43 RLC Test Cases

Applicability

All test cases in this section are applicable for the MS supporting GPRS service with RLC/MAC in acknowledged mode.

Default conditions and messages

The default conditions, message contents and macros not specified in this section must be set as in section 40.

Initial conditions

Unless otherwise indicated, the initial conditions for all acknowledged mode tests, as a minimum, are as follows. Other initial conditions may apply. In the event of conflict between initial conditions stated here and those stated in a test case, the test case shall take precedence.

- The MS is GPRS attached.
- A PDP context has been established with RLC acknowledged mode operation.

43.1 Acknowledged Mode

43.1.1 Acknowledged mode / Uplink TBF

43.1.1.1 Acknowledged mode / Uplink TBF / Send state variable V(S)

43.1.1.1.1 Conformance requirements

1. The send state variable, V(S), can take on the values 0 through 127. Each RLC data block contains a block sequence number (BSN) field that is 7 bits in length. At the time that an in-sequence RLC data block is designated for transmission, the value of BSN is set equal to the value of the send state variable.
2. V(S) shall be set to the value 0 at the beginning of each TBF in which the RLC endpoint is the transmitter.
3. The value of V(S) shall be incremented by 1 after transmission of the RLC data block with BSN = V(S).

References

GSM 04.60, section 9.1.1.

43.1.1.1.2 Test purpose

1. To verify that the mobile station sets the V(S) to 0 at the beginning of each TBF.
2. To verify that the mobile station increases the V(S) by 1 after transmission of the RLC data block with BSN set to V(S).
3. To verify that the mobile station wraps the V(S) to 0 after 127.

43.1.1.1.3 Method of test

Initial Conditions

System Simulator:

1 cell, default setting, PBCCH not present

Mobile Station:

The MS is GPRS updated with a P-TMSI allocated, SPLIT PG CYCLE negotiated and the test PDP context2 activated.

Related PICS/PIXIT Statement(s)

The way to initiate an acknowledged uplink transfer.

Test Procedure

The MS is made to send RLC data blocks. SS checks that the BSN in the RLC data block:

1. is set to the value 0 at the beginning of each TBF in which the mobile station is the transmitter;
2. is incremented by 1 in each subsequent RLC data block in the TBF; and
3. takes on all values in the range 0 to 127 and then back to 0.

Maximum Duration of Test

5 min.

Expected Sequence

Step	Direction	Message	Comments
1		{ Uplink dynamic allocation two phase access}	n = 3500 octets, USF_GRANULARITY = 1 block CHANNEL_CODING_COMMAND: cs1
2	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH assigned, containing USF assigned to the MS.
3	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH SS verifies that the BSN starts from 0.
4	SS -> MS	PACKET UPLINK ACK/NACK	SS acknowledges each RLC data block, RBB set to 1, containing USF assigned to the MS
5	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH SS verifies that the BSN is updated according to BSN(n) = (BSN(n-1) + 1) mod 128
6	-	Steps 4 & 5 are repeated atleast 128 times	
7		{ Completion of uplink RLC data block transfer}	

43.1.1.2 Acknowledged mode / Uplink TBF / Transmit window size

43.1.1.2.1 Conformance requirements

1. V(S) shall not exceed V(A) modulo 128 by more than the maximum allowed number of outstanding RLC data blocks k (window size k is defined in GSM 04.60 section 9.1.9).
2. If V(S) = V(A) + k modulo 128 (i.e., the transmit window is stalled), the mobile station shall set the stall indicator to 1 in each RLC data block transmitted and transmit the oldest RLC data block whose corresponding element in V(B) has the value PENDING_ACK, then the next oldest RLC data block whose corresponding element in V(B) has the value PENDING_ACK, etc.

References

GSM 04.60, sections 9.1.1, 9.1.3 and 9.1.9.

43.1.1.2.2 Test purpose

1. To verify that the mobile station sets the stall indicator to 1 in each RLC data block transmitted once the transmit window is stalled.
2. To verify that the mobile station retransmits data blocks that are pending acknowledgment.
3. To verify that the mobile station retransmits unacknowledged RLC data blocks in correct order while the transmit window is stalled.

43.1.1.2.3 Method of test

Initial Conditions

System Simulator:

1 cell, default setting, PBCCH not present

Mobile Station:

The MS is GPRS updated with a P-TMSI allocated, SPLIT PG CYCLE negotiated and the test PDP Context2 activated.

