -------  a/b - 2'
                a/b - 2 -------  RR      ----->
                        <------  I+S     -------  a/b - 3'
                a/b - 3 -------  RR      ----->
                        <------  I+S     -------  a/b - 4'
                a/b - 4 -------  RR      ----->
                        <------  I+S     -------  a/b - 5'
                a/b - 5 -------  RR      ----->
```

Case b

```
                b - 1   -------  REJ     ----->
                        <------  I+S     -------  b - 2'
                b - 2   -------  RR      ----->
                        <------  I+S     -------  b - 3'
                b - 3   -------  RR      ----->
                        <------  I+S     -------  b - 4'
                b - 4            SREJ(b/a) or REJ(b/b) ?
```

Case b/a

```
                b/a - 1 -------  SREJ    ----->
                        <------  I+S     -------  b/a - 2'
                b/a - 2 -------  RR      ----->
```

Case b/b

```
                b/b - 1    -------    REJ        ----->
                           <------    I+S        -------       b/b - 2'
                b/b - 2    -------    RR         ----->
                           <------    I+S        -------       b/b - 3'
                b/b - 3    -------    RR         ----->
                           <------    I+S        -------       i'
                i          -------    RR         ----->
                           <------    I+S        -------       i+1'
                i+1                   SREJ(c) or REJ(d) ?
```

Sequence c (SREJ used)

```
                c/k - 0    -------    SREJ       ----->
                           <------    I+S        -------       c/k - 0'
                c/k - 1               SREJ(c) or REJ(d) ?
```

Sequence d (REJ used)

```
                d/k - 0    -------    REJ        ----->
                           <------    I+S        -------       d/k - 0'
                d/k - 1    -------    RR         ----->
                           <------    I+S        -------       d/k - 1'
                d/k - 2               SREJ(c) or REJ(d) ?


                j          -------    RR         ----->
                           <------    I+S        -------       j'
                ...                   etc...                   ...
```

The frames from the SS will be:

0': One I+S frame containing N(S)=Nss mod(62), N(R)=Nms+1 mod(62).

1': One I+S frame containing N(S)=Nss+2 mod(62), N(R)=Nms+1 mod(62).

Case a:

a - 2': One I+S frame containing N(S)=Nss+4 mod(62), N(R)=Nms+1 mod(62).

Case a/a:

a/a - 2': One I+S frame containing N(S)=Nss+1 mod(62), N(R)=Nms+1 mod(62).

a/a - 3': One I+S frame containing N(S)=Nss+3 mod(62), N(R)=Nms+1 mod(62).

Case a/b:

a/b - 2': One I+S frame containing N(S)=Nss+1 mod(62), N(R)=Nms+1 mod(62).

a/b - 3': One I+S frame containing N(S)=Nss+2 mod(62), N(R)=Nms+1 mod(62).

a/b - 4': One I+S frame containing N(S)=Nss+3 mod(62), N(R)=Nms+1 mod(62).

a/b - 5': One I+S frame containing N(S)=Nss+4 mod(62), N(R)=Nms+1 mod(62).

Case b:

b - 2': One I+S frame containing N(S)=Nss+1 mod(62), N(R)=Nms+1 mod(62).

b - 3': One I+S frame containing N(S)=Nss+2 mod(62), N(R)=Nms+1 mod(62).

b - 4': One I+S frame containing N(S)=Nss+4 mod(62), N(R)=Nms+1 mod(62).

Case b/a:

b/a - 2': One I+S frame containing N(S)=Nss+3 mod(62), N(R)=Nms+1 mod(62).

Case b/b:

b/b - 2': One I+S frame containing N(S)=Nss+3 mod(62), N(R)=Nms+1 mod(62).

b/b - 3': One I+S frame containing N(S)=Nss+4 mod(62), N(R)=Nms+1 mod(62).

i': One I+S frame containing N(S)=Nss+5 mod(62), N(R)=Nms+1 mod(62).

i+1': One I+S frame containing N(S)=Nss+5+Kim mod(62), N(R)=Nms+1 mod(62).

Sequence c (with k=1 to Kim-1):

c/k - 0': One I+S frame containing N(S)=Nss+5+k mod(62), N(R)=Nms+1 mod(62).

Sequence d (with k=1 to Kim-1):

d/k - 0': One I+S frame containing N(S)=Nss+5+k mod(62), N(R)=Nms+1 mod(62).

d/k - 1': One I+S frame containing N(S)=Nss+5+Kim mod(62), N(R)=Nms+1 mod(62).

j',...: One I+S frame containing N(S)=Nss+Kim+6,... mod(62), N(R)=Nms+1 mod(62).

Specific message content

The frames from the MS shall be:

0: One RR frame containing N(R)=Nss+1 mod(62).

1: The MS shall reject the missing I+S frame numbered Nss+1. It may send a SREJ frame (see case a). If it cannot send SREJ, it shall send a REJ frame (see case b).

Case a

a - 1: One supervisory SREJ frame containing N(R)=Nss+1 mod(62).

a - 2: The MS shall reject the missing I+S frame numbered Nss+3. It may send a SREJ frame (see case a). If it cannot send SREJ, it shall send a REJ frame (see case b).

Case a/a

a/a - 1: One supervisory SREJ frame containing N(R)=Nss+3 mod(62).

a/a - 2: One RR frame containing N(R)=Nss+3 mod(62).

a/a - 3: One RR frame containing N(R)=Nss+5 mod(62).

Case a/b

a/b - 1: One supervisory REJ frame containing N(R)=Nss+1 mod(62).

a/b - 2: One RR frame containing N(R)=Nss+2 mod(62).

a/b - 3: One RR frame containing N(R)=Nss+3 mod(62).

a/b - 4: One RR frame containing N(R)=Nss+4 mod(62).

a/b - 5: One RR frame containing N(R)=Nss+5 mod(62).

Case b

    b - 1: One supervisory REJ frame containing N(R)=Nss+1 mod(62).

    b - 2: One RR frame containing N(R)=Nss+2 mod(62).

    b - 3: One RR frame containing N(R)=Nss+3 mod(62).

    b - 4: The MS shall reject the missing I+S frame numbered Nss+2. It may send a SREJ frame (see case a). If it cannot send SREJ, it shall send a REJ frame (see case b).

    Case b/a

        b/a - 1: One supervisory SREJ frame containing N(R)=Nss+2 mod(62).

        b/a - 2: One RR frame containing N(R)=Nss+5 mod(62).

    Case b/b

        b/b - 1: One supervisory REJ frame containing N(R)=Nss+2 mod(62).

        b/b - 2: One RR frame containing N(R)=Nss+4 mod(62).

        b/b - 3: One RR frame containing N(R)=Nss+5 mod(62).

  i: One RR frame containing N(R)=Nss+6 mod(62).

  i+1: The MS shall reject all missing I+S frames (i.e. KIM-1 frames). It may send a SREJ frame (see sequence c with k=1). If it cannot send SREJ, it shall send a REJ frame (see sequence d with k=1).

Sequence c (with k=1 to KIM-1):

    c/k - 0: One SREJ frame containing N(R)=Nss+5+k mod(62).

    c/k - 1: If k<KIM-1, the MS shall reject all missing I+S frames (i.e. KIM-1 frames). It may send a SREJ frame (see sequence c with k=k+1). If it cannot send SREJ, it shall send a REJ frame (see sequence d with k=k+1). If k=KIM-1, the MS has no more frame to reject (see frame numbered j).

Sequence d (with k=1 to KIM-1):

    d/k - 0: One REJ frame containing N(R)=Nss+5+k mod(62).

    d/k - 1: One RR frame containing N(R)=Nss+5+k+1 mod(62).

    d/k - 2: If k<KIM-1, the MS shall reject all missing I+S frames (i.e. KIM-1 frames). It may send a SREJ frame (see sequence c with k=k+1). If it cannot send SREJ, it shall send a REJ frame (see sequence d with k=k+1). If k=KIM-1, the MS has no more frame to reject (see frame numbered j).

  j,...: One RR frame containing N(R)=Nss+KIM+6,... mod(62).

29.3.2.5.2   Retransmission of REJ or SREJ frames

29.3.2.5.2.1   Conformance requirements

The MS shall not retransmit a REJ frame upon time-out. It may repeat SREJ frames.

References

GSM 04.22 sections 5.2.3.4 and 5.2.3.6.

29.3.2.5.2.2   Test purpose

To test that the MS is able to retransmit a SREJ supervisory frames, and does not retransmit a REJ frame.

29.3.2.5.2.3 Test method

Initial Conditions

The window size from IWF (SS) to MS is called K_{IM}.

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use default RLP parameters.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

Case a: No negotiation will be initiated by the MS.

Case b: The MS initiates negotiation of RLP default parameters.

NOTE: The MS is allowed to initiate the negotiation of the RLP default parameters, within allowed ranges, defined in GSM 04.22. The MS shall do this in the ADM, after having sent a CONNECT ACKNOWLEDGE message (MO-case) or after having received a CONNECT ACKNOWLEDGE message from the SS (MT-case). The SS shall accept and use the new RLP parameters till the end of the test.

The ABM will be entered.

Related PICS/PIXIT statements

Supported bearer services; characteristics of non-transparent services.

Foreseen final state of the MS

Idle.

Test procedure

After optional status bits exchange between the MS and the SS, the SS is made to send continuously I+S frames. The delay between two consecutive I+S frames shall be inferior to T1.

The MS is made to send no user data. It sends only supervisory frames.

The SS sends a I+S frame numbered Nss. The MS shall acknowledge this frame. Then the SS sends a I+S frame numbered Nss+2.

The MS shall ask for the retransmission of the missing frame numbered Nss+1. The MS may send a SREJ frame (see case a). If it cannot send SREJ, it shall send a REJ frame (see case b).

Case a: If the MS chooses to send a SREJ, it shall send a SREJ frame containing N(R)=Nss+1.

The SS does not retransmit the rejected frame.

The MS may repeat (see case a1) or not (see case a2) the reject SREJ frame.

Case a1: If the MS chooses to retransmit the SREJ, it shall send a SREJ frame containing N(R)=Nss+1, at the expiry of T1.

The SS sends a I+S frame numbered Nss+1 and the MS shall acknowledge this frame (N(R)=Nss+3).

The SS sends a I+S frame numbered Nss+4.

The MS shall ask for the retransmission of the missing frame numbered Nss+3. The MS shall send a SREJ frame containing N(R)=Nss+3.

At expiry of T1, the MS shall send a new SREJ frame containing N(R)=Nss+3. This step is repeated N2 times.

The SS checks for 2*T1 that the SREJ frame is not repeated by the MS.

Case a2:   If the MS chooses not to repeat the SREJ frame, The SS checks for 2*T1 that the   SREJ frame is not repeated by the MS.

Case b: If the MS chooses to send a REJ, it shall send a REJ frame containing N(R)=Nss+1.

The SS does not retransmit the rejected frame.

The MS shall not repeat the reject REJ frame.

The SS checks for 2*T1 that the SREJ frame is not repeated by the MS.

The MS is returned to the idle state by clearing of the call.

Maximum duration of test

1 minute.

Expected sequence

                            MS   SS

                                        <------   I+S   -------   0'

                            0   -------   RR   ----->

                                        <------   I+S   -------   1'

                            1   SREJ(a) or REJ(b) ?

Case a

                            a - 1   -------   SREJ   ----->

                            a - 2   SREJ repeated (a1) or not (a2) ?

Case a1

T1 Time-out   a1 - 1   -------   SREJ   ----->

                                        <------   I+S   -------   a1 - 1'

                            a1 - 2   -------   RR   ----->

                                        <------   I+S   -------   a1 - 2'

                            a1 - 3   -------   SREJ   ----->

T1 Time-out   a1 - 4   -------   SREJ   ----->

                            ...   etc...   ...

T1 Time-out   a1 - 3+N2 -------   SREJ   ----->
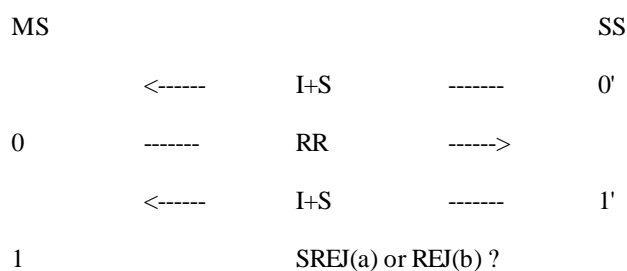
T1 Time-out   SREJ not repeated
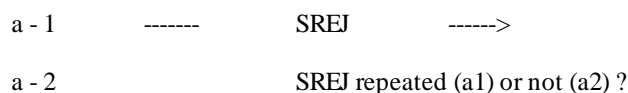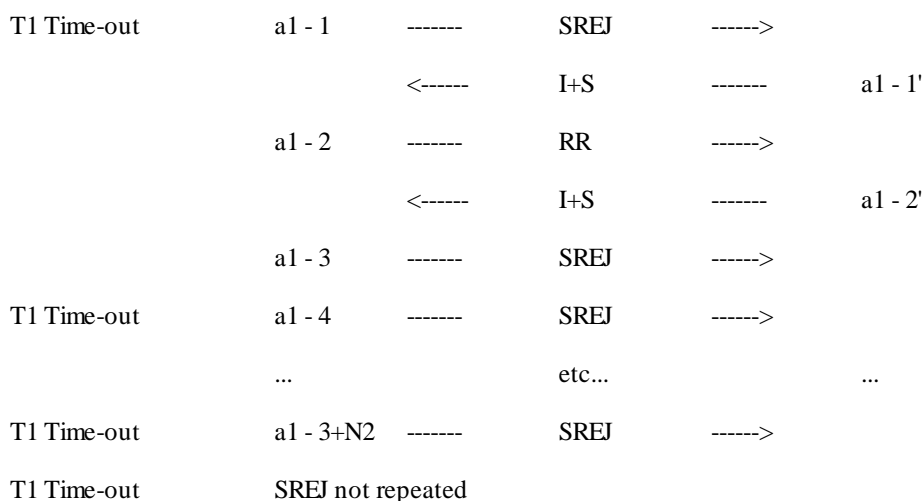
Case a2

T1 Time-out   SREJ not repeated

Case b

                            b - 1   -------   REJ   ----->

T1 Time-out   SREJ not repeated

The frames from the SS will be:

   0': One I+S frame containing N(S)=N$_{SS}$ mod(62), N(R)=N$_{MS}$+1 mod(62).

   1': One I+S frame containing N(S)=N$_{SS}$+2 mod(62), N(R)=N$_{MS}$+1 mod(62).

Case a:

      Case a1:

         a1 - 1': One I+S frame containing N(S)=N$_{SS}$+1 mod(62), N(R)=N$_{MS}$+1 mod(62).

         a1 - 2': One I+S frame containing N(S)=N$_{SS}$+4 mod(62), N(R)=N$_{MS}$+1 mod(62).

Specific message content

The frames from the MS shall be:

0: One RR frame containing N(R)=Nss+1 mod(62).

1: The MS shall reject the missing I+S frame numbered Nss+1. It may send a SREJ frame (see case a). If it cannot send SREJ, it shall send a REJ frame (see case b).

Case a

a - 1: One supervisory SREJ frame containing N(R)=Nss+1 mod(62).

a - 2: SREJ frame may be repeated, (see case a1) or not (see case a2).

Case a1

a1 - 1: On T1 Time-out, one supervisory SREJ frame containing N(R)=Nss+1 mod(62).

a1 - 2: One RR frame containing N(R)=Nss+3 mod(62).

a1 - 3,...,b2 - 3+N2: On T1 Time-out, one supervisory SREJ frame containing N(R)=Nss+3 mod(62).

Case b

b - 1: One supervisory REJ frame containing N(R)=Nss+1 mod(62).

29.3.2.5.3 I+S reject frame

29.3.2.5.3.1 Conformance requirements

The MS shall be able to use I+S frames to carry a REJ or SREJ frame when it detects that one or more numbered information frame is received out of sequence.

References

GSM 04.22 sections 5.2.3.4, 5.2.3.6

29.3.2.5.3.2 Test purpose

To test the MS is able to send SREJ or REJ frames in I+S frames when an out of sequence information frame has been received.

29.3.2.5.3.3 Test method

Initial Conditions

The window size from IWF (SS) to MS is called K_{IM}.

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use default RLP parameters.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

Case a: No negotiation will be initiated by the MS.

Case b: The MS initiates negotiation of RLP default parameters.

NOTE: The MS is allowed to initiate the negotiation of the RLP default parameters, within allowed ranges, defined in GSM 04.22. The MS shall do this in the ADM, after having sent a CONNECT ACKNOWLEDGE message (MO-case) or after having received a CONNECT ACKNOWLEDGE message from the SS (MT-case). The SS shall accept and use the new RLP parameters till the end of the test.

The ABM will be entered.

Related PICS/PIXIT statements

Supported bearer services; characteristics of non-transparent services.

Foreseen final state of the MS

Idle.

Test procedure

The SS is made to send continuously I+S frames. The delay between two consecutive I+S frames shall be inferior to T1.

The SS acknowledges all the received I+S frames.

The MS is made to send continuously I+S frames.

The SS sends a I+S frame numbered Nss. The MS shall acknowledge this frame. Then the SS sends a I+S frame numbered Nss+2.

The MS shall ask for the retransmission of the missing frame numbered Nss+1. The MS may send a SREJ frame (see case a). If it cannot send SREJ, it shall send a REJ frame (see case b). The MS has user data to transmit, it shall use an I+S frame (instead of supervisory frame) to reject the missing frame.

Case a: If the MS chooses to send a SREJ, it shall send a I+S SREJ frame containing N(R)=Nss+1.

The SS sends a I+S frame numbered Nss+1 and the MS acknowledges this frame (N(R)=Nss+3).

The SS sends a I+S frame numbered Nss+3, etc... and the MS acknowledges these frames (N(R)=Nss+4, etc...).

Case b: If the MS chooses to send a REJ, it shall send a I+S REJ frame containing N(R)=Nss+1.

The SS sends I+S frames numbered Nss+1, Nss+2, etc... and the MS shall acknowledge this frame (N(R)=Nss+2, Nss+3, etc...).

The MS is returned to the idle state by clearing of the call.

Maximum duration of test

1 minute.

Expected sequence

```
                MS                                        SS

                      <------    I+S     -------    0'

          0           -------    I+S     ------>

                      <------    I+S     -------    1'

          1                     SREJ(a) or REJ(b) ?
```

Case a

```
          a - 1       -------    SREJ(I+S)  ------>

                      <------    I+S     -------    a - 2'

          a - 2       -------    I+S     ------>

                      <------    I+S     -------    a - 3'

          a - 3       -------    I+S     ------>
```

Case b

```
          b - 1       -------    REJ (I+S)  ------>

                      <------    I+S     -------    b - 2'

          b - 2       -------    I+S     ------>

                      <------    I+S     -------    b - 3'

          b - 3       -------    I+S     ------>


          ...                   etc...                    ...
```
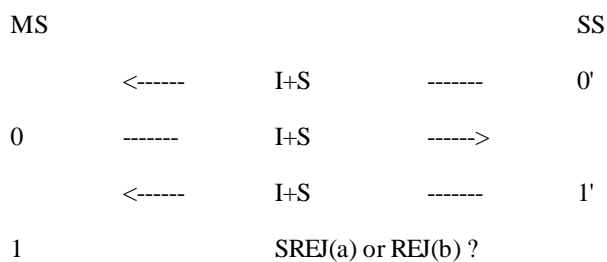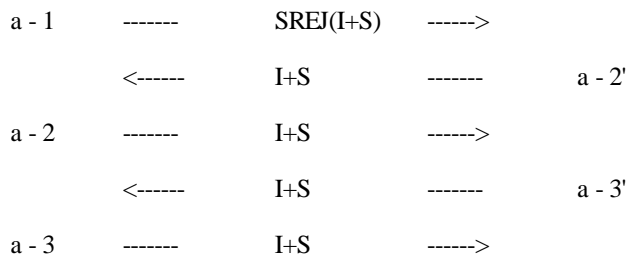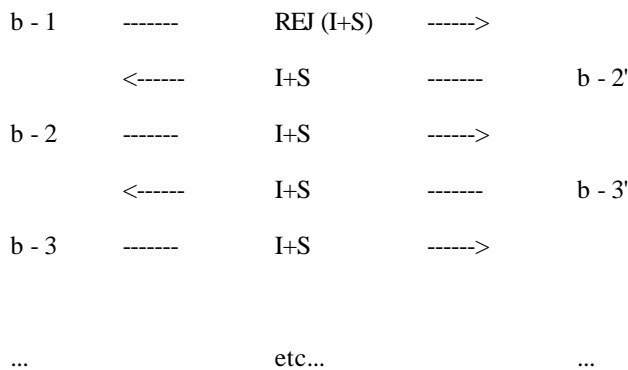
The frames from the SS will be:

   0': One I+S frame containing $N(S)=N_{SS}$ mod(62), $N(R)=N_{MS}+1$ mod(62).

   1': One I+S frame containing $N(S)=N_{SS}+2$ mod(62), $N(R)=N_{MS}+2$ mod(62).

Case a:

   a - 2': One I+S frame containing $N(S)=N_{SS}+1$ mod(62), $N(R)=N_{MS}+3$ mod(62).

   a - 3': One I+S frame containing $N(S)=N_{SS}+3$ mod(62), $N(R)=N_{MS}+4$ mod(62).

Case b:

   b - 2': One I+S frame containing $N(S)=N_{SS}+1$ mod(62), $N(R)=N_{MS}+3$ mod(62).

   b - 3': One I+S frame containing $N(S)=N_{SS}+2$ mod(62), $N(R)=N_{MS}+4$ mod(62).

Specific message content

The frames from the MS shall be:

0: One I+S RR frame containing $N(S)=N_{MS}+1$, $N(R)=N_{SS}+1$ mod(62).

1: The MS shall reject the missing I+S frame numbered $N_{SS}+1$. It may send a I+S SREJ frame (see case a). If it cannot send SREJ, it shall send a I+S REJ frame (see case b).

Case a

a - 1: One I+S SREJ frame containing $N(S)=N_{MS}+2$, $N(R)=N_{SS}+1$ mod(62).

a - 2: One I+S RR frame containing $N(S)=N_{MS}+3$, $N(R)=N_{SS}+3$ mod(62).

a - 3: One I+S RR frame containing $N(S)=N_{MS}+4$, $N(R)=N_{SS}+4$ mod(62).

Case b

b - 1: One I+S REJ frame containing $N(S)=N_{MS}+2$, $N(R)=N_{SS}+1$ mod(62).

b - 2: One I+S RR frame containing $N(S)=N_{MS}+3$, $N(R)=N_{SS}+2$ mod(62).

b - 3: One I+S RR frame containing $N(S)=N_{MS}+4$, $N(R)=N_{SS}+3$ mod(62).

29.3.2.6 Checkpoint recovery

29.3.2.6.1 SS in checkpoint recovery mode

29.3.2.6.1.1 Test purpose

To test the correct handling of received frame with P=1.

29.3.2.6.1.2 Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use default RLP parameters.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

Case a: No negotiation will be initiated by the MS.

Case b: The MS initiates negotiation of RLP default parameters.

NOTE: The MS is allowed to initiate the negotiation of the RLP default parameters, within allowed ranges, defined in GSM 04.22. The MS shall do this in the ADM, after having sent a CONNECT ACKNOWLEDGE message (MO-case) or after having received a CONNECT ACKNOWLEDGE message from the SS (MT-case). The SS shall accept and use the new RLP parameters till the end of the test.

The ABM will be entered.

Procedure

The MS is made to send continuously I+S frames with a delay inferior to T1 between each frame.

The SS is made to send continuously I+S frames with a delay superior to T2 and inferior to T1 between each frame.

The SS acknowledges the received I+S frames in its sending I+S frames.

The MS shall acknowledge the received I+S frames in its sending I+S frames.

After having sent i I+S frames, the SS sends a I+S frame with P bit set to 1.

The MS shall answer with a supervisory RR or RNR frame with F bit set to 1 and N(R) coded to the next frame waited by the MS.

The SS continue sending I+S frames and acknowledging the I+S frames received from the MS.

The MS shall continue sending I+S frames and acknowledging the I+S frames received from the SS.

The SS rejects 1 I+S frame in a supervisory SREJ frame with P bit set to 1.

The MS shall answer with a supervisory RR or RNR frame with F bit set to 1 and N(R) coded to the next frame waited by the MS.

Then the MS shall retransmit the rejected I+S frame.

The SS continue sending I+S frames and acknowledging the I+S frames received from the MS.

The MS shall continue sending I+S frames and acknowledging the I+S frames received from the SS.

After having sent j I+S frames, the SS sends a supervisory RR frame with P bit set to 1.

The MS shall answer with a supervisory RR or RNR frame with F bit set to 1 and N(R) coded to the next frame waited by the MS.

The SS continue sending I+S frames and acknowledging the I+S frames received from the MS.

The MS shall continue sending I+S frames and acknowledging the I+S frames received from the SS.

The MS is returned to the idle state by clearing of the call.
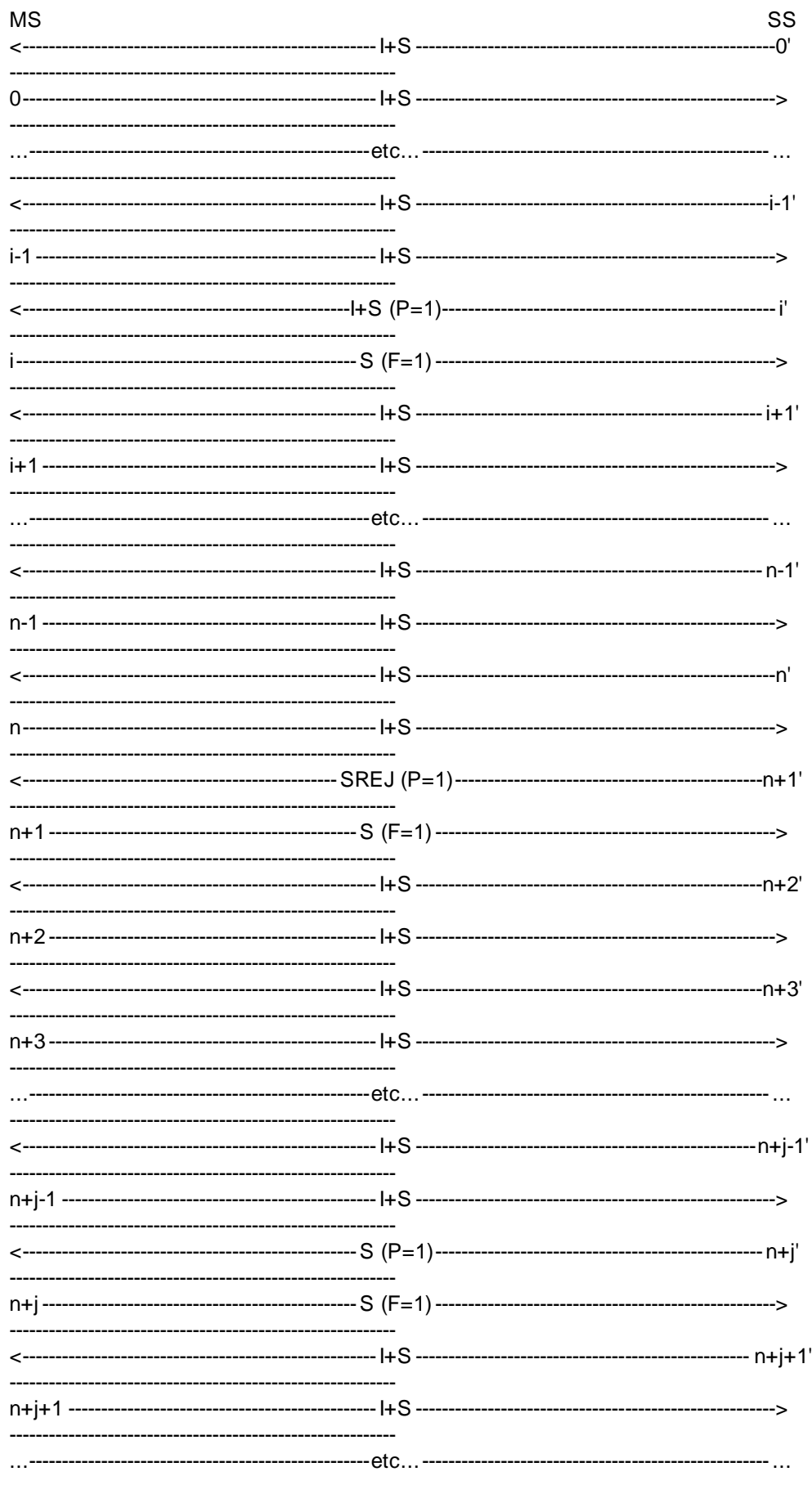
Expected sequence

