

Link Manager Protocol (LMP)

Bluetooth® Test Suite

- **Revision:** LMP.TS.5.1.0
- **Revision Date:** 2018-12-07
- **Group Prepared By:** BTI
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Abstract:

This document defines the testing requirements for implementations of the Bluetooth Link Manager layer.



Revision History

Revision Number	Date	Comments
2.0.E.0	2004-10-20	<p>Initial document from version 1.2</p> <p>Changes for V2.0 + EDR</p> <p>TSE 641 for TP/ENC/BV-03-CTP/ENC/BV-12-C, TP/LIH/BV-03-C, TP/LIH/BV-12-C, TP/LIH/BV-20-C, TP/LIH/BV-34-C, TP/LIH/BV-60-C, TP/LIH/BV116-C, TP/LIH/BV-71-C, and TP/LIH/BV-72-C</p> <p>TSE 655 for TP/LIH/BV-111-C</p> <p>TSE 656 for TP/AUT/BV-01-C</p> <p>TSE 665 for TP/LIH/BV-101-C and TP/LIH/BV-102-C</p> <p>TSE 598 for TP/ENC/BV-10-C</p> <p>TSE 599 for TP/LIH/BV-104-C and TP/LIH/BV-104-C</p> <p>TSE 600 for TP/AFH/BV-05-C</p> <p>TSE 653 for TP/LIH/BV-103-C, TP/LIH/BV-106-CTP/LIH/BV-107-C, TP/LIH/BV-110-C, TP/LIH/BV-112-C, and TP/LIH/BV-113-C.</p> <p>TSE 679 for TP/LIH/BV-100-C, TP/LIH/BV-104-C, and TP/LIH/BV-105-C.</p>
2.0.E.1 Draft	2004-11-04	Editorial change to TCMT 14a to 15 and 14b to 16.
2.0.E.1	2004-11-04	First version for 1.2/2.0/2.0 + EDR available for qualification.
2.0.E.2r1	2005-03-24	TSE 695 for TCMT
2.0.E.2	2005-03-24	Prepare for publication.
2.0.E.3r1	2005-03-29	Remove TSE 653 for TP/LIH/BV-103-C, TP/LIH/BV-106-CTP/LIH/BV-107-C, TP/LIH/BV-110-C, TP/LIH/BV-112-C, and TP/LIH/BV-113-C.
2.0.E.3	2005-03-29	Prepare for publication.
2.0.E.4r1	2005-03-31	TSE 757 for TP/LIH/BV-83-C.
2.0.E.4	2005-03-31	Prepare for publication.
2.0.E.5r0	2005-08-08	<p>TSE 733 for TP/LIH/BV-61-C and TP/LIH/BV-64-C</p> <p>TSE 750 for TOC814 for TP/ENC/BV-12-C</p> <p>TSE 753 for TP/AFH/BV-04-C</p>
2.0.E.5r1	2005-10-18	Add TSE 699 for TP/LIH/BV-84-C and TP/LIH/BV-84-C. Fix header and front page for specification versions
2.0.E.6r0	2006-05-10	<p>TSE 844: TP/LIH/BV-42-C: Add comment to MSCTSE 918: TP/LIH/BV-42-C: Changed comment beneath MSC from "POLL" to "allowed"</p> <p>TSE 935: TP/LIH/BV-86: Fix 2-EV3 packet sentence in test procedure.</p>



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		TSE 943: change TP/LIH/BV-84-C and TP/LIH/BV-85-C: 'Notes' TSE 1819: correct references to TP/ENC/BV figures
2.0.E.6	2006-06-05	Prepare for publication.
2.1.E.1r0 to 2.1.E.1r10	2006-09-27	<p>Add Section 4.1.x "Conformance"</p> <p>TSE 1741: TP/LIH/BV-83-C: Add 0x20 as an error code.</p> <p>TSE 1798: TP/LIH/BV-61 and TP/LIH/BV-64: Add DM1 as an allowed packet parameter MSCs.</p> <p>TSE 1785: See TSE 935; TSE 1800: TP/LIH/BV-47-C, TP/LIH/BV-48-C: use of HV packets; TSE 1801: TP/LIH/BV-106-C: use of HV packets; TSE 1808: TP/LIH/BV-85-C; change MSC, change Notes</p> <p>TSE 1888: Remove "Applicable if" clauses from TP/AUT/BV-05-C, TP/AUT/BV-12-C, TP/AUT/BV-0513-C, TP/ENC/BV-01-C, TP/ENC/BV-04-C, TP/ENC/BV-05-C, TP/ENC/BV-06-C, TP/ENC/BV-07-C, TP/ENC/BV-08-C, TP/ENC/BV-09-C, TP/ENC/BV-10-C, TP/ENC/BV-11-C, TP/ENC/BV-12-C, TP/ENC/BV-13-C, TP/INF/BV-05-C, TP/INF/BV-4-C, TP/LIH/BV-01 02 03 06 09 10 11 12 14 15 16 17 18 19 20 22 23 24 25 26 27 29 32 34 35 36 37 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 63 64 71 72 75 76 77 78 79 87 110 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116-C, TP/AFH/BV-04 05 06 07 08 09-C.</p> <p>Add TP/LIH/BV-117-C through TP/LIH/BV-125-C for Sniff Subrating.</p> <p>Add TP/LIH/BV-126-C for Link Supervision Timeout Changed Event.</p> <p>Add TP/ENC/BV-14-C through TP/ENC/BV-19-C for Encryption Pause Resume.</p>
2.1.E.1r0 to 2.1.E.1r10	2006-09-27	<p>Make changes to match updated Sniff subrating test case spec</p> <p>Add Section 5.2 and subsections for Simple Pairing Test cases and related text, including TP/SP/BV-01-C through TP/SP/BV-29-C</p> <p>Change MSC for SP/BV-07</p> <p>Spec erratum #1993 changes to Figs 5.9, 5.10, 5.11, 5.13, 5.14</p> <p>Remove "Applicable for" statement in sections 5.x.x</p> <ul style="list-style-type: none"> -Figure 5.139 and 5.140: Add boxes with ALT labels -Figures 5.1 – 5.4: Add Optional box to MSCs <p>Spec erratum 1993 changes to Figs 5.9, 5.10, 5.11, 5.13, 5.14</p> <p>Add test cases:</p> <p>TP/SP/BV-30-C, TP/SP/BV-31-C, TP/SP/BV-32-C, TP/INF/BV-18-C, TP/INF/BI-19-C, TPINF/BV-20-C, TP/INF/BV-21-C</p> <p>TCMT Changes: Add row for TP/INF/BV-18-C, TP/INF/BI-19-C, TPINF/BV-20-C, TP/INF/BV-21-C, Add new SP cases</p>



Revision Number	Date	Comments
		<p>TSE 2038: Change 'F' to 'D' in Event_Mask parameter Figure 5.1 – 5.4</p> <p>TSE 2045: TP/SP/BV-06, TP/SP/BV-07, TP/SP/BV-12, TP/SP/BV-13, TP/SP/BV-18, TP/SP/BV-19, TP/SP/BV-20, TP/SP/BV-21, TP/SP/BV-22, TP/SP/BV-23, TP/SP/BV-29</p> <p>TSE 2047: SP/BV/20-C AND SP/BV/21-C: Remove HCI_Remote_OOB_Data_Request event and -Reply command</p> <p>TSE 2053: add to MSC TP/SP/BV-21 TP/SP/BV-23, TP/SP/BV-27, Remove from MSC TP/SP/BV-18-C AND TP/SP/BV-24-C</p> <p>TSE 2058: Fixed second MSC for SP/BV-29-C</p> <p>TSE 2066: TP/LIH/BV-118-C Pass verdict 2D = 640 slots. TSE 2074: TP/SP/BV-24, TP/SP/BV-25, TP/SP/BV-26, TP/SP/BV-27: MSCs and pass verdict for -24</p> <p>TSE 2080: TP/SP/BV-28-C similar to TP/SP/BV-29</p>
2.1.E.1	2007-06-07	Prepare for publication.
2.1.E.2r0	2007-Nov	<p>TSE 2075: TP/SP/BV-19, TPSP/BV-23, TP/SP/BV-25, TP/SP/BV-27</p> <p>TSE 2060: Add notes to TP/ENC/BV-14, TP/ENC/BV-15, TP/ENC/BV-18 and TP/ENC/BV-19, TP/ENC/BV-16 and TP/ENC/BV-17</p> <p>TSE 2214: Move 5.7.22.11 to 5.7.27; add 5.7.27.3TSE 2225: TP/ENC/BV-14-C, TP/ENC/BV-15-C, TP/ENC/BV-16-C, TP/ENC/BV-17-C: update MSCs</p> <p>TSE 2235: TP/ENC/BV-18-C</p> <p>TSE 2242: TP/SP/BV-14-C</p> <p>TSE 2243: TP/SP/BV-05-C, TP/SP/BV-30-C TP/SP/BV-31-C, TP/SP/BV-32-C, updated MSCs</p> <p>TSE 2247:TP/INF/BV-21: Change parameter in MSC</p> <p>TSE 2248: TP/INF/BV-18 TP/INF/BV-19 TP/INF/BV-20 MSCs.</p> <p>TSE 2250: TP/SP/BV-31-C MSC caption. TSE 2277: TP/INF/BV-18 TP/INF/BV-19 TP/INF/BV-20TSE 2306: TP/SP/BV-11-C: Change pass verdict</p> <p>TSE 2312: TP/SP/BV-30-C,TP/SP/BV-31-C and TP/SP/BV-32-C change MSC opcodes</p> <p>TSE 2313: TP/SP/BV-28-C: MSC update</p> <p>TSE 2322: TP/INF/BV-18-C, TP/INF/BV-19-C, TP/INF/BV-20-C: Add parameters (remove '?')TSE 2394: TP/LIH/BV-84-C, TP/LIH/BV-85-C</p> <p>TSE 2398: TP/ENC/BV-17-C: update MSC</p> <p>TSE 2401; TP/SP/BV-31-C: update MSC</p> <p>TSE 2403: TP/SP/BV-04-C: update Initial condition</p>
2.1.E.2	2008-04-01	Prepare for publication.



Revision Number	Date	Comments
2.1.E.3r0	2008-10-08	TSE 2419: TP/SP/BV-20-C: Correct MSC TSE 2617: TP/INF/BV-14-C TSE 2626: TP/ENC/BV-05-C, TP/ENC/BV-06-C, TP/ENC/BV-07-C, TP/ENC/BV-10-C, TP/ENC/BV-18-C, TP/ENC/BV-19-C: Add note in test procedure
2.1.E.3	2008-12-12	Prepare for publication.
2.1.E.4r0-1	2009-02-12	Add EPC test cases to section 5.7.14. Update TCMT with new EPC test case mappings. Updated TP/ENC/BV-01-C MSC and verdicts. Input reviewer comments for 3.0 +HS test cases.
3.0.H.0 2.1.E.4	2009-02-12	Prepare for publication.
3.0.H.0a 2.1.E.4a	2009-05-11	Fix to TSE 2626. Test cases affected: TP/ENC/BV-05-C, TP/ENC/BV-06-C, TP/ENC/BV-07-C, TP/ENC/BV-10-C, TP/ENC/BV-18-C, TP/ENC/BV-19-C
3.0.H.1	2009-08-16	TSE 2981: Correction to TCMT for TP/LIH/BV-133-C TSE 2941: TP/LIH/BV-127-C, TP/LIH/BV-128-C, update opcode in MSCs
3.0.H.2r0	2009-12-01	Added TP/INF/BV-22-C for LE features
3.0.H.2r1	2009-12-02	Fixed TCMT for new test case
4.0.0	2009-12-17	Prepare for publication
4.0.1r0	2010-11-24	TSE 2978: Remove last line from TCMT for TP/RD/BV-01-C
4.0.1r1	2011-07-13	Address reviewer (MS) comment: Apply TSE 3047 to TP/LIH/BV-61-C per TSE Approval reason
4.0.1	2011-07-18	Prepare for publication
4.0.2r0	2011-11-06	TSE 4228: Update TCMT, new test cases TP/SP/BV-33-C, TP/SP/BV-34-C, TP/SP/BV-35-C, TP/SP/BV-36-C
4.0.2	2012-03-30	Prepare for publication
4.0.3r0	2012-05-16	TSE: 4613: TP/INF/BV-22-C; Update MSC
4.0.3	2012-07-24	Prepare for publication.
4.0.4r0	2012-11-05	TSE 4920: Added new test TP/ENC/BV-22-C (Initiate Encryption) for slave initiating encryption in section 5.5.1, TCMT entry in Encryption section.



Revision Number	Date	Comments
		TSE 4921: Added new tests TP/ENC/BV-20-C, TP/ENC/BV-21-C, TP/ENC/BV-22-C and TP/ENC/BV-23-C in section 5.5.2, TCMT entry in Encryption section.
4.0.4	2012-11-16	Prepare for Publication
4.0.5r1	2013-05-29	TSE 5068: Updated MSC for TP/LIH/BV-02-C, slave and master labels were reversed. TSE 5069: Added TP/ENC/BV-24-C to TCMT for "Encryption Pause/Resume" mapped to "LMP 6/10".
4.0.5	2013-07-02	Prepare for publication
4.0.6r0 to 4.0.6r4	2013-07-03 to 2013-09-16	Template Conversion: - Update of language to match BTI approved wording (example, fail verdicts) - Removal of Test Subgroup Objectives - Removal of sections marked "N/A" - New Pass/Fail Verdict Criteria section added
4.1.0r01	2013-09-16	BR/EDR Secure Connections CR Integration
4.1.0r02	2013-10-01	Updated graphics from WMF to VSD--dh.
4.1.0r03	2013-10-07	TSE 5182: Editorial cleanup of the TCMT. TSE 5189: Removed "Note: If legacy host is supported, then only MSC 2 should be executed. Otherwise, both MSCs shall be executed." in test procedure of TP/END/BV/20-C. TSE 5200: Update MSCs for TP/ENC/BV-20-C and TP/ENC/BV-23-C. TSE 5267: Update MSCs for TP/ENC/BV-14-C and TP/ENC/BV-15-C. TSE 5302: Updated master and slave labels for MSC in TP/LIH/BV-42-C. TSE 5346: Update in Initial Condition, Test Procedure, MSC and removal of the inconclusive verdict for TP/ENC/BV-07-C. TSE 5347: Updated MSC for TP/LIH/BV-123-C to match Test Procedure. TSE 5350: Updated TP/SP/BV-01-C and TP/SP/BV-02-C.
4.1.0r04	2013-10-09	Piconet Clock Adjust CR
4.1.0	2013-12-03	Prepare for Publication
4.1.1r00	2014-04-07	TSE 5471: Updated MSC for TP/INF/BV-22-C. TSE 5530: Updated MSC, step C of the test procedure and the pass verdict for TP/XCL/BV-01-C and TP/XCL/BV-02-C.



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		TSE 5582: Updated MSC and Pass verdict for TP/LIH/BV-135-C, TP/LIH/BV-137-C, TP/LIH/BV-139-C and TP/LIH/BV-141-C
4.1.1	2014-07-07	TCRL 2014-1 Publication
4.2.0r00	2014-11-24	Revved version to align with Core 4.2 release
4.2.0	2014-12-04	Prepare for TCRI 2014-2 publication
4.2.1r00	2015-10-07	TSE 6565: Resolved TBD opcodes in MSCs in Section 4.2.6 and 4.2.7; removed TBD opcodes in MSCs for TP/SP/BV-06-Cb, TP/SP/BV-08-Cb, TP/SP/BV-10-Cb, TP/SP/BV-45-Cb, TP/SP/BV-28-C, and TP/SP/BV-29-C; resolved TBD opcodes in MSCs for TP/SP/BV-54-C, TP/SP/BV-55-C, TP/SP/BV-56-C, TP/SP/BV-57-C, TP/SP/BV-58-C, TP/SP/BV-59-C, TP/SP/BV-60-C, TP/SP/BV-61-C, TP/SP/BV-62-C, and TP/SP/BV-63-C; revised two references in MSC for TP/SP/BV-47-C from TP/SP/BV-TBD01 to TP/SP/BV-41-C.
4.2.1	2015-12-22	Prepared for TCRL 2015-2 publication.
4.2.2r00	2016-02-15	TSE 6889: Deleted invalid references to DSCO and DESCO in test cases TP/LIH/BV-43-C and TP/LIH/BV-103-C.
4.2.2	2016-07-07	Prepared for TCRL 2016-1 publication
5.0.0r00	2016-07-08	Integrated Slot Availability Mask CRr06 for Core Specification v5.0 release
5.0.0r01	2016-06-29	Issue 6888: "the MSB of CLK27" changed to "CLK ₂₇ ." Replaced "the first LMP_SAM_switch PDU" with "an LMP_SAM_switch PDU" in test case TP/SAM/BV-01-C. Removed all references to "D _{SAM} ." Updated SAM_Submaps values for PDUs "N _{SAM-SM} = 0" in TP/SAM/BI-05-C.
5.0.0	2016-12-13	Approved by BTI. Prepared for TCRL 2016-2 publication.
5.0.1r00	2017-05-18	Converted to new Test Case ID conventions as defined in TSTO v4.1.
5.0.1	2017-07-05	Approved by BTI. Prepared for TCRL 2017-1 publication.
5.0.2r00	2017-10-12	TSE 9779: Revised LMP/SAM/BV-02-C test procedure.
5.0.2r01	2017-10-18	TSE 9873: Revised LMP/AUT/BV-13-C and LMP/ENC/BV-37-C – 38-C MSCs. Missing Underscores in HCI_Change_Connection_Link_Key_Complete Event.
5.0.2r02	2017-10-19	TSE 9928: ESR 11 - Change Flags field to Unused in QoS Setup Complete and Flow Specification Complete. Revised MSCs for LMP/LIH/BV-39-C, LMP/LIH/BV-40-C, LMP/LIH/BV-41-C, LMP/LIH/BV-42-C, LMP/LIH/BV-81-C by removing reference to Flags where QoS Setup Complete Event is mentioned.
5.0.2	2017-12-07	Approved by BTI. Prepared for TCRL 2017-2 publication.



Revision Number	Date	Comments
5.0.3r00	2018-01-05	Template update.
5.0.3r02	2018-02-22	TSE 10263 (rating 1): Replaced MSC for LMP/INF/BV-21-C.
5.0.3r02	2018-02-22	TSE 10238 (rating 1): Replaced Verifying MSC for LMP/LIH/BV-22-C.
5.0.3r03	2018-03-02	<p>TSE 10342 (rating 3): Changed initial condition for LMP/AUT/BV-14-C to 17-C to the exact wording used for the P-256 Simple Pairing tests.</p> <p>TSE 10341 (rating 3): For Section 4.2.7 (Secure Simple Pairing P256) MSC, moved the HCI_Write_Secure_Connections_Host_Support command from after to before HCI_Write_Scan_Enable.</p> <p>TSE 10257 (rating 3): For LMP/INF/BV-16-C MSC, added an optional if exchange to HCI_Read_Remote_Extended_Features.</p> <p>TSE 10256 (rating 3): Changed initial condition for LMP/INF/BV-05-C from “Pairing / Authentication and features request has to be carried out.” to “ACL connection has been established between the IUT and the Lower Tester.”</p>
5.0.3r04	2018-03-13	TSE 9710 (rating 3): Clarified LMP QoS PDU generation: replaced MSCs in LMP/LIH/BV-14-C, 15-C, 17-C, 18-C, 39-C, 40-C, LMP/SAM/BV-08-C; revised test procedure in LMP/LIH/BV-39-C, 40-C; and replaced polling figure in LMP/SAM/BV-08-C.
5.0.3r05	2018-03-20	TSE 10469 (rating 3): Fixed problematic exchanges: replaced LMP/SP/BV-26-C MSC b, 27-C and MSC b.
5.0.3r06	2018-03-22	<p>TSE 10468 (rating 1): Changed 28 to 31 in MSC capiton for LMP/ENC/BV-31-C.</p> <p>TSE 10456 (rating 3): Added “with Keypress notification” to headings for LMP/SP/BV-33-C to 36-C. Added missing ends of test procedures to LMP/SP/BV-35-C and 36-C MSC b.</p>
5.0.3r07	2018-04-12	TSE 10471 (rating 3): Updated LMP/SP/BV-01-C Test Procedure to allow only MSC2.
5.0.3r08	2018-04-13	<p>TSE 10472 (rating 4): Removed MSC 1 from test case LMP/SP/BV-05-C and revised MSC 2 to take out the notion of it being alternative 2. Updated the Pass verdict, removed Note in the intro, and changed the cross reference in the Initial Condition.</p> <p>TSE 10537 (rating 3): Invert direction of first LMP_sniff_subrating_req and LMP_sniff_subrating_res arrows for the LMP/LIH/BV-119-C test procedure MSC.</p>
5.0.3r09	2018-05-09	TSE 10256 (rating 3): Changed initial condition to reference Default Settings for test case LMP/INF/BV-05-C.



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5.0.3r10	2018-05-10	TSE 10658 (rating 1): Replaced MSC for test case LMP/LIH/BV-16-C.
5.0.3r11	2018-05-15	TSE 9782 (rating 2): Updated MSCs and figures for test cases LMP/LIH/BV-14-C, 15-C, 17-C, 18-C, 39-C, 40-C; and LMP/SAM/ BV-08-C.
5.0.3r12	2018-06-05	TSE 10470 (rating 3): Replaced MSC 2 in test procedure for test case LMP/AUT/BV-06-C.
5.0.3r13	2018-06-08	TSE 10257: fixed integration error. In the last HCI event in the MSC, changed the page number from 0x00 to 0x01.
5.0.3r14	2018-06-12	TSE 6810 (rating 1): Revised pass verdict for test cases LMP/SP/BV-20-C, 26-C, and 27-C. TSE 10257: fixed integration and formatting error in MSC.
5.0.3r15	2018-06-20	Core E10734 Pairing Updates TS CR: Added new test cases LMP/SP/BI-01-C to 12-C, and added them to the TCMT. Updated Section 4.3.5 Pass/Inconclusive/Fail Verdict Conventions with inconclusive verdict conventions.
5.0.3	2018-07-02	Approved by BTI. Prepared for 2018-1 publication.
5.0.4r01-r10	2018-07-26 - 2018-11-08	TSE 10810 (rating 1): Revised MSCs using the old HCI_IO_Capability_Response command instead of the correct HCI_IO_Capability_Request_Reply command. Affects these MSCs: LMP/SP/BV-07-C to 29-C, and 33-C to 36-C. Core Minor Enhancements Batch 1 Test CRr10-clean: Added “Flow Specification” section and new test case LMP/LIH/BV-88-C to spec text and TCMT. Issue 11122: Deleted Madrid MEP19 test case LMP/LIH/BV-88-C and removed test case mapping. TSE 10539 (rating 3): Updated MSC and test procedure steps for test cases LMP/ENC/BV-30-C and 47-C. TSE 10553 (rating 3): Updated MSC, test procedure steps, and pass verdict for test cases LMP/ENC/BV-29-C, 32-C, 46-C, and 49-C. TSE 10677 (rating 4): Added new test cases LMP/SAM/BV-09-C and LMP/SAM/BV-10-C and updated TCMT with new test cases. TSE 10753 (rating 3): Updated MSCs for test cases LMP/LIH/BV-121-C and 122-C. TSE 10890 (rating 3): Updated MSCs for sections 4.2.2 Encryption, and 4.2.6 AES-CCM Encryption. TSE 10753 (rating 3): Updated MSCs for test cases LMP/LIH/BV-121-C and 122-C. TSE 10890 (rating 3): Updated MSCs for sections 4.2.2 Encryption, and 4.2.6 AES-CCM Encryption. TSE 10929 (rating 3): Updated MSCs and pass verdict for test cases LMP/AUT/BV-03-C, 04-C, and LMP/SP/BV-05-C. Updated



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		<p>MSCs for test cases LMP/AUT/BV-05-C and 06-C. Updated pass verdict for test cases LMP/SP/BV-01-C and 02-C. Updated TCMT for test cases LMP/AUT/BV-03-C, 05-C, and 06-C.</p> <p>TSE 10953 (rating 3): Updated initial condition for test cases LMP/AFH/BV-05-C to 08-C.</p> <p>TSE 10960 (rating 1): Updated initial condition for test cases LMP/SAM/BV-06-C and 07-C.</p> <p>TSE 10995 (rating 3): Updated MSC in sections 4.2.1 Authentication, 4.2.2 Encryption, and 4.2.6 AES-CCM Encryption. Updated initial condition for test cases LMP/AUT/BV-04-C and 06-C. Updated initial condition, test procedure, and MSCs for test cases LMP/ENC/BV-05-C, 06-C, and 22-C.</p> <p>TSE 11037 (rating 1): Updated pass verdict for test case LMP/ENC/BV-22-C.</p> <p>TSE 11047 (rating 1): Added new test case LMP/AUT/BI-01-C and updated the TCMT with the new test case.</p> <p>TSE 11125 (rating 1): Changed section title of test cases LMP/LIH/BV-51-C to "Accept SCO Closure as Slave" and LMP/LIH/BV-59-C to "Accept SCO Closure as Master".</p> <p>TSE 11126 (rating 2): In TCMT, updated mapping for test case LMP/LIH/BV-34-C.</p> <p>TSE 10995 (rating 3): Fixed paragraph breaks between the initial condition and test procedure for test cases LMP/ENC/BV-05-C, 06-C, and 22-C.</p> <p>TSE 11208 (rating 1) Updated description of LMP/LIH/BV-46-C. Missing to update the Table of Contents. Updated version on document front page.</p> <p>TSE 10553 (rating 3): Added "messages" as postfix to LMP_Ping_Res to test procedure steps and pass verdict for test cases LMP/ENC/BV-29-C, 32-C, 46-C, and 49-C.</p>
5.1.0r00-r01	2018-11-13 - 2018-11-28	<p>Updated revision number from 5.0.4 to 5.1.0 to align with the adoption of Core Specification version 5.1.</p> <p>TSE 11313 (rating 4): Updated MSC for AUT/BI-01-C with PIN Code Request Event.</p>
5.1.0	2018-12-07	Approved by BTI. Prepared for TCRL 2018-2 publication.

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Contents

1 Scope	24
2 References, Definitions, and Abbreviations	25
2.1 References	25
3 Test Suite Structure (TSS)	26
3.1 Overview.....	26
3.2 Test Suite Structure (TSS)	27
3.2.1 Test Groups	28
3.2.2 Protocol Groups.....	28
3.2.2.1 Authentication Procedures	28
3.2.2.2 Encryption.....	28
3.2.2.3 Information Requests	28
3.2.2.4 Link Handling.....	28
3.2.2.5 Test Mode.....	28
3.2.2.6 Adaptive Frequency Hopping	28
3.2.2.7 Simple Pairing	28
3.2.2.8 MWS Coexistence	28
3.2.2.9 Slot Availability Mask.....	28
3.2.3 Behavior Testing Groups	28
3.2.3.1 Valid Behavior (BV) Tests	28
3.2.3.2 Invalid Behavior (BI) Tests	29
4 Test Cases (TC).....	30
4.1 Introduction	30
4.1.1 Test Case Identification Conventions.....	30
4.1.2 Conformance	30
4.1.3 Baseband Assumptions	31
4.1.4 Master – Slave Switch	31
4.1.5 Applicable Parameter Values.....	31
4.1.6 Advertisement of Features for Test Cases.....	31
4.2 Default Settings	32
4.2.1 Authentication	32
4.2.2 Encryption	33
4.2.3 Information Requests.....	34
4.2.4 Link Handling	35
4.2.5 Simple Pairing.....	36
4.2.6 AES-CCM Encryption	37
4.2.7 Secure Simple Pairing P256	38
4.3 Preambles.....	38
4.3.1 Connection establishment IUT Master	39
4.3.2 Connection Establishment Lower Tester	40
4.3.3 Default Settings	41
4.3.4 External Frame Configuration	42
4.3.5 Pass/InconclusiveFail Verdict Conventions	42
4.4 Authentication Procedures	42
4.4.1 Authentication - Both Master and Slave.....	43
4.4.1.1 LMP/AUT/BI-01-C [Error Return When a Unit Key is Requested]	43
4.4.1.2 LMP/AUT/BV-01-C [Authentication Reject, No Link Key]	44



4.4.2	Pairing - Both Master and Slave	44
4.4.2.1	LMP/AUT/BV-03-C [Create Link Key].....	45
4.4.2.2	LMP/AUT/BV-04-C [Pairing, IUT Initiator].....	47
4.4.2.3	LMP/AUT/BV-05-C [IUT Responder, Fixed PIN]	50
4.4.2.4	LMP/AUT/BV-06-C [IUT Initiator; Responder has Fixed PIN]	52
4.4.3	Change Link Key - Both Master and Slave	55
4.4.3.1	LMP/AUT/BV-12-C [Change Link Key, IUT Responder].....	55
4.4.3.2	LMP/AUT/BV-13-C [Change Link Key, IUT Initiator].....	56
4.4.4	Secure Authentication Procedures.....	58
4.5	Encryption.....	63
4.5.1	Encryption - Slave	64
4.5.1.1	LMP/ENC/BV-01-C [Accept Encryption]	64
4.5.1.2	LMP/ENC/BV-02-C [Accept Broadcast Encryption].....	66
4.5.1.3	LMP/ENC/BV-03-C [Reject Encryption]	68
4.5.1.4	LMP/ENC/BV-04-C [Stop Encryption, Master Command]	68
4.5.1.5	LMP/ENC/BV-09-C [Stop Encryption, Master Command]	69
4.5.1.6	LMP/ENC/BV-11-C [Semi-permanent Link Key].....	71
4.5.1.7	LMP/ENC/BV-12-C [Reject Broadcast Encryption].....	73
4.5.1.8	LMP/ENC/BV-22-C [Initiate Encryption]	75
4.5.1.9	LMP/ENC/BV-23-C [Pausing and Resuming without Disabling Encryption, IUT Slave, Master Initiated as a result of change connection link key].....	77
4.5.1.10	LMP/ENC/BV-24-C [Pausing and Resuming without Disabling Encryption, IUT Slave, Master Initiated with role switch].....	79
4.5.1.11	LMP/ENC/BV-25-C [Initiate AES-CCM Encryption]	81
4.5.1.12	LMP/ENC/BV-26-C [Accept AES-CCM Encryption Request]	83
4.5.1.13	LMP/ENC/BV-27-C [Stop AES-CCM Encryption from master]	85
4.5.1.14	LMP/ENC/BV-28-C [Stop AES-CCM Encryption from host]	86
4.5.1.15	LMP/ENC/BV-29-C [Combating forged acknowledgements when AES-CCM Encryption is enabled].....	88
4.5.1.16	LMP/ENC/BV-30-C [Responding to LMP_ping_req when AES-CCM Encryption is enabled].....	89
4.5.1.17	LMP/ENC/BV-31-C [No response to LMP_ping_req]	90
4.5.1.18	LMP/ENC/BV-32-C [Modified Authentication Payload Timeout].....	92
4.5.1.19	LMP/ENC/BV-33-C [Accept AES-CCM Encryption Request – Legacy Host]	93
4.5.2	Encryption - Master.....	95
4.5.2.1	LMP/ENC/BV-05-C [Initiate Encryption]	95
4.5.2.2	LMP/ENC/BV-06-C [Slave Declines Encryption]	97
4.5.2.3	LMP/ENC/BV-07-C [Initiate Encryption Stop]	98
4.5.2.4	LMP/ENC/BV-08-C [Step Encryption, Slave Request]	99
4.5.2.5	LMP/ENC/BV-10-C [Initiate Broadcast Encryption]	100
4.5.2.6	LMP/ENC/BV-13-C [Initiate Semi-permanent Link Key Change].....	102
4.5.2.7	LMP/ENC/BV-14-C [Pausing and Resuming Encryption without Disabling Encryption Mode - Master Initiated].....	103
4.5.2.8	LMP/ENC/BV-15-C [Pausing and Resuming Encryption without Disabling Encryption Mode - Slave Initiated].....	105
4.5.2.9	LMP/ENC/BV-16-C [Pausing and Resuming Encryption without Disabling Encryption Mode - Master Initiated with Role Switch].....	107
4.5.2.10	LMP/ENC/BV-17-C [Pausing and Resuming Encryption without Disabling Encryption Mode - Slave Initiated with Role Switch].....	109
4.5.2.11	LMP/ENC/BV-18-C [Starting and Stopping Encryption with Legacy Device - Master Initiated].....	111



4.5.2.12	LMP/ENC/BV-19-C [Stopping and Restarting Encryption with Legacy Device - Slave Initiated].....	113
4.5.2.13	LMP/ENC/BV-20-C [Pausing and Resuming without Disabling Encryption, IUT Master, Slave Initiated as a Result of Change Connection Link Key].....	115
4.5.2.14	LMP/ENC/BV-21-C [Pausing and Resuming without Disabling Encryption, IUT Master, Slave Initiated with Role Switch].....	117
4.5.2.15	LMP/ENC/BV-34-C [Initiate AES-CCM Encryption].....	119
4.5.2.16	LMP/ENC/BV-35-C [Initiate AES-CCM Encryption Stop].....	121
4.5.2.17	LMP/ENC/BV-36-C [Stop AES-CCM Encryption, slave request].....	122
4.5.2.18	LMP/ENC/BV-37-C [Pausing and Resuming without Disabling AES-CCM Encryption, IUT Master, Master Initiated as a result of change connection link key].....	123
4.5.2.19	LMP/ENC/BV-38-C [Pausing and Resuming without Disabling AES-CCM Encryption, IUT Slave, Slave Initiated as a result of change connection link key].....	126
4.5.2.20	LMP/ENC/BV-39-C [Pausing and Resuming without Disabling AES-CCM Encryption, IUT Master, Slave Initiated as a result of change connection link key].....	128
4.5.2.21	LMP/ENC/BV-40-C [Pausing and Resuming without Disabling AES-CCM Encryption, IUT Slave, Master Initiated as a result of change connection link key].....	130
4.5.2.22	LMP/ENC/BV-41-C [Pausing and Resuming without Disabling AES-CCM Encryption, IUT Master, Master Initiated with role switch].....	132
4.5.2.23	LMP/ENC/BV-42-C [Pausing and Resuming without Disabling AES-CCM Encryption, IUT Slave, Slave Initiated with role switch].....	134
4.5.2.24	LMP/ENC/BV-43-C [Pausing and Resuming without Disabling AES-CCM Encryption, IUT Master, Slave Initiated with role switch].....	136
4.5.2.25	LMP/ENC/BV-44-C [Pausing and Resuming without Disabling AES-CCM Encryption, IUT Slave, Master Initiated with role switch].....	138
4.5.2.26	LMP/ENC/BV-45-C [Broadcast Encryption is not used with AES-CCM encryption]	140
4.5.2.27	LMP/ENC/BV-46-C [Combating forged acknowledgements when AES-CCM Encryption is enabled].....	141
4.5.2.28	LMP/ENC/BV-47-C [Responding to LMP_ping_req when AES-CCM Encryption is enabled].....	143
4.5.2.29	LMP/ENC/BV-48-C [No response to LMP_ping_req]	144
4.5.2.30	LMP/ENC/BV-49-C [Modified Authentication Payload Timeout].....	145
4.5.2.31	LMP/ENC/BV-50-C [Initiate AES-CCM Encryption – Legacy Host]	147
4.6	Information Requests.....	149
4.6.1	Clock Offset Request - Slave	149
4.6.1.1	LMP/INF/BV-01-C [Clock Offset Response]	149
4.6.2	Clock Offset Request - Master	150
4.6.2.1	LMP/INF/BV-02-C [Clock Offset Request]	150
4.6.3	Timing Accuracy Information Request - Both Master and Slave	151
4.6.3.1	LMP/INF/BV-05-C [Timing Accuracy Response]	151
4.6.4	LMP Version - Both Master and Slave	152
4.6.4.1	LMP/INF/BV-08-C [Version/Company ID Response]	152
4.6.4.2	LMP/INF/BV-09-C [Request LMP Version]	153
4.6.5	Supported features - Both Master and Slave	154
4.6.5.1	LMP/INF/BV-10-C [Supported Features Response]	155
4.6.5.2	LMP/INF/BV-11-C [Supported Features Request]	155
4.6.5.3	LMP/INF/BV-14-C [Tx Power Limit]	156
4.6.5.4	LMP/INF/BV-16-C [Extended Features Request]	158
4.6.5.5	LMP/INF/BV-17-C [Extended Features Response]	160
4.6.6	Name Request - Both Master and Slave	160
4.6.6.1	LMP/INF/BV-12-C [Name Response]	161
4.6.6.2	LMP/INF/BV-13-C [Name Request]	161



4.6.6.3	LMP/INF/BV-18-C [Simple Pairing Controller - Remote Name Request - IUT Initiator].....	163
4.6.6.4	LMP/INF/BV-19-C [Simple Pairing Controller - Remote Name Request -Legacy remote device without extended features - IUT Initiator].....	165
4.6.6.5	LMP/INF/BV-20-C [Simple Pairing Controller - Remote Name Request - Legacy remote device with extended features - IUT Initiator].....	166
4.6.6.6	LMP/INF/BV-21-C [Simple Pairing Controller - Remote Name Response - IUT Responder]	168
4.6.6.7	LMP/INF/BV-22-C [LE Features in LMP Feature Set]	169
4.7	Link Handling	171
4.7.1	Switch of Master Slave Role - Slave	171
4.7.1.1	LMP/LIH/BV-01-C [Initiate Role Switch]	171
4.7.1.2	LMP/LIH/BV-79-C [Role Switch at Setup, Slave].....	173
4.7.2	Switch of Master Slave Role - Master	175
4.7.2.1	LMP/LIH/BV-02-C [Accept Role Switch].....	175
4.7.2.2	LMP/LIH/BV-78-C [Role Switch at Setup, Master].....	177
4.7.3	Switch of Master Slave Role - Both Master and Slave	179
4.7.3.1	LMP/LIH/BV-03-C [Unsupported Role Switch].....	179
4.7.4	Detach - Both Master and Slave	180
4.7.4.1	LMP/LIH/BV-04-C [Close Link on Request]	180
4.7.4.2	LMP/LIH/BV-05-C [Close Link, HCI Command].....	180
4.7.4.3	LMP/LIH/BV-82-C [Setup Rejected]	181
4.7.5	Hold mode - Slave	182
4.7.5.1	LMP/LIH/BV-06-C [Hold Mode, Slave].....	183
4.7.5.2	LMP/LIH/BV-09-C [Hold Mode Request, Slave]	185
4.7.6	Hold Mode - Master	187
4.7.6.1	LMP/LIH/BV-10-C [Hold Mode, Master].....	187
4.7.6.2	LMP/LIH/BV-11-C [Hold Mode Request, Master]	189
4.7.7	Hold mode - Both Master and Slave	191
4.7.7.1	LMP/LIH/BV-12-C [Hold Mode Unsupported]	191
4.7.8	Sniff Mode - Slave	191
4.7.8.1	LMP/LIH/BV-14-C [Enter Sniff Mode]	192
4.7.8.2	LMP/LIH/BV-15-C [Initiate Sniff Mode, Slave]	194
4.7.8.3	LMP/LIH/BV-16-C [Exit Sniff Mode].....	196
4.7.8.4	LMP/LIH/BV-17-C [Accept Sniff Reject]	197
4.7.9	Sniff Mode - Master	199
4.7.9.1	LMP/LIH/BV-18-C [Initiate Sniff Mode, Master]	199
4.7.9.2	LMP/LIH/BV-19-C [Request Sniff Mode Exit].....	201
4.7.10	Sniff Mode - Both Master and Slave	202
4.7.10.1	LMP/LIH/BV-20-C [Sniff Mode Reject]	202
4.7.11	Park State - Slave	203
4.7.11.1	LMP/LIH/BV-22-C [Accept Park Request, Slave]	203
4.7.11.2	LMP/LIH/BV-23-C [Park Request Rejected]	205
4.7.11.3	LMP/LIH/BV-24-C [Broadcast Scan Window]	207
4.7.11.4	LMP/LIH/BV-25-C [Modify Beacon Parameters]	208
4.7.11.5	LMP/LIH/BV-26-C [Exit Park, Master Request]	210
4.7.11.6	LMP/LIH/BV-75-C [Exit Park, Slave Request]	211
4.7.12	Park State - Master	213
4.7.12.1	LMP/LIH/BV-27-C [Request Park]	213
4.7.12.2	LMP/LIH/BV-29-C [Accept Park Request, Master]	215
4.7.12.3	LMP/LIH/BV-32-C [Request Park Exit]	217
4.7.13	Park state - Both Master and Slave	218



4.7.13.1	LMP/LIH/BV-34-C [Park Reject]	218
4.7.14	Power control - Both Master and Slave.....	219
4.7.14.1	LMP/LIH/BV-35-C [Lowest Power Report].....	219
4.7.14.2	LMP/LIH/BV-36-C [Highest Power Report].....	220
4.7.14.3	LMP/LIH/BV-76-C [Request Decreased Power]	221
4.7.14.4	LMP/LIH/BV-77-C [Request Increased Power].....	223
4.7.14.5	LMP/LIH/BV-127-C [Respond to EPC Increment Request].....	224
4.7.14.6	LMP/LIH/BV-128-C [Respond to EPC Decrement Request]	226
4.7.14.7	LMP/LIH/BV-129-C [Respond to EPC go to Maximum Power Level]	228
4.7.14.8	LMP/LIH/BV-130-C [Request an EPC Increment]	229
4.7.14.9	LMP/LIH/BV-131-C [Request an EPC Decrement].....	231
4.7.14.10	LMP/LIH/BV-132-C [Request an EPC go to Max].....	233
4.7.14.11	LMP/LIH/BV-133-C [Power Response Reports Unsupported Modulation Correctly]	234
4.7.15	Quality of Service (QoS) - Slave	235
4.7.15.1	LMP/LIH/BV-39-C [Accept Polling Interval Notification].....	236
4.7.15.2	LMP/LIH/BV-40-C [Accept Polling Interval Request]	237
4.7.15.3	LMP/LIH/BV-41-C [Polling Interval Rejected]	237
4.7.16	Quality of Service (QoS) - Master	239
4.7.16.1	LMP/LIH/BV-42-C [Set Polling Interval]	239
4.7.17	SCO Links - Slave.....	241
4.7.17.1	LMP/LIH/BV-43-C [Accept HV1 SCO Request]	241
4.7.17.2	LMP/LIH/BV-44-C [Accept HV2 SCO Request]	243
4.7.17.3	LMP/LIH/BV-45-C [Accept HV3 SCO Request]	245
4.7.17.4	LMP/LIH/BV-46-C [Request HV1 SCO]	247
4.7.17.5	LMP/LIH/BV-47-C [Accept Change to HV2 as Slave].....	249
4.7.17.6	LMP/LIH/BV-48-C [Accept Change to HV3]	250
4.7.17.7	LMP/LIH/BV-49-C [Request Change to HV2]	251
4.7.17.8	LMP/LIH/BV-50-C [HV2 Request Rejected by Master].....	253
4.7.17.9	LMP/LIH/BV-51-C [Accept SCO Closure as Slave]	254
4.7.17.10	LMP/LIH/BV-52-C [Request SCO Closure as Slave]	255
4.7.17.11	LMP/LIH/BV-134-C [SCO Connection creation fails when AES-CCM encryption is enabled].....	256
4.7.17.12	LMP/LIH/BV-135-C [Accepting SCO Connection creation fails when AES-CCM encryption is enabled]	257
4.7.17.13	LMP/LIH/BV-136-C [SCO Connection creation fails when AES-CCM encryption is enabled – Enhanced Setup Synchronous Connection]	259
4.7.17.14	LMP/LIH/BV-137-C [Accepting SCO Connection creation fails when AES-CCM encryption is enabled – Enhanced Accept Synchronous Connection]	261
4.7.18	SCO links - Master.....	262
4.7.18.1	LMP/LIH/BV-53-C [Establish SCO].....	262
4.7.18.2	LMP/LIH/BV-54-C [Accept SCO Request as Master]	264
4.7.18.3	LMP/LIH/BV-55-C [Request Change to HV3]	266
4.7.18.4	LMP/LIH/BV-56-C [HV3 Request Rejected by Slave].....	268
4.7.18.5	LMP/LIH/BV-57-C [Accept Change to HV2 as Master]	269
4.7.18.6	LMP/LIH/BV-58-C [Request SCO Closure as Master]	271
4.7.18.7	LMP/LIH/BV-59-C [Accept SCO Closure as Master]	272
4.7.18.8	LMP/LIH/BV-138-C [SCO Connection creation fails when AES-CCM encryption is enabled]	272
4.7.18.9	LMP/LIH/BV-139-C [Accepting SCO Connection creation fails when AES-CCM encryption is enabled]	274



4.7.18.10	LMP/LIH/BV-140-C [SCO Connection creation fails when AES-CCM encryption is enabled – Enhanced Setup Synchronous Connection]	276
4.7.18.11	LMP/LIH/BV-141-C [Accepting SCO Connection creation fails when AES-CCM encryption is enabled – Enhanced Accept Synchronous Connection]	278
4.7.19	SCO Links - Both Master and Slave	279
4.7.19.1	LMP/LIH/BV-60-C [Reject SCO Request].....	279
4.7.20	eSCO Links - Slave.....	280
4.7.20.1	LMP/LIH/BV-100-C [Accept EV3 eSCO Request].....	280
4.7.20.2	LMP/LIH/BV-101-C [Accept EV4 eSCO Request].....	282
4.7.20.3	LMP/LIH/BV-102-C [Accept EV5 eSCO Request].....	284
4.7.20.4	LMP/LIH/BV-103-C [Request eSCO as Slave]	286
4.7.20.5	LMP/LIH/BV-104-C [Accept Change to EV4].....	288
4.7.20.6	LMP/LIH/BV-105-C [Accept Change to EV5].....	290
4.7.20.7	LMP/LIH/BV-106-C [Request Change to EV4]	291
4.7.20.8	LMP/LIH/BV-107-C [EV4 Request Rejected].....	293
4.7.20.9	LMP/LIH/BV-108-C [Accept eSCO Closure as Slave]	294
4.7.20.10	LMP/LIH/BV-109-C [Request eSCO Closure as Slave].....	295
4.7.21	eSCO links - Master.....	296
4.7.21.1	LMP/LIH/BV-110-C [Request ESCO as Master].....	296
4.7.21.2	LMP/LIH/BV-111-C [Accept eSCO Request].....	298
4.7.21.3	LMP/LIH/BV-112-C [Request eSCO Change]	300
4.7.21.4	LMP/LIH/BV-113-C [eSCO Change Rejected]	302
4.7.21.5	LMP/LIH/BV-114-C [Request to Close eSCO Link]	303
4.7.21.6	LMP/LIH/BV115-C [Accept eSCO Closure as Master]	304
4.7.21.7	LMP/LIH/BV116-C [Reject eSCO Request].....	305
4.7.22	Sniff Subrating	306
4.7.22.1	LMP/LIH/BV-117-C [LMP Feature Bits]	307
4.7.22.2	LMP/LIH/BV-118-C [Entering Sniff Subrating Mode from Sniff Mode With Lower Tester as The Initiator].....	307
4.7.22.3	LMP/LIH/BV-119-C [Entering Sniff Subrating Mode From Sniff Mode With IUT As The Initiator].....	309
4.7.22.4	LMP/LIH/BV-120-C [IUT Rejects Sniff Subrating Request When In Active Mode].....	311
4.7.22.5	LMP/LIH/BV-121-C [Entering Sniff Subrating Mode With Lower Tester Initiating Sniff Mode Request].....	312
4.7.22.6	LMP/LIH/BV-122-C [Entering Sniff Subrating Mode with IUT Initiating Sniff Mode Request]	316
4.7.22.7	LMP/LIH/BV-123-C [IUTs Transitioning from Existing Sniff Subrating Mode to A New Set of Subrating Parameters].....	319
4.7.22.8	LMP/LIH/BV-124-C [Sniff Subrating Mode to Active Mode Transition Initiated By Lower Tester]	321
4.7.22.9	LMP/LIH/BV-125-C [Sniff Subrating Mode to Active Mode Transition Initiated By IUT]	322
4.7.23	Control of Multi-slot Packets - Slave	323
4.7.23.1	LMP/LIH/BV-61-C [Request Maximum Slots as Slave]	324
4.7.23.2	LMP/LIH/BV-63-C [Accept Maximum Slot Request]	326
4.7.24	Control of Multi-slot Packets - Master	327
4.7.24.1	LMP/LIH/BV-64-C [Request Maximum Slots as Master]	327
4.7.25	Paging Scheme - Both Master and Slave	330
4.7.25.1	LMP/LIH/BV-71-C [Reject Page Mode Negotiation]	330
4.7.25.2	LMP/LIH/BV-72-C [Reject Page Scan Negotiation]	331
4.7.26	Link Supervision - Slave	332
4.7.26.1	LMP/LIH/BV-73-C [Set Supervision Timer as Slave]	332
4.7.27	Link Supervision.....	333



4.7.27.1	LMP/LIH/BV-74-C [Set Supervision Timer as Master]	333
4.7.27.2	LMP/LIH/BV-126-C [Set Supervision Timer as Slave]	334
4.7.28	Deadlock Avoidance	336
4.7.28.1	LMP/LIH/BV-80-C [Avoid Deadlock as Master]	336
4.7.28.2	LMP/LIH/BV-81-C [Avoid Deadlock as Slave]	337
4.7.29	Test for Devices that do not Support Enhanced Data Rate	338
4.7.29.1	LMP/LIH/BV-83-C [Test for Devices that do not support Enhanced Data Rate]	338
4.7.30	Setting up and Removing Enhanced Data Rate ACL connection	339
4.7.30.1	LMP/LIH/BV-84-C [EDR ACL Link Set Up]	339
4.7.30.2	LMP/LIH/BV-85-C [EDR ACL Link Remove]	341
4.7.31	Setting Enhanced Data Rate eSCO Connection	342
4.7.31.1	LMP/LIH/BV-86-C [EDR 2-EV3 eSCO Link Setup]	342
4.7.31.2	LMP/LIH/BV-87-C [EDR eSCO Link Remove]	344
4.8	Test Modes	345
4.8.1	Enabled Mode - Slave	345
4.8.1.1	LMP/TEM/BV-01-C [Reject Test Mode Request]	345
4.9	Adaptive Frequency Hopping	346
4.9.1	Adaptive Frequency Hopping Test Cases	346
4.9.1.1	LMP/AFH/BV-01-C [AFH Enable – Slave]	346
4.9.1.2	LMP/AFH/BV-02-C [AFH Disable - Slave]	348
4.9.1.3	LMP/AFH/BV-03-C [AFH Switch – Slave]	350
4.9.1.4	LMP/AFH/BV-04-C [Classification Reporting – Normal Operation]	351
4.9.1.5	LMP/AFH/BV-05-C [Classification Reporting – After Successful Master Slave Switch]	353
4.9.1.6	LMP/AFH/BV-06-C [Classification Reporting – After Unsuccessful Master Slave Switch]	355
4.9.1.7	LMP/AFH/BV-07-C [Classification Reporting – After Unpark]	357
4.9.1.8	LMP/AFH/BV-08-C [Classification Reporting – After Unhold]	358
4.9.1.9	LMP/AFH/BV-09-C [Slave device does not send a LMP_Set_AFH PDU -after successful master slave switch]	360
4.10	Simple Pairing Procedures	362
4.10.1	Backward Compatibility Procedures	362
4.10.1.1	LMP/SP/BV-01-C [Simple Pairing Capable Controller - Pairing - IUT Initiator]	362
4.10.1.2	LMP/SP/BV-02-C [Simple Pairing Capable Controller - Pairing - IUT Responder]	362
4.10.1.3	LMP/SP/BV-03-C [Simple Pairing Capable Controller - Legacy Host- IUT Initiator]	363
4.10.1.4	LMP/SP/BV-04-C [Simple Pairing Capable Controller - Legacy Host - IUT Responder]	364
4.10.1.5	LMP/SP/BV-05-C [Simple Pairing Capable Controller - Legacy Remote Host - IUT Initiator]	365
4.10.1.6	LMP/SP/BV-37-C [Secure Connections Capable Controller – Legacy Host – IUT Initiator – Unauthenticated Link Key]	367
4.10.1.7	LMP/SP/BV-38-C [Secure Connections Capable Controller – Legacy Host – IUT Initiator – Authenticated Link Key]	371
4.10.1.8	LMP/SP/BV-39-C [Secure Connections Capable Controller – Host has no P256 OOB data available – IUT Initiator – OOB]	374
4.10.1.9	LMP/SP/BV-40-C [Secure Connections Capable Controller and Host – Legacy Remote Controller – IUT Initiator]	378
4.10.2	Numeric Comparison Procedures	378
4.10.2.1	LMP/SP/BV-06-C [Numeric Comparison - IUT Initiator – Success]	378
4.10.2.2	LMP/SP/BV-07-C [Numeric Comparison - IUT Responder – Success]	382
4.10.2.3	LMP/SP/BV-08-C [Numeric Comparison - IUT Initiator - Failure on Initiating Side]	385
4.10.2.4	LMP/SP/BV-09-C [Numeric Comparison - IUT Responder - Failure on Initiating Side]	387
4.10.2.5	LMP/SP/BV-10-C [Numeric Comparison - IUT Initiator - Failure on Responding Side]	389
4.10.2.6	LMP/SP/BV-11-C [Numeric Comparison - IUT Responder - Failure on Responding Side]	391



4.10.2.7	LMP/SP/BV-41-C [Numeric Comparison – IUT Initiator – Success, P-256].....	393
4.10.2.8	LMP/SP/BV-42-C [Numeric Comparison – IUT Responder – Success, P-256].....	396
4.10.2.9	LMP/SP/BV-43-C [Numeric Comparison – IUT Initiator, Failure on Initiating side, P-256]	399
4.10.2.10	LMP/SP/BV-44-C [Numeric Comparison – IUT Responder – Failure on Initiating Side, P-256]	402
4.10.2.11	LMP/SP/BV-45-C [Numeric Comparison – IUT Initiator – Failure on Responding Side, P-256]	404
4.10.2.12	LMP/SP/BV-46-C [Numeric Comparison – IUT Responder – Failure on Responding Side, P-256].....	406
4.10.2.13	LMP/SP/BV-47-C [Pairing on encrypted ACL – Numeric Comparison – IUT Initiator – Success, P-256]	408
4.10.3	Passkey Entry Procedures.....	410
4.10.3.1	LMP/SP/BV-12-C [Passkey Entry - IUT Initiator – Success].....	410
4.10.3.2	LMP/SP/BV-13-C [Passkey Entry - IUT Responder – Success].....	413
4.10.3.3	LMP/SP/BV-14-C [Passkey Entry - IUT Initiator - Failure on Initiating Side].....	416
4.10.3.4	LMP/SP/BV-15-C [Passkey Entry - IUT Responder - Failure on Initiating Side].....	417
4.10.3.5	LMP/SP/BV-16-C [Passkey Entry - IUT Initiator - Failure on Responding Side].....	419
4.10.3.6	LMP/SP/BV-17-C [Passkey Entry - IUT Responder - Failure on Responding Side]	421
4.10.3.7	LMP/SP/BV-48-C [Passkey Entry – IUT Initiator – Success, P-256]	423
4.10.3.8	LMP/SP/BV-49-C [Passkey Entry – IUT Responder – Success, P-256].....	426
4.10.3.9	LMP/SP/BV-50-C [Passkey Entry – IUT Initiator – Failure on Initiating Side, P-256].....	429
4.10.3.10	LMP/SP/BV-51-C [Passkey Entry – IUT Responder – Failure on Initiating Side, P-256].....	432
4.10.3.11	LMP/SP/BV-52-C [Passkey Entry – IUT Initiator – Failure on Responding Side, P-256].....	434
4.10.3.12	LMP/SP/BV-53-C [Passkey Entry – IUT Responder – Failure on Responding Side, P-256].....	436
4.10.4	Out-of-Band Procedures.....	438
4.10.4.1	LMP/SP/BV-18-C [OOB Protocol - IUT Initiator - IUT with OOB Authentication Data – Success].....	438
4.10.4.2	LMP/SP/BV-19-C [OOB Protocol - IUT Responder - IUT with OOB Authentication Data – Success].....	442
4.10.4.3	LMP/SP/BV-20-C [OOB Protocol - IUT Initiator – Lower Tester with OOB Authentication Data – Success]	445
4.10.4.4	LMP/SP/BV-21-C [OOB Protocol - IUT Responder – Lower Tester with OOB Authentication Data – Success]	449
4.10.4.5	LMP/SP/BV-22-C [OOB Protocol - IUT Initiator - IUT and Lower Tester with OOB Authentication Data - Success]	452
4.10.4.6	LMP/SP/BV-23-C [OOB Protocol - IUT Responder - IUT and Lower Tester with OOB Authentication Data – Success]	455
4.10.4.7	LMP/SP/BV-24-C [OOB Protocol - IUT Initiator - IUT with OOB Authentication Data - Failure]	458
4.10.4.8	LMP/SP/BV-25-C [OOB Protocol - IUT Responder - IUT with OOB Authentication Data - Failure]	460
4.10.4.9	LMP/SP/BV-26-C [OOB Protocol - IUT Initiator – Lower Tester with OOB Authentication Data - Failure]	462
4.10.4.10	LMP/SP/BV-27-C [OOB Protocol - IUT Responder – Lower Tester with OOB Authentication Data - Failure]	464
4.10.4.11	LMP/SP/BV-54-C [OOB Protocol – IUT Initiator – IUT with OOB Authentication Data - Success, P-256]	466
4.10.4.12	LMP/SP/BV-55-C [OOB Protocol – IUT Responder – IUT with OOB Authentication Data – Success, P-256]	469
4.10.4.13	LMP/SP/BV-56-C [OOB Protocol – IUT Initiator – Lower Tester with OOB Authentication Data - Success, P-256]	472
4.10.4.14	LMP/SP/BV-57-C [OOB Protocol – IUT Responder – Lower Tester with OOB Authentication Data – Success, P-256]	476



4.10.4.15	LMP/SP/BV-58-C [OOB Protocol – IUT Initiator – IUT and Lower Tester with OOB Authentication Data - Success, P-256].....	479
4.10.4.16	LMP/SP/BV-59-C [OOB Protocol – IUT Responder – IUT and Lower Tester with OOB Authentication Data – Success, P-256]	483
4.10.4.17	LMP/SP/BV-60-C [OOB Protocol – IUT Initiator - IUT with OOB Authentication Data – Failure, P-256].....	486
4.10.4.18	LMP/SP/BV-61-C [OOB Protocol – IUT Responder - IUT with OOB Authentication Data – Failure, P-256].....	489
4.10.4.19	LMP/SP/BV-62-C [OOB Protocol – IUT Initiator – Lower Tester with OOB Authentication Data – Failure, P-256]	491
4.10.4.20	LMP/SP/BV-63-C [OOB Protocol – IUT Responder – Lower Tester with OOB Authentication Data – Failure, P-256].....	493
4.10.5	Test Mode Procedures.....	495
4.10.5.1	LMP/SP/BV-28-C [Simple Pairing Debug Mode - Fixed Private Key].....	495
4.10.5.2	LMP/SP/BV-29-C [Simple Pairing Debug Mode - Responding Device Uses Fixed Private Key]	498
4.10.5.3	LMP/SP/BV-64-C [Simple Pairing Debug Mode – Fixed Private Key, P256].....	501
4.10.5.4	LMP/SP/BV-65-C [Simple Pairing Debug Mode – Responding Device Uses Fixed Private Key, P256].....	504
4.10.6	Simple Pairing Failure Procedures.....	507
4.10.6.1	LMP/SP/BV-30-C [Simple Pairing Failed - IUT Responder]	507
4.10.6.2	LMP/SP/BV-31-C [Simple Pairing Capable Controller–Host rejects Simple Pairing–IUT Initiator].....	508
4.10.6.3	LMP/SP/BV-32-C [Simple Pairing Capable Controller–Host rejects Simple Pairing–IUT Responder].....	509
4.10.6.4	LMP/SP/BV-33-C [Passkey Entry with Keypress notification - IUT Initiator - Success]	510
4.10.6.5	LMP/SP/BV-34-C [Passkey Entry with Keypress notification - IUT Responder – Success].....	514
4.10.6.6	LMP/SP/BV-35-C [Passkey Entry with Keypress notification - IUT Initiator - Failure on Responding Side]	517
4.10.6.7	LMP/SP/BV-36-C [Passkey Entry with Keypress notification - IUT Responder - Failure on Responding Side]	519
4.10.6.8	LMP/SP/BI-01-C [Numeric Comparison - IUT Initiator – Invalid Public Key Failure, P-192]	521
4.10.6.9	LMP/SP/BI-02-C [Numeric Comparison - IUT Responder – Invalid Public Key Failure, P- 192]	524
4.10.6.10	LMP/SP/BI-03-C [Passkey Entry - IUT Initiator – Invalid Public Key Failure, P-192].....	526
4.10.6.11	LMP/SP/BI-04-C [Passkey Entry - IUT Responder – Invalid Public Key Failure, P-192]	529
4.10.6.12	LMP/SP/BI-05-C [OOB Protocol - IUT Initiator - IUT with OOB Authentication Data – Invalid Public Key Failure, P-192].....	532
4.10.6.13	LMP/SP/BI-06-C [OOB Protocol - IUT Responder - IUT with OOB Authentication Data – Invalid Public Key Failure, P-192].....	535
4.10.6.14	LMP/SP/BI-07-C [Numeric Comparison - IUT Initiator – Invalid Public Key Failure, P-256]	538
4.10.6.15	LMP/SP/BI-08-C [Numeric Comparison - IUT Responder – Invalid Public Key Failure, P- 256]	539
4.10.6.16	LMP/SP/BI-09-C [Passkey Entry - IUT Initiator – Invalid Public Key Failure, P-256].....	540
4.10.6.17	LMP/SP/BI-10-C [Passkey Entry - IUT Responder – Invalid Public Key Failure, P-256]	540
4.10.6.18	LMP/SP/BI-11-C [OOB Protocol - IUT Initiator - IUT with OOB Authentication Data – Invalid Public Key Failure, P-256].....	541
4.10.6.19	LMP/SP/BI-12-C [OOB Protocol - IUT Responder - IUT with OOB Authentication Data – Invalid Public Key Failure, P-256].....	542
4.11	Piconet Clock Adjust.....	542
4.11.1	LMP/XCL/BV-01-C [Master Initiates Coarse Clock Adjustment]	542
4.11.2	LMP/XCL/BV-02-C [Slave Coarse Clock Adjustment Request]	544
4.11.3	LMP/XCL/BV-03-C [Test that master does not reuse clk_adj_id within LSTO]	545



4.12 Slot Availability Mask	547
4.12.1 LMP/SAM/BV-01-C [Respond to three SAM instances].....	547
4.12.2 LMP/SAM/BV-02-C [Initiate three SAM instances].....	550
4.12.3 LMP/SAM/BI-03-C [Respond to invalid SAM type 0 submap configuration sequence].....	552
4.12.4 LMP/SAM/BI-04-C [Respond to invalid SAM type 0 submap].....	554
4.12.5 LMP/SAM/BI-05-C [Respond to invalid SAM index].....	557
4.12.6 LMP/SAM/BV-06-C [SAM is disabled after a successful role switch].....	560
4.12.7 LMP/SAM/BV-07-C [SAM is resumed after a failed role switch]	562
4.12.8 LMP/SAM/BV-08-C [SAM and sniff mode].....	564
4.12.9 LMP/SAM/BV-09-C [Respond to request for SAM Anchor Point using Initialization Procedure 2].....	566
4.12.10 LMP/SAM/BV-10-C [Initiate SAM Anchor Point using Initialization Procedure 2].....	568
5 Test Case Mapping.....	570



1 Scope

This Bluetooth document contains the Test Suite Structure (TSS) and Test Cases (TC) to test the Bluetooth Link Manager layer.

The objective of this Test Suite is to provide a basis for conformance tests for Bluetooth devices giving a high probability of air interface inter-operability between different manufacturers' Bluetooth devices.



2 References, Definitions, and Abbreviations

2.1 References

This Bluetooth document incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For the purpose of this Bluetooth document, the definitions and abbreviations in [1] and [5] apply.

- [1] Specification of the Bluetooth System, Core System Package, Volume 2, Part C
- [2] ISO/IEC 9646-1 and ISO/IEC 9646-2 OSI Conformance Testing Methodology and Framework
- [3] ICS Proforma for Link Manager (LMP)
- [4] Specification of the Bluetooth System, Core System Package, Volume 3, Part D
- [5] Test Strategy & Terminology Overview, Volume 1, Part A.
- [6] Specification of the Bluetooth System, Core System Package, Volume 2, Part A
- [7] Specification of the Bluetooth System, Core System Package, Volume 2, Part E
- [8] Specification of the Bluetooth System, Core System Package, Volume 2, Part F
- [9] Specification of the Bluetooth System, Core System Package, Volume 2, Part B
- [10] Specification of the Bluetooth System, Volume 2 Part C (Link Layer Protocol Specification), Version 4.2 or later
- [11] Test Suite for Baseband (BB)



3 Test Suite Structure (TSS)

3.1 Overview

The Link Manager is layer 3 of the Bluetooth protocol stack.

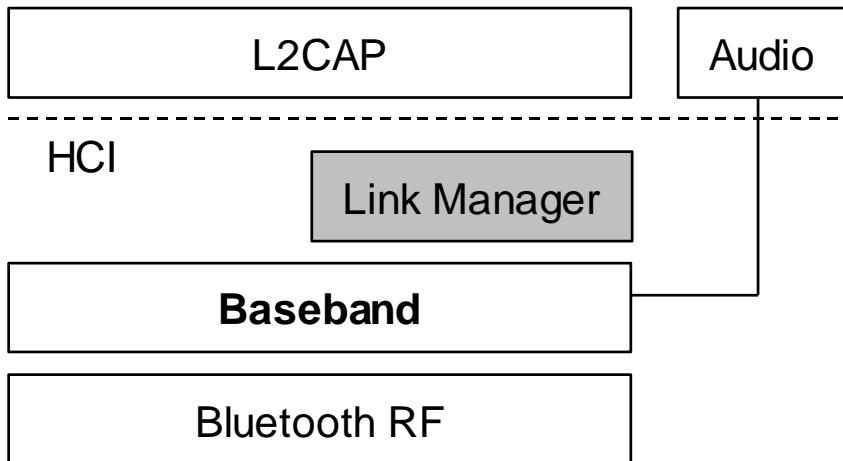


Figure 3.1: Bluetooth protocol stack, basic layers.

The Link Manager specifies seven groups of services:

- Authentication Procedures
- Encryption
- Information Requests
- Link Handling
- Test Mode
- Adaptive Frequency Hopping
- Simple Pairing

[Figure 3.2](#) shows the Link Manager Test Suite Structure (TSS) including its subgroups for the conformance testing.



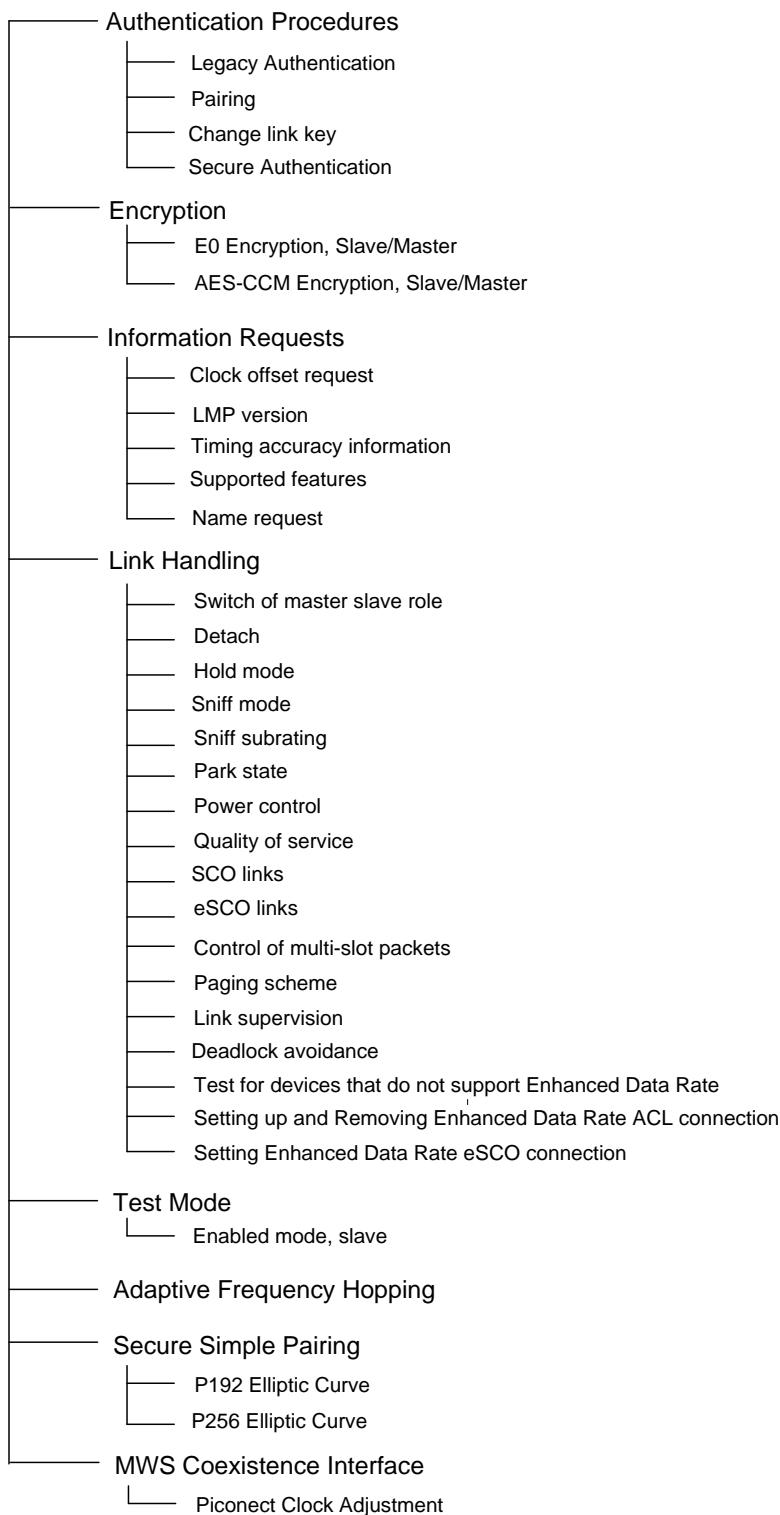


Figure 3.2: TSS for Link Manager

3.2 Test Suite Structure (TSS)

The test suite structure is structured as a tree with a first level defined as LM representing the protocol groups: Authentication Procedures, Encryption, Information requests, Link Handling, Testmode, and Adaptive Frequency Hopping, Secure Simple Pairing and MWS Coexistence.



3.2.1 Test Groups

The test groups are organized in 3 levels. The first level defines the protocol groups representing the protocol services. The second level separates the protocol services in functional modules. The last level in each branch contains the standard ISO subgroups BV and BI.

The main test groups are the capability group, the valid behavior group and the invalid behavior group.

3.2.2 Protocol Groups

The protocol groups identify the Bluetooth Link Manager services: Authentication Procedures, Encryption, Information Requests, Link Handling, Testmode, Adaptive Frequency Hopping, Simple Pairing, and Piconet Clock Adjustment as defined in [1].

3.2.2.1 Authentication Procedures

The authentication procedures module covers the whole authentication procedure for two devices.

3.2.2.2 Encryption

The encryption module covers the optional encryption procedure so that two devices can use encrypted traffic.

3.2.2.3 Information Requests

The information requests module covers the information procedure between two devices.

3.2.2.4 Link Handling

The link handling module covers the link handling procedures such as Enhanced Data Rate link set up and parking a device.

3.2.2.5 Test Mode

The test mode module verifies that a master cannot set a slave into test mode unless it is locally enabled.

3.2.2.6 Adaptive Frequency Hopping

The Adaptive Frequency Hopping (AFH) module covers adaptive frequency hopping control functions.

3.2.2.7 Simple Pairing

The Simple Pairing module covers simple pairing functions.

3.2.2.8 MWS Coexistence

The MWS Coexistence module verifies that the master of a piconet can adjust the piconet clock.

3.2.2.9 Slot Availability Mask

3.2.3 Behavior Testing Groups

The TSS accommodates both valid and invalid behaviors.

3.2.3.1 Valid Behavior (BV) Tests

This sub group provides testing to verify that the IUT reacts in conformity with the Bluetooth standard, after receipt or exchange of valid Protocol Data Units (PDUs). Valid PDUs means that the exchange of messages and the content of the exchanged messages are considered as valid.



3.2.3.2 Invalid Behavior (BI) Tests

This sub group provides testing to verify that the IUT reacts in conformity with the Bluetooth standard, after receipt of a syntactically or semantically invalid PDU.



4 Test Cases (TC)

4.1 Introduction

4.1.1 Test Case Identification Conventions

Test cases shall be 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>**.

Bolded ID parts shall appear in the order prescribed. Non-bolded ID parts (if applicable) shall appear between the bolded parts. The order of the non-bolded parts may vary from test suite to test suite, but shall be consistent within each individual test suite.

Identifier Abbreviation	Spec Identifier <spec abbreviation>
LMP	Link Manager Protocol
Identifier Abbreviation	Feature Identifier <feat>
AFH	Adaptive Frequency Hopping
AUT	Authentication Procedure
ENC	Encryption
INF	Information Requests
LIH	Link Handling
SAM	Slot Availability Mask
SP	Simple Pairing
TEM	Test Mode
XCL	Coexistence Piconet Clock Adjustment

Table 4.1: TP Feature Naming Convention for LMP

4.1.2 Conformance

When conformance is claimed, all capabilities indicated as mandatory for this Specification shall be supported in the specified manner (process-mandatory). This also applies for all optional and conditional capabilities for which support is indicated. All mandatory capabilities, and optional and conditional capabilities for which support is indicated, are subject to verification as part of the Bluetooth certification program.

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 that is not excluded by the Specification, OR
- That capabilities enabled by the implementations are sustained over durations expected by the use case, OR
- That the implementation gracefully handles any quantity of data expected by the use case, OR
- That in cases where more than one valid interpretation of the Specification exist, the implementation complies with at least one interpretation and gracefully handles other interpretations OR
- That the implementation is immune to attempted security exploits.

A single execution of each of the required tests is required in order to constitute a pass verdict. However, it is noted that in order 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 Generator, 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 errata request such that the issue may be addressed.

4.1.3 Baseband Assumptions

Subsections Test cases are built upon having a Baseband Link up and running. The IUT and the Lower Tester must be in connection state (Active mode). DM1 packages shall be used where not otherwise specified. See [Preambles](#).

All test cases are built upon a connection between two (2) devices a master and a slave.

4.1.4 Master – Slave Switch

To force the IUT to become master of the Piconet, Paging of the Lower Tester must be used as PDU LMP_switch_req is optional and all IUTs will not support this. See [Preambles](#).

4.1.5 Applicable Parameter Values

The parameter values indicated in the test cases are thought to be reasonable. However, what is reasonable ultimately depends on the user scenario the IUT is intended for. In those cases, where the Bluetooth System Specification does not require the implementation of a specific value, and the IUT cannot support the value indicated in a test case, it is allowed to test the IUT with another value. The selected value has to be given as IXIT information. When a value deviates from what is indicated in the test case it shall be selected as close as possible to the value indicated in the test case. The selected value must not be such that the test purpose for the test case cannot be verified or the test case is not applicable. All test cases applicable as determined by the combination of Test Case Reference List, Implementation Conformance Statement and Test Case Mapping Table, must be executed successfully to complete the qualification of the IUT.

4.1.6 Advertisement of Features for Test Cases

It is favorable to avoid LMP traffic that could create situations in which a test case is not designed to be executed or which may add complexity to the test system implementation. This can be achieved by proper selection of which features are advertised by the Lower Tester. In some test cases this is exactly specified in the test suite but in most cases it is not. As a general rule, for each test case the Lower



Tester should not advertise more features than necessary to facilitate execution of the test purpose. Specifically, with the introduction of Enhanced Data Rate, this feature shall only be advertised by the Lower Tester in those test cases where it is necessary for the test purpose.

4.2 Default Settings

The default settings must be carried out before each test case to guarantee a correct set up each time the tests are performed. Please see Default settings for the set up messages used.

4.2.1 Authentication

This default setting will be used for the different authentication test cases.

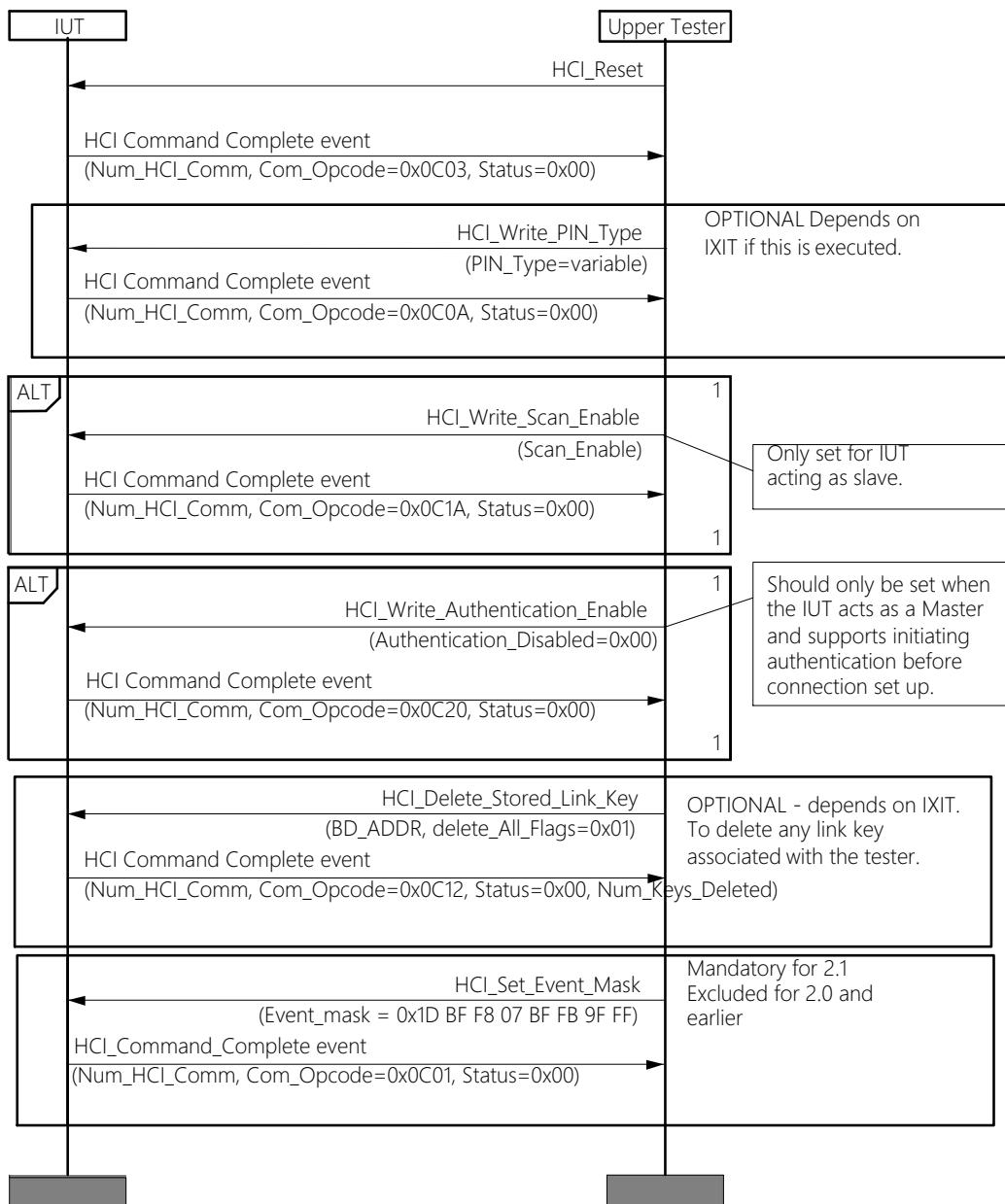


Figure 4.1: Default settings used for authentication test cases



4.2.2 Encryption

This default setting will be used for the different encryption test cases.

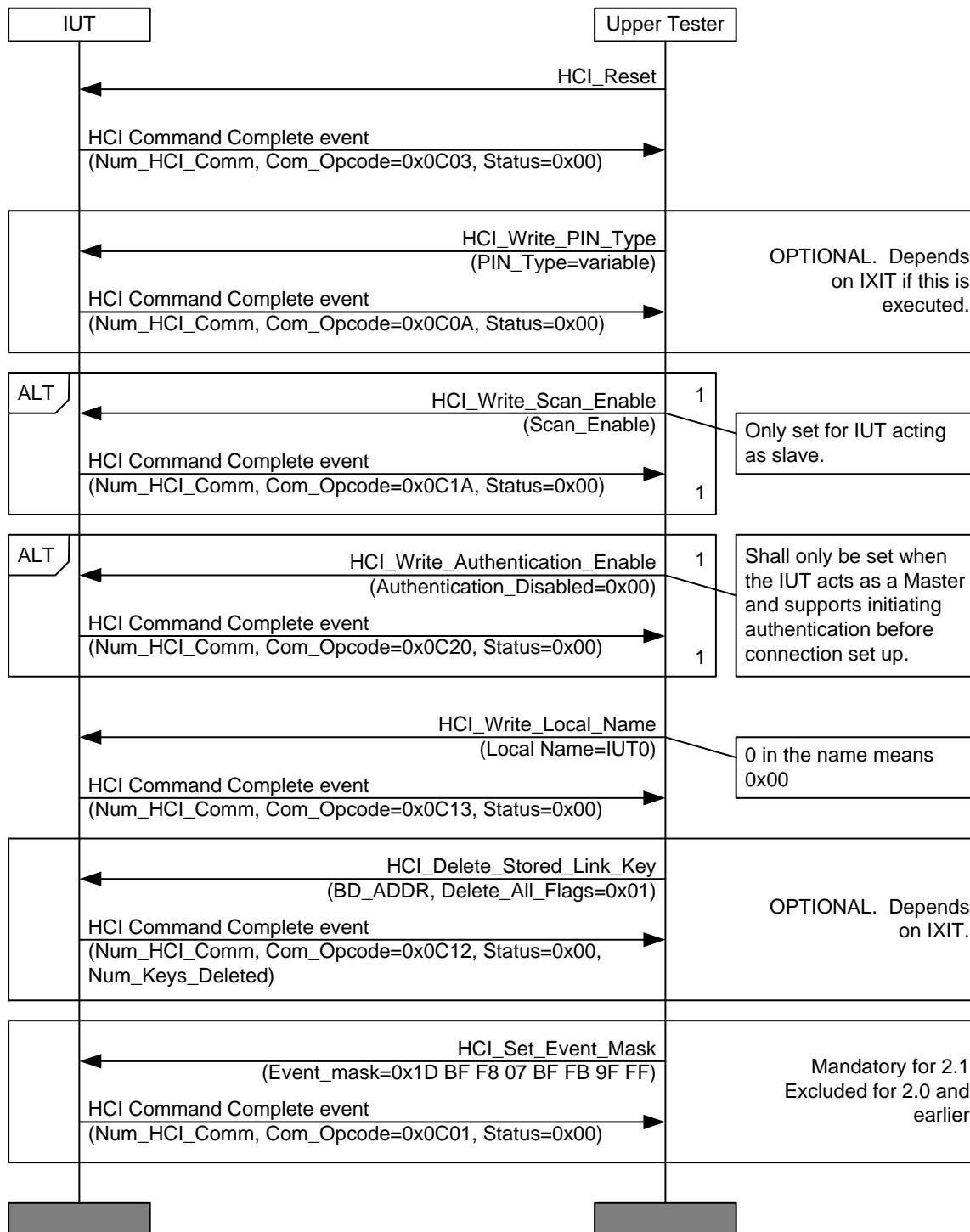


Figure 4.2: Default settings used for encryption test cases



4.2.3 Information Requests

This default setting will be used for the different information requests test cases.

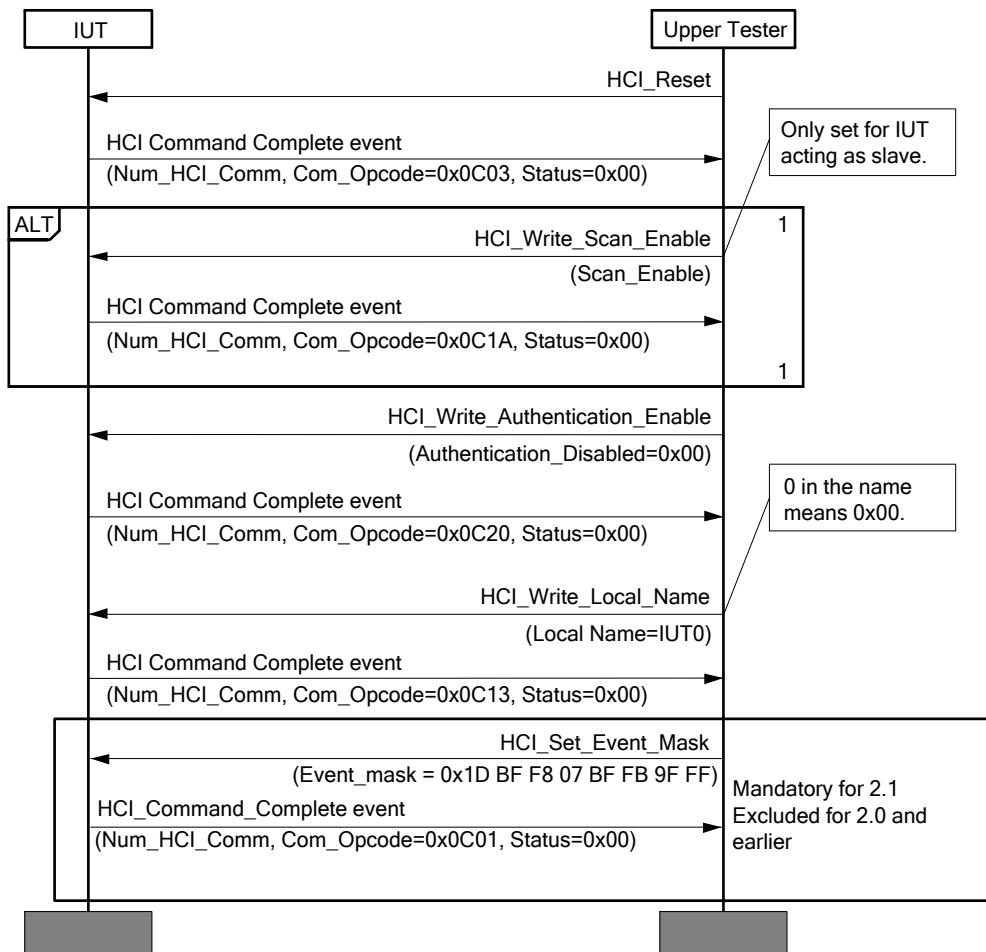


Figure 4.3: Default settings used for information requests test cases



4.2.4 Link Handling

This default setting will be used for the different link handling test cases.

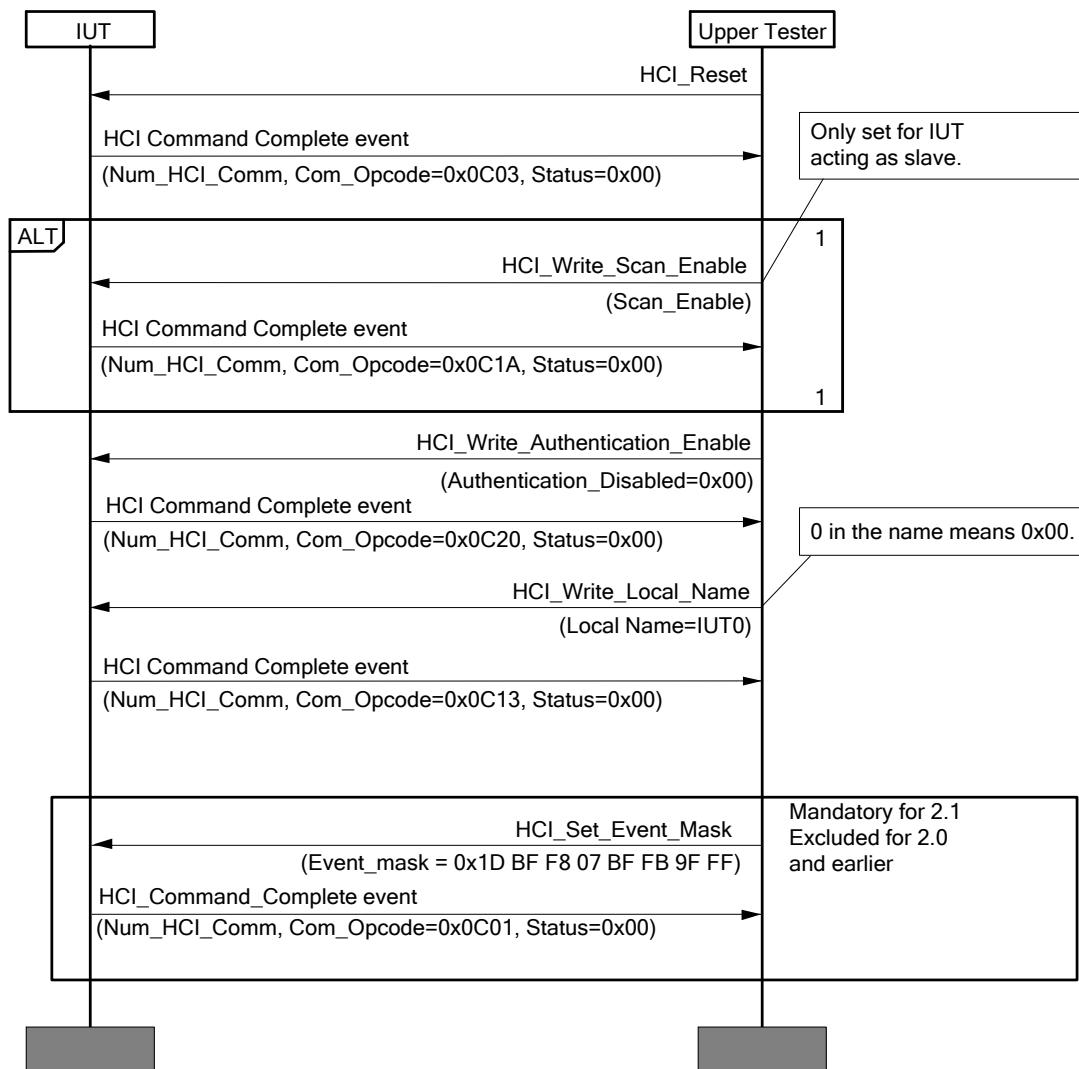


Figure 4.4: Default settings used for link handling test cases



4.2.5 Simple Pairing

The default settings used for the Simple Pairing test cases.

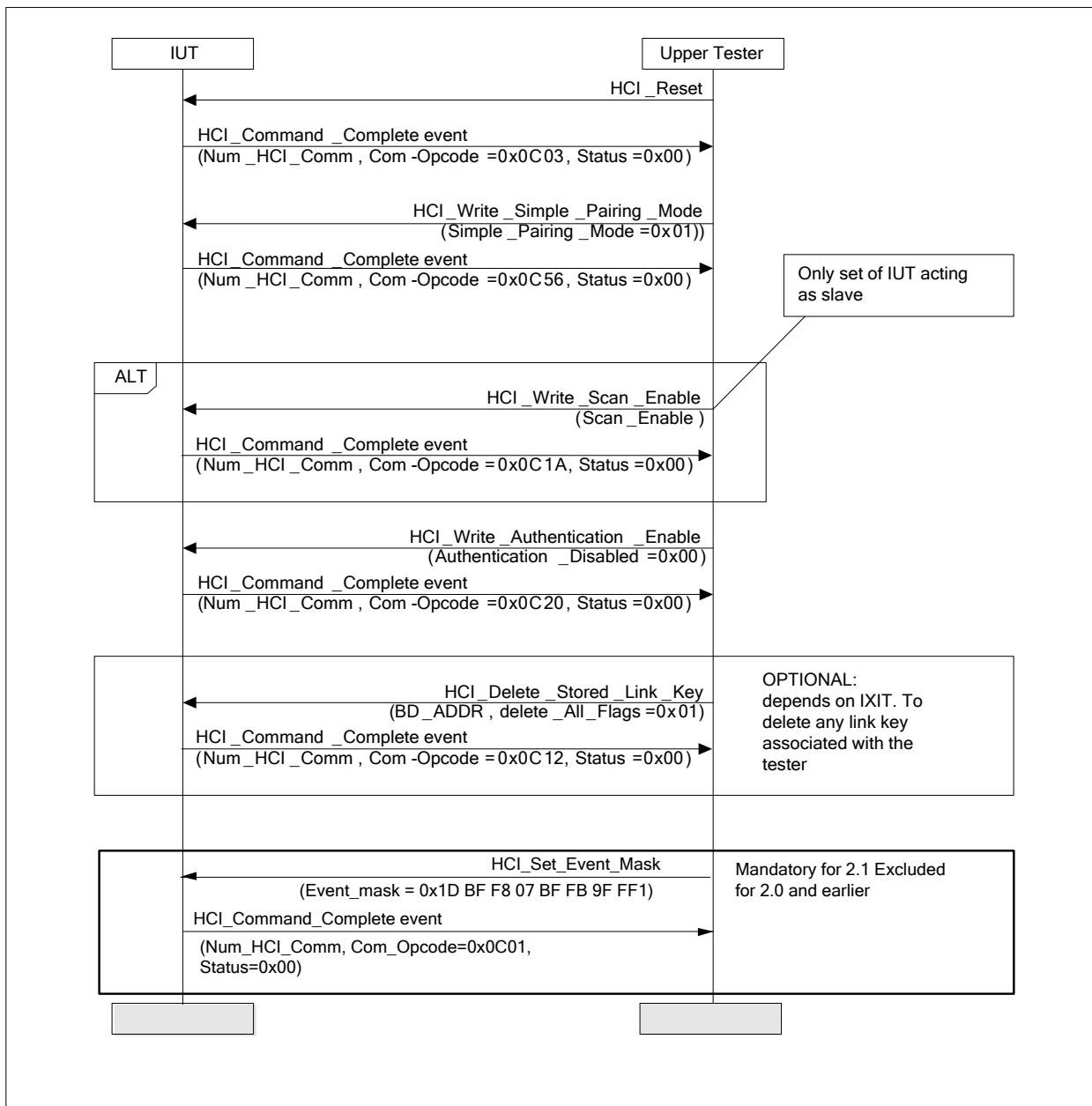


Figure 4.5: Default setting used for simple pairing test cases.



4.2.6 AES-CCM Encryption

The default settings used for the AES-CCM encryption test cases.

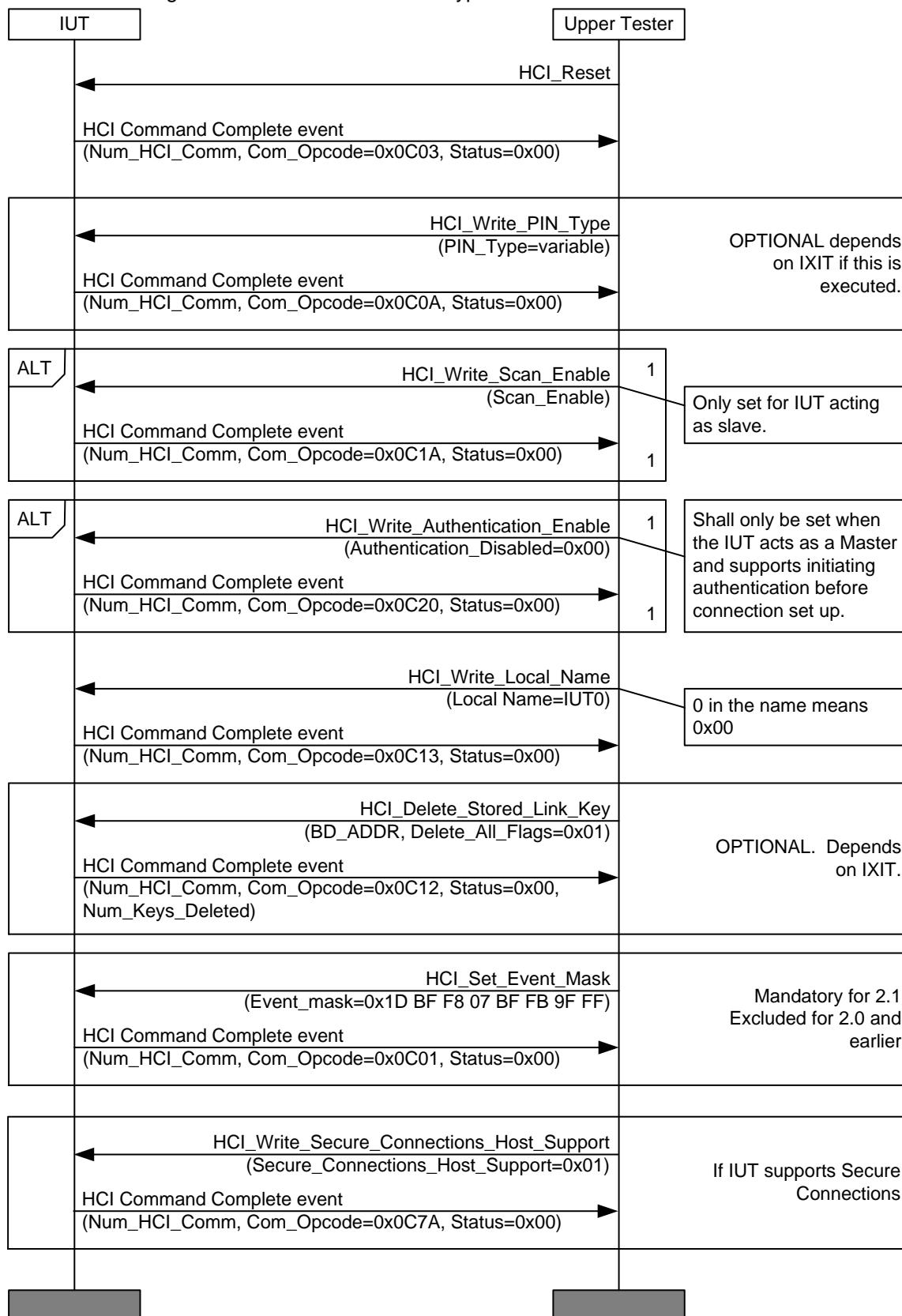


Figure 4.6: Default setting used for AES-CCM encryption test cases

4.2.7 Secure Simple Pairing P256

The default settings used for the Secure Simple Pairing test cases using the P256 Elliptic Curve.

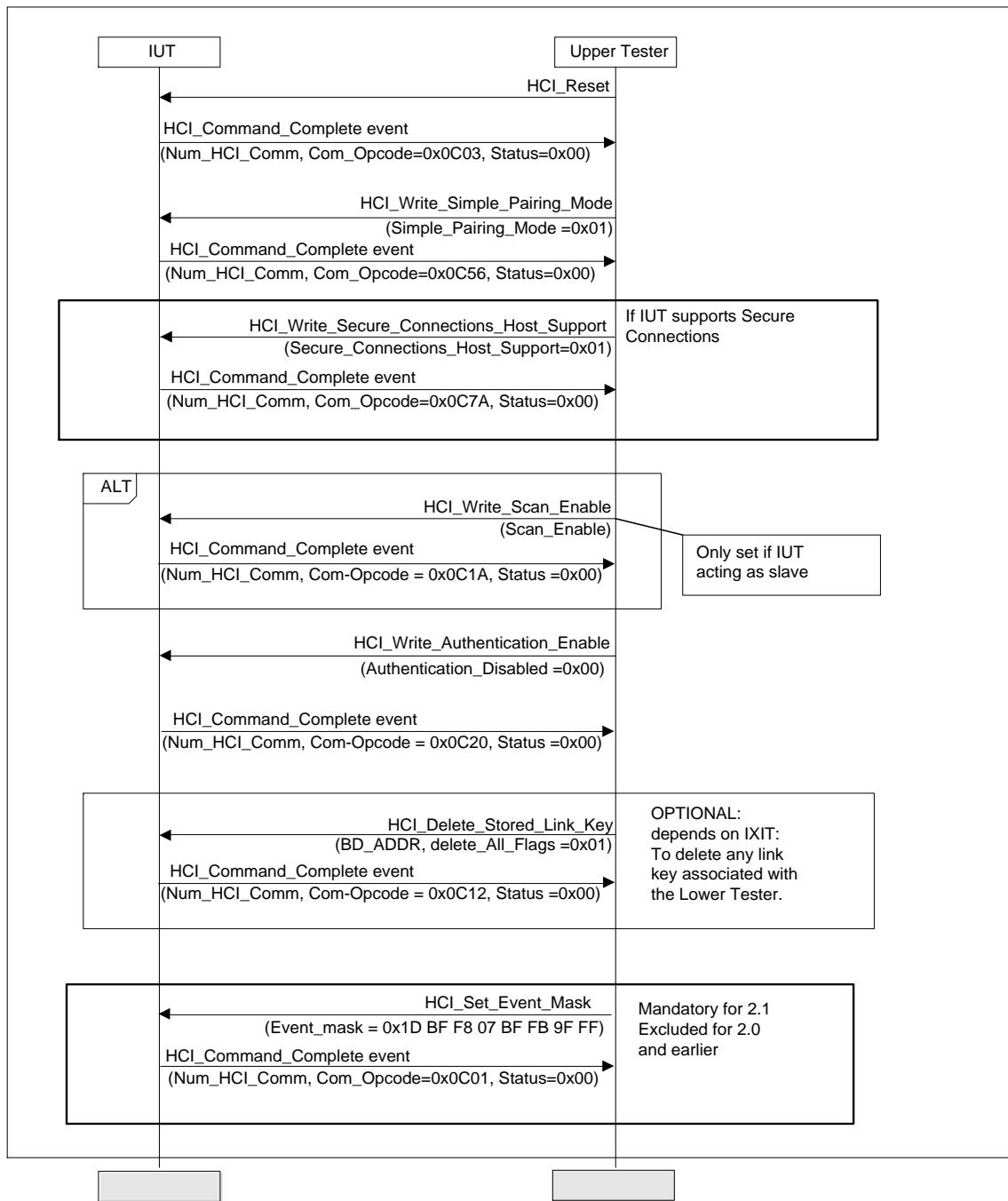


Figure 4.7: Default setting used for the Secure Simple Pairing test cases using the P256 Elliptic Curve.

4.3 Preambles

The MSCs in this section are provided for information, as they are used by test equipment in achieving the initial conditions in certain tests.



4.3.1 Connection establishment IUT Master

This Preamble will be used when the IUT will act as master.

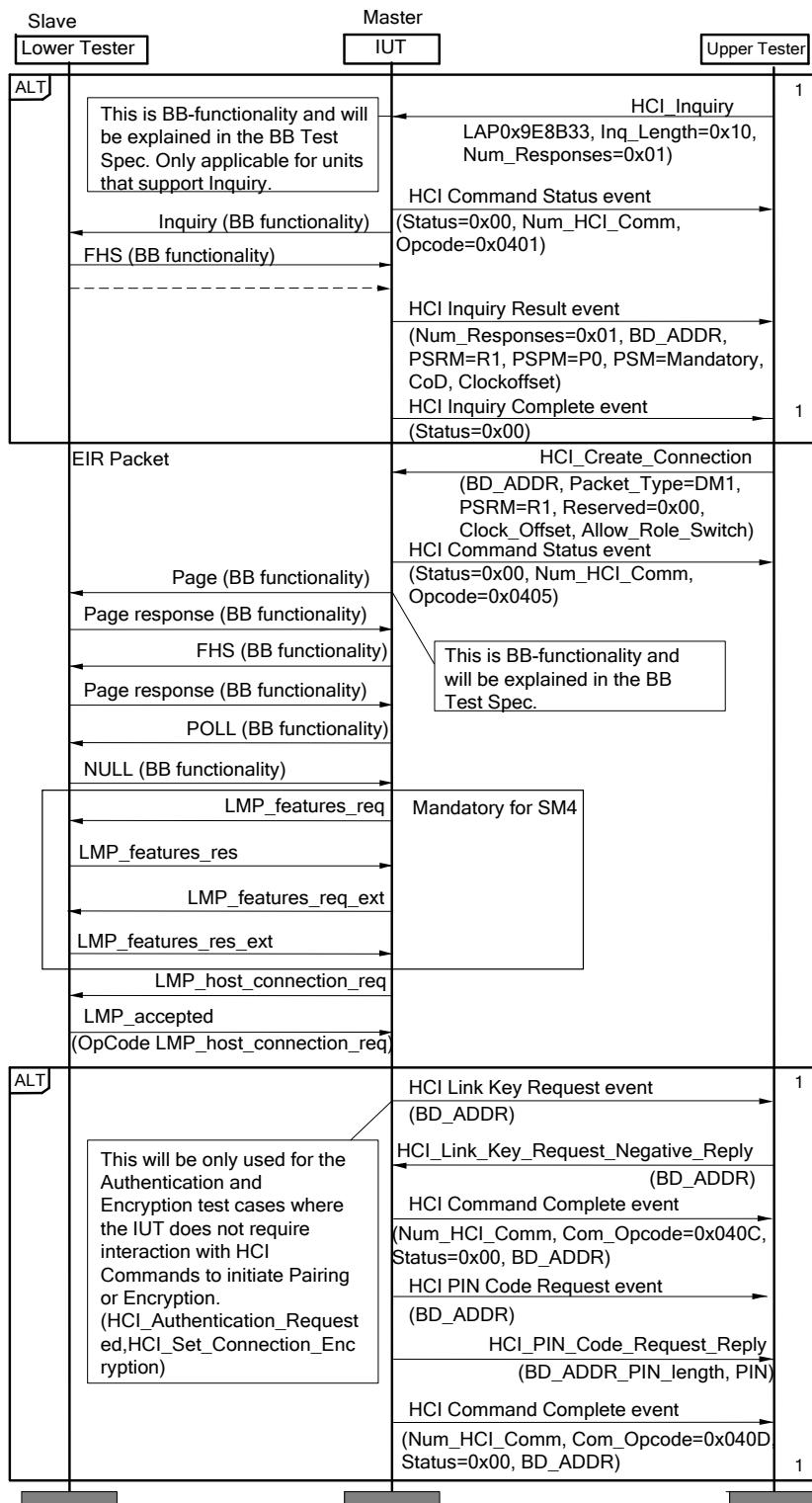


Figure 4.8: Preamble used when the IUT will act as Master



4.3.2 Connection Establishment Lower Tester

This Preamble will be used in all cases when the IUT will act as a slave.

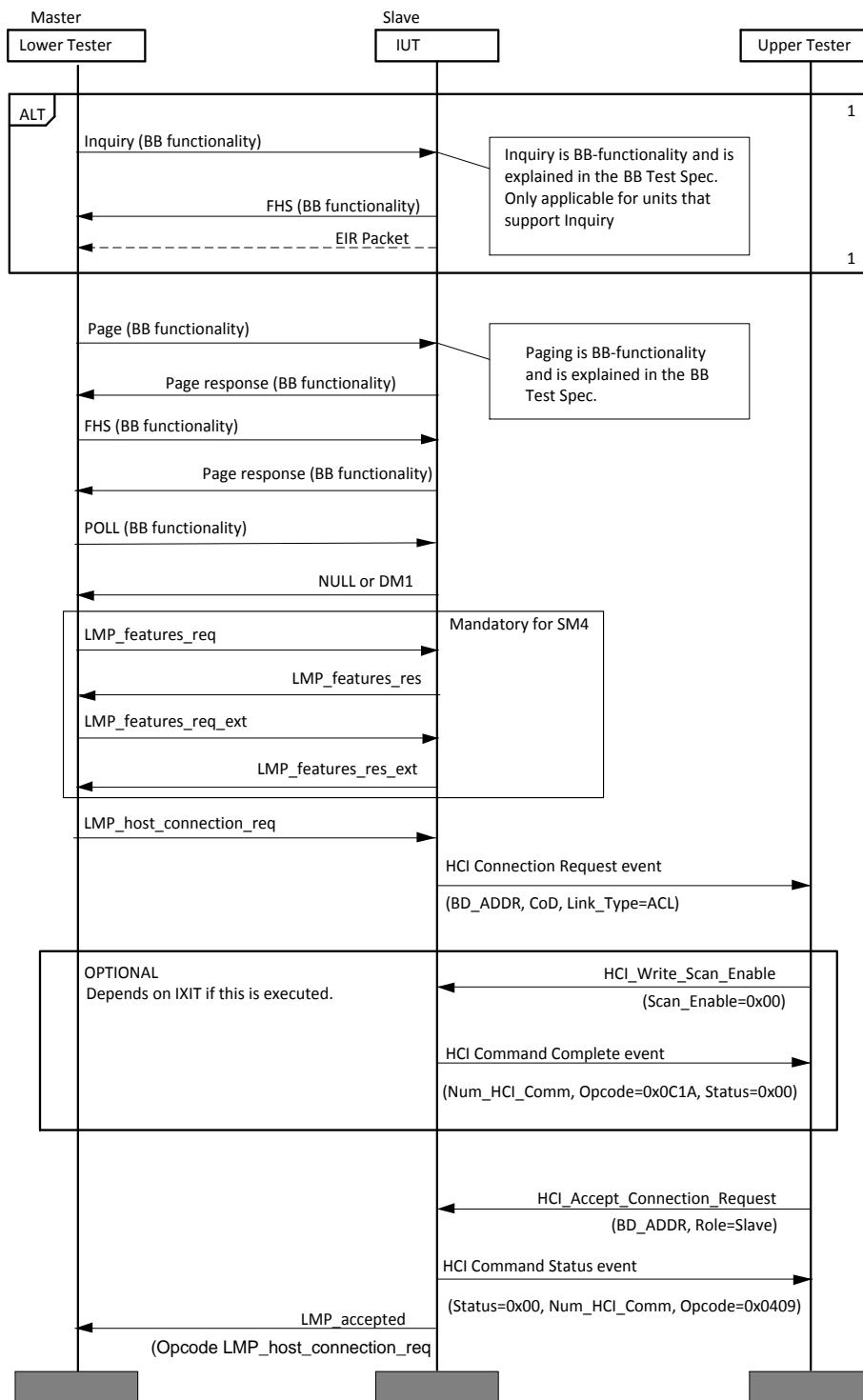


Figure 4.9: Preamble used when the IUT will act as Slave



4.3.3 Default Settings

Connection setup with the Enhanced Data Rate ACL link enabled.

