15 Supplementary Services

This clause is FFS.

16 Short message service (SMS)

Ref.: 3GPP TS 23.040, 3GPP TS 24.011 (point to point)
3GPP TS 23.041, (cell broadcast)

General

The purpose of these tests is to verify that the UE can handle Iu mode system functions when submitting or receiving Short Messages (SM) between UE and a short message service centre as described in 3GPP TS 23.040.

The procedures are based upon services provided by the Mobility Management (MM) sublayer and GPRS Mobility Management (GMM) sublayer which are not tested in this case.

The SMS comprises three basic services; SMS point to point services on CS mode, on PS mode and SMS cell broadcast service. The SMS point to point services on CS mode shall work in an active UE at any time independent of whether or not there is a speech or data call in progress. The SMS point to point services on PS mode shall work in an active UE at any time independent of whether or not there is a PDP context in progress. The SMS cell broadcast service only works when the UE is in idle mode.

Since the timer TC1M currently is not standardized, the value of TC1M shall be declared by the manufacturer (to be used in clauses 16.1.1 and 16.1.2).

The manufacturer shall declare whether SMS messages are stored in the USIM and/or the ME. This shall be referred to as the SMS message store in the following tests.

Unless otherwise stated default message contents from 3GPP TS 34.108 applies for following tests.

16.1 Short message service point to point on CS mode

All of test cases in this clause are applied to UE supporting CS mode.

16.1.1 SMS mobile terminated

16.1.1.1 Definition

16.1.1.2 Conformance requirements

An active UE shall be able to receive short message TPDU (SMS-DELIVER) at any time, independently of whether or not there is a speech or data call in progress. A report will always be returned to the SC, confirming that the UE has received the short message.

Reference

3GPP TS 23.040 clause 3.1.

16.1.1.3 Test purpose

To verify the ability of a UE to receive and decode the SMS where provided for the point to point service.

16.1.1.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in MM-state "Idle, updated";
  - the SMS message storage shall be empty.

Related ICS/IXIT Statements

Support for Short message MT/PP.

The value of timer TC1M.

Whether SMS messages are stored in the USIM and/or the ME.

Support for call control state U10.

Maximum number of retransmissions of an unacknowledged CP-DATA message.

Test procedure

a) The UE terminates the establishment of Radio Resource Connection. After the completion of the RRC Connection the SS authenticates the UE.

After the SS receives SECURITY MODE COMPLETE, the SS sends a CP-DATA message. The information element of the CP-DATA message will be RP-DATA RPDU (SMS DELIVER TPDU).

b) The SS waits a maximum of 25 s for the CP-ACK message and then a maximum of 60 s for the CP-DATA message containing the RP-ACK RPDU.

c) The SS sends a CP-ACK to the UE within TC1M with no further CP-DATA messages and the SS initiates RRC Connection release.

d) Steps a), b) and c) are repeated but the first CP-DATA message from the UE is not acknowledged. The second CP-DATA message from the UE is acknowledged by a CP-ACK within a time TC1M.

e) Steps a) and b) are repeated. The SS is configured not to send CP-ACK. Then maximum 3 CP-DATA retransmissions may occur. After a duration of 4 times TC1M + 10 s (Maximum of T3240) SS initiates the channel release. This is the appropriate time to wait to verify that the UE does not send more than the maximum allowed (3) CP-DATA retransmissions.

f) The SMS message store shall be cleared manually by the operator.

g) A data or speech call is established on a DTCH with the SS and the state U10 of call control is entered.

The SS sends a CP-DATA message. The information element of the CP-DATA message will be RP-DATA RPDU (SMS DELIVER TPDU). The SS waits a maximum of 25 s for the CP-ACK message and then a maximum of 60 s for the CP-DATA message containing the RP-ACK RPDU.

h) The SS sends a CP-ACK to the UE within TC1M with no further CP-DATA messages. SS will wait for a period of 120ms. for the UE to send acknowledgement to the CP-ACK prior to the SS initiating the DISCONNECT. The SS initiates RRC Connection release. The SMS message store shall be cleared manually by the operator.

i) Steps g) and h) are repeated but the first CP-DATA message from the UE is not acknowledged. The second CP-DATA message from the UE is acknowledged by a CP-ACK within a time TC1M.

j) Step g) is repeated. The SS is configured not to send CP-ACK. Then maximum 3 CP-DATA retransmissions may occur. After a duration of 4 times TC1M + 10 s (Maximum of T3240) SS initiates the channel release. This is the appropriate time to wait to verify that the UE does not send more than the maximum allowed (3) CP-DATA retransmissions (during a call in progress).

k) A data or speech call is established on a DTCH with the SS and the state U10 of call control shall be entered. The speech call is cleared by the SS with a disconnect message. (The call clearing is continued on the DCCH in parallel to the following exchange of messages related to SMS).

The SS sends a CP-DATA RPDU (SMS DELIVER TPDU) message. The information element of the CP-DATA message is RP-DATA.

The SS waits a maximum of 25 s for the CP-ACK message and then a maximum of 60 s for the CP-DATA message containing the RP-ACK RPDU.

The SS sends a CP-ACK to the UE within TC1M with no further CP-DATA messages and the SS initiates channel release.

The SMS message store shall be cleared manually by the operator.

l) A data or speech call is established with the SS and the state U10 of call control is entered. The speech call shall be cleared from the UE. (The call clearing is continued in parallel to the following exchange of messages related to SMS).

The SS sends a CP-DATA message. The information element of the CP-DATA message is RP-DATA RPDU (SMS DELIVER TPDU).

The SS waits a maximum of 25 s for the CP-ACK message and then a maximum of 60 s for the CP-DATA message containing the RP-ACK RPDU.

The SS sends a CP-ACK to the UE within TC1M with no further CP-DATA messages and the SS initiates RRC Connection release.

The SMS message store shall be cleared manually by the operator.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS 34.108. The IE “Paging cause” in the PAGING TYPE 1 message is set to “Terminating Low Priority Signalling”. The SS verifies that the IE “Establishment cause” in the received RRC CONNECTION REQUEST message is set to “Terminating Low Priority Signalling”.
2	-->		PAGING RESPONSE	
3	<--		AUTHENTICATION REQUEST	
4	-->		AUTHENTICATION RESPONSE	
5	SS			The SS starts integrity protection
6			(void)	
7	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
8	SS			Waits max 25 s for CP-ACK
9	-->		CP-ACK	
10	SS			Waits max 60 s for RP-ACK RPDU
11	-->		CP-DATA	Contains RP-ACK RPDU
12	<--		CP-ACK	
13	SS			The SS releases the RRC connection
14	UE			The UE shall indicate that an SM has arrived.
15			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS 34.108. The IE “Paging cause” in the PAGING TYPE 1 message is set to “Terminating Low Priority Signalling”. The SS verifies that the IE “Establishment cause” in the received RRC CONNECTION REQUEST message is set to “Terminating Low Priority Signalling”.
16	-->		PAGING RESPONSE	
17	<--		AUTHENTICATION REQUEST	
18	-->		AUTHENTICATION RESPONSE	
19	SS			The SS starts integrity protection
20			(void)	
21	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
22	SS			Waits max 25 s for CP-ACK
23	-->		CP-ACK	
24	SS			Waits max 60 s for RP-ACK RPDU
25	-->		CP-DATA	First CP-DATA from UE, contains RP-ACK RPDU
26	SS			First CP-DATA message not acknowledged by SS
27	-->		CP-DATA	Retransmitted CP-DATA from UE within twice TC1M, after step 25, contains RP-ACK RPDU

Step	Direction		Message	Comments
	UE	SS		
28	<--		CP-ACK	Second CP_DATA message is acknowledged
29	SS			The SS releases the RRC connection
30	UE			The UE shall indicate that an SM has arrived.
31			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS 34.108. The IE "Paging cause" in the PAGING TYPE 1 message is set to "Terminating Low Priority Signalling". The SS verifies that the IE "Establishment cause" in the received RRC CONNECTION REQUEST message is set to "Terminating Low Priority Signalling".
32	-->		PAGING RESPONSE	
33	<--		AUTHENTICATION REQUEST	
34	-->		AUTHENTICATION RESPONSE	
35	SS			The SS starts integrity protection
36			(void)	
37	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
38	SS			Waits max 25 s for CP-ACK
39	-->		CP-ACK	
40	SS			Waits max 60 s for RP-ACK RPDU
41	-->		CP-DATA	Contains RP-ACK RPDU
42	SS			First CP-DATA message not acknowledged by SS
43			CP-DATA	Retransmitted CP-DATA from UE within twice TC1M after step 41, contains RP-ACK RPDU
44	SS			Retransmitted CP-DATA message not acknowledged by SS
45	UE			Depending upon the maximum number of CP-DATA retransmissions implemented, step 43 and 44 may be repeated. The maximum number of retransmissions may however not exceed three. The UE may also send less than 3 re-transmissions. The same RRC connection shall be used for CP-DATA retransmissions.
45a	UE			The UE may send a Signalling Connection Release Indication message immediately when TC1M has run out. This is according to TS 24.011 clause 5.3.2.1.
46	SS			The SS releases the RRC connection after a duration of 4*TC1M + 10 s (Maximum of T3240) from step 41.
47			(void)	
48	UE			The UE shall indicate that an SM has arrived.
49	SS			Following steps are applicable only for UE which supports CS call establishment (ICS pc_CS_CallEst). A data or speech call is established on a DTCH and the state U10 of call control is entered.
50			(void)	
51	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
52	SS			Waits max 25 s for CP-ACK
53	-->		CP-ACK	
54	SS			Waits max 60 s for RP-ACK RPDU
55	-->		CP-DATA	Contains RP-ACK RPDU
56	<--		CP-ACK	
56a	SS			SS will wait for 120 ms for the ACK SUFI.
57	<--		DISCONNECT	Disconnect the active call
58	-->		RELEASE	
58a	←		RELEASE COMPLETE	
58b	SS			The SS releases the RRC connection
59	UE			The UE shall indicate that an SM has arrived.
60	UE			Clear the SMS message store
61	SS			A data or speech call is established on a DTCH and the state U10 of call control is entered.
62			(void)	
63	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
64	SS			Waits max 25 s for CP-ACK
65	-->		CP-ACK	
66	SS			Waits max 60 s for RP-ACK RPDU
67	-->		CP-DATA	First CP-DATA from UE, contains RP-ACK RPDU
68	SS			First CP-DATA message not acknowledged by SS

Step	Direction		Message	Comments
	UE	SS		
69	-->		CP-DATA	Retransmitted CP-DATA message within twice TC1M after step 67, contains RP-ACK RPDU
70	<--		CP-ACK	Second CP-DATA message is acknowledged
70a	SS			SS will wait for 120 ms for the ACK SUFI.
71	<--		DISCONNECT	Disconnect the active call
72	-->		RELEASE	
73	←		RELEASE COMPLETE	
74	SS			The SS releases the RRC connection
75	UE			The UE shall indicate that an SM has arrived.
76	UE			Clear the SMS message store
77	SS			A data or speech call is established on a DTCH and the state U10 of call control is entered.
78			(void)	
79	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
80	SS			Waits max 25 s for CP-ACK
81	-->		CP-ACK	
82	SS			Waits max 60 s for RP-ACK RPDU
83	-->		CP-DATA	First CP-DATA from UE, contains RP-ACK RPDU
84	SS			First CP-DATA message not acknowledged by SS
85	-->		CP-DATA	Retransmitted CP-DATA message within twice TC1M after step 83, contains RP-ACK RPDU
86	SS			Retransmitted CP-DATA message not acknowledged by SS
87	UE			Depending on the maximum number of CP-DATA retransmissions implemented, step 85-86 may be repeated. The maximum number of retransmissions may however not exceed three. The UE may also send less than 3 re-transmissions. The same RRC connection shall be used for CP-DATA retransmissions.
87a	←		DISCONNECT	Disconnect the active call
87b	→		RELEASE	
87c	←		RELEASE COMPLETE	
88			(void)	
89	SS			The SS releases the RRC connection after a duration of 4*TC1M + 10 s (Maximum of T3240) from step 83.
90	UE			The UE shall indicate that an SM has arrived.
91	UE			Clear the SMS message store
92	SS			A data or speech call is established on a DTCH and the state U10 of call control is entered.
93			(void)	
94	<--		DISCONNECT	The speech call is cleared by the SS. The call clearing is continued in parallel to the following exchange of messages related to SMS.
95	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
96			void	
96a	→		RELEASE	UE releases the connection
96b	←		RELEASE COMPLETE	SS completes the connection release (Step 96a and 96b may be executed after step 97)
97	-->		CP-ACK	
			Void	
98	SS			Waits max 60 s for RP-ACK RPDU
99	-->		CP-DATA	Contains RP-ACK RPDU
100	<--		CP-ACK	
101	SS			The SS releases the RRC connection.
102	UE			The UE shall indicate that an SM has arrived.
103	UE			Clear the SMS message store
104	SS			A data or speech call is established on a DTCH and the state U10 of call control is entered.
105			(void)	
106	-->		DISCONNECT	The speech call is cleared from the UE. The call clearing is continued in parallel to the following exchange of messages related to SMS.
107	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
108	<--		RELEASE	This message is likely to be sent before all of the CP-DATA message has been sent on the DCCH.

Step	Direction		Message	Comments
	UE	SS		
109	-->		RELEASE COMPLETE	
110	-->		CP-ACK	shall be sent before 25 s after the start of step 107
111	SS			Waits max 60 s for RP-ACK RPDU
112	-->		CP-DATA	Contains RP-ACK RPDU
113	<--		CP-ACK	
114	SS			The SS releases the RRC connection
115	UE			The UE shall indicate that an SM has arrived.
116	UE			Clear the SMS message store
NOTE: Time values for SS wait time are chosen sufficiently high to be sure that the UE has enough time to respond to the different messages.				

Specific Message Contents

SMS DELIVER TPDU (not containing a type 0 message)

Information element	Comment Value
TP-PID	Different from Type 0: “01000000”B
TP-UDL	160
TP-UD (140 octets)	text of message (160 characters)
NOTE: The 160 characters in TP-UD shall include at least one occurrence of each character in the default alphabet (see 3GPP TS 23.038, clause 6.2.1).	

16.1.1.5 Test requirements

After step 7 UE shall receive SMS-DELIVER TPDU and send CP-ACK within 25 s and CP-DATA containing RP-ACK within 60 s after sending CP-ACK.

After step 14 UE shall indicate that an SM has arrived.

After step 25 UE shall retransmit CP-DATA containing RP-ACK within twice TC1M.

After step 30 UE shall indicate that an SM has arrived.

After step 43 UE shall repeat CP-DATA retransmissions and the maximum number of retransmissions must not exceed three.

After step 48 UE shall indicate that an SM has arrived.

After step 51 UE shall receive SMS-DELIVER TPDU and send CP-ACK within 25 s and CP-DATA containing RP-ACK within 60 s after sending CP-ACK.

After step 59 UE shall indicate that an SM has arrived.

After step 67 UE shall retransmit CP-DATA containing RP-ACK within twice TC1M.

After step 75 UE shall indicate that an SM has arrived.

After step 79 UE shall repeat CP-DATA retransmissions and the maximum number of retransmissions must not exceed three.

After step 90 UE shall indicate that an SM has arrived.

After step 95 UE shall receive SMS-DELIVER TPDU and send CP-ACK within 25 s and CP-DATA containing RP-ACK within 60 s after sending CP-ACK.

After step 102 UE shall indicate that an SM has arrived.

After step 107 UE shall receive SMS-DELIVER TPDU and send CP-ACK within 25 s and CP-DATA containing RP-ACK within 60 s after sending CP-ACK.

After step 115 UE shall indicate that an SM has arrived.

16.1.2 SMS mobile originated

16.1.2.1 Definition

16.1.2.2 Conformance requirements

An active UE shall be able to submit short message TPDU (SMS-SUBMIT) at any time, independently of whether or not there is a speech or data call in progress.

Reference

3GPP TS 23.040 clause 3.1.

16.1.2.3 Test purpose

To verify that the UE is able to correctly send a short message where the SMS is provided for the point to point service.

16.1.2.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in MM-state "Idle, updated";
  - the SMS message storage shall be empty.

Related ICS/IXIT Statements

Support for Short message MO/PP.

Support for state U10 of call control.

The value of timer TC1M.

Whether SMS messages are stored in the USIM and/or the ME.

Maximum number of retransmissions of an unacknowledged CP-DATA message.

Test procedure

a) The UE shall be set up to send an SM to the SS. The UE establishes successfully an RRC connection.

b) The SS performs authentication and after that, the SS starts integrity protection.

c) The SS responds to the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the UE with a CP-ACK message within TC1M followed by a CP-DATA message containing the correct RP-ACK RPDU. The SS waits a maximum of 25 s for the CP-ACK message.

d) The SS sends a channel release message to the UE.

e) Steps a) and b) are repeated. The SS is configured not to send the CP-ACK message. Then maximum 3 CP-DATA retransmissions may occur. After a duration of 4 times TC1M + 10 s (Maximum of T3240) the SS initiates channel release. This is the appropriate time to wait to verify that the UE does not send more than the maximum CP-DATA retransmissions.

f) Steps a) and b) are repeated. On receipt of the CP-DATA from the UE the SS sends a CP-ERROR message within TC1M containing a "Network Failure" cause. Then the SS initiates channel release.

g) A data or speech call is established with the SS and the state U10 of call control is entered. The UE is set up to send an SM to the SS. After the reception of the CM SERVICE REQUEST, the SS sends a CM SERVICE ACCEPT message.

h) The SS responds to the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the UE with a CP-ACK message within TC1M followed by a CP-DATA message containing the correct RP-ACK RPDU. The SS waits a maximum of 25 s for the CP-ACK message. Then the SS sends a channel release message to the UE.

i) Step g) is repeated. The SS is configured not to send the CP-ACK message. Then maximum 3 CP-DATA retransmissions may occur. After a duration of 4 times TC1M + 10 s (Maximum of T3240) the SS initiates channel release. This is the appropriate time to wait to verify that the UE does not send more than the maximum CP-DATA retransmissions (during a call in progress).

j) (void)

k) The UE is set up to send an SM to the SS. On receipt of the CM SERVICE REQUEST the SS sends a CM SERVICE REJECT message with the reject cause set to "Service Option not supported" or "Service Option temporarily out of order". After 5 s the SS initiates channel release.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1	UE			The UE is set up to send an SM
2	SS			The SS verifies that the IE “Establishment cause” in the received RRC CONNECTION REQUEST message is set to “Originating Low Priority Signalling”.
3	<--		Void	
4	-->		Void	
5	-->		CM SERVICE REQUEST	CM service type set to "Short Message Service"
6	<--		AUTHENTICATION REQUEST	
7	-->		AUTHENTICATION RESPONSE	
8	SS			The SS starts integrity protection
9			Void	
10	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
11	<--		CP-ACK	Sent within TC1M after step 10
12	<--		CP-DATA	Contains RP-ACK RPDU
13	SS			Waits max 25 s for CP-ACK
14	-->		CP-ACK	
15	SS			The SS releases the RRC connection.
16	UE			The UE is set up to send an SM
17	SS			The SS verifies that the IE “Establishment cause” in the received RRC CONNECTION REQUEST message is set to “Originating Low Priority Signalling”.
18			Void	
19			Void	
20			Void	
21			Void	
22	-->		CM SERVICE REQUEST	CM service type set to "Short Message Service"
23	<--		AUTHENTICATION REQUEST	
24	-->		AUTHENTICATION RESPONSE	
25	<--		SECURITY MODE COMMAND	
26	-->		SECURITY MODE COMPLETE	
27	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
28	SS			SS configured not to send CP-ACK
29	-->		CP-DATA	Retransmitted CP-DATA message within twice TC1M after step 27
30	UE			Depending on the maximum number of CP-DATA retransmissions implemented, step 29 may be repeated. The maximum number of retransmissions may however not exceed three. The UE may also send less than 3 re-transmissions. The same RRC connection shall be used for CP-DATA retransmissions.
30aa	UE			The UE may send a Signalling Connection Release Indication message immediately when TC1M has run out. This is according to TS 24.011 clause 5.3.2.1.
30a	SS			The SS releases the RRC connection after a duration of 4*TC1m + 10 s (Maximum of T3240) from step 27.
30b			Void	
31			Void	

Step	Direction		Message	Comments
	UE	SS		
32	UE			The UE is set up to send an SM
33	SS			The SS verifies that the IE “Establishment cause” in the received RRC CONNECTION REQUEST message is set to “Originating Low Priority Signalling”.
34			(void)	
35			(void)	
36			(void)	
37	-->		CM SERVICE REQUEST	CM service type set to "Short Message Service"
38	<--		AUTHENTICATION REQUEST	
39	-->		AUTHENTICATION RESPONSE	
40	SS			The SS starts integrity protection
41			(void)	
42	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
43	<--		CP-ERROR	Sent within TC1M containing "Network Failure" cause.
44	SS			The SS releases the RRC connection.
45			(void)	
46	SS			Following steps are applicable only for UE which supports CS call establishment (ICS pc_CS_CallEst). A data or speech call is established on a DTCH and the state U10 of call control is entered.
47	UE			The UE is set up to send an SM
48	-->		CM SERVICE REQUEST	CM service type set to "short message "
49	<--		CM SERVICE ACCEPT	
50	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
51	<--		CP-ACK	Sent within TC1M after step 50
52	<--		CP-DATA	Contains RP-ACK RPDU
53	SS			Waits max 25 s for CP-ACK
54	-->		CP-ACK	
55	SS			The SS releases the RRC connection.
56			(void)	
57	SS			A data or speech call is established on a DTCH and the state U10 of call control is entered.
57a	UE			The UE is set up to send an SM
58	-->		CM SERVICE REQUEST	CM service type set to "Short Message Service", upon CP-DATA retransmission new RRC connection has to be established, see step 64a.
59	<--		CM SERVICE ACCEPT	
60	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
61	SS			SS configured not to send CP-ACK
62	-->		CP-DATA	Retransmitted CP-DATA message within twice TC1M after step 60
63	UE			Depending on the maximum number of CP-DATA retransmissions implemented, step 62 may be repeated. The maximum number of retransmissions may however not exceed three. The UE may also send less than 3 re-transmissions. The same RRC connection shall be used for CP-DATA retransmissions.
63a			(void)	
64	SS			The SS releases the RRC connection after a duration of 4*TC1m + 10 s (Maximum of T3240) from step 60.
64a			(void)	
65			(void)	
66-78			(void)	
79	UE			The UE is set up to send an SM
80	SS			The SS verifies that the IE “Establishment cause” in the received RRC CONNECTION REQUEST message is set to “Originating Low Priority Signalling”.
81			(void)	
82	-->		CM SERVICE REQUEST	CM service type set to "Short Message Service"
83	<--		CM SERVICE REJECT	Reject cause set to "Service Option not supported" or "Service Option temporarily out of order"
84			(void)	
85	SS			The SS releases the RRC connection. 5 s after CM SERVICE REJECT
86			(void)	

Step	Direction		Message	Comments
	UE	SS		
NOTE: Time values for SS wait times are chosen sufficiently high to be sure that the UE has enough time to respond to the different messages.				

Specific Message Contents

SMS SUBMIT TPDU

Information element	Comment Value
TP-UDL TP-UD (140 octets)	as applicable 160 ASCII characters

16.1.2.5 Test requirements

After step 10 UE shall send a CP-DATA containing RP-data. The RP-DATA shall contain SMS SUBMIT TPDU.

After step 27 UE shall retransmit a CP-DATA containing RP-data and the maximum number of retransmissions must not exceed three. The RP-DATA shall contain SMS SUBMIT TPDU.

After step 50 UE shall send a CP-DATA containing RP-data. The RP-DATA shall contain SMS SUBMIT TPDU.

After step 62 UE shall retransmit a CP-DATA containing RP-data and the maximum number of retransmissions must not exceed three. The RP-DATA shall contain SMS SUBMIT TPDU.

After step 85 UE shall not send any CP-DATA.

16.1.3 Test of memory full condition and memory available notification:

The Memory Available Notification provides a means for the UE to notify the network that it has memory available to receive one or more short messages. The SMS status field in the USIM contains status information on the "memory available" notification flag.

16.1.3.1 Definition

16.1.3.2 Conformance requirement

1. When a mobile terminated message is Class 2, the UE shall ensure that the message has been transferred to the SMS data field in the USIM before sending an acknowledgement to the SC. The UE shall return a protocol error message if the short message cannot be stored in the USIM and there is other short message storage available in the UE. If all the short message storage in the UE is already in use, the UE shall return "memory capability exceeded".

2. When the UE rejects a short message due to lack of available memory capability the need to transfer notification shall be stored in the USIM.

3. If the memory capability becomes available because memory is cleared, the value of the memory capability exceeded notification flag in the USIM is read. If the flag is set, the UE notifies the network that memory capability is now available. After a positive acknowledgement from the network, the ME unsets the memory capability exceeded notification flag in the USIM.

References

- 3GPP TS 23.038 clause 4

- 3GPP TS 23.040 clauses 9.2.3.10, 10.3 (operation 14)..

16.1.3.3 Test purpose

1. To verify that the UE sends the correct acknowledgement when its memory in the USIM becomes full.

2. To verify that the UE sends the correct acknowledgement when its memory in the ME and the USIM becomes full, and sets the "memory exceeded" notification flag in the USIM.

3. To verify that the UE performs the "memory available" procedure when its message store becomes available for receiving short messages, and only at this moment.

16.1.3.4 Method of test

Initial conditions

- System Simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in MM-state "Idle, updated";
  - the SMS message storage shall be empty;
  - the UE shall be connected to the USIM simulator. The following shall be present in the USIM simulator:
    - EF_{SMS} with at least one record;
    - EF_{SMSS}, with SMS "Memory Cap. Exceed" notification flag set to "memory available";
    - Service no. 10 (SMS) in EF_{UST} set to allocated and activated.
  - for storing of Class 1 Short Messages the UE shall be set up to store Short Messages in the ME memory (by way of MMI, as described in ICS/IXIT statement).

Related ICS/IXIT Statements

Support for Short message MT/PP.

Whether SMS messages are stored in the USIM and/or the ME.

The value of timer TC1M.

Test procedure

a) step a) of clause 16.1.5.3 (test of Class 2 Short Messages) is repeated until the UE sends a negative acknowledgement (RP-ERROR). The USIM simulator shall indicate if the "memory capability exceeded" notification flag has been set on the USIM.

b) a Class 1 Short Message is sent to the UE.

c) step b) is repeated until the UE sends a negative acknowledgement (RP-ERROR). The USIM simulator shall indicate if the "memory capability exceeded" notification flag has been set on the USIM.

d) a Short Message is sent to the UE with the DCS field of the SMS-DELIVER TPDU set to 0.

e) the SS prompts the operator to read a short message and to remove it from the message store of the UE.

f) the SS waits for a RRC CONNECTION REQUEST from the UE, and sends a RRC CONNECTION SETUP.

g) after the SS receives a RRC CONNECTION SETUP COMPLETE, the SS authenticates the UE and activates ciphering.

h) the SS answers to the RP-SMMA from the UE with a CP-DATA containing a RP-ACK RPDU.

i) after the UE has acknowledged the CP-DATA with a CP-ACK, the SS releases the RRC connection. The USIM simulator shall indicate if the "memory capability exceeded" notification flag has been unset on the USIM.

j) step e) is repeated.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		

Step	Direction		Message	Comments
	UE	SS		
1			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
2	-->		PAGING RESPONSE	
3	<--		AUTHENTICATION REQUEST	
4	-->		AUTHENTICATION RESPONSE	
5	<--		SECURITY MODE COMMAND	
6	-->		SECURITY MODE COMPLETE	
7	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 2 Short Message
8		SS		Waits max 25 s for CP-ACK
9	-->		CP-ACK	
10		SS		Waits max 60 s for RP-ACK RPDU
11	-->		CP-DATA	Contains RP-ACK RPDU
12	<--		CP-ACK	Within TC1M after step 11
13	<--		RRC CONNECTION RELEASE	RRC connection is released. Step 1-13 is repeated until UE sends a negative acknowledgement (RP-ERROR) in step 11. The RP-ERROR RPDU cause field shall be "Protocol error, unspecified" if there is message capability in the USIM, or "Memory capability exceeded" if there is no message capability in the USIM. If the total memory store of the UE is full, the ME shall set the "memory capability exceeded" notification flag on the USIM.
14	-->		RRC CONNECTION RELEASE COMPLETE	
15			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
16	-->		PAGING RESPONSE	
17	<--		AUTHENTICATION REQUEST	
18	-->		AUTHENTICATION RESPONSE	
19	<--		SECURITY MODE COMMAND	
20	-->		SECURITY MODE COMPLETE	
21	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 1 Short Message
22		SS		Waits max 25 s for CP-ACK
23	-->		CP-ACK	
24		SS		Waits max 60 s for RP-ACK RPDU
25	-->		CP-DATA	Shall contain RP-ACK RPDU if there is memory capability in the ME. If not it shall contain RP-ERROR RPDU which cause field shall be "memory capability exceeded". If the total memory store of the UE now becomes full at this step, the ME shall set the "memory cap. exceed" notification flag on the USIM.
26	<--		CP-ACK	Within TC1M after step 25
27	<--		RRC CONNECTION RELEASE	RRC connection is released. Step 15-27 is repeated until the UE sends an RP-ERROR. The USIM simulator shall indicate if the "memory capability exceeded" notification flag has been set on the USIM.
28	-->		RRC CONNECTION RELEASE COMPLETE	
29			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
30	-->		PAGING RESPONSE	
31	<--		AUTHENTICATION REQUEST	
32	-->		AUTHENTICATION RESPONSE	
33	<--		SECURITY MODE COMMAND	
34	-->		SECURITY MODE COMPLETE	
35	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) with TP-DCS set to 0
36		SS		Waits max 25 s for CP-ACK
37	-->		CP-ACK	
38		SS		Waits max 60 s for RP-ACK RPDU
39	-->		CP-DATA	Shall contain RP-ERROR RPDU with error cause "memory capability exceeded".
40	<--		CP-ACK	Within TC1M after step 39
41	<--		RRC CONNECTION RELEASE	RRC connection is released.

Step	Direction		Message	Comments
	UE	SS		
42	-->		RRC CONNECTION RELEASE COMPLETE	
43	SS			Prompts the operator to remove one of the short messages from the message store of the UE.
44	<--		SYSTEM INFORMATION	BCCH
45	-->		RRC CONNECTION REQUEST	CCCH
46	<--		RRC CONNECTION SETUP	CCCH
47	-->		RRC CONNECTION SETUP COMPLETE	DCCH
48	-->		CM SERVICE REQUEST	CM service type information element is set to "Short message transfer".
49	<--		CM SERVICE ACCEPT	
50	-->		CP-DATA	Contains RP-SMMA RPDU
51	<--		CP-ACK	
52	<--		CP-DATA	Contains RP-ACK RPDU
53	-->		CP-ACK	Acknowledge of CP-DATA containing the RP-ACK RPDU. The ME shall unset the "memory capability exceeded" notification flag on the USIM.
54	<--		RRC CONNECTION RELEASE	RRC connection is released. The USIM simulator shall indicate if the "memory capability exceeded" notification flag has been unset on the USIM.
55	-->		RRC CONNECTION RELEASE COMPLETE	
56	SS			Prompts the operator to remove one of the short messages from the message store of the UE.
57	UE			Shall not attempt to send a RP-SMMA RPDU. This is verified by checking that the UE does not send a CHANNEL REQUEST message with the establishment cause "Other services which can be completed with an SDCCH"
NOTE: Time values for SS wait time are chosen sufficiently high to be sure that the UE has enough time to respond to the different messages.				

Specific Message Contents

SMS-DELIVER TPDU in step 7

Information element	Comment Value
TP-DCS	default alphabet, class 2 "11110010"B

SMS-DELIVER TPDU in step 21

TP-DCS	default alphabet, class 1 "11110001"B

SMS-DELIVER TPDU in step 35

TP-DCS	default alphabet "00000000"B

16.1.3.5 Test requirements

After UE sends a negative acknowledgement (RP-ERROR) in step 11, the USIM simulator shall indicate if the "memory capability exceeded" notification flag has been set on the USIM.

After UE sends a negative acknowledgement (RP-ERROR) in step 25, the USIM simulator shall indicate if the "memory capability exceeded" notification flag has been set on the USIM.

After step 53 the ME shall unset the "memory capability exceeded" notification flag on the USIM.

After step 57 UE shall not attempt to send a RP-SMMA RPDU.

16.1.4 Test of the status report capabilities and of SMS-COMMAND:

This test applies to UEs which support the status report capabilities.

16.1.4.1 Definition

16.1.4.2 Conformance requirement

The SMS offers the SC the capabilities of informing the UE of the status of a previously sent mobile originated short message. This is achieved by the SC returning a status report TPDU (SMS-STATUS-REPORT) to the originating UE.

SMS-COMMAND enables an UE to invoke an operation at the SC.

The UE shall increment TP-MR by 1 for each SMS-SUBMIT or SMS-COMMAND being submitted.

References

- 3GPP TS 23.040 clause 3.2.9.
- 3GPP TS 23.040 clauses 9.2.3.2, 9.2.3.4, 9.2.3.5, 9.2.3.6, 9.2.3.14, 9.2.3.18, 9.2.3.19, 9.2.3.26.

16.1.4.3 Test purpose

1) To verify that the UE is able to accept a SMS-STATUS-REPORT TPDU.
2) To verify that the UE is able to use the SMS-COMMAND functionality correctly and sends an SMS-COMMAND TPDU with the correct TP-Message-Reference.

16.1.4.4 Method of test

Initial conditions

- System Simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in MM-state "Idle, updated".

Related ICS/IXIT Statements

Support of SMS MO/PP and MT/PP.