```
MS                                                                    SS
<---------------------------------------- I+S ----------------------------------------0'
----------------------------------------------------
0----------------------------------------- I+S ---------------------------------------->
----------------------------------------------------
...---------------------------------------etc...----------------------------------------- ...
----------------------------------------------------
<---------------------------------------- I+S ----------------------------------------i-1'
----------------------------------------------------
i-1 --------------------------------------- I+S --------------------------------------->
----------------------------------------------------
<-----------------------------------------I+S (P=1)----------------------------------------i'
----------------------------------------------------
i----------------------------------------- S (F=1) ----------------------------------------->
----------------------------------------------------
<---------------------------------------- I+S ----------------------------------------i+1'
----------------------------------------------------
i+1 ---------------------------------------- I+S --------------------------------------->
----------------------------------------------------
...---------------------------------------etc...----------------------------------------- ...
----------------------------------------------------
<---------------------------------------- I+S ----------------------------------------n-1'
----------------------------------------------------
n-1 --------------------------------------- I+S --------------------------------------->
----------------------------------------------------
<---------------------------------------- I+S ----------------------------------------n'
----------------------------------------------------
n----------------------------------------- I+S --------------------------------------->
----------------------------------------------------
<---------------------------------------- SREJ (P=1)----------------------------------------n+1'
----------------------------------------------------
n+1 --------------------------------------- S (F=1) ----------------------------------------->
----------------------------------------------------
<---------------------------------------- I+S ----------------------------------------n+2'
----------------------------------------------------
n+2 --------------------------------------- I+S --------------------------------------->
----------------------------------------------------
<---------------------------------------- I+S ----------------------------------------n+3'
----------------------------------------------------
n+3 --------------------------------------- I+S --------------------------------------->
----------------------------------------------------
...---------------------------------------etc...----------------------------------------- ...
----------------------------------------------------
<---------------------------------------- I+S ----------------------------------------n+j-1'
----------------------------------------------------
n+j-1 -------------------------------------- I+S --------------------------------------->
----------------------------------------------------
<----------------------------------------- S (P=1)----------------------------------------- n+j'
----------------------------------------------------
n+j --------------------------------------- S (F=1) ----------------------------------------->
----------------------------------------------------
<---------------------------------------- I+S ---------------------------------------- n+j+1'
----------------------------------------------------
n+j+1 -------------------------------------- I+S --------------------------------------->
----------------------------------------------------
...---------------------------------------etc...----------------------------------------- ...
----------------------------------------------------
```

The frames from the SS will be:

0',...,i-1': One I+S RR frame containing:

 N(S)=NSS,...,NSS+i-1 mod(62),

 N(R)=NMS,...,NMS+i-1 mod(62).

i': One I+S RR frame containing:

 C/R=1,

 P/F=1,

 N(S)=NSS+i mod(62),

 N(R)=NMS+i mod(62).

i+1',...,n-1': One I+S RR frame containing:

 N(S)=NSS+i+1,...,NSS+n-1 mod(62),

 N(R)=NMS+i-1...,NMS+n-3 mod(62).

n: One I+S RR frame containing:

 N(S)=NSS+n mod(62),

 N(R)=NMS+n-3 mod(62).

n+1: One supervisory SREJ frame containing:

 C/R=1,

 P/F=1,

 N(R)=NMS+n-2 mod(62).

n+2': One I+S RR frame containing:

 N(S)=NSS+n+1 mod(62),

 N(R)=NMS+n-2 mod(62).

n+3',...,n+j-1': One I+S RR frame containing:

 N(S)=NSS+n+2,...,NSS+n+j mod(62),

 N(R)=NMS+n,... ,NMS+n+j-3 mod(62).

n+j: One supervisory SREJ frame containing:

 C/R=1,

 P/F=1,

 N(R)=NMS+n-2 mod(62).

n+j+1',...: One I+S RR frame containing:

 N(S)=NSS+n+j+1,... mod(62),

 N(R)=NMS+n+j-2,... mod(62).

29.3.2.6.1.3 Test requirements

The frames from the MS shall be:

0,...,i-1: One I+S frame containing:

N(S)=NMS,...,NMS+i-1 mod(62),

N(R)=NSS+1,...,NSS+i mod(62).

i': One supervisory RR frame containing:

C/R=0,

P/F=1,

N(R)=NSS+i+1 mod(62).

i+1,...,n: One I+S frame containing:

N(S)=NMS+i,...,NMS+n-1 mod(62),

N(R)=NSS+i+2,...,NSS+n+1 mod(62).

n+1: One supervisory RR frame containing:

C/R=0,

P/F=1,

N(R)=NSS+n+1 mod(62).

n+2: One I+S frame containing:

N(S)=NMS+n-2 mod(62),

N(R)=NSS+n+2 mod(62).

n+3,...,n+j-1: One I+S frame containing:

N(S)=NMS+n,...,NMS+n+j-3 mod(62),

N(R)=NSS+n+3,...,NSS+n+j+1 mod(62).

n+j: One supervisory RR frame containing:

C/R=0,

P/F=1,

N(R)=NSS+n+j+1 mod(62).

n+j+1,...: One I+S frame containing:

N(S)=NMS+n+j-2 mod(62),

N(R)=NSS+n+j+2,... mod(62).

29.3.2.6.2 End of the window

29.3.2.6.2.1 Test purpose

To test the correct handling of checkpoint recovery at the end of the window.

29.3.2.6.2.2 Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use RLP default parameters except the window size from MS to IWF (SS), called KMI.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

Since some RLP parameters are different from the default parameters, a negotiation procedure will be initiated by the MS after the CONNECKT ACKNOWLEDGE message. The MS may negotiate the RLP default parameters within allowed ranges, defined in GSM 04.22, except the window size from MS to IWF (SS), called KMI, which has to be a non default value.

The SS shall accept and use the new RLP parameters till the end of the test.

After the negotiation procedure the ABM will be entered. This test is repeated twice with 2 different values of KMI, randomly chosen.

Procedure

The MS is made to send continuously I+S frames with a delay inferior to T1 between each frame.

The SS does not acknowledge the received I+S frames in RR frames.

The MS stops sending I+S frames after having sent KMI frames without acknowledgement, due to the window size.

At the expiry of T1 after the last sending I+S frame, the MS shall send a supervisory command RR frame with P bit set to 1.

The SS answer in a RR response frame with F bit set to 1 and acknowledging j<KMI frames (j is randomly chosen).

The MS shall retransmit the KMI-j lost I+S frames and then shall continue to send I+S frames.

The SS acknowledges the received I+S frames in RR frames.

The MS is returned to the idle state by clearing of the call.

Expected sequence

```
         MS                                                                    SS
         0----------------------------------------- I+S ----------------------------------------->
         -------------------------------------------------
         <----------------------------------------- RR -----------------------------------------0'
         -------------------------------------------------
         ...---------------------------------------etc...-------------------------------------- ...
         -------------------------------------------------
         KMI-1 ------------------------------------- I+S ----------------------------------------->
         -------------------------------------------------
         <----------------------------------------- RR -----------------------------------------KMI-1'
         -------------------------------------------------
         Stops sending I+S frames
         KMI----------------------------------------S ----------------------------------------->
         -------------------------------------------------
         <----------------------------------------- RR ----------------------------------------- KMI'
         -------------------------------------------------
         ...---------------------------------------etc...------------------------------------- ...
         -------------------------------------------------
         n-1 ---------------------------------------S ----------------------------------------->
         -------------------------------------------------
         <----------------------------------------- RR ----------------------------------------- n-1'
         -------------------------------------------------
         T1 Time-out
         n--------------------------------------- S (P=1)----------------------------------------->
         -------------------------------------------------
         <--------------------------------------- RR (F=1)-----------------------------------------n'
         -------------------------------------------------
         n+1 --------------------------------------- I+S ----------------------------------------->
         -------------------------------------------------
         <--------------------------------------- RR -----------------------------------------n+1'
         -------------------------------------------------
         ...--------------------------------------- etc...------------------------------------- ...
         -------------------------------------------------
         m--------------------------------------- I+S ----------------------------------------->
         -------------------------------------------------
         <--------------------------------------- RR ----------------------------------------- m'
         -------------------------------------------------
         m+1 --------------------------------------- I+S ----------------------------------------->
         -------------------------------------------------
         <--------------------------------------- RR ----------------------------------------- m+1'
         -------------------------------------------------
         ...--------------------------------------- etc...----------------------------------- ...
         -------------------------------------------------
```

The frames from the SS will be:

0',...,n-1': One RR frame containing:

$N(R)=N_{MS} \mod(62)$.

n': One supervisory RR frame containing:

C/R=0,

P/F=1,

$N(R)=N_{MS}+i-1+j \mod(62)$.

n+1',...: One supervisory RR frame containing:

N(R)=NMS+i+j mod(62).

29.3.2.6.2.3 Test requirements

The frames from the MS shall be:

0,...,KMI-1: One I+S frame containing:

N(S)=NMS,...,NMS+KMI-1 mod(62).

KMI,...,n-1: The MS stops sending I+S frames. It sends S frames.

n: On T1 Time-out after the last sent I+S frame, the MS sends a S frame containing C/R=1 and P/F=1.

n+1,...,m: The MS retransmits the lost I+S frames, it send I+S frames containing N(S)=NMS-1+j,...,NMS+KMI-1 mod(62).

m+1,...: One I+S frames containing:

N(S)=NMS+KMI,... mod(62)

29.3.2.6.3 End of a sequence

29.3.2.6.3.1 Test purpose

To test the correct handling of checkpoint recovery at the end of a sequence of frames

29.3.2.6.3.2 Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use RLP default parameters except the window size from MS to IWF (SS), called KMI.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

Since some RLP parameters are different from the default parameters, a negotiation procedure will be initiated by the MS after the CONNECKT ACKNOWLEDGE message. The MS may negotiate the RLP default parameters within allowed ranges, defined in GSM 04.22, except the window size from MS to IWF (SS), called KMI, which has to be a non default value.

The SS shall accept and use the new RLP parameters till the end of the test.

After the negotiation procedure the ABM will be entered.

This test is repeated twice with 2 different values of KMI, randomly chosen.

Procedure

The MS is made to send a sequence of i I+S frames (1<i<KIM) with a delay inferior to T1 between each frame.

The SS does not acknowledge the received I+S frames.

The MS sends S frames.

At the expiry of T1 after the last sending I+S frame, the MS shall send a supervisory command RR frame with P bit set to 1.

The SS answer in a RR response frame with F bit set to 1 and acknowledging j<i frames (j is randomly chosen).

The MS shall retransmit the i-j lost I+S frames.

The SS acknowledges the received I+S frames in RR frames.

The MS is returned to the idle state by clearing of the call.

Expected sequence

```
MS                                                                    SS
0----------------------------------------- I+S ----------------------------------------->
-----------------------------------------------
<------------------------------------------ RR ----------------------------------------0'
-----------------------------------------------
...-------------------------------------etc...----------------------------------------- ...
-----------------------------------------------
i-1 ---------------------------------------- I+S ----------------------------------------->
-----------------------------------------------
<------------------------------------------ RR ----------------------------------------i-1'
-----------------------------------------------
i----------------------------------------------S ----------------------------------------->
-----------------------------------------------
<------------------------------------------ RR -----------------------------------------i'
-----------------------------------------------
...-------------------------------------------etc... ----------------------------------- ...
-----------------------------------------------
n-1 -------------------------------------------S ----------------------------------------->
-----------------------------------------------
<------------------------------------------- RR ------------------------------------- n-1'
-----------------------------------------------
T1 Time-out
n------------------------------------------- S (P=1)----------------------------------------->
-----------------------------------------------
<--------------------------------------------RR (F=1)----------------------------------------n'
-----------------------------------------------
n+1 --------------------------------------- I+S ----------------------------------------->
-----------------------------------------------
<------------------------------------------ RR ----------------------------------------n+1'
-----------------------------------------------
...-----------------------------------------etc... ---------------------------------------- ...
-----------------------------------------------
m------------------------------------------- I+S ----------------------------------------->
-----------------------------------------------
<------------------------------------------ RR ----------------------------------------- m'
-----------------------------------------------
```

The frames from the SS will be:

0',...,n-1': One RR frame containing:

   N(R)=NMS mod(62).

n': One supervisory RR frame containing:

   C/R=0,

   P/F=1,

   N(R)=NMS+j mod(62).

n+1',...: One supervisory RR frame containing:

N(R)=NMS+j mod(62).

29.3.2.6.3.3 Test requirements

The frames from the MS shall be:

0,...,i-1: One I+S frame containing:

N(S)=NMS,...,NMS+i-1 mod(62).

i-1,...,n-1: The MS sends S frames.

n: On T1 Time-out after the last sent I+S frame, the MS sends a S frame containing C/R=1 and P/F=1.

n+1,...,m: The MS retransmits the lost I+S frames, it send I+S frames containing N(S)=NMS+j,...,NMS+i-1 mod(62).

29.3.2.6.4 Time-out of one frame

29.3.2.6.4.1 Test purpose

To test the correct handling of checkpoint recovery when a frame is not acknowledge.

29.3.2.6.4.2 Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use default RLP parameters.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

Case a: No negotiation will be initiated by the MS.

Case b: The MS initiates negotiation of RLP default parameters.

NOTE: The MS is allowed to initiate the negotiation of the RLP default parameters, within allowed ranges, defined in GSM 04.22. The MS shall do this in the ADM, after having sent a CONNECT ACKNOWLEDGE message (MO-case) or after having received a CONNECT ACKNOWLEDGE message from the SS (MT-case). The SS shall accept and use the new RLP parameters till the end of the test.

The ABM will be entered.

Procedure

The MS is made to send only one I+S frames.

The SS does not acknowledge the received I+S frame.

At the expiry of T1 after the sending of the I+S frame, the MS shall send a supervisory command RR frame with P bit set to 1.
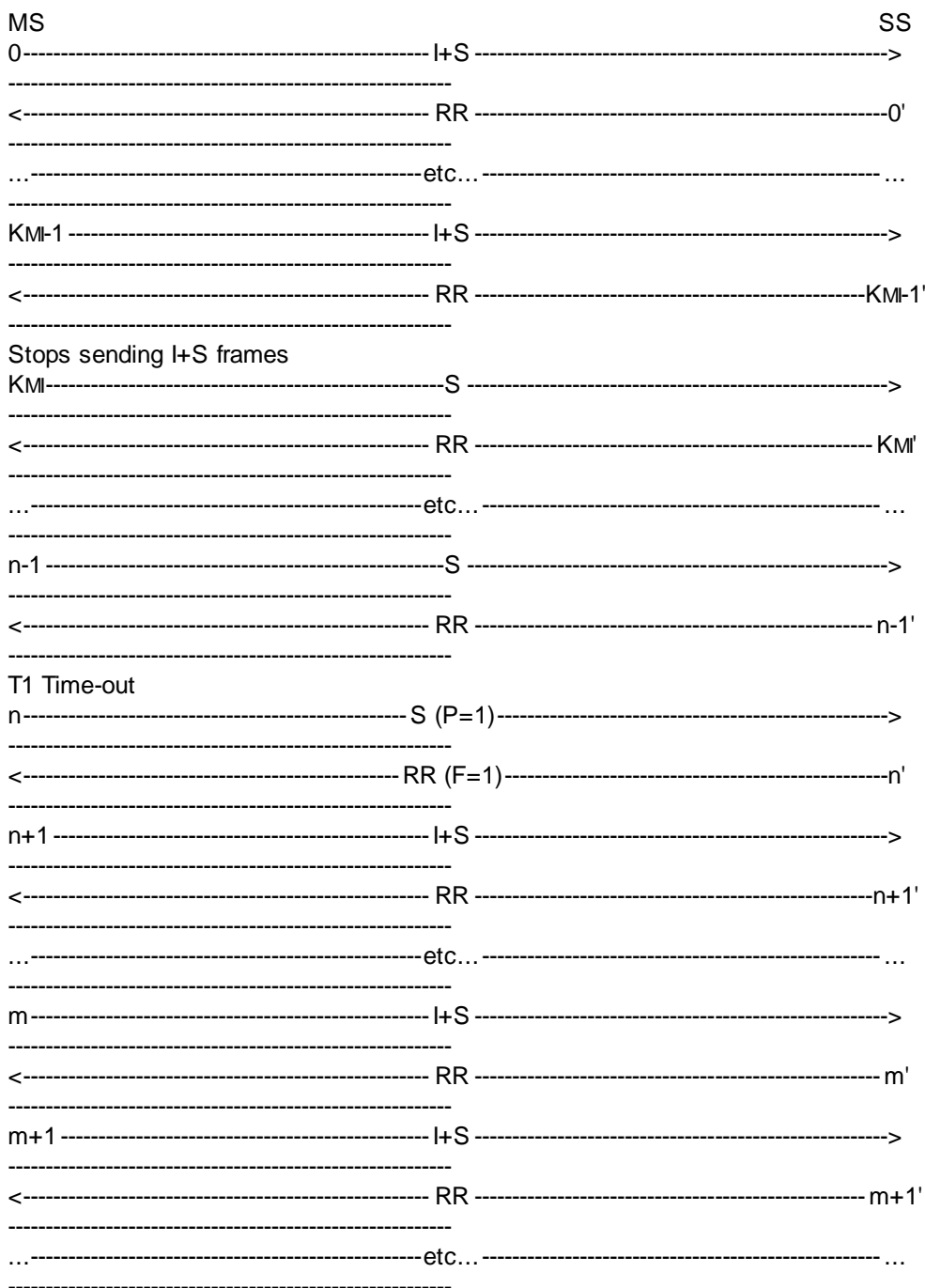
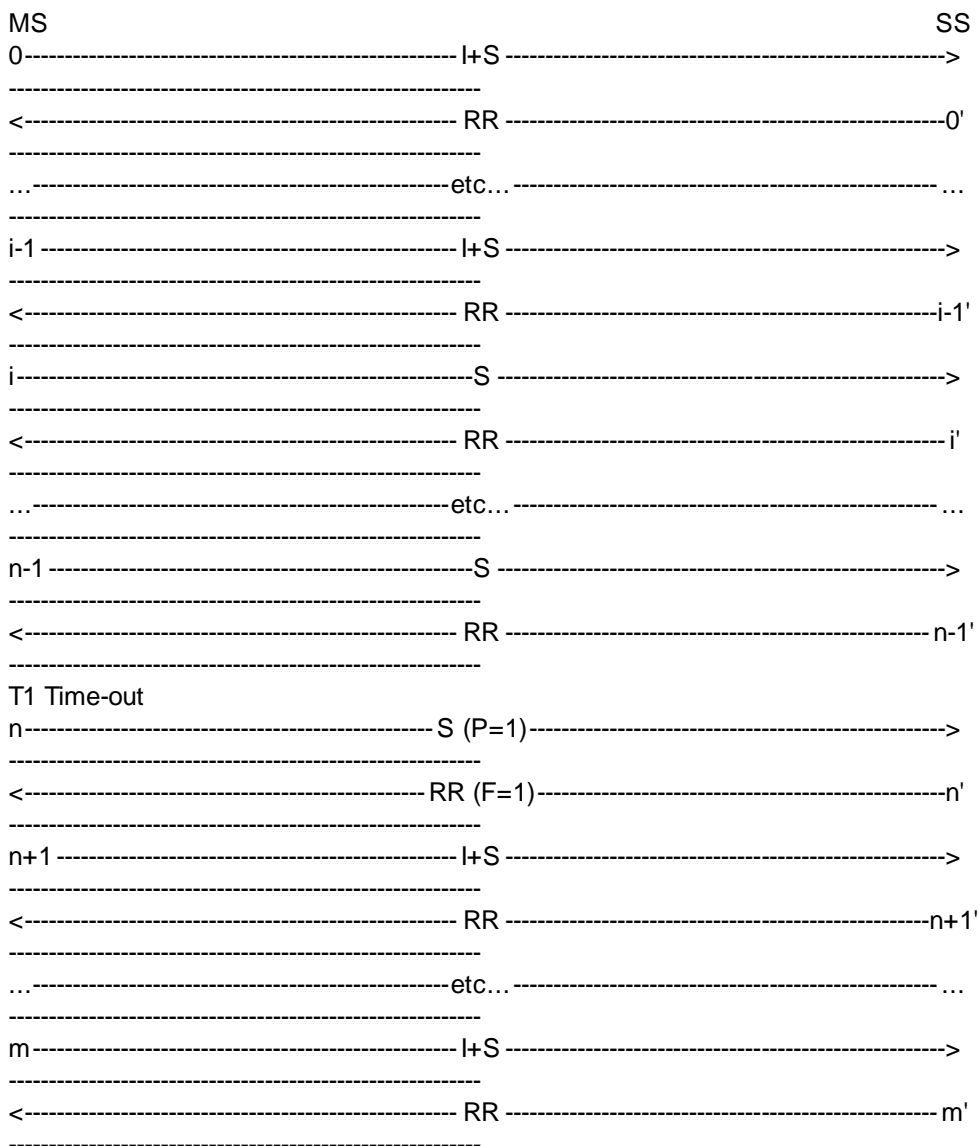The SS answer in a RR response frame with F bit set to 1 and N(R) corresponding to the I+S frame sent by the MS.

The MS shall retransmit the I+S frame.

The SS acknowledges the received I+S frame in RR frame.

The MS is returned to the idle state by clearing of the call.

Expected sequence

