RFCOMM

Bluetooth® Test Suite

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Contents

1 Scope

This Bluetooth document contains the Test Suite Structure (TSS) and test cases to test the implementation of the Bluetooth RFCOMM Protocol with the objective to provide a high probability of air interface interoperability between the tested implementation and other manufacturers' Bluetooth devices.

2 References, definitions, and abbreviations

2.1 References

This document incorporates provisions from other publications by dated or undated reference. These references are cited at the appropriate places in the text, and the publications are listed hereinafter. Additional definitions and abbreviations can be found in [1], [2], [3], and [5].

[1] Specification of the Bluetooth System; RFCOMM with TS07.10 or later

[2] TS101 369 V6.3.0 (1999-03): “GSM TS07.10”

[3] Generic Access Profile (GAP)

[4] ICS Proforma for RFCOMM Profile

[5] Test Strategy and Terminology Overview

[6] Bluetooth Core Specification, Version 2.0 or later

[7] RFCOMM Implementation eXtra Information for Testing (IXIT)

[8] Appropriate Language Mapping Tables document

2.2 Definitions

In this Bluetooth document, the definitions from [1], [2], [3], and [5] apply.

Certain terms that were identified as inappropriate have been replaced. For a list of the original terms and their replacement terms, see the Appropriate Language Mapping Tables document [8].

2.3 Acronyms and abbreviations

In this Bluetooth document, the definitions, acronyms, and abbreviations from [1], [2], [3], and [5] apply.

3 Test Suite Structure (TSS)

3.1 Overview

The RFCOMM Protocol defines the protocols and procedures that are used by devices using Bluetooth for setting up virtual serial cable emulation (such as RS232) between two peer devices.

Figure 3.1 shows the RFCOMM Protocol in relation to other Bluetooth protocols.

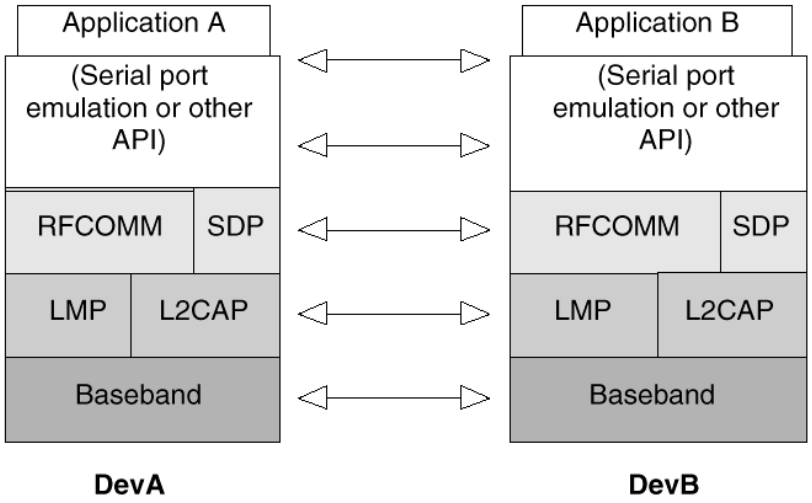

Figure 3.1: RFCOMM in the Bluetooth stack

The Bluetooth Profiles specify two typical configurations (roles) of devices:

- Device A (DevA) – This device takes initiative to form a connection to another device.
  - (DevA is Initiator according to GAP [3])
- Device B (DevB) – This device waits for another device to take initiative to connect.
  - (DevB is Acceptor according to GAP [3])

3.2 Test Strategy

The test objectives are to verify the functionality of the RFCOMM Protocol within a Bluetooth Host and enable interoperability between Bluetooth Hosts on different devices. The testing approach covers mandatory and optional requirements in the specification and matches these to the support of the IUT as described in the ICS. Any defined test herein is applicable to the IUT if the ICS logical expression defined in the Test Case Mapping Table (TCMT) evaluates to true.

The test equipment provides an implementation of the Radio Controller and the parts of the Host needed to perform the test cases defined in this Test Suite. A Lower Tester acts as the IUT's peer device and interacts with the IUT over-the-air interface. The configuration, including the IUT, needs to implement similar capabilities to communicate with the test equipment. For some test cases, it is necessary to stimulate the IUT from an Upper Tester. In practice, this could be implemented as a special test interface, a Man Machine Interface (MMI), or another interface supported by the IUT.

This Test Suite contains Valid Behavior (BV) tests complemented with Invalid Behavior (BI) tests where required. The test coverage mirrored in the Test Suite Structure is the result of a process that started with catalogued specification requirements that were logically grouped and assessed for testability enabling coverage in defined test purposes.

3.3 Test groups

The following test groups have been defined:

- Initialize RFCOMM session
- Shutdown RFCOMM session
- Establish DLC
- Disconnect DLC
- Sending RS 232 control signals
- Transfer information
- Test command
- Aggregate flow control
- Remote Line Status indication
- DLC parameter negotiation
- Remote port negotiation

Note that the RFCOMM groups handle testing of features from RFCOMM to transport user data, modem control signals and configuration commands. The test cases found in these groups are based on the RFCOMM Protocol specification together with the TS07.10 specification.

4 Test cases (TC)

4.1 Introduction

4.1.1 Test case identification conventions

Test cases are assigned unique identifiers per the conventions in [5]. The convention used here is: **<spec abbreviation>/<IUT role>/**<class>/**<feat>**/<func>/<subfunc>/<cap>/<xx>-<nn>-<y>.

Identifier Abbreviation	Feature Identifier <feat>
RFCOMM	RFCOMM Protocol
DEVA	Device A (Initiator) role
DEVB	Device B (Acceptor) role
DEVA-DEVB	The role of the IUT does not affect the test procedure. The test case is role agnostic.
RFC	RFCOMM function

Table 4.1: RFCOMM TC feature naming conventions

4.1.2 Conformance

When conformance is claimed for a particular specification, all capabilities are to be supported in the specified manner. The mandated tests from this Test Suite depend on the capabilities to which conformance is claimed.

The Bluetooth Qualification Program may employ tests to verify implementation robustness. The level of implementation robustness that is verified varies from one specification to another and may be revised for cause based on interoperability issues found in the market.

Such tests may verify:

- That claimed capabilities may be used in any order and any number of repetitions not excluded by the specification
- That capabilities enabled by the implementations are sustained over durations expected by the use case
- That the implementation gracefully handles any quantity of data expected by the use case
- That in cases where more than one valid interpretation of the specification exists, the implementation complies with at least one interpretation and gracefully handles other interpretations
- That the implementation is immune to attempted security exploits

A single execution of each of the required tests is required to constitute a Pass verdict. However, it is noted that to provide a foundation for interoperability, it is necessary that a qualified implementation consistently and repeatedly pass any of the applicable tests.

In any case, where a member finds an issue with the test plan generated by the Bluetooth SIG qualification tool, with the test case as described in the Test Suite, or with the test system utilized, the member is required to notify the responsible party via an erratum request such that the issue may be addressed.

4.1.3 General assumptions

No more than one ACL link exists between the Lower Tester and the IUT.

Only one connection at a time and consequently only a point-to-point configuration is considered.

Support of one-slot packets is required to ensure data rates up to 128 kbps.

There are no fixed Central and Peripheral roles.

DevA and DevB can be either a Data Circuit Endpoint (DCE) or a Data Terminal Endpoint (DTE).

The role of DevA/DevB taken on by the IUT does not matter to achieve a pass verdict for some test cases for this Protocol as indicated in the test purpose and is specified in the test case identifier for role agnostic tests as detailed in Table 4.1. The role of the IUT/Lower Tester for these tests is specified in the IXIT [7] in order to enable the correct test environment conditions to provoke the Lower Tester.

4.1.4 Pass/Fail verdict conventions

Each test case has an Expected Outcome section. The IUT is granted the Pass verdict when all the detailed pass criteria conditions within the Expected Outcome section are met.

The convention in this Test Suite is that, unless there is a specific set of fail conditions outlined in the test case, the IUT fails the test case as soon as one of the pass criteria conditions cannot be met. If this occurs, then the outcome of the test is a Fail verdict.

4.2 RFCOMM

4.2.1 Initialize RFCOMM Session

Verify the initialization procedure of an RFCOMM session. The IUT is a device taking on a role as DevA and/or as DevB. The IUT may act as either Central or Peripheral.

RFCOMM/DEVA/RFC/BV-01-C [Initialize RFCOMM Session – Initiate]

- Test Purpose

  Verify that the IUT initializes an RFCOMM session and starts the RFCOMM multiplexer on the control channel DLCI0.

- Reference

  [1] 5.2.1

  [2] 5.3.1

- Initial Condition

  - The IUT is a device taking on the role as DevA. The Lower Tester is Acceptor.
  - An ACL link has been established between the IUT and the Lower Tester and the IUT has done an SDP query to get the RFCOMM Server channel number.

- Test Procedure

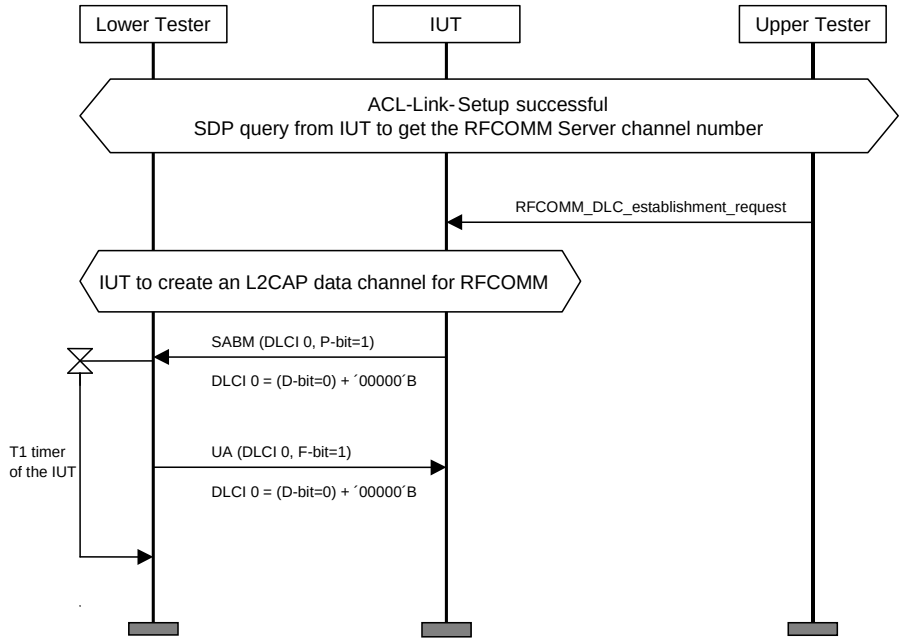

Figure 4.1: RFCOMM/DEVA/RFC/BV-01-C [Initialize RFCOMM Session – Initiate]

- Test Condition

  It must be possible to send an establishment request from the Upper Tester to initiate an RFCOMM session.