Test procedure

a) The UE is made to send a Mobile Originated short message setting TP-SRR as in steps a) to d) of test 16.1.2 (SMS Mobile originated).

b) The SS sends a CP-DATA message containing a RP-DATA RPDU itself containing an SMS-STATUS-REPORT TPDU.

c) The SS sends a RRC CONNECTION RELEASE message.

d) The UE is made to send an SMS-COMMAND message enquiring about the previously submitted short message.

e) void.

f) The SS acknowledges the CP-DATA message from the UE with a CP-ACK followed by a CP-DATA message containing an RP-ACK RPDU

g) After receiving the CP-ACK from the UE, the SS releases the RRC connection by using a RRC CONNECTION RELEASE message.

h) The UE is made to send an SMS-COMMAND message requiring to delete the previously submitted short message.

i) steps e) to g) are repeated.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1	<--		SYSTEM INFORMATION	BCCH
2	-->		RRC CONNECTION REQUEST	CCCH
3	<--		RRC CONNECTION SETUP	CCCH
4	-->		RRC CONNECTION SETUP COMPLETE	DCCH
5	-->		CM SERVICE REQUEST	
6	<--		AUTHENTICATION REQUEST	
7	-->		AUTHENTICATION RESPONSE	
8	<--		SECURITY MODE COMMAND	
9	-->		SECURITY MODE COMPLETE	
10	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
11	<--		CP-ACK	Sent within TC1M after step 10
12	<--		CP-DATA	Contains RP-ACK RPDU
13	SS			Waits max 25 s for CP-ACK
14	-->		CP-ACK	
15	<--		RRC CONNECTION RELEASE	RRC connection is released.
16	-->		RRC CONNECTION RELEASE COMPLETE	
17			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
18	-->		PAGING RESPONSE	
19	<--		AUTHENTICATION REQUEST	
20	-->		AUTHENTICATION RESPONSE	
21	<--		SECURITY MODE COMMAND	
22	-->		SECURITY MODE COMPLETE	
23	<--		CP-DATA	Contains RP-DATA RPDU (SMS-STATUS-REPORT TPDU)
24	-->		CP-ACK	
25	-->		CP-DATA	Contains RP-ACK RPDU
26	<--		CP-ACK	
27	<--		RRC CONNECTION RELEASE	RRC connection is released.
28	-->		RRC CONNECTION RELEASE COMPLETE	
29	UE			The UE is made to send an SMS-COMMAND message enquiring about the previously submitted SM
30	<--		SYSTEM INFORMATION	BCCH
31	-->		RRC CONNECTION REQUEST	CCCH
32	<--		RRC CONNECTION SETUP	CCCH
33	-->		RRC CONNECTION SETUP COMPLETE	DCCH
34	-->		CM SERVICE REQUEST	
35	<--		AUTHENTICATION REQUEST	
36	-->		AUTHENTICATION RESPONSE	
37	<--		SECURITY MODE COMMAND	
38	-->		SECURITY MODE COMPLETE	
39	-->		CP-DATA	Contains RP-DATA RPDU (SMS-COMMAND TPDU) which shall contain the correct TP-MR
40	<--		CP-ACK	
41	<--		CP-DATA	Contains RP-ACK RPDU
42	-->		CP-ACK	
43	<--		RRC CONNECTION RELEASE	RRC connection is released.
44	-->		RRC CONNECTION RELEASE COMPLETE	
45	UE		The UE is made to send an SMS-COMMAND	message requiring to delete the previously submitted SM.
46	-->		RRC CONNECTION REQUEST	CCCH
47	<--		RRC CONNECTION SETUP	CCCH
48	-->		RRC CONNECTION SETUP COMPLETE	DCCH
49	-->		CM SERVICE REQUEST	
50	<--		AUTHENTICATION REQUEST	
51	-->		AUTHENTICATION RESPONSE	
52	<--		SECURITY MODE COMMAND	
53	-->		SECURITY MODE COMPLETE	

Step	Direction		Message	Comments
	UE	SS		
54	-->		CP-DATA	Contains RP-DATA RPDU (SMS-COMMAND TPDU) which shall contain the correct TP-MR
55	<--		CP-ACK	
56	<--		CP-DATA	Contains RP-ACK RPDU
57	-->		CP-ACK	
58	<--		RRC CONNECTION RELEASE	RRC connection is released.
59	-->		RRC CONNECTION RELEASE COMPLETE	

Specific Message Contents

SMS SUBMIT TPDU

Information element	Comment Value
TP-SRR	status report is requested "1"B

SMS-STATUS-REPORT TPDU (SS to UE in step 23):

Information element	Comment Value
TP-MR	same as previous SMS-SUBMIT
TP-MMS	no more messages "1"B
TP-SRQ	result of SMS-SUBMIT "0"B
TP-RA	same as the Destination address of the SMS-SUBMIT
TP-ST	SM received "00000000"B

first SMS-COMMAND TPDU (UE to SS in step 39)

Information element	Comment Value
TP-MR	TP-MR in previous SMS-SUBMIT plus "1"
TP-SRR	status report requested "1"B
TP-CT	Enquiry relating to previously submitted short message "00000000"B
TP-MN	not checked (TP-MR in previous SMS-SUBMIT)

second SMS-COMMAND TPDU (UE to SS in step 54)

Information element	Comment Value
TP-MR	TP-MR in previous SMS-COMMAND plus "1"
TP-CT	Delete previously submitted short message "00000010"B
TP-MN	not checked (TP-MR in previous SMS-SUBMIT)

16.1.4.5 Test requirements

After step 23 UE accept a SMS-STATUS-REPORT TPDU.

After step 39 UE shall send a SMS-COMMAND TPDU with the correct TP-Message-Reference.

After step 54 UE shall send a SMS-COMMAND TPDU with the correct TP-Message-Reference.

16.1.5 Test of message class 0 to 3

16.1.5.1 Short message class 0

16.1.5.1.1 Definition

16.1.5.1.2 Conformance requirement

When a mobile terminated message is class 0 and the UE has the capability of indicating short messages, the UE shall indicate the message immediately and send an acknowledgement to the SC when the message has successfully reached

the UE irrespective of whether there is memory available in the USIM or ME. The message shall not be automatically stored in the USIM or ME.

Reference

3GPP TS 23.038 clause 4.

16.1.5.1.3 Test purpose

To verify that the UE will accept and indicate but not store a class 0 message, and that it will accept and indicate a class 0 message if its message store is full.

NOTE: failure of this test in a UE could cause it to reject a class 0 message when its SMS memory becomes full. This could lead to unwanted repetitions between the UE and the service centre.

16.1.5.1.4 Method of test

Initial conditions

- System Simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in MM-state "Idle, updated";
  - the UE message store shall be empty.

Related ICS/IXIT Statements

Support for Short message MT/PP.

The value of timer TC1M.

Whether SMS messages are stored in the USIM and/or the ME.

Test procedure

a) The SS sends a class 0 message by using the method described in step a) of clause 16.1.1 but with the TPDU described in this clause.

b) The UE message store shall be filled (for example by using the method of clause 16.1.3 test of the memory available notification) with the same SMS-DELIVER TPDU except that TP-DCS is set to class 1.

c) The SS sends a class 0 message as in step a).

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
2	-->		PAGING RESPONSE	
3	<--		AUTHENTICATION REQUEST	
4	-->		AUTHENTICATION RESPONSE	
5	<--		SECURITY MODE COMMAND	
6	-->		SECURITY MODE COMPLETE	
7	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 0 Short Message
8	-->		CP-ACK	
9	-->		CP-DATA	Contains RP-ACK RPDU.
10	<--		CP-ACK	
11	<--		RRC CONNECTION RELEASE	
12	-->		RRC CONNECTION RELEASE COMPLETE	
13	UE			The content of the short message shall be indicated by the ME. The UE shall not store the message. This can be checked by verifying that it is impossible to retrieve any short messages from the UE message store.
14	SS			The UE message store shall be filled (for example by using the method of 16.1.3) with Class 1 SMS-DELIVER TPDU.
15			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
16	-->		PAGING RESPONSE	
17	<--		AUTHENTICATION REQUEST	
18	-->		AUTHENTICATION RESPONSE	
19	<--		SECURITY MODE COMMAND	
20	-->		SECURITY MODE COMPLETE	
21	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 0 Short Message
22	-->		CP-ACK	
23	-->		CP-DATA	Contains RP-ACK RPDU.
24	<--		CP-ACK	
25	<--		RRC CONNECTION RELEASE	
26	-->		RRC CONNECTION RELEASE COMPLETE	
27	UE			The content of the short message shall be indicated by the ME.

Specific Message Contents

SMS-DELIVER TPDU (containing a class 0 message) (SS to UE)

Information element	Comment Value	
TP-DCS	default alphabet, class 0	"1111 0000"B

SMS-DELIVER TPDU (containing a class 1 message to fill the UE message store) (SS to UE)

Information element	Comment Value	
TP-DCS	default alphabet, class 1	"1111 0001"B

16.1.5.1.5 Test requirements

After step 7 UE shall accept and indicate but not store a class 0 message.

After step 21 UE shall accept and indicate a class 0 message.

16.1.5.2 Test of class 1 short messages

This test shall apply to UEs which support:

- storing of received Class 1 Short Messages; and
- indicating of stored Short Messages.

16.1.5.2.1 Definition

16.1.5.2.2 Conformance requirement

When a mobile terminated message is class 1, the UE shall send an acknowledgement to the SC when the message has successfully reached the UE and can be stored, either in the ME or in the USIM.

Reference

3GPP TS 23.038 clause 4.

16.1.5.2.3 Test purpose

This procedure verifies that the UE acts correctly on receiving a class 1 message, i.e. that it stores the message in the ME or USIM and sends an acknowledgement (at RP and CP-Layer).

16.1.5.2.4 Method of test

Initial conditions

- System Simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in MM-state "Idle, updated";
  - the UE message store shall be empty;
  - for storing of class 1 Short Messages, the UE shall be set up to store Short Messages in the ME memory (by way of MMI, as described in ICS/IXIT statement).

Related ICS/IXIT Statements

Support for Short message MT/PP.

The value of timer TC1M.

Whether SMS messages are stored in the USIM and/or the ME.

Test procedure

a) The SS delivers a Short Message of class 1 to the UE as specified in clause 16.1.1, step a).

b) The Short Message is recalled (e.g. by means of the MMI).

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
2	-->		PAGING RESPONSE	
3	<--		AUTHENTICATION REQUEST	
4	-->		AUTHENTICATION RESPONSE	
5	<--		SECURITY MODE COMMAND	
6	-->		SECURITY MODE COMPLETE	
7	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 1 Short Message
8	-->		CP-ACK	
9	-->		CP-DATA	Contains RP-ACK RPDU.
10	<--		CP-ACK	
11	<--		RRC CONNECTION RELEASE	
12	-->		RRC CONNECTION RELEASE COMPLETE	
13	UE			The short message shall be recalled and indicated at the UE.

Specific Message Contents

SMS-DELIVER TPDU (containing a class 1 message) (SS to UE)

Information element	Comment Value	
TP-DCS	default alphabet, class 1	"1111 0001"B

16.1.5.2.5 Test requirements

After step 7 UE shall store the message in the ME or USIM and send an acknowledgement.

16.1.5.3 Test of class 2 short messages

16.1.5.3.1 Definition

Class 2 Short Messages are defined as USIM specific, and the UE shall ensure that a message of this class is stored on the USIM.

16.1.5.3.2 Conformance requirement

When a mobile terminated message is Class 2, the UE shall ensure that the message has been correctly transferred to the SMS data field in the USIM before sending an acknowledgement to the SC. The UE shall return a "protocol error, unspecified" error message if the short message cannot be stored in the USIM and there is other short message storage available at the UE. If all the short message storage at the UE is already in use, the UE shall return "memory capacity exceeded".

References

- 3GPP TS 23.040 clause 9.2.3.10.
- 3GPP TS 23.038 clause 4.
- 3GPP TS 34.108 clause 8.3.2.28.

16.1.5.3.3 Test purpose

This procedure verifies that the UE acts correctly on receiving a class 2 message, i.e. that it stores the message correctly in the USIM, and if this is not possible, returns a protocol error message, with the correct error cause, to the network.

There are 2 cases:

1) if the UE supports storing of short messages in the USIM and in the ME, and storage in the ME is not full, and the short message cannot be stored in the USIM, the error cause shall be "protocol error, unspecified";

2) if the UE supports storing of short messages in the USIM and not in the ME, and storage in the ME is not full, and the short message cannot be stored in the USIM, the error cause shall be "memory capacity exceeded".

NOTE: If the UE supports storing of short messages in the USIM and the ME, and storage in the ME is full, and the short message cannot be stored in the USIM, the error cause shall be "memory capacity exceeded". This case is not tested in this test.

16.1.5.3.4 Method of test

Initial conditions

- System Simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in MM-state "Idle, updated";
  - the ME message store shall be empty;
  - the ME shall be connected to the USIM simulator. The following shall be present in the USIM simulator:
    - EF_{SMS} with at least two free records and one full record;
    - EF_{SMSS}, with SMS "Memory Cap. Exceed" notification flag set to "memory available";
    - Service no. 10 (SMS) in EF_{UST} set to allocated and activated;
    - for storing of Class 1 Short Messages the UE shall be set up to store Short Messages in the ME memory (by way of MMI, as described in ICS/IXIT statement).

Related ICS/IXIT Statements

Support for Short message MT/PP.

The value of timer TC1M.

Whether SMS messages are stored in the USIM and/or the ME.

Test procedure

a) The SS delivers a Short Message of class 2 to the UE as specified in clause 16.1.1, step b).

b) Following an attempt by the ME to store the short message in a free record of EF_{SMS} in the USIM, the USIM simulator returns the status response "OK" ("90 00").

c) Step a) is repeated.

d) Following an attempt by the ME to store the short message in a free record of EF_{SMS} in the USIM, the USIM simulator returns the status response "memory problem" ("92 40").

e) The USIM simulator indicates if an attempt was made in steps a) and c) to store the messages and if the messages are stored according to the requirement.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1	<		Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
2	-->		PAGING RESPONSE	
3	<--		AUTHENTICATION REQUEST	
4	-->		AUTHENTICATION RESPONSE	
5	<--		SECURITY MODE COMMAND	
6	-->		SECURITY MODE COMPLETE	
7	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 2 Short Message

Step	Direction		Message	Comments
	UE	SS		
8	-->		CP-ACK	
9	ME			The ME shall correctly store the short message in a free record of EFSMS in the USIM, i.e. - the ME shall use a free record - the first byte of the record shall indicate "message received by UE from network" - the TS-Service-Centre-Address shall be correctly stored - the TPDU shall be identical to that sent by the SS - bytes following the TPDU shall be set to "FF"
10	USIM			The USIM simulator returns the status response "OK" ("90 00"). The USIM simulator shall indicate if an attempt was made by the ME to store the short message in the USIM.
11	-->		CP-DATA	Contains RP-ACK RPDU.
12	<--		CP-ACK	
13	<--		RRC CONNECTION RELEASE	
14	-->		RRC CONNECTION RELEASE COMPLETE	
15			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
16	-->		PAGING RESPONSE	
17	<--		AUTHENTICATION REQUEST	
18	-->		AUTHENTICATION RESPONSE	
19	<--		SECURITY MODE COMMAND	
20	-->		SECURITY MODE COMPLETE	
21	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 2 Short Message
22	-->		CP-ACK	
23	ME			The ME shall attempt to store the short message in a free record of EFSMS in the USIM.
24	USIM			The USIM simulator returns the status response "memory problem" ("92 40"). The USIM simulator shall indicate if an attempt was made by the ME to store the short message in the USIM.
25	-->		CP-DATA	Contains RP-ERROR RPDU with error cause "protocol error, unspecified" if the UE supports storing of short messages in the ME, or error cause "memory capacity exceeded" if not.
26	<--		CP-ACK	
27	<--		RRC CONNECTION RELEASE	
28	-->		RRC CONNECTION RELEASE COMPLETE	

Specific Message Contents

SMS-DELIVER TPDU (containing a class 2 message) (SS to UE)

Information element	Comment Value	
TP-DCS	default alphabet, class 2	"1111 0010"B

16.1.5.3.5 Test requirements

After step 10 UE shall confirm that the short message is stored in the USIM and send CP-DATA containing RP-ACK RPDU.

After step 25 UE shall confirm that the short message cannot be stored in the USIM and send CP-DATA containing RP-ERROR RPDU. If UE supports storing of short message in the ME, the error cause of RP-ERROR RPDU shall be "protocol error, unspecified", and if not the error cause of RP-ERROR RPDU shall be "memory capacity exceeded"

16.1.5.4 Test of class 3 short messages

For further study.

16.1.6 Test of short message type 0 (R99 and REL-4 UE)

16.1.6.1 Definition and applicability

This tests that the UE correctly acknowledges the receipt of the short message type 0 to the SC in Circuit Switched mode. It is highly recommended that the UE discards the contents of the short message type 0.

This test shall apply to all R99 and REL-4 UEs supporting receipt of short messages in CS mode.

16.1.6.2 Conformance requirement

When a mobile terminated message is type 0, the UE shall acknowledge receipt of the short message to the SC but may discard its contents.

Note: It is highly recommended that the UE discards the type 0 short message. This means that the UE is able to receive the type 0 short message irrespective of whether there is memory available in the (U)SIM or ME or not, the UE does not indicate the receipt of the type 0 short message to the user, and the message is not stored in the (U)SIM or ME.

Reference(s)

3GPP TS 23.040, 9.2.3.9.

16.1.6.3 Test purpose

To verify that the UE will acknowledge receipt of the short message to the SC. The UE should discard its contents.

NOTE: failure of this test in a UE could cause it to reject a type 0 message when the network is trying to reach the UE. This could lead to unwanted repetitions between the UE and the service centre.

16.1.6.4 Method of test

Initial conditions

System Simulator:

1 cell, default parameters.

User Equipment:

the UE shall be in MM-state "Idle, updated".

Related ICS/IXIT Statements

Support for Short Message MT/PP.

The value of timer TC1M.

Foreseen Final State of UE

Idle, updated.

Test Procedure

The SS sends a type 0 message by using the method described in step a) of section 16.1.1 but with the TPDU described in this section.

Maximum Duration of Test

1 minute

Expected Sequence

Step	Direction		Message	Comments
	UE	SS		
1			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
2	-->		PAGING RESPONSE	
3	<--		AUTHENTICATION REQUEST	
4	-->		AUTHENTICATION RESPONSE	
5	<--		SECURITY MODE COMMAND	
6	-->		SECURITY MODE COMPLETE	
7	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), type 0 Short Message
8	-->		CP-ACK	
9	-->		CP-DATA	Contains RP-ACK TP-Protocol-Identifier (TP-PID).
10	<--		CP-ACK	
11	<--		RRC CONNECTION RELEASE	
12	-->		RRC CONNECTION RELEASE COMPLETE	
13	UE			It is highly recommended that the UE discards the type 0 short message. This means that the UE is able to receive the type 0 short message irrespective of whether there is memory available in the (U)SIM or ME or not, the UE does not indicate the receipt of the type 0 short message to the user, and the message is not stored in the (U)SIM or ME.

Specific Message Contents:

SMS-DELIVER TPDU (containing a type 0 message) (SS to UE):

Information element	Comment Value
TP-MTI	SMS-DELIVER "00"B
TP-MMS	more messages are waiting in SC "0"B
TP-RP	no reply path "0"B
TP-UDHI	TP-UD contains only the SM"0"B
TP-SRI	no status report returned 0
TP-OA	an international number coded E.164
TP-PID	Type 0: "01000000"B
TP-DCS	default alphabet “0000 0000"B
TP-SCTS	any legal value (cf. 3GPP TS 23.040)
TP-UDL	160
TP-UD (140 octets)	text of message (160 characters)

16.1.6a Test of short message type 0 (≥ REL-5 UE)

16.1.6a.1 Definition and applicability

This tests that the UE correctly acknowledges the receipt of the short message type 0 to the SC in Circuit Switched mode. The UE shall discard the contents of the short message type 0.

This test shall apply to all ≥ REL-5 UEs supporting receipt of short messages in CS mode.

16.1.6a.2 Conformance requirement

When a mobile terminated message is type 0, the UE shall acknowledge receipt of the short message to the SC but shall discard its contents. This means that

- the UE shall be able to receive the type 0 short message irrespective of whether there is memory available in the (U)SIM or ME or not,
- the UE shall not indicate the receipt of the type 0 short message to the user,
- the short message shall neither be stored in the (U)SIM nor ME.

References

3GPP TS 23.040 9.2.3.1, 9.2.3.2, 9.2.3.4, 9.2.3.7, 9.2.3.9, 9.2.3.10, 9.2.3.11, 9.2.3.16, 9.2.3.17, 9.2.3.23.

16.1.6a.3 Test purpose

To verify that the UE will acknowledge receipt of the short message to the SC. The UE shall discard its contents. This means that

- the UE shall be able to receive the type 0 short message irrespective of whether there is memory available in the (U)SIM or ME or not,
- the UE shall not indicate the receipt of the type 0 short message to the user,
- the short message shall neither be stored in the (U)SIM nor ME.

NOTE: Failure of this test in a UE could cause it to reject a type 0 message when the network is trying to reach the UE. This could lead to unwanted repetitions between the US and the service centre. In addition service affecting restrictions could happen to the customer.

16.1.6a.4 Method of test

Initial conditions

System Simulator:

1 cell, default parameters.

User Equipment:

the UE shall be in MM-state "Idle, updated".

the ME- and (U)SIM message store shall be empty.

Related ICS/IXIT Statements

Support for Short Message MT/PP.

The value of timer TC1M.

Foreseen Final State of UE

Idle, updated.

Test Procedure

a) The SS sends a type 0 short message by using the method described in step a) of clause 16.1.1 but with the TPDU described in this section.

b) The ME- and (U)SIM short message store shall be filled (for example by using the method of clause 16.1.3 test of the memory available notification).

c) The SS sends a type 0 short message as in step a).

Maximum Duration of Test

5 minutes

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
2	-->		PAGING RESPONSE	
3	<--		AUTHENTICATION REQUEST	
4	-->		AUTHENTICATION RESPONSE	
5	<--		SECURITY MODE COMMAND	
6	-->		SECURITY MODE COMPLETE	
7	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), type 0 Short Message
8	-->		CP-ACK	
9	-->		CP-DATA	Contains RP-ACK RPDU.
10	<--		CP-ACK	
11	<--		RRC CONNECTION RELEASE	
12	-->		RRC CONNECTION RELEASE COMPLETE	
13	UE			The UE shall discard the type 0 short message. This means that the UE does not indicate the receipt of the type 0 short message to the user. The UE shall not store the message in the (U)SIM or ME. This can be checked by verifying that it is impossible to retrieve any short messages from the ME- and (U)SIM message store.
14		SS		The ME- and (U)SIM message store shall be filled (for example by using the method of 16.1.3).
15			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
16	-->		PAGING RESPONSE	
17	<--		AUTHENTICATION REQUEST	
18	-->		AUTHENTICATION RESPONSE	
19	<--		SECURITY MODE COMMAND	
20	-->		SECURITY MODE COMPLETE	
21	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), type 0 Short Message
22	-->		CP-ACK	
23	-->		CP-DATA	Contains RP-ACK RPDU.
24	<--		CP-ACK	
25	<--		RRC CONNECTION RELEASE	
26	-->		RRC CONNECTION RELEASE COMPLETE	
27	UE			The UE shall discard the type 0 short message. This means that the UE does not indicate the receipt of the type 0 short message to the user. The UE shall not store the message in the (U)SIM or ME. This can be checked by verifying that it is impossible to retrieve any short messages from the ME- and (U)SIM message store.

Specific Message Contents:

SMS-DELIVER TPDU (containing a type 0 message) (SS to UE):

Information element	Comment Value	
TP-MTI	SMS-DELIVER	"00"B
TP-MMS	more messages are waiting in SC	"0"B
TP-RP	no reply path	"0"B
TP-UDHI	TP-UD contains only the SM	"0"B
TP-SRI	no status report returned	"0"B
TP-OA	an international number coded E.164	
TP-PID	Type 0:	"01000000"B
TP-DCS	default alphabet	“0000 0000"B
TP-SCTS	any legal value (cf. 3GPP TS 23.040)	
TP-UDL		160
TP-UD (140 octets)	text of message (160 characters)	

16.1.6a.5 Test requirements

After step 9 (ME- and (U)SIM message store not filled) UE shall send CP-DATA containing RP-ACK RPDU (TP-Protocol-Identifier: type 0 Short Message).

After step 13 UE shall discard the type 0 short message (it is impossible to retrieve any short messages from the ME- and (U)SIM message store).

After step 23 (ME- and (U)SIM message store filled) UE shall send CP-DATA containing RP-ACK RPDU (TP-Protocol-Identifier: type 0 Short Message).

After step 27 UE shall discard the type 0 short message (it is impossible to retrieve any short messages from the ME- and (U)SIM message store).

16.1.7 Test of the replace mechanism for SM type 1-7

16.1.7.1 Definition

16.1.7.2 Conformance requirement

On receipt of a short message, the UE shall check to see if the associated Protocol Identifier contains a Replace Short Message Type code. If such a code is present, then the UE will check the associated originating address (TP-OA) and replace any existing stored message having the same Protocol Identifier code and originating address with the new short message.

References

3GPP TS 23.040 clause 9.2.3.2, 9.2.3.9.

16.1.7.3 Test purpose

This procedure verifies the correct implementation of the replace mechanism for Replace Short Messages.

16.1.7.4 Method of test

Initial conditions

- System Simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in MM-state "Idle, updated";
  - the UE message store shall be empty.

Related ICS/IXIT Statements

Support for Short message MT/PP.

The value of timer TC1M.

Test procedure

a) Two different numbers n and m are drawn randomly between 1 and 7. Two different addresses for TP-Originating-Address (TPOA1 and TPOA2) are drawn.

b) The SS delivers a short message to the UE as specified in clause 16.1.1 step a). In the SMS-DELIVER TPDU, the TP-Protocol-Identifier parameter is "Replace Short Message Type n", the TP-Originating-Address is TPOA1, and the RP-Originating-Address is RPOA.

c) Step b) is repeated but with a different TP-Originating-Address (TPOA2), and different contents of TP-User-Data in the SMS-DELIVER TPDU. The other parameters are the same as in step b).

d) Void

e) Step c) is repeated but with the TP-Protocol-Identifier equal to "Replace Short Message Type m", and contents of TP-User-Data different from the former two messages. The other parameters are the same as in step c).

f) Step e) is repeated but the contents of TP-User-Data are different from that used in step e).

g) The SS prompts the operator to indicate the Short Messages stored in the UE.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
2	-->		PAGING RESPONSE	
3	<--		AUTHENTICATION REQUEST	
4	-->		AUTHENTICATION RESPONSE	
5	<--		SECURITY MODE COMMAND	
6	-->		SECURITY MODE COMPLETE	
7	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) TP-PID is "Replace Short Message Type n", TP-OA is TPOA1 and RP-OA is RPOA
8	-->		CP-ACK	
9	-->		CP-DATA	Contains RP-ACK RPDU.
10	<--		CP-ACK	
11	<--		RRC CONNECTION RELEASE	
12	-->		RRC CONNECTION RELEASE COMPLETE	
13			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
14	-->		PAGING RESPONSE	
15	<--		AUTHENTICATION REQUEST	
16	-->		AUTHENTICATION RESPONSE	
17	<--		SECURITY MODE COMMAND	
18	-->		SECURITY MODE COMPLETE	
19	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) TP-PID is "Replace Short Message Type n", TP-OA is TPOA2 and RP-OA is RPOA, TP-UD different from step 7
20	-->		CP-ACK	
21	-->		CP-DATA	Contains RP-ACK RPDU.
22	<--		CP-ACK	
23	<--		RRC CONNECTION RELEASE	
24	-->		RRC CONNECTION RELEASE COMPLETE	
25			(void)	
26			(void)	
27			(void)	
28			(void)	
29			(void)	
30			(void)	
31			(void)	
32			(void)	
33			(void)	
34			(void)	
35			(void)	
36			(void)	
37			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
38	-->		PAGING RESPONSE	
39	<--		AUTHENTICATION REQUEST	
40	-->		AUTHENTICATION RESPONSE	
41	<--		SECURITY MODE COMMAND	
42	-->		SECURITY MODE COMPLETE	
43	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) TP-PID is "Replace Short Message Type m", TP-OA is TPOA2 and RP-OA is RPOA, TP-UD different from step 7 and 19
44	-->		CP-ACK	
45	-->		CP-DATA	Contains RP-ACK RPDU.

Step	Direction		Message	Comments
	UE	SS		
46	<--		CP-ACK	
47	<--		RRC CONNECTION RELEASE	
48	-->		RRC CONNECTION RELEASE COMPLETE	
49			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
50	-->		PAGING RESPONSE	
51	<--		AUTHENTICATION REQUEST	
52	-->		AUTHENTICATION RESPONSE	
53	<--		SECURITY MODE COMMAND	
54	-->		SECURITY MODE COMPLETE	
55	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) TP-PID is "Replace Short Message Type m", TP-OA is TPOA2 and RP-OA is RPOA, TP-UD different from step 43
56	-->		CP-ACK	
57	-->		CP-DATA	Contains RP-ACK RPDU.
58	<--		CP-ACK	
59	<--		RRC CONNECTION RELEASE	
60	-->		RRC CONNECTION RELEASE COMPLETE	
61	SS			Prompts the operator to indicate the Short Messages stored in the UE. Only the Short Messages delivered in step 7, 19 and 55 shall be retrievable and indicated

Specific Message Contents

SMS-DELIVER TPDU

Information element	Comment Value
TP-MMS	no more messages are waiting in SC "1"B
TP-PID	binary 01000xxx, xxx represents n resp. m (see test method description)

16.1.7.5 Test requirements

After step 61 only the Short Messages delivered in step 7, 19 and 55 shall be retrieved and indicated.

16.1.8 Test of the reply path scheme

16.1.8.1 Definition

16.1.8.2 Conformance requirement

When a replying UE receives an original mobile terminated short message it has:

- originating SME = TP-Originating Address in the SMS-DELIVER TPDU;
- original SC = RP-Originating Address in the RP-MT-DATA.

When submitting the reply mobile originated short message, the replying UE should use parameters as follows:

- TP-Destination Address in SMS-SUBMIT TPDU = originating SME;
- RP-Destination Address in RP-MO-DATA = original SC.

References

3GPP TS 23.040 3.2.10, 9.2.3.2, 9.2.3.17, Annex D.5, D.6.

NOTE: Annex D of 3GPP TS 23.040 is only informative.

16.1.8.3 Test purpose

This procedure verifies that the UE is able to send a Reply Short Message back to the correct originating SME even if in the meantime it receives another Short Message.

16.1.8.4 Method of test

Initial conditions

- System Simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in MM-state "Idle, updated";
  - the UE message store shall be empty.

Related ICS/IXIT Statements

Support for Short message MT/PP.

Support for Short message MO/PP.

The value of timer TC1M.

Test procedure

a) The SS delivers a Short Message as specified in clause 16.1.1, step b) with TP-Reply-Path set to 1.

b) Step a) is repeated but with:
   - different TP-Originating-Address for the originating SME;
   - different RP-Originating-Address for the original SC; and
   - different message contents TP-User-Data.

c) UE sends the Reply Short Message corresponding to one of two received Short Messages (e.g. by means of the MMI).

d) step c) is repeated for the other Short Message.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
2	-->		PAGING RESPONSE	
3	<--		AUTHENTICATION REQUEST	
4	-->		AUTHENTICATION RESPONSE	
5	<--		SECURITY MODE COMMAND	
6	-->		SECURITY MODE COMPLETE	
7	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) TP-RP set to 1
8	-->		CP-ACK	Sent within TC1M after step 7
9	-->		CP-DATA	Contains RP-ACK RPDU.
10	<--		CP-ACK	
11	<--		RRC CONNECTION RELEASE	
12	-->		RRC CONNECTION RELEASE COMPLETE	
13			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
14	-->		PAGING RESPONSE	
15	<--		AUTHENTICATION REQUEST	
16	-->		AUTHENTICATION RESPONSE	
17	<--		SECURITY MODE COMMAND	

Step	Direction		Message	Comments
	UE	SS		
18	-->		SECURITY MODE COMPLETE	
19	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) TP-OA, RP-OA and TP-UD different from step 7
20	-->		CP-ACK	Sent within TC1M after step 7
21	-->		CP-DATA	Contains RP-ACK RPDU.
22	<--		CP-ACK	
23	<--		RRC CONNECTION RELEASE	
24	-->		RRC CONNECTION RELEASE COMPLETE	
25	UE			UE establishes the RRC connection in order to send the Reply Short Message corresponding to one of two received Short Messages:
26	<--		SYSTEM INFORMATION	BCCH
27	-->		RRC CONNECTION REQUEST	CCCH
28	<--		RRC CONNECTION SETUP	CCCH
29	-->		RRC CONNECTION SETUP COMPLETE	DCCH
30	-->		CM SERVICE REQUEST	
31	<--		AUTHENTICATION REQUEST	
32	-->		AUTHENTICATION RESPONSE	
33	<--		SECURITY MODE COMMAND	
34	-->		SECURITY MODE COMPLETE	
35	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU) RP-DA = RP-OA corresponding to the message TP-DA = TP-OA corresponding to the message
36	<--		CP-ACK	Sent within TC1M after step 35
37	<--		CP-DATA	Contains RP-ACK RPDU
38	SS			Waits max 25 s for CP-ACK
39	-->		CP-ACK	
40	<--		RRC CONNECTION RELEASE	RRC connection is released.
40A	-->		RRC CONNECTION RELEASE COMPLETE	
41	UE			UE establishes the RRC connection in order to send the Reply Short Message corresponding to other Short Message.
42	<--		SYSTEM INFORMATION	BCCH
43	-->		RRC CONNECTION REQUEST	CCCH
44	<--		RRC CONNECTION SETUP	CCCH
45	-->		RRC CONNECTION SETUP COMPLETE	DCCH
46	-->		CM SERVICE REQUEST	
47	<--		AUTHENTICATION REQUEST	
48	-->		AUTHENTICATION RESPONSE	
49	<--		SECURITY MODE COMMAND	
50	-->		SECURITY MODE COMPLETE	
51	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU) RP-DA = RP-OA corresponding to the Message TP-DA = TP-OA corresponding to the message
52	<--		CP-ACK	Sent within TC1M after step 51
53	<--		CP-DATA	Contains RP-ACK RPDU
54	SS			Waits max 25 s for CP-ACK
55	-->		CP-ACK	
56	<--		RRC CONNECTION RELEASE	RRC connection is released.
57	-->		RRC CONNECTION RELEASE COMPLETE	

Specific Message Contents

SMS-DELIVER TPDU

Information element	Comment Value
TP-MMS	no more messages are waiting in SC "1"B
TP-RP	Reply Path exists "1"B

16.1.8.5 Test requirements

After step 35 UE shall send the Reply Short Message corresponding to one of two previously received short messages.

After step 51 UE shall send the Reply Short Message corresponding to the other of two previously received short messages.

16.1.9 Multiple SMS mobile originated

16.1.9.1 UE in idle mode

This test applies to UE supporting the ability of sending multiple short messages on the same RRC connection when there is no call in progress.

16.1.9.1.1 Definition

16.1.9.1.2 Conformance requirements

Release 1999:

If another short message or a memory available notification is to be sent, an originating SMR entity in the UE may choose to continue to use the same RRC connection. When the UE chooses to use the same RRC connection, then:

- the UE shall transmit a CM SERVICE REQUEST for the new CM connection before the final CP-ACK (e.g. the one that acknowledges the CP-DATA that carried the RP-ACK) for the old MM connection is transmitted;
- before transmission of the first CP-DATA on the new MM connection, the UE shall transmit the CP-ACK for the old MM connection;
- the Transaction Identifier used on the new MM connection shall be different to that used on the old MM connection; and
- the UE shall not initiate establishment of the new MM connection before the final CP-DATA (e.g. the one carrying the RP-ACK) has been received.

Release 4 or later release:

In the case of a SMS transfer via the CS domain, when the UE chooses to use the same RR or CS signalling connection, then:

- the UE shall transmit a CM SERVICE REQUEST for the new CM connection before the final CP-ACK (i.e. the one that acknowledges the CP-DATA that carried the RP-ACK) for the old MM connection is transmitted;
- before transmission of the first CP-DATA on the new MM connection, the UE may transmit the CP-ACK for the old MM connection; the UE shall not transmit the final CP-ACK after the new CP-DATA;
- the Transaction Identifier used on the new MM connection shall be different to that used on the old MM connection; and
- the UE shall not initiate establishment of the new MM connection before the final CP-DATA (e.g. the one carrying the RP-ACK) has been received.

References

- 3GPP TS 23.040 clause 3.1.
- 3GPP TS 24.011 clause 5.4.

16.1.9.1.3 Test purpose

To verify that the UE is able to correctly concatenate multiple short messages on the same RRC connection when using a DCCH.

16.1.9.1.4 Method of test

Initial conditions

- System simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in MM-state "Idle, updated";
  - the SMS message storage shall be empty.

Related ICS/IXIT statements

Support for concatenation of multiple short messages MO/PP on the same RRC connection.

Description of how to enter multiple SMS.

Whether SMS messages are stored in the USIM and/or the ME.

Foreseen final state of UE

Idle, updated.