```
MS                                                                               SS
0------------------------------------------- I+S ----------------------------------------->
---------------------------------------------------
<----------------------------------------- RR ------------------------------------------0'
---------------------------------------------------
1---------------------------------------------S ----------------------------------------->
---------------------------------------------
<----------------------------------------- RR ------------------------------------------1'
---------------------------------------------------
...------------------------------------------etc...-------------------------------------- ...
---------------------------------------------------
n-1 -------------------------------------------S ----------------------------------------->
---------------------------------------------------
<----------------------------------------- RR ---------------------------------------- n-1'
---------------------------------------------------
T1 Time-out
n---------------------------------------- S (P=1)----------------------------------------->
---------------------------------------------------
<------------------------------------ RR (F=1)----------------------------------------n'
---------------------------------------------------
n+1 ------------------------------------------ I+S ----------------------------------------->
---------------------------------------------------
<--------------------------------------- RR ------------------------------------------n+1'
---------------------------------------------------
```

The frames from the SS will be:

0',...,n-1': One RR frame containing:

   N(R)=NMS mod(62).

n': One supervisory RR frame containing:

   C/R=0,

   P/F=1,

   N(R)=NMS mod(62).

n+1': One supervisory RR frame containing:

   N(R)=NMS+1 mod(62).

29.3.2.6.4.3   Test requirements

The frames from the MS shall be:

0,: One I+S frame containing:

   N(S)=NMS mod(62).

1,...,n-1: The MS sends S frames.

n: On T1 Time-out after the I+S frame, the MS sends a S frame containing C/R=1 and P/F=1.

n+1: The MS retransmits the I+S frame containing N(S)=NMS mod(62).

29.3.2.6.5   No response to checkpointing

29.3.2.6.5.1   Test purpose

To test the correct repetition of a frame with P=1 if SS does not answer to checkpointing.

29.3.2.6.5.2   Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use default RLP parameters.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

> Case a: No negotiation will be initiated by the MS.

> Case b: The MS initiates negotiation of RLP default parameters.

> NOTE: The MS is allowed to initiate the negotiation of the RLP default parameters, within allowed ranges, defined in GSM 04.22. The MS shall do this in the ADM, after having sent a CONNECT ACKNOWLEDGE message (MO-case) or after having received a CONNECT ACKNOWLEDGE message from the SS (MT-case). The SS shall accept and use the new RLP parameters till the end of the test.

The ABM will be entered.

Procedure

The MS is made to send only one I+S frames.

The SS does not acknowledge the received I+S frame.

At the expiry of T1 after the sending of the I+S frame, the MS shall send a supervisory command RR frame with P bit set to 1.

The SS answer in a RR response frame with F bit set to 0 and N(R) acknowledging the I+S frame sent by the MS.

At the expiry of T1 after the sending of the frame with P=1, the MS shall send a new supervisory command RR frame with P bit set to 1.
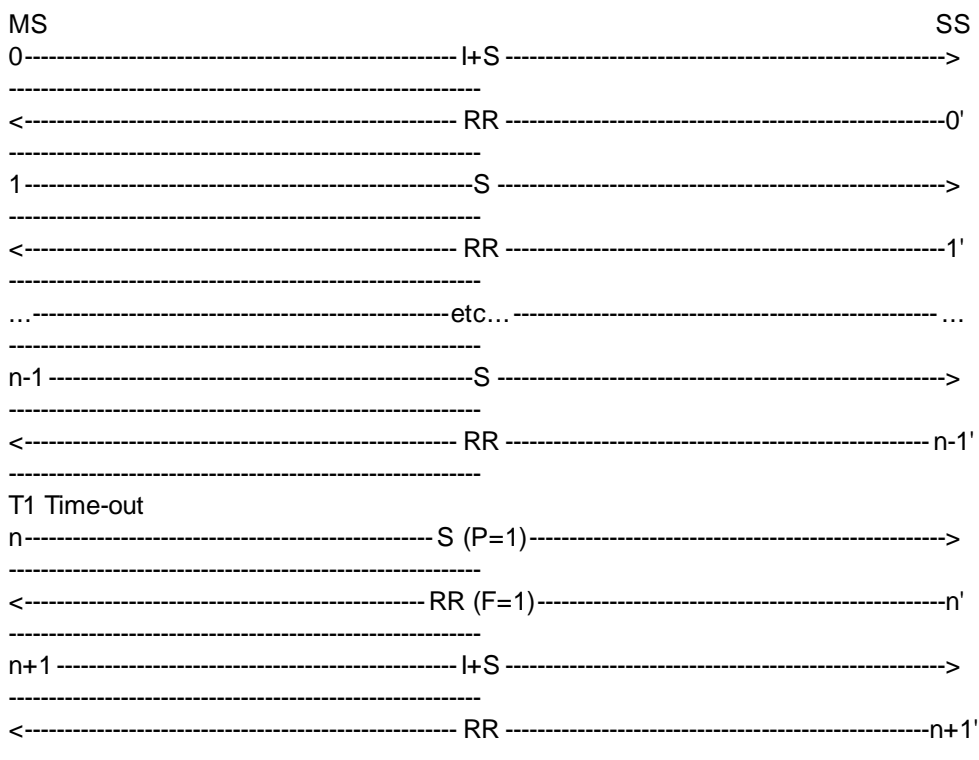
The SS answer in a RR response frame with F bit set to 1 and N(R) corresponding to the I+S frame sent by the MS.

The MS shall retransmit the I+S frame.

The SS acknowledges the received I+S frame in RR frame.

The MS is returned to the idle state by clearing of the call.

Expected sequence

```
        MS                                                                    SS
        0------------------------------------ I+S ------------------------------------->
        ------------------------------------------------------
        <------------------------------------ RR ------------------------------------0'
        ------------------------------------------------------
        1-----------------------------------------S ------------------------------------->
        ------------------------------------------------------
        <----------------------------------- RR ------------------------------------1'
        ------------------------------------------------------
        ...-----------------------------------etc...----------------------------------- ...
        ------------------------------------------------------
        n-1 ----------------------------------------S ------------------------------------->
        ------------------------------------------------------
        <----------------------------------- RR ------------------------------------ n-1'
        ------------------------------------------------------
        T1 Time-out
        n------------------------------------- S (P=1)----------------------------------->
        ------------------------------------------------------
        <------------------------------------- RR (F=0)------------------------------------n'
        ------------------------------------------------------
        T1 Time-out
        n+1 ------------------------------------- S (P=1)------------------------------------->
        ------------------------------------------------------
        <------------------------------------- RR (F=1)------------------------------------n+1'
        ------------------------------------------------------
        n+2 ------------------------------------- I+S ------------------------------------->
        ------------------------------------------------------
        <------------------------------------- RR ------------------------------------n+2'
        ------------------------------------------------------
```

The frames from the SS will be:

0',...,n-1': One RR frame containing:

$N(R)=N_{MS} \bmod(62)$.

n': One supervisory RR frame containing:

C/R=0,

P/F=0,

$N(R)=N_{MS}+1 \bmod(62)$.

n+1': One supervisory RR frame containing:

C/R=0,

P/F=1,

$N(R)=N_{MS} \bmod(62)$.

n+2': One supervisory RR frame containing:

$N(R)=N_{MS}+1 \bmod(62)$.

29.3.2.6.5.3   Test requirements

The frames from the MS shall be:

0,: One I+S frame containing:

N(S)=NMS mod(62).

1,...,n-1: The MS sends S frames.

n: On T1 Time-out after the I+S frame, the MS sends a S frame containing C/R=1 and P/F=1.

n+1: On T1 Time-out after the sending of the first frame with P=1, the MS sends a S frame containing C/R=1 and P/F=1.

n+2: The MS retransmits the I+S frame containing N(S)=NMS mod(62).

29.3.2.6.6 Incorrect response to checkpointing

29.3.2.6.6.1 Test purpose

To test the correct repetition of a frame with P=1 if the answer to checkpointing is incorrect.

29.3.2.6.6.2 Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use default RLP parameters.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

> Case a: No negotiation will be initiated by the MS.

> Case b: The MS initiates negotiation of RLP default parameters.

NOTE: The MS is allowed to initiate the negotiation of the RLP default parameters, within allowed ranges, defined in GSM 04.22. The MS shall do this in the ADM, after having sent a CONNECT ACKNOWLEDGE message (MO-case) or after having received a CONNECT ACKNOWLEDGE message from the SS (MT-case). The SS shall accept and use the new RLP parameters till the end of the test.

The ABM will be entered.

Procedure

The MS is made to send only one I+S frames.

The SS does not acknowledge the received I+S frame.

The MS sends supervisory frame with P set to 0 when it has nothing else to send.

At the expiry of T1 after the sending of the I+S frame, the MS shall send a supervisory command RR frame with P bit set to 1.

The SS answer in a supervisory SREJ response frame with F bit set to 1 and N(R) rejecting the I+S frame sent by the MS.

At the expiry of T1 after the sending of the frame with P=1, the MS shall send a new supervisory command RR frame with P bit set to 1.

The SS answer in a supervisory REJ response frame with F bit set to 1 and N(R) rejecting the I+S frame sent by the MS.

At the expiry of T1 after the sending of the frame with P=1, the MS shall send a new supervisory command RR frame with P bit set to 1.

The SS answer in a RR response frame with F bit set to 1 and N(R) corresponding to the I+S frame sent by the MS.
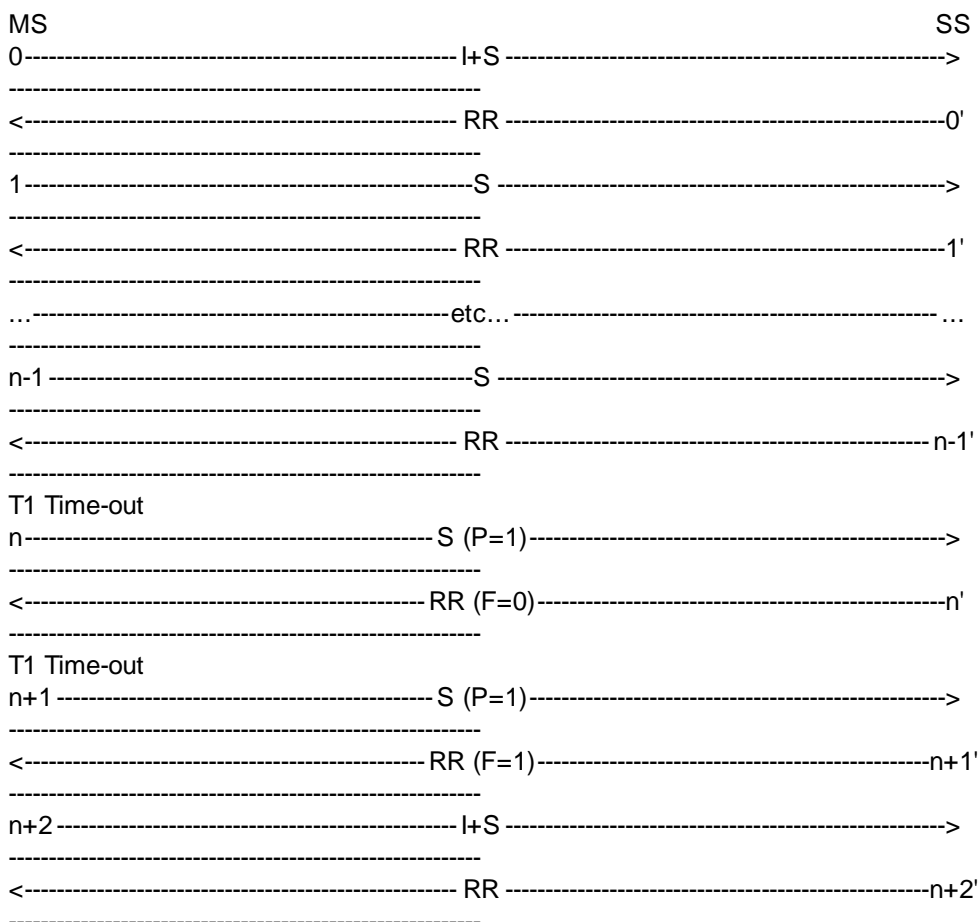
The MS shall retransmit the I+S frame.

The SS acknowledges the received I+S frame in RR frame.

The MS is returned to the idle state by clearing of the call.

Expected sequence

```
MS                                                                          SS
0------------------------------------- I+S ------------------------------------>
---------------------------------------------
<------------------------------------ RR ------------------------------------0'
---------------------------------------------
1-------------------------------------S ------------------------------------>
---------------------------------------------
<------------------------------------ RR ------------------------------------1'
---------------------------------------------
...-------------------------------------etc...------------------------------- ...
---------------------------------------------
n-1 -------------------------------------S ------------------------------------>
---------------------------------------------
<----------------------------------- SREJ (F=1) ------------------------------n'
---------------------------------------------
n+1 -------------------------------------S ------------------------------------>
---------------------------------------------
<------------------------------------ RR ------------------------------------n+1'
---------------------------------------------
...-------------------------------------etc...------------------------------- ...
---------------------------------------------
p-1 -------------------------------------S ------------------------------------>
---------------------------------------------
<------------------------------------ RR ------------------------------------p-1'
---------------------------------------------
T1 Time-out
p------------------------------------- S (P=1)----------------------------------->
---------------------------------------------
<----------------------------------- REJ (F=1) ------------------------------p'
---------------------------------------------
p+1 -------------------------------------S ------------------------------------>
---------------------------------------------
<------------------------------------ RR ------------------------------------p+1'
---------------------------------------------
...-------------------------------------etc...------------------------------- ...
---------------------------------------------
q-1 -------------------------------------S ------------------------------------>
---------------------------------------------
<------------------------------------ RR ------------------------------------q-1'
---------------------------------------------
T1 Time-out
q------------------------------------- S (P=1)----------------------------------->
---------------------------------------------
<----------------------------------- RR (F=1)-------------------------------q'
---------------------------------------------
q+1 -------------------------------------I+S ------------------------------------>
---------------------------------------------
<------------------------------------ RR ------------------------------------q+1'
---------------------------------------------
```

The frames from the SS will be:

0',...,n-1': One RR frame containing:

> N(R)=NMS mod(62).
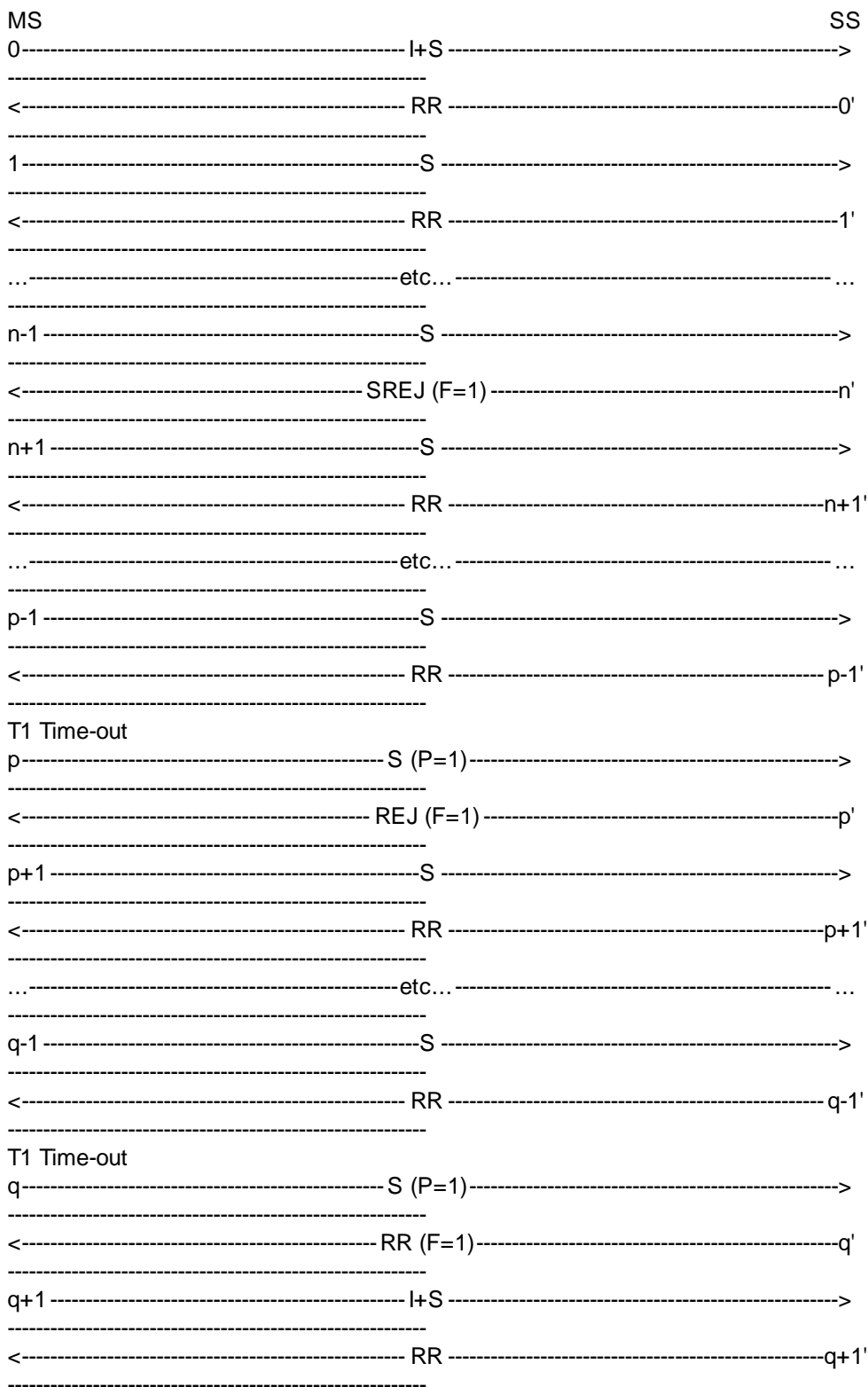
n': One supervisory SREJ frame containing:

> C/R=0,

> P/F=1,

> N(R)=NMSmod(62).

m+1',...,p-1': One RR frame containing:

> N(R)=NMS mod(62).

p': One supervisory REJ frame containing:

> C/R=0,

> P/F=1,

> N(R)=NMSmod(62).

p+1',...,q-1': One RR frame containing:

> N(R)=NMS mod(62).

q': One supervisory RR frame containing:

> C/R=0,

> P/F=1,

> N(R)=NMSmod(62).

q+1': One RR frame containing:

> N(R)=NMS+1 mod(62).

29.3.2.6.6.3 Test requirements

The frames from the MS shall be:

0,: One I+S frame containing:

> N(S)=NMS mod(62).

1,...,n-1: The MS sends S frames.

n: On T1 Time-out after the I+S frame, the MS sends a S frame containing:

> C/R=1,

> P/F=1.

n+1,...,p-1: The MS sends S frames.

p: On T1 Time-out after the I+S frame, the MS sends a S frame containing:

> C/R=1,

> P/F=1.

p+1,...,q-1: The MS sends S frames.

q: On T1 Time-out after the I+S frame, the MS sends a S frame containing:

C/R=1,

P/F=1.

q+1: The MS retransmits the I+S frame containing:

N(S)=NMS mod(62).

29.3.2.6.7 Total loss of response to checkpointing

29.3.2.6.7.1 Definition and applicability

The last frame of a sequence of numbered information frames is guarded by timer T1. Failure to receive an acknowledgement, or a reject, within a time T1, shall result in the RLP entity starting a checkpoint recovery procedure. If the RLP peer entity fails to respond to a checkpoint command, which is also guarded by timer T1, the checkpoint recovery procedure shall be repeated, up to N2 times.

29.3.2.6.7.2 Conformance requirements

The MS shall start the checkpoint procedure after failure to receive acknowledgement of a numbered information frame within a time T1. GSM 04.22, 5.3.3., 5.3.3.2.

The MS shall repeat the checkpoint procedure, up to N2 times, if the peer RLP entity fails to respond to a checkpoint command within a time T1. GSM 04.22, 5.3.3.2

The MS shall disconnect or reset the RLP link after the checkpoint procedure has been performed N2+1 times, GSM 04.22, 5.3.3.2

References

GSM 04.22 section 5.3.3., 5.3.3.2.

29.3.2.6.7.3 Test purpose

To test the correct handling of a total loss of response to checkpointing.

29.3.2.6.7.4 Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

If possible, the MS is configured to use RLP default parameters except the number of retransmission N2. If a MS cannot be configured to use a non default N2 value, the SS shall use XID negotiation to modify the value of N2 to be used during the test.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

Since some RLP parameters are different from the default parameters, a negotiation procedure will be initiated by the MS after the CONNECKT ACKNOWLEDGE message. The MS may negotiate the RLP default parameters within allowed ranges, defined in GSM 04.22, except the number of retransmission N2, which has to be a non default value.

The SS shall accept and use the new RLP parameters till the end of the test.

After the negotiation procedure the ABM will be entered.

Once in ABM, the SS shall initiate the transmission of an I+S frame, which will transfer L2RCOP status information between peer L2RCOP entities (SS to MS). The MS may respond with an I+S frame containing L2RCOP status information. The SS shall be capable of initiating this sequence, or responding to an I+S L2RCOP status frame from the MS.

This test is repeated twice with 2 different values of N2, randomly chosen.

Test Procedure

The MS is made to send only one I+S frames.

The SS does not acknowledge the received I+S frame.

At the expiry of T1 after the sending of the I+S frame, the MS shall send a supervisory command RR frame with P bit set to 1.

The SS answer in a RR response frame with F bit set to 0 and N(R) acknowledging the I+S frame sent by the MS.

At the expiry of T1 after the sending of the frame with P=1, the MS shall send a new supervisory command RR frame with P bit set to 1.

The SS answer in a RR response frame with F bit set to 0 and N(R) corresponding to the I+S frame sent by the MS.
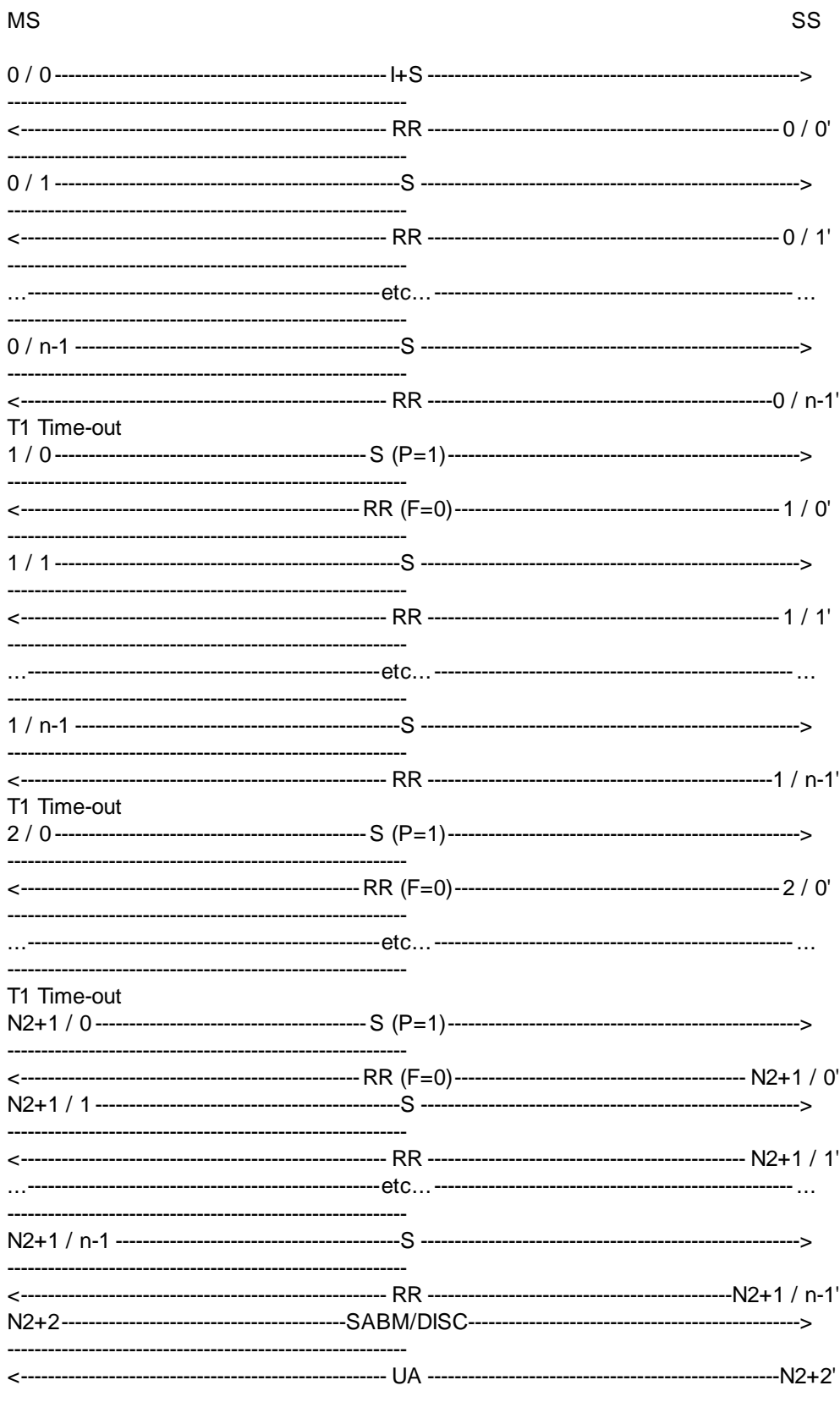
These 2 last steps are repeated N2 times.

At the expiry of T1 after the sending of the frame with P=1, the MS shall reset (SABM) or disconnect (DISC) the link.

The SS answer with an UA frame.

The MS is returned to the idle state by clearing of the call.

Expected sequence