  The value of the T1 timer of the IUT can be taken from TSPX_link_to in the IXIT. The IUT should initiate the baseband link unless already established.

- Expected Outcome

  Pass verdict

  The IUT transmits an SABM command with the P-bit set to 1 to establish the dedicated control channel DLCI0.

  The FCS field is calculated correctly on the contents of the address, control, and length field.

RFCOMM/DEVB/RFC/BV-02-C [Initialize RFCOMM Session – Respond]

- Test Purpose

  Verify that the IUT responds successfully when the Lower Tester initializes an RFCOMM session and starts the RFCOMM multiplexer on the control channel DLCI0.

- Reference

  [1] 5.2.1

  [2] 5.3.1

- Initial Condition
  - The IUT is a device taking on the role as DevB. The Lower Tester is Initiator.
  - An L2CAP connection-oriented data channel has been established and the IUT is in the OPEN state.
  - The RFCOMM Server Channel number can be taken from the IXIT.
- Test Procedure

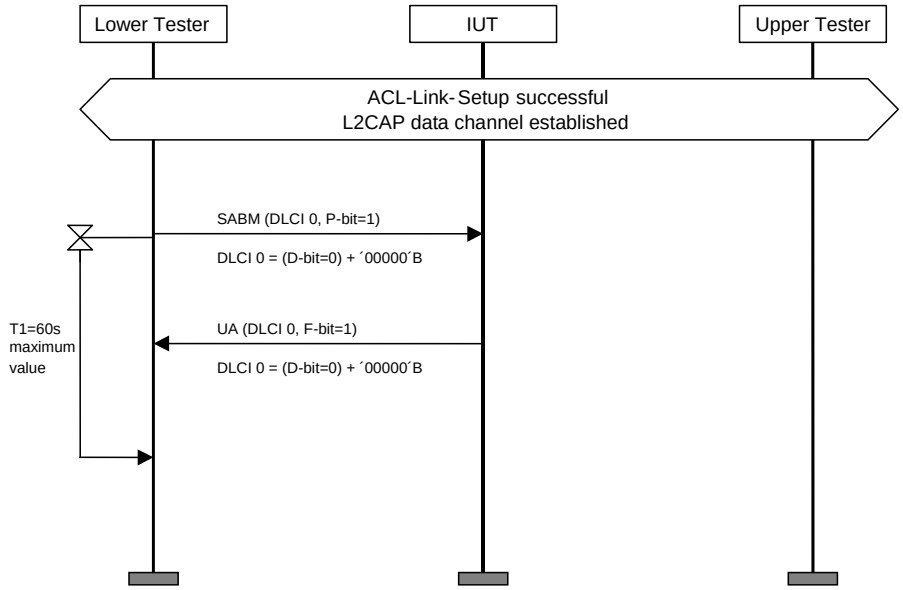

Figure 4.2: RFCOMM/DEVB/RFC/BV-02-C [Initialize RFCOMM Session – Respond]

- Test Condition

  The Acknowledgement Timer T1 has a value in the interval 10–60 seconds. The test case uses the maximum value. The Lower Tester should initiate the baseband link unless already established.

- Expected Outcome

  Pass verdict

  The IUT sends a UA response with the F-bit set to 1 upon receiving an SABM command from the Lower Tester to establish the dedicated control channel DLCI0.

  The FCS field is calculated correctly on the contents of the address, control and length field.

4.2.2 Shutdown RFCOMM Session

Verify the shutdown procedure of an RFCOMM session. The IUT is a device taking on a role as DevA and/or as DevB. The IUT may act as either Central or Peripheral.

RFCOMM/DEVA-DEVB/RFC/BV-03-C [Shutdown RFCOMM Session – Lower Tester]

- Test Purpose

  Verify that the IUT responds successfully when the Lower Tester closes the RFCOMM session.

- Reference

  [1] 5.2.2

  [2] 5.3.4

- Initial Condition

  - The IUT may act as either Central or Peripheral. The Lower Tester initiates the test procedure.
  - An RFCOMM session is initiated between the IUT and the Lower Tester.
  - In case the IUT is a device taking on the role as DevA, the IUT has to initiate the RFCOMM session. See RFCOMM/DEVA/RFC/BV-01-C [Initialize RFCOMM Session – Initiate].
  - In case the IUT is a device taking on the role as DevB, the Lower Tester has to initiate the RFCOMM session. See RFCOMM/DEVB/RFC/BV-02-C [Initialize RFCOMM Session – Respond].

- Test Procedure

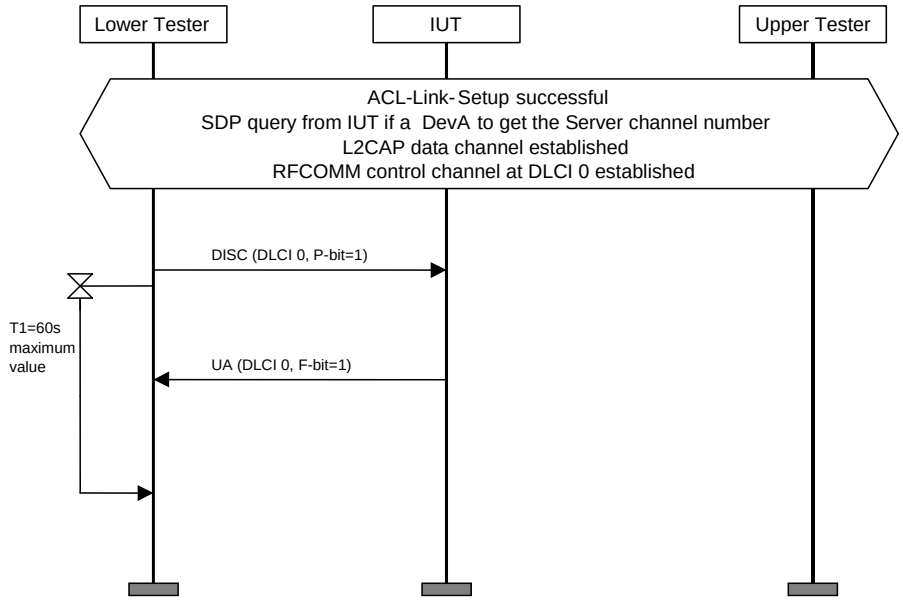

Figure 4.3: RFCOMM/DEVA-DEVB/RFC/BV-03-C [Shutdown RFCOMM Session – Lower Tester]

- Test Condition

  The Acknowledgement Timer T1 has a value in the interval 10–60 seconds. The test case uses the maximum value.

- Expected Outcome

  Pass verdict

  The IUT sends a UA response with the F-bit set to 1 upon receiving a DISC command from the Lower Tester to release the dedicated control channel DLCI0.

  The FCS field is calculated correctly on the contents of the address, control and length field.

  Inconclusive verdict

  The IUT sends a DM response upon receiving a DISC command from the Lower Tester.

RFCOMM/DEVA-DEVB/RFC/BV-04-C [Shutdown RFCOMM Session – IUT]

- Test Purpose

  Verify that the IUT can request to close the RFCOMM session.

  Applicable only for IUTs supporting a facility for close down the whole multiplexer session by first sending the DISC command.

- Reference

  [1] 5.2.2

  [2] 5.3.4

- Initial Condition

  - The IUT may act as either Central or Peripheral.
  - An RFCOMM session is initiated between the IUT and the Lower Tester.
  - In case the IUT is a device taking on the role as DevA, the IUT has to initiate the RFCOMM session and to establish the DLC. See RFCOMM/DEVA/RFC/BV-05-C [Establish DLC – Initiate].
  - In case the IUT is a device taking on the role as DevB, the Tester has to initiate the RFCOMM session and to establish the DLC. See RFCOMM/DEVB/RFC/BV-06-C [Establish DLC – Respond].

- Test Procedure

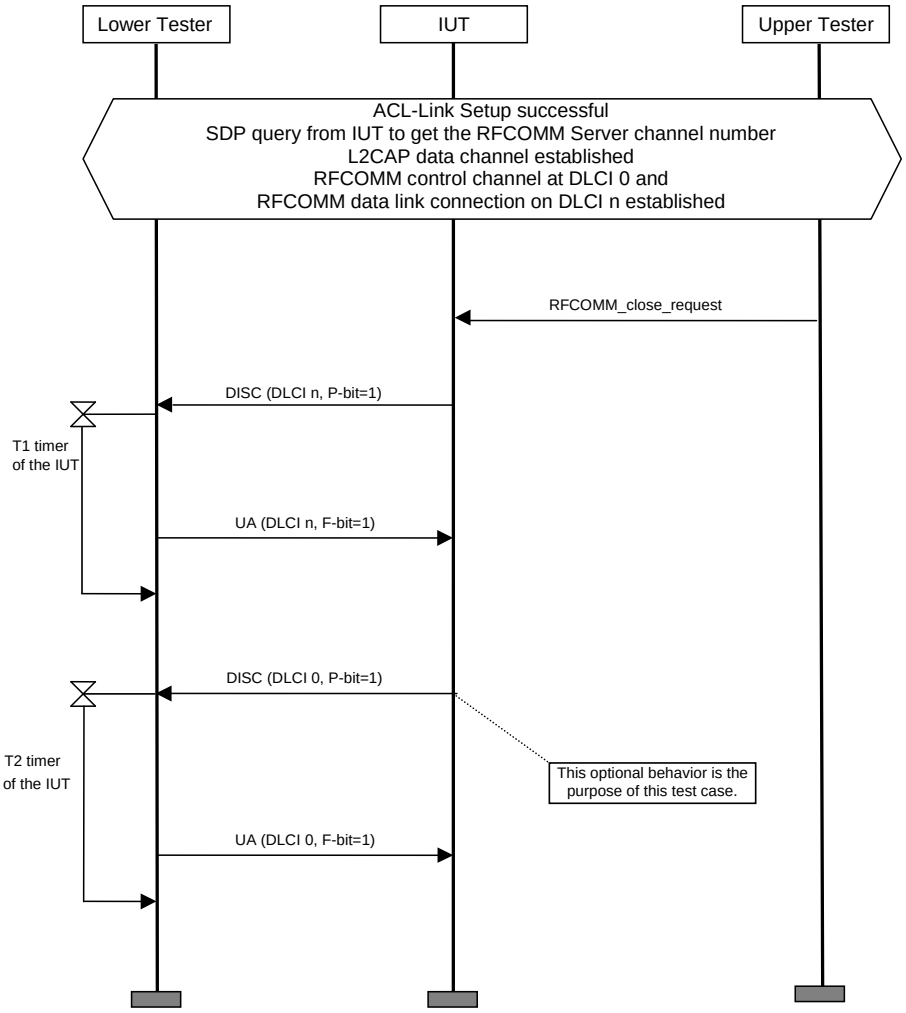

Figure 4.4: RFCOMM/DEVA-DEVB/RFC/BV-04-C [Shutdown RFCOMM Session – IUT]

- Test Condition

  It must be possible to send a close request from the Upper Tester to close down an existing RFCOMM session.