Related PICS/PIXIT Statement(s)

The way to initiate an acknowledged uplink transfer.

Test Procedure

The MS transmits k (window size) blocks without acknowledgement from SS. Confirm that the MS:

a) sets the stall indicator bit once the window is stalled; and

b) retransmits blocks that are pending acknowledgement, oldest first.

Maximum Duration of Test

5 min.

Expected Sequence

Step	Direction	Message	Comments
1		{ Uplink dynamic allocation two phase access}	n = 1500 octets USF_GRANULARITY = 1 block CHANNEL_CODING_COMMAND: cs1
2	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH, containing USF assigned to the MS.
3	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH
4			Repeat steps 2 and 3 until the stall indication bit is set in the data block received in step 3. SS doesn't acknowledge any of the data blocks with BSN from 0 to 63
5	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH assigned, USF assigned to the MS.
6	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH
7			Repeat steps 5 & 6 until all unacknowledged blocks are retransmitted. SS verifies that the unacknowledged data blocks are retransmitted with SI field set to 1. SS verifies that in the retransmitted blocks the BSN is from 0 to 63
8	SS->MS	Packet Uplink Ack/Nack	SS acknowledges all the data blocks USF not assigned to the MS
9			Wait for 6 blocks with no assigned USF
10	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH assigned, USF assigned to the MS.
11	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH
12	SS		Verify that MS is not retransmitting any acknowledged blocks Verify transmitted data blocks are BSNs 64 and higher
13		{ Completion of uplink RLC data block transfer}	

43.1.1.3 Acknowledged mode / Uplink TBF / Acknowledge state variable V(A)

43.1.1.3.1 Conformance requirements

1. The Acknowledge state variable V(A) contains the BSN value of the oldest RLC data block that has not been positively acknowledged by its peer. V(A) can take on the values 0 through 127.

2. V(A) shall be set to the value 0 at the beginning of each TBF in which the RLC endpoint is the transmitter.

3. The value of V(A) shall be updated from the values received from its peer in the received block bitmap (RBB) of the Packet Ack/Nack message (see subclause 9.1.8).

References

GSM 04.60, sections 9.1.2 and 9.1.8.

43.1.2.3.2 Test purpose

1. To verify that the mobile station correctly decodes the RBB and updates the values of V(A).

43.1.2.3.3 Method of test

Initial Conditions

System Simulator:

1 cell, default setting, PBCCH not present

Mobile Station:

The MS is GPRS updated with a P-TMSI allocated, SPLIT PG CYCLE negotiated and the test PDP Context2 activated.

Related PICS/PIXIT Statement(s)

The way to initiate an acknowledged uplink transfer.

Test Procedure

1. The mobile station transmits k (window size) blocks without acknowledgment from SS. SS then acknowledges the first n blocks. The mobile station then shall transmit n more data blocks.

2. The test is performed for the values of N = 10,15 and 20.

Maximum Duration of Test

5 min.

Expected Sequence

Step	Direction	Message	Comments
1		{ Uplink dynamic allocation two phase access}	n = 3000 octets USF_GRANULARITY = 1 block CHANNEL_CODING_COMMAND: cs1
2	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH, containing USF assigned to the MS.
3	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH
4			Repeat steps 2 and 3 until the stall indication bit is set in the data block received in step 3. SS doesn't acknowledge any of the data blocks with BSN from 0 to 63
5	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH assigned, USF assigned to the MS.
6	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH
7			Repeat steps 5 and 6 until unacknowledged data blocks (BSN = 0 to 30) are retransmitted with SI field set to 1
8			Wait BS_CV_MAX periods without granting USF.
9	SS -> MS	PACKET UPLINK ACK/NACK	SS acknowledges first N (=10) RLC data blocks, RBB set to 1 and negatively acknowledges the rest with RBB set to 0 USF not assigned to the MS
10			Wait for 6 blocks with no USF
11	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH assigned, USF assigned to the MS.
12	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH BSN = N & SI = 0
13	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH assigned, USF assigned to the MS.
14	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH BSN = N + 1 & SI = 0
15	SS		Repeat steps 13 and 14 until all negatively acknowledged data blocks are retransmitted followed by new data blocks SS verifies that the negatively acknowledged data blocks are retransmitted before new data blocks are sent. SS verifies that RLC data block with BSN=N is received following the reception of the data block with BSN = 63 + N SI = 1 for BSN = 63 + N
16		{ Completion of uplink RLC data block transfer}	
17	-	-	The procedure is repeated for different values of N

43.1.1.4 Acknowledged mode / Uplink TBF / Negatively acknowledged RLC data blocks

43.1.1.4.1 Conformance requirements

1. The transmitter shall transmit the oldest RLC data block whose corresponding element in V(B) indexed relative to V(A) has the value NACKED.
2. If [V(S) < V(A) + k] modulo 128 and no RLC data blocks have a corresponding element in V(B) with the value NACKED, the RLC data block with BSN = V(S) shall be transmitted.
3. As each RLC data block is transmitted the corresponding element in V(B) shall be set to the value PENDING_ACK.