```
          MS                                                                              SS

          0 / 0 ------------------------------------------ I+S ------------------------------------------>
          ----------------------------------------------
          <------------------------------------------ RR ------------------------------------------ 0 / 0'
          ----------------------------------------------
          0 / 1 -------------------------------------------S ------------------------------------------>
          ----------------------------------------------
          <------------------------------------------ RR ------------------------------------------ 0 / 1'
          ----------------------------------------------
          ...-------------------------------------------etc...------------------------------------------ ...
          ----------------------------------------------
          0 / n-1 ------------------------------------------S ------------------------------------------>
          ----------------------------------------------
          <------------------------------------------ RR ------------------------------------------0 / n-1'
          T1 Time-out
          1 / 0 ------------------------------------------ S (P=1)------------------------------------------>
          ----------------------------------------------
          <------------------------------------------ RR (F=0)------------------------------------------ 1 / 0'
          ----------------------------------------------
          1 / 1 -------------------------------------------S ------------------------------------------>
          ----------------------------------------------
          <------------------------------------------ RR ------------------------------------------ 1 / 1'
          ----------------------------------------------
          ...-------------------------------------------etc...------------------------------------------ ...
          ----------------------------------------------
          1 / n-1 ------------------------------------------S ------------------------------------------>
          ----------------------------------------------
          <------------------------------------------ RR ------------------------------------------1 / n-1'
          T1 Time-out
          2 / 0 ------------------------------------------ S (P=1)------------------------------------------>
          ----------------------------------------------
          <------------------------------------------ RR (F=0)------------------------------------------ 2 / 0'
          ----------------------------------------------
          ...-------------------------------------------etc...------------------------------------------ ...
          ----------------------------------------------

          T1 Time-out
          N2+1 / 0 ------------------------------------------ S (P=1)------------------------------------------>
          ----------------------------------------------
          <------------------------------------------ RR (F=0)------------------------------------------ N2+1 / 0'
          N2+1 / 1 ------------------------------------------S ------------------------------------------>
          ----------------------------------------------
          <------------------------------------------ RR ------------------------------------------ N2+1 / 1'
          ...-------------------------------------------etc...------------------------------------------ ...
          ----------------------------------------------
          N2+1 / n-1 ------------------------------------------S ------------------------------------------>
          ----------------------------------------------
          <------------------------------------------ RR ------------------------------------------N2+1 / n-1'
          N2+2------------------------------------------SABM/DISC------------------------------------------>
          ----------------------------------------------
          <------------------------------------------ UA ------------------------------------------N2+2'
          ----------------------------------------------
```

The frames from the SS will be:

0 / i',...,0 / i': One RR frame containing:

    P/F=0,

N(R)=NMS mod(62).

i = 0,...,n-1.

k / i',...,k / i': One RR frame containing:

P/F=0,

N(R)=NMS mod(62).

k = 1,..., N2+1, i = 0,...,n-1.

N2+2': One UA frame containing:

C/R=0,

P/F=P/F received in the DISC or SABM.

29.3.2.6.7.5 Test requirements

The frames from the MS shall be:

0 / 0: One I+S frame containing:

N(S)=NMS mod(62).

0 / 1,..., 0/ n-1: The MS sends S frames.

k / 0: On T1 Time-out after the I+S frame, the MS sends a S frame containing:

C/R=1,

P/F=1.

k = 1,..., N2+1.

k / 1,..., k / n-1: The MS sends S frames.

N2+2: The MS sends a SABM (C/R=1, P/F=1) or a DISC(C/R=1) frame.

29.3.2.6.8 Retransmission of a sequence

29.3.2.6.8.1 Test purpose

To test the correct repetition of a sequence of frame.

29.3.2.6.8.2 Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use RLP default parameters except the number of retransmission N2.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

Since some RLP parameters are different from the default parameters, a negotiation procedure will be initiated by the MS after the CONNECKT ACKNOWLEDGE message. The MS may negotiate the RLP default parameters within allowed ranges, defined in GSM 04.22, except the number of retransmission N2, which has to be a non default value.

The SS shall accept and use the new RLP parameters till the end of the test.

After the negotiation procedure the ABM will be entered.

This test is repeated twice with 2 different values of N2, randomly chosen. The window size fromMS to IWF (SS) is called K$_{MI}$.

Procedure

The MS is made to send a sequence of i I+S frames (1<i<KIM) with a delay inferior to T1 between each frame.

The SS does not acknowledge the received I+S frames.

The MS starts sending supervisory frames after having sent i frames.

At the expiry of T1 after the last sending I+S frame, the MS shall send a supervisory command RR frame with P bit set to 1.

The SS answers in a RR response frame with F bit set to 1 and acknowledging no frames.

The MS shall retransmit the all I+S frames. Then the MS shall sends supervisory frames.

At the expiry of T1 after the last sending I+S frame, the MS shall send a supervisory command RR frame with P bit set to 1.
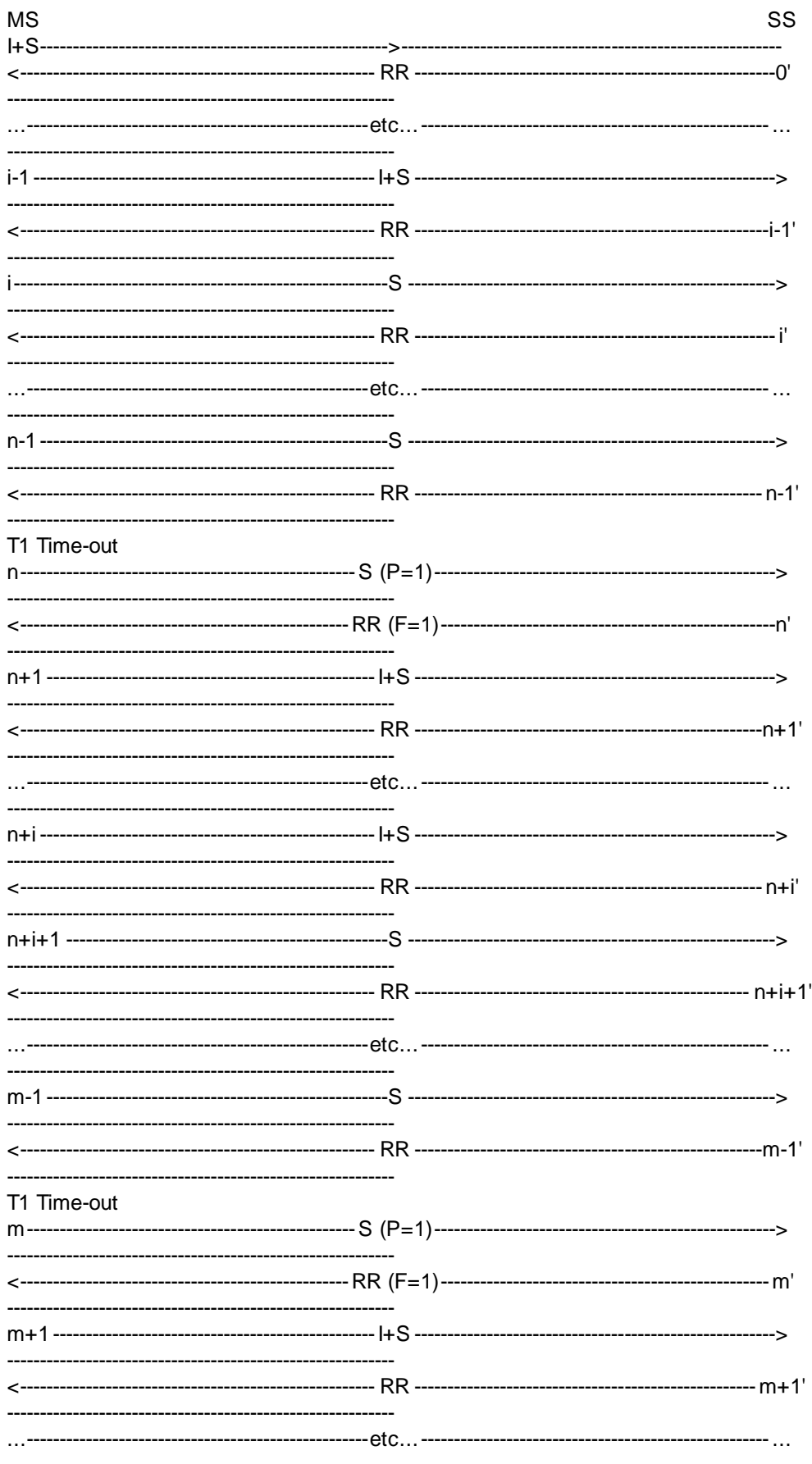
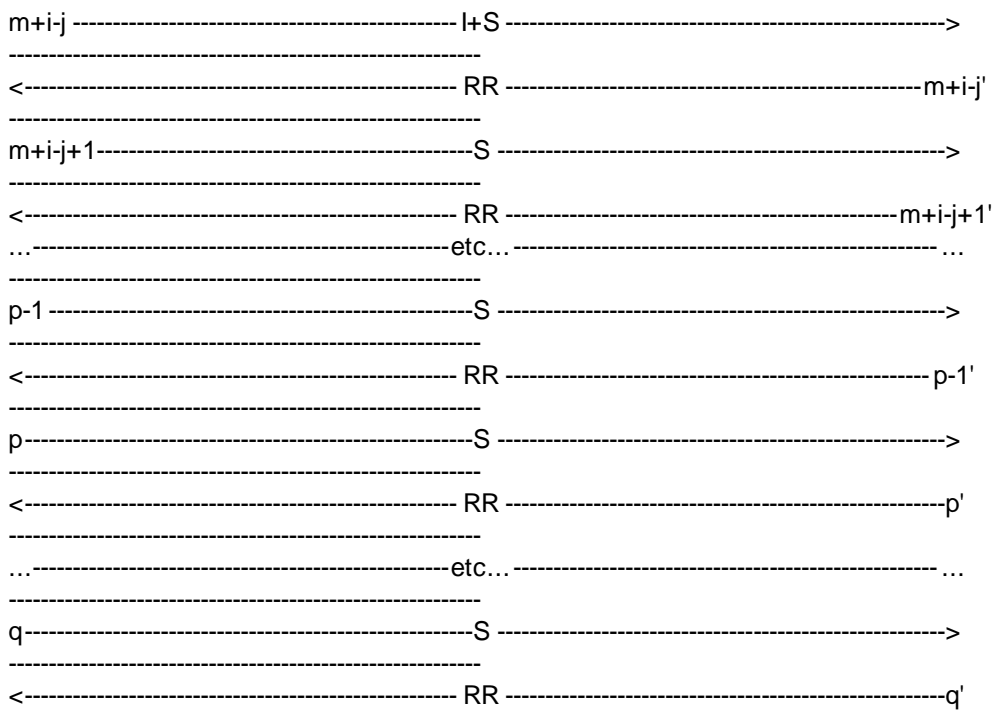The SS answers in a RR response frame with F bit set to 1 and acknowledging j<i frames. (j randomly chosen).

The MS shall retransmit the i-j lost I+S frames.

0,25*T1 after the last I+S frame of the sequence, the SS acknowledges all the received I+S frames in RR frame.

The MS is returned to the idle state by clearing of the call.

Expected sequence

```
MS                                                                          SS
I+S----------------------------------------->---------------------------------------------
<----------------------------------------- RR ---------------------------------------------0'
-------------------------------------------------
...-------------------------------------------etc...-------------------------------------------- ...
-------------------------------------------------
i-1 ------------------------------------------I+S ------------------------------------------->
-------------------------------------------------
<----------------------------------------- RR ----------------------------------------------i-1'
-------------------------------------------------
i----------------------------------------------S ------------------------------------------->
-------------------------------------------------
<----------------------------------------- RR ---------------------------------------------- i'
-------------------------------------------------
...------------------------------------------etc... -------------------------------------------- ...
-------------------------------------------------
n-1 ------------------------------------------S ------------------------------------------->
-------------------------------------------------
<----------------------------------------- RR ------------------------------------------ n-1'
-------------------------------------------------
T1 Time-out
n-------------------------------------------- S (P=1)--------------------------------------->
-------------------------------------------------
<----------------------------------------- RR (F=1)----------------------------------------n'
-------------------------------------------------
n+1 -------------------------------------------I+S ------------------------------------------->
-------------------------------------------------
<----------------------------------------- RR ---------------------------------------------n+1'
-------------------------------------------------
...-------------------------------------------etc...----------------------------------------- ...
-------------------------------------------------
n+i ----------------------------------------I+S ------------------------------------------->
-------------------------------------------------
<----------------------------------------- RR ----------------------------------------- n+i'
-------------------------------------------------
n+i+1 --------------------------------------S ------------------------------------------->
-------------------------------------------------
<----------------------------------------- RR --------------------------------------- n+i+1'
-------------------------------------------------
...--------------------------------------------etc...--------------------------------------- ...
-------------------------------------------------
m-1 -------------------------------------------S ------------------------------------------->
-------------------------------------------------
<----------------------------------------- RR ---------------------------------------------m-1'
-------------------------------------------------
T1 Time-out
m----------------------------------------- S (P=1)----------------------------------------->
-------------------------------------------------
<----------------------------------------- RR (F=1)---------------------------------------- m'
-------------------------------------------------
m+1 -----------------------------------------I+S ------------------------------------------->
-------------------------------------------------
<----------------------------------------- RR ------------------------------------------- m+1'
-------------------------------------------------
...-------------------------------------------etc... ------------------------------------------- ...
-------------------------------------------------
```

```
m+i-j -------------------------------------- I+S ------------------------------------------------->
-----------------------------------------------------
<----------------------------------------- RR -------------------------------------------------m+i-j'
-----------------------------------------------------
m+i-j+1--------------------------------------S ------------------------------------------------->
-----------------------------------------------------
<----------------------------------------- RR -----------------------------------------m+i-j+1'
...------------------------------------------etc...------------------------------------------------ ...
-----------------------------------------------------
p-1 ----------------------------------------S ------------------------------------------------->
-----------------------------------------------------
<----------------------------------------- RR -------------------------------------------------p-1'
-----------------------------------------------------
p-------------------------------------------S ------------------------------------------------->
-----------------------------------------------------
<----------------------------------------- RR -------------------------------------------------p'
-----------------------------------------------------
...------------------------------------------etc...------------------------------------------------ ...
-----------------------------------------------------
q-------------------------------------------S ------------------------------------------------->
-----------------------------------------------------
<----------------------------------------- RR -------------------------------------------------q'
-----------------------------------------------------
```

The frames from the SS will be:

0',...,n-1': One RR frame containing:

   $N(R)=NMS \bmod(62)$.

n': One supervisory RR frame containing:

   C/R=0,

   P/F=1,

   $N(R)=NMS \bmod(62)$.

n+1',...,m-1': One supervisory RR frame containing:

   $N(R)=NMS \bmod(62)$.

m': One supervisory RR frame containing:

   C/R=0,

   P/F=1,

   $N(R)=NMS+j \bmod(62)$.

m+1,...,p-2': One supervisory RR frame containing:

   $N(R)=NMS+j \bmod(62)$.

p-1': 0,25*T1 after the last received I+S frame, the SS sends a supervisory RR frame containing:

   $N(R)=NMS+i \bmod(62)$.

p',...,q': during at least T1, the SS sends supervisory frames.

29.3.2.6.8.3   Test requirements

The frames from the MS shall be:

0,...,i-1: One I+S frame containing:

N(S)=NMS,...,NMS+i-1 mod(62).

i,...,n-1: The MS sends S frames with P bit set to 0.

n: On T1 Time-out after the I+S frame, the MS sends a S frame containing:

C/R=1,

P/F=1.

n+1,...,n+i: The MS retransmits the I+S frames containing:

N(S)=NMS,...,NMS+i-1 mod(62).

n+i+1,...,m-1: The MS sends S frames with P bit set to 0.

m: On T1 Time-out after the I+S frame, the MS sends a S frame containing:

C/R=1,

P/F=1.

m+1,...,m+i-j: The MS retransmits the I+S frames containing:

N(S)=NMS+j,...,NMS+i-1 mod(62).

m+i-j+1,...,q: The MS sends S frames with P bit set to 0.

29.3.2.6.9 N2 retransmission of a sequence

29.3.2.6.9.1 Definition and applicability

The last frame of a sequence of numbered information frames is guarded by timer T1. Failure to receive an acknowledgement, or a reject, within a time T1, shall result in the RLP entity starting a checkpoint recovery procedure. If the peer RLP entity responds with a Supervisory frame with the F-bit set to "1", the MS shall retransmit the numbered frames, if appropriate.

29.3.2.6.9.2 Conformance requirements

The MS shall start the checkpoint procedure after failure to receive acknowledgement of a numbered information frame within a time T1. GSM 04.22, 5.3.3., 5.3.3.2.

The MS shall retransmit the I+S frame sequence starting at N(R), upon reception of a Supervisory frame with the F-bit set to "1" from the peer RLP entity. This shall constitute a retransmission of the original I+S sequence only if N(R) remains constant, GSM 04.22, 5.3.3.

The MS shall disconnect or reset the RLP link after the I+S sequence and checkpoint procedure has been performed N2+1 times, GSM 04.22, 5.3.3.2

References

GSM 04.22 section 5.3.3., 5.3.3.2.

29.3.2.6.9.3 Test purpose

To test the correct repetition of a sequence of frame.

29.3.2.6.9.4   Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

If possible, the MS is configured to use RLP default parameters except the number of retransmission N2. If a MS cannot be configured to use a non default N2 value, the SS shall use XID negotiation to modify the value of N2 to be used during the test.

A non transparent data call will be established, so that the MS is in call state U10 ("Call Active").

Since some RLP parameters are different from the default parameters, a negotiation procedure will be initiated by the MS after the CONNECKT ACKNOWLEDGE message. The MS may negotiate the RLP default parameters within allowed ranges, defined in GSM 04.22, except the number of retransmission N2, which has to be a non default value.

The SS shall accept and use the new RLP parameters till the end of the test.

After the negotiation procedure the ABM will be entered.

Once in ABM, the SS shall initiate the transmission of an I+S frame, which will transfer L2RCOP status information between peer L2RCOP entities (SS to MS). The MS may respond with an I+S frame containing L2RCOP status information. The SS shall be capable of initiating this sequence, or responding to an I+S L2RCOP status frame from the MS.

This test is repeated twice with 2 different values of N2, randomly chosen.

The window size from MS to IWF (SS) is called KMI.

Test Procedure

The MS is made to send a sequence of i I+S frames ($1 < i < K_{MI}$, and $i > N2$) with a delay inferior to T1 between each frame.

The SS does not acknowledge the received I+S frames.

The MS shall send S frames after having sent the i I+S frames.

At the expiry of T1 after the last sending I+S frame, the MS shall send a supervisory command RR frame with P bit set to 1.

The SS answer in a RR response frame with F bit set to 1 and acknowledging 1 frame.

The MS shall retransmit the i-1 lost I+S frames.

The SS does not acknowledge the received I+S frames.

The MS shall send S frames after having sent the i I+S frames.

The 5 last steps are repeated N2 times.

At the expiry of T1 after the last sending I+S frame, the MS shall send a supervisory command RR frame with P bit set to 1.

The SS answer in a RR response frame with F bit set to 1 and acknowledging 1 frame.

After the reception of the last RR response the MS shall reset or disconnect the RLP link by sending an SABM (C/R=1, P/F=1) or a DISC (C/R=1) frame.

The SS answer with an UA frame.

The MS is returned to the idle state by clearing of the call.

Expected sequence

```
MS                                                                       SS
0------------------------------------------- I+S ----------------------------------------->
-----------------------------------------------
<----------------------------------------- RR -----------------------------------------0'
-----------------------------------------------
...------------------------------------------etc...------------------------------------ ...
-----------------------------------------------
i-1 ----------------------------------------- I+S ----------------------------------------->
-----------------------------------------------
<----------------------------------------- RR ----------------------------------------i-1'
-----------------------------------------------
i-------------------------------------------S ----------------------------------------->
-----------------------------------------------
<----------------------------------------- RR ----------------------------------------i'
-----------------------------------------------
...------------------------------------------etc...------------------------------------ ...
-----------------------------------------------
n-------------------------------------------S ----------------------------------------->
-----------------------------------------------
<----------------------------------------- RR ----------------------------------------n'
-----------------------------------------------
T1 Time-out
1 / 0 ------------------------------------ S (P=1)----------------------------------->
-----------------------------------------------
<------------------------------------ RR (F=1)----------------------------------- 1 / 0'
-----------------------------------------------
1 / 1 ----------------------------------------- I+S ----------------------------------------->
-----------------------------------------------
<----------------------------------------- RR ----------------------------------------- 1 / 1'
-----------------------------------------------
...----------------------------------------etc...------------------------------------------ ...
-----------------------------------------------
1 / i-1 ----------------------------------------- I+S ----------------------------------------->
-----------------------------------------------
<----------------------------------------- RR ----------------------------------------- 1 / i-1'
-----------------------------------------------
1 / i -----------------------------------------S ----------------------------------------->
-----------------------------------------------
<----------------------------------------- RR -----------------------------------------1 / i'
-----------------------------------------------
...----------------------------------------etc...------------------------------------------ ...
-----------------------------------------------
1 / n1 -----------------------------------------S ----------------------------------------->
-----------------------------------------------
<----------------------------------------- RR ----------------------------------------- 1 / n1'
-----------------------------------------------
T1 Time-out
2 / 0 -------------------------------------- S (P=1)----------------------------------->
-----------------------------------------------
<------------------------------------- RR (F=1)----------------------------------- 2 / 0'
-----------------------------------------------
2 / 1 -------------------------------------------- I+S ----------------------------------------->
-----------------------------------------------
<------------------------------------------- RR -------------------------------------------2 / 1'
-----------------------------------------------
...------------------------------------------etc...------------------------------------------ ...
-----------------------------------------------
```