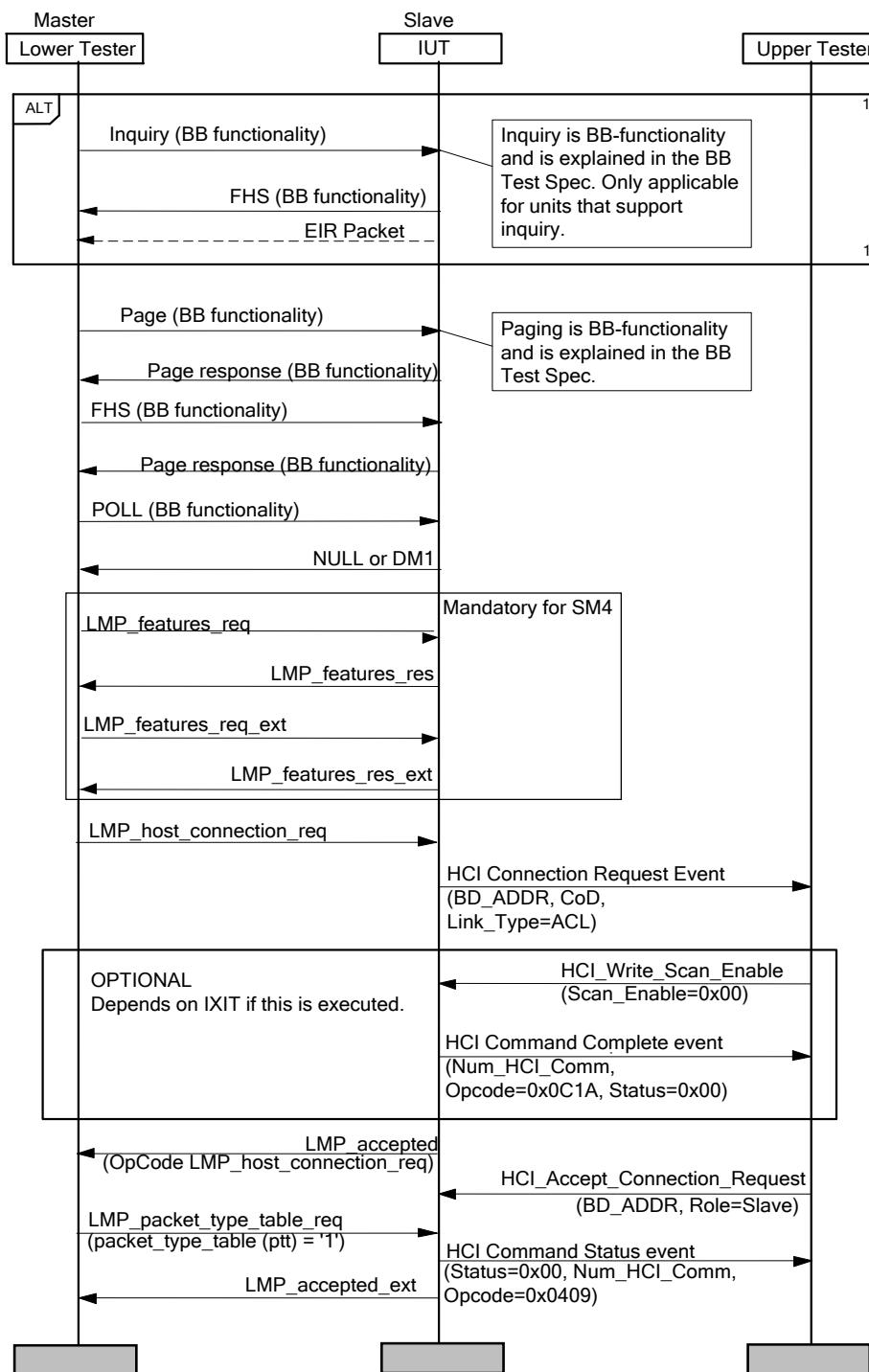
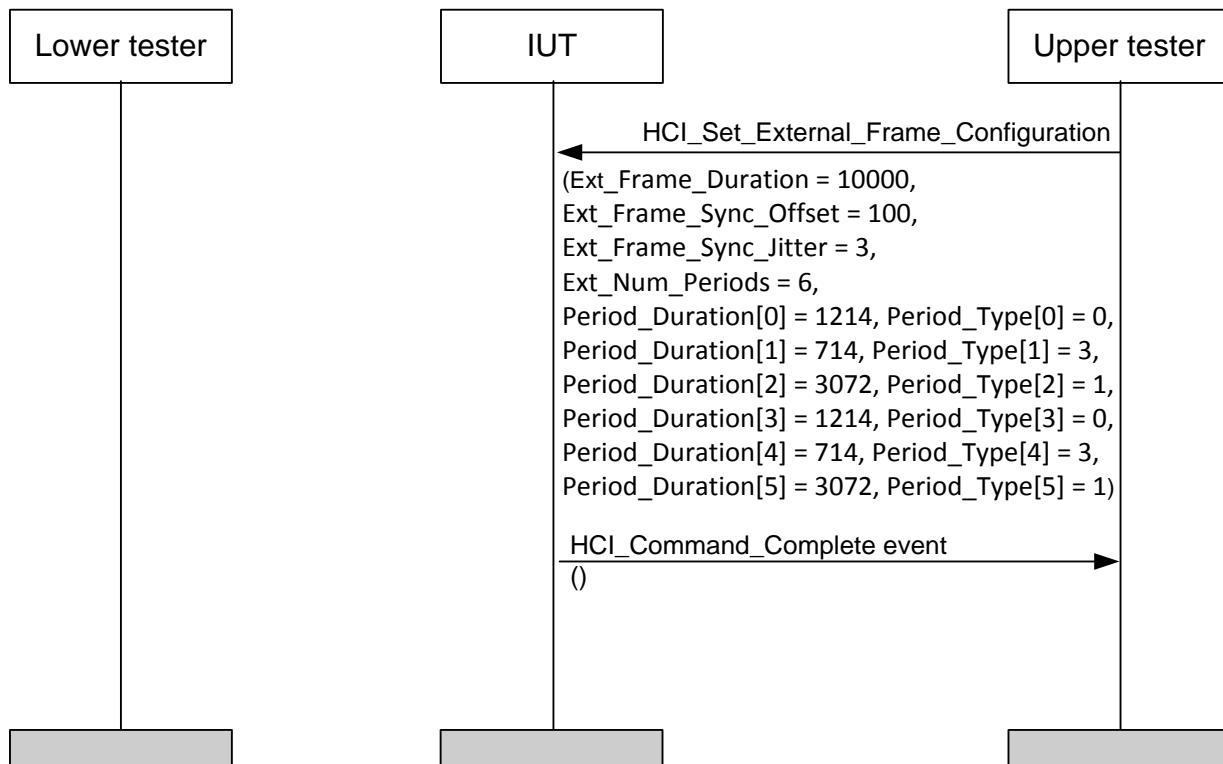


Figure 4.10: Connection setup with the Enhanced Data Rate established



4.3.4 External Frame Configuration

This preamble will be used for extenal frame configuration for Piconet Clock Adjust test cases. The IUT may use the specified HCI or any equivalent method to set up the test parameters.



4.3.5 Pass/InconclusiveFail Verdict Conventions

Each test case has an Expected Outcome section, which outlines all the detailed pass criteria conditions that shall be met by the IUT to merit a Pass verdict.

Certain test cases also have an Inconclusive Verdict defined. If the conditions for this verdict are met, the test provides evidence that the IUT neither meets nor violates the test case; instead it means that the test case was not applicable to the IUT, and therefore a Pass Verdict is not required in order to achieve Qualification of the IUT. Implementers are encouraged to provide mechanisms to avoid the behavior leading to an Inconclusive condition during testing.

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 one of the pass criteria conditions or the inconclusive conditions (where they exist) cannot be met, and if this occurs, the outcome of the test shall be the Fail Verdict.

For an Inconclusive Verdict, all the pass criteria conditions apply up to the point in the test procedure where an Inconclusive Verdict is identified. If one of the pass criteria in a step prior to the Inconclusive Verdict cannot be met, the outcome of the test shall be the Fail Verdict and not the Inconclusive Verdict.

4.4 Authentication Procedures

- Test group objectives:

To verify the correct implementation of the Authentication services.



4.4.1 Authentication - Both Master and Slave

- Test subgroup objectives:

To verify the authentication procedure. The role of the IUT is of no importance.

4.4.1.1 LMP/AUT/BI-01-C [Error Return When a Unit Key is Requested]

Verify that the IUT properly returns an error when the LT requests the Unit Key.

IUT is Initiator. The Lower Tester is the Responder.

- Reference
[1] 4.2.2.1
- Initial Condition
See Section 4.1.3
- Test Procedure

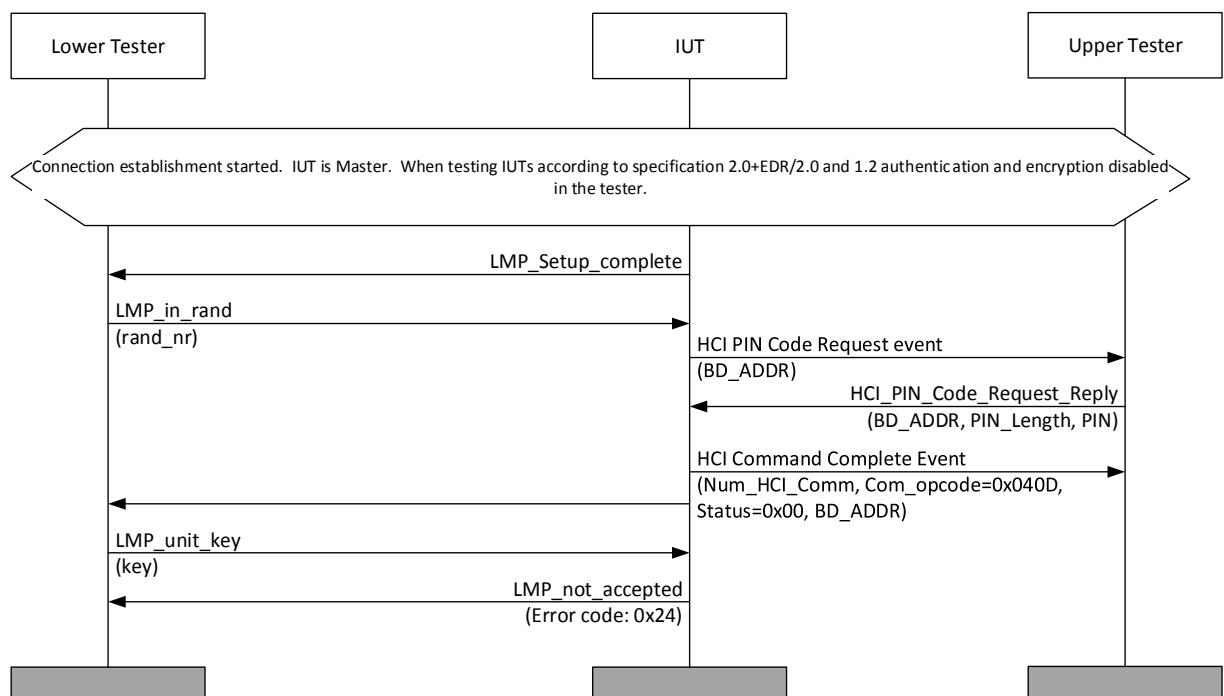


Figure 4.11: LMP/AUT/BI-01-C, Error Return When a Unit Key is Requested

- Expected Outcome

Pass Verdict

The IUT transmits LMP_not_accepted upon reception of LMP_unit_key.



4.4.1.2 LMP/AUT/BV-01-C [Authentication Reject, No Link Key]

- Test Purpose

Verify that the IUT rejects the authentication as the IUT has no link key associated with the Lower Tester. IUT is Responder and has no link key associated with the Initiator. The Lower Tester is Initiator.

- Reference

[1] 4.2.1.2

- Initial Condition

See Section 4.1.3

- Test Procedure

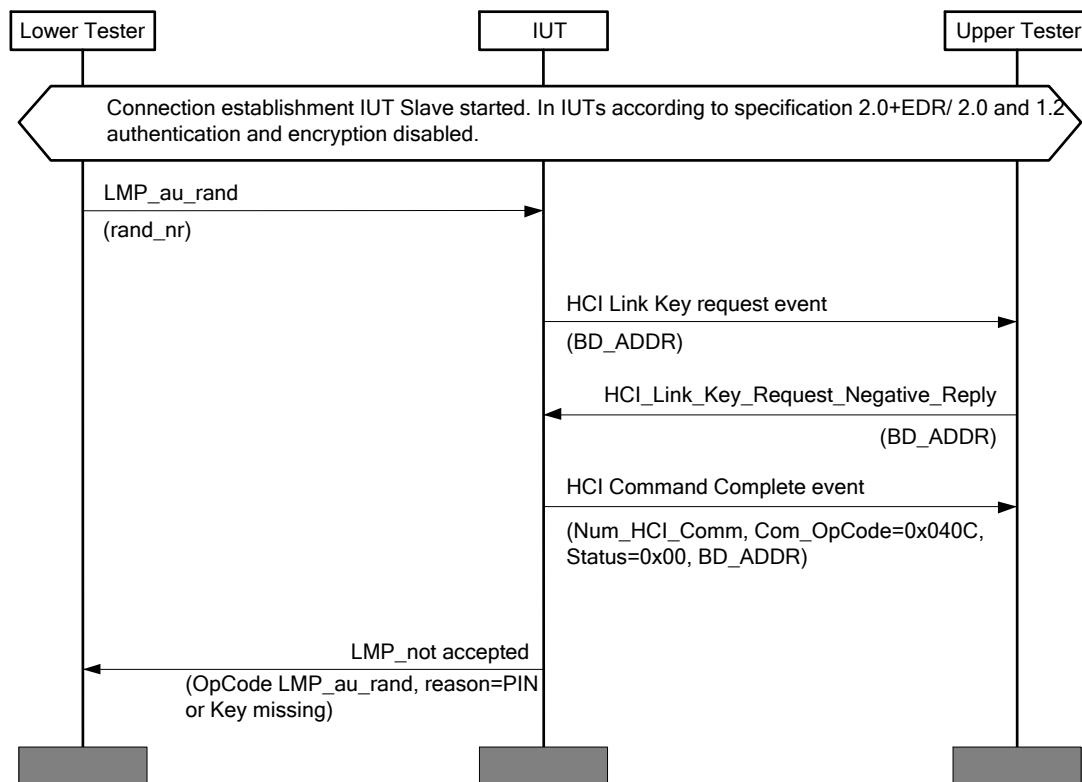


Figure 4.12: LMP/AUT/BV-01-C

- Expected Outcome

Pass verdict

The IUT transmits the PDU LMP_not_accepted containing the opcode for PDU LMP_au_rand and "PIN or Key missing" upon reception PDU LMP_au_rand.

4.4.2 Pairing - Both Master and Slave

- Test subgroup objectives:

To verify the pairing procedure. The role of the IUT is of no importance.



4.4.2.1 LMP/AUT/BV-03-C [Create Link Key]

- Test Purpose

Verify that the IUT creates the correct link key.

The IUT is Responder and has a variable PIN code. The Lower Tester is initiator.

The Lower Tester does not support Simple Pairing.

- Reference

[1] 4.2.2

- Initial Condition

See Section 4.1.3



- Test Procedure

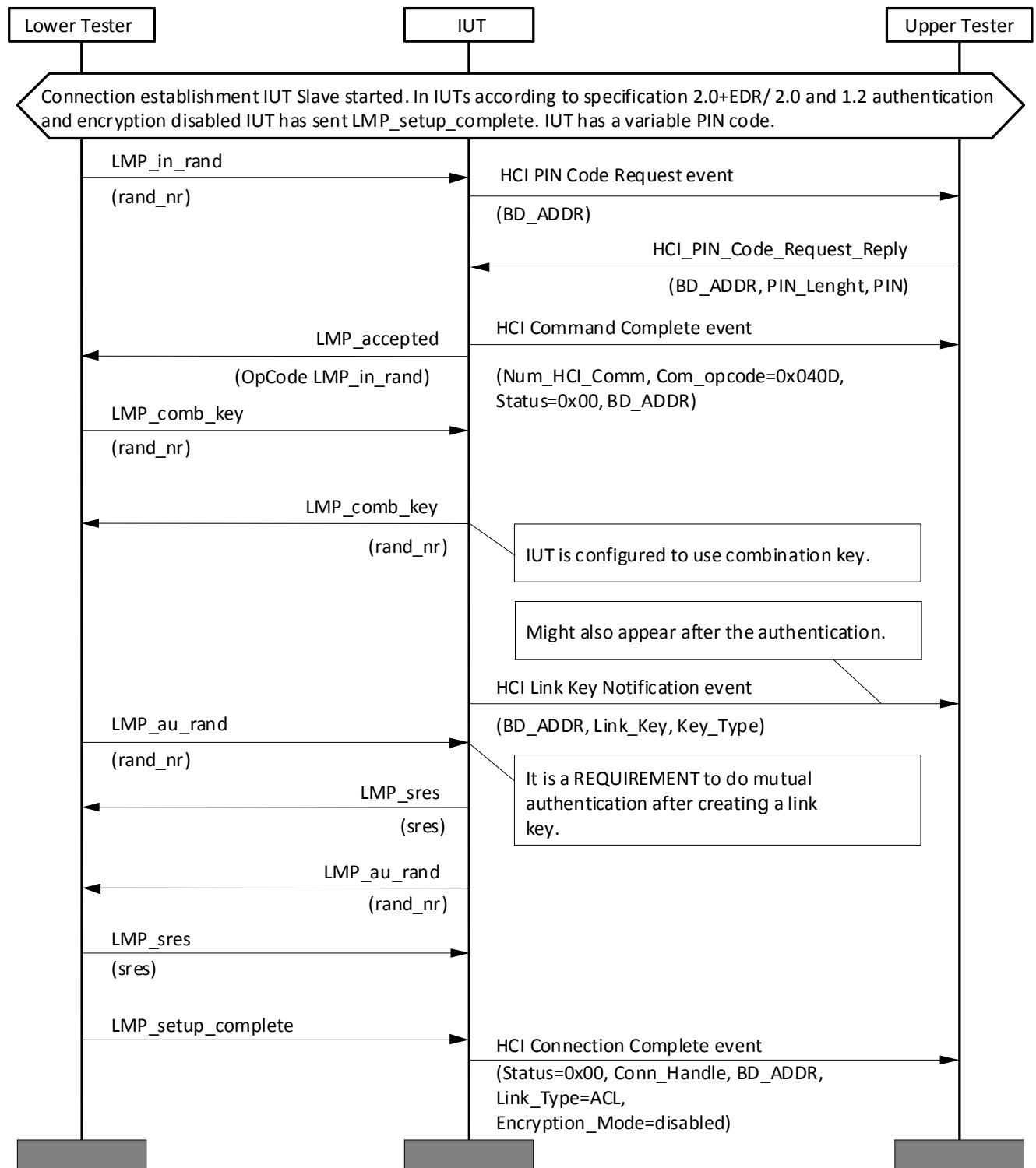


Figure 4.13: LMP/AUT/BV-03-C

- Test Condition

The manufacturer of the IUT must define BD_ADDR.



- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted containing the opcode for PDU LMP_in_rand upon reception of PDU LMP_in_rand.

The IUT transmits PDU LMP_comb_key upon reception of PDU LMP_comb_key.

- Notes

Possible interaction might be needed on the IUT. HCI commands might be needed for PIN, Key, etc. It is implementation dependent.

4.4.2.2 LMP/AUT/BV-04-C [Pairing, IUT Initiator]

- Test Purpose

Verify that the IUT initiates a complete Pairing and authentication procedure.

IUT is Initiator. The Lower Tester is Responder.

The Lower Tester does not support Simple Pairing.

- Reference

[1] 4.2.2.1

- Initial Condition

See Section 4.1.3

If ICS item LMP 3/1 is supported, the Upper Tester shall send HCI_Write_Authentication_Enable (Enabled=0x01) before starting the connection.

- Test Procedure

The test procedure is divided into two MSC's. MSC No 1 is used when pairing is initiated without interaction of HCI commands. MSC No 2 is when the IUT requires HCI Connection Complete event before being able to initiate pairing.

ICS item LMP, 3/1 and LMP, 3/2 will tell which test procedure to run (If both are ticked MSC 1 will be the test procedure).



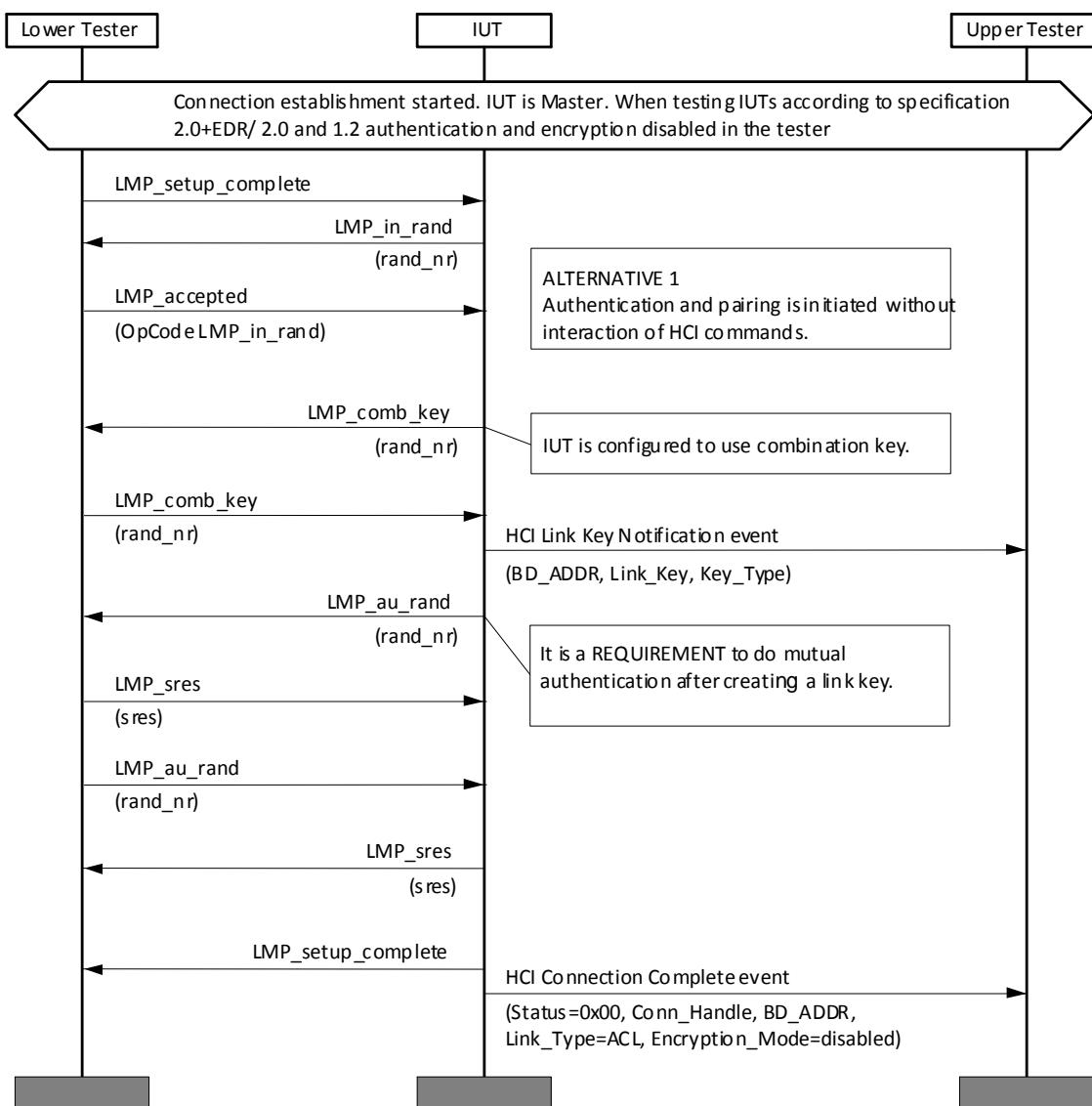


Figure 4.14: LMP/AUT/BV-04-C, MSC 1

MSC 1: Pairing is initiated without interaction of HCI command.



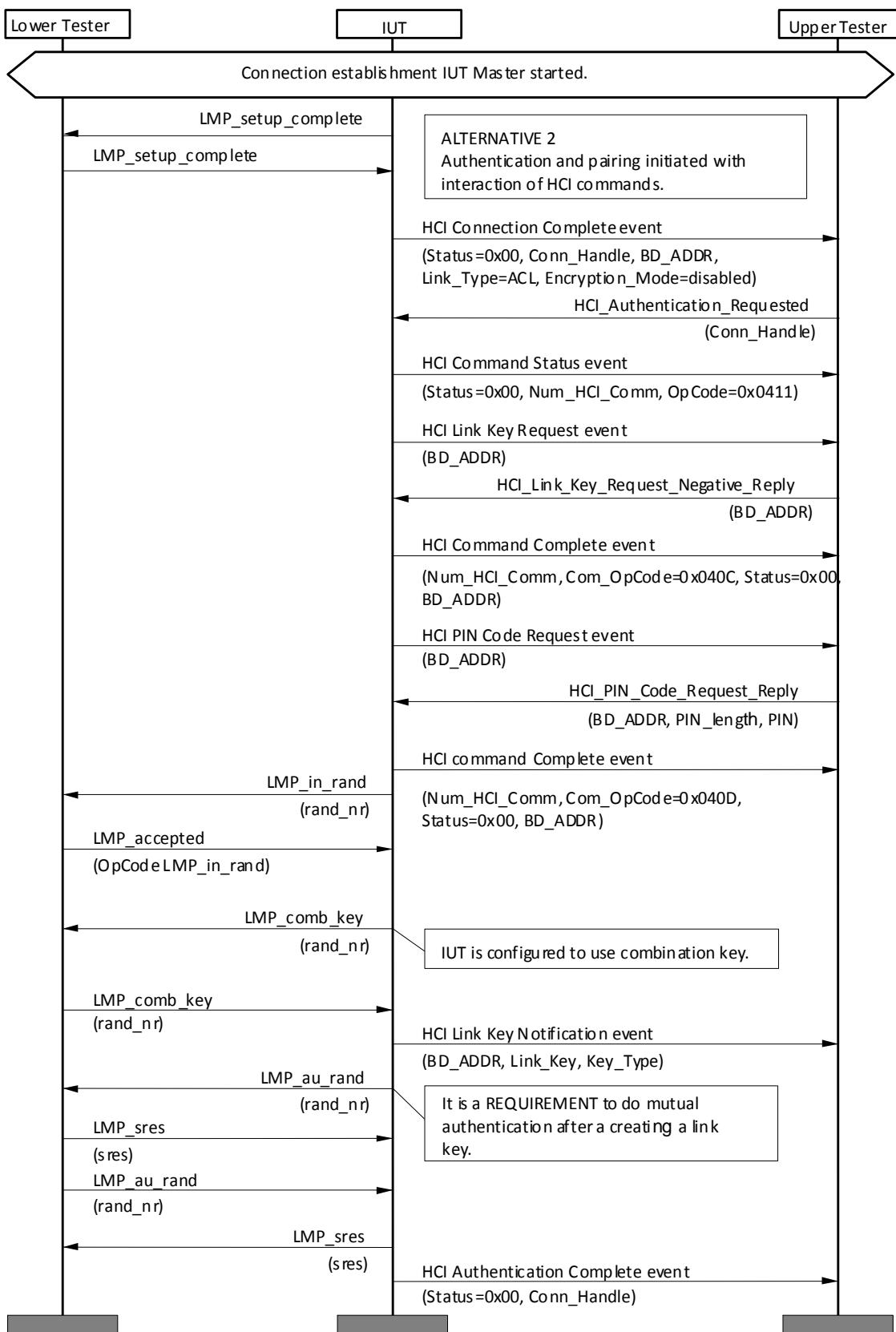


Figure 4.15: LMP/AUT/BV-04-C, MSC 2

MSC 2: IUT requires interaction of HCI_Authentication_Requested to initiate pairing.



- Test Condition

It must be possible to control the IUT to initiate the pairing procedure. The manufacturer of the IUT must define BD_ADDR.

- Expected Outcome

Pass verdict

Correct PDU LMP_in_rand is transmitted.

Correct PDU LMP_Comb_key is transmitted.

Correct Link key is created checked by an authentication (SRES is checked.)

- Notes

Possible interaction might be needed on IUT. HCI commands might be needed for PIN, Key etc. It is implementation dependent.

The configuration of the IUT and Lower Tester will decide which LMP commands to use when creating the Link Key.

It must be verified that if both the Lower Tester and the IUT are configured to use combination key a mutual authentication has to be carried out.

The initiation of the pairing procedure might be taken on an already established link.

4.4.2.3 LMP/AUT/BV-05-C [IUT Responder, Fixed PIN]

- Test Purpose

Verify that when the IUT has a fixed PIN can request to become initiator.

IUT is Responder and has a fixed PIN code. The Lower Tester is Initiator.

The Lower Tester does not support Simple Pairing.

- Reference

[1] 4.2.3

- Initial Condition

See Section 4.1.3



- Test Procedure

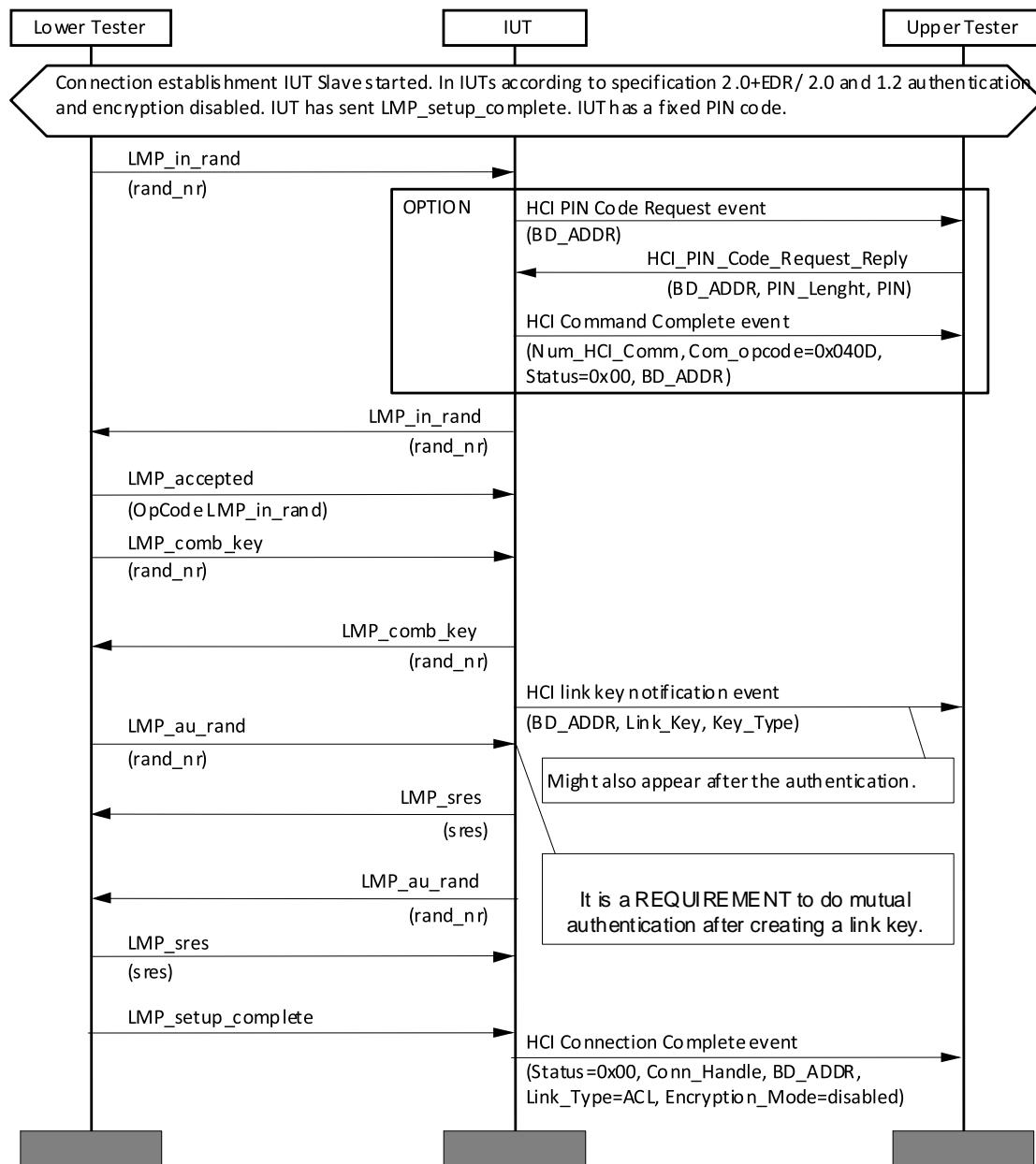


Figure 4.16: LMP/AUT/BV-05-C

- Test Condition

The manufacturer of the IUT must define BD_ADDR.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_in_rand upon reception of PDU LMP_in_rand and accepts reception of PDU LMP_accepted containing the opcode for PDU LMP_in_rand and the correct Kinit is generated.



- Notes

Possible interaction might be needed on IUT. HCI commands might be needed for PIN, Key etc. It is implementation dependent.

4.4.2.4 LMP/AUT/BV-06-C [IUT Initiator; Responder has Fixed PIN]

- Test Purpose

Verify that the IUT accepts that the Lower Tester has a fixed PIN. The Lower Tester is Responder and has a fixed PIN code. The IUT is Initiator and does not have a fixed PIN code.

Lower Tester does not support Simple Pairing.

- Reference

[1] 4.2.2.2

- Initial Condition

See Section 4.1.3

If ICS item LMP 3/1 is supported, the Upper Tester shall send HCI_Write_Authentication_Enable (Enabled=0x01) before starting the connection.

- Test Procedure

The test procedure is divided into two MSC's. MSC No 1 is used when pairing is initiated without interaction of HCI commands. MSC No 2 is when the IUT requires HCI Connection Complete event before being able to initiate pairing.

ICS item LMP, 3/1 and LMP, 3/2 will tell which test procedure to run (If both are ticked MSC 1 will be the test procedure).



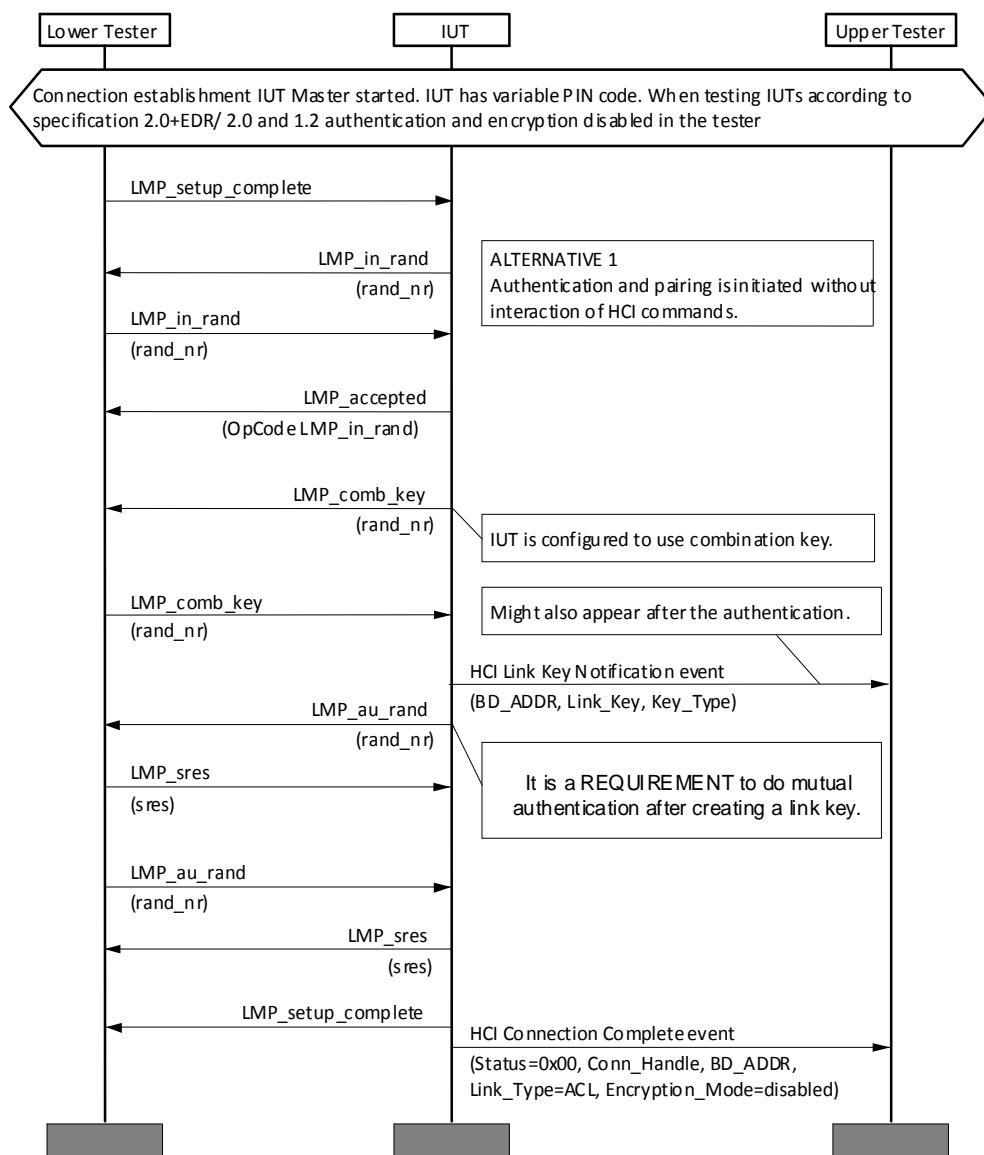


Figure 4.17: LMP/AUT/BV-06-C, MSC 1

MSC 1: Pairing is initiated without interaction of HCI command.



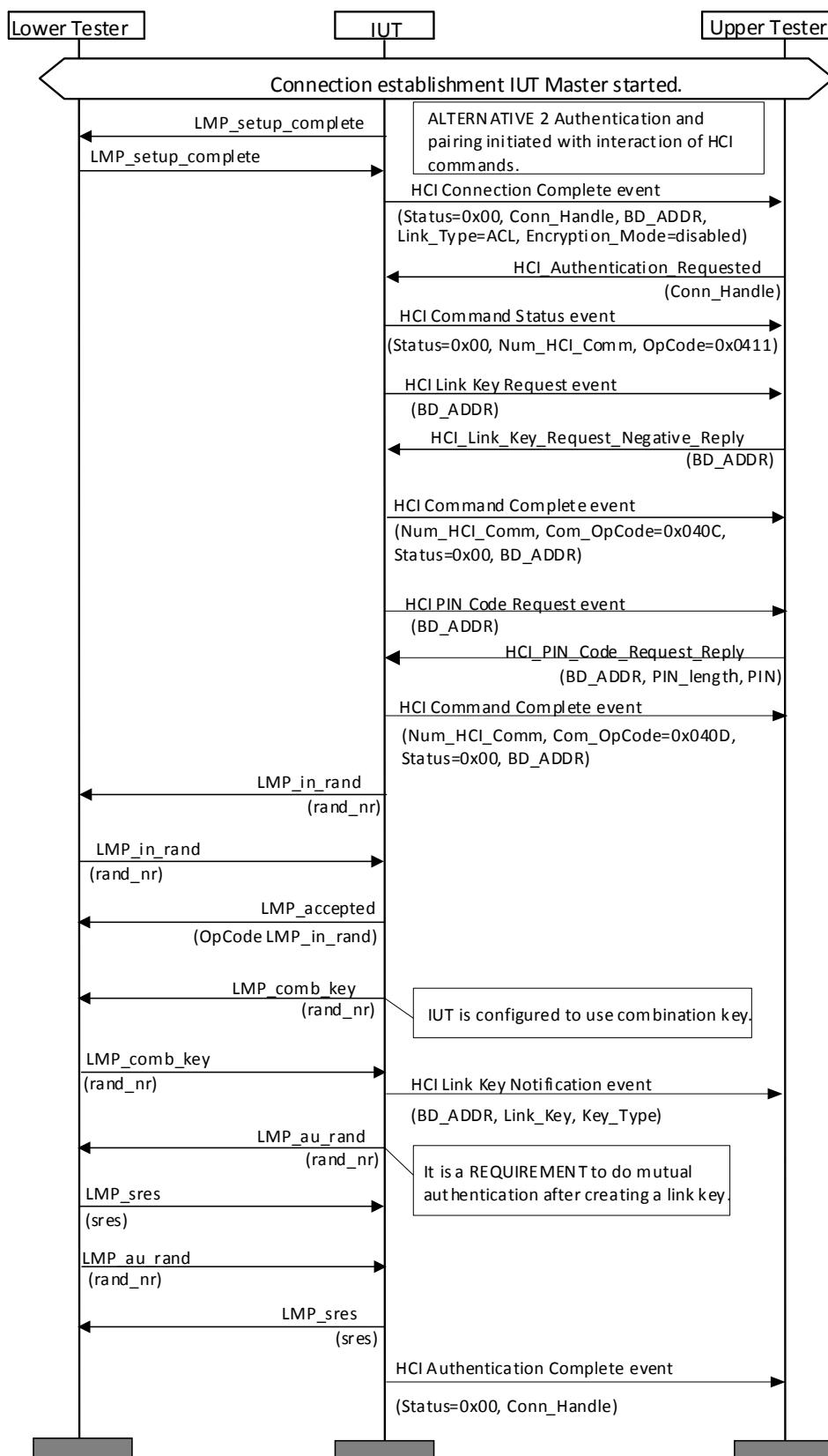


Figure 4.18: LMP/AUT/BV-06-C, MSC 2

MSC 2: IUT requires interaction of HCI_Authentication_Requested to initiate pairing.



- Test Condition

It must be possible to control the IUT to initiate the pairing procedure. The manufacturer of the IUT must define the BD_ADDR.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted upon reception of PDU LMP_in_rand.

- Notes

Possible interaction might be needed on IUT. HCI commands might be needed for PIN, Key etc. It is implementation dependent.

4.4.3 Change Link Key - Both Master and Slave

- Test subgroup objectives:

To verify the change link key procedure. The role of the IUT is of no importance.

4.4.3.1 LMP/AUT/BV-12-C [Change Link Key, IUT Responder]

- Test Purpose

Verify that the IUT accepts change of link key and that the IUT creates the new link key correct. The Lower Tester is initiating unit configured to use a combination key. The IUT is configured to use a combination key. No Encryption.

- Reference

[1] 4.2.3

- Initial Condition

See Section 4.1.3



- Test Procedure

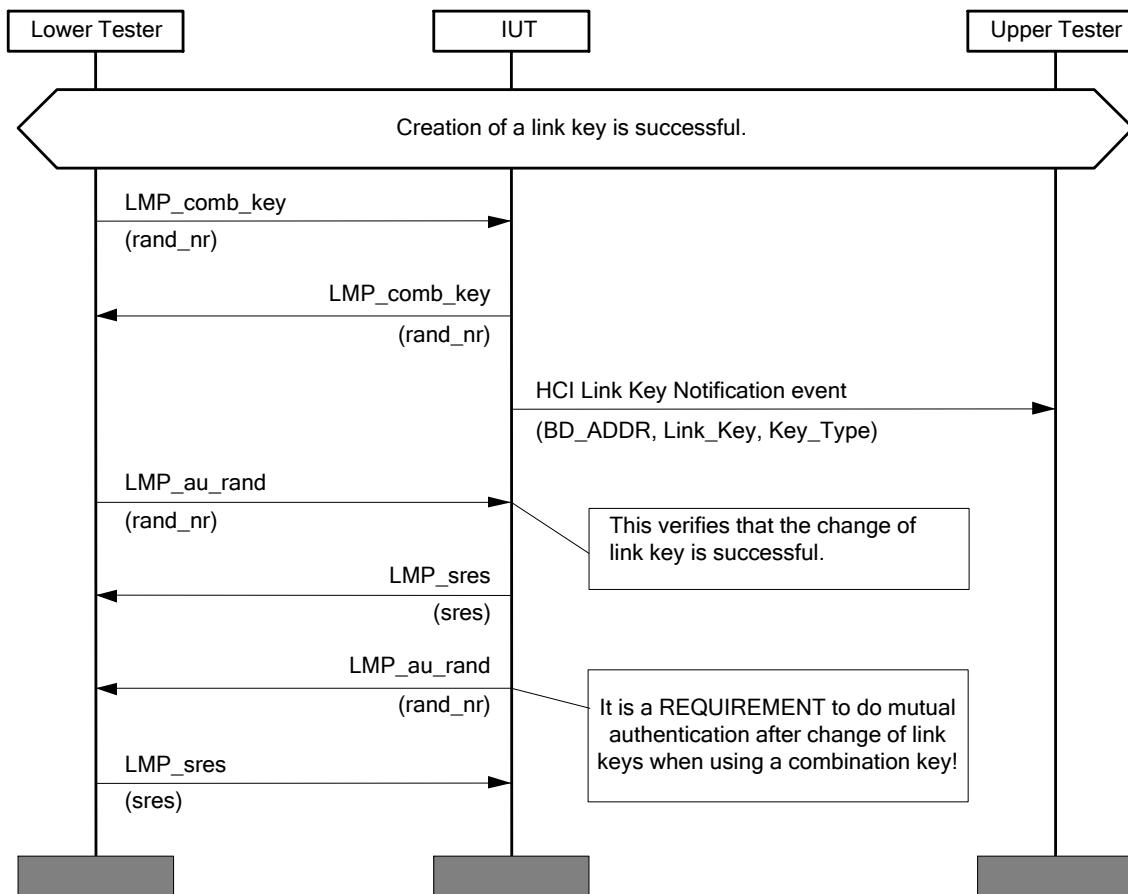


Figure 4.19: LMP/AUT/BV-12-C

- Test Condition

The manufacturer of the IUT must define which key the IUT uses.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_comb_key upon reception of PDU LMP_comb_key. The Link key must be the calculated link Key.

4.4.3.2 LMP/AUT/BV-13-C [Change Link Key, IUT Initiator]

- Test Purpose

Verify that the IUT can change link key and that the IUT creates the new link key correct. The IUT is the initiating unit configured to use a comb key. Encryption is not used.

- Reference

[1] 4.2.3



- Initial Condition

See Section 4.1.3

- Test Procedure

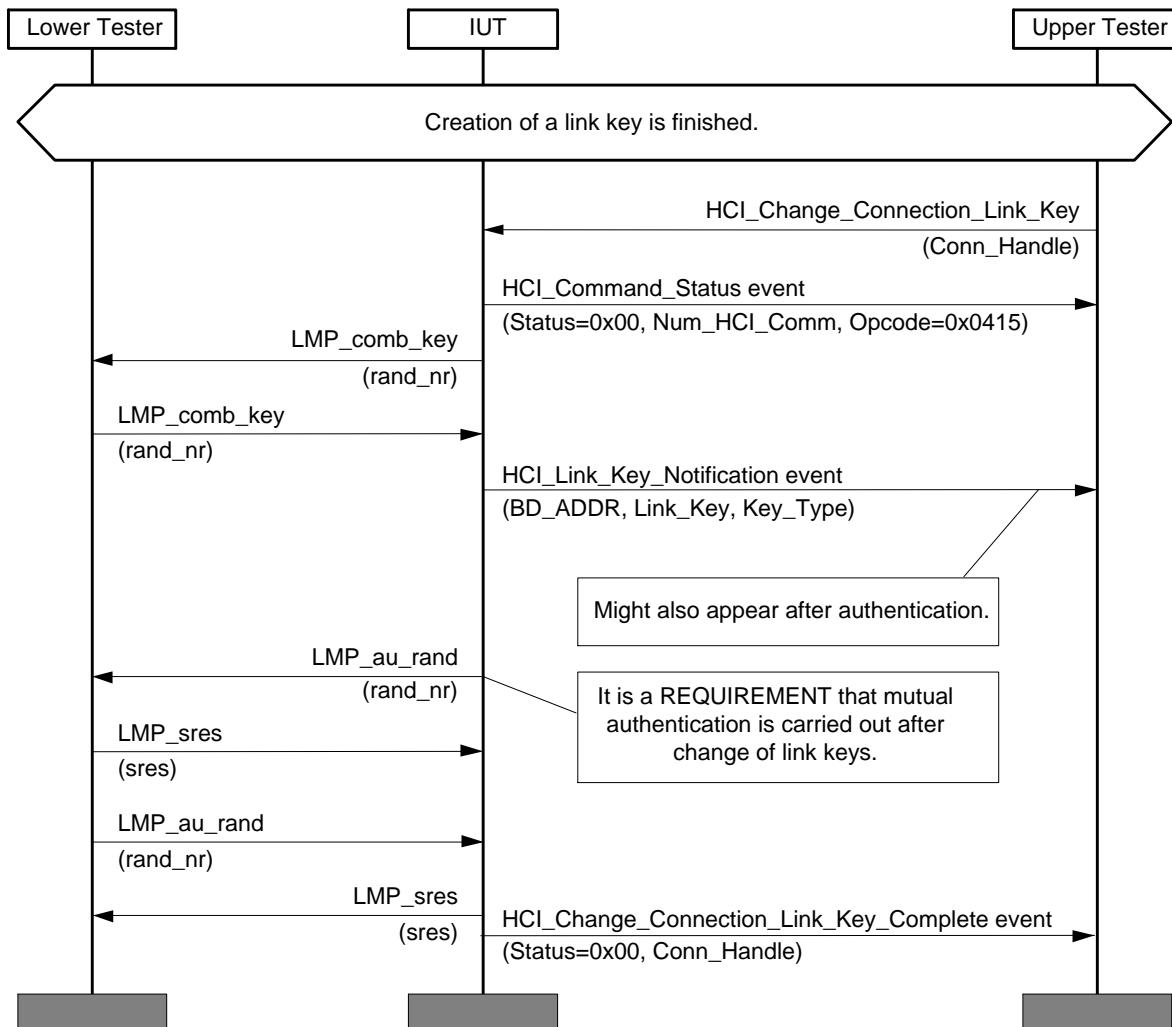


Figure 4.20: LMP/AUT/BV-13-C

- Test Condition

The manufacturer of the IUT must define which key the IUT uses.

It must be possible to control the IUT to initiate the change of Link Key.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_comb_key and accepts reception of PDU LMP_comb_key. The Link key must be the calculated link Key.



4.4.4 Secure Authentication Procedures

- Test subgroup objectives:

To verify the Secure Authentication procedure.

4.4.4.1.1 LMP/AUT/BV-14-C [Secure Authentication, Responder (IUT) has link key, Initiator (Lower Tester) is master]

- Test Purpose

To verify the Secure Authentication procedure when the Lower Tester is the initiator, IUT is responder and IUT has the link key. The IUT is slave and the Lower Tester is master.

- Reference

[1] 4.2.1.4

- Initial Condition

See [Connection establishment IUT Master](#) and [Secure Simple Pairing P256](#).



- Test Procedure

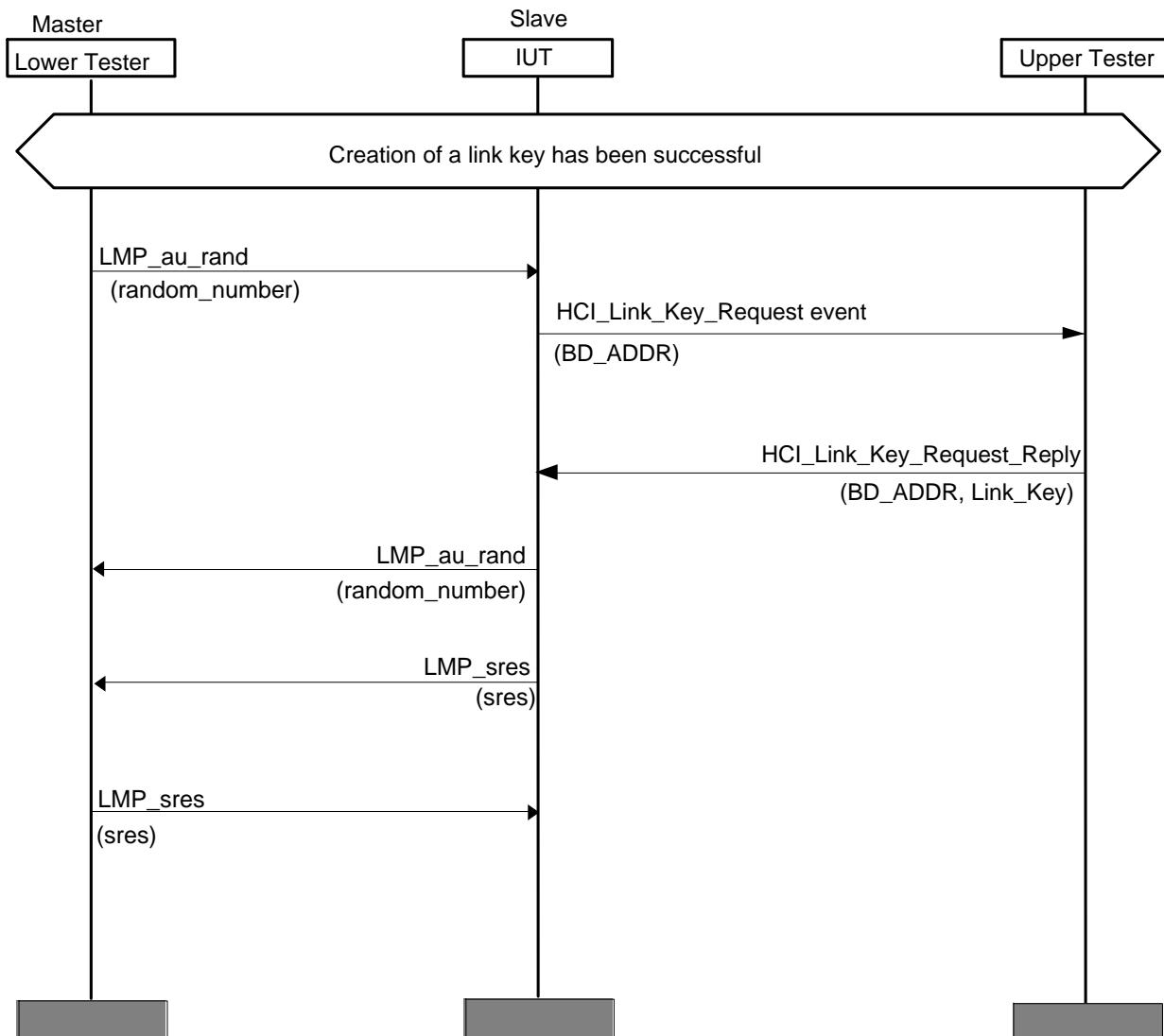


Figure 4.21: LMP/AUT/BV-14-C

- Expected Outcome

Pass verdict

The IUT transmits the PDU LMP_au_rand upon reception of PDU LMP_au_rand from the Lower Tester.

The IUT transmits the PDU LMP_sres containing the correct authentication response.

4.4.4.1.2 LMP/AUT/BV-15-C [Secure Authentication, Responder (IUT) has link key, Initiator (Lower Tester) is slave]

- Test Purpose

To verify the Secure Authentication procedure when the Lower Tester is the initiator, IUT is responder and IUT has the link key. The IUT is master and the Lower Tester is slave.



- Reference
[1] 4.2.1.4
- Initial Condition
See [Connection Establishment Lower Tester](#) and [Secure Simple Pairing P256](#).
- Test Procedure

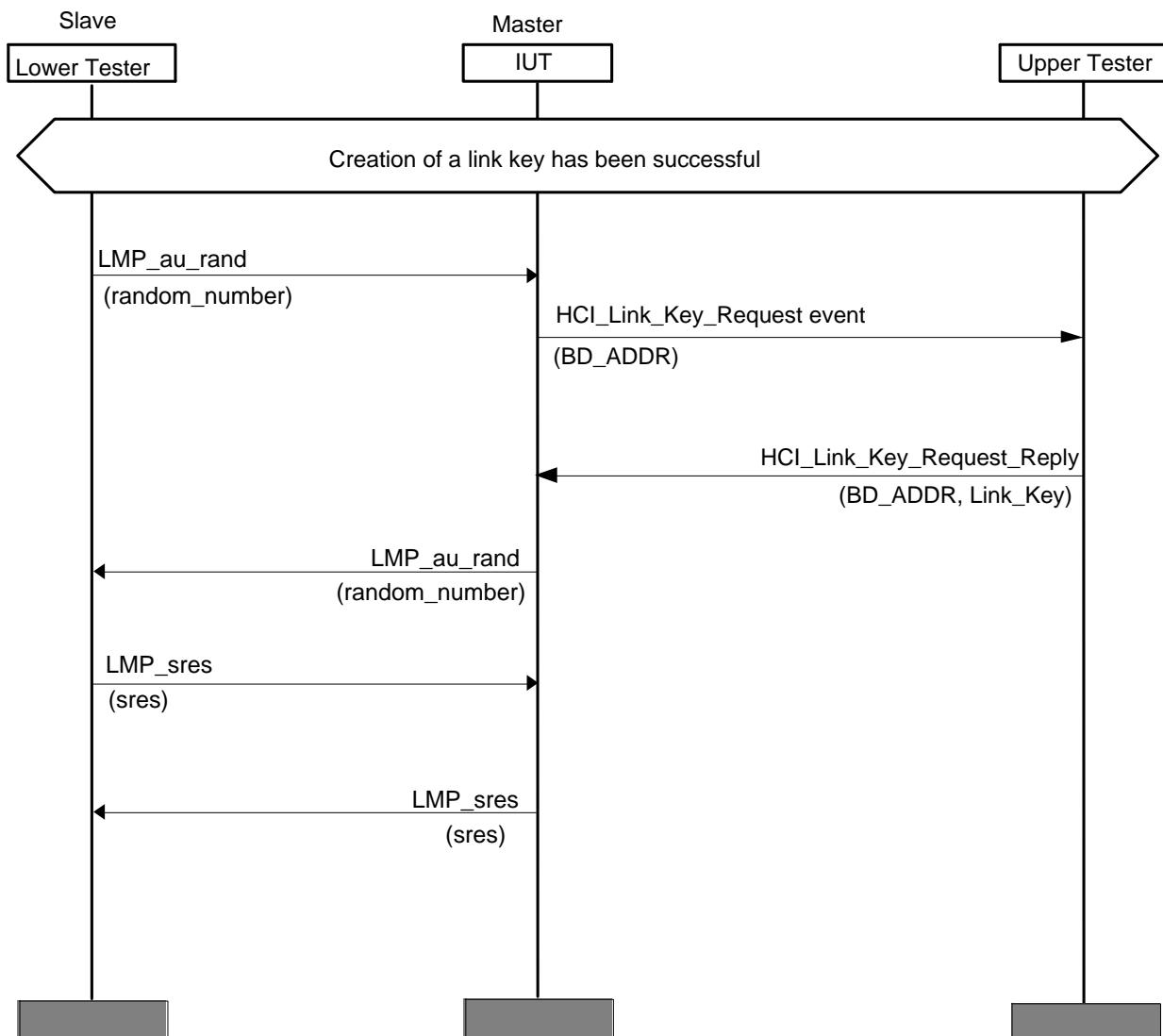


Figure 4.22: LMP/AUT/BV-15-C

- Expected Outcome

Pass verdict

The IUT transmits the PDU LMP_au_rand upon reception of PDU LMP_au_rand from the Lower Tester.

The IUT transmits the PDU LMP_sres containing the correct authentication response upon reception of PDU LMP_sres from the Lower Tester.



4.4.4.1.3 LMP/AUT/BV-16-C (Secure Authentication, Responder (Lower Tester) has link key, Initiator (IUT) is master)

- Test Purpose

To verify the Secure Authentication procedure when the Lower Tester is the responder, IUT is initiator and IUT has the link key. The IUT is master and the Lower Tester is slave.

- Reference

[1] 4.2.1.4

- Initial Condition

See [Connection establishment IUT Master](#) and [Secure Simple Pairing P256](#).

- Test Procedure

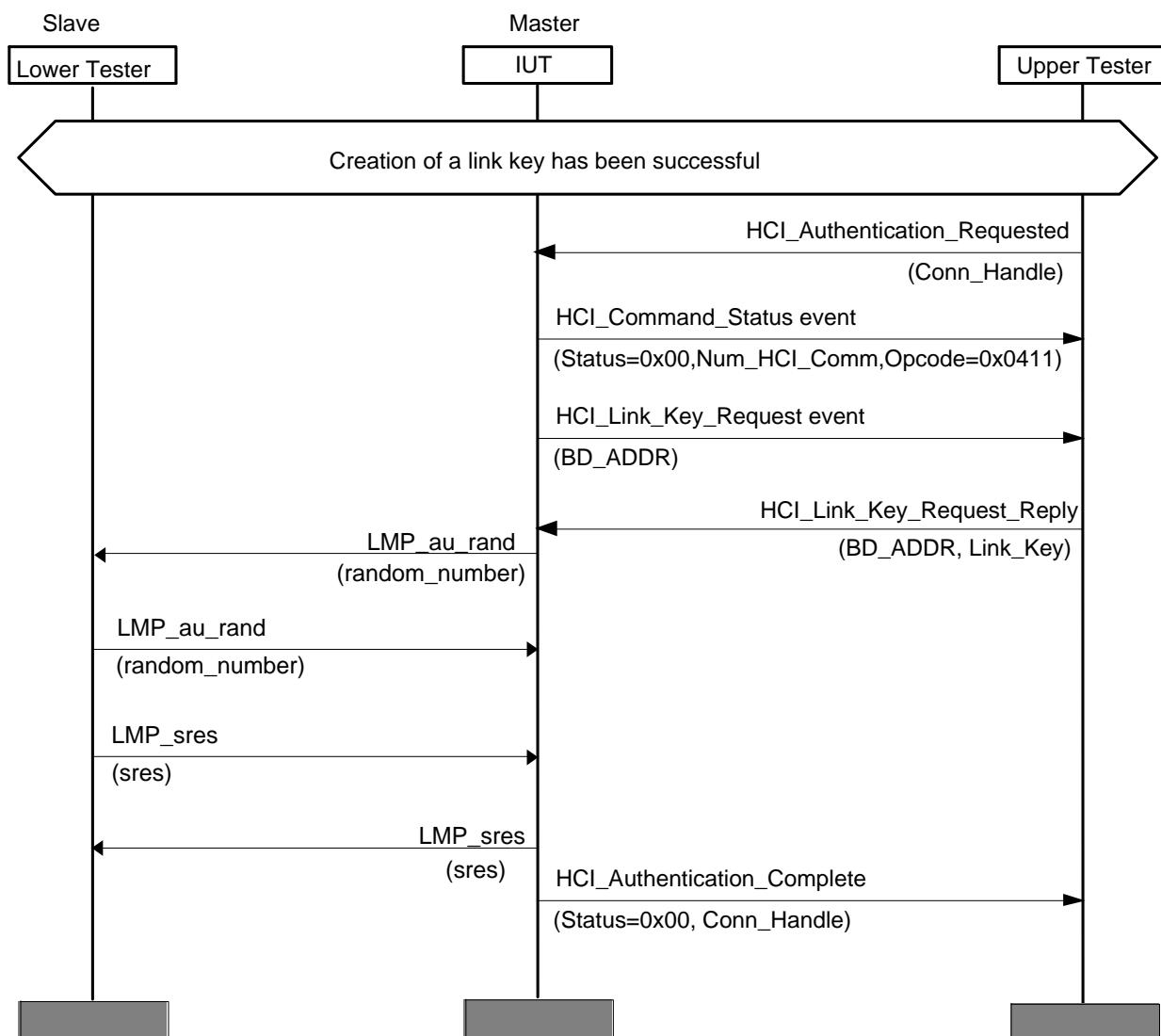


Figure 4.23: LMP/AUT/BV-16-C



- Expected Outcome

Pass verdict

The IUT transmits the PDU LMP_au_rand upon receiving the Link Key from the Upper Tester.

The IUT transmits the PDU LMP_sres containing the correct authentication response upon reception of the PDU LMP_sres from the Lower Tester.

4.4.4.1.4 LMP/AUT/BV-17-C [Secure Authentication, Responder (Lower Tester) has link key, Initiator (IUT) is slave]

- Test Purpose

To verify the Secure Authentication procedure when the Lower Tester is the responder, IUT is initiator and IUT has the link key. The IUT is slave and the Lower Tester is master.

- Reference

[1] 4.2.1.4

- Initial Condition

See [Connection Establishment Lower Tester](#) and [Secure Simple Pairing P256](#).



- Test Procedure

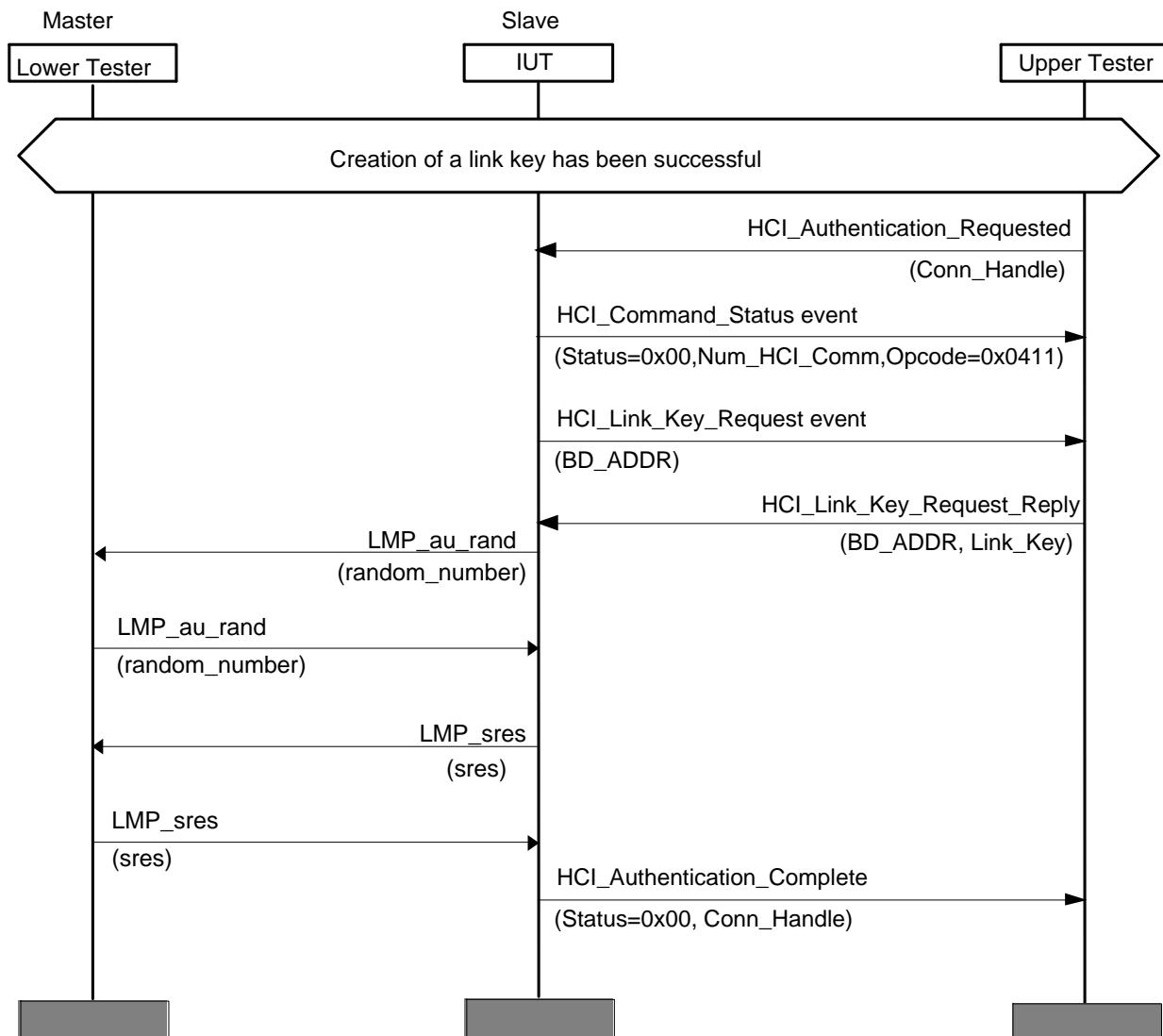


Figure 4.24: LMP/AUT/BV-17-C

- Expected Outcome

Pass verdict

The IUT transmits the PDU LMP_au_rand upon receiving the Link Key from the Upper Tester.

The IUT transmits the PDU LMP_sres containing the correct authentication response upon reception of the PDU LMP_au_rand from the Lower Tester.

4.5 Encryption

- Test group objectives:

To verify the correct implementation of the Encryption services.



4.5.1 Encryption - Slave

- Test subgroup objectives:

To verify that the master and the slave agree upon whether to use encryption or not and if encryption shall only apply to point to point packets or if encryption shall apply to both point to point packets and broadcast packets. The IUT is slave.

4.5.1.1 LMP/ENC/BV-01-C [Accept Encryption]

- Test Purpose

Verify that the IUT accepts the encryption negotiation procedure and uses the encryption only for point to point messages. The Lower Tester is master and the IUT is slave.

- Reference

[1] 4.2.5

- Initial Condition

See [LMP/ENC/BV-01-C \[Accept Encryption\]](#).



- Test Procedure

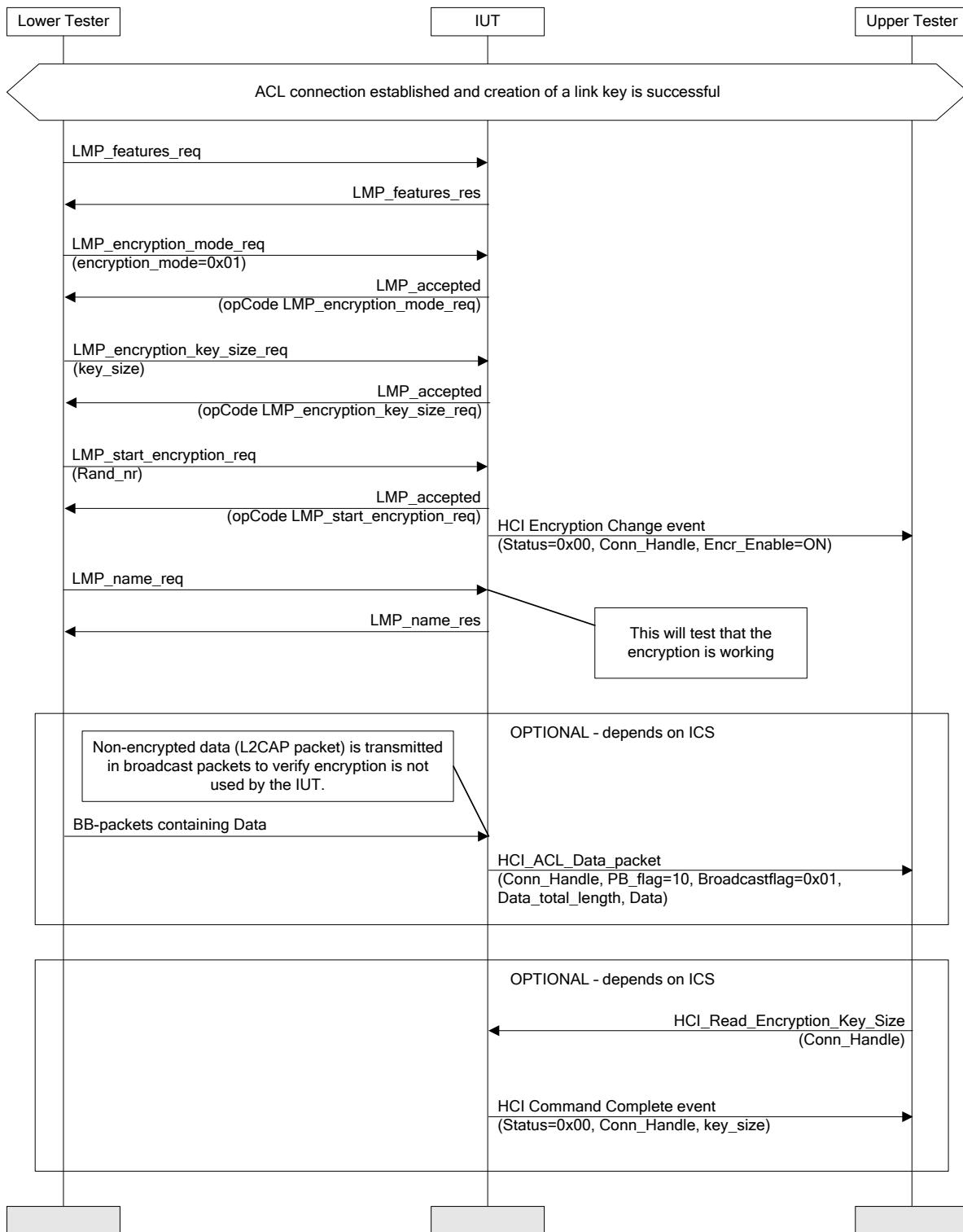


Figure 4.25: LMP/ENC/BV-01-C

If the IUT supports broadcast packets the Lower Tester transmits non-encrypted broadcast packets.



- Test Condition

The Lower Tester must use an acceptable key length.

A statement as indicated in ICS BB, 11/1 if the IUT supports broadcast packets or not.

- Expected Outcome

Pass verdict

The IUT accepts the encryption negotiation and uses the encryption afterwards.

The IUT must respond correctly to the PDU LMP_name_req to prove that encryption is used.

If broadcast is supported the IUT must send HCI ACL Data with non-encrypted payload to the Upper Tester.

If Read Encryption Key Size is supported, the IUT shall return the key_size parameter from the LMP_encryption_key_size_req PDU in the Command Complete event following the HCI Read Encryption Key Size command.

- Notes

If the IUT starts to negotiate for encryption key size the Lower Tester must negotiate.

4.5.1.2 LMP/ENC/BV-02-C [Accept Broadcast Encryption]

- Test Purpose

Verify that the IUT accepts the broadcast encryption negotiation procedure and uses the encryption both for point to point messages as well as broadcast messages. The Lower Tester is master and the IUT is slave.

- Reference

[1] 4.2.5

- Initial Condition

See [Figure 4.26: LMP/ENC/BV-02-C](#).



- Test Procedure

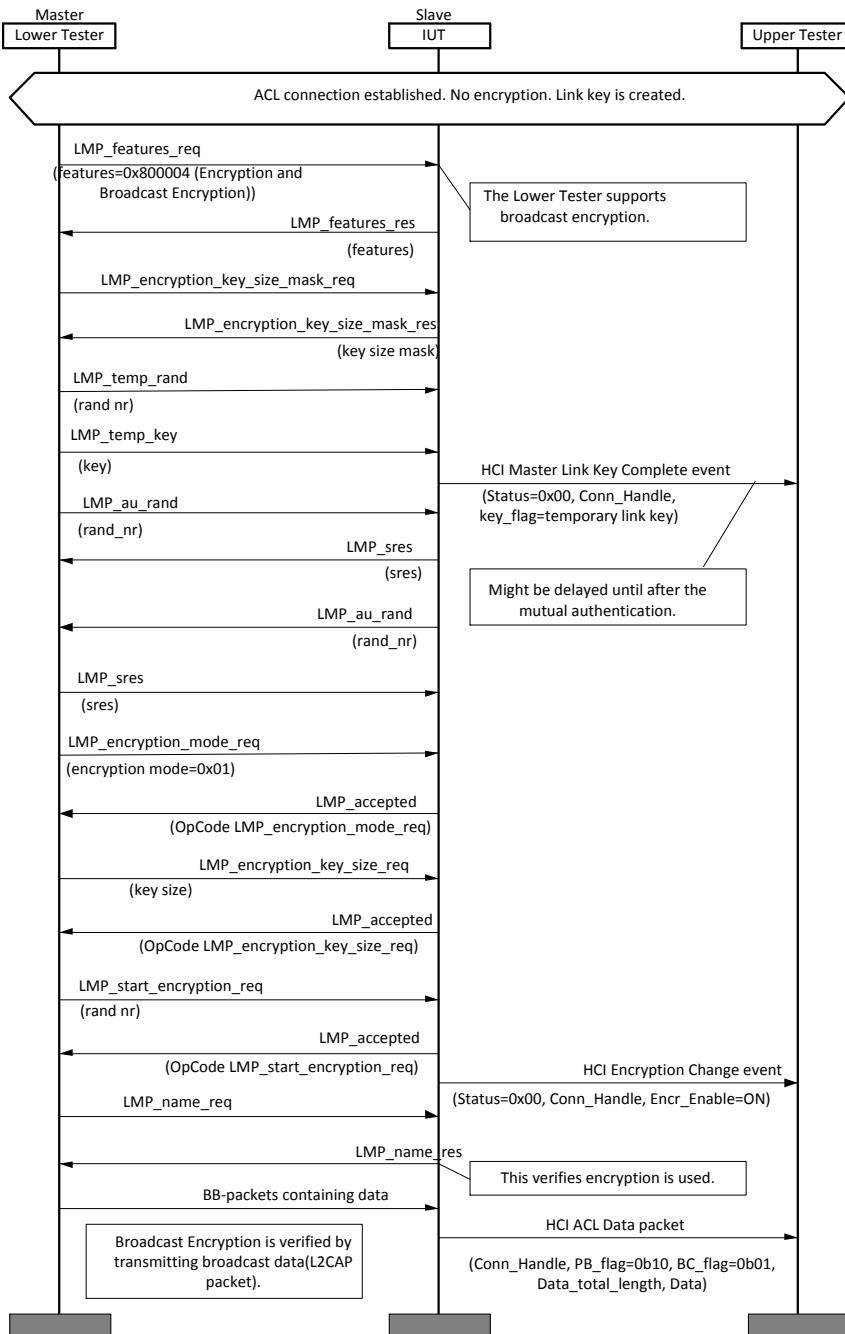


Figure 4.26: LMP/ENC/BV-02-C

- Expected Outcome

Pass verdict

The IUT accepts the encryption negotiation and uses the encryption on both broadcast and point-to-point messages. HCI ACL Data Packet is sent to the Upper Tester.



- Notes

If the IUT starts to negotiate for encryption key size the Lower Tester must negotiate.

4.5.1.3 LMP/ENC/BV-03-C [Reject Encryption]

- Test Purpose

Verify that the IUT does not accept the encryption negotiation procedure. The Lower Tester is master and the IUT is slave.

- Reference

[1] 4.2.5

- Initial Condition

See [Figure 4.27: LMP/ENC/BV-03-C](#).

- Test Procedure

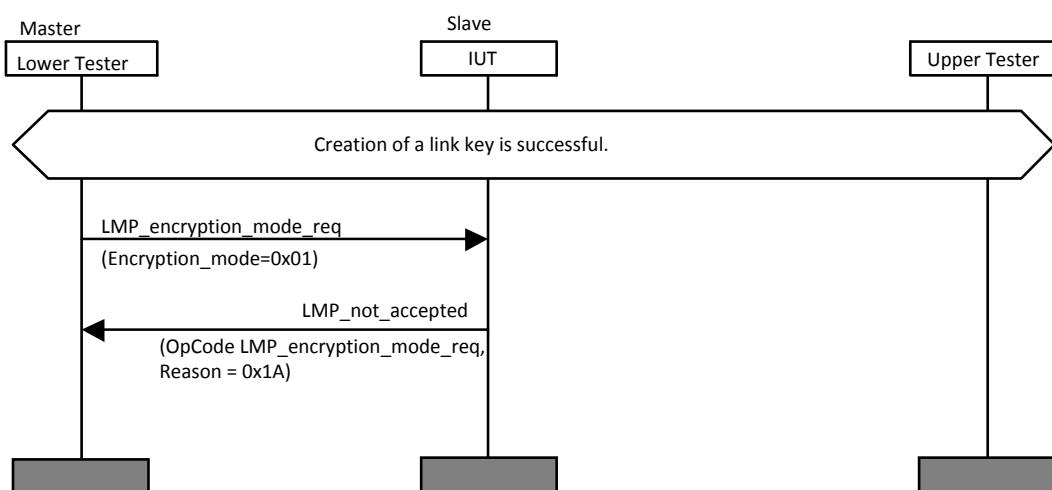


Figure 4.27: LMP/ENC/BV-03-C

- Expected Outcome

Pass verdict

The IUT transmits the PDU LMP_not_accepted containing “Reason = 0x1A” upon reception of PDU LMP_encryption_mode_req.

4.5.1.4 LMP/ENC/BV-04-C [Stop Encryption, Master Command]

- Test Purpose

Verify that the IUT stops using encryption after request from the Lower Tester.

The Lower Tester is master and the IUT is slave.



- Reference
- [1] 4.2.5.4
- Initial Condition
See [Figure 4.28](#)
- Test Procedure

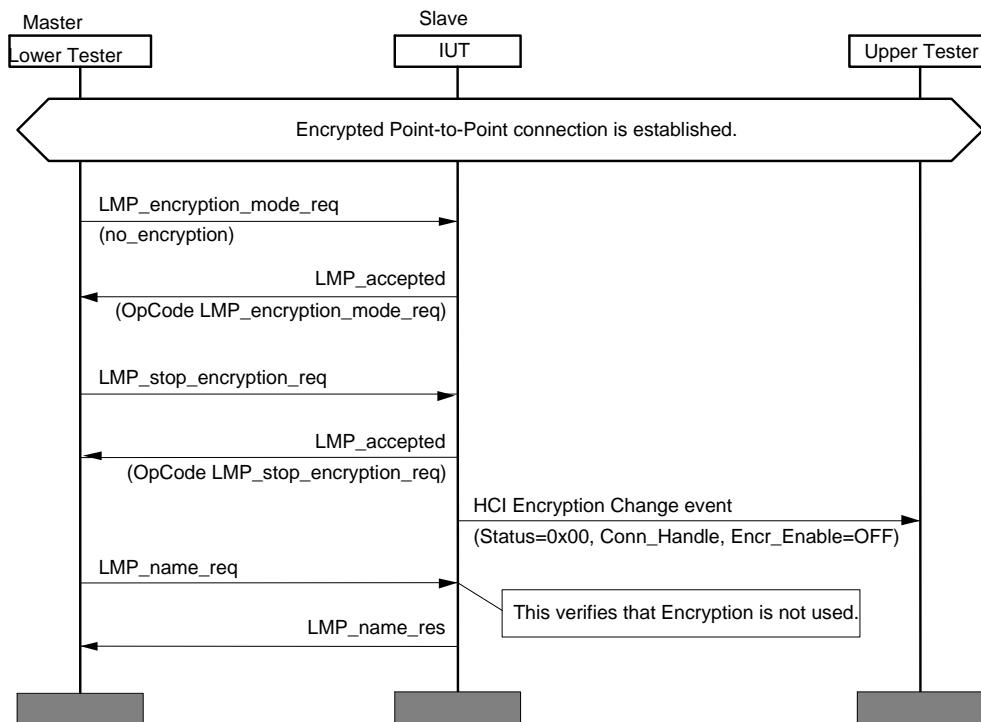


Figure 4.28: LMP/ENC/BV-04-C

- Test Condition
The manufacturer of the IUT must define the features supported by the IUT.
- Expected Outcome
Pass verdict

The IUT transmits PDU LMP_accepted upon reception of PDU LMP_stop_encryption and stops using encryption. The IUT must respond correctly to the PDU LMP_name_req to prove that encryption is not used.

4.5.1.5 LMP/ENC/BV-09-C [Stop Encryption, Master Command]

- Test Purpose
Verify that the IUT stops encryption upon the appropriate HCI command. The IUT is the slave and requests stop encryption.



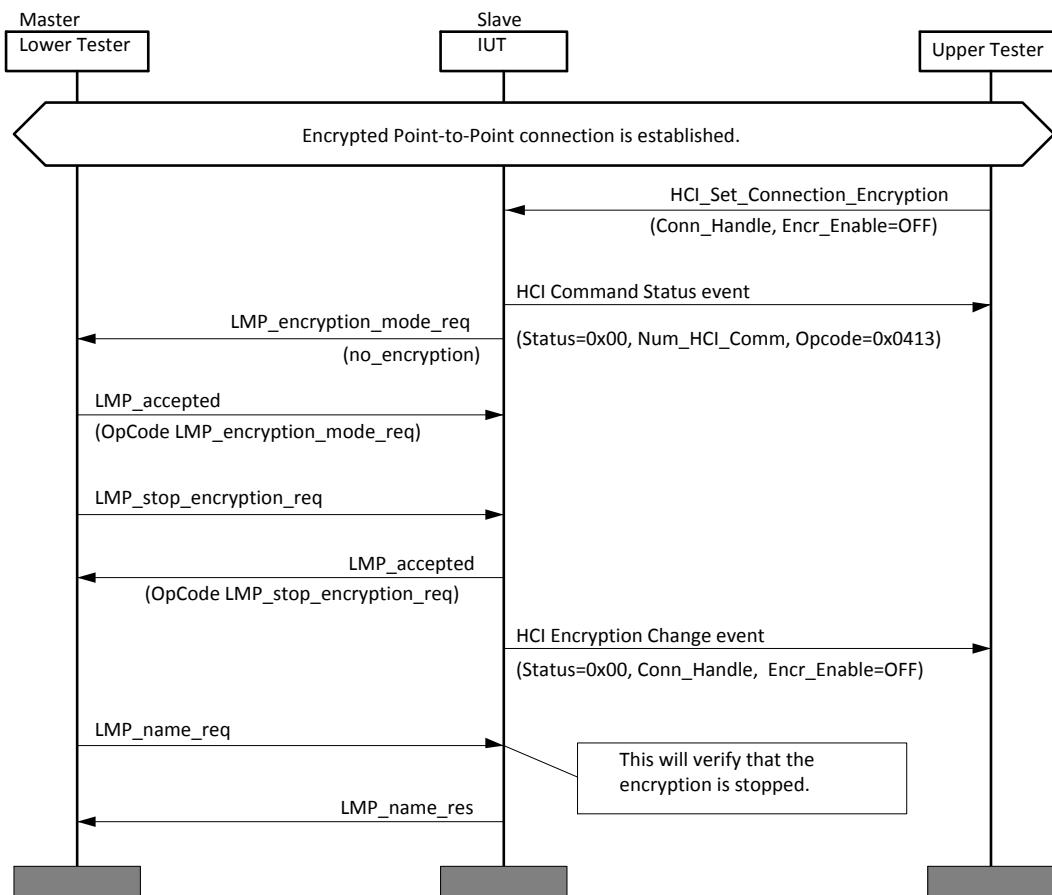
- Reference

[1] 4.2.5.4

- Initial Condition

See [Figure 4.29: LMP/ENC/BV-09-C](#).

- Test Procedure



[Figure 4.29: LMP/ENC/BV-09-C](#)

- Test Condition

The manufacturer of the IUT must define the features supported by the IUT.

- Expected Outcome

Pass verdict

The IUT transmits PDU `LMP_encryption_mode_req`. The IUT transmits PDU `LMP_accepted` upon reception of PDU `LMP_stop_encryption_req` and stops using encryption. The IUT must respond correctly to the PDU `LMP_name_req` to prove that encryption is not used.



4.5.1.6 LMP/ENC/BV-11-C [Semi-permanent Link Key]

- Test Purpose

Verify that the IUT accepts that the semi-permanent link key becomes the current link key upon notice from the Lower Tester. Verify that the encryption is stopped. The Lower Tester is master. The IUT is slave.

- Reference

[1] 4.2.4.2

- Initial Condition

See [Figure 4.30: LMP/ENC/BV-11-C](#).



- Test Procedure

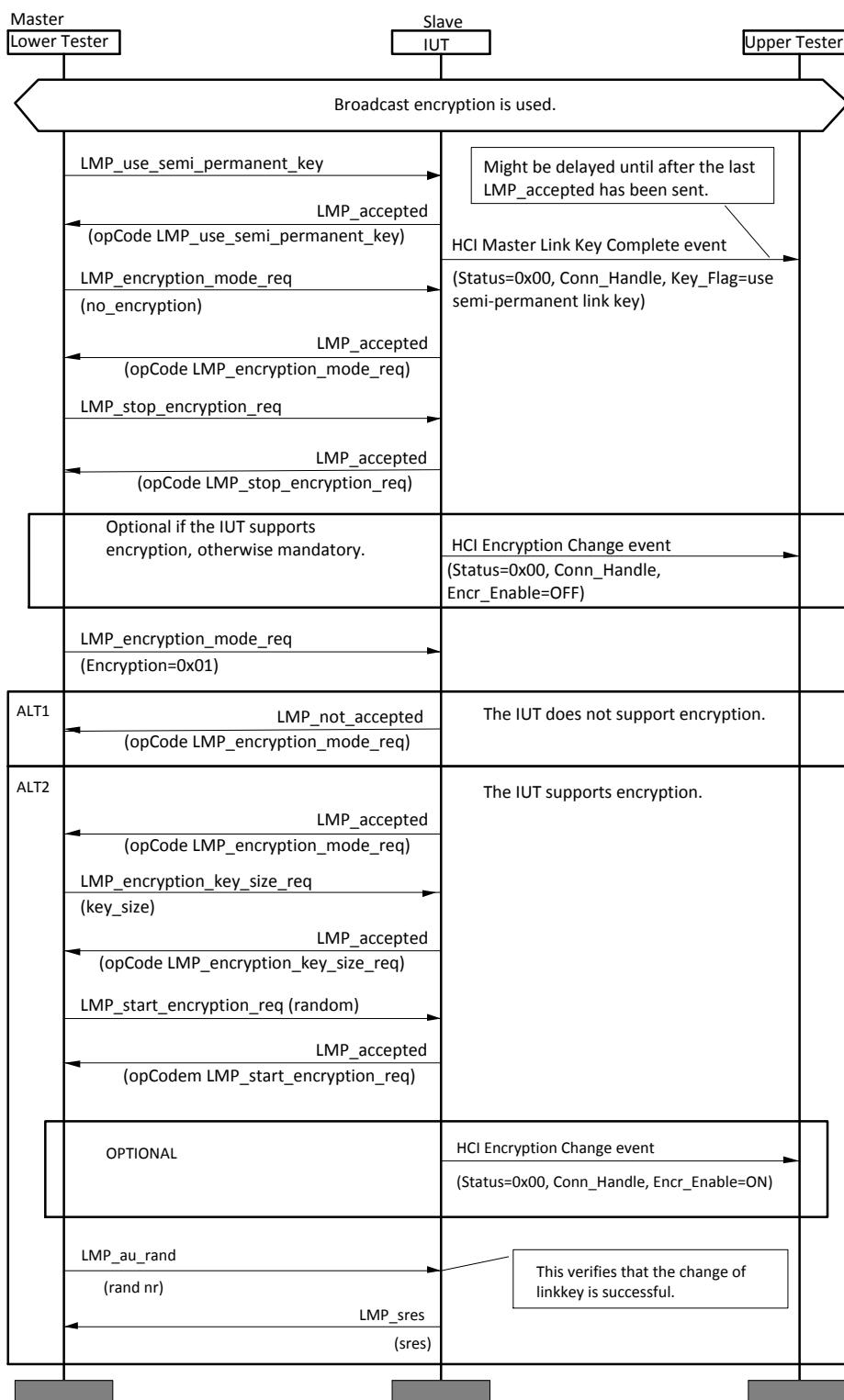


Figure 4.30: LMP/ENC/BV-11-C



- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted upon reception of LMP_use_semi_permanent_key, LMP_encryption_mode_req and LMP_stop_encryption_req. The Link key must be the Semi Permanent Key and encryption must be stopped.

4.5.1.7 LMP/ENC/BV-12-C [Reject Broadcast Encryption]

- Test Purpose

Verify that IUT does not accept the broadcast encryption negotiation procedure. The Lower Tester is master and the IUT is slave.

- Reference

[1] 4.2.5

- Initial Condition

See [Figure 4.31: LMP/ENC/BV-12-C](#).



- Test Procedure

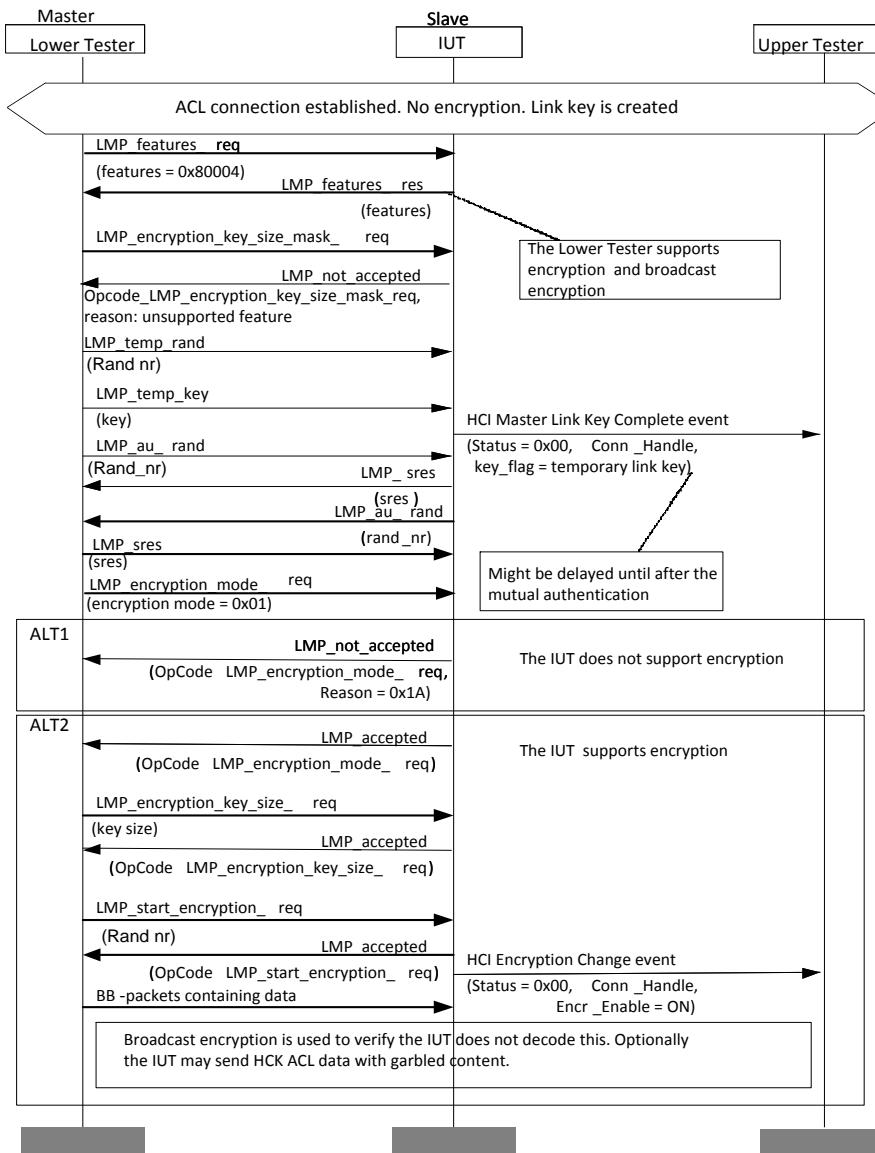


Figure 4.31: LMP/ENC/BV-12-C

- Expected Outcome

Pass verdict

The IUT transmits the PDU LMP_not_accepted containing "Reason = 0x1A" upon reception of the PDU LMP_encryption_key_size_mask_req.

- Notes

The IUT may support point-to-point encryption.



4.5.1.8 LMP/ENC/BV-22-C [Initiate Encryption]

- Test Purpose

Verify that the IUT initiates the encryption procedure and uses encryption only for point to point messages. The IUT is slave and the Lower Tester is master.

- Reference

[1] 4.2.5

- Initial Condition

- See Default SettingsTest Procedure



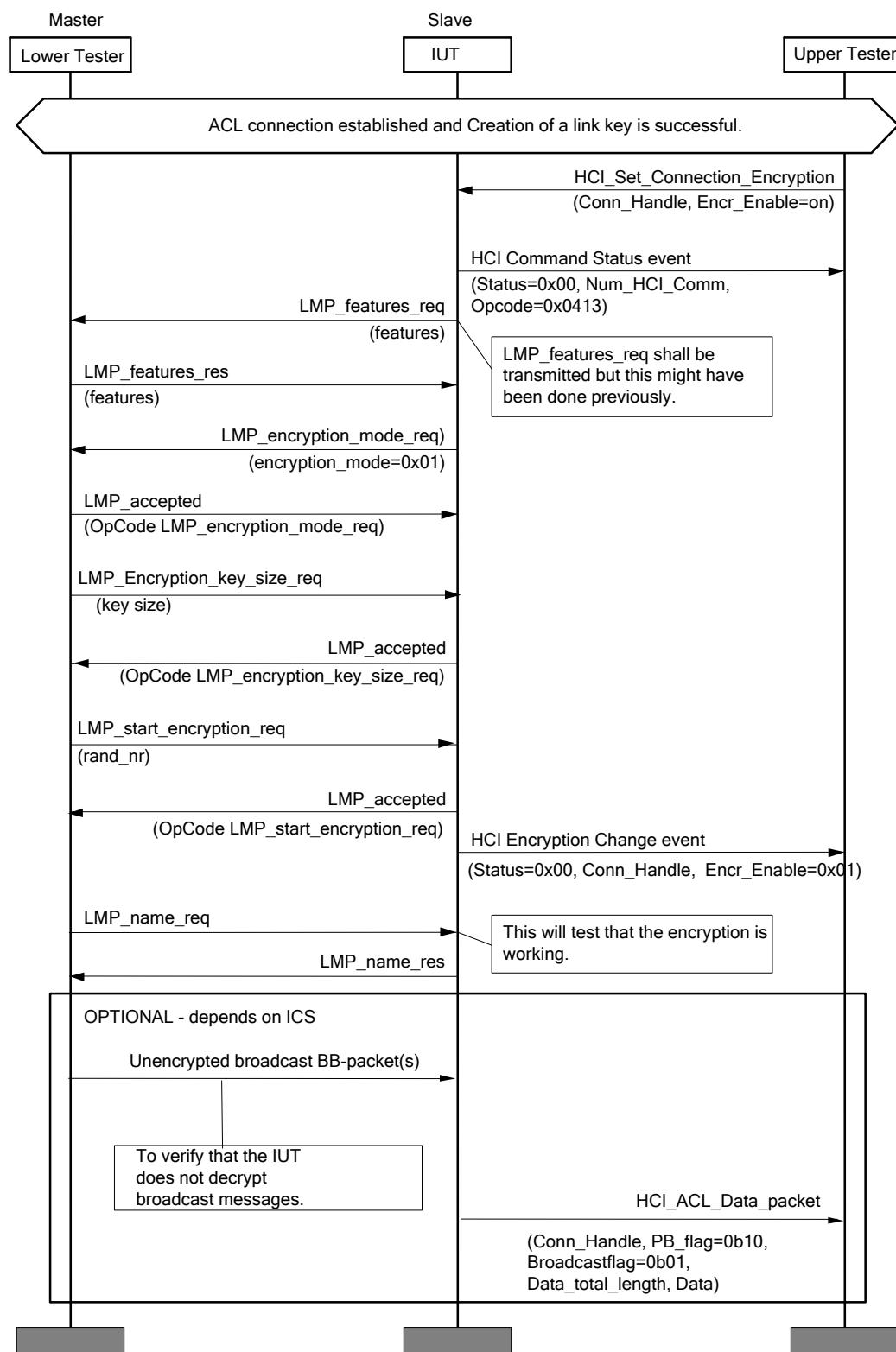


Figure 4.32: LMP/ECC/BV-22-C

If the IUT supports broadcast packets the IUT transmits non-encrypted broadcast packets.



- Test Condition

A statement as indicated in ICS BB, 11/1 if the IUT supports broadcast packets or not.

- Expected Outcome

Pass verdict

The PDU LMP_features_req has to be sent at least once by the IUT before starting the encryption.

The IUT initiates the encryption negotiation and uses the encryption afterwards.

The IUT must respond correctly to the PDU LMP_name_req to prove that encryption is used.

If broadcast is supported the IUT must pass on broadcast ACL traffic with non-encrypted payloads from the Lower Tester to the Upper Tester.

The Encryption_Enabled Parameter in the Encryption Change event reports encryption has been enabled.

- Notes

The suggested key size must be within the Lower Tester's key size range.

4.5.1.9 LMP/ENC/BV-23-C [Pausing and Resuming without Disabling Encryption, IUT Slave, Master Initiated as a result of change connection link key]

- Test Purpose

Verify that the IUT as slave can respond to master initiated pause and resume of encryption without disabling the encryption mode as part of the change connection link key procedure.

- Reference

[1] 4.2.3, 4.2.5.3, 4.2.5.5

- Initial Condition

The Lower Tester is master and the IUT is slave.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

Both devices are sending data to each other.



- Test Procedure

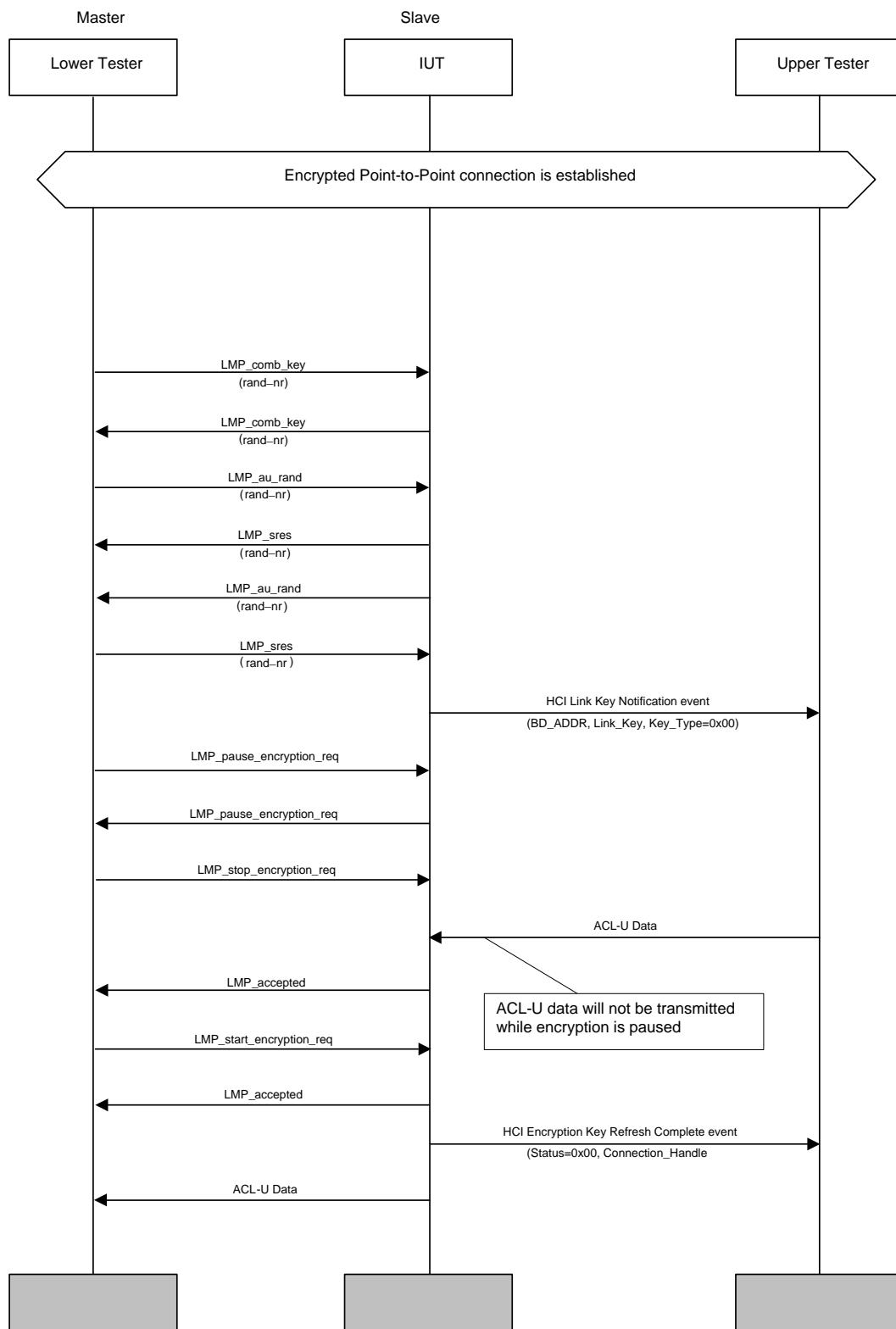


Figure 4.33: LMP/ENC/BV-23-C

The Lower Tester performs the change connection link key procedure.



The Lower Tester initiates the pausing of encryption.

The IUT accepts the pausing of encryption.

The Lower Tester resumes encryption.

- Expected Outcome

Pass verdict

The IUT responds to the LMP_pause_encryption_req with an LMP_pause_encryption_req.

The IUT transmits no data packets while encryption is paused.

The IUT transmits data packets after encryption is resumed.

4.5.1.10 LMP/ENC/BV-24-C [Pausing and Resuming without Disabling Encryption, IUT Slave, Master Initiated with role switch]

- Test Purpose

Verify that the IUT as slave can respond to master initiated pause and resume of encryption without disabling the encryption mode as part of the role switch procedure.

- Reference

[1] 4.2.5.3, 4.2.5.5, 4.4.2.

- Initial Condition

The Lower Tester is master and the IUT is slave.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

Both devices are sending data to each other.



- Test Procedure

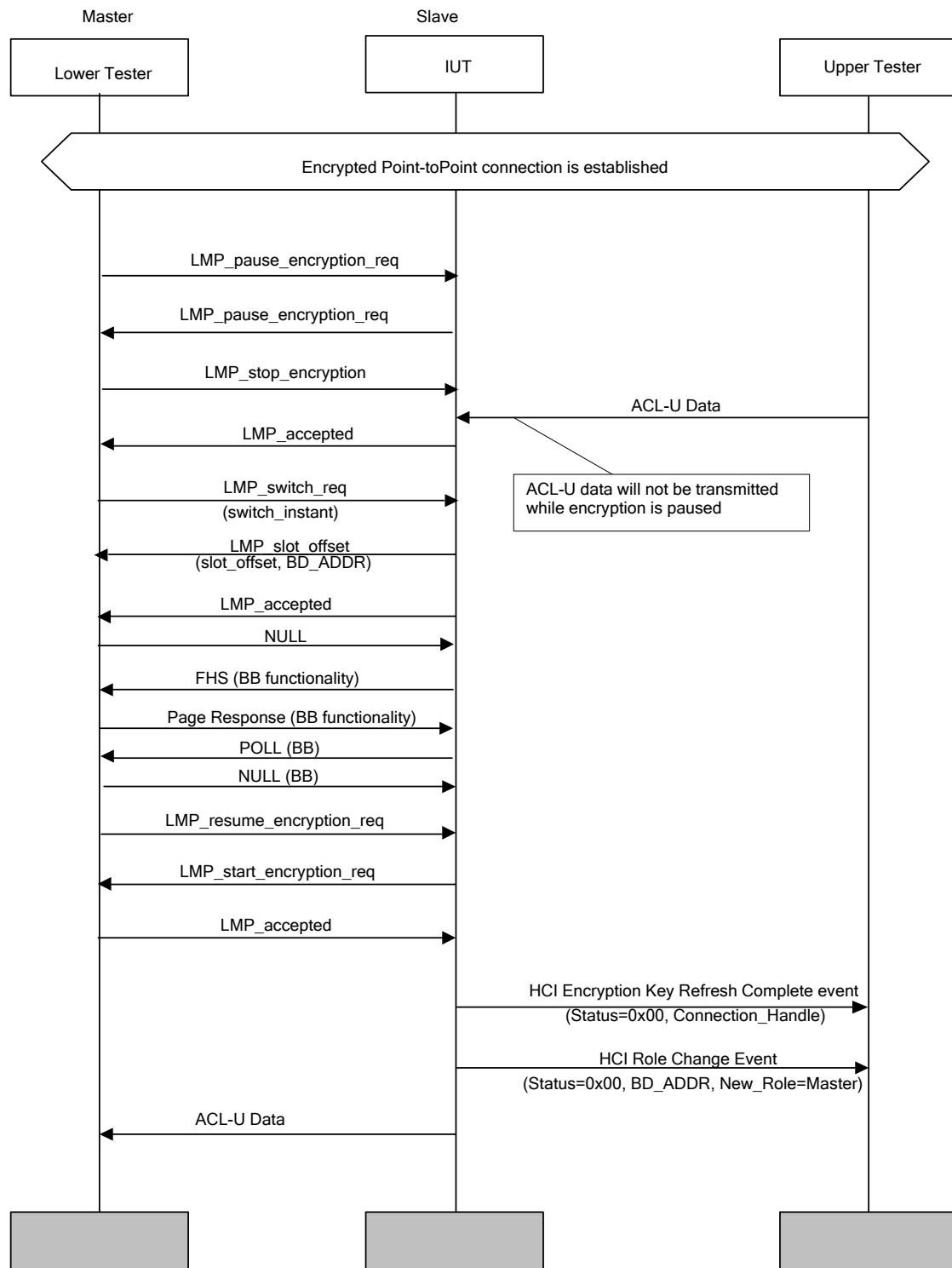


Figure 4.34: LMP/ENC/BV-24-C

The Lower Tester initiates the pausing of encryption.

The IUT accepts the pausing of encryption.



The Lower Tester initiates a role switch.

The Lower Tester resumes encryption.

- Expected Outcome

Pass verdict

The IUT responds to the LMP_pause_encryption_req with an LMP_pause_encryption_req.

The IUT transmits no data packets while encryption is paused.

The IUT transmits data packets after encryption is resumed.

The role switch succeeds.

4.5.1.11 LMP/ENC/BV-25-C [Initiate AES-CCM Encryption]

- Test Purpose

Verify that the IUT initiates the encryption procedure and uses AES-CCM encryption only for point to point messages when the remote controller's LMP feature bits indicate support for Secure Connections both in the Controller and Host.

- Reference

[1] 4.2.5

- Initial Condition

The Lower Tester is master and the IUT is slave.

ACL connection has been established between the IUT and the Lower Tester and the creation of a link key between the IUT and Lower Tester has been successful.



- Test Procedure

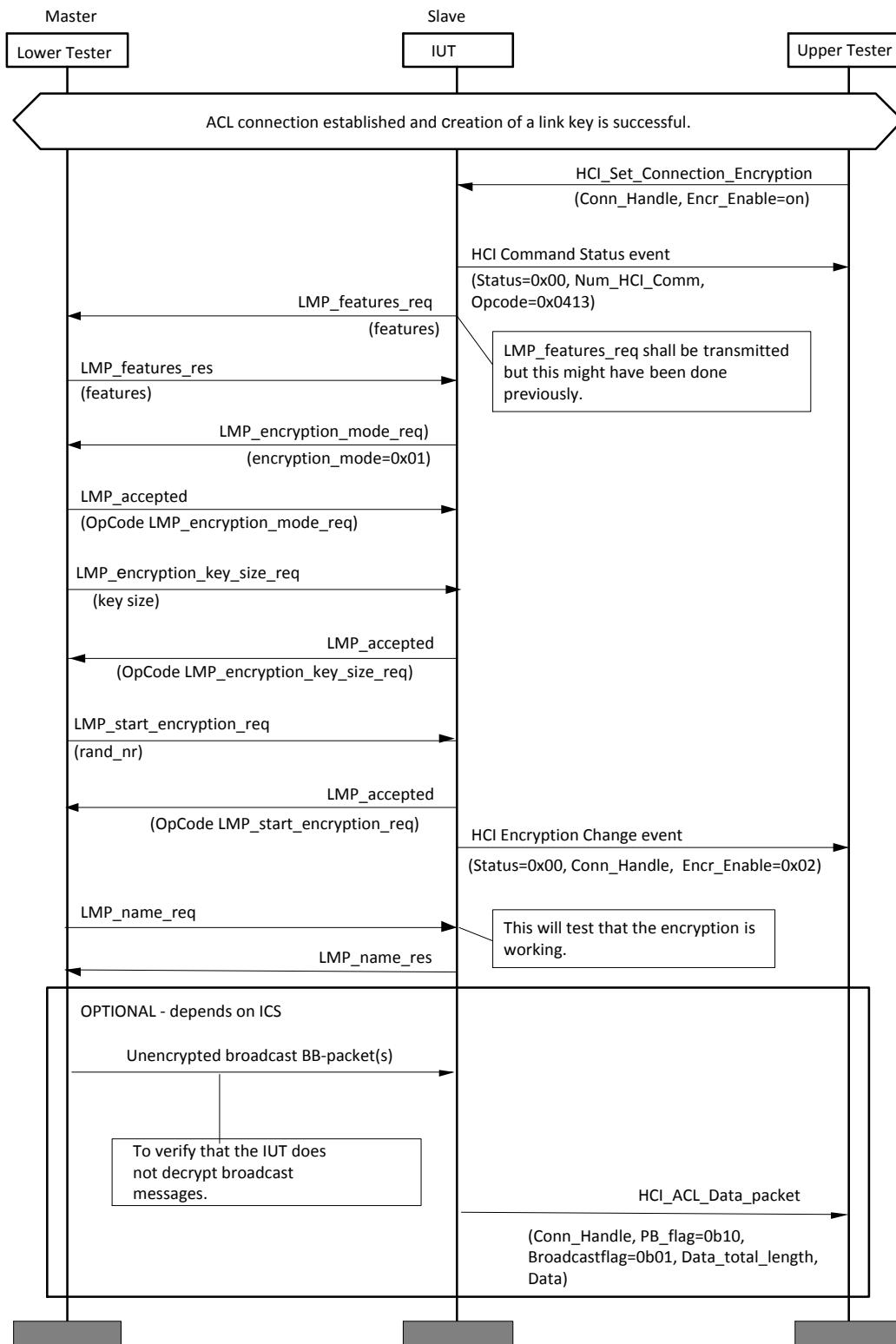


Figure 4.35: LMP/ENC/BV-25-C Encryption is initiated after ACL connection creation.