References

GSM 04.60, section 9.1.3.

43.1.1.4.2 Test purpose

1. To verify that the mobile station retransmits Nacked data blocks before transmission of new information.
2. To verify that the mobile station retransmits Nacked blocks in order of age, older first.
3. To verify that the mobile station only retransmit Nacked blocks once per negative acknowledgment.

43.1.1.4.3 Method of test

Initial Conditions

System Simulator:

1 cell, default setting, , PBCCH not present, BS_CV_MAX = 0

Mobile Station:

The MS is GPRS updated with a P-TMSI allocated, SPLIT PG CYCLE negotiated and the test PDP Context2 activated.

Related PICS/PIXIT Statement(s)

The way to initiate an acknowledged uplink transfer.

Test Procedure

The MS is made to transmit RLC data blocks. The SS randomly negatively acknowledges RLC data blocks. The MS retransmits the negatively acknowledged RLC data blocks, oldest first before transmitting new RLC data blocks.

The SS does not send further acknowledgements. The MS does not retransmit the previously negatively acknowledged RLC data blocks.

Maximum Duration of Test

5 min.

Expected Sequence

Step	Direction	Message	Comments
1		{ Uplink dynamic allocation two phase access}	n = 1500 octets USF_GRANULARITY = 1 block CHANNEL_CODING_COMMAND: cs1
2	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH assigned, USF assigned to the MS.
3	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH
4			Repeat steps 2 and 3 until received data block BSN = 30
5			Wait BS_CV_MAX periods without granting USF.
6	SS -> MS	PACKET UPLINK ACK/NACK	SS acknowledges RLC data blocks with BSN 10 to 30, RBB set to 1 and negatively acknowledges the rest with RBB set to 0 USF not assigned to the MS
7			Wait for 6 blocks with no USF
8	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH assigned, USF assigned to the MS.
9	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH BSN = 0..9
10	SS		Repeat steps 8 & 9 ten times SS verifies that the Nacked data blocks are received before new data block once per negative acknowledgment. New data block BSN=31
11	SS -> MS	PACKET UPLINK ACK/NACK	SS acknowledges retransmitted (BSN 0..9) RLC data blocks, RBB set to 1
12	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH, containing USF assigned to the MS.
13	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH
14	SS		Repeat steps 11 and 12 until the stall indication bit is set in the data block received in step 12. SS verifies that acknowledged blocks are not retransmitted
15			Wait BS_CV_MAX periods without granting USF.
16	SS -> MS	PACKET UPLINK ACK/NACK	SS negatively acknowledges RLC data blocks with BSN 55 to 60, RBB set to 0 and acknowledges the rest with RBB set to 1 USF not assigned to the MS
17			Wait for 6 blocks with no USF.
18	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH assigned, USF assigned to the MS.
19	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH BSN = 55..60
20	SS		Repeat steps 18& 19 until all Nacked blocks are received SS verifies that the Nacked data blocks are received before new data blocks once per negative acknowledgment.
21		{ Completion of uplink RLC data block transfer}	

43.1.1.5 Acknowledged mode / Uplink TBF / Invalid Negative Acknowledgment

43.1.1.5.1 Conformance requirements

1. If the mobile station is the transmitter, it shall set an instance of timer T3198 for each RLC data block sent (section 9.1.3 GSM 04.60).
2. The timer T3198 shall have the expiry value set to BS_CV_MAX block periods (section 9.1.3 GSM 04.60).
3. The mobile station shall not modify the element in the acknowledge state array, V(B), corresponding to an RLC data block that cannot be validly negatively acknowledged (section 9.1.8 GSM 04.60).

References

GSM 04.60, sections 9.1.3 and 9.1.8.

43.1.1.5.2 Test purpose

1. To verify the operation of the timer T3198.
2. To verify the correct response of the mobile station to an invalid negative acknowledgement.