  The value of the T1 timer of the IUT can be taken from the IXIT.

- Expected Outcome

  Pass verdict

  The IUT transmits a DISC command with the P-bit set to 1 to release the dedicated control channel DLCI0.

  The FCS field is calculated correctly on the contents of the address, control and length field.

4.2.3 Establish DLC

Verify the establishment procedure of a data link connection (DLC). The IUT is a device taking on a role as DevA and/or as DevB. The IUT may act as either Central or Peripheral.

RFCOMM/DEVA/RFC/BV-05-C [Establish DLC – Initiate]

- Test Purpose

  Verify that the IUT establishes a new data link connection on the RFCOMM session.

- Reference

  [1] 5.2.1

  [2] 5.4.1

- Initial Condition

  - The IUT is a device taking on the role as DevA. The Lower Tester is Acceptor.
  - An ACL link has been established between the IUT and the Lower Tester, and the IUT has done an SDP query to get the RFCOMM Server channel number.
  - The test RFCOMM/DEVA/RFC/BV-01-C [Initialize RFCOMM Session – Initiate] should have been performed successfully.

- Test Procedure

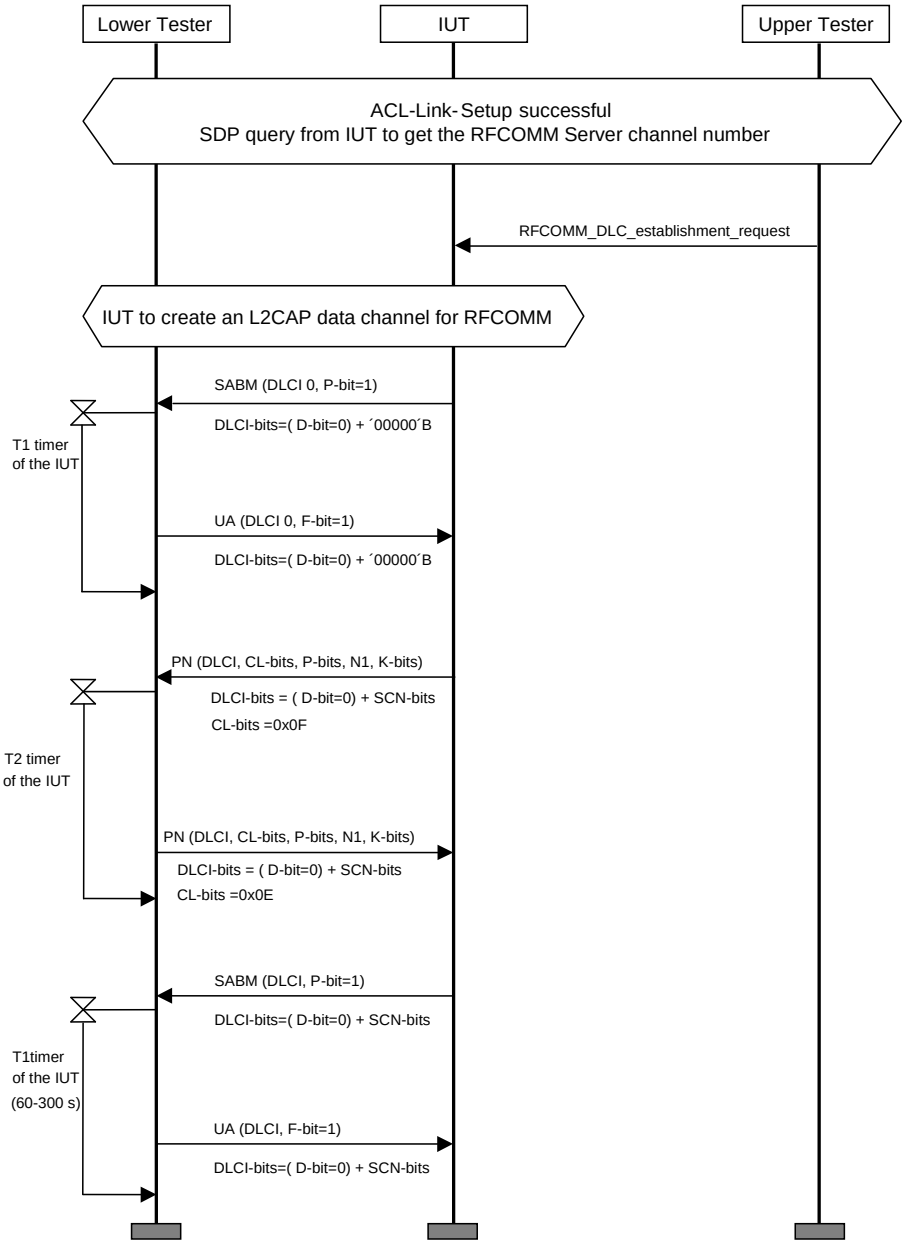

Figure 4.5: RFCOMM/DEVA/RFC/BV-05-C [Establish DLC – Initiate]

- Test Condition

  It must be possible to send an establishment request from the Upper Tester to build up a DLC.

  For the DLC a DLCI in the range 2–61 is assignable. A direction bit D is used in conjunction with the RFCOMM Server channel number SCN.

  The value of the T1 timer of the IUT should be taken from the IXIT.

  The value of K bits indicates the initial credits issued by the IUT and should be taken from the IXIT.

- Expected Outcome

  Pass verdict

  The IUT transmits a PN command with the address field containing the DLCI value associated with the desired connection. The CL-bits must be set to 0x0F and the I-bits, T-bits and NA-bits must all be set to 0.

  The IUT transmits an SABM command with the P-bit set to 1 to establish a data link connection. The address field contains the DLCI value associated with the desired connection.

  The FCS field is calculated correctly on the contents of the address, control and length field.

  K bits indicate the initial credits issued by the IUT.

RFCOMM/DEVB/RFC/BV-06-C [Establish DLC – Respond]

- Test Purpose

  Verify that the IUT responds successfully when the Lower Tester establishes a data link connection on the RFCOMM session.

- Reference

  [1] 5.2.1

  [2] 5.4.1

- Initial Condition

  - The IUT is a device taking on the role as DevB. The Lower Tester is Initiator.
  - Perform RFCOMM/DEVB/RFC/BV-02-C [Initialize RFCOMM Session – Respond].

- Test Procedure

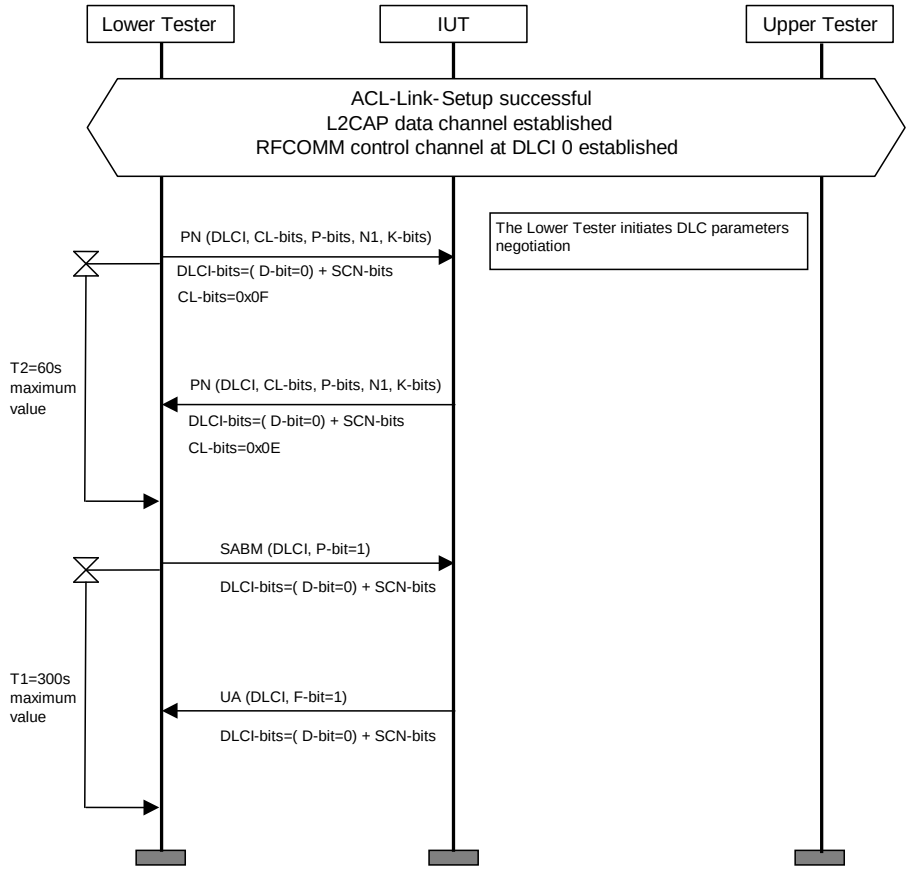

Figure 4.6: RFCOMM/DEVB/RFC/BV-06-C [Establish DLC – Respond]

- Test Condition

  The Acknowledgement Timer T1 has a value in the interval 60–300 seconds. The test case uses the maximum value. The Lower Tester should initiate the baseband link unless already established.

  For the DLC a DLCI in the range 2 to 61 is assignable. A direction bit D is used in conjunction with the RFCOMM Server channel number SCN.

  The value of K bits indicates the initial credits issued by the IUT and is taken from the IXIT.

  The RFCOMM Server Channel number is taken from the IXIT.

- Expected Outcome

  Pass verdict

  The IUT sends a PN response with CL-bits set to 0x0E and I-bits, T-bits and NA-bits all set to zero.

  And the IUT sends a UA response with the F-bit set to 1 upon receiving an SABM command from the Tester to establish a data link connection

  The FCS field is calculated correctly on the contents of the address, control and length field. K bits indicate the initial credits issued by the IUT.

4.2.4 Disconnect DLC

Verify the shutdown procedure of an RFCOMM session. The IUT is a device taking on a role as DevA and/or as DevB. The IUT may act as either Central or Peripheral.

RFCOMM/DEVA-DEVB/RFC/BV-07-C [Disconnect DLC by IUT]

- Test Purpose

  Verify that the IUT can request to close the data link connection on the RFCOMM session.