If the IUT supports broadcast packets the IUT transmits non-encrypted broadcast packets.



- Test Condition

If the IUT supports broadcast packets as indicated by the ICS selection of BB, 11/1 the optional portion of the MSC is applicable and verifies that encryption is not used by the IUT in broadcast packets.

- Expected Outcome

Pass verdict

The IUT initiates the encryption negotiation and uses the encryption afterwards.

The IUT responds correctly to the PDU LMP_name_req (this proves that encryption is used).

If broadcast is supported the IUT sends HCI ACL Data with non-encrypted payload to the Upper Tester.

If Read Encryption Key Size is supported, the IUT shall return the key_size parameter from the LMP_encryption_key_size_req PDU in the Command Complete event following the HCI Read Encryption Key Size command.

The Encryption_Enabled Parameter in the Encryption Change event reports AES-CCM encryption has been enabled.

- Notes

If the IUT starts to negotiate for encryption key size the Lower Tester must negotiate.

The suggested key size must be within the Lower Tester's key size range.

4.5.1.12 LMP/ENC/BV-26-C [Accept AES-CCM Encryption Request]

- Test Purpose

Verify that the IUT accepts the encryption negotiation procedure initiated by the Lower Tester and uses AES-CCM encryption only for point to point messages when the remote controller's LMP feature bits indicate support for Secure Connections both in the Controller and the Host.

- Reference

[1] 4.2.5

- Initial Condition

The Lower Tester is master and the IUT is slave.

An ACL connection has been established between the IUT and the Lower Tester and a link key has been successfully created between the two.



- Test Procedure

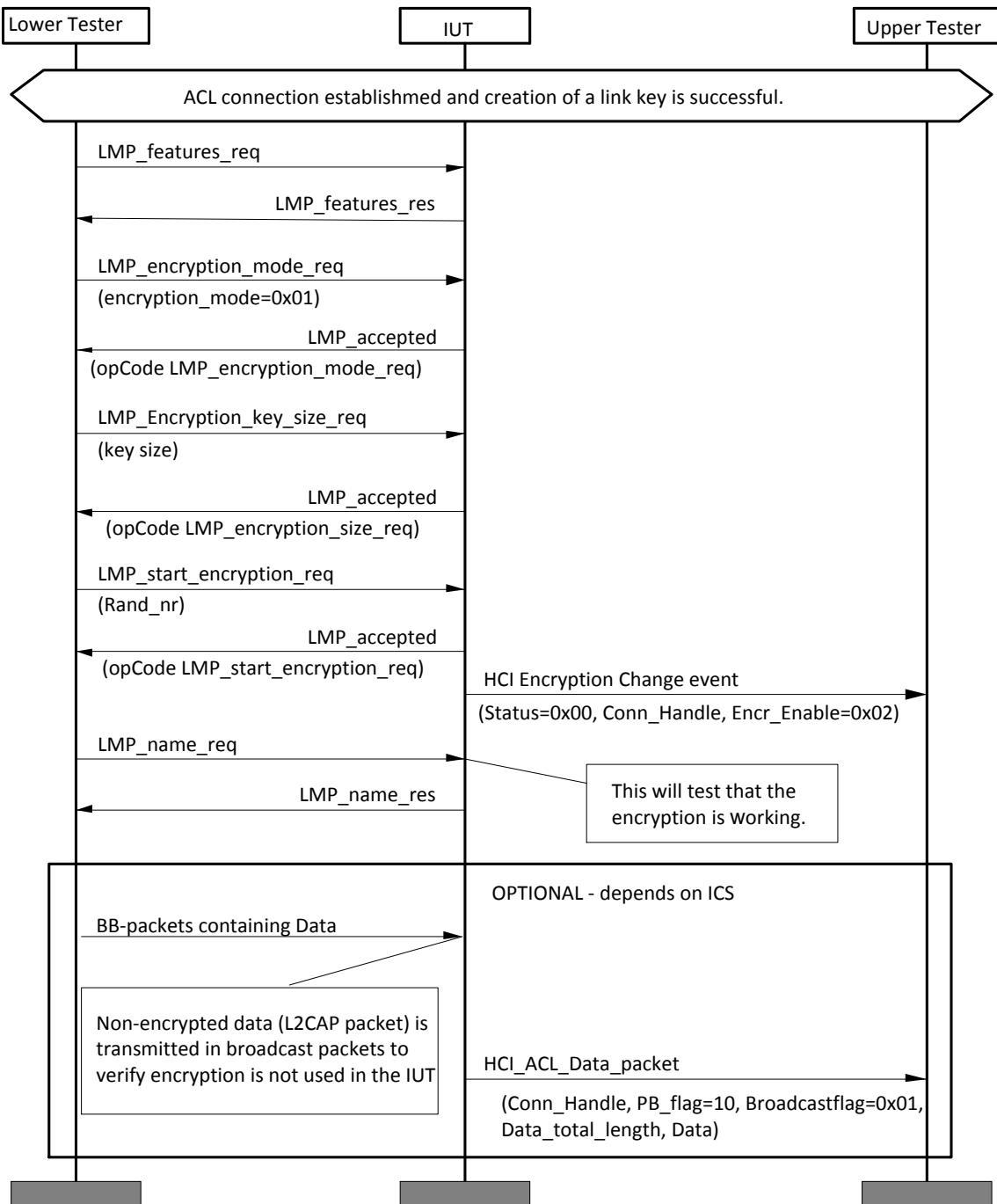


Figure 4.36: LMP/ENC/BV-26-C

If the IUT supports broadcast packets the Lower Tester transmits non-encrypted broadcast packets.

- Test Condition

The Lower Tester must use an acceptable key length.



If the IUT supports broadcast packets as indicated by the ICS selection of BB 11/1 the optional portion of the MSC is applicable and verifies that encryption is not used by the IUT in broadcast packets.

- Expected Outcome

Pass verdict

The IUT accepts the encryption negotiation and uses the encryption afterwards.

The IUT responds correctly to the PDU LMP_name_req (this proves that encryption is used).

If broadcast is supported the IUT sends HCI ACL Data with non-encrypted payload to the Upper Tester.

If Read Encryption Key Size is supported, the IUT shall return the key_size parameter from the LMP_encryption_key_size_req PDU in the Command Complete event following the HCI Read Encryption Key Size command.

The Encryption_Enabled Parameter in the Encryption Change event reports AES-CCM encryption has been enabled.

- Notes

If the IUT starts to negotiate for encryption key size the Lower Tester must negotiate.

This test case is similar to [LMP/ENC/BV-01-C \[Accept Encryption\]](#).

4.5.1.13 [LMP/ENC/BV-27-C \[Stop AES-CCM Encryption from master\]](#)

- Test Purpose

Verify that the IUT rejects a request to stop AES-CCM encryption from the Lower Tester.

- Reference

[\[1\]](#) 4.2.5.4

- Initial Condition

The Lower Tester is master and the IUT is slave.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.



- Test Procedure

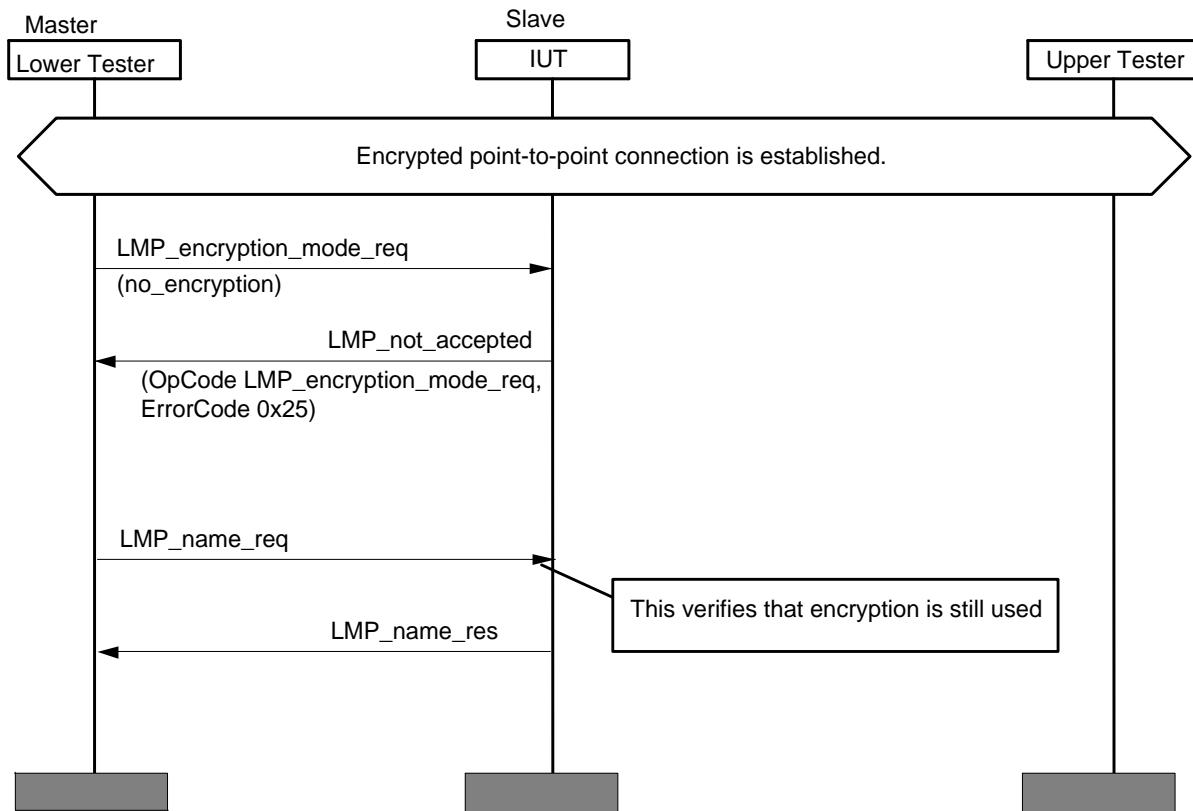


Figure 4.37: LMP/ENC/BV-27-C

- Test Condition

The manufacturer of the IUT must define the features supported by the IUT.

- Expected Outcome

Pass verdict

The IUT transmits PDU **LMP_not_accepted** with error code “Encryption Mode Not Allowed (0x25)” upon reception of PDU **LMP_encryption_mode_req** from the Lower Tester and does not stop using encryption.

The IUT responds correctly to the PDU **LMP_name_req** (this proves that encryption is still used).

4.5.1.14 LMP/ENC/BV-28-C [Stop AES-CCM Encryption from host]

- Test Purpose

Verify that the IUT rejects a request to stop AES-CCM encryption upon receiving the appropriate HCI command from the Host.

- Reference

[1] 4.2.5.4



- Initial Condition

The Lower Tester is master and the IUT is slave.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

- Test Procedure

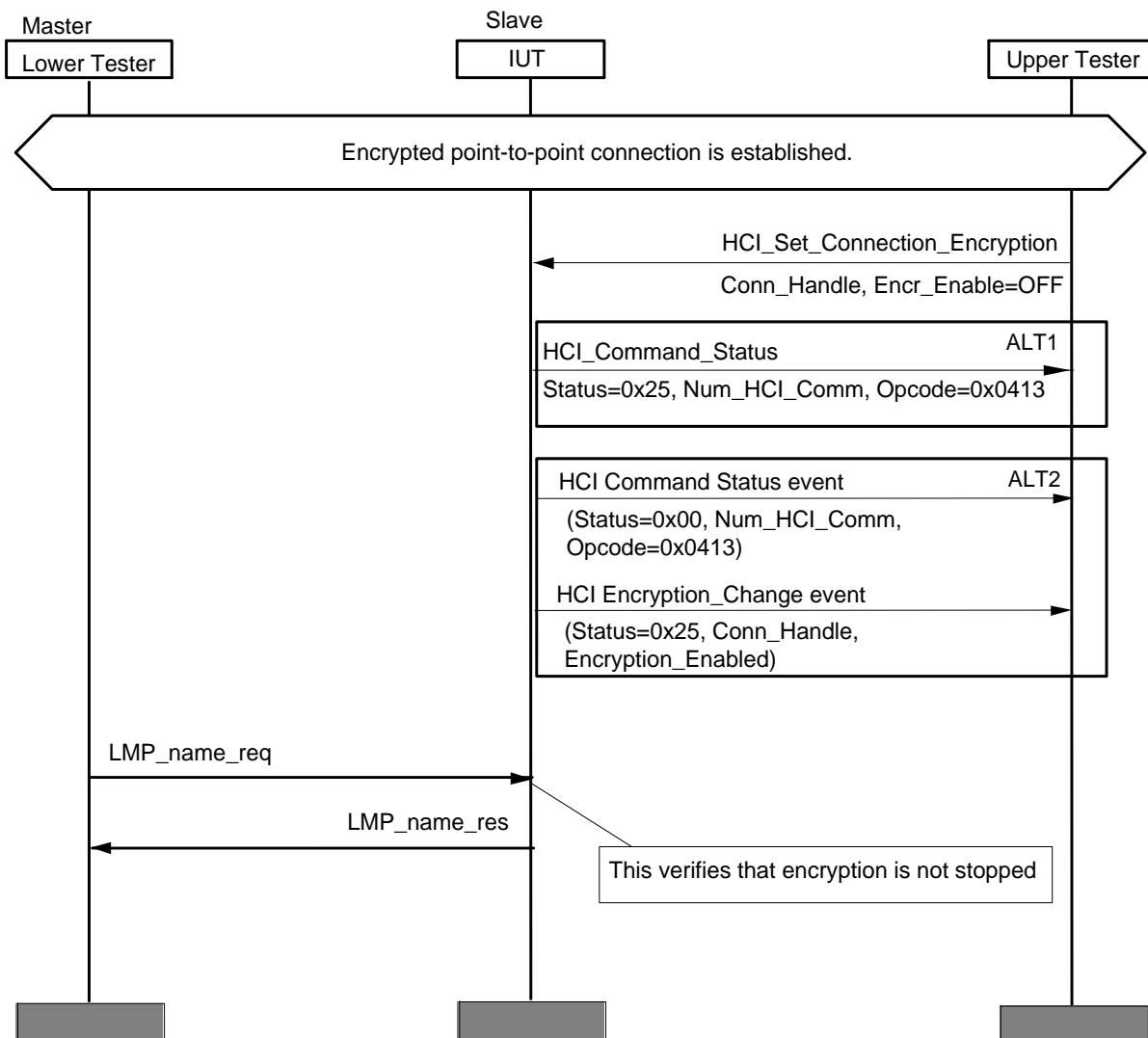


Figure 4.38: LMP/ENC/BV-28-C

- Expected Outcome

Pass verdict

The IUT either returns an `HCI_Command_Status` event with error code "Encryption Mode Not Acceptable (0x25)" OR returns an `HCI_Command_Status` event with status "Command currently in pending (0x00)" followed by an `HCI_Encryption_Change` event with error code "Encryption Mode Not Acceptable (0x25)".

The IUT responds correctly to the PDU `LMP_name_req` (this proves that encryption is still used).



4.5.1.15 LMP/ENC/BV-29-C [Combating forged acknowledgements when AES-CCM Encryption is enabled]

- Test Purpose

Verify that the IUT as slave periodically sends an LMP_ping_req on an idle ACL link on which AES-CCM encryption has been enabled in order to force the other side to transmit an ACL packet (LMP_ping_res).

- Reference

[1] 4.1.13

- Initial Condition

The Lower Tester is master and the IUT is slave.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

- Test Procedure

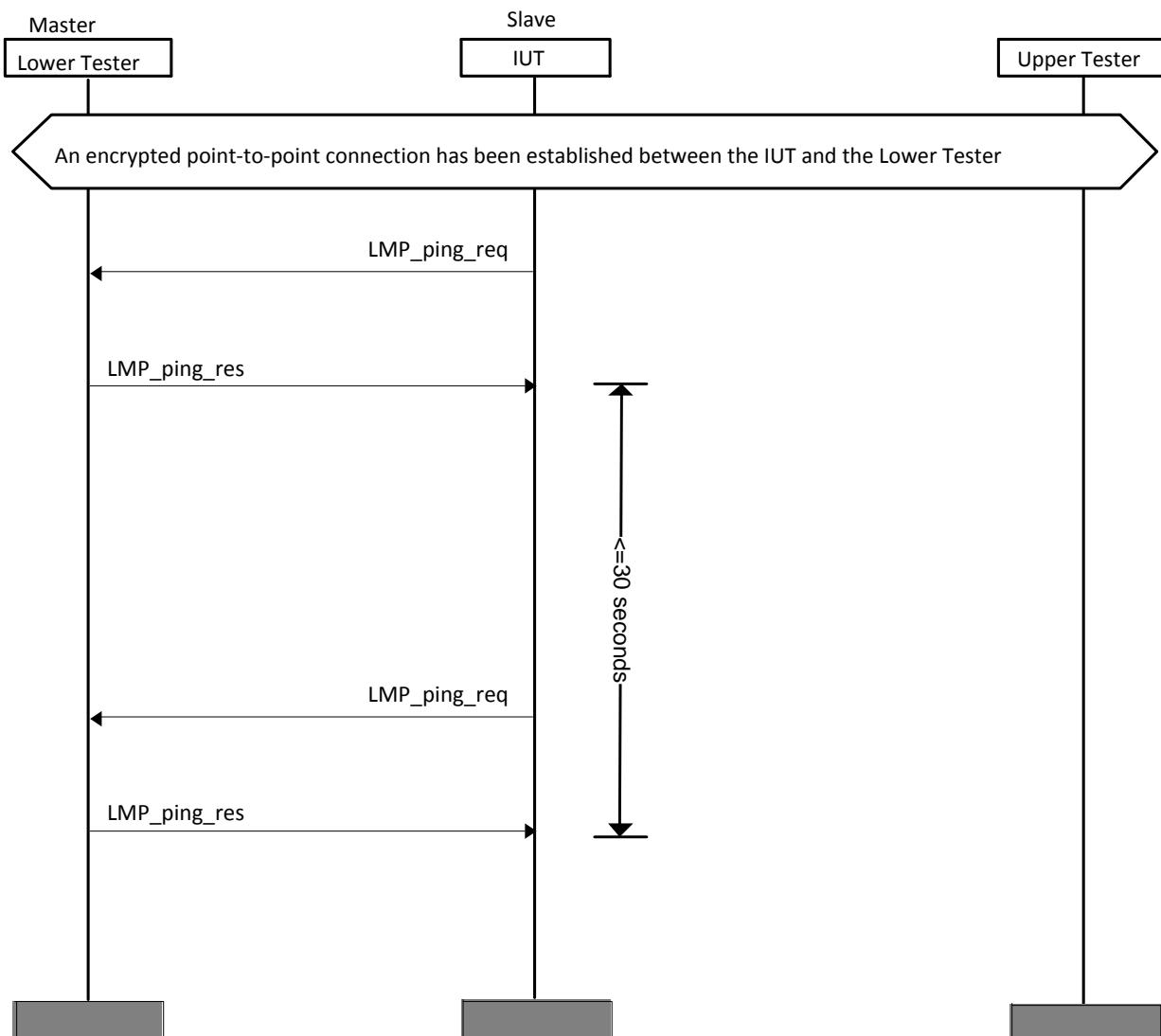


Figure 4.39: LMP/ENC/BV-29-C



1. The ACL connection is kept idle i.e. no ACL-U or ACL-C traffic is exchanged for 60 seconds.
 2. The IUT transmits the PDU LMP_ping_req so that the LMP_ping_res messages successfully received by the IUT are less than (or equal to) 30 seconds apart.
 3. The Lower Tester responds with LMP_ping_res.
- Expected Outcome

Pass verdict

The IUT transmits the PDU LMP_ping_req so that the LMP_ping_res messages successfully received by the IUT are less than (or equal to) 30 seconds apart.

- Notes

The Lower Tester should attempt to not transmit any packets that contain a MIC. However, if this is not possible and the Lower Tester autonomously transmits a data packet that contains a MIC, the Lower Tester should wait another 30 seconds.

4.5.1.16 LMP/ENC/BV-30-C [Responding to LMP_ping_req when AES-CCM Encryption is enabled]

- Test Purpose

Verify that the IUT as slave responds to an LMP_ping_req sent by the Lower Tester when AES-CCM encryption has been enabled.

- Reference

[1] 4.1.13

- Initial Condition

The Lower Tester is master and the IUT is slave.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

- Test Procedure

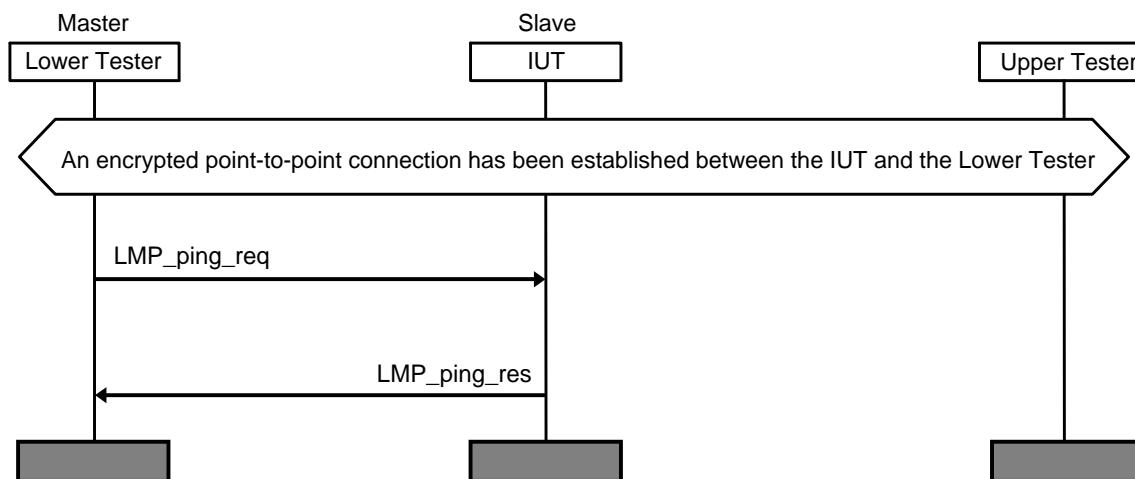


Figure 4.40: LMP/ENC/BV-30-C



1. The Lower Tester transmits the PDU LMP_ping_req.
 2. The IUT responds with an LMP_ping_res.
- Expected Outcome

Pass verdict

The IUT responds to every LMP_ping_req with an LMP_ping_res.

4.5.1.17 LMP/ENC/BV-31-C [No response to LMP_ping_req]

- Test Purpose

Verify that the IUT as slave generates the HCI Authenticated Payload Timeout Expired event when the Lower Tester doesn't respond to an LMP_ping_req sent by the IUT within the Authenticated_Payload_Timeout interval.

- Reference

[1] 4.1.13

- Initial Condition

The Lower Tester is master and the IUT is slave.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.



- Test Procedure

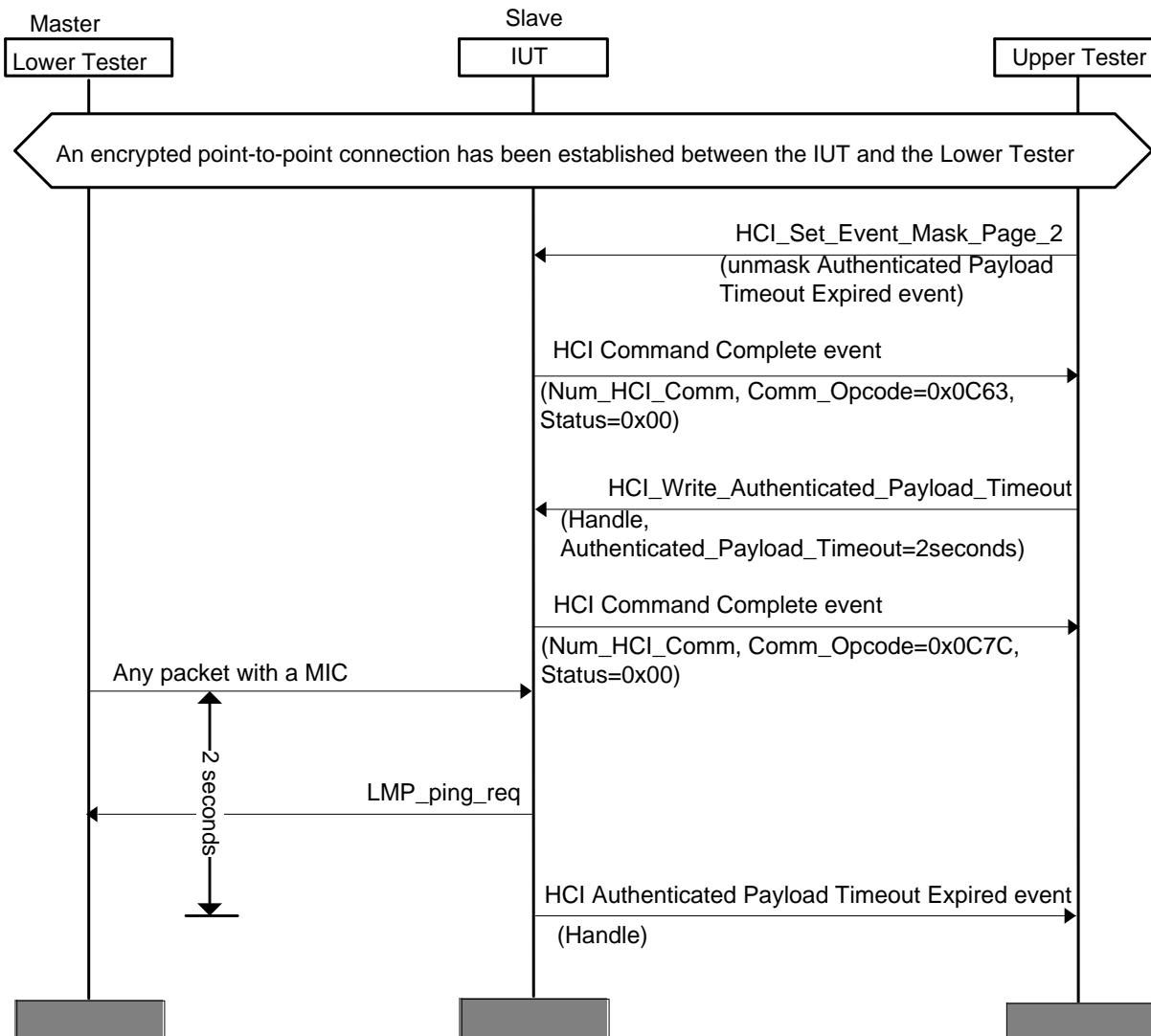


Figure 4.41: LMP/ENC/BV-31-C

1. The Upper Tester sets the Authenticated_Payload_Timeout to 2 seconds.
2. The Upper Tester unmasks the HCI Authenticated Payload Timeout Expired event.
3. The ACL connection is kept idle i.e. no ACL-U or ACL-C traffic is exchanged for 10 seconds.
4. The IUT transmits the PDU LMP_ping_req to the Lower Tester.
5. The Lower Tester does not respond with LMP_ping_res.
6. The IUT sends an HCI Authenticated Payload Timeout Expired event to the Upper Tester 2 seconds after the last packet that contained a MIC was received by the IUT from the Lower Tester.

- Expected Outcome

Pass verdict

The IUT transmits the PDU LMP_ping_req to the Lower Tester and sends an HCI Authenticated Payload Timeout Expired event to the Upper Tester when the Lower Tester doesn't respond with an LMP_ping_res.



4.5.1.18 LMP/ENC/BV-32-C [Modified Authentication Payload Timeout]

- Test Purpose

Verify that the IUT as slave uses the correct value of the Authenticated Payload Timeout set by the Upper Tester.

- Reference

[1] 4.1.13

- Initial Condition

The Lower Tester is master and the IUT is slave.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

- Test Procedure

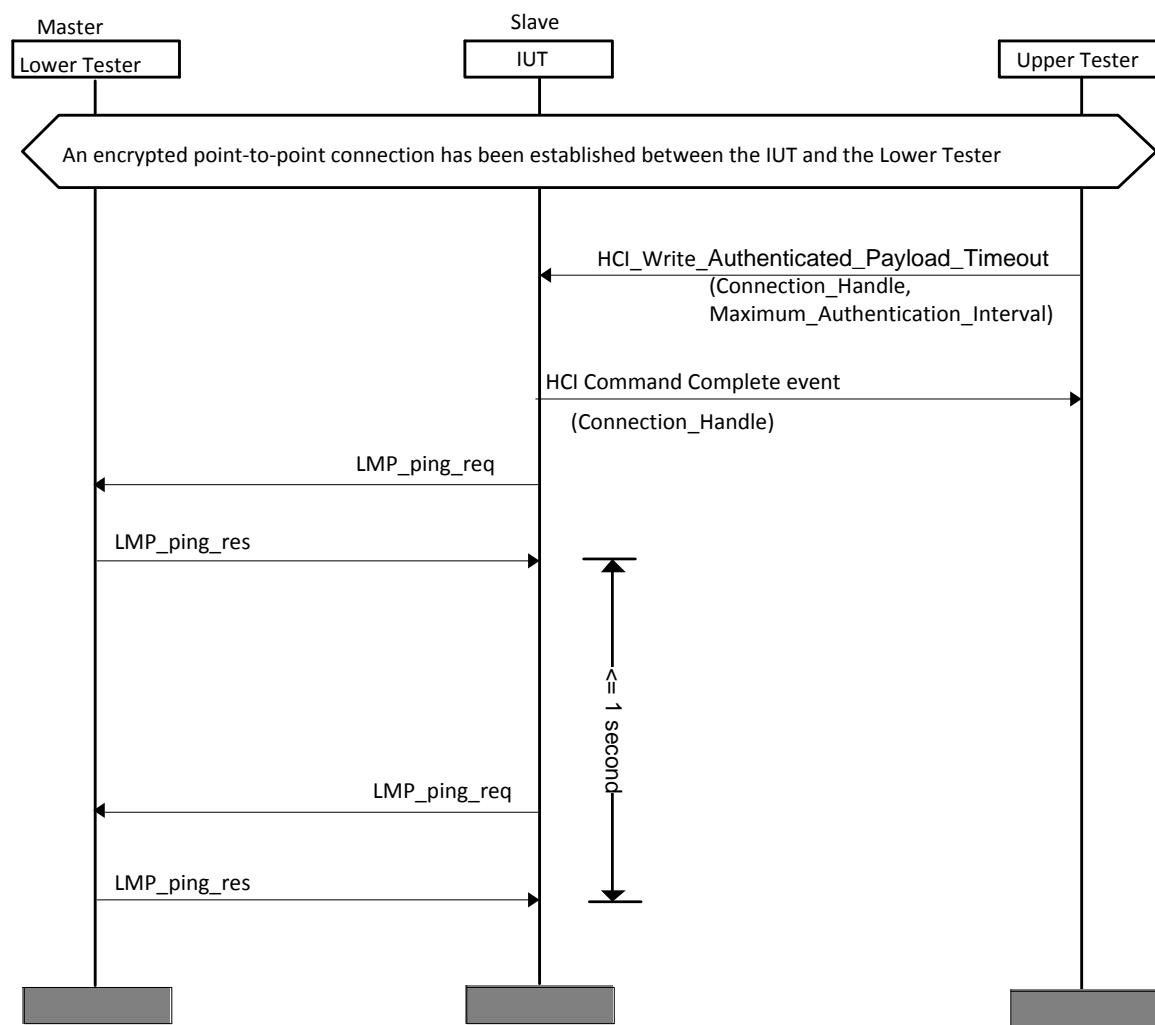


Figure 4.42: LMP/ENC/BV-32-C

1. The Upper Tester modifies the Authenticated Payload Timeout to 1 second.
2. The ACL connection is kept idle i.e. no ACL-U or ACL-C traffic is exchanged for 2 seconds.



3. The IUT transmits the PDU LMP_ping_req so that the LMP_ping_res messages successfully received by the IUT are less than (or equal to) 1 second apart.
 4. The Lower Tester responds with LMP_ping_res.
- Expected Outcome

Pass verdict

The IUT transmits the PDU LMP_ping_req so that the LMP_ping_res messages successfully received by the IUT are less than (or equal to) 1 second apart.

- Notes

The Lower Tester should attempt to not transmit any packets that contain a MIC. However, if this is not possible and the Lower Tester autonomously transmits a data packet that contains a MIC, the Lower Tester should wait another 1 second.

4.5.1.19 LMP/ENC/BV-33-C [Accept AES-CCM Encryption Request – Legacy Host]

- Test Purpose

Verify that the IUT accepts the encryption negotiation procedure initiated by the Lower Tester and uses E0 encryption only for point to point messages when the remote controller's LMP feature bits indicate support for Secure Connections both in the Controller and the Host but the local host does not indicate support for Secure Connections and reports the correct Encryption_Enabled to a legacy Host.

- Reference

[1] 4.2.5

- Initial Condition

The Lower Tester is master and the IUT is slave.

The Upper Tester doesn't set the Secure Connections Host Support to enabled.

An ACL connection has been established between the IUT and the Lower Tester and a link key has been successfully created between the two.



- Test Procedure

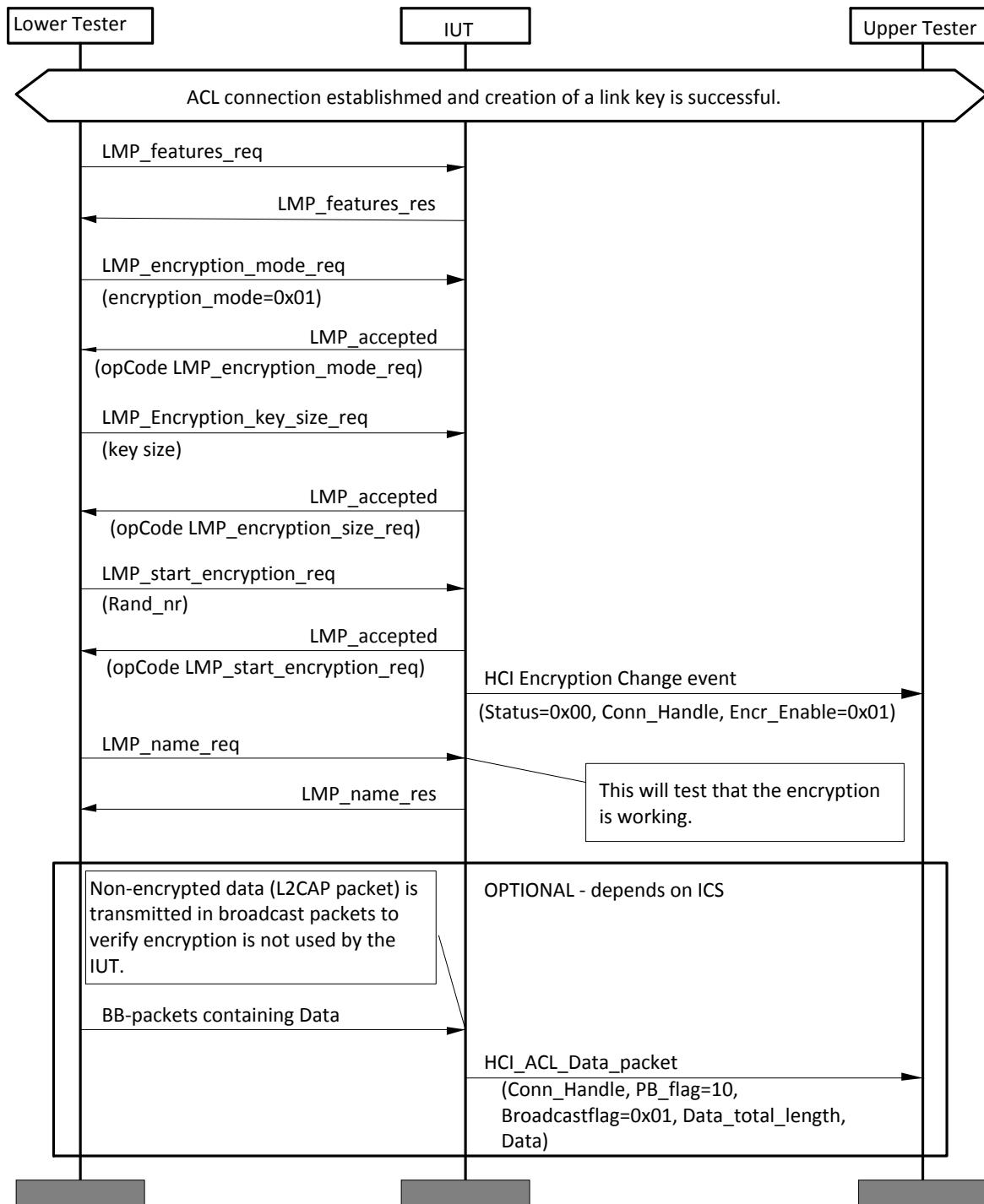


Figure 4.43: LMP/ENC/BV-33-C

If the IUT supports broadcast packets the Lower Tester transmits non-encrypted broadcast packets.

- Test Condition

The Lower Tester must use an acceptable key length.



If the IUT supports broadcast packets as indicated by the ICS selection of BB, 11/1 the optional portion of the MSC is applicable and verifies that encryption is not used by the IUT in broadcast packets.

- Expected Outcome

Pass verdict

The IUT accepts the encryption negotiation and uses encryption afterwards.

The IUT responds correctly to the PDU LMP_name_req (this proves that encryption is used).

If broadcast is supported the IUT sends HCI ACL Data with non-encrypted payload to the Upper Tester.

If Read Encryption Key Size is supported, the IUT shall return the key_size parameter from the LMP_encryption_key_size_req PDU in the Command Complete event following the HCI Read Encryption Key Size command.

The Encryption_Enabled Parameter in the Encryption Change event reports “Link Level Encryption is ON with E0”.

- Notes

If the IUT starts to negotiate for encryption key size the Lower Tester must negotiate.

4.5.2 Encryption - Master

- Test subgroup objectives:

To verify that the master and the slave agree upon whether to use encryption or not and if encryption shall only apply to point to point packets or if encryption shall apply to both point to point packets and broadcast packets. The IUT is master.

4.5.2.1 LMP/ENC/BV-05-C [Initiate Encryption]

- Test Purpose

Verify that the IUT initiates the encryption procedure and uses encryption on point to point messages only. The IUT is master and the Lower Tester is slave.

- Reference

[1] 4.2.5

- Initial Condition

- See Default SettingsTest Procedure



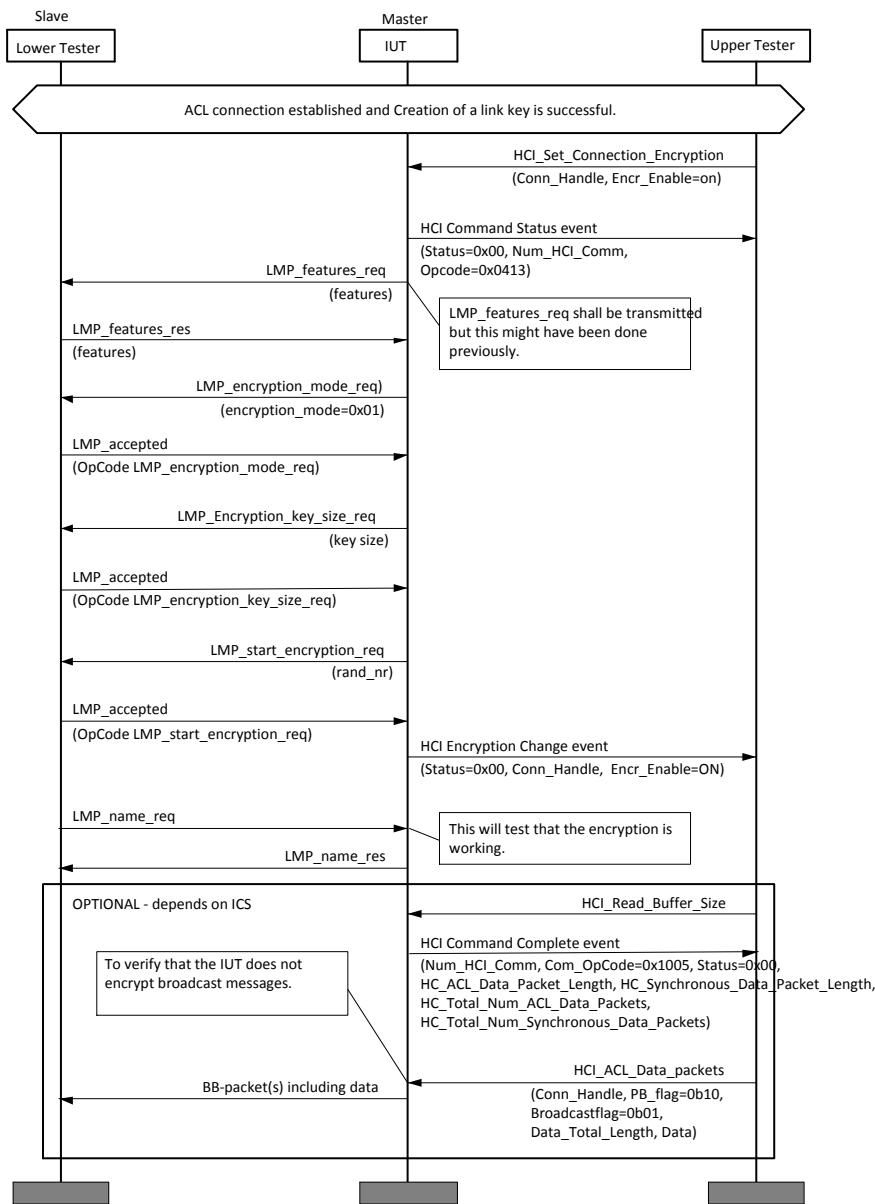


Figure 4.44: LMP/ENC/BV-05-C

If the IUT supports broadcast packets the IUT transmits non-encrypted broadcast packets.

- **Test Condition**

A statement as indicated in ICS BB, 11/1 if the IUT supports broadcast packets or not.

- **Expected Outcome**

Pass verdict

The PDU LMP_features_req has to be sent at least once by the IUT before starting the encryption.

The IUT initiates the encryption negotiation and uses the encryption afterwards.



The IUT must respond correctly to the PDU LMP_name_req to prove that encryption is used.

If broadcast is supported the IUT must transmit broadcast ACL packets with non-encrypted payload to the Lower Tester.

- Notes

The suggested key size must be within the Lower Tester's key size range.

4.5.2.2 LMP/ENC/BV-06-C [Slave Declines Encryption]

- Test Purpose

Verify that the IUT accepts that the Lower Tester declines the encryption mode. The IUT is master and the Lower Tester is slave.

- Reference

[1] 4.2.5

- Initial Condition

- See Default SettingsTest Procedure

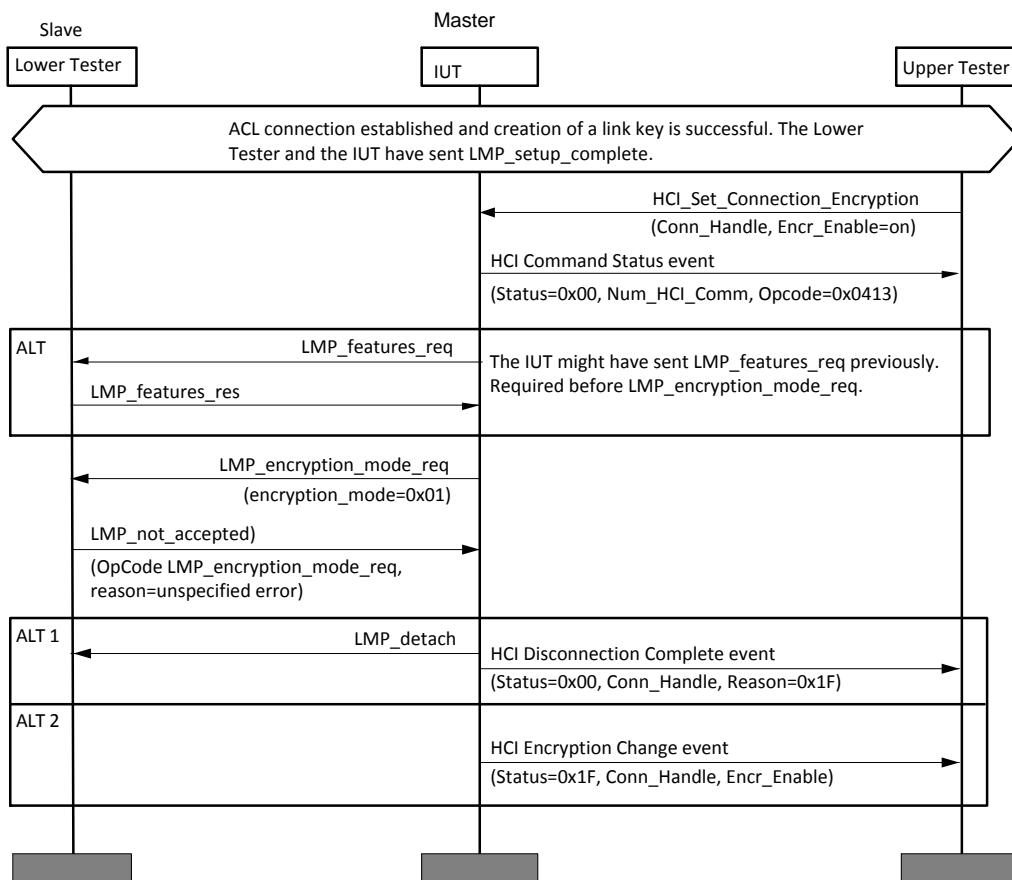


Figure 4.45: LMP/ENC/BV-06-C

- Test Condition

It must be possible to control the IUT to initiate the encryption.



- Expected Outcome

Pass verdict

The IUT transmits the PDU LMP_encryption_mode_req. After reception of the PDU LMP_not_accepted it does not continue with the encryption negotiation.

4.5.2.3 LMP/ENC/BV-07-C [Initiate Encryption Stop]

- Test Purpose

Verify that the IUT initiates stop of encryption. The IUT is master and the Lower Tester is slave.

- Reference

[1] 4.2.5.4

- Initial Condition

See Section 4.2.2.

- Test Procedure

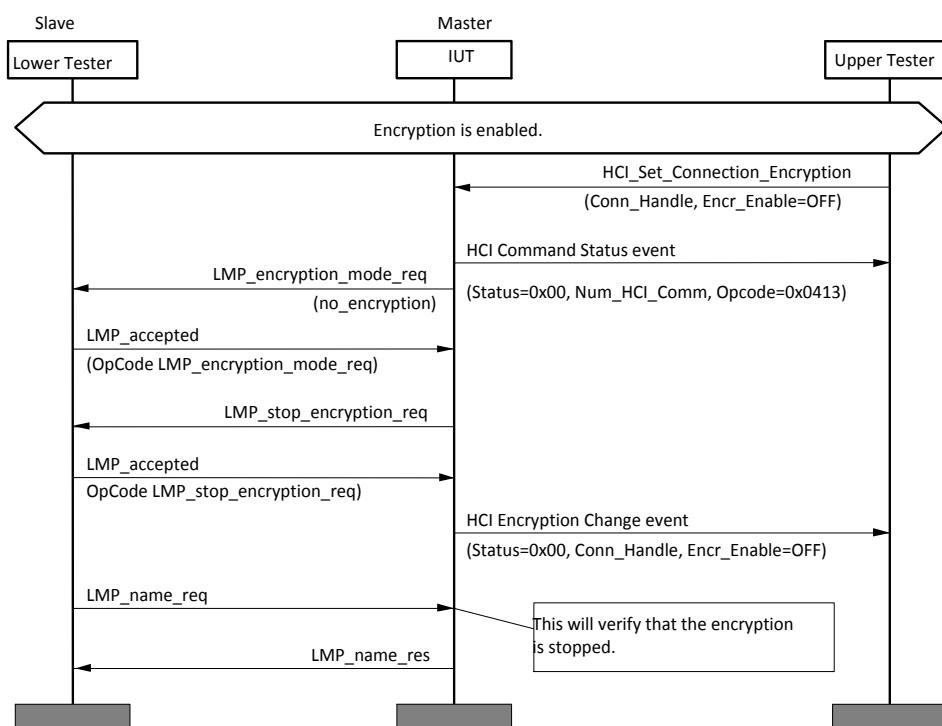


Figure 4.46: LMP/ENC/BV-07-C

- Test Condition

It must be possible to control the IUT to initiate the stop of the encryption.



- Expected Outcome

Pass verdict

The IUT transmits the PDU LMP_stop_encryption_req and accepts the PDU LMP_accepted and stops using encryption.

4.5.2.4 LMP/ENC/BV-08-C [Step Encryption, Slave Request]

- Test Purpose

Verify that the IUT accepts encryption stop upon request from the Lower Tester. The Lower Tester is the slave.

- Reference

[1] 4.2.5.4

- Initial Condition

See [Figure 4.47](#)

- Test Procedure

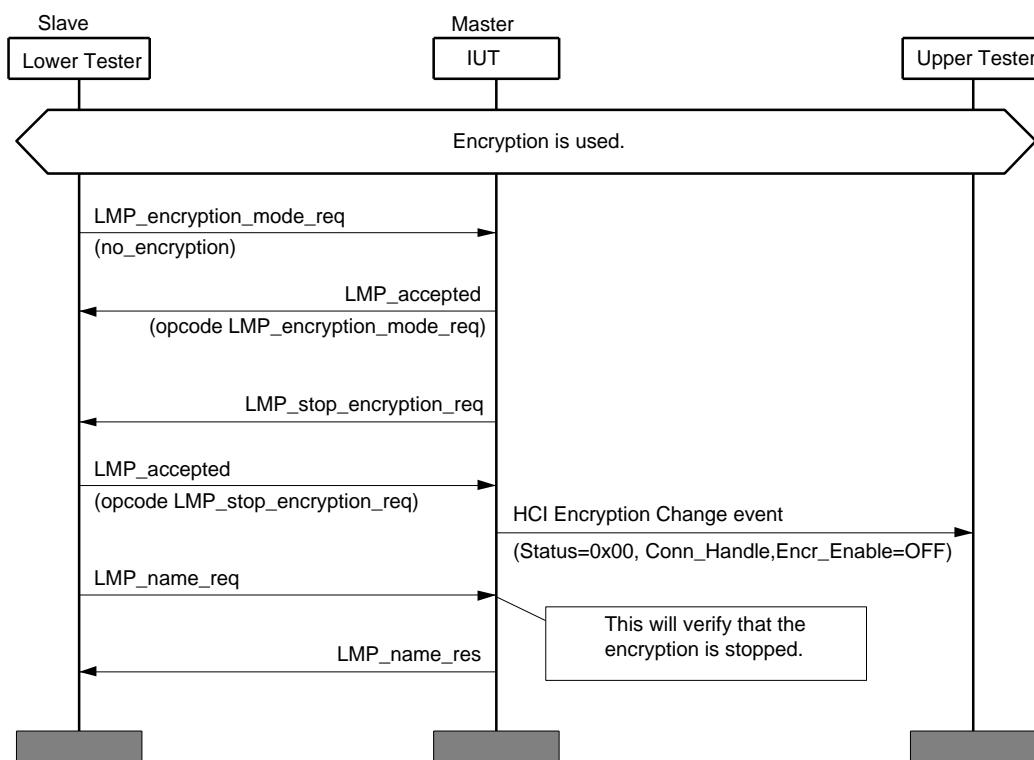


Figure 4.47: LMP/ENC/BV-08-C



- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted followed by LMP_stop_encryption_req upon reception of PDU LMP_encryption_mode_req and stops using encryption. The IUT must respond correctly to the PDU LMP_name_req to prove that encryption is not used.

4.5.2.5 LMP/ENC/BV-10-C [Initiate Broadcast Encryption]

- Test Purpose

Verify that the IUT initiates the broadcast encryption negotiation procedure and uses encryption on point-to-point and broadcast messages.

- Reference

[1] 4.2.5

- Initial Condition

See [Figure 4.48](#).



- Test Procedure

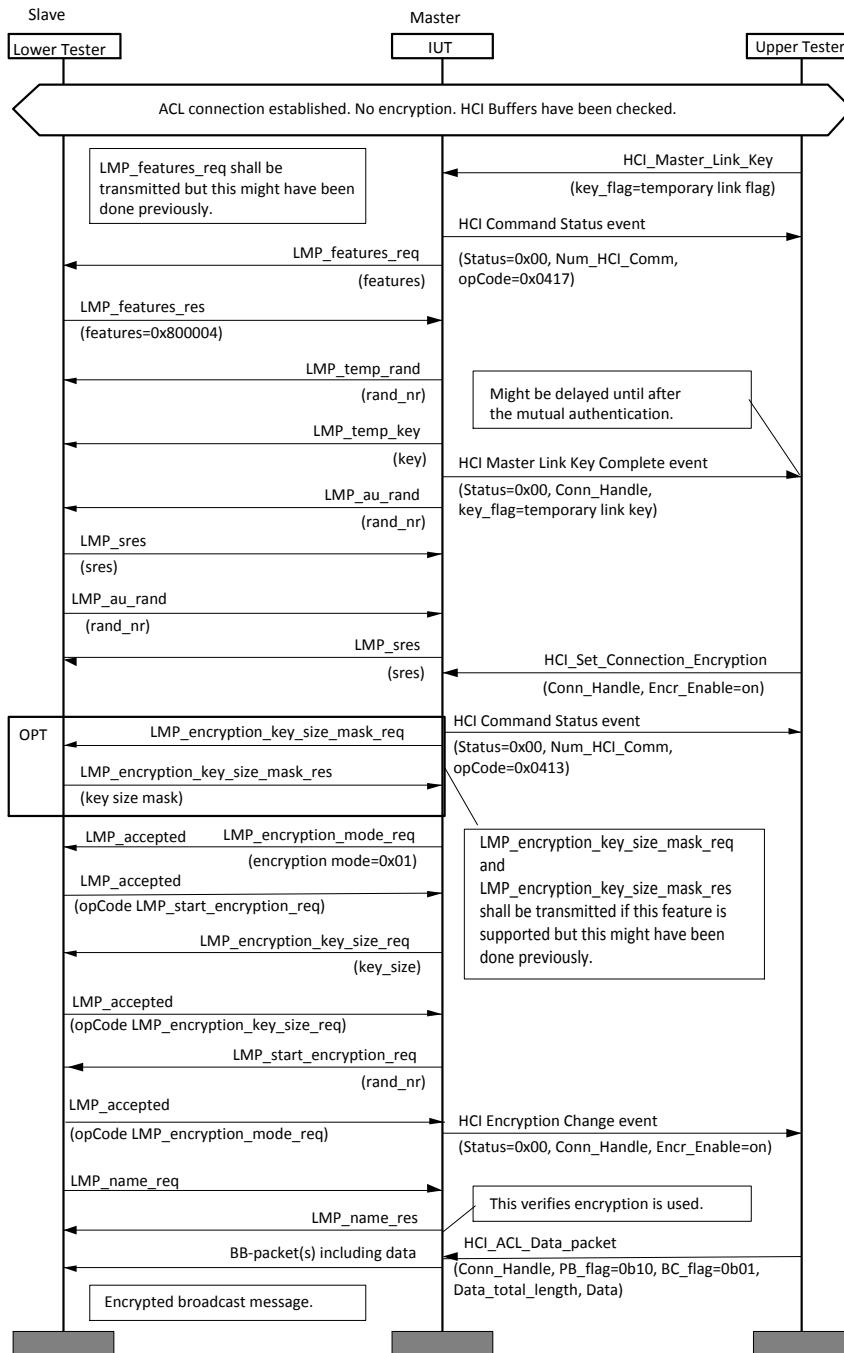


Figure 4.48: LMP/ENC/BV-10-C

- Test Condition

It must be possible to control the IUT to initiate encryption.



- Expected Outcome

Pass verdict

The IUT initiates the broadcast encryption negotiation and uses point-to-point and broadcast encryption afterwards. The PDU LMP_features_req has to be sent at least once by the IUT before starting the encryption.

- Notes

The suggested key size must be within the Lower Tester's key size range. The Lower Tester does not initiate exchange of supported features. Broadcast and Unicast uses different HCI connection handles.

4.5.2.6 LMP/ENC/BV-13-C [Initiate Semi-permanent Link Key Change]

- Test Purpose

Verify that the IUT can initiate a change to the semi-permanent link key. Verify that the IUT stops the encryption. The IUT is master. The Lower Tester is slave.

- Reference

[1] 4.2.4.2

- Initial Condition

See [Figure 4.49](#)



- Test Procedure

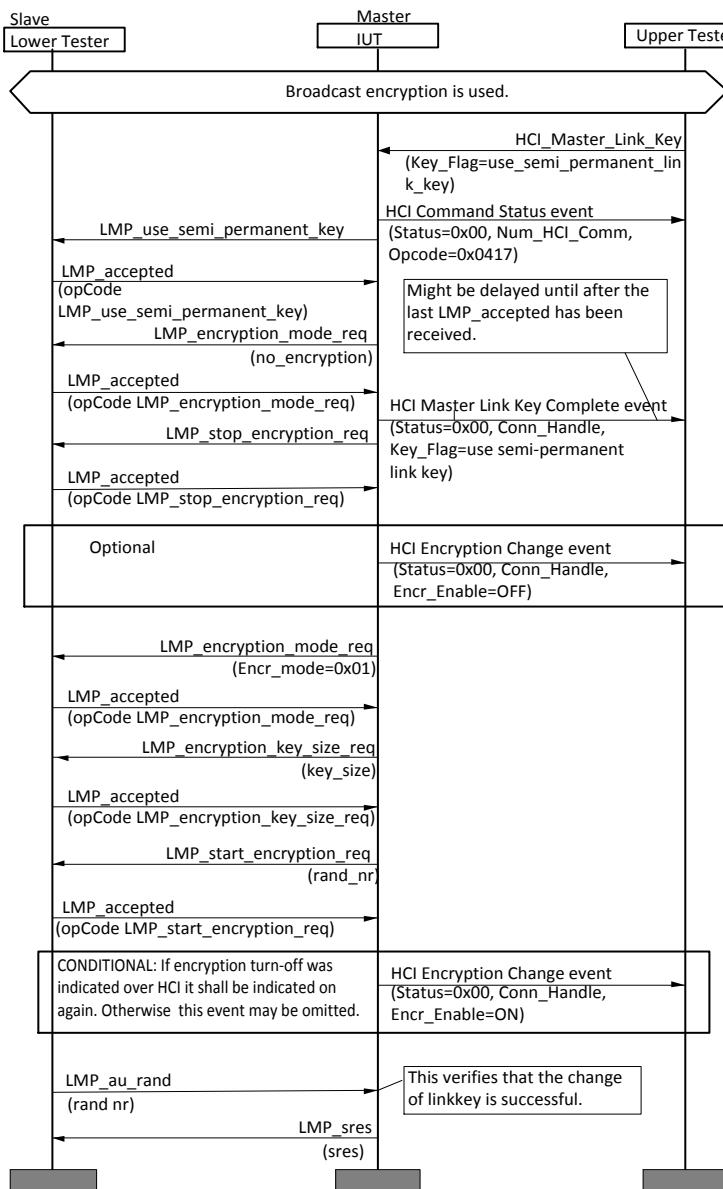


Figure 4.49: LMP/ENC/BV-13-C

- Expected Outcome

Pass verdict

The IUT transmits LMP_use_semi_permanent_key, LMP_encryption_mode_req and LMP_stop_encryption_req. Encryption is restarted. The Link key must be the Semi Permanent Key.

4.5.2.7 LMP/ENC/BV-14-C [Pausing and Resuming Encryption without Disabling Encryption Mode - Master Initiated]

- Test Purpose

Verify that the IUT as master can pause and resume encryption without disabling the encryption mode.



- Reference
 - [1] 4.2.3, 4.2.5.3, 4.2.5.5, 4.4.2

- Initial Condition

The IUT is a master of a connection using encryption.

Both devices are sending data to the other device.

- Test Procedure

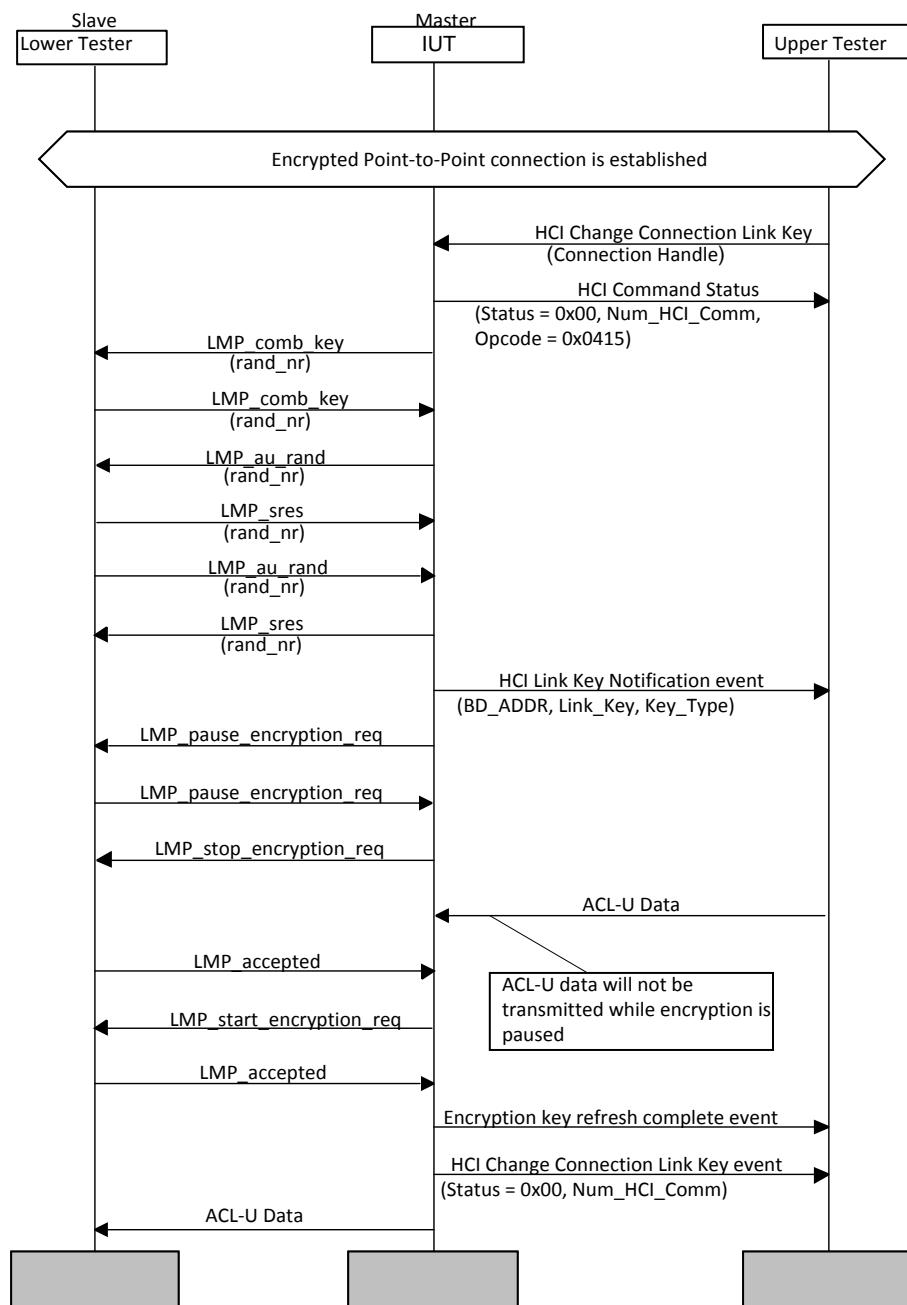


Figure 4.50: LMP/ENC/BV-14-C



The IUT initiates the pausing of encryption.

The Lower Tester accepts the pausing of encryption.

The IUT resumes encryption.

- Expected Outcome

Pass verdict

The IUT transmits no data packets while encryption is paused.

The IUT transmits data packets after encryption is resumed.

- Notes

HCI_Change_Connection_Link_Key_Complete event may be received anytime after HCI_link_key_notification_event.

4.5.2.8 LMP/ENC/BV-15-C [Pausing and Resuming Encryption without Disabling Encryption Mode - Slave Initiated]

- Test Purpose

Verify that the IUT as slave can pause and resume encryption without disabling the encryption mode.

- Reference

[1] 4.2.3, 4.2.5.3, 4.2.5.5, 4.4.2

- Initial Condition

The IUT is a slave of a connection using encryption.

Both devices are sending data to the other device.



- Test Procedure

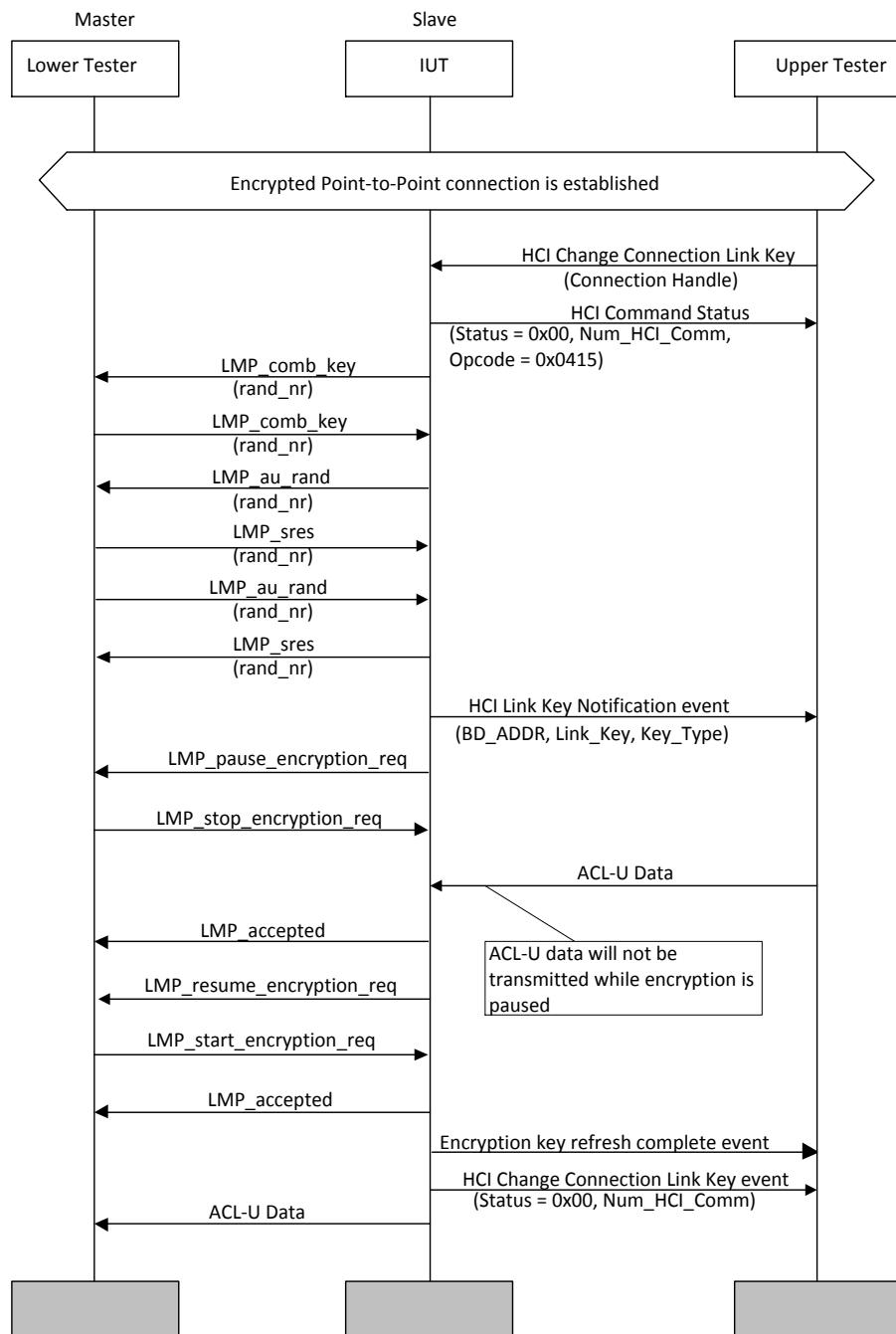


Figure 4.51: LMP/ENC/BV-15-C

The IUT initiates the pausing of encryption.

The Lower Tester accepts the pausing of encryption.

The IUT resumes encryption.



- Expected Outcome

Pass verdict

The IUT transmits no data packets while encryption is paused.

The IUT transmits data packets after encryption is resumed.

- Notes

HCI_Change_Connection_Link_Key_Complete event may be received anytime after HCI_link_key_notification_event.

4.5.2.9 LMP/ENC/BV-16-C [Pausing and Resuming Encryption without Disabling Encryption Mode - Master Initiated with Role Switch]

- Test Procedure

Verify that the IUT as master can pause and resume encryption without disabling the encryption mode.

- Reference

[1] 4.2.3, 4.2.5.3, 4.2.5.5, 4.4.2

- Initial Condition

The IUT is a master of a connection using encryption.

Both devices are sending data to the other device.



- Test Procedure

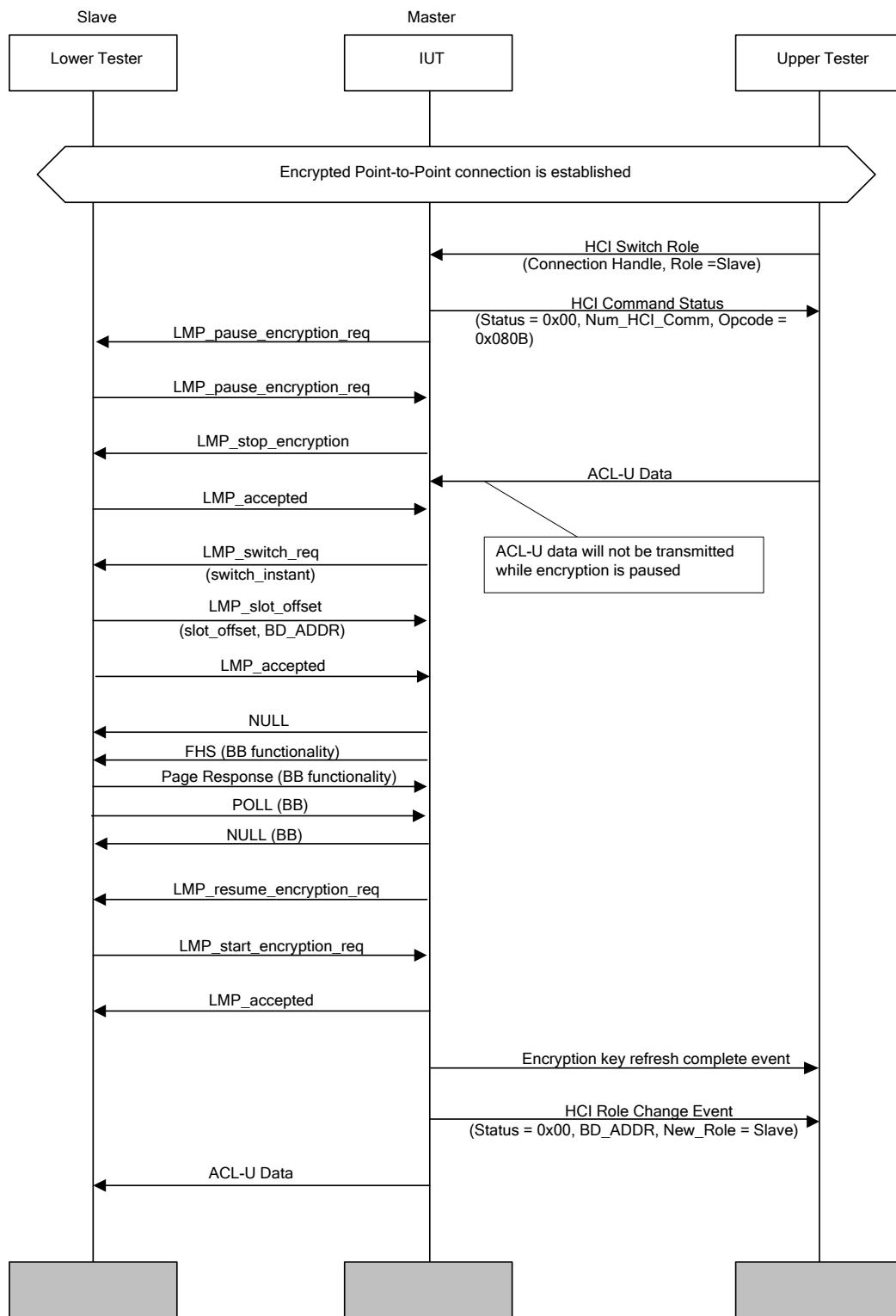


Figure 4.52: LMP/ENC/BV-16-C

The IUT is requested to perform a role switch using the HCI Switch Role command.

The IUT initiates the pausing of encryption.



The Lower Tester accepts the pausing of encryption.

The IUT initiates a role switch.

The IUT resumes encryption.

The Role Change event is generated on the IUT.

- Expected Outcome

Pass verdict

The IUT transmits no data packets while encryption is paused.

The IUT transmits data packets after encryption is resumed.

The role switch succeeds.

- Notes

If the test procedure fails due to role switch, repeat the test. HCI_Role_Change event may be received anytime after role switch.

4.5.2.10 LMP/ENC/BV-17-C [Pausing and Resuming Encryption without Disabling Encryption Mode - Slave Initiated with Role Switch]

- Test Procedure

Verify that the IUT as slave can pause and resume encryption without disabling the encryption mode.

- Reference

[1] 4.2.3, 4.2.5.3, 4.2.5.5, 4.4.2

- Initial Condition

The IUT is a slave of a connection using encryption.

Both devices are sending data to the other device.

Test Procedure



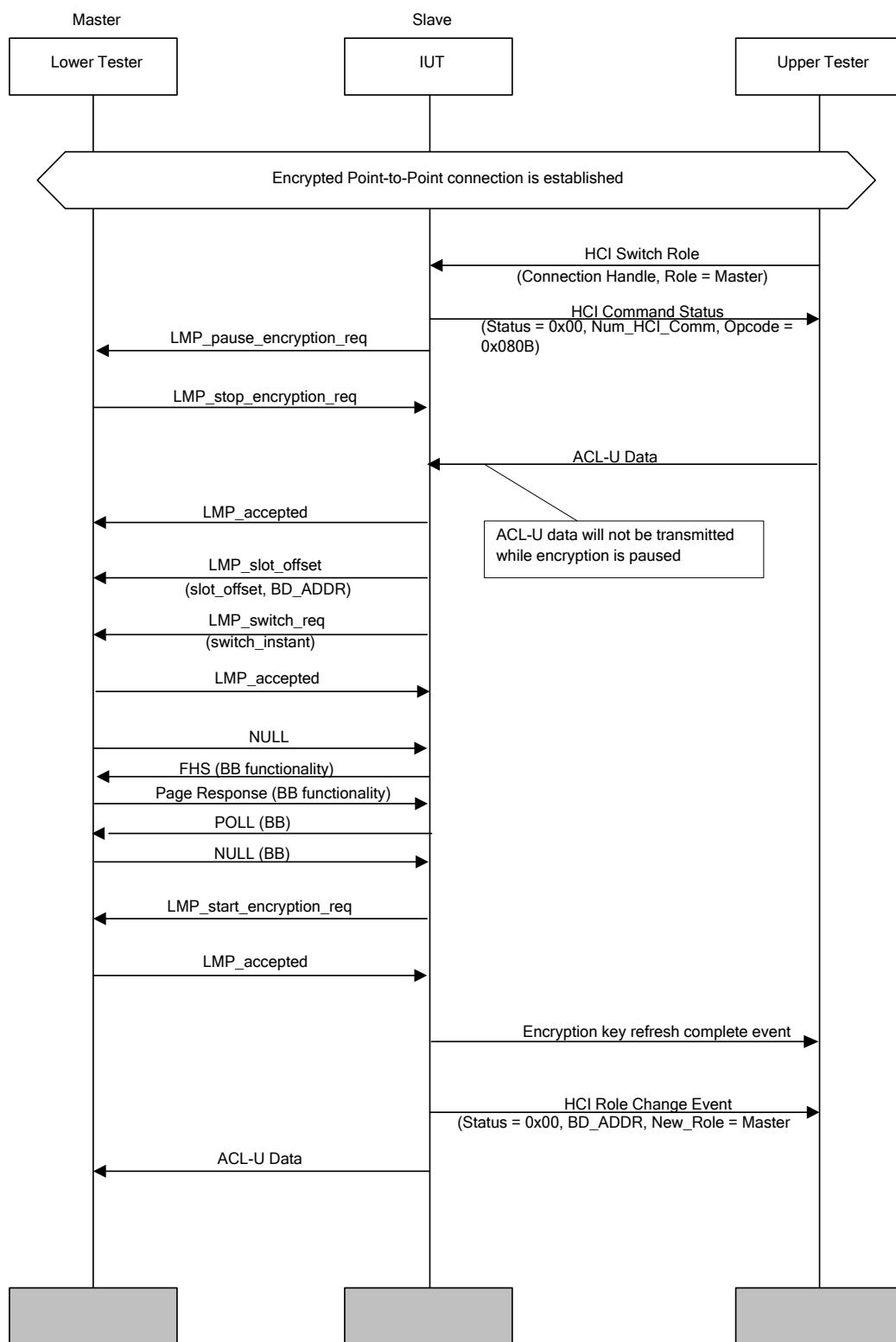


Figure 4.53: LMP/ENC/BV-17-C

The IUT is requested to perform a role switch using the HCI Switch Role command.

The IUT initiates the pausing of encryption.



The Lower Tester accepts the pausing of encryption.

The IUT initiates a role switch.

The IUT resumes encryption.

The Role Change event is generated on the IUT.

- Expected Outcome

Pass verdict

The IUT transmits no data packets while encryption is paused.

The IUT transmits data packets after encryption is resumed.

The role switch succeeds.

- Notes

HCI_Role_Change event may be received anytime after role switch.

4.5.2.11 LMP/ENC/BV-18-C [Starting and Stopping Encryption with Legacy Device - Master Initiated]

- Test Procedure

Verify that the IUT as master can stop and restart encryption with a device that does not support Encryption Pause Resume.

- Reference

[1] 4.2.3, 4.2.5.3, 4.2.5.5, 4.4.2

- Initial Condition

The IUT is a master of a connection using encryption.

The Lower Tester is a device that does not support Encryption Pause Resume.



- Test Procedure

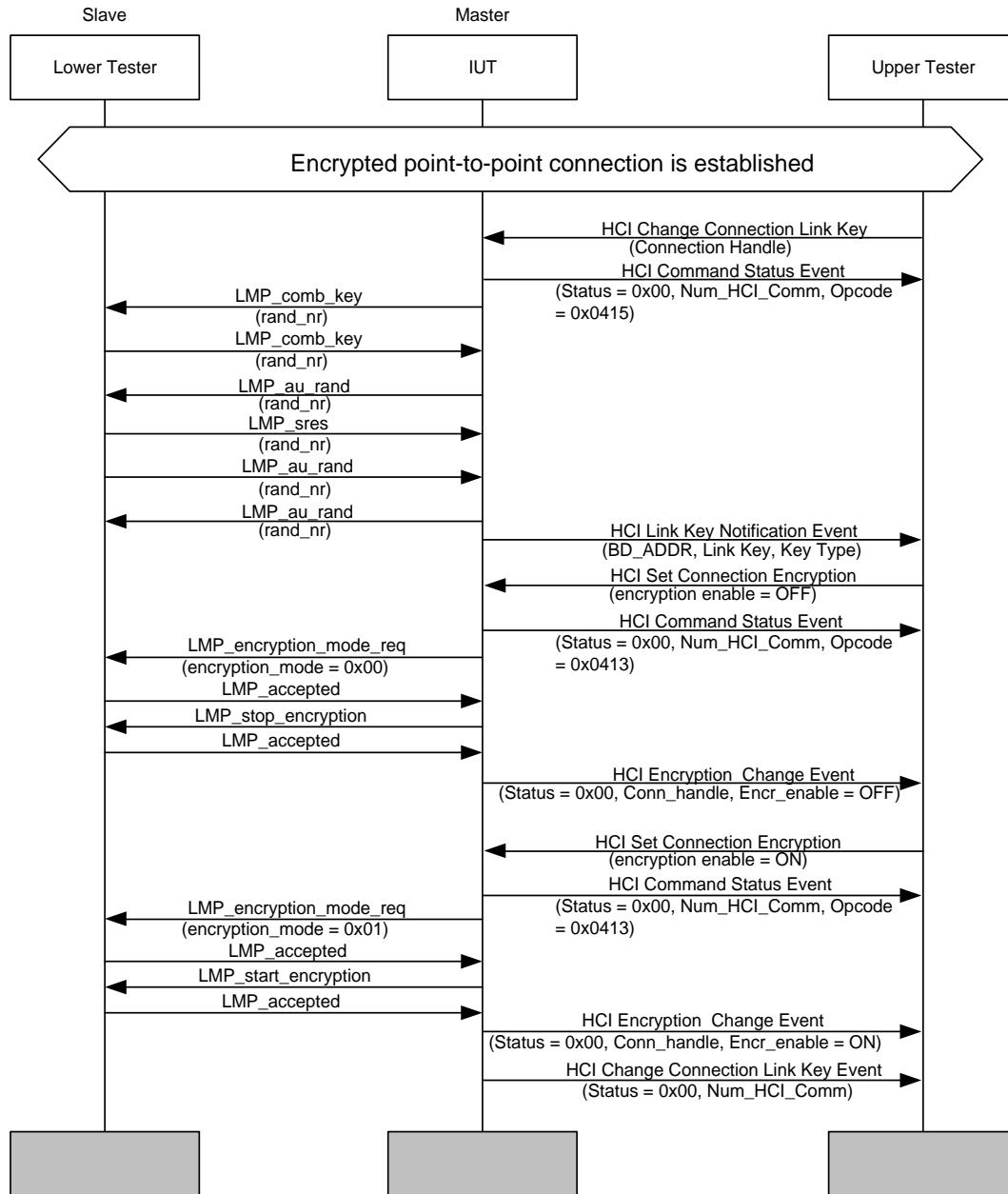


Figure 4.54: LMP/ENC/BV-18-C

- Expected Outcome

Pass verdict

Encryption is stopped and then restarted.

- Notes

HCI_Change_Connection_Link_Key_Complete event may be received anytime after HCI_link_key_notification_event.



4.5.2.12 LMP/ENC/BV-19-C [Stopping and Restarting Encryption with Legacy Device - Slave Initiated]

- **Test Procedure**

Verify that the IUT as slave can stop and restart encryption with a device that does not support Pause Encryption.

- **Reference**

[1] 4.2.3, 4.2.5.3, 4.2.5.5, 4.4.2

- **Initial Condition**

The IUT is a slave of a connection using encryption.

The Lower Tester is a device that does not support Encryption Pause Resume.



- Test Procedure

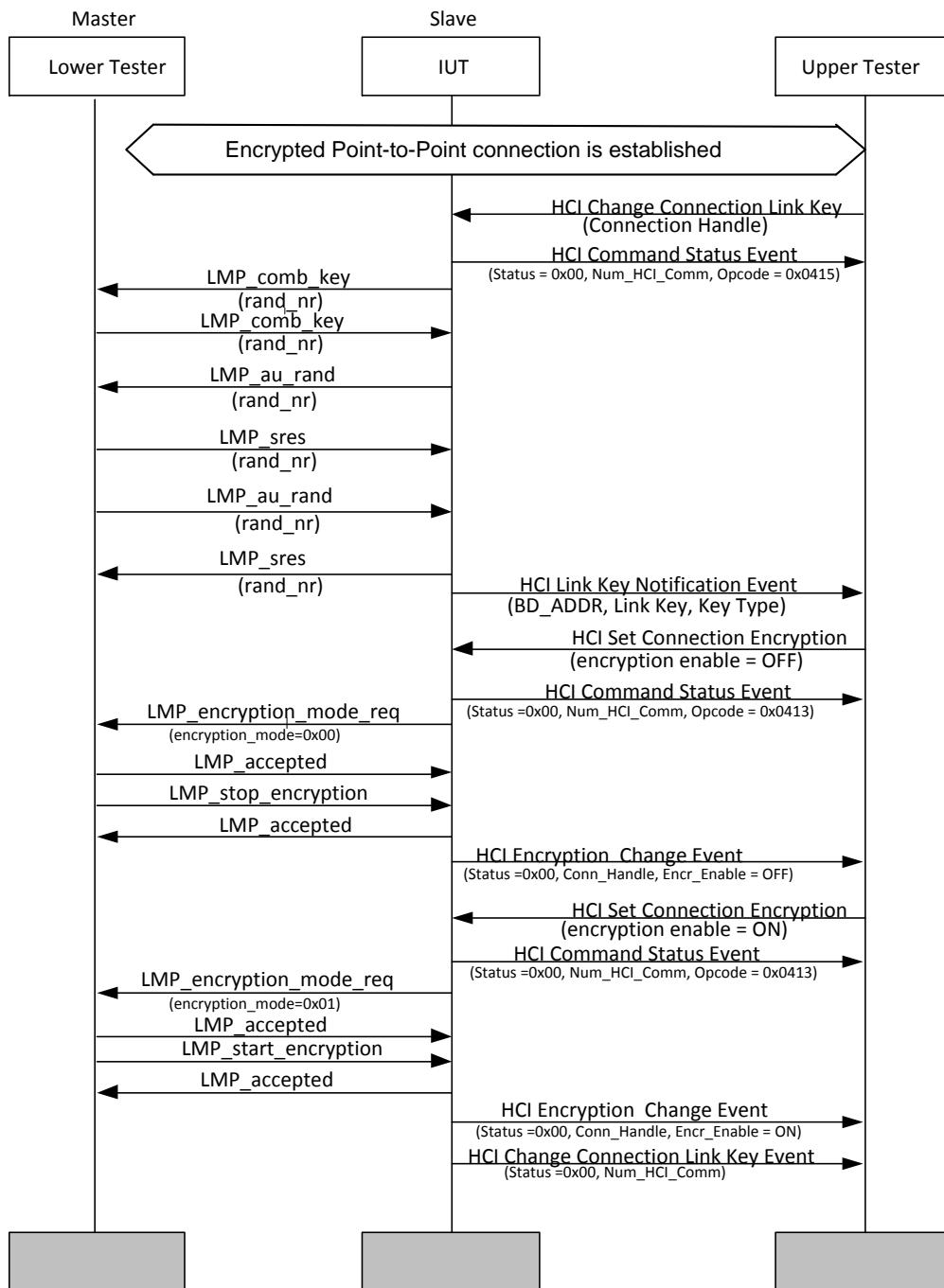


Figure 4.55: LMP/ENC/BV-19-C

The IUT stops encryption.

The Lower Tester accepts the stopping of encryption.

The IUT restarts encryption.



- Expected Outcome

Pass verdict

Encryption is stopped and then restarted.

- Notes

HCI_Change_Connection_Link_Key_Complete event may be received anytime after HCI_link_key_notification_event.

4.5.2.13 LMP/ENC/BV-20-C [Pausing and Resuming without Disabling Encryption, IUT Master, Slave Initiated as a Result of Change Connection Link Key]

- Test Purpose

Verify that the IUT as master can respond to slave initiated pause and resume of encryption without disabling the encryption mode as part of the change connection link key procedure.

- Reference

[1] 4.2.3, 4.2.5.3, 4.2.5.5

- Initial Condition

The Lower Tester is slave and the IUT is master.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

Both devices are sending data to each other.



- Test Procedure

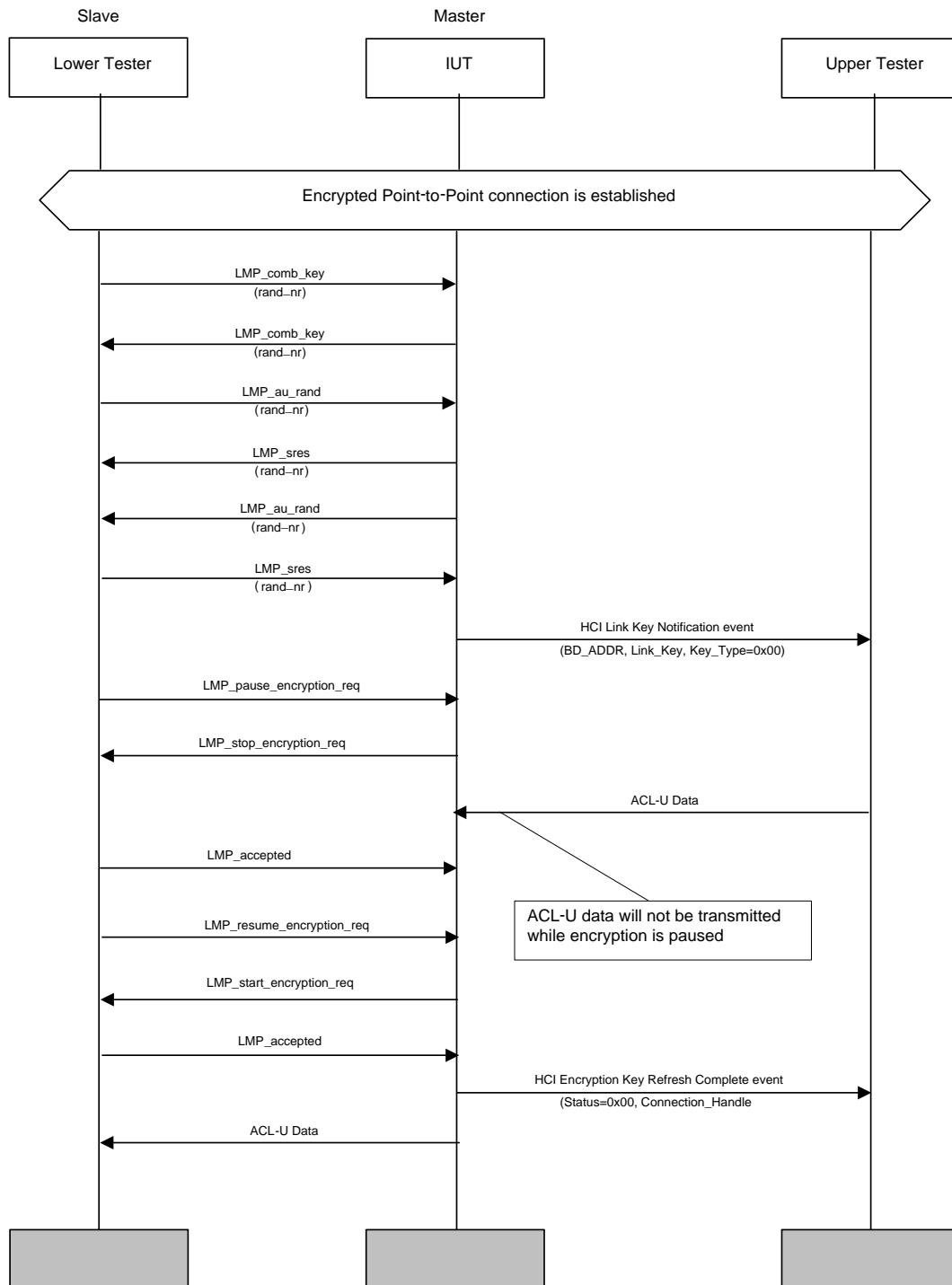


Figure 4.56: LMP/ENC/BV-20-C



The Lower Tester performs the change connection link key procedure.

The Lower Tester initiates the pausing of encryption.

The IUT accepts the pausing of encryption.

The Lower Tester resumes encryption.

- Expected Outcome

Pass verdict

The IUT pauses encryption using LMP_stop_encryption_req.

The IUT transmits no data packets while encryption is paused.

The IUT transmits data packets after encryption is resumed.

4.5.2.14 LMP/ENC/BV-21-C [Pausing and Resuming without Disabling Encryption, IUT Master, Slave Initiated with Role Switch]

- Test Purpose

Verify that the IUT as master can respond to slave initiated pause and resume of encryption without disabling the encryption mode as part of the role switch procedure.

- Reference

[1] 4.2.5.3, 4.2.5.5, 4.4.2.

- Initial Condition

The Lower Tester is slave and the IUT is master.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

Both devices are sending data to each other.



- Test Procedure

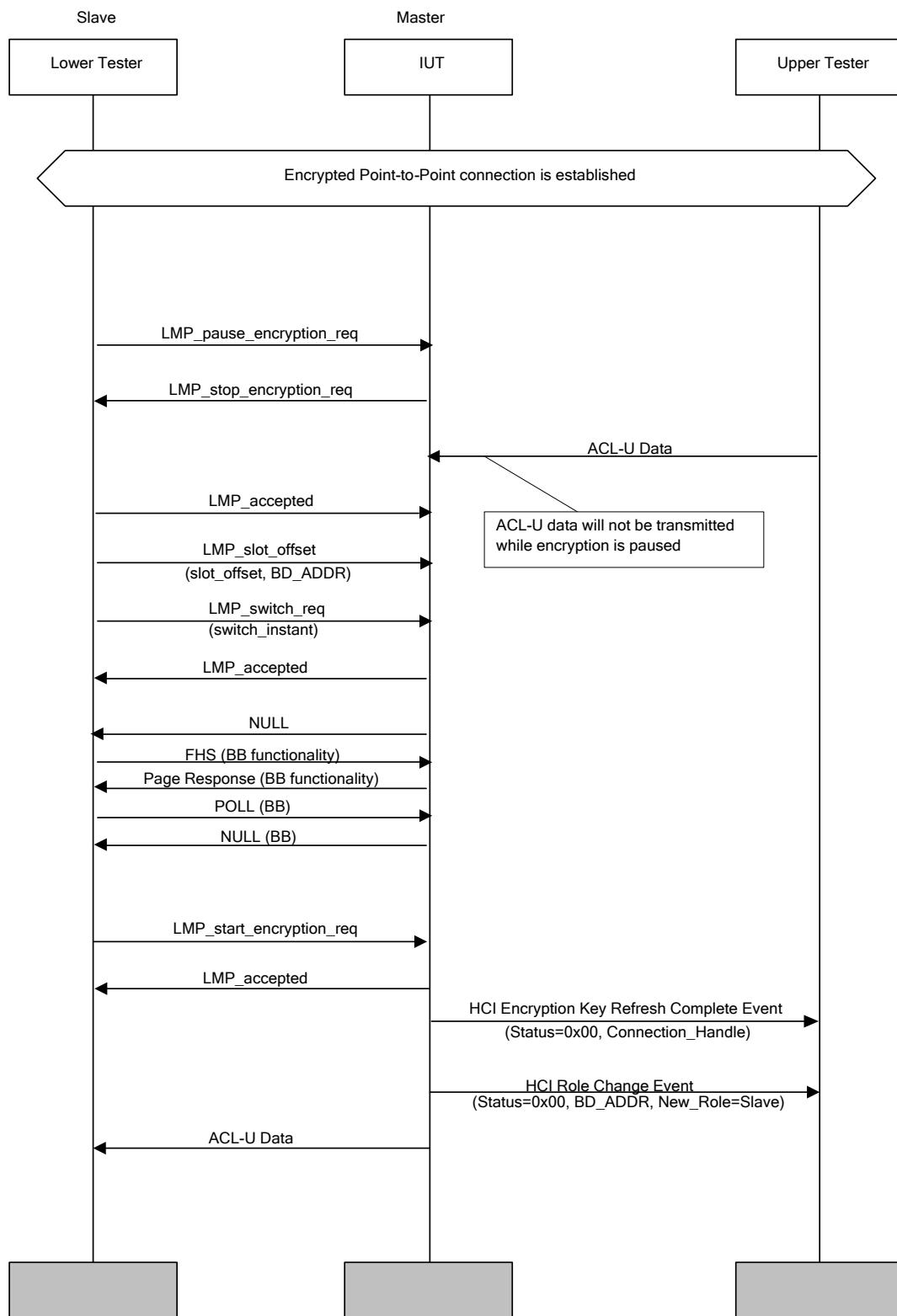


Figure 4.57: LMP/ENC/BV-21-C



The Lower Tester initiates the pausing of encryption.

The IUT accepts the pausing of encryption.

The Lower Tester initiates a role switch.

The Lower Tester resumes encryption.

- Expected Outcome

Pass verdict

The IUT pauses encryption using LMP_stop_encryption_req.

The IUT transmits no data packets while encryption is paused.

The IUT transmits data packets after encryption is resumed.

The role switch succeeds.

4.5.2.15 LMP/ENC/BV-34-C [Initiate AES-CCM Encryption]

- Test Purpose

Verify that the IUT initiates the encryption procedure and uses AES-CCM encryption only for point to point messages when the remote controller's LMP feature bits indicate support for Secure Connections both in the Controller and the Host.

- Reference

[1] 4.2.5

- Initial Condition

The Lower Tester is slave and the IUT is master.

ACL connection has been established between the IUT and the Lower Tester and the creation of a link key between the IUT and Lower Tester has been successful.



- Test Procedure

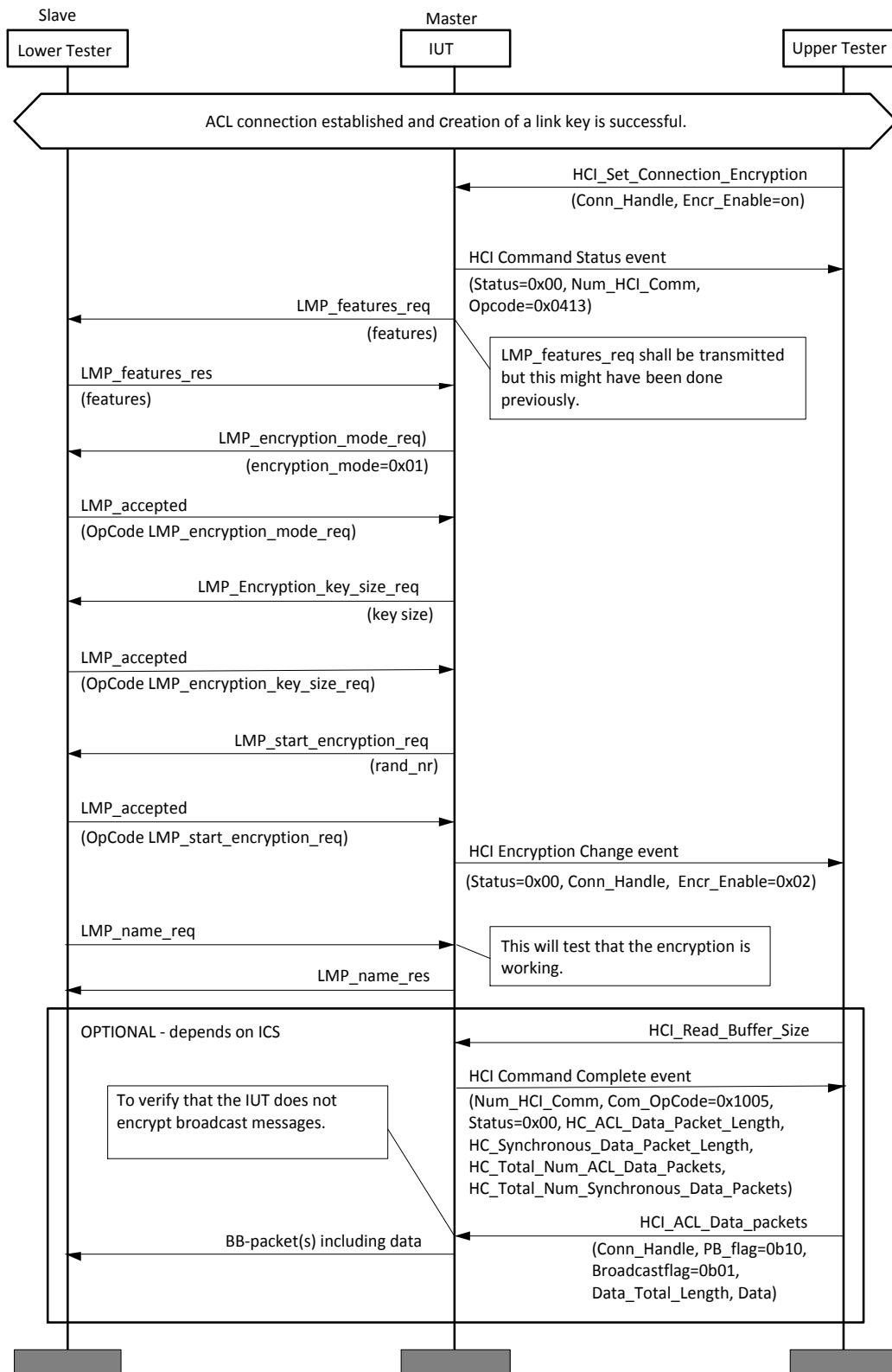


Figure 4.58: LMP/ENC/BV-34-C



If the IUT supports broadcast packets the IUT transmits non-encrypted broadcast packets.

- **Test Condition**

If the IUT supports broadcast packets as indicated by the ICS selection of BB, 11/1 the optional portion of the MSC is applicable and verifies that encryption is not used by the IUT in broadcast packets.

- **Expected Outcome**

Pass verdict:

The IUT initiates the encryption negotiation and uses the encryption afterwards.

The IUT responds correctly to the PDU LMP_name_req (this proves that encryption is used).

If broadcast is supported the IUT transmits broadcast ACL packets with non-encrypted payload to the Lower Tester.

If Read Encryption Key Size is supported, the IUT shall return the key_size parameter from the LMP_encryption_key_size_req PDU in the Command Complete event following the HCI Read Encryption Key Size command.

The Encryption_Enabled Parameter in the Encryption Change event reports AES-CCM encryption has been enabled.

- **Notes**

The suggested key size must be within the Lower Tester's key size range.

If the IUT starts to negotiate for encryption key size the Lower Tester must negotiate.

This test case is similar to [LMP/ENC/BV-05-C \[Initiate Encryption\]](#).

4.5.2.16 LMP/ENC/BV-35-C [Initiate AES-CCM Encryption Stop]

- **Test Purpose**

Verify that the IUT rejects a request from the Upper Tester to stop AES-CCM encryption.

- **Reference**

[\[1\] 4.2.5.4](#)

- **Initial Condition**

The Lower Tester is slave and the IUT is master.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.



- Test Procedure

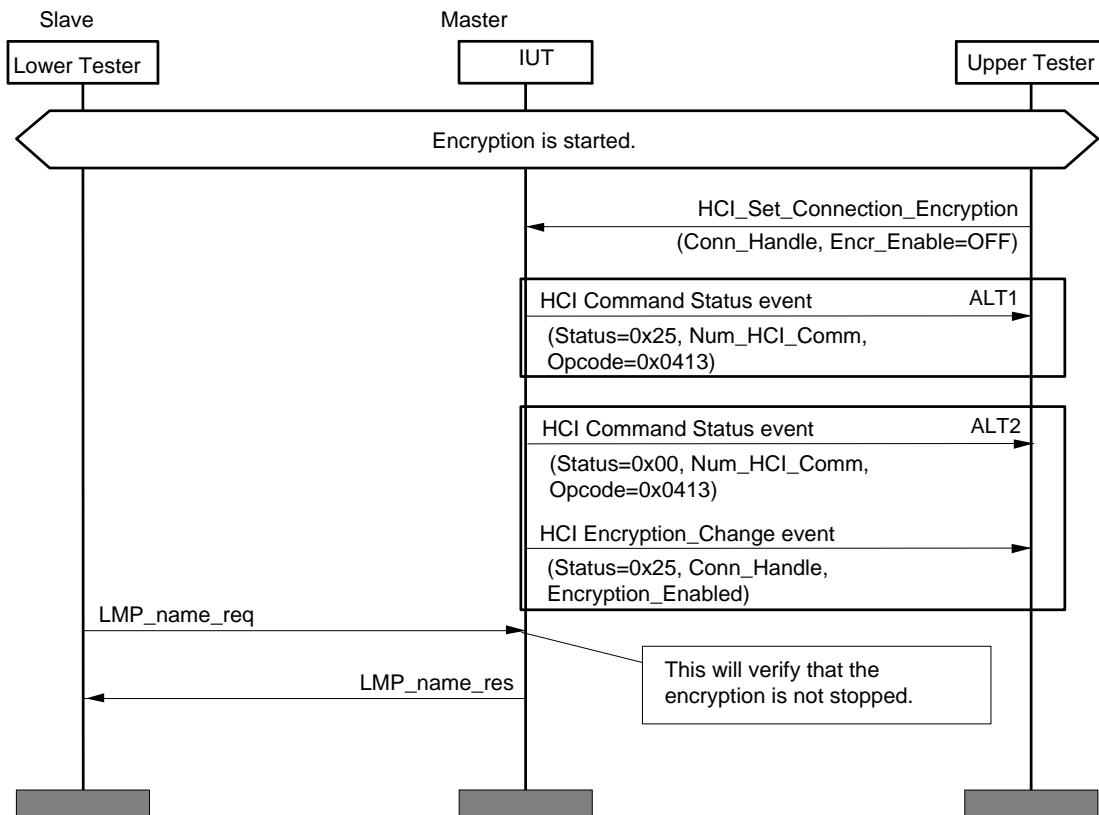


Figure 4.59: LMP/ENC/BV-35-C

If the IUT supports broadcast packets the IUT transmits non-encrypted broadcast packets.

- Expected Outcome

Pass verdict

The IUT either returns an HCI_Command_Status event with error code “Encryption Mode Not Acceptable (0x25)” OR returns an HCI_Command_Status event with status “Command currently in pending (0x00)” followed by an HCI_Encryption_Change event with error code “Encryption Mode Not Acceptable (0x25)”.

4.5.2.17 LMP/ENC/BV-36-C [Stop AES-CCM Encryption, slave request]

- Test Purpose

Verify that the IUT rejects a request to stop AES-CCM encryption from the Lower Tester.

- Reference

[1] 4.2.5.4

- Initial Condition

The Lower Tester is slave and the IUT is master.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.



- Test Procedure

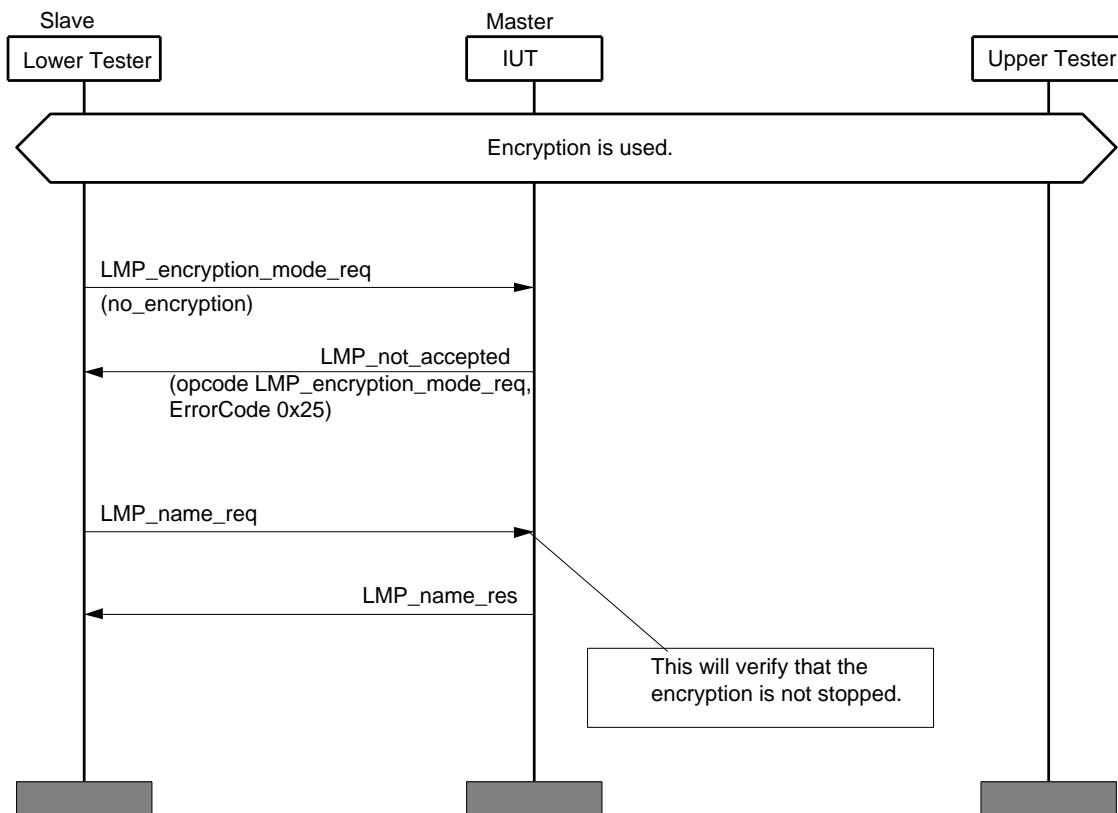


Figure 4.60: LMP/ENC/BV-36-C

If the IUT supports broadcast packets the IUT transmits non-encrypted broadcast packets.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_not_accepted upon reception of PDU LMP_encryption_mode_req and does not stop using encryption.

The IUT responds correctly to the PDU LMP_name_req (this proves that encryption is still used).

4.5.2.18 LMP/ENC/BV-37-C [Pausing and Resuming without Disabling AES-CCM Encryption, IUT Master, Master Initiated as a result of change connection link key]

- Test Purpose

Verify that the IUT as master can pause and resume AES-CCM encryption without disabling the encryption mode as part of the change connection link key procedure.

- Reference

[1] 4.2.3, 4.2.5.3, 4.2.5.5



- Initial Condition

The Lower Tester is slave and the IUT is master.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

Both devices are sending data to each other.