43.1.1.5.3 Method of test

Initial Conditions

System Simulator:

1 cell, default setting, , PBCCH not present, BS_CV_MAX = 15.

Mobile Station:

The MS is GPRS updated with a P-TMSI allocated, SPLIT PG CYCLE negotiated and the test PDP Context2 activated.

Related PICS/PIXIT Statement(s)

The way to initiate an acknowledged uplink transfer.

Test Procedure

The MS is made to send RLC data blocks. The SS negatively acknowledges some RLC data blocks within BS_CV_MAX block periods. The MS shall not retransmit the RLC data blocks that were negatively acknowledged.

Maximum Duration of Test

5 min.

Expected Sequence

Step	Direction	Message	Comments
1		{ Uplink dynamic allocation two phase access}	n = 440 octets USF_GRANULARITY = 1 block CHANNEL_CODING_COMMAND: cs1
2	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH assigned, USF assigned to the MS.
3	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH BSN = 0
4	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH assigned, USF assigned to the MS.
5	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH BSN = 1
6	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH assigned, USF assigned to the MS.
7	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH BSN = 2
8	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH assigned, USF assigned to the MS.
9	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH BSN =3
			Wait for BS_CV_MAX block period of Block BSN = 0 to expire
10	SS -> MS	PACKET UPLINK ACK/NACK	SS negatively acknowledges blocks BSN = 0 and BSN =3, RBB = 0 and acknowledges blocks BSN = 1 and BSN = 2, RBB = 1 USF not assigned to the MS
11			Wait for 6 blocks with no USF.
12	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH assigned, USF assigned to the MS.
13	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH SS verifies that data block BSN = 0 is retransmitted
14	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH assigned, USF assigned to the MS.
15	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH SS verifies that data block BSN = 3 is not retransmitted New data block received with BSN = 4
16		{ Completion of uplink RLC data block transfer}	

43.1.1.6 Acknowledged mode / Uplink TBF / Decoding of Received Block Bitmap

43.1.1.6.1 Conformance requirements

For each bit in the RBB whose corresponding BSN value is within the transmit window, if the bit contains the value '1', the corresponding element in V(B) indexed relative to SSN shall be set to the value ACKED. If the bit contains the value '0', the element in V(B) shall be set to the value NACKED. A bit within the RBB whose corresponding BSN is not within the transmit window, shall be ignored.

References

GSM 04.60, section 9.1.8.

43.1.1.6.2 Test purpose

1. To verify the decoding of the received block bitmap of the Packet Uplink Ack/Nack message.

43.1.1.6.3 Method of test

Initial Conditions

System Simulator:

1 cell, default setting, PBCCH not present

Mobile Station:

The MS is GPRS updated with a P-TMSI allocated, SPLIT PG CYCLE negotiated and the test PDP Context2 activated.

Related PICS/PIXIT Statement(s)

The way to initiate an acknowledged uplink transfer.

Test Procedure

The MS is made to send RLC data blocks. The SS negatively acknowledges one or more RLC data blocks after BS_CV_MAX block periods. The MS retransmits these blocks.

The SS negatively acknowledges data blocks outside the transmit window. The MS ignores these negative acknowledgments.

Maximum Duration of Test

5 min.

Expected Sequence

Step	Direction	Message	Comments
1		{ Uplink dynamic allocation two phase access}	n = 4000 octets USF_GRANULARITY = 1 block CHANNEL_CODING_COMMAND: cs1
2	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH assigned, USF assigned to the MS.
3	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH
4			Repeat steps 2 and 3 until received data block BSN = 19 SS doesn't acknowledge any of the data blocks with BSN from 0 to 19
5			Wait BS_CV_MAX periods without granting USF.
6	SS -> MS	PACKET UPLINK ACK/NACK	SS negatively acknowledges RLC data block with BSN 0, RBB set to 0 and acknowledges data blocks with BSN from 1 to 19, RBB set to 1 USF not assigned to the MS
7			Wait for 6 blocks with no USF.
8	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH SS verifies that the Nacked data block (BSN = 0) is received before new data blocks
9	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH, containing USF assigned to the MS.
10	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH
11			Repeat steps 9 and 10 until BSN=63 SS doesn't acknowledge any of the data blocks until BSN = 63
12	SS -> MS	PACKET UPLINK ACK/NACK	SS acknowledges all RLC data blocks with RBB set to 1 USF assigned to the MS
13	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH SS receives new data block with BSN = 64
14	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH, containing USF assigned to the MS.
15	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH
16			Repeat steps 14 and 15 until BSN=80 SS doesn't acknowledge any of the data blocks
17			Wait BS_CV_MAX periods without granting USF.
18	SS -> MS	PACKET UPLINK ACK/NACK	SS negatively acknowledges RLC data block with bit corresponding to BSN 50 in RBB set to 0 and all other bits set to 1 USF not assigned to the MS
19			Wait for 6 blocks with no USF.
20	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH, containing USF assigned to the MS.
21	MS -> SS	UPLINK RLC DATA BLOCK	Received on the assigned PDTCH
22	SS		Repeat steps 20 and 21 until BSN=127 SS verifies that the MS ignored negative acknowledgment outside the window and sends new data blocks BSN=81 to 127
23		{ Completion of uplink RLC data block transfer}	