Test procedure

a) The UE shall be set up to send 3 short messages as multiple SM to the SS. The UE establishes successfully an RRC connection and then the SS performs the authentication.

b) The SS starts integrity protection.

c) The SS responds to the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the UE with a CP-ACK message followed by a CP-DATA message containing the correct RP-ACK RPDU. The Transaction Identifier used on this MM connection is 'x'.

d) The UE shall transmit a CM SERVICE REQUEST for the new CM connection (for the second short message) before the final CP-ACK (the one that acknowledges the CP-DATA that carried the RP-ACK before) for the old MM connection is transmitted. The UE shall not initiate establishment of the new MM connection before the final CP-DATA (i.e. the one carrying the RP-ACK for the first short message) has been received. Before transmission of the first CP-DATA on the new MM connection:

   - For R99: The UE shall transmit the CP-ACK for the old MM connection. The Transaction Identifier used on the new MM connection shall be y, where y <> x (see step c)). Thereby, the UE can transmit the final CP-ACK after either the sending of the CM SERVICE REQUEST for the new CM connection or the reception of the CM SERVICE ACCEPT for the new CM connection, thus two branches for the transmission of the final CP-ACK are possible which are specified in the expected sequence table like A and B respectively. The SS waits for the UE to transmit the final CP-ACK. If received within 5 s then the SS transmits the CM SERVICE ACCEPT and waits for the UE to transmit the first CP-DATA on the new MM connection (branch A). If the final CP-ACK is not received within 5 s then the SS transmits the CM SERVICE ACCEPT and waits for the UE to send the final CP-ACK followed by the first CP-DATA on the new MM connection (branch B).

   - For Rel-4 or later release: The UE may transmit the CP-ACK for the old MM connection. The Transaction Identifier used on the new MM connection shall be y, where y <> x (see step c)). Thereby, the UE can transmit the final CP-ACK after either the sending of the CM SERVICE REQUEST for the new CM connection or the reception of the CM SERVICE ACCEPT for the new CM connection or not to send a CP-ACK at all, thus three cases are possible. These cases are specified using two branches for the transmission of the final CP-ACK where the transmission of the final CP-ACK for the old MM connection is optional. The two branches are specified in the expected sequence table like A and B respectively. The SS waits for the UE

to transmit the final CP-ACK. If received within 5 s then the SS transmits the CM SERVICE ACCEPT and waits for the UE to transmit the first CP-DATA on the new MM connection (branch A). If the final CP-ACK is not received within 5 s then the SS transmits the CM SERVICE ACCEPT and then waits for the UE to send the final CP-ACK (optional) and/or the first CP-DATA on the new MM connection (branch B).

e) Void.

f) The SS responds to the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the UE with a CP-ACK message followed by a CP-DATA message containing the correct RP-ACK RPDU.

g) The UE shall transmit a CM SERVICE REQUEST for the new CM connection (for the third short message) before the final CP-ACK (the one that acknowledges the CP-DATA that carried the RP-ACK before) for the old MM connection is transmitted. Before transmission of the first CP-DATA on the new MM connection:

- For R99: The UE shall transmit the CP-ACK for the old MM connection. The Transaction Identifier used on the new MM connection shall be z, where z <> y (see step d)). The UE shall not initiate establishment of the new MM connection before the final CP-DATA (i.e. the one carrying the RP-ACK for the second short message) has been received. Thereby, the UE can transmit the final CP-ACK after either the sending of the CM SERVICE REQUEST for the new CM connection or the reception of the CM SERVICE ACCEPT for the new CM connection, thus two branches for the transmission of the final CP-ACK are possible which are specified in the expected sequence table like A and B respectively. The SS waits for the UE to transmit the final CP-ACK. If received within 5 s then the SS transmits the CM SERVICE ACCEPT and waits for the UE to transmit the first CP-DATA on the new MM connection (branch A). If the final CP-ACK is not received within 5 s then the SS transmits the CM SERVICE ACCEPT and waits for the UE to send the final CP-ACK followed by the first CP-DATA on the new MM connection (branch B).

- For Rel-4 or later release: The UE may transmit the CP-ACK for the old MM connection. The Transaction Identifier used on the new MM connection shall be z, where z <> y (see step d)). Thereby, the UE can transmit the final CP-ACK after either the sending of the CM SERVICE REQUEST for the new CM connection or the reception of the CM SERVICE ACCEPT for the new CM connection or not to send a CP-ACK at all, thus three cases are possible. These cases are specified using two branches for the transmission of the final CP-ACK where the transmission of the final CP-ACK for the old MM connection is optional. The two branches are specified in the expected sequence table like A and B respectively. The SS waits for the UE to transmit the final CP-ACK. If received within 5 s then the SS transmits the CM SERVICE ACCEPT and waits for the UE to transmit the first CP-DATA on the new MM connection (branch A). If the final CP-ACK is not received within 5 s then the SS transmits the CM SERVICE ACCEPT and then waits for the UE to send the final CP-ACK (optional) and/or the first CP-DATA on the new MM connection (branch B).

h) Void.

i) The SS responds to the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the UE with a CP-ACK message followed by a CP-DATA message containing the correct RP-ACK RPDU.

j) The SS waits a maximum of 5 s after sending CP-DATA for the CP-ACK message from the UE.

k) The SS sends a RRC CONNECTION RELEASE to the UE.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1	UE			The UE is set up to send 3 short messages as multiple SM
2	SS			The SS verifies that the IE “Establishment cause” in the received RRC CONNECTION REQUEST message is set to “Originating Low Priority Signalling”.
3			(void)	
4			(void)	
5	-->		CM SERVICE REQUEST	CM service type set to "Short Message Service".
6	<--		AUTHENTICATION REQUEST	
7	-->		AUTHENTICATION RESPONSE	
8	SS			The SS starts integrity protection
9			Void	
10	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU). The Transaction Identifier used in steps 10, 11, 12 and 14 shall be x.

Step	Direction		Message	Comments
	UE	SS		
11	<--		CP-ACK	
12	<--		CP-DATA	Contains RP-ACK RPDU
13	-->		CM SERVICE REQUEST	CM service type set to "Short Message Service".
14	-->		CP-ACK	The one that acknowledges the CP-DATA which carried the RP-ACK RPDU. If CP-ACK received then continue at A15 If CP-ACK is not received within 5 s from the CM SERVICE REQUEST was sent in step 13 then goto step B15a. (See note 1 and note 2)
Branch A				
A15	<--		CM SERVICE ACCEPT	After having sent the CM SERVICE ACCEPT then goto step 16.
Branch B				
B15a	<--		CM SERVICE ACCEPT	
B15b	-->		CP-ACK	The one that acknowledges the CP-DATA which carried the RP-ACK RPDU. For Rel-4 or later release UE: Optional step (See note 2)
16	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU). The Transaction Identifier used in steps 16, 17, 18 and 20 shall be y where y <> x (see step 10).
17	<--		CP-ACK	
18	<--		CP-DATA	Contains RP-ACK RPDU
19	-->		CM SERVICE REQUEST	CM service type set to "Short Message Service".
20	-->		CP-ACK	The one that acknowledges the CP-DATA which carried the RP-ACK RPDU. If CP-ACK received then continue at A21 If CP-ACK is not received within 5 s from the CM SERVICE REQUEST was sent in step 19 then goto step B21a. (See note 1 and note 2)
Branch A				
A21	<--		CM SERVICE ACCEPT	After having sent the CM SERVICE ACCEPT then goto step 22.
Branch B				
B21a	<--		CM SERVICE ACCEPT	
B21b	-->		CP-ACK	The one that acknowledges the CP-DATA which carried the RP-ACK RPDU. For Rel-4 or later release UE: Optional step (See note 2)
22	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU). The Transaction Identifier used in steps 22, 23, 24 and 25 shall be z, where z <> y (see step 16).
23	<--		CP-ACK	
24	<--		CP-DATA	Contains RP-ACK RPDU
25	-->		CP-ACK	Shall be sent within 5 s of step 24
26	SS			The SS releases the RRC connection

NOTE 1: 5 s have been agreed to be a reasonable value to secure that the UE have enough time to respond to the different messages.

NOTE 2: The CP-ACK for the old MM connection can be received either before or after the reception of the CM SERVICE ACCEPT message. For Release 4 or later release the UE transmission of the final CP-ACK is optional.

16.1.9.1.5 Test requirements

In step 13 the UE shall transmit a CM SERVICE REQUEST for the new CM connection (for the second short message) before the final CP-ACK for the old MM connection is transmitted.

In step 19 the UE shall transmit a CM SERVICE REQUEST for the new CM connection (for the third short message) before the final CP-ACK for the old MM connection is transmitted.

16.1.9.2 UE in active mode

This test applies to UE supporting the ability of sending concatenated multiple short messages when there is a call in progress.

16.1.9.2.1 Definition

16.1.9.2.2 Conformance requirements

Release 1999:

If another short message or a memory available notification is to be sent, an originating SMR entity in the UE may choose to continue to use the same RRC connection. When the UE chooses to use the same RRC connection, then:

- the UE shall transmit a CM SERVICE REQUEST for the new CM connection before the final CP-ACK (e.g. the one that acknowledges the CP-DATA that carried the RP-ACK) for the old MM connection is transmitted;
- before transmission of the first CP-DATA on the new MM connection, the UE shall transmit the CP-ACK for the old MM connection;
- the Transaction Identifier used on the new MM connection shall be different to that used on the old MM connection; and
- the UE shall not initiate establishment of the new MM connection before the final CP-DATA (e.g. the one carrying the RP-ACK) has been received.

Release 4 or later release:

In the case of a SMS transfer via the CS domain, when the UE chooses to use the same RR or CS signalling connection, then:

- the UE shall transmit a CM SERVICE REQUEST for the new CM connection before the final CP-ACK (i.e. the one that acknowledges the CP-DATA that carried the RP-ACK) for the old MM connection is transmitted;
- before transmission of the first CP-DATA on the new MM connection, the UE may transmit the CP-ACK for the old MM connection; the UE shall not transmit the final CP-ACK after the new CP-DATA;
- the Transaction Identifier used on the new MM connection shall be different to that used on the old MM connection; and
- the UE shall not initiate establishment of the new MM connection before the final CP-DATA (e.g. the one carrying the RP-ACK) has been received.

References

- 3GPP TS 23.040 clause 3.1.
- 3GPP TS 24.011 clause 5.4.

16.1.9.2.3 Test purpose

To verify that the UE is able to correctly concatenate multiple short messages on the same RRC connection when sent parallel to a call.

16.1.9.2.4 Method of test

Initial conditions

- System simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in MM-state "Idle, updated";
  - the SMS message storage shall be empty.

Related ICS/IXIT statements

Support for concatenation of multiple short messages MO/PP on the same RRC connection.

Description of how to enter multiple SMS.

Support for state U10 of call control.

Whether SMS messages are stored in the USIM and/or the ME.

Foreseen final state of UE

Idle, updated.

Test procedure

a) A data or speech call is established on a DTCH with the SS and the state U10 of call control is entered. The UE is set up to send 3 short messages as multiple SM to the SS. After the reception of the CM SERVICE REQUEST, the SS sends a CM SERVICE ACCEPT message.

b) Steps c) to k) of the test procedure in clause 16.1.9.1.4 are repeated.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1		SS		A data or speech call is established on a DTCH and the state U10 of call control is entered.
2	UE			The UE is set up to send 3 short messages as multiple SM
3	-->		CM SERVICE REQUEST	Sent in a layer 2 frame on the DCCH. CM service type set to "Short Message Service"
4	<--		CM SERVICE ACCEPT	
7	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU). The Transaction Identifier used in steps 7, 8, 9 and 11 shall be x.
8	<--		CP-ACK	
9	<--		CP-DATA	Contains RP-ACK RPDU
10	-->		CM SERVICE REQUEST	Sent in a layer 2 frame on the DCCH. CM service type set to "Short Message Service"
11	-->		CP-ACK	The one that acknowledges the CP-DATA which carried the RP-ACK RPDU. If CP-ACK received then continue at A12 If CP-ACK is not received within 5 s from the CM SERVICE REQUEST was sent in step 10 then goto step B11. (See note 1 and note 2)
Branch A				
A12	<--		CM SERVICE ACCEPT	After having sent the CM SERVICE ACCEPT then goto step 13.
Branch B				
B11	<--		CM SERVICE ACCEPT	
B12	-->		CP-ACK	The one that acknowledges the CP-DATA which carried the RP-ACK RPDU. For Rel-4 or later release UE: Optional step (See note 2)
13	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU). The Transaction Identifier used in steps 13, 14, 15 and 17 shall be y where y <> x (see step 7).
14	<--		CP-ACK	
15	<--		CP-DATA	Contains RP-ACK RPDU
16	-->		CM SERVICE REQUEST	Sent in a layer 2 frame on the DCCH. CM service type set to "Short Message Service"
17	-->		CP-ACK	The one that acknowledges the CP-DATA which carried the RP-ACK RPDU. If CP-ACK received then continue at A18. If CP-ACK is not received within 5 s from the CM SERVICE REQUEST was sent in step 16 then goto step B17. (See note 1 and note 2)
Branch A				
A18	<--		CM SERVICE ACCEPT	
Branch B				
B17	<--		CM SERVICE ACCEPT	

Step	Direction		Message	Comments
	UE	SS		
B18	-->		CP-ACK	The one that acknowledges the CP-DATA which carried the RP-ACK RPDU. For Rel-4 or later release UE: Optional step (See note 2)
19	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU). The Transaction Identifier used in steps 19, 20, 21 and 22 shall be z, where z <> y (see step 13).
20	<--		CP-ACK	
21	<--		CP-DATA	Contains RP-ACK RPDU
22	-->		CP-ACK	Shall be sent within 5 s of step 21
23	SS			The SS releases the RRC connection
NOTE 1: 5 s have been agreed to be a reasonable value to secure that the UE have enough time to respond to the different messages.				
NOTE 2: The CP-ACK for the old MM connection can be received either before or after the reception of the CM SERVICE ACCEPT message. For Release 4 or later release the UE transmission of the final CP-ACK is optional.				

16.1.9.2.5 Test requirements

In step 10 the UE shall transmit a CM SERVICE REQUEST for the new CM connection (for the second short message) before the final CP-ACK for the old MM connection is transmitted.

In step 16 the UE shall transmit a CM SERVICE REQUEST for the new CM connection (for the third short message) before the final CP-ACK for the old MM connection is transmitted.

16.1.10 Test of capabilities of simultaneously receiving a short message whilst sending a mobile originated short message

16.1.10.1 Definition

16.1.10.2 Conformance requirements

An active UE shall be able to receive a short message TPDU (SMS-DELIVER) at any time, independently of whether or not there is an SMS mobile originated call (SMS-SUBMIT or SMS-COMMAND) in progress.

References

3GPP TS 23.040 clauses 3.1, 9.2.3.16.

3GPP TS 24.011 clause 3.2.

16.1.10.3 Test purpose

The test verifies that the UE is capable of simultaneously receiving a network originated SM whilst sending a mobile originated SM.

16.1.10.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in MM-state "Idle, updated";
  - the SMS message storage shall be empty.

Related ICS/IXIT Statements

Support for Short message MO/PP and MT/PP.

Support for state U10 of call control.

The value of timer TC1M.

Whether SMS messages are stored in the USIM and/or the ME.

Test procedure

a) The SS is configured to receive a mobile originated SM. In clause 16.1.2 steps a) and b) are repeated and, using the end of the CP-DATA message from the UE as a trigger, the SS sends a SM to the UE. In this case a new transaction identifier shall be used in the CP messages of SMS mobile terminated.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1	UE			The UE is set up to send an SM
2	SS			The SS verifies that the IE "Establishment cause" in the received RRC CONNECTION REQUEST message is set to "Originating Low Priority Signalling".
3			(void)	
4			(void)	
5	-->		CM SERVICE REQUEST	CM service type set to "Short Message Service"
6	<--		AUTHENTICATION REQUEST	
7	-->		AUTHENTICATION RESPONSE	
8	SS			The SS starts integrity protection
9			(void)	
10	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
11	SS			The SS sends an SM to the UE triggered by the end of the CP-DATA message from the UE
12	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
13	UE			The UE shall correctly receive the SM and indicate that a message has arrived. In the MO case the UE shall send the CP-ACK message with transaction identifier assigned to this transfer. In the MT case the UE shall send a CP-ACK message and a CP-DATA message containing the RP-ACK RPDU. The transaction identifier shall be the same as chosen by the SS for the MT transfer.
NOTE: Time values for SS wait times are chosen sufficiently high to be sure that the UE has enough time to respond to the different messages.				

Specific Message Contents

SMS SUBMIT TPDU

Information element	Comment Value
TP-UDL	as applicable
TP-UD (140 octets)	160 ASCII characters

16.1.10.5 Test requirements

After step 12 UE shall correctly receive the SM and indicate that a message has arrived.

16.2 Short message service point to point on PS mode

All of test cases in this clause are applied to the UE supported PS mode.

16.2.1 SMS mobile terminated

16.2.1.1 Definition

16.2.1.2 Conformance requirements

An active UE shall be able to receive short message TPDU (SMS-DELIVER) at any time, independently of whether or not there is a PDP context in progress. A report will always be returned to the SC, confirming that the UE has received the short message.

References

3GPP TS 23.040 clauses 3.1, 9.2.3.16.

16.2.1.3 Test purpose

To verify the ability of a UE to receive and decode the SMS where provided for the point to point service.

16.2.1.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in GMM-state "GMM-REGISTERED";
  - the SMS message storage shall be empty.

Related ICS/IXIT Statements

Support for Short message MT/PP.

The value of timer TC1M.

Whether SMS messages are stored in the USIM and/or the ME.

Support for session management state "PDP-ACTIVE".

Maximum number of retransmissions of an unacknowledged CP-DATA message.

Test procedure

a) Mobile terminates establishment of Radio Resource Connection. After the completion of RRC Connection the SS authenticates the UE and activates ciphering.

   After the SS receives SECURITY MODE COMPLETE, the SS sends a CP-DATA message. The information element of the CP-DATA message will be RP-DATA RPDU (SMS DELIVER TPDU).

b) The SS waits a maximum of 25 s for the CP-ACK message and then a maximum of 60 s for the CP-DATA message containing the RP-ACK RPDU.

c) The SS sends a CP-ACK to the UE within TC1M with no further CP-DATA messages and the SS initiates channel release.

d) Steps a), b) and c) are repeated but the first CP-DATA message from the UE is not acknowledged. The second CP-DATA message from the UE is acknowledged by a CP-ACK within a time TC1M.

e) Steps a) and b) are repeated. The SS is configured not to send CP-ACK. Then maximum 3 CP-DATA retransmissions may occur. After a duration of 4 times TC1M + 10 s (Maximum for T3317) SS initiates the channel release. This is the appropriate time to wait to verify that the UE does not send more than the maximum allowed (3) CP-DATA retransmissions.

f) The SMS message store shall be cleared manually by the operator.

g) A PDP context is established with the SS and the state PDP-ACTIVE of session management is entered.

   The SS sends a CP-DATA message. The information element of the CP-DATA message will be RP-DATA RPDU (SMS DELIVER TPDU). The SS waits a maximum of 25 s for the CP-ACK message and then a maximum of 60 s for the CP-DATA message containing the RP-ACK RPDU.

h) The SS sends a CP-ACK to the UE within TC1M with no further CP-DATA messages and the SS initiates channel release. The SMS message store shall be cleared manually by the operator.

i) Steps g) and h) are repeated but the first CP-DATA message from the UE is not acknowledged. The second CP-DATA message from the UE is acknowledged by a CP-ACK within a time TC1M.

j) Step g) is repeated. The SS is configured not to send CP-ACK. Then maximum 3 CP-DATA retransmissions may occur. After a duration of 4 times TC1M + 10 s (Maximum for T3317) SS initiates the channel release. This is the appropriate time to wait to verify that the UE does not send more than the maximum allowed (3) CP-DATA retransmissions (during PDP context in progress).

k) A PDP context is established with the SS and the state PDP-ACTIVE of session management is entered. The PDP context is cleared by the SS with a disconnect message. (The PDP context deactivating is continued in parallel to the following exchange of messages related to SMS).

The SS sends a CP-DATA RPDU (SMS DELIVER TPDU) message. The information element of the CP-DATA message is RP-DATA.

The SS waits a maximum of 25 s for the CP-ACK message and then a maximum of 60 s for the CP-DATA message containing the RP-ACK RPDU.

The SS sends a CP-ACK to the UE within TC1M with no further CP-DATA messages and the SS initiates channel release.

The SMS message store shall be cleared manually by the operator.

l) A PDP context is established with the SS and the state PDP-ACTIVE of session management is entered. The PDP context shall be cleared from the UE. (The PDP context deactivating is continued in parallel to the following exchange of messages related to SMS).

The SS sends a CP-DATA message. The information element of the CP-DATA message is RP-DATA RPDU (SMS DELIVER TPDU).

The SS waits a maximum of 25 s for the CP-ACK message and then a maximum of 60 s for the CP-DATA message containing the RP-ACK RPDU.

The SS sends a CP-ACK to the UE within TC1M with no further CP-DATA messages and the SS initiates channel release.

The SMS message store shall be cleared manually by the operator.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108. The IE “Paging cause” in the PAGING TYPE 1 message is set to “Terminating Low Priority Signalling”. The SS verifies that the IE “Establishment cause” in the received RRC CONNECTION REQUEST message is set to “Terminating Low Priority Signalling”.
2	-->		SERVICE REQUEST	
3	<--		AUTHENTICATION AND CIPHERING REQUEST	
4	-->		AUTHENTICATION AND CIPHERING RESPONSE	
5		SS		The SS starts integrity protection
6			(void)	
7	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
8		SS		Waits max 25 s for CP-ACK
9	-->		CP-ACK	
10		SS		Waits max 60 s for RP-ACK RPDU
11	-->		CP-DATA	Contains RP-ACK RPDU
12	<--		CP-ACK	
13		SS		The SS releases the RRC connection.
14	UE			The UE shall indicate that an SM has arrived.
15			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108. The IE “Paging cause” in the PAGING TYPE 1 message is set to “Terminating Low Priority Signalling”. The SS verifies that the IE “Establishment cause” in the received RRC CONNECTION REQUEST message is set to “Terminating Low Priority Signalling”
16	-->		SERVICE REQUEST	
17	<--		AUTHENTICATION AND CIPHERING REQUEST	
18	-->		AUTHENTICATION AND CIPHERING RESPONSE	
19		SS		The SS starts integrity protection
20			(void)	
21	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
22		SS		Waits max 25 s for CP-ACK
23	-->		CP-ACK	
24		SS		Waits max 60 s for RP-ACK RPDU
25	-->		CP-DATA	First CP-DATA from UE, contains RP-ACK RPDU
26		SS		First CP-DATA message not acknowledged by SS
27	-->		CP-DATA	Retransmitted CP-DATA from UE within twice TC1M, after step 25, contains RP-ACK RPDU
28	<--		CP-ACK	Second CP_DATA message is acknowledged
29		SS		The SS releases the RRC connection.
30	UE			The UE shall indicate that an SM has arrived.
31			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108. The IE “Paging cause” in the PAGING TYPE 1 message is set to “Terminating Low Priority Signalling”. The SS verifies that the IE “Establishment cause” in the received RRC CONNECTION REQUEST message is set to “Terminating Low Priority Signalling”.
32	-->		SERVICE REQUEST	
33	<--		AUTHENTICATION AND CIPHERING REQUEST	
34	-->		AUTHENTICATION AND CIPHERING RESPONSE	
35		SS		The SS starts integrity protection
36			(void)	
37	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
38		SS		Waits max 25 s for CP-ACK
39	-->		CP-ACK	
40		SS		Waits max 60 s for RP-ACK RPDU
41	-->		CP-DATA	Contains RP-ACK RPDU
42		SS		First CP-DATA message not acknowledged by SS

Step	Direction		Message	Comments
	UE	SS		
43			CP-DATA	Retransmitted CP-DATA from UE within twice TC1M after step 41, contains RP-ACK RPDU
44	SS			Retransmitted CP-DATA message not acknowledged by SS
45	UE			Depending upon the maximum number of CP-DATA retransmissions implemented, step 43 and 44 may be repeated. The maximum number of retransmissions may however not exceed three. The UE may also send less than 3 re-transmissions. The same RRC connection shall be used for CP-DATA retransmissions.
45a	UE			The UE may send a Signalling Connection Release Indication message immediately when TC1M has run out. This is according to TS 24.011 clause 5.3.2.1.
46	SS			The SS releases the RRC connection after a duration of 4*TC1M + 10 s (Maximum for T3317) from step 41.
47			Void	
48	UE			The UE shall indicate that an SM has arrived.
49	UE			A PDP context is established with the SS and the state PDP-ACTIVE of session management is entered.
50			(void)	
51	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
52	SS			Waits max 25 s for CP-ACK
53	-->		CP-ACK	
54	SS			Waits max 60 s for RP-ACK RPDU
55	-->		CP-DATA	Contains RP-ACK RPDU
56	<--		CP-ACK	
57	<--		DEACTIVATE PDP CONTEXT REQUEST	Deactivates an existing PDP context.
58	-->		DEACTIVATE PDP CONTEXT ACCEPT	
58a	-->		DETACH REQUEST	A manual attach UE is detached
58b	<--		DETACH ACCEPT	
58c	SS			The SS releases the RRC connection.
59	UE			The UE shall indicate that an SM has arrived.
60	UE			Clear the SMS message store
61	UE			A PDP context is established with the SS and the state PDP-ACTIVE of session management is entered.
62			(void)	
63	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
64	SS			Waits max 25 s for CP-ACK
65	-->		CP-ACK	
66	SS			Waits max 60 s for RP-ACK RPDU
67	-->		CP-DATA	First CP-DATA from UE, contains RP-ACK RPDU
68	SS			First CP-DATA message not acknowledged by SS
69	-->		CP-DATA	Retransmitted CP-DATA message within twice TC1M after step 67, contains RP-ACK RPDU
70	<--		CP-ACK	Second CP-DATA message is acknowledged
71	<--		DEACTIVATE PDP CONTEXT REQUEST	Deactivates an existing PDP context.
72	-->		DEACTIVATE PDP CONTEXT ACCEPT	
72a	-->		DETACH REQUEST	A manual attach UE is detached
72b	<--		DETACH ACCEPT	
73	SS			The SS releases the RRC connection
74	UE			The UE shall indicate that an SM has arrived.
75	UE			Clear the SMS message store
76	UE			A PDP context is established with the SS and the state PDP-ACTIVE of session management is entered.
77			(void)	
78	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
79	SS			Waits max 25 s for CP-ACK
80	-->		CP-ACK	
81	SS			Waits max 60 s for RP-ACK RPDU
82	-->		CP-DATA	First CP-DATA from UE, contains RP-ACK RPDU
83	SS			First CP-DATA message not acknowledged by SS

Step	Direction		Message	Comments
	UE	SS		
84	-->		CP-DATA	Retransmitted CP-DATA message within twice TC1M after step 82, contains RP-ACK RPDU
85	SS			Retransmitted CP-DATA message not acknowledged by SS
86	UE			Depending on the maximum number of CP-DATA retransmissions implemented, step 83-84 may be repeated. The maximum number of retransmissions may however not exceed three. The UE may also send less than 3 re-transmissions. The same RRC connection shall be used for CP-DATA retransmissions.
86a	<--		DEACTIVATE PDP CONTEXT REQUEST	Deactivates an existing PDP context.
86b	-->		DEACTIVATE PDP CONTEXT ACCEPT	
86c	-->		DETACH REQUEST	A manual attach UE is detached
86d	<--		DETACH ACCEPT	
87	SS			The SS releases the RRC connection after a duration of 4*TC1M + 10 s (Maximum for T3317) from step 82.
88			(void)	
89	UE			The UE shall indicate that an SM has arrived.
90	UE			Clear the SMS message store
91	SS			A PDP context is established with the SS and the state PDP-ACTIVE of session management is entered.
92			(void)	
93			(void)	
94	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
94a	<--		DEACTIVATE PDP CONTEXT REQUEST	The PDP context is deactivated by the SS. The PDP context deactivating is continued in parallel to the following exchange of messages related to SMS.
94b	-->		DEACTIVATE PDP CONTEXT ACCEPT	This message should be transmitted within T3395 Expiry and at any step before step 96
94c			VOID	
94d			VOID	
94e			VOID	
95	SS			Waits max 25 s for CP-ACK
96	-->		CP-ACK	
97	SS			Waits max 60 s for RP-ACK RPDU
98	-->		CP-DATA	Contains RP-ACK RPDU
99	<--		CP-ACK	
99a	-->		DETACH REQUEST	A manual attach UE is detached
99b	<--		DETACH ACCEPT	
100	SS			The SS releases the RRC connection
101	UE			The UE shall indicate that an SM has arrived.
102	UE			Clear the SMS message store
103	UE			A PDP context is established with the SS and the state PDP-ACTIVE of session management is entered.
104			(void)	
105	-->		DEACTIVATE PDP CONTEXT REQUEST	The PDP context is deactivated by the UE. The PDP context deactivation is continued in parallel to the following
106	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)
107	<--		DEACTIVATE PDP CONTEXT ACCEPT	
107a			VOID	
107b			VOID	
107c			VOID	

Step	Direction		Message	Comments
	UE	SS		
108	→		CP-ACK	shall be sent before 25 s after the start of step 106
109	SS			Waits max 60 s for RP-ACK RPDU
110	-->		CP-DATA	Contains RP-ACK RPDU
111	<--		CP-ACK	
111a	-->		DETACH REQUEST	A manual attach UE is detached
111b	<--		DETACH ACCEPT	
112	SS			The SS releases the RRC connection
113	UE			The UE shall indicate that an SM has arrived.
114	UE			Clear the SMS message store
NOTE: Time values for SS wait time are chosen sufficiently high to be sure that the UE has enough time to respond to the different messages.				

Specific Message Contents

SMS DELIVER TPDU (not containing a type 0 message)

Information element	Comment Value
TP-PID	Different from Type 0: “01000000”B
TP-UDL	160
TP-UD (140 octets)	text of message (160 characters)
NOTE: The 160 characters in TP-UD shall include at least one occurrence of each character in the default alphabet (see 3GPP TS 23.038, clause 6.2.1).	

16.2.1.5 Test requirements

After step 7 UE shall receive SMS-DELIVER TPDU and send CP-ACK within 25 s and CP-DATA containing RP-ACK within 60 s.

After step 14 UE shall indicate that an SM has arrived.

After step 27 UE shall retransmit CP-DATA containing RP-ACK within twice TC1M.

After step 30 UE shall indicate that an SM has arrived.

After step 43 UE shall repeat CP-DATA retransmissions and the maximum number of retransmissions must not exceed three.

After step 48 UE shall indicate that an SM has arrived.

After step 51 UE shall receive SMS-DELIVER TPDU and send CP-ACK within 25 s and CP-DATA containing RP-ACK within 60 s.

After step 59 UE shall indicate that an SM has arrived.

After step 69 UE shall retransmit CP-DATA containing RP-ACK within twice TC1M.

After step 74 UE shall indicate that an SM has arrived.

After step 84 UE shall repeat CP-DATA retransmissions and the maximum number of retransmissions must not exceed three.

After step 89 UE shall indicate that an SM has arrived.

After step 94 UE shall receive SMS-DELIVER TPDU and send CP-ACK within 25 s and CP-DATA containing RP-ACK within 60 s.

After step 101 UE shall indicate that an SM has arrived.

After step 106 UE shall receive SMS-DELIVER TPDU and send CP-ACK within 25 s and CP-DATA containing RP-ACK within 60 s.

After step 113 UE shall indicate that an SM has arrived.

16.2.2 SMS mobile originated

16.2.2.1 Definition

16.2.2.2 Conformance requirements

An active UE shall be able to submit short message TPDU (SMS-SUBMIT) at any time, independently of whether or not there is a PDP context in progress.

References

3GPP TS 23.040 clause 3.1, 9.2.3.16.

16.2.2.3 Test purpose

To verify that the UE is able to correctly send a short message where the SMS is provided for the point to point service.

16.2.2.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in GMM-state "GMM-REGISTERED";
  - the SMS message storage shall be empty.

Related ICS/IXIT Statements

Support for Short message MO/PP.

Support for state PDP-ACTIVE of session management.

The value of timer TC1M.

Whether SMS messages are stored in the USIM and/or the ME.

Maximum number of retransmissions of an unacknowledged CP-DATA message.

Test procedure

a) The UE shall be set up to send an SM to the SS. The UE establishes successfully an RRC connection.

b) The SS performs authentication and after that, the SS starts integrity protection.

c) The SS responds to the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the UE with a CP-ACK message within TC1M followed by a CP-DATA message containing the correct RP-ACK RPDU. The SS waits a maximum of 25 s for the CP-ACK message.

d) The SS sends a channel release message to the UE.

e) Steps a) and b) are repeated. The SS is configured not to send the CP-ACK message. Then maximum 3 CP-DATA retransmissions may occur. After a duration of 4 times TC1M + 10 s (Maximum for T3317) SS initiates channel release. This is the appropriate time to wait to verify that the UE does not send more than the maximum CP-DATA retransmissions.

f) Steps a) and b) are repeated. On receipt of the CP-DATA from the UE the SS sends a CP-ERROR message within TC1M containing a "Network Failure" cause. Then the SS initiates channel release.

g) A PDP context is established with the SS and the state PDP-ACTIVE of session management is entered. The UE is set up to send an SM to the SS.

h) The SS responds to the CP-DATA containing RP-DATA RPDU (SMS SUBMIT TPDU) from the UE with a CP-ACK message within TC1M followed by a CP-DATA message containing the correct RP-ACK RPDU. The SS waits a maximum of 25 s for the CP-ACK message. Then the SS sends a channel release message to the UE.

i) Step g) is repeated. The SS is configured not to send the CP-ACK message. Then maximum 3 CP-DATA retransmissions may occur. After a duration of 4 times TC1M + 10 s (Maximum for T3317) the SS initiates channel release. This is the appropriate time to wait to verify that the UE does not send more than the maximum CP-DATA retransmissions (during a PDP context in progress).

j) (void)

k) The UE is set up to send an SM to the SS. On receipt of the SERVICE REQUEST the SS sends a SERVICE REJECT message with the reject cause set to "GPRS services not allowed". After 5 s the SS initiates channel release.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1	UE			The UE is set up to send an SM
2		SS		The SS verifies that the IE "Establishment cause" in the received RRC CONNECTION REQUEST message is set to "Originating Low Priority Signalling".
3			(void)	
4			(void)	
5	-->		SERVICE REQUEST	
6	<--		AUTHENTICATION AND CIPHERING REQUEST	
7	-->		AUTHENTICATION AND CIPHERING RESPONSE	
8		SS		The SS starts integrity protection
9			(void)	
10	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
11	<--		CP-ACK	Sent within TC1M after step 10
12	<--		CP-DATA	Contains RP-ACK RPDU
13		SS		Waits max 25 s for CP-ACK
14	-->		CP-ACK	
15		SS		The SS releases the RRC connection
16			(void)	
17	UE			The UE is set up to send an SM
18		SS		The SS verifies that the IE "Establishment cause" in the received RRC CONNECTION REQUEST message is set to "Originating Low Priority Signalling".
19			(void)	
20			(void)	
21	-->		SERVICE REQUEST	
22	<--		AUTHENTICATION AND CIPHERING REQUEST	
23	-->		AUTHENTICATION AND CIPHERING RESPONSE	
24		SS		The SS starts integrity protection
25			(void)	
26	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
27		SS		SS configured not to send CP-ACK
28	-->		CP-DATA	Retransmitted CP-DATA message within twice TC1M after step 26
29	UE			Depending on the maximum number of CP-DATA retransmissions implemented, step 28 may be repeated. The maximum number of retransmissions may however not exceed three. The UE may also send less than 3 re-transmissions. The same RRC connection shall be used for CP-DATA retransmissions.
29a	UE			The UE may send a Signalling Connection Release Indication message immediately when TC1M has run out. This is according to TS 24.011 clause 5.3.2.1.