- Test Procedure

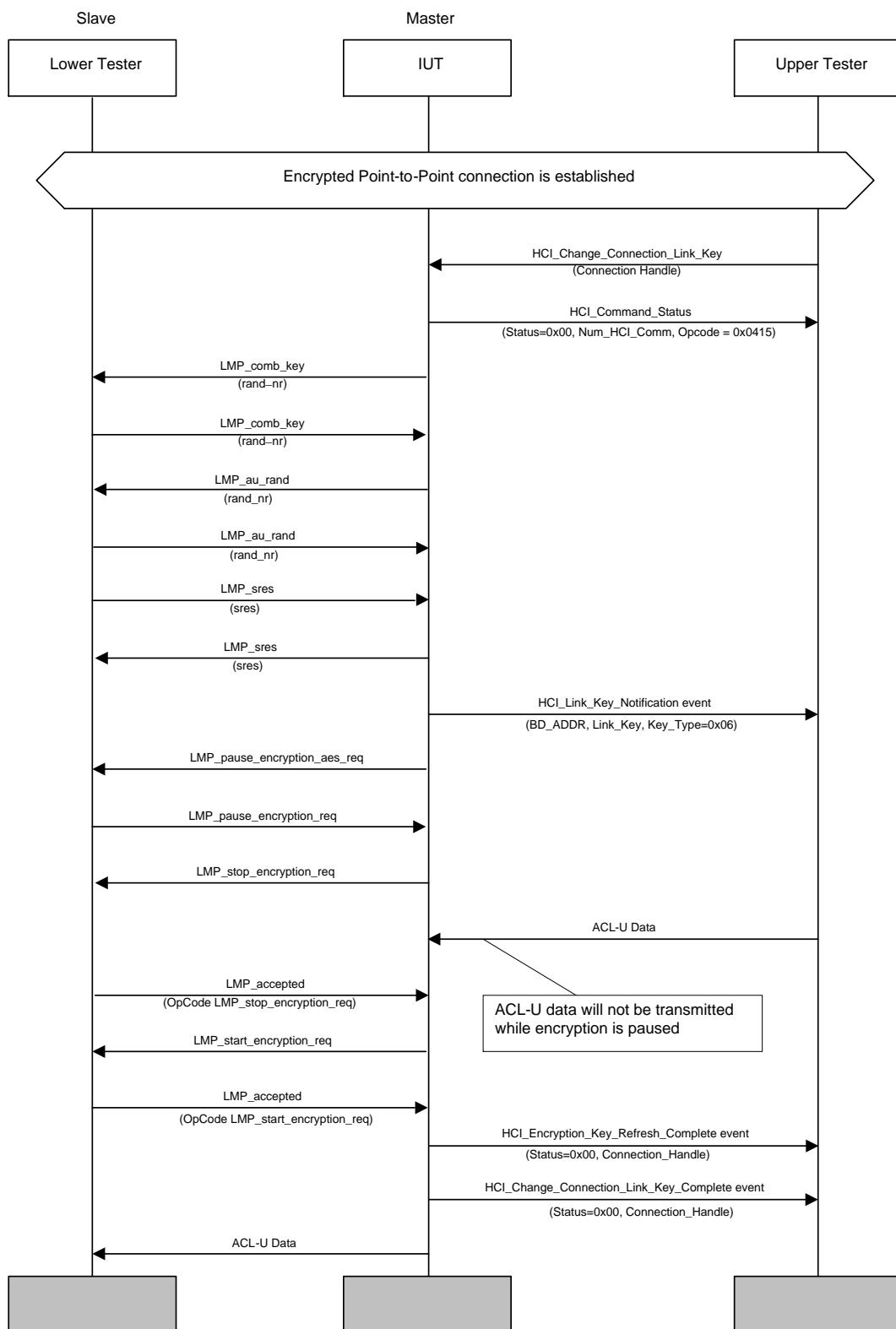


Figure 4.61: LMP/ENC/BV-37-C



1. The Upper Tester requests the IUT to perform a change connection link key procedure using the HCI Change Connection Link Key command.
 2. The IUT performs the change connection link key procedure.
 3. The IUT initiates the pausing of encryption.
 4. The Lower Tester accepts the pausing of encryption.
 5. The IUT resumes encryption.
 6. The Change Connection Link Key Complete event is generated on the IUT.
- Expected Outcome

Pass verdict

The IUT pauses encryption using LMP_pause_encryption_aes_req.

The IUT transmits no data packets while encryption is paused.

The IUT transmits data packets after encryption is resumed.

- Notes

HCI_Change_Connection_Link_Key_Complete event may be received anytime after HCI_link_key_notification_event.

This test case is similar to [LMP/ENC/BV-14-C \[Pausing and Resuming Encryption without Disabling Encryption Mode - Master Initiated\]](#).

4.5.2.19 [LMP/ENC/BV-38-C \[Pausing and Resuming without Disabling AES-CCM Encryption, IUT Slave, Slave Initiated as a result of change connection link key\]](#)

- Test Purpose

Verify that the IUT as slave can pause and resume AES-CCM encryption without disabling the encryption mode as part of the change connection link key procedure.

- Reference

[\[1\]](#) 4.2.3, 4.2.5.3, 4.2.5.5

- Initial Condition

The Lower Tester is master and the IUT is slave.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

Both devices are sending data to each other.



- Test Procedure

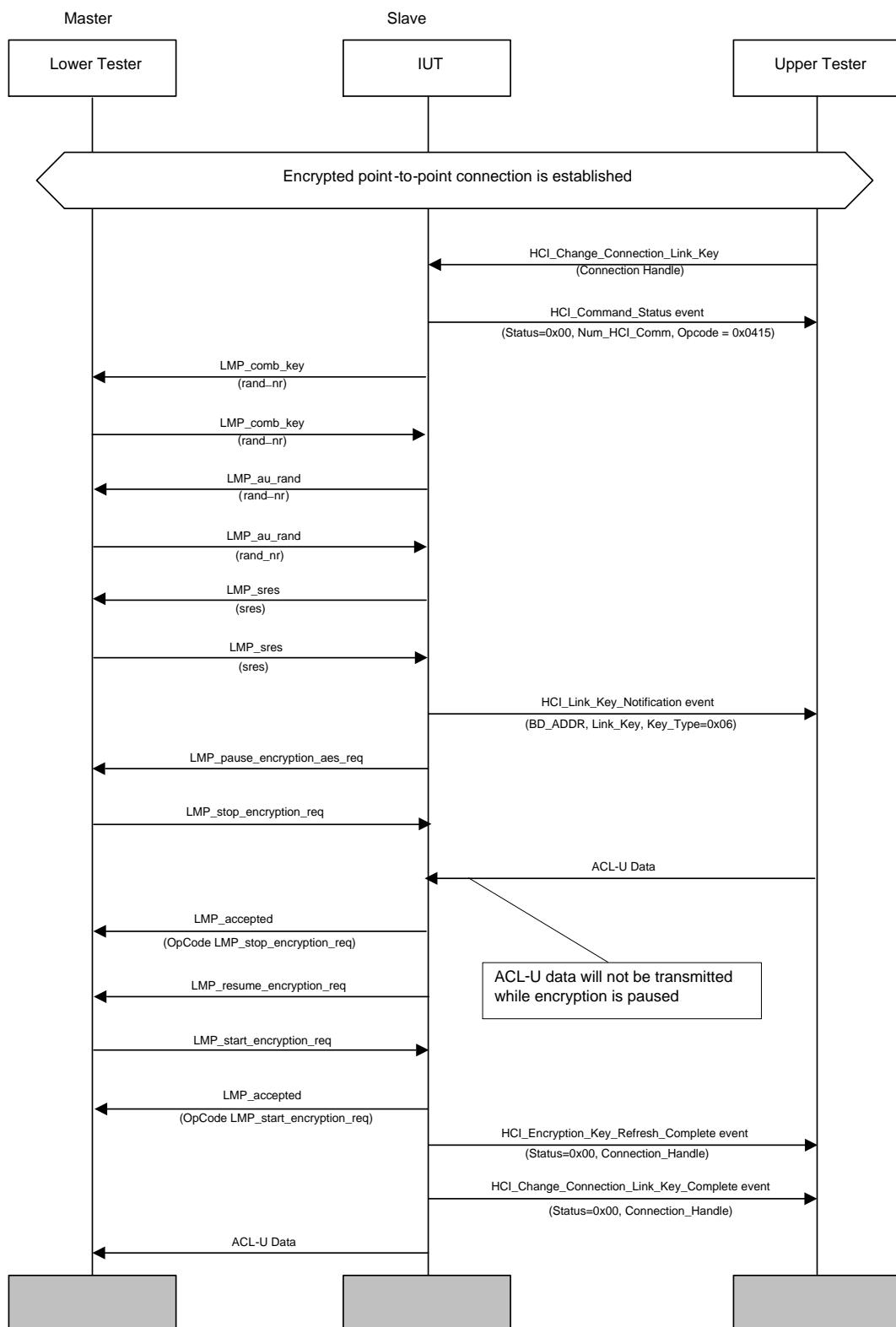


Figure 4.62: LMP/ENC/BV-38-C



1. The Upper Tester requests the IUT to perform a change connection link key procedure using the HCI Change Connection Link Key command.
 2. The IUT performs the change connection link key procedure.
 3. The IUT initiates the pausing of encryption.
 4. The Lower Tester accepts the pausing of encryption.
 5. The IUT resumes encryption.
 6. The Change Connection Link Key Complete event is generated on the IUT.
- Expected Outcome

Pass verdict

The IUT pauses encryption using LMP_pause_encryption_aes_req.

The IUT transmits no data packets while encryption is paused.

The IUT transmits data packets after encryption is resumed.

- Notes

HCI_Change_Connection_Link_Key_Complete event may be received anytime after HCI_link_key_notification_event.

This is similar to [LMP/ENC/BV-15-C \[Pausing and Resuming Encryption without Disabling Encryption Mode - Slave Initiated\]](#).

4.5.2.20 [LMP/ENC/BV-39-C \[Pausing and Resuming without Disabling AES-CCM Encryption, IUT Master, Slave Initiated as a result of change connection link key\]](#)

- Test Purpose

Verify that the IUT as master can respond to slave initiated pause and resume of AES-CCM encryption without disabling the encryption mode as part of the change connection link key procedure.

- Reference

[\[1\]](#) 4.2.3, 4.2.5.3, 4.2.5.5

- Initial Condition

The Lower Tester is slave and the IUT is master.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

Both devices are sending data to each other.



- Test Procedure

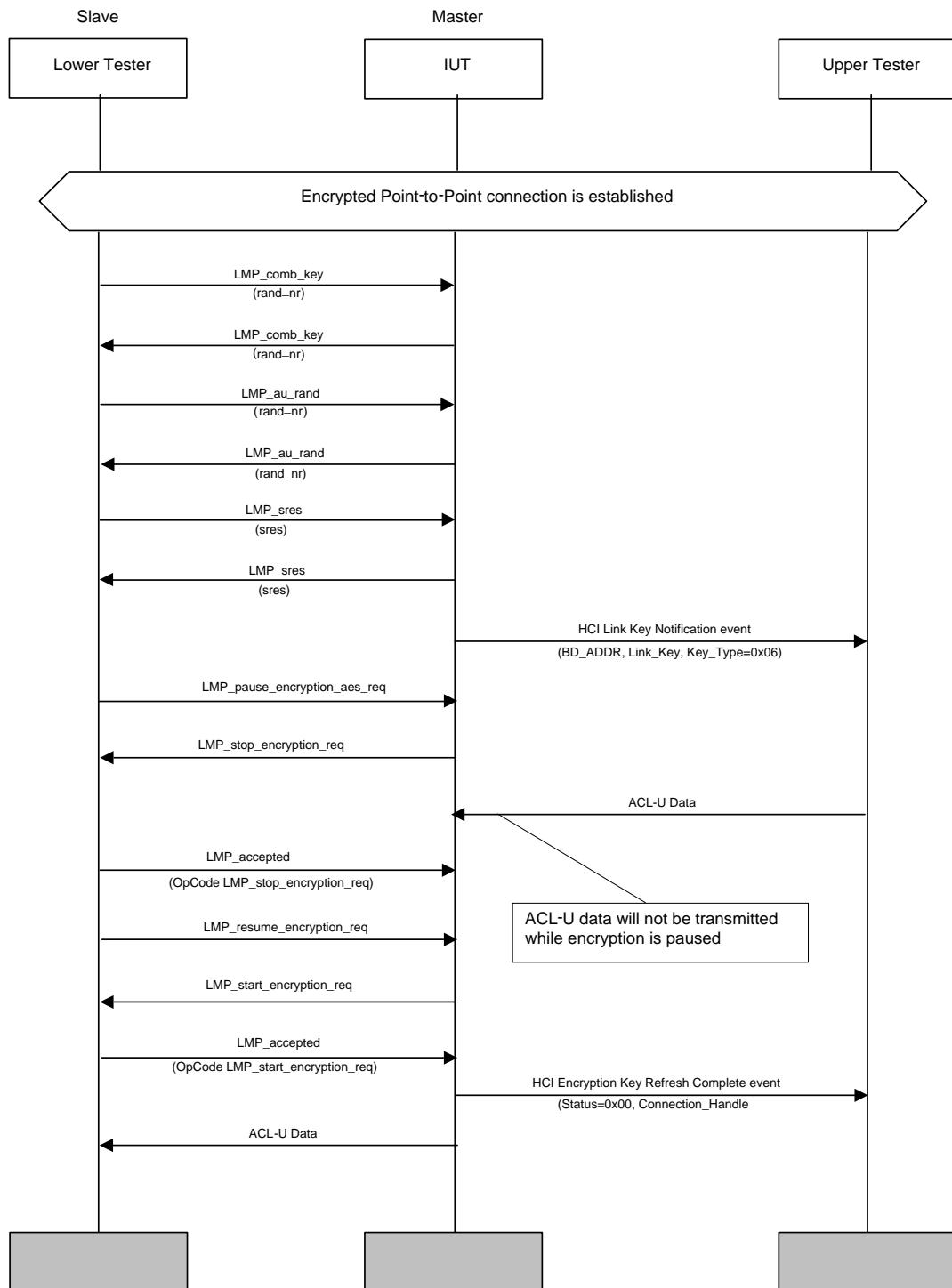


Figure 4.63: LMP/ENC/BV-39-C

1. The Lower Tester performs the change connection link key procedure.
2. The Lower Tester initiates the pausing of encryption.
3. The IUT accepts the pausing of encryption.
4. The Lower Tester resumes encryption.



- Expected Outcome

Pass verdict

The IUT pauses encryption using LMP_stop_encryption_req.

The IUT transmits no data packets while encryption is paused.

The IUT transmits data packets after encryption is resumed.

4.5.2.21 LMP/ENC/BV-40-C [Pausing and Resuming without Disabling AES-CCM Encryption, IUT Slave, Master Initiated as a result of change connection link key]

- Test Purpose

Verify that the IUT as slave can respond to master initiated pause and resume of AES-CCM encryption without disabling the encryption mode as part of the change connection link key procedure.

- Reference

[1] 4.2.3, 4.2.5.3, 4.2.5.5

- Initial Condition

The Lower Tester is master and the IUT is slave.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

Both devices are sending data to each other.



- Test Procedure

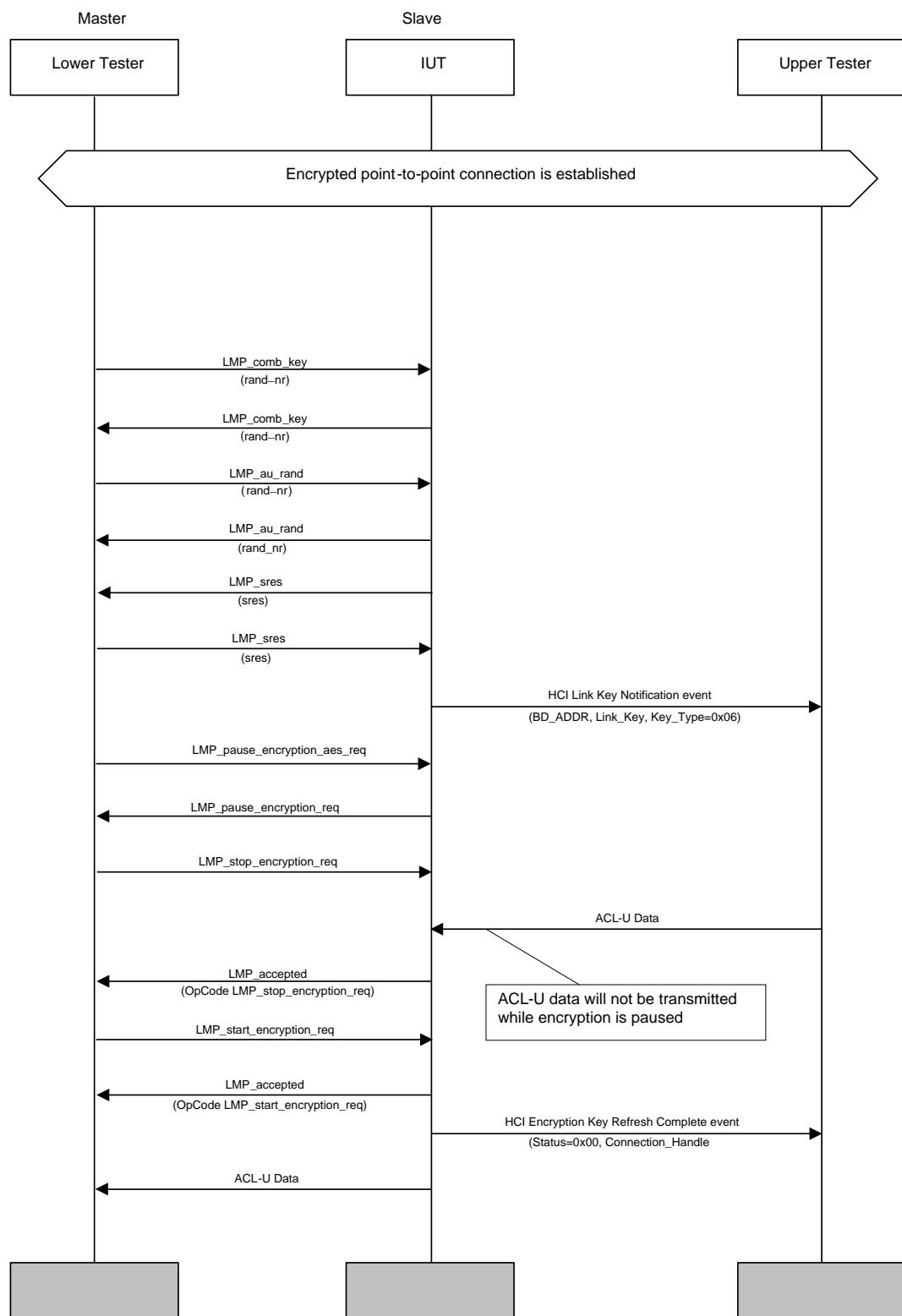


Figure 4.64: LMP/ENC/BV-40-C

- The Lower Tester performs the change connection link key procedure.
- The Lower Tester initiates the pausing of encryption.



3. The IUT accepts the pausing of encryption.
 4. The Lower Tester resumes encryption.
- Expected Outcome

Pass verdict

The IUT responds to the LMP_pause_encryption_aes_req with an LMP_pause_encryption_req.

The IUT transmits no data packets while encryption is paused.

The IUT transmits data packets after encryption is resumed.

4.5.2.22 LMP/ENC/BV-41-C [Pausing and Resuming without Disabling AES-CCM Encryption, IUT Master, Master Initiated with role switch]

- Test Purpose

Verify that the IUT as master can pause and resume AES-CCM encryption without disabling the encryption mode as part of the role switch procedure.

- Reference

[1] Section 4.2.5.3, 4.2.5.5, 4.4.2.

- Initial Condition

The Lower Tester is slave and the IUT is master.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

Both devices are sending data to each other.



- Test Procedure

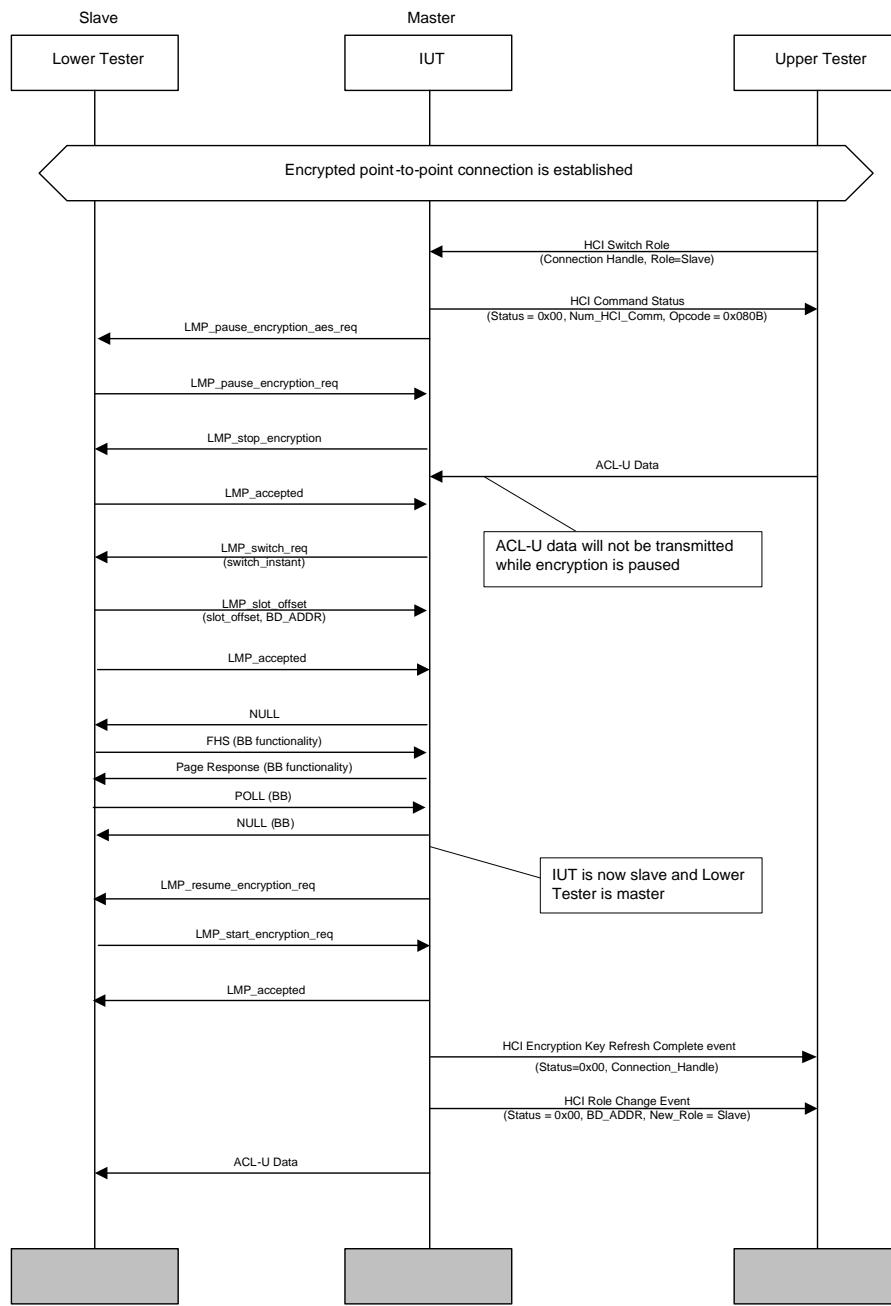


Figure 4.65: LMP/ENC/BV-41-C

1. The Upper Tester requests the IUT to perform a role switch using the HCI Switch Role command.
2. The IUT initiates the pausing of encryption.
3. The Lower Tester accepts the pausing of encryption.
4. The IUT initiates a role switch.
5. The IUT resumes encryption.
6. The Role Change event is generated on the IUT.

- Expected Outcome

Pass verdict

The IUT pauses encryption using LMP_pause_encryption_aes_req.

The IUT transmits no data packets while encryption is paused.

The IUT transmits data packets correctly after encryption is resumed.

The role switch succeeds.

- Notes

If the test procedure fails due to role switch, repeat the test.

HCI_Role_Change event may be received anytime after role switch.

This test case is similar to [LMP/ENC/BV-16-C \[Pausing and Resuming Encryption without Disabling Encryption Mode - Master Initiated with Role Switch\]](#).

4.5.2.23 [LMP/ENC/BV-42-C \[Pausing and Resuming without Disabling AES-CCM Encryption, IUT Slave, Slave Initiated with role switch\]](#)

- Test Purpose

Verify that the IUT as slave can pause and resume AES-CCM encryption without disabling the encryption mode as part of the role switch procedure.

- Reference

[\[1\]](#) 4.2.5.3, 4.2.5.5, 4.4.2

- Initial Condition

The Lower Tester is master and the IUT is slave.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

Both devices are sending data to each other.



- Test Procedure

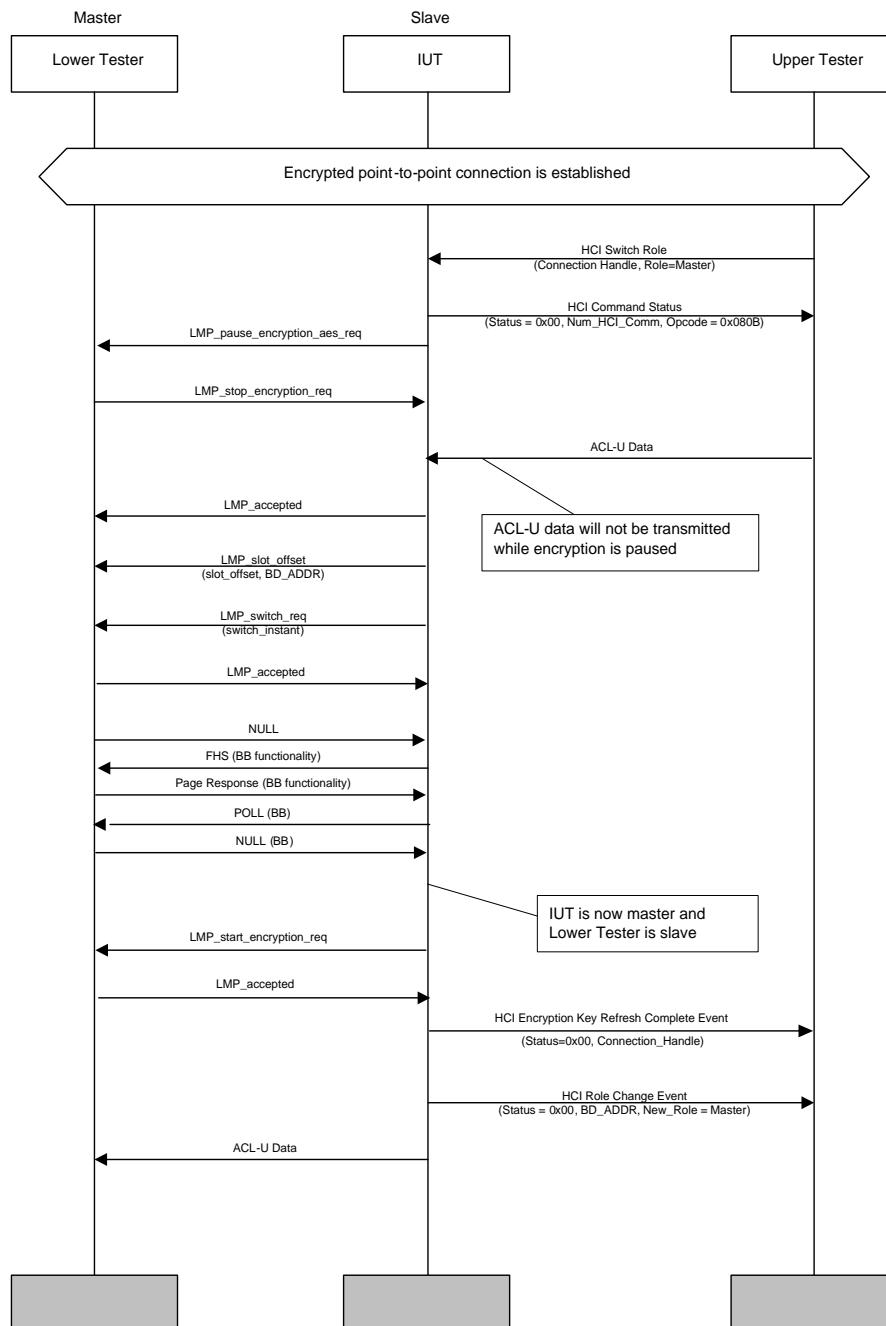


Figure 4.66: LMP/ENC/BV-42-C

1. The Upper Tester requests the IUT to perform a role switch using the HCI Switch Role command.
2. The IUT initiates the pausing of encryption.
3. The Lower Tester accepts the pausing of encryption.
4. The IUT initiates a role switch.
5. The IUT resumes encryption.
6. The Role Change event is generated on the IUT.

- Expected Outcome

Pass verdict

The IUT pauses encryption using LMP_pause_encryption_aes_req.

The IUT transmits no data packets while encryption is paused.

The IUT transmits data packets correctly after encryption is resumed.

The role switch succeeds.

- Notes

If the test procedure fails due to role switch, repeat the test.

HCI_Role_Change event may be received anytime after role switch.

This test case is similar to [LMP/ENC/BV-17-C \[Pausing and Resuming Encryption without Disabling Encryption Mode - Slave Initiated with Role Switch\]](#).

4.5.2.24 [LMP/ENC/BV-43-C \[Pausing and Resuming without Disabling AES-CCM Encryption, IUT Master, Slave Initiated with role switch\]](#)

- Test Purpose

Verify that the IUT as master can respond to slave initiated pause and resume of AES-CCM encryption without disabling the encryption mode as part of the role switch procedure.

- Reference

[\[1\]](#) 4.2.5.3, 4.2.5.5, 4.4.2

- Initial Condition

The Lower Tester is slave and the IUT is master.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

Both devices are sending data to each other.



- Test Procedure

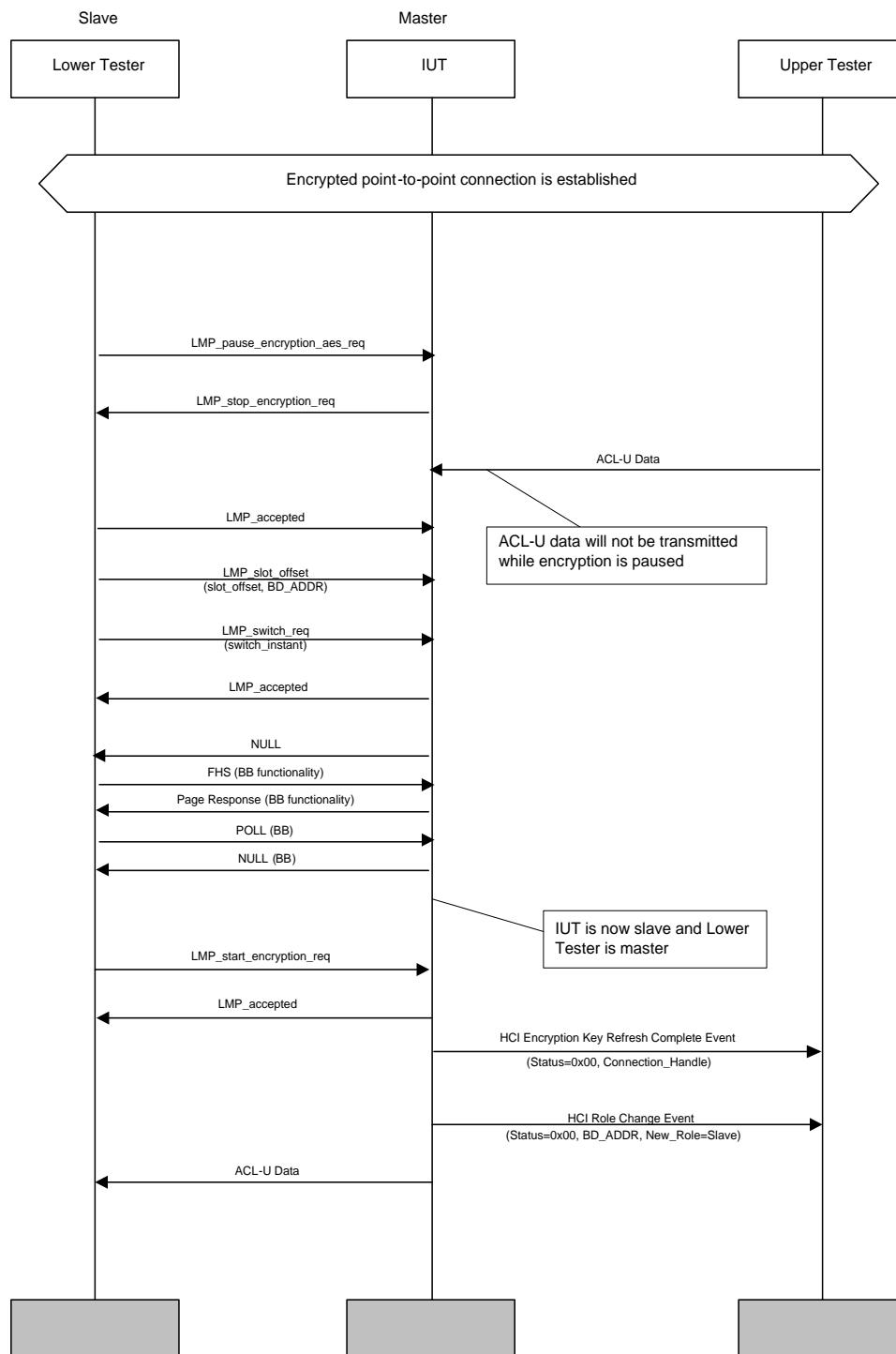


Figure 4.67: LMP/ENC/BV-43-C

1. The Lower Tester initiates the pausing of encryption.
2. The IUT accepts the pausing of encryption.
3. The Lower Tester initiates a role switch.
4. The Lower Tester resumes encryption.



- Expected Outcome

Pass verdict

The IUT pauses encryption using LMP_stop_encryption_req.

The IUT transmits no data packets while encryption is paused.

The IUT transmits data packets correctly after encryption is resumed.

The role switch succeeds.

4.5.2.25 LMP/ENC/BV-44-C [Pausing and Resuming without Disabling AES-CCM Encryption, IUT Slave, Master Initiated with role switch]

- Test Purpose

Verify that the IUT as slave can respond to master initiated pause and resume of AES-CCM encryption without disabling the encryption mode as part of the role switch procedure.

- Reference

[1] Section 4.2.5.3, 4.2.5.5, 4.4.2.

- Initial Condition

The Lower Tester is master and the IUT is slave.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

Both devices are sending data to each other.



- Test Procedure

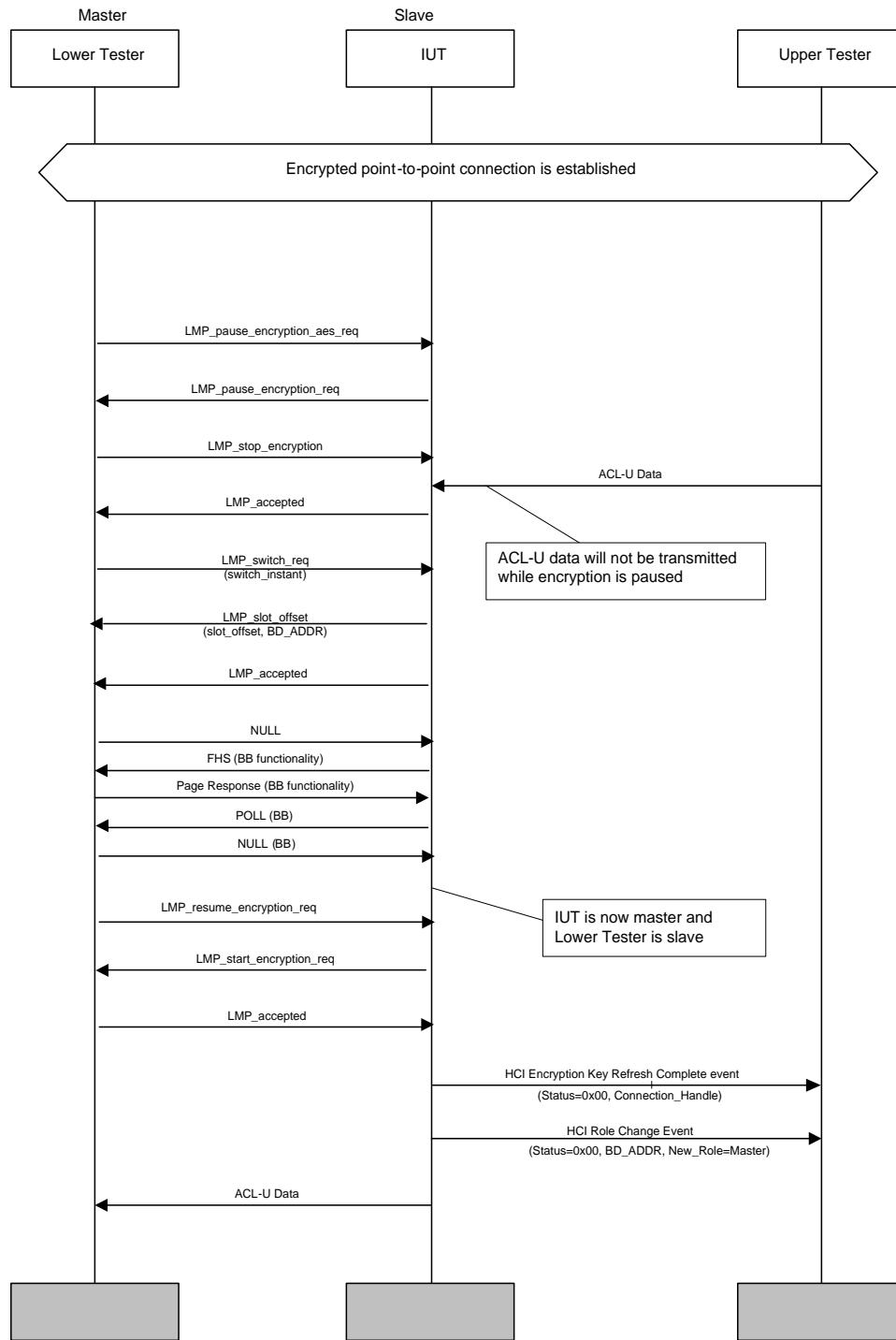


Figure 4.68: LMP/ENC/BV-41-C

1. The Lower Tester initiates the pausing of encryption.
2. The IUT accepts the pausing of encryption.
3. The Lower Tester initiates a role switch.
4. The Lower Tester resumes encryption.



- Expected Outcome

Pass verdict

The IUT responds to the LMP_pause_encryption_aes_req with an LMP_pause_encryption_req.

The IUT transmits no data packets while encryption is paused.

The IUT transmits data packets correctly after encryption is resumed.

The role switch succeeds.

4.5.2.26 LMP/ENC/BV-45-C [Broadcast Encryption is not used with AES-CCM encryption]

- Test Purpose

Verify that the IUT as master rejects a request from the Upper Tester to use the Temporary Link Key when AES-CCM encryption has been enabled on a point-to-point link with a slave and does not use encryption on broadcast messages.

- Reference

[1] 4.2.4.1

- Initial Condition

The Lower Tester is slave and the IUT is master.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.



- Test Procedure

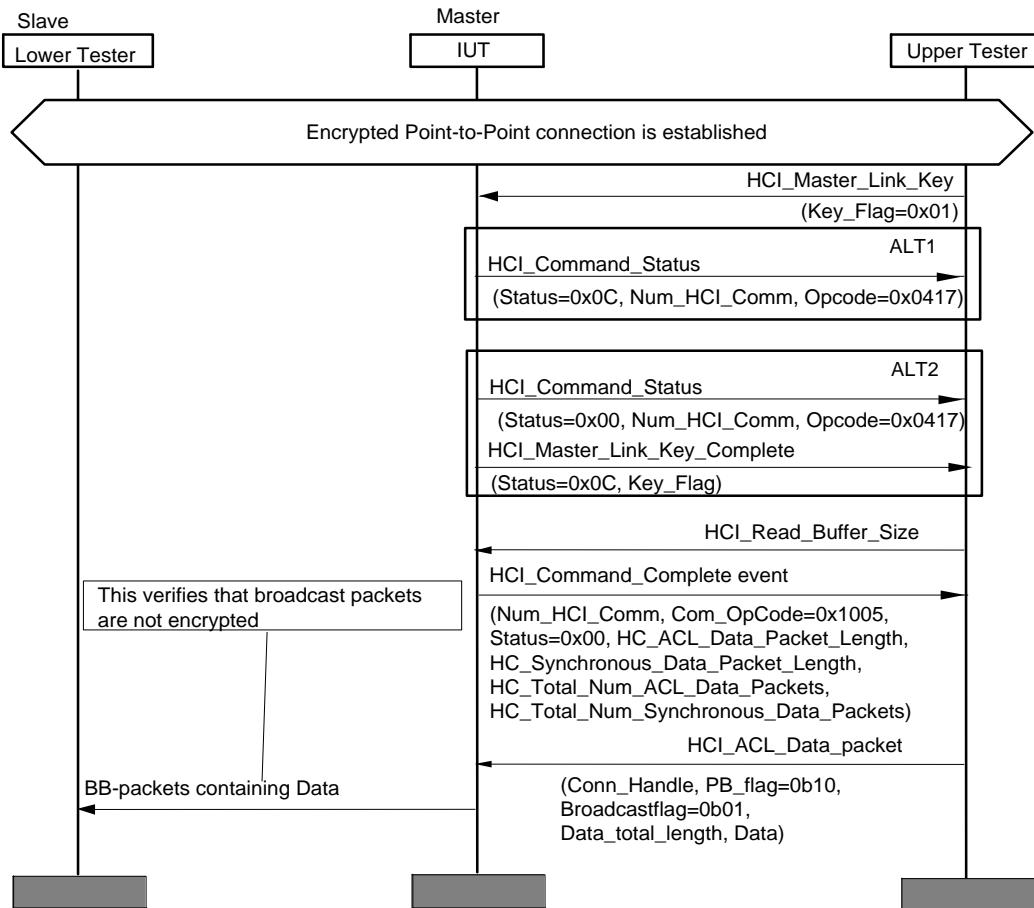


Figure 4.69: LMP/ENC/BV-45-C

The Upper Tester requests the IUT to use a temporary link key in order to encrypt broadcast messages using the HCI Master Link Key command.

- Expected Outcome

Pass verdict

The IUT rejects the HCI Master Link Key command with error code Command Disallowed (0x0C).

Broadcast messages are not encrypted thereafter.

4.5.2.27 LMP/ENC/BV-46-C [Combating forged acknowledgements when AES-CCM Encryption is enabled]

- Test Purpose

Verify that the IUT as master periodically sends an LMP_ping_req on an idle ACL link on which AES-CCM encryption has been enabled in order to force the other side to transmit an ACL packet (LMP_ping_res).

- Reference

[1] 4.1.13



- Initial Condition

The Lower Tester is slave and the IUT is master.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

- Test Procedure

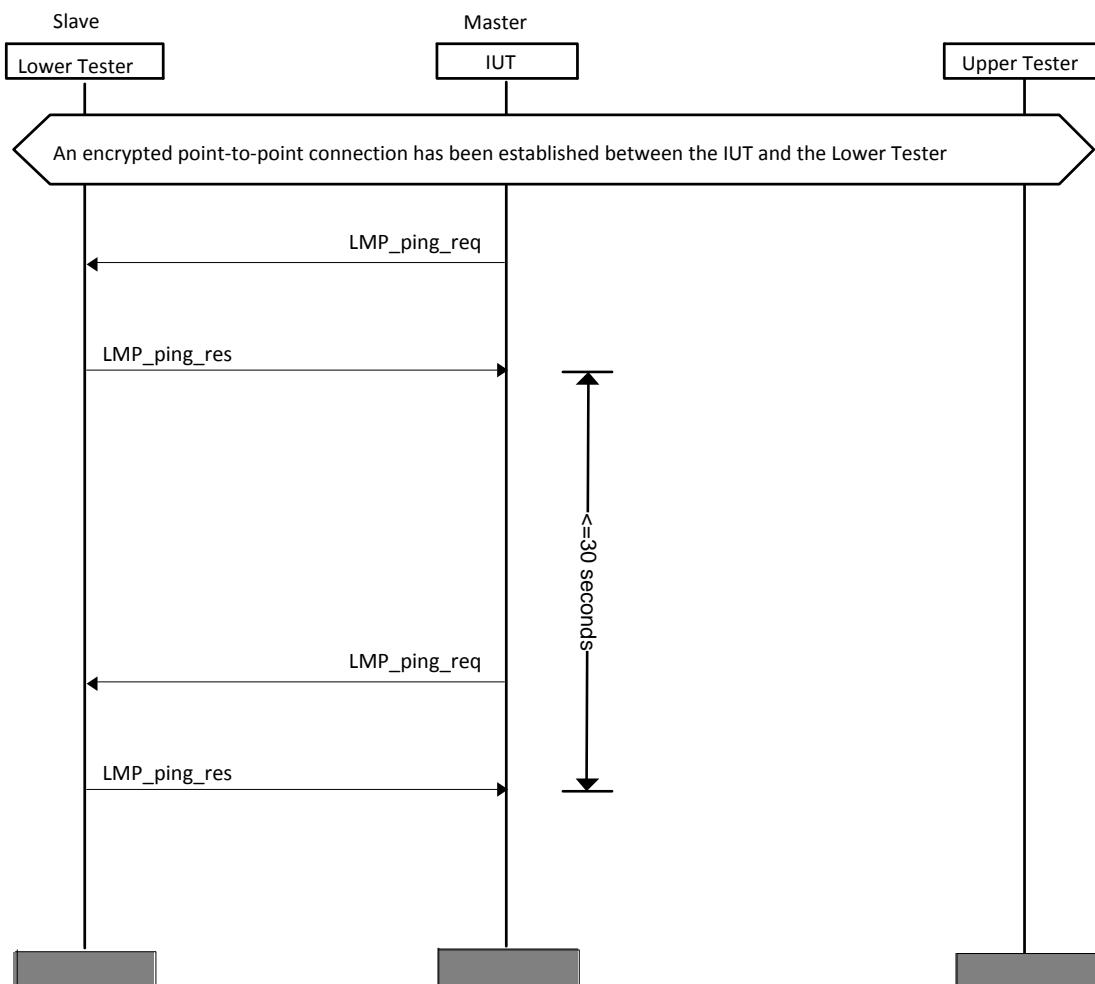


Figure 4.70: LMP/ENC/BV-46-C

1. The ACL connection is kept idle i.e. no ACL-U or ACL-C traffic is exchanged for 60 seconds.
 2. The IUT transmits the PDU LMP_ping_req so that the LMP_ping_res messages successfully received by the IUT are less than (or equal to) 30 seconds apart.
 3. The Lower Tester responds with LMP_ping_res.
- Expected Outcome

Pass verdict

The IUT transmits the PDU LMP_ping_req so that the LMP_ping_res messages successfully received by the IUT are less than (or equal to) 30 seconds apart.



- Notes

The Lower Tester should attempt to not transmit any packets that contain a MIC. However, if this is not possible and the Lower Tester autonomously transmits a data packet that contains a MIC, the Lower Tester should wait another 30 seconds.

4.5.2.28 LMP/ENC/BV-47-C [Responding to LMP_ping_req when AES-CCM Encryption is enabled]

- Test Purpose

Verify that the IUT as master responds to an LMP_ping_req sent by the Lower Tester when AES-CCM encryption has been enabled.

- Reference

[1] 4.1.13

- Initial Condition

The Lower Tester is slave and the IUT is master.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

- Test Procedure

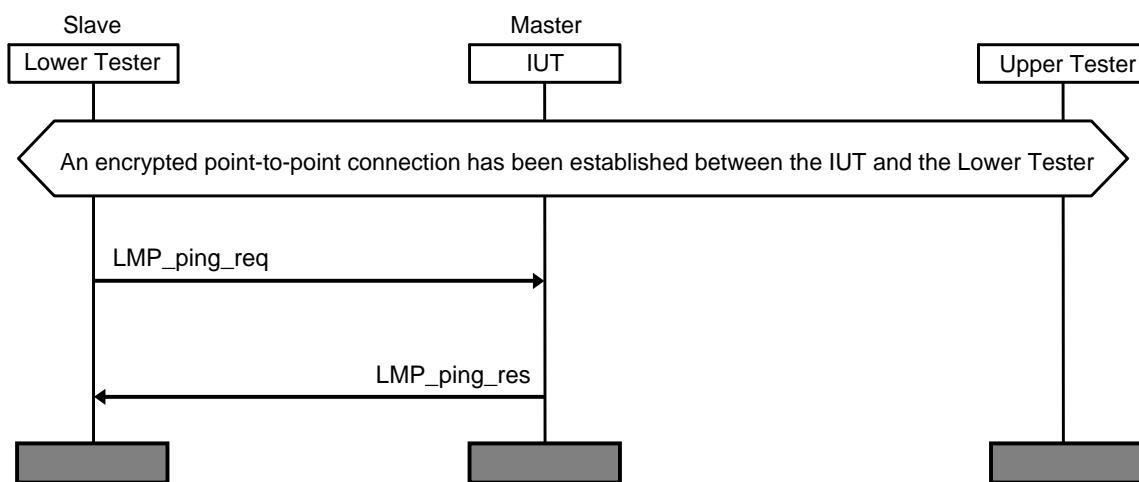


Figure 4.71: LMP/ENC/BV-47-C

- The Lower Tester transmits the PDU LMP_ping_req.
 - The IUT responds with an LMP_ping_res.
- Expected Outcome

Pass verdict

The IUT responds to every LMP_ping_req with an LMP_ping_res.

4.5.2.29 LMP/ENC/BV-48-C [No response to LMP_ping_req]

- Test Purpose

Verify that the IUT as master generates the HCI Authenticated Payload Timeout Expired event when the Lower Tester doesn't respond to an LMP_ping_req sent by the IUT within the Authenticated_Payload_Timeout interval.

- Reference

[1] 4.1.13

- Initial Condition

The Lower Tester is slave and the IUT is master.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

- Test Procedure

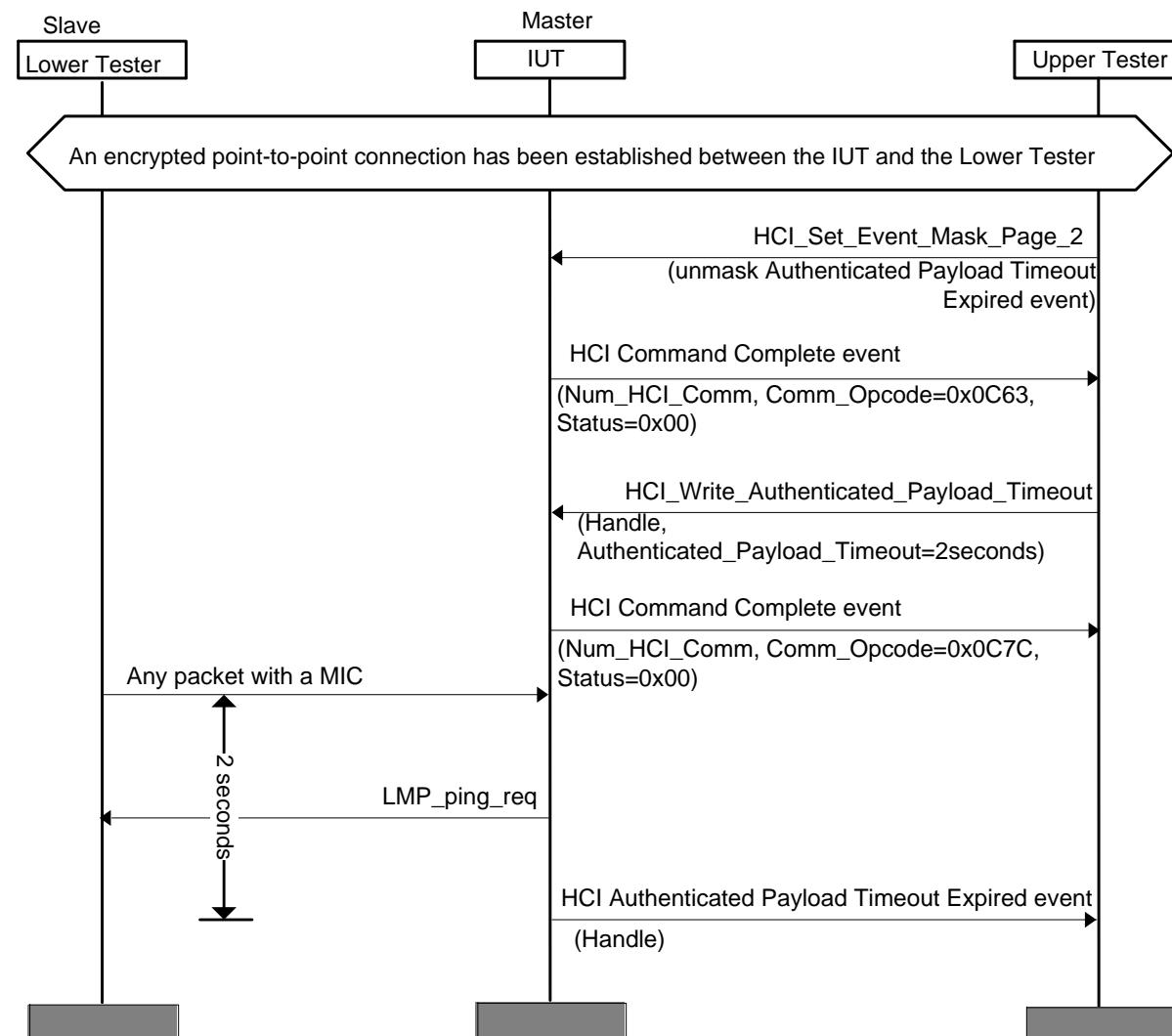


Figure 4.72: LMP/ENC/BV-48-C



1. The Upper Tester sets the Authenticated_Payload_Timeout to 2 seconds.
 2. The Upper Tester unmasks the HCI Authenticated Payload Timeout Expired event.
 3. The ACL connection is kept idle i.e. no ACL-U or ACL-C traffic is exchanged for 10 seconds.
 4. The IUT transmits the PDU LMP_ping_req to the Lower Tester.
 5. The Lower Tester does not respond with LMP_ping_res.
 6. The IUT sends an HCI Authenticated Payload Timeout Expired event to the Upper Tester 2 seconds after the last packet that contained a MIC was received by the IUT from the Lower Tester.
- Expected Outcome

Pass verdict

The IUT transmits the PDU LMP_ping_req to the Lower Tester and sends an HCI Authenticated Payload Timeout Expired event to the Upper Tester when the Lower Tester doesn't respond with an LMP_ping_res.

4.5.2.30 LMP/ENC/BV-49-C [Modified Authentication Payload Timeout]

- Test Purpose

Verify that the IUT as master uses the correct value of the Authenticated Payload Timeout set by the Upper Tester.

- Reference

[1] 4.1.13

- Initial Condition

The Lower Tester is slave and the IUT is master.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.



- Test Procedure

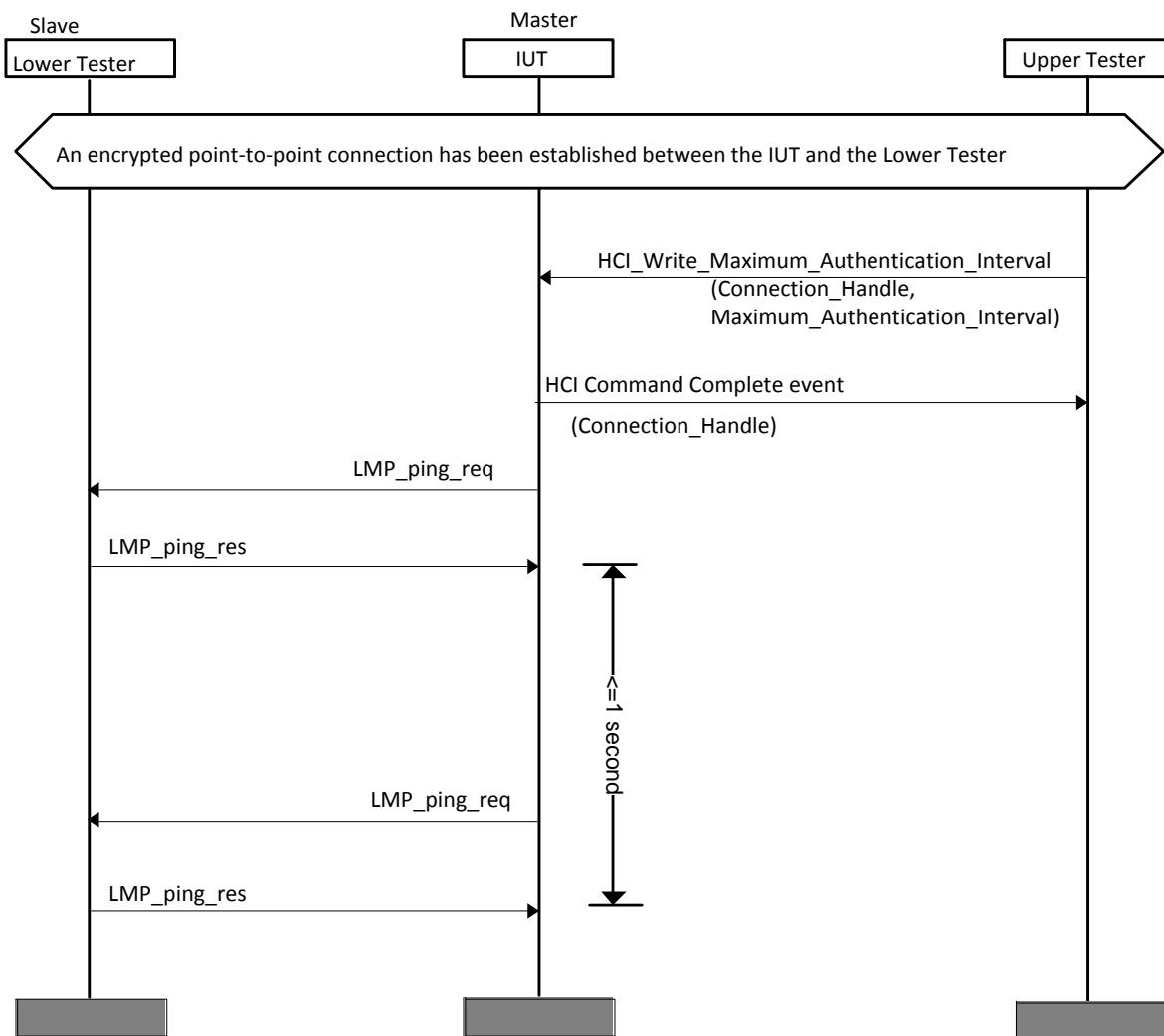


Figure 4.73: LMP/ENC/BV-49-C

1. The Upper Tester modifies the Authentication Payload Timeout to 1 second.
 2. The ACL connection is kept idle i.e. no ACL-U or ACL-C traffic is exchanged for 2 seconds.
 3. The IUT transmits the PDU `LMP_ping_req` so that the `LMP_ping_res` messages successfully received by the IUT are less than (or equal to) 1 second apart.
 4. The Lower Tester responds with `LMP_ping_res` PDU.
- Expected Outcome

Pass verdict

The IUT transmits the PDU `LMP_ping_req` so that the `LMP_ping_res` messages successfully received by the IUT are less than (or equal to) 1 second apart.

- Notes

The Lower Tester should attempt to not transmit any packets that contain a MIC. However, if this is not possible and the Lower Tester autonomously transmits a data packet that contains a MIC, the Lower Tester should wait another 1 second.



4.5.2.31 LMP/ENC/BV-50-C [Initiate AES-CCM Encryption – Legacy Host]

- **Test Purpose**

Verify that the IUT initiates the encryption procedure and uses E0 encryption only for point to point messages when the remote controller's LMP feature bits indicate support for Secure Connections both in the Controller and the Host but the local host does not indicate support for Secure Connections and reports the correct Encryption_Enabled to a legacy Host.

- **Reference**

[1] 4.2.5

- **Initial Condition**

The Lower Tester is slave and the IUT is master.

The Upper Tester doesn't set the Secure Connections Host Support to enabled.

ACL connection has been established between the IUT and the Lower Tester and the creation of a link key between the IUT and Lower Tester has been successful.



- Test Procedure

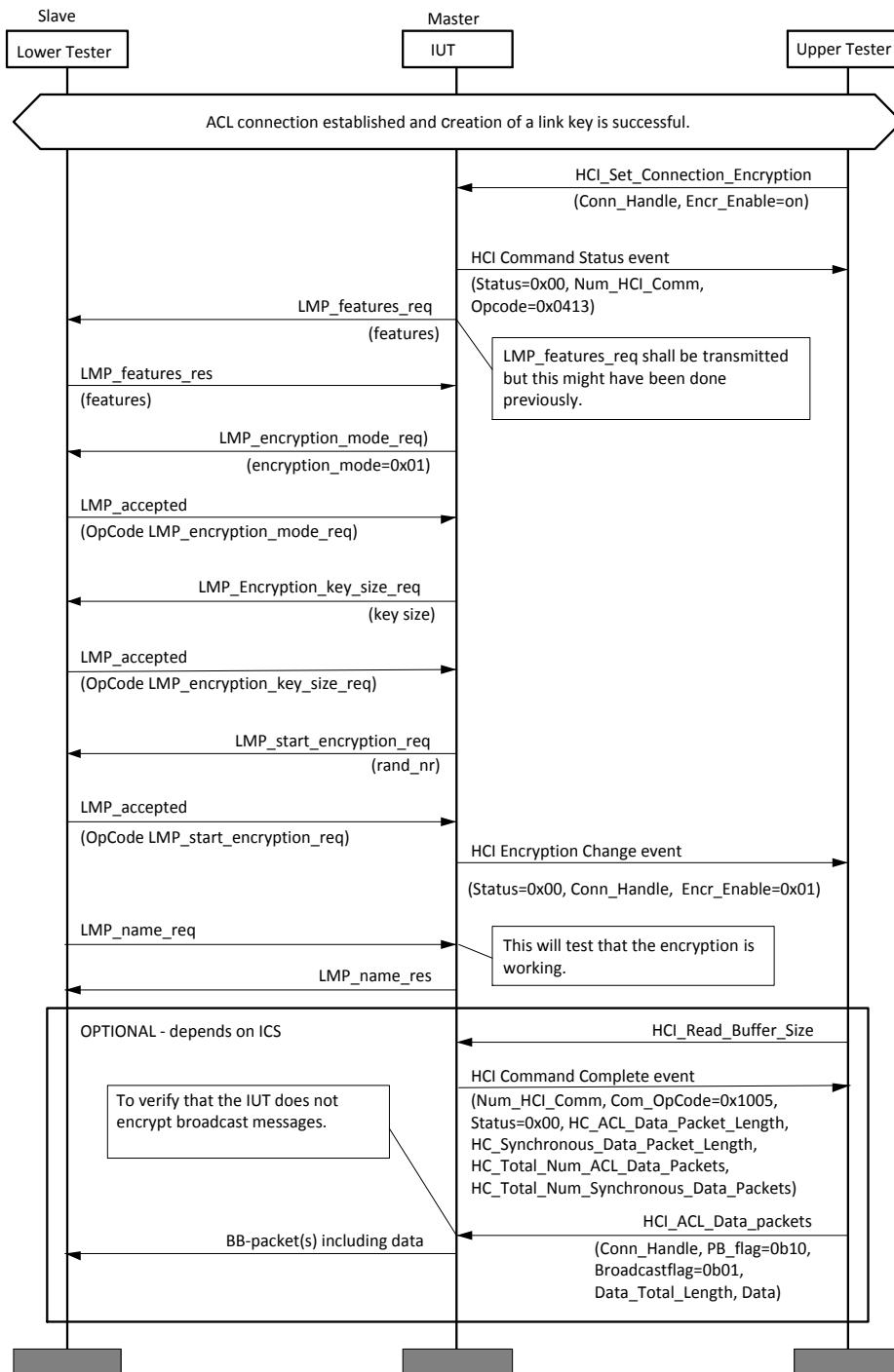


Figure 4.74: LMP/ENC/BV-50-C: Encryption is initiated after ACL connection creation.

If the IUT supports broadcast packets the IUT transmits non-encrypted broadcast packets.

- Test Condition

If the IUT supports broadcast packets as indicated by the ICS selection of BB, 11/1 the optional portion of the MSC is applicable and verifies that encryption is not used by the IUT in broadcast packets.



- Expected Outcome

Pass verdict

The IUT initiates the encryption negotiation and uses the encryption afterwards.

The IUT responds correctly to the PDU LMP_name_req (this proves that encryption is used).

If broadcast is supported the IUT transmits broadcast ACL packets with non-encrypted payload to the Lower Tester.

If Read Encryption Key Size is supported, the IUT shall return the key_size parameter from the LMP_encryption_key_size_req PDU in the Command Complete event following the HCI Read Encryption Key Size command.

The Encryption_Enabled Parameter in the Encryption Change event or the Connection Complete event reports “Link Level Encryption is ON with E0”.

- Notes

The suggested key size must be within the Lower Tester’s key size range.

4.6 Information Requests

- Test group objectives:

To verify the correct implementation of the Information requests services.

4.6.1 Clock Offset Request - Slave

- Test subgroup objectives:

To verify that the master can request this clock offset anytime during the connection. The IUT is slave.

4.6.1.1 LMP/INF/BV-01-C [Clock Offset Response]

- Test Purpose

Verify that the IUT responds with the clock offset upon request from the Lower Tester.

IUT is slave. The Lower Tester is master.

- Reference

[1] 4.3.2

- Initial Condition

See [Default Settings](#).



- Test Procedure

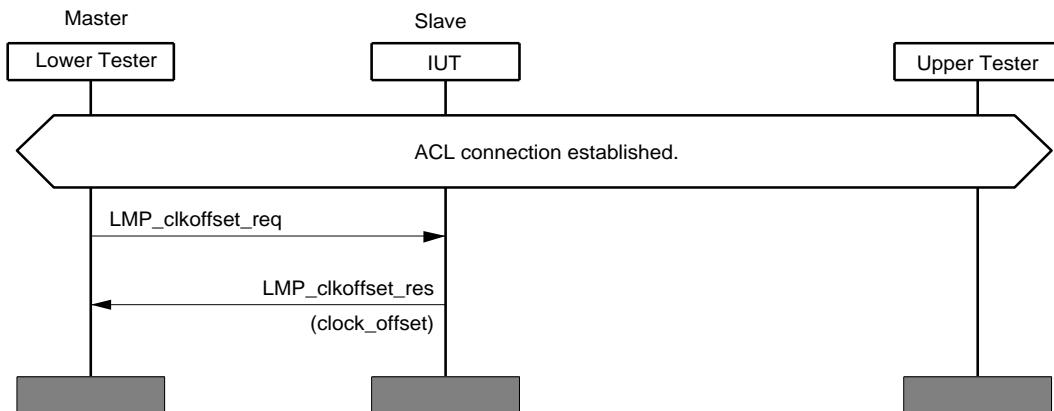


Figure 4.75: LMP/INF/BV-01-C

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_clkoffset_res upon reception of PDU LMP_clkoffset_req.

4.6.2 Clock Offset Request - Master

- Test subgroup objectives:

To verify that the master can request this clock offset anytime during the connection. The IUT is master.

4.6.2.1 LMP/INF/BV-02-C [Clock Offset Request]

- Test Purpose

Verify that the IUT can request for the Lower Tester's clock offset.

IUT is master. The Lower Tester is slave.

- Reference

[1] 4.3.2

- Initial Condition

See [Default Settings](#).

The IUT must page the Lower Tester to become the master of the Piconet.



- Test Procedure

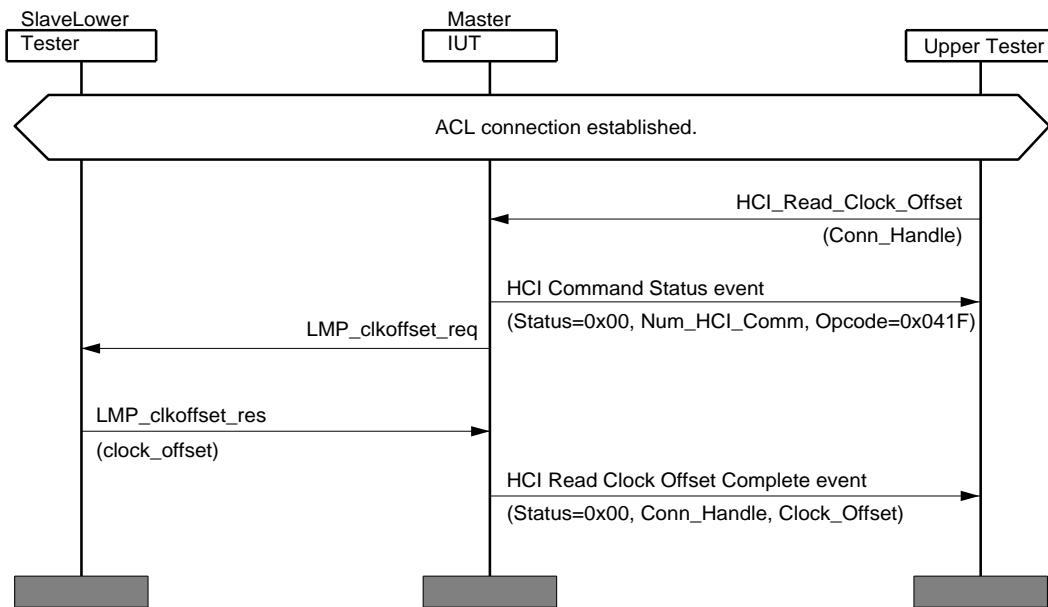


Figure 4.76: LMP/INF/BV-02-C

- Test Condition

It must be possible to control the IUT to initiate the Clock offset request.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_clkoffset_req and accepts reception of PDU LMP_clkoffset_res.

4.6.3 Timing Accuracy Information Request - Both Master and Slave

- Test subgroup objectives:

To verify that a unit can request for timing accuracy information. The role of the IUT is of no importance.

4.6.3.1 LMP/INF/BV-05-C [Timing Accuracy Response]

- Test Purpose

Verify that the IUT responds with timing accuracy information upon request from the Lower Tester. The Lower Tester initiates the service.

- Reference

[1] 4.3.1

- Initial Condition

See Default Settings (Section 4.2.3).



- Test Procedure

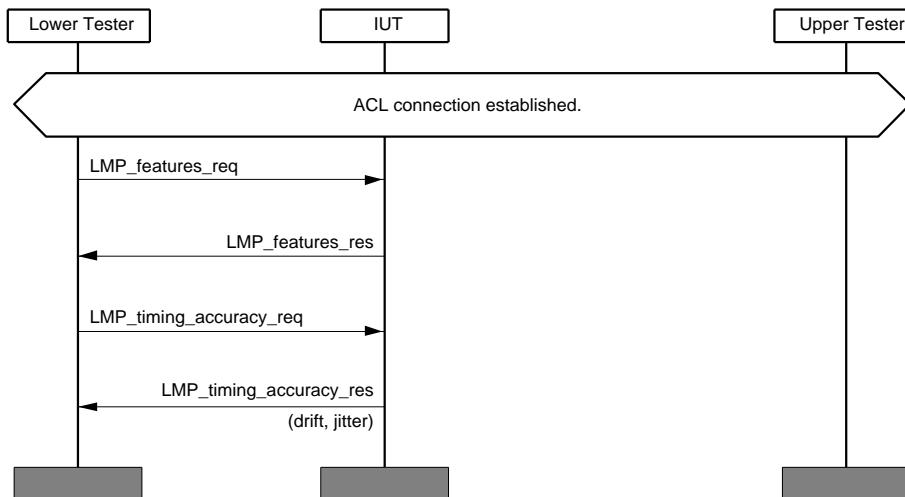


Figure 4.77: LMP/IINF/BV-05-C

- Test Condition

The manufacturer of the IUT must define Drift and Jitter.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_timing_accuracy_res containing drift and jitter defined by the manufacturer upon reception of PDU LMP_timing_accuracy_req.

4.6.4 LMP Version - Both Master and Slave

- Test subgroup objectives:

To verify that a unit can request for the version of the LM protocol of another unit. The role of the IUT is of no importance.

4.6.4.1 LMP/IINF/BV-08-C [Version/Company ID Response]

- Test Purpose

Verify that the IUT responds with the correct Version number and company ID upon request from the Lower Tester.

The Lower Tester initiates the service.

- Reference

[1] 4.3.3

[Bluetooth Assigned Numbers](#)

- Initial Condition

See [Default Settings](#).



- Test Procedure

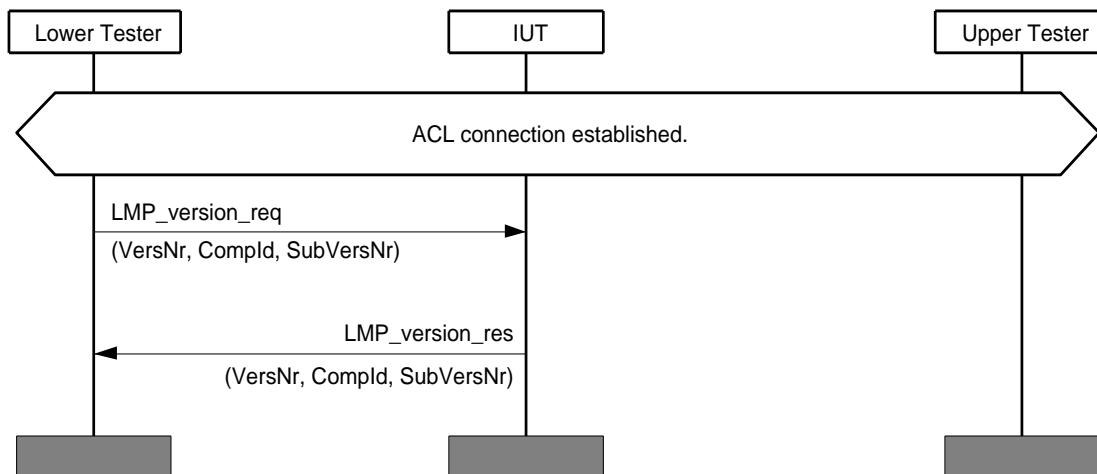


Figure 4.78: LMP/INF/BV-08-C

- Test Condition

The manufacturer of the IUT must declare VersNr, Compld and SubVersNr as IXIT.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_version_res containing VersNr, Compld and SubVersNr as declared by the manufacturer upon reception of PDU LMP_version_req.

The VersNr value sent by the IUT matches the Specification version to which conformance is claimed.

4.6.4.2 LMP/INF/BV-09-C [Request LMP Version]

- Test Purpose

Verify that the IUT can request the LMP version from the Lower Tester.

The IUT initiates the service.

- Reference

[1] 4.3.3

[Bluetooth Assigned Numbers](#)

- Initial Condition

See [Default Settings](#).



- Test Procedure

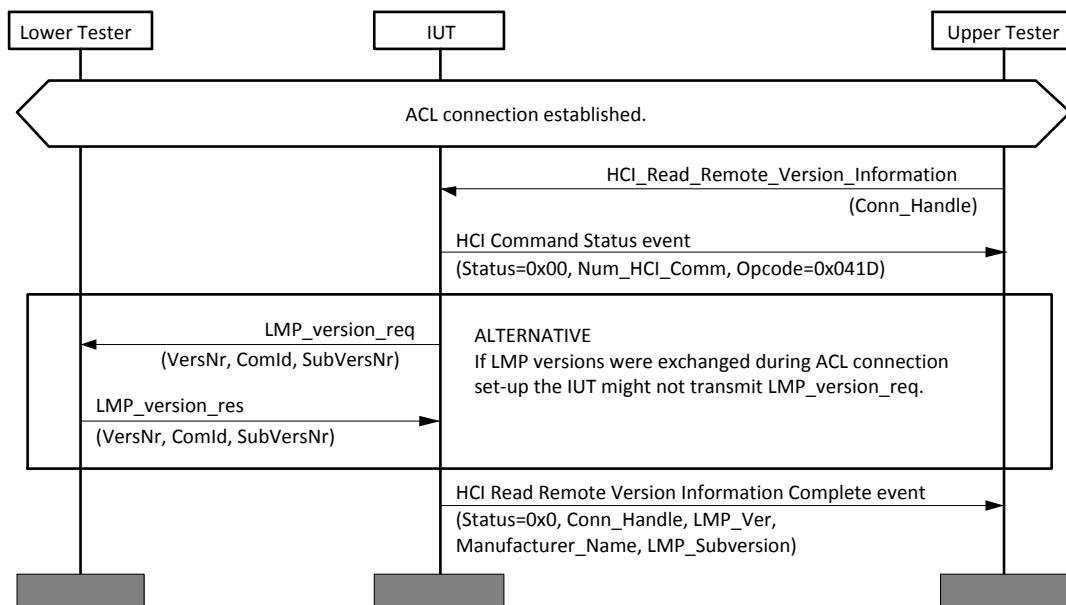


Figure 4.79: LMP/INF/BV-09-C

- Test Condition

The manufacturer of the IUT must declare VersNr, ComId and SubVersNr as IXIT.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_version_req containing VersNr, ComId and SubVersNr as declared by the manufacturer and accepts reception of PDU LMP_version_res.

The IUT returns HCI Read Remote Version Information Complete Event containing the values received in the PDU LMP_version_res.

The VersNr value sent by the IUT in the LMP_version_req matches the Specification version to which conformance is claimed.

- Notes

If LMP versions were exchanged during ACL connection set-up the IUT might not transmit LMP_version_req.

4.6.5 Supported features - Both Master and Slave

- Test subgroup objectives:

To verify that a unit can request for another unit's supported features. The role of the IUT is of no importance.



4.6.5.1 LMP/INF/BV-10-C [Supported Features Response]

- **Test Purpose**

Verify that the IUT responds with the correct features supported upon request from the Lower Tester.
The Lower Tester initiates the service.

- **Reference**

[1] 4.3.4

- **Initial Condition**

See [Default Settings](#).

- **Test Procedure**

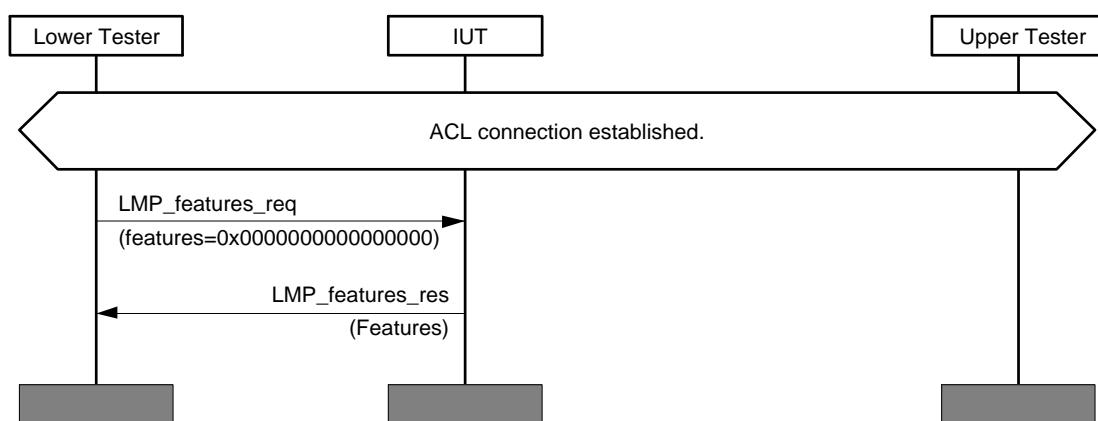


Figure 4.80: LMP/INF/BV-10-C

- **Test Condition**

The manufacturer of the IUT must define features supported.

- **Expected Outcome**

Pass verdict

The IUT transmits PDU LMP_features_res containing features supported defined by the manufacturer upon reception of PDU LMP_features_req.

- **Notes**

The feature 0x000000 means that the Lower Tester supports nothing.

4.6.5.2 LMP/INF/BV-11-C [Supported Features Request]

- **Test Purpose**

Verify that the IUT can request for the features supported by the Lower Tester.

The IUT initiates the service.



- Reference
[1] 4.3.4
- Initial Condition
See [Default Settings](#).
- Test Procedure

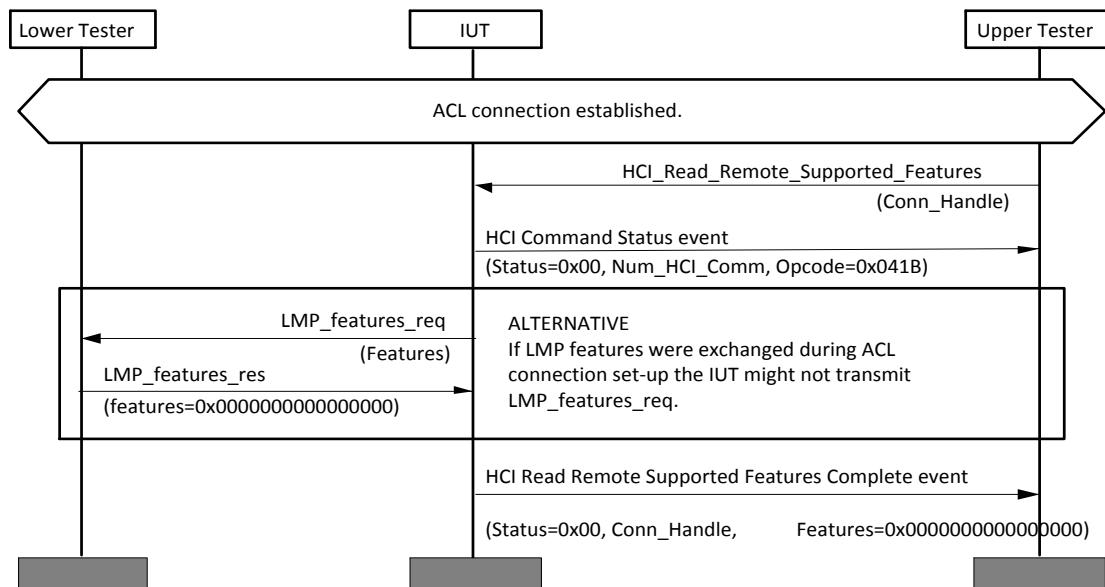


Figure 4.81: LMP/INF/BV-11-C

- Test Condition

It must be possible to control the IUT to initiate the features request.

The manufacturer of the IUT must define features supported.

- Expected Outcome

Pass verdict

The IUT transmits PDU **LMP_features_req** containing features supported defined by the manufacturer and accepts reception of PDU **LMP_features_res**.

- Notes

The feature **0x000000** means that the Lower Tester supports nothing.

4.6.5.3 LMP/INF/BV-14-C [Tx Power Limit]

- Test Purpose

Verify that the IUT does not transmit over 4 dBm when features have been exchanged and the Lower Tester does not support RSSI. The IUT acts as master.



- Reference

[6] 3

[1] 4.5.3

- Initial Condition

See [Default Settings](#).

- Test Procedure

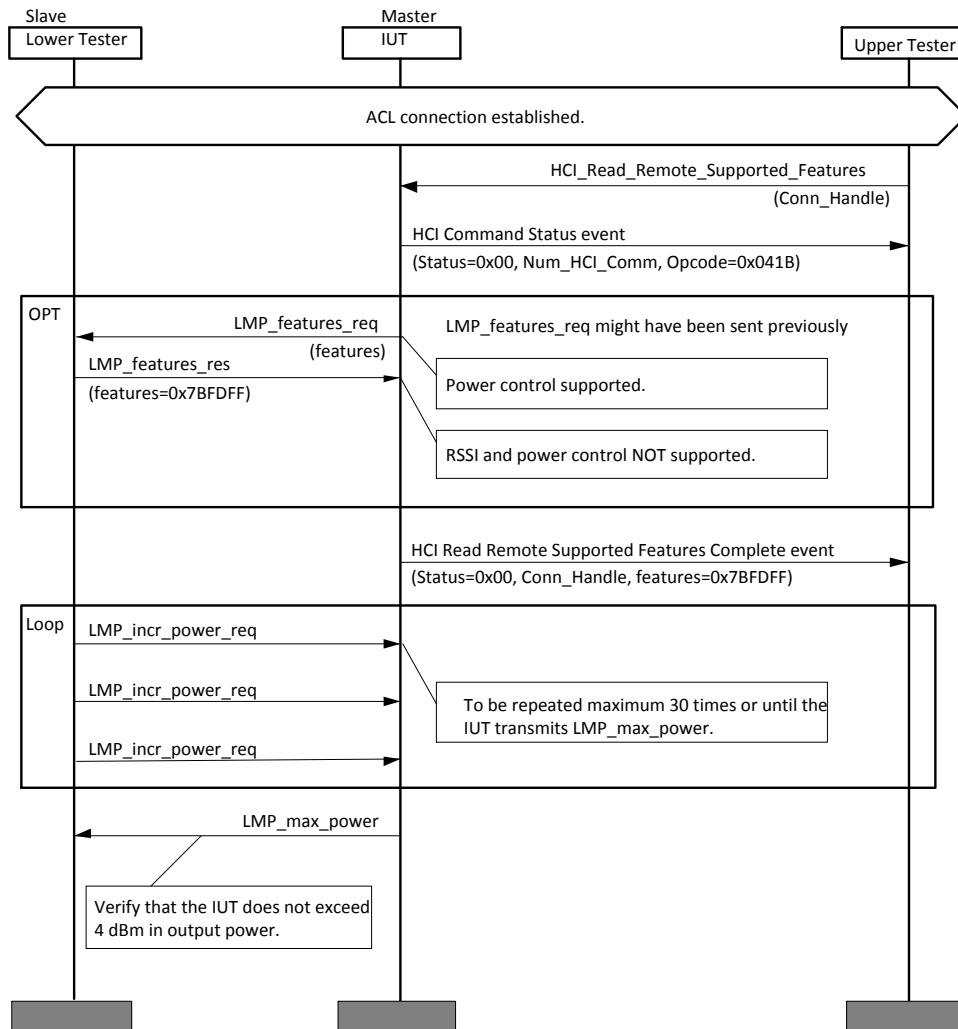


Figure 4.82: LMP/INF/BV-14-C

The power transmitted by the IUT shall be measured on all packets commencing after the Lower Tester has sent LMP_features_res. The peak power shall be measured on every packet (baseband and link manager functionality) received from the IUT.

- Test Condition

Nominal Test Conditions, see [6] Section 5.1. The Lower Tester and IUT must be connected with cable and RF attenuator to give sufficient measurement accuracy. An IXIT parameter is used to give



the value for the RF attenuator calculated from the IUT's maximum TX power level, the cable loss and the Lower Tester's preferred RX power level.

- Expected Outcome

Pass verdict

The IUT does not transmit over 4 dBm after receiving LMP_features_res.

- Notes

The IUT might transmit over 4 dBm during a short period of time after receiving LMP_features_res for latency reasons. It is assumed the Lower Tester's RF power level measurement function is calibrated with respect to its own bandwidth and the bandwidth of a conformant Bluetooth RF signal. The measurement inaccuracy should not exceed ± 2 dB.

The feature (0x7BFDF) means that the Lower Tester does not support RSSI and power control.

It is assumed the IUT's transmit power range is less than 60 dB.

4.6.5.4 LMP/INF/BV-16-C [Extended Features Request]

- Test Purpose

Verify that the IUT asks for extended features supported.

- Reference

[1] 4.3.4

- Initial Condition

See [Default Settings](#).



- Test Procedure

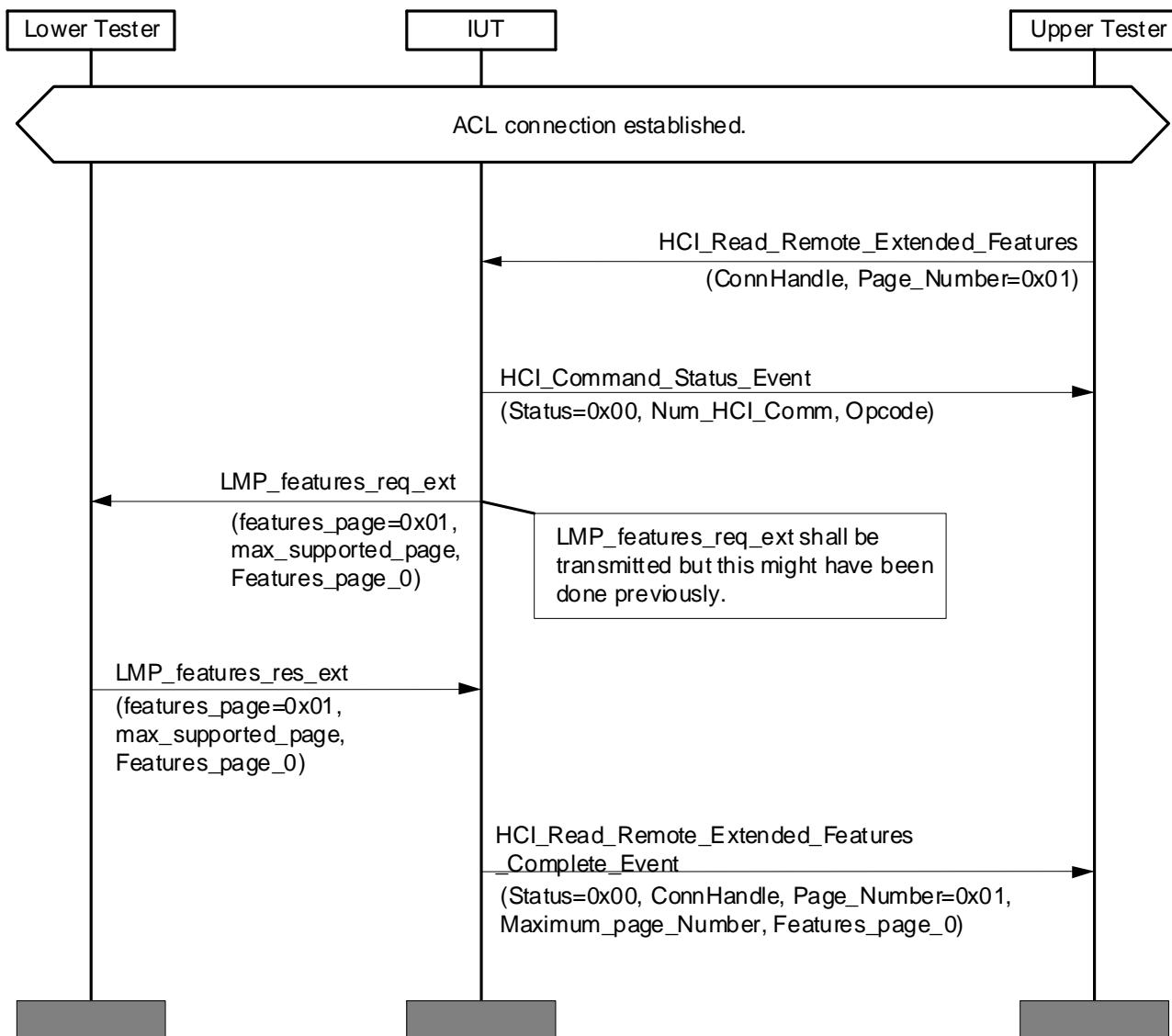


Figure 4.83: LMP/INF/BV-16-C

- Test Condition

The manufacturer of the IUT must define extended features supported.

- Expected Outcome

Pass verdict

The IUT transmits PDU **LMP_features_req_ext** containing extended features supported defined by the manufacturer.

- Notes

If remote extended features have been cached by the IUT it might not transmit **LMP_features_req_ext** again.



4.6.5.5 LMP/INF/BV-17-C [Extended Features Response]

- Test Purpose

Verify that the IUT responds with the correct extended features supported upon request from the Lower Tester.

- Reference

[1] 4.3.4

- Initial Condition

See [Default Settings](#).

- Test Procedure

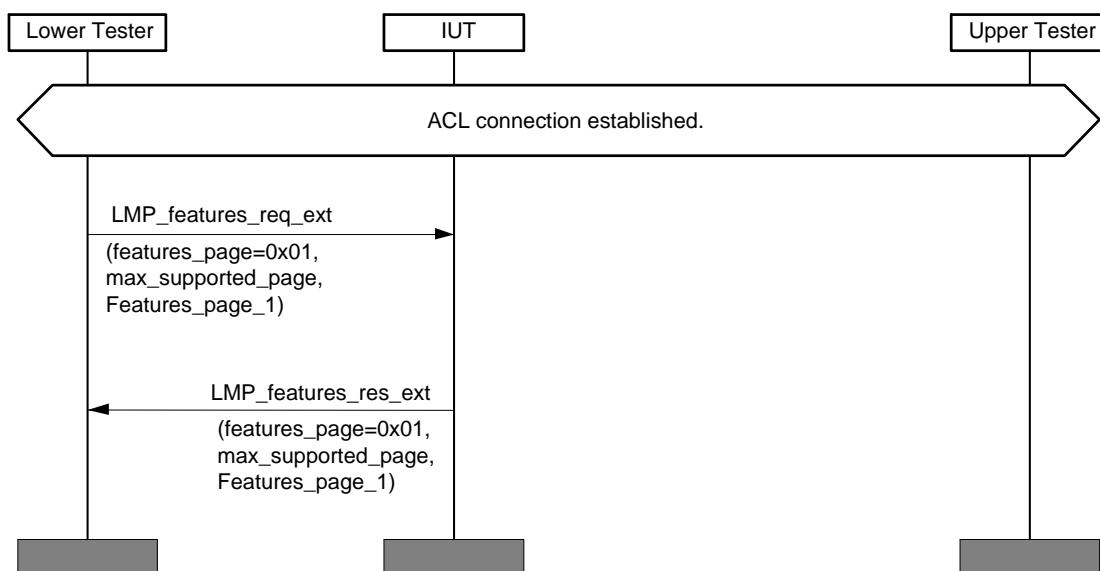


Figure 4.84: LMP/INF/BV-17-C

- Test Condition

The manufacturer of the IUT must define extended features supported. Feature number 63, extended features, is supported.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_features_res_ext containing extended features supported defined by the manufacturer upon reception of PDU LMP_features_req_ext.

4.6.6 Name Request - Both Master and Slave

- Test subgroup objectives:

To verify that a unit can request for another unit's name. The role of the IUT is of no importance.



4.6.6.1 LMP/INF/BV-12-C [Name Response]

- **Test Purpose**

Verify that the IUT responds with the correct name upon request from the Lower Tester. The Lower Tester initiates the service.

- **Reference**

[1] 4.3.5

- **Initial Condition**

See [Default Settings](#).

Name of the IUT must have been entered.

- **Test Procedure**

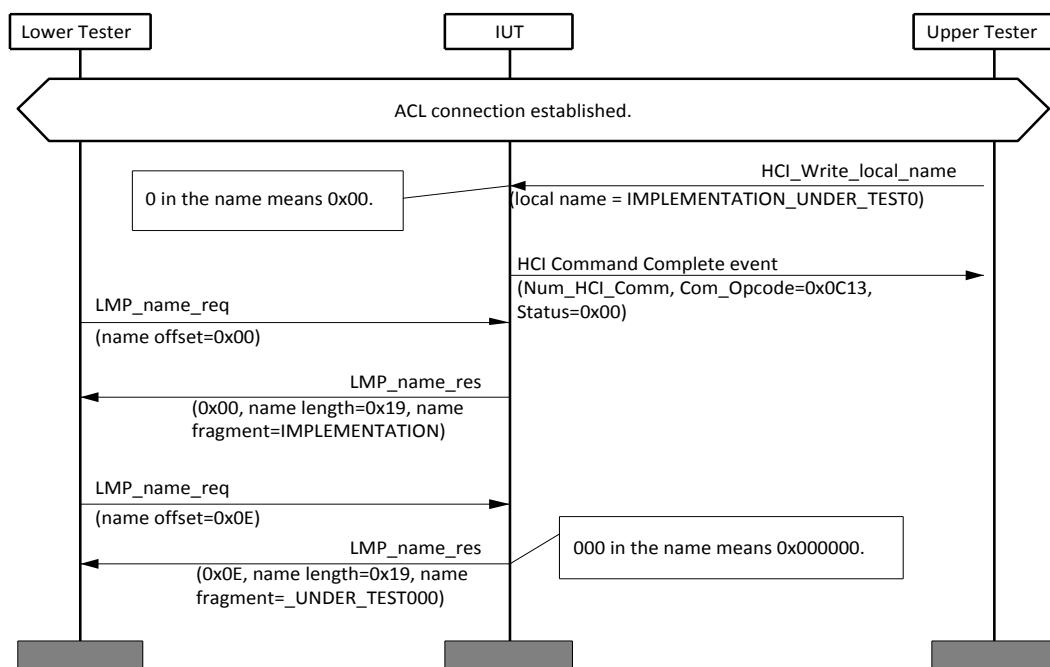


Figure 4.85: LMP/INF/BV-12-C

- **Test Condition**

It must be possible to enter a name or the name must be provided by the manufacturer.

Expected Outcome

Pass verdict

The IUT transmits PDU **LMP_name_res** upon reception of PDU **LMP_name_req**.

4.6.6.2 LMP/INF/BV-13-C [Name Request]

- **Test Purpose**

Verify that the IUT can request the name from the Lower Tester.



The IUT initiates the service.

- Reference

[1] 4.3.5

- Initial Condition

See [Default Settings](#).

Name of the IUT must have been entered.

- Test Procedure

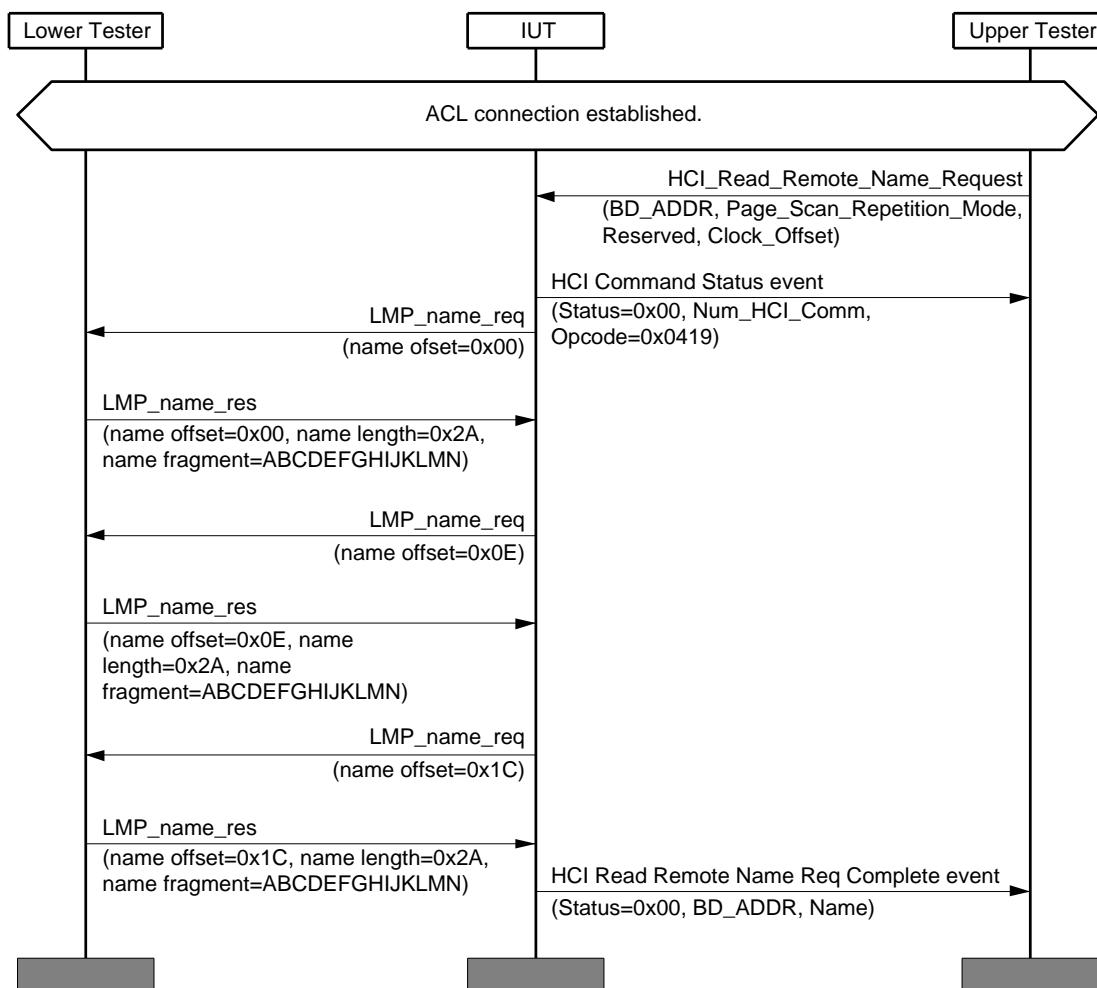


Figure 4.86: LMP/INF/BV-13-C

- Test Condition

It must be possible to control the IUT to initiate the name request.

It must be possible to enter a name or the name must be provided by the manufacturer.



- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_name_req and accepts reception of PDU LMP_name_res, this must be repeated until the full name is retrieved. Correct name passed to the Upper Tester.

4.6.6.3 LMP/INF/BV-18-C [Simple Pairing Controller - Remote Name Request - IUT Initiator]

- Test Purpose

Verify that the IUT responds correctly to Remote Name Request command from the Host.

- Reference

[1] 4.3.5

[7] 7.1.19

[8] 2.1

- Initial Condition

See Section 4.1.3 and Version 2.1 Host Preamble.

Upper and Lower Tester Supports SSP.

Lower Tester's LMP SSP (Host) feature bit is set

Lower Tester's LMP extended feature bit is set.



- Test Procedure

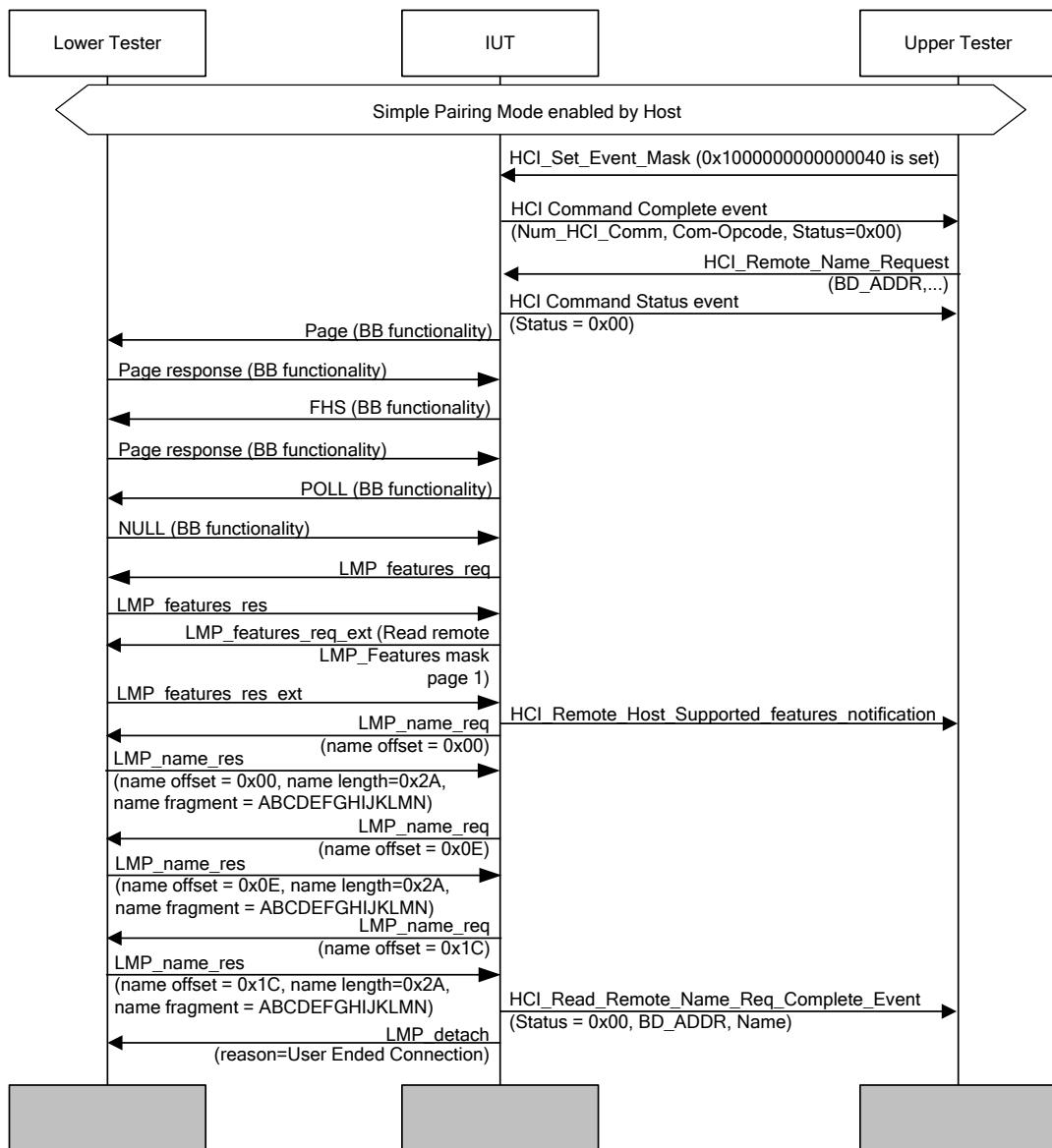


Figure 4.87: LMP/INF/BV-18-C

- Test Condition

It must be possible to control the IUT to initiate the name request.

It must be possible to enter a name or the name must be provided by the manufacturer.



- Expected Outcome

Pass verdict

The IUT returns Remote Host Supported features after reading the LMPextended feature page.

The IUT transmits PDU LMP_name_req after retrieving the LMP features and accepts reception of PDU LMP_name_res, this must be repeated until the full name is retrieved. Correct name passed to the Upper Tester.

4.6.6.4 LMP/INF/BV-19-C [Simple Pairing Controller - Remote Name Request -Legacy remote device without extended features - IUT Initiator]

- Test Purpose

Verify that the Remote Host Supported Features Notification event is not generated against a legacy device that does not support the LMP extended features. IUT has 2.1 or later Host and 2.1 or later Controller. Lower Tester has 2.0 Host and 2.0 Controller.

- Reference

[1] 4.3.5

[8] 2.1

[7] 7.1.19

- Initial Condition

Version 2.1 Host Preamble.

Lower Tester's LMP extended feature bit is not set.

- Test Procedure

IUT performs a remote name request.



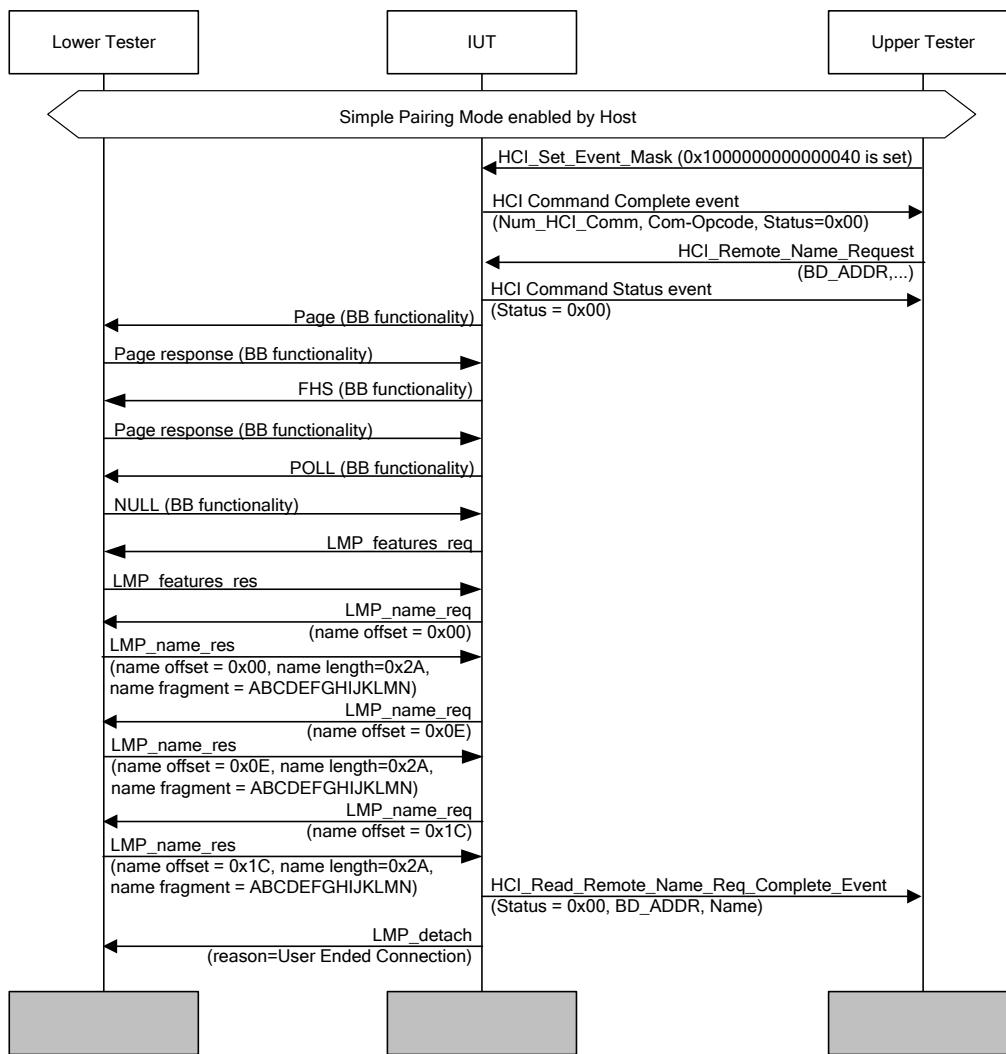


Figure 4.88: LMP/INF/BV-19-C

- Expected Outcome

Pass verdict

Verify that the LMP extended feature page is not read.

Verify that the Remote Name Request Complete event is generated and that the Remote Host Supported Features Notification event is not sent.

4.6.6.5 LMP/INF/BV-20-C [Simple Pairing Controller - Remote Name Request - Legacy remote device with extended features - IUT Initiator]

- Test Purpose

Verify that the IUT responds correctly to Remote Name Request command from the Host.

- Reference

[1] 4.3.5

[8] 2.1



[7] 7.1.19

- Initial Condition

See Section 4.1.3 and Version 2.1 Host Preamble.

Lower Tester's LMP SSP (Host) and Controller feature bits are not set.

Lower Tester's LMP extended feature bit is set.

- Test Procedure

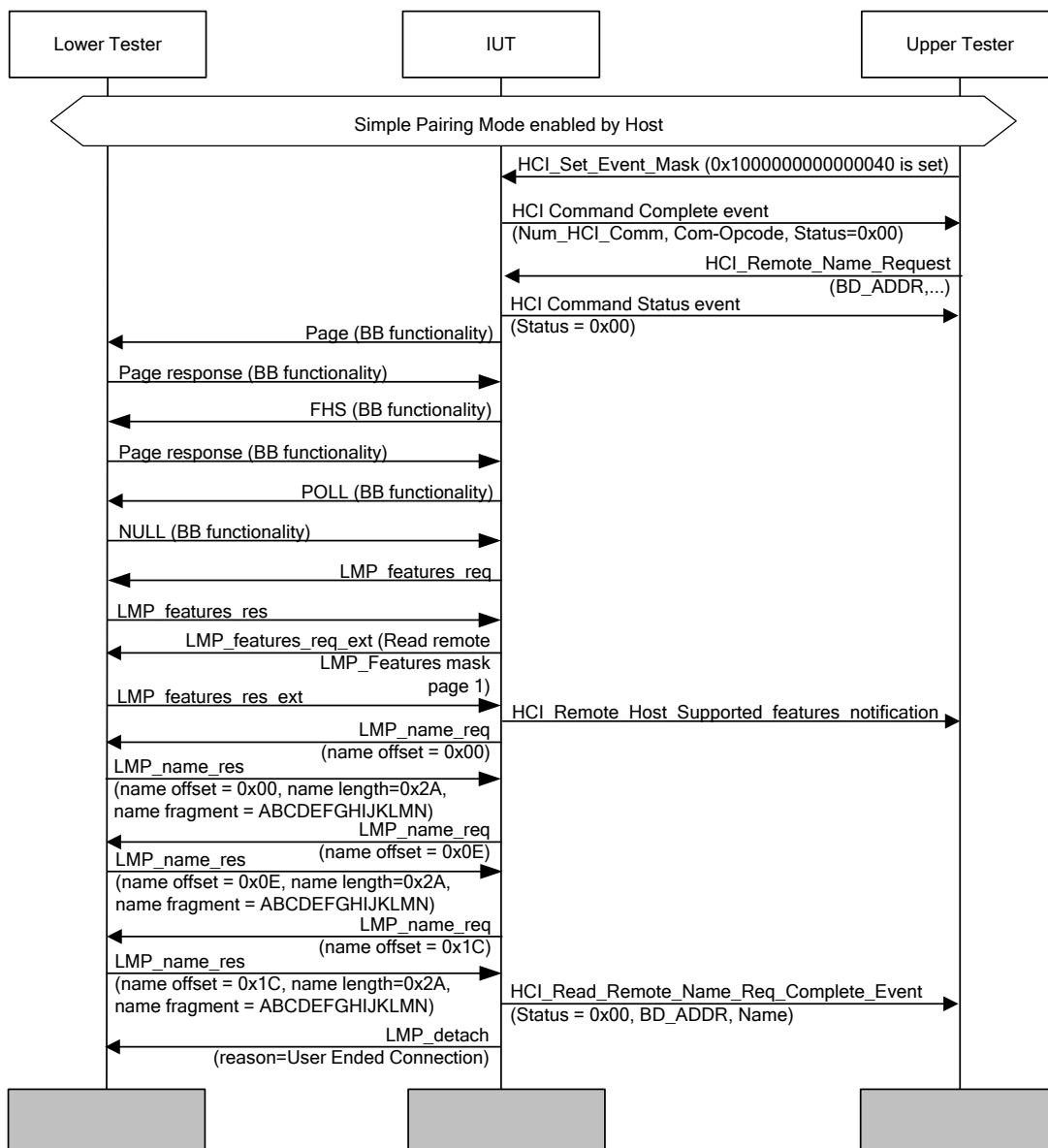


Figure 4.89: LMP/IINF/BV-20-C

- Test Condition

It must be possible to control the IUT to initiate the name request.