43.1.2 Acknowledged mode / Downlink TBF

43.1.2.1 Acknowledged mode / Downlink TBF / Receive state variable V(R)

43.1.2.1.1 Conformance requirements

1. In RLC acknowledged mode, each RLC endpoint receiver shall have an associated receive state variable V(R). The receive state variable denotes the BSN of the next in-sequence RLC data block expected to be received.

2. The mobile station shall set V(R) to the value 0 at the beginning of each TBF in which the RLC endpoint is the receiver.

References

GSM 04.60, section 9.1.5.

43.1.3.1.2 Test purpose

1. To verify correct initialisation of the receive state variable, V(R).

2. To verify the receive state variable, V(R) is set to the next in sequence RLC data block expected to be received.

43.1.3.1.3 Method of test

Initial Conditions

System Simulator:

1 cell, default setting, PBCCH not present

Mobile Station:

The MS is GPRS updated with a P-TMSI allocated, SPLIT PG CYCLE negotiated and the test PDP Context2 activated.

Related PICS/PIXIT Statement(s)

Support GPRS service.

Test Procedure

SS establishes a downlink TBF and sends RLC data blocks with BSN values between 0 to N in sequence. The MS is polled in each RLC data block by setting the S/P bit. SS verifies that the SSN in the Packet Downlink Ack/Nack message sent by the MS is set to [N+1] modulo 128. SS then sends more RLC data blocks with random BSN N1 that holds a value between [N+1] modulo 128 and [N+64] modulo 128. The MS is polled in the last RLC data block by setting the S/P bit. SS verifies that the SSN in the Packet Downlink Ack/Nack message sent by the MS is set to [N1+1] modulo 128.

The test is performed for the values of N = 1,10,63,64,126,127.

Maximum Duration of Test

5 min.

Expected Sequence

1		{Downlink TBF establishment}	Macro parameters: Acknowledged mode
2	SS -> MS	DOWNLINK RLC DATA BLOCK	BSN = 0 to N MS is polled S/P bit '1' RRBP 00
3	MS -> SS	Packet Downlink Ack/ Nack	SSN value should be [N+1] modulo 128.
4	SS -> MS	DOWNLINK RLC DATA BLOCK	BSN = N1 a random number between [N+1] mod 128 and [N+64] modulo 128 MS is polled S/P bit '1' RRBP 00
5	MS -> SS	Packet Downlink Ack/ Nack	SSN value should be [N1+1] modulo 128.

43.1.2.2 Acknowledged mode / Downlink TBF / Receive window state variable V(Q)

43.1.2.2.1 Conformance requirements

In RLC acknowledged mode, each RLC endpoint receiver shall have an associated receive window state variable, V(Q). The mobile station shall set V(Q) to the value 0 at the beginning of each TBF in which the RLC endpoint is the receiver.

The value of V(Q) shall be updated when the RLC receiver receives the RLC data block whose BSN is equal to V(Q).

References

GSM 04.60, section 9.1.6.

43.1.2.2.2 Test purpose

1. To verify that V(Q) is not updated when data blocks with BSN not equal to V(Q) are received.

43.1.2.2.3 Method of test

Initial Conditions

System Simulator:

1 cell, default setting, PBCCH not present

Mobile Station:

The MS is GPRS updated with a P-TMSI allocated, SPLIT PG CYCLE negotiated and the test PDP Context2 activated.