Step	Direction		Message	Comments
	UE	SS		
30		SS		The SS releases the RRC connection after a duration of 4*TC1M + 10 s (Maximum for T3317) from step 26.
30a			(void)	
31			(void)	
32	UE			The UE is set up to send an SM
33		SS		The SS verifies that the IE "Establishment cause" in the received RRC CONNECTION REQUEST message is set to "Originating Low Priority Signalling".
34			(void)	
35			(void)	
36	-->		SERVICE REQUEST	
37	<--		AUTHENTICATION AND CIPHERING REQUEST	
38	-->		AUTHENTICATION AND CIPHERING RESPONSE	
39		SS		The SS starts integrity protection
40			(void)	
41	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
42	<--		CP-ERROR	Sent within TC1M containing "Network Failure" cause.
43		SS		The SS releases the RRC connection.
44			(void)	
45	UE			A PDP context is established with the SS and the state PDP-ACTIVE of session management is entered.
46	UE			The UE is set up to send an SM
47			(void)	
48			(void)	
49	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
50	<--		CP-ACK	Sent within TC1M after step 49
51	<--		CP-DATA	Contains RP-ACK RPDU
52		SS		Waits max 25 s for CP-ACK
53	-->		CP-ACK	
53a	<--		DEACTIVATE PDP CONTEXT REQUEST	Deactivates an existing PDP context.
53b	-->		DEACTIVATE PDP CONTEXT ACCEPT	
53c	-->		DETACH REQUEST	A manual attach UE is detached
53d	<--		DETACH ACCEPT	
54		SS		The SS releases the RRC connection.
55			(void)	
56	UE			A PDP context is established with the SS and the state PDP-ACTIVE of session management is entered.
56a	UE			The UE is set up to send an SM. Continue at step 59 (signalling connection already established in step 56).
56b			(void)	
56c			(void)	
56d			(void)	
56e			(void)	
57			(void)	
58			(void)	
59	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
60		SS		SS configured not to send CP-ACK
61	-->		CP-DATA	Retransmitted CP-DATA message within twice TC1M after step 59
62	UE			Depending on the maximum number of CP-DATA retransmissions implemented, step 61 may be repeated. The maximum number of retransmissions may however not exceed three. The UE may also send less than 3 re-transmissions. The same RRC connection shall be used for CP-DATA retransmissions.
63		SS		The SS releases the RRC connection after a duration of 4*TC1M + 10 s (Maximum for T3317) from step 59.
63a			(void)	
64			(void)	
65-77			(void)	
78	UE			The UE is set up to send an SM

Step	Direction		Message	Comments
	UE	SS		
79	SS			The SS verifies that the IE “Establishment cause” in the received RRC CONNECTION REQUEST message is set to “Originating Low Priority Signalling”.
80			(void)	
81	-->		SERVICE REQUEST	
82	<--		SERVICE REJECT	Reject cause set to "GPRS services not allowed"
83	SS			The SS releases the RRC connection. The RRC connection is releases 5 s after SERVICE REJECT
NOTE: Time values for SS wait times are chosen sufficiently high to be sure that the UE has enough time to respond to the different messages.				

Specific Message Contents

SMS SUBMIT TPDU

Information element	Comment Value
TP-UDL	as applicable
TP-UD (140 octets)	160 ASCII characters

16.2.2.5 Test requirements

After step 10 UE shall send a CP-DATA containing RP-data. The RP-DATA shall contain SMS SUBMIT TPDU.

After step 26 UE shall retransmit a CP-DATA containing RP-data. The RP-DATA shall contain SMS SUBMIT TPDU.

After step 49 UE shall send a CP-DATA containing RP-data. The RP-DATA shall contain SMS SUBMIT TPDU.

After step 61 UE shall repeat CP-DATA retransmissions and the maximum number of retransmissions must not exceed three.

After step 82 UE shall not send CP-DATA.

16.2.3 Test of memory full condition and memory available notification:

The Memory Available Notification provides a means for the UE to notify the network that it has memory available to receive one or more short messages. The SMS status field in the USIM contains status information on the "memory available" notification flag.

16.2.3.1 Definition

16.2.3.2 Conformance requirement

1. When a mobile terminated message is Class 2, the UE shall ensure that the message has been transferred to the SMS data field in the USIM before sending an acknowledgement to the SC. The UE shall return a protocol error message if the short message cannot be stored in the USIM and there is other short message storage available in the UE. If all the short message storage in the UE is already in use, the UE shall return "memory capability exceeded".

2. When the UE rejects a short message due to lack of available memory capability the need to transfer notification shall be stored in the USIM.

3. If the memory capability becomes available because memory is cleared, the value of the memory capability exceeded notification flag in the USIM is read. If the flag is set, the UE notifies the network that memory capability is now available. After a positive acknowledgement from the network, the ME unsets the memory capability exceeded notification flag in the USIM.

References

- 3GPP TS 23.038 clause 4.

- 3GPP TS 23.040 clauses 9.2.3.10, 10.3 (operation 14).

16.2.3.3 Test purpose

1. To verify that the UE sends the correct acknowledgement when its memory in the USIM becomes full.
2. To verify that the UE sends the correct acknowledgement when its memory in the ME and the USIM becomes full, and sets the "memory exceeded" notification flag in the USIM.
3. To verify that the UE performs the "memory available" procedure when its message store becomes available for receiving short messages, and only at this moment.

16.2.3.4 Method of test

Initial conditions

- System Simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in GMM-state "GMM-REGISTERED";
  - the SMS message storage shall be empty;
  - the UE shall be connected to the USIM simulator. The following shall be present in the USIM simulator:
    - EF_{SMS} with at least one record;
    - EF_{SMSS}, with SMS "Memory Cap. Exceed" notification flag set to "memory available";
    - Service no. 10 (SMS) in EF_{UST} set to allocated and activated.
  - for storing of Class 1 Short Messages the UE shall be set up to store Short Messages in the ME memory (by way of MMI, as described in ICS/IXIT statement).

Related ICS/IXIT Statements

Support for Short message MT/PP.

Whether SMS messages are stored in the USIM and/or the ME.

The value of timer TC1M.

Test procedure

a) step a) of clause 16.2.5.3 (test of Class 2 Short Messages) is repeated until the UE sends a negative acknowledgement (RP-ERROR). The USIM simulator shall indicate if the "memory capability exceeded" notification flag has been set on the USIM.

b) a Class 1 Short Message is sent to the UE.

c) step b) is repeated until the UE sends a negative acknowledgement (RP-ERROR). The USIM simulator shall indicate if the "memory capability exceeded" notification flag has been set on the USIM.

d) a Short Message is sent to the UE with the DCS field of the SMS-DELIVER TPDU set to 0.

e) the SS prompts the operator to read a short message and to remove it from the message store of the UE.

f) the SS waits for a RRC CONNECTION REQUEST from the UE, and sends a RRC CONNECTION SETUP.

g) after the SS receives a RRC CONNECTION SETUP COMPLETE, the SS authenticates the UE and activates ciphering.

h) the SS answers to the RP-SMMA from the UE with a CP-DATA containing a RP-ACK RPDU.

i) after the UE has acknowledged the CP-DATA with a CP-ACK, the SS releases the RRC connection. The USIM simulator shall indicate if the "memory capability exceeded" notification flag has been unset on the USIM.

j) step e) is repeated.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
2	-->		SERVICE REQUEST	
3	<--		AUTHENTICATION AND CIPHERING REQUEST	
4	-->		AUTHENTICATION AND CIPHERING RESPONSE	
5	<--		SECURITY MODE COMMAND	
6	-->		SECURITY MODE COMPLETE	
7	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 2 Short Message
8	SS			Waits max 25 s for CP-ACK
9	-->		CP-ACK	
10	SS			Waits max 60 s for RP-ACK RPDU
11	-->		CP-DATA	Contains RP-ACK RPDU
12	<--		CP-ACK	Within TC1M after step 11
13	<--		RRC CONNECTION RELEASE	RRC connection is released. Step 1-13 is repeated until UE sends a negative acknowledgement (RP-ERROR) in step 11. The RP-ERROR RPDU cause field shall be "Protocol error, unspecified" if there is message capability in the USIM, or "Memory capability exceeded" if there is no message capability in the USIM. If the total memory store of the UE is full, the ME shall set the "memory capability exceeded" notification flag on the USIM.
14	-->		RRC CONNECTION RELEASE COMPLETE	
15			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
16	-->		SERVICE REQUEST	
17	<--		AUTHENTICATION AND CIPHERING REQUEST	
18	-->		AUTHENTICATION AND CIPHERING RESPONSE	
19	<--		SECURITY MODE COMMAND	
20	-->		SECURITY MODE COMPLETE	
21	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 1 Short Message
22	SS			Waits max 25 s for CP-ACK
23	-->		CP-ACK	
24	SS			Waits max 60 s for RP-ACK RPDU
25	-->		CP-DATA	Shall contain RP-ACK RPDU if there is memory capability in the ME. If not it shall contain RP-ERROR RPDU which cause field shall be "memory capability exceeded". If the total memory store of the UE now becomes full at this step, the ME shall set the "memory cap. exceed" notification flag on the USIM.
26	<--		CP-ACK	Within TC1M after step 25
27	<--		RRC CONNECTION RELEASE	RRC connection is released. Step 16-27 is repeated until the UE sends an RP-ERROR. The USIM simulator shall indicate if the "memory capability exceeded" notification flag has been set on the USIM.
28	-->		RRC CONNECTION RELEASE COMPLETE	
29			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
30	-->		SERVICE REQUEST	
31	<--		AUTHENTICATION AND CIPHERING REQUEST	
32	-->		AUTHENTICATION AND CIPHERING RESPONSE	
33	<--		SECURITY MODE COMMAND	
34	-->		SECURITY MODE COMPLETE	

Step	Direction		Message	Comments
	UE	SS		
35	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) with TP-DCS set to 0
36		SS		Waits max 25 s for CP-ACK
37	-->		CP-ACK	
38		SS		Waits max 60 s for RP-ACK RPDU
39	-->		CP-DATA	Shall contain RP-ERROR RPDU with error cause "memory capability exceeded".
40	<--		CP-ACK	Within TC1M after step 39
41	<--		RRC CONNECTION RELEASE	RRC connection is released.
42	-->		RRC CONNECTION RELEASE COMPLETE	
43		SS		Prompts the operator to remove one of the short messages from the message store of the UE.
44	<--		SYSTEM INFORMATION	BCCH
45	-->		RRC CONNECTION REQUEST	CCCH
46	<--		RRC CONNECTION SETUP	CCCH
47	-->		RRC CONNECTION SETUP COMPLETE	DCCH
48	-->		SERVICE REQUEST	
49	<--		SERVICE ACCEPT	
50	-->		CP-DATA	Contains RP-SMMA RPDU
51	<--		CP-ACK	
52	<--		CP-DATA	Contains RP-ACK RPDU
53	-->		CP-ACK	Acknowledge of CP-DATA containing the RP-ACK RPDU. The ME shall unset the "memory capability exceeded" notification flag on the USIM.
54	<--		RRC CONNECTION RELEASE	RRC connection is released. The USIM simulator shall indicate if the "memory capability exceeded" notification flag has been unset on the USIM.
55	-->		RRC CONNECTION RELEASE COMPLETE	
56		SS		Prompts the operator to remove one of the short messages from the message store of the UE.
57	UE			Shall not attempt to send a RP-SMMA RPDU. This is verified by checking that the UE does not send a CHANNEL REQUEST message with the establishment cause "Other services which can be completed with an SDCCH"
NOTE: Time values for SS wait time are chosen sufficiently high to be sure that the UE has enough time to respond to the different messages.				

Specific Message Contents

SMS-DELIVER TPDU in step 7

Information element	Comment Value
TP-DCS	default alphabet, class 2 "11110010"B

SMS-DELIVER TPDU in step 21

TP-DCS	default alphabet, class 1 "11110001"B

SMS-DELIVER TPDU in step 35

TP-DCS	default alphabet "00000000"B

16.2.3.5 Test requirements

After UE sends a negative acknowledgement (RP-ERROR) in step 11, the USIM simulator shall indicate if the "memory capability exceeded" notification flag has been set on the USIM.

After UE sends a negative acknowledgement (RP-ERROR) in step 25, the USIM simulator shall indicate if the "memory capability exceeded" notification flag has been set on the USIM.

After step 53 the ME shall unset the "memory capability exceeded" notification flag on the USIM.

After step 57 UE shall not attempt to send a RP-SMMA RPDU.

16.2.4 Test of the status report capabilities and of SMS-COMMAND:

This test applies to UEs which support the status report capabilities.

16.2.4.1 Definition

16.2.4.2 Conformance requirement

The SMS offers the SC the capabilities of informing the UE of the status of a previously sent mobile originated short message. This is achieved by the SC returning a status report TPDU (SMS-STATUS-REPORT) to the originating UE.

SMS-COMMAND enables an UE to invoke an operation at the SC.

The UE shall increment TP-MR by 1 for each SMS-SUBMIT or SMS-COMMAND being submitted.

References

- 3GPP TS 23.040 clauses 3.2.9, 9.2.3.2, 9.2.3.4, 9.2.3.5, 9.2.3.6, 9.2.3.14, 9.2.3.18, 9.2.3.19, 9.2.3.26.

16.2.4.3 Test purpose

1) To verify that the UE is able to accept a SMS-STATUS-REPORT TPDU.

2) To verify that the UE is able to use the SMS-COMMAND functionality correctly and sends an SMS-COMMAND TPDU with the correct TP-Message-Reference.

16.2.4.4 Method of test

Initial conditions

- System Simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in GMM-state "GMM-REGISTERED".

Related ICS/IXIT Statements

Support of SMS MO/PP and MT/PP.

Test procedure

a) The UE is made to send a Mobile Originated short message setting TP-SRR as in steps a) to d) of test 16.2.2 (SMS Mobile originated).

b) The SS sends a CP-DATA message containing a RP-DATA RPDU itself containing an SMS-STATUS-REPORT TPDU.

c) The SS sends a RRC CONNECTION RELEASE message.

d) The UE is made to send an SMS-COMMAND message enquiring about the previously submitted short message.

e) Void.

f) The SS acknowledges the CP-DATA message from the UE with a CP-ACK followed by a CP-DATA message containing an RP-ACK RPDU.

g) After receiving the CP-ACK from the UE, the SS releases the RRC connection by using a RRC CONNECTION RELEASE message.

h) The UE is made to send an SMS-COMMAND message requiring to delete the previously submitted short message.

i) steps e) to g) are repeated.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1		<--	SYSTEM INFORMATION	BCCH
2		-->	RRC CONNECTION REQUEST	CCCH
3		<--	RRC CONNECTION SETUP	CCCH
4		-->	RRC CONNECTION SETUP COMPLETE	DCCH
5		-->	SERVICE REQUEST	
6		<--	AUTHENTICATION AND CIPHERING REQUEST	
7		-->	AUTHENTICATION AND CIPHERING RESPONSE	
8		<--	SECURITY MODE COMMAND	
9		-->	SECURITY MODE COMPLETE	
10		-->	CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
11		<--	CP-ACK	Sent within TC1M after step 10
12		<--	CP-DATA	Contains RP-ACK RPDU
13	SS			Waits max 25 s for CP-ACK
14		-->	CP-ACK	
15		<--	RRC CONNECTION RELEASE	RRC connection is released.
16		-->	RRC CONNECTION RELEASE COMPLETE	
17			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
18		-->	SERVICE REQUEST	
19		<--	AUTHENTICATION AND CIPHERING REQUEST	
20		-->	AUTHENTICATION AND CIPHERING RESPONSE	
21		<--	SECURITY MODE COMMAND	
22		-->	SECURITY MODE COMPLETE	
23		<--	CP-DATA	Contains RP-DATA RPDU (SMS-STATUS-REPORT TPDU)
24		-->	CP-ACK	
25		-->	CP-DATA	Contains RP-ACK RPDU
26		<--	CP-ACK	
27		<--	RRC CONNECTION RELEASE	
28		-->	RRC CONNECTION RELEASE COMPLETE	
29	UE			The UE is made to send an SMS-COMMAND message enquiring about the previously submitted SM
30		<--	SYSTEM INFORMATION	BCCH
31		-->	RRC CONNECTION REQUEST	CCCH
32		<--	RRC CONNECTION SETUP	CCCH
33		-->	RRC CONNECTION SETUP COMPLETE	DCCH
34		-->	SERVICE REQUEST	
35		<--	AUTHENTICATION AND CIPHERING REQUEST	
36		-->	AUTHENTICATION AND CIPHERING RESPONSE	
37		<--	SECURITY MODE COMMAND	
38		-->	SECURITY MODE COMPLETE	
39		-->	CP-DATA	Contains RP-DATA RPDU (SMS-COMMAND TPDU) which shall contain the correct TP-MR
40		<--	CP-ACK	
41		<--	CP-DATA	Contains RP-ACK RPDU
42		-->	CP-ACK	
43		<--	RRC CONNECTION RELEASE	
44		-->	RRC CONNECTION RELEASE COMPLETE	

Step	Direction		Message	Comments
	UE	SS		
45	UE		The UE is made to send an SMS-COMMAND	message requiring to delete the previously submitted SM.
46	-->		RRC CONNECTION REQUEST	CCCH
47	<--		RRC CONNECTION SETUP	CCCH
48	-->		RRC CONNECTION SETUP COMPLETE	DCCH
49	-->		SERVICE REQUEST	
50	<--		AUTHENTICATION AND CIPHERING REQUEST	
51	-->		AUTHENTICATION AND CIPHERING RESPONSE	
52	<--		SECURITY MODE COMMAND	
53	-->		SECURITY MODE COMPLETE	
54	-->		CP-DATA	Contains RP-DATA RPDU (SMS-COMMAND TPDU) which shall contain the correct TP-MR
55	<--		CP-ACK	
56	<--		CP-DATA	Contains RP-ACK RPDU
57	-->		CP-ACK	
58	<--		RRC CONNECTION RELEASE	
59	-->		RRC CONNECTION RELEASE COMPLETE	

Specific Message Contents

SMS SUBMIT TPDU

Information element	Comment Value
TP-SRR	status report is requested "1"B

SMS-STATUS-REPORT TPDU (SS to UE in step 23):

Information element	Comment Value
TP-MR	same as previous SMS-SUBMIT
TP-MMS	no more messages "1"B
TP-SRQ	result of SMS-SUBMIT "0"B
TP-RA	same as the Destination address of the SMS-SUBMIT
TP-ST	SM received "00000000"B

first SMS-COMMAND TPDU (UE to SS in step 39)

Information element	Comment Value
TP-MR	TP-MR in previous SMS-SUBMIT plus "1"
TP-SRR	status report requested "1"B
TP-CT	Enquiry relating to previously submitted short message "00000000"B
TP-MN	not checked (TP-MR in previous SMS-SUBMIT)

second SMS-COMMAND TPDU (UE to SS in step 54)

Information element	Comment Value
TP-MR	TP-MR in previous SMS-COMMAND plus "1"
TP-CT	Delete previously submitted short message "00000010"B
TP-MN	not checked (TP-MR in previous SMS-SUBMIT)

16.2.4.5 Test requirements

After step 23 UE accept a SMS-STATUS-REPORT TPDU.

After step 39 UE shall send a SMS-COMMAND TPDU with the correct TP-Message-Reference.

After step 54 UE shall send a SMS-COMMAND TPDU with the correct TP-Message-Reference.

16.2.5 Test of message class 0 to 3

16.2.5.1 Short message class 0

16.2.5.1.1 Definition

16.2.5.1.2 Conformance requirement

When a mobile terminated message is class 0 and the UE has the capability of indicating short messages, the UE shall indicate the message immediately and send an acknowledgement to the SC when the message has successfully reached the UE irrespective of whether there is memory available in the USIM or ME. The message shall not be automatically stored in the USIM or ME.

Reference

3GPP TS 23.038 clause 4.

16.2.5.1.3 Test purpose

To verify that the UE will accept and indicate but not store a class 0 message, and that it will accept and indicate a class 0 message if its message store is full.

NOTE: failure of this test in a UE could cause it to reject a class 0 message when its SMS memory becomes full. This could lead to unwanted repetitions between the UE and the service centre.

16.2.5.1.4 Method of test

Initial conditions

- System Simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in GMM-state "GMM-REGISTERED";
  - the UE message store shall be empty.

Related ICS/IXIT Statements

Support for Short message MT/PP.

The value of timer TC1M.

Whether SMS messages are stored in the USIM and/or the ME.

Test procedure

a) The SS sends a class 0 message by using the method described in step a) of clause 16.2.1 but with the TPDU described in this clause.

b) The UE message store shall be filled (for example by using the method of clause 16.2.3 test of the memory available notification) with the same SMS-DELIVER TPDU except that TP-DCS is set to class 1.

c) The SS sends a class 0 message as in step a).

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
2	-->		SERVICE REQUEST	
3	<--		AUTHENTICATION AND CIPHERING REQUEST	
4	-->		AUTHENTICATION AND CIPHERING RESPONSE	
5	<--		SECURITY MODE COMMAND	
6	-->		SECURITY MODE COMPLETE	
7	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 0 Short Message
8	-->		CP-ACK	
9	-->		CP-DATA	Contains RP-ACK RPDU.
10	<--		CP-ACK	
11	<--		RRC CONNECTION RELEASE	
12	-->		RRC CONNECTION RELEASE COMPLETE	
13	UE			The content of the short message shall be indicated by the ME. The UE shall not store the message. This can be checked by verifying that it is impossible to retrieve any short messages from the UE message store.
14		SS		The UE message store shall be filled (for example by using the method of 16.2.3) with Class 1 SMS-DELIVER TPDU.
15			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
16	-->		SERVICE REQUEST	
17	<--		AUTHENTICATION AND CIPHERING REQUEST	
18	-->		AUTHENTICATION AND CIPHERING RESPONSE	
19	<--		SECURITY MODE COMMAND	
20	-->		SECURITY MODE COMPLETE	
21	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 0 Short Message
22	-->		CP-ACK	
23	-->		CP-DATA	Contains RP-ACK RPDU.
24	<--		CP-ACK	
25	<--		RRC CONNECTION RELEASE	
26	-->		RRC CONNECTION RELEASE COMPLETE	
27	UE			The content of the short message shall be indicated by the ME.

Specific Message Contents

SMS-DELIVER TPDU (containing a class 0 message) (SS to UE)

Information element	Comment Value	
TP-DCS	default alphabet, class 0	"1111 0000"B

SMS-DELIVER TPDU (containing a class 1 message to fill the UE message store) (SS to UE)

Information element	Comment Value	
TP-DCS	default alphabet, class 1	"1111 0001"B

16.2.5.1.5 Test requirements

After step 7 UE shall accept and indicate but not store a class 0 message.

After step 21 UE shall accept and indicate a class 0 message.

16.2.5.2 Test of class 1 short messages

This test shall apply to UEs which support:

- storing of received Class 1 Short Messages; and
- indicating of stored Short Messages.

16.2.5.2.1 Definition

16.2.5.2.2 Conformance requirement

When a mobile terminated message is class 1, the UE shall send an acknowledgement to the SC when the message has successfully reached the UE and can be stored, either in the ME or in the USIM.

Reference

3GPP TS 23.038 clause 4.

16.2.5.2.3 Test purpose

This procedure verifies that the UE acts correctly on receiving a class 1 message, i.e. that it stores the message in the ME or USIM and sends an acknowledgement (at RP and CP-Layer).

16.2.5.2.4 Method of test

Initial conditions

- System Simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in GMM-state "GMM-REGISTERED";
  - the UE message store shall be empty;
  - for storing of class 1 Short Messages, the UE shall be set up to store Short Messages in the ME memory (by way of MMI, as described in ICS/IXIT statement).

Related ICS/IXIT Statements

Support for Short message MT/PP.

The value of timer TC1M.

Whether SMS messages are stored in the USIM and/or the ME.

Test procedure

a) The SS delivers a Short Message of class 1 to the UE as specified in clause 16.2.1, step a).

b) The Short Message is recalled (e.g. by means of the MMI).

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
2	-->		SERVICE REQUEST	
3	<--		AUTHENTICATION AND CIPHERING REQUEST	
4	-->		AUTHENTICATION AND CIPHERING RESPONSE	
5	<--		SECURITY MODE COMMAND	
6	-->		SECURITY MODE COMPLETE	
7	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 1 Short Message
8	-->		CP-ACK	
9	-->		CP-DATA	Contains RP-ACK RPDU.
10	<--		CP-ACK	
11	<--		RRC CONNECTION RELEASE	
12	-->		RRC CONNECTION RELEASE COMPLETE	
13	UE			The short message shall be recalled and indicated at the UE.

Specific Message Contents

SMS-DELIVER TPDU (containing a class 1 message) (SS to UE)

Information element	Comment Value	
TP-DCS	default alphabet, class 1	"1111 0001"B

16.2.5.2.5 Test requirements

After step 7 UE shall store the message in the ME or USIM and send an acknowledgement.

16.2.5.3 Test of class 2 short messages

16.2.5.3.1 Definition

Class 2 Short Messages are defined as USIM specific, and the UE shall ensure that a message of this class is stored on the USIM.

16.2.5.3.2 Conformance requirement

When a mobile terminated message is Class 2, the UE shall ensure that the message has been correctly transferred to the SMS data field in the USIM before sending an acknowledgement to the SC. The UE shall return a "protocol error, unspecified" error message if the short message cannot be stored in the USIM and there is other short message storage available at the UE. If all the short message storage at the UE is already in use, the UE shall return "memory capacity exceeded".

References

3GPP TS 23.040 clause 9.2.3.10.

3GPP TS 23.038 clause 4.3

3GPP TS 34.108 clause 8.3.2.28.

16.2.5.3.3 Test purpose

This procedure verifies that the UE acts correctly on receiving a class 2 message, i.e. that it stores the message correctly in the USIM, and if this is not possible, returns a protocol error message, with the correct error cause, to the network.

There are 2 cases:

1) if the UE supports storing of short messages in the USIM and in the ME, and storage in the ME is not full, and the short message cannot be stored in the USIM, the error cause shall be "protocol error, unspecified";

2) if the UE supports storing of short messages in the USIM and not in the ME, and storage in the ME is not full, and the short message cannot be stored in the USIM, the error cause shall be "memory capacity exceeded".

NOTE: If the UE supports storing of short messages in the USIM and the ME, and storage in the ME is full, and the short message cannot be stored in the USIM, the error cause shall be "memory capacity exceeded". This case is not tested in this test.

16.2.5.3.4 Method of test

Initial conditions

- System Simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in GMM-state "GMM-REGISTERED";
  - the ME message store shall be empty;
  - the ME shall be connected to the USIM simulator. The following shall be present in the USIM simulator:
    - EF_{SMS} with at least two free records and one full record;
    - EF_{SMSS}, with SMS "Memory Cap. Exceed" notification flag set to "memory available";
    - Service no. 10 (SMS) in EF_{UST} set to allocated and activated;
    - for storing of Class 1 Short Messages the UE shall be set up to store Short Messages in the ME memory (by way of MMI, as described in ICS/IXIT statement).

Related ICS/IXIT Statements

Support for Short message MT/PP.

The value of timer TC1M.

Whether SMS messages are stored in the USIM and/or the ME.

Test procedure

a) The SS delivers a Short Message of class 2 to the UE as specified in clause 16.2.1, step b).

b) Following an attempt by the ME to store the short message in a free record of EF_{SMS} in the USIM, the USIM simulator returns the status response "OK" ("90 00").

c) Step a) is repeated.

d) Following an attempt by the ME to store the short message in a free record of EF_{SMS} in the USIM, the USIM simulator returns the status response "memory problem" ("92 40").

e) The USIM simulator indicates if an attempt was made in steps a) and c) to store the messages and if the messages are stored according to the requirement.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
2	-->		SERVICE REQUEST	

Step	Direction		Message	Comments
	UE	SS		
3	<--		AUTHENTICATION AND CIPHERING REQUEST	
4	-->		AUTHENTICATION AND CIPHERING RESPONSE	
5	<--		SECURITY MODE COMMAND	
6	-->		SECURITY MODE COMPLETE	
7	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 2 Short Message
8	-->		CP-ACK	
9	ME			The ME shall correctly store the short message in a free record of EFSMS in the USIM, i.e. - the ME shall use a free record - the first byte of the record shall indicate "message received by UE from network" - the TS-Service-Centre-Address shall be correctly stored - the TPDU shall be identical to that sent by the SS - bytes following the TPDU shall be set to "FF"
10	USIM			The USIM simulator returns the status response "OK" ("90 00"). The USIM simulator shall indicate if an attempt was made by the ME to store the short message in the USIM.
11	-->		CP-DATA	Contains RP-ACK RPDU.
12	<--		CP-ACK	
13	<--		RRC CONNECTION RELEASE	
14	-->		RRC CONNECTION RELEASE COMPLETE	
15			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
16	-->		SERVICE REQUEST	
17	<--		AUTHENTICATION AND CIPHERING REQUEST	
18	-->		AUTHENTICATION AND CIPHERING RESPONSE	
19	<--		SECURITY MODE COMMAND	
20	-->		SECURITY MODE COMPLETE	
21	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), Class 2 Short Message
22	-->		CP-ACK	
23	ME			The ME shall attempt to store the short message in a free record of EFSMS in the USIM.
24	USIM			The USIM simulator returns the status response "memory problem" ("92 40"). The USIM simulator shall indicate if an attempt was made by the ME to store the short message in the USIM.
25	-->		CP-DATA	Contains RP-ERROR RPDU with error cause "protocol error, unspecified" if the UE supports storing of short messages in the ME, or error cause "memory capacity exceeded" if not.
26	<--		CP-ACK	
27	<--		RRC CONNECTION RELEASE	
28	-->		RRC CONNECTION RELEASE COMPLETE	

Specific Message Contents

SMS-DELIVER TPDU (containing a class 2 message) (SS to UE)

Information element	Comment Value	
TP-DCS	default alphabet, class 2	"1111 0010"B

16.2.5.3.5 Test requirements

After step 10 UE shall confirm that the short message is stored in the USIM and send CP-DATA containing RP-ACK RPDU.

After step 24 UE shall confirm that the short message cannot be stored in the USIM and send CP-DATA containing RP-ERROR RPDU. If UE supports storing of short message in the ME, the error cause of RP-ERROR RPDU shall be "protocol error, unspecified", and if not the error cause of RP-ERROR RPDU shall be "memory capacity exceeded"

16.2.5.4 Test of class 3 short messages

For further study.

16.2.6 Test of short message type 0 (R99 and REL-4 UE)

16.2.6.1 Definition and applicability

This tests that the UE correctly acknowledges the receipt of the short message type 0 to the SC in Packet Switched mode. It is highly recommended that the UE discards the contents of the short message type 0.

This test shall apply to all R99 and REL-4 UEs supporting receipt of short messages in PS mode.

16.2.6.2 Conformance requirement

When a mobile terminated message is type 0, the UE shall acknowledge receipt of the short message to the SC but may discard its contents.

Note: It is highly recommended that the UE discards the type 0 short message. This means that the UE is able to receive the type 0 short message irrespective of whether there is memory available in the (U)SIM or ME or not, the UE does not indicate the receipt of the type 0 short message to the user, and the message is not stored in the (U)SIM or ME.

Reference(s)

3GPP TS 23.040, 9.2.3.9.

16.2.6.3 Test purpose

To verify that the UE will acknowledge receipt of the short message to the SC. The UE should discard its contents.

NOTE: failure of this test in a UE could cause it to reject a type 0 message when the network is trying to reach the UE. This could lead to unwanted repetitions between the UE and the service centre.

16.2.6.4 Method of test

Initial conditions

System Simulator:

1 cell, default parameters.

User Equipment:

the UE shall be in GMM-state "GMM-REGISTERED";

Related ICS/IXIT Statements

Support for Short Message MT/PP.

The value of timer TC1M.

Foreseen Final State of UE

Idle, updated.

Test Procedure

The SS sends a type 0 message by using the method described in step a) of section 16.2.1 but with the TPDU described in this section.

Maximum Duration of Test

1 minute

Expected Sequence

Step	Direction		Message	Comments
	UE	SS		
1			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
2	-->		SERVICE REQUEST	
3	<--		AUTHENTICATION AND CIPHERING REQUEST	
4	-->		AUTHENTICATION AND CIPHERING RESPONSE	
5	<--		SECURITY MODE COMMAND	
6	-->		SECURITY MODE COMPLETE	
7	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), type 0 Short Message
8	-->		CP-ACK	
9	-->		CP-DATA	Contains RP-ACK TP-Protocol-Identifier (TP-PID).
10	<--		CP-ACK	
11	<--		RRC CONNECTION RELEASE	
12	-->		RRC CONNECTION RELEASE COMPLETE	
13	UE			It is highly recommended that the UE discards the type 0 short message. This means that the UE is able to receive the type 0 short message irrespective of whether there is memory available in the (U)SIM or ME or not, the UE does not indicate the receipt of the type 0 short message to the user, and the message is not stored in the (U)SIM or ME.

Specific Message Contents:

SMS-DELIVER TPDU (containing a type 0 message) (SS to UE):

Information element	Comment Value
TP-MTI	SMS-DELIVER "00"B
TP-MMS	more messages are waiting in SC "0"B
TP-RP	no reply path "0"B
TP-UDHI	TP-UD contains only the SM"0"B
TP-SRI	no status report returned 0
TP-OA	an international number coded E.164
TP-PID	Type 0: "01000000"B
TP-DCS	default alphabet "0000 0000"B
TP-SCTS	any legal value (cf. 3GPP TS 23.040)
TP-UDL	160
TP-UD (140 octets)	text of message (160 characters)

16.2.6a Test of short message type 0 (≥ REL-5 UE)

16.2.6a.1 Definition and applicability

This tests that the UE correctly acknowledges the receipt of the short message type 0 to the SC in Packet Switched mode. The UE discards the contents of the short message type 0.

This test shall apply to all ≥ REL-5 UEs supporting receipt of short messages in PS mode.

16.2.6a.2 Conformance requirement

When a mobile terminated message is type 0, the UE shall acknowledge receipt of the short message to the SC but shall discard its contents. This means that

- the UE shall be able to receive the type 0 short message irrespective of whether there is memory available in the (U)SIM or ME or not,
- the UE shall not indicate the receipt of the type 0 short message to the user,
- the short message shall neither be stored in the (U)SIM nor ME.

References

3GPP TS 23.040 9.2.3.2, 9.2.3.4, 9.2.3.7, 9.2.3.9, 9.2.3.10, 9.2.3.11, 9.2.3.16, 9.2.3.17, 9.2.3.23.

16.2.6a.3 Test purpose

To verify that the UE will acknowledge receipt of the short message to the SC. The UE shall discard its contents. This means that

- the UE shall be able to receive the type 0 short message irrespective of whether there is memory available in the (U)SIM or ME or not,
- the UE shall not indicate the receipt of the type 0 short message to the user,
- the short message shall neither be stored in the (U)SIM nor ME.

NOTE: failure of this test in a UE could cause it to reject a type 0 message when the network is trying to reach the UE. This could lead to unwanted repetitions between the US and the service centre. In addition service affecting restrictions could happen to the customer.

16.2.6a.4 Method of test

Initial conditions

System Simulator:

1 cell, default parameters.

User Equipment:

the UE shall be in GMM-state "GMM-REGISTERED";

the ME- and (U)SIM message store shall be empty.

Related ICS/IXIT Statements

Support for Short Message MT/PP.

The value of timer TC1M.

Foreseen Final State of UE

Idle, updated.

Test Procedure

a) The SS sends a type 0 short message by using the method described in step a) of clause 16.2.1 but with the TPDU described in this section.

b) The ME- and (U)SIM short message store shall be filled (for example by using the method of clause 16.2.3 test of the memory available notification).

c) The SS sends a type 0 short message as in step a).