It must be possible to enter a name or the name must be provided by the manufacturer.

- Expected Outcome

Pass verdict

The IUT returns Remote Host Supported features after reading the LMP feature page.

The IUT transmits PDU LMP_name_req after retrieving the LMP features and accepts reception of PDU LMP_name_res, this must be repeated until the full name is retrieved. Correct name passed to the Upper Tester.

4.6.6.6 LMP/INF/BV-21-C [Simple Pairing Controller - Remote Name Response - IUT Responder]

- Test Purpose

Verify that the IUT responds with LMP extended features page 1 when requested during a remote name request. IUT has 2.1 or later Host and 2.1 or later Controller. Lower Tester has 2.1 Host and 2.1 Controller.

- Reference

[1] 4.3.5

[8] 2.1

[7] 7.1.19

- Initial Condition

Version 2.1 Host Preamble.

Lower Tester's LMP extended features bit is set.

Lower Tester's LMP SSP (Host) Feature bit is set.

IUT has page scan enabled.

- Test Procedure

Lower Tester performs a Remote Name Request.



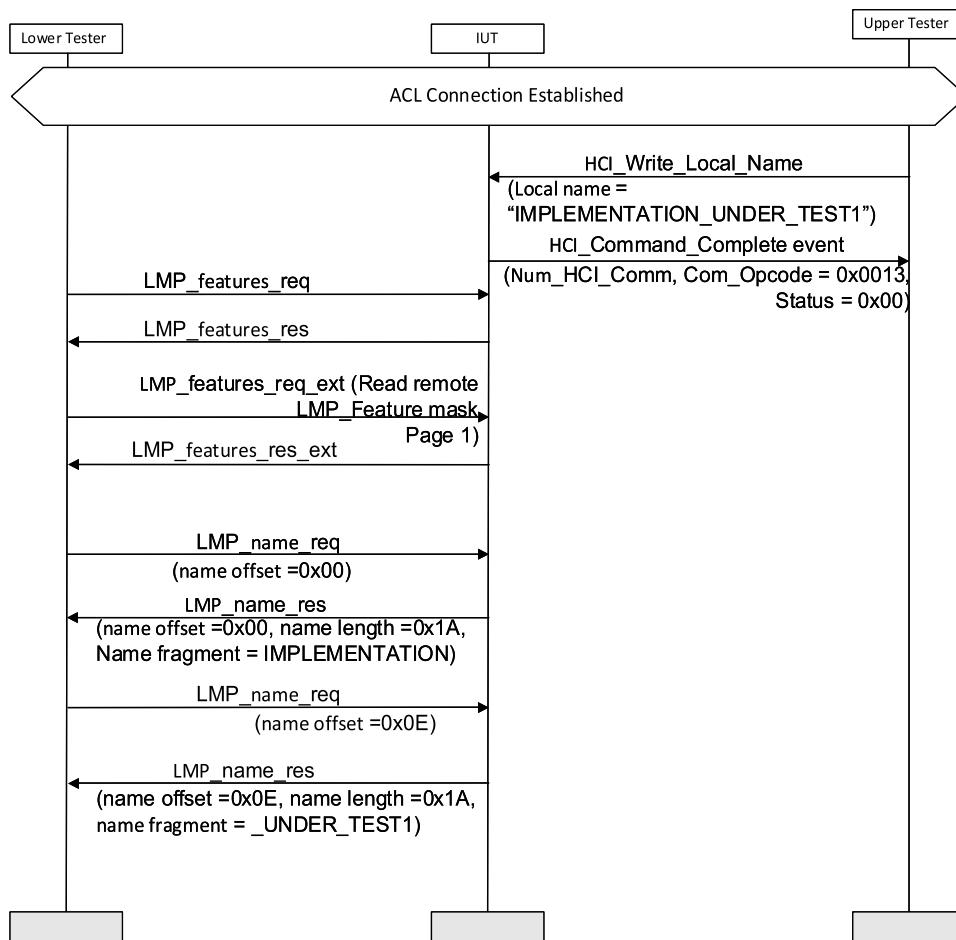


Figure 4.90: LMP/INF/BV-21-C [Simple Pairing Controller - Remote Name Response - IUT Responder]

- Expected Outcome

Pass verdict

IUT responds with LMP extended features page 1 when requested during a remote name request.
IUT responds to the remote name request from the Lower Tester.

4.6.6.7 LMP/INF/BV-22-C [LE Features in LMP Feature Set]

- Test Purpose

Verify that IUT responds with the correct LE features and extended LE features supported upon request from the Lower Tester.

The IUT acts as a responder BR device.

The Lower Tester is a BR/EDR device and initiates the service.

- Reference

[1] 3.2



- Initial Condition

[Default Settings.](#)

- Test Procedure

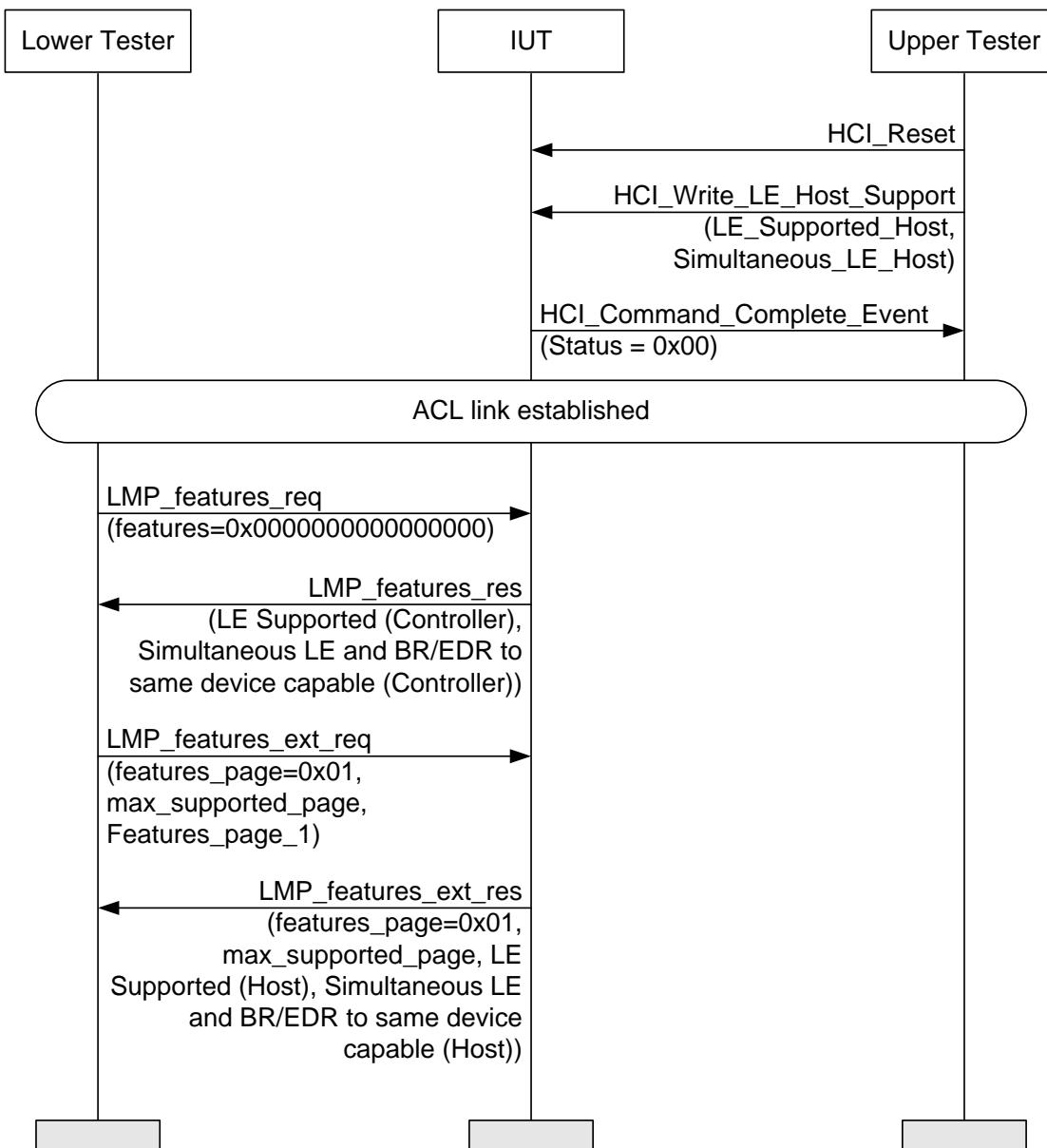


Figure 4.91: LMP/INF/BV-22-C

- Expected Outcome

Pass verdict

The IUT transmits PDU **LMP_features_res** containing

"LE Supported (Controller)" and "Simultaneous LE and BR/EDR to same device capable (Controller)" features set to value as reported by the **HCI_Read_Local_Supported_Features** response upon reception of PDU **LMP_features_req**.



The IUT transmits PDU LMP_features_res_ext containing

“LE Supported (Host)” and “Simultaneous LE and BR/EDR to same device capable (Host)” extended features set to values in Write LE Host Supported upon reception of PDU LMP_features_req_ext.

4.7 Link Handling

- Test group objectives:

To verify the correct implementation of the Link Handling services.

4.7.1 Switch of Master Slave Role - Slave

- Test subgroup objectives:

To verify that a unit can request for a Master Slave Switch. The IUT is slave.

4.7.1.1 LMP/LIH/BV-01-C [Initiate Role Switch]

- Test Purpose

Verify that the IUT can request to become a master and carry out all necessary messages. IUT is slave and initiates the service. The Lower Tester is master.

- Reference

[1] 4.4.2

- Initial Condition

See [Default Settings](#).



- Test Procedure

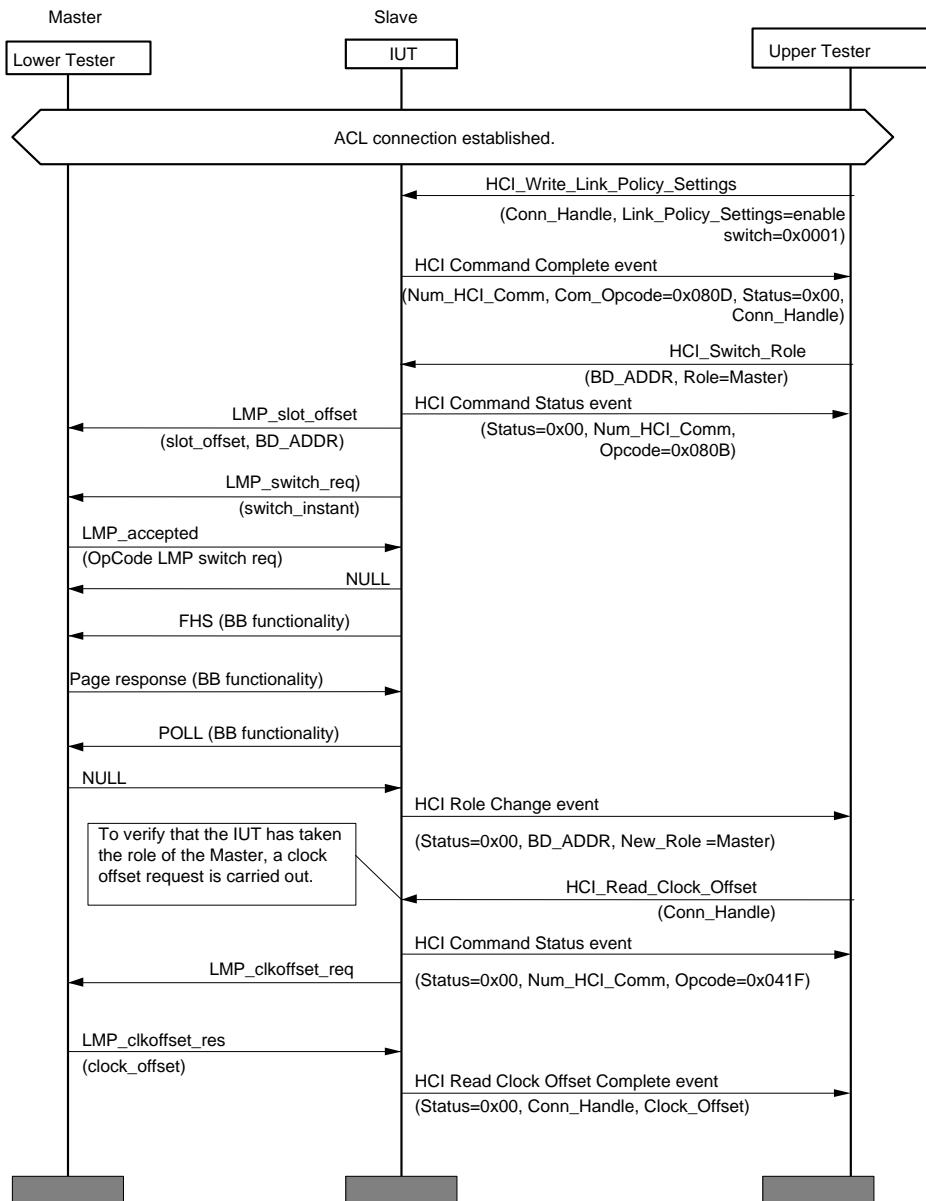


Figure 4.92: LMP/LIH/BV-01-C

- Test Condition

It must be possible to control the IUT to initiate the Master Slave Switch.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_switch_req and accepts reception of PDU LMP_accepted. The IUT must be the master of the piconet.



4.7.1.2 LMP/LIH/BV-79-C [Role Switch at Setup, Slave]

- Test Purpose

Verify that the IUT can request a role switch correctly during connection setup. The Lower Tester initiates the connection establishment and pages the IUT. The IUT requests a master/slave switch. The IUT will become the slave unless the roles switch during connection setup.

- Reference

[1] 4.1.1

- Initial Condition

See [Default Settings](#).



- Test Procedure

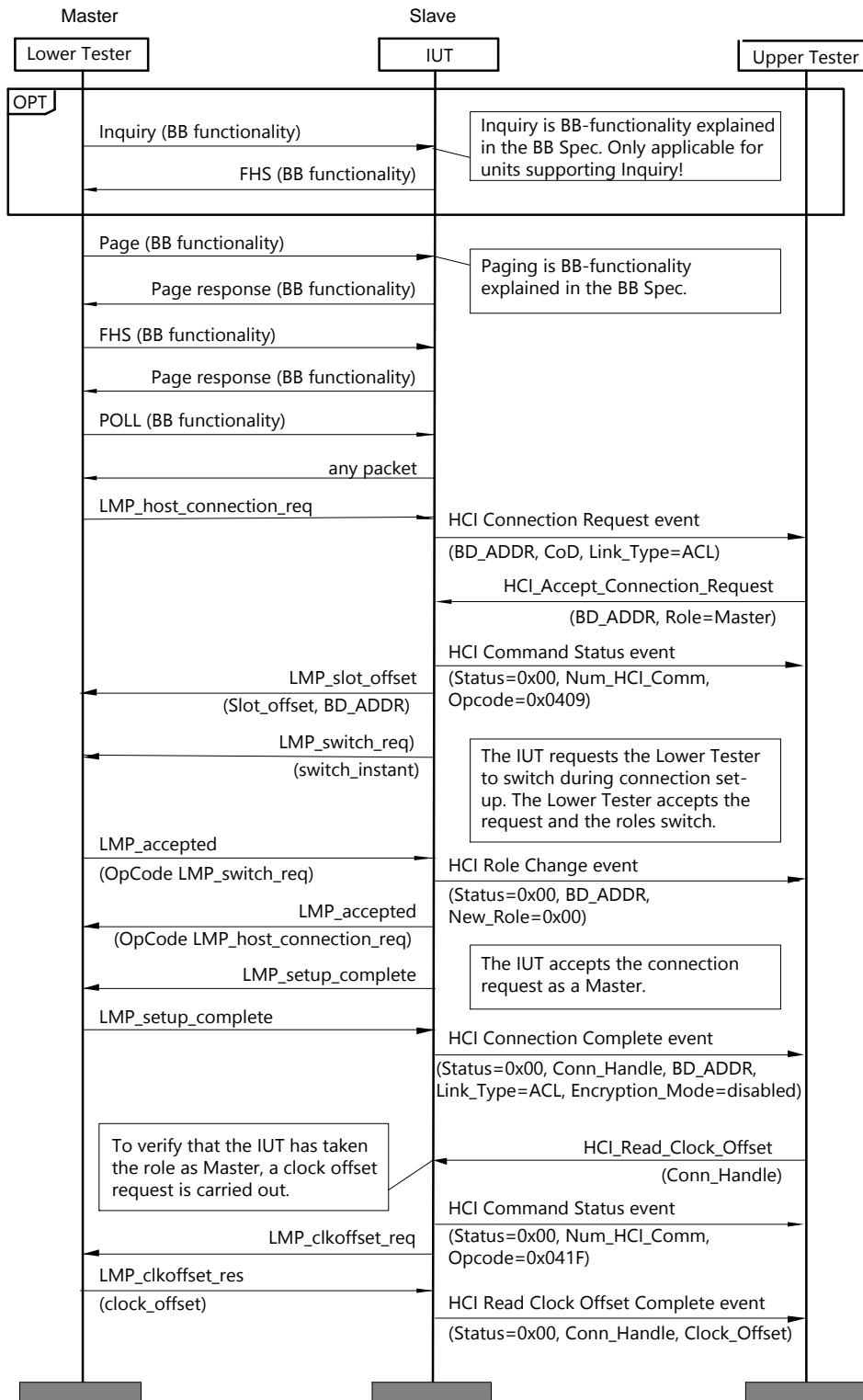


Figure 4.93: LMP/LIH/BV-79-C



- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_slot_offset followed by LMP_switch_req upon reception of PDU LMP_host_connection_req. The IUT transmits PDU LMP_clkoffset_res upon reception of PDU LMP_clkoffset_req.

4.7.2 Switch of Master Slave Role - Master

- Test subgroup objectives:

To verify that a unit can request for a Master Slave Switch. The IUT is master.

4.7.2.1 LMP/LIH/BV-02-C [Accept Role Switch]

- Test Purpose

Verify that the IUT accepts that the Lower Tester requests to switch roles from slave to master and master to slave. IUT is master. The Lower Tester is slave and initiates the service.

- Reference

[1] 4.4.2

- Initial Condition

See [Default Settings](#).

The IUT must page the Lower Tester to become the master of the Piconet.



- Test Procedure

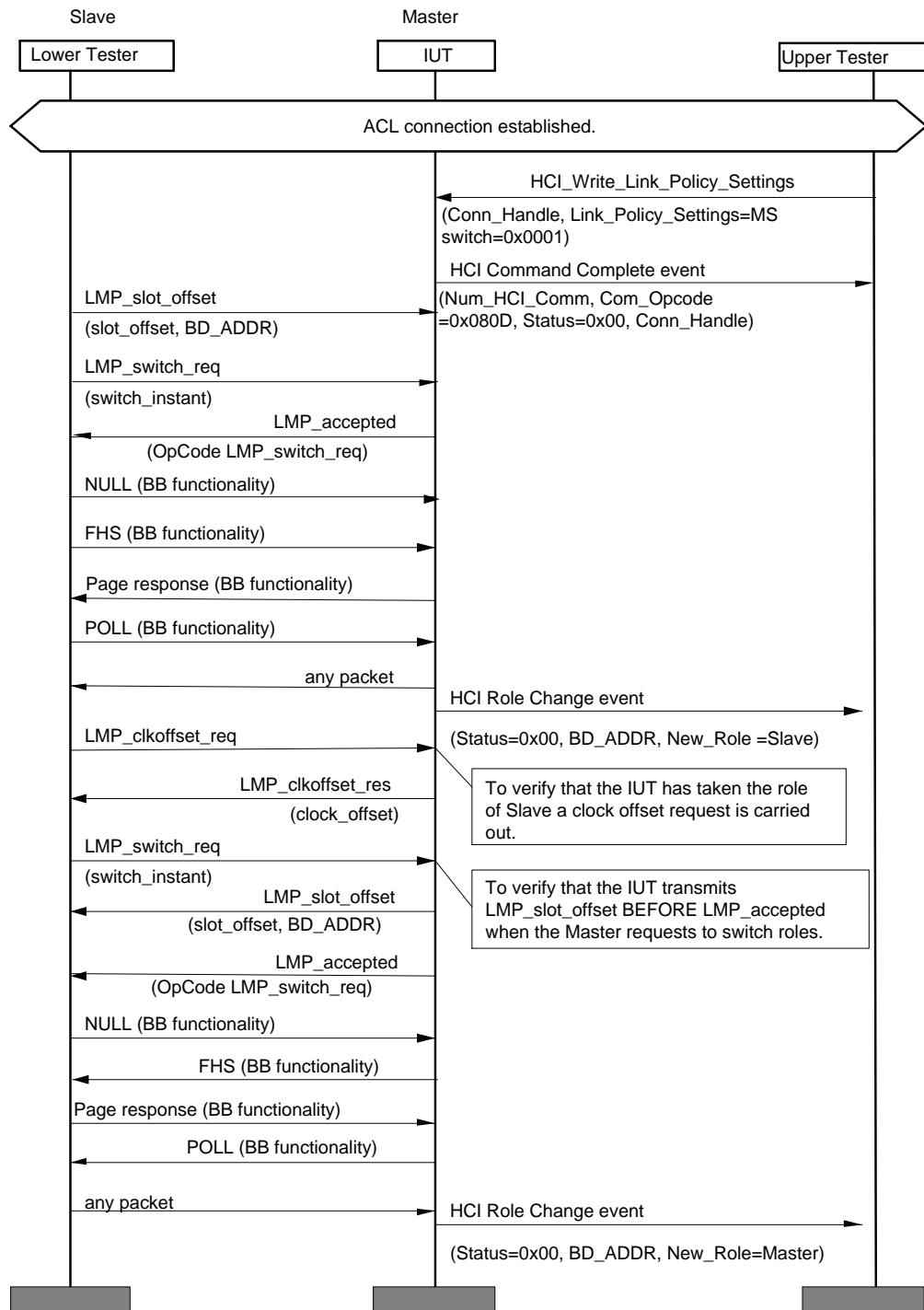


Figure 4.94: LMP/LIH/BV-02-C

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted upon reception of PDU LMP_switch_req.



The IUT must become slave.

The IUT must transmit LMP_slot_offset and LMP_accepted upon reception of LMP_switch_req.

The IUT must become master.

4.7.2.2 [LMP/LIH/BV-78-C \[Role Switch at Setup, Master\]](#)

- Test Purpose

Verify that the IUT handles a role switch request correctly during connection setup. The IUT initiates the connection establishment and pages the Lower Tester. The Lower Tester requests a master/slave switch. The IUT will become the master of the piconet unless the roles switch during connection setup.

- Reference

[\[1\]](#) 4.1.1

- Initial Condition

See [Default Settings](#).



- Test Procedure

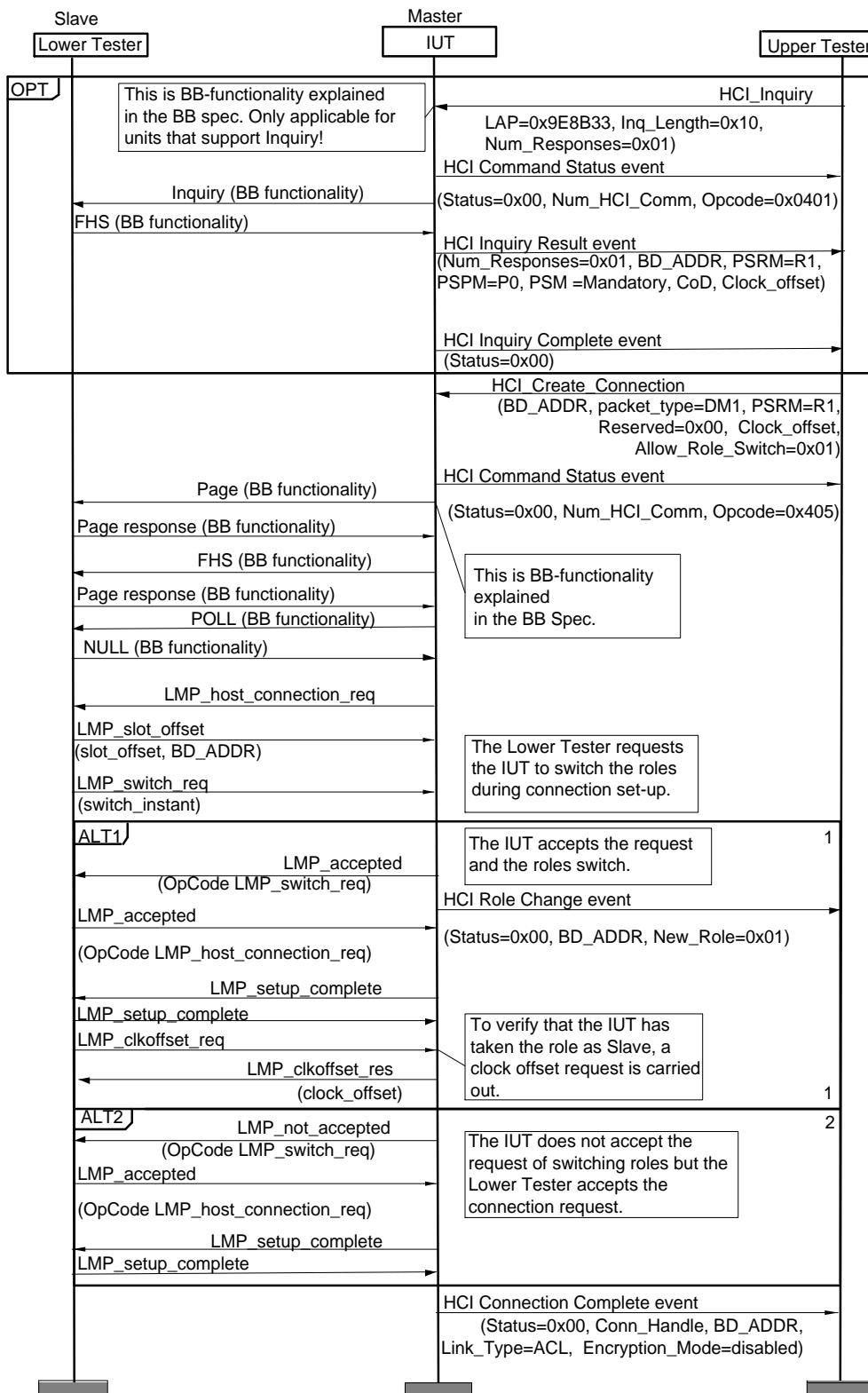


Figure 4.95: LMP/LIH/BV-78 -C



- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted upon reception of PDU LMP_switch_req and transmits PDU LMP_clkoffset_res upon reception of PDU LMP_clkoffset_req.

4.7.3 Switch of Master Slave Role - Both Master and Slave

- Test subgroup objectives:

To verify that the IUT declines the Master Slave Switch in a correct manner. The role of the IUT is of no importance.

4.7.3.1 LMP/LIH/BV-03-C [Unsupported Role Switch]

- Test Purpose

Verify that the IUT responds that it does not support master slave switch upon request from the Lower Tester.

- Reference

[1] 4.4.2

- Initial Condition

See [Default Settings](#).

- Test Procedure

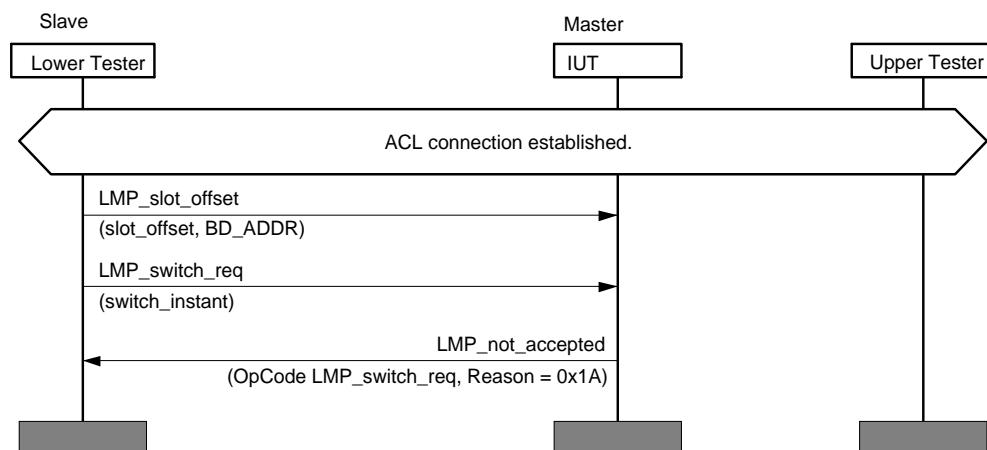


Figure 4.96: LMP/LIH/BV-03-C

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_not_accepted containing "Reason = 0x1A" upon reception of PDU LMP_switch_req.



4.7.4 Detach - Both Master and Slave

- Test subgroup objectives:

To verify that the connection between two Bluetooth devices can be closed anytime by the master or the slave. The role of the IUT is of no importance.

4.7.4.1 LMP/LIH/BV-04-C [Close Link on Request]

- Test Purpose

Verify that the IUT closes the link upon request from the Lower Tester.

The Lower Tester is the Initiator.

- Reference

[1] 4.1.2

See [Default Settings](#).

- Test Procedure

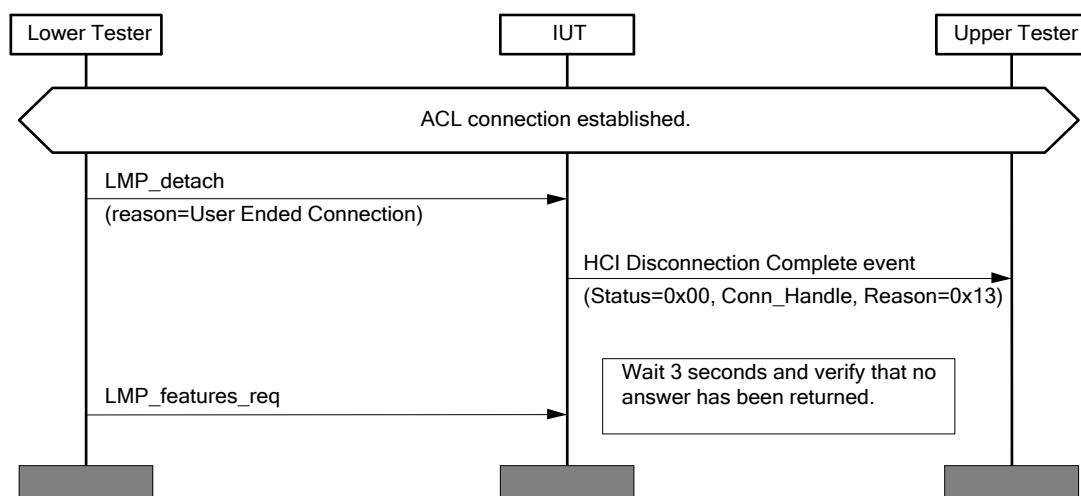


Figure 4.97: LMP/LIH/BV-04-C

- Expected Outcome

Pass verdict

The IUT accepts reception of PDU LMP_Detach. Both the LM and BB links must close down after the reception.

4.7.4.2 LMP/LIH/BV-05-C [Close Link, HCI Command]

- Test Purpose

Verify that the IUT can close the link.

The IUT is the initiating Unit.



- Reference
[1] 4.1.2
- Initial Condition
See [Default Settings](#).
- Test Procedure

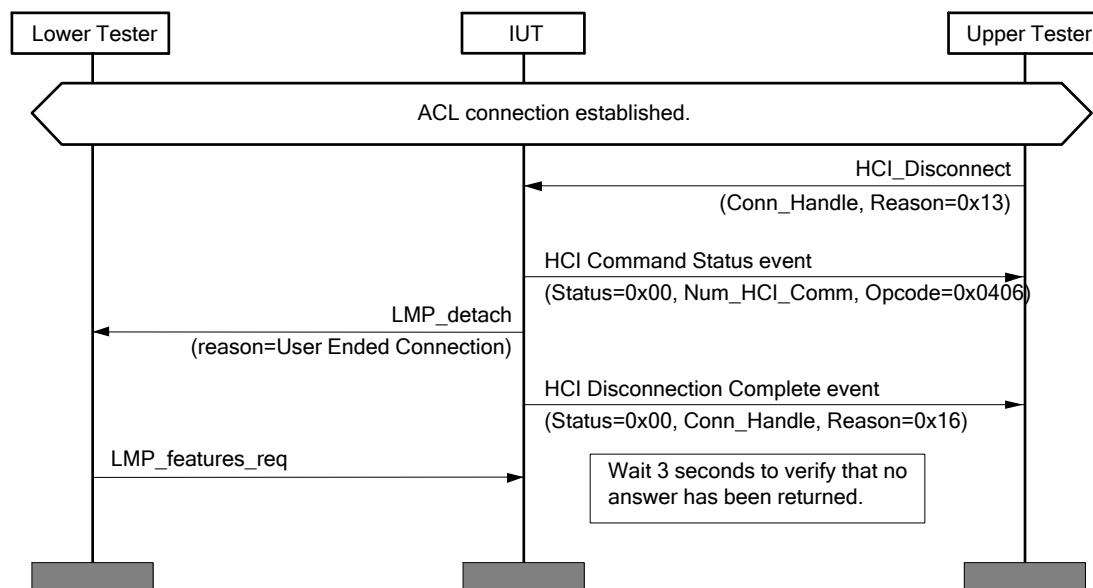


Figure 4.98: LMP/LIH/BV-05-C

- Test Condition

It must be possible to control the IUT to initiate the detach procedure.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_Detach. Both BB and LM links must close down after the reception.

4.7.4.3 LMP/LIH/BV-82-C [Setup Rejected]

- Test Purpose

Verify that the IUT accepts that the Lower Tester rejects the connection setup.

Verify that the IUT closes the link correctly.

IUT is master and requests an ACL link.

- Reference

[1] 4.1.1



- Initial Condition

See [Figure 4.99](#).

- Test Procedure

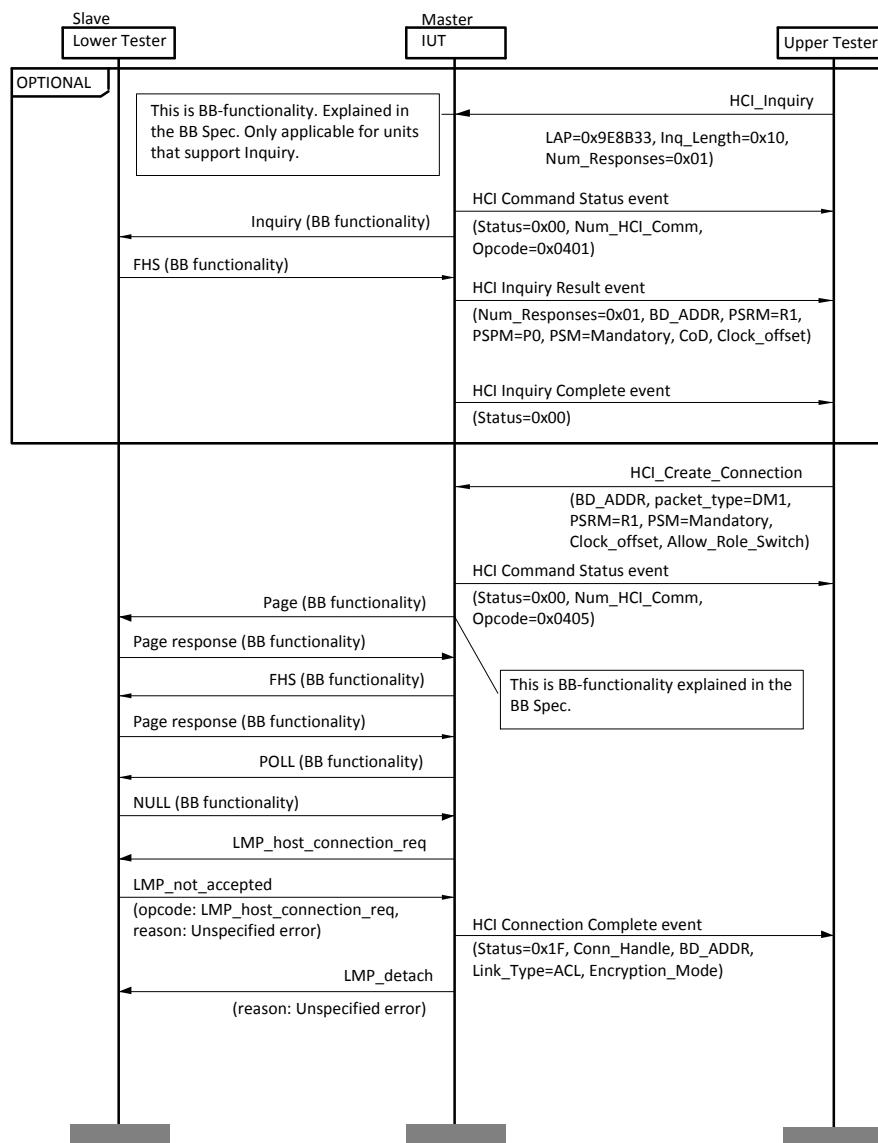


Figure 4.99: LMP/LIH/BV-82-C

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_detach upon reception of PDU LMP_not_accepted.

4.7.5 Hold mode - Slave

- Test subgroup objectives:

To verify that the ACL connection between two Bluetooth devices can be placed in hold mode for a specified hold time. The IUT is slave.



4.7.5.1 LMP/LIH/BV-06-C [Hold Mode, Slave]

- Test Purpose

Verify that the IUT enters and exits Hold Mode after the Hold interval, first upon request from the Lower Tester and then upon force from the Lower Tester. The IUT is slave. The Lower Tester is master and initiates the service first by requesting and as a second step by force. Baseband functionality is tested in the test case.

- Reference

[1] 4.5.1.1

- Initial Condition

See [Default Settings](#).

An IXIT statement gives acceptable values for the hold interval.



- Test Procedure

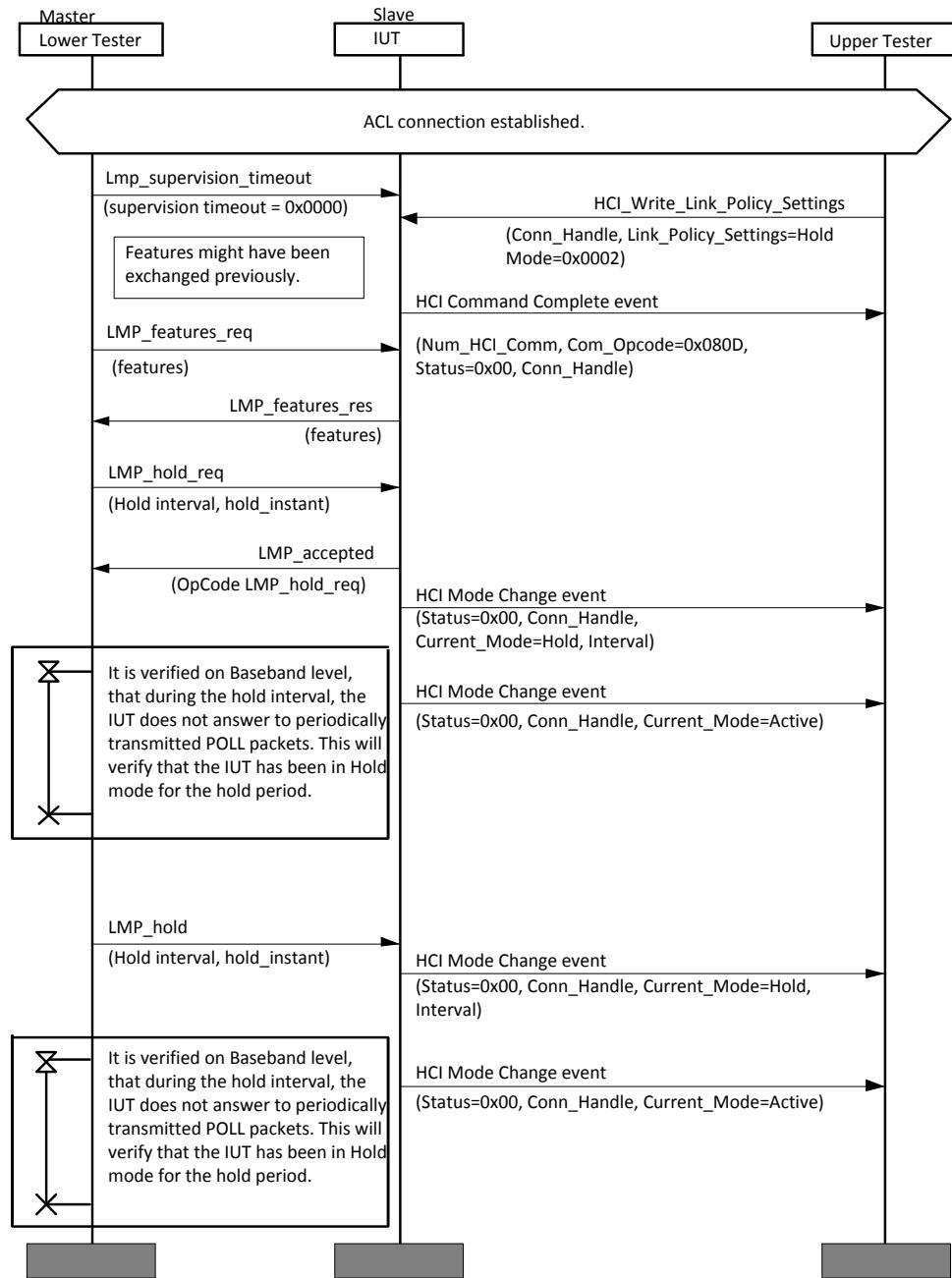


Figure 4.100: LMP/LIH/BV-06-C

The Lower Tester does not go to hold mode but transmits POLL packets frequently during the IUT's hold interval.

- Expected Outcome

Pass verdict

The IUT accepts the PDU LMP_hold_req by transmitting PDU LMP_accepted.

The IUT accepts the PDU LMP_hold.



The IUT does not respond to POLL packets during the hold interval.

- Notes

The hold interval shall have an even value. The hold instant shall be at an even slot.

4.7.5.2 LMP/LIH/BV-09-C [Hold Mode Request, Slave]

- Test Purpose

Verify that the IUT can request or force the Lower Tester to enter Hold Mode during the Hold interval. The IUT initiates the service by requesting or forcing. The Lower Tester is master. Baseband functionality is tested in the test case.

- Reference

[1] 4.5.1

- Initial Condition

See [Default Settings](#).

An IXIT statement gives acceptable values for the hold interval.



- Test Procedure

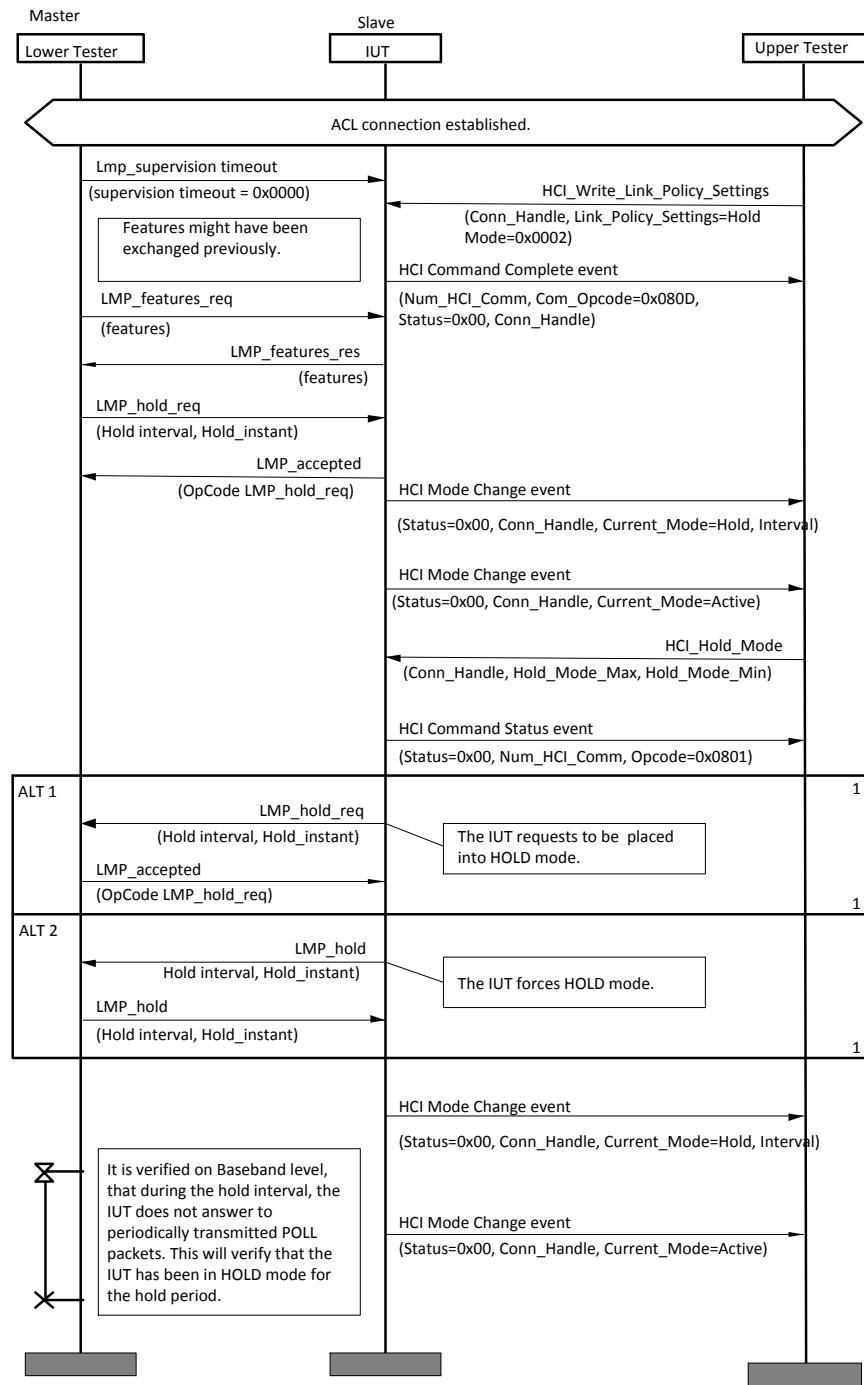


Figure 4.101: LMP/LIH/BV-09-C

The Lower Tester does not go to hold mode but transmits POLL packets frequently during the IUT's hold interval.



- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_hold_req or alternatively transmits PDU LMP_Hold and accepts the PDU LMP_accepted or alternatively PDU LMP_hold. The IUT does not respond to POLL packets during the hold interval.

- Notes

There is no special HCI command for PDU LMP_hold it is the same as for PDU LMP_hold_req. It is therefore not possible to know if the IUT is going to force or request the Lower Tester to go in to HOLD mode.

The hold interval shall have an even value. The hold instant shall be at an even slot. Hold_Mode_Min and Hold_Mode_Max sent from the Upper Tester will have the same value to exactly define the hold interval.

4.7.6 Hold Mode - Master

- Test subgroup objectives:

To verify that the ACL connection between two Bluetooth devices can be placed in hold mode for a specified hold time. The IUT is master.

4.7.6.1 LMP/LIH/BV-10-C [Hold Mode, Master]

- Test Purpose

Verify that the IUT can request or force the ACL link into Hold mode after a previous successful request. The IUT is master and initiates the service. The Lower Tester is slave. Baseband functionality is tested in the test case.

- Reference

[1] 4.5.1

- Initial Condition

See [Default Settings](#).

The IUT must page the Lower Tester to become the master of the Piconet.

An IXIT statement gives acceptable values for the hold interval.



- Test Procedure

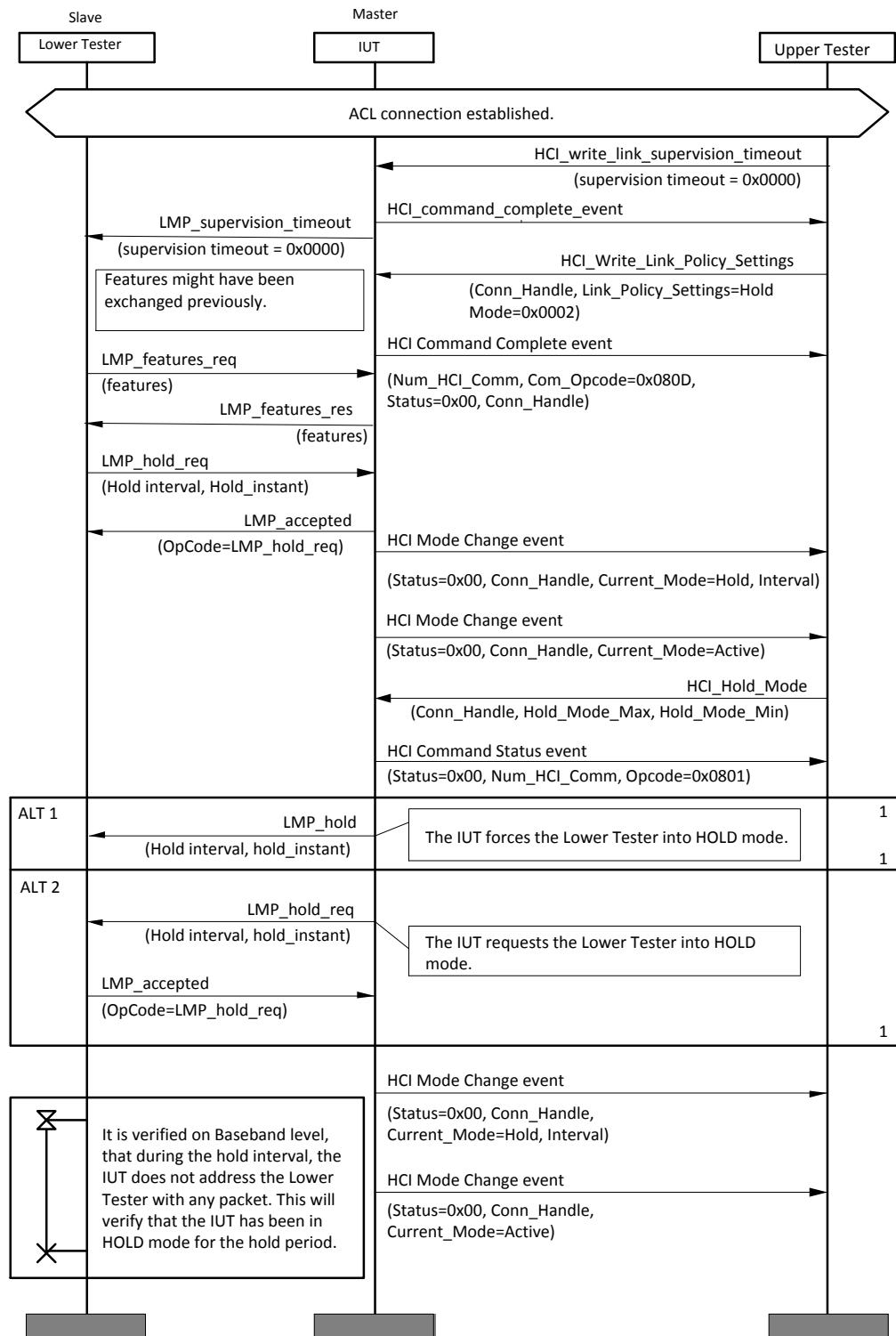


Figure 4.102: LMP/LIH/BV-10-C

The Lower Tester does not go to hold mode but verifies the IUT does not address the Lower Tester during the IUT's hold interval.



- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_hold or LMP_hold_req. The IUT does not address the Lower Tester during the Hold interval.

- Notes

There is no special HCI command for PDU LMP_hold it is the same as for PDU LMP_hold_req. It is therefore not possible to know if the IUT is going to force or request the Lower Tester to go in to HOLD mode.

The hold interval shall have an even value. The hold instant shall be at an even slot. Hold_Mode_Min and Hold_Mode_Max sent from the Upper Tester will have the same value to exactly define the hold interval.

4.7.6.2 LMP/LIH/BV-11-C [Hold Mode Request, Master]

- Test Purpose

Verify that the IUT accepts that the Lower Tester forces Hold mode. The IUT is master. The Lower Tester is slave and initiates the service by force. Baseband functionality is tested in the test case.

- Reference

[1] 4.5.1.2

- Initial Condition

See [Default Settings](#).

The IUT must page the Lower Tester to become the master of the Piconet.

An IXIT statement gives acceptable values for the hold interval.



- Test Procedure

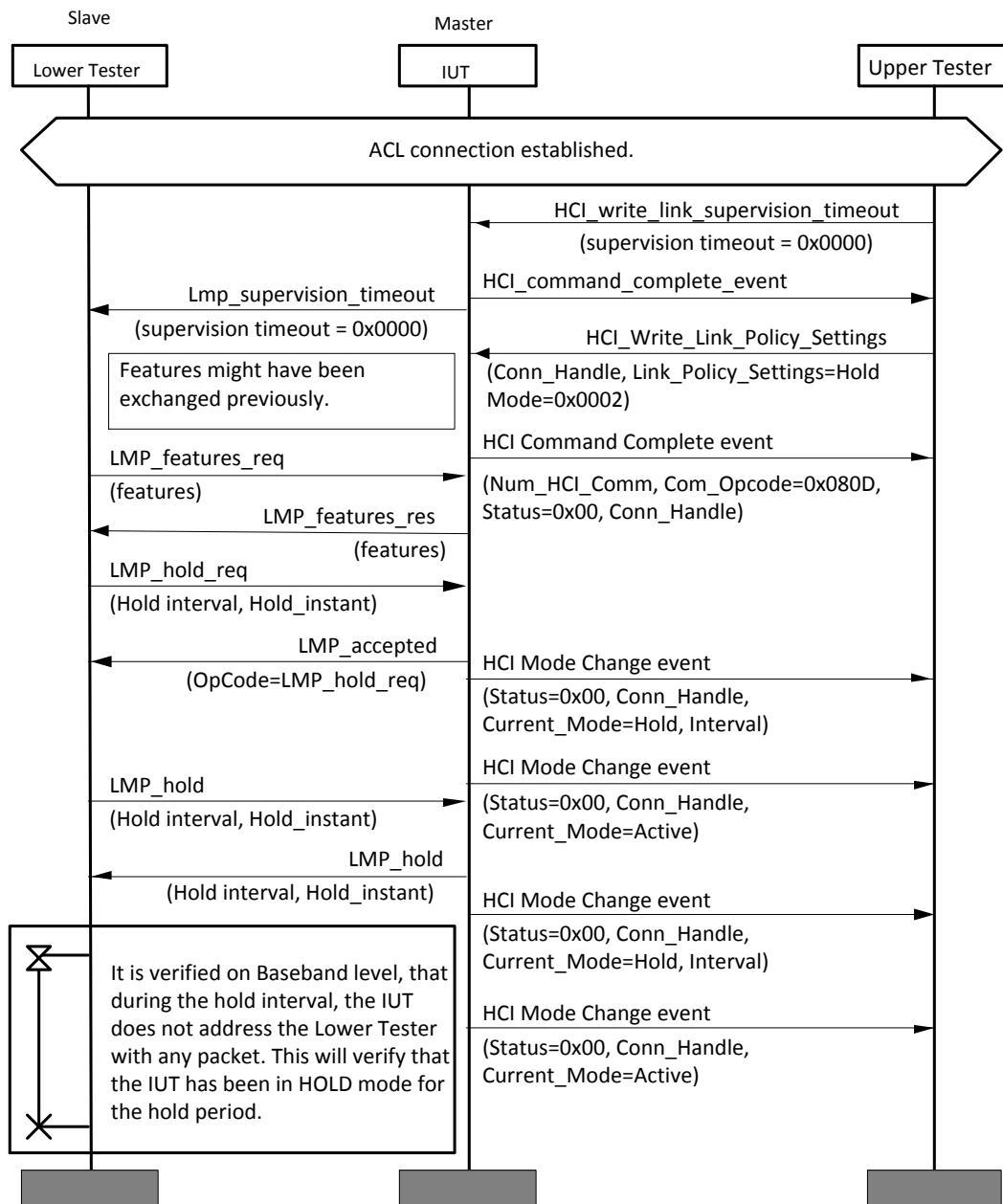


Figure 4.103: LMP/LIH/BV-11-C

The Lower Tester does not go to hold mode but verifies the IUT does not address the Lower Tester during the IUT's hold interval.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_hold upon reception of PDU LMP_hold. The IUT does not address the Lower Tester during the Hold interval.



- Notes

The hold interval shall have an even value. The hold instant shall be at an even slot.

4.7.7 Hold mode - Both Master and Slave

- Test subgroup objectives:

To verify that the IUT declines the Hold Mode in a correct manner. The role of the IUT is of no importance.

4.7.7.1 LMP/LIH/BV-12-C [Hold Mode Unsupported]

- Test Purpose

Verify that the IUT responds that it does not support Hold mode upon request from the Lower Tester.

- Reference

[1] 4.5.1.3

- Initial Condition

See [Default Settings](#).

- Test Procedure

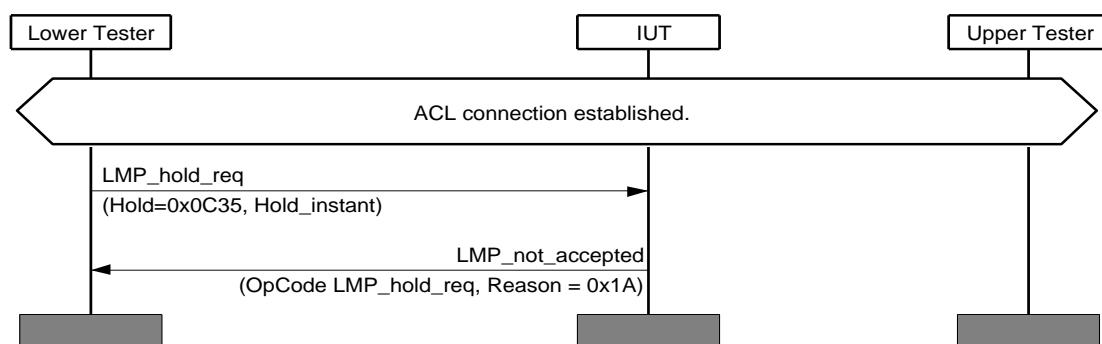


Figure 4.104: LMP/LIH/BV-12-C

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_not_accepted containing “Reason = 0x1A” upon reception of PDU LMP_hold_req.

4.7.8 Sniff Mode - Slave

- Test subgroup objectives:

To verify that the ACL connection between two Bluetooth devices can be placed in sniff mode. The IUT is slave.



4.7.8.1 LMP/LIH/BV-14-C [Enter Sniff Mode]

- Test Purpose

Verify that the IUT enters Sniff Mode upon request from the Lower Tester. Verify that the IUT interprets the sniff attempt and sniff timeout correctly.

IUT is slave. The Lower Tester is master and initiates the service by requesting. Baseband functionality is tested in the test case.

- Reference

[1] 4.5.3.1

- Initial Condition

See [Default Settings](#).

- Test Procedure



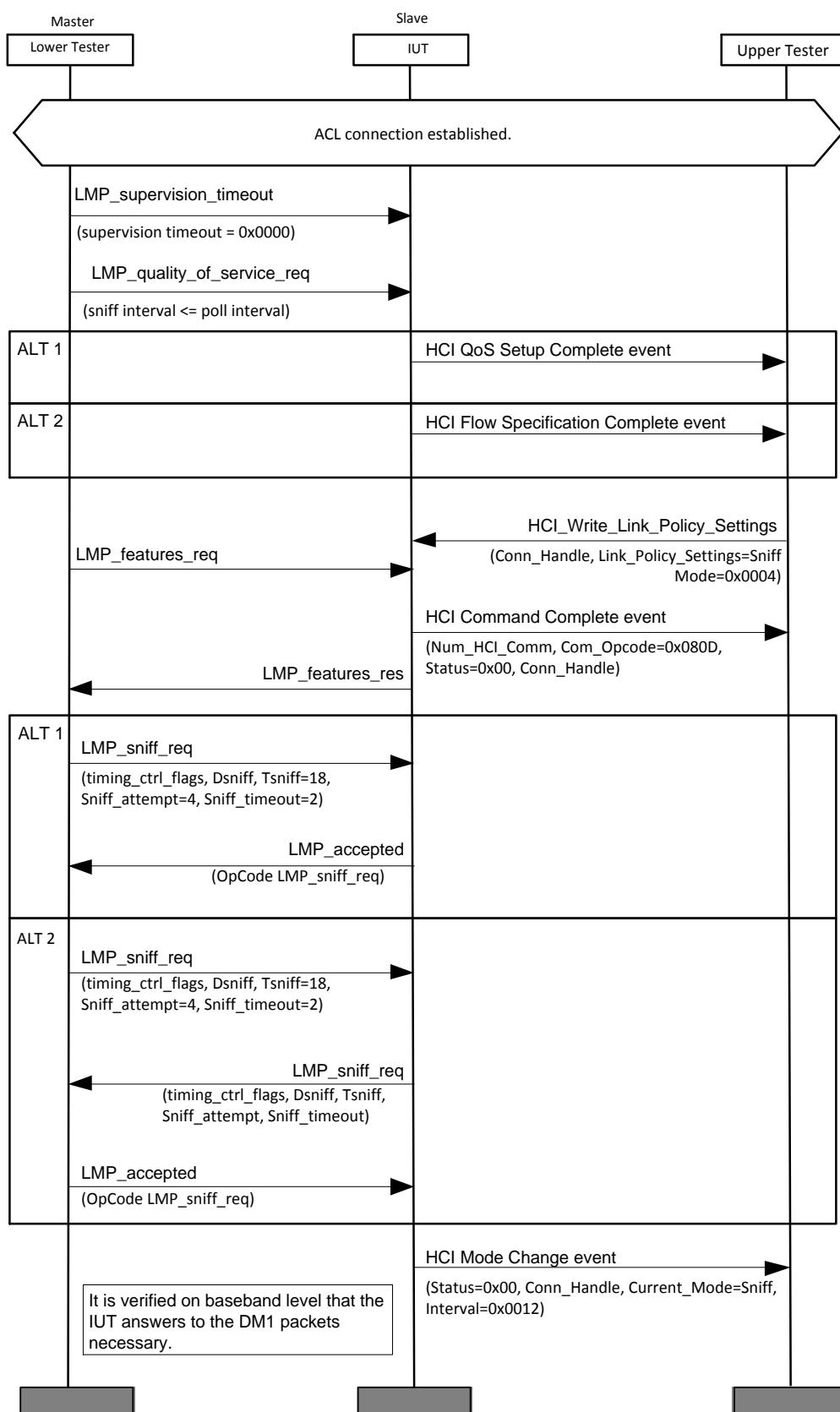


Figure 4.105: LMP/LIH/BV-14-C, MSC

MSC: Lower Tester requests the IUT to enter SNIFF mode.



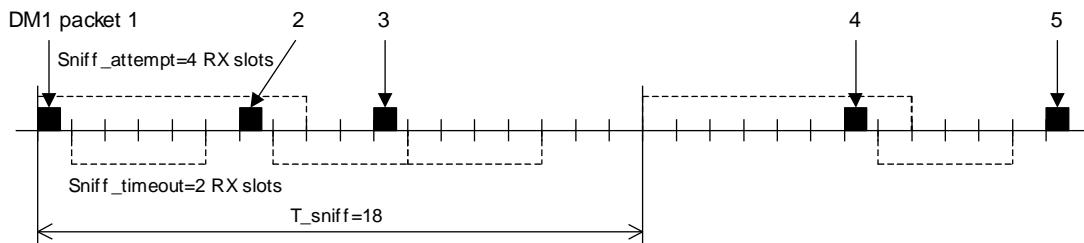


Figure 4.106: LMP/LIH/BV-14-C, Polling

The Lower Tester must start POLLING the IUT according to [Figure 4.106: LMP/LIH/BV-14-C, Polling](#). Verify that the DM1 packets 1-4 are acknowledged, but DM1 packet 5 must remain unacknowledged. Everything is checked on baseband level.

DM1 packets transmitted by the Lower Tester contain data.

Monitor the result for a period of $20 \times T_{\text{SNIFF}}$ slots.

- **Test Condition**

It must be possible to check the Sniff interval on Baseband level.

- **Expected Outcome**

Pass verdict

The IUT transmits PDU LMP_accepted or PDU LMP_sniff_req upon reception of PDU LMP_sniff_req. The IUT must enter SNIFF mode and acknowledge DM1 packet 1-4 but DM1 packet 5 must remain unacknowledged.

- **Notes**

Timing control flags and Dsniff are determined by CLK_{27} of the master.

4.7.8.2 LMP/LIH/BV-15-C [Initiate Sniff Mode, Slave]

- **Test Purpose**

Verify that the IUT can request the Lower Tester to enter Sniff Mode. Verify that the IUT interprets the sniff attempt and sniff timeout correctly.

IUT is slave and initiates the service by requesting. The Lower Tester is master and accepts first request. Baseband functionality is tested in the test case.

- **Reference**

[1] 4.5.3.1

- **Initial Condition**

See [Default Settings](#).



- Test Procedure

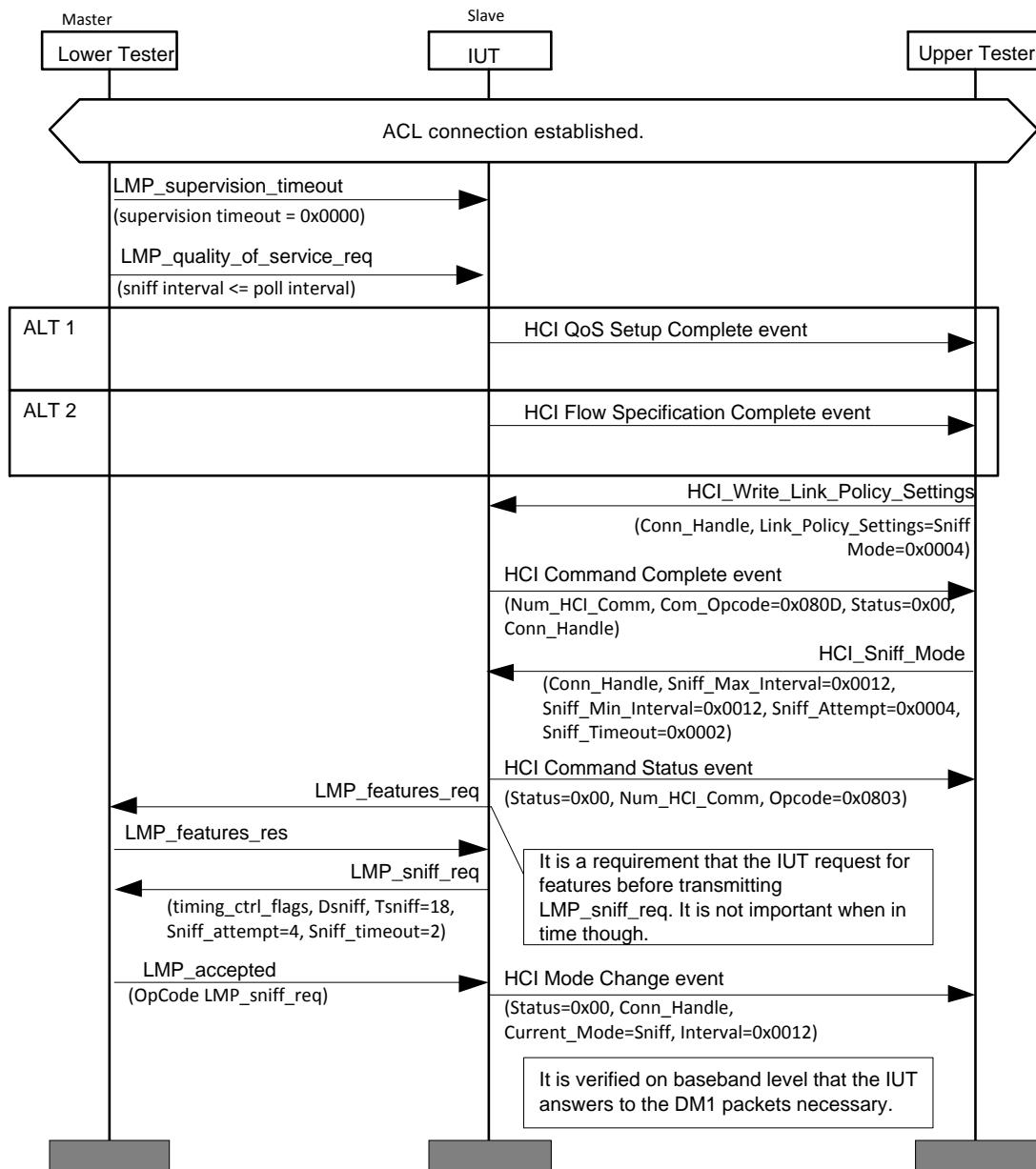


Figure 4.107: LMP/LIH/BV-15-C, MSC

MSC: IUT requests the Lower Tester to enter SNIFF mode.

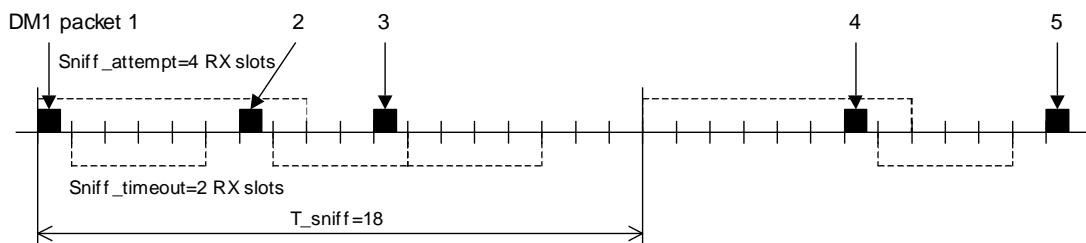


Figure 4.108: LMP/LIH/BV-15-C, Polling



The Lower Tester must start POLLING the IUT according to [Figure 4.108: LMP/LIH/BV-15-C, Polling](#). Verify that the DM1 packets 1-4 are acknowledged, but DM1 packet 5 must remain unacknowledged. Everything is checked on baseband level.

DM1 packets transmitted by the Lower Tester contain data.

Monitor the result for a period of 20° TSNIFF slots.

- **Test Condition**

It must be possible to check the Sniff interval on Baseband level.

It must be possible to control the IUT to initiate the sniff request.

- **Expected Outcome**

Pass verdict

The IUT transmits PDU LMP_sniff_req and accepts reception of PDU LMP_accepted. The IUT must enter SNIFF mode and acknowledge DM1 packet 1-4 but DM1 packet 5 must remain unacknowledged.

- **Notes**

Timing control flags and Dsniff are determined by CLK₂₇ of the master.

4.7.8.3 LMP/LIH/BV-16-C [Exit Sniff Mode]

- **Test Purpose**

Verify that the IUT exits SNIFF mode upon request from the Lower Tester.

The Lower Tester is master and initiates the service. Baseband functionality is tested in the test case.

- **Reference**

[1] 4.5.3.2

- **Initial Condition**

See [Default Settings](#).



- Test Procedure

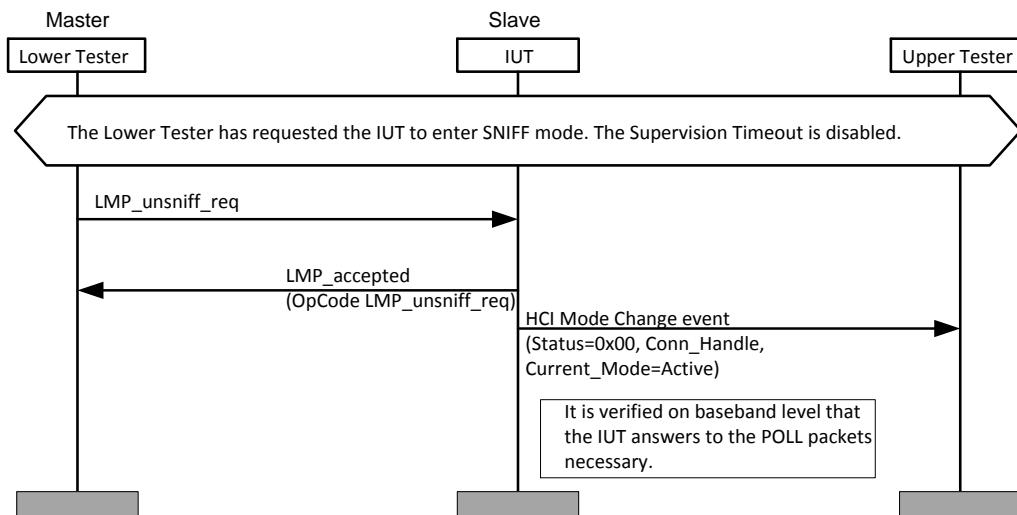


Figure 4.109: LMP/LIH/BV-16-C

Verify that the IUT has left the SNIFF mode by polling the IUT in all master slots. The IUT must acknowledge all POLL packets.

Monitor the result for a period of 200 slots.

- Test Condition

It must be possible to check the Sniff interval on Baseband level.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted upon reception of PDU LMP_unsniff_req. The IUT must exit SNIFF mode.

4.7.8.4 LMP/LIH/BV-17-C [Accept Sniff Reject]

- Test Purpose

Verify that the IUT accepts that the Lower Tester declines the SNIFF mode request. Verify that the IUT remains in active mode.

The Lower Tester is master. The IUT is slave and initiates the service by requesting. Baseband functionality is tested in the test case.

- Reference

[1] 4.5.3.1

- Initial Condition

See [Default Settings](#).



- Test Procedure

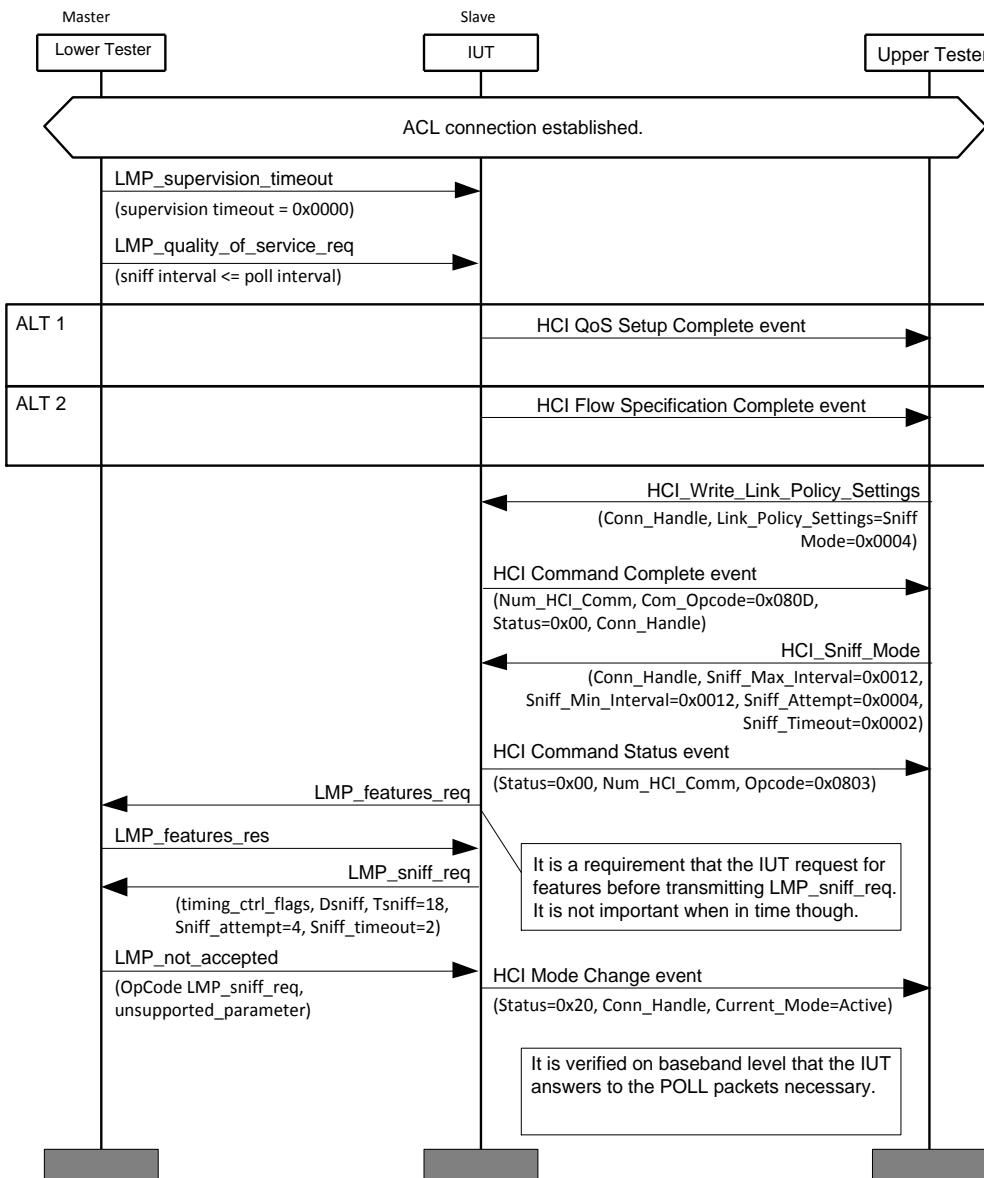


Figure 4.110: LMP/LIH/BV-17-C

Verify that the IUT has left the SNIFF mode by polling the IUT in all master slots. The IUT must acknowledge all POLL packets.

Monitor the result for a period of 200 slots.

- Test Condition

It must be possible to check the Sniff interval on Baseband level.

It must be possible to control the IUT to initiate the sniff request.



- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_sniff_req. The Lower Tester transmits PDU LMP_not_accepted. The IUT must not enter Sniff mode after the reception.

- Notes

Timing control flags and Dsniff are determined by CLK₂₇ of the master.

4.7.9 Sniff Mode - Master

- Test subgroup objectives:

To verify that the ACL connection between two Bluetooth devices can be placed in sniff mode. The IUT is master.

4.7.9.1 LMP/LIH/BV-18-C [Initiate Sniff Mode, Master]

- Test Purpose

Verify that the IUT can request the Lower Tester into Sniff mode. Verify that the IUT does not address the Lower Tester with its LT_ADDR outside the SNIFF slots. The IUT is master and initiates the service by requesting. The Lower Tester is slave. Baseband functionality is tested in the test case.

- Reference

[1] 4.5.3.1

- Initial Condition

See [Default Settings](#).

The IUT must page the Lower Tester to become the master of the Piconet.



- Test Procedure

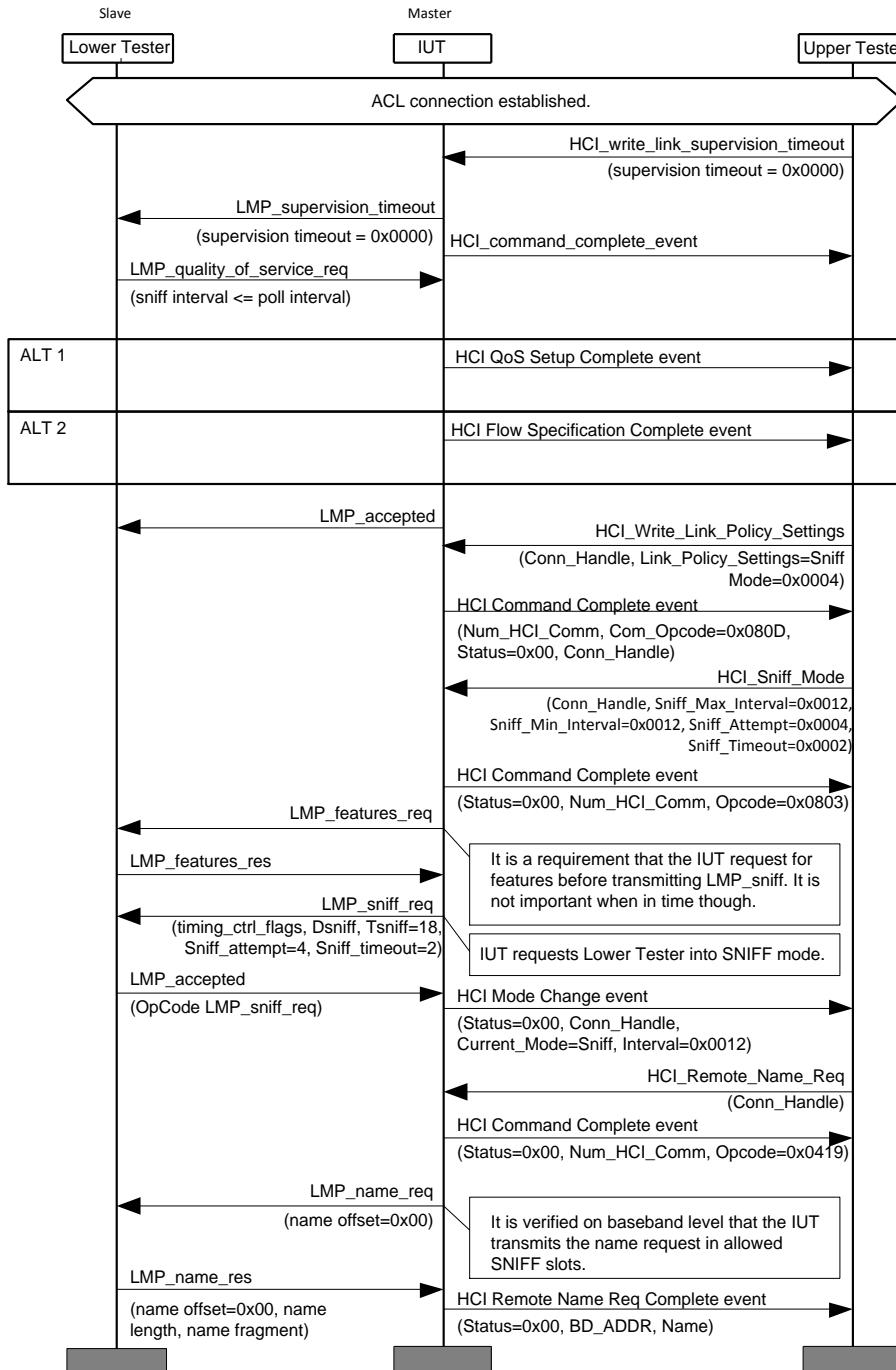


Figure 4.111: LMP/LIH/BV-18-C, MSC

MSC: IUT requests the Lower Tester in to SNIFF mode.



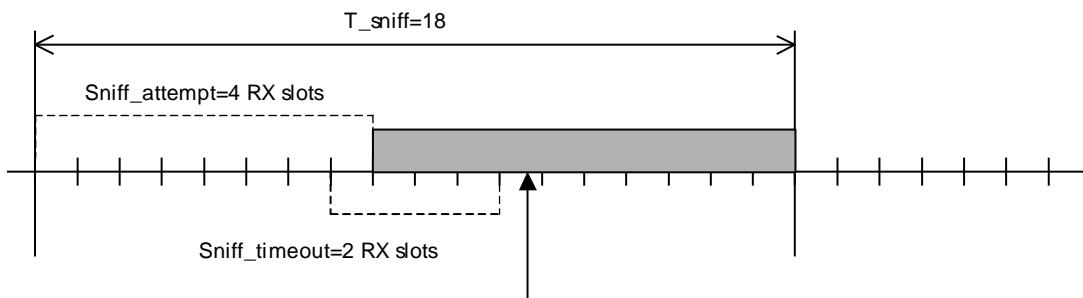


Figure 4.112: LMP/LIH/BV-18-C, Verifying

Verify that the IUT does not address the Lower Tester with the LT_ADDR in the grey zone, unless a packet follows in the Sniff timeout frame after a packet received in the Sniff attempt frame.

Monitor the result for a period of $20^*TSNIFF$ slots.

- **Test Condition**

It must be possible to check the Sniff interval on Baseband level.

It must be possible to control the IUT to initiate the sniff mode.

- **Expected Outcome**

Pass verdict

The IUT transmits PDU LMP_sniff_req. The ACL link must enter Sniff mode and no Polling should be done outside the sniff interval.

- **Notes**

Timing control flags and Dsniff are determined by CLK₂₇ of the master.

4.7.9.2 LMP/LIH/BV-19-C [Request Sniff Mode Exit]

- **Test Purpose**

Verify that the IUT can request the Lower Tester to exit SNIFF mode.

IUT is master and initiates the service. Baseband functionality is tested in the test case.

- **Reference**

[1] 4.5.3.2

- **Initial Condition**

See [Default Settings](#).

The IUT have requested the Lower Tester into SNIFF mode.



- Test Procedure

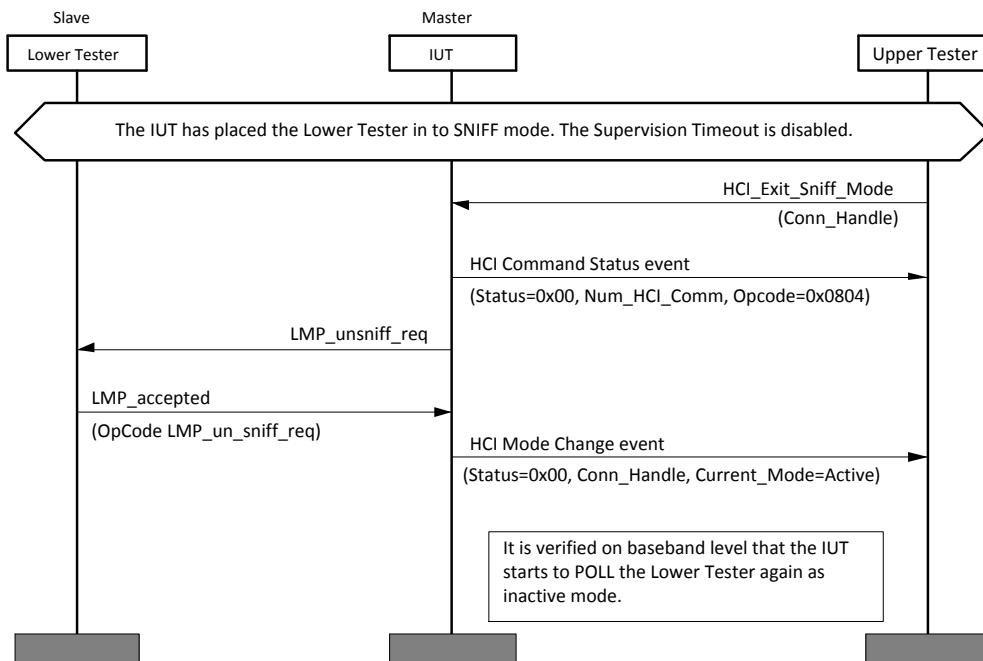


Figure 4.113: LMP/LIH/BV-19-C

The IUT should POLL the Lower Tester in all master slots.

Monitor the result for a period of 200 slots.

- Test Condition

It must be possible to check the Sniff interval on Baseband level.

It must be possible to control the IUT to initiate the unsniff request.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_unsniff_req and accepts reception of PDU LMP_accepted. The ACL link must exit Sniff mode.

4.7.10 Sniff Mode - Both Master and Slave

- Test subgroup objectives:

To verify that the IUT declines the Sniff mode in a correct manner. The role of the IUT is of no importance.

4.7.10.1 LMP/LIH/BV-20-C [Sniff Mode Reject]

- Test Purpose

Verify that the IUT responds that it does not support sniff mode upon request from the Lower Tester. The Lower Tester initiates the service.



- Reference
- [1] 4.5.3.1
- Initial Condition
See [Default Settings](#).
- Test Procedure

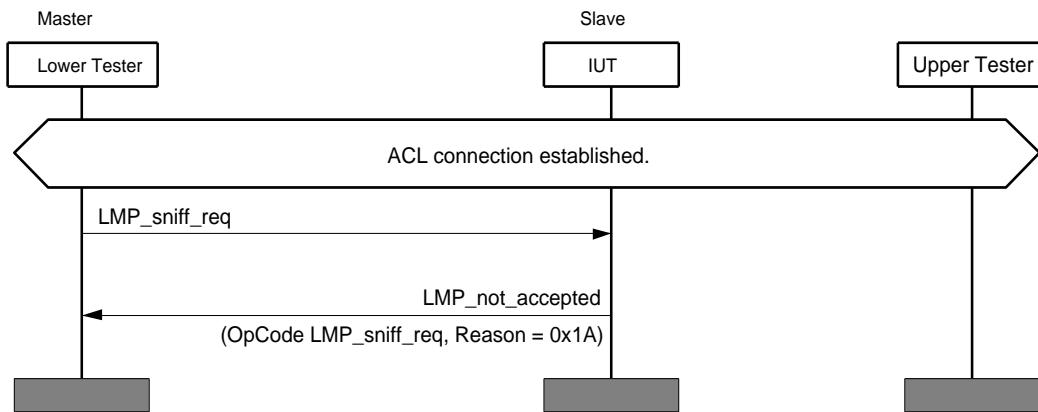


Figure 4.114: LMP/LIH/BV-20-C

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_not_accepted containing “Reason = 0x1A” upon reception of PDU LMP_sniff_req.

4.7.11 Park State - Slave

- Test subgroup objectives:

To verify that the ACL connection between two Bluetooth devices can be placed in Park state. The IUT is slave.

4.7.11.1 LMP/LIH/BV-22-C [Accept Park Request, Slave]

- Test Purpose

Verify that the IUT can request to be placed into parked state. The IUT receives a zero PM_ADDR.

IUT is slave and initiates the service by requesting. The Lower Tester is master. Baseband functionality is tested in the test case.

- Reference
- [1] 4.5.2.2
- Initial Condition
See [Figure 4.115](#).



- Test Procedure

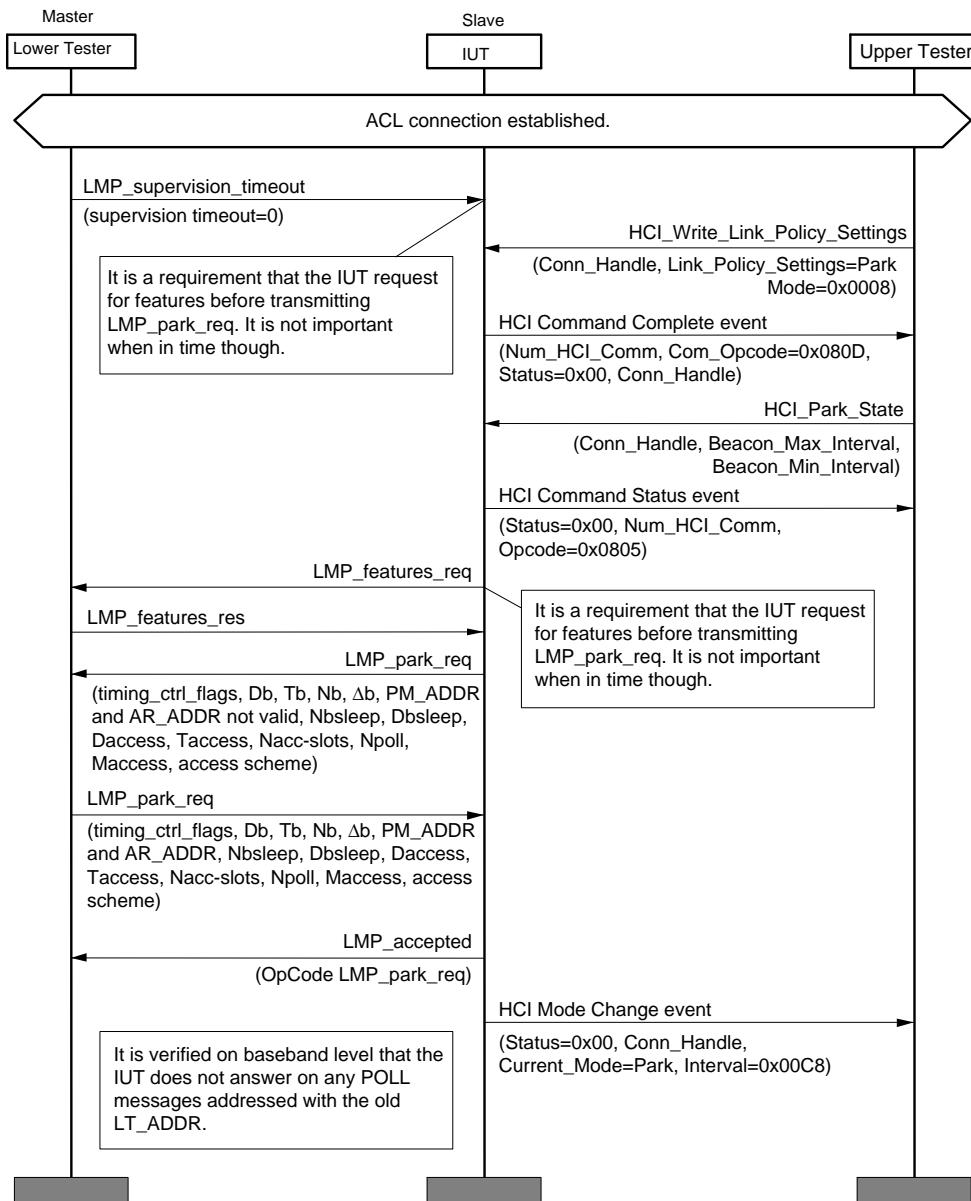


Figure 4.115: LMP/LIH/BV-22-C, MSC

The IUT requests that the Lower Tester place the IUT into PARK state.

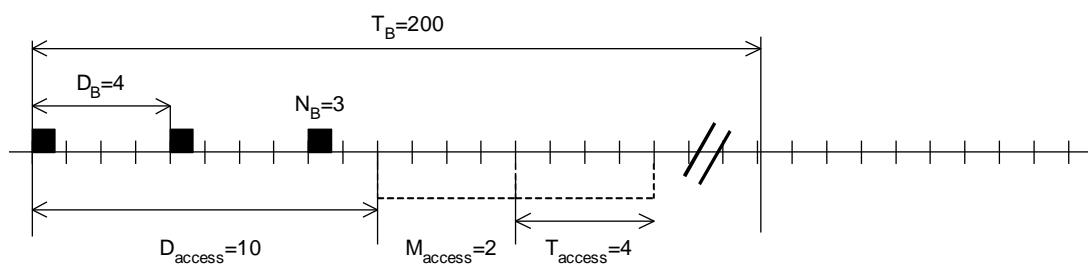


Figure 4.116: LMP/LIH/BV-22-C, Park setting



Park setting set by the Lower Tester. Please see [Section 4.1.5](#) on applicable parameter values.

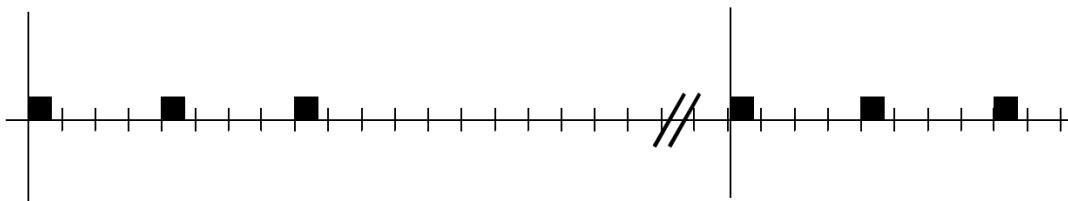


Figure 4.117: LMP/LIH/BV-22-C, Verifying

Verify that the IUT does not acknowledge the three POLL packets carrying the IUT's old LT_ADDR.

To verify that the IUT is in fact in PARK state the Lower Tester must POLL the IUT in slots outside the beacon interval with the old LT_ADDR. The IUT must not acknowledge.

Monitor the result for 20^*TB slots.

- **Test Condition**

It must be possible to control the IUT to initiate the park request.

It must be possible to check the park mode on Baseband level.

The Lower Tester should know which park parameters can be accepted by the IUT (declared as IXIT).

- **Expected Outcome**

Pass verdict

The IUT transmits PDU LMP_park_req and accepts reception of PDU LMP_park_req. The ACL link must enter Park state.

- **Notes**

Timing control flags, DB, DBsleep, Dacess are determined by CLK₂₇ of the master.

The PM_ADDR is set to zero so that PDU LMP_unpark_BD_ADDR_req has to be used.

Beacon_Max_Interval and Beacon_Min_Interval shall be set to the same value to precisely define the beacon interval.

4.7.11.2 LMP/LIH/BV-23-C [Park Request Rejected]

- **Test Purpose**

Verify that the IUT accepts that the Lower Tester declines the park state. Verify that the link is kept active. IUT is slave and initiates the service by requesting. The Lower Tester is master. Baseband functionality is tested in the test case.

- **Reference**

[1] 4.5.2.2



- Initial Condition

See [Figure 4.118](#).

- Test Procedure

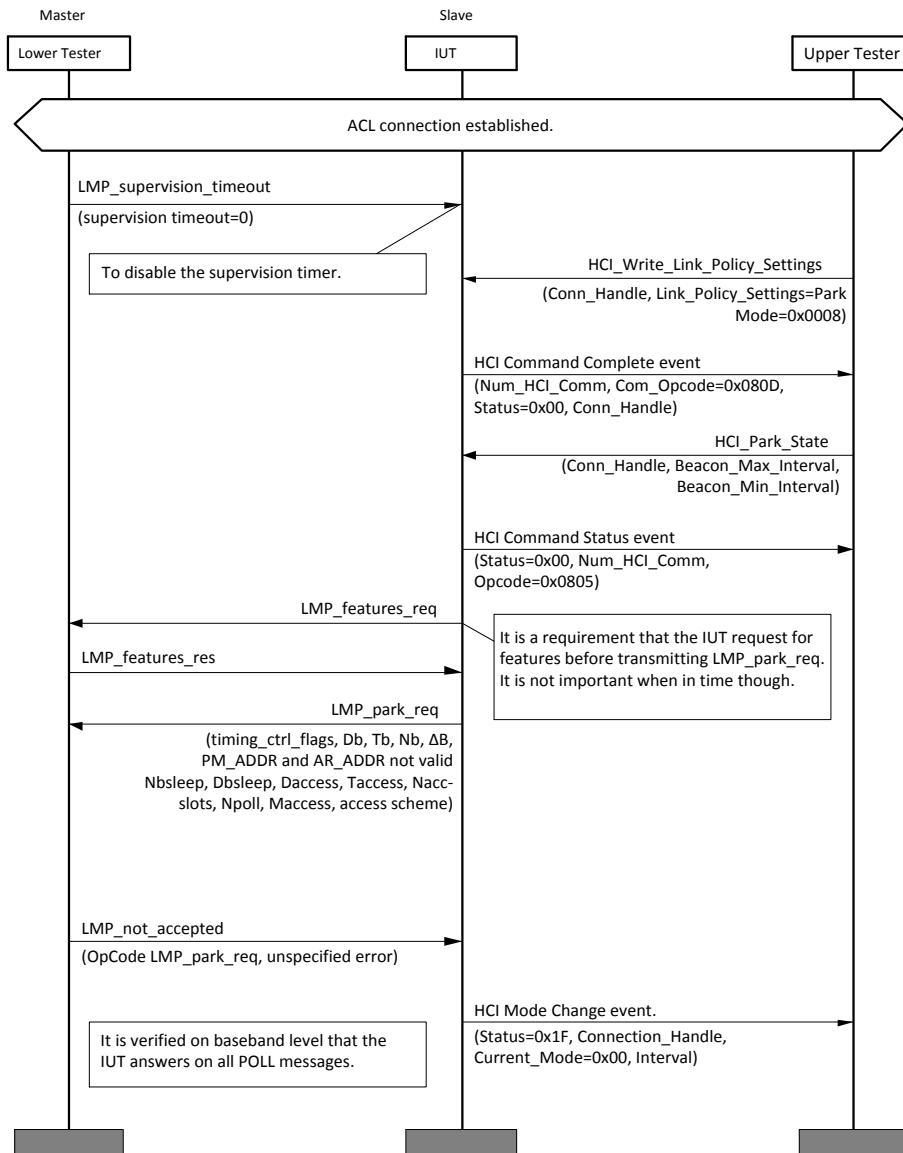


Figure 4.118: LMP/LIH/BV-23-C

Monitor the result for 200 slots.

- Test Condition

It must be possible to control the IUT to initiate the park request.

It must be possible to check the park state on Baseband level.



- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_park_req and accepts reception of PDU LMP_not_accepted. The ACL link must not be changed.

- Notes

Beacon_Max_Interval and Beacon_Min_Interval shall be set to the same value to precisely define the beacon interval.

4.7.11.3 LMP/LIH/BV-24-C [Broadcast Scan Window]

- Test Purpose

Verify that the IUT listens to the broadcast messages sent in a broadcast scan window received by the Lower Tester. IUT is slave. The Lower Tester is master and sets a Broadcast Scan Window. Baseband functionality is tested in the test case.

- Reference

[1] 4.5.2.3

- Initial Condition

See [Default Settings](#).

The IUT has to be in parked state.

- Test Procedure

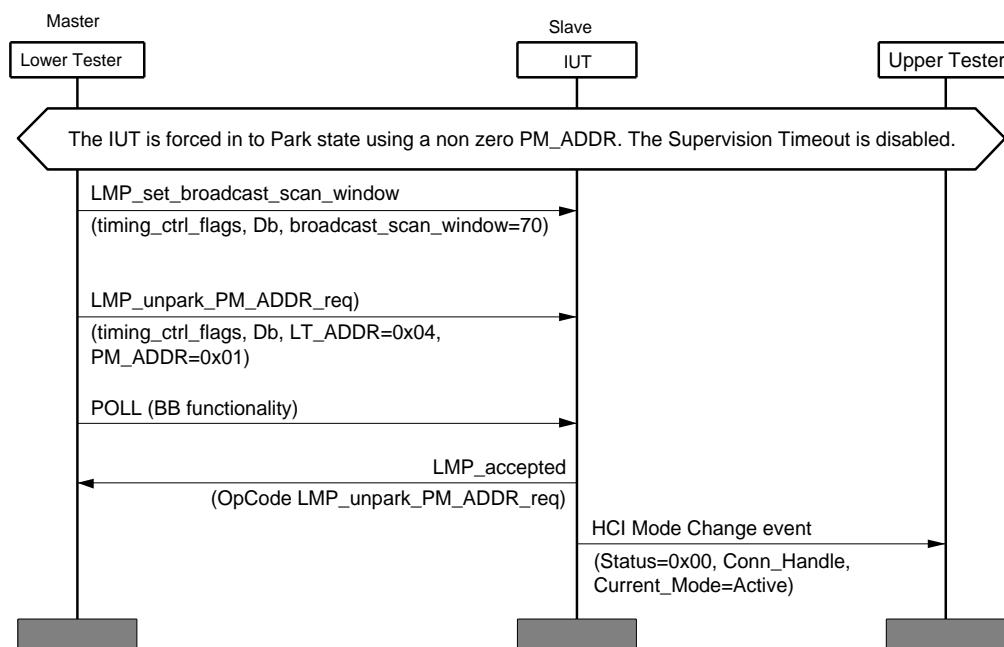


Figure 4.119: LMP/LIH/BV-24-C, MSC

MSC: Lower Tester sets the broadcast scan window.



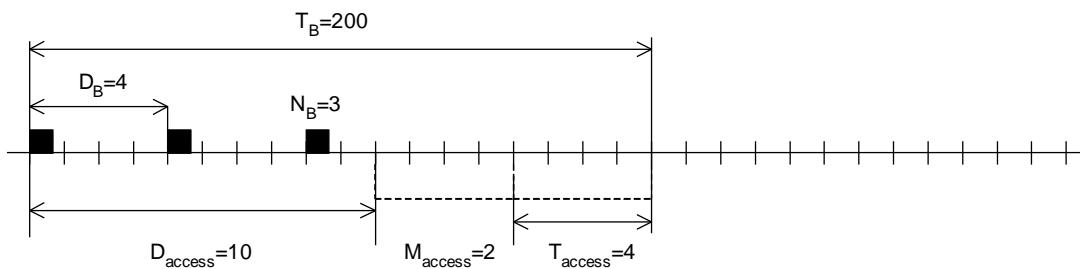


Figure 4.120: LMP/LIH/BV-24-C, Original Park setting

Original Park mode settings. Please see [Section 4.1.5](#) on applicable parameter values.

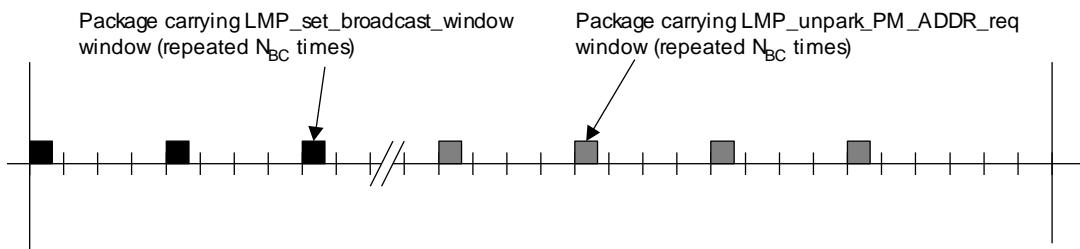


Figure 4.121: LMP/LIH/BV-24-C, Broadcast message sending

The Broadcast messages must be sent in the slots shown in [Figure 4.121: LMP/LIH/BV-24-C, Broadcast message sending](#).

The Lower Tester transmits the PDU LMP_unpark_PM_ADDR_req in the slots shown in [Figure 4.121: LMP/LIH/BV-24-C, Broadcast message sending](#) and verifies that the IUT unparks.

- Test Condition

It must be possible to check the park state on Baseband level.

- Expected Outcome

Pass verdict

The IUT changes the broadcast scan window upon reception of PDU LMP_set_broadcast_scan_window and is able to receive broadcast messages in the broadcast scan window.

The SEQN bit is restarted as after a new connection, when exiting PARK state.

- Notes

Timing control flags and DB are determined by CLK₂₇ of the master.

4.7.11.4 LMP/LIH/BV-25-C [Modify Beacon Parameters]

- Test Purpose

Verify that the IUT modifies the beacon parameters upon a broadcast message received by the Lower Tester. Verify that the IUT receives the beacon packets. IUT is slave. The Lower Tester is master. Baseband functionality is tested in the test case.



- Reference
- [1] 4.5.2.3
- Initial Condition
See [Figure 4.122](#)
- Test Procedure

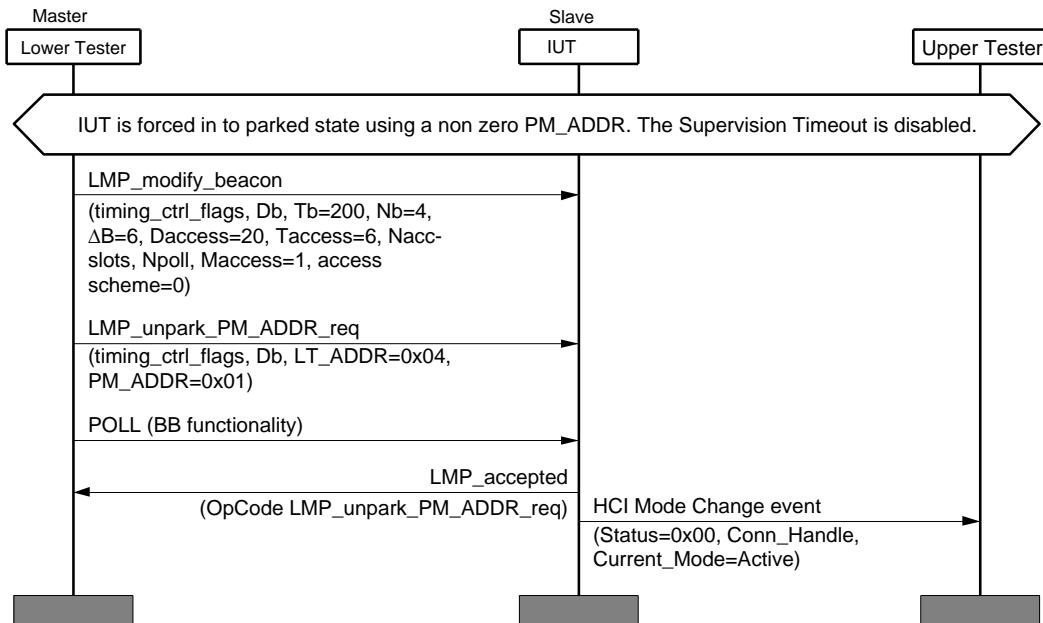


Figure 4.122: LMP/LIH/BV-25-C, MSC

MSC: Lower Tester modifies the beacon.

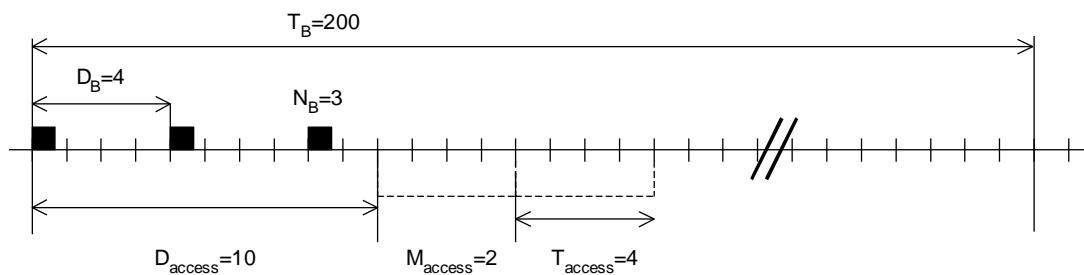


Figure 4.123: LMP/LIH/BV-25-C, Original Park setting

Original Park mode settings. Please see [Section 4.1.5](#) on applicable parameter values.



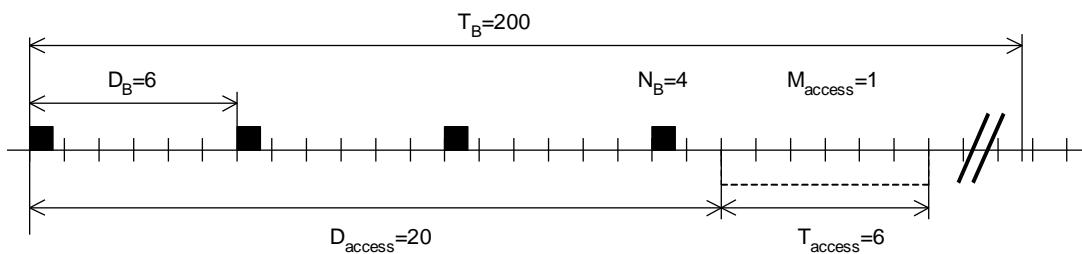


Figure 4.124: LMP/LIH/BV-25-C, Modified Park setting

Modified Park state settings.