Related PICS/PIXIT Statement(s)

None

Test Procedure

SS establishes a downlink TBF and sends an RLC data block with BSN value N (N in the range 1..63) and polls the MS. The MS shall accept the block and sends a Packet Downlink Ack/Nack message. SS verifies that SSN is set to [N+1] and RBB bit corresponding to N is set to 1. SS sends another RLC data block to the MS with BSN value 64 and polls the MS. SS verifies that the SSN and RBB fields in the Packet Downlink Ack/Nack message sent by the MS are not updated.

Maximum Duration of Test

5 min.

Expected Sequence

1		{Downlink TBF establishment}	Macro parameters: Acknowledged mode
2	SS -> MS	DOWNLINK RLC DATA BLOCK	BSN = N (N is in the range of [1..63]) polls the MS
3	MS -> SS	Packet Downlink Ack/ Nack	SSN value should be [N+1] RBB set for block N
4	SS -> MS	DOWNLINK RLC DATA BLOCK	BSN = 64, polls the MS
5	MS -> SS	Packet Downlink Ack/ Nack	SSN value should be [N+1]. No change in RBB
6	SS -> MS	DOWNLINK RLC DATA BLOCK	BSN = 0, polls the MS
7	MS -> SS	Packet Downlink Ack/ Nack	SSN value should be [N+1]. RBB updated
8	SS -> MS	DOWNLINK RLC DATA BLOCK	BSN = 64, polls the MS
9	MS -> SS	Packet Downlink Ack/ Nack	SSN value should be 65.

43.1.2.3 Acknowledged mode / Downlink TBF / Re-assembly of RLC data blocks

43.1.2.3.1 Conformance requirements

RLC data blocks shall be collected at the receiver until all RLC data blocks comprising an LLC PDU have been received. The RLC headers shall be removed from each RLC data block at this time and the RLC data units re-assembled into an LLC PDU and passed to the next higher layer.

References

GSM 04.60, section 9.1.11.

43.1.2.3.2 Test purpose

To verify the correct re-assembly of the RLC data blocks.

43.1.2.3.3 Method of test

Initial Conditions

System Simulator:

1 cell, default setting, PBCCH not present

Mobile Station:

The MS is GPRS updated with a P-TMSI allocated, SPLIT PG CYCLE negotiated and PDPContext7 is activated. .

Related PICS/PIXIT Statement(s)

None

Test Procedure

SS establishes a downlink TBF and sends several data blocks in random sequence , but within the range of transmit and receive window.

Maximum Duration of Test

5 min.

Expected Sequence

1		{Downlink TBF establishment}	Macro parameters: Acknowledged mode
2	SS -> MS	DOWNLINK RLC DATA BLOCK	, A bit set (A=1) in LLC frame SS sends datablocks in random sequence
3			Repeat step 2 until all the data blocks in one LLC frame is transmitted
4	MS -> SS	Packet Downlink Ack/ Nack	
4		{ Uplink dynamic allocation two phase access}	USF_GRANULARITY = 1 block
5	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH assigned, USF assigned to the MS.
6	MS -> SS	UPLINK RLC DATA BLOCK	LLC Supervisory frame (RR) acknowledging a valid LLC frame
7		{ Completion of uplink RLC data block transfer}	

43.1.2.4 Acknowledged mode / Downlink TBF / Re-assembly / Length Indicator

43.1.2.4.1 Conformance requirements

1. The Extension (E) bit is used to indicate the presence of an optional extension octet in the RLC data block header. The More (M) bit is used to indicate the presence of an LLC frame following the current LLC frame. The M bit, the E bit, and the Length Indicator, are used to delimit LLC frames within a TBF.

2. The Length Indicator (LI) field is six bits in length and shall be encoded as a binary number. The value 0 shall indicate that no LLC frame boundary does exist, that the M bit shall be ignored and that the E bit shall be interpreted as having the value 1.

3 A singular case occurs when the end of the LLC PDU would fit within the RLC data block but the addition of the Length Indicator octet (to indicate the LLC PDU boundary) causes the LLC PDU to extend into the next RLC data block. In this case, this additional LI field shall take the value 0 whatever is the length of the last but one LLC PDU segment.

References

GSM 04.60, section 9.1.11, Annexure B 2.

43.1.2.4.2 Test purpose

To verify the correct decoding of RLC data block length indication, more(M) and extension(E) bit fields during re-assembly of LLC frames into RLC data blocks.

43.1.3.4.3 Method of test

Initial Conditions

System Simulator:

1 cell, default setting.