- Reference

  [1] 5.2

  [2] 5.4.2

- Initial Condition

  - The IUT may act as either Central or Peripheral.
  - An RFCOMM session is initiated and a data connection is established between the IUT and the Lower Tester.
  - In case the IUT is a device taking on the role as DevA, the IUT has to initiate the RFCOMM session and to establish the DLC. See RFCOMM/DEVA/RFC/BV-05-C [Establish DLC – Initiate].
  - In case the IUT is a device taking on the role as DevB, the Tester has to initiate the RFCOMM session and to establish the DLC. See RFCOMM/DEVB/RFC/BV-06-C [Establish DLC – Respond].

- Test Procedure

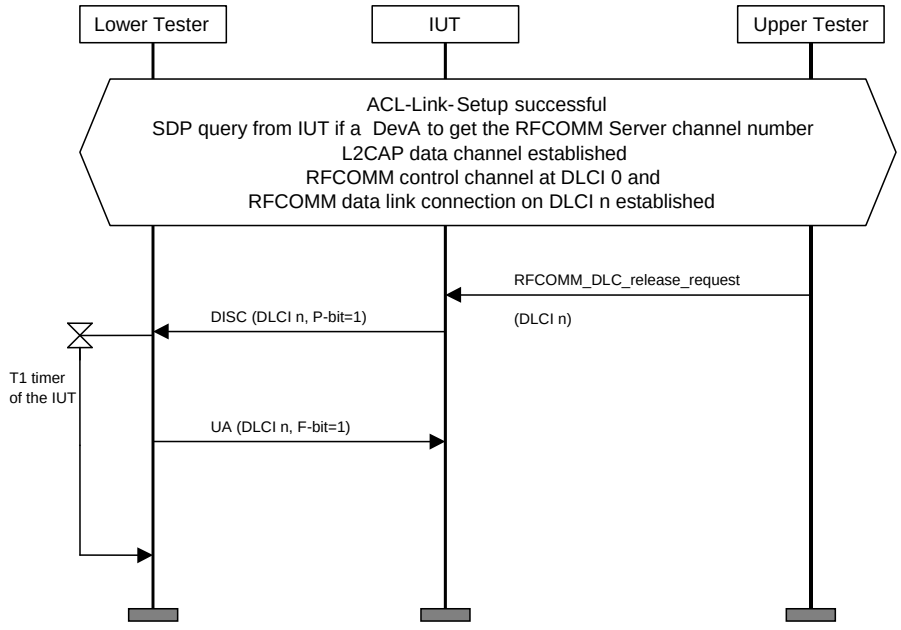

Figure 4.7: RFCOMM/DEVA-DEVB/RFC/BV-07-C [Disconnect DLC by IUT]

- Test Condition

  It must be possible to send a release request from the Upper Tester to release an existing data link connection.

- Expected Outcome

  Pass verdict

  The IUT transmits a DISC command with the P-bit set to 1 to release the DLC.

  The FCS field is calculated correctly on the contents of the address, control and length field.

RFCOMM/DEVA-DEVB/RFC/BV-08-C [Disconnect DLC by Lower Tester]

- Test Purpose

  Verify that the IUT responds successfully when the Lower Tester closes the data link connection on the RFCOMM session.

- Reference

  [1] 5.2

  [2] 5.4.2

- Initial Condition

  - The IUT may act as either Central or Peripheral. The Lower Tester initiates the test procedure.
  - An RFCOMM session is initiated and a data connection is established between the IUT and the Lower Tester.
  - In case the IUT is a device taking on the role as DevA, the IUT has to initiate the RFCOMM session and to establish the DLC. See RFCOMM/DEVA/RFC/BV-05-C [Establish DLC – Initiate].
  - In case the IUT is a device taking on the role as DevB, the Tester has to initiate the RFCOMM session and to establish the DLC. See RFCOMM/DEVB/RFC/BV-06-C [Establish DLC – Respond].

- Test Procedure

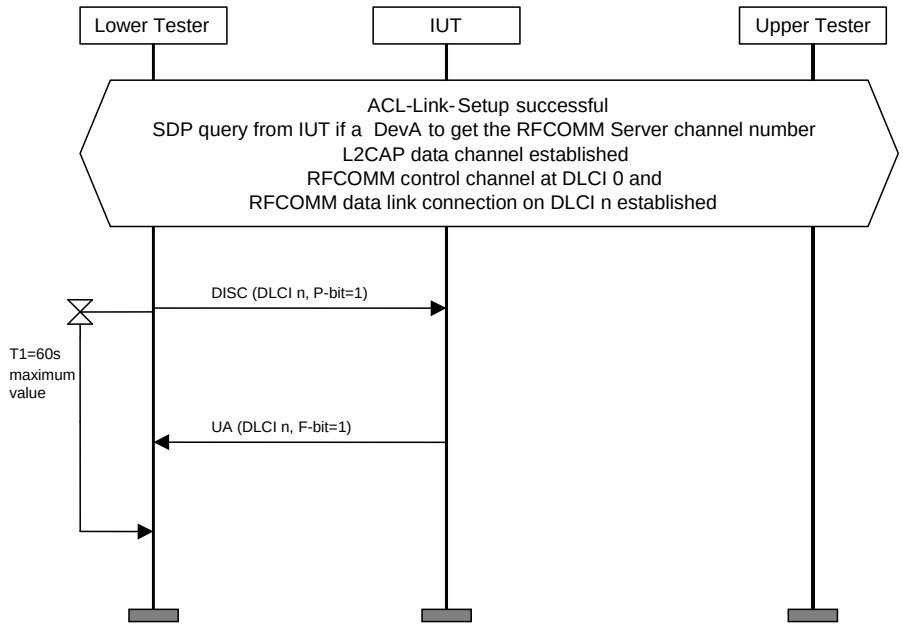

Figure 4.8: RFCOMM/DEVA-DEVB/RFC/BV-08-C [Disconnect DLC by Lower Tester]

- Test Condition

  The Acknowledgement Timer T1 has a value in the interval 10–60 seconds. The test case uses the maximum value.

- Expected Outcome

  Pass verdict

  The IUT sends a UA response with the F-bit set to 1 upon receiving a DISC command from the Lower Tester to release the data link connection.

  The FCS field is calculated correctly on the contents of the address, control and length field.

4.2.5 Test Command

Verify the reaction of a test command sent by the Lower Tester on the multiplexer control channel. The IUT is a device taking on a role as DevA and/or as DevB. The IUT may act as either Central or Peripheral.

RFCOMM/DEVA-DEVB/RFC/BV-11-C [Respond to Test Command]

- Test Purpose

  Verify that the IUT can reply a test command sent from the Tester.

- Reference

  [1] 4.3

  [2] 5.4.6.3.4

- Initial Condition

  - The IUT may act as either Central or Peripheral. The Tester initiates the test procedure.
  - An RFCOMM session is initiated between the IUT and the Lower Tester.
  - In case the IUT is a device taking on the role as DevA, the IUT has to initiate the RFCOMM session. See RFCOMM/DEVA/RFC/BV-01-C [Initialize RFCOMM Session – Initiate].
  - In case the IUT is a device taking on the role as DevB, the Lower Tester has to initiate the RFCOMM session. See RFCOMM/DEVB/RFC/BV-02-C [Initialize RFCOMM Session – Respond].

- Test Procedure

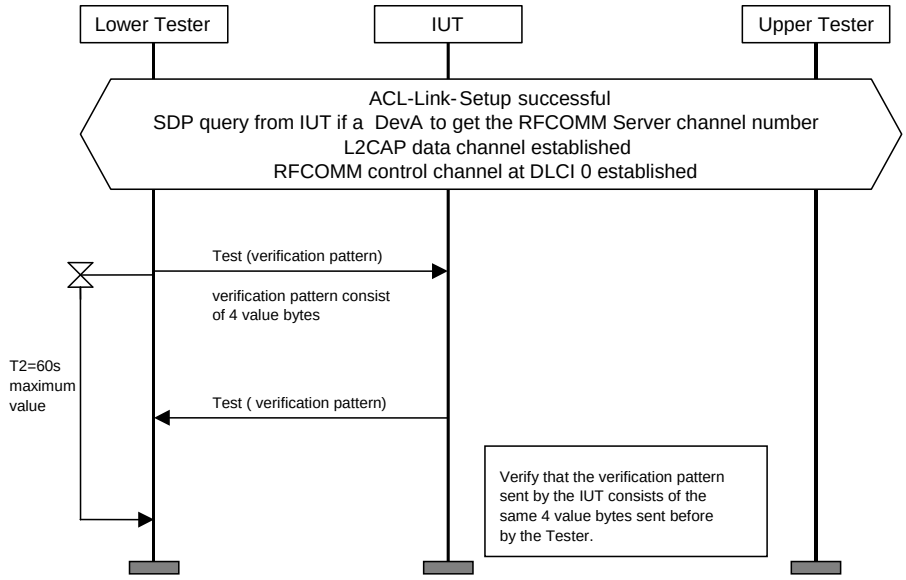

Figure 4.9: RFCOMM/DEVA-DEVB/RFC/BV-11-C [Respond to Test Command]

The verification pattern can contain from one up to 125 value bytes. The verification pattern length is provided by IXIT and is chosen by the Lower Tester. The bit settings inside the value bytes are selected randomly by the Lower Tester.

- Test Condition

  The verification pattern is defined to be up to 125 bytes long. Thus, this upper limit is to ensure that the information field of the UIH frame carrying multiplexer commands never becomes bigger than the default value for N1.

- Expected Outcome

  Pass verdict

  The IUT responds with a Test response with the verification pattern the Lower Tester has sent in its Test command.

  The FCS field is calculated correctly and only from the address and the control field.

  The P-bit inside the control field is set to 0.

4.2.6 Remote Line Status Indication

Verify the information procedure of any changes in the RS232 line status. The IUT is a device taking on a role as DevA and/or as DevB. The IUT may act as either Central or Peripheral.

RFCOMM/DEVA-DEVB/RFC/BV-13-C [Remote Line Status Indication – Lower Tester]

- Test Purpose

  Verify that the IUT responds to a Remote Line Status Command from the Lower Tester.