The Lower Tester transmits the PDU LMP_unpark_PM_ADDR_req using the new beacon slots and verifies that the IUT unparks.

- Test Condition

It must be possible to check the park state on Baseband level.

- Expected Outcome

Pass verdict

The IUT changes the beacon parameters upon reception of PDU LMP_modify_beacon and is able to listen to broadcast messages.

The SEQN bit is restarted as after a new connection, when exiting PARK state.

- Notes

Timing control flags, DB, DBsleep, Daccess are determined by CLK₂₇ of the master.

4.7.11.5 LMP/LIH/BV-26-C [Exit Park, Master Request]

- Test Purpose

Verify that the IUT exits PARK state upon request from the Lower Tester using the BD_ADDR of the IUT. IUT is slave. The Lower Tester is master. Baseband functionality is tested in the test case.

- Reference

[1] 4.5.2.4

- Initial Condition

See [Figure 4.125](#)

The IUT has to be in parked state.



- Test Procedure

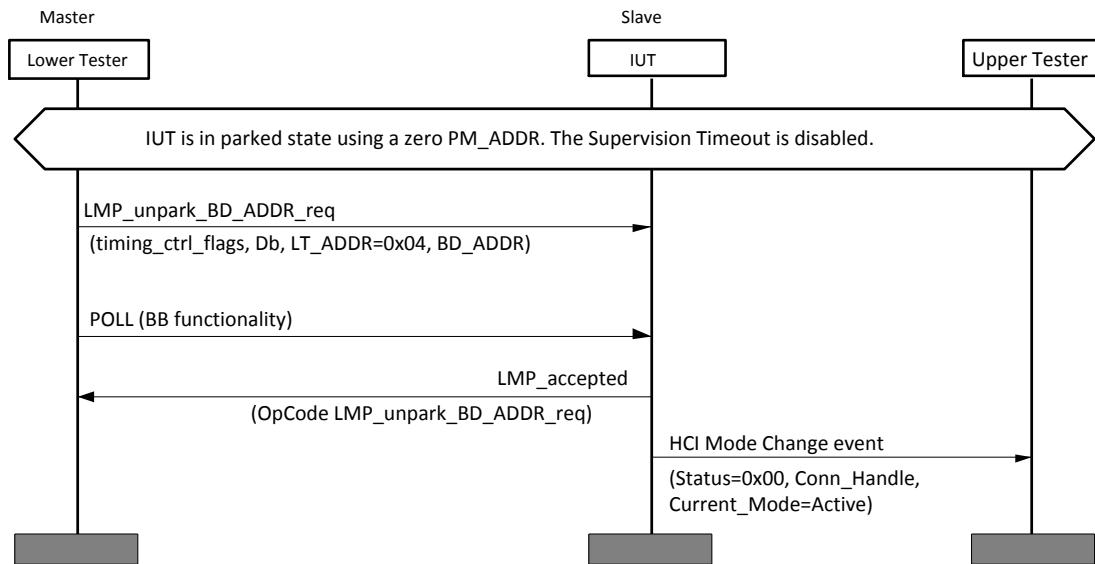


Figure 4.125: LMP/LIH/BV-26-C

- Test Condition

The manufacturer of the IUT must define the BD_ADDR.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted upon reception of PDU LMP_unpark_BD_ADDR_req. The IUT must leave the PARK state.

The SEQN bit is restarted as after a new connection, when exiting PARK state.

- Notes

Timing control flags are determined by CLK₂₇ of the master.

4.7.11.6 LMP/LIH/BV-75-C [Exit Park, Slave Request]

- Test Purpose

Verify that the IUT exits PARK state upon request from the IUT using the AR_ADDR of the IUT. IUT is slave. The Lower Tester is master. Baseband functionality is tested in the test case.

- Reference

[1] 8.9.6

- Initial Condition

See [Figure 4.126](#)

The IUT has to be in parked state.



- Test Procedure

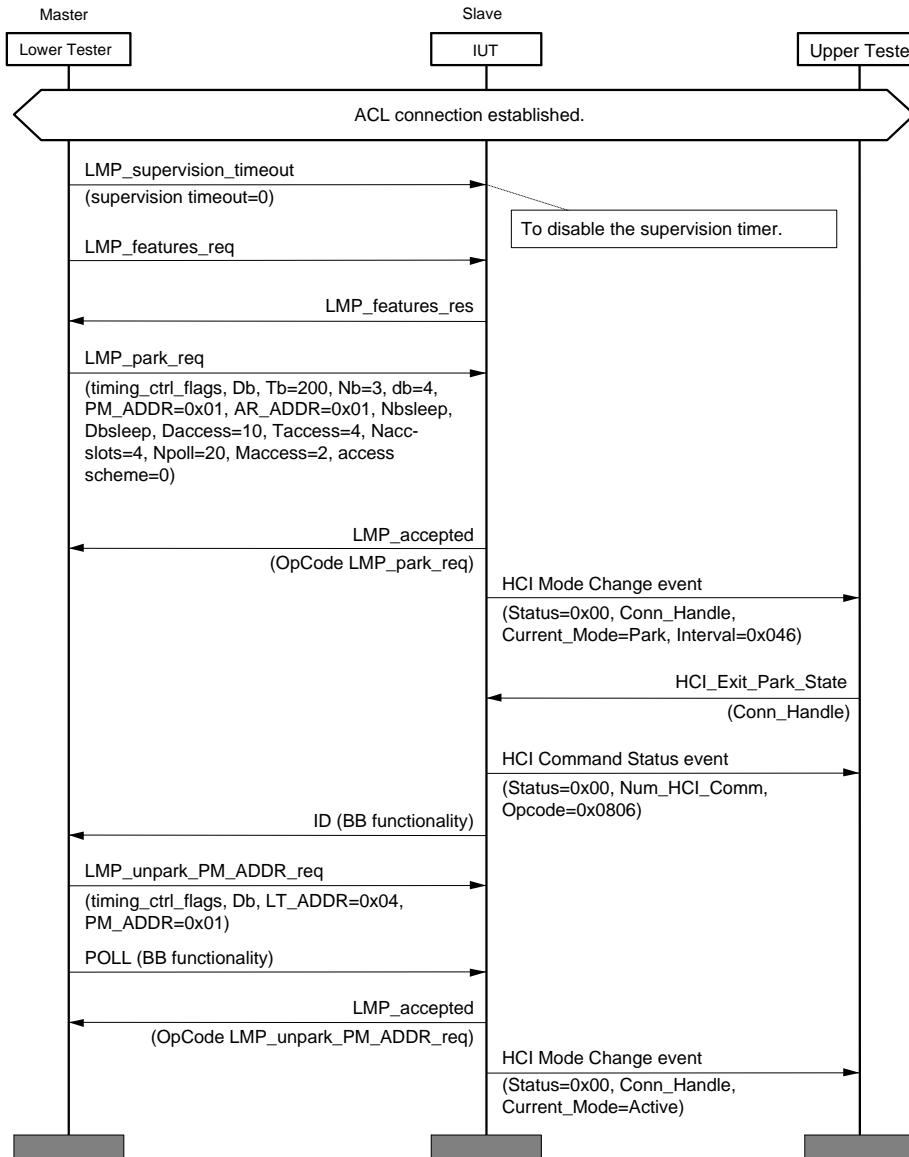


Figure 4.126: LMP/LIH/BV-75-C, MSC

MSC IUT requests to exit PARK state.

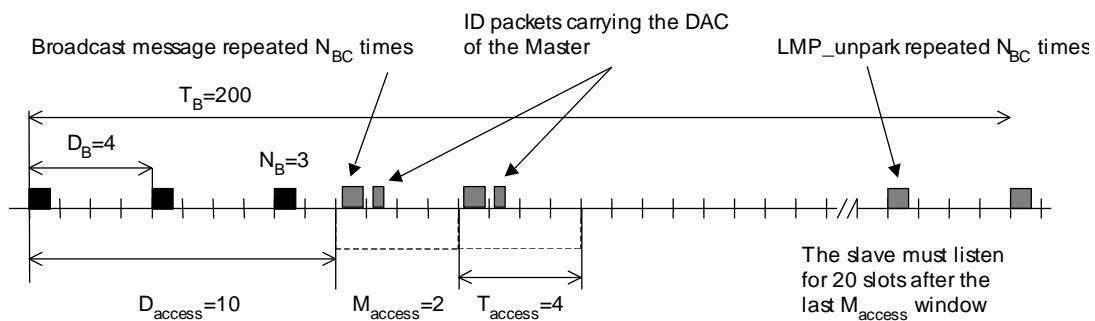


Figure 4.127: LMP/LIH/BV-75-C, ID packet transmitting



The IUT has the AR_ADDR 0x01 and will transmit the ID packet containing the DAC of the master as shown in the figure.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted upon reception of PDU LMP_unpark_PM_ADDR_req. The IUT must leave the PARK state.

The SEQN bit is restarted as after a new connection, when exiting PARK state.

- Notes

Timing control flags are determined by CLK₂₇ of the master.

4.7.12 Park State - Master

- Test subgroup objectives:

To verify that the ACL connection between two Bluetooth devices can be placed in Park state. The IUT is master.

4.7.12.1 LMP/LIH/BV-27-C [Request Park]

- Test Purpose

Verify that the IUT can request the Lower Tester to enter Park State. Verify that the IUT uses the beacon interval.

IUT is master and initiates the service. The Lower Tester is slave. Baseband functionality is tested in the test case.

- Reference

[1] 4.5.2.1

- Initial Condition

See [Default Settings](#).

The IUT must page the Lower Tester to become the master of the Piconet.

The Lower Tester has to know which park parameters can be accepted by the IUT (declared as IXIT).



- Test Procedure

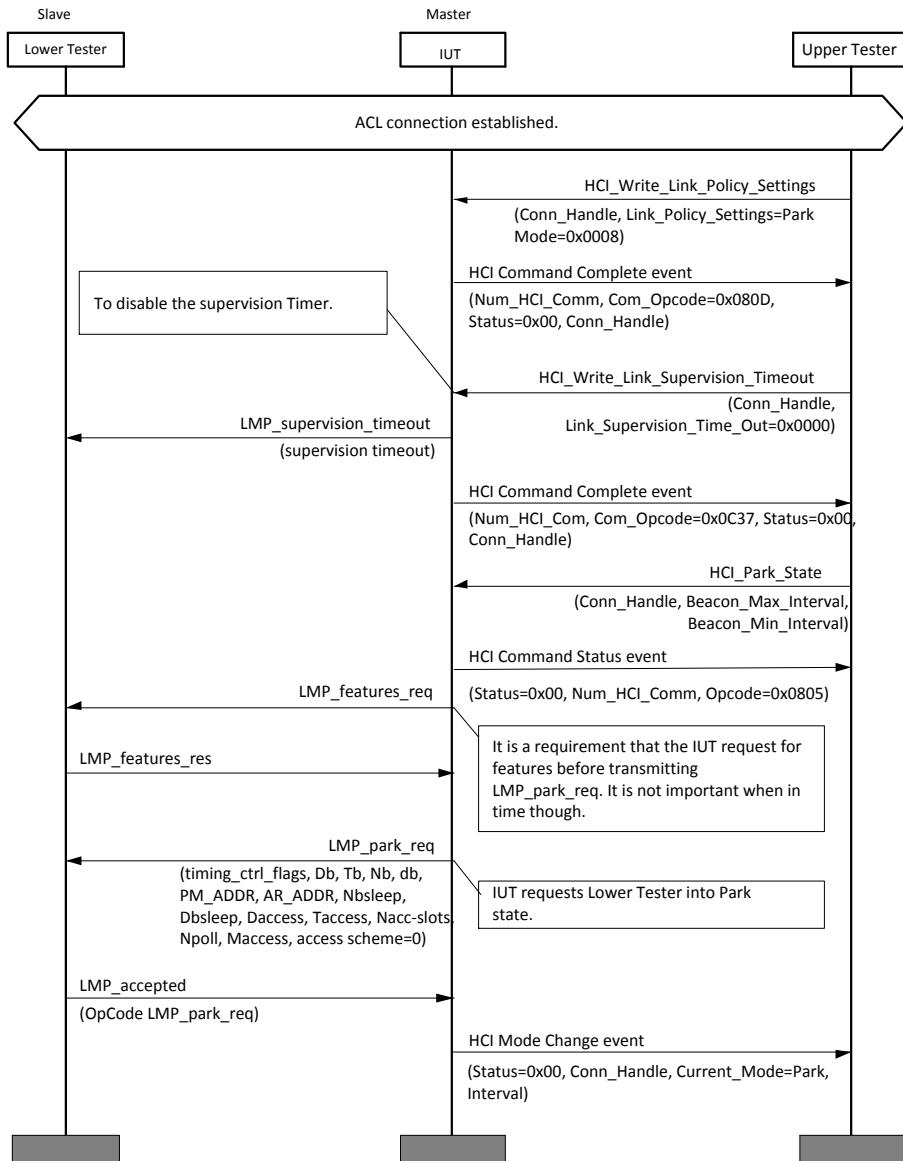


Figure 4.128: LMP/LIH/BV-27-C, MSC

MSC: The IUT requests the Lower Tester to enter PARK state.

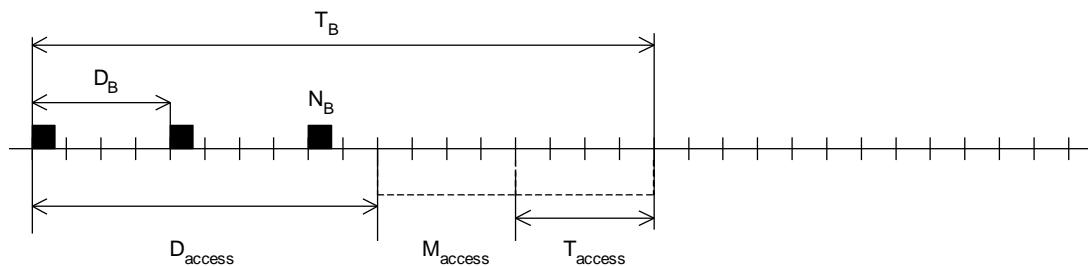


Figure 4.129: LMP/LIH/BV-27-C, Verifying

Verify that the IUT uses the beacon slots as shown in [Figure 4.129](#).



Verify that the IUT establishes the beacon channel according to the data in LMP_park.

Monitor for 20*TB slots.

- **Test Condition**

It must be possible to control the IUT to initiate the park state.

It must be possible to check the park state on Baseband level.

- **Expected Outcome**

Pass verdict

The IUT transmits PDU LMP_park_req and accepts reception of PDU LMP_accepted. The ACL link must enter Park state and the IUT must use the beacon interval for broadcast messages.

- **Notes**

Timing control flags, DB, DBsleep, Dacess are determined by CLK₂₇ of the master.

Beacon_Max_Interval and Beacon_Min_Interval shall be set to the same value to precisely define the beacon interval.

4.7.12.2 LMP/LIH/BV-29-C [Accept Park Request, Master]

- **Test Purpose**

Verify that the Lower Tester can request the IUT to be placed in to PARK state.

IUT is master. The Lower Tester is slave and initiates the service by requesting. Baseband functionality is tested in the test case.

- **Reference**

[1] 4.5.2.2

- **Initial Condition**

See [Default Settings](#).

The IUT must page the Lower Tester to become the master of the Piconet.



- Test Procedure

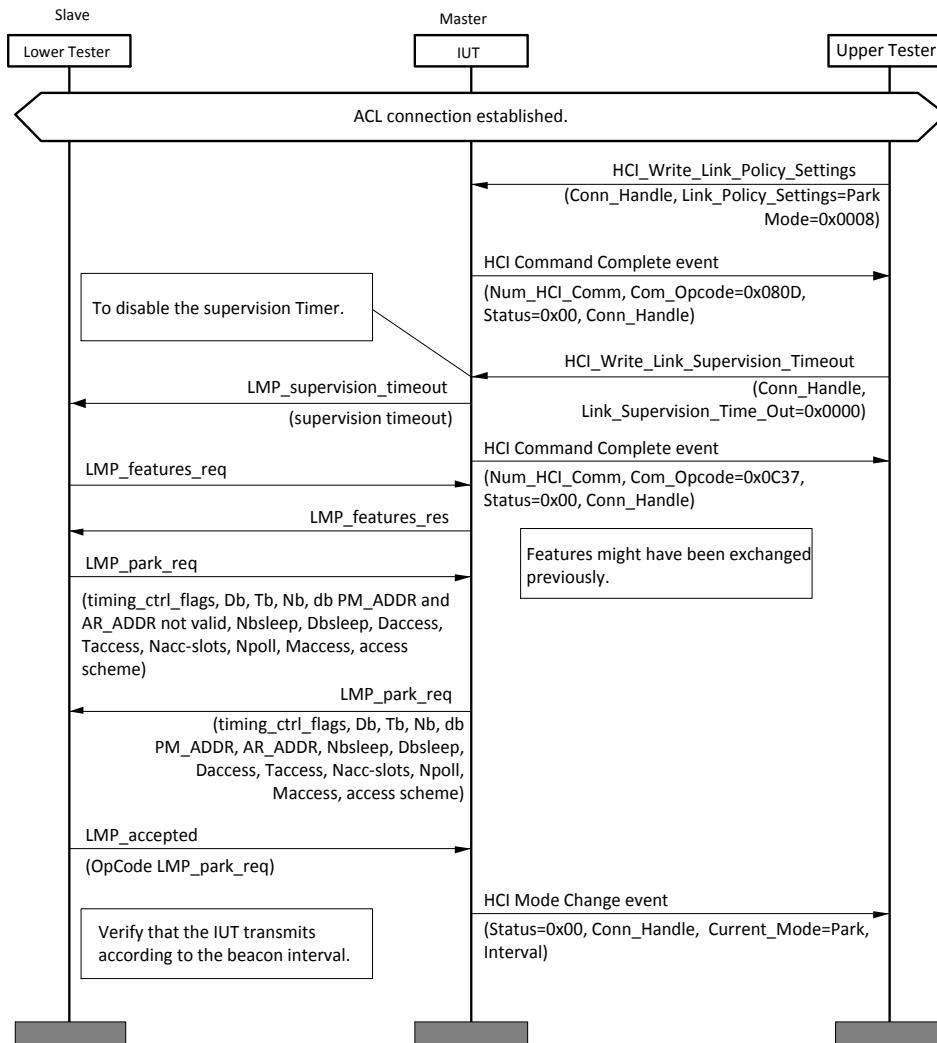


Figure 4.130: LMP/LIH/BV-29-C

- Test Condition

It must be possible to check the park state on Baseband level.

The Lower Tester should know which park parameters can be accepted by the IUT (declared as IXIT).

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_park_req upon reception of PDU LMP_park_req. The ACL link must enter Park state.

- Notes

Timing control flags, DB, DBsleep, Dacess are determined by CLK₂₇ of the master.



Beacon_Max_Interval and Beacon_Min_Interval shall be set to the same value to precisely define the beacon interval.

4.7.12.3 LMP/LIH/BV-32-C [Request Park Exit]

- Test Purpose

Verify that the IUT can request the Lower Tester to exit PARK state using the PM_ADDR. IUT is master. The Lower Tester is slave. Baseband functionality is tested in the test case.

- Reference

[1] 4.5.2.4

- Initial Condition

See [Default Settings](#).

The Lower Tester has to be in parked state.

- Test Procedure

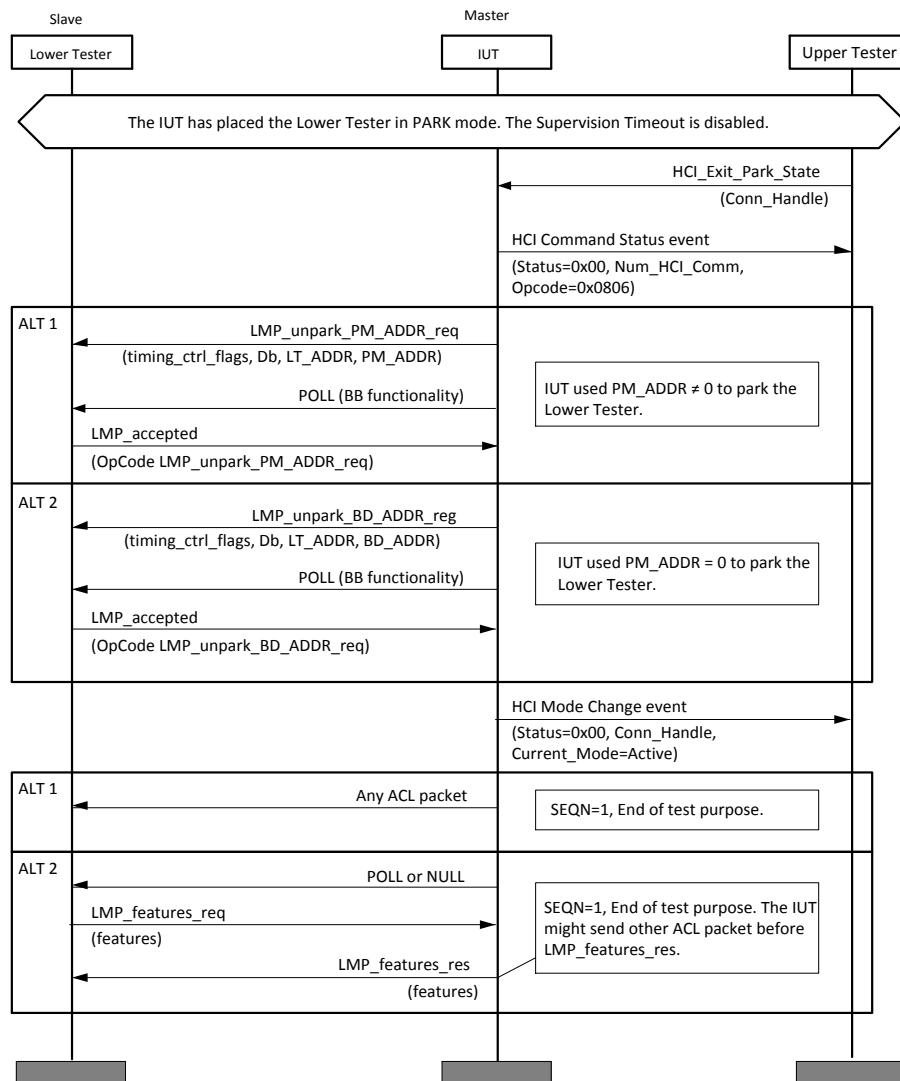


Figure 4.131: LMP/LIH/BV-32-C

- **Test Condition**

It must be possible to control the IUT to initiate the unpark request.

It must be possible to check the park state on Baseband level.

- **Expected Outcome**

Pass verdict

The IUT transmits PDU LMP_unpark_PM_ADDR_req or LMP_unpark_BD_ADDR_req and accepts PDU LMP_accepted. The ACL link must be active.

The SEQN bit is restarted as after a new connection, when exiting PARK state.

- **Notes**

Timing control flags are determined by CLK₂₇ of the master.

Beacon_Max_Interval and Beacon_Min_Interval shall be set to the same value to precisely define the beacon interval.

4.7.13 Park state - Both Master and Slave

- **Test subgroup objectives:**

To verify that the IUT declines the PARK state in a correct manner. The role of the IUT is of no importance.

4.7.13.1 LMP/LIH/BV-34-C [Park Reject]

- **Test Purpose**

Verify that the IUT responds that it does not support Park state upon request from the Lower Tester.

- **Reference**

[1] 4.5.2.1

- **Initial Condition**

See [Default Settings](#).



- Test Procedure

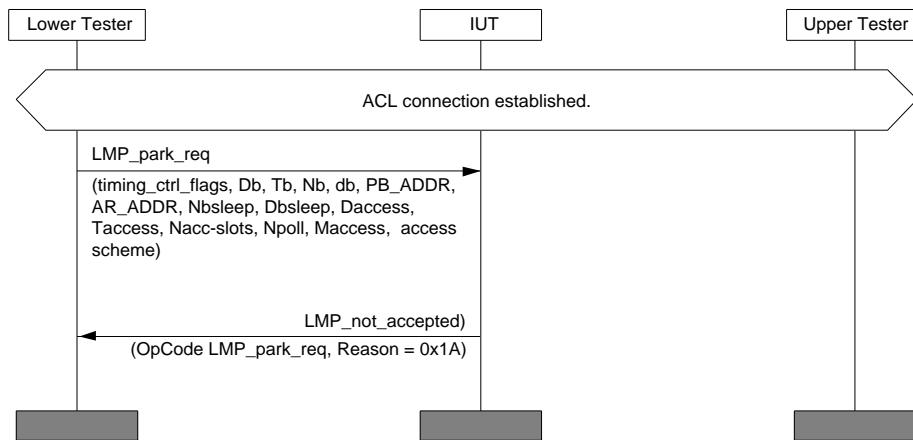


Figure 4.132: LMP/LIH/BV-34-C

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_not_accepted containing “Reason = 0x1A” upon reception of PDU LMP_park_req.

4.7.14 Power control - Both Master and Slave

- Test subgroup objectives:

To verify that a unit can request a change of another unit's TX power. The role of the IUT is of no importance.

4.7.14.1 LMP/LIH/BV-35-C [Lowest Power Report]

- Test Purpose

Verify that the IUT reports that it transmits on lowest power upon request from the Lower Tester to decrease the power. The Lower Tester initiates the service.

- Reference

[1] 4.1.3

- Initial Condition

See [Default Settings](#).



- Test Procedure

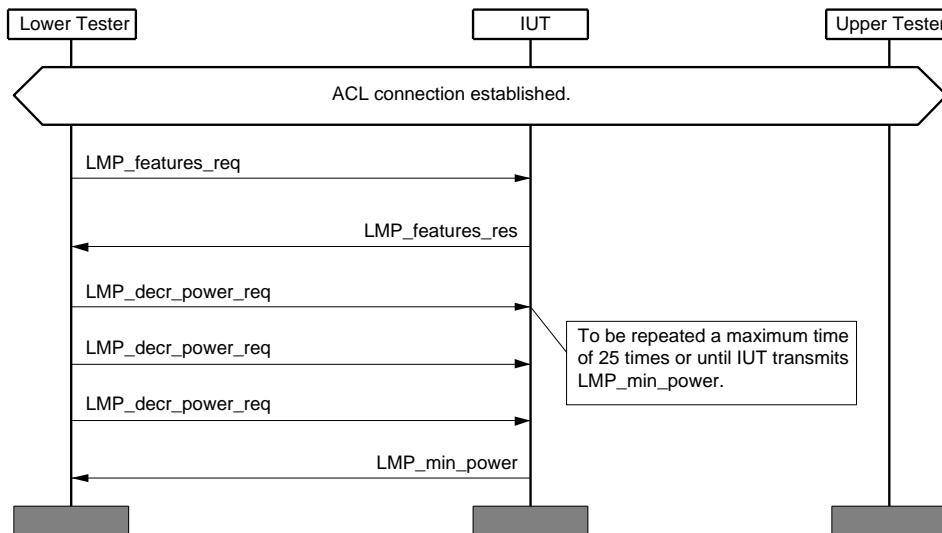


Figure 4.133: LMP/LIH/BV-35-C

The Lower Tester will not transmit PDU LMP_decr_power_req more than 25 times.

The Lower Tester will not transmit PDU LMP_decr_power_req more than once every 5 seconds. If a maximum step rate is declared as IXIT the Lower Tester should use this value.

- Expected Outcome

Pass verdict

The IUT accepts PDU LMP_decr_power_req and transmits PDU LMP_min_power.

4.7.14.2 LMP/LIH/BV-36-C [Highest Power Report]

- Test Purpose

Verify that the IUT reports that it transmits on highest power upon request from the Lower Tester to increase the power. The Lower Tester initiates the service.

- Reference

[1] 4.1.3

- Initial Condition

See [Default Settings](#).



- Test Procedure

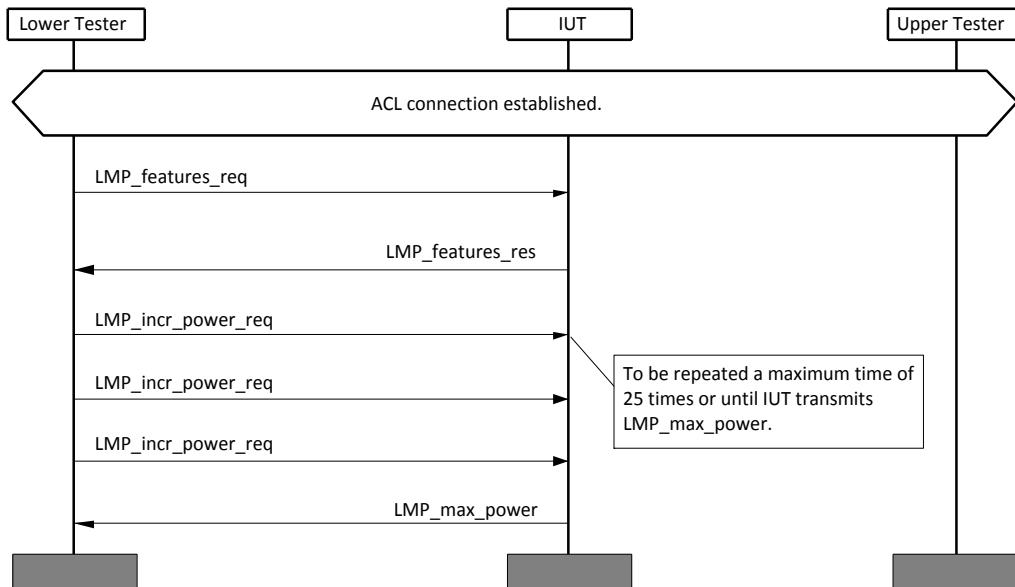


Figure 4.134: LMP/LIH/BV-36-C

The Lower Tester will not transmit PDU LMP_incr_power_req more than 25 times.

The Lower Tester will not transmit PDU LMP_incr_power_req more than once every 5 seconds. If a maximum step rate is declared as IXIT the Lower Tester should use this value.

- Expected Outcome

Pass verdict

The IUT accepts PDU LMP_incr_power_req and transmits PDU LMP_max_power.

4.7.14.3 LMP/LIH/BV-76-C [Request Decreased Power]

- Test Purpose

Verify that the IUT transmits PDU LMP_decr_power_req when the Lower Tester transmits POLL packets at power levels around the upper threshold of the Golden Receive Power Range (measured at the IUT's antenna connector). The Lower Tester acts as master.

- Reference

[1] 4.5.3

[6] 4.6

- Initial Condition

See [Default Settings](#).



- Test Procedure

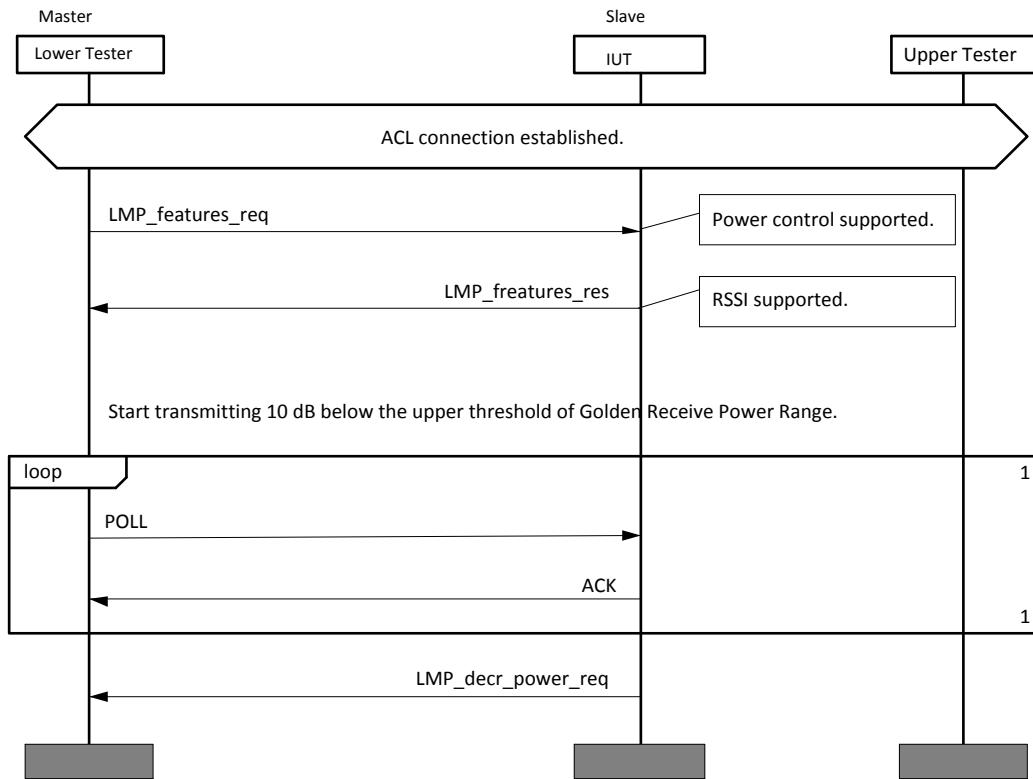


Figure 4.135: LMP/LIH/BV-76-C

The Lower Tester starts transmitting with the power level 10 dB below the declared upper threshold of the Golden Receive Power Range. The Lower Tester increases its power at steps of 2 dB, at a rate of not more than 1 step per 5-second period. If a maximum step rate is declared as IXIT the Lower Tester should use this value. The Lower Tester shall not increase the power level more than 7 dB above the declared threshold. The Lower Tester continuously transmits POLL packets.

Verify that the IUT transmits LMP_decr_power_req within the range.

- Test Condition

Nominal Test Conditions, see [6] Section 5.1.

The Lower Tester should know the Golden Receive Power Range and maximum step rate of the IUT (declared as IXIT). The Lower Tester and IUT must be connected with cable and RF attenuator to give sufficient measurement accuracy. An IXIT parameter is used to give the value for the RF attenuator calculated from the IUT's Golden Receive Power Range, the cable loss and the Lower Tester's TX power range.

- Expected Outcome

Pass verdict

The IUT transmits LMP_decr_power_req.



- Notes

The initial power level is 10 dB below the declared upper threshold to give a margin. The Lower Tester shall have an accuracy not worse than ± 3 dB in transmitted power level. Until dedicated Bluetooth test systems are available it is allowed to use other values for step size and accuracy in the transmitted power level. Also, the POLL packet can be replaced with other packet types.

4.7.14.4 LMP/LIH/BV-77-C [Request Increased Power]

- Test Purpose

Verify that the IUT transmits PDU LMP_incr_power_req when the Lower Tester transmits POLL packets at power levels around the lower threshold of the Golden Receive Power Range (measured at the IUT's antenna connector). The Lower Tester acts as master.

- Reference

[1] 4.5.3

[6] 4.6

- Initial Condition

See [Default Settings](#).

- Test Procedure

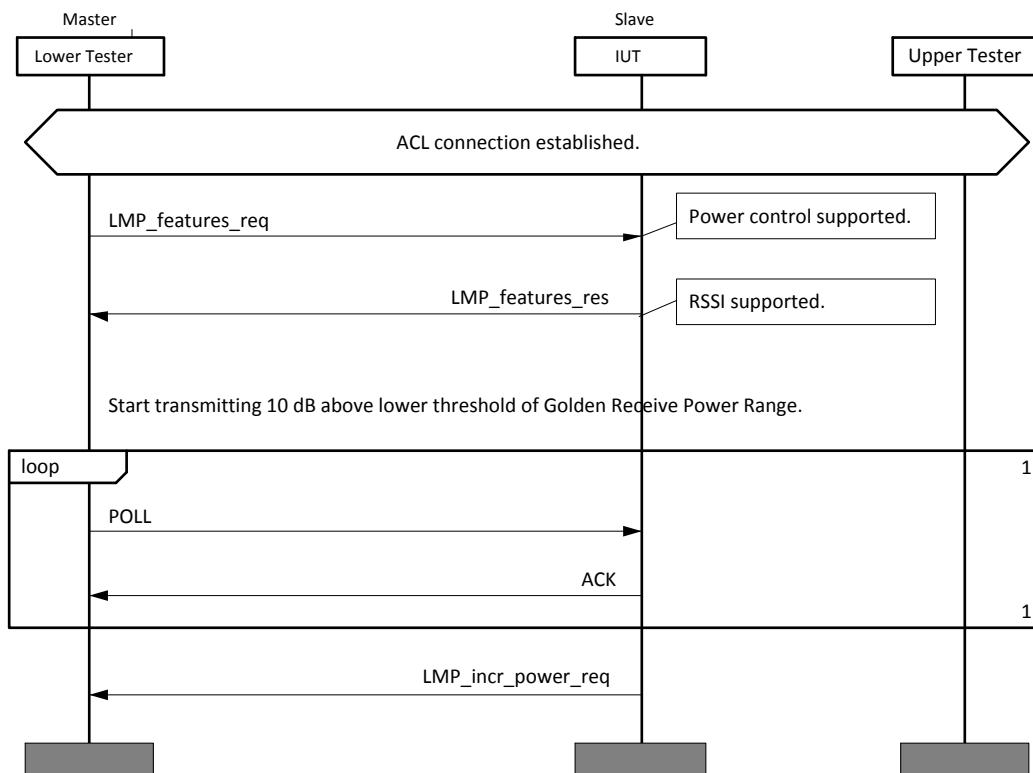


Figure 4.136: LMP/LIH/BV-77-C

The Lower Tester starts transmitting with the power level 10 dB above the declared lower threshold of the Golden Receive Power Range. The Lower Tester decreases its power at steps of 2 dB, at a rate



of not more than 1 step per 5-second period. If a maximum step rate is declared as IXIT the Lower Tester should use this value. The Lower Tester shall not decrease the power level more than 6 dB below the declared threshold. The Lower Tester continuously transmits POLL packets.

Verify that the IUT transmits LMP_incr_power_req within the range.

- **Test Condition**

Nominal Test Conditions, see [6] Section 5.1.

The Lower Tester should know the Golden Receive Power Range and maximum step rate of the IUT (declared as IXIT). The Lower Tester and IUT must be connected with cable and RF attenuator to give sufficient measurement accuracy. An IXIT parameter is used to give the value for the RF attenuator calculated from the IUT's Golden Receive Power Range, the cable loss and the Lower Tester's TX power range.

- **Expected Outcome**

Pass verdict

The IUT transmits LMP_incr_power_req.

- **Notes**

The initial power level is 10 dB above the declared lower threshold to give a margin. The Lower Tester shall have an accuracy not worse than ± 3 dB in transmitted power level. Until dedicated Bluetooth test systems are available it is allowed to use other values for step size and accuracy in the transmitted power level. Also, the POLL packet can be replaced with other packet types.

4.7.14.5 LMP/LIH/BV-127-C [Respond to EPC Increment Request]

- **Test Purpose**

Verify that the IUT will respond correctly to an Enhanced Power Control increment single step request and the HCI_Read_Enhanced_Power_Level command.

- **Reference**

[1] 4.1.3

- **Initial Condition**

See [Default Settings](#).



- Test Procedure

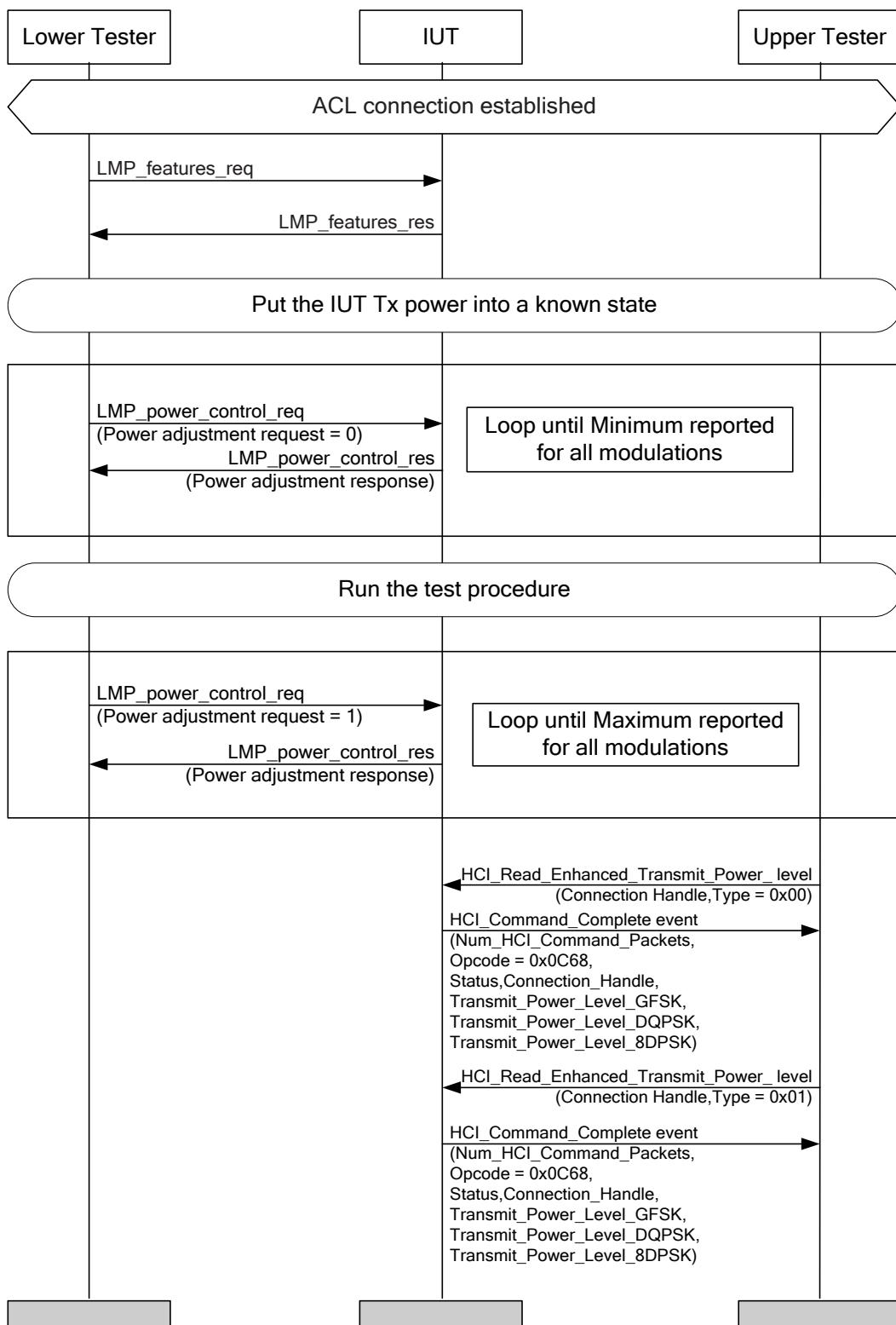


Figure 4.137: LMP/LIH/BV-127-C



- Expected Outcome

Pass verdict

After the Lower Tester sends the LMP_features_req PDU the IUT responds with an LMP_feature_res PDU indicating support for power control power control requests, and Enhanced Power Control.

After the Lower Tester sends the LMP_power_control_req PDU with increment one step the IUT sends the LMP_power_control_res PDU with the power adjustment response reporting that at least one supported modulation has “changed one step.”

After the Lower Tester sends the LMP_power_control_req PDU with increment one step the IUT sends the LMP_power_control_res PDU with the power adjustment response reporting that for all supported modulations not at minimum or maximum have “changed one step.”

The Lower Tester shall be able to send LMP_power_control_req PDU with increment one step to the IUT and the IUT will reach a state where the LMP_power_control_res PDU power adjustment response will report maximum power for all supported modulations.

The IUT responds to the HCI_Read_Enhanced_Transmit_Power_Level command with an HCI Command Complete event with the current and maximum power levels equal when all supported modulations report they are at maximum.

4.7.14.6 LMP/LIH/BV-128-C [Respond to EPC Decrement Request]

- Test Purpose

Verify that the IUT will respond correctly to an Enhanced Power Control decrement single step request and the HCI_Read_Enhanced_Power_Level command.

- Reference

[1] 4.1.3

- Initial Condition

See [Default Settings](#).



- Test Procedure

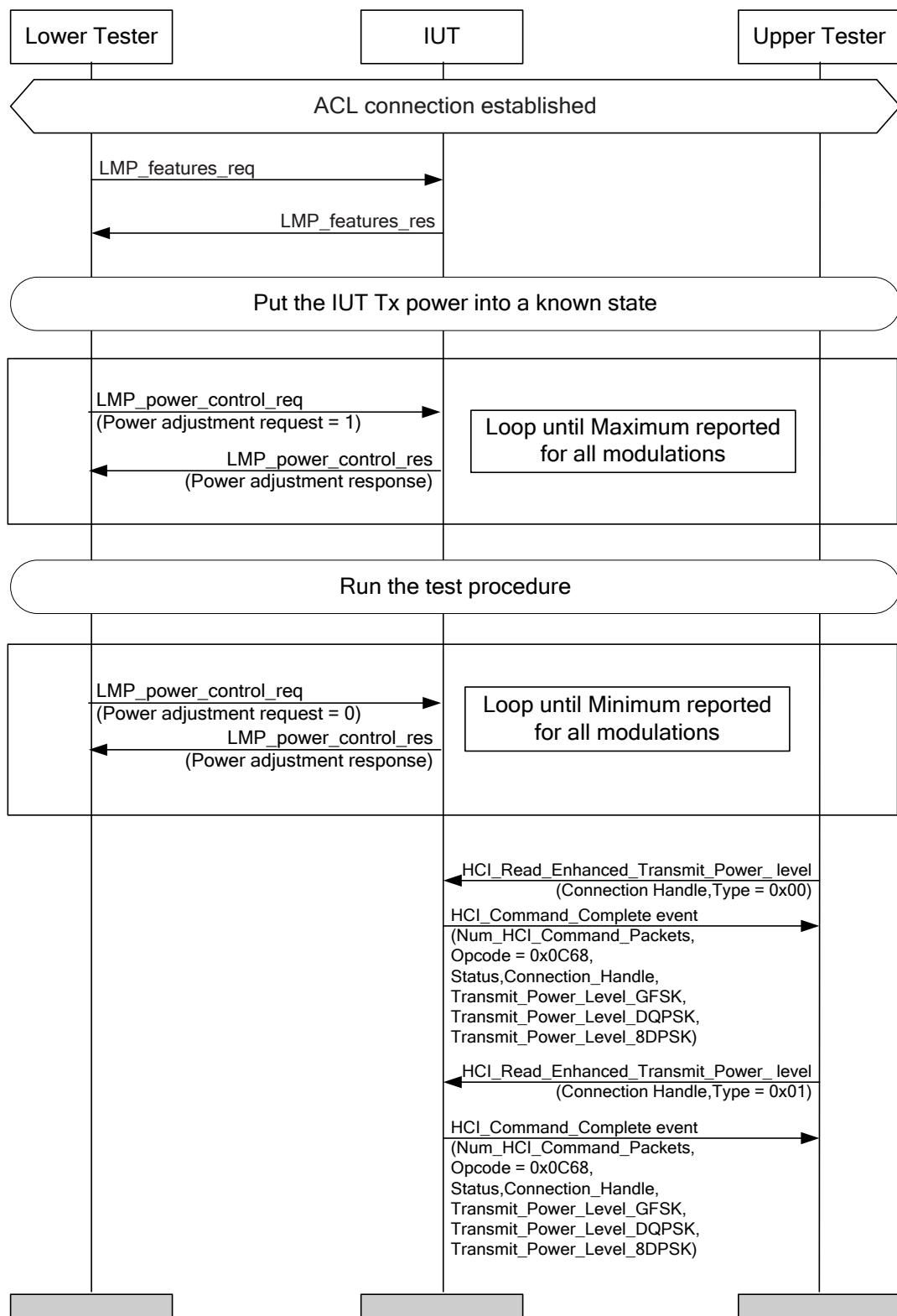


Figure 4.138: LMP/LIH/BV-128-C



- Expected Outcome

Pass verdict

After the Lower Tester sends the LMP_features_req PDU the IUT responds with an LMP_feature_res PDU indicating support for power control, power control requests, and Enhanced Power Control.

After the Lower Tester sends the LMP_power_control_req PDU with decrement one step the IUT sends the LMP_power_control_res PDU with the power adjustment response reporting that at least one supported modulation has “changed one step.”

After the Lower Tester sends the LMP_power_control_req PDU with decrement one step the IUT sends the LMP_power_control_res PDU with the power adjustment response reporting that for all supported modulations not at minimum or maximum have “changed one step.”

The Lower Tester shall be able to send LMP_power_control_req PDU with decrement one step to the IUT and the IUT will reach a state where the LMP_power_control_res PDU power adjustment response will report minimum power for all supported modulations.

The IUT responds to the HCI_Read_Enhanced_Transmit_Power_Level command with an HCI Command Complete event with the current and maximum power levels are not equal when all supported modulations report they are at minimum.

4.7.14.7 LMP/LIH/BV-129-C [Respond to EPC go to Maximum Power Level]

- Test Purpose

Verify that the IUT can be requested to go to maximum power level using the Enhanced Power Control go to maximum request.

- Reference

[1] 4.1.3

- Initial Condition

See [Default Settings](#).



- Test Procedure

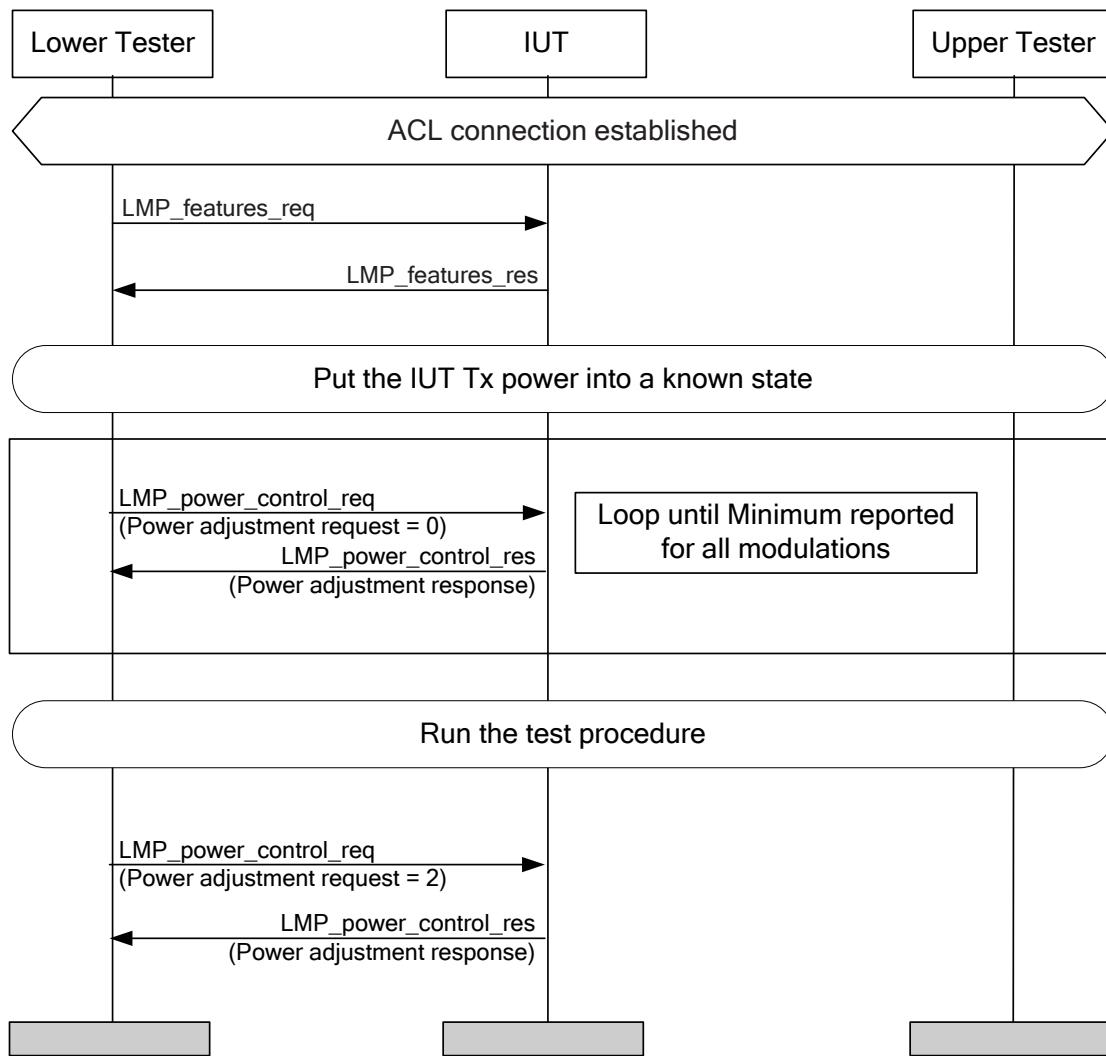


Figure 4.139: LMP/LIH/BV-129-C

- Expected Outcome

Pass verdict

After the Lower Tester sends the LMP_features_req PDU the IUT responds with an LMP_feature_res PDU indicating support for power control, power control requests, and Enhanced Power Control.

After the Lower Tester sends the LMP_power_control_req PDU with go to maximum the IUT sends the LMP_power_control_res PDU with the power adjustment response reporting maximum power for all supported modulations.

4.7.14.8 LMP/LIH/BV-130-C [Request an EPC Increment]

- Test Purpose

Verify that the IUT will request an Enhanced Power Control increment single step.



- Reference

[6] 4.6

[1] 4.5.3

- Initial Condition

See [Default Settings](#).

- Test Procedure

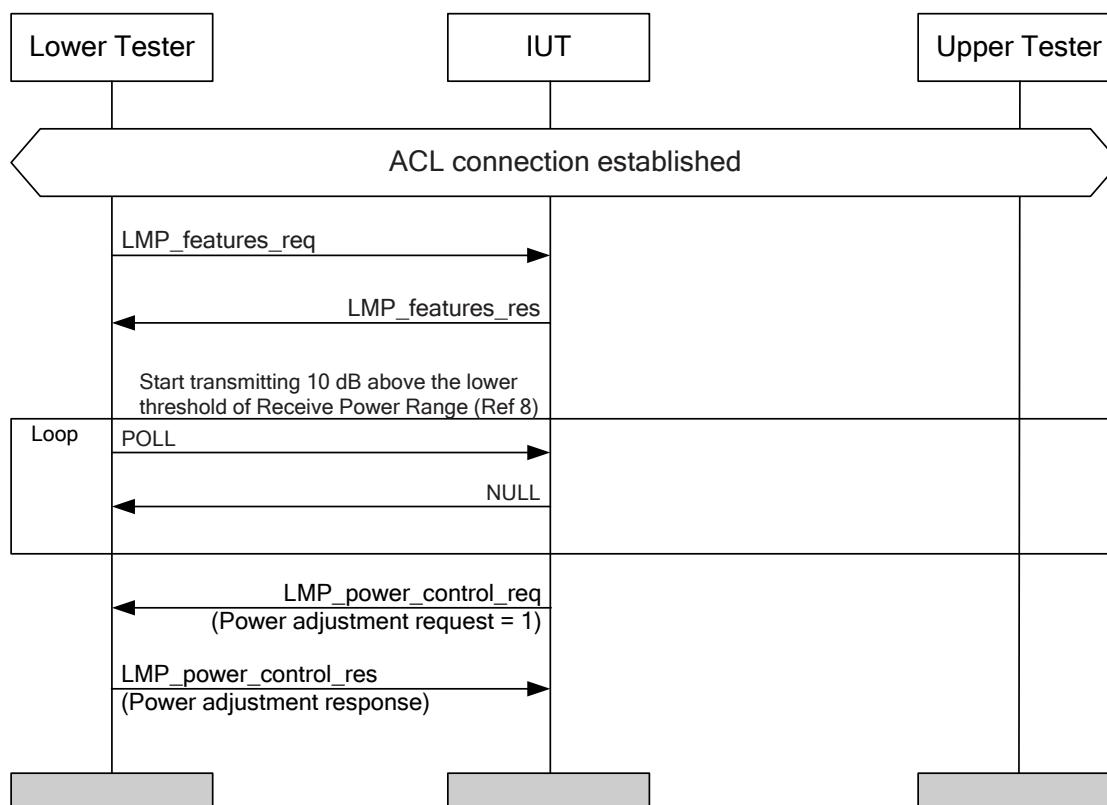


Figure 4.140: LMP/LIH/BV-130-C

The Lower Tester starts transmitting with the power level 10 dB above the declared lower threshold of the Receive Power Range.

The Lower Tester decreases its power at steps of 2 dB.

The Lower Tester shall not decrease the power level more than 6 dB below the declared lower threshold.

The Lower Tester continuously transmits POLL packets.

- Test Condition

Nominal Test Conditions; see [6] Section 5.1.

The Lower Tester should know the Receive Power Range of the IUT (declared as IXIT).



The Lower Tester and IUT must be connected with cable and RF attenuator to give sufficient measurement accuracy.

An IXIT parameter is used to give the value for the RF attenuator calculated from the IUT's Receive Power Range, the cable loss and the Lower Tester's TX power range.

- Expected Outcome

Pass verdict

After the Lower Tester sends the LMP_features_req PDU the IUT responds with an LMP_feature_res PDU indicating support for power control, power control requests, and Enhanced Power Control.

The IUT sends the LMP_power_control_req PDU with increment power adjustment req.

- Notes

The initial power level is 10 dB above the declared lower threshold to give a margin. The Lower Tester shall have an accuracy not worse than ± 3 dB in transmitted power level. Until dedicated Bluetooth test systems are available it is allowed to use other values for step size and accuracy in the transmitted power level. The POLL packet can be replaced with other packet types.

4.7.14.9 LMP/LIH/BV-131-C [Request an EPC Decrement]

- Test Purpose

Verify that the IUT will request an Enhanced Power Control decrement single step.

- Reference

[6] 4.6

[1] 4.5.3

- Initial Condition

See [Default Settings](#).



- Test Procedure

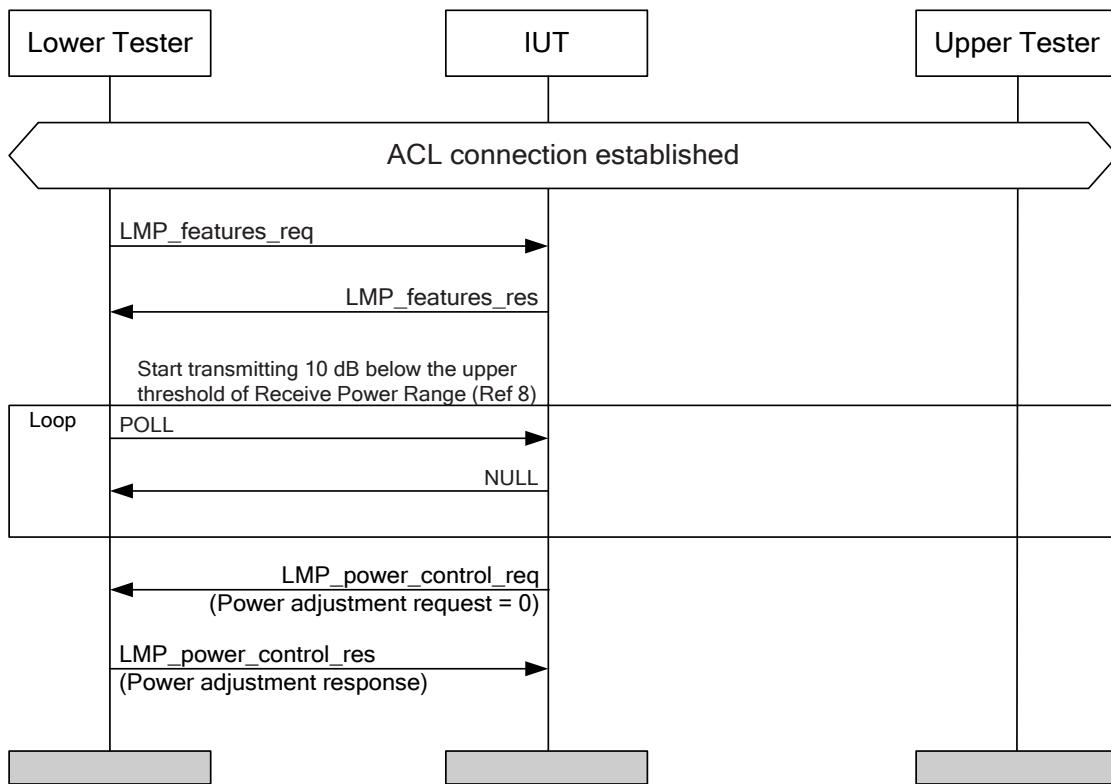


Figure 4.141: LMP/LIH/BV-131-C

The Lower Tester starts transmitting with the power level 10 dB below the declared upper threshold of the Receive Power Range.

The Lower Tester increases its power at steps of 2 dB.

The Lower Tester shall not increase the power level more than 7 dB above the declared upper threshold.

The Lower Tester continuously transmits POLL packets.

- Test Condition

Nominal Test Conditions; see [6] Section 5.1.

The Lower Tester should know the Receive Power Range and maximum step rate of the IUT (declared as IXIT).

The Lower Tester and IUT must be connected with cable and RF attenuator to give sufficient measurement accuracy.

An IXIT parameter is used to give the value for the RF attenuator calculated from the IUT's Receive Power Range, the cable loss and the Lower Tester's TX power range.



- Expected Outcome

Pass verdict

After the Lower Tester sends the LMP_features_req PDU the IUT responds with an LMP_feature_res PDU indicating support for power control, power control requests, and Enhanced Power Control.

The IUT sends the LMP_power_control_req PDU with decrement power adjustment req.

- Notes

The initial power level is 10 dB below the declared upper threshold to give a margin. The Lower Tester shall have accuracy not worse than ± 3 dB in transmitted power level. Until dedicated Bluetooth test systems are available it is allowed to use other values for step size and accuracy in the transmitted power level. Also, the POLL packet can be replaced with other packet types.

4.7.14.10 LMP/LIH/BV-132-C [Request an EPC go to Max]

- Test Purpose

Verify that the IUT will request an Enhanced Power Control power go to max.

- Reference

[6] 4.6

[1] 4.5.3

- Initial Condition

See [Default Settings](#).



- Test Procedure

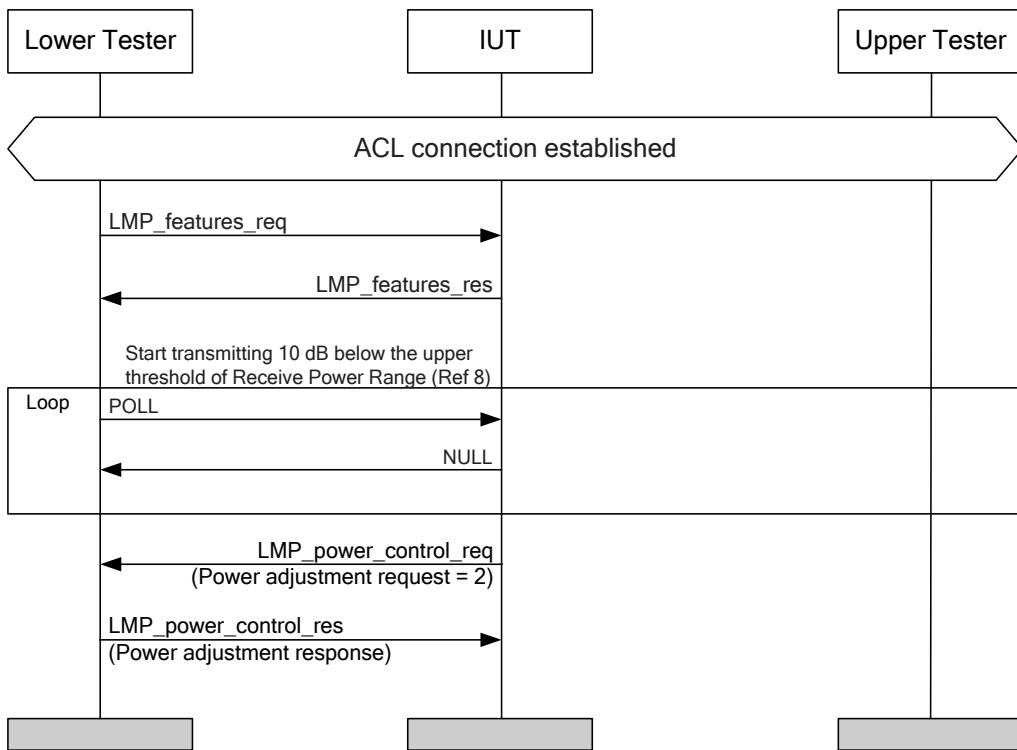


Figure 4.142: LMP/LIH/BV-132-C

The Lower Tester starts transmitting with the power level 10 dB below the declared upper threshold of the Receive Power Range.

The Lower Tester decreases its power to 10dB below the lower threshold of the Receive Power Range.

The Lower Tester continuously transmits POLL packets.

- Expected Outcome

Pass verdict

After the Lower Tester sends the LMP_features_req PDU the IUT responds with an LMP_feature_res PDU indicating support for power control, power control requests, and Enhanced Power Control.

The IUT correctly sends the power change go to max request to the Lower Tester.

All supported modulations report to be at max power.

4.7.14.11 LMP/LIH/BV-133-C [Power Response Reports Unsupported Modulation Correctly]

- Test Purpose

Verify that the IUT will respond correctly to an EPC power change request for an unsupported modulation type from a device that supports Enhanced Power Control.

Applicable only for units that support EPC and do not support either 2Mbps or 3Mbps packet types.



- Reference

[6] 4.6

[1] 4.5.3

- Initial Condition

See [Default Settings](#).

- Test Procedure

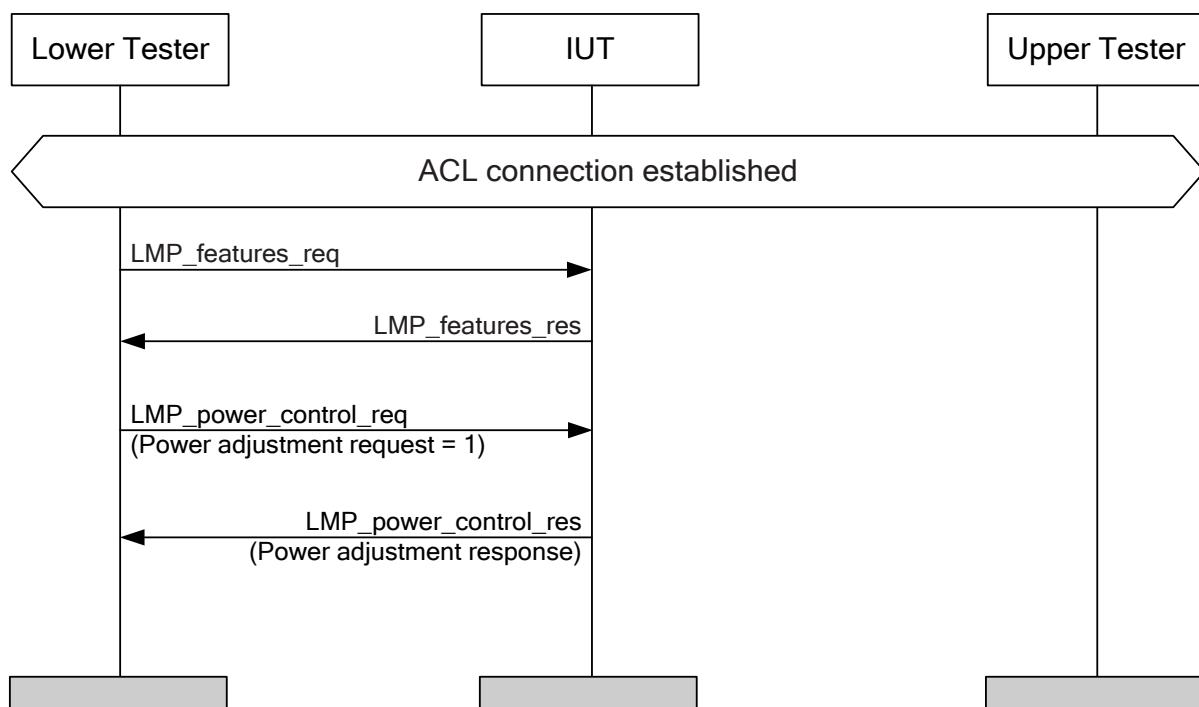


Figure 4.143: LMP/LIH/BV-133-C

- Expected Outcome

Pass verdict

After the Lower Tester sends the LMP_features_req PDU the IUT responds with an LMP_feature_res PDU indicating support for power control, power control requests, and Enhanced Power Control.

After the Lower Tester sends the LMP_power_control_req PDU with increment one step the IUT sends the LMP_power_control_res PDU with the power adjustment response not supported for any modulations that are not supported.

4.7.15 Quality of Service (QoS) - Slave

- Test subgroup objectives:

To verify that a unit can request a change of maximum polling interval. The IUT is slave.



4.7.15.1 LMP/LIH/BV-39-C [Accept Polling Interval Notification]

- Test Purpose

Verify that the IUT accepts the new maximum polling interval after notification from the Lower Tester.

IUT is slave. The Lower Tester is master and notifies the slave.

- Reference

[1] 4.1.8.1

- Initial Condition

See [Default Settings](#).

- Test Procedure

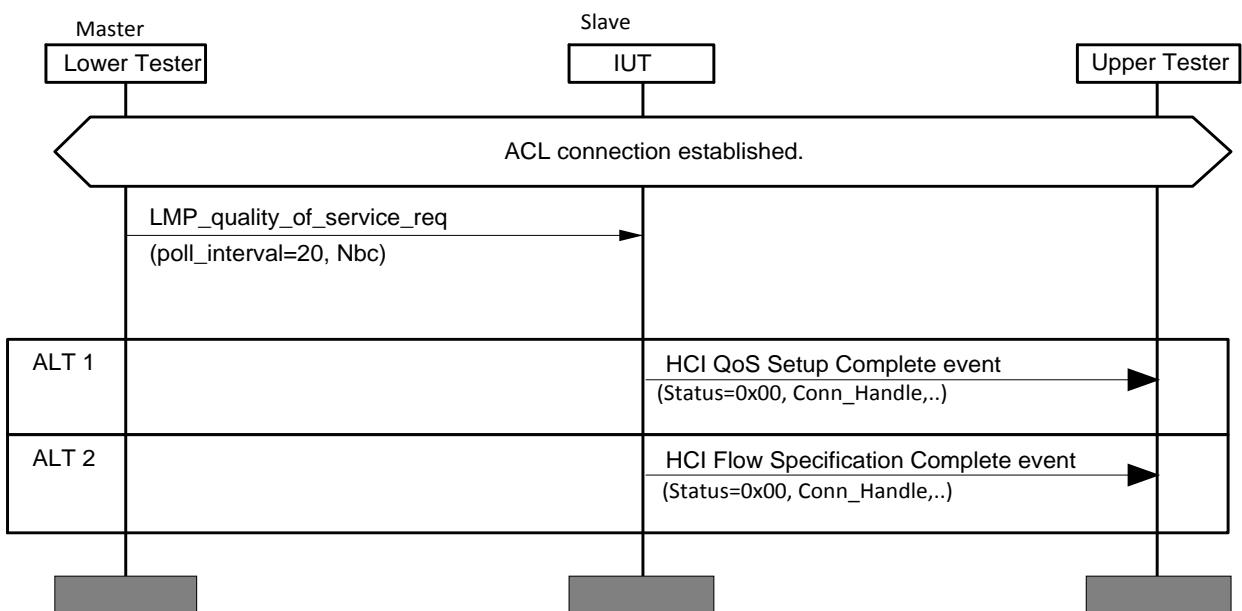


Figure 4.144: LMP/LIH/BV-39-C

Verify that the IUT transmits HCI_QoS_Setup_Complete_Event or HCI_Flow_Specification_Complete_Event to verify that it has received the PDU LMP_quality_of_service.

- Expected Outcome

Pass verdict

The IUT accepts the PDU LMP_quality_of_service.



4.7.15.2 LMP/LIH/BV-40-C [Accept Polling Interval Request]

- **Test Purpose**

Verify that the IUT accepts the new maximum polling interval after request from the Lower Tester. The maximum polling interval must be changed accordingly. IUT is slave. The Lower Tester is master and requests the slave.

- **Reference**

[1] 4.1.8.2

- **Initial Condition**

See [Default Settings](#).

- **Test Procedure**

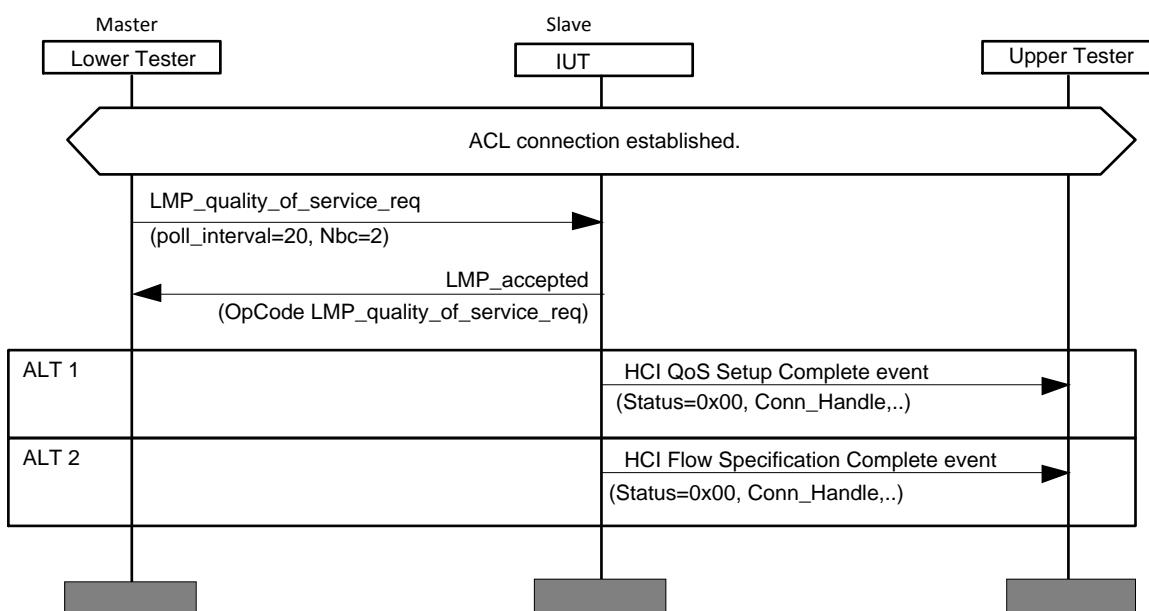


Figure 4.145: LMP/LIH/BV-40-C

Verify that the IUT transmits HCI_QoS_Setup_Complete_Event or HCI_Flow_Specification_Complete_Event to verify that it has received the PDU LMP_quality_of_service_req.

- **Expected Outcome**

Pass verdict

The IUT transmits PDU LMP_accepted upon reception of PDU LMP_quality_of_service_req.

4.7.15.3 LMP/LIH/BV-41-C [Polling Interval Rejected]

- **Test Purpose**

Verify that the IUT accepts a rejection of the Polling interval from the Lower Tester. IUT is slave and requests the master. The Lower Tester is master.



- Reference
 - [1] 4.1.8.2
- Initial Condition
See [Default Settings](#).
- Test Procedure

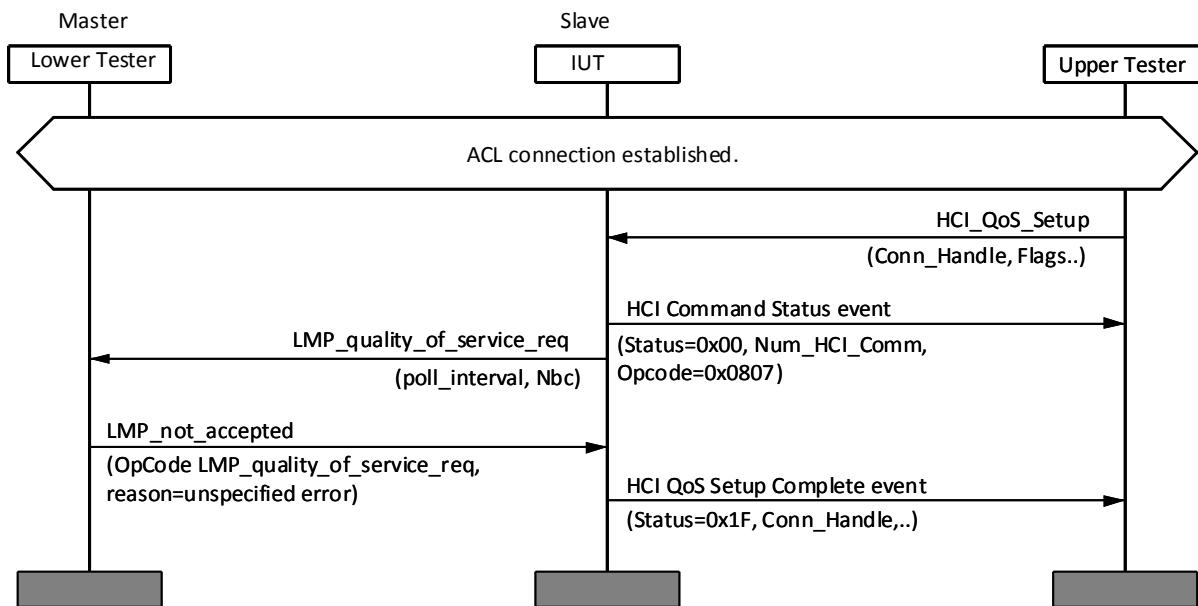


Figure 4.146: LMP/LIH/BV-41-C

Verify that the IUT transmits HCI_QoS_Complete_Event to report that LMP_not_accepted was received upon reception of PDU LMP_quality_of_service.

- Test Condition

It must be possible to check the POLL interval on Baseband level.

It must be possible to control the IUT to initiate the Quality of service.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_quality_of_service_req and accepts the reception of PDU LMP_not_accepted.

- Notes

There is no special HCI command for PDU LMP_quality_of_service_req, it is the same as for PDU LMP_quality_of_service.



4.7.16 Quality of Service (QoS) - Master

- Test subgroup objectives:

To verify that a unit can request a change of maximum polling interval. The IUT is master.

4.7.16.1 LMP/LIH/BV-42-C [Set Polling Interval]

- Test Purpose

Verify that the IUT can request or notify the Lower Tester the new polling interval. Verify on baseband level that the time between subsequent transmissions to the Lower Tester never exceeds the POLLING interval.

IUT is master and notifies or requests the Lower Tester. The Lower Tester is slave.

- Reference

[1] 4.1.8

- Initial Condition

See [Default Settings](#).

The IUT must page the Lower Tester to become the master of the Piconet.



- Test Procedure

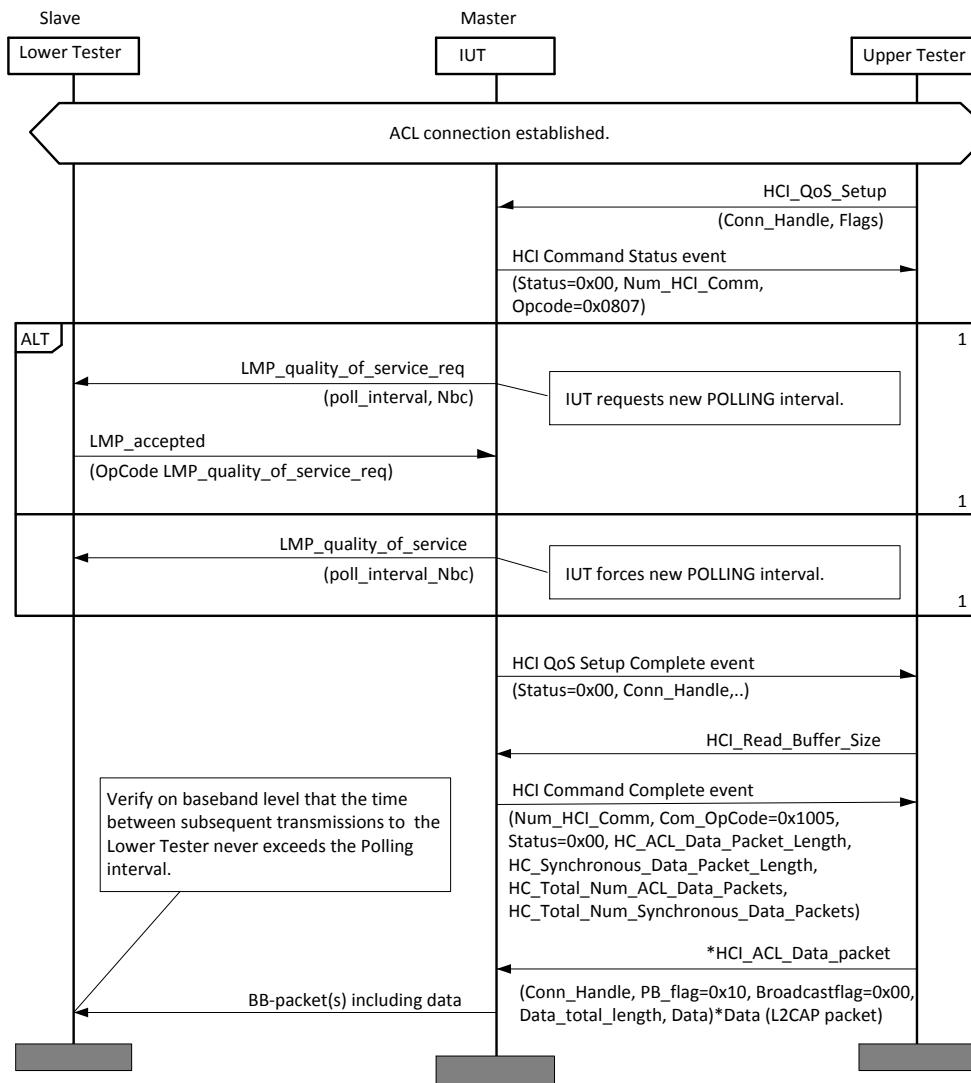


Figure 4.147: LMP/LIH/BV-42-C

Verify that the IUT transmits allowed packets according to the polling interval given.

- Test Condition

It must be possible to check the POLL interval on Baseband level.

It must be possible to control the IUT to initiate the Quality of service.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_quality_of_service and changes to the new maximum polling interval.



- Notes

There is no special HCI command for PDU LMP_quality_of_service, it is the same as for PDU LMP_quality_of_service_req.

4.7.17 SCO Links - Slave

- Test subgroup objectives:

To verify that the unit can initiate and delete an SCO link. The IUT is slave.

4.7.17.1 LMP/LIH/BV-43-C [Accept HV1 SCO Request]

- Test Purpose

Verify that the IUT sets up an SCO link upon request from the Lower Tester. Verify that the correct SCO setup is used. HV1 packages are used. IUT is slave. The Lower Tester is master and initiates the service.

- Reference

[1] 4.6.1.1

- Initial Condition

See [Default Settings](#).

A features request has to be carried out: see [LMP/INF/BV-10-C \[Supported Features Response\]](#)



- Test Procedure

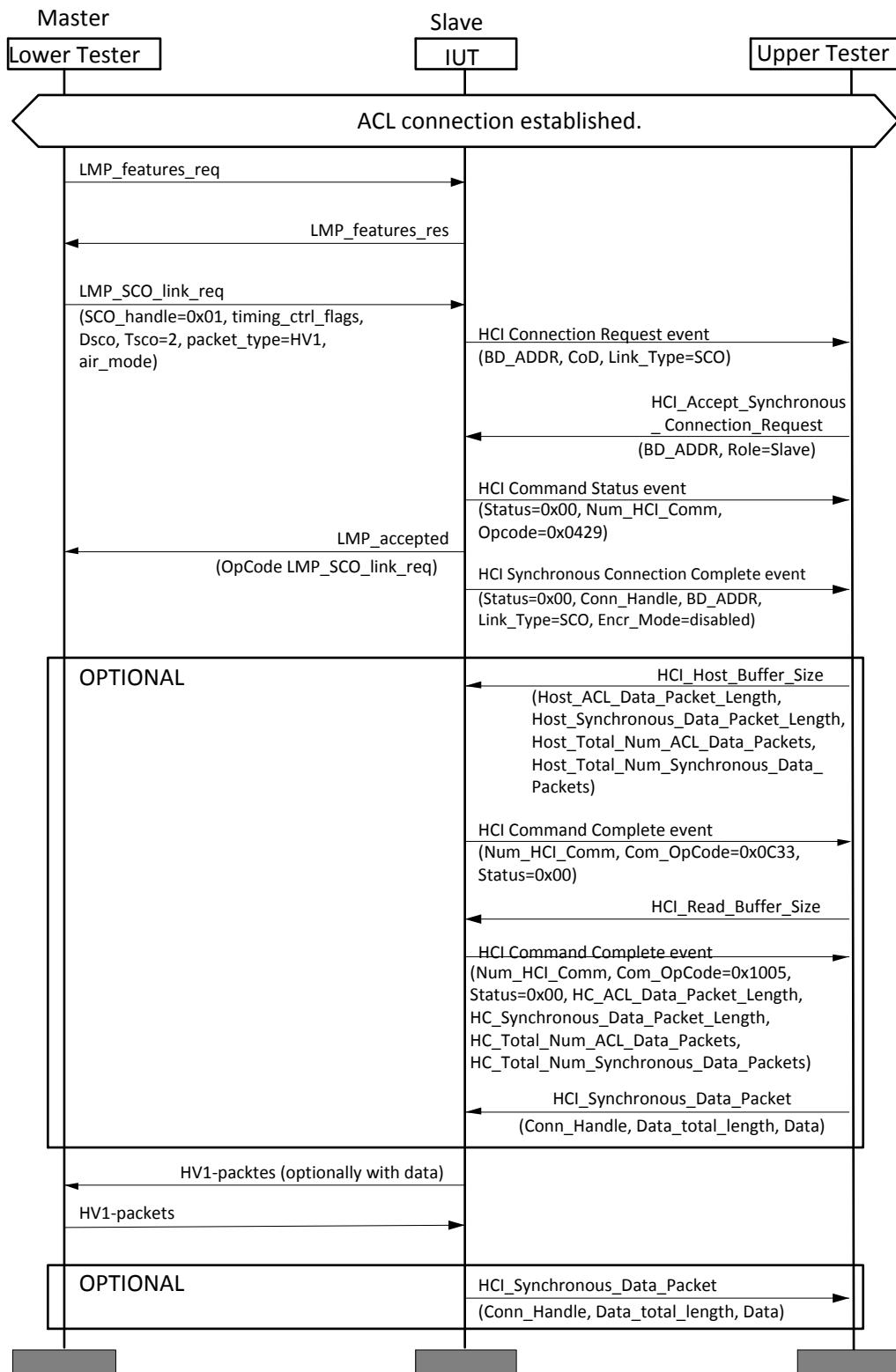


Figure 4.148: LMP/LIH/BV-43-C

Verify that a HV1 package is sent every second time slot.



- Test Condition

The need to have HCI_Synchronous_Data packets to generate HV packets should be declared as IXIT. However, payload content is not verified.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted using a DM1 packet upon reception of PDU LMP_SCO_link_req. An SCO link has been established accordingly.

4.7.17.2 LMP/LIH/BV-44-C [Accept HV2 SCO Request]

- Test Purpose

Verify that the IUT sets up an SCO link upon request from the Lower Tester. Verify that the correct SCO setup is used. HV2 packages are used. IUT is slave. The Lower Tester is master and initiates the service.

- Reference

[1] 4.6.1.1

- Initial Condition

See [Default Settings](#).

A features request has to be carried out: [LMP/INF/BV-10-C \[Supported Features Response\]](#)



- Test Procedure

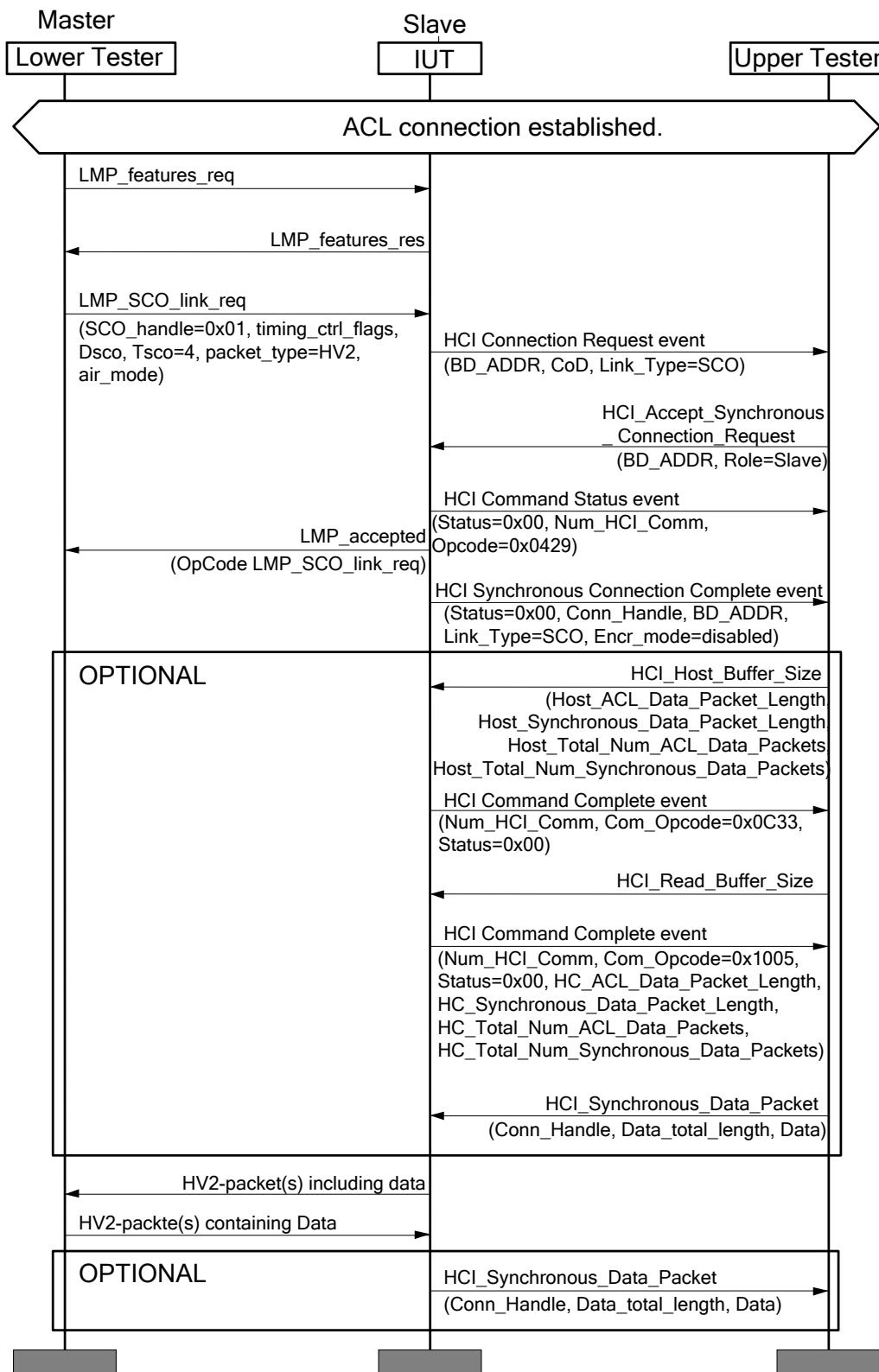


Figure 4.149: LMP/LIH/BV-44-C

Verify that a HV2 package is sent every four time slots.



- Test Condition

The need to have HCI_Synchronous_Data packets to generate HV packets should be declared as IXIT. However, payload content is not verified.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted upon reception of PDU LMP SCO_link_req. An SCO link has to be established accordingly.

4.7.17.3 LMP/LIH/BV-45-C [Accept HV3 SCO Request]

- Test Purpose

Verify that the IUT sets up an SCO link upon request from the Lower Tester. Verify that the correct SCO setup is used. HV3 packages are used. IUT is slave. The Lower Tester is master and initiates the service.

- Reference

[1] 4.6.1.1

- Initial Condition

See [Default Settings](#).



- Test Procedure

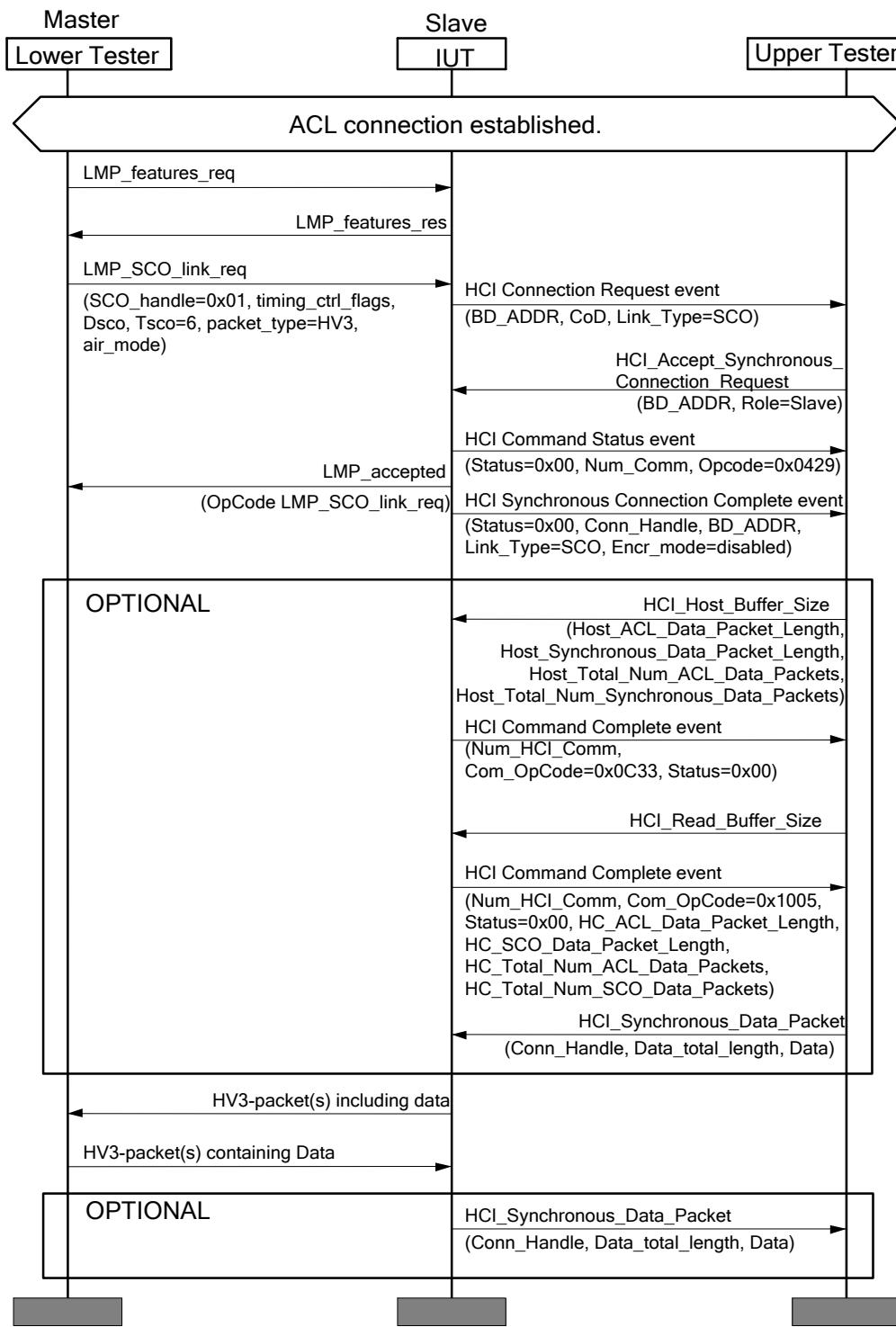


Figure 4.150: LMP/LIH/BV-45-C

Verify that a HV3 package is sent every six time slots.



- Test Condition

The need to have HCI_Synchronous_Data packets to generate HV packets should be declared as IXIT. However, payload content is not verified.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted upon reception of PDU LMP SCO_link_req. An SCO link has to be established accordingly.

4.7.17.4 LMP/LIH/BV-46-C [Request HV1 SCO]

- Test Purpose

Verify that the IUT can request the Lower Tester to set up an SCO link. Verify that the correct SCO setup is used. HV1 packages are used. IUT is slave and initiates the service. The Lower Tester is master.

- Reference

[1] 4.6.1.2

- Initial Condition

See [Default Settings](#).



- Test Procedure

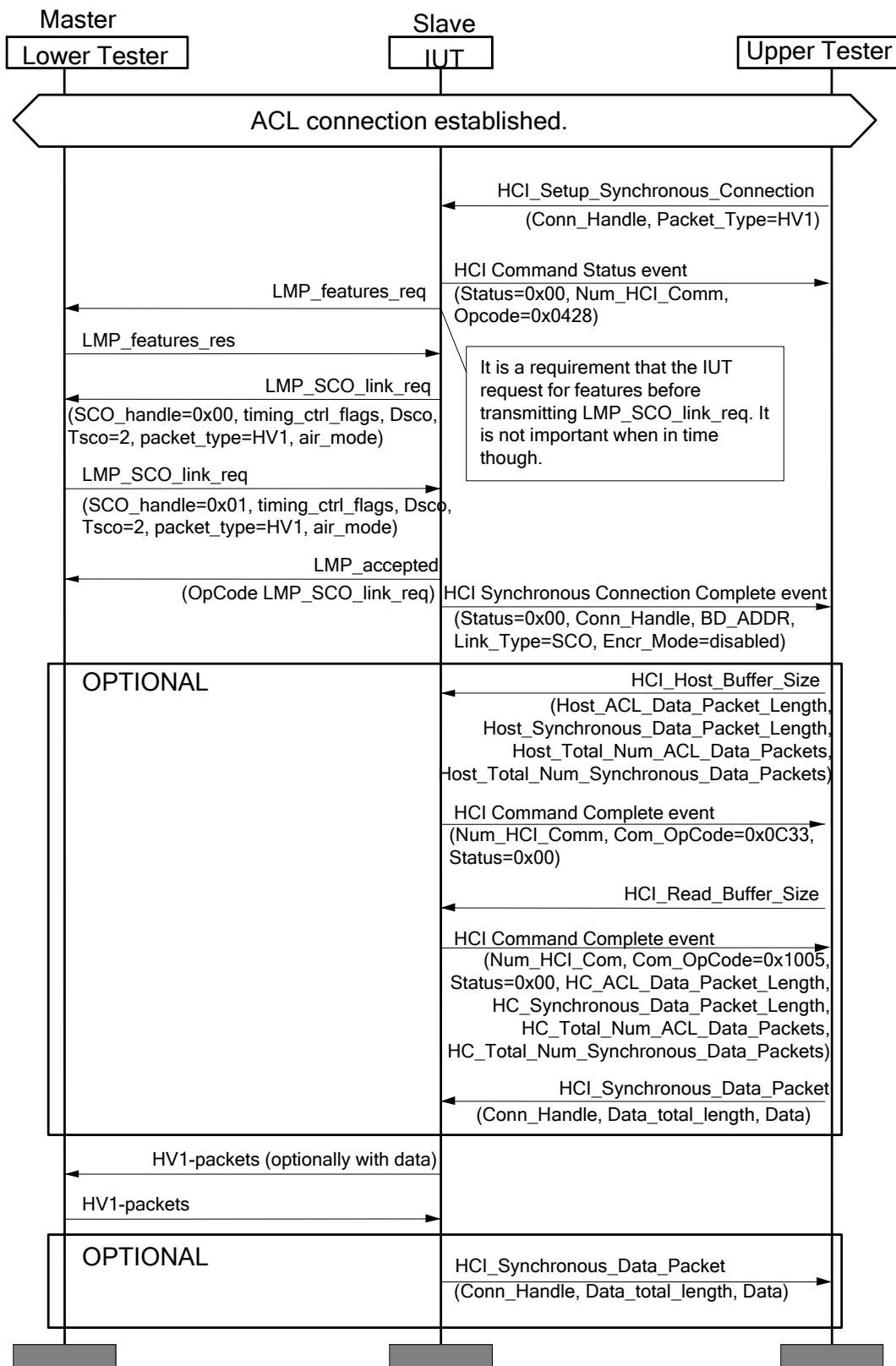


Figure 4.151: LMP/LIH/BV-46-C

Verify that a HV1 package is sent every second time slot.



- Test Condition

The need to have HCI_Synchronous_Data packets to generate HV packets should be declared as IXIT. However, payload content is not verified.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted using a DM1 packet upon reception of PDU LMP_SCO_link_req. An SCO link has been established accordingly.

4.7.17.5 LMP/LIH/BV-47-C [Accept Change to HV2 as Slave]

- Test Purpose

Verify that the IUT changes SCO interval and SCO packet type (from HV1 to HV2) upon request from the Lower Tester.

The IUT is slave. The Lower Tester is master and initiates the service.

- Reference

[1] 4.6.1.3

- Initial Condition

See [LMP/LIH/BV-43-C \[Accept HV1 SCO Request\]](#), with the exception that HCI_Accept_Synchronous_Connection shall use a packet type of all HV packets (0x03FF).

- Test Procedure

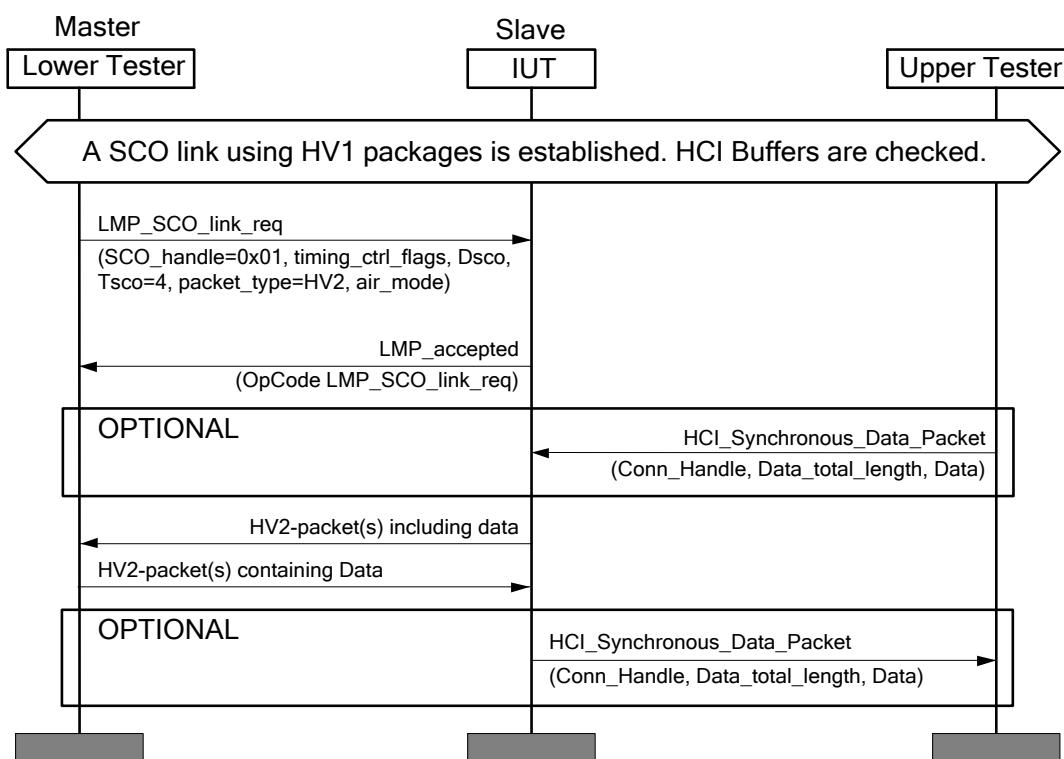


Figure 4.152: LMP/LIH/BV-47-C

Verify that a HV2 package is sent every four time slots.

- Test Condition

The need to have HCI_Synchronous_Data packets to generate HV packets should be declared as IXIT. However, payload content is not verified.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted upon reception of PDU LMP SCO_link_req. The SCO interval, TSCO, and packet type must be changed accordingly.

4.7.17.6 LMP/LIH/BV-48-C [Accept Change to HV3]

- Test Purpose

Verify that the IUT changes SCO interval and SCO packet type (from HV1 to HV3) upon request from the Lower Tester. IUT is slave. The Lower Tester is master and initiates the service.

- Reference

[1] 4.6.1.3

- Initial Condition

See [LMP/LIH/BV-43-C \[Accept HV1 SCO Request\]](#), with the exception that HCI_Accept_Synchronous_Connection shall use a packet type of all HV packets (0x03FF).

- Test Procedure



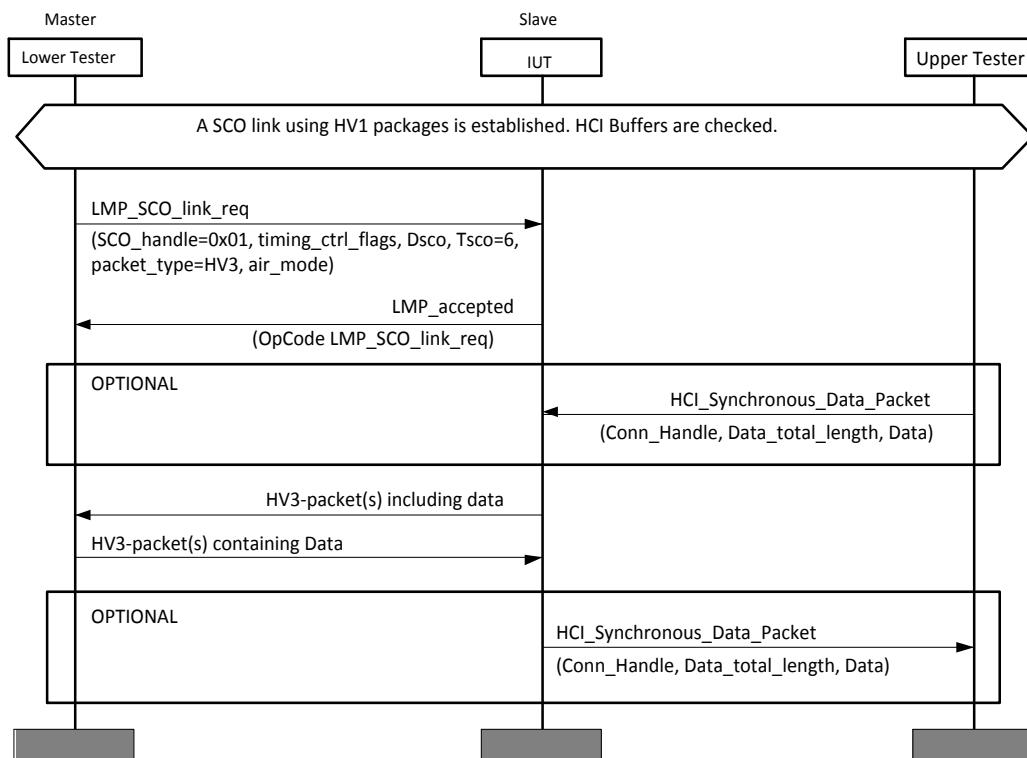


Figure 4.153: LMP/LIH/BV-48-C

Verify that a HV3 package is sent every six time slots.

- **Test Condition**

The need to have HCI_Synchronous_Data packets to generate HV packets should be declared as IXIT. However, payload content is not verified.

- **Expected Outcome**

Pass verdict

The IUT transmits PDU LMP_accepted upon reception of PDU LMP_SCO_link_req. The SCO interval, TSCO, and packet type must be changed accordingly.

4.7.17.7 LMP/LIH/BV-49-C [Request Change to HV2]

- **Test Purpose**

Verify that the IUT can request the Lower Tester to change the SCO interval and packet type (from HV1 to HV2). The IUT is slave and initiates the service. The Lower Tester is master.

- **Reference**

[1] 4.6.1.4

- **Initial Condition**

See [LMP/LIH/BV-43-C \[Accept HV1 SCO Request\]](#)



- Test Procedure

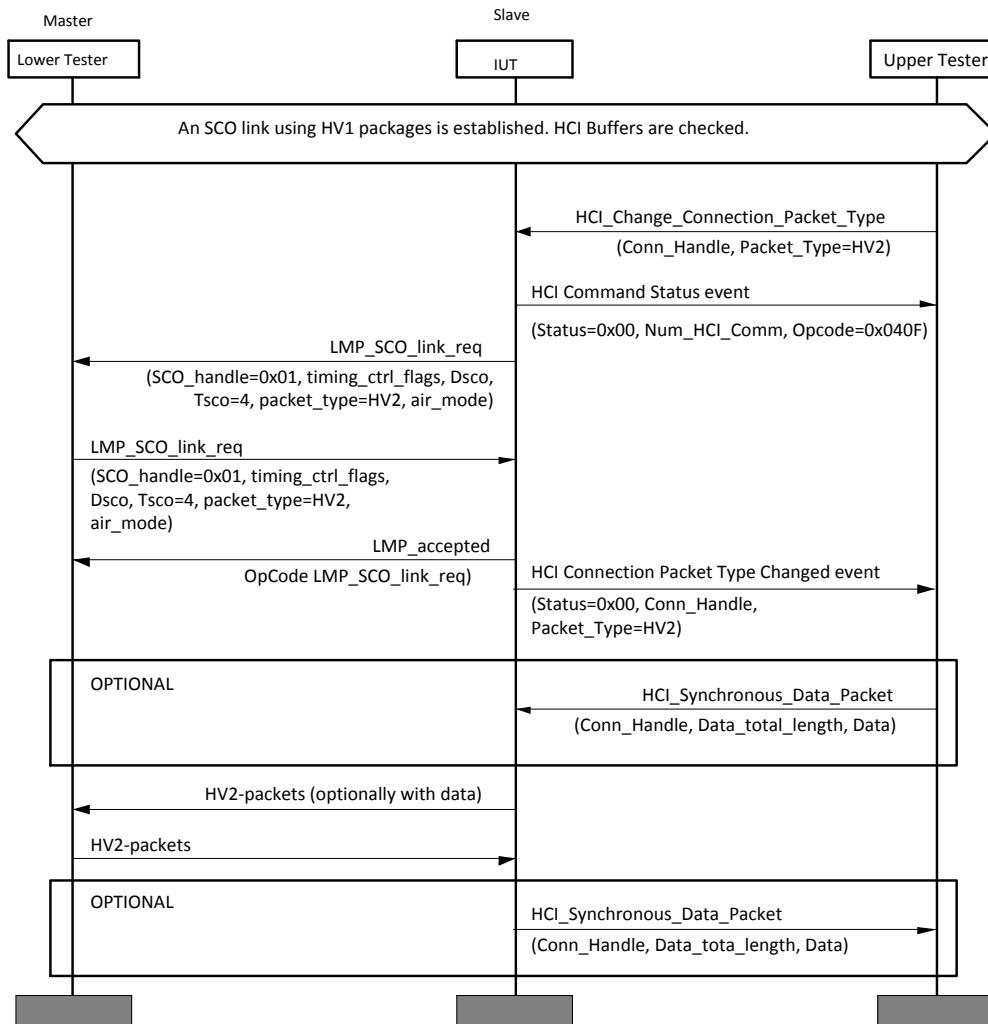


Figure 4.154: LMP/LIH/BV-49-C

Verify that a HV2 package is sent every four time slots.

- Test Condition

It must be possible to control the IUT to initiate the request for the SCO link request. The need to have HCI_Synchronous_Data packets to generate HV packets should be declared as IXIT. However, payload content is not verified.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_SCO_link_req and PDU LMP_accepted upon reception of PDU LMP_SCO_link_req. The packet type used must be HV2.