Mobile Station:

The MS is GPRS updated with a P-TMSI allocated, SPLIT PG CYCLE negotiated and PDPContext7 activated.

Related PICS/PIXIT Statement(s)

None

Test Procedure

SS establishes a downlink TBF and sends data blocks containing two LLC frames (A bit set) with length indicator encoded. The MS is expected to decode these fields and re-assemble LLC frames correctly.

The size of the first LLC frame is 15 octets and second is 24 octets .

Maximum Duration of Test

5 min.

Expected Sequence

1		{Downlink TBF establishment}	Macro parameters: Acknowledged mode
2	SS -> MS	DOWNLINK RLC DATA BLOCK	15 octets of first LLC frame and 4 octets of second LLC frame Length Indicator = 15,M =1, E = 1 A bit set (A = 1) in both LLC frames
3		{ Uplink dynamic allocation two phase access}	USF_GRANULARITY = 1 block
4	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH assigned, USF assigned to the MS.
5	MS -> SS	UPLINK RLC DATA BLOCK	LLC Supervisory frame (RR) acknowledging first LLC frame
6		{ Completion of uplink RLC data block transfer}	
7	SS -> MS	DOWNLINK RLC DATA BLOCK	19 octets from second LLC frameLength indicator = 0, M = 0, E = 1
8	SS -> MS	DOWNLINK RLC DATA BLOCK	1 octet from second LLC frame Length indicator = 1, M = 1, E = 1
9		{ Uplink dynamic allocation two phase access}	USF_GRANULARITY = 1 block
10	SS -> MS	PACKET DOWNLINK DUMMY CONTROL BLOCK	Sent on the PACCH of the PDCH assigned, USF assigned to the MS.
11	MS -> SS	UPLINK RLC DATA BLOCK	LLC Supervisory frame (RR) acknowledging second LLC frame
12		{ Completion of uplink RLC data block transfer}	

43.2 Control Blocks

43.2.1 Control Blocks Re-assembly

43.2.1.1 Conformance requirements

The network may segment RLC/MAC control messages into one or two RLC/MAC control blocks depending on the length of the RLC/MAC control message.

RLC/MAC control blocks shall be collected at the receiver until all RLC/MAC control blocks comprising a RLC/MAC control message have been received. The receiving side shall determine the length of the RLC/MAC control message contents by interpreting the RLC/MAC control block contents.

References

GSM 04.60, sections 9.1.11a, 9.1.11b and 9.1.2.

43.2.1.2 Test purpose

To verify that the MS re-assembles a RLC control message If it spans across more than one RLC control block.

43.2.1.3 Method of test

Initial Conditions

System Simulator:

1 cell, default setting, PBCCH not present

Mobile Station:

The MS is switched off.

Related PICS/PIXIT Statement(s)

Method of trigger GPRS attach at power on.

Test Procedure

The MS is switched on and triggered to perform a GPRS attach. The SS sends a PACKET UPLINK ASSIGNMENT message that spans more than one RLC control block. The PACKET UPLINK ASSIGNMENT message contains Dynamic Allocation struct (Timeslot allocation with power control parameters included) and frequency parameters with direct encoding 2 struct information fields. The SS verifies that RLC data blocks containing Attach Request message are received from the MS.. Switch off the MS.

Maximum Duration of Test

5 min.

Expected sequence

1	MS		The MS is switched on and triggered to perform a GPRS attach.
2	MS -> SS	CHANNEL REQUEST	
3	SS -> MS	IMMEDIATE ASSIGNMENT	Indicating two phase access
4	MS -> SS	PACKET RESOURCE REQUEST	
5	SS -> MS	PACKET UPLINK ASSIGNMENT	Frequency Parameter direct encoding 2 information element. Dynamic Allocation struct information element (Timeslot allocation and Power Control parameters included) Payload type = 10, Sent on PACCH.
6	MS -> SS	UPLINK RLC DATA BLOCKS	Attach Request received on PDTCH assigned in step 5