- Reference

  [1] 5.5.2

  [2] 5.4.6.3.10

- Initial Condition
  - The IUT may act as either Central or Peripheral. The Lower Tester initiates the test procedure.
  - An RFCOMM session is initiated and a data connection is established between the IUT and the Lower Tester.
  - In case the IUT is a device taking on the role as DevA, the IUT has to initiate the RFCOMM session and to establish the DLC. See RFCOMM/DEVA/RFC/BV-05-C [Establish DLC – Initiate].
  - In case the IUT is a device taking on the role as DevB, the Tester has to initiate the RFCOMM session and to establish the DLC. See RFCOMM/DEVB/RFC/BV-06-C [Establish DLC – Respond].
- Test Procedure

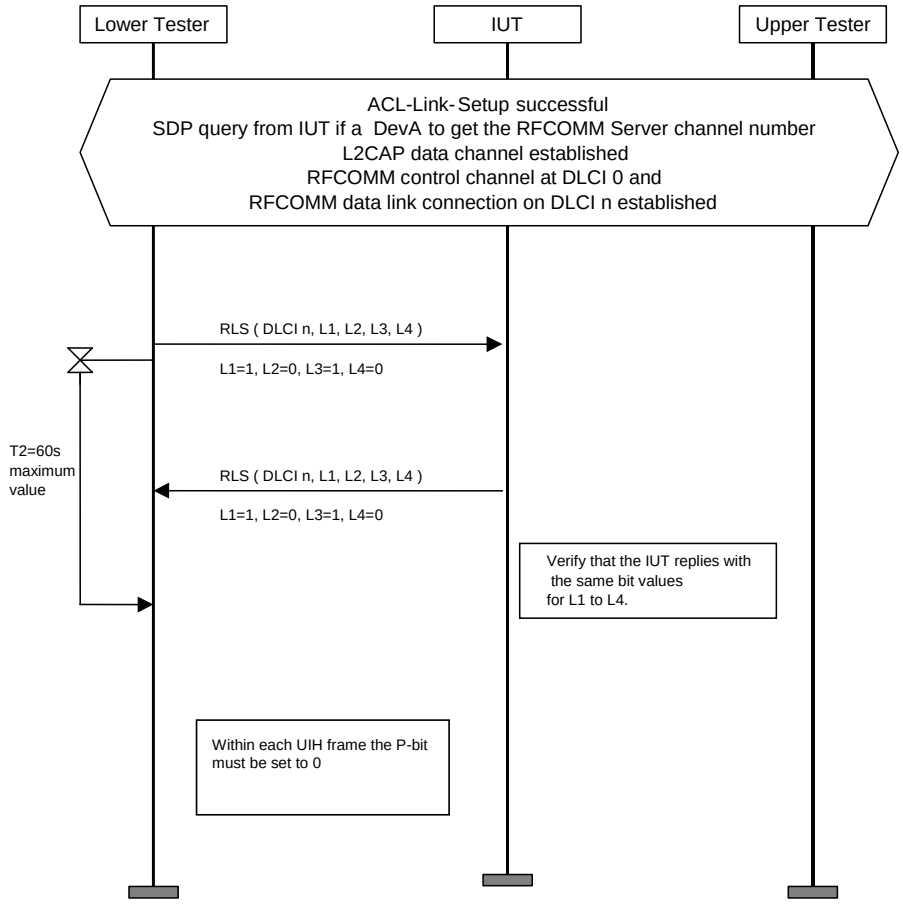

Figure 4.10: RFCOMM/DEVA-DEVB/RFC/BV-13-C [Remote Line Status Indication – Lower Tester]

- Expected Outcome

  Pass verdict

  The IUT responds with an RLS response containing the values it received upon indication from the Lower Tester.

  The FCS field is calculated correctly and only from the address and the control field.

  The P-bit inside the control field is set to 0.

Inconclusive verdict

The IUT responds with an RLS command containing the values it received upon indication from the Lower Tester.

The IUT sends a DISC command.

RFCOMM/DEVA-DEVB/RFC/BV-14-C [Remote Line Status Indication – IUT]

- Test Purpose

  Verify that the IUT sends a Remote Line Status Command upon a change of the remote port line status.

  Applicable only for IUTs with a physical port supporting the service.

- Reference

  [1] 5.5.2

  [2] 5.4.6.3.10

- Initial Condition

  - The IUT may act as either Central or Peripheral.
  - An RFCOMM session is initiated and a data connection is established between the IUT and the Lower Tester.
  - From the Tester point of view, the default port settings apply; that means the data bits are followed by one stop bit (S-bit =0). If the IUT sends an RPN command, the Tester accept the Port Value Octet bits by sending the parameter mask set to 1.
  - In case the IUT is a device taking on the role as DevA, the IUT has to initiate the RFCOMM session and to establish the DLC. See RFCOMM/DEVA/RFC/BV-05-C [Establish DLC – Initiate].
  - In case the IUT is a device taking on the role as DevB, the Tester has to initiate the RFCOMM session and to establish the DLC. See RFCOMM/DEVB/RFC/BV-06-C [Establish DLC – Respond].

- Test Procedure

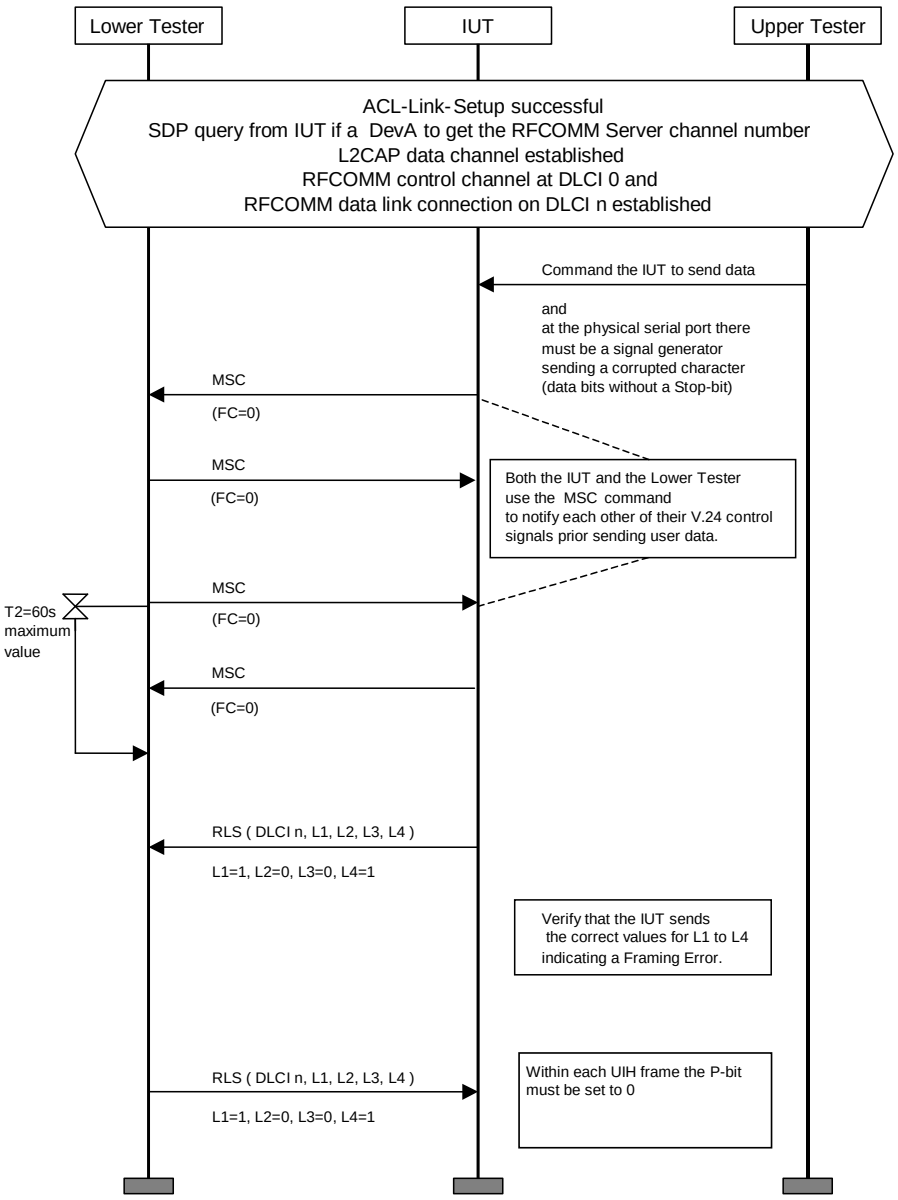

Figure 4.11: RFCOMM/DEVA-DEVB/RFC/BV-14-C [Remote Line Status Indication – IUT]

- Test Condition

  A signal generator is needed to provide the physical serial port with a data stream.

- Expected Outcome

  Pass verdict

  The IUT sends a Remote Line Status command upon receiving a data character not terminated with a stop bit. The RLS command indicates the Line Status with the RLS octet field set according to a bit setting of L1=1, L2=0, L3=0 and L4=1.

  The FCS field is calculated correctly and only from the address and the control field.

  The P-bit inside the control field is set to 0.

4.2.7 DLC Parameter Negotiations

Verify the parameter negotiation procedure for the DLC adjustment. The IUT is a device taking on a role as DevA and/or as DevB. The IUT may act as either Central or Peripheral.

RFCOMM/DEVA-DEVB/RFC/BV-15-C [DLC Parameter Negotiation – Lower Tester]

- Test Purpose

  Verify that the IUT negotiates DLC parameters upon request from the Lower Tester.

- Reference

  [1] 5.5.3

  [2] 5.4.6.3.1

- Initial Condition
  - The IUT may act as either Central or Peripheral. The Lower Tester initiates the test procedure.
  - The MTU of the L2CAP layer is configured such that the requested N1 fits.
  - An RFCOMM session is initiated between the IUT and the Lower Tester.
  - In case the IUT is a device taking on the role as DevA, the IUT has to initiate the RFCOMM session. See RFCOMM/DEVA/RFC/BV-01-C [Initialize RFCOMM Session – Initiate].
  - In case the IUT is a device taking on the role as DevB, the Lower Tester has to initiate the RFCOMM session. See RFCOMM/DEVB/RFC/BV-02-C [Initialize RFCOMM Session – Respond].