4.7.17.8 LMP/LIH/BV-50-C [HV2 Request Rejected by Master]

- **Test Purpose**

Verify that the IUT can request for a change of the SCO interval and packet type (from HV1 to HV2).

Verify that the IUT accepts that the Lower Tester rejects the request. The IUT is slave and initiates the service. The Lower Tester is master.

- **Reference**

[1] 4.6.1.4

- **Initial Condition**

See [Default Settings](#).

- **Test Procedure**

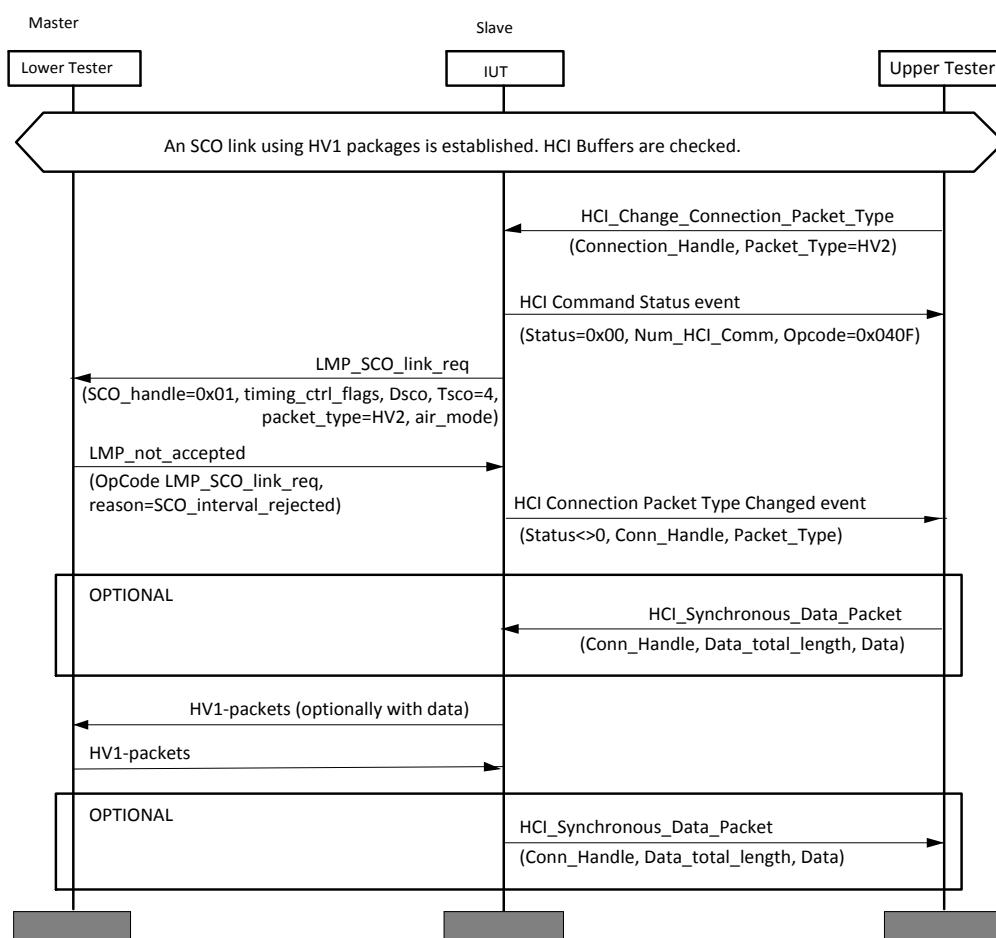


Figure 4.155: LMP/LIH/BV-50-C

Verify that a HV1 package is sent every two time slots.



- Test Condition

It must be possible to control the IUT to initiate the request for the SCO link request. The need to have HCI_Synchronous_Data packets to generate HV packets should be declared as IXIT. However, payload content is not verified.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_SC0_link_req and accepts PDU LMP_not_accepted. The packet type must remain HV1.

4.7.17.9 LMP/LIH/BV-51-C [Accept SCO Closure as Slave]

- Test Purpose

Verify that the IUT accepts a request from the Lower Tester to remove the SCO link.

- Reference

[1] 4.6.1.5

- Initial Condition

See [Default Settings](#).

- Test Procedure

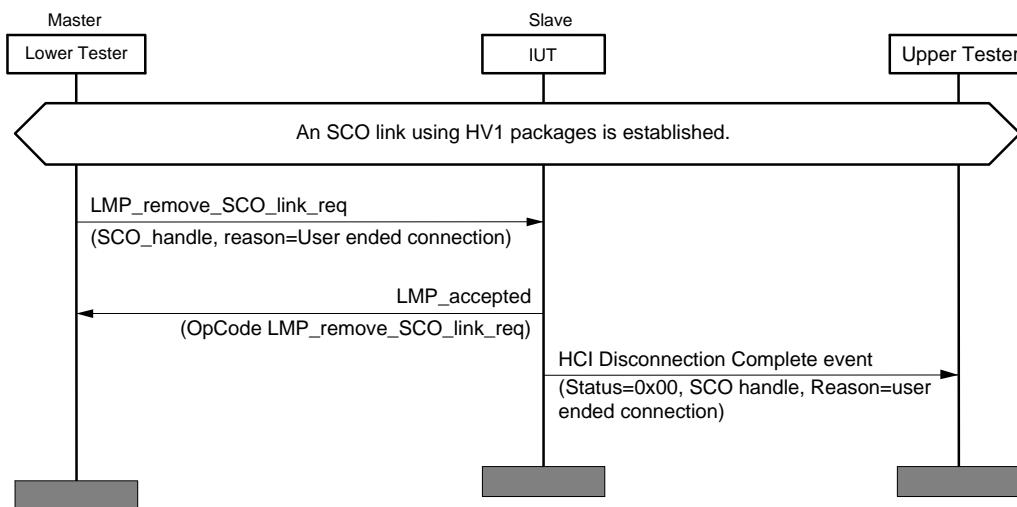


Figure 4.156: LMP/LIH/BV-51-C

Verify that the SCO link is removed.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted upon reception of PDU LMP_remove SCO_link_req. The SCO link must be closed.



4.7.17.10 LMP/LIH/BV-52-C [Request SCO Closure as Slave]

- Test Purpose

Verify that the IUT can request the Lower Tester to remove the SCO link. The IUT initiates the request.

- Reference

[1] 4.6.1.5

- Initial Condition

See [Default Settings](#).

- Test Procedure

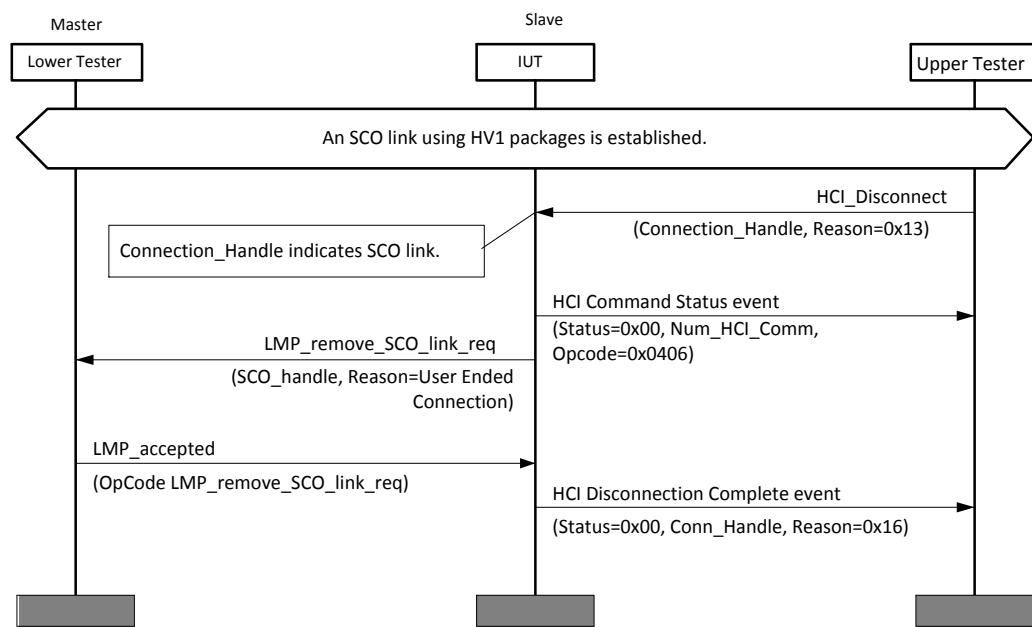


Figure 4.157: LMP/LIH/BV-52-C

Verify that the SCO link is removed.

- Test Condition

It must be possible to control the IUT to initiate the removal of the SCO link.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_remove_SCO_link_req and accepts reception of PDU LMP_accepted. The SCO link must be closed.



4.7.17.11 LMP/LIH/BV-134-C [SCO Connection creation fails when AES-CCM encryption is enabled]

- Test Purpose

Verify that if AES-CCM encryption has been enabled on an ACL connection, SCO connection creation requests from the Upper Tester (using the HCI Setup Synchronous Connection command) will be rejected by the IUT with error code 0x0E: Connection Rejected Due to Security Reasons.

- Reference

[1] 4.6.1

- Initial Condition

The Lower Tester is master and the IUT is slave.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

- Test Procedure

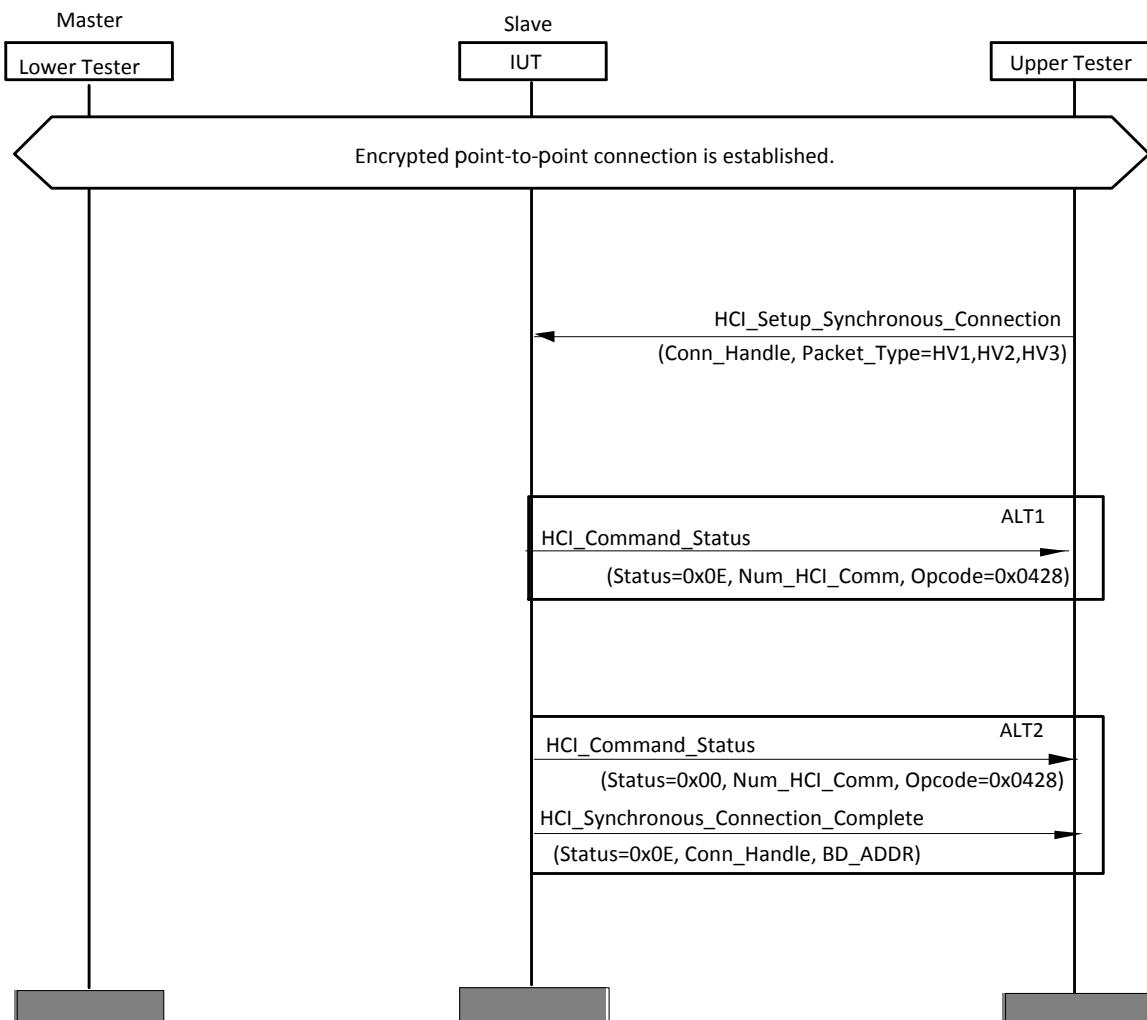


Figure 4.158: LMP/LIH/BV-134-C



The Upper Tester requests the IUT to create a SCO connection to the Lower Tester using the HCI Setup Synchronous Connection Command (by only enabling SCO packet types: HV1, HV2 and HV3).

- Expected Outcome

Pass verdict

The IUT responds to the HCI Setup Synchronous Connection Command with either an HCI Command Status event or an HCI Synchronous Connection Complete event with error code 0x0E: Connection Rejected Due to Security Reasons.

- Notes

If the IUT sends an LMP_SCO_link_req to the Lower Tester, the Lower Tester should accept the request.

4.7.17.12 LMP/LIH/BV-135-C [Accepting SCO Connection creation fails when AES-CCM encryption is enabled]

- Test Purpose

Verify that if AES-CCM encryption has been enabled on an ACL connection, SCO connection accept requests from the Upper Tester (using the HCI Accept Synchronous Connection Request command) will be rejected by the IUT with error code 0x0E: Connection Rejected Due to Security Reasons.

- Reference

[1] 4.6.1

- Initial Condition

The Lower Tester is master and the IUT is slave.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.



- Test Procedure

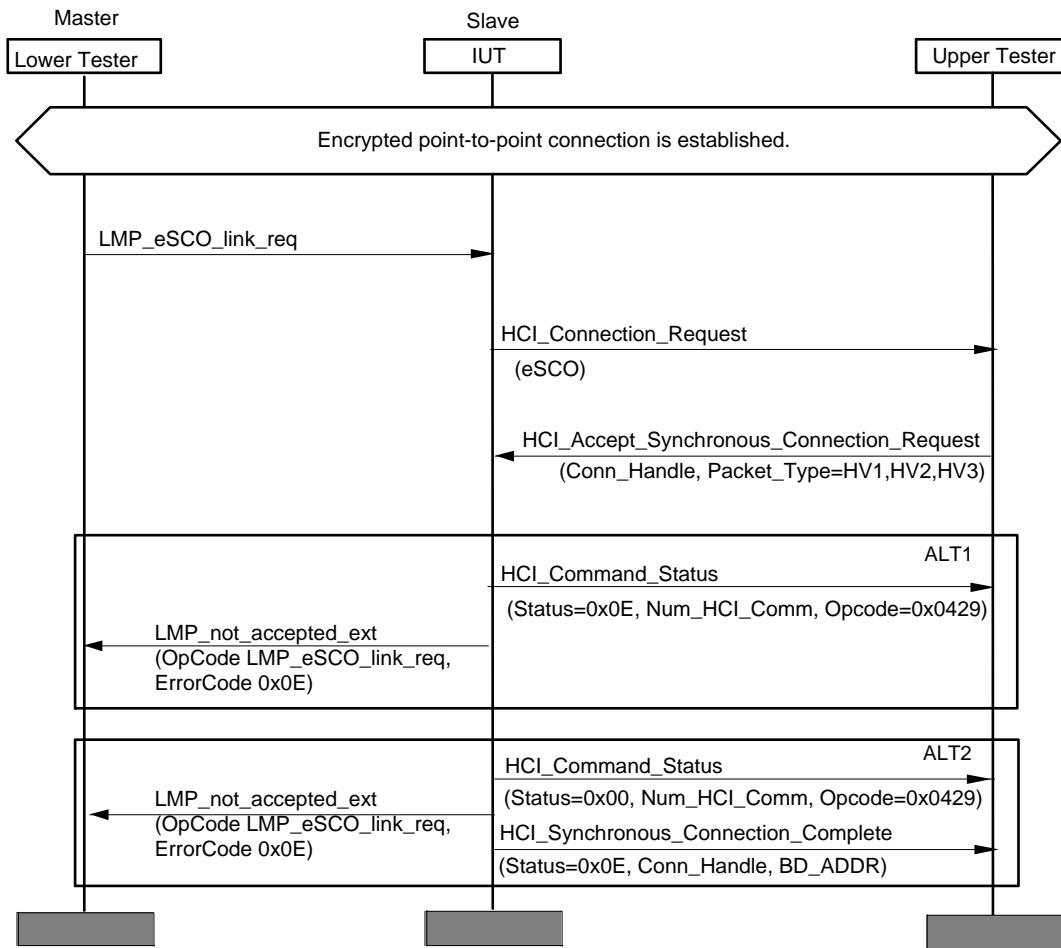


Figure 4.159: LMP/LIH/BV-135-C

The Lower Tester sends an LMP_eSCO_link_req to the IUT.

The IUT generates a Connection Request event.

The Upper Tester responds with an HCI Accept Synchronous Connection Request Command (enabling only SCO packet types: HV1, HV2 and HV3).

- Expected Outcome

Pass verdict

The IUT responds to the HCI Accept Synchronous Connection Request Command with either an HCI Command Status event or an HCI Synchronous Connection Complete event with error code 0x0E: Connection Rejected Due to Security Reasons.

The IUT responds to the LMP_eSCO_req with an LMP_not_accepted_ext with error code 0x0E: Connection Rejected Due to Security Reasons.



- Notes

If the IUT sends an LMP_SCO_link_req to the Lower Tester, the Lower Tester should accept the request.

4.7.17.13 LMP/LIH/BV-136-C [SCO Connection creation fails when AES-CCM encryption is enabled – Enhanced Setup Synchronous Connection]

- Test Purpose

Verify that if AES-CCM encryption has been enabled on an ACL connection, SCO connection creation requests (using the HCI Enhanced Setup Synchronous Connection command) from the Upper Tester will be rejected by the IUT with error code 0x0E: Connection Rejected Due to Security Reasons.

- Reference

[1] 4.6.1

- Initial Condition

The Lower Tester is master and the IUT is slave.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.



- Test Procedure

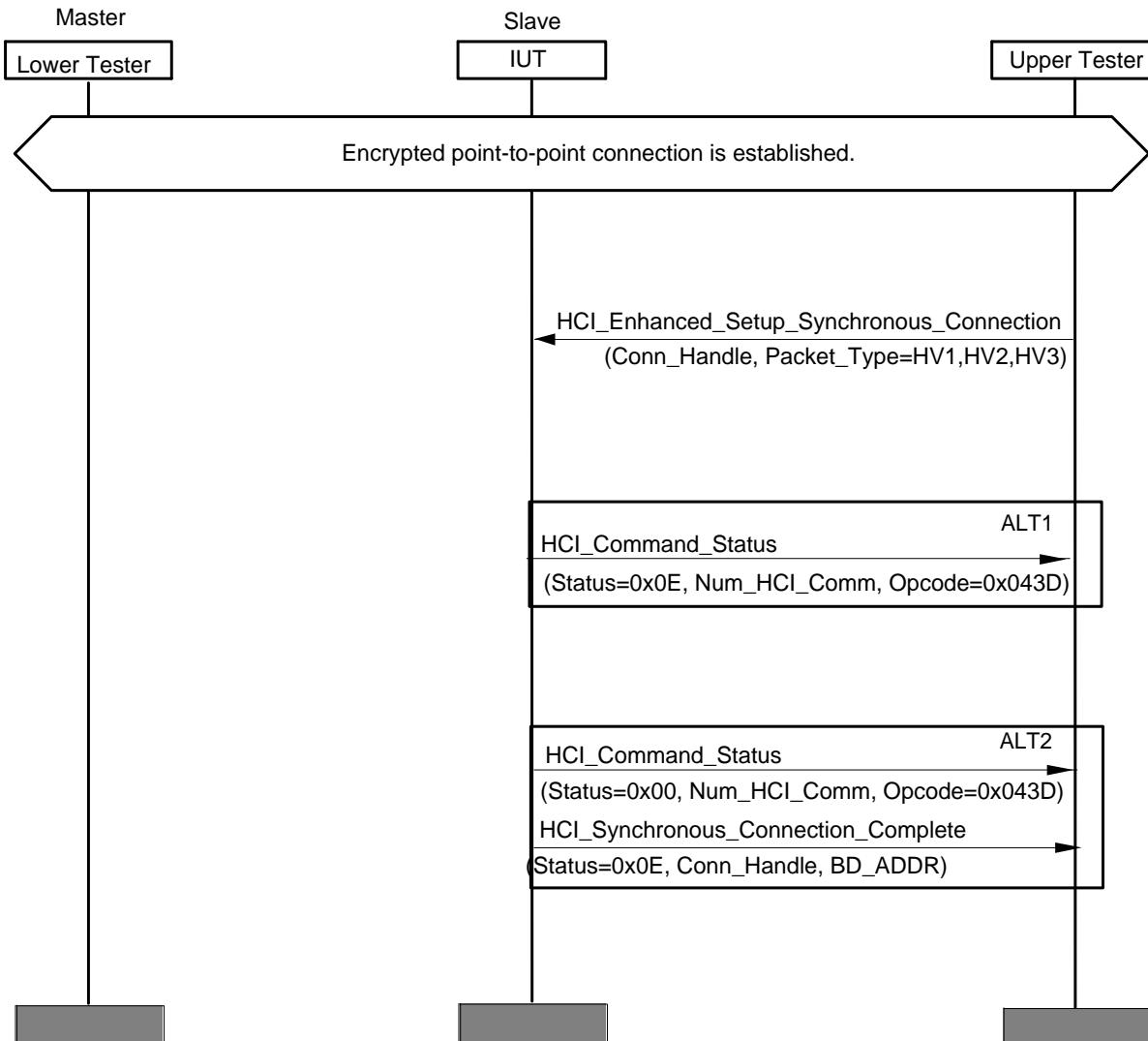


Figure 4.160: LMP/LIH/BV-136-C

The Upper Tester requests the IUT to create a SCO connection to the Lower Tester using the HCI Enhanced Setup Synchronous Connection Command (by only enabling SCO packet types: HV1, HV2 and HV3).

- Expected Outcome

Pass verdict

The IUT responds to the HCI Enhanced Setup Synchronous Connection Command with either an HCI Command Status event or an HCI Synchronous Connection Complete event with error code 0x0E: Connection Rejected Due to Security Reasons.

- Notes

If the IUT sends an LMP_SCO_link_req to the Lower Tester, the Lower Tester should accept the request.



4.7.17.14 LMP/LIH/BV-137-C [Accepting SCO Connection creation fails when AES-CCM encryption is enabled – Enhanced Accept Synchronous Connection]

- Test Purpose

Verify that if AES-CCM encryption has been enabled on an ACL connection, SCO connection accept requests from the Upper Tester (using the HCI Enhanced Accept Synchronous Connection Request command) will be rejected by the IUT with error code 0x0E: Connection Rejected Due to Security Reasons.

- Reference

[1] 4.6.1

- Initial Condition

The Lower Tester is master and the IUT is slave.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

- Test Procedure

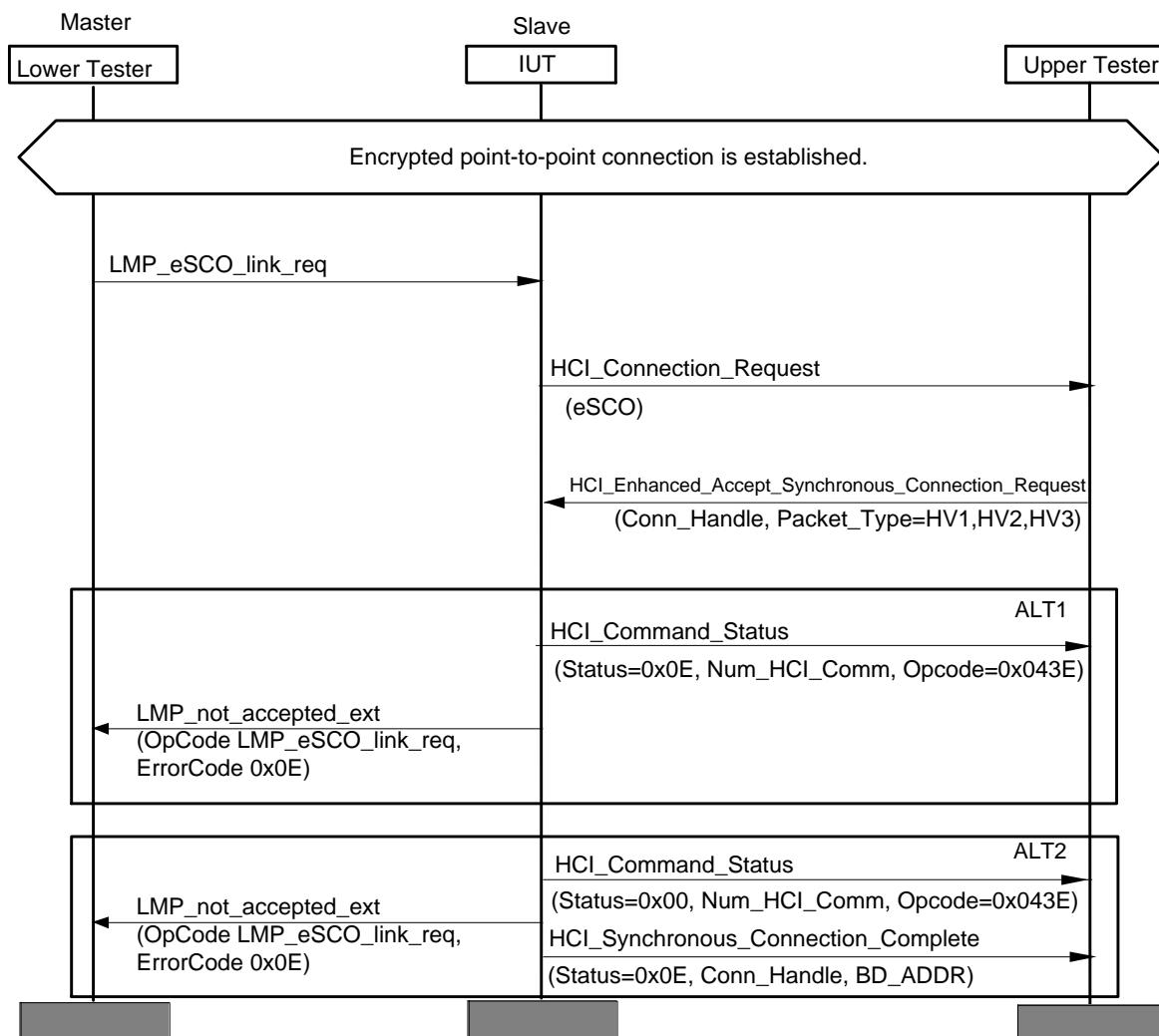


Figure 4.161: LMP/LIH/BV-137-C



The Lower Tester sends an LMP_eSCO_link_req to the IUT.

The IUT generates a Connection Request event.

The Upper Tester responds with an HCI Enhanced Accept Synchronous Connection Request Command (enabling only SCO packet types: HV1, HV2 and HV3).

- Expected Outcome

Pass verdict

The IUT responds to the HCI Enhanced Accept Synchronous Connection Request Command with either an HCI Command Status event or an HCI Synchronous Connection Complete event with error code 0x0E: Connection Rejected Due to Security Reasons.

The IUT responds to the LMP_eSCO_req with an LMP_not_accepted_ext with error code 0x0E: Connection Rejected Due to Security Reasons.

- Notes

If the IUT sends an LMP_SCO_link_req to the Lower Tester, the Lower Tester should accept the request.

4.7.18 SCO links - Master

- Test subgroup objectives:

To verify that the unit can initiate and delete an SCO link. The IUT is master.

4.7.18.1 LMP/LIH/BV-53-C [Establish SCO]

- Test Purpose

Verify that the IUT can establish an SCO link.

IUT is master and initiates the service. The Lower Tester is slave.

- Reference

[1] 4.6.1.1

- Initial Condition

See [Default Settings](#).

A features request has to be carried out: see [LMP/INF/BV-10-C \[Supported Features Response\]](#).

The IUT must page the Lower Tester to become the master of the Piconet.



- Test Procedure

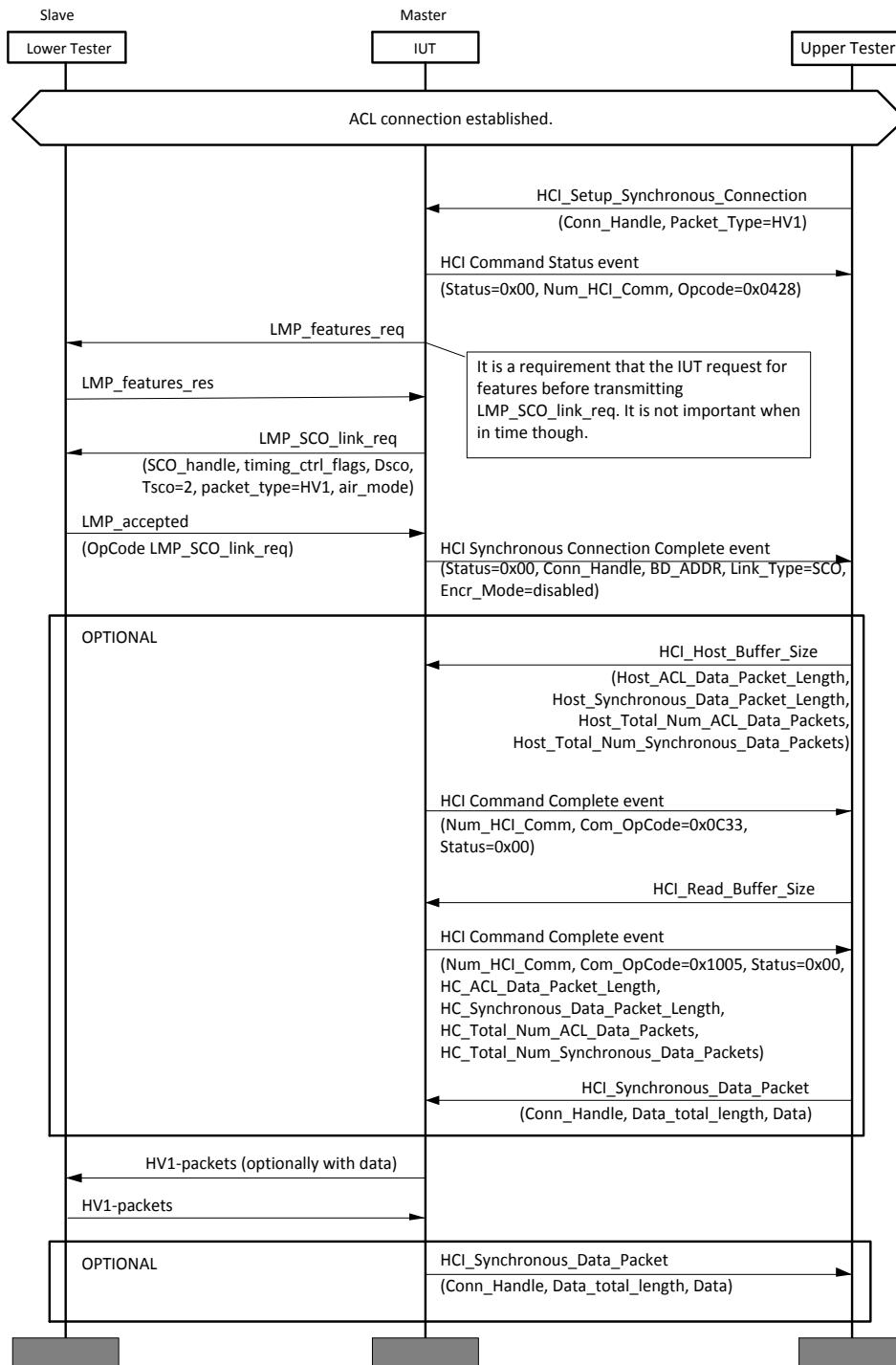


Figure 4.162: LMP/LIH/BV-53-C

Verify that a HV1 package is sent every second time slot.



- Test Condition

It must be possible to control the IUT to initiate the request for an SCO link. The need to have HCI_Synchronous_Data packets to generate HV packets should be declared as IXIT. However, payload content is not verified.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_SCO_link_req and accepts reception of LMP_accepted. An SCO link has to be established accordingly.

4.7.18.2 LMP/LIH/BV-54-C [Accept SCO Request as Master]

- Test Purpose

Verify that the IUT accepts a request from the Lower Tester to initiate an SCO link.

IUT is master. The Lower Tester is slave and initiates the service.

- Reference

[1] 4.6.1.2

- Initial Condition

See [Default Settings](#).

The IUT must page the Lower Tester to become the master of the Piconet.



- Test Procedure

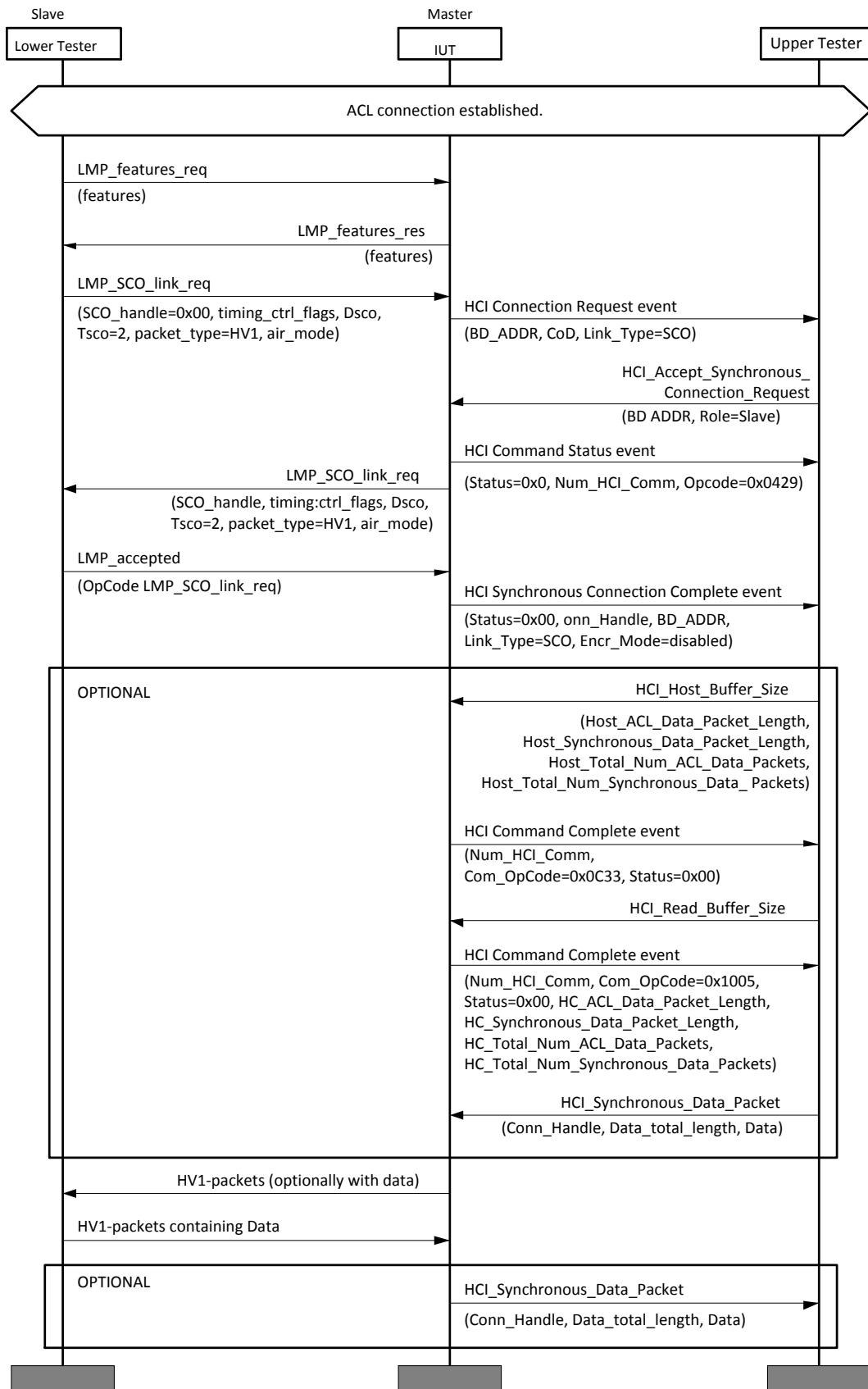


Figure 4.163: LMP/LIH/BV-54-C

Verify that a HV1 package is sent every second time slot.

- Test Condition

The need to have HCI_Synchronous_Data packets to generate HV packets should be declared as IXIT. However, payload content is not verified.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP SCO_link_req upon reception of PDU LMP SCO_link_req and accepts reception of PDU LMP_accepted. An SCO link has to be established accordingly.

4.7.18.3 LMP/LIH/BV-55-C [Request Change to HV3]

- Test Purpose

Verify that the IUT can request a change of the SCO parameters (packet type HV1 to HV3). The IUT is master. The Lower Tester is slave and initiates the service.

- Reference

[1] 4.6.1.3

- Initial Condition

See [Default Settings](#).



- Test Procedure

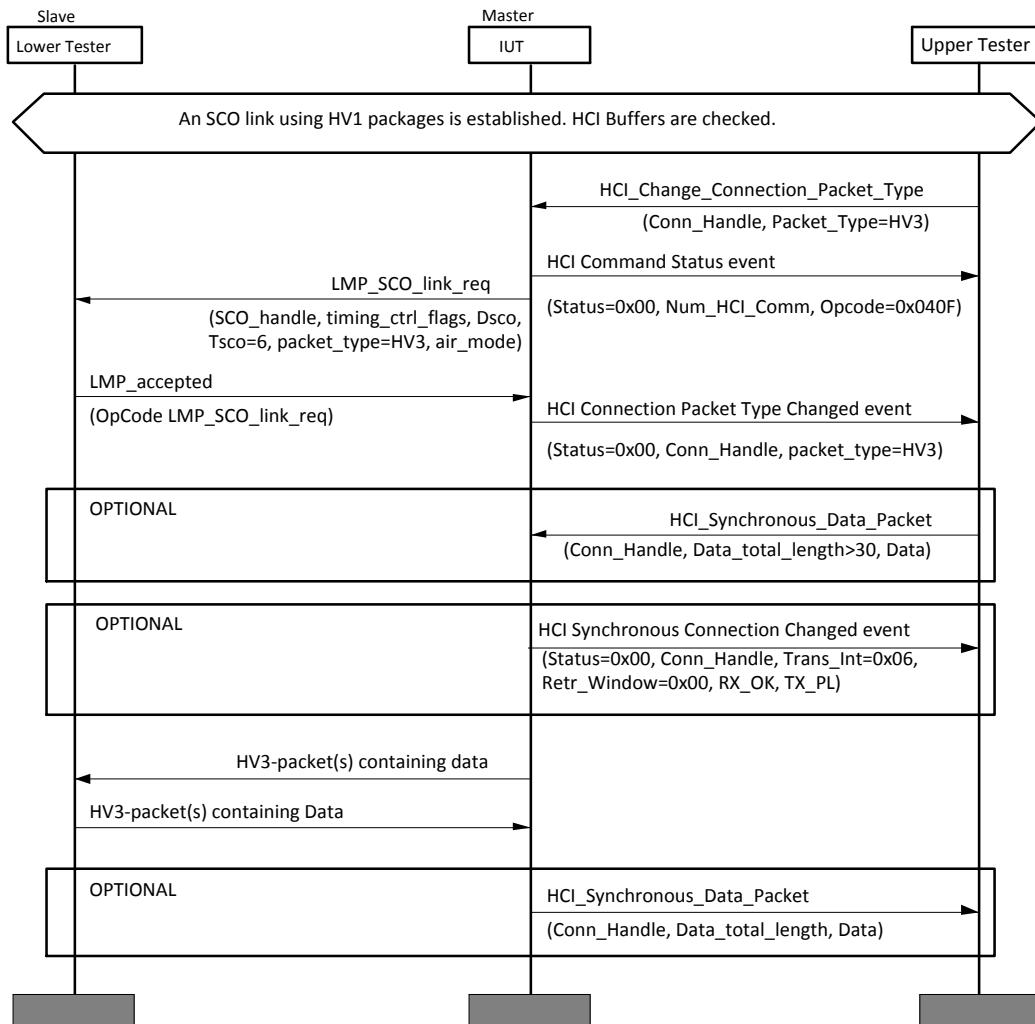


Figure 4.164: LMP/LIH/BV-55-C

Verify that a HV3 package is sent every six time slots.

- Test Condition

It must be possible to control the IUT to initiate the request for a change of SCO parameters. The need to have HCI_Synchronous_Data packets to generate HV packets should be declared as IXIT. However, payload content is not verified.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_SCO_link_req and accepts reception of PDU LMP_accepted. The SCO parameters must be changed accordingly.



4.7.18.4 LMP/LIH/BV-56-C [HV3 Request Rejected by Slave]

- **Test Purpose**

Verify that the IUT can request a change of the SCO parameters (packet type HV1 to HV3). Verify that the IUT accepts a rejection from the Lower Tester. The IUT is master. The Lower Tester is slave and initiates the service.

- **Reference**

[1] 4.6.1.4

- **Initial Condition**

See [Default Settings](#).

- **Test Procedure**

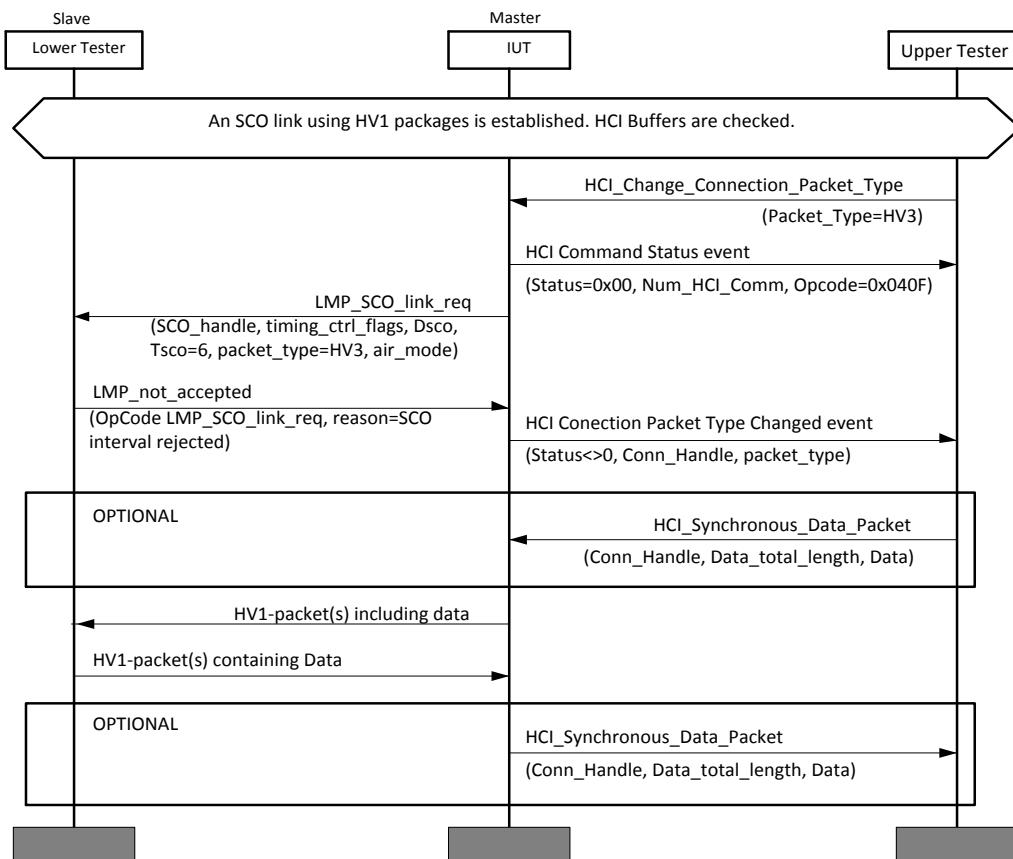


Figure 4.165: LMP/LIH/BV-56-C

Verify that a HV1 package is sent every two time slots.

- **Test Condition**

It must be possible to control the IUT to initiate the request for a change of SCO parameters. The need to have HCI_Synchronous_Data packets to generate HV packets should be declared as IXIT. However, payload content is not verified.



- Expected Outcome

Pass verdict

The SCO link must not be changed.

4.7.18.5 LMP/LIH/BV-57-C [Accept Change to HV2 as Master]

- Test Purpose

Verify that the IUT accepts a request from the Lower Tester to change the SCO parameters (packet type HV1 to HV2).

The IUT is master. The Lower Tester is slave and initiates the service.

- Reference

[1] 4.6.1.4

- Initial Condition

See [Default Settings](#).



- Test Procedure

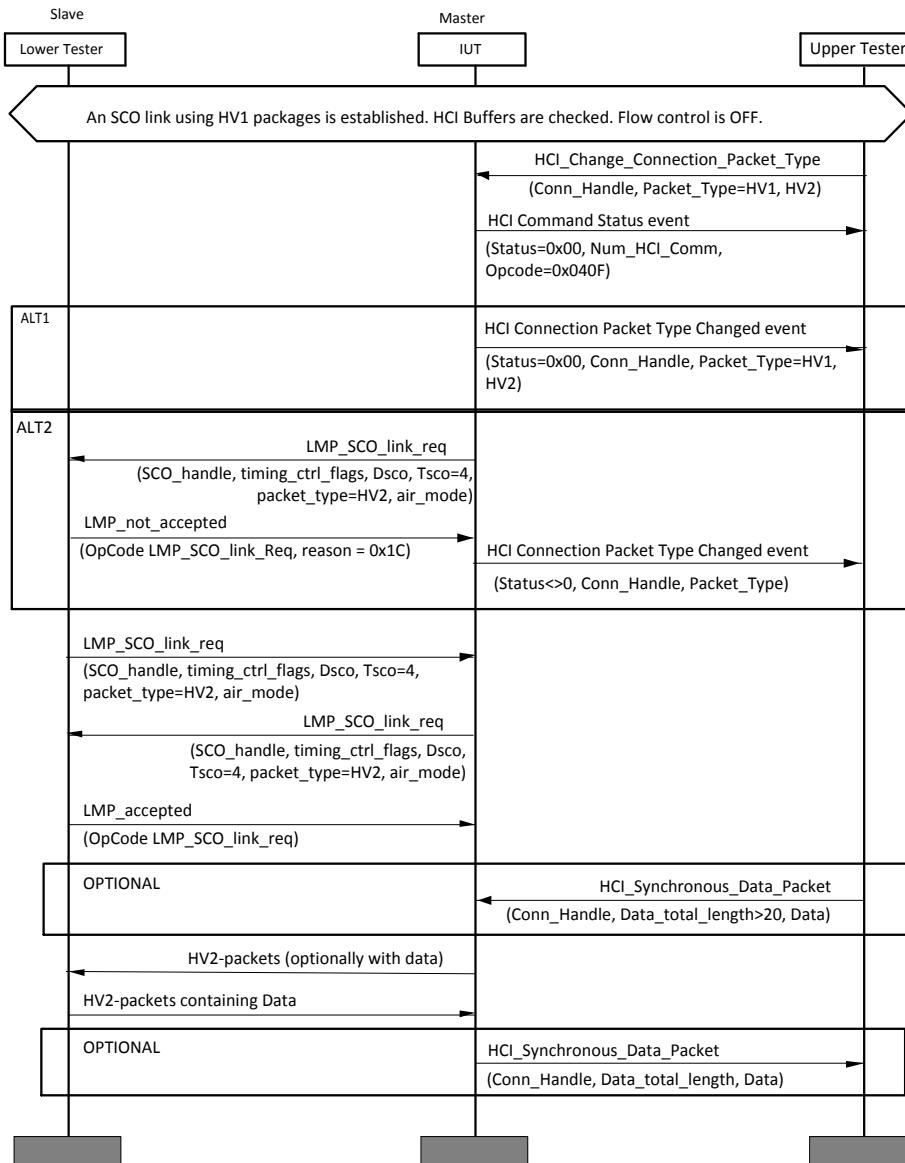


Figure 4.166: LMP/LIH/BV-57-C

Verify that a HV2 package is sent every four time slots.

- Test Condition

The need to have HCI_Synchronous_Data packets to generate HV packets should be declared as IXIT.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_SCO_link_req upon reception of PDU LMP_SCO_link_req and accepts reception of PDU LMP_accepted. The SCO interval must be changed accordingly.



4.7.18.6 LMP/LIH/BV-58-C [Request SCO Closure as Master]

- Test Purpose

Verify that the IUT can request to close the SCO link.

The IUT is master and initiates the service. The Lower Tester is slave.

- Reference

[1] 4.6.1.5

- Initial Condition

See [Default Settings](#).

- Test Procedure

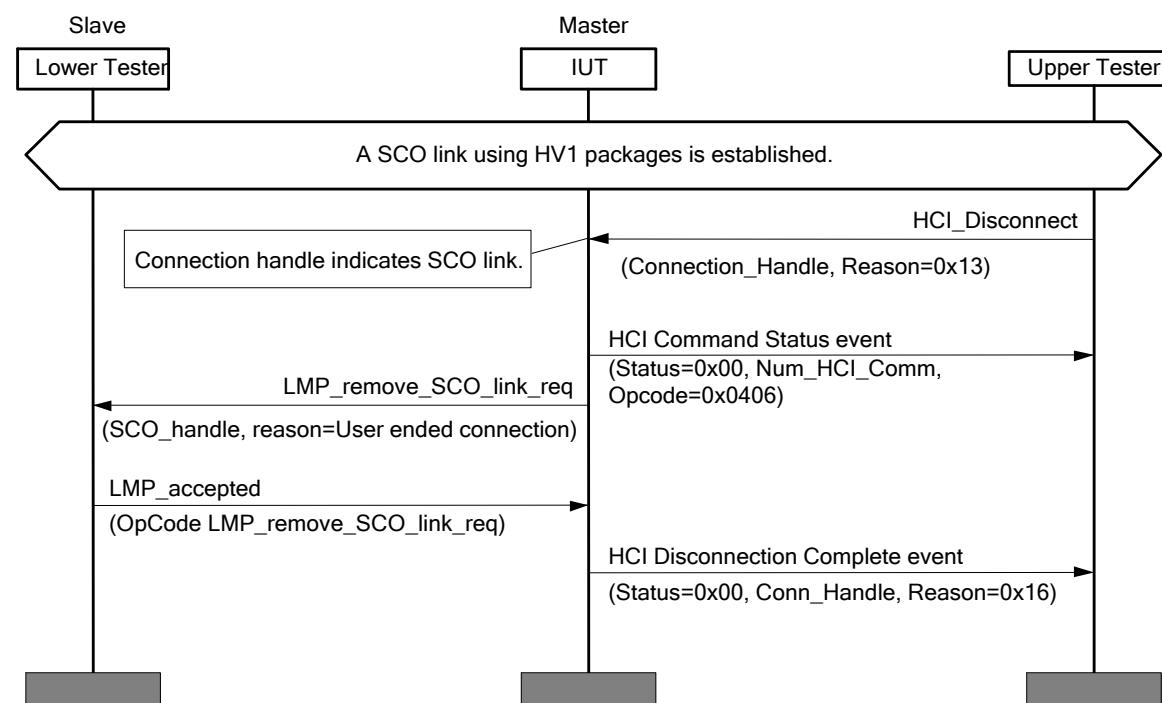


Figure 4.167: LMP/LIH/BV-58-C

Verify that the SCO link is closed.

- Test Condition

It must be possible to control the IUT to initiate the request to remove the SCO link.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_remove_SCO_link_req and accepts reception of PDU LMP_accepted. The SCO link must be removed.



4.7.18.7 LMP/LIH/BV-59-C [Accept SCO Closure as Master]

- Test Purpose

Verify that the Lower Tester can request the IUT to close the SCO link. The IUT is master and initiates the service. The Lower Tester is slave.

- Reference

[1] 4.6.1.5

- Initial Condition

See [Default Settings](#).

- Test Procedure

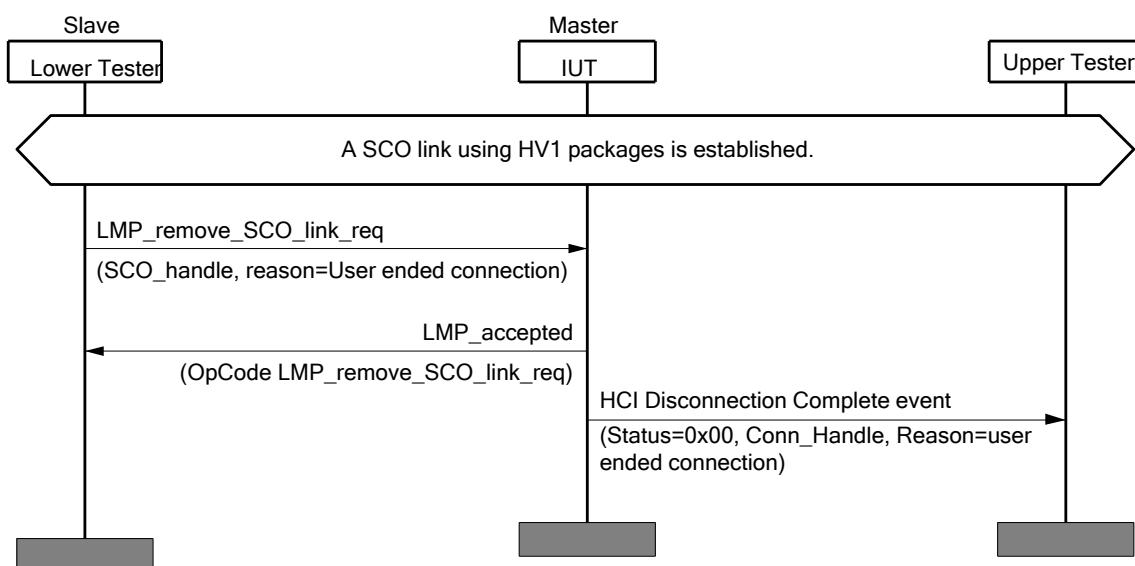


Figure 4.168: LMP/LIH/BV-59-C

Verify that the SCO link is closed.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted upon reception of PDU LMP_remove_SCO_link_req. The SCO link must be removed.

4.7.18.8 LMP/LIH/BV-138-C [SCO Connection creation fails when AES-CCM encryption is enabled]

- Test Purpose

Verify that if AES-CCM encryption has been enabled on an ACL connection, SCO connection creation requests from the Upper Tester will be rejected by the IUT with error code 0x0E: Connection Rejected Due to Security Reasons.



- Reference

[1] 4.6.1

- Initial Condition

The Lower Tester is slave and the IUT is master.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

- Test Procedure

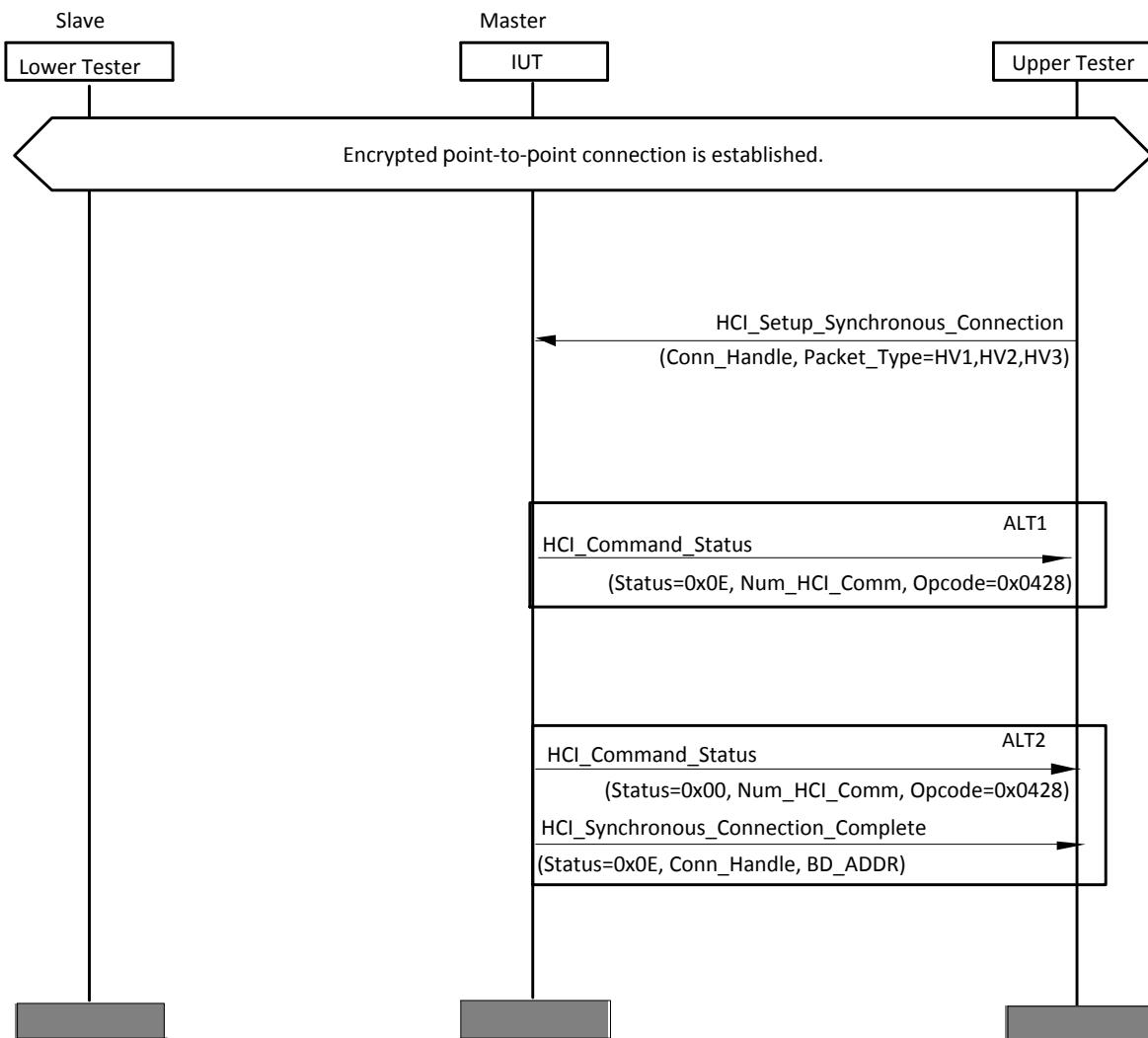


Figure 4.169: LMP/LIH/BV-138-C

The Upper Tester requests the IUT to create a SCO connection to the Lower Tester using the HCI Setup Synchronous Connection Command (by only enabling SCO packet types: HV1, HV2 and HV3).



- Expected Outcome

Pass verdict

The IUT responds to the HCI Setup Synchronous Connection Command with either an HCI Command Status event or an HCI Synchronous Connection Complete event with error code 0x0E: Connection Rejected Due to Security Reasons.

- Notes

If the IUT sends an LMP_SCO_link_req to the Lower Tester, the Lower Tester should accept the request.

4.7.18.9 LMP/LIH/BV-139-C [Accepting SCO Connection creation fails when AES-CCM encryption is enabled]

- Test Purpose

Verify that if AES-CCM encryption has been enabled on an ACL connection, SCO connection accept requests from the Upper Tester will be rejected by the IUT with error code 0x0E: Connection Rejected Due to Security Reasons.

- Reference

[1] 4.6.1

- Initial Condition

The Lower Tester is slave and the IUT is master.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.



- Test Procedure

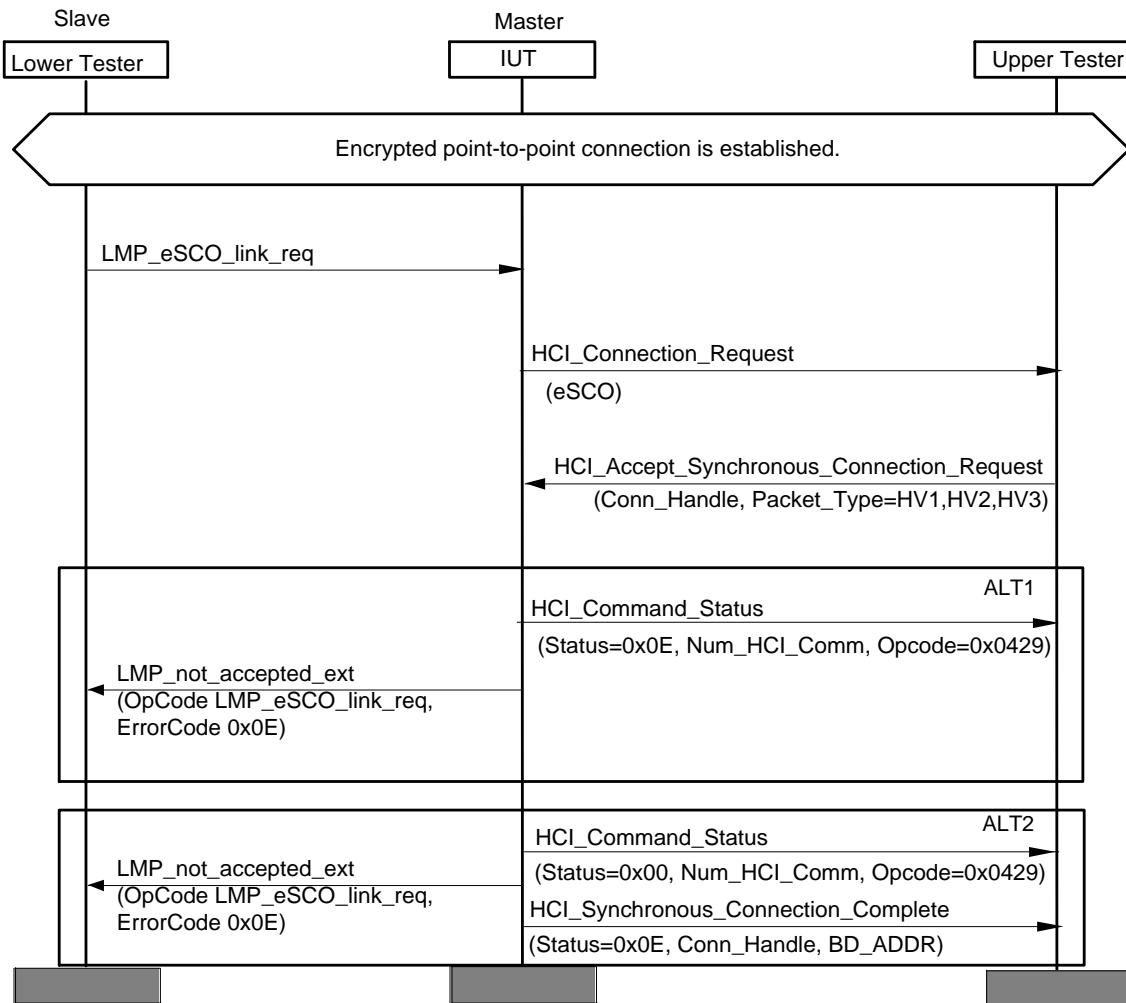


Figure 4.170: LMP/LIH/BV-139-C

The Lower Tester sends an **LMP_eSCO_link_req** to the IUT.

The IUT generates a Connection Request event.

The Upper Tester responds with an HCI Accept Synchronous Connection Request Command (enabling only SCO packet types: HV1, HV2 and HV3).

- Expected Outcome

Pass verdict

The IUT responds to the HCI Accept Synchronous Connection Request Command with either an HCI Command Status event or an HCI Synchronous Connection Complete event with error code 0x0E: Connection Rejected Due to Security Reasons.

The IUT responds to the **LMP_eSCO_req** with an **LMP_not_accepted_ext** with error code 0x0E: Connection Rejected Due to Security Reasons.



- Notes

If the IUT sends an LMP_SCO_link_req to the Lower Tester, the Lower Tester should accept the request.

4.7.18.10 LMP/LIH/BV-140-C [SCO Connection creation fails when AES-CCM encryption is enabled – Enhanced Setup Synchronous Connection]

- Test Purpose

Verify that if AES-CCM encryption has been enabled on an ACL connection, SCO connection creation requests (using the HCI Enhanced Setup Synchronous Connection command) from the Upper Tester will be rejected by the IUT with error code 0x0E: Connection Rejected Due to Security Reasons.

- Reference

[1] 4.6.1

- Initial Condition

The Lower Tester is slave and the IUT is master.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.



- Test Procedure

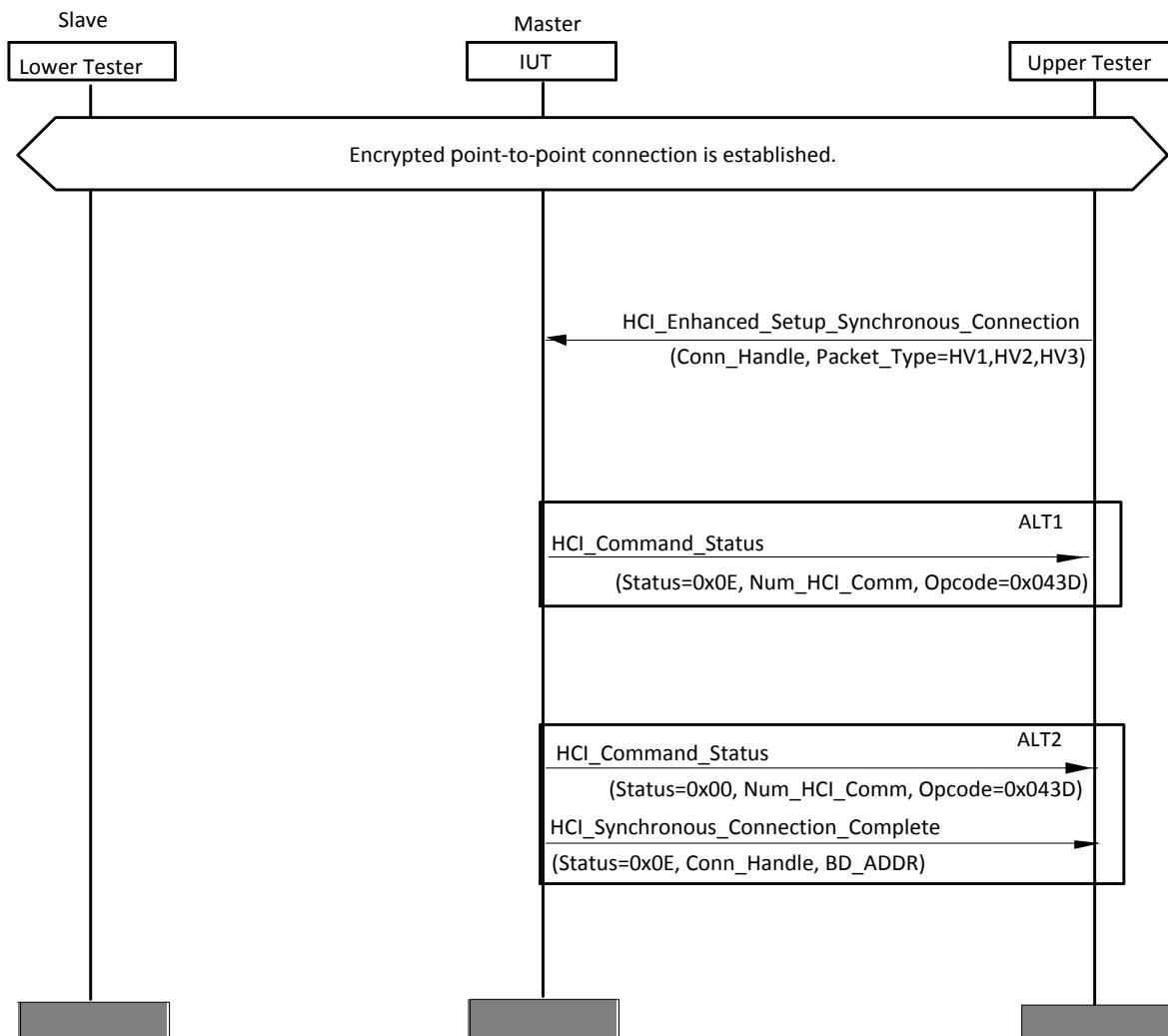


Figure 4.171: LMP/LIH/BV-140-C

The Upper Tester requests the IUT to create a SCO connection to the Lower Tester using the HCI Enhanced Setup Synchronous Connection Command (by only enabling SCO packet types: HV1, HV2 and HV3).

- Expected Outcome

Pass verdict

The IUT responds to the HCI Enhanced Setup Synchronous Connection Command with either an HCI Command Status event or an HCI Synchronous Connection Complete event with error code 0x0E: Connection Rejected Due to Security Reasons.

- Notes

If the IUT sends an LMP_SCO_link_req to the Lower Tester, the Lower Tester should accept the request.



4.7.18.11 LMP/LIH/BV-141-C [Accepting SCO Connection creation fails when AES-CCM encryption is enabled – Enhanced Accept Synchronous Connection]

- Test Purpose

Verify that if AES-CCM encryption has been enabled on an ACL connection, SCO connection accept requests from the Upper Tester (using the HCI Enhanced Accept Synchronous Connection Request command) will be rejected by the IUT with error code 0x0E: Connection Rejected Due to Security Reasons.

- Reference

[1] 4.6.1

- Initial Condition

The Lower Tester is slave and the IUT is master.

An encrypted point-to-point connection has been established between the IUT and the Lower Tester.

- Test Procedure

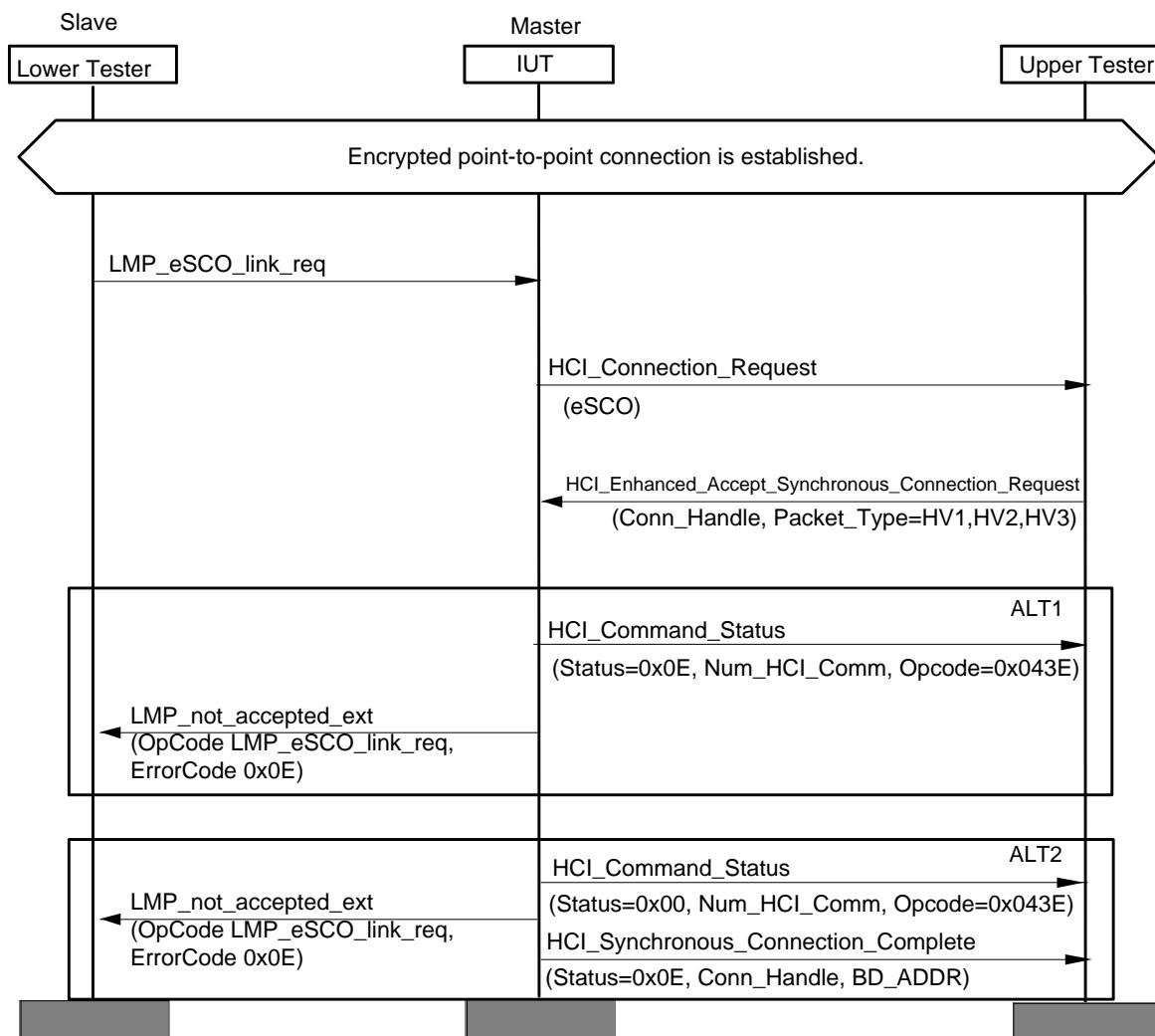


Figure 4.172: LMP/LIH/BV-141-C



The Lower Tester sends an LMP_eSCO_link_req to the IUT.

The IUT generates a Connection Request event.

The Upper Tester responds with an HCI Enhanced Accept Synchronous Connection Request Command (enabling only SCO packet types: HV1, HV2 and HV3).

- Expected Outcome

Pass verdict

The IUT responds to the HCI Enhanced Accept Synchronous Connection Request Command with either an HCI Command Status event or an HCI Synchronous Connection Complete event with error code 0x0E: Connection Rejected Due to Security Reasons.

The IUT responds to the LMP_eSCO_req with an LMP_not_accepted_ext with error code 0x0E: Connection Rejected Due to Security Reasons.

- Notes

If the IUT sends an LMP_SCO_link_req to the Lower Tester, the Lower Tester should accept the request.

4.7.19 SCO Links - Both Master and Slave

- Test subgroup objectives:

To verify that the IUT declines the SCO link request in a correct manner. The role of the IUT is of no importance.

4.7.19.1 LMP/LIH/BV-60-C [Reject SCO Request]

- Test Purpose

Verify that the IUT responds that it does not support SCO links upon request from the Lower Tester.
The Lower Tester initiates the service.

- Reference

[1] 4.6.1.1

- Initial Condition

See [Default Settings](#).



- Test Procedure

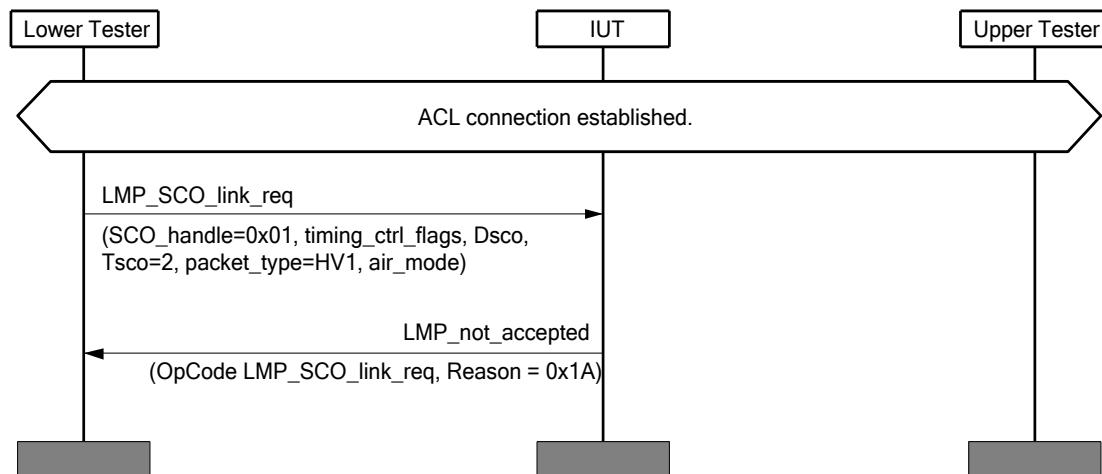


Figure 4.173: LMP/LIH/BV-60-C

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_not_accepted containing “Reason = 0x1A” upon reception of PDU LMP_SCO_link_req.

4.7.20 eSCO Links - Slave

4.7.20.1 LMP/LIH/BV-100-C [Accept EV3 eSCO Request]

- Test Purpose

Verify that the IUT sets up an eSCO link upon request from the Lower Tester. Verify that the correct eSCO setup is used. EV3 packets are used. IUT is slave. The Lower Tester is master and initiates the service.

- Reference

[1] 4.6.2.1

- Initial Condition

See [Default Settings](#).

A features request has to be carried out.



- Test Procedure

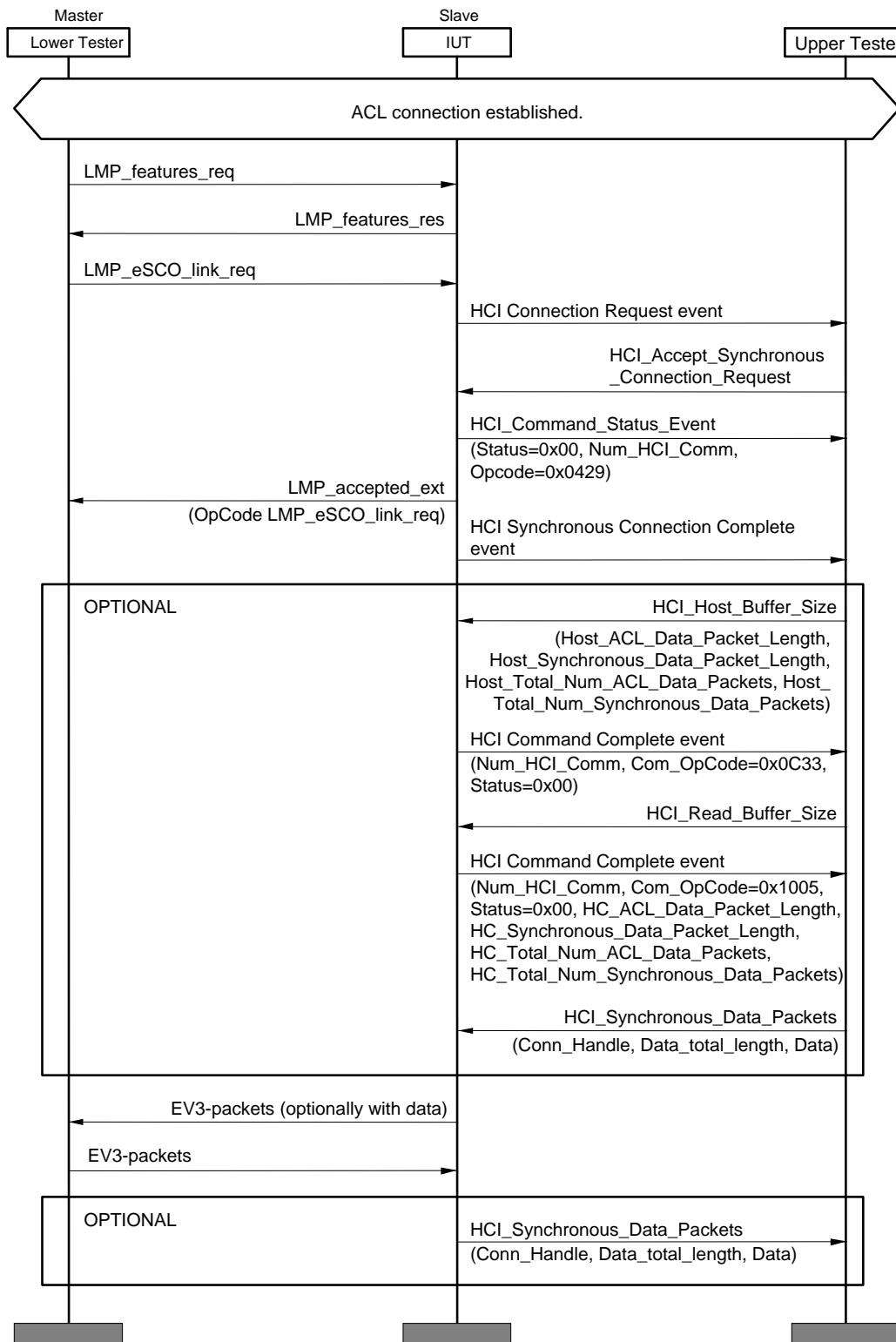


Figure 4.174: LMP/LIH/BV-100-C

The LMP_eSCO_link_req shall have the following content:

- eSCO handle: Any valid number.



- eSCO LT_ADDR: Any valid number.
- Timing control flags: Derived from master clock.
- Desco: Any number in the range [0, Tesco - 2].
- Tesco: 6 slots.
- Wesco: 2 slots.
- Packet type M→S: EV3.
- Packet type S→M: EV3.
- Packet length M→S: 30 bytes.
- Packet length S→M: 30 bytes.
- Air mode: Any supported air mode.
- Negotiation Flag: Initiate Negotiation.

Verify that EV3 packets are transmitted at the eSCO instants and retransmitted inside the retransmission window.

- Test Condition

The need to have HCI_Synchronous_Data packets to generate EV packets should be declared as IXIT. However, payload content is not verified.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted_ext upon reception of PDU LMP_eSCO_link_req. An eSCO links is established accordingly.

- Notes

The IUT may negotiate the eSCO parameters.

4.7.20.2 LMP/LIH/BV-101-C [Accept EV4 eSCO Request]

- Test Purpose

Verify that the IUT sets up an eSCO link upon request from the Lower Tester. Verify that the correct eSCO setup is used. EV4 packets are used. IUT is slave. The Lower Tester is master and initiates the service.

- Reference

[1] 4.6.2.2

- Initial Condition

See [Default Settings](#).

A features request has to be carried out.



- Test Procedure

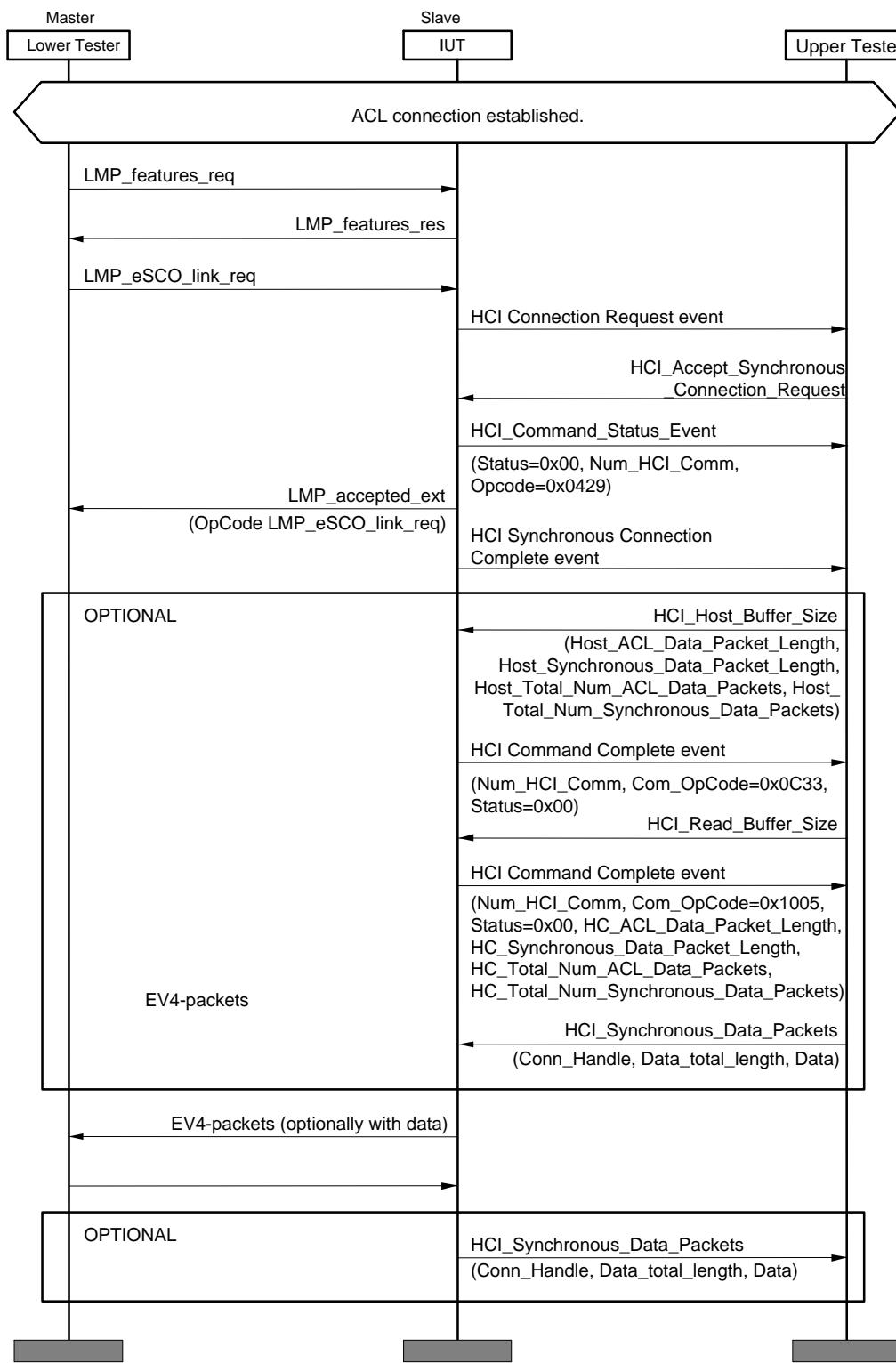


Figure 4.175: LMP/LIH/BV-101-C

The LMP_eSCO_link_req shall have the following content:

- eSCO handle: Any valid number.



- eSCO LT_ADDR: Any valid number.
- Timing control flags: Derived from master clock.
- Desco: Any number in the range [0, Tesco - 2].
- Tesco: 16 slots.
- Wesco: 6 slots.
- Packet type M→S: EV4.
- Packet type S→M: EV4.
- Packet length M→S: 80 bytes.
- Packet length S→M: 80 bytes.
- Air mode: Transparent.
- Negotiation Flag: Initiate Negotiation.

Verify that EV4 packets are transmitted at the eSCO instants and retransmitted inside the retransmission window.

- Test Condition

The need to have HCI_Synchronous_Data packets to generate EV packets should be declared as IXIT. However, payload content is not verified.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted_ext upon reception of PDU LMP_eSCO_link_req. An eSCO links is established accordingly.

- Notes

The IUT may negotiate the eSCO parameters.

4.7.20.3 LMP/LIH/BV-102-C [Accept EV5 eSCO Request]

- Test Purpose

Verify that the IUT sets up an eSCO link upon request from the Lower Tester. Verify that the correct eSCO setup is used. EV5 packets are used. IUT is slave. The Lower Tester is master and initiates the service.

- Reference

[1] 4.6.2.1

- Initial Condition

See [Default Settings](#).

A features request has to be carried out.



- Test Procedure

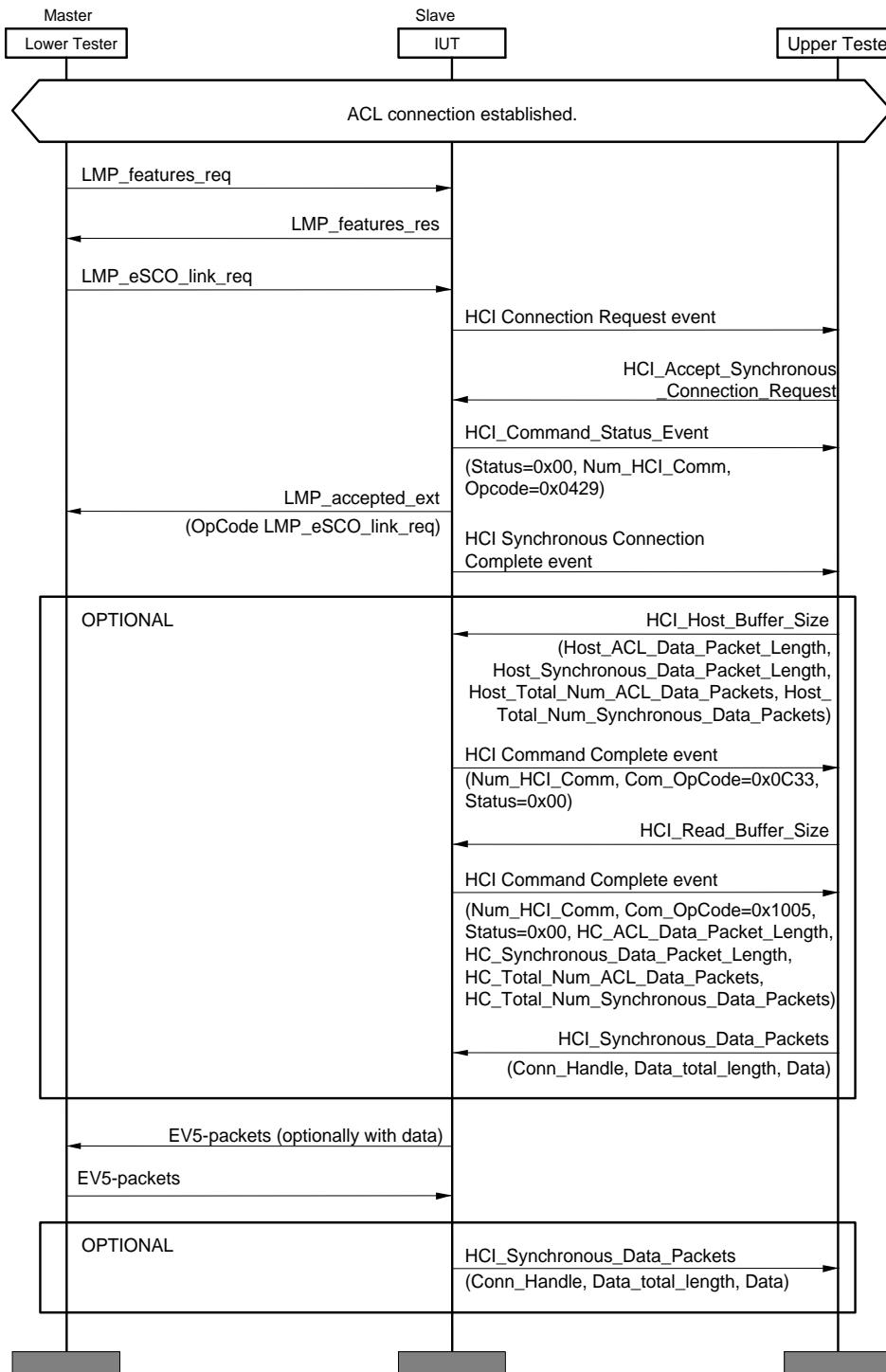


Figure 4.176: LMP/LIH/BV-102-C

The LMP_eSCO_link_req shall have the following content:

- eSCO handle: Any valid number.
- eSCO LT_ADDR: Any valid number.



- Timing control flags: Derived from master clock.
- Desco: Any number in the range [0, Tesco - 2].
- Tesco: 16 slots.
- Wesco: 6 slots.
- Packet type M→S: EV5.
- Packet type S→M: EV5.
- Packet length M→S: 80 bytes.
- Packet length S→M: 80 bytes.
- Air mode: Transparent.
- Negotiation Flag: Initiate Negotiation.

Verify that EV5 packets are transmitted at the eSCO instants and retransmitted inside the retransmission window.

- **Test Condition**

The need to have HCI_Synchronous_Data packets to generate EV packets should be declared as IXIT. However, payload content is not verified.

- **Expected Outcome**

Pass verdict

The IUT transmits PDU LMP_accepted_ext upon reception of PDU LMP_eSCO_link_req. An eSCO links is established accordingly.

- **Notes**

The IUT may negotiate the eSCO parameters.

4.7.20.4 LMP/LIH/BV-103-C [Request eSCO as Slave]

- **Test Purpose**

Verify that the IUT can request the Lower Tester to set up an eSCO link. Verify that the correct eSCO setup is used. IUT is slave and initiates the service. The Lower Tester is master.

- **Reference**

[1] 4.6.2.2

- **Initial Condition**

See [Default Settings](#).

A features request has to be carried out.



- Test Procedure

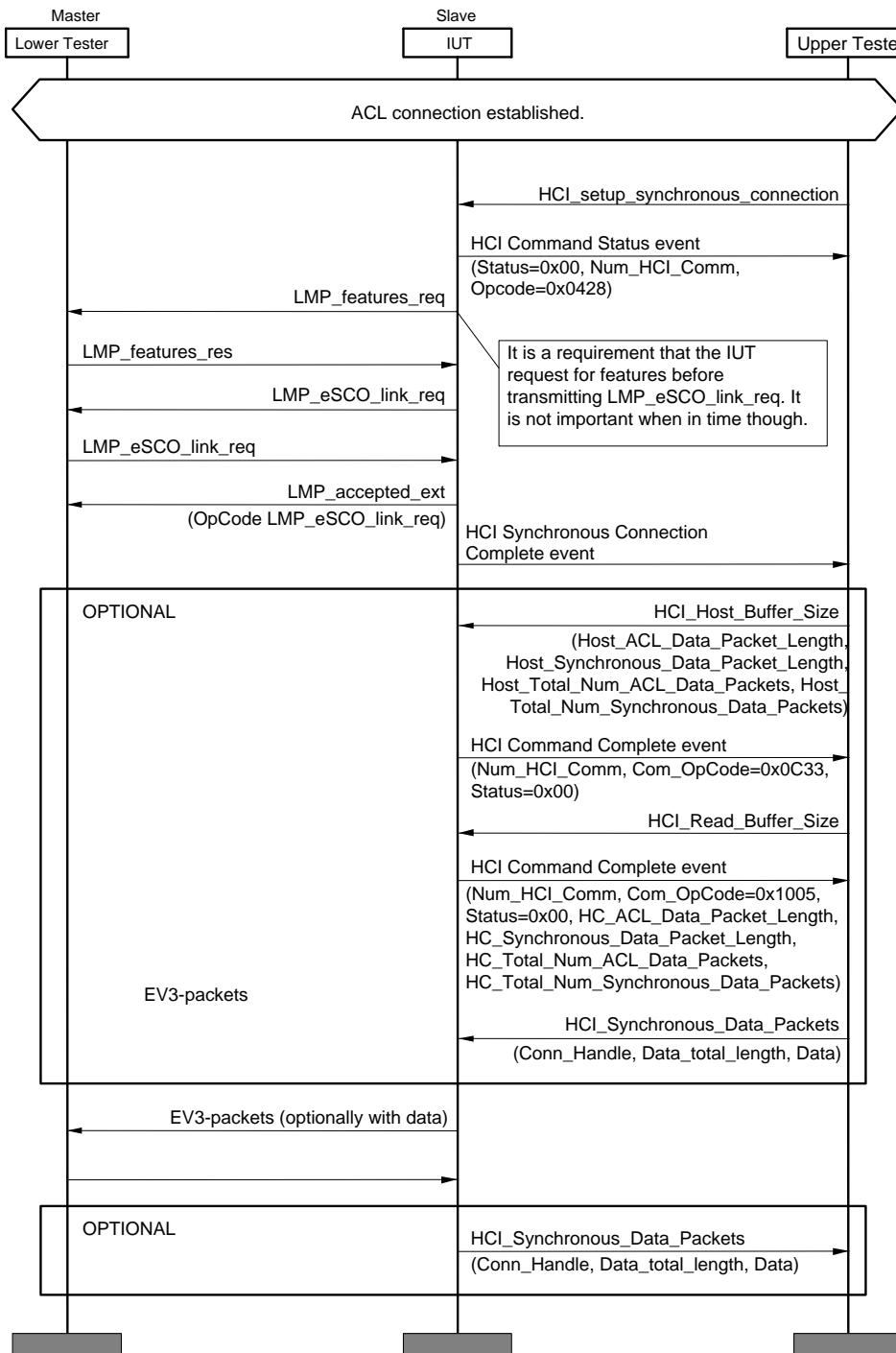


Figure 4.177: LMP/LIH/BV-103-C

The `HCI_Setup_Synchronous_Connection` shall have the following content:

- Connection Handle: Any valid number.
- Transmit Bandwidth: 8000 bytes/s.
- Receive Bandwidth: 8000 bytes/s.



- Max Latency: 7 ms.
- Content Format: Any supported air mode.
- Retransmission Effort: 1.
- Packet Type: EV3.

Verify that EV packets are transmitted at the eSCO instants and retransmitted inside the retransmission window.

- **Test Condition**

The need to have HCI_Synchronous_Data packets to generate EV packets should be declared as IXIT. However, payload content is not verified.

- **Expected Outcome**

Pass verdict

The IUT transmits PDU LMP_eSCO_link_req with parameters that satisfy the bandwidth and latency requirements. An eSCO links is established accordingly.

- **Notes**

The choice of packet type and packet length is up to the IUT.

4.7.20.5 LMP/LIH/BV-104-C [Accept Change to EV4]

- **Test Purpose**

Verify that the IUT changes eSCO interval and eSCO packet type (from EV3 to EV4) upon request from the Lower Tester. The IUT is slave. The Lower Tester is master and initiates the service.

- **Reference**

[1] 4.6.2.3

- **Initial Condition**

See [LMP/LIH/BV-100-C \[Accept EV3 eSCO Request\]](#), with the exception that the HCI_Accept_Synchronous_Connection shall use a packet type of all EV packets (0x38).



- Test Procedure

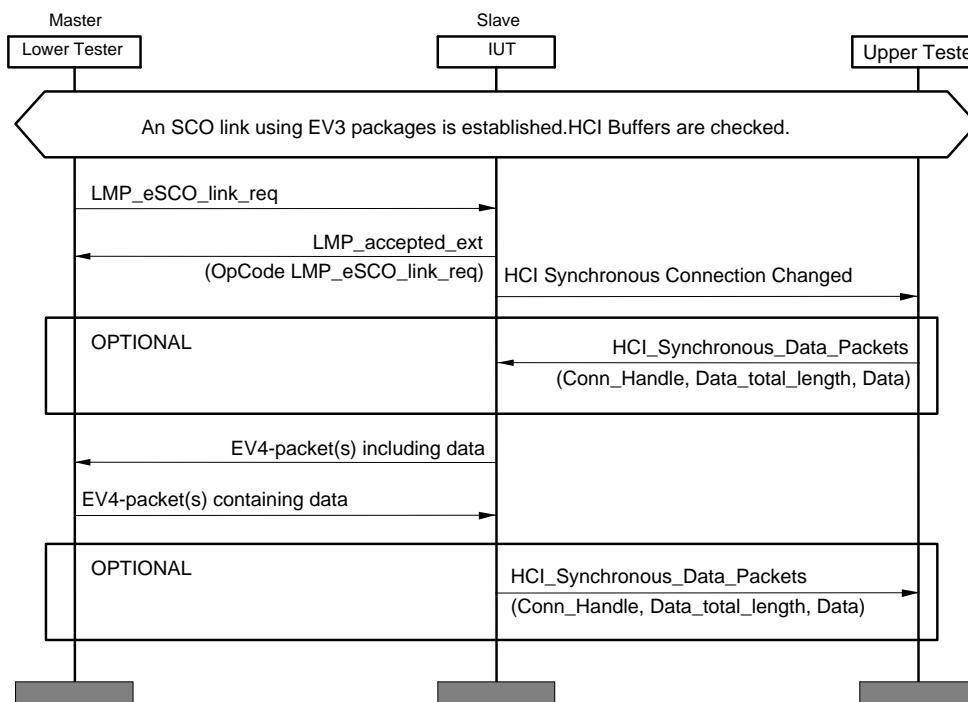


Figure 4.178: LMP/LIH/BV-104-C

The LMP_eSCO_link_req shall have the following content:

- eSCO handle: The current handle of the eSCO link.
- eSCO LT_ADDR: The current LT_ADDR of the eSCO link.
- Timing control flags: Derived from master clock.
- Desco: Any number in the range [0, Tesco - 2].
- Tesco: 16 slots.
- Wesco: 6 slots.
- Packet type M→S: EV4.
- Packet type S→M: EV4.
- Packet length M→S: 80 bytes.
- Packet length S→M: 80 bytes.
- Air mode: The current air mode of the eSCO link.
- Negotiation Flag: Initiate Negotiation.

Verify that EV4 packets are transmitted at the eSCO instants and retransmitted inside the retransmission window.

- Test Condition

The need to have HCI_Synchronous_Data packets to generate EV packets should be declared as IXIT. However, payload content is not verified.



- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted_ext upon reception of PDU LMP_eSCO_link_req. The interval and packet type are changed accordingly, and data is transferred after the change.

- Notes

The IUT may negotiate the EV4 eSCO parameters.

4.7.20.6 LMP/LIH/BV-105-C [Accept Change to EV5]

- Test Purpose

Verify that the IUT changes eSCO interval and eSCO packet type (from EV3 to EV5) upon request from the Lower Tester. The IUT is slave. The Lower Tester is master and initiates the service.

- Reference

[1] 4.6.2.3

- Initial Condition

See [LMP/LIH/BV-100-C \[Accept EV3 eSCO Request\]](#), with the exception that the HCI_Accept_Synchronous_Connection shall use a packet type of all EV packets (0x38).

- Test Procedure

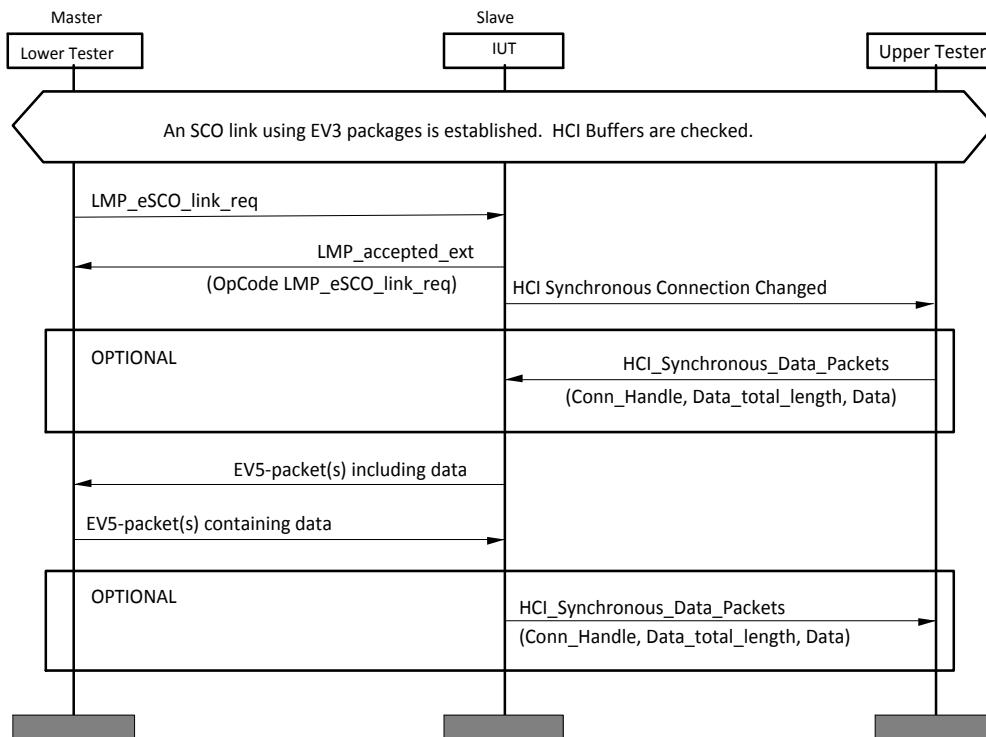


Figure 4.179: LMP/LIH/BV-105-C



The LMP_eSCO_link_req shall have the following content:

- eSCO handle: The current handle of the eSCO link.
- eSCO LT_ADDR: The current LT_ADDR of the eSCO link.
- Timing control flags: Derived from master clock.
- Desco: Any number in the range [0, Tesco - 2].
- Tesco: 16 slots.
- Wesco: 6 slots.
- Packet type M→S: EV5.
- Packet type S→M: EV5.
- Packet length M→S: 80 bytes.
- Packet length S→M: 80 bytes.
- Air mode: The current air mode of the eSCO link.
- Negotiation Flag: Initiate Negotiation.

Verify that EV5 packets are transmitted at the eSCO instants and retransmitted inside the retransmission window.

- Test Condition

The need to have HCI_Synchronous_Data packets to generate EV packets should be declared as IXIT. However, payload content is not verified.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted_ext upon reception of PDU LMP_eSCO_link_req. The interval and packet type are changed accordingly, and data is transferred after the change.

- Notes

The IUT may negotiate the EV5 eSCO parameters.

4.7.20.7 LMP/LIH/BV-106-C [Request Change to EV4]

- Test Purpose

Verify that the IUT can request the Lower Tester to change the eSCO interval and packet type (from EV3 to EV4). The IUT is slave and initiates the service. The Lower Tester is master.

- Reference

[1] 4.6.2.3

- Initial Condition

See LMP/LIH/BV-100-C [Accept EV3 eSCO Request], with the exception that the HCI_Accept_Synchronous_Connection shall use a packet type of all EV packets (0x38).



- Test Procedure

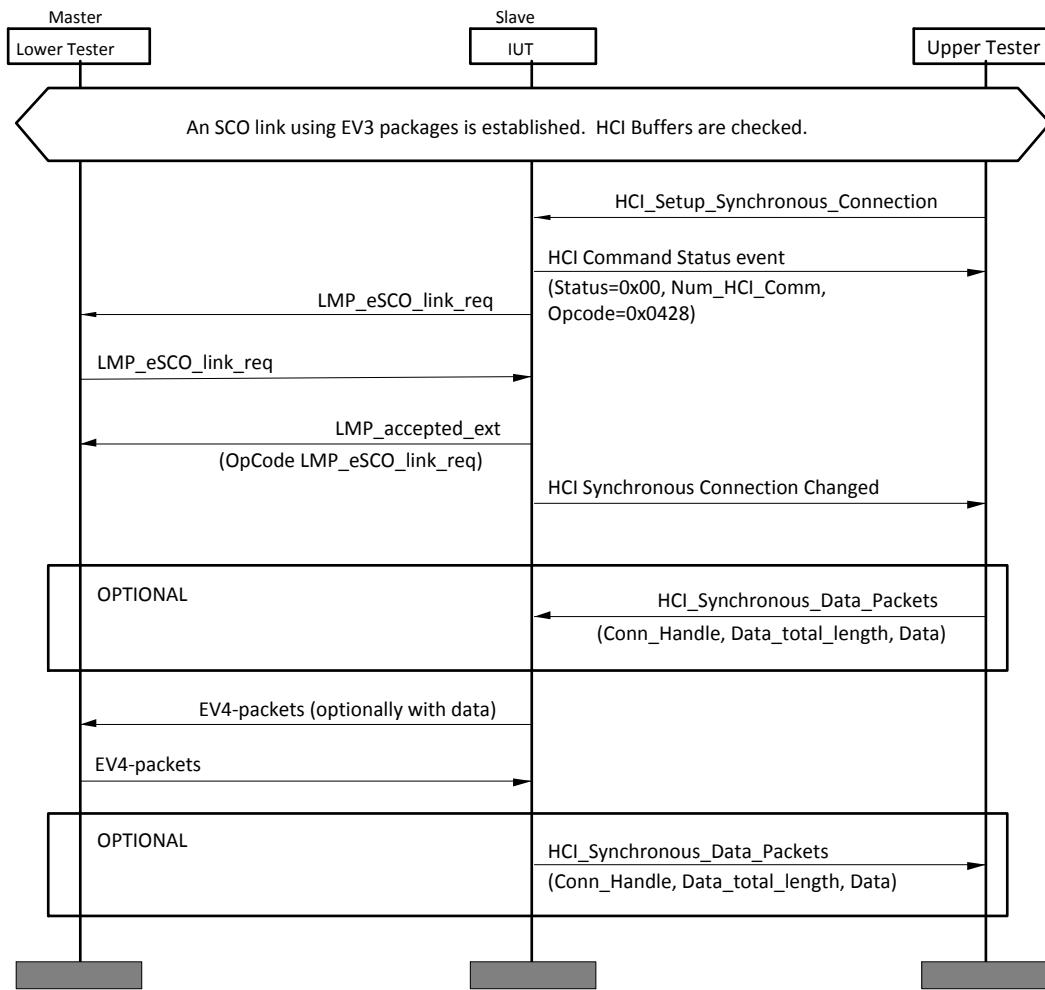


Figure 4.180: LMP/LIH/BV-106-C

The HCI_Setup_Synchronous_Connection shall have the following content:

- Connection Handle: The handle of the current eSCO connection.
- Transmit Bandwidth: 8000 bytes/s.
- Receive Bandwidth: 8000 bytes/s.
- Max Latency: 18 ms.
- Content Format: The air mode of the current eSCO connection.
- Retransmission Effort: 1.
- Packet Type: EV4.

Verify that EV4 packets are transmitted at the eSCO instants and retransmitted inside the retransmission window.

- Test Condition

The need to have HCI_Synchronous_Data packets to generate EV packets should be declared as IXIT. However, payload content is not verified.



- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_eSCO_link_req. After transmitting PDU LMP_accepted_ext, the interval and packet type are changed accordingly, and data is transferred after the change.

4.7.20.8 LMP/LIH/BV-107-C [EV4 Request Rejected]

- Test Purpose

Verify that the IUT can request the Lower Tester to change the eSCO interval and packet type (from EV3 to EV4). Verify that the IUT accepts that the Lower Tester rejects the request. The IUT is slave and initiates the service. The Lower Tester is master.

- Reference

[1] 4.6.2.3

- Initial Condition

See [LMP/LIH/BV-100-C \[Accept EV3 eSCO Request\]](#).