Maximum Duration of Test

5 minutes

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
2	-->		SERVICE REQUEST	
3	<--		AUTHENTICATION AND CIPHERING REQUEST	
4	-->		AUTHENTICATION AND CIPHERING RESPONSE	
5	<--		SECURITY MODE COMMAND	
6	-->		SECURITY MODE COMPLETE	
7	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), type 0 Short Message
8	-->		CP-ACK	
9	-->		CP-DATA	Contains RP-ACK RPDU.
10	<--		CP-ACK	
11	<--		RRC CONNECTION RELEASE	
12	-->		RRC CONNECTION RELEASE COMPLETE	
13	UE			The UE shall discard the type 0 short message. This means that the UE does not indicate the receipt of the type 0 short message to the user. The UE shall not store the message in the (U)SIM or ME. This can be checked by verifying that it is impossible to retrieve any short messages from the ME- and (U)SIM message store.
14	SS			The ME- and (U)SIM message store shall be filled (for example by using the method of 16.1.3).
15			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
16	-->		SERVICE REQUEST	
17	<--		AUTHENTICATION AND CIPHERING REQUEST	
18	-->		AUTHENTICATION AND CIPHERING RESPONSE	
19	<--		SECURITY MODE COMMAND	
20	-->		SECURITY MODE COMPLETE	
21	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU), type 0 Short Message
22	-->		CP-ACK	
23	-->		CP-DATA	Contains RP-ACK RPDU.
24	<--		CP-ACK	
25	<--		RRC CONNECTION RELEASE	
26	-->		RRC CONNECTION RELEASE COMPLETE	
27	UE			The UE shall discard the type 0 short message. This means that the UE does not indicate the receipt of the type 0 short message to the user. The UE shall not store the message in the (U)SIM or ME. This can be checked by verifying that it is impossible to retrieve any short messages from the ME- and (U)SIM message store.

Specific Message Contents:

SMS-DELIVER TPDU (containing a type 0 message) (SS to UE):

Information element	Comment Value	
TP-MTI	SMS-DELIVER	"00"B
TP-MMS	more messages are waiting in SC	"0"B
TP-RP	no reply path	"0"B
TP-UDHI	TP-UD contains only the SM	"0"B
TP-SRI	no status report returned	"0"B
TP-OA	an international number coded E.164	
TP-PID	Type 0:	"01000000"B
TP-DCS	default alphabet	“0000 0000"B
TP-SCTS	any legal value (cf. 3GPP TS 23.040)	
TP-UDL		160
TP-UD (140 octets)	text of message (160 characters)	

16.2.6a.5 Test requirements

After step 9 (ME- and (U)SIM message store not filled) UE shall send CP-DATA containing RP-ACK RPDU (TP-Protocol-Identifier: type 0 Short Message).

After step 13 UE shall discard the type 0 short message (it is impossible to retrieve any short messages from the ME- and (U)SIM message store).

After step 23 (ME- and (U)SIM message store filled) UE shall send CP-DATA containing RP-ACK RPDU (TP-Protocol-Identifier: type 0 Short Message).

After step 27 UE shall discard the type 0 short message (it is impossible to retrieve any short messages from the ME- and (U)SIM message store).

16.2.7 Test of the replace mechanism for SM type 1-7

16.2.7.1 Definition

16.2.7.2 Conformance requirement

On receipt of a short message, the UE shall check to see if the associated Protocol Identifier contains a Replace Short Message Type code. If such a code is present, then the UE will check the associated originating address (TP-OA) and replace any existing stored message having the same Protocol Identifier code and originating address with the new short message.

References

3GPP TS 23.040 clause 9.2.3.2, 9.2.3.9.

16.2.7.3 Test purpose

This procedure verifies the correct implementation of the replace mechanism for Replace Short Messages.

16.2.7.4 Method of test

Initial conditions

- System Simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in GMM-state "GMM-REGISTERED";
  - the UE message store shall be empty.

Related ICS/IXIT Statements

Support for Short message MT/PP.

The value of timer TC1M.

Test procedure

a) Two different numbers n and m are drawn randomly between 1 and 7. Two different addresses for TP-Originating-Address (TPOA1 and TPOA2) are drawn.

b) The SS delivers a short message to the UE as specified in clause 16.2.1 step a). In the SMS-DELIVER TPDU, the TP-Protocol-Identifier parameter is "Replace Short Message Type n", the TP-Originating-Address is TPOA1, and the RP-Originating-Address is RPOA.

c) Step b) is repeated but with a different TP-Originating-Address (TPOA2), and different contents of TP-User-Data in the SMS-DELIVER TPDU. The other parameters are the same as in step b).

d)

e) Step c) is repeated but with the TP-Protocol-Identifier equal to "Replace Short Message Type m", and contents of TP-User-Data different from the former two messages. The other parameters are the same as in step c).

f) Step e) is repeated but the contents of TP-User-Data are different from that used in step e).

g) The SS prompts the operator to indicate the Short Messages stored in the UE.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
2	-->		SERVICE REQUEST	
3	<--		AUTHENTICATION AND CIPHERING REQUEST	
4	-->		AUTHENTICATION AND CIPHERING RESPONSE	
5	<--		SECURITY MODE COMMAND	
6	-->		SECURITY MODE COMPLETE	
7	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) TP-PID is "Replace Short Message Type n", TP-OA is TPOA1 and RP-OA is RPOA
8	-->		CP-ACK	
9	-->		CP-DATA	Contains RP-ACK RPDU.
10	<--		CP-ACK	
11	<--		RRC CONNECTION RELEASE	
12	-->		RRC CONNECTION RELEASE COMPLETE	
13			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
14	-->		SERVICE REQUEST	
15	<--		AUTHENTICATION AND CIPHERING REQUEST	
16	-->		AUTHENTICATION AND CIPHERING RESPONSE	
17	<--		SECURITY MODE COMMAND	
18	-->		SECURITY MODE COMPLETE	
19	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) TP-PID is "Replace Short Message Type n", TP-OA is TPOA2 and RP-OA is RPOA1, TP-UD different from step 7
20	-->		CP-ACK	
21	-->		CP-DATA	Contains RP-ACK RPDU.
22	<--		CP-ACK	
23	<--		RRC CONNECTION RELEASE	
24	-->		RRC CONNECTION RELEASE COMPLETE	

Step	Direction		Message	Comments
	UE	SS		
25			(void)	
26			(void)	
27			(void)	
28			(void)	
29			(void)	
30			(void)	
31			(void)	
32			(void)	
33			(void)	
34			(void)	
35			(void)	
36			(void)	
37			(void)	See 3GPP TS34.108
38	-->		SERVICE REQUEST	
39	<--		AUTHENTICATION AND CIPHERING REQUEST	
40	-->		AUTHENTICATION AND CIPHERING RESPONSE	
41	<--		SECURITY MODE COMMAND	
42	-->		SECURITY MODE COMPLETE	
43	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) TP-PID is "Replace Short Message Type m", TP-OA is TPOA2 and RP-OA is RPOA, TP-UD different from step 7 and 19
44	-->		CP-ACK	
45	-->		CP-DATA	Contains RP-ACK RPDU.
46	<--		CP-ACK	
47	<--		RRC CONNECTION RELEASE	
48	-->		RRC CONNECTION RELEASE COMPLETE	
49			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
50	-->		SERVICE REQUEST	
51	<--		AUTHENTICATION AND CIPHERING REQUEST	
52	-->		AUTHENTICATION AND CIPHERING RESPONSE	
53	<--		SECURITY MODE COMMAND	
54	-->		SECURITY MODE COMPLETE	
55	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) TP-PID is "Replace Short Message Type m", TP-OA is TPOA2 and RP-OA is RPOA, TP-UD different from step 43
56	-->		CP-ACK	
57	-->		CP-DATA	Contains RP-ACK RPDU.
58	<--		CP-ACK	
59	<--		RRC CONNECTION RELEASE	
60	-->		RRC CONNECTION RELEASE COMPLETE	
61	SS			Prompts the operator to indicate the Short Messages stored in the UE. Only the Short Messages delivered in step 7, 19 and 55 shall be retrievable and indicated

Specific Message Contents

SMS-DELIVER TPDU

Information element	Comment Value
TP-MMS	no more messages are waiting in SC "1"B
TP-PID	binary 01000xxx, xxx represents n resp. m (see test method description)

16.2.7.5 Test requirements

After step 61 only the Short Messages delivered in step 7, 19 and 55 shall be retrieved and indicated.

16.2.8 Test of the reply path scheme

16.2.8.1 Definition

16.2.8.2 Conformance requirement

When a replying UE receives an original mobile terminated short message it has:

- originating SME = TP-Originating Address in the SMS-DELIVER TPDU;
- original SC = RP-Originating Address in the RP-MT-DATA.

When submitting the reply mobile originated short message, the replying UE should use parameters as follows:

- TP-Destination Address in SMS-SUBMIT TPDU = originating SME;
- RP-Destination Address in RP-MO-DATA = original SC.

References

3GPP TS 23.040 3.2.10, 9.2.3.2, 9.2.3.17, Annex D clauses D.5 and D.6.

NOTE: Annex D of 3GPP TS 23.040 is only informative.

16.2.8.3 Test purpose

This procedure verifies that the UE is able to send a Reply Short Message back to the correct originating SME even if in the meantime it receives another Short Message.

16.2.8.4 Method of test

Initial conditions

- System Simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in GMM-state "GMM-REGISTERED";
  - the UE message store shall be empty.

Related ICS/IXIT Statements

Support for Short message MT/PP.

Support for Short message MO/PP.

The value of timer TC1M.

Test procedure

a) The SS delivers a Short Message as specified in clause 16.2.1, step b) with TP-Reply-Path set to 1.

b) Step a) is repeated but with:
   - different TP-Originating-Address for the originating SME;
   - different RP-Originating-Address for the original SC; and
   - different message contents TP-User-Data.

c) UE sends the Reply Short Message corresponding to one of two received Short Messages (e.g. by means of the MMI).

d) step c) is repeated for the other Short Message.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
2	-->		SERVICE REQUEST	
3	<--		AUTHENTICATION AND CIPHERING REQUEST	
4	-->		AUTHENTICATION AND CIPHERING RESPONSE	
5	<--		SECURITY MODE COMMAND	
6	-->		SECURITY MODE COMPLETE	
7	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) TP-RP set to 1
8	-->		CP-ACK	Sent within TC1M after step 7
9	-->		CP-DATA	Contains RP-ACK RPDU.
10	<--		CP-ACK	
11	<--		RRC CONNECTION RELEASE	
12	-->		RRC CONNECTION RELEASE COMPLETE	
13			Mobile terminated establishment of Radio Resource Connection	See 3GPP TS34.108
14	-->		SERVICE REQUEST	
15	<--		AUTHENTICATION AND CIPHERING REQUEST	
16	-->		AUTHENTICATION AND CIPHERING RESPONSE	
17	<--		SECURITY MODE COMMAND	
18	-->		SECURITY MODE COMPLETE	
19	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU) TP-OA, RP-OA and TP-UD different from step 7
20	-->		CP-ACK	Sent within TC1M after step 7
21	-->		CP-DATA	Contains RP-ACK RPDU.
22	<--		CP-ACK	
23	<--		RRC CONNECTION RELEASE	
24	-->		RRC CONNECTION RELEASE COMPLETE	
25	UE			UE establishes the RRC connection in order to send the Reply Short Message corresponding to one of two received Short Messages
26	<--		SYSTEM INFORMATION	BCCH
27	-->		RRC CONNECTION REQUEST	CCCH
28	<--		RRC CONNECTION SETUP	CCCH
29	-->		RRC CONNECTION SETUP COMPLETE	DCCH
30	-->		SERVICE REQUEST	
31	<--		AUTHENTICATION AND CIPHERING REQUEST	
32	-->		AUTHENTICATION AND CIPHERING RESPONSE	
33	<--		SECURITY MODE COMMAND	
34	-->		SECURITY MODE COMPLETE	
35	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU) RP-DA = RP-OA corresponding to the message TP-DA = TP-OA corresponding to the message
36	<--		CP-ACK	Sent within TC1M after step 35
37	<--		CP-DATA	Contains RP-ACK RPDU
38	SS			Waits max 25 s for CP-ACK
39	-->		CP-ACK	
40	<--		RRC CONNECTION RELEASE	RRC connection is released.
41	-->		RRC CONNECTION RELEASE COMPLETE	

Step	Direction		Message	Comments
	UE	SS		
42	UE			UE establishes the RRC connection in order to send the Reply Short Message corresponding to other Short Message.
43	<--		SYSTEM INFORMATION	BCCH
44	-->		RRC CONNECTION REQUEST	CCCH
45	<--		RRC CONNECTION SETUP	CCCH
46	-->		RRC CONNECTION SETUP COMPLETE	DCCH
47	-->		SERVICE REQUEST	
48	<--		AUTHENTICATION AND CIPHERING REQUEST	
49	-->		AUTHENTICATION AND CIPHERING RESPONSE	
50	<--		SECURITY MODE COMMAND	
51	-->		SECURITY MODE COMPLETE	
52	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU) RP-DA = RP-OA corresponding to the Message TP-DA = TP-OA corresponding to the message
53	<--		CP-ACK	Sent within TC1M after step 52
54	<--		CP-DATA	Contains RP-ACK RPDU
55	SS			Waits max 25 s for CP-ACK
56	-->		CP-ACK	
57	<--		RRC CONNECTION RELEASE	RRC connection is released.
58	-->		RRC CONNECTION RELEASE COMPLETE	

Specific Message Contents

SMS-DELIVER TPDU

Information element	Comment Value
TP-MMS	no more messages are waiting in SC "1"B
TP-RP	Reply Path exists "1"B

16.2.8.5 Test requirements

After step 35 UE shall send the Reply Short Message corresponding to one of two previously received short messages.

After step 52 UE shall send the Reply Short Message corresponding to the other of two previously received short messages.

16.2.9 Multiple SMS mobile originated

16.2.9.1 UE in idle mode

This test is not applicable for R99.

16.2.9.2 UE in active mode

This test is not applicable for R99.

16.2.10 Test of capabilities of simultaneously receiving a short message whilst sending a mobile originated short message

16.2.10.1 Definition

16.2.10.2 Conformance requirements

An active UE shall be able to receive a short message TPDU (SMS-DELIVER) at any time, independently of whether or not there is an SMS mobile originated call (SMS-SUBMIT or SMS-COMMAND) in progress.

References

3GPP TS 23.040 clause 3.1, 9.2.3.16.

3GPP TS 24.011 clause 3.2.

16.2.10.3 Test purpose

The test verifies that the UE is capable of simultaneously receiving a network originated SM whilst sending a mobile originated SM.

16.2.10.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.
- User Equipment:
  - the UE shall be in GMM-state "GMM-REGISTERED";
  - the SMS message storage shall be empty.

Related ICS/IXIT Statements

Support for Short message MO/PP and MT/PP.

Support for state PDP-ACTIVE of session management.

The value of timer TC1M.

Whether SMS messages are stored in the USIM and/or the ME.

Test procedure

a) The SS is configured to receive a mobile originated SM. In clause 16.2.2 steps a) and b) are repeated and, using the end of the CP-DATA message from the UE as a trigger, the SS sends a SM to the UE. In this case a new transaction identifier shall be used in the CP messages of SMS mobile terminated.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1	UE			The UE is set up to send an SM
2		SS		The SS verifies that the IE “Establishment cause” in the received RRC CONNECTION REQUEST message is set to “Originating Low Priority Signalling”.
3			(void)	
4			(void)	
5	-->		SERVICE REQUEST	
6	<--		AUTHENTICATION AND CIPHERING REQUEST	
7	-->		AUTHENTICATION AND CIPHERING RESPONSE	
8		SS		The SS starts integrity protection
9				
10	-->		CP-DATA	Contains RP-DATA RPDU (SMS SUBMIT TPDU)
11		SS		The SS sends an SM to the UE triggered by the end of the CP-DATA message from the UE
12	<--		CP-DATA	Contains RP-DATA RPDU (SMS DELIVER TPDU)

Step	Direction		Message	Comments
	UE	SS		
13	UE			The UE shall correctly receive the SM and indicate that a message has arrived. In the MO case the UE shall send the CP-ACK message with transaction identifier assigned to this transfer. In the MT case the UE shall send a CP-ACK message and a CP-DATA message containing the RP-ACK RPDU. The transaction identifier shall be the same as chosen by the SS for the MT transfer.
NOTE: Time values for SS wait times are chosen sufficiently high to be sure that the UE has enough time to respond to the different messages.				

Specific Message Contents

SMS SUBMIT TPDU

Information element	Comment Value
TP-UDL	as applicable
TP-UD (140 octets)	160 ASCII characters

16.2.10.5 Test requirements

After step 12 UE shall correctly receive the SM and indicate that a message has arrived.

16.3 Short message service cell broadcast

16.3.1 Definition

16.3.2 Conformance requirements

In idle mode, the UE has the ability to ignore repeated broadcasts of CBS messages already received (the message has not changed since it was last broadcast i.e. sequence number has not changed within the message's indicated geographical area);

A UE supporting Cell Broadcast Service (CBS) shall be capable to receive BMC messages in the Idle mode.

References

- 3GPP TS 23.041 clause 8.
- 3GPP TS 25.324 clause 11.

16.3.3 Test purpose

This test verifies that an UE supporting SMS-CB is able to receive SMS-CB messages and is able to ignore repeated broadcasts of CBS messages.

16.3.4 Method of test

Initial conditions

- System Simulator:
  - 1 cell, default parameters;
  - the SS provides a BCCH/CCCH to support the UE in idle mode;
  - periodic location updating is disabled.
- User Equipment:
  - the UE shall be in the idle updated state.

Related ICS/IXIT Statements

Support for short message transmission cell broadcast.

Test procedure

Three Cell Broadcast (CB) messages are sent by the SS on the CTCH with message codes 0,1,1 in serial number fields respectively.

NOTE: If the UE fails the test because of a failure to receive the message due to collision of CTCH and paging occasion, then the operator may re-run the test.

Expected sequence

Since the SMS-CB messages are sent continuously, a table is not applicable in this test.

Specific Message Contents:

Use the default parameter values for the system information block 1 with the same type specified in clause 6.1.0b of TS 34.108, with the following exceptions:

- CN domain identity		PS
- CHOICE CN Type		GSM-MAP
- CN domain specific NAS system information		
- GSM-MAP NAS system information		05 00H
- CN domain specific DRX cycle length coefficient		9
- CN domain identity		CS
- CHOICE CN Type		GSM-MAP
- CN domain specific NAS system information		
- GSM-MAP NAS system information		1E 01H
- CN domain specific DRX cycle length coefficient		9

Use the default parameter values for the system information block 5 with the same type specified in clause 6.1.0b of TS 34.108, with the following exceptions:

- FACH/PCH information	
- TFS	(PCH)
- CHOICE Transport channel type	Common transport channels
- Dynamic Transport format information	
- RLC Size	240
- Number of TB and TTI List	
- Number of Transport blocks	0
- Number of Transport blocks	1
- CHOICE Logical channel List	ALL
- Semi-static Transport Format information	
- Transmission time interval	10 ms
- Type of channel coding	Convolutional
- Coding Rate	1/2
- Rate matching attribute	230
- CRC size	16 bit
- Transport channel Identity	12 (for PCH)
- CTCH indicator	FALSE
- TFS	(FACH)
- CHOICE Transport channel type	Common transport channels
- Dynamic Transport format information	
- RLC Size	168
- Number of TB and TTI List	
- Number of Transport blocks	0
- Number of Transport blocks	1
- Number of Transport blocks	2
- CHOICE Logical channel List	ALL
- Semi-static Transport Format information	
- Transmission time interval	10 ms
- Type of channel coding	Convolutional
- Coding Rate	1/2
- Rate matching attribute	220
- CRC size	16 bit

- Transport channel Identity	13 (for FACH)
- CTCH indicator	TRUE
- TFS	(FACH)
- CHOICE Transport channel type	Common transport channels
- Dynamic Transport format information	
- RLC Size	360
- Number of TB and TTI List	
- Number of Transport blocks	0
- Number of Transport blocks	1
- CHOICE Logical channel List	ALL
- Semi-static Transport Format information	
- Transmission time interval	10 ms
- Type of channel coding	Turbo
- Rate matching attribute	130
- CRC size	16bit
- Transport channel Identity	14 (for FACH)
- CTCH indicator	FALSE
- PICH info	
- CHOICE mode	FDD
- Channelisation code	2
- Number of PI per frame	18
- STTD indicator	FALSE
- CBS DRX Level 1 information	
- Period of CTCH allocation (N)	2
- CBS frame offset (K)	0

Cell broadcast test message content

Information element	Comment Value
Message Type	CBS Message "1"B (see 3GPP TS 25.324, clause 11.1)
Message ID	
Serial Number	
- Geographical scope	"01"B
- Message code	see test procedure "0000000000"B or "0000000001"B
- Update number	as applicable
Data Coding Scheme	Default alphabet, English "00000001"B
CB Data	max 1246 octets

16.3.5 Test requirements

In consequence of test the UE shall ignore third message and store two messages.

16.3a Short message service cell broadcast Discontinuous Reception (DRX)

16.3a.1 Definition

16.3a.2 Conformance requirements

A UE supporting Cell Broadcast Service (CBS) shall be capable to receive BMC messages in the Idle mode.

In idle mode, the UE will enter CBS DRX mode based upon received Schedule Messages.

References

- 3GPP TS 25.324 clause 9.1.
- 3GPP TS 23.041 clause 8.

16.3a.3 Test purpose

This test verifies that a UE supporting SMS-CB and SMS-CB DRX is able to receive SMS-CB messages in DRX..

16.3a.4 Method of test

Initial conditions

- System Simulator:
  - 1 cell, default parameters;
  - the SS provides a BCCH/CCCH to support the UE in idle mode;
  - Cell Broadcast Service DRX is enabled.
  - periodic location updating is disabled.
- User Equipment:
  - the UE shall be in the idle updated state.
  - the UE shall be configured, not to opt-out of presentation of Cell Broadcast messages with Message ID 4371 and 4379.

Related ICS/IXIT Statements

Support for short message transmission cell broadcast.

Support for short message transmission cell broadcast DRX.

Test procedure

a) The SS sends CELL BROADCAST SCHEDULE #1 message (1 CTCH-BS) on the CTCH.

b) The SS waits for 6 CTCH-BS after Step a), then sends CELL BROADCAST TEST #1 message (3 CTCH-BS), followed by CELL BROADCAST SCHEDULE #2 message (1 CTCH-BS). (Note 1)

c) The SS waits for 9 CTCH-BS after Step b), then sends CELL BROADCAST SCHEDULE#3 message (1 CTCH-BS), followed by CELL BROADCAST TEST #2 message (3 CTCH-BS). (Note 2)

d) The SS waits for 10 CTCH-BS after Step c), then sends CELL BROADCAST TEST #3 message (3 CTCH-BS). (Note 3)

NOTE 1: CELL BROADCAST TEST#1 and CELL BROADCAST SCHEDULE #2 are situated at the beginning of the Scheduling period referred to by CELL BROADCAST SCHEDULE #1.

NOTE 2: CELL BROADCAST SCHEDULE #3 and CELL BROADCAST TEST#2 and are situated in the middle of the Scheduling period referred to by CELL BROADCAST SCHEDULE #2.

NOTE 3: CELL BROADCAST TEST#3 is situated at the end of the Scheduling period referred to by CELL BROADCAST SCHEDULE #3.

NOTE 4: If the UE fails the test because of a failure to receive the message due to collision of CTCH and paging occasion, then the operator may re-run the test.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1	<--		CELL BROADCAST SCHEDULE #1	
2	SS		Waits for 6 CTCH-BS	
3-4	<--		CELL BROADCAST TEST #1	
	UE		The UE shall receive the CELL BROADCAST TEST #1	
5	-->		CELL BROADCAST SCHEDULE #2	
6	SS		Waits for 9 CTCH-BS	
7	<--		CELL BROADCAST SCHEDULE #3	

Step	Direction		Message	Comments
	UE	SS		
8-9	-->		CELL BROADCAST TEST #2	
	UE		The UE shall receive the CELL BROADCAST TEST #2	
10	SS		Waits for 10 CTCH-BS	
11-12	<--		CELL BROADCAST TEST #3	
	UE		The UE shall receive the CELL BROADCAST TEST #3	

Specific Message Contents:

Use the default parameter values for the system information block 1 with the same type specified in clause 6.1.0b of TS 34.108, with the following exceptions:

Information Element	Value/remark
- CN domain identity	PS
- CHOICE CN Type	GSM-MAP
- CN domain specific NAS system information	
- GSM-MAP NAS system information	05 00H
- CN domain specific DRX cycle length coefficient	9
- CN domain identity	CS
- CHOICE CN Type	GSM-MAP
- CN domain specific NAS system information	
- GSM-MAP NAS system information	1E 01H
- CN domain specific DRX cycle length coefficient	9

Use the default parameter values for the system information block 5 with the same type specified in clause 6.1.0b of TS 34.108, with the following exceptions:

Information Element	Value/remark
- FACH/PCH information	
- TFS	(PCH)
- CHOICE Transport channel type	Common transport channels
- Dynamic Transport format information	
- RLC Size	240
- Number of TB and TTI List	
- Number of Transport blocks	0
- Number of Transport blocks	1
- CHOICE Logical channel List	ALL
- Semi-static Transport Format information	
- Transmission time interval	10 ms
- Type of channel coding	Convolutional
- Coding Rate	1/2
- Rate matching attribute	230
- CRC size	16 bit
- Transport channel Identity	12 (for PCH)
- CTCH indicator	FALSE
- TFS	(FACH)
- CHOICE Transport channel type	Common transport channels
- Dynamic Transport format information	
- RLC Size	168
- Number of TB and TTI List	
- Number of Transport blocks	0
- Number of Transport blocks	1
- Number of Transport blocks	2
- CHOICE Logical channel List	ALL
- Semi-static Transport Format information	
- Transmission time interval	10 ms
- Type of channel coding	Convolutional
- Coding Rate	1/2
- Rate matching attribute	220
- CRC size	16 bit
- Transport channel Identity	13 (for FACH)
- CTCH indicator	TRUE
- TFS	(FACH)

- CHOICE Transport channel type	Common transport channels
- Dynamic Transport format information	
- RLC Size	360
- Number of TB and TTI List	
- Number of Transport blocks	0
- Number of Transport blocks	1
- CHOICE Logical channel List	ALL
- Semi-static Transport Format information	
- Transmission time interval	10 ms
- Type of channel coding	Turbo
- Rate matching attribute	130
- CRC size	16bit
- Transport channel Identity	14 (for FACH)
- CTCH indicator	FALSE
- PICH info	
- CHOICE mode	FDD
- Channelisation code	2
- Number of PI per frame	18
- STTD indicator	FALSE
- CBS DRX Level 1 information	
- Period of CTCH allocation (N)	2
- CBS frame offset (K)	0

CELL BROADCAST SCHEDULE #1

Information element	Comment Value
Message Type	"00000010"B (Schedule message)
Offset to Begin CTCH BS index	"00000111"B
Length of CBS Scheduling Period	"00001010"B
New Message Bitmap	octet 1: “11110000”B octet 2: “00000000”B
Message Description	
- Message Description Type[1]	"00000001"B (New message)
- Message ID[1]	4370 (CMAS Presidential Alert)
- Message Description Type[2]	"00000110"B (Schedule message)

CELL BROADCAST SCHEDULE #2

Information element	Comment Value
Message Type	"00000010"B
Offset to Begin CTCH BS index	"00000111"B
Length of CBS Scheduling Period	"00001010"B
New Message Bitmap	octet 1: “00011110”B octet 2: “00000000”B
Message Description	
- Message Description Type[1]	"00000110"B (Schedule message)
- Message Description Type[2]	"00000001"B (New message)
- Message ID[2]	4371 (CMAS Imminent Threat Alert – Severity: Extreme, Urgency: Immediate, Certainty: Observed)

CELL BROADCAST SCHEDULE #3

Information element	Comment Value
Message Type	"00000010"B
Offset to Begin CTCH BS index	"00000111"B
Length of CBS Scheduling Period	"00001010"B
New Message Bitmap	octet 1: “00000001”B octet 2: “11000000”B
Message Description	
- Message Description Type[1]	"00000001"B (New message)
- Message ID[1]	4379 (CMAS Child Abduction Emergency)

CELL BROADCAST TEST #1

Information element	Comment Value
Message Type	"00000001"B (CBS message)
Message ID	4370 (CMAS Presidential Alert)
Serial Number	
- Geographical scope	"10"B (Service Area wide)
- Message code	"0000000000"B
- Update number	“0000”B
Data Coding Scheme	“00000001"B (GSM 7-bit default alphabet, English)
CB Data	90 characters i.e. 79 octets

CELL BROADCAST TEST #2

Information element	Comment Value
Message Type	"00000001"B (CBS message)
Message ID	4371 (CMAS Imminent Threat Alert – Severity: Extreme, Urgency: Immediate, Certainty: Observed)
Serial Number	
- Geographical scope	"10"B (Service Area wide)
- Message code	"0000000000"B
- Update number	“0000”B
Data Coding Scheme	“00000001"B (GSM 7-bit default alphabet, English)
CB Data	90 characters i.e. 79 octets

CELL BROADCAST TEST #3

Information element	Comment Value
Message Type	"00000001"B (CBS message)
Message ID	4379 (CMAS Child Abduction Emergency)
Serial Number	
- Geographical scope	"10"B (Service Area wide)
- Message code	"0000000000"B
- Update number	“0000”B
Data Coding Scheme	“00000001"B (GSM 7-bit default alphabet, English)
CB Data	90 characters i.e. 79 octets

16.3a.5 Test requirements

1. After Step 3 the UE shall receive the CELL BROADCAST TEST #1.
2. After Step 8 the UE shall receive the CELL BROADCAST TEST #2.
3. After Step 11 the UE shall receive the CELL BROADCAST TEST #3.

16.4 Default message contents:

16.4.1 Default message contents for SM-CP protocol

CP-DATA

Information element	Comment Value
Protocol Discriminator	SMS messages ("1001"B)
Transaction Identifier	
TIO	any value from the set {0, ..., 6}
TI flag	0
Message type	00000001
CP-User data	
length indicator	
RPDU	max 248 octets

CP-ACK

Information element	Comment Value
Transaction Identifier	
TIO	
TI flag	
Message type	00000100

CP-ERROR

Information element	Comment Value
Transaction Identifier	
TIO	
TI flag	
Message type	00010000
CP-Cause	
Cause value	see 3GPP TS 24.011, clause 8.1.4.2

16.4.2 Default message contents for SM-RP protocol

RP-DATA

Information element	Comment Value
RP-Message Type	"001"B (SS->UE) or "000"B(UE->SS)
RP-Message Reference	see 3GPP TS 24.011, clause 8.2.3
RP-Originator Address	see 3GPP TS 24.011, clause 8.2.5.1
RP-Destination Address	see 3GPP TS 24.011, clause 8.2.5.2
RP-User Data	see 3GPP TS 24.011, clause 8.2.5.3
Length indicator	
TP-DATA	max 233 octets

RP-ACK

Information element	Comment Value
RP-Message Type	"010"B (UE->SS) or "011"B(SS->UE)
RP-Message Reference	see 3GPP TS 24.011, clause 8.2.3
RP-User Data	see 3GPP TS 24.011, clause 8.2.5.3 : optional, may be present or not
RP-User Data IEI	"1000001"B
Length indicator	
TP-Data	max 232 octets

RP-ERROR

Information element	Comment Value
RP-Message Type	"100"B (UE->SS) or "101"B(SS->UE)
RP-Message Reference	see 3GPP TS 24.011, clause 8.2.3
RP-Cause	see 3GPP TS 24.011, clause 8.2.5.4
RP-User Data	see 3GPP TS 24.011, clause 8.2.5.3: optional, may be present or not
RP-User Data IEI	"1000001"B
Length indicator	
TP-Data	max 232 octets

RP-SMMA (UE->SS)

Information element	Comment Value
RP-Message Type	"110"B (UE->SS)
RP-Message Reference	see 3GPP TS 24.011, clause 8.2.3

16.4.3 Default message contents for SM-TP protocol

SMS DELIVER TPDU

Information element	Comment Value
TP-MTI	SMS DELIVER "00"B
TP-MMS	more messages are waiting in SC "0"B
TP-RP	no reply path "0"B
TP-UDHI	TP-UD contains only the SM"0"B
TP-SRI	no status report returned"0"B
TP-OA	an international number coded E.164
TP-PID	default"00000000"B
TP-DCS	default alphabet "00000000"B
TP-SCTS	any legal value (cf. 3GPP TS 23.040)
TP-UDL	
TP-UD	max 140 octets

SMS SUBMIT TPDU

Information element	Comment Value	
TP-MTI	SMS SUBMIT	"01"B
TP-RD	SC shall accept same SMS-SUBMIT	"0"B
TP-VPF	TP-VP field not present	"00"B
TP-RP	no reply path	"0"B
TP-UDHI	TP-UD contains only the SM	"00"B
TP-SRR	no request of status report	"00"B
TP-MR		
TP-DA	an international number coded E164	
TP-PID	default	"00000000"B
TP-DCS	default alphabet	"00000000"B
TP-VP		
TP-UDL		
TP-UD	max 140 octets	

SMS COMMAND TPDU

Information element	Comment Value	
TP-MTI	SMS-COMMAND	"10"B
TP-UDHI	TP-UD contains only the SM	"00"B
TP-SRR	status report not requested	"0"B
TP-MR		
TP-PID	default	"00000000"B
TP-CT		
TP-MN		
TP-DA	an international number coded E164	
TP-CDL		
TP-CD		

SMS STATUS REPORT TPDU

Information element	Comment Value
TP-MTI	SMS-STATUS-REPORT"10"B
TP-MMS	no more messages "1"B
TP-SRQ	result of SMS-SUBMIT "0"B
TP-MR	
TP-RA	the destination address of the previous SM MO
TP-SCTS	any legal value (cf. 3GPP TS 23.040, clause 9.2.3.11)
TP-DT	any legal value (cf. 3GPP TS 23.040, clause 9.2.3.13)
TP-ST	see 3GPP TS 23.040, clause 9.2.3.15

17 Specific features

17.1 Test of autocalling restrictions

17.1.1 General

It is essential that all autocalling apparatus is prevented from continuously dialling a given number, to avoid machines repeatedly disturbing PSTN subscribers in error, or numerous repeat attempts to unobtainable numbers which cause waste of valuable network resources. Therefore autocalling restrictions are defined by TS 22.001.

The tests shall be performed using all of the call methods specified by the supplier in the IXIT statement TS 34.123-2. The supplier shall state any autocalling procedures implemented and how many times they can be repeated to a single number and the minimum re-attempt interval(s), i.e. the complete re-try schedule or algorithm with parameter values. The supplier shall further describe any automatic methods for making repeated calls to a single number. The supplier shall also state in the IXIT statement the number of B-party numbers that can be stored on the list of blacklisted numbers as described in TS 22.001, annex E.

For an external R-interface the supplier shall state in the IXIT statement the procedure for autocalling restrictions for that interface and the possible parameter settings for the number of times the LTE can make a re-attempt and the minimum accepted time between re-attempts accepted by the UE. The conditions for clearing the autocalling constraints shall be stated in the IXIT statement.

For external interfaces the LTE must be programmed so that it clearly attempts to violate the autocalling constraints.

For all the tests in this clause the call setup procedure uses the Generic Setup Procedure for Circuit Switched connection as specified in TS 34.108 clause 7. A Radio Access Bearer to set up shall be selected from one of the speech or CS data bearers within the capability of the UE as specified in the ICS statement. Unless otherwise indicated, this procedure shall only run to the transmission by the SS or UE of the SETUP message (CC).

17.1.2 Constraining the access to a single number (TS 22.001 category 3)

17.1.2.1 Definition

This test checks that when an auto-dialled call to a B-party number fails due to a category 3 cause, only one retry to that number is permitted.

During this test the SETUP messages shall contain the same B-party number.

No manual intervention shall be performed except to initiate and end the test.

17.1.2.2 Conformance requirement

A repeat call attempt may be made when a call attempt is unsuccessful for the reasons listed below (as defined in TS 24.008).