```
2 / i-2 ---------------------------------------- I+S ----------------------------------------->
----------------------------------------------
<---------------------------------------------- RR ---------------------------------------- 2 / i-2'
----------------------------------------------
2 / i-1 ---------------------------------------- S ----------------------------------------->
----------------------------------------------
<---------------------------------------------- RR ---------------------------------------- 2 / i-1'
----------------------------------------------
...----------------------------------------etc... ---------------------------------------- ...
----------------------------------------------
2 / n2 ----------------------------------------S ----------------------------------------->
----------------------------------------------
<---------------------------------------------- RR ---------------------------------------- 2 / n2'
----------------------------------------------
...----------------------------------------etc... ---------------------------------------- ...
----------------------------------------------
T1 Time-out
N2 / 0---------------------------------- S (P=1)----------------------------------------->
----------------------------------------------
<---------------------------------------- RR (F=1)----------------------------------------N2 / 0'
N2 / 1 ---------------------------------------- I+S ----------------------------------------->
----------------------------------------------
<---------------------------------------------- RR ----------------------------------------N2 / 1'
...----------------------------------------etc... ---------------------------------------- ...
----------------------------------------------
N2 / i-N2----------------------------------------I+S ----------------------------------------->
----------------------------------------------
<---------------------------------------------- RR ---------------------------------------- N2 / i-N2'
N2 / i-N2+1 ----------------------------------------S ----------------------------------------->
----------------------------------------------
<---------------------------------------------- RR ---------------------------------------- N2 / i-N2+1'
...----------------------------------------etc... ---------------------------------------- ...
----------------------------------------------
N2 / nN2----------------------------------------S ----------------------------------------->
----------------------------------------------
<---------------------------------------------- RR ----------------------------------------N2 / nN2'
T1 Time-out
N2+1 / 0 ---------------------------------- S (P=1)----------------------------------------->
----------------------------------------------
<---------------------------------------- RR (F=1)---------------------------------------- N2+1 / 0'
----------------------------------------SABM/DISC---------------------------------------->
----------------------------------------------
<---------------------------------------- UA ----------------------------------------
```
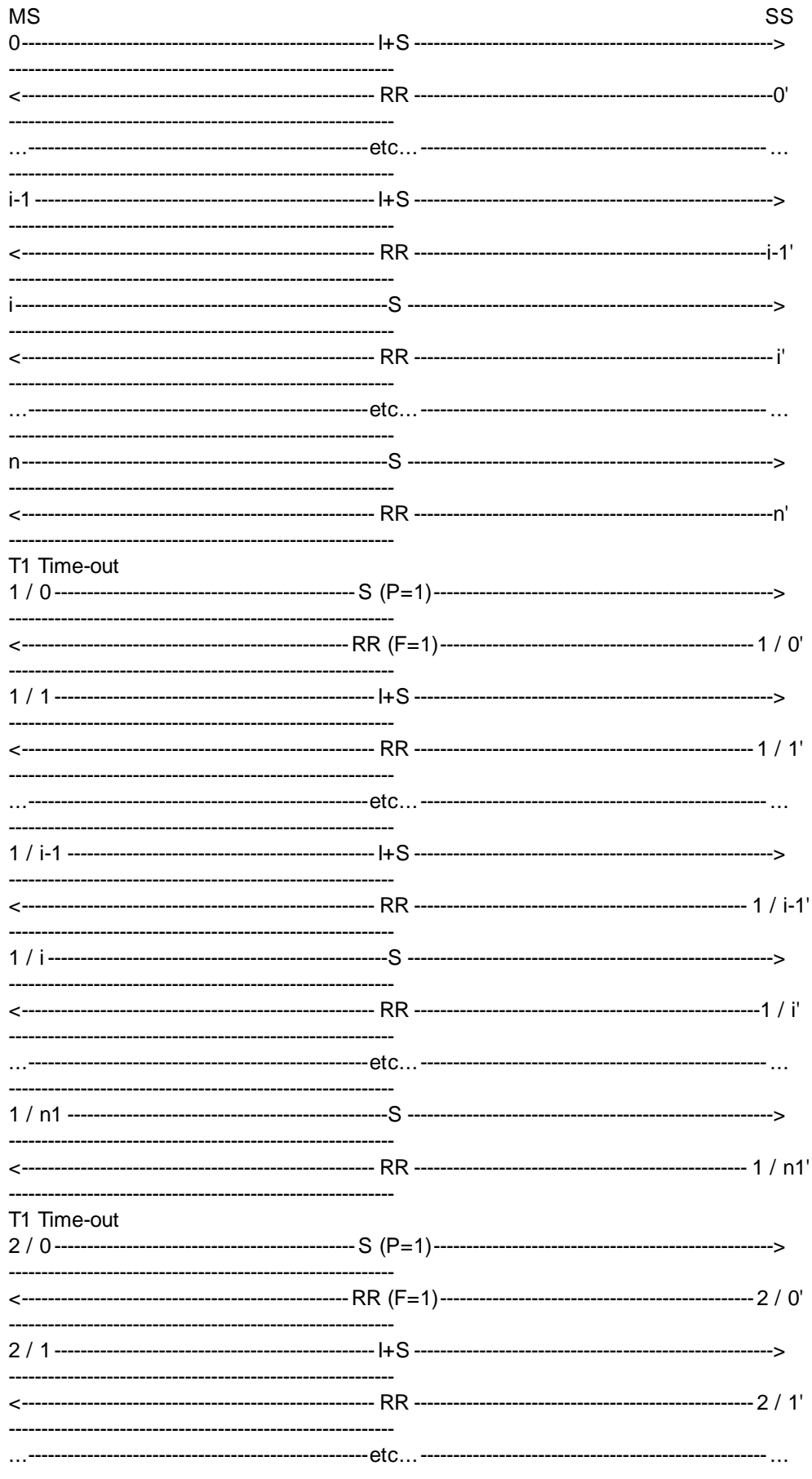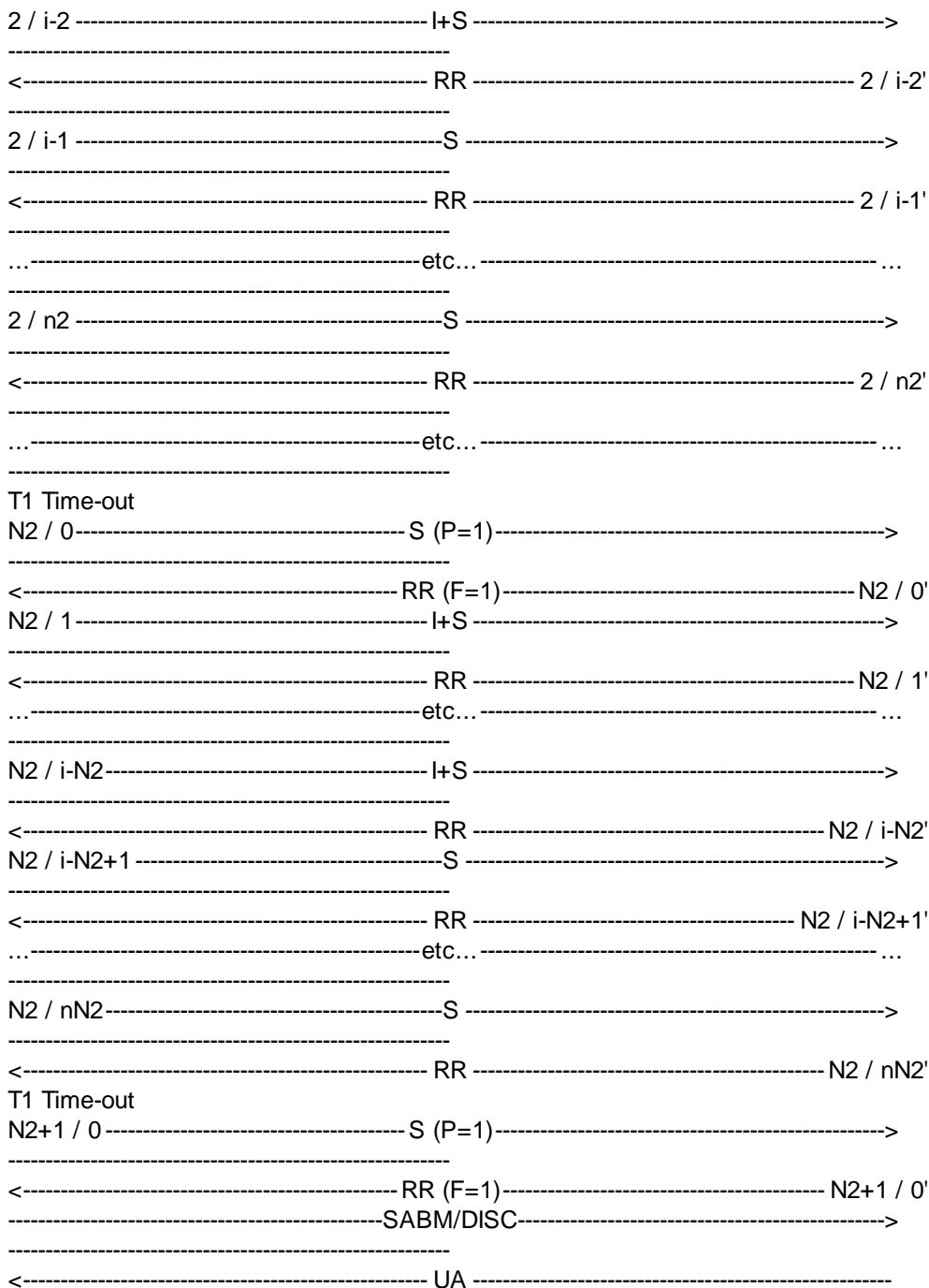
The frames from the SS will be:

0',...,n': One RR frame containing:

$N(R)=NMS \bmod(62)$.

k / 0': One supervisory RR frame containing:

C/R=0,

P/F=1,

$N(R)=NMS+k \bmod(62)$.

k = 1, ..., N2+1.

k / 1',...,k / nk': One RR frame containing:

N(R)=NMS+k mod(62).

k = 1, ..., N2.

One UA frame with P/F bit equal to the P/F received.

29.3.2.6.9.5 Test requirements

The frames from the MS shall be:

0,...,i-1: One I+S frame containing:

N(S)=NMS,...,NMS+i-1 mod(62).

i,..., n: The MS sends S frames.

k / 0: The MS stops sending I+S frames. It sends S frames. On T1 Time-out after the last sent I+S frame, the MS sends a S frame containing:

C/R=1,

P/F=1.

k = 1, ..., N2+1.

k / 1,..., k / i-k: The MS retransmits the I+S frames containing:

N(S)=NMS+k,...,NMS+i-1 mod(62).

k = 1, ..., N2.

k / i-k+1,..., k / nk: The MS sends S frames. k= 1, ..., N2.

The MS shall reset to disconnect the RLP link. It shall send an SABM (C/R=1, P/F=1) or a DISC (C/R=1).

29.3.3 Negotiation of the RLP parameters

29.3.3.1 Negotiation initiated by the SS

29.3.3.1.1 Conformance requirements

The MS shall be able to respond to a negotiation request from the network and to configure its RLP parameters accordingly. It shall do so in ABM mode as well as in ADM mode.

References

GSM 04.22 section 5.2.2.6.

29.3.3.1.2 Test purpose

To test the correct handling of the MS to a received XID frame in ADM or ABM mode.

29.3.3.1.3 Test method

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use RLP default parameters. The window size from IWF (SS) to MS is called K_{IM}.

The MS is made to establish a MO non transparent data call. In initial conditions MS is in call state U10 ("Call Active") after having sent a CONN_ACK message.

> Case a: No negotiation will be initiated by the MS.

> Case b: The MS initiates negotiation of RLP default parameters.

> NOTE: The MS is allowed to initiate the negotiation of the RLP default parameters, within allowed ranges, defined in GSM 04.22. The MS shall do this in the ADM, after having sent a CONNECT ACKNOWLEDGE message (MO-case) or after having received a CONNECT ACKNOWLEDGE message from the SS (MT-case.)

Related PICS/PIXIT statements

Supported bearer services; characteristics of non-transparent services.

Foreseen final state of the MS

Idle.

Test procedure

Case 1: Testing of the correct handling of the MS to a received XID frame in ADM

> Immediately after having received the "CONN_ACK", the SS sends a correct XID frame containing randomly chosen parameters different from the default parameters and supported by the MS.

> If the MS initiates a negotiation procedure, before the SS is able to transmit the XID frame (timing conflict), the SS should accept this - XID frame from the MS and start his own negotiation afterwards.

> The MS shall respond with a XID frame. If parameters sent in this frame are different from those chosen by the SS, the correct sense of negotiation is checked. The final parameters are noted (T1, T2, N2, K_{IM} (window IWF (SS) -> MS), K_{MI} (window MS -> IWF (SS))).

> The MS sends a SABM and the SS answers with an UA. Note: the SABM frame may be sent by the MS before the XID response frame. In such a case, the SS waits for the XID response before sending the UA.

Case 2: Testing of the correct handling of the MS to a received XID frame in ABM

> The MS sends a SABM and the SS answer with an UA.

> The SS sends a correct XID frame containing parameters different from the default parameters and supported by the MS.

> The MS shall respond with a XID frame. If parameters sent in this frame are different from those chosen by the SS, the correct sense of negotiation is checked. The final parameters are noted (T1, T2, N2, K_{IM} (window IWF (SS) -> MS), K_{MI} (window MS -> IWF (SS))).

> The SS checks that the MS uses the new parameters determined during the negotiation procedure.

Verification of T2

> After optional status bits exchange between the MS and the SS, the SS is configured to send I+S frames with a delay inferior to T1 between each frame. The MS is made to send no user data, it sends only supervisory frame.

> The SS sends an I+S frame numbered N(S)=Nss mod(62), the MS shall acknowledge this frame within T2.

Verification of K_{IM}

> The SS sends an I+S frame numbered Nss+K_{IM}+1 mod(62). The MS shall ignore this frame (out of the window), it shall not acknowledge or reject it. This is checked during at least T2.

The SS sends an I+S frame numbered N(S)=Nss+1 mod(62), the MS shall acknowledge this frame.

The SS sends an I+S frame numbered Nss+K_{IM}+1 mod(62). The MS shall reject all the lost frames numbered Nss+2 mod(62) to Nss+K_{IM} mod(62). It shall send a REJ or SREJ frame with N(R)=Nss+2 mod(62).

If REJ frame is used by the MS, the SS restarts the transmission of I+S frames from frame numbered Nss+2 mod(62). The MS shall acknowledge these frames. After having sent at least the frame numbered Nss+K_{IM}+2 mod(62), the SS stops sending I+S frames.

If SREJ frame is used by the MS, the SS restarts the transmission of I+S frames from frame numbered Nss+2 mod(62). It does send the frame numbered Nss+K_{IM}+1 mod(62) a second time. The MS shall acknowledge these frames. After having sent at least the frame numbered Nss+K_{IM}+2 mod(62), the SS stops sending I+S frames.

Verification of K_{MI}

The MS is now configured to send continuously I+S frames with a delay inferior to T1 between each frame.

The MS sends I+S frames, the SS does not acknowledge these frames.

After having sent K_{MI} I+S frames, the MS shall stop sending I+S frames (end of the window).

Verification of T1

At the expiry of T1 after the last I+S frame, the MS shall enter in "checkpoint recovery" mode, it shall send a supervisory RR frame with C=1 and P=1.

The SS does not answer to checkpointing.

Verification of N2

At the expiry of T1 after the last RR (C=1, P=1) frame, the MS shall resend a supervisory RR frame with C=1 and P=1. The SS does not answer to checkpointing. This is repeated N2 times.

After N2 retransmissions of the same RR frame (C=1, P=1), The MS shall reset or disconnect the RLP link by sending a SABM (C=1,P=1) or a DISC (C=1) frame. The SS answers with an UA (R=0) frame with F bit set to P bit received in SABM or DISC frame.

The MS is returned to the idle state by clearing of the call.

The test is performed for case 1 and 2.

Maximum duration of test

1 minute.

Expected sequence

```
                 MS                                         SS
Case  1
        optionally:
                    -------     XID        ----->
                    <------     XID        -------
                                ....
                    <------     XID        -------     0'
          0         -------     XID        ----->
          1         -------     SABM       ----->
                    <------     UA         -------     1'


Case  2
        optionally:
                    -------     XID        ----->
                    <------     XID        -------
                                .....
          0         -------     SABM       ----->
                    <------     UA         -------     0'
                    (------     I+S        ----->)     Optional
                    (<------    S          ------)
                    <------     XID        -------     1'
          1         -------     XID        ----->
                    <------     I+S        -------     2'
          2         -------     RR         ----->
                    <------     I+S        -------     3'
          3         -------     RR         ----->
                    <------     I+S        -------     4'
          4         -------     RR         ----->
                    <------     I+S        -------     5'
          5         -------     REJ or SREJ ----->
                    <------     I+S        -------     6'
          6         -------     RR         ----->
          ...                   etc...                ...
                    <------     I+S        -------     i-1'
         i-1        -------     RR         ----->
                    <------     RR         -------     i'
          i         -------     RR         ----->
          ...                   etc...                ...
```

```
                       <------         RR            -------         j-1'
       j-1   -------         RR            ----->
        j    -------         I+S           ----->
                       <------         RR            -------         j'
       ...                           etc...                          ...
   j+KMI-1   -------         I+S           ----->
                       <------         RR            -------         j+KMI-1'
    j+KMI    -------         RR (P=1)      ----->
                       <------         RR            -------         j+KMI'
   j+KMI+1   -------         RR (P=1)      ----->
                       <------         RR            -------         j+KMI+1'
       ...                           etc...                          ...
  j+KMI+N2   -------         RR (P=1)      ----->
                       <------         RR            -------         j+KMI+N2'
 j+KMI+N2+1  -------         SABM / DISC   ----->
                       <------         UA            -------         j+KMI+N2+1'
```

The frame from the SS will be:

Case 1:

   0': One XID frame containing: C=1, P=1.

   1': One UA frame containing: R=0, F=1. Note: If SABM is received before the reception of the XID response frame, the SS will wait for the XID before sending the UA frame.

Case 2:

   0': One UA frame containing: R=0, F=1.

   1': One XID frame containing: C=1, P=1.

   2': One I+S frame containing $N(S)=N_{SS}$ mod(62), $N(R)=N_{MS}$ mod (62).

   3': One I+S frame containing $N(S)=N_{SS}+K_{IM}+1$ mod(62), $N(R)=N_{MS}$ mod (62).

   4': A delay D (T2<D<T1) after step 3', one I+S frame containing $N(S)=N_{SS}+1$ mod(62), $N(R)=N_{MS}$ mod (62).

   5': One I+S frame containing $N(S)=N_{SS}+K_{IM}+1$ mod(62), $N(R)=N_{MS}$ mod (62).

If REJ frame is used by the MS:

   6',..., $K_{IM}+5$': One I+S frame containing $N(S)=N_{SS}+2$, .., $N_{SS}+K_{IM}+1$ mod(62), $N(R)=N_{MS}$ mod (62).

   $K_{IM}+6$',...,i-1': One I+S frame containing $N(S)=N_{SS}+K_{IM}+2$,...,k-1 mod(62), $N(R)=N_{MS}$ mod (62).

If SREJ frame is used by the MS:

   6',..., $K_{IM}+4$': One I+S frame containing $N(S)=N_{SS}+2$, .., $N_{SS}+K_{IM}$ mod(62), $N(R)=N_{MS}$ mod (62).

   $K_{IM}+5$',...,i-1': One I+S frame containing $N(S)=N_{SS}+K_{IM}+2$,...,k-1 mod(62), $N(R)=N_{MS}$ mod (62).

The SS stops sending I+S frames.

   i',...,j-1': One RR frame containing, $N(R)=N_{MS}$ mod (62).

j',...,j+K_{MI}-1': One RR frame containing N(R)=N_{MS} mod (62).

j+K_{MI}',...,j+K_{MI}+N2': One RR (R=0, F=0) frame containing N(R)=N_{MS} mod (62).

j+K_{MI}+N2+1': One UA (R=0) frame with F bit set to P bit received in SABM or DISC frame.

Specific message content

The frame from the MS shall be:

Case 1:

0: One XID frame containing: R=0, F=1. The MS may changed the RLP parameters. In this case the SS verifies the correct sense of negotiation. The final parameters are noted (T1, T2, N2, K_{IM}, K_{MI}).

1: One SABM frame containing: C=1,P=1.

NOTE: The MS may send an SABM frame before the XID.

Case 2:

0: One SABM frame containing: C=1,P=1.

1: One XID frame containing: R=0, F=1. The MS may changed the RLP parameters. In this case the SS verifies the correct sense of negotiation. The final parameters are noted (T1, T2, N2, K_{IM}, K_{MI}).

2: One RR frame containing N(R)=N_{SS}+1 mod (62) within T2.

3: One RR frame containing N(R)=N_{SS}+1 mod (62).

4: One RR frame containing N(R)=N_{SS}+2 mod (62).

5: One REJ or SREJ frame containing N(R)=N_{SS}+2 mod (62).

If REJ frame is used by the MS:

6,..., K_{IM}+5: One RR frame containing N(R)=N_{SS}+3, .., N_{SS}+K_{IM}+2 mod(62).

K_{IM}+6,...,i-1: One RR frame containing N(R)=N_{SS}+K_{IM}+3,...,k mod(62).

If SREJ frame is used by the MS:

6,..., K_{IM}+3: One RR frame containing N(R)=N_{SS}+3, ..., N_{SS}+K_{IM} mod(62).

K_{IM}+4: One RR frame containing N(R)=N_{SS}+K_{IM}+2 mod(62).

K_{IM}+5,...,i-1: One RR frame containing N(R)=N_{SS}+K_{IM}+3,...,k mod(62).

i,...,j-1: One RR frame containing, N(R)=k mod (62).

The MS starts sending data.

j,...,j+K_{MI}-1: One I+S frame containing N(S)=N_{MS},...,N_{MS}+K_{MI}-1 mod(62), N(R)=k mod (62).

j+K_{MI}: T1 after the last I+S frame sent, one supervisory RR (C=1, P=1) frame containing N(R)=k mod (62).

j+K_{MI}+1,...,j+K_{MI}+N2: At T1 expiry, one supervisory RR (C=1, P=1) frame containing N(R)=k mod (62).

j+K_{MI}+N2+1: One SABM (C=1, P=1) or DISC (C=1) frame.

29.3.3.2   Negotiation initiated by the MS

29.3.3.2.1   Definition and applicability

The XID negotiation procedure allows RLP parameters to be negotiated between peer RLP entities.

This test is only applicable to those MS's which support non-default RLP parameters.

29.3.3.2.2 Conformance requirements

The MS shall be able to initiate a negotiation with the network when its RLP parameters are set to non default values. It shall then configure its RLP parameters accordingly. It shall do so in ABM mode as well as in ADM mode. GSM 04.22, 5.2.2.6.

References

GSM 04.22 section 5.2.2.6.

29.3.3.2.3 Test purpose

To test that the MS initiate the negotiation if RLP parameters are different from default parameters.

29.3.3.2.4 Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use RLP arbitrary chosen parameters different from the default parameters.

1 - The MS is made to establish a MO non transparent data call. In initial conditions MS is in call state U10 ("Call Active") after having sent a CONN_ACK message.

2 - The MS is made to establish a MT non transparent data call. In initial conditions MS is in call state U10 ("Call Active") after having received a CONN_ACK message.

This test is performed for initial conditions 1 and 2.

Once in ABM, the SS shall initiate the transmission of an I+S frame, which will transfer L2RCOP status information between peer L2RCOP entities (SS to MS). The MS may respond with an I+S frame containing L2RCOP status information. The SS shall be capable of initiating this sequence, or responding to an I+S L2RCOP status frame from the MS.

Related PICS/PIXIT statements

Supported bearer services; characteristics of non-transparent services.

Foreseen final state of the MS

Idle.

Test procedure

The MS shall send an XID (C=1, P=1) frame containing a set of RLP parameters different from the default set. The SS answers with XID (R=0, F=1) containing new parameters randomly chosen, the sense of negotiation is correct. Optionally, a renegotiation initiated by the MS should be possible, if the parameters, randomly chosen by the SS are not supported by the MS. In this case, the SS should accept the parameters renegotiated by the MS, if they are within the allowed range defined in GSM 04.22. The final parameters are noted (T1, T2, N2, K_{IM} (window IWF (SS) -> MS), K_{MI} (window MS -> IWF (SS))).

The MS established the ABM mode by sending a SABM (C=1, P=1) frame. The SS answers with a UA (R=0, F=1) frame. The SABM frame may be sent by the MS before the XID. In such a case, the SS answers to the XID after having established the ABM mode (i.e. after having sent the UA).

The SS checks that the MS uses the new parameters determined during the negotiation procedure.

Verification of T2

The SS is configured to send I+S frames with a delay inferior to T1 between each frame. The MS is made to send no user data, it sends only supervisory frame.

The SS sends an I+S frame numbered N(S)=Nss mod(62), the MS shall acknowledge this frame within T2.

Verification of K_{IM}

The SS sends an I+S frame numbered Nss+K_{IM}+1 mod(62). The MS shall ignore this frame (out of the window), it shall not acknowledge or reject it. This is checked during at least T2.

The SS sends an I+S frame numbered N(S)=Nss+1 mod(62), the MS shall acknowledge this frame.

The SS sends an I+S frame numbered Nss+K_{IM}+1 mod(62). The MS shall reject all the lost frames numbered Nss+2 mod(62) to Nss+K_{IM} mod(62). It shall send a REJ or SREJ frame with N(R)=Nss+2 mod(62)

If REJ frame is used by the MS, the SS restarts the transmission of I+S frames from frame numbered Nss+2 mod(62). The MS shall acknowledge these frames. After having sent at least the frame numbered Nss+K_{IM}+2 mod(62), the SS stops sending I+S frames.

If SREJ frame is used by the MS, the SS restarts the transmission of I+S frames from frame numbered Nss+2 mod(62). It does send the frame numbered Nss+K_{IM}+1 mod(62) a second time. The MS shall acknowledge these frames. After having sent at least the frame numbered Nss+K_{IM}+2 mod(62), the SS stops sending I+S frames.

Verification of K_{MI}

The MS is now configured to send continuously I+S frames with a delay inferior to T1 between each frame.

The MS sends I+S frames, the SS does not acknowledge these frames.

After having sent K_{MI} I+S frames, the MS shall stop sending I+S frames (end of the window).

Verification of T1

At the expiry of T1 after the last I+S frame, the MS shall enter in "checkpoint recovery" mode, it shall send a supervisory RR frame with C=1 and P=1.

The SS does not answer to checkpointing.

Verification of N2

At the expiry of T1 after the last RR (C=1, P=1) frame, the MS shall resend a supervisory RR frame with C=1 and P=1. The SS does not answer to checkpointing. This is repeated N2 times.

After N2 retransmissions of the same RR frame (C=1, P=1), The MS shall reset or disconnect the RLP link by sending a SABM (C=1,P=1) or a DISC (C=1) frame. The SS answers with an UA (R=0) frame with F bit set to P bit received in SABM or DISC frame.

The MS is returned to the idle state by clearing of the call.

Expected sequence

		MS					SS
0	-------	XID	----->				
	<-----	XID	-------			0	

optional renegotiation:

	-------	XID	----->		
	<-----	XID	-------		

1	-------	SABM	----->		
	<-----	UA	-------	1'
	<-----	I+S	-------	2'
2	-------	RR	----->	
	<-----	I+S	-------	3'
3	-------	RR	----->	
	<-----	I+S	-------	4'
4	-------	RR	----->	
	<-----	I+S	-------	5'
5	-------	REJ or SREJ	----->	
	<-----	I+S	-------	6'
6	-------	RR	----->	
...		etc...		...
	<-----	I+S	-------	i-1'
i-1	-------	RR	----->	
	<-----	RR	-------	i'
i	-------	RR	----->	
...		etc...		...
	<-----	RR	-------	j-1'
j-1	-------	RR	----->	
j	-------	I+S	----->	
	<-----	RR	-------	j'
...		etc...		...
j+K$_{MI}$-1	-------	I+S	----->	
	<-----	RR	-------	j+K$_{MI}$-1'
j+K$_{MI}$	-------	RR	----->	

ETSI

```
                        <------        RR        -------      j+K_MI'

        j+K_MI+1    -------        RR        ------>

                        <------        RR        -------      j+K_MI+1'

            ...                   etc...                     ...