- Test Procedure

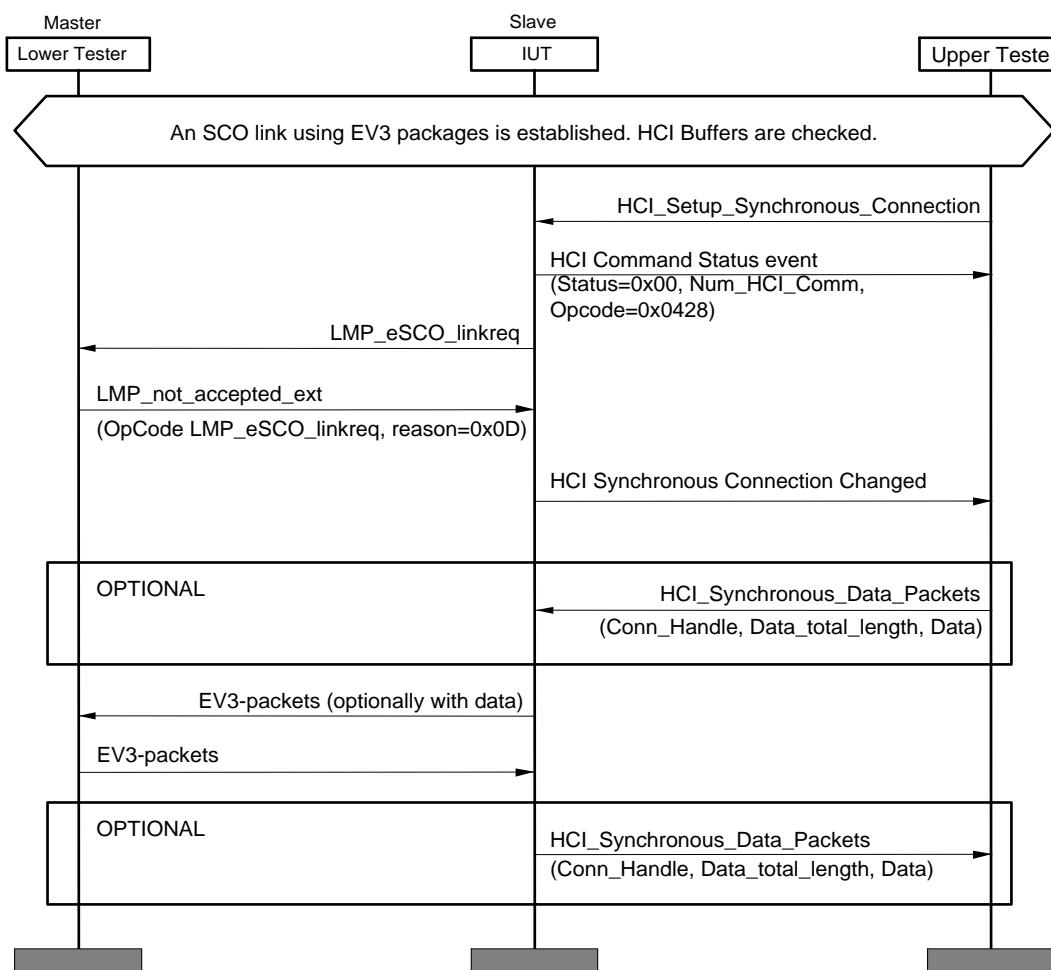


Figure 4.181: LMP/LIH/BV-107-C



The HCI_Setup_Synchronous_Connection shall have the following content:

- Connection Handle: The handle of the current eSCO link.
- Transmit Bandwidth: 8000 bytes/s.
- Receive Bandwidth: 8000 bytes/s.
- Max Latency: 18 ms.
- Content Format: The air mode of the current eSCO link.
- Retransmission Effort: 1.
- Packet Type: EV4.

Verify that EV3 packets are transmitted at the eSCO instants and retransmitted inside the retransmission window.

- Test Condition

The need to have HCI_Synchronous_Data packets to generate EV packets should be declared as IXIT. However, payload content is not verified.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_eSCO_link_req. After reception of PDU LMP_not_accepted_ext, data is still transferred according to the previous configuration.

4.7.20.9 LMP/LIH/BV-108-C [Accept eSCO Closure as Slave]

- Test Purpose

Verify that the IUT accepts a request from the Lower Tester to remove the eSCO link.

- Reference

[1] 4.6.2.4

- Initial Condition

See [LMP/LIH/BV-100-C \[Accept EV3 eSCO Request\]](#).



- Test Procedure

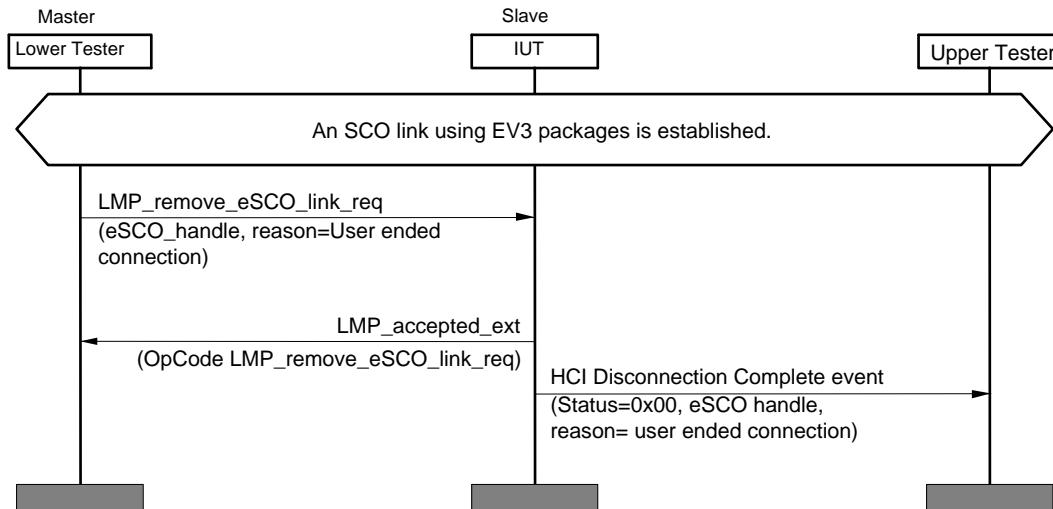


Figure 4.182: LMP/LIH/BV-108-C

The LMP_remove_eSCO_link shall have the following content:

- eSCO handle: The handle of the current eSCO link.
- Reason: 0x13 User ended connection.

Verify that the eSCO link is removed.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted_ext upon reception of PDU LMP_remove_eSCO_link. The eSCO link is closed.

4.7.20.10 LMP/LIH/BV-109-C [Request eSCO Closure as Slave]

- Test Purpose

Verify that the IUT can request the Lower Tester to remove the eSCO link. The IUT initiates the service.

- Reference

[1] 4.6.2.4

- Initial Condition

See [LMP/LIH/BV-100-C \[Accept EV3 eSCO Request\]](#).



- Test Procedure

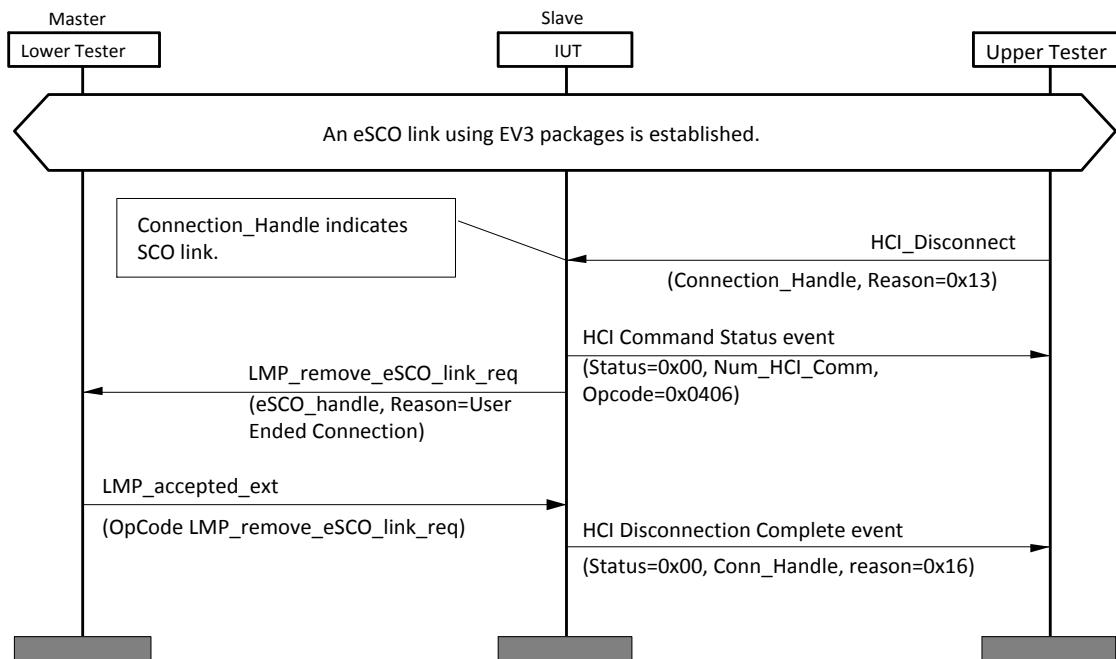


Figure 4.183: LMP/LIH/BV-109-C

The HCI_Disconnect shall have the following content:

- Connection Handle: The handle of the current eSCO Link.
- Reason: 0x13 User ended connection.

Verify that the eSCO link is removed.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_remove_eSCO_link_req and accepts reception of PDU LMP_accepted_ext. The eSCO link must be closed.

4.7.21 eSCO links - Master

4.7.21.1 LMP/LIH/BV-110-C [Request ESCO as Master]

- Test Purpose

Verify that the IUT can establish an eSCO link. IUT is master and initiates the service. The Lower Tester is slave.

- Reference

[1] 4.6.2.1

- Initial Condition

See [Default Settings](#).



- Test Procedure

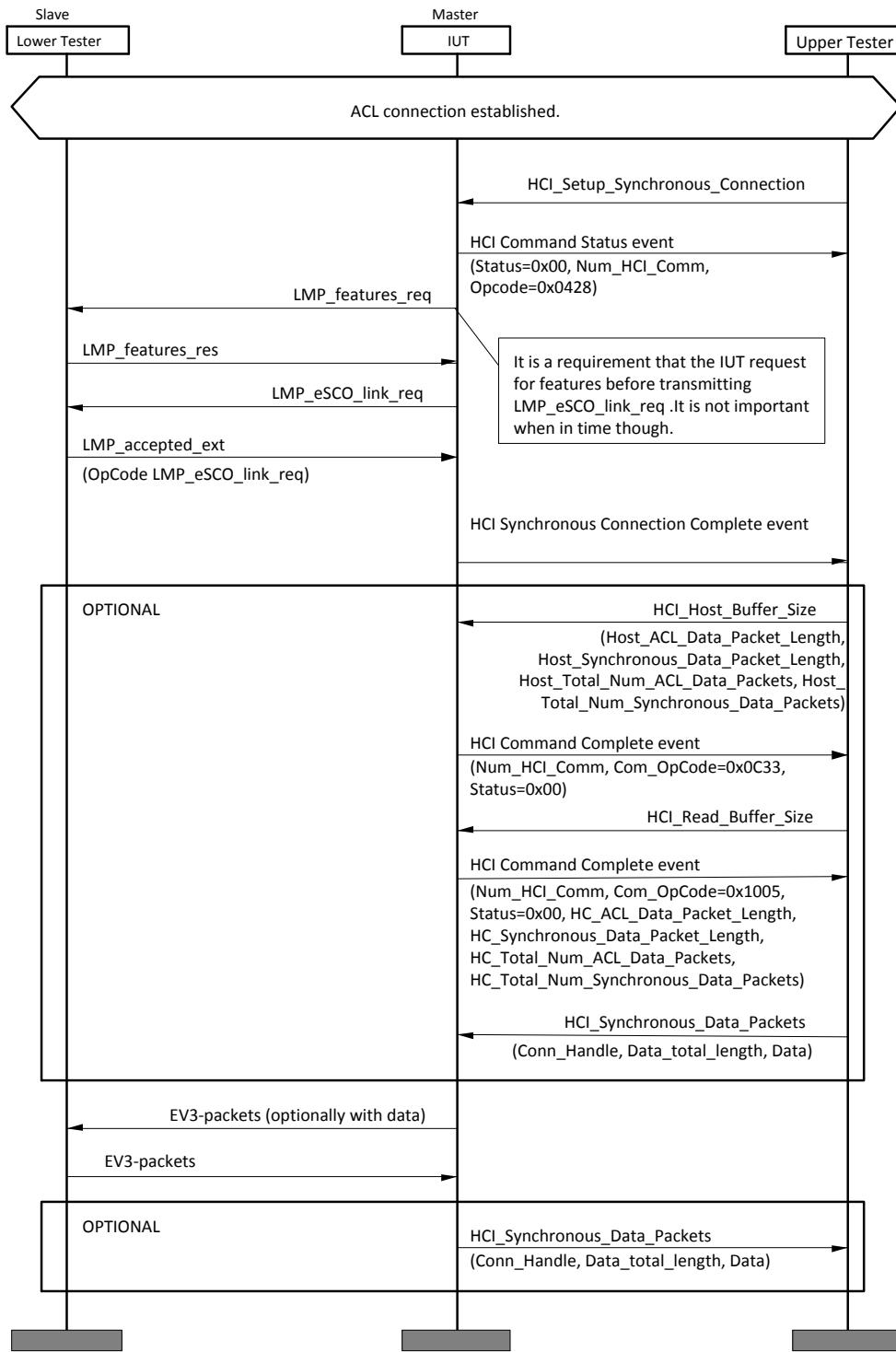


Figure 4.184: LMP/LIH/BV-110-C

The HCI_Setup_Synchronous_Connection shall have the following content:

- Connection Handle: Any valid number.
- Transmit Bandwidth: 8000 bytes/s.



- Receive Bandwidth: 8000 bytes/s.
- Max Latency: 7 ms.
- Content Format: Any supported air mode.
- Retransmission Effort: 1.
- Packet Type: EV3.

Verify that EV3 packets are transmitted at the eSCO instants and retransmitted inside the retransmission window.

- Test Condition

The need to have HCI_Synchronous_Data packets to generate EV packets should be declared as IXIT. However, payload content is not verified.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_eSCO_link_req with parameters that satisfy the bandwidth and latency requirements. An eSCO link is established accordingly.

4.7.21.2 LMP/LIH/BV-111-C [Accept eSCO Request]

- Test Purpose

Verify that the IUT accepts a request from the Lower Tester to initiate an eSCO link. IUT is master. The Lower Tester is slave and initiates the service.

- Reference

[1] 4.6.2.2

- Initial Condition

See [Default Settings](#).



- Test Procedure

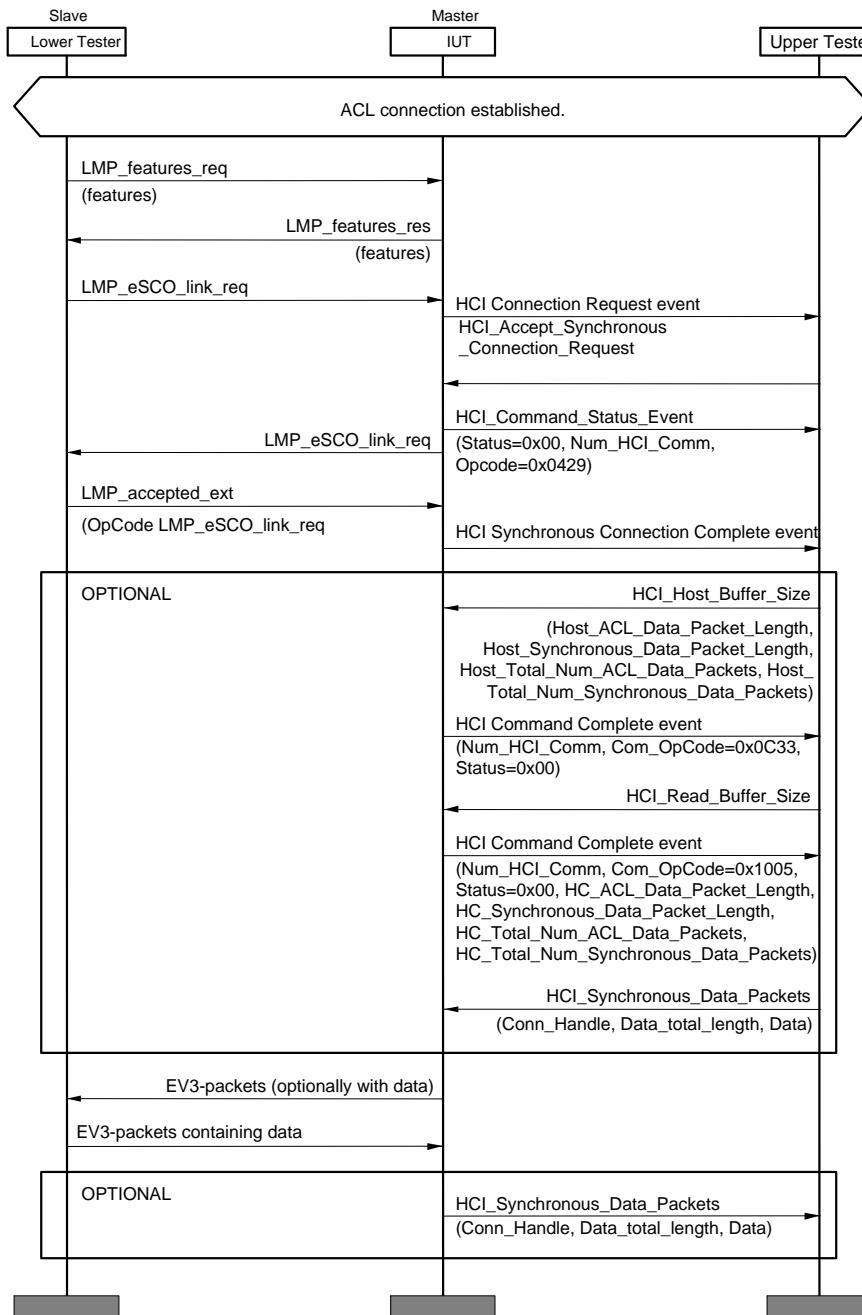


Figure 4.185: LMP/LIH/BV-111-C

The LMP_eSCO_link_req shall have the following content:

- eSCO handle: Any valid number.
- eSCO LT_ADDR: Any valid number.
- Timing control flags: Derived from IUT's master clock.
- Desco: Any number in the range [0, Tesco - 2].
- Tesco: 6 slots.



- Wesco: 2 slots.
- Packet type M→S: EV3.
- Packet type S→M: EV3.
- Packet length M→S: 30 bytes.
- Packet length S→M: 30 bytes.
- Air mode: Any supported air mode.
- Negotiation Flag: Initiate Negotiation.

Verify that EV3 packets are transmitted at the eSCO instants and retransmitted inside the retransmission window.

- Test Condition

The need to have HCI_Synchronous_Data packets to generate EV packets should be declared as IXIT. However, payload content is not verified.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_eSCO_link_req upon reception of PDU LMP_eSCO_link_req. An eSCO link is established accordingly.

4.7.21.3 LMP/LIH/BV-112-C [Request eSCO Change]

- Test Purpose

Verify that the IUT can request a change of the eSCO parameters (packet type EV3 to EV4 or EV5). The IUT is master and initiates the service. The Lower Tester is slave.

- Reference

[1] 4.6.2.3

- Initial Condition

See [LMP/LIH/BV-110-C \[Request ESCO as Master](#)



- Test Procedure

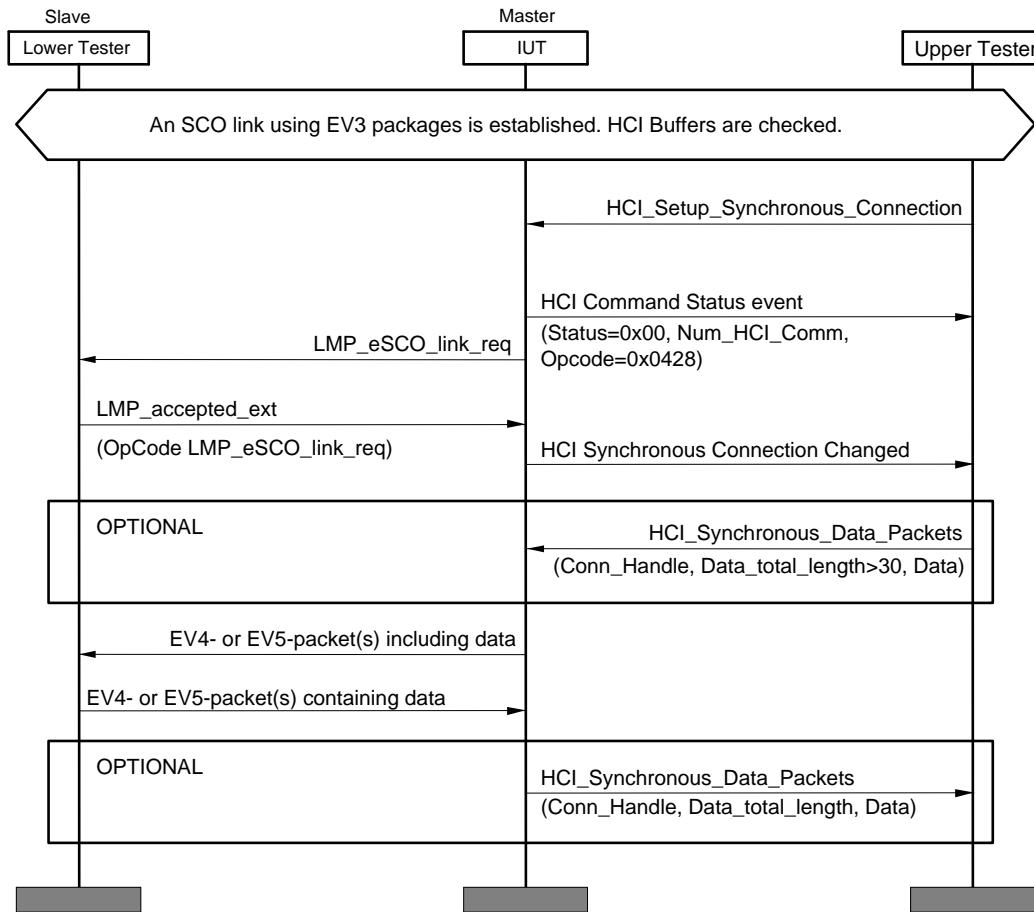


Figure 4.186: LMP/LIH/BV-112-C

The **HCI_Setup_Synchronous_Connection** shall have the following content:

- Connection Handle: The handle of the current eSCO link.
- Transmit Bandwidth: 8000 bytes/s.
- Receive Bandwidth: 8000 bytes/s.
- Max Latency: 18 ms.
- Content Format: The air mode of the current eSCO link.
- Retransmission Effort: 1.
- Packet Type: EV4, EV5.

Verify that EV4 or EV5 packets are transmitted at the eSCO instants and retransmitted inside the retransmission window.

- Test Condition

The need to have **HCI_Synchronous_Data** packets to generate EV packets should be declared as IXIT. However, payload content is not verified.



- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_eSCO_link_req. Data is transferred using the bandwidth, max latency and air mode specified in the HCI command.

4.7.21.4 LMP/LIH/BV-113-C [eSCO Change Rejected]

- Test Purpose

Verify that the IUT can request a change of the eSCO parameters (packet type EV3 to EV4 or EV5). Verify that the IUT accepts a rejection from the Lower Tester. The IUT is master and initiates the service. The Lower Tester is slave.

- Reference

[1] 4.6.2.3

- Initial Condition

See [LMP/LIH/BV-110-C \[Request ESCO as Master\]](#)

- Test Procedure

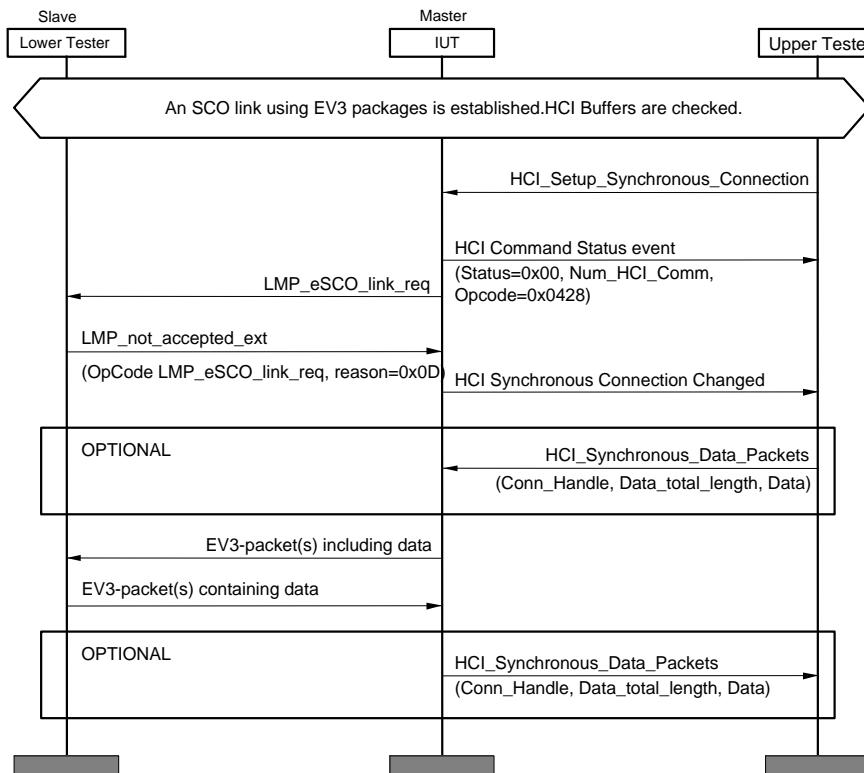


Figure 4.187: LMP/LIH/BV113-C

The HCI_Setup_Synchronous_Connection shall have the following content:

- Connection Handle: The handle of the current eSCO link.
- Transmit Bandwidth: 8000 bytes/s.



- Receive Bandwidth: 8000 bytes/s.
- Max Latency: 18 ms.
- Content Format: The air mode of the current eSCO link.
- Retransmission Effort: 1.
- Packet Type: EV4, EV5.

Verify that EV3 packets are transmitted at the eSCO instants and retransmitted inside the retransmission window.

- Test Condition

The need to have HCI_Synchronous_Data packets to generate EV packets should be declared as IXIT. However, payload content is not verified.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_eSCO_link_req. After receiving PDU LMP_not_accepted_ext, data is still transferred according to the original configuration.

4.7.21.5 LMP/LIH/BV-114-C [Request to Close eSCO Link]

- Test Purpose

Verify that the IUT can request to close the eSCO link. The IUT is master and initiates the service. The Lower Tester is slave.

- Reference

[1] 4.6.2.4

- Initial Condition

See [LMP/LIH/BV-110-C \[Request ESCO as Master\]](#).



- Test Procedure

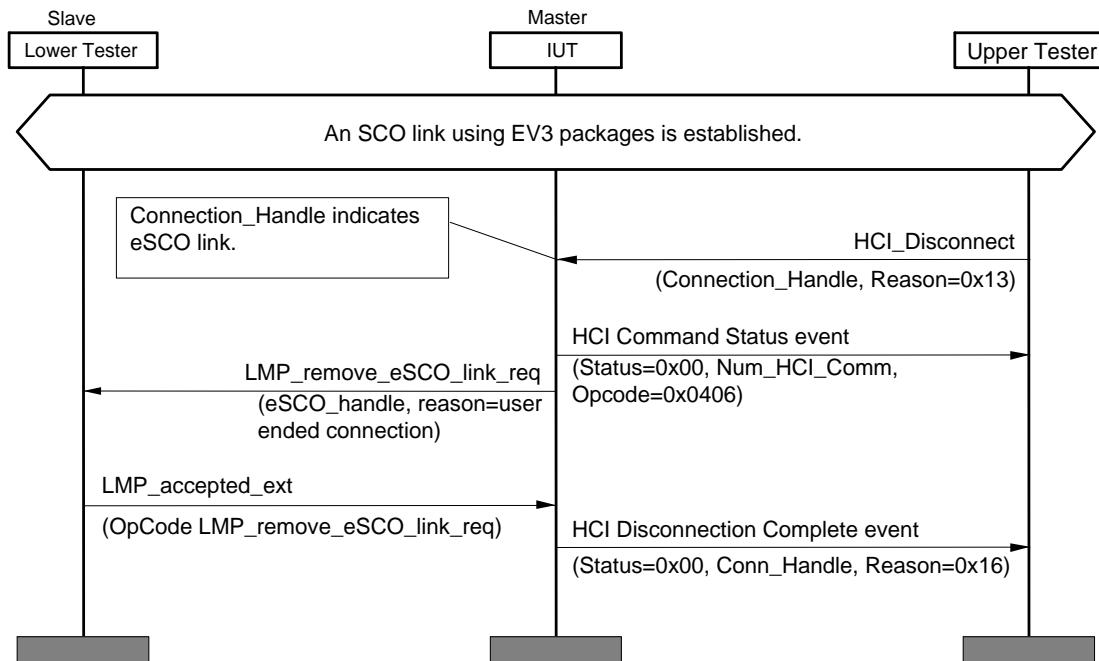


Figure 4.188: LMP/LIH/BV-114-C

The HCI_Disconnect shall have the following content:

- Connection Handle: The handle of the current eSCO Link.
- Reason: 0x13 User ended connection.

Verify that the eSCO link is removed.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_remove_eSCO_link_req and delivers HCI Disconnection Complete event. The eSCO link is closed.

4.7.21.6 LMP/LIH/BV115-C [Accept eSCO Closure as Master]

- Test Purpose

Verify that the Lower Tester can request the IUT to close the eSCO link. The IUT is master. The Lower Tester is slave and initiates the service.

- Reference

[1] 4.6.2.4

- Initial Condition

See [LMP/LIH/BV-110-C \[Request ESCO as Master\]](#).



- Test Procedure

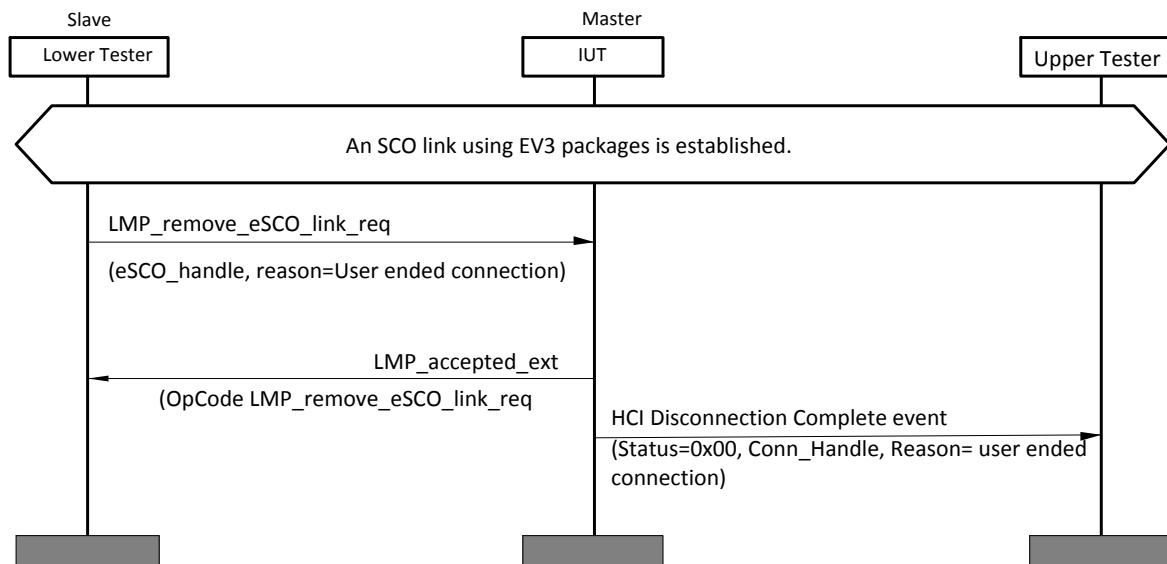


Figure 4.189: LMP/LIH/BV115-C

The LMP_remove_eSCO_link shall have the following content:

- eSCO handle: The handle of the current eSCO link.
- Reason: 0x13 User ended connection.

Verify that the eSCO link is removed.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted_ext upon reception of PDU LMP_remove_eSCO_link. The eSCO link is closed.

4.7.21.7 LMP/LIH/BV116-C [Reject eSCO Request]

- Test Purpose

Verify that the IUT responds that it does not support eSCO links upon request from the Lower Tester. The Lower Tester initiates the service. It does not matter whether the IUT is slave or master in this test.

- Reference

[1] 4.6.2

- Initial Condition

See [Default Settings](#).



- Test Procedure

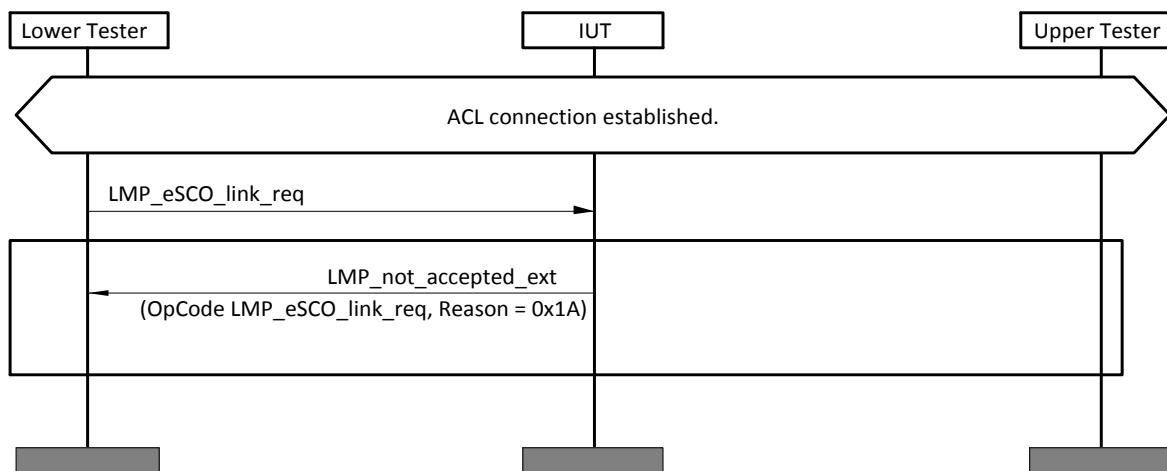


Figure 4.190: LMP/LIH/BV116-C

The LMP_eSCO_link_req shall have the following content:

- eSCO handle: Any valid number.
- eSCO LT_ADDR: Any valid number.
- Timing control flags: Derived from master clock.
- Desco: Any number in the range [0, Tesco - 2].
- Tesco: 6 slots.
- Wesco: 2 slots.
- Packet type M→S: EV3.
- Packet type S→M: EV3.
- Packet length M→S: 30 bytes.
- Packet length S→M: 30 bytes.
- Air mode: Any air mode.
- Negotiation Flag: Initiate Negotiation.
- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_not_accepted_ext containing “Reason = 0x1A” upon reception of PDU LMP_eSCO_link_req.

4.7.22 Sniff Subrating

- Test subgroup objectives:

To verify that the unit can imitate and reject a sniff subrating link request. See Baseband Test Suite, Section 4.11.1, “Sniff Subrating Preamble” [11].



4.7.22.1 LMP/LIH/BV-117-C [LMP Feature Bits]

- **Test Purpose**

Verify that a device has set the correct LMP feature bits for sniff substrate.

- **Reference**

[1] 3.2, 3.3

- **Initial Condition**

The IUT is a slave.

An ACL connection has been established between the Lower Tester and IUT, where the IUT is slave.

- **Test Procedure**

Lower Tester sends LMP_feature_req and IUT responds LMP_feature_res.

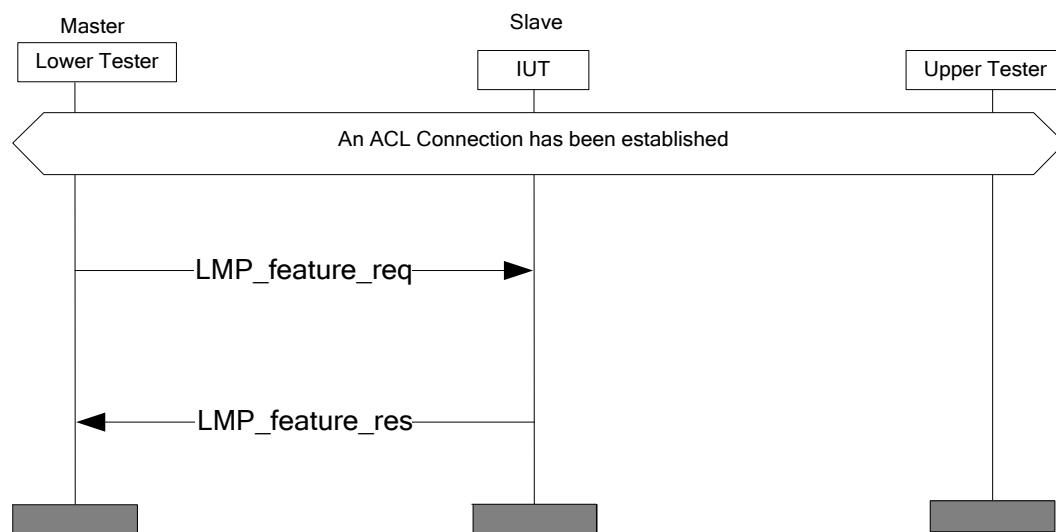


Figure 4.191: LMP/LIH/BV-117-C Sniff Subrating LMP Feature Bits

- **Expected Outcome**

Pass verdict

The following feature bits are set in the response from the IUT:

- Bit 7, "Sniff Mode" (Byte 0, Bit 7)
- Bit 41, "Sniff Subrating" (Byte 5, Bit 1).

4.7.22.2 LMP/LIH/BV-118-C [Entering Sniff Subrating Mode from Sniff Mode With Lower Tester as The Initiator]

- **Test Purpose**

Verify that IUT enters sniff subrating mode as it claims when the Lower Tester initiates sniff subrating mode request.



- Reference
 - [1] 4.5.3.3
 - [9] 5.1, 5.2
- Initial Condition
 1. The IUT is slave.
 2. Lower Tester and IUT have a connection in sniff mode. The following are the sniff parameters:
 - a. Tsniff = 20 slots
 - b. Sniff attempt = 1
 - c. Sniff timeout = 0
 3. No ACL_U data are being exchanged to simplify the test case.
- Test Procedure

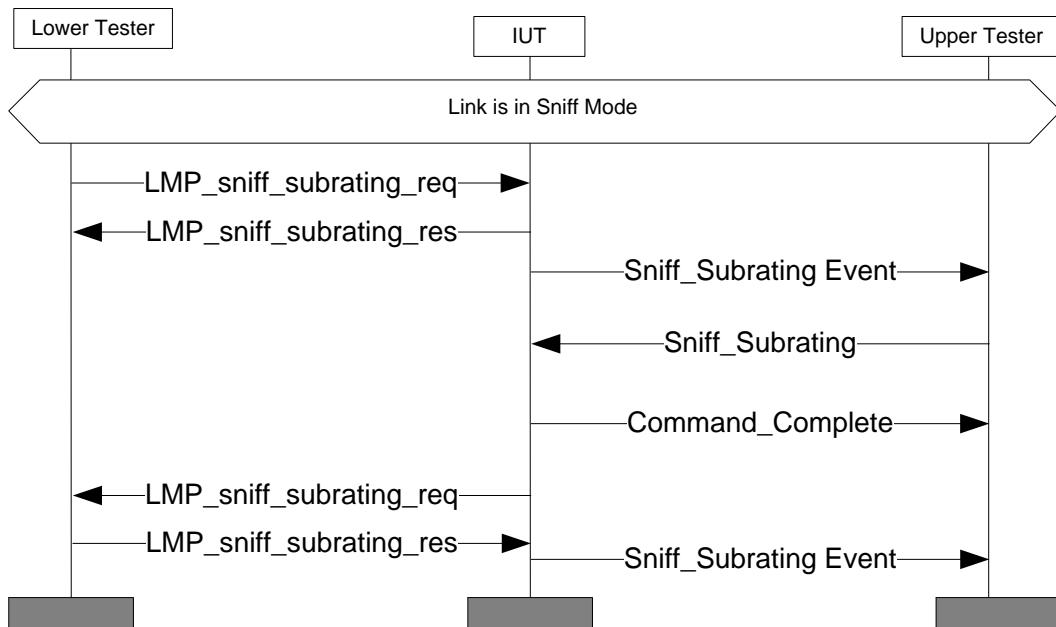


Figure 4.192: LMP/LIH/BV-118-C

1. Lower Tester sends LMP_sniff_subrating_req to the IUT with the following parameters:
 - a. max sniff subrate = 4
 - b. min sniff mode timeout = 320 slots
 - c. sniff_subrating_instant = at least 80 slots ahead of the current piconet clock but not more than 400 slots
2. IUT sends LMP_sniff_subrating_res to the Lower Tester with the following parameters (sniff subrating default values):
 - a. max sniff subrate = 1
 - b. min sniff mode timeout = 0 slots



3. After Sniff Subrate Event has been already observed from the Upper Tester, it issues a HCI_Sniff_Subrating command with the following parameters:
 - a. Maximum_Latency = 160 slots
 - b. Minimum_Remote_Timeout = 160 slots
 - c. Minimum_Local_Timeout = 640 slots
 4. IUT sends LMP_sniff_subrating_req with the following parameters to the Lower Tester.
 - a. max sniff subrate = 8
 - b. min sniff mode timeout = 160 slots
 5. Lower Tester sends LMP_sniff_subrating_res to the IUT with the following parameters (same parameters as the previous negotiation)
 - a. max sniff subrate = 4
 - b. min sniff mode timeout = 320 slots
 - c. sniff_subrating_instant = at least 80 slots ahead of the current piconet clock but not more than 400 slots.
- Expected Outcome

Pass verdict

1. Sniff Subrate Event has been observed before step 3) with the following parameters received by Upper Tester.
 - a. Maximum_Transmit_Latency = 20 slots
 - b. Maximum_Receive_Latency = 80 slots
 - c. Minimum_Remote_Timeout = 0 slots
 - d. Minimum_Local_Timeout = 320 slots
2. After step 5) Sniff Subrate Event has been observed with the following parameters received by Upper Tester.
 - a. Maximum_Transmit_Latency = 160 slots
 - b. Maximum_Receive_Latency = 80 slots
 - c. Minimum_Remote_Timeout = 160 slots
 - d. Minimum_Local_Timeout = 640 slots

4.7.22.3 LMP/LIH/BV-119-C [Entering Sniff Subrating Mode From Sniff Mode With IUT As The Initiator]

- Test Purpose

Verify that IUT enters sniff subrating mode as it claims when the IUT initiates sniff subrating mode request.



- Reference
 - [1] 4.5.3.3
 - [9] 5.1, 5.2
- Initial Condition
 1. The IUT is slave.
 2. Lower Tester and IUT have a connection in sniff mode. The sniff parameters are
 - a. Tsniff = 20 slots
 - b. Sniff attempt = 1
 - c. Sniff timeout = 0.
 3. No ACL_U data are being exchanged to simplify the test case.
- Test Procedure

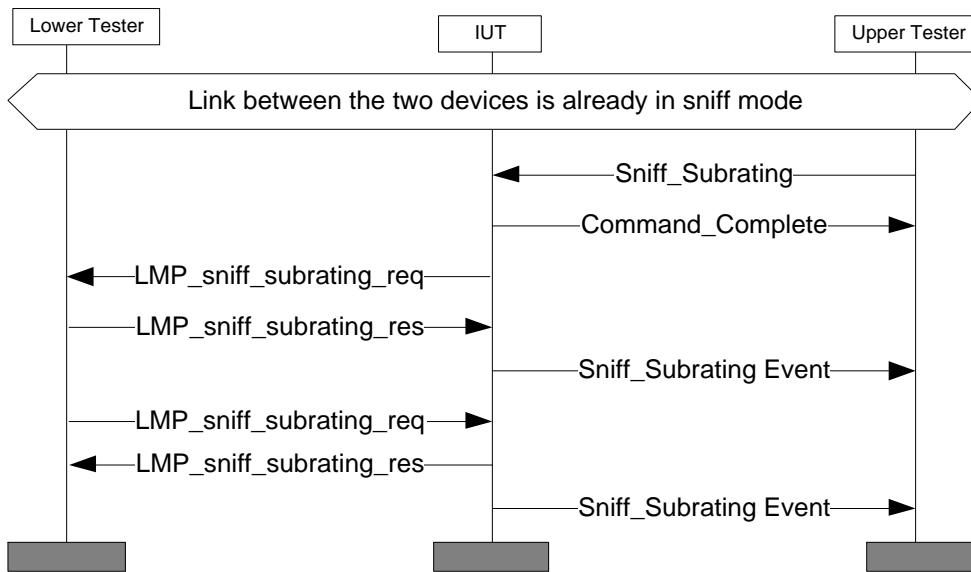


Figure 4.193: LMP/LIH/BV-119-C

1. Upper Tester issues an HCI_Sniff_Subrating command to the IUT with the following parameters:
 - a. Maximum_Latency = 80 slots
 - b. Minimum_Remote_Timeout = 320 slots
 - c. Minimum_Local_Timeout = 320 slots
2. IUT sends LMP_sniff_subrating_req with the following parameters to the Lower Tester
 - a. max sniff subrate = 4
 - b. min sniff mode timeout = 320 slots
3. Lower Tester sends LMP_sniff_subrating_res to the IUT with the following parameters (sniff subrating default values)
 - a. max sniff subrate = 1
 - b. min sniff mode timeout = 0 slots



- c. sniff_subrating_instant = at least 80 slots ahead of the current piconet clock but not more than 400 slots
- 4. After Sniff Subrate Event has been observed already from the Upper Tester. The Lower Tester sends LMP_sniff_subrating_req to the IUT with the following parameters:
 - a. max sniff subrate = 4
 - b. min sniff mode timeout = 160 slots
 - c. sniff_subrating_instant = at least 80 slots ahead of the current piconet clock but not more than 400 slots
- 5. IUT sends LMP_sniff_subrating_res with the following parameters to the Lower Tester (same parameters than former negotiation).
 - a. max sniff subrate = 4
 - b. min sniff mode timeout = 320 slots

- Expected Outcome

Pass verdict

1. Sniff Subrate Event has been observed before step 4) with the following parameters received by Upper Tester.
 - a. Maximum_Transmit_Latency = 80 slots
 - b. Maximum_Receive_Latency = 20 slots
 - c. Minimum_Remote_Timeout = 320 slots
 - d. Minimum_Local_Timeout = 320 slots
2. After step 5) Sniff Subrate Event has been observed with the following parameters received by Upper Tester.
 - a. Maximum_Transmit_Latency = 80 slots
 - b. Maximum_Receive_Latency = 80 slots
 - c. Minimum_Remote_Timeout = 320 slots
 - d. Minimum_Local_Timeout = 320 slots

4.7.22.4 LMP/LIH/BV-120-C [IUT Rejects Sniff Subrating Request When In Active Mode]

- Test Purpose

Verify that IUT rejects sniff subrating request correctly when the connection is still in active mode.

- Reference

[1] 4.5.3.3

[9] 5.2, 5.2

- Initial Condition

Lower Tester and IUT have a connection in active mode.

No sniff mode negotiation is going on.



IUT's role does not matter as a slave or master.

- Test Procedure

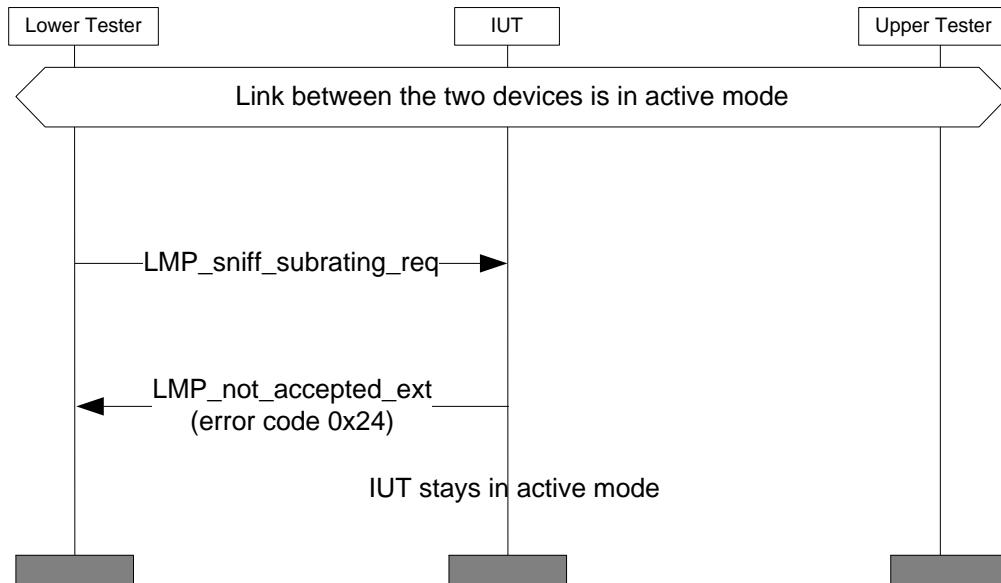


Figure 4.194: LMP/LIH/BV-120-C

Lower Tester issues LMP_sniff_subrating_request even though the connection is not in sniff mode yet. The following parameters are used in the LMP transaction:

1. max_sniff_subrate = 2
2. min_sniff_mode_timeout = 80
3. sniff_subrating_instant: at least 80 slots ahead of the current piconet clock but not more than 400 slots.

- Expected Outcome

Pass verdict

The LMP_sniff_subrating_req has been rejected correctly by the IUT with error code 0x24: LMP PDU not allowed.

No Sniff Subrate Event has been observed before from the Upper Tester.

4.7.22.5 LMP/LIH/BV-121-C [Entering Sniff Subrating Mode With Lower Tester Initiating Sniff Mode Request]

- Test Purpose

Verify that IUT enters sniff subrating mode when the Lower Tester and IUT have sniff subrating parameters already (either just obtained from their hosts or from sniff subrating history) and the Lower Tester initiates sniff mode request.

- Reference

[1] 4.5.3.3

[9] 5.1, 5.2



- Initial Condition
 - 1. IUT may be master or slave.
 - 2. Lower Tester and IUT have a connection in active mode.
 - 3. No ACL_U data are being exchanged.
 - 4. Upper Tester issues a HCI_Sniff_Subrating command with the following parameters:
 - a. Maximum_Latency = 80 slots
 - b. Minimum_Remote_Timeout = 320 slots
 - c. Minimum_Local_Timeout = 320 slots
 - 5. Lower Tester has the following parameters already:
 - a. Maximum_Latency = 80 slots
 - b. Minimum_Remote_Timeout = 320 slots
 - c. Minimum_Local_Timeout = 320 slots



- Test Procedure

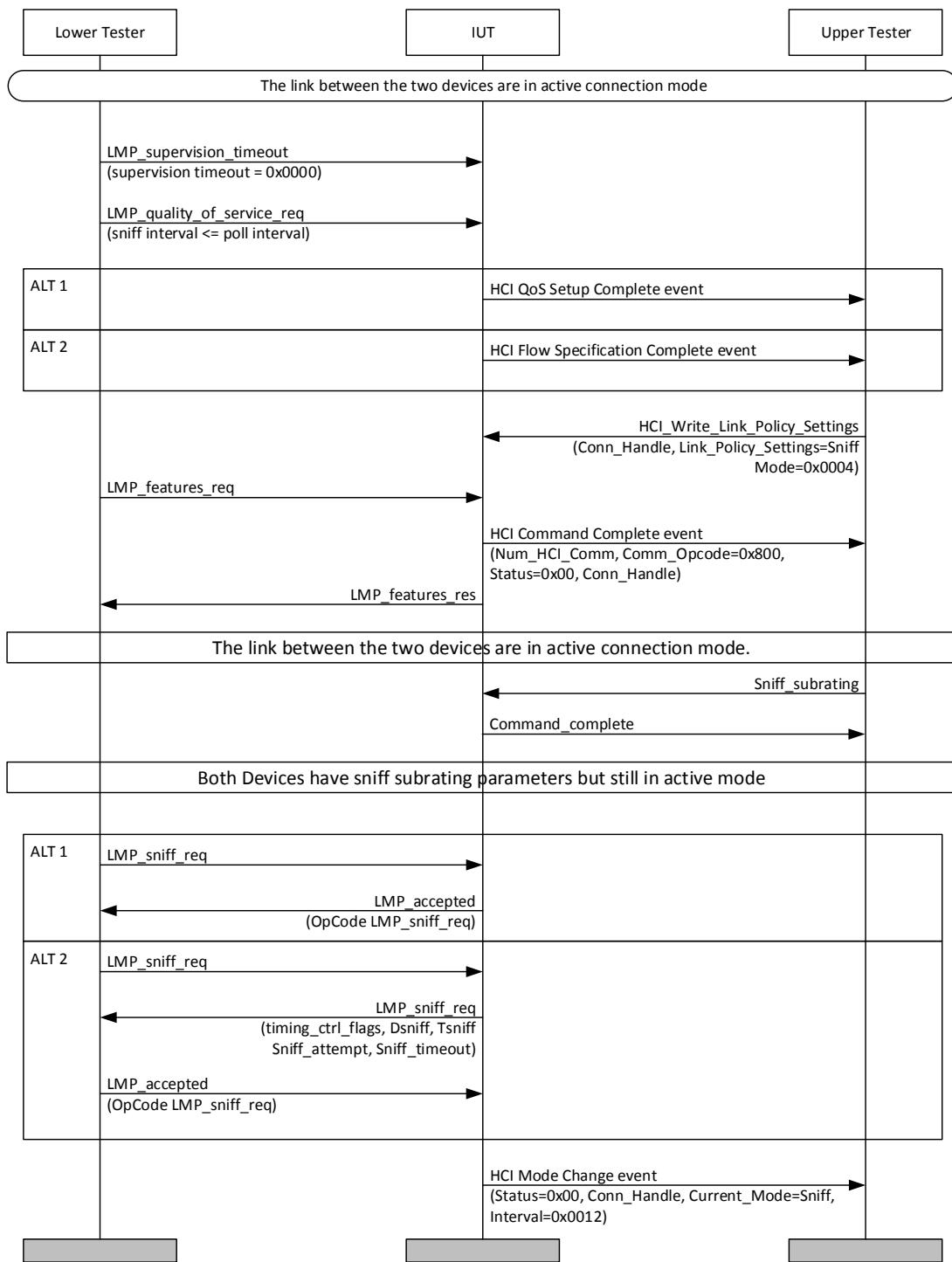


Figure 4.195: LMP/LIH/BV-121-C a



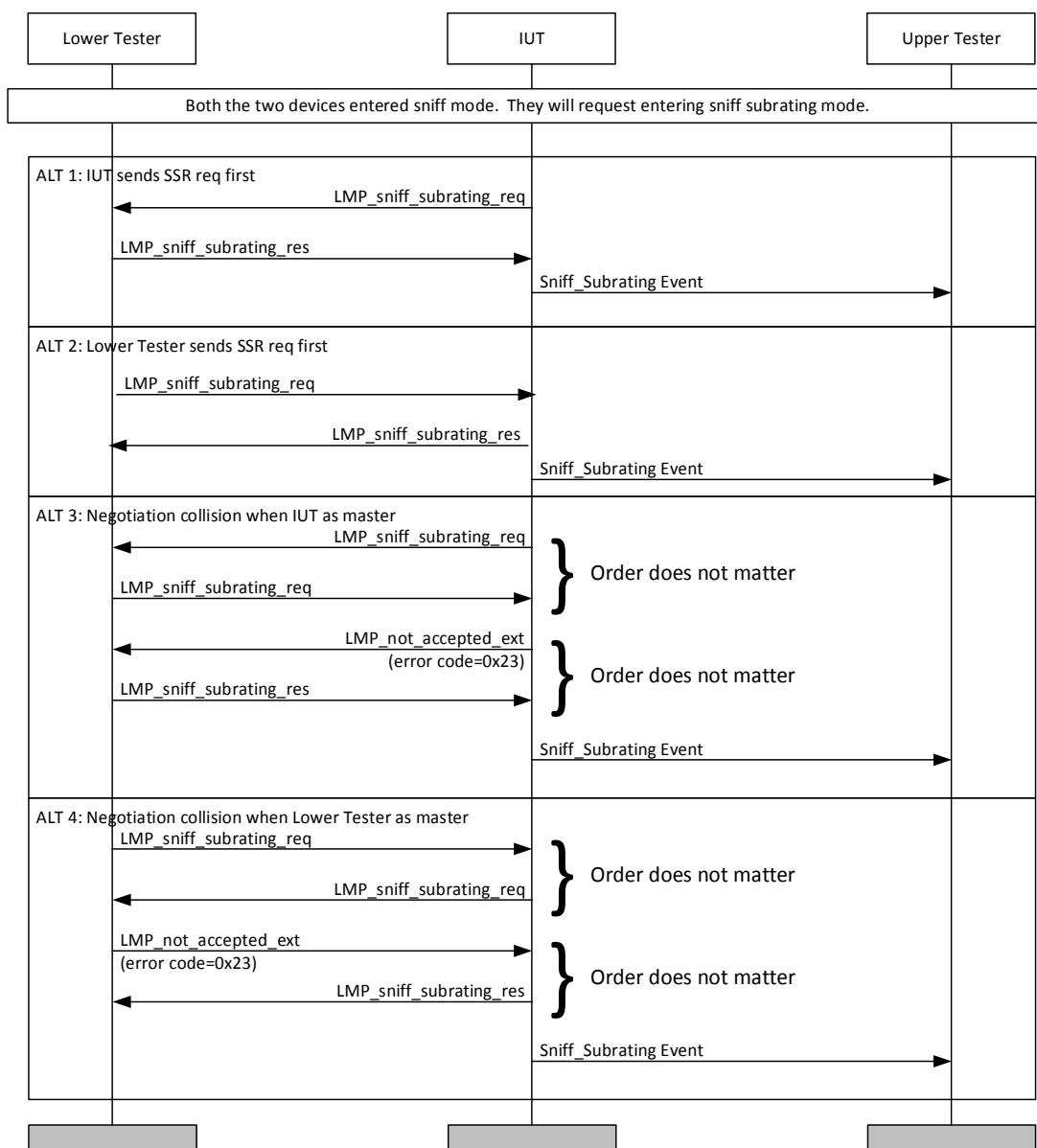


Figure 4.196: LMP/LIH/BV-121-C b

1. Lower Tester sends LMP_sniff_req to the IUT with the following sniff parameters:
 - a. Tsniff = 20 slots
 - b. Sniff attempt = 1
 - c. Sniff timeout = 0
2. Lower Tester sends LMP_sniff_subrating_req or LMP_sniff_subrating_res with the following parameters:
 - a. max_sniff_subrate = 4
 - b. max_sniff_subrate = 320
 - c. sniff_subrating_instant = at least 80 slots ahead of the current piconet clock but not more than 400 slots.

- Expected Outcome

Pass verdict

1. Mode change event has been observed with current mode = sniff from the Upper Tester
2. Sniff Subrate Event has been observed with the following parameters received by the Upper Tester.
 - a. Maximum_Transmit_Latency = 80 slots
 - b. Maximum_Receive_Latency = 80 slots
 - c. Minimum_Remote_Timeout = 320 slots
 - d. Minimum_Local_Timeout = 320 slots

- Notes

All the LMP transaction scenarios shown in the MSC are legal permutations but cannot be totally controlled by the Lower or Upper Testers. They are listed here for reference only.

4.7.22.6 LMP/LIH/BV-122-C [Entering Sniff Subrating Mode with IUT Initiating Sniff Mode Request]

- Test Purpose

Verify that IUT enters sniff subrating mode when the Lower Tester and IUT already have sniff subrating parameters (either just obtained from their hosts or from sniff subrating history) and the IUT initiates sniff mode request.

- Reference

[1] 4.5.3.3, 5.2

- Initial Condition

1. IUT may be the master or slave.
2. Lower Tester and IUT have a connection in active mode.
3. No ACL_U data are being exchanged.
4. Upper Tester issues a HCI_Sniff_Subrating command with the following parameters:
 - a. Maximum_Latency = 80 slots
 - b. Minimum_Remote_Timeout = 320 slots
 - c. Minimum_Local_Timeout = 320 slots
5. Lower Tester has the following parameters already,
 - a. Maximum_Latency = 80 slots
 - b. Minimum_Remote_Timeout = 320 slots
 - c. Minimum_Local_Timeout = 320 slots



- Test Procedure

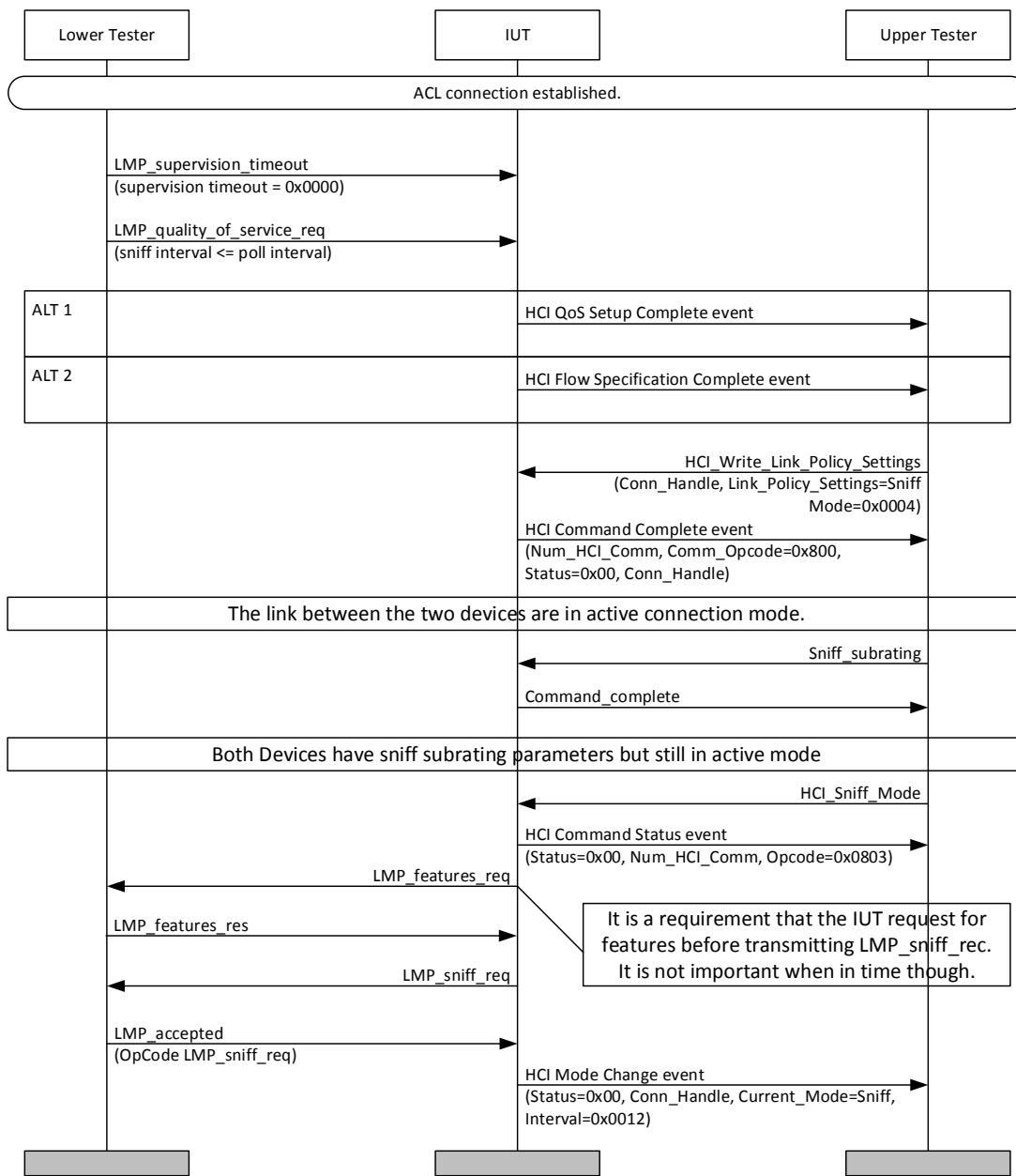


Figure 4.197: LMP/LIH/BV-122-C a



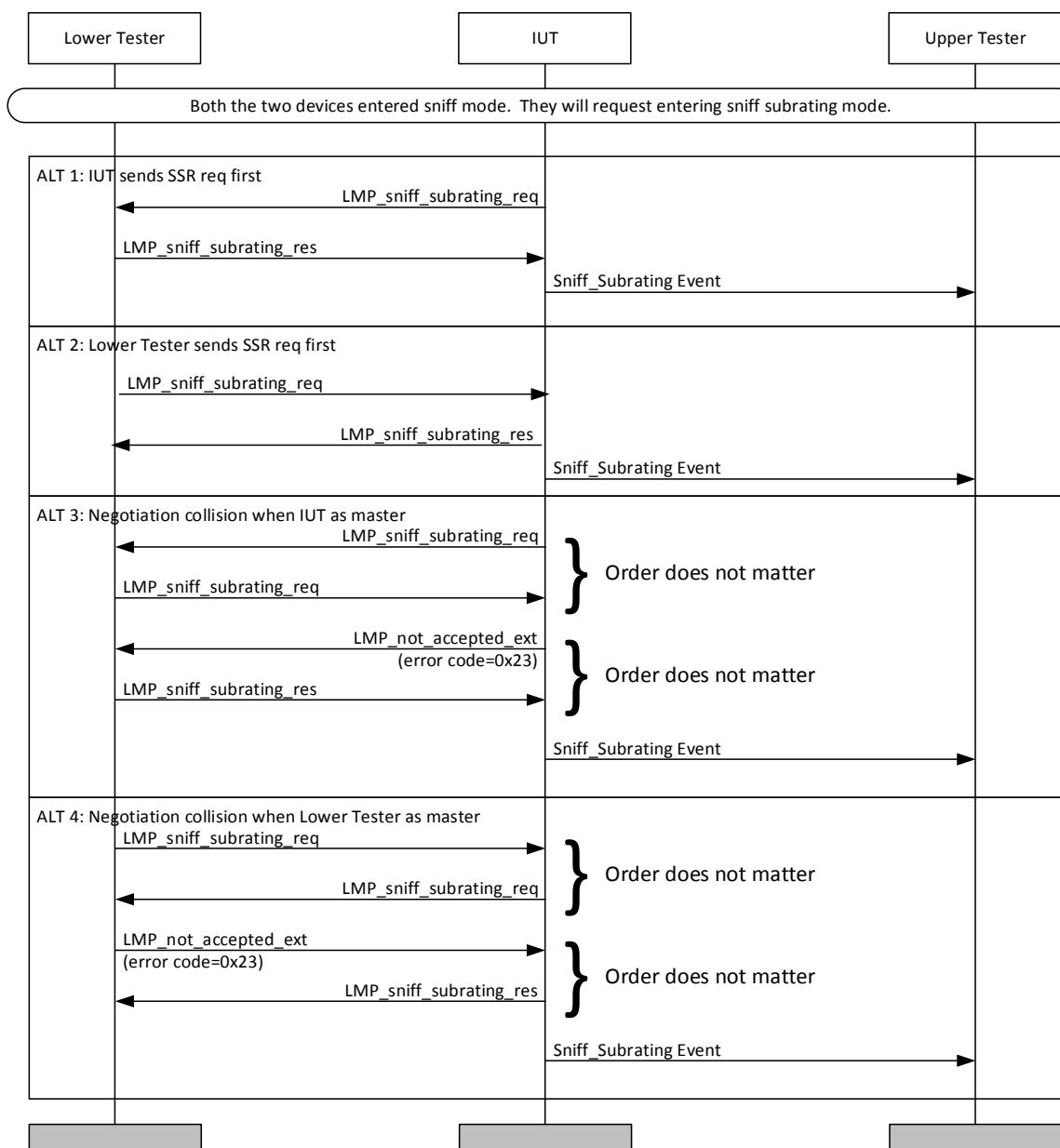


Figure 4.198: LMP/LIH/BV-122-C b

1. Upper Tester issues HCI_sniff_mode command with the following sniff parameters:
 - a. Max Sniff Interval = 20 slots
 - b. Min Sniff Interval = 20 slots
 - c. Sniff attempt = 1
 - d. Sniff timeout = 0
2. Lower Tester sends LMP_sniff_subrating_req or LMP_sniff_subrating_res with the following parameters already,
 - a. max_sniff_subrate = 4
 - b. min_sniff_mode_timeout = 320

- c. sniff_subrating_instant = at least 80 slots ahead of the current piconet clock but not more than 400 slots
 - Expected Outcome
- Pass verdict
1. Mode change event has been observed with current mode = SNIFF from the Upper Tester
 2. Sniff Subrating Event has been observed with the following parameters received by the Upper Tester.
 - a. Maximum_Transmit_Latency = 80 slots
 - b. Maximum_Receive_Latency = 80 slots
 - c. Minimum_Remote_Timeout = 320 slots
 - d. Minimum_Local_Timeout = 320 slots
- Notes

All the LMP transaction scenarios shown in the MSC are legal permutations but cannot be totally controlled by the Lower or Upper Testers. They are listed here for reference only.

4.7.22.7 LMP/LIH/BV-123-C [IUTs Transitioning from Existing Sniff Subrating Mode to A New Set of Subrating Parameters]

- Test Purpose

Verify that an IUT already in sniff subrating mode will transition to a new set of subrating parameters successfully.

- Reference

[1] 4.5.3.3, 5.2

- Initial Condition

1. The IUT is slave.
2. Lower Tester and IUT have a connection in sniff mode. The sniff parameters are
 - a. Tsniff = 20 slots
 - b. Sniff attempt = 1
 - c. Sniff timeout = 0.
3. Upper Tester issues an HCI_Sniff_Subrating command with the following parameters:
 - a. Maximum_Latency = 80 slots
 - b. Minimum_Remote_Timeout = 320 slots
 - c. Minimum_Local_Timeout = 320 slots
4. Lower Tester has the following parameters received from the IUT (IUT sends LMP_sniff_subrating_req with the following parameters):
 - a. max sniff substrate = 4
 - b. min sniff mode timeout = 320 slots



5. IUT has the following parameters received from the Lower Tester (Lower Tester sends LMP_sniff_subrating_res to the IUT):
 - a. max sniff substrate = 8
 - b. min sniff mode timeout = 160 slots
 - c. sniff_subrating_instant = at least 240 slots ahead of the current piconet clock but not more than 360 slots
6. Sniff Subrate Event has been observed by the Upper Tester with the following parameters:
 - a. Maximum_Transmit_Latency = 80 slots
 - b. Maximum_Receive_Latency = 160 slots
 - c. Minimum_Remote_Timeout = 320 slots
 - d. Minimum_Local_Timeout = 320 slots
7. No data is being exchanged between the two devices.

- Test Procedure

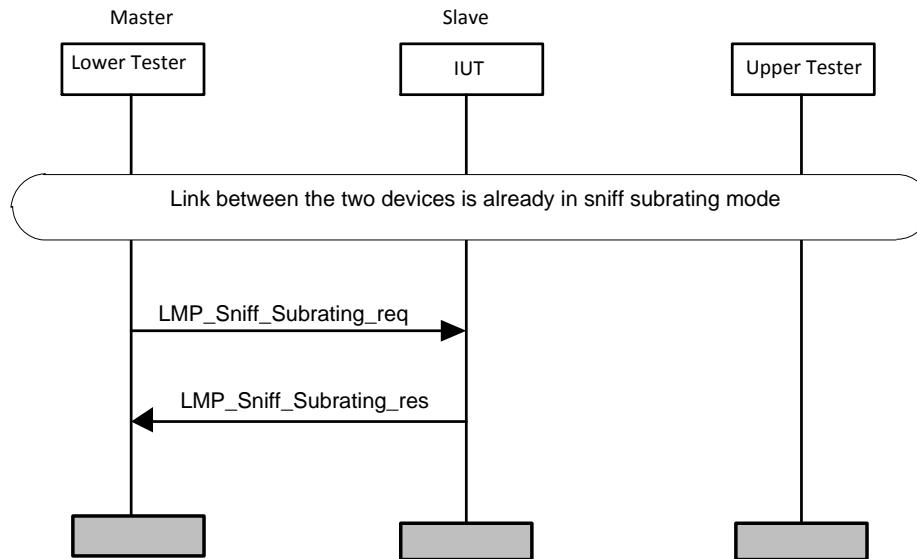


Figure 4.199: LMP/LIH/BV-123-C

1. The Lower Tester sends LMP_sniff_subrating_req to the IUT with the following parameters:
 - a. max sniff substrate = 12
 - b. min sniff mode timeout = 480 slots
 - c. sniff_subrating_instant = at least 480 slots ahead of the current piconet clock but not more than 960 slots
2. The IUT sends LMP_sniff_subrating_res with the following parameters (same parameters than the former negotiation)
 - a. max sniff substrate = 4
 - b. min sniff mode timeout = 320 slots



- Expected Outcome

Pass verdict

Sniff Subrate Event has been observed by the Upper Tester with the following parameters:

- Maximum_Transmit_Latency = 80 slots
- Maximum_Receive_Latency = 240 slots
- Minimum_Remote_Timeout = 320 slots
- Minimum_Local_Timeout = 480 slots

4.7.22.8 LMP/LIH/BV-124-C [Sniff Subrating Mode to Active Mode Transition Initiated By Lower Tester]

- Test Purpose

Verify that the IUT can transition from sniff subrating mode to active mode when the Lower Tester's host issues an Exit_Sniff command.

- Reference

[1] 4.5.3.3, 5.2

- Initial Condition

1. IUT is in a slave role.
2. A sniff subrating connection has been established between the Lower Tester and IUT as slave.
3. Upper Tester issues an HCI_Sniff_Subrating command with the following parameters:

- a. Maximum_Latency = 80 slots
- b. Minimum_Remote_Timeout = 320 slots
- c. Minimum_Local_Timeout = 320 slots

4. IUT sends LMP_sniff_subrating_req with the following parameters to the Lower Tester:

- a. max sniff subrate = 4
- b. min sniff mode timeout = 320 slots

5. Lower Tester sends LMP_sniff_subrating_res to the IUT with the following parameters (sniff subrating default values):

- a. max sniff subrate = 4
- b. min sniff mode timeout = 320 slots
- c. sniff_subrating_instant = at least 240 slots ahead of the current piconet clock but not more than 360 slots

6. Sniff Subrate Event has been observed with the following parameters received by the Upper Tester.

- a. Maximum_Transmit_Latency = 80 slots
- b. Maximum_Receive_Latency = 80 slots
- c. Minimum_Remote_Timeout = 320 slots
- d. Minimum_Local_Timeout = 320 slots



- Test Procedure

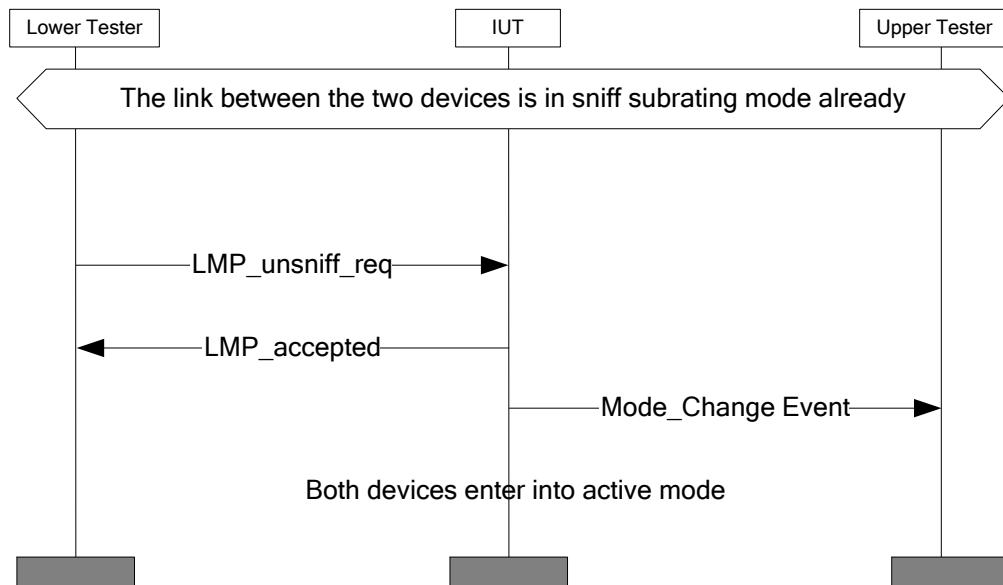


Figure 4.200: LMP/LIH/BV-124-C

Lower Tester sends an LMP_unsniff_req command and the link is out of sniff subrating mode.

- Expected Outcome

Pass verdict

Mode Change Event (ACTIVE) has been observed by the Upper Tester.

4.7.22.9 LMP/LIH/BV-125-C [Sniff Subrating Mode to Active Mode Transition Initiated By IUT]

- Test Purpose

Verify that the IUT can transition from sniff subrating mode to active mode when the Upper Tester issues an Exit_Sniff command.

- Reference

[1] 4.5.3.3, 5.2

- Initial Condition

1. IUT is a slave.
2. A sniff subrating connection has been established between Lower Tester and IUT as slave.
3. Upper Tester issues an HCI_Sniff_Subrating command with the following parameters:
 - a. Maximum_Latency = 80 slots
 - b. Minimum_Remote_Timeout = 320 slots
 - c. Minimum_Local_Timeout = 320 slots
4. IUT sends LMP_sniff_subrating_req with the following parameters to the Lower Tester.
 - a. max sniff subrate = 4
 - b. min sniff mode timeout = 320 slots



5. Lower Tester sends LMP_sniff_subrating_res to the IUT with the following parameters (sniff subrating default values):
 - a. max sniff substrate = 4
 - b. min sniff mode timeout = 320 slots
 - c. sniff_subrating_instant = at least 240 slots ahead of the current piconet clock but not more than 360 slots
 6. Sniff Subrate Event has been observed with the following parameters received by the Upper Tester.
 - a. Maximum_Transmit_Latency = 80 slots
 - b. Maximum_Receive_Latency = 80 slots
 - c. Minimum_Remote_Timeout = 320 slots
 - d. Minimum_Local_Timeout = 320 slots
- Test Procedure

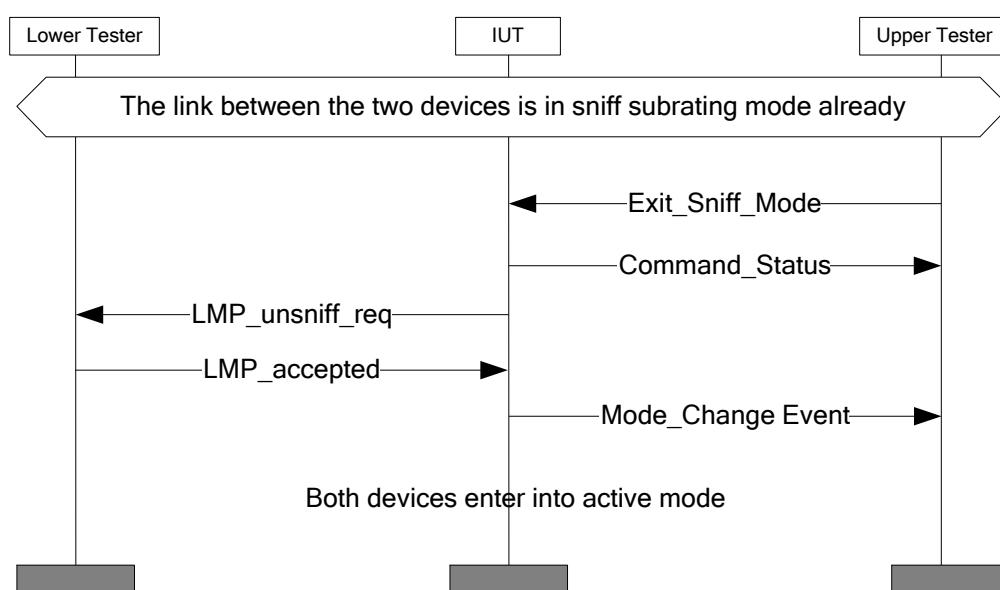


Figure 4.201: LMP/LIH/BV-125C

Upper Tester issues an unsniff command.

- Expected Outcome

Pass verdict

Mode Change Event (ACTIVE) has been observed by the Upper Tester.

4.7.23 Control of Multi-slot Packets - Slave

- Test subgroup objectives:

To verify that a unit can request for a maximum of slots that to be used. The IUT is slave.



4.7.23.1 LMP/LIH/BV-61-C [Request Maximum Slots as Slave]

- Test Purpose

Verify that the IUT can request and accept a maximum number of slots. The IUT is slave and initiates the service. The Lower Tester is master.

- Reference

[1] 4.1.10

- Initial Condition

See Default Settings.

DM1 up and running.



- Test Procedure

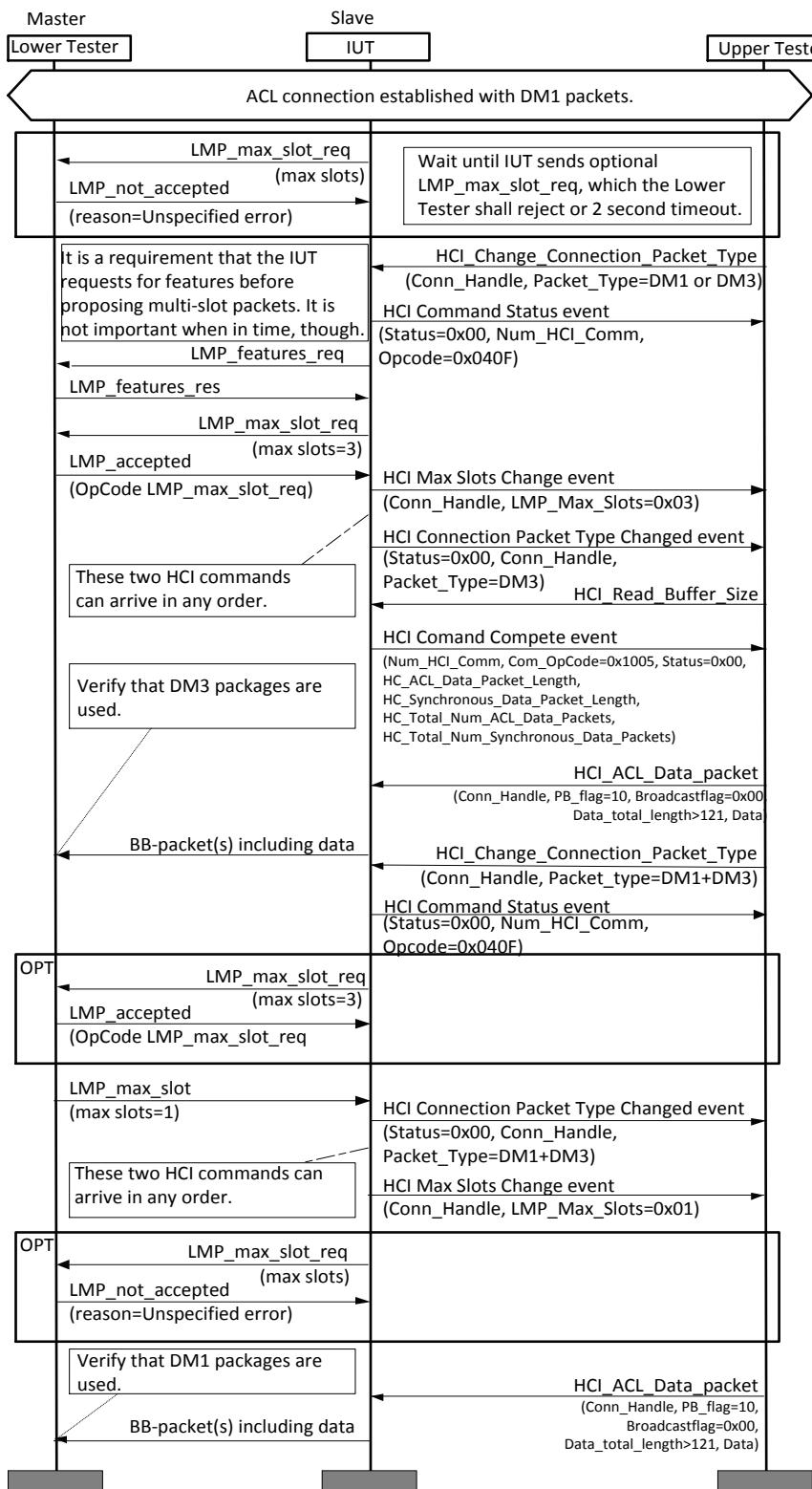


Figure 4.202: LMP/LIH/BV-61-C

Verify that the indicated packages are used.



- Expected Outcome

Pass verdict

The IUT uses DM3 packages after reception of PDU LMP_accepted.

The IUT accepts reception of PDU LMP_max_slot and changes to DM1 packages.

- Notes

If DM3 packages are not supported by the IUT they have to be replaced with DH3 or DM5 or DH5.

4.7.23.2 LMP/LIH/BV-63-C [Accept Maximum Slot Request]

- Test Purpose

Verify that the IUT can accept a request to use a maximum number of slots. The IUT is slave. The Lower Tester is master and initiates the service.

- Reference

[1] 4.1.10

- Initial Condition

See [Default Settings](#).

DM1 up and running.



- Test Procedure

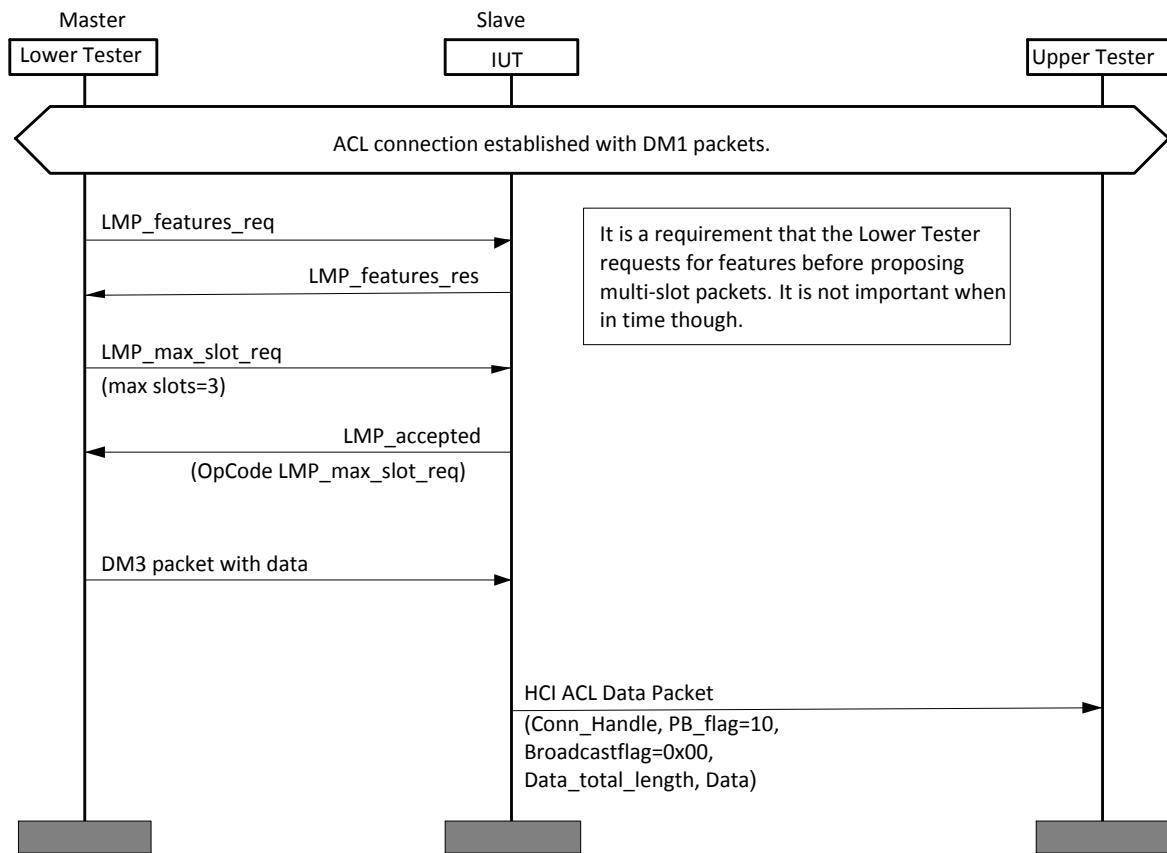


Figure 4.203: LMP/LIH/BV-63-C

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted upon reception of LMP_max_slot_req.

The IUT transmits a HCI ACL Data Packet to the Upper Tester.

- Notes

If DM3 packages are not supported by the IUT they have to be replaced with DH3 or DM5 or DH5.

4.7.24 Control of Multi-slot Packets - Master

- Test subgroup objectives:

To verify that a unit can request for a maximum of slots that to be used. The IUT is master.

4.7.24.1 LMP/LIH/BV-64-C [Request Maximum Slots as Master]

- Test Purpose

Verify that the IUT can request and accept a maximum number of slots. The IUT is master and initiates the service. The Lower Tester is slave.



- Reference

[1] 4.1.10

- Initial Condition

See [Default Settings](#).

DM1 up and running.

The IUT must page the Lower Tester to become the master of the Piconet.



- Test Procedure

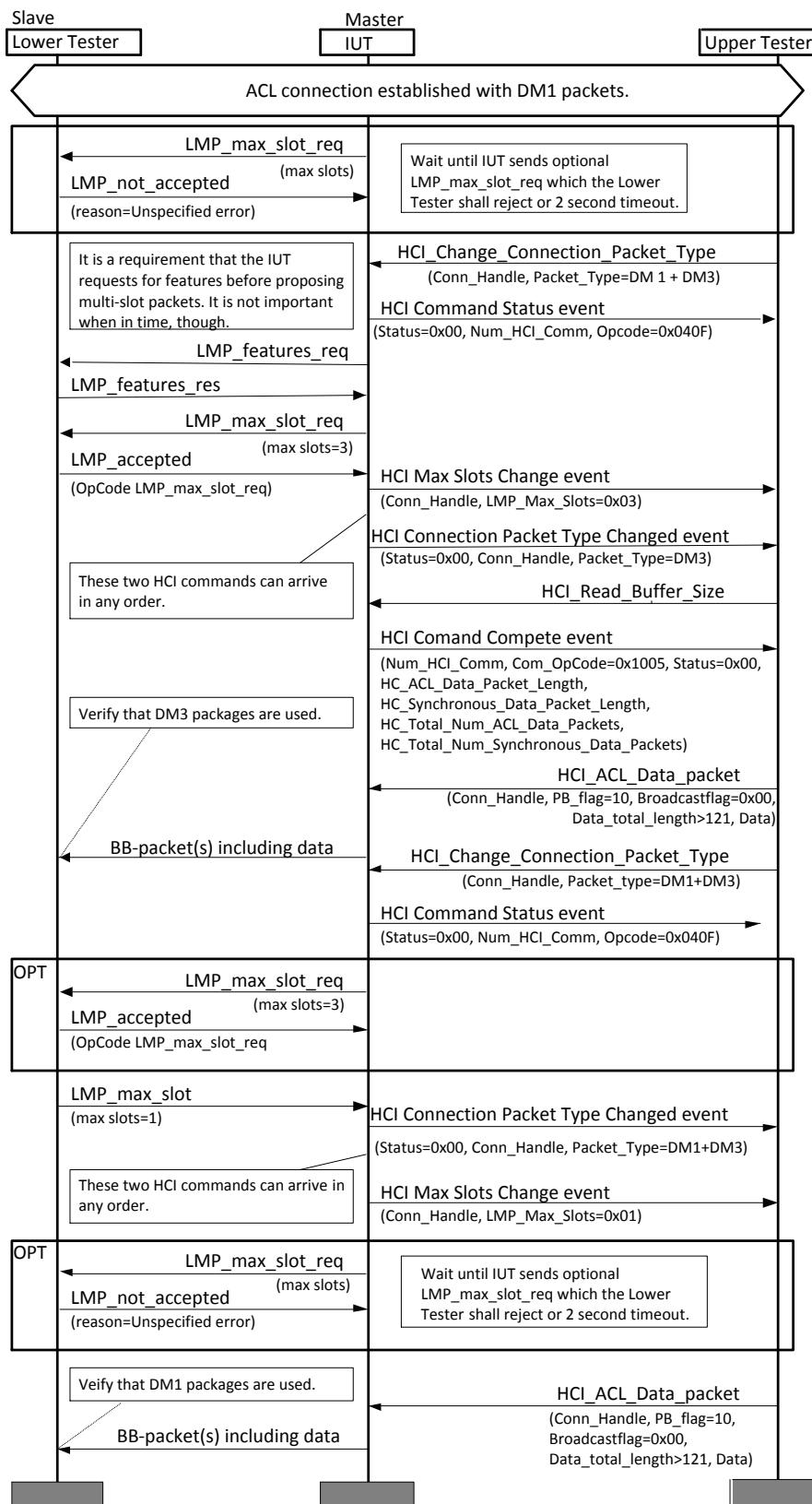


Figure 4.204: LMP/LIH/BV-64-C



Verify that the indicated packages are used.

- Test Condition

It must be possible to control the IUT to initiate the control of multislots packages.

- Expected Outcome

Pass verdict

The IUT uses DM1 or DM3 packages after reception of PDU LMP_accepted.

The IUT accepts PDU LMP_max_slot and changes to DM1 packages.

- Notes

If DM3 packages are not supported by the IUT they have to be replaced with DH3 or DM5 or DH5.

4.7.25 Paging Scheme - Both Master and Slave

- Test subgroup objectives:

To verify that the IUT declines the Paging scheme changes in a correct manner. The role of the IUT is of no importance.

4.7.25.1 LMP/LIH/BV-71-C [Reject Page Mode Negotiation]

- Test Purpose

Verify that the IUT responds to the Lower Tester that it does not support to negotiate the paging scheme, when the Lower Tester tries to negotiate the page mode.

- Reference

[1] 4.1.9.1

- Initial Condition

See [Default Settings](#).



- Test Procedure

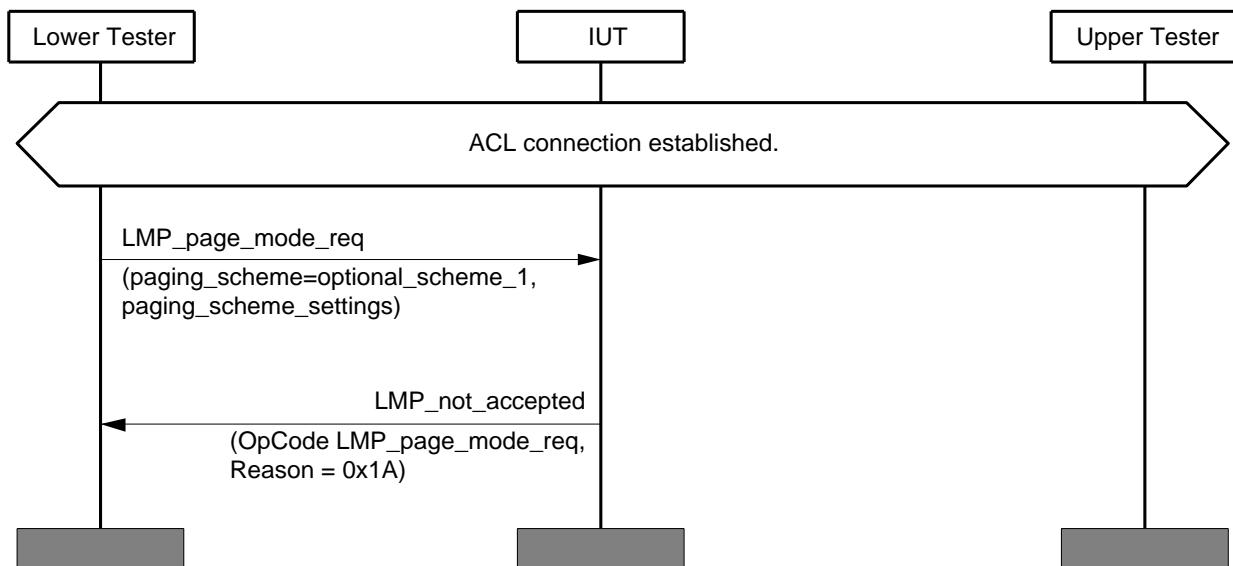


Figure 4.205: LMP/LIH/BV-71-C

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_not_accepted containing “Reason = 0x1A” upon reception of LMP_page_mode_req.

4.7.25.2 LMP/LIH/BV-72-C [Reject Page Scan Negotiation]

- Test Purpose

Verify that the IUT responds to the Lower Tester that it does not support to negotiate the paging scheme, when the Lower Tester tries to negotiate the page scan mode.

- Reference

[1] 4.1.9.2

- Initial Condition

See [Default Settings](#).



- Test Procedure

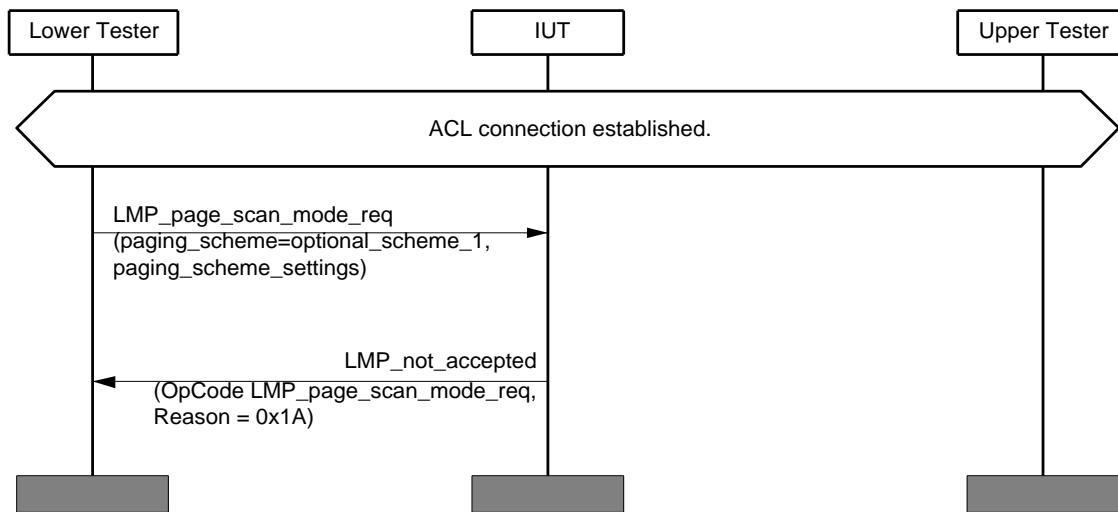


Figure 4.206: LMP/LIH/BV-72-C

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_not_accepted containing “Reason = 0x1A” upon reception of PDU LMP_page_scan_mode_req.

4.7.26 Link Supervision - Slave

- Test subgroup objectives:

To verify that you can set the supervision timeout for the IUT. The IUT is slave.

4.7.26.1 LMP/LIH/BV-73-C [Set Supervision Timer as Slave]

- Test Purpose

Verify that the IUT sets the supervision timer upon notice from the Lower Tester. The IUT is slave.
The Lower Tester is master.

- Reference

[1] 4.1.6

- Initial Condition

See [Default Settings](#).



- Test Procedure

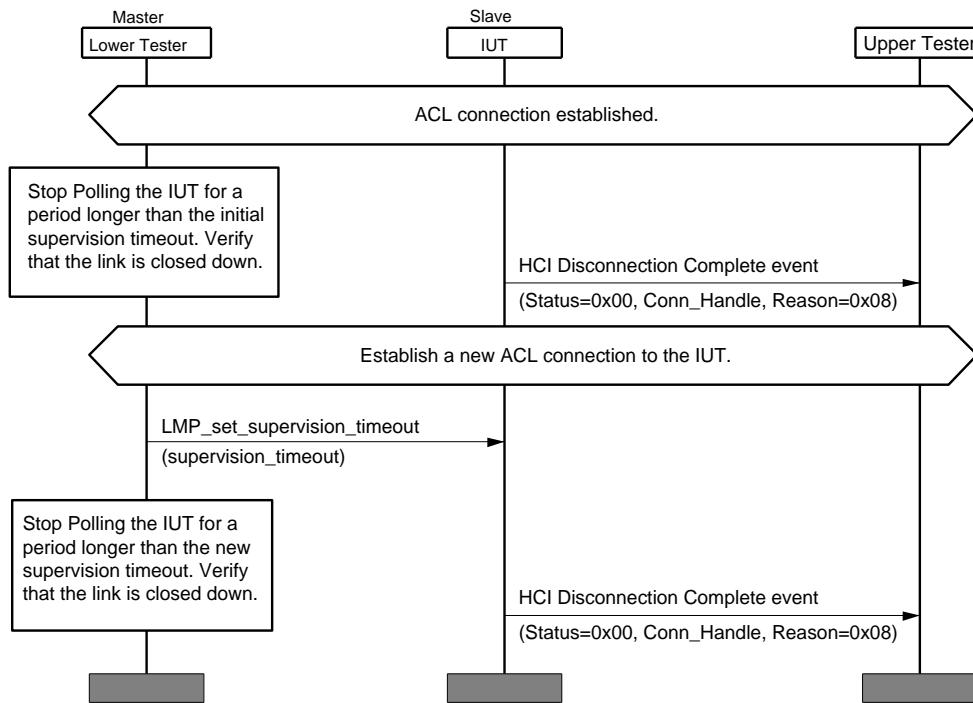


Figure 4.207: LMP/LIH/BV-73-C

- Expected Outcome

Pass verdict

The IUT closes down the connection after expiration of the supervision timeout and changes the supervision timeout upon notice from the Lower Tester and closes the connection after the changed timer expires.

4.7.27 Link Supervision

- Test subgroup objectives:

To verify that the IUT can set the supervision timeout. The IUT is master.

4.7.27.1 LMP/LIH/BV-74-C [Set Supervision Timer as Master]

- Test Purpose

Verify that the IUT sets the supervision timer. The IUT is master. The Lower Tester is slave.

- Reference

[1] 4.1.6

- Initial Condition

See [Default Settings](#).

The IUT has to page the Lower Tester to become the master of the Piconet.



- Test Procedure

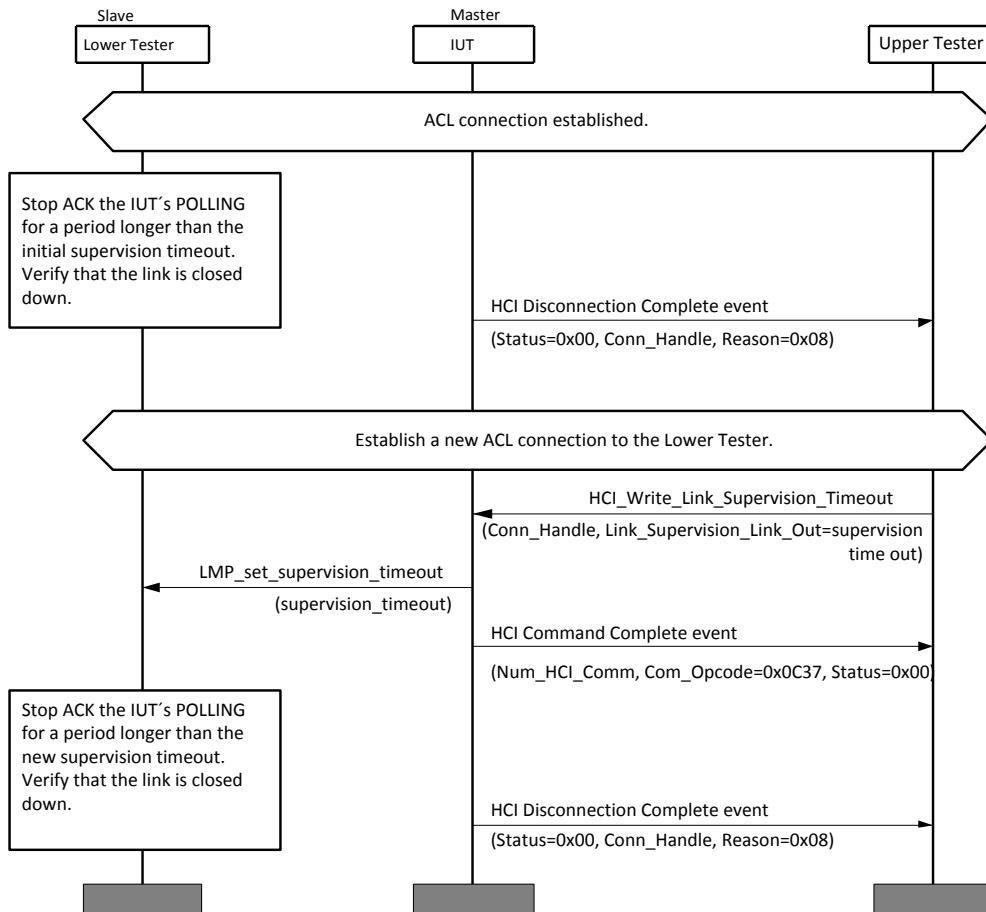


Figure 4.208: LMP/LIH/BV-74-C

- Expected Outcome

Pass verdict

The IUT closes down the connection after expiration of the supervision timeout and can change the supervision timeout and closes the connection after the changed timer expires.

4.7.27.2 LMP/LIH/BV-126-C [Set Supervision Timer as Slave]

- Test Purpose

Verify that the IUT sends an LSTO event to the Host when the event mask is enabled and when the master sends a link supervision timeout. The IUT is slave. The Lower Tester is master.

- Reference

[1] 4.1.6

- Initial Condition

Enable LSTO Event in the Event mask on IUT device - IUT (slave) and the Lower Tester (master).



IUT is a slave in a connection with the Lower Tester

See [Default Settings](#).

- Test Procedure

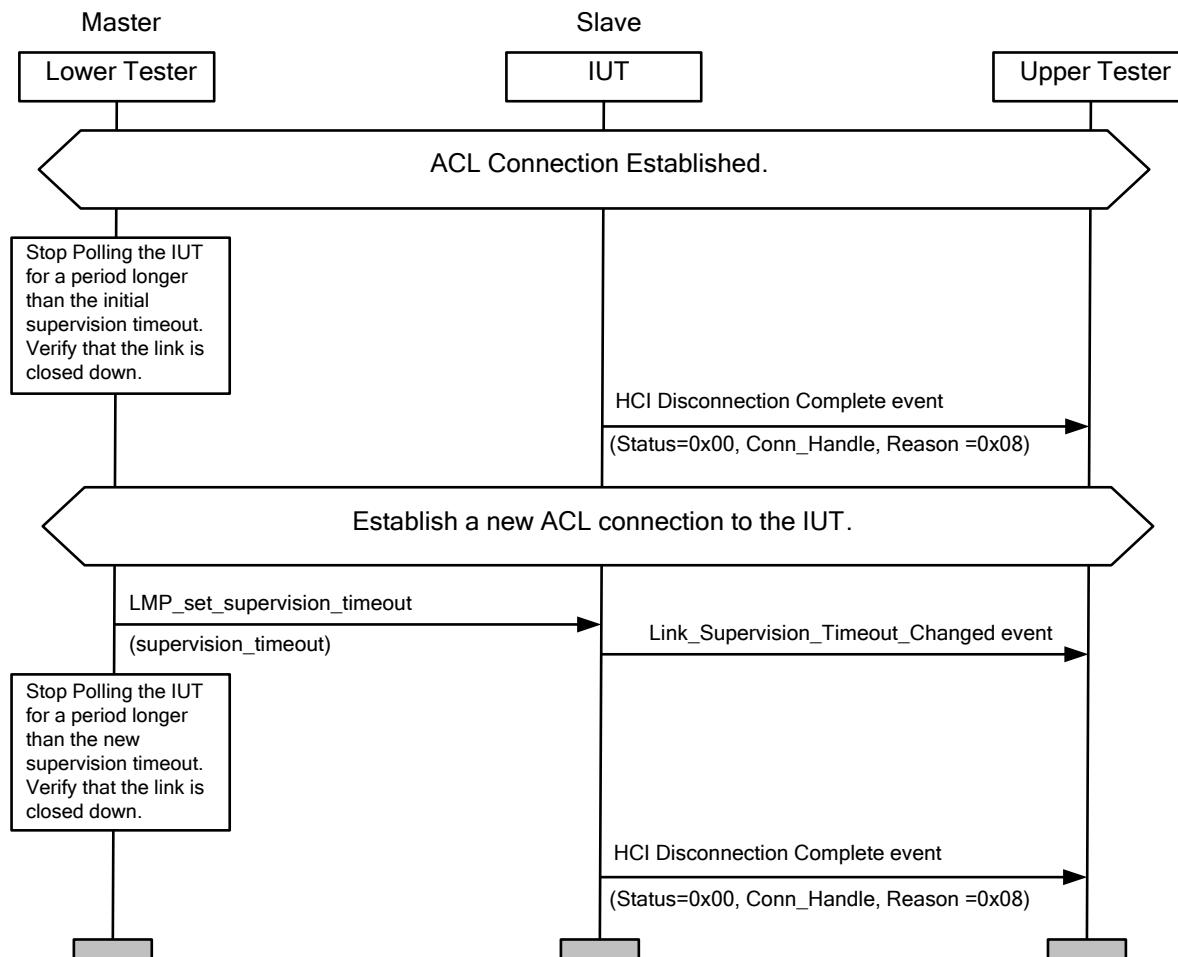


Figure 4.209: LMP/LIH/BV-126-C

The Lower Tester shall change its link_supervision_timeout value (new value = old value + 5 seconds)

The Upper Tester verifies that an HCI event is generated by the IUT after the LMP is sent from the Lower Tester. The HCI event shall contain the new timeout value.

- Expected Outcome

Pass verdict

Upper Tester receives HCI_LSTO_Event generated by IUT and the content of the new timeout is as specified by the master.

The IUT closes down the connection after expiration of the supervision timeout and changes the supervision timeout upon notice from the Lower Tester and closes the connection after the changed timer expires.



4.7.28 Deadlock Avoidance

- Test subgroup objectives:

To verify that a unit does not run into a deadlock situation.

4.7.28.1 LMP/LIH/BV-80-C [Avoid Deadlock as Master]

- Test Purpose

Verify that the IUT does not create a deadlock situation during ACL connection set-up. The IUT is master.

- Reference

[1] 2.7, 4.3.4

- Initial Condition

See [Default Settings](#).

- Test Procedure

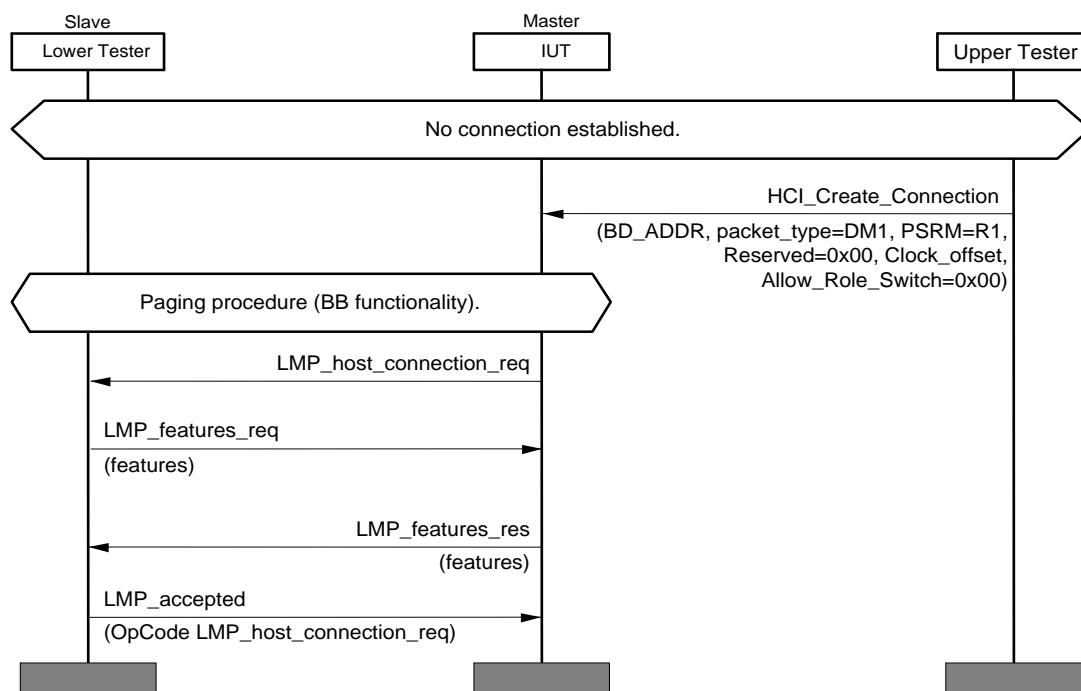


Figure 4.210: LMP/LIH/BV-80-C

- Expected Outcome

Pass verdict

The IUT transmits LMP_features_res before receiving LMP_accepted.



4.7.28.2 LMP/LIH/BV-81-C [Avoid Deadlock as Slave]

- **Test Purpose**

Verify that the IUT does not create a deadlock situation on an active ACL connection. The IUT is slave.

- **Reference**

[1] 2.7, 4.3.4

- **Initial Condition**

See [Default Settings](#).

- **Test Procedure**