- Test Procedure

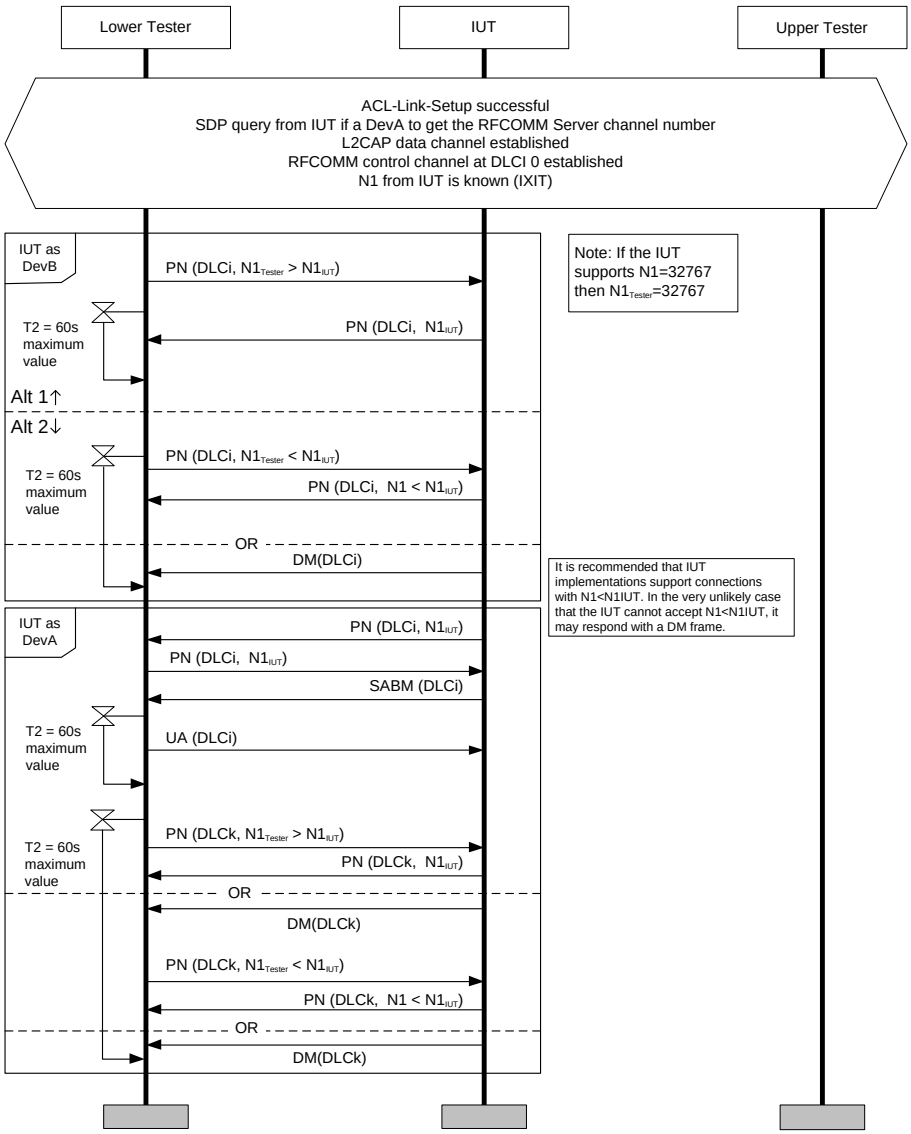

Figure 4.12: RFCOMM/DEVA-DEVB/RFC/BV-15-C [DLC Parameter Negotiation – Lower Tester]

If the IUT is DevA, it issues a PN command. If the IUT is DevB, the Lower Tester issues a PN command.

- Test Condition

  The manufacturer declares with IXIT:

  The maximum frame size N1.

  Acceptable values for the UUID for a service record that will yield a DLCI for which a connection can be accepted.

- Expected Outcome

  Pass verdict

  The IUT responds with a PN response upon receiving a PN command from the Lower Tester. In that the I-bits, T-bits and NA-bits must be set to zero. CL-bits must be set to 0x0E.

  The FCS field is calculated correctly and only from the address and the control field.

  The P-bit inside the control field is set to 0.

- Notes

  Before a DLC is set up there must be an agreement on the parameters to be used for that DLC. These parameters are determined by DLC parameter negotiation.

  The following parameters are fixed within RFCOMM:

  The I-bits are all set to zero, which means that UIH frames are used for carrying information.

  The T-bits are all set to zero and define the acknowledgement timer, which is not negotiable in RFCOMM.

  The NA-bits are all set to zero and therefore the maximum number of retransmissions N2 is set to 0.

  The CL-bits are set to 0x0F by the Lower Tester indicating that credit base flow control is supported.

  The following parameters are not fixed within RFCOMM:

  The K-bits indicate the initial number of credits issued in the PN request and in the PN response.

  It is recommended that implementations support connections with N1 < $N1_{IUT}$. In the very unlikely case that an implementation cannot accept a N1 < $N1_{IUT}$, the IUT may respond with a DM frame. An IUT (as DevA) may respond with a DM frame to the Lower Tester's PN command with the unacceptable value N1 > $N1_{IUT}$.

4.2.8 Remote Port Negotiations

Verify the negotiation procedure for the remote port adjustment. The IUT is a device taking on a role as DevA and/or as DevB. The IUT may act as either Central or Peripheral.

RFCOMM/DEVA-DEVB/RFC/BV-17-C [Remote Port Negotiation – Lower Tester]

- Test Purpose

  Verify that the IUT negotiates remote port communication settings upon inquiry from the Lower Tester.

- Reference

  [1] 5.5.1

  [2] 5.4.6.3.9

- Initial Condition

  - The IUT may act as either Central or Peripheral. The Lower Tester initiates the test procedure.
  - An RFCOMM session is initiated between the IUT and the Lower Tester.
  - In case the IUT is a device taking on the role as DevA, the IUT has to initiate the RFCOMM session. See RFCOMM/DEVA/RFC/BV-01-C [Initialize RFCOMM Session – Initiate].

- In case the IUT is a device taking on the role as DevB, the Lower Tester has to initiate the RFCOMM session. See RFCOMM/DEVB/RFC/BV-02-C [Initialize RFCOMM Session – Respond].

- Test Procedure

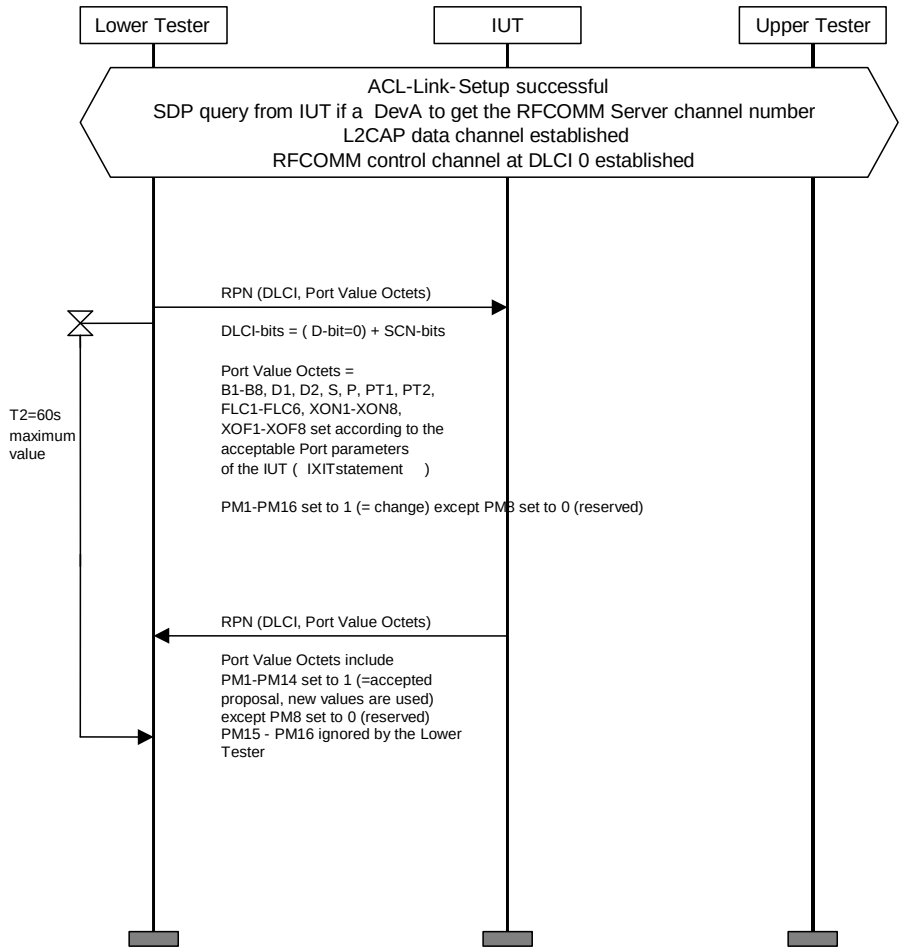

Figure 4.13: RFCOMM/DEVA-DEVB/RFC/BV-17-C [Remote Port Negotiation – Lower Tester]

- Test Condition

  The manufacturer declares with an IXIT the following parameters with acceptable values:

  - Baud rate (2400 bit/s - 230400 bit/s)
  - Number of data bits (5 bits - 8 bits)
  - Number of stop bits (1stop bit (S=0) or 1,5 stop bits (S=1))
  - Parity (no or yes)
  - Parity type (odd, even, mark or space)
  - Flow control (XON/XOFF on input, XON/XOFF on output, RTR on input, RTR on output, RTC on input, RTC on output)
  - XON character
  - XOFF character
  - The UUID for a service record that will yield a DLCI for which a connection can be accepted

- Expected Outcome

  Pass verdict

  The IUT responds with an RPN response with the parameter mask set to 1 for all parameters that means it accepts all parameters proposed by the Lower Tester (bit 8 is reserved and is set to 0 by the IUT; bits 15 and 16 are ignored by the Lower Tester).

  The FCS field is calculated correctly and only from the address and the control field.

  The P-bit inside the control field is set to 0.

RFCOMM/DEVA-DEVB/RFC/BV-19-C [Remote Port Negotiation – Request]

- Test Purpose

  Verify that the IUT responds with its current port values setting upon request from the Lower Tester.

- Reference

  [1] 5.5.1

  [2] 5.4.6.3.9

- Initial Condition

  - The IUT may act as either Central or Peripheral. The Lower Tester initiates the test procedure.
  - An RFCOMM session is initiated between the IUT and the Lower Tester.
  - In case the IUT is a device taking on the role as DevA, the IUT has to initiate the RFCOMM session. See RFCOMM/DEVA/RFC/BV-01-C [Initialize RFCOMM Session – Initiate].
  - In case the IUT is a device taking on the role as DevB, the Lower Tester has to initiate the RFCOMM session. See RFCOMM/DEVB/RFC/BV-02-C [Initialize RFCOMM Session – Respond].