        j+K_MI+N2    -------       RR        ------>

                        <------        RR        -------      j+K_MI+N2'

    j+K_MI+N2+1  -------     SABM / DISC  ------>

                        <------        UA        -------      j+K_MI+N2+1'
```

The frame from the SS will be:

0': One XID frame containing: R=0, F=1. The RLP parameters are changed by the SS, the sense of negotiation is correct. The final parameters are noted (T1, T2, N2, K_{IM}, K_{MI}).

1': One UA frame containing: R=0, F=1. Note: If SABM is received before the XID, the SS answers to the XID after having established the ABM mode (i.e. after having sent the UA).

2': One I+S frame containing N(S)=N_{SS} mod(62), N(R)=N_{MS} mod (62).

3': One I+S frame containing N(S)=N_{SS}+K_{IM}+1 mod(62), N(R)=N_{MS} mod (62).

4': A delay D (T2<D<T1) after step 3', one I+S frame containing N(S)=N_{SS}+1 mod(62), N(R)=N_{MS} mod (62).

5': One I+S frame containing N(S)=N_{SS}+K_{IM}+1 mod(62), N(R)=N_{MS} mod (62).

If REJ frame is used by the MS:

6',..., K_{IM}+5': One I+S frame containing N(S)=N_{SS}+2, .., N_{SS}+K_{IM}+1 mod(62), N(R)=N_{MS} mod (62).

K_{IM}+6',...,i-1': One I+S frame containing N(S)=N_{SS}+K_{IM}+2,...,k-1 mod(62), N(R)=N_{MS} mod (62).

If SREJ frame is used by the MS:

6',..., K_{IM}+4': One I+S frame containing N(S)=N_{SS}+2, .., N_{SS}+K_{IM} mod(62), N(R)=N_{MS} mod (62).

K_{IM}+5',...,i-1': One I+S frame containing N(S)=N_{SS}+K_{IM}+2,...,k-1 mod(62), N(R)=N_{MS} mod (62).

The SS stops sending I+S frames.

i',...,j-1': One RR frame containing, N(R)=N_{MS} mod (62).

j',...,j+K_{MI}-1': One RR frame containing N(R)=N_{MS} mod (62).

j+K_{MI}',...,j+K_{MI}+N2': One RR (R=0, F=0) frame containing N(R)=N_{MS} mod (62).

j+K_{MI}+N2+1': One UA (R=0) frame with F bit set to P bit received in SABM or DISC frame.

29.3.3.2.5 Test requirements

Specific message content

The frame from the MS shall be:

0: One XID frame containing: C=1, P=1.

1: One SABM frame containing: C=1,P=1.

NOTE: The MS may send the SABM frame before the XID.

2: One RR frame containing N(R)=Nss+1 mod (62) within T2.

3: One RR frame containing N(R)=Nss+1 mod (62).

4: One RR frame containing N(R)=Nss+2 mod (62).

5: One REJ or SREJ frame containing N(R)=Nss+2 mod (62).

If REJ frame is used by the MS:

6,..., Kɪᴍ+5: One RR frame containing N(R)=Nss+3, .., Nss+Kɪᴍ+2 mod(62).

Kɪᴍ+6,...,i-1: One RR frame containing N(R)=Nss+Kɪᴍ+3,...,k mod(62).

If SREJ frame is used by the MS:

6,..., Kɪᴍ+3: One RR frame containing N(R)=Nss+3, ..., Nss+Kɪᴍ mod(62).

Kɪᴍ+4: One RR frame containing N(R)=Nss+Kɪᴍ+2 mod(62).

Kɪᴍ+5,...,i-1: One RR frame containing N(R)=Nss+Kɪᴍ+3,...,k mod(62).

i,...,j-1: One RR frame containing, N(R)=k mod (62).

The MS starts sending data.

j,...,j+Kᴍɪ-1: One I+S frame containing N(S)=Nᴍs,...,Nᴍs+Kᴍɪ-1 mod(62), N(R)=k mod (62).

j+Kᴍɪ: T1 after the last I+S frame sent, one supervisory RR (C=1, P=1) frame containing N(R)=k mod (62).

j+Kᴍɪ+1,...,j+Kᴍɪ+N2: At T1 expiry, one supervisory RR (C=1, P=1) frame containing N(R)=k mod (62).

j+Kᴍɪ+N2+1: One SABM (C=1, P=1) or DISC (C=1) frame.

29.3.3.3   Collision of XID frames

29.3.3.3.1   Definition and applicability

The XID negotiation procedure allows RLP parameters to be negotiated between peer RLP entities. If a collision of XID frames occurs, the MS shall ignore all XID frames and restart the parameter negotiation on expiry of timer T1.

This test is only applicable to those MS's which support non-default RLP parameters.

29.3.3.3.2   Conformance requirements

The MS shall be able to ignore an XID frame from the network in the case where it has sent a XID frame asking for a negotiation to the network, and to restart the negotiation procedure after expiry of timer T1. GSM 04.22, 5.2.2.6.

References

GSM 04.22 section 5.2.2.6..

29.3.3.3.3   Test purpose

To test that the correct reaction of the MS to a collision of XID frames.

29.3.3.3.4   Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use RLP parameters different from the default parameters and arbitrary chosen.

The MS is made to establish a MO non transparent data call. In initial conditions MS is in call state U10 ("Call Active") after having sent a CONN_ACK message.

Once in ABM, the SS shall initiate the transmission of an I+S frame, which will transfer L2RCOP status information between peer L2RCOP entities (SS to MS). The MS may respond with an I+S frame containing L2RCOP status information. The SS shall be capable of initiating this sequence, or responding to an I+S L2RCOP status frame from the MS.

Related PICS/PIXIT statements

Supported bearer services; characteristics of non-transparent services.

Foreseen final state of the MS

Idle.

Test procedure

The MS shall send an XID (C=1, P=1) frame containing a set of RLP parameters different from the default set. The SS sends a XID (C=1, P=1) command frame containing new parameters. After a delay the MS shall resend the same XID that it has previously sent. The SS answers with XID (R=0, F=1) accepting the parameters chosen by the MS. These parameters are noted (T1, T2, N2, K_{IM} (window IWF (SS) -> MS), K_{MI} (window MS -> IWF (SS))).

The MS established the ABM mode by sending a SABM (C=1, P=1) frame. The SS answers with a UA (R=0, F=1) frame. The SABM frame may be sent by the MS at any instant (i.e. just after having received an XID, before having sent the response). In such a case, the SS answers to the XID after having established the ABM mode (i.e. after having sent the UA).

The SS checks that the MS uses the new parameters determined during the negotiation procedure.

Verification of T2

> The SS is configured to send I+S frames with a delay inferior to T1 between each frame. The MS is made to send no user data, it sends only supervisory frame.

> The SS sends an I+S frame numbered N(S)=Nss mod(62), the MS shall acknowledge this frame within T2.

Verification of K_{IM}

> The SS sends an I+S frame numbered Nss+K_{IM}+1 mod(62). The MS shall ignore this frame (out of the window), it shall not acknowledge or reject it. This is checked during at least T2.

> The SS sends an I+S frame numbered N(S)=Nss+1 mod(62), the MS shall acknowledge this frame.

> The SS sends an I+S frame numbered Nss+K_{IM}+1 mod(62). The MS shall reject all the lost frames numbered Nss+2 mod(62) to Nss+K_{IM} mod(62). It shall send a REJ or SREJ frame with N(R)=Nss+2 mod(62).

> If REJ frame is used by the MS, the SS restarts the transmission of I+S frames from frame numbered Nss+2 mod(62). The MS shall acknowledge these frames. After having sent at least the frame numbered Nss+K_{IM}+2 mod(62), the SS stops sending I+S frames.

> If SREJ frame is used by the MS, the SS restarts the transmission of I+S frames from frame numbered Nss+2 mod(62). It does send the frame numbered Nss+K_{IM}+1 mod(62) a second time. The MS shall acknowledge these frames. After having sent at least the frame numbered Nss+K_{IM}+2 mod(62), the SS stops sending I+S frames.

Verification of K_{MI}

The MS is now configured to send continuously I+S frames with a delay inferior to T1 between each frame.

The MS sends I+S frames, the SS does not acknowledge these frames.

After having sent K_{MI} I+S frames, the MS shall stop sending I+S frames (end of the window).

Verification of T1

At the expiry of T1 after the last I+S frame, the MS shall enter in "checkpoint recovery" mode, it shall send a supervisory RR frame with C=1 and P=1.

The SS does not answer to checkpointing.

Verification of N2

At the expiry of T1 after the last RR (C=1, P=1) frame, the MS shall resend a supervisory RR frame with C=1 and P=1. The SS does not answer to checkpointing. This is repeated N2 times.

After N2 retransmissions of the same RR frame (C=1, P=1), The MS shall reset or disconnect the RLP link by sending a SABM (C=1,P=1) or a DISC (C=1) frame. The SS answers with an UA (R=0) frame with F bit set to P bit received in SABM or DISC frame.

The MS is returned to the idle state by clearing of the call.

Maximum duration of test

1 minute.

Expected sequence

```
        MS                                              SS

        0       -------    XID          ----->

                <------    XID          -------      0'

        1       -------    XID          ----->

                <------    XID          -------      1'

        2       -------    SABM         ----->

                <------    UA           -------      2'

                <------    I+S          -------      3'

        3       -------    RR           ----->

                <------    I+S          -------      4'

        4       -------    RR           ----->

                <------    I+S          -------      5'

        5       -------    RR           ----->

                <------    I+S          -------      6'

        6       -------    REJ or SREJ  ----->

                <------    I+S          -------      7'

        7       -------    RR           ----->

        ...                etc...                    ...

                <------    I+S          -------      i-1'

        i-1     -------    RR           ----->

                <------    RR           -------      i'

        i       -------    RR           ----->

        ...                etc...                    ...

                <------    RR           -------      j-1'

        j-1     -------    RR           ----->

        j       -------    I+S          ----->

                <------    RR           -------      j'

        ...                etc...                    ...

      j+KMI-1   -------    I+S          ----->

                <------    RR           -------    j+KMI-1'

      j+KMI     -------    RR           ----->

                <------    RR           -------    j+KMI'

      j+KMI+1   -------    RR           ----->

                <------    RR           -------    j+KMI+1'

        ...                etc...                    ...

     j+KMI+N2   -------    RR           ----->

                <------    RR           -------   j+KMI+N2'

    j+KMI+N2+1  -------    SABM / DISC  ----->
```

$$\text{<------} \qquad \text{UA} \qquad \text{-------} \qquad j+K_{MI}+N2+1'$$

The frame from the SS will be:

0': One XID frame containing: C=1, P=1.

1': One XID frame containing: R=0, F=1. The RLP parameters are changed by the SS, the sense of negotiation is correct. The final parameters are noted (T1, T2, N2, K_{IM}, K_{MI}).

2': One UA frame containing: R=0, F=1. Note: If SABM is received before one of the XID frames, the SS will answer to the XID after having established the ABM mode (i.e. after having sent the UA).

3': One I+S frame containing N(S)=N_{SS} mod(62), N(R)=N_{MS} mod (62).

4': One I+S frame containing N(S)=N_{SS}+K_{IM}+1 mod(62), N(R)=N_{MS} mod (62).

5': A delay D (T2<D<T1) after step 3', one I+S frame containing N(S)=N_{SS}+1 mod(62), N(R)=N_{MS} mod (62).

6': One I+S frame containing N(S)=N_{SS}+K_{IM}+1 mod(62), N(R)=N_{MS} mod (62).

If REJ frame is used by the MS:

7',..., K_{IM}+6': One I+S frame containing N(S)=N_{SS}+2, .., N_{SS}+K_{IM}+1 mod(62), N(R)=N_{MS} mod (62).

K_{IM}+7',...,i-1': One I+S frame containing N(S)=N_{SS}+K_{IM}+2,...,k-1 mod(62), N(R)=N_{MS} mod (62).

If SREJ frame is used by the MS:

7',..., K_{IM}+5': One I+S frame containing N(S)=N_{SS}+2, .., N_{SS}+K_{IM} mod(62), N(R)=N_{MS} mod (62).

K_{IM}+6',...,i-1': One I+S frame containing N(S)=N_{SS}+K_{IM}+2,...,k-1 mod(62), N(R)=N_{MS} mod (62).

The SS stops sending I+S frames.

i',...,j-1': One RR frame containing, N(R)=N_{MS} mod (62).

j',...,j+K_{MI}-1': One RR frame containing N(R)=N_{MS} mod (62).

j+K_{MI}',...,j+K_{MI}+N2': One RR (R=0, F=0) frame containing N(R)=N_{MS} mod (62).

j+K_{MI}+N2+1': One UA (R=0) frame with F bit set to P bit received in SABM or DISC frame.

29.3.3.3.5 Test requirements

Specific message content

The frame from the MS shall be:

0: One XID frame containing: C=1, P=1.

1: After T1(def) expiry, one XID frame containing: C=1, P=1.

NOTE: The MS may send an SABM frame before the 1st or the 2nd XID frame.

2: One SABM frame containing: C=1,P=1.

3: One RR frame containing N(R)=N_{SS}+1 mod (62) within T2.

4: One RR frame containing N(R)=N_{SS}+1 mod (62).

5: One RR frame containing N(R)=N_{SS}+2 mod (62).

6: One REJ or SREJ frame containing N(R)=N_{SS}+2 mod (62).

If REJ frame is used by the MS:

> 7,..., $K_{IM}+6$: One RR frame containing N(R)=$N_{SS}+3$, .., $N_{SS}+K_{IM}+2$ mod(62).

> $K_{IM}+7$,...,i-1: One RR frame containing N(R)=$N_{SS}+K_{IM}+3$,...,k mod(62).

If SREJ frame is used by the MS:

> 7,..., $K_{IM}+4$: One RR frame containing N(R)=$N_{SS}+3$, ..., $N_{SS}+K_{IM}$ mod(62).

> $K_{IM}+5$: One RR frame containing N(R)=$N_{SS}+K_{IM}+2$ mod(62).

> $K_{IM}+6$,...,i-1: One RR frame containing N(R)=$N_{SS}+K_{IM}+3$,...,k mod(62).

> i,...,j-1: One RR frame containing, N(R)=k mod (62).

The MS starts sending data.

> j,...,j+$K_{MI}-1$: One I+S frame containing N(S)=N_{MS},...,$N_{MS}+K_{MI}-1$ mod(62), N(R)=k mod (62).

> j+K_{MI}: T1 after the last I+S frame sent, one supervisory RR (C=1, P=1) frame containing N(R)=k mod (62).

> j+$K_{MI}+1$,...,j+$K_{MI}+N2$: At T1 expiry, one supervisory RR (C=1, P=1) frame containing N(R)=k mod (62).

> j+$K_{MI}+N2+1$: One SABM (C=1, P=1) or DISC (C=1) frame.

29.3.3.4 Loss of XID frames

29.3.3.4.1 Conformance requirements

The MS shall repeat an XID frame upon expiry of RLP timer T1 if the network has not acknowledged it by a correct XID frame.

References

GSM 04.22 section 5.2.2.6.

29.3.3.4.2 Test purpose

To test that the MS repeats the XID frame if the SS does not answer correctly.

29.3.3.4.3 Test method

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use RLP parameters different from the default parameters (T1 different from T1(def)).

The MS is made to establish a MO non transparent data call. In initial conditions MS is in call state U10 ("Call Active") after having sent a CONN_ACK message.

Related PICS/PIXIT statements

Supported bearer services; characteristics of non-transparent services.

Foreseen final state of the MS

Idle.

Test procedure

The MS shall send an XID (C=1, P=1) frame containing a set of RLP parameters different from the default set. The SS sends a XID (R=0, F=0) command frame. The MS shall ignores this frame.

After a delay the MS shall resend the same XID that it has previously sent. The SS does not answer.

After a delay the MS shall resend the same XID that it has previously sent. The SS answers with XID (R=0, F=1) accepting the parameters chosen by the MS.

The MS established the ABM mode by sending a SABM (C=1, P=1) frame. The answer with a UA (R=0, F=1) frame. The SABM frame may be sent by the MS at any instant (i.e. just after having received an XID). In such a case, the SS answers to the XID after having established the ABM mode (i.e. after having sent the UA).

The MS is returned to the idle state by clearing of the call.

Maximum duration of test

1 minute.

Expected sequence

```
        MS                                              SS

        0       -------        XID          ----->
                <------        XID          -------       0'
        1       -------        XID          ----->
        2       -------        XID          ----->
                <------        XID          -------       2'
        3       -------        SABM         ----->
                <------        UA           -------       3'
```
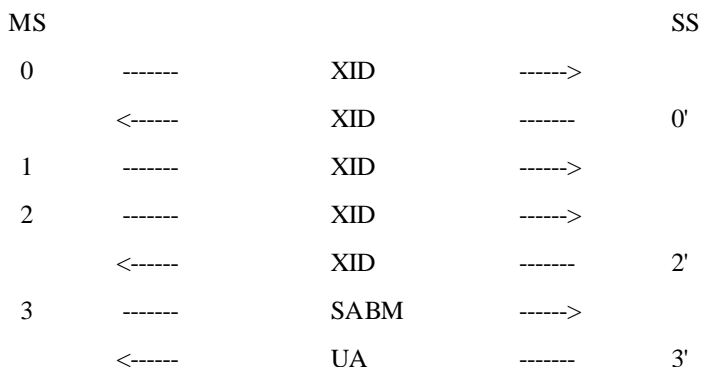
The frame from the SS will be:

   0': One XID frame containing: R=0, F=0.

   2': One XID frame containing: R=0, F=1. The RLP parameters are accepted by the SS.

   3': One UA frame containing: R=0, F=1. Note: If SABM is received before the XID, the SS will answer to the XID after having established the ABM mode (i.e. after having sent the UA).

Specific message content

The frame from the MS shall be:

   0: One XID frame containing: C=1, P=1.

   1: After T1(def) expiry, one XID frame containing: C=1, P=1.

   2: After T1(def) expiry, one XID frame containing: C=1, P=1.

   3: One SABM frame containing: C=1,P=1.

   NOTE: The MS may send the SABM frame before XID(s), at any moment.

29.3.3.5 Total loss of XID frames

29.3.3.5.1 Definition and applicability

The XID negotiation procedure allows RLP parameters to be negotiated between peer RLP entities. An unsuccsessful XID exchange shall be repeated on expiry of T1. After N2 times of unsuccessful repetition, the RLP link shall be disconnected.

This test is only applicable to those MS's which support non-default RLP parameters.

29.3.3.5.2 Conformance requirements

The MS shall not repeat an unacknowledged XID frame more than N2 times. After N2 repetition it shall disconnect the RLP link if it had been connected earlier. GSM04.22, 5.2.2.6.

References

GSM 04.22 section 5.2.2.6.

29.3.3.5.3 Test purpose

To test that the MS repeats the XID frame no more than N2 times, if the SS does not answer correctly.

29.3.3.5.4 Method of test

Initial Conditions

System Simulator:

The SS is configured to use default RLP parameters.

Mobile Station:

The MS is configured to use RLP parameters different from the default parameters.

The MS is made to establish a MO non transparent data call. In initial conditions MS is in call state U10 ("Call Active") after having sent a CONN_ACK message.

Related PICS/PIXIT statements

Supported bearer services; characteristics of non-transparent services.

Foreseen final state of the MS

Idle.

Test procedure

Case a: The MS sends an XID (C=1, P=1) frame in ADM mode

Case b: The MS enters the ABM mode and sends an XID (C=1, P=1) frame after optional status bits exchange between the MS and the SS.

The SS does not answer.

After a delay T1 (def), the MS shall resend the same XID that it has previously sent. The SS does not answer. This step is repeated N2 (def) times.

Case a: After N2 (def) retransmissions the SS waits for 2 * T1 to ensure that the XID frame is not repeated any more.

Case b: , After N2 (def) retransmissions the link shall be disconnected. The MS shall send a DISC (C=1) frame, and the SS answers with a UA (R=0, F equal to the P bit received in the DISC).

The MS is returned to the idle state by clearing of the call.

Maximum duration of test

1 minute.

Expected sequence

               MS   SS

Case a:

1	-------	XID	----->	
2	-------	XID	----->	
...		etc...		...
N2(def) +1	-------	XID	----->	
				Wait for 2*T1

Case b:

0	-------	SABM	----->	
	<------	UA	-------	0'
	(-------	I+S	----->)	Optional
	(<------	S	-------)	
1	-------	XID	----->	
2	-------	XID	----->	
...		etc...		...
N2(def)+1	-------	XID	----->	
N2(def)+2	-------	DISC	----->	
	<------	UA	----->	N2+2'
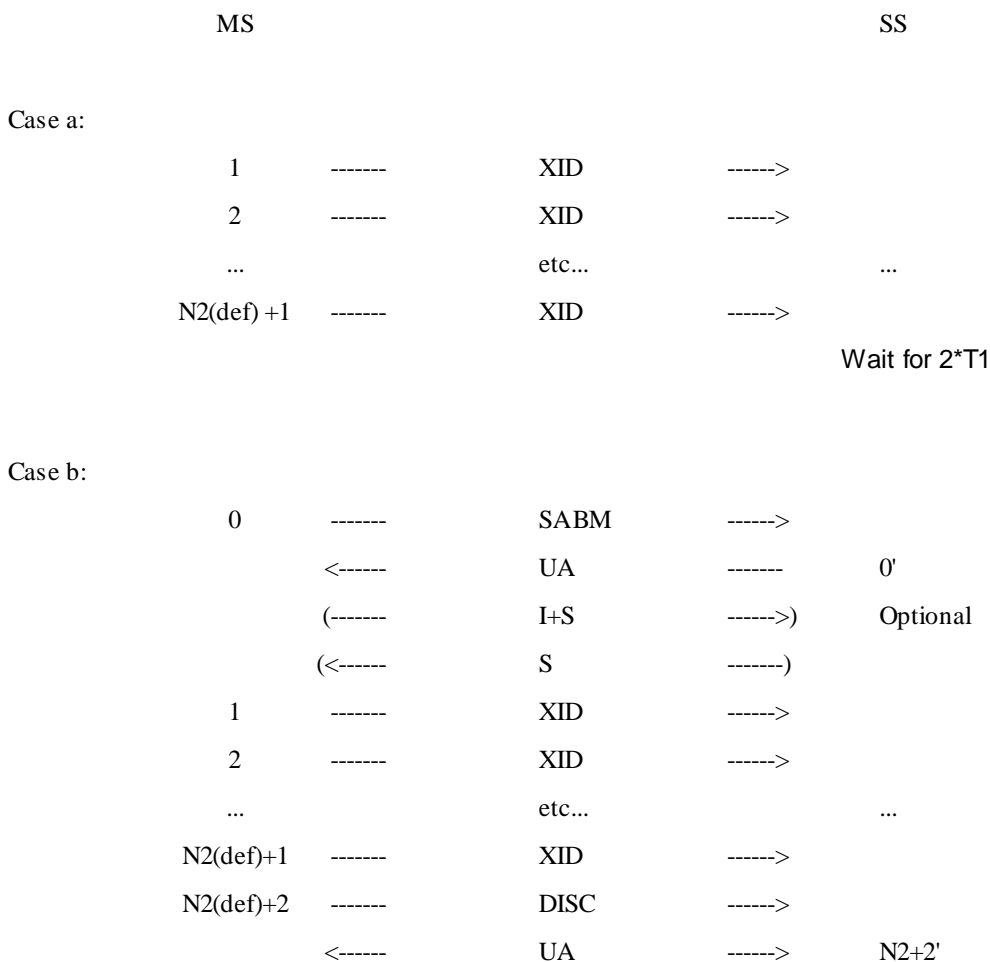
The frame from the SS will be:

    0': One UA frame containing: R=0, F=1, if the MS sends a SABM.

    N2+2': One UA frame containing: R=0, F equal to P bit received in DISC frame.

29.3.3.5.5   Test requirements

Specific message content

The frame from the MS shall be:

    0: The MS may send a SABM frame containing: C=1,P=1. This frame may be sent at any instant. This is not verified.

    1: One XID frame containing: C=1, P=1.

    2,...,N2(def)+1: After T1 (def) expiry, one XID frame containing: C=1, P=1.

N2(def)+2: If the MS has previously established the ABM mode (SABM/UA exchange), it shall disconnect the link by sending a DISC (C=1) frame.

29.4 Facsimile tests for the transparent network support

29.4.1 General

According to CCITT T.30 a facsimile call can be divided into the following phases:

- Phase A - call establishment procedure;

- Phase B - pre-message procedure (identification and selection of required facilities);

- Phase C - message transmission according to CCITT T.4;

- Phase D - post-message procedure;

- Phase E - call release procedure.

For each phase a single test sequence was drafted, i.e. the verification of the basic procedures of a fax call will at least consist of 5 tests, in order to verify the above described phases.

In the IDLE state the fax adapter, originating or terminating, will send continuously SYNC frames containing the pattern specified in GSM 03.45 (CT105 (see note 2) and 109 (see note 2) are in OFF condition).

For the test of the facsimile data transmission, .i.e. the phase C, test chart #2 according to CCITT T.21 should be used.

The T.4/30 messages marked with the '*' sign indicate that for the transmission across the radio interface in case of the BCS phase STATUS frames are used, and in case of the message phase the usage of DATA frames is implied.

Manufacturer-declared fax equipment should be connected to the MS, i.e. where possible a fax adapter and a fax machine Group 3. Measuring devices to monitor the T.4/T.30 protocol, the circuits and the SYNC, STATUS and DATA frames should be provided. Configurations, where no access to the interfaces to monitor the protocol and circuits is possible, might exist.

Abbreviations used:

BC-IE	Bearer Capability Information Element
BCS	Binary Coded Signalling
BCS-REC	BCS Reception State of the FA
BCS-TRA	BCS Transmission State of the FA
CED	Called Station Identification
CFR	Confirmation To Receive
CMM	Channel Mode Modify
CMM ACK	Channel Mode Modify Acknowledge
CNG	Calling Tone
DCD	Data Call Direction
DCS	Digital Command Signal
DIS	Digital Identification Signal
EOM	End Of Message
EOP	End Of Procedure

FA	Fax Adapter	
Fax		Facsimile App. or PC-Fax (e.g. fax softw. running on a notebook)
ICM		In-Call Modification
IDLE		Idle State of the FA
MCF		Message Confirmation
MO		Mobile Originating
MPS		Multi Page Signal
MSG-REC		Message Reception State of the FA
MT		Mobile Terminating
RCSD-IE		Reverse Call Setup Direction Information Element
TCF		Training Check Frame
TCH		Traffic Channel
TS 61		Teleservice 61 (alternate speech/fax)
TS 62		Teleservice 62 (automatic fax)

29.4.2 Mobile originated call

29.4.2.1 Call establishment procedure

29.4.2.1.1 Alternate speech / facsimile

29.4.2.1.1.1 Definition and applicability

This test is applicable to an MS supporting TS 61.

29.4.2.1.1.2 Conformance requirement

An MS supporting transparent facsimile group 3 shall perform the ICM and shall support the frames and circuits at the Um-, R- and 2w-interface according to the specifications referred to in the section "Reference".

Reference

GSM 03.45, GSM 07.01, CCITT T.30.

29.4.2.1.1.3 Test purpose

To verify the transition from speech to fax in case of an MS supporting TS 61 and that the circuit and tone handling of the MT and FA is correct.

29.4.2.1.1.4 Method of test

Initial conditions

A TS 61 s/f call is set up. The speech phase is active.

Test procedure

The transition from speech to fax is initiated by manual intervention at both ends of the connection. The data call direction DCD is mobile originated. Upon connection to line the FA turns on CT108.2 (see note 2) as a basic requirement for the transition from speech to fax. Now, within the next 3 seconds the FA has to detect the DCD, which is in this case is mobile originated, i.e. CT105 is set to ON (see note 2) condition. The following ICM procedure via the MODIFY message is carried out by the MT 3 seconds after circuit CT108.2 was set to ON (see note 2) condition. On completion of the ICM procedure the synchronization of the TCH begins and after its completion the MT has to set CT107 to ON (see note 2) condition and the FA has to send the CED tone (see note 2) towards the connected fax. When CT106/109 are set to ON (see note 2) phase A is completed. Then the call is cleared by manual intervention at the MT or the activity progress of the call proceeds to the next phase.

Expected sequence

MS: SS:

Step   Direction

1	MS-->SS	Fax:	Connect to line (see note 1)		Connect to line (see note 1)
		FA:	CT108.2 ON (see note 2)		
			Detect DCD		
			CT105 ON (see note 2)		
		MT:	Send MODIFY message ------>		Receive MODIFY message
			3 seconds after CT108.2 ON (see note 2)		
2	SS-->MS		<-----		Send MODIFY COMPLETE
3	MS<->SS		TCH Synchronization <---->		TCH Synchronization
		MT:	CT107 ON (see note 2), when synchronized		
		FA:	Generate CED (see note 2)		
		Fax:	Detect CED (see note 2)		
4	SS-->MS		<-----		Set X and SB bit in V.110 frame
		MT:	CT106/109 ON (see note 2)		
		FA:	Enter BCS-TRA state		Enter BCS-REC state

29.4.2.1.1.5   Test requirements

1. The condition of CT108.2 and CT105 is verified (see note 2); CT106, 107, 109 have to be in OFF (see note 2) condition. The MODIFY message has to be sent 3 seconds after circuit CT108.2 has gone to ON condition (see note 2).

2. To be verified that the MT begins the synchronization phase by sending the pattern 1/OFF after the reception of the MODIFY COMPLETE message, that CT107 is turned on (see note 2) by the MT after successful synchronization and that the CED tone (see note 2) is transmitted by the FA after CT107 has gone to ON condition (see note 2).

3. To be verified that CT106 and CT109 are turned on (see note 2), when in the modified V.110 frames received from the SS the X and SB bits are set. The state of the FA shall be verified (-> BCS-TRA).

29.4.2.1.2   Automatic facsimile

29.4.2.1.2.1   Definition and applicability

This test is applicable to an MS supporting TS 62.

29.4.2.1.2.2   Conformance requirement

The MS supporting transparent facsimile group 3 shall perform the call setup procedure and shall support the frames and the circuits at the Um-,R- and 2w-interface according the specifications referred to in the section "Reference".

Reference

GSM 03.45, GSM 07.01, CCITT T.30.

29.4.2.1.2.3   Test purpose

To verify that the circuit and tone handling of the MT and FA is correct.

29.4.2.1.2.4   Method of test

Initial conditions

The MS, configured for the TS 62 fax call, is updated. Then the call establishment phase A begins.

Test procedure

The FA sets CT108.2 to ON (see note 2) condition and passes the dialling information to the MT. A SETUP message is then sent by the MT towards the SS. When the TCH is available (indicated by the CONNECT message) the synchronization phase begins, i.e. both entities start sending the synchronization pattern 1/OFF. CT106, 107, 109 have to be in OFF condition (see note 2). Upon completion of the synchronization phase the MT sets CT107 to ON condition (see note 2) causing the FA to connect the fax to line. The SS sets CT106 and CT109 to ON at the MT by means of the V.110 X and SB bits. The FA then generates the CED tone (see note 2), which completes phase A. Then the call is cleared by manual intervention at the MT or the activity progress of the call proceeds to the next phase.

Expected sequence