These reasons are classified in three major categories:

1. "Busy destination";
2. "Unobtainable destination - temporary";
3. "Unobtainable destination - permanent/long term".

NOTE: Cause values for each category are defined in TS 22.001, annex E.

The table below describes a repeat call restriction pattern to any B number. This pattern defines a maximum number (n) of call repeat attempts; when this number n is reached, the associated B number shall be blacklisted by the UE until a manual re-set at the UE is performed in respect of that B number. When a repeat attempt to any one B number fails, or is blacklisted, this does not prevent calls being made to other B numbers.

For the categories 1 and 2 above, n shall be 10; for category 3, n shall be 1.

Call attempt	Minimum duration between call attempts
Initial call attempt	-
1st repeat attempt	5 s
2nd repeat attempt	1 min
3rd repeat attempt	1 min
4th repeat attempt	1 min
5th repeat attempt	3 min
.	
.	
nth repeat attempt	3 min

Reference:

3GPP TS 22.001 annex E.

17.1.2.3 Test purpose

To ensure the correct behaviour of the UE to TS 22.001 Category 3.

17.1.2.4 Method of test

Initial condition.

There shall be no numbers in the list of blacklisted numbers in the UE. The time set between the first re-attempt and the next re-attempt is set to the minimum value possible. The number of re-attempts is set to the lowest possible number, greater than 1, that is supported by the UE. The autocalling function is invoked for the B-party number to be used during the test.

Related ICS/IXIT Statement(s)

ICS: TBD.

IXIT: Description of auto calling management:

- selection of the auto calling;
- indication that the call failed and a re-try is attempted;
- indication that a call finally failed.

Test Procedure

Step	Direction		Message	Comments
	UE	SS		
1	UE			"called number" entered
2	→		GENERIC SETUP PROCEDURE MOBILE ORIGINATED, CS (Up to SETUP)	Establishment cause indicates "originating call".
3	←		RELEASE COMPLETE	Cause value from category 3 of TS 22.001, Annex E.
4	←		RRC CONNECTION RELEASE	
5	→		RRC CONNECTION RELEASE COMPLETE	The signalling link is released
6				The UE is invoking the auto calling function. The time between step 4 and 7 must be minimum 5 sec.
7	→		GENERIC SETUP PROCEDURE MOBILE ORIGINATED, CS (Up to SETUP)	Establishment cause indicates "originating call".
8	←		RELEASE COMPLETE	Cause value from category 3 of TS 22.001, Annex E.
9	←		RRC CONNECTION RELEASE	
10	→		RRC CONNECTION RELEASE COMPLETE	The main signalling link is released
11	UE			Clear the auto calling constraint after a minimum of 2 minutes from step 9.

17.1.2.5 Test requirements

The time between step 4 and 7 must be minimum 5 s.

No further call attempt shall be made after step 9.

17.1.3 Constraining the access to a single number (TS 22.001 categories 1 and 2)

17.1.3.1 Definition

This test checks that when an auto-dialled call to a B-party number fails due to a category 2 cause, the time between of retries complies with the requirements, and the number of retries does not exceed that declared by the UE manufacturer, and is never more than 10.

During this test the SETUP messages shall contain the same B-party number.

No manual intervention shall be performed except to initiate and end the test.

17.1.3.2 Conformance requirement

The UE must fulfil the requirements for category 1 and 2, see clause 17.1.2.2.

Reference:

3GPP TS 22.001 annex E.

17.1.3.3 Test purpose

To ensure the correct behaviour of the UE to TS 22.001 Categories 1 and 2.

17.1.3.4 Method of test

Initial condition

There shall be no numbers in the list of blacklisted numbers in the UE. The re-try scheme is set to give the shortest possible intervals between re-tries. The number of re-attempts is set to the maximum possible number (N), that is supported by the UE. The autocalling function is invoked for the B-party number to be used during the test.

Related ICS/IXIT Statement(s)

ICS: TBD

IXIT: Description of auto calling management:

- selection of the auto calling;
- indication that the call failed and a re-try is attempted;
- indication that a call finally failed.

Test Procedure

A, UE originated, generic call setup is performed up to the SETUP message. The SS then releases the establishment with a cause value from category 1 or 2 (TS 22.001, annex E).

The UE is continuously making new generic call setup attempts invoked by the auto calling function after each RRC CONNECTION RELEASE from the SS.

Step	Direction		Message	Comments
	UE	SS		
1	UE			"called number" entered
2	→		GENERIC SETUP PROCEDURE MOBILE ORIGINATED, CS (Up to SETUP)	Establishment cause indicates "originating call".
3	←		RELEASE COMPLETE	Cause value from category 1 or 2 of TS 22.001, Annex E. This shall be chosen randomly, from both categories. Cause no. 27 shall be excluded if the UE has implemented in category 3 of TS 22.001, as declared in IXIT statement
4	←		RRC CONNECTION RELEASE	
5				The UE is invoking the auto calling function. 1: At the first re-attempt the time between step 4 and 7 must be minimum 5 sec. 2: At the 2nd, 3rd and 4th re-attempt the time between step 4 and 7 must be minimum 1 min. 3: At the 5th to 10th re-attempt the time between step 4 and 7 must be minimum 3 min.
6	→		RRC CONNECTION RELEASE COMPLETE	The signalling link is released
7	→		GENERIC SETUP PROCEDURE MOBILE ORIGINATED, CS (Up to SETUP)	Establishment cause indicates "originating call".
8	←		RELEASE COMPLETE	Cause value from category 1 or 2 of TS 22.001, Annex E. This shall be chosen randomly, from both categories. Cause no. 27 shall be excluded if the UE has implemented in category 3 of TS 22.001, as declared in PIXIT statement
9	←		RRC CONNECTION RELEASE	
10	→		RRC CONNECTION RELEASE COMPLETE	The signalling link is released.
11				The auto calling function shall repeat step 5 to 9 (N-1) times. The UE shall not make more than maximum 10 re-attempts.
12	UE			Clear the auto calling constraint by manual intervention after a minimum of 4 minutes from step 11. Following the final completion of step 11 the UE initiate a call prior to manual intervention.

17.1.3.5 Test requirements

1: At the first re-attempt the time between step 4 and 7 must be minimum 5 sec. 2: At the 2nd, 3rd and 4th re-attempt the time between step 4 and 7 must be minimum 1 min. 3: At the 5th to 10th re-attempt the time between step 4 and 7 must be minimum 3 min.

The UE shall not make more than maximum 10 re-attempts.

17.1.4 Behaviour of the UE when its list of blacklisted numbers is full

17.1.4.1 Definition and applicability

This tests that the UE does not allow autocalling when its list of blacklisted numbers is full.

The number of B-party numbers that can be stored in the list of blacklisted numbers, as stated in the IXIT statement, is M.

This test shall only apply to UE that are capable of autocalling more than M B-party numbers.

17.1.4.2 Conformance requirement

The number of B numbers that can be held in the blacklist is at the manufacturers discretion but there shall be at least 8. However, when the blacklist is full the UE shall prohibit further automatic call attempts to any one number until the blacklist is manually cleared at the UE in respect of one or more B numbers.

Reference

TS 22.001, Annex E.

17.1.4.3 Test purpose

To ensure the correct behaviour of the UE when its list of blacklisted numbers is full.

17.1.4.4 Method of test

Initial condition

The list of blacklisted numbers, in the UE, shall be full. This may be achieved as described in the procedure in clause 17.1.2, applied to M B-party numbers.

Related ICS/IXIT Statement(s)

PICS: TBD.

PIXIT: Description of auto calling management:

- selection of the auto calling;
- indication that the call failed and a re-try is attempted;
- indication that a call finally failed.

Test Procedure

The autocalling function is invoked for a B-party number that is not in the list of blacklisted numbers.

Clear the autocalling constraint by manual intervention after a minimum of 10 s.

17.1.4.5 Test requirements

The UE must not initiate a call.

17.2 Location Services

The test cases for Location Services (LCS) are provided in 3GPP TS 37.571-2 [49], clause 6..

17.2.1 Void

17.2.2 Assisted GPS Network Induced Tests

17.2.2.1 LCS Network Induced location request/ UE-Based GPS/ Emergency Call / with USIM

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.1.1.

17.2.2.2 LCS Network Induced location request/ UE-Based GPS/ Emergency Call / without USIM

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.1.2.

17.2.2.3 LCS Network induced location request/ UE-Assisted GPS/ Emergency call/ With USIM

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.1.3.

17.2.2.4 LCS Network induced location request/ UE-Assisted GPS/ Emergency call/ Without USIM

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.1.4.

17.2.3 Assisted GPS Mobile Originated Tests

17.2.3.1 Void

17.2.3.2 LCS Mobile originated location request/ UE-Based GPS/ Position estimate request/ Success

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.2.1.

17.2.3.3 LCS Mobile originated location request/ UE-Based or UE-Assisted GPS/ Assistance data request/ Success

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.2.2.

17.2.3.4 LCS Mobile originated location request/ UE-Assisted GPS/ Position Estimate/ Success

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.2.3.

17.2.3.5 Void

17.2.3.6 LCS Mobile originated location request/ UE-Based GPS/ Transfer to third party/ Success

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.2.4.

17.2.3.7 LCS Mobile originated location request/ UE-Assisted GPS/ Transfer to third party/ Success

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.2.5.

17.2.3.8 LCS Mobile originated location request/ UE-Based or UE-Assisted GPS/ Assistance data request/ Failure

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.2.6.

17.2.3.9 LCS Mobile originated location request/ UE-Based GPS/ Position estimate request/ Failure

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.2.7.

17.2.4 Assisted GPS Mobile Terminated Tests

17.2.4.1 LCS Mobile terminated location request/ UE-Based GPS

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.3.1.

17.2.4.2 LCS Mobile-terminated location request/UE-Based GPS/ Request for additional assistance data/ Success

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.3.2.

17.2.4.3 LCS Mobile-terminated location request/UE-Based GPS/ Failure – Not Enough Satellites

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.3.3.

17.2.4.4 LCS Mobile terminated location request/ UE-Assisted GPS/ Success

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.3.4.

17.2.4.5 LCS Mobile terminated location request/ UE-Assisted GPS/ Request for additional assistance data/ Success

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.3.5.

17.2.4.6 LCS Mobile terminated location request/ UE-Based GPS/ Privacy Verification/ Location Allowed if No Response

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.3.6.

17.2.4.7 LCS Mobile terminated location request/ UE-Based GPS/ Privacy Verification/ Location Not Allowed if No Response

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.3.7.

17.2.4.8 LCS Mobile terminated location request/ UE-Assisted GPS/ Privacy Verification/ Location Allowed if No Response

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.3.8.

17.2.4.9 LCS Mobile terminated location request/ UE-Assisted GPS/ Privacy Verification/ Location Not Allowed if No Response

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.3.9.

17.2.4.10 LCS Mobile terminated location request/ UE-Based or UE-Assisted GPS/ Configuration Incomplete

This test case is provided in 3GPP TS 37.571-2 [49], sub-clause 6.1.3.10.

17.2.5 Void

17.2.6 Void

17.2.7 Void

17.3 Mobility between 3GPP WLAN Interworking and 3GPP Systems

17.3.1 Discovery of the Home Agent via DNS

17.3.1.1 Definition and applicability

This test case is applicable for all UEs which support mobility between 3GPP WLAN Interworking and 3GPP Systems, and discovery of the Home Agent via DNS.

17.3.1.2 Conformance requirement

From TS 24.327 clause 5.1.2.2

The first procedure the UE needs to perform for DSMIPv6 initial attach is the discovery of the node acting as the HA.

The UE discovers the IPv6 address and optionally the IPv4 address of the HA in one of the three following ways:

- via DNS as defined in 3GPP TS 24.303 [3];
- during the PDP context activation procedure in GERAN or UTRAN accesses via the Protocol Configuration Options as defined in 3GPP TS 24.008 [4] if the HA IP address is available in the GGSN; or
- via IKEv2 during tunnel setup with PDG for 3GPP I-WLAN as defined in annex B if the HA IP address is available in the PDG.

From TS 24.303 clause 5.1.2.1.2

A UE performing Home Agent discovery based on DNS shall support the implementation of standard DNS mechanisms.

The UE shall perform DNS Lookup by Home Agent Name as specified in IETF RFC 5026 [10].The QNAME shall be set to the requested HA-APN. The HA-APN shall be constructed as specified in 3GPP TS 23.003 [17]. If a HA has both an IPv4 and an IPv6 address, the corresponding DNS record should be configured with both 'AAAA' and 'A ' records. Accordingly the UE should perform one DNS lookup procedure to retrieve both 'AAAA' and 'A' records. The DNS server replies with one 'AAAA' and one 'A' record.

Reference(s)

3GPP TS 24.327 clause 5.1.2.2

3GPP TS 24.303 clause 5.1.2.1.2

17.3.1.3 Test purpose

The purpose of this test case is to verify that when the UE is configured to discover the IP address of the Home Agent via DNS, it transmits a DNS Query with QNAME set to the FQDN of the Home Agent.

17.3.1.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.
- User Equipment:
  - The UE shall be in MM-state "Idle, updated".
  - The UE is configured to discover the Home Agent address via DNS.
  - The UE is configured with a DNS server address.
  - The UE is configured with the HA-APN Network Identifier.
  - The UE has acquired an IP address.

Related ICS/IXIT Statements

Support of mobility between 3GPP WLAN Interworking and 3GPP Systems

Support for being configured to discover the Home Agent address via DNS

Test procedure

a) The UE transmits a DNS Query message with QNAME set to the FQDN of the Home Agent (derived from HA-APN Network Identifier and PLMN information).

b) The SS transmits a DNS Response message with the IPv6 and IPv4 addresses of the Home Agent.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1	→		DNS Query	QNAME set to FQDN of the Home Agent
2	←		DNS Response	DNS Response message contains IPv6 and IPv4 addresses of the Home Agent

Specific Message Contents

DNS Query (Step 1)

Information Element	Value/remark
QR=	'0'B
QPCODE=	'0000'B
QNAME=	Fully Qualified Domain Name of the Home Agent
QTYPE=	A
QCLASS=	IN
QNAME=	Fully Qualified Domain Name of the Home Agent
QTYPE=	AAAA
QCLASS=	IN

DNS Response (Step 2)

Information Element	Value/remark
QR=	'1'B
QPCODE=	'0000'B
QNAME=	Same as received in DNS Query (Step 1)
QTYPE=	A
QCLASS=	IN
QNAME=	Same as received in DNS Query (Step 1)
QTYPE=	AAAA
QCLASS=	IN
RR	
- NAME	Same as received in DNS Query (Step 1)
- TYPE	A
- CLASS	IN
- RDATA	IPv4 address of HA
RR	
- NAME	Same as received in DNS Query (Step 1)
- TYPE	AAAA
- CLASS	IN
- RDATA	IPv6 address of HA

17.3.1.5 Test requirements

1. At Step 1, UE shall send a DNS Query message with QNAME set to the FQDN of the Home Agent (derived from HA-APN Network Identifier and PLMN information).

17.3.2 Discovery of the Home Agent address and Home Network Prefix during PDP context activation procedure

17.3.2.1 Definition and applicability

This test case is applicable for all UEs which support mobility between 3GPP WLAN Interworking and 3GPP Systems.

17.3.2.2 Conformance requirement

from TS 24.327, subclause 5.1.2.2

The first procedure the UE needs to perform for DSMIPv6 initial attach is the discovery of the node acting as the HA.

The UE discovers the IPv6 address and optionally the IPv4 address of the HA in one of the three following ways:

- via DNS as defined in 3GPP TS 24.303 [3];
- during the PDP context activation procedure in GERAN or UTRAN accesses via the Protocol Configuration Options as defined in 3GPP TS 24.008 [4] if the HA IP address is available in the GGSN; or
- via IKEv2 during tunnel setup with PDG for 3GPP I-WLAN as defined in annex B if the HA IP address is available in the PDG.

If the HA IP address(es) are available in the GGSN, the GGSN shall return the HA IP address(es) in the Protocol Configuration Options during the PDP context activation procedure when attaching to the GERAN or UTRAN accesses. If the HA IP address(es) are not available in the GGSN, the UE shall discover the HA IP address(es) by DNS if the UE wants to perform the handover to 3GPP I-WLAN.

If the UE requests the HA IP address(es) during the IPsec tunnel setup to PDG in 3GPP I-WLAN connection and if the HA IP address(es) are available in the PDG, the PDG shall return the HA IP address(es) in IKEv2 configuration payload attributes as defined in annex B. If the HA IP address(es) are not available in the PDG, the UE shall discover the HA IP address(es) by DNS before performing the H1 PDN attach.

The UE shall support the HA discovery based on DNS and on Protocol Configuration Options. The UE may support the HA discovery based on IKEv2.

The HA IP address(es) may also be pre-configured in the UE.

from TS 24.327, subclause 5.1.2.3

The UE shall perform the security association establishment with the HA as specified in 3GPP TS 24.303 [3]. For this procedure the UE shall support IKEv2 protocol and EAP over IKEv2 as described in IETF RFC 4306 [9]. The detailed procedure and supported extensions for this step are specified in 3GPP TS 24.303 [3]. The UE may use either EAP-SIM or EAP-AKA for authentication purposes.

During the IKEv2 exchange, the UE shall request an IPv6 home network prefix as specified in 3GPP TS 24.303 [3]. The UE shall then auto-configure an IPv6 home address from the received prefix and create child SA as specified in 3GPP TS 24.303 [3].

In the IKEv2 signalling the UE should indicate the target PDN the UE wants to connect to in the IDr payload as specified in 3GPP TS 24.303 [3].

from TS 24.327, subclause 5.1.2.4

The DSMIPv6 home link detection function is used by the UE to detect if, for a specific PDN, an access interface is on the home link from DSMIPv6 perspective. The home link detection function for a specific PDN connection shall be performed whenever the UE receives a new IPv6 prefix, either at initial attach or after a handover.

The UE is informed of the IPv6 prefix associated with a specific access interface. If the UE is connected to GPRS systems, the UE knows the IPv6 prefix via the IPv6 address auto configuration as described in 3GPP TS 29.061 [6]. If UE is connected to the 3GPP I-WLAN, it knows the IPv6 prefix via IPv6 address auto configuration as described in 3GPP TS 29.161 [7].

In the scenarios considered in this specification, the Home Network Prefix associated to the PDN connection can be assigned:

- via Protocol Configuration Options from the GGSN in GPRS systems as specified in 3GPP TS 24.008 [4];
- via IPsec security associations bootstrap with the PDG in I-WLAN as specified in annex B;
- via the establishment of IPsec security associations with the HA as specified in 3GPP TS 24.303 [3] subclause 5.1.2.2; or
- the HNP may also be pre-configured in the UE.

NOTE: If a pre-configured HNP is available, the UE can use it for home link detection. However the UE cannot use it for the IPv6 address auto configuration.

The home link detection procedure performed by the UE is specified in 3GPP TS 24.303 [3].

If the UE detects it is in the home link for this specific PDN over the access interface, the UE shall not perform the H1 PDN attach. If the UE detects it is not on the home link, the UE shall perform IKEv2 procedure for security associations setup and IPv6 prefix and optionally IPv4 HA assignment if the UE does not have a valid security association with the HA, and then the UE shall send a Binding Update as specified in 3GPP TS 24.303 [3].

Reference(s)

3GPP TS 24.327 clause 5.1.2.32

3GPP TS 24.327 clause 5.1.2.3

3GPP TS 24.327 clause 5.1.2.4

17.3.2.3 Test purpose

1) To verify that when the UE has sets up PDP context, it requests for Home Agent IPv6 address and optionally for Home Agent IPv4 address and Home Network Prefix

17.3.2.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.
- User Equipment:
  - The UE shall be in GMM-state "GMM-REGISTERED, normal service".

Related ICS/IXIT Statements

Support of mobility between 3GPP WLAN Interworking and 3GPP Systems

Test procedure

a) UE sets request for a Home Agent address and Home Network Prefix to the GGSN within the Protocol Configuration Options IE in Activate PDP Context Request message. UE initiates an Activate PDP Context procedure.

b) SS responds with an Activate PDP Context Accept including list of HA addresses and Home Network Prefix..

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1	→		Activate PDP Context Request	
2	←		Activate PDP Context Accept	

Specific Message Contents

Activate PDP Context Request (step 1)

NOTE: Containers can be in any order.

Information Elements	Value/Remarks
Protocol Configuration options - Additional Parameters -- container 1 Identifier -- Container 1 Length -- container 2 Identifier -- Container 2 Length -- container 3 Identifier -- Container 3 Length	 0007H (DSMIPv6 Home Agent Address); 0 bytes 0008H (DSMIPv6 Home Network Prefix) (optional); 0 bytes 0009H (DSMIPv6 IPv4 Home Agent Address) (optional) 0 bytes

Activate PDP Context Accept (step 2)

Information Elements	Value/Remarks
Protocol Configuration options	
- Additional Parameters	
-- container 1 Identifier	0007H (DSMIPv6 Home Agent Address);
-- Container 1 Length	16 bytes;
-- Container 1 contents	IPv6 HA Address set by SS;
-- container 2 Identifier	0008H (DSMIPv6 Home Network Prefix); sent if requested by UE
-- Container 2 Length	17 bytes;
-- Container 2 contents	Home Network Prefix set by SS;
-- container 3 Identifier	0009H (DSMIPv6 IPv4 Home Agent Address); sent if requested by UE
-- Container 3 Length	4 bytes;
-- Container 3 contents	IPv4 HA Address set by SS;

17.3.2.5 Test requirements

1) In step 1, the UE shall request for HA IPv6 address and optionally HA IPv4 address and Home Network Prefix to the GGSN within the Protocol Configuration Options IE.

17.3.3 Void

17.3.4 Security association establishment

17.3.4.1 Definition and applicability

This test case is applicable for all UEs which support mobility between 3GPP WLAN Interworking and 3GPP Systems.

17.3.4.2 Conformance requirement

From TS 24.327 clause 5.1.2.3

The UE shall perform the security association establishment with the HA as specified in 3GPP TS 24.303 [3]. For this procedure the UE shall support IKEv2 protocol and EAP over IKEv2 as described in IETF RFC 4306 [9]. The detailed procedure and supported extensions for this step are specified in 3GPP TS 24.303 [3]. The UE may use either EAP-SIM or EAP-AKA for authentication purposes.

During the IKEv2 exchange, the UE shall request an IPv6 home network prefix as specified in 3GPP TS 24.303 [3]. The UE shall then auto-configure an IPv6 home address from the received prefix and create child SA as specified in 3GPP TS 24.303 [3].

In the IKEv2 signalling the UE should indicate the target PDN the UE wants to connect to in the IDr payload as specified in 3GPP TS 24.303 [3].

From TS 24.303 clause 5.1.2.2

The UE shall support the IKEv2 protocol (see IETF RFC 4306 [14]) for negotiating the IPsec security association to secure DSMIPv6 signalling and shall support EAP over IKEv2 as described in IETF RFC 4306 [14] to perform authentication with an AAA server. In a case an additional authentication and authorization of the IPSec security association is needed with an external AAA server, then the additional authentication steps during the IKEv2 exchange shall be supported as specified in IETF RFC 4739 [23] and described in 3GPP TS 33.234 [24].

The UE shall support IPsec ESP (see IETF RFC 4303 [11]) in order to provide authentication of Binding Update and Binding Acknowledgement messages as specified in IETF RFC 4877 [4]. The UE shall support multiple authentication exchanges in the IKEv2 protocol as specified in IETF RFC 4739 [23] in order to support authentication with an external AAA server. The UE shall support the redirect mechanism as defined in draft-ietf-ipsecme-ikev2-redirect [30].

The UE shall initiate the security association establishment procedure by sending the IKE_SA_INIT request message defined in IETF RFC 4306 [14] to the HA. The UE shall indicate support for the HA reallocation by including a REDIRECT_SUPPORTED payload in the IKE_SA_INIT request as specified in draft-ietf-ipsecme-ikev2-redirect [30]. On receipt of an IKE_SA_INIT response, the UE shall send an IKE_AUTH request message including the MN-NAI in the IDi payload and the Access Point Name (APN) of the target PDN the UE wants to connect to in the IDr payload. The APN shall be formatted as defined in 3GPP TS 23.003 [17]. The username part of the MN-NAI included in "IDi"

payload may be an IMSI, pseudonym or re-authentication ID. The UE shall include in the IDi payload the same MN-NAI it includes in the EAP-Response/Identity within the EAP-AKA exchange.

In the very first EAP-Response/Identity within the IKEv2 exchange the UE shall include a NAI whose username is derived from IMSI. In subsequent exchanges the UE should use pseudonyms and re-authentication identities provided by the 3GPP AAA server as specified in IETF RFC 4187 [26].

NOTE: Fast re-authentication mechanism is optional, and therefore is an implementation option in the UE and operator configuration issue (i.e. it also depends on whether the AAA server sent a re-authentication ID during previous EAP authentication) whether to use it during security association establishment.

EAP-AKA over IKEv2 shall be used to authenticate UE in the IKE_AUTH exchange, while public key signature based authentication with certificates shall be used to authenticate the HA.

During the IKEv2 exchange, the HA may trigger the UE to perform the HA reallocation procedure. If the UE receives as part of the IKE_AUTH response message a REDIRECT payload containing the IP address of a target HA as specified in subclause 5.1.3.1, the UE shall initiate a new IKEv2 security association with the target HA. The UE shall terminate the IKEv2 security association with the initial HA by sending an IKEv2 Informational message with a DELETE payload as specified in IETF RFC 4306 [14].

During the IKEv2 exchange, the UE shall request the allocation of an IPv6 home prefix through the Configuration Payload in the IKE_AUTH. Since in EPS a unique IPv6 prefix is assigned to the UE, the UE shall include a MIP6_HOME_PREFIX attribute in the CFG_REQUEST message as described in IETF RFC 5026 [10]. In addition the UE may include the INTERNAL_IP6_DNS attribute in the CFG_REQUEST as described in IETF RFC 4306 [14] to request the DNS server IPv6 address of the PLMN it is connecting to via DSMIPv6. In the same way the UE may include the INTERNAL_IP4_DNS attribute in the CFG_REQUEST to request the IPv4 address of the DNS server.

The UE shall then auto-configure a Home Address from the IPv6 prefix received from the HA and shall run a CREATE_CHILD_SA exchange to create the security association for the new Home Address. In the CREATE_CHILD_SA exchange the UE shall include the Home Address and the appropriate selectors in the TSi (Traffic Selector-initiator) payload to negotiate the IPsec security association for protecting the Binding Update and Binding Acknowledgement messages as specified in IETF RFC 4877 [4].

Reference(s)

3GPP TS 24.327 clause 5.1.2.3

3GPP TS 24.303 clause 5.1.2.2

17.3.4.3 Test purpose

1. To verify that when the UE has acquired the IP address of the Home Agent, it transmits an IKE_SA_INIT message addressed to the Home Agent to initiate security association establishment.

2. To verify that when the UE receives an IKA_SA_INIT response message, it transmits an IKE_AUTH Request message containing the configuration payload MIP6_HOME_PREFIX to receive the prefix to use for Home Address configuration.

3. To verify that when the UE receives an IKE_AUTH Response message including an EAP-Request/AKA Challenge, it transmits an IKE_AUTH Request message containing the correct EAP-Response/AKA-Challenge.

4. To verify that when the UE receives an IKE_AUTH Response message including EAP-Success, it transmits an IKE_AUTH Request message with Authentication payload.

5. To verify that when the UE receives an IKE_AUTH Response message with configuration payload MIP6_HOME_PREFIX containing the Home Network Prefix HNP associated to the UE, it transmits a CREATE_CHILD_SA Request message including traffic selectors fields (TSi and TSr) that contain the parameters identifying the Binding Update (BU)/Binding Acknowledgments (BA) messages.

17.3.4.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.

- User Equipment:
  - The UE shall be in MM-state "Idle, updated".
  - The UE has acquired an IP address.
  - The UE has discovered the IP address of the Home Agent (either via DNS, IKEv2 signalling or during PDP context activation procedure).

Related ICS/IXIT Statements

Support of mobility between 3GPP WLAN Interworking and 3GPP Systems

Test procedure

a) The UE transmits an IKE_SA_INIT message addressed to the Home Agent.

b) The SS transmits an IKE_SA_INIT message.

c) The UE transmits an IKE_AUTH Request message containing the configuration payload MIP6_HOME_PREFIX, a MN-NAI derived from UE IMSI in the IDi field and an APN in the IDr field.

d) The SS transmits an IKE_AUTH Response message including an EAP-Request/AKA-Challenge.

e) The UE transmits an IKE_AUTH Request message including the EAP-Response/AKA-Challenge.

f) The SS transmits an IKE_AUTH Response message including EAP-Success.

g) The UE transmits an IKE_AUTH Request message with Authentication payload.

h) The SS transmits an IKE_AUTH Response message with configuration payload MIP6_HOME_PREFIX containing the Home Network Prefix HNP associated to the UE.

i) The UE transmits a CREATE_CHILD_SA Request message including traffic selectors fields (TSi and TSr) that contain the parameters identifying the Binding Update (BU) / Binding Acknowledgments (BA) messages.

j) The SS transmits a CREATE_CHILD_SA Response message.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1	→		IKE_SA_INIT	IKE_SA_INIT addressed to the Home Agent
2	←		IKE_SA_INIT	
3	→		IKE_AUTH Request	IKE_AUTH Request message contains the configuration payload MIP6_HOME_PREFIX, a MN-NAI derived from UE IMSI in the IDi field and an APN in the IDr field
4	←		IKE_AUTH Response	IKE_AUTH Response message includes an EAP-Request/AKA-Challenge
5	→		IKE_AUTH Request	IKE_AUTH Request message includes the EAP-Response/AKA-Challenge
6	←		IKE_AUTH Response	IKE_AUTH Response message includes EAP-Success
7	→		IKE_AUTH Request	IKE_AUTH Request message with Authentication payload
8	←		IKE_AUTH Response	IKE_AUTH Response message with configuration payload MIP6_HOME_PREFIX containing the Home Network Prefix HNP associated to the UE
9	→		CREATE_CHILD_SA Request	CREATE_CHILD_SA Request message includes traffic selectors fields (TSi and TSr) that contain the parameters identifying the Binding Update (BU) / Binding Acknowledgments (BA) messages
10	←		CREATE_CHILD_SA Response	

Specific Message Contents

IKE_SA_INIT (Step 1)

Information Element	Value/remark
IKE Header	
- Initiator's IKE_SA SPI	Set by the UE
- Responder's IKE_SA SPI	'0'B (First message in IKE_SA_INIT exchange)
- Next Payload	'00100001'B (SA)
- Exchange Type	'00100010'B (IKE_SA_INIT)
Security Association Payload	
- Next Payload	'00100010'B (KE)
- More Proposal	'00000010'B
- Proposal #	'00000001'B
- Protocol ID	'00000001'B (IKE)
- SPI size	'00000000'B
- Number of transforms	'00000010'B
- More transform	'00000011'B (This is the transform for confidentiality)
- Transform type	'00000001'B (Encryption)
- Transform ID	'00000011'B (3DES in CBC mode)
- More transform	'00000011'B (This is the transform for prf)
- Transform type	'00000010'B (PRF)
- Transform ID	'00000010'B (PRF_HMAC_SHA1)
- More transform	'00000011'B (This is the transform for integrity)
- Transform type	'00000011'B (Integrity)
- Transform ID	'00000010'B (HMAC-SHA1-96)
- Last transform	'00000000'B (This is the transform for DH)
- Transform type	'00000100'B (DH)
- Transform ID	'00000010'B (Diffie-Hellman group 2)
- Last proposal	'00000000'B
- Proposal #	'00000010'B (Second cryptographic suite)
- Protocol ID	'00000001'B (IKE)
- SPI size	'00000000'B
- Number of transforms	'00000010'B
- More transform	'00000011'B (This is the transform for confidentiality)
- Transform type	'00000001'B (Encryption)
- Transform ID	'00001011'B (AES with 128-bit keys in CBC mode)
- More transform	'00000011'B (This is the transform for prf)
- Transform type	'00000010'B (PRF)
- Transform ID	'00000100'B (PRF_AES128_XCBC)
- More transform	'00000011'B (This is the transform for integrity)
- Transform type	'00000011'B (Integrity)
- Transform ID	'00000101'B (AES-XCBC-MAC-96)
- Last transform	'00000000'B (This is the transform for DH)
- Transform type	'00000100'B (DH)
- Transform ID	'00000010'B (Diffie-Hellman group 2)
Key Exchange Payload	
- Next Payload	'00101000'B (Nonce)
- DH Group #	'0000000000000010'B (DH group 2)
- Key Exchange Data	Set by the UE
Nonce Payload	
- Next Payload	'00101001'B (Notify REDIRECT_SUPPORTED)
- Nonce data	Random number set by the UE
REDIRECT_SUPPORTED Notify Payload	
- Next Payload	'00000000'B (No Next Payload)
- Protocol ID	'00000000'B (Notification not specific to a particular SA)
- SPI size	'00000000'B (SPI field not present)
- Notify Message Type	'0100000000010110'B (REDIRECT_SUPPORTED)

IKE_SA_INIT (Step 2)

Information Element	Value/remark
IKE Header	
- Initiator's IKE_SA SPI	Same as that set by the UE in IKE_SA_INIT as Step 1
- Responder's IKE_SA SPI	Set by the SS
- Next Payload	'00100001'B (SA)
- Exchange Type	'00100010'B (IKE_SA_INIT)
Security Association Payload	
- Next Payload	'00100010'B (KE)
- Proposal	One of the 2 proposals included in IKE_SA_INIT at Step 1
Key Exchange Payload	
- Next Payload	'00101000'B (Nonce)
- DH Group #	'0000000000000010'B (DH group 2)
- Key Exchange Data	Set by the SS
Nonce Payload	
- Next Payload	'00000000'B (No Next Payload)
- Nonce data	Set by the SS

IKE_AUTH Request (Step 3)

Information Element	Value/remark
IKE Header	
- Initiator's IKE_SA SPI	Same as that set by the UE in IKE_SA_INIT as Step 1
- Responder's IKE_SA SPI	Same as that set by the SS in IKE_SA_INIT as Step 2
- Next Payload	'00101110'B (E)
- Exchange Type	'00100011'B (IKE_AUTH)
Encrypted Payload	
- Next Payload	'00100011'B (IDi)
- Initialization Vector	Random value set by the UE
- Encrypted IKE Payloads	
- Identification – Initiator Payload	
- Next Payload	'00101111'B (CP)
- ID Type	'00000010'B
- ID	Set to MN-NAI
- Configuration Payload	
- Next Payload	'00100001'B (SA)
- CFG Type	'00000001'B (Request)
- Configuration Attribute	'00010000'B (MIP6_HOME_PREFIX attribute)
- Length	'0000000000000000'B
- Security Association Payload	
- Next Payload	'00101100'B (TSi)
- Proposals	Any set of allowed values
- Traffic Selector – Initiator Payload	
- Next Payload	'00101100'B (TSr)
- Traffic selector data	Any set of allowed values
- Traffic Selector – Responder Payload	
- Next Payload	'00100100'B (IDr)
- Traffic selector data	Any set of allowed values
- Identification – Responder Payload	
- Next Payload	'00000000'B (No Next Payload)
- ID Type	'00000010'B
- ID	APN
- Padding	Set by the UE
- Pad Length	Set by the UE
- Integrity checksum data	Set by the UE

IKE_AUTH Response (Step 4)