- Test Procedure

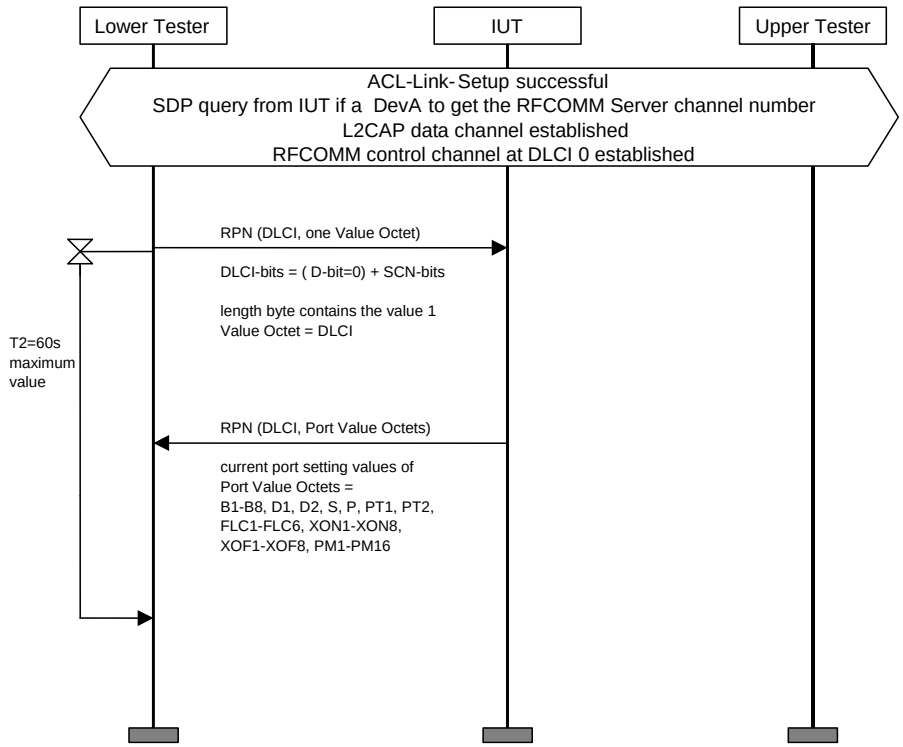

Figure 4.14: RFCOMM/DEVA-DEVB/RFC/BV-19-C [Remote Port Negotiation – Request]

- Test Condition

  The manufacturer declares with an IXIT:

  - Acceptable values for the UUID for a service record that will yield a DLCI for which a connection can be accepted
  - Acceptable values for the baud rate

- Expected Outcome

  Pass verdict

  The IUT interprets the Lower Tester's RPN command including only one value byte as a request and responds with its current Port Values setting.

  The FCS field is calculated correctly and only from the address and the control field.

  The P-bit inside the control field is set to 0.

4.2.9 Credit Based Flow Control

Verify the flow control using credits. The IUT is a device taking on a role as DevA and/or as DevB. The IUT may act as either Central or Peripheral.

RFCOMM/DEVA-DEVB/RFC/BV-21-C [Credit Based Flow Control]

- Test Purpose

  Verify that the IUT handles flow control correctly when the Lower Tester controls the data by issuing credits.

- Reference

  [1] 6.5

- Initial Condition

  - The IUT may act as either Central or Peripheral. The Lower Tester initiates the test procedure.
  - An RFCOMM session is initiated and a data connection is established between the IUT and the Lower Tester.
  - In case the IUT is a device taking on the role as DevA, the IUT has to initiate the RFCOMM session and to establish the DLC. See RFCOMM/DEVA/RFC/BV-05-C [Establish DLC – Initiate].
  - In case the IUT is a device taking on the role as DevB, the Tester has to initiate the RFCOMM session and to establish the DLC. See RFCOMM/DEVB/RFC/BV-06-C [Establish DLC – Respond].

- Test Procedure

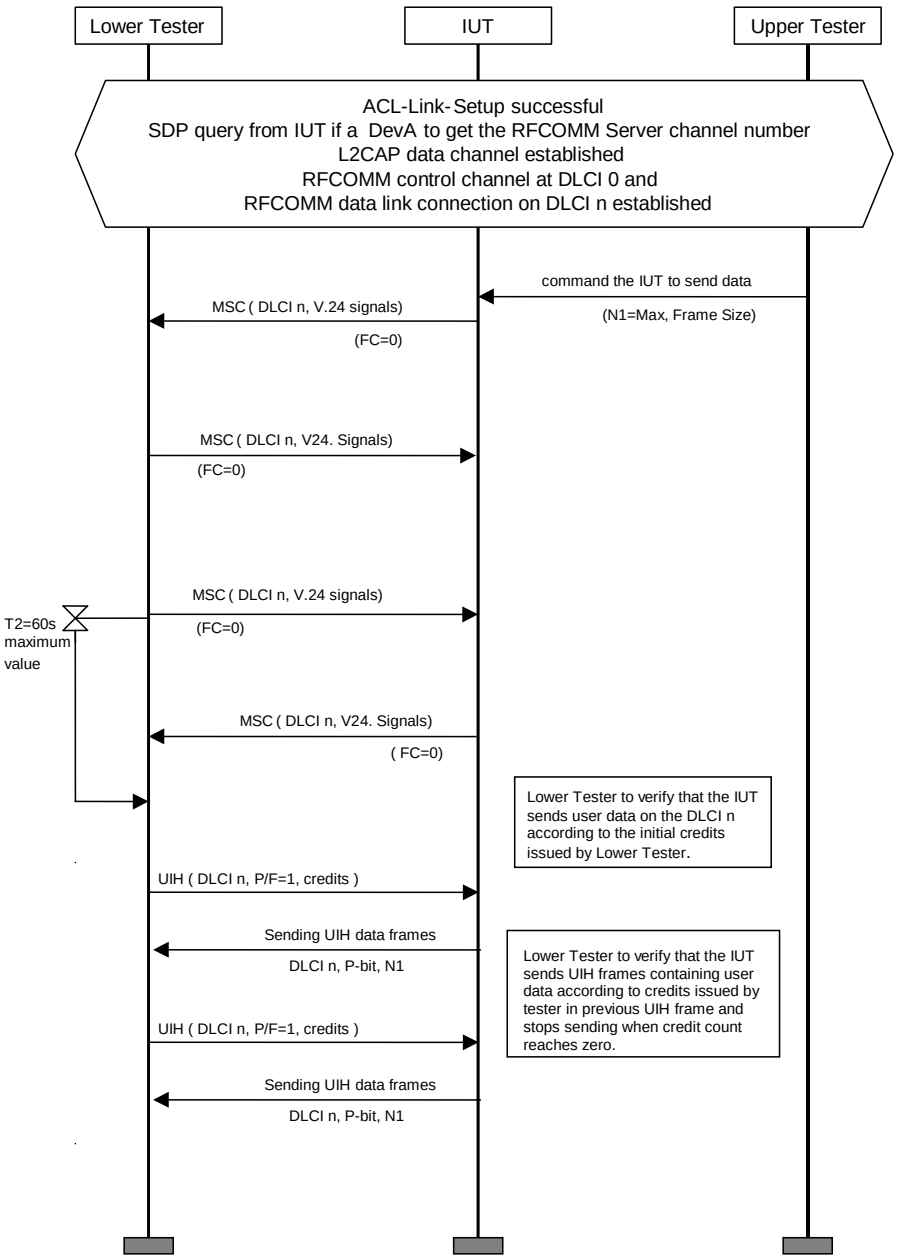

Figure 4.15: RFCOMM/DEVA-DEVB/RFC/BV-21-C [Credit Based Flow Control]

- Test Condition

  It must be guaranteed that the IUT can send data if requested via the Upper Tester.

  When credit based flow control is being used, the FC bit in the MSC command has no meaning and should be set to zero.

- Expected Outcome

  Pass verdict

  The IUT sends a number of UIH frames containing user data according to the initial amount of credits issued by the Lower Tester. Then, the IUT stops sending data until a UIH frame issuing more credits is received.

RFCOMM/DEVA-DEVB/RFC/BV-22-C [Transfer Information]

- Test Purpose

  Verify that the IUT starts transmitting user data on the data link connection.

- Reference

  [1] 4.2

- Initial Condition

  - The IUT may act as either Central or Peripheral.
  - An RFCOMM session is initiated and a data connection is established between the IUT and the Lower Tester. The Lower Tester gives initial credits to the IUT in the PN frame transmitted when DLCI is established.
  - In case the IUT is a device taking on the role as DevA, the IUT has to initiate the RFCOMM session and to establish the DLC. See RFCOMM/DEVA/RFC/BV-05-C [Establish DLC – Initiate].
  - In case the IUT is a device taking on the role as DevB, the Tester has to initiate the RFCOMM session and to establish the DLC. See RFCOMM/DEVB/RFC/BV-06-C [Establish DLC – Respond].

- Test Procedure

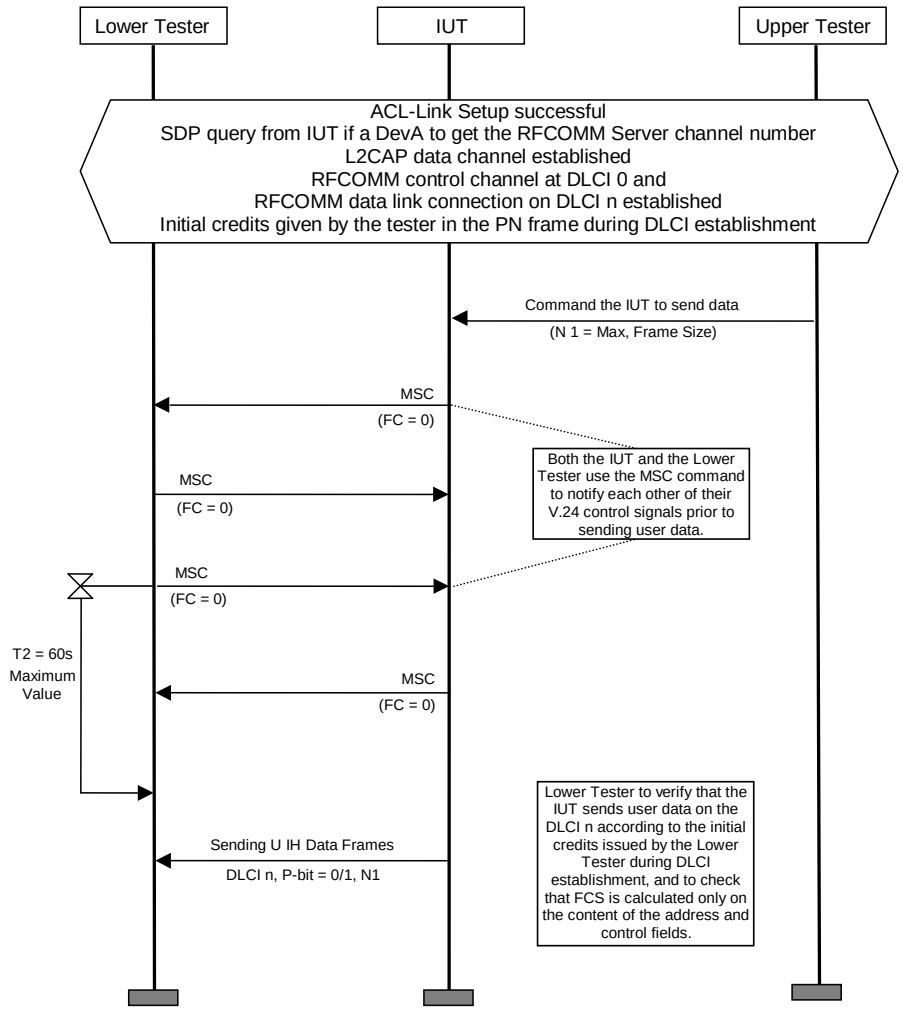

Figure 4.16: RFCOMM/DEVA-DEVB/RFC/BV-22-C [Transfer Information]

- Expected Outcome

  Pass verdict

  The IUT conveys information data using UIH frames with an information length specified by the length indicator. The maximum number of octets in the information field must not be higher than N1 for UIH frames with P/F-bit = 0, and N1 -1 for UIH frames with P/F-bit = 1.