```
MS:                                                          SS:
Step   Direction
-----------------------------------------------------------------------------------------------------------
1      MS-->SS      Fax:                          Dial
       FA:          Pass dialling info, CT108.2 ON (see note 2)
       MT:          Send SETUP message            ------>     Receive SETUP message
2      SS-->MS                                    <-----      Send CONNECT message
3      MS<->SS      TCH Synchronization           <---->      TCH Synchronization
       MT:          CT107 ON (see note 2), when synchronized
4      SS-->MS                                    <-----      Set X and SB bit in V.110 frame
       MT: CT106/109 ON (see note 2)
       FA: Generate CED (see note 2)
       Fax: Detect CED (see note 2)
5      FA: Enter BCS-TRA state (see note 3)   Enter BCS-REC state
```

29.4.2.1.2.5   Test requirements

1. The condition of CT108.2 (see note 2) is verified and the SETUP message should contain the BC-IE for TS 62.

2. To be verified that at the MT CT106, 107, 109 are in OFF (see note 2) condition, that the MT begins the synchronization phase by sending the pattern 1/OFF and that CT107 (see note 2) is turned on by the MT after successful synchronization.

3. To be verified that CT106 and CT109 are turned on (see note 2), when in the V.110 frames received from the SS the X and SB bits are set and that the FA sends the CED (see note 2) tone towards the fax machine.

4. The state of the FA shall be verified (-> BCS-TRA).

29.4.2.2 Pre-message procedure

29.4.2.2.1 Definition and applicability

This test is applicable to an MS supporting TS 61 and/or TS 62.

29.4.2.2.2 Conformance requirement

The MS supporting transparent facsimile group 3 shall perform the pre-message procedure and shall support the frames and the circuits at the Um-,R- and 2w-interface according the specifications referred to in the section "Reference".

Reference

GSM 03.45, CCITT T.30.

29.4.2.2.3 Test purpose

To verify the correct handling of the T.30 DIS/DCS/TCF frames.

29.4.2.2.4 Method of test

Initial conditions

The activity progress of the fax call is brought to the beginning of Phase B.

Test procedure

After phase A the FA is in BCS-TRA state and sends SYNC frames. The SS being in BCS-REC state sends the T.30 DIS embedded in STATUS frames indicating its capabilities. The received DIS is checked, if necessary edited by the FA and sent to the fax. Then the FA returns to the idle state. The fax checks whether the indicated capabilities are in line with its own or not, and chooses the capabilities which are supported end-to-end by the connected fax machines by answering with the DCS frame preceded by the preamble. The FA enters the BCS-REC state and the BCS information is transmitted using the STATUS frames. Afterwards the FA returns to the idle state. Upon reception of the training sequence the FA enters the MSG-REC state without waiting for an acknowledge from the SS, i.e. the TCF is conveyed by means of the DATA frames. The FA enters the idle state and sends at least 5 SYNC frames to indicate that the message phase is over. Then the CFR frame is received, i.e. the FA enters the BCS-TRA state and receives the CFR in STATUS frames. Now, phase B is completed and the data transfer phase C begins. Then the call is cleared by manual intervention at the MT or the activity progress of the call proceeds to the next phase.

Expected sequence

MS: SS:
Step   Direction

----
1   SS-->MS   <-----   Send preamble*,DIS*
                FA: BCS-TRA
                        Monitor DIS
                        Generate preamble,DIS
                        CT105 OFF (see note 2)
                        IDLE
                Fax: Receive preamble,DIS
2   MS-->SS Fax: Send preamble,DCS
                FA: CT109 ON (see note 2)
                        BCS-REC
                        Monitor DCS
                        Send preamble*,DCS*
                        CT109 OFF (see note 2)   ----->   Receive preamble*,DCS*
                        IDLE
3   MS-->SS Fax: Send training,TCF
                FA: CT109 ON (see note 2)
                        MSG-REC
                        Send TCF*
                        CT109 OFF (see note 2)   ----->   Receive TCF*
4   SS<--MS   <-----   Send preamble*,CFR*
                FA: CT105 ON (see note 2)
                        BCS-TRA
                        Generate preamble, CFR
                        CT105 OFF (see note 2)
                        IDLE
                Fax: Receive preamble, CFR

29.4.2.2.5   Test requirements

1. To be verified that SYNC frames are transmitted across the radio interface in BCS-TRA and in the IDLE state and that CT105 is set to OFF (see note 2) . The correct generation of the T.30 BCS shall be verified (down-conversion to the BCS speed according to GSM 03.45).

2. The condition of CT109 shall be verified (see note 2); that the DCS is correctly inserted into the STATUS frames and that the IDENT octet contains the BCS-REC identifier. At CT109=OFF (see note 2), the FA returns to the idle state and sends SYNC frames (pattern according to GSM 03.45).

3. To be verified that the FA turns on CT109 (see note 2), enters the MSG-REC state and sends the TCF embedded in DATA frames without waiting for the confirmation that the SS has entered the MSG-TRA state. The ident octet has to be checked (-> MSG-REC). CT109 shall be in OFF condition (see note 2).

4. The condition of CT105 (see note 2) is to be verified. The correct generation of the T.30 BCS shall be checked. In IDLE state SYNC frames have to be sent.

29.4.2.3   Message procedure

29.4.2.3.1   Definition and applicability

This test is applicable to an MS supporting TS 61 and/or TS 62.

29.4.2.3.2   Conformance requirement

The MS supporting transparent facsimile group 3 shall perform the message procedure and shall support the frames and the circuits at the Um-,R- and 2w-interface according the specifications referred to in the section "Reference".

Reference

GSM 03.45, CCITT T.30, CCITT T.4, CCITT T.21.

29.4.2.3.3 Test purpose

To verify the facsimile data transmission phase.

29.4.2.3.4 Method of test

Initial conditions

The activity progress of the fax call is brought to the beginning of Phase C. The ECM shall not be used.

Test procedure

The FA is in IDLE state. The connected fax starts transmitting the fax message. Upon reception of the training sequence the FA enters the MSG-REC state and sends STATUS frames, which contain the ident octet set to MSG-REC, interleaved with SYNC frames to the SS. When the SS has entered the MSG-TRA state, which is indicated to the FA by means of the ident octet set to MSG-TRA, the FA starts sending the fax coded data (received from the connected fax) embedded in DATA frames. When the transmission is finished the FA is again in the idle state for at least 5 SYNC frames to indicate that the message phase is over and Phase D begins. Then the call is cleared by manual intervention at the MT or the activity progress of the call proceeds to the next phase.

Expected sequence

```
MS:                                                    SS:
Step   Direction
----------------------------------------------------------------------------------------------------------
1      MS-->SS    Fax:   Send training, fax message
                  FA:    CT109 ON (see note 2)
                         MSG-REC
                         Send STATUS frames (MSG-REC)
                           interleaved with SYNC
                           frames
                         Wait for MSG-TRA indication
                           from SS
2      SS-->MS                                        <-----  Send STATUS frames with
                                                               MSG-TRA identifier
3      MS-->SS           Send fax message*            ----->  Receive fax message*
                              "                                   "
                              "                                   "
                              "                                   "
                         CT109 OFF (see note 2)
                         IDLE
4      MS-->SS    FA:    Send at least                ----->  Receive SYNC frames
                         5 SYNC frames
```

29.4.2.3.5 Test requirements

1. To be verified that the FA enters the MSG-REC state and inserts the correct ident octet in the STATUS frames interleaved with SYNC frames.

2. To be verified that the FA sends the fax message after the SS has sent the STATUS frames containing the MSG-TRA identifier.

3. At the end of the document transmission the condition of CT109 (see note 2) shall be checked.

4. It shall be verified that at least 5 SYNC frames are sent in order to indicate the end of phase C.

29.4.2.4 Post-message procedure

29.4.2.4.1 Definition and applicability

This test is applicable to an MS supporting TS 61 and/or TS 62.

29.4.2.4.2 Conformance requirement

The MS supporting transparent facsimile group 3 shall perform the post-message procedure and shall support the frames and the circuits at the Um-,R- and 2w-interface according the specifications referred to in the section "Reference".

Reference

GSM 03.45, CCITT T.30.

29.4.2.4.3 Test purpose

To verify phase D of the facsimile transmission.

29.4.2.4.4 Method of test

Initial conditions

The activity progress of the fax call is brought to the beginning of Phase D. The ECM shall not be used.

Test procedure

The fax sends the preamble followed by the EOP frame. The FA then enters the BCS-REC state after having transmitted at least 5 SYNC frames since the last transition to the idle state and sends the EOP frame embedded in STATUS frames to the SS. The FA enters the idle state again. Upon detection of the BCS-REC identifier octet the BCS-TRA state is entered in order to receive the MCF frame issued by the SS. Then the preamble and the MCF frame are conveyed to the connected fax by the FA. The FA enters the idle state. Phase D of the fax transmission is completed. Then the call is cleared by manual intervention at the MT or the activity progress of the call proceeds to the next phase.

Expected sequence

```
MS:                                                             SS:
Step   Direction
------------------------------------------------------------------------------------------------------------
1      MS-->SS    Fax:   Send preamble, EOP
                  FA:    CT109 ON (see note 2)
                         BCS-REC
                         Send preamble*, EOP*
                         CT109 OFF (see note 2)      ----->      Receive preamble*, EOP*
                         IDLE
2      SS-->MS                                       <-----      Send preamble*, MCF*
                  FA:    CT105 ON (see note 2)
                         BCS-TRA
                          Transmit preamble, MCF
                         CT105 OFF (see note 2)
                         IDLE
                  Fax:   Receive preamble, MCF
```

29.4.2.4.5 Test requirements

1. To be verified that the FA enters the BCS-REC state and inserts the correct ident octet in the STATUS frames. The up-conversion to the message speed has to be checked.. The condition of CT109 has to be verified (see note 2). The contents of the SYNC frames shall be checked.

2. To be verified that the FA enters the BCS-TRA state upon detection of the BCS-REC identifier and that the correct T.30 message is conveyed to the connected fax machine (down-conversion to the BCS speed). The condition of CT105 should be checked (see note 2).

29.4.2.5 Call release procedure

29.4.2.5.1 Definition and applicability

This test is applicable to an MS supporting TS 61 and/or TS 62.

29.4.2.5.2 Conformance requirement

The MS supporting transparent facsimile group 3 shall perform the call release procedure and shall support the frames and the circuits at the Um-,R- and 2w-interface according the specifications referred to in the section "Reference".

Reference

GSM 03.45, CCITT T.30.

29.4.2.5.3 Test purpose

To verify phase E of the facsimile transmission.

29.4.2.5.4 Method of test

Initial conditions

The activity progress of the fax call is brought to the beginning of Phase E.

Test procedure

The fax sends the preamble followed by the DCN frame. The FA then enters the BCS-REC state and sends the DCN frame embedded in STATUS frames to the SS. The FA enters the IDLE state again. CT108.2 will go OFF condition (see note 2) and after 200ms CT109 will go to OFF condition (see note 2) too. The MT then sends the DISC message and the call is cleared.

Expected sequence

```
MS:                                                  SS:
Step   Direction
-----------------------------------------------------------------------------------------------------------------
1      MS-->SS      Fax:   Send preamble, DCN
                    FA:    CT109 ON (see note 2)
                           BCS-REC
                           CT108.2 OFF (see note 2)
                           Transmit preamble*, DCN*
                           CT109 OFF (see note 2)         ----->     Receive preamble*, DCN*
                           after 200 ms
                           IDLE
                    MT:    Send DISC message              ----->     Receive DISC message
```

29.4.2.5.5 Test requirements

To be verified that CT108.2 is turned off (see note 2) and that CT109 is set to OFF (see note 2) 200ms after the DCN frame has been sent. The contents of the STATUS frames including the ident octet has to be checked (up-conversion to the message speed according to GSM 03.45). The MT shall send the DISC message.

29.4.2.6 CTC processing - 4th PPR for the same block

29.4.2.6.1 Definition and applicability

This test is applicable to an MS supporting TS 61 and/or TS 62. The FA and the facsimile device have to support the error correction mode.

29.4.2.6.2 Conformance requirement

The MS supporting transparent facsimile group 3 shall perform the CTC processing procedure and shall support the frames and the circuits at the Um-,R- and 2w-interface according the specifications referred to in the section "Reference".

Reference

GSM 03.45, CCITT T.30.

29.4.2.6.3 Test purpose

To verify phase D of the facsimile transmission in case of a 4th PPR for the same block.

29.4.2.6.4 Method of test

Initial conditions

The activity progress of the fax call is brought to the beginning of Phase C. The ECM shall be used. The fax transmission shall start a speed of 9,6 kBit/s.

Test procedure

The fax sends the preamble followed by the PPS-NULL(0,0) frame. The FA then enters the BCS-REC state and sends the PPS* frame embedded in STATUS frames to the SS. The SS responds with the PPR* frame requesting corrupted frames to be retransmitted. This test sequence is repeated 4 times causing the fax machine to send the CTC frame which indicates the fallback bit rate of 7 200 kBit/s The FA sends the CTC* after recognizing the new message speed to the SS. The SS responds with the CTR* frame and the fax machine retransmits the corrupted frames which are inserted into DATA frames by the FA. After every third DATA frame the FA has to insert a SYNC frame. After the retransmission, the fax machine sends the PPS-NULL(0,0) which is answered by the SS with the MCF* frame. Phase D of the fax transmission is completed. Then the call is cleared by manual intervention at the MT or the activity progress of the call proceeds to the next phase.

Expected sequence

```
MS:                                          SS:
Step    Direction
-----------------------------------------------------------------------------------------------------------------------
1    MS-->SS    Fax:  Send training, fax message
                FA:   CT109 ON (see note 2)
                      MSG-REC
                      Send fax message*          ---->   Receive fax message*
                      "                                   "
                      "                                   "
                      "                                   "
                      CT109 OFF (see note 2)
                      IDLE
2    MS-->SS    FA:   Send at least              ---->   Receive SYNC frames
                      5 SYNC frames
3    MS-->SS    Fax:  Send preamble, PPS-NULL
                FA:   CT109 ON (see note 2)
                      BCS-REC
                      Send preamble*, PPS-NULL*
```

			CT109 OFF (see note 2) IDLE	----->	Receive preamble*, PPS-NULL*
4	SS-->MS			<-----	Send preamble*, PPR*
		FA:	CT105 ON (see note 2) BCS-TRA Transmit preamble, PPR CT105 OFF (see note 2) IDLE		
		Fax:	Receive preamble, PPR		
5	Repeat steps 1 to 4 four times				
6	MS-->SS	Fax:	Send preamble, CTC		
		FA:	CT109 ON (see note 2) BCS-REC Monitor CTC		
			Send preamble*, CTC*	----->	Receive preamble*, CTC*
			CT109 OFF (see note 2) IDLE		
7	SS-->MS			<-----	Send preamble*, CTR*
		FA:	CT105 ON (see note 2) BCS-TRA Transmit preamble, CTR CT105 OFF (see note 2) IDLE		
		Fax:	Receive preamble, CTR		
8	MS-->SS	Fax:	Send training, fax message		
		FA:	CT109 ON (see note 2) MSG-REC		
			Send fax message*	----->	Receive fax message*
			" " "		" " "
			CT109 OFF (see note 2) IDLE		
9	MS-->SS	FA:	Send at least 5 SYNC frames	----->	Receive SYNC frames
10	MS-->SS	Fax:	Send preamble, PPS-NULL		
		FA:	CT109 ON (see note 2) BCS-REC Send preamble*, PPS-NULL*		
			CT109 OFF (see note 2) IDLE	----->	Receive preamble*, PPS-NULL*
11	SS-->MS			<-----	Send preamble*, MCF*
		FA:	CT105 ON (see note 2) BCS-TRA Transmit preamble, MCF CT105 OFF (see note 2) IDLE		
		Fax:	Receive preamble, MCF		

29.4.2.6.5   Test requirement

It shall be verified that the FA transmits 1 SYNC frame every 3 DATA frames.

29.4.2.7 Transition from Facsimile to Speech - Procedure interrupt generated by receiving station

29.4.2.7.1 Definition and applicability

This test is applicable to an MS supporting TS 61.

29.4.2.7.2 Conformance requirement

The MS supporting transparent facsimile group 3 shall perform the ICM procedure and shall support the frames and the circuits at the Um-,R- and 2w-interface according the specifications referred to in the section "Reference".

Reference

GSM 03.45, CCITT T.30.

29.4.2.7.3 Test purpose

To verify the transition from fax to speech in case of an MS supporting TS 61.

29.4.2.7.4 Method of test

Initial conditions

The activity progress of the fax call is brought to phase C (message phase). The ECM shall not be used.

Test procedure

During the message phase a procedure interrupt is generated by the SS, which is executed as soon as phase D is entered. The SS then sends the PIP frame causing an alert at the mobile side. When the operator at the mobile side goes on line the PRI-Q frame is generated and results in an alarm at the SS side. The operator at this side going on line completes the PRI handshaking by causing the PIP frame to be sent. Upon completion of the PRI handshaking the MT executes the MODIFY procedure, which leads to the speech phase. Then the call is cleared by manual intervention at the MT or the facsimile phase maybe reselected.

Expected sequence

```
MS:                                                          SS:
Step   Direction
-------------------------------------------------------------------------------------------------------
1      Message Procedure (as described above)                Operator intervention requested
2      MS-->SS    Fax:   Send preamble, EOP
                  FA:    CT109 ON (see note 2)
                         BCS-REC
                         Send preamble*, EOP*
                         CT109 OFF (see note 2)      ----->   Receive preamble*, EOP*
                         IDLE
3      SS-->MS                                       <-----   Send preamble*, PIP*
                  FA:    CT105 ON (see note 2)
                         BCS-TRA
                         Transmit preamble, PIP
                         CT105 OFF (see note 2)
                         IDLE
                  Fax:   Receive preamble, PIP
                         Alert operator
4      MS-->SS    Operator goes on line
                  Fax:   Send preamble, PRI-EOP
                  FA:    CT109 ON (see note 2)
```

			BCS-REC		
			Send preamble*, PRI-EOP*		
			CT109 OFF (see note 2)	----->	Receive preamble*, PRI-EOP*
			IDLE		Alert operator
		MT:	CT106/109 OFF (see note 2)		
5	SS-->MS				Operator goes on line
				<-----	Send preamble*, PIP*
		FA:	CT105 ON (see note 2)		
			BCS-TRA		
			Transmit preamble, PIP		
			CT105 OFF (see note 2)		
			IDLE		
		Fax:	Receive preamble, PIP		
6	MS-->SS	FA:	CT108.2 OFF (see note 2)		
		MT:	Send MODIFY message	----->	Receive MODIFY m.
				<-----	Send MODIFY COMPLETE
			CT107 OFF (see note 2)		

SPEECH PHASE

29.4.2.7.5   Test requirements

1. To be verified that CT106/109 are in OFF (see note 2) condition.

2. To be verified that CT108.2 goes to OFF (see note 2) upon completion of the PRI handshaking, that this transition to OFF triggers the MODIFY message to be sent and that the reception of the MODIFY COMPLETE message causes CT107 to be set to OFF (see note 2) condition by the MT. In addition the availability of the speech channel shall be checked.

29.4.2.8   Transition from Facsimile to Speech - Procedure interrupt generated by transmitting station

29.4.2.8.1   Definition and applicability

This test is applicable to an MS supporting TS 61.

29.4.2.8.2   Conformance requirement

The MS supporting transparent facsimile group 3 shall perform the ICM procedure and shall support the frames and the circuits at the Um-,R- and 2w-interface according the specifications referred to in the section "Reference".

Reference

GSM 03.45, CCITT T.30.

29.4.2.8.3   Test purpose

To verify the transition from fax to speech in case of an MS supporting TS 61.

29.4.2.8.4   Method of test

Initial conditions

The activity progress of the fax call is brought to phase C (message phase). The ECM shall not be used.

Test procedure

During the message phase a procedure interrupt is generated at the MS side, which is executed as soon as phase D is entered. The fax then sends the PRI-EOP frame causing an alert at the SS side. When the operator at the SS side goes on line the PIP frame is generated and results in an alarm at the MS side. The operator at this side going on line completes the PRI handshaking by causing the PRI-EOP frame to be sent. Upon completion of the PRI handshaking the MT executes the MODIFY procedure, which leads to the speech phase. Then the call is cleared by manual intervention at the MT or the facsimile phase maybe reselected.

Expected sequence