43.3 Default Message Contents and Macros

43.3.1 Message Contents

43.3.1.1 Packet Uplink Assignment

MESSAGE_TYPE	001110
PAGE_MODE	Normal Paging
Referenced Address	
-	10 (TLLI)
CHANNEL_CODING_COMMAND	CS-1 coding
TLLI_BLOCK_CHANNEL_CODING	use value indicated in CHANNEL_CODING_COMMAND
Packet Timing Advance	
-	1 (timing advance value)
- TIMING_ADVANCE_VALUE	30 bit periods
-	0 (no timing advance index)
{L|H<Frequency Parameters>}	H (Frequency Parameters present)
- Frequency Parameters	
-	1 hopping)
-	
- TSC	5
	11 (Direct Encoding Struct 2)
Direct Encoding Struct 2	
MAIO	arbitrarily chosen
HSN	arbitrarily chosen
Length of MA Frequency lists	Length of frequency list chosen for the bit map 0 format
MA Frequency list contents	arbitrarily chosen (bit map 0 format)
	0 (Dynamic Allocation)
Dynamic Allocation	
- Extended_Dynamic_Allocation	0
-	1
P0 Bit	0
P0	0 db
PR mode	
USF Granularity	0 (one block)
{L|H<UPLINK_TFI_ASSIGNMENT>}	1 (assign an uplink TFI)
- UPLINK_TFI_ASSIGNMENT	0000110 (uplink TBF identifier)
{0|1 RLC Data Blocks Granted}	1
RLC Data Blocks Granted	00000000
{0|1 TBF Starting time description}	1
TBF Starting time	arbitrarily chosen
TIMESLOT_ALLOCATION with Power Control	1
Parameters	
ALPHA	0.5
- USF_TN0	0
- GAMMA_TN0	0
- USF_TN1	0
- GAMMA_TN1	0
- USF_TN2	1
USF_TN2	arbitrarily chosen
- GAMMA_TN2	1
GAMMA_TN2	arbitrarily chosen
- USF_TN3	0
- GAMMA_TN3	0
- USF_TN4	0
- GAMMA_TN4	0
- USF_TN5	0
- GAMMA_TN5	0

- USF_TN6	0
- GAMMA_TN6	0
- USF_TN7	0
- GAMMA_TN7	0
spare padding	Spare Padding

43.3.2 Macros

43.3.2.1 Macro for uplink dynamic allocation two phase access (PBCCH not present)

Step	Direction	Message	Comments
		{Uplink dynamic allocation two phase access}	Macro parameters: n: the number of data octets to be transferred, USF_GRANULARITY: 1 or 4 blocks, RLC_DATA_BLOCKS_GRANTED: 9-261 (close-end), or absent (open-end) CHANNEL_CODING_COMMAND: CS-1, -2, -3, -4 TBF_STARTING_TIME
0	MS		Trigger the MS initiating uplink transfer **n** octets data according to the test PDP context activated
1	MS -> SS	CHANNEL REQUEST	Received on RACH.
2	SS -> MS	IMMEDIATE ASSIGNMENT	Single block assignment, to order the MS to follow the two phase access procedure. Sent on AGCH.
3	MS -> SS	PACKET RESOURCE REQUEST	Two phase access procedure. Received on the single block assigned in step 2. Check that the PEAK_THROUGHPUT, RADIO_PRIORITY and RLC_MODE are compliant with the PDP context used.
4	SS -> MS	PACKET UPLINK ASSIGNMENT	uplink dynamic allocation, no starting time (as defualt, otherwise use TBF_STARTING_TIME), Sent on PACCH of the same PDCH assigned in step 2.

42.3.2.2 Macro for downlink TBF establishment (PBCCH not present)

Step	Direction	Message	Comments
		{Downlink TBF establishment**}**	Macro parameters: TBF_STARTING_TIME
1	SS -> MS	PAGING REQUEST	Page info contains P-TMSI of the MS. Sent on PCH.
2	MS -> SS	CHANNEL REQUEST	ACCESS TYPE = " Page Response ". Received on RACH.
3	SS -> MS	IMMEDIATE ASSIGNMENT	Random Reference = pertaining to the message received in step 2. Fixed allocation for RLC data blocks, Sent on AGCH.
4	MS -> SS	UPLINK RLC DATA BLOCK	LLC PDU implicitly indicating paging response, containing TLLI in the RLC/MAC header. Received on uplink PDTCH assigned in step 3.
5	SS -> MS	PACKET UPLINK ACK/NACK	Acknowledge the received RLC data block. Sent on uplink PACCH.
6	MS -> SS	PACKET CONTROL ACKNOWLEDGEMENT	Acknowledge the RLC control message. Received on uplink PACCH.
7	SS -> MS	IMMEDIATE ASSIGNMENT	Downlink Assignment, TLLI value as received. Sent on AGCH. Macro parameter as assigned in the test case.