Information Element	Value/remark
IKE Header	
- Initiator's IKE_SA SPI	Same as that set by the UE in IKE_SA_INIT as Step 1
- Responder's IKE_SA SPI	Same as that set by the SS in IKE_SA_INIT as Step 2
- Next Payload	'00101110'B (E)
- Exchange Type	'00100011'B (IKE_AUTH)
Encrypted Payload	
- Next Payload	'00100100'B (IDr)
- Initialization Vector	Set by the SS
- Encrypted IKE Payloads	
- Identification – Responder Payload	
- Next Payload	'00100101'B (CERT)
- ID Type	'00000010'B
- ID	APN
- Certificate Payload	
- Next Payload	'00110000'B (EAP)
- Cert encoding	'00000100'B (X.509 certificate - signature)
- Certificate data	Set by the SS (DER encoded X.509 certificate)
- Length	'0000000000000000'B
- Extensible Authentication Payload	
- Next Payload	'00000000'B (No Next Payload)
- Code	'00000001'B (Request)
- Type	'00010111'B (AKA)
- Subtype	AKA-Challenge
- Attribute Type	'00000001'B (AT_RAND)
- AT_RAND	An arbitrarily selected 128 bits value
- Attribute Type	'00000010'B (AT_AUTN)
- AT_AUTN	See TS 24.301 subclause 9.9.3.2
- Padding	Set by the SS
- Pad Length	Set by the SS
- Integrity checksum data	Set by the SS

IKE_AUTH Request (Step 5)

Information Element	Value/remark
IKE Header	
- Initiator's IKE_SA SPI	Same as that set by the UE in IKE_SA_INIT as Step 1
- Responder's IKE_SA SPI	Same as that set by the SS in IKE_SA_INIT as Step 2
- Next Payload	'00101110'B (E)
- Exchange Type	'00100011'B (IKE_AUTH)
Encrypted Payload	
- Next Payload	'00110000'B (EAP)
- Initialization Vector	Random value set by the UE
- Encrypted IKE Payloads	
- Extensible Authentication Payload	
- Next Payload	'00000000'B (No Next Payload)
- Code	'00000010'B (Response)
- Type	'00010111'B (AKA)
- Subtype	AKA-Challenge
- Attribute Type	'00000011'B (AT_RES)
- AT_RES	See TS 24.301 subclause 9.9.3.4
- Padding	Set by the UE
- Pad Length	Set by the UE
- Integrity checksum data	Set by the UE

IKE_AUTH Response (Step 6)

Information Element	Value/remark
IKE Header	
- Initiator's IKE_SA SPI	Same as that set by the UE in IKE_SA_INIT as Step 1
- Responder's IKE_SA SPI	Same as that set by the SS in IKE_SA_INIT as Step 2
- Next Payload	'00101110'B (E)
- Exchange Type	'00100011'B (IKE_AUTH)
Encrypted Payload	
- Next Payload	'00110000'B (EAP)
- Initialization Vector	Set by the SS
- Encrypted IKE Payloads	
- Extensible Authentication Payload	
- Next Payload	'00000000'B (No Next Payload)
- Code	'00000011'B (Success)
- Padding	Set by the SS
- Pad Length	Set by the SS
- Integrity checksum data	Set by the SS

IKE_AUTH Request (Step 7)

Information Element	Value/remark
IKE Header	
- Initiator's IKE_SA SPI	Same as that set by the UE in IKE_SA_INIT as Step 1
- Responder's IKE_SA SPI	Same as that set by the SS in IKE_SA_INIT as Step 2
- Next Payload	'00101110'B (E)
- Exchange Type	'00100011'B (IKE_AUTH)
Encrypted Payload	
- Next Payload	'00100111'B (AUTH)
- Initialization Vector	Random value set by the UE
- Encrypted IKE Payloads	
- Authentication Payload	
- Next Payload	'00000000'B (No Next Payload)
- Auth Method	'00000010'B (Shared Key Integrity code)
- Auth Data	Derived from the MSK obtained from AKA exchange
- Padding	Set by the UE
- Pad Length	Set by the UE
- Integrity checksum data	Set by the UE

IKE_AUTH Response (Step 8)

Information Element	Value/remark
IKE Header	
- Initiator's IKE_SA SPI	Same as that set by the UE in IKE_SA_INIT as Step 1
- Responder's IKE_SA SPI	Same as that set by the SS in IKE_SA_INIT as Step 2
- Next Payload	'00101110'B (E)
- Exchange Type	'00100011'B (IKE_AUTH)
Encrypted Payload	
- Next Payload	'00100111'B (AUTH)
- Initialization Vector	Set by the SS
- Encrypted IKE Payloads	
- Authentication Payload	
- Next Payload	'00101111'B (CP)
- Auth Method	'00000010'B (Shared Key Integrity code)
- Auth Data	Derived from the MSK obtained from AKA exchange
- Configuration Payload	
- Next Payload	'00100001'B (SA)
- CFG Type	'00000010'B (Reply)
- Configuration Attribute	'00010000'B (MIP6_HOME_PREFIX attribute)
- Length	'0000000000010101'B
- Prefix lifetime	Any allowed value
- Home Prefix	IPv6 prefix – 16 bytes
- Prefix length	'10000000'B
- Security Association Payload	
- Next Payload	'00101101'B (TSi)
- Proposal	One of the 2 proposals included in IKE_AUTH Request at Step 3
- Traffic Selector – Initiator Payload	
- Next Payload	'00101100'B (TSr)
- Traffic Selector data	Any allowed set of values
- Traffic Selector – Responder Payload	
- Next Payload	'00000000'B (No Next Payload)
- Traffic Selector data	Any allowed set of values
- Padding	Set by the SS
- Pad Length	Set by the SS
- Integrity checksum data	Set by the SS

CREATE_CHILD_SA Request (Step 9)

Information Element	Value/remark
IKE Header	
- Initiator's IKE_SA SPI	Same as that set by the UE in IKE_SA_INIT as Step 1
- Responder's IKE_SA SPI	Same as that set by the SS in IKE_SA_INIT as Step 2
- Next Payload	'00101110'B (E)
- Exchange Type	'00 100100'B (CREATE_CHILD_SA)
Encrypted Payload	
- Next Payload	'00100001'B (SA)
- Initialization Vector	Random value set by the UE
- Encrypted IKE Payloads	
- Security Association Payload	
- Next Payload	'00101000'B (Ni)
- More proposal	'00000010'B
- Proposal #	'00000001'B (First cryptographic suite)
- Protocol ID	'00000011'B
- SPI size	'00000100'B
- Number of transforms	'00000010'B
- SPI	Set by the UE
- More transform	'00000011'B (This is the transform for confidentiality)
- Transform type	'00000001'B (Encryption)
- Transform ID	'00000011'B (3DES in CBC mode)
- Last transform	'00000011'B (This is the transform for integrity)
- Transform type	'00000011'B (Integrity)
- Transform ID	'00000010'B (HMAC-SHA1-96)
- Last proposal	'00000000'B
- Proposal #	'00000010'B (Second cryptographic suite)
- Protocol ID	'00000011'B (ESP)
- SPI size	'00000100'B
- Number of transforms	'00000010'B
- SPI	Set by the UE
- More transform	'00000011'B (This is the transform for confidentiality)
- Transform type	'00000001'B (Encryption)
- Transform ID	'00001011'B (AES with 128-bit keys in CBC mode)
- Last transform	'00000011'B (This is the transform for integrity)
- Transform type	'00000011'B (Integrity)
- Transform ID	'00000101'B (AES-XCBC-MAC-96)
- Nonce Payload	
- Next Payload	'00101100'B (TSi)
- Nonce data	Random number set by the UE
- Traffic Selector – Initiator Payload	
- Next Payload	'00101101'B (TSr)
- Traffic Selector data	Any set of values containing the traffic selector of the CREATE_CHILD_SA Response at Step 10
- Traffic Selector – Responder Payload	'00000000'B (SPI field not present)
- Next Payload	'00101001'B (Notify – Use transport mode)
- Traffic Selector data	Any set of values containing the traffic selector of the CREATE_CHILD_SA Response at Step 10
- Use transport mode Notify Payload	
- Next Payload	'00101001'B (Notify – Use transport mode)
- Protocol ID	'00000011'B (ESP)
- SPI size	'00000100'B
- Notify Message Type	'1000000000000111'B (Use transport mode)
- SPI	Same as that set by the UE in SA proposal #1
- Use transport mode Notify Payload	
- Next Payload	'00000000'B (No Next Payload)
- Protocol ID	'00000011'B (ESP)
- SPI size	'00000100'B
- Notify Message Type	'1000000000000111'B (Use transport mode)
- SPI	Same as that set by the UE in SA proposal #1
- Padding	Set by the UE
- Pad Length	Set by the UE
- Integrity checksum data	Set by the UE

CREATE_CHILD_SA Response (Step 10)

Information Element	Value/remark
IKE Header	
- Initiator's IKE_SA SPI	Same as that set by the UE in IKE_SA_INIT as Step 1
- Responder's IKE_SA SPI	Same as that set by the SS in IKE_SA_INIT as Step 2
- Next Payload	'00101110'B (E)
- Exchange Type	'00 100100'B (CREATE_CHILD_SA)
Encrypted Payload	
- Next Payload	'00100001'B (SA)
- Initialization Vector	Set by the SS
- Encrypted IKE Payloads	
- Security Association Payload	
- Next Payload	'00101000'B (Nr)
- Last proposal	'00000000'B
- Proposal #	One of the 2 proposals included in the CREATE_CHILD_SA Request at Step 9
- Protocol ID	'00000011'B (ESP)
- SPI size	'00000100'B
- SPI	Set by the SS
- First transform	'00000011'B (This is the transform for confidentiality)
- Transform type	'00000001'B (Encryption)
- Transform attribute type	The corresponding value of the chosen proposal
- Last transform	'00000011'B (This is the transform for integrity)
- Transform type	'00000011'B (Integrity)
- Transform attribute type	The corresponding value of the chosen proposal
- Nonce Payload	
- Next Payload	
- Nonce data	'00101100'B (TSi)
- Traffic Selector – Initiator Payload	Set by the SS
- Next Payload	'00101101'B (TSr)
- Number of traffic selectors	'00000010'B
- TS type	'00001000'B (IPv6 range)
- IP protocol	'10000111B (Mobility header)
- Start port	'0000010100000000'B (BU)
- End port	'0000010100000000'B (BU)
- Starting address	HoA address derived from HNP
- Ending address	HoA address derived from HNP
- TS type	'00001000'B (IPv6 range)
- IP protocol	'10000111B (Mobility header)
- Start port	'0000011000000000'B (BA)
- End port	'0000011000000000'B (BA)
- Starting address	HoA address derived from HNP
- Ending address	HoA address derived from HNP
- Traffic Selector – Responder Payload	
- Next Payload	'00101001'B (Notify – Use transport mode)
- Number of traffic selectors	'00000010'B
- TS type	'00001000'B (IPv6 range)
- IP protocol	'10000111B (Mobility header)
- Start port	'0000010100000000'B (BU)
- End port	'0000010100000000'B (BU)
- Starting address	HA address
- Ending address	HA address
- TS type	'00001000'B (IPv6 range)
- IP protocol	'10000111B (Mobility header)
- Start port	'0000011000000000'B (BA)
- End port	'0000011000000000'B (BA)
- Starting address	HA address
- Ending address	HA address
- Use transport mode Notify Payload	
- Next Payload	'00000000'B (No Next Payload)
- Protocol ID	'00000011'B (ESP)
- SPI size	Set by the SS
- Notify Message Type	'1000000000000111'B (Use transport mode)
- SPI	Same as that set by the SS in the accepted proposal
- Padding	Set by the UE
- Pad Length	Set by the UE
- Integrity checksum data	Set by the UE

17.3.4.5 Test requirements

1. At Step 1, UE shall send an IKE_SA_INIT message addressed to the Home Agent to initiate security association establishment.
2. At Step 3, UE shall send an IKE_AUTH Request message containing the configuration payload MIP6_HOME_PREFIX.
3. At Step 5, UE shall send an IKE_AUTH Request message containing the correct EAP-Response/AKA-Challenge.
4. At Step 7, UE shall send an IKE_AUTH Request message with Authentication payload.
5. At Step 9, UE shall send a CREATE_CHILD_SA Request message including traffic selectors fields (TSi and TSr) that contain the parameters identifying the Binding Update (BU)/Binding Acknowledgments (BA) messages.

17.3.5 Registration of a new IPv6 CoA (Binding Update/Acknowledgment procedure in IPv6 network)

17.3.5.1 Definition and applicability

This test case is applicable for all UEs which support mobility between 3GPP WLAN Interworking and 3GPP Systems.

17.3.5.2 Conformance requirement

From TS 24.327 clause 5.1.2.5

After establishing the security association and obtaining the IPv6 home network prefix and after performing the home link detection, if not on the home link, the UE shall send a Binding Update message as specified in 3GPP TS 24.303 [3] to register its IPv6 home address with its care-of address.

The UE may also request in the Binding Update an IPv4 home address based on the procedure specified in 3GPP TS 24.303 [3].

From TS 24.303 clause 5.1.2.3

The DSMIPv6 Home Link Detection Function is used by the UE to detect if an access interface is on the home link for a PDN from a DSMIPv6 perspective. The Home Link Detection function shall be performed before sending DSMIPv6 Binding Update via the same access interface.

To perform the Home Link Detection procedure, the UE shall compare the assigned Home Network Prefix for a PDN with the IPv6 prefix or prefixes included in the Prefix Information Option in the Router Advertisements received on the local link. The Home Network Prefix can be assigned in a 3GPP access via PCO, as specified in 3GPP TS 24.301 [15], or via IKEv2 as specified in subclause 5.1.2.2. If there is a match between the Home Network Prefix and one of the local prefixes, the UE is attached on the home link over the respective access interface and shall not send a Binding Update to the HA unless the UE currently has a valid DSMIPv6 Binding Update list entry. If the UE has a valid DSMIPv6 Binding Update list entry, the UE shall proceed to perform the action specified in subclause 5.2.2.4. If there is not any match, the UE shall proceed as specified in subclause 5.1.2.4.

NOTE: The UE does not need to run IKEv2 for home link detection if the Home Network prefix is dynamically received in a PCO Information Element.

From TS 24.303 clause 5.1.2.4

After establishing the security association and obtaining the IPv6 Home Address, the UE shall send a Binding Update message as specified in IETF RFC 3775 [6] and IETF RFC 5555 [2] in order to register its Home Address and Care-of Address at the HA, if it detects it is in the foreign network.

If both IPv4 and IPv6 Care-of Address are received at the foreign network, the UE shall first attempt to use the IPv6 Care-of Address for its binding registration. The UE shall not register both IPv4 and IPv6 Care-of Address to its HA.

If IPv6 Care-of Address is used for initial binding registration, the UE shall send the Binding Update message to the IPv6 address of the HA. In this Binding Update message the H (home registration) and A (acknowledge) bits shall be set. If the UE needs an IPv4 Home Address, the UE shall include the 0.0.0.0 address in the IPv4 Home Address option to request a dynamic IPv4 Home Address.

When IPv6 Care-of Address is used for initial binding registration, the Alternate Care-of Address option shall be used by the UE to carry the Care-of Address inside a Mobility Header which is protected by ESP. If this option is present, the address included in this option is the same address present in the source address of the IPv6 packet.

If IPv4 Care-of Address is used for initial binding registration, the UE shall send the Binding Update as follows (see IETF RFC 5555 [2]):

- The IPv6 packet, with the IPv6 Home Address as the Source Address field of the IPv6 header, shall be encapsulated in UDP.
- The UE shall include the IPv4 Care-of Address as the Source Address field of the IPv4 header and the HA IPv4 address as the Destination Address field of the IPv4 header.
- The UE shall include the IPv4 Care-of Address option containing the IPv4 Care-of Address.
- The UE shall set the H (home registration) and A (acknowledge) flags.
- The UE shall set the F (UDP encapsulation required) flag to 0.
- The UE shall set the R (Mobile Router Flag) flag to 1.
- If the UE needs an IPv4 Home Address, the UE shall include an IPv4 Home Address option with the 0.0.0.0 address in the Binding Update message, as defined in IETF RFC 5555 [2].

When the UE receives the Binding Acknowledgement from the HA, it shall validate it based on the rules described in IETF RFC 3775 [6] and IETF RFC 5555 [2]. If the Binding Acknowledgement contains the successful status code 0 ("Binding Update Accepted"), the UE shall create an entry for the registered Home Address in its Binding Update List and may start sending packets containing its IPv6 Home Address or other IPv6 addresses auto-configured from the assigned home network prefix.

If the Binding Acknowledgement contains a value of 128, the UE may re-send the BU as specified in IETF RFC 3775 [6]. If the Binding Acknowledgement contains a value from 129 to 133 as specified in IETF RFC 3775 [6] or a value from 140 to 143 as specified in IETF RFC 3963 [29], the UE shall not send the BU to the HA and should discover another HA.

If the Binding Acknowledgment contains an IPv4 Address Acknowledgement option with status code value from 0 to 127 (indicating success), the UE shall create two entries in its Binding Update List, one for the IPv6 Home Address and another for the IPv4 Home Address. If the Binding Acknowledgement contains an IPv4 Address Acknowledgment option with status code indicating error (i.e. 128 or higher), the UE shall create an entry only for the IPv6 HoA in its binding update list. Moreover, if the status code is 129 ("Administratively prohibited") or 132 ("Dynamic IPv4 home address assignment not available"), the UE shall not re-send the Binding Update and it shall use only the IPv6 HoA. If the Binding Acknowledgement contains an IPv4 Address Acknowledgement option with status 128 ("Failure, reason unspecified"), 130 ("Incorrect IPv4 home address"), 131 ("Invalid IPv4 address") or 133 ("Prefix allocation unauthorized") it shall re-send the Binding Update including the 0.0.0.0 address in the IPv4 Home Address option. If the Binding Acknowledgement does not contain an IPv4 Address Acknowledgment option, the UE shall create an entry only for the IPv6 HoA in its binding update list.

NOTE: The value to be used to identify the IPv4 address acknowledgement option in the mobility header is 30;

The UE may then send data traffic either with the IPv6 Home Address or with the IPv4 Home Address. If the UE is located on an IP6-enabled link, it shall send IPv6 packets as described in IETF RFC 3775 [6]; IPv4 traffic shall be encapsulated in IPv6 packets as described in IETF RFC 5555 [2]. If the UE is located on an IPv4-only link and the Binding Acknowledgement contains the NAT detection option with the F flag set, the UE shall send IPv6 and IPv4 packets following the vanilla UDP encapsulation rules specified in IETF RFC 5555 [2]. Otherwise the UE shall send IPv6 and IPv4 packets encapsulated in IPv4 as specified in IETF RFC 5555 [2].

Once the DSMIPv6 tunnel is established, the UE may build a DHCPv4 or DHCPv6 message as described in IETF RFC 4039 [26] or IETF RFC 3736 [13] respectively and send it via the DSMIPv6 tunnel as described in IETF RFC 3775 [6] in order to retrieve additional parameters, e.g. Vendor-specific options.

From TS 24.303 clause 5.2.2.3

If the access network supports IPv6, as soon as the UE has received via a Router Advertisement at least an IPv6 prefix which is not present in its Prefix List, the UE shall perform the Home Link detection as specified in subclause 5.1.2.3.

If the UE detects it is not attached to the home link, the UE shall send a Binding Update to the HA including the newly configured IP address as the Care-of Address in the Source IP address of the packet and optionally in the Alternate Care-of Address Option [6]. The UE build the Binding Update message as specified in IETF RFC 3775 [6].

If the UE has been assigned also an IPv4 Home Address and wants to update also the binding for it, the UE shall include the IPv4 Home Address option including the assigned IPv4 Home Address in the same Binding Update message.

If the UE has been assigned also an IPv4 Home Address and wants to release it, the UE shall not include any IPv4 Home Address option in the same Binding Update.

If the UE does not have an IPv4 Home Address but wants to configure one, the UE shall include the IPv4 Home Address option with the 0.0.0.0 address as specified in subclause 5.1.2.4.

If the access network supports only IPv4, as soon as the UE has configured an IPv4 Care-of Address which is different from the previous Care-of Address, the UE shall send a Binding Update tunnelled in UDP as specified in IETF RFC 5555 [2]. The UE shall set the F flag to "0". The UE shall set the R flag to "1".

Independent of an IPv6 or IPv4 access network the UE shall set the Key Management Capability (K) bit in the Binding Update message.

Reference(s)

3GPP TS 24.327 clause 5.1.2.5

3GPP TS 24.303 clauses 5.1.2.3, 5.1.2.4 and 5.2.2.3

17.3.5.3 Test purpose

To verify that when the UE has established a security association with the Home Agent and received the IPv6 Home Address, upon detecting that it is not on the Home Link, it transmits a Binding Update message in order to register it Home Address and Care-of-Address at the Home Agent.

17.3.5.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.
- User Equipment:
  - The UE's Prefix List has been cleared.
  - The UE shall be in MM-state "Idle, updated".
  - The UE has acquired an IP address.
  - The UE has established a security association with the Home Agent and obtained an IPv6 Home Address, by executing the steps in test case 17.3.4 with the following exception: the IPv6 home prefix assigned to the UE by the SS shall be the same as the prefix used during IP address acquisition by the UE.

Related ICS/IXIT Statements

Support of mobility between 3GPP WLAN Interworking and 3GPP Systems

Test procedure

a) The SS broadcasts a Router Advertisement with a Prefix Information Option containing an IPv6 prefix different from the Home Network Prefix assigned to the UE during the preamble.

b) The UE transmits a Binding Update with its IPv6 CoA in the IP Source Address field of the IP Header and the IPv6 Home Agent address in the IP destination Address field of the IP header.

c) The SS transmits a Binding Acknowledgement accepting the Binding Update.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1	←		Router Advertisement	The Prefix Information Option in the Router Advertisement contains an IPv6 prefix different from the Home Network Prefix assigned to the UE during the preamble
2	→		Binding Update	Binding Update contains UE's IPv6 CoA in the IP Source Address field of the IP Header and the IPv6 Home Agent address in the IP destination Address field of the IP header
3	←		Binding Acknowledgement	Binding Acknowledgement accepting the Binding Update

Specific Message Contents

Router Advertisement (Step 1)

Use the default message contents found in TS 34.108, clause 9.1.4, with the following exceptions:

Information Element	Value/remark
Prefix	IPv6 prefix different from the Home Network Prefix assigned to the UE during the preamble

Binding Update (Step 2)

Use the default message contents found in TS 34.108, clause 9.1.4, with the following exceptions:

Information Element	Value/remark
IPv4 Home Address option	Optional: Set to the value "0.0.0.0" to request allocation for the UE. The "P" flag is set to '0'B.
Alternate Care-of Address option	The Prefix Length is set to the requested prefix length of '32'. Same IPv6 address as that inserted in the IP Source Address field

Binding Acknowledgement (Step 3)

Use the default message contents found in TS 34.108, clause 9.1.4.

17.3.5.5 Test requirements

1. At Step 2, UE shall send a Binding Update with its IPv6 CoA in the IP Source Address field of the IP Header and the IPv6 Home Agent address in the IP destination Address field of the IP header.

17.3.6 Registration of a new IPv4 CoA (Binding Update/Acknowledgment procedure in IPv4 network)

17.3.6.1 Definition and applicability

This test case is applicable for all UEs which support mobility between 3GPP WLAN Interworking and 3GPP Systems.

17.3.6.2 Conformance requirement

From TS 24.327 clause 5.1.2.5

After establishing the security association and obtaining the IPv6 home network prefix and after performing the home link detection, if not on the home link, the UE shall send a Binding Update message as specified in 3GPP TS 24.303 [3] to register its IPv6 home address with its care-of address.

The UE may also request in the Binding Update an IPv4 home address based on the procedure specified in 3GPP TS 24.303 [3].

From TS 24.303 clause 5.1.2.3

The DSMIPv6 Home Link Detection Function is used by the UE to detect if an access interface is on the home link for a PDN from a DSMIPv6 perspective. The Home Link Detection function shall be performed before sending DSMIPv6 Binding Update via the same access interface.

To perform the Home Link Detection procedure, the UE shall compare the assigned Home Network Prefix for a PDN with the IPv6 prefix or prefixes included in the Prefix Information Option in the Router Advertisements received on the local link. The Home Network Prefix can be assigned in a 3GPP access via PCO, as specified in 3GPP TS 24.301 [15], or via IKEv2 as specified in subclause 5.1.2.2. If there is a match between the Home Network Prefix and one of the local prefixes, the UE is attached on the home link over the respective access interface and shall not send a Binding Update to the HA unless the UE currently has a valid DSMIPv6 Binding Update list entry. If the UE has a valid DSMIPv6 Binding Update list entry, the UE shall proceed to perform the action specified in subclause 5.2.2.4. If there is not any match, the UE shall proceed as specified in subclause 5.1.2.4.

NOTE: The UE does not need to run IKEv2 for home link detection if the Home Network prefix is dynamically received in a PCO Information Element.

From TS 24.303 clause 5.1.2.4

After establishing the security association and obtaining the IPv6 Home Address, the UE shall send a Binding Update message as specified in IETF RFC 3775 [6] and IETF RFC 5555 [2] in order to register its Home Address and Care-of Address at the HA, if it detects it is in the foreign network.

If both IPv4 and IPv6 Care-of Address are received at the foreign network, the UE shall first attempt to use the IPv6 Care-of Address for its binding registration. The UE shall not register both IPv4 and IPv6 Care-of Address to its HA.

If IPv6 Care-of Address is used for initial binding registration, the UE shall send the Binding Update message to the IPv6 address of the HA. In this Binding Update message the H (home registration) and A (acknowledge) bits shall be set. If the UE needs an IPv4 Home Address, the UE shall include the 0.0.0.0 address in the IPv4 Home Address option to request a dynamic IPv4 Home Address.

When IPv6 Care-of Address is used for initial binding registration, the Alternate Care-of Address option shall be used by the UE to carry the Care-of Address inside a Mobility Header which is protected by ESP. If this option is present, the address included in this option is the same address present in the source address of the IPv6 packet.

If IPv4 Care-of Address is used for initial binding registration, the UE shall send the Binding Update as follows (see IETF RFC 5555 [2]):

- The IPv6 packet, with the IPv6 Home Address as the Source Address field of the IPv6 header, shall be encapsulated in UDP.
- The UE shall include the IPv4 Care-of Address as the Source Address field of the IPv4 header and the HA IPv4 address as the Destination Address field of the IPv4 header.
- The UE shall include the IPv4 Care-of Address option containing the IPv4 Care-of Address.

- The UE shall set the H (home registration) and A (acknowledge) flags.
- The UE shall set the F (UDP encapsulation required) flag to 0.
- The UE shall set the R (Mobile Router Flag) flag to 1.
- If the UE needs an IPv4 Home Address, the UE shall include an IPv4 Home Address option with the 0.0.0.0 address in the Binding Update message, as defined in IETF RFC 5555 [2].

When the UE receives the Binding Acknowledgement from the HA, it shall validate it based on the rules described in IETF RFC 3775 [6] and IETF RFC 5555 [2]. If the Binding Acknowledgement contains the successful status code 0 ("Binding Update Accepted"), the UE shall create an entry for the registered Home Address in its Binding Update List and may start sending packets containing its IPv6 Home Address or other IPv6 addresses auto-configured from the assigned home network prefix.

If the Binding Acknowledgement contains a value of 128, the UE may re-send the BU as specified in IETF RFC 3775 [6]. If the Binding Acknowledgement contains a value from 129 to 133 as specified in IETF RFC 3775 [6] or a value from 140 to 143 as specified in IETF RFC 3963 [29], the UE shall not send the BU to the HA and should discover another HA.

If the Binding Acknowledgment contains an IPv4 Address Acknowledgement option with status code value from 0 to 127 (indicating success), the UE shall create two entries in its Binding Update List, one for the IPv6 Home Address and another for the IPv4 Home Address. If the Binding Acknowledgement contains an IPv4 Address Acknowledgment option with status code indicating error (i.e. 128 or higher), the UE shall create an entry only for the IPv6 HoA in its binding update list. Moreover, if the status code is 129 ("Administratively prohibited") or 132 ("Dynamic IPv4 home address assignment not available"), the UE shall not re-send the Binding Update and it shall use only the IPv6 HoA. If the Binding Acknowledgement contains an IPv4 Address Acknowledgement option with status 128 ("Failure, reason unspecified"), 130 ("Incorrect IPv4 home address"), 131 ("Invalid IPv4 address") or 133 ("Prefix allocation unauthorized") it shall re-send the Binding Update including the 0.0.0.0 address in the IPv4 Home Address option. If the Binding Acknowledgement does not contain an IPv4 Address Acknowledgment option, the UE shall create an entry only for the IPv6 HoA in its binding update list.

NOTE: The value to be used to identify the IPv4 address acknowledgement option in the mobility header is 30;

The UE may then send data traffic either with the IPv6 Home Address or with the IPv4 Home Address. If the UE is located on an IP6-enabled link, it shall send IPv6 packets as described in IETF RFC 3775 [6]; IPv4 traffic shall be encapsulated in IPv6 packets as described in IETF RFC 5555 [2]. If the UE is located on an IPv4-only link and the Binding Acknowledgement contains the NAT detection option with the F flag set, the UE shall send IPv6 and IPv4 packets following the vanilla UDP encapsulation rules specified in IETF RFC 5555 [2]. Otherwise the UE shall send IPv6 and IPv4 packets encapsulated in IPv4 as specified in IETF RFC 5555 [2].

Once the DSMIPv6 tunnel is established, the UE may build a DHCPv4 or DHCPv6 message as described in IETF RFC 4039 [26] or IETF RFC 3736 [13] respectively and send it via the DSMIPv6 tunnel as described in IETF RFC 3775 [6] in order to retrieve additional parameters, e.g. Vendor-specific options.

From TS 24.303 clause 5.2.2.3

If the access network supports IPv6, as soon as the UE has received via a Router Advertisement at least an IPv6 prefix which is not present in its Prefix List, the UE shall perform the Home Link detection as specified in subclause 5.1.2.3.

If the UE detects it is not attached to the home link, the UE shall send a Binding Update to the HA including the newly configured IP address as the Care-of Address in the Source IP address of the packet and optionally in the Alternate Care-of Address Option [6]. The UE build the Binding Update message as specified in IETF RFC 3775 [6].

If the UE has been assigned also an IPv4 Home Address and wants to update also the binding for it, the UE shall include the IPv4 Home Address option including the assigned IPv4 Home Address in the same Binding Update message.

If the UE has been assigned also an IPv4 Home Address and wants to release it, the UE shall not include any IPv4 Home Address option in the same Binding Update.

If the UE does not have an IPv4 Home Address but wants to configure one, the UE shall include the IPv4 Home Address option with the 0.0.0.0 address as specified in subclause 5.1.2.4.

If the access network supports only IPv4, as soon as the UE has configured an IPv4 Care-of Address which is different from the previous Care-of Address, the UE shall send a Binding Update tunnelled in UDP as specified in IETF RFC 5555 [2]. The UE shall set the F flag to "0". The UE shall set the R flag to "1".

Independent of an IPv6 or IPv4 access network the UE shall set the Key Management Capability (K) bit in the Binding Update message.

Reference(s)

3GPP TS 24.327 clause 5.1.2.5

3GPP TS 24.303 clauses 5.1.2.3, 5.1.2.4 and 5.2.2.3

17.3.6.3 Test purpose

To verify that when the UE has established a security association with the Home Agent and received the IPv6 Home Address, upon detecting that it is not on the Home Link, it transmits a Binding Update message in order to register it Home Address and Care-of-Address at the Home Agent.

17.3.6.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.
- User Equipment:
  - The UE's Prefix List has been cleared.
  - The UE shall be in MM-state "Idle, updated".
  - The UE has acquired an IPv4 address.
  - The UE has established a security association with the Home Agent and obtained an IPv6 Home Address, by executing the steps in test case 17.3.4.

Related ICS/IXIT Statements

Support of mobility between 3GPP WLAN Interworking and 3GPP Systems

Test procedure

a) The UE transmits a Binding Update with its IPv4 CoA in the IP Source Address field of the IP Header and the IPv4 Home Agent address in the IP destination Address field of the outer IP header.

b) The SS transmits a Binding Acknowledgement accepting the Binding Update.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1	→		Binding Update	Binding Update contains UE's IPv4 CoA in the IP Source Address field of the IP Header and the IPv4 Home Agent address in the IP destination Address field of the outer IP header
2	←		Binding Acknowledgement	Binding Acknowledgement accepting the Binding Update

Specific Message Contents

Binding Update (Step1)

Use the default message contents found in TS 34.108, clause 9.1.4, with the following exceptions:

Information Element	Value/remark
IPv4 Home Address option	Optional: Set to the value "0.0.0.0" to request allocation for the UE. The "P" flag is set to '0'B. The Prefix Length is set to the requested prefix length of '32'.
Alternate Care-of Address option	Not present

Binding Acknowledgement (Step 2)

Use the default message contents found in TS 34.108, clause 9.1.4.

17.3.6.5 Test requirements

1. At Step 1, UE shall send a Binding Update with its IPv4 CoA in the IP Source Address field of the IP Header and the IPv4 Home Agent address in the IP destination Address field of the IP header.

17.3.7 Re-registration of IPv6 CoA

17.3.7.1 Definition and applicability

This test case is applicable for all UEs which support mobility between 3GPP WLAN Interworking and 3GPP Systems.

17.3.7.2 Conformance requirement

From TS 24.303 clause 5.3.2

As specified in IETF RFC 3775 [6], if the UE wants to extend the validity of an existing binding at the HA, the UE shall send a new Binding Update to the HA before the expiration of the lifetime indicated in the received Binding Acknowledgement, even if it is not changing its primary Care-of Address. This Binding Update is usually referred as periodic Binding Update.

The UE shall follow the rules described in IETF RC 3775 [6], IETF RFC 5555 [2] and in subclause 5.1.2.4 to send a periodic Binding Update and handle the associated Binding Acknowledgement. As the UE has not performed any handover, the UE shall confirm the already registered Care of Address and shall indicate the desired lifetime value. In a periodic Binding Update the UE may request an IPv4 Home Address.

Reference(s)

3GPP TS 24.303 clause 5.3.2

17.3.7.3 Test purpose

To verify that when the registration of the UE's Care-of-Address is about to expire, the UE initiates the re-registration procedure to extend the lifetime of the registration of its Care-of-Address.

17.3.7.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.
- User Equipment:
  - The UE's Prefix List has been cleared.

- The UE shall be in MM-state "Idle, updated".
- The UE has acquired an IP address.
- The UE has established a security association with the Home Agent and obtained an IPv6 Home Address, by executing the steps in test case 17.3.4 with the following exception: the IPv6 home prefix assigned to the UE by the SS shall be the same as the prefix used during IP address acquisition by the UE.

Related ICS/IXIT Statements

Support of mobility between 3GPP WLAN Interworking and 3GPP Systems

Test procedure

a - c) The UE registers its IPv6 Home Address and IPv6 Care-of-Address at the Home Agent by performing steps a – c) defined in test case 17.3.5.

d) Within 10 min of Step c), the UE transmits a Binding Update with its IPv6 CoA in the IP Source Address field of the IP Header and the IPv6 Home Agent address in the IP Destination Address field of the IP header.

e) The SS transmits a Binding Acknowledgement accepting the Binding Update.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1-3			Steps defined in test case 17.3.5	The same messages as in test case 17.3.5 Steps 1-3 are used.
4	→		Binding Update	Binding Update contains UE's IPv6 CoA in the IP Source Address field of the IP Header and the IPv6 Home Agent address in the IP Destination Address field of the IP header. Message shall be sent within 10 min of Step 3.
5	←		Binding Acknowledgement	Binding Acknowledgement accepting the Binding Update

Specific Message Contents

Binding Update (Step 4)

Use the default message contents found in TS 34.108, clause 9.1.4, with the following exceptions:

Information Element	Value/remark
IPv4 Home Address option	Optional: If an IPv4 Home Address was included in the Binding Acknowledgement sent by the SS at Step 3, field should be set to this IPv4 Home Address. Else, set to the value "0.0.0.0" to request allocation for the UE. The "P" flag is set to '0'. The Prefix Length is set to the requested prefix length of '32'.
Alternate Care-of Address option	Same IPv6 address as that inserted in the IP Source Address field

Binding Acknowledgement (Step 5)

Use the default message contents found in TS 34.108, clause 9.1.4, with the following exceptions:

Information Element	Value/remark
P	Not present

17.3.7.5 Test requirements

1. Within 10 min of Step 3, UE shall send a Binding Update with its IPv6 CoA in the IP Source Address field of the IP Header and the IPv6 Home Agent address in the IP Destination Address field of the IP header.