```
MS:                                                                                    SS:
Step   Direction
--------------------------------------------------------------------------------------------------------------------------
1      Message Procedure (as described above)
       Operator intervention requested
2      MS-->SS    Fax:   Send preamble, PRI-EOP
                  FA:    CT109 ON (see note 2)
                         BCS-REC
                         Send preamble*, PRI-EOP*
                         CT109 OFF (see note 2)      ----->      Receive preamble*, PRI-EOP*
                         IDLE
3      SS-->MS                                       <-----      Send preamble*, PIP*
                  FA:    CT105 ON (see note 2)
                         BCS-TRA
                         Transmit preamble, PIP
                         CT105 OFF (see note 2)
                         IDLE
                  Fax:   Receive preamble, PIP
                         Alert operator
4      MS-->SS    Operator goes on line
                  MT:    CT106/109 OFF (see note 2)
                  Fax:   Send preamble, PRI-EOP
                  FA:    CT109 ON (see note 2)
                         BCS-REC
                         Send preamble*, PRI-EOP*
                         CT109 OFF (see note 2)      ----->      Receive preamble*, PRI-EOP*
                         IDLE
5      MS-->SS    FA:    CT108.2 OFF (see note 2)
                  MT:    Send MODIFY message          ----->      Receive MODIFY m.
                                                      <-----      Send MODIFY COMPLETE

                         CT107 OFF (see note 2)

                         SPEECH PHASE
```

29.4.2.8.5   Test requirements

1. To be verified that CT106/109 are in OFF (see note 2) condition.

2. To be verified that CT108.2 goes to OFF (see note 2) upon completion of the PRI handshaking, that this transition to OFF triggers the MODIFY message to be sent and that the reception of the MODIFY COMPLETE message causes CT107 to be set to OFF (see note 2) condition by the MT. In addition the availability of the speech channel shall be checked.

29.4.2.9 Quality check

29.4.2.9.1 Definition and applicability

This test is applicable to all configurations supporting transparent facsimile group 3.

29.4.2.9.2 Conformance requirement

The configuration supporting transparent facsimile group 3 shall decode the T.4 coding and shall generate a document.

Reference

GSM 03.45, CCITT T.21, CCITT T.4.

29.4.2.9.3 Test purpose

To verify the quality of the received document.

29.4.2.9.4 Method of test

Initial conditions

The document has been received at the called side.

Test procedure

The quality of the received document at the SS side shall be checked.

29.4.2.9.5 Test requirement

The contents of the transmitted and the received document shall be the same.

29.4.3 Mobile terminated call

29.4.3.1 Call Establishment Procedure

29.4.3.1.1 Alternate Speech/Facsimile

29.4.3.1.1.1 DCD Mobile Terminated

29.4.3.1.1.1.1 Definition and applicability

This test is applicable to an MS supporting TS 61.

29.4.3.1.1.1.2 Conformance requirement

The MS supporting transparent facsimile group 3 shall perform the ICM procedure and shall support the frames and the circuits at the Um-,R- and 2w-interface according the specifications referred to in the section "Reference".

Reference

GSM 03.45, CCITT T.30

29.4.3.1.1.1.3 Test purpose

To verify the transition from speech to fax in case of an MS supporting TS 61 and that the circuit and tone handling of the MT and FA is correct in case of an MT DCD.

29.4.3.1.1.1.4   Method of test

Initial conditions

A TS 61 s/f call is set up. The speech phase is active.

Test procedure

The transition from speech to fax is initiated by manual intervention at both ends of the connection, i.e. the data call direction DCD is mobile terminated. Upon connection to line the FA turns on CT108.2 (see note 2) as a basic requirement for the transition from speech to fax. Now, within the next 3 seconds the FA has to detect the DCD, which is in this case mobile terminated, i.e. CT105 is set to OFF condition (see note 2). The following ICM procedure via the MODIFY message is carried out by the MT 3 seconds after circuit CT108.2 (see note 2) was set to ON condition. On completion of the ICM the synchronization of the TCH begins and after its completion the MT has to set CT107 to ON condition (see note 2). When CT106/109 are set to ON (see note 2) phase A is completed. Then the call is cleared by manual intervention at the MT or the activity progress of the call proceeds to the next phase.

Expected sequence

```
MS:                                                                SS:
Step   Direction
----------------------------------------------------------------------------------------------------------------
1      MS-->SS    Fax:  Connect to line (see note 1)      Connect to line (see note 1)
                  FA:   CT108.2 ON (see note 2)
                        Detect DCD
                        CT105 OFF (see note 2)
                  MT:   Send MODIFY message       ------>  Receive MODIFY message
                        3 seconds after CT108.2 ON (see note 2)
2      SS-->MS                                    <-----   Send MODIFY COMPLETE
3      MS<->SS    TCH Synchronization             <---->   TCH Synchronization
                  MT:   CT107 ON (see note 2), when synchronized
4      SS-->MS                                    <-----   Set X and SB bit in V.110 frame
                  MT:   CT106/109 ON (see note 2)
                  FA:   Enter BCS-REC state                Enter BCS-TRA state
```

29.4.3.1.1.1.5   Test requirements

1. The condition of CT108.2 and CT105 is verified (see note 2); CT106, 107, 109 have to be in OFF (see note 2) condition. The MODIFY message has to be sent 3 seconds +/- 10% after circuit CT108.2 has gone to ON (see note 2) condition.

2. The RCSD-IE shall not be included in the MODIFY message.

3. To be verified that the MT begins the synchronization phase by sending the pattern 1/OFF after the reception of the MODIFY COMPLETE message, that CT107 is turned on (see note 2) by the MT after successful synchronization.

4. To be verified that CT106 and CT109 are turned on (see note 2), when in the V.110 frames received from the SS the X and SB bits are set. The state of the FA shall be verified (->BCS-REC).

29.4.3.1.1.2   DCD mobile originated

29.4.3.1.1.2.1   Definition and applicability

This test is applicable to an MS supporting TS 61.

29.4.3.1.1.2.2 Conformance requirement

The MS supporting transparent facsimile group 3 shall perform the ICM procedure and shall support the frames and the circuits at the Um-,R- and 2w-interface according the specifications referred to in the section "Reference".

Reference

GSM 03.45, CCITT T.30.

29.4.3.1.1.2.3 Test purpose

To verify the transition from speech to fax in case of an MS supporting TS 61 and that the circuit and tone handling of the MT and FA is correct in case of an MO DCD.

29.4.3.1.1.2.4 Method of test

Initial conditions

A TS 61 s/f call is set up. The speech phase is active.

Test procedure

The transition from speech to fax is initiated by manual intervention at both ends of the connection, i.e. the data call direction DCD is mobile originated. Upon connection to line the FA turns on CT108.2 (see note 2) as a basic requirement for the transition from speech to fax. Now, within the next 3 seconds the FA has to detect the DCD, which is in this case mobile originated, i.e. CT105 is set to ON condition (see note 2), indicating that the MT has to include the RCSD-IE in the MODIFY message. The following ICM procedure via the MODIFY message is carried out by the MT 3 seconds after circuit CT108.2 (see note 2) was set to ON condition. On completion of the ICM the synchronization of the TCH begins and after its completion the MT has to set CT107 to ON condition (see note 2). When CT106/109 are set to ON (see note 2), phase A is completed. Then the call is cleared by manual intervention at the MT or the activity progress of the call proceeds to the next phase.

Expected sequence

```
MS:                                                            SS:
Step    Direction
------------------------------------------------------------------------------------------------------------
1       MS-->SS     Fax:    Connect to line (see note 1)              Connect to line (see note 1)
                    FA:     CT108.2 ON (see note 2)
                            Detect DCD
                            CT105 ON (see note 2)
                    MT:     Send MODIFY message       ------>         Receive MODIFY message
                              with RCSD-IE 3 seconds
                              after CT108.2 ON (see note 2)
2       SS-->MS                                       <-----          Send MODIFY COMPLETE
                                                                        with RCSD-IE
3       MS<->SS     TCH Synchronization               <--->           TCH Synchronization
                    MT:     CT107 ON (see note 2), when synchronized
                    FA:     Generate CED (see note 2)
                    Fax:    Detect CED (see note 2)
4       SS-->MS                                       <-----          Set X and SB bit in modified
                                                                        V.110 frame
                    MT:     CT106/109 ON (see note 2)
                    FA:     Enter BCS-TRA state                       Enter BCS-REC state
```

29.4.3.1.1.2.5 Test requirements

1. The condition of CT108.2 and CT105 is verified (see note 2); CT106, 107, 109 have to be in OFF (see note 2) condition.

2. The MODIFY message containing the RCSD-IE has to be sent 3 seconds +/- 10% after circuit CT108.2 has gone to ON (see note 2) condition.

3. To be verified that the MT begins the synchronization phase by sending the pattern 1/OFF after the reception of the MODIFY COMPLETE message, that CT107 is turned on (see note 2) by the MT after successful synchronization. The CED (see note 2) tone has to be transmitted by the FA.

4. To be verified that CT106 and CT109 are turned on (see note 2), when in the modified V.110 frames received from the SS the X and SB bits are set. The state of the FA shall be verified (-> BCS-TRA).

29.4.3.1.2 Automatic facsimile

29.4.3.1.2.1 Definition and applicability

This test is applicable to an MS supporting TS 62.

29.4.3.1.2.2 Conformance requirement

The MS supporting transparent facsimile group 3 shall perform the call setup procedure and shall support the frames and the circuits at the Um-,R- and 2w-interface according the specifications referred to in the section "Reference".

Reference

GSM 03.45, GSM 07.01, CCITT T.30.

29.4.3.1.2.3 Test purpose

To verify that the circuit and tone handling of the MT and FA is correct.

29.4.3.1.2.4 Method of test

Initial conditions

The MS, configured for the fax call, is updated. Then the call establishment phase begins.

Test procedure

The SS will send the SETUP message causing CT125 (see note 2) going to ON condition at the MT. The FA then sends ring current (see note 2) to the fax machine, which will connect to line. The FA sets CT108.2 (see note 2) to ON condition which causes the MT to send the CONNECT message towards the SS. When the TCH is available (indicated by the CONNECT ACK message) the synchronization phase begins, i.e. both entities start sending the synchronization pattern 1/OFF. CT106, 107, 109 have to be in OFF (see note 2) condition. Upon completion of the synchronization phase the MT sets CT107 (see note 2) to ON condition causing the FA to send the CNG tone (see note 2) while the SS turns on CT108.2 causing the CED tone to be sent. Then the SS sets CT106 and 109 to ON (see note 2) at the MT by means of the modified V.110 X and SB bits, which completes Phase A. Then the call is cleared by manual intervention at the MT or the activity progress of the call proceeds to the next phase.

Expected sequence

MS:					SS:
Step	Direction				

```
-------------------------------------------------------------------------------------------------------
1      SS-->MS                                                <-----    Send SETUP message
              MT:   CT125 ON (see note 2)
              FA:   Cause ring current to flow (see note 2)
2      MS-->SS    Fax:  Connect to line (see note 1)
              FA:   CT108.2 ON (see note 2)
              MT:   Send CONNECT message        ------>    Receive CONNECT message
3      SS-->MS                                              Send CONN ACK message
4      MS<->SS       TCH Synchronization         <---->    TCH Synchronization
              MT:   CT107 ON (see note 2), when completed
              FA:   Generate CNG (see note 2)
              Fax:  Receive CNG (see note 2)
5      SS-->MS                                      <-----    Set X and SB bit in modified
                                                                V.110 frame
              MT:   CT106/109 ON (see note 2)
6             FA:   Enter BCS-REC state                    Enter BCS-TRA state
```

29.4.3.1.2.5 Test requirements

1. The condition of CT125 (see note 2) shall be verified.

2. CT108.2 to be verified (see note 2) and the CONNECT message has to be sent by the MT.

3. To be verified that at the MT CT106, 107, 109 are in OFF (see note 2) condition, that the MT begins the synchronization phase by sending the pattern 1/OFF, that CT107 is turned on (see note 2) by the MT after successful synchronization and that the CNG tone (see note 2) is sent.

4. It shall be verified that CT106 and CT109 are turned on (see note 2), when in the modified V.110 frames received from the SS the X and SB bits are set.

5. The state of the FA shall be verified (-> BCS-REC).

29.4.3.2 Pre-message procedure

29.4.3.2.1 Definition and applicability

This test is applicable to an MS supporting TS 61 and/or TS 62.

29.4.3.2.2 Conformance requirement

The MS supporting transparent facsimile group 3 shall perform the pre-message procedure and shall support the frames and the circuits at the Um-,R- and 2w-interface according the specifications referred to in the section "Reference".

Reference

GSM 03.45, CCITT T.30.

29.4.3.2.3 Test purpose

To verify the correct handling of the T.30 DIS/DCS/TCF frames.

29.4.3.2.4 Method of test

Initial conditions

The activity progress of the fax call is brought to the beginning of Phase B. The fax transmission shall start using a speed of 9,6 kBit/s.

Test procedure

After phase A the FA being in BCS-REC state, sends the DIS* frame in order to indicate the capabilities of the connected fax and the FA and returns to the idle state. The SS's answer to the DIS is the DCS*. Upon detection of the BCS-REC identifier the FA enters the BCS-TRA state, receives the DCS* and transmits the DCS to the fax. After being for 75 ± 20 ms in IDLE state the FA autonomously enters the MSG-TRA state and begins transmitting the training sequence towards the fax without being triggered by the remote FA/SS. Meanwhile the SS sends the TCF*, which is buffered by the FA. When the training is done the FA transmits the buffered TCF towards the fax. Then the CFR* frame is transmitted to the SS. Now, phase B is completed and the data transfer phase C begins. Then the call is cleared by manual intervention at the MT or the call activity progress proceeds to the next phase.

Expected sequence

```
MS:                                                          SS:
Step    Direction
-----------------------------------------------------------------------------------------------------
1       MS-->SS     Fax:    Send preamble,DIS
                    FA:     BCS-REC
                            Filter DIS
                            Send preamble*,DIS*         ----->      Receive preamble*,DIS*
                            CT109 OFF (see note 2)
                            IDLE
2       SS-->MS                                         <-----      Send preamble*,DCS*
                    FA:     CT105 ON (see note 2)
                            BCS-TRA
                            Monitor DCS
                            Transmit preamble,DCS
                            CT105 OFF (see note 2)
                            IDLE
                    Fax:    Receive preamble,DCS
3       SS-->MS                                         <-----      Send TCF*
                    FA:     CT105 ON (see note 2)
                            MSG-TRA
                            Initiate training after 75 ms +-20 ms in IDLE
                            Transmit TCF
                            CT105 OFF (see note 2)
                            IDLE
                    Fax:    Receive training,TCF
4       MS-->SSFax: Send preamble, CFR
                    FA:     CT109 ON (see note 2)
                            BCS-REC
                            Send preamble*,CFR*
                            CT109 OFF (see note 2)      ----->      Receive preamble*,CFR*
                            IDLE
```

29.4.3.2.5 Test requirements

1. To be verified that the DIS is filtered and that the correct up-conversion to the message speed is applied. CT109 should go to OFF (see note 2).

2. The DCS shall indicate a message speed of 7 200 bit/s and the down-conversion to the BCS speed shall be verified.

3. The FA, after the reception of the DCS, sends SYNC frames for 75 ± 20 ms and changes to the MSG-TRA state without being triggered by the SS. When the training is over the TCF is transmitted to the fax.

4. The condition of CT109 (see note 2), the ident octet of the STATUS frames and the up-conversion to the message speed shall be verified.

29.4.3.3   Message procedure

29.4.3.3.1   Definition and applicability

This test is applicable to an MS supporting TS 61 and/or TS 62.

29.4.3.3.2   Conformance requirement

The MS supporting transparent facsimile group 3 shall perform the message procedure and shall support the frames and the circuits at the Um-,R- and 2w-interface according the specifications referred to in the section "Reference".

Reference

GSM 03.45, CCITT T.30, CCITT T.4, CCITT T.21.

29.4.3.3.3   Test purpose

To verify the facsimile data transmission phase.

29.4.3.3.4   Method of test

Initial conditions

The activity progress of the fax call is brought to the beginning of Phase C. The ECM shall not be used.

Test procedure

The FA is in idle state. Upon reception of the MSG-REC identifier the FA enters the MSG-TRA state, sends the MSG-TRA identifier and initiates the training. While the training is in progress data being received is buffered and conveyed to the connected fax upon end of training. When the transmission is finished the FA is again in the IDLE state and Phase D begins. Then the call is cleared by manual intervention at the MT or the activity progress of the call will proceed to the next phase.

Expected sequence

MS: SS:

Step   Direction

1	SS-->MS			<-----	Transmit STATUS interleaved
					with SYNC frames
2	MS-->SS	FA:	CT105 ON (see note 2)		
			MSG-TRA		
			Initiate training		
			Send STATUS interleaved		
			with SYNC frames	----->	
3	SS-->MS			<-----	Send fax message*
		FA:	Buffer received data during training		
			Receive fax message*		
			"		"
			"		"
			"		"
			CT105 OFF (see note 2)		
			IDLE		
		Fax:	Receive training, fax message		

29.4.3.3.5   Test requirements

1. To be verified that the FA enters the MSG-TRA state and inserts the correct ident octet in the STATUS frames. Training has to be initiated (see note 2). STATUS frames have to be sent interleaved with SYNC frames.

2. The condition of CT105 (see note 2) shall be checked.

29.4.3.4   Post-message procedure

29.4.3.4.1   Definition and applicability

This test is applicable to an MS supporting TS 61 and/or TS 62.

29.4.3.4.2   Conformance requirement

The MS supporting transparent facsimile group 3 shall perform the post-message procedure and shall support the frames and the circuits at the Um-,R- and 2w-interface according the specifications referred to in the section "Reference".

Reference

GSM 03.45, CCITT T.30

29.4.3.4.3   Test purpose

To verify phase D of the facsimile transmission.

29.4.3.4.4   Method of test

Initial conditions

The activity progress of the fax call is brought to the beginning of Phase D. The ECM shall not be used.

Test procedure

The SS sends the EOP* frame. The FA then enters the BCS-TRA state and conveys the EOP frame to the fax machine. The fax answers the EOP with the MCF frame. The FA will enter the BCS-REC state, transmit the BCS-REC identifier and

will convey the MCF* frame to the SS. Afterwards the FA enters the IDLE state. Phase D of the fax transmission is completed. Then the call is cleared by manual intervention at the MT or the activity progress of the call will proceed to the next phase.

Expected sequence

```
MS:                                                          SS:
Step    Direction
----------------------------------------------------------------------------------------------------------------------
1       SS-->MS                                      <-----     Send preamble*, EOP*
                FA:     CT105 ON (see note 2)
                        BCS-TRA
                         Transmit preamble, EOP
                        CT105 OFF (see note 2)
                        IDLE
                Fax:    Receive preamble, EOP
2       MS-->SS  Fax:    Send preamble, MCF
                FA:     CT109 ON (see note 2)
                        BCS-REC
                        Send preamble*, MCF*
                        CT109 OFF (see note 2)     ----->     Receive preamble*, MCF*
                        IDLE
```

29.4.3.4.5   Test requirements

1. To be verified that the FA enters the BCS-TRA state upon detection of the BCS-REC identifier and that the correct T.30 message (down conversion to the message speed) is conveyed to the connected fax.

2. To be verified that the FA enters the BCS-REC state and that the correct STATUS frames are sent (up-conversion to the message speed).

29.4.3.5   Call release procedure

29.4.3.5.1   Definition and applicability

This test is applicable to an MS supporting TS 61 and/or TS 62.

29.4.3.5.2   Conformance requirement

The MS supporting transparent facsimile group 3 shall perform the call release procedure and shall support the frames and the circuits at the Um-,R- and 2w-interface according the specifications referred to in the section "Reference".

Reference

GSM 03.45, CCITT T.30.

29.4.3.5.3   Test purpose

To verify phase E of the facsimile transmission.

29.4.3.5.4   Method of test

Initial conditions

The activity progress of the fax call is brought to the beginning of Phase E.

Test procedure

The SS sends the preamble followed by the DCN frame. The FA then enters the BCS-TRA state and sends the DCN frame to the fax terminal. The FA enters the idle state again. CT108.2 (see note 2) will go OFF condition. The MT then sends the DISC message and the call is cleared.

Expected sequence

MS: SS:

Step   Direction

1	SS-->MS			<-----	Send preamble*, DCN*
	FA:	CT105 ON (see note 2)			
		BCS-TRA			
		CT108.2 OFF (see note 2)			
		Generate preamble, DCN			
		CT105 OFF (see note 2)			
		IDLE			
	Fax:	Receive preamble, DCN			
	MT:	Send DISC message	----->		Receive DISC message

29.4.3.5.5 Test requirements

To be verified that CT108.2 is turned off (see note 2) and that the correct down-conversion to the BCS speed is applied. The MT shall send the DISC message.

29.4.3.6 Speed conversion factor

29.4.3.6.1 Definition and applicability

This test is applicable to an MS supporting TS 61 and/or TS 62.

29.4.3.6.2 Conformance requirement

The MS supporting transparent facsimile group 3 shall perform the up- and down-conversion procedure and shall support the frames and the circuits at the Um-,R- and 2w-interface according the specifications referred to in the section "Reference".

Reference

GSM 03.45, CCITT T.30.

29.4.3.6.3 Test purpose

To verify the correct speed conversion for the BCS phases.

29.4.3.6.4 Method of test

Initial conditions

The activity progress of the fax call is brought to the beginning of Phase B. The ECM shall not be used.

Test procedure

The following test sequence is repeated 5 times with 5 different DCS frames indicating a message speed of 9,6/7,2/4,8/2,4 and 9,6 kBit/s. This test is done to verify that the FA detects a change of the TCH access rate and due to this updates the speed conversion factor, which is used for the up-conversion of the BCS signalling to the message speed and vice

versa. Then the call is cleared by manual intervention at the MT or the activity progress of the call proceeds to the next phase.

Expected sequence

MS: SS:

Step   Direction

1	MS-->SS	Fax:	Send preamble,DIS
		FA:	BCS-REC
			Monitor DIS
			Send preamble*,DIS* -----> Receive preamble*,DIS*
			CT109 OFF (see note 2)
			IDLE

2	SS-->MS		<----- Send preamble*,DCS*
		FA:	CT105 ON (see note 2)
			BCS-TRA
			Monitor DCS
			Transmit preamble,DCS
			CT105 OFF (see note 2)
			IDLE
		Fax:	Receive preamble,DCS

3   SS<->MS   Execution of the CMM procedure **): The SS sends the CMM message
                  150 ms after the DCS has been sent and the MT completes the procedure
                  by sending the CMM ACK message

4	SS-->MS		<----- Send TCF*
		FA:	CT105 ON (see note 2)
			MSG-TRA
			Initiate training after 75 ms +/- 20 ms in idle
			Generate TCF
			CT105 OFF (see note 2)
			IDLE
		Fax:	Receive training,TCF

5	MS-->SS	Fax:	Send preamble, CFR
		FA:	CT109 ON (see note 2)
			BCS-REC
			Send preamble*,CFR*
			CT109 OFF (see note 2) -----> Receive preamble*,CFR*
			IDLE

6	SS-->MS		<----- Send fax message*
		FA:	CT105 ON (see note 2)
			MSG-TRA
			Initiate training
			Buffer received data during training
			Receive fax message*
			" "
			" "
			" "
			CT105 OFF (see note 2)
			IDLE
		Fax:	Receive training, fax message

7	SS-->MS		<----- Send preamble*, EOM*
		FA:	CT105 ON (see note 2)
			BCS-TRA
			Transmit preamble, EOM
			CT105 OFF (see note 2)
			IDLE
		Fax:	Receive preamble, EOM

8	MS-->SS	Fax:	Send preamble, MCF
		FA:	CT109 ON (see note 2)
			BCS-REC
			Send preamble*, MCF*

CT109 OFF (see note 2)   ----->   Receive preamble*, MCF*
IDLE

9   Repeat steps 2 to 8 four times

**)   only if the requested rate in the DCS differs from the existing radio channel rate (when the radio channel rate equals 9 600 kbit/s and the DCS requests 7 200 kbit/s no CMM will be executed)

29.4.3.6.5   Test requirements

1. The MT shall send the CMM ACK message.

2. For 7,2/9,6 kBit/s:

    The correct up- and down-conversion shall be verified (4 STATUS frames for 1 BCS octet)

    For 4,8 kBit/s:

    The correct up- and down-conversion shall be verified (2 STATUS frames for 1 BCS octet)

    For 2,4 kBit/s:

    The correct up- and down-conversion shall be verified (1 STATUS frame for 1 BCS octet)

    The IDENT octet shall be set to BCS-REC in case of the up-conversion.

29.4.3.7   Quality Check

29.4.3.7.1   Definition and applicability

This test is applicable to all configurations supporting transparent facsimile group 3.

29.4.3.7.2   Conformance requirement

The configuration supporting transparent facsimile group 3 shall decode the T.4 coding and shall generate a document.

Reference

GSM 03.45, CCITT T.21, CCITT T.4.

29.4.3.7.3   Test purpose

To verify the quality of the received document.

29.4.3.7.4   Method of test

Initial conditions

The document has been received at the called side.

Test procedure

The quality of the document at the receiving side shall be checked.

29.4.3.7.5   Test requirements

The contents of the transmitted and the received document shall be the same.

29.4.4   Notes

The following notes apply throughout the clause 29.4.

NOTE 1: By pressing the START button on the facsimile apparatus or in case of PC fax by selecting the appropriate software menu point or automatically.

NOTE 2: Or equivalent function/means having the same result.

NOTE 3: Tested by monitoring the contents of the STATUS frame ident octet identifier.

NOTE 4: If no access is available to the 2w interface, this requirement cannot always be verified.