  The FCS field is calculated correctly and only from the address and the control fields.

  The P-bit inside the control field is set to 0 if no credit field is inserted or 1 if credit field is present in the UIH frame structure.

  The IUT stops sending UIH frames containing user data when initial credits count reaches zero.

- Notes

  When credit based flow control is being used, the FC bit in the MSC command has no meaning and should be set to zero.

4.2.10 Non-Supported Commands

Verify responder behavior upon reception of an unsupported command type.

RFCOMM/DEVA-DEVB/RFC/BV-25-C [Non-Supported Command Response]

- Test Purpose

  Verify that the IUT sends a Non-Supported Command (NSC) response and correctly reports the unsupported command type upon reception of an UIH frame containing an unsupported command.

- Reference

  [1] 4.3

- Initial Condition

  - The IUT may act as Central or Peripheral.
  - An RFCOMM session is initiated between the IUT and the Lower Tester.
  - In case the IUT is a device taking on the role as DevA, the IUT has to initiate the RFCOMM session. See RFCOMM/DEVA/RFC/BV-01-C [Initialize RFCOMM Session – Initiate].
  - In case the IUT is a device taking on the role as DevB, the Lower Tester has to initiate the RFCOMM session. See RFCOMM/DEVB/RFC/BV-02-C [Initialize RFCOMM Session – Respond].

- Test Procedure

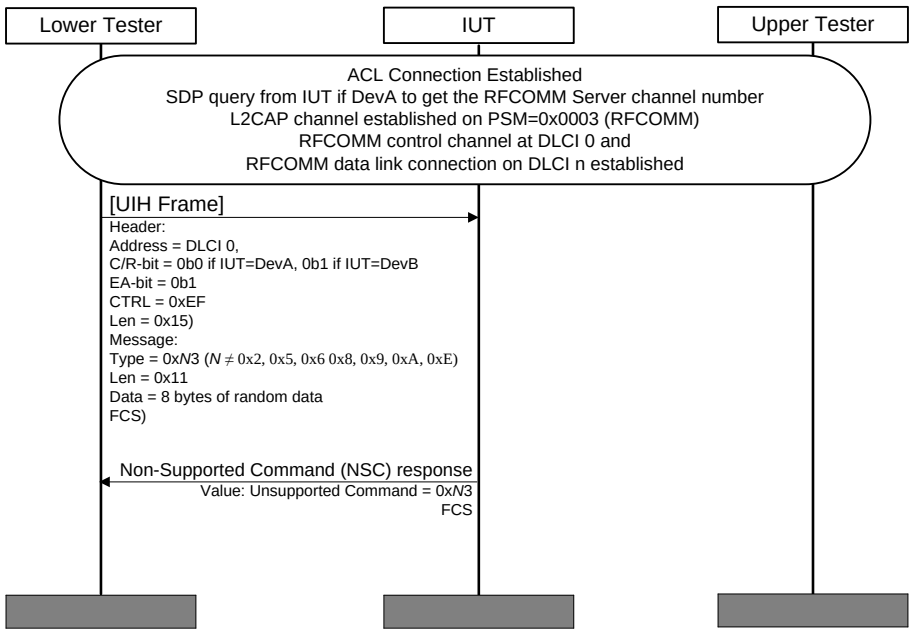

Figure 4.17: RFCOMM/DEVA-DEVB/RFC/BV-25-C [Non-Supported Command Response]

The P/F bit inside the Control field is set to 0.

- Expected Outcome

  Pass verdict

  The IUT sends a Non-Supported Command (NSC) response frame to the Lower Tester upon reception of a UIH frame containing an unsupported command type.

The value for the Unsupported Command sent by the IUT matches the value sent by the Lower Tester.

The FCS field is calculated correctly and only from the Address and Control fields.

The P/F bit inside the Control field is set to 0.

5 Test case mapping

The Test Case Mapping Table (TCMT) maps test cases to specific requirements in the ICS. The IUT is tested in all roles for which support is declared in the ICS document.

The columns for the TCMT are defined as follows:

Item: Contains a logical expression based on specific entries from the associated ICS document. Contains a logical expression (using the operators AND, OR, NOT as needed) based on specific entries from the applicable ICS document(s). The entries are in the form of y/x references, where y corresponds to the table number and x corresponds to the feature number as defined in the ICS document for RFCOMM Protocol [4].

Feature: A brief, informal description of the feature being tested.

Test Case(s): The applicable test case identifiers are required for Bluetooth Qualification if the corresponding y/x references defined in the Item column are supported. Further details about the function of the TCMT are elaborated in [5].

For the purpose and structure of the ICS/IXIT, refer to [5].

Item	Feature	Test Case(s)
RFCOMM 1/1	Initialize RFCOMM session – Ability to initiate	RFCOMM/DEVA/RFC/BV-01-C
RFCOMM 1/2	Initialize RFCOMM session – Ability to respond	RFCOMM/DEVB/RFC/BV-02-C
RFCOMM 1/4	Shutdown RFCOMM session – initiated by Lower Tester	RFCOMM/DEVA-DEVB/RFC/BV-03-C
RFCOMM 1/3 AND RFCOMM 1/21	Shutdown RFCOMM session – initiated by IUT	RFCOMM/DEVA-DEVB/RFC/BV-04-C
RFCOMM 1/5	Establish DLC - Ability to initiate	RFCOMM/DEVA/RFC/BV-05-C
RFCOMM 1/6	Establish DLC - Ability to respond	RFCOMM/DEVB/RFC/BV-06-C
RFCOMM 1/7	Disconnect DLC – by IUT	RFCOMM/DEVA-DEVB/RFC/BV-07-C
RFCOMM 1/8	Disconnect DLC – by Lower Tester	RFCOMM/DEVA-DEVB/RFC/BV-08-C
RFCOMM 1/11	Respond to Test command	RFCOMM/DEVA-DEVB/RFC/BV-11-C
RFCOMM 1/14	Remote Line Status indication – Lower Tester	RFCOMM/DEVA-DEVB/RFC/BV-13-C
RFCOMM 1/15 AND SPP 2/1	Remote Line Status indication – IUT	RFCOMM/DEVA-DEVB/RFC/BV-14-C
RFCOMM 1/16	DLC parameter negotiation – Lower Tester	RFCOMM/DEVA-DEVB/RFC/BV-15-C
RFCOMM 1/19	Remote port negotiation – Lower Tester	RFCOMM/DEVA-DEVB/RFC/BV-17-C
RFCOMM 1/19	Remote port negotiation – request	RFCOMM/DEVA-DEVB/RFC/BV-19-C
RFCOMM 1/22	Credit Based Flow Control	RFCOMM/DEVA-DEVB/RFC/BV-21-C
RFCOMM 1/10	Transfer information. Credit Based Flow Control	RFCOMM/DEVA-DEVB/RFC/BV-22-C
RFCOMM 1/18	Send Non-Supported Command (NSC) response	RFCOMM/DEVA-DEVB/RFC/BV-25-C

Table 5.1: Test case mapping

6 Revision history and acknowledgments

Revision History

Publication Number	Revision Number	Date	Comments
0	1.1.0	2004-12-07	Incorporated March 2004 Addendum: TSE 542 for TP/RFC/BV-15-C. Incorporate TSE 575 for new TP/RFC/BV-24-C and change TCMT. Editorial changes and format changes Under each subgroup was BV and BI objectives repeated exactly as they were laid out in 4.3.2 and 4.3.3. Deemed redundant, these repetitions were removed. A reference to the test sub group 5. 2.12.4 N/ABI Test Purposes contained no test content and was removed. Under 5.1.1 TP Definition Conventions, the legacy table was removed and instead replaced by TP Definition Conventions in Test Strategy & Terminology Overview, Volume 1, Part A.
	1.1.1r0	2006-11	Insert Conformance Section 4.3.4 TSE: 1914: TP/RFC/BV-09-C and TP/RFC/BV-10-C: remove the Flow Control = 0 on the first two MSC messages.
	1.1.1r1	2006-11-22	TSE 1536: Change MSC parameter negotiations for test case RFC/BV-15-C Move MFCs to their respective test cases
1	1.1.1	2007-01-10	Prepare for publication.
	1.1.2r0	2008-11-06	TSE 2552: TP/RFC/BV-15-C: Update Notes and MSC
2	1.1.2	2008-12-04	Prepare for publication.
	1.1.3r0	2011-11-11	TSE 3321: TP/RFC/BV-14-C: update TCMT
	1.1.3r1	2012-02-08	TSE 2034: Removal of six test cases. TP/RFC/BV-20-C, TP/RFC/BV-23-C, TP/RFC/BV-24-C, TP/RFC/BV-09-C, TP/RFC/BV-10-C, TP/RFC/BV-12-C
3	1.1.3	2012-03-30	Prepare for publication.
	1.2.0r0	2012-09-25	TSE 4959: Added new section, Non-Supported Commands, and TP/RFC/BV-23-C test case, included TP/RFC/BV-23-C in TCMT. Version updated to align with specification version 1.2 Updated Conformance section to match updated TSTO doc language. Editorial changes to align with current standards.

Publication Number	Revision Number	Date	Comments
	1.2.0r1	2012-10-03	Changes based on reviews from Alicia and Magnus Added Test Strategy and Overview Document to the reference list and cross-referenced it in Section 3. Deleted definitions section due to the reference to the Test Strategy document. Updated reference in section 2 to read, “or later” Removed the RFCOMM prefix from the TCMT
4	1.2.0	2012-11-13	Prepare for Publication
	1.2.1r1	2013-05-01	TSE 5096: Renamed test case TP/RFC/BV-23-C that was added in TSE 4959 to TP/RFC/BV-25-C since it was a duplication of a test case ID that was previously removed by TSE 2034. Updated all references.
5	1.2.1	2013-07-02	Prepare for Publication
	1.2.2r00	2016-08-29	Converted to new Test Case ID conventions as defined in TSTO v4.1.
	1.2.2r01	2016-11-16	Converted to latest template
6	1.2.2	2016-12-13	Approved by BTI. Prepared for TCRL 2016-2 publication.
	p7r00–r01	2024-01-05 – 2024-01-10	TSE 24743 (rating 1): Updated to align the document with the latest standards.
7	p7	2024-07-01	Approved by BTI on 2024-05-22. Prepared for TCRL 2024-1 publication.

Acknowledgments

Name	Company
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