17.3.8 Re-registration of Ipv4 CoA

17.3.8.1 Definition and applicability

This test case is applicable for all UEs which support mobility between 3GPP WLAN Interworking and 3GPP Systems.

17.3.8.2 Conformance requirement

From TS 24.303 clause 5.3.2

As specified in IETF RFC 3775 [6], if the UE wants to extend the validity of an existing binding at the HA, the UE shall send a new Binding Update to the HA before the expiration of the lifetime indicated in the received Binding Acknowledgement, even if it is not changing its primary Care-of Address. This Binding Update is usually referred as periodic Binding Update.

The UE shall follow the rules described in IETF RC 3775 [6], IETF RFC 5555 [2] and in subclause 5.1.2.4 to send a periodic Binding Update and handle the associated Binding Acknowledgement. As the UE has not performed any handover, the UE shall confirm the already registered Care of Address and shall indicate the desired lifetime value. In a periodic Binding Update the UE may request an IPv4 Home Address.

Reference(s)

3GPP TS 24.303 clause 5.3.2

17.3.8.3 Test purpose

To verify that when the registration of the UE's Care-of-Address is about to expire, the UE initiates the re-registration procedure to extend the lifetime of the registration of its Care-of-Address.

17.3.8.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.
- User Equipment:
  - The UE's Prefix List has been cleared.
  - The UE shall be in MM-state "Idle, updated".
  - The UE has acquired an IPv4 address.
  - The UE has established a security association with the Home Agent and obtained an IPv6 Home Address, by executing the steps in test case 17.3.4.

Related ICS/IXIT Statements

Support of mobility between 3GPP WLAN Interworking and 3GPP Systems

Test procedure

a - b) The UE registers its IPv6 Home Address and IPv4 Care-of-Address at the Home Agent by performing steps a –b) defined in test case 17.3.6.

c) Within 10 min of Step b), the UE transmits a Binding Update with its IPv4 CoA in the IP Source Address field of the outer IP Header and the IPv4 Home Agent address in the IP Destination Address field of the outer IP header.

d) The SS transmits a Binding Acknowledgement accepting the Binding Update.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1-2			Steps defined in test case 17.3.6	The same messages as in test case 17.3.6 Steps 1-2 are used.
3	→		Binding Update	Binding Update contains UE's IPv4 CoA in the IP Source Address field of the outer IP Header and the IPv4 Home Agent address in the IP Destination Address field of the outer IP header. Message shall be sent within 10 min of Step 2.
4	←		Binding Acknowledgement	Binding Acknowledgement accepting the Binding Update

Specific Message Contents

Binding Update (Step 3)

Use the default message contents found in TS 34.108, clause 9.1.4, with the following exceptions:

Information Element	Value/remark
IPv4 Home Address option	Optional: If an IPv4 Home Address was included in the Binding Acknowledgement sent by the SS at Step 2, field should be set to this IPv4 Home Address. Else, set to the value "0.0.0.0" to request allocation for the UE. The "P" flag is set to '0'. The Prefix Length is set to the requested prefix length of '32'.
Alternate Care-of Address option	Not present

Binding Acknowledgement (Step 4)

Use the default message contents found in TS 34.108, clause 9.1.4, with the following exceptions:

Information Element	Value/remark
P	Not present

17.3.8.5 Test requirements

1. Within 10 min of Step 2, UE shall send a Binding Update with its IPv4 CoA in the IP Source Address field of the outer IP Header and the IPv4 Home Agent address in the IP Destination Address field of the outer IP header.

17.3.9 Return to home link

17.3.9.1 Definition and applicability

This test case is applicable for all UEs which support mobility between 3GPP WLAN Interworking and 3GPP Systems.

17.3.9.2 Conformance requirement

From TS 24.327 clause 5.2.2.1

When the UE is connected to the GPRS systems and wants to move to 3GPP I-WLAN, the UE shall initiate the tunnel establishment procedure towards the PDG as described in 3GPP TS 24.234 [5] and shall then perform the home link detection as described in subclause 5.1.2.4:

…

- If the UE is on the home link, the UE shall send a Binding Update with lifetime set to 0 to remove the binding at the HA as specified in 3GPP TS 24.303 [3].

From TS 24.327 clause 5.2.3.1

Once the UE is attached to the GPRS system and after performing the PDP context activation procedure, it will receive a new PDP address as a Care-of-Address. The UE shall then perform the home link detection procedure as specified in subclause 5.1.2.4:

….

- If the UE is on the home link, the UE shall send a Binding Update with lifetime set to 0 to remove the binding at the HA as specified in 3GPP TS 24.303 [3].

From TS 24.303 clause 5.2.2.4

If the access network supports IPv6, as soon as the UE has received via a Router Advertisement message at least an IPv6 prefix which is not present in its Prefix List, the UE shall perform the Home Link detection as specified in subclause 5.1.2.3 to detect if the UE is attaching to the home link. If the UE detects it is attached to the home link and there is a valid DSMIPv6 Binding Update list entry at the UE, the UE shall send a Binding Update with the Lifetime field set to "0" in order to remove the binding at the HA, as specified in IETF RFC 3775 [6]. If an IPv4 home address was assigned to the UE, as an optimization the UE may not include the IPv4 home address option as the binding for the IPv4 home address will be removed by the HA. Independent of an IPv6 or IPv4 access network the UE shall set the Key Management Capability (K) bit in the de-registration Binding Update message. The UE may preserve the IKEv2 session in order to avoid re-establishing the session when the next handover occurs. If there is not a safe assumption that the UE will remain in the home link (e.g. switching off the non-3GPP radio interface in case of a dual radio terminal), the UE should preserve the IKEv2 session.

Reference(s)

3GPP TS 24.327 clauses 5.2.2.1 and 5.2.3.1

3GPP TS 24.303 clause 5.2.2.4

17.3.9.3 Test purpose

To verify that when the UE detects it is attached to the home link, it transmits a Binding Update message with the lifetime field set to “0”.

17.3.9.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.
- User Equipment:
  - The UE shall be in MM-state "Idle, updated".
  - The UE has acquired an IP address.
  - The UE has established a security association with the Home Agent and obtained an IPv6 Home Address, by executing the steps in test case 17.3.4 with the following exception: the IPv6 home prefix assigned to the UE by the SS shall be the same as the prefix used during IP address acquisition by the UE.
  - The UE has registered its IPv6 Home Address and its Care-of-Address (acquired IPv6 address) at the Home Agent, by executing the steps in test case 17.3.5.

Related ICS/IXIT Statements

Support of mobility between 3GPP WLAN Interworking and 3GPP Systems

Test procedure

a) The SS broadcasts a Router Advertisement with a Prefix Information Option containing an IPv6 prefix matching the Home Network Prefix assigned to the UE during the preamble.

b) The UE transmits a Binding Update message with the lifetime field set to “0”.

c) The SS transmits a Binding Acknowledgement accepting the Binding Update with the lifetime field set to "0".

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1	←		Router Advertisement	The Prefix Information Option in the Router Advertisement contains an IPv6 prefix matching the Home Network Prefix assigned to the UE during the preamble
2	→		Binding Update	Lifetime field is set to "0"
3	←		Binding Acknowledgement	Binding Acknowledgement accepting the Binding Update with the lifetime field set to "0"

Specific Message Contents

Router Advertisement (Step 1)

Use the default message contents found in TS 34.108, clause 9.1.4, with the following exceptions:

Information Element	Value/remark
Prefix	IPv6 prefix equal to Home Network Prefix assigned to the UE during preamble

Binding Update (Step 2)

Use the default message contents found in TS 34.108, clause 9.1.4, with the following exceptions:

Information Element	Value/remark
Lifetime	'0000000000000000'B
IPv4 Home Address option	Not present
Alternate Care-of Address option	Not present

Binding Acknowledgement (Step 3)

Use the default message contents found in TS 34.108, clause 9.1.4, with the following exceptions:

Information Element	Value/remark
Lifetime	'0000000000000000'B
IPv4 Address Acknowledgement option	Not present
Binding Refresh Advice option	Not present

17.3.9.5 Test requirements

1. At Step 2, UE shall send a Binding Update message with the lifetime field set to "0".

17.3.10 Security association establishment

17.3.10.1 Definition and applicability

This test case is applicable for all UEs which support mobility between 3GPP WLAN Interworking and 3GPP Systems.

17.3.10.2 Conformance requirement

Reference(s)

3GPP TS 24.327 clause 5.4.1

UE and HA may create a child security association using the IKEv2 session established as described in subclause 5.1.2.3. This child security association is used to cipher or integrity protect, or both, all data traffic exchanged

within the DSMIPv6 tunnel. The profiles for tunnel mode IPsec ESP are defined in 3GPP TS 33.234 [19]. The procedure is initiated by the HA and may be initiated at any time after the security association between UE and HA has been set up. The support of this procedure is optional for both the HA and the UE.

3GPP TS 24.327 clause 5.4.2

When the UE receives a CREATE_CHILD_SA request from the HA with selectors indicating the DSMIPv6 tunnel traffic, the UE should reply with a CREATE_CHILD_SA response selecting the preferred transform proposed by the HA as specified in IETF RFC 4306 [9].

If the child SA is created successfully, the UE shall start ciphering or integrity protecting, or both, all the uplink packets in the DSMIPv6 tunnel as negotiated with the HA during the CREATE_CHILD_SA procedure.

The UE may stop ciphering or integrity protecting, or both, the DSMIPv6 tunnel traffic. In order to do that, the UE shall delete the respective child security association by sending an INFORMATIONAL request message including the DELETE payload as specified in IETF RFC 4306 [9]. The protocol ID shall be set to 3 in order to indicate that only the ESP SA shall be removed.

3GPP TS 24.327 clause 5.4.3

After establishing the IPsec security association with the UE as described in subclause 5.1.3.3, the HA may optionally trigger the creation of a child security association to protect the traffic send via the DSMIPv6 tunnel.

In order to activate the protection of DSMIPv6 tunnel traffic, the HA shall initiate the creation of a child security association sending a CREATE_CHILD_SA request message to the UE. In the CREATE_CHILD_SA message the HA shall request for an ESP security association; the HA shall also set the SA payload depending if integrity protection or ciphering, or both, are needed as described in IETF RFC 4306 [9]. The traffic selectors shall be set as described in subclause 5.2.4 of IETF RFC 3776 [11].

If the child security association is created successfully, the HA shall start ciphering or integrity protecting, or both, all the downlink packets in the DSMIPv6 tunnel as negotiated with the UE during the CREATE_CHILD_SA procedure.

At any time the HA may stop ciphering or integrity protecting, or both, the DSMIPv6 tunnel traffic. In order to do that, the HA shall delete the respective child security association by sending an INFORMATIONAL request message including the DELETE payload as specified in IETF RFC 4306 [9]. The protocol ID shall be set to 3 in order to indicate that only the ESP SA shall be removed.

After establishing the IPsec security association with the UE as described in subclause 5.1.3.3, the HA may optionally trigger the creation of a child security association to protect the traffic send via the DSMIPv6 tunnel.

In order to activate the protection of DSMIPv6 tunnel traffic, the HA shall initiate the creation of a child security association sending a CREATE_CHILD_SA request message to the UE. In the CREATE_CHILD_SA message the HA shall request for an ESP security association; the HA shall also set the SA payload depending if integrity protection or ciphering, or both, are needed as described in IETF RFC 4306 [9]. The traffic selectors shall be set as described in subclause 5.2.4 of IETF RFC 3776 [11].

If the child security association is created successfully, the HA shall start ciphering or integrity protecting, or both, all the downlink packets in the DSMIPv6 tunnel as negotiated with the UE during the CREATE_CHILD_SA procedure.

At any time the HA may stop ciphering or integrity protecting, or both, the DSMIPv6 tunnel traffic. In order to do that, the HA shall delete the respective child security association by sending an INFORMATIONAL request message including the DELETE payload as specified in IETF RFC 4306 [9]. The protocol ID shall be set to 3 in order to indicate that only the ESP SA shall be removed.

17.3.10.3 Test purpose

To verify that when the HA sets up a Child SA by sending a CREATE_CHILD_SA Request the UE replies with a CREATE_CHILD_SA Response.

17.3.10.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.

- User Equipment:
  - The UE shall be in MM-state "Idle, updated".
  - The UE has acquired an IP address.
  - The UE has discovered the IP address of the Home Agent (either via DNS, IKEv2 signalling or during PDP context activation procedure).
  - The UE has set up a Security Association with the Home Agent

Related ICS/IXIT Statements

Support of mobility between 3GPP WLAN Interworking and 3GPP Systems

Test procedure

a) The SS transmits a CREATE_CHILD_SA Request message including traffic selectors fields (TSi and TSr) that contain the parameters identifying the data traffic to be encrypted.

b) The UE transmits a CREATE_CHILD_SA Response message.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1	→		CREATE_CHILD_SA Request	CREATE_CHILD_SA Request message includes traffic selectors fields (TSi and TSr) that contain the parameters identifying the data traffic to be encrypted
2	←		CREATE_CHILD_SA Response	

Specific Message Contents

CREATE_CHILD_SA Request (Step 1)

Information Element	Value/remark
IKE Header	
- Initiator's IKE_SA SPI	Same as that set by the SS in IKE_SA exchange
- Responder's IKE_SA SPI	Same as that set by the UE in IKE_SA exchange
- Next Payload	'00101110'B (E)
- Exchange Type	'00 100100'B (CREATE_CHILD_SA)
Encrypted Payload	
- Next Payload	'00100001'B (SA)
- Initialization Vector	Random value set by the UE

- Encrypted IKE Payloads	
- Security Association Payload	
- Next Payload	'00101000'B (Ni)
- More proposal	'00000010'B
- Proposal #	'00000001'B (First cryptographic suite)
- Protocol ID	'00000011'B
- SPI size	'00000100'B
- Number of transforms	'00000010'B
- SPI	Set by the SS
- More transform	'00000011'B (This is the transform for confidentiality)
- Transform type	'00000001'B (Encryption)
- Transform ID	'00000011'B (3DES in CBC mode)
- Last transform	'00000011'B (This is the transform for integrity)
- Transform type	'00000011'B (Integrity)
- Transform ID	'00000010'B (HMAC-SHA1-96)
- Last proposal	'00000000'B
- Proposal #	'00000010'B (Second cryptographic suite)
- Protocol ID	'00000011'B (ESP)
- SPI size	'00000100'B
- Number of transforms	'00000010'B
- SPI	Set by the SS
- More transform	'00000011'B (This is the transform for confidentiality)
- Transform type	'00000001'B (Encryption)
- Transform ID	'00001011'B (AES with 128-bit keys in CBC mode)
- Last transform	'00000011'B (This is the transform for integrity)
- Transform type	'00000011'B (Integrity)
- Transform ID	'00000101'B (AES-XCBC-MAC-96)
- Nonce Payload	
- Next Payload	'00101100'B (TSi)
- Nonce data	Random number set by the SS
- Traffic Selector – Initiator Payload	
- Next Payload	'00101101'B (TSr)
- Number of traffic selectors	'00000001'B
- TS type	'00001000'B (IPv6 range)
- Starting address	HoA address derived from HNP
- Ending address	HoA address derived from HNP
- Traffic Selector – Responder Payload	
- Next Payload	'00101001'B (Notify – Use transport mode)
- Traffic Selector data	Any value
- Use transport mode Notify Payload	'00101001'B (Notify – Use tunnel mode)
- Next Payload	'00000011'B (ESP)
- Protocol ID	'00000100'B
- SPI size	'1000000000000111'B (Use tunnel mode)
- Notify Message Type	Same as that set by the SS in SA proposal #1
- SPI	'00000000'B (SPI field not present)
- Use transport mode Notify Payload	
- Next Payload	'00000000'B (No Next Payload)
- Protocol ID	'00000011'B (ESP)
- SPI size	'00000100'B
- Notify Message Type	'1000000000000111'B (Use transport mode)
- SPI	Set by the SS
- Padding	Set by the SS
- Pad Length	Set by the SS
- Integrity checksum data	Set by the SS

CREATE_CHILD_SA Response (Step 2)

Information Element	Value/remark
IKE Header	
- Initiator's IKE_SA SPI	Same as that set by the UE in IKE_SA exchange
- Responder's IKE_SA SPI	Same as that set by the SS in IKE_SA exchange
- Next Payload	'00101110'B (E)
- Exchange Type	'00 100100'B (CREATE_CHILD_SA)
Encrypted Payload	
- Next Payload	'00100001'B (SA)
- Initialization Vector	Set by the SS
- Encrypted IKE Payloads	
- Security Association Payload	
- Next Payload	'00101000'B (Nr)
- Last proposal	'00000000'B
- Proposal #	One of the 2 proposals included in the CREATE_CHILD_SA Request at Step 1
- Protocol ID	'00000011'B (ESP)
- SPI size	'00000100'B
- SPI	Set by the UE
- First transform	'00000011'B (This is the transform for confidentiality)
- Transform type	'00000001'B (Encryption)
- Transform attribute type	The corresponding value of the chosen proposal
- Last transform	'00000011'B (This is the transform for integrity)
- Transform type	'00000011'B (Integrity)
- Transform attribute type	The corresponding value of the chosen proposal
- Nonce Payload	
- Next Payload	'00101100'B (TSi)
- Nonce data	Set by the SS
- Traffic Selector – Initiator Payload	
- Next Payload	'00101101'B (TSr)
- Traffic Selector – Responder Payload	
- Next Payload	'00101001'B (Notify – Use transport mode)
- Use transport mode Notify Payload	
- Next Payload	'00000000'B (No Next Payload)
- Protocol ID	'00000011'B (ESP)
- SPI size	Set by the UE
- Notify Message Type	'1000000000000111'B (Use transport mode)
- SPI	Set by the UE
- Padding	Set by the UE
- Pad Length	Set by the UE
- Integrity checksum data	Set by the UE

17.3.10.5 Test requirements

1. At Step 2, UE shall send a CREATE_CHILD_SA response addressed to the Home Agent to initiate data traffic tunnelling.

17.3.11 Termination of protection of DSMIPv6 tunnel traffic by Home Agent

17.3.11.1 Definition and applicability

This test case is applicable for all UEs which support mobility between 3GPP WLAN Interworking and 3GPP Systems.

17.3.11.2 Conformance requirement

From TS 24.327 clause 5.4.1

UE and HA may create a child security association using the IKEv2 session established as described in subclause 5.1.2.3. This child security association is used to cipher or integrity protect, or both, all data traffic exchanged within the DSMIPv6 tunnel. The profiles for tunnel mode IPsec ESP are defined in 3GPP TS 33.234 [19]. The procedure is initiated by the HA and may be initiated at any time after the security association between UE and HA has been set up. The support of this procedure is optional for both the HA and the UE.

From TS 24.327 clause 5.4.2

When the UE receives a CREATE_CHILD_SA request from the HA with selectors indicating the DSMIPv6 tunnel traffic, the UE should reply with a CREATE_CHILD_SA response selecting the preferred transform proposed by the HA as specified in IETF RFC 4306 [9].

If the child SA is created successfully, the UE shall start ciphering or integrity protecting, or both, all the uplink packets in the DSMIPv6 tunnel as negotiated with the HA during the CREATE_CHILD_SA procedure.

The UE may stop ciphering or integrity protecting, or both, the DSMIPv6 tunnel traffic. In order to do that, the UE shall delete the respective child security association by sending an INFORMATIONAL request message including the DELETE payload as specified in IETF RFC 4306 [9]. The protocol ID shall be set to 3 in order to indicate that only the ESP SA shall be removed.

From TS 24.327 clause 5.4.3

After establishing the IPsec security association with the UE as described in subclause 5.1.3.3, the HA may optionally trigger the creation of a child security association to protect the traffic send via the DSMIPv6 tunnel.

In order to activate the protection of DSMIPv6 tunnel traffic, the HA shall initiate the creation of a child security association sending a CREATE_CHILD_SA request message to the UE. In the CREATE_CHILD_SA message the HA shall request for an ESP security association; the HA shall also set the SA payload depending if integrity protection or ciphering, or both, are needed as described in IETF RFC 4306 [9]. The traffic selectors shall be set as described in subclause 5.2.4 of IETF RFC 3776 [11].

If the child security association is created successfully, the HA shall start ciphering or integrity protecting, or both, all the downlink packets in the DSMIPv6 tunnel as negotiated with the UE during the CREATE_CHILD_SA procedure.

At any time the HA may stop ciphering or integrity protecting, or both, the DSMIPv6 tunnel traffic. In order to do that, the HA shall delete the respective child security association by sending an INFORMATIONAL request message including the DELETE payload as specified in IETF RFC 4306 [9]. The protocol ID shall be set to 3 in order to indicate that only the ESP SA shall be removed.

After establishing the IPsec security association with the UE as described in subclause 5.1.3.3, the HA may optionally trigger the creation of a child security association to protect the traffic send via the DSMIPv6 tunnel.

In order to activate the protection of DSMIPv6 tunnel traffic, the HA shall initiate the creation of a child security association sending a CREATE_CHILD_SA request message to the UE. In the CREATE_CHILD_SA message the HA shall request for an ESP security association; the HA shall also set the SA payload depending if integrity protection or ciphering, or both, are needed as described in IETF RFC 4306 [9]. The traffic selectors shall be set as described in subclause 5.2.4 of IETF RFC 3776 [11].

If the child security association is created successfully, the HA shall start ciphering or integrity protecting, or both, all the downlink packets in the DSMIPv6 tunnel as negotiated with the UE during the CREATE_CHILD_SA procedure.

At any time the HA may stop ciphering or integrity protecting, or both, the DSMIPv6 tunnel traffic. In order to do that, the HA shall delete the respective child security association by sending an INFORMATIONAL request message including the DELETE payload as specified in IETF RFC 4306 [9]. The protocol ID shall be set to 3 in order to indicate that only the ESP SA shall be removed.

Reference(s)

3GPP TS 24.327 clauses 5.4.1, 5.4.2 and 5.4.3

17.3.11.3 Test purpose

To verify that when the Home Agent terminates the previously set up Child SA by sending an INFORMATIONAL Request, the UE replies with an INFORMATIONAL Response.

17.3.11.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.
- User Equipment:

- The UE shall be in MM-state "Idle, updated".
- The UE has acquired an IP address.
- The UE has discovered the IP address of the Home Agent (either via DNS, IKEv2 signalling or during PDP context activation procedure).
- The UE has set up a Security Association with the Home Agent.
- The Home Agent has set up a child Security Association to protect data traffic.

Related ICS/IXIT Statements

Support of mobility between 3GPP WLAN Interworking and 3GPP Systems

Test procedure

a) The SS transmits an INFORMATIONAL Request message including a DELETE payload with the SPI value of the security association set up during preamble to protect data traffic.

b) The UE transmits an INFORMATIONAL Response message including a DELETE payload with the SPI value of the security association set up during preamble to protect data traffic..

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1	←		INFORMATIONAL Request	INFORMATIONAL Request message includes a DELETE payload indicating the SPIs of the CHILD_SA to be removed
2	→		INFORMATIONAL Response	

Specific Message Contents

INFORMATIONAL Request (Step 1)

Information Element	Value/remark
IKE Header	
- Initiator's IKE_SA SPI	Same as that set by the SS in IKE_SA exchange
- Responder's IKE_SA SPI	Same as that set by the UE in IKE_SA exchange
- Next Payload	'00101110'B (E)
- Exchange Type	'00 100101'B (INFORMATIONAL)
Encrypted Payload	
- Next Payload	'00101010'B (DELETE payload)
- Encrypted IKE Payloads	
- Delete Payload	
- Next Payload	'00000000'B (No Next Payload)
- Protocol ID	'00000011'B (ESP)
- SPI size	'00000100'B
- SPI	Same as the one set by SS when creating the CHILD_SA
- Padding	Set by the SS
- Pad Length	Set by the SS
- Integrity checksum data	Set by the SS

INFORMATIONAL Response (Step 2)

Information Element	Value/remark
IKE Header	
- Initiator's IKE_SA SPI	Same as that set by the UE in IKE_SA exchange
- Responder's IKE_SA SPI	Same as that set by the SS in IKE_SA exchange
- Next Payload	'00101110'B (E)
- Exchange Type	'00 100101'B (INFORMATIONAL)
Encrypted Payload	
- Next Payload	'00101010'B (DELETE payload)
- Encrypted IKE Payloads	
- Delete Payload	
- Next Payload	'00000000'B (No Next Payload)
- Protocol ID	'00000011'B (ESP)
- SPI size	'00000100'B
- SPI	Same as the one set by UE when creating the CHILD_SA
- Padding	Set by the UE
- Pad Length	Set by the UE
- Integrity checksum data	Set by the UE

17.3.11.5 Test requirements

1. At Step 2, the UE shall send an INFORMATIONAL response addressed to the Home Agent to stop data traffic encryption.

17.3.12 Dual-Stack Mobile IPv6 detach in IPv6 network

17.3.12.1 Definition and applicability

This test case is applicable for all UEs which support mobility between 3GPP WLAN Interworking and 3GPP Systems.

17.3.12.2 Conformance requirement

From TS 24.327 clause 5.3.2.1

The network-initiated detach is based on the usage of the Binding Revocation Indication (BRI) message. When the UE receives a BRI, it shall proceed as described in 3GPP TS 24.303 [3].

From TS 24.303 clause 5.4.2.1

Upon receiving a Binding Revocation Indication (BRI) message according to draft-ietf-mext-binding-revocation [19] from the HA, the UE first shall perform the required validity checks on the BRI according to draft-ietf-mext-binding-revocation [19].

The UE shall send a Binding Revocation Acknowledgement (BRA) as specified in draft-ietf-mext-binding-revocation [19]. In this message the UE shall set the status field to 'Success' to reflect that it has received the BRI message. The BRA message may be tunnelled in UDP or IPv4 as specified in subclause 5.1.2.4 for Binding Update messages.

The UE then shall remove the entry identified in the BRI as deregistered from its binding update list and shall use the procedures defined in IETF RFC 4306 [14] to remove the IPsec security associations associated with the DSMIPv6 registration as described in subclause 5.4.2.2.

From TS 24.303 clause 5.4.2.2

To detach from a specific PDN to which it is connected through a DSMIPv6 session, the UE shall send a Binding Update with the Lifetime field set to 0 as specified in IETF RFC 3775 [6].

The UE shall use the procedures defined in the IKEv2 protocol in IETF RFC 4306 [14] to remove the IPsec security associations associated with the DSMIPv6 registration. The UE shall close the security associations associated with the DSMIPv6 registration and instruct the HA to do the same by sending the INFORMATIONAL request message including a DELETE payload. The Protocol ID in the DELETE payload shall be set to "1" (IKE) to indicate that all IPsec ESP security associations that were negotiated within the IKEv2 exchange shall be deleted.

Reference(s)

3GPP TS 24.327 clause 5.3.2.1

3GPP TS 24.303 clauses 5.4.2.1 and 5.4.2.2

17.3.12.3 Test purpose

To verify that when the UE receives a Binding Revocation Indication message from the HA, it transmits a Binding Revocation Acknowledgement message with the status field set to 'Success', and removes the IPsec security associations associated with the DSMIPv6 registration.

17.3.12.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.
- User Equipment:
  - The UE shall be in MM-state "Idle, updated".
  - The UE has acquired an IPv6 address.
  - The UE has established a security association with the Home Agent and obtained an IPv6 Home Address, by executing the steps in test case 17.3.4 with the following exception: the IPv6 home prefix assigned to the UE by the SS shall be the same as the prefix used during IP address acquisition by the UE.
  - The UE has registered its IPv6 Home Address and its Care-of-Address (acquired IPv6 address) at the Home Agent, by executing the steps in test case 17.3.5.

Related ICS/IXIT Statements

Support of mobility between 3GPP WLAN Interworking and 3GPP Systems

Test procedure

a) The SS transmits a Binding Revocation Indication message to the UE.

b) The UE transmits a Binding Revocation Acknowledgement message with the status field set to 'Success'.

c) The UE transmits an IKEv2 INFORMATIONAL message containing a DELETE payload.

d) The SS transmits an IKEv2 INFORMATIONAL message containing a DELETE payload back to the UE.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1	←		Binding Revocation Indication	
2	→		Binding Revocation Acknowledgement	Status field is set to 'Success'
3	→		IKEv2 INFORMATIONAL	Message contains a DELETE payload
4	←		IKEv2 INFORMATIONAL	Message contains a DELETE payload

Specific Message Contents

Binding Revocation Indication (Step 1)

Use the default message contents found in TS 34.108, clause 9.1.4.

Binding Revocation Acknowledgement (Step 2)

Use the default message contents found in TS 34.108, clause 9.1.4.

IKEv2 INFORMATIONAL (Step 3)

Information Element	Value/remark
IKE Header	
- Initiator's IKE_SA SPI	The one identifying the UE in the SA set up during the preamble
- Responder's IKE_SA SPI	The one identifying the HA in the SA set up during the preamble
- Next Payload	'00101110'B (E)
- Exchange Type	'00100101'B (INFORMATIONAL)
Encrypted Payload	
- Next Payload	'00101010'B (DELETE)
Delete Payload	
- Next Payload	'00000000'B (No Next Payload)
- Protocol ID	'00000001'B (IKE_SA)
Padding	Set by the UE
Pad Length	Set by the UE
Integrity checksum data	Set by the UE

IKEv2 INFORMATIONAL (Step 4)

Information Element	Value/remark
IKE Header	
- Initiator's IKE_SA SPI	Same as that set by the UE at Step 3
- Responder's IKE_SA SPI	Same as that set by the SS at Step 3
- Next Payload	'00101110'B (E)
- Exchange Type	'00100101'B (INFORMATIONAL)
Encrypted Payload	
- Next Payload	'00101010'B (DELETE)
Delete Payload	
- Next Payload	'00000000'B (No Next Payload)
- Protocol ID	'00000001'B (IKE_SA)
Padding	Set by the SS
Pad Length	Set by the SS
Integrity checksum data	Set by the SS

17.3.12.5 Test requirements

1. At Step 2, UE shall send a Binding Revocation Acknowledgement message with the status field set to 'Success'.
2. At Step 3, UE shall send an IKEv2 INFORMATIONAL message containing a DELETE payload.

17.3.13 Dual-Stack Mobile IPv6 detach in IPv4 network

17.3.13.1 Definition and applicability

This test case is applicable for all UEs which support mobility between 3GPP WLAN Interworking and 3GPP Systems.

17.3.13.2 Conformance requirement

From TS 24.327 clause 5.3.2.1

The network-initiated detach is based on the usage of the Binding Revocation Indication (BRI) message. When the UE receives a BRI, it shall proceed as described in 3GPP TS 24.303 [3].

From TS 24.303 clause 5.4.2.1

Upon receiving a Binding Revocation Indication (BRI) message according to draft-ietf-mext-binding-revocation [19] from the HA, the UE first shall perform the required validity checks on the BRI according to draft-ietf-mext-binding-revocation [19].

The UE shall send a Binding Revocation Acknowledgement (BRA) as specified in draft-ietf-mext-binding-revocation [19]. In this message the UE shall set the status field to 'Success' to reflect that it has received the BRI message. The BRA message may be tunnelled in UDP or IPv4 as specified in subclause 5.1.2.4 for Binding Update messages.

The UE then shall remove the entry identified in the BRI as deregistered from its binding update list and shall use the procedures defined in IETF RFC 4306 [14] to remove the IPsec security associations associated with the DSMIPv6 registration as described in subclause 5.4.2.2.

From TS 24.303 clause 5.4.2.2

The UE shall use the procedures defined in the IKEv2 protocol in IETF RFC 4306 [14] to remove the IPsec security associations associated with the DSMIPv6 registration. The UE shall close the security associations associated with the DSMIPv6 registration and instruct the HA to do the same by sending the INFORMATIONAL request message including a DELETE payload. The Protocol ID in the DELETE payload shall be set to "1" (IKE) to indicate that all IPsec ESP security associations that were negotiated within the IKEv2 exchange shall be deleted.

Reference(s)

3GPP TS 24.327 clause 5.3.2.1

3GPP TS 24.303 clauses 5.4.2.1 and 5.4.2.2

17.3.13.3 Test purpose

To verify that when the UE receives a Binding Revocation Indication message from the HA, it transmits a Binding Revocation Acknowledgement message with the status field set to 'Success', and removes the IPsec security associations associated with the DSMIPv6 registration.

17.3.13.4 Method of test

Initial Conditions

- System simulator:
  - 1 cell, default parameters.
- User Equipment:
  - The UE shall be in MM-state "Idle, updated".
  - The UE has acquired an IPv4 address.
  - The UE has established a security association with the Home Agent and obtained an IPv6 Home Address, by executing the steps in test case 17.3.4.
  - The UE has registered its IPv6 Home Address and its Care-of-Address (acquired IPv4 address) at the Home Agent, by executing the steps in test case 17.3.6.

Related ICS/IXIT Statements

Support of mobility between 3GPP WLAN Interworking and 3GPP Systems

Test procedure

a) The SS transmits a Binding Revocation Indication message with the A flag set to the UE.

b) The UE transmits a Binding Revocation Acknowledgement message with the status field set to 'Success'.

c) The UE transmits an IKEv2 INFORMATIONAL message containing a DELETE payload.

d) The SS transmits an IKEv2 INFORMATIONAL message containing a DELETE payload back to the UE.

Expected sequence

Step	Direction		Message	Comments
	UE	SS		
1	←		Binding Revocation Indication	A flag is set
2	→		Binding Revocation Acknowledgement	Status field is set to 'Success'
3	→		IKEv2 INFORMATIONAL	Message contains a DELETE payload
4	←		IKEv2 INFORMATIONAL	Message contains a DELETE payload

Specific Message Contents

Binding Revocation Indication (Step 1)

Use the default message contents found in TS 34.108, clause 9.1.4.

Binding Revocation Acknowledgement (Step 2)

Use the default message contents found in TS 34.108, clause 9.1.4.

IKEv2 INFORMATIONAL (Step 3)

Information Element	Value/remark
IKE Header	
- Initiator's IKE_SA SPI	The one identifying the UE in the SA set up during the preamble
- Responder's IKE_SA SPI	The one identifying the HA in the SA set up during the preamble
- Next Payload	'00101110'B (E)
- Exchange Type	'00100101'B (INFORMATIONAL)
Encrypted Payload	
- Next Payload	'00101010'B (DELETE)
Delete Payload	
- Next Payload	'00000000'B (No Next Payload)
- Protocol ID	'00000001'B (IKE_SA)
Padding	Set by the UE
Pad Length	Set by the UE
Integrity checksum data	Set by the UE

IKEv2 INFORMATIONAL (Step 4)

Information Element	Value/remark
IKE Header	
- Initiator's IKE_SA SPI	Same as that set by the UE at Step 3
- Responder's IKE_SA SPI	Same as that set by the SS at Step 3
- Next Payload	'00101110'B (E)
- Exchange Type	'00100101'B (INFORMATIONAL)
Encrypted Payload	
- Next Payload	'00101010'B (DELETE)
Delete Payload	
- Next Payload	'00000000'B (No Next Payload)
- Protocol ID	'00000001'B (IKE_SA)
Padding	Set by the SS
Pad Length	Set by the SS
Integrity checksum data	Set by the SS

17.3.13.5 Test requirements

1. At Step 2, UE shall send a Binding Revocation Acknowledgement message with the status field set to 'Success'.
2. At Step 3, UE shall send an IKEv2 INFORMATIONAL message containing a DELETE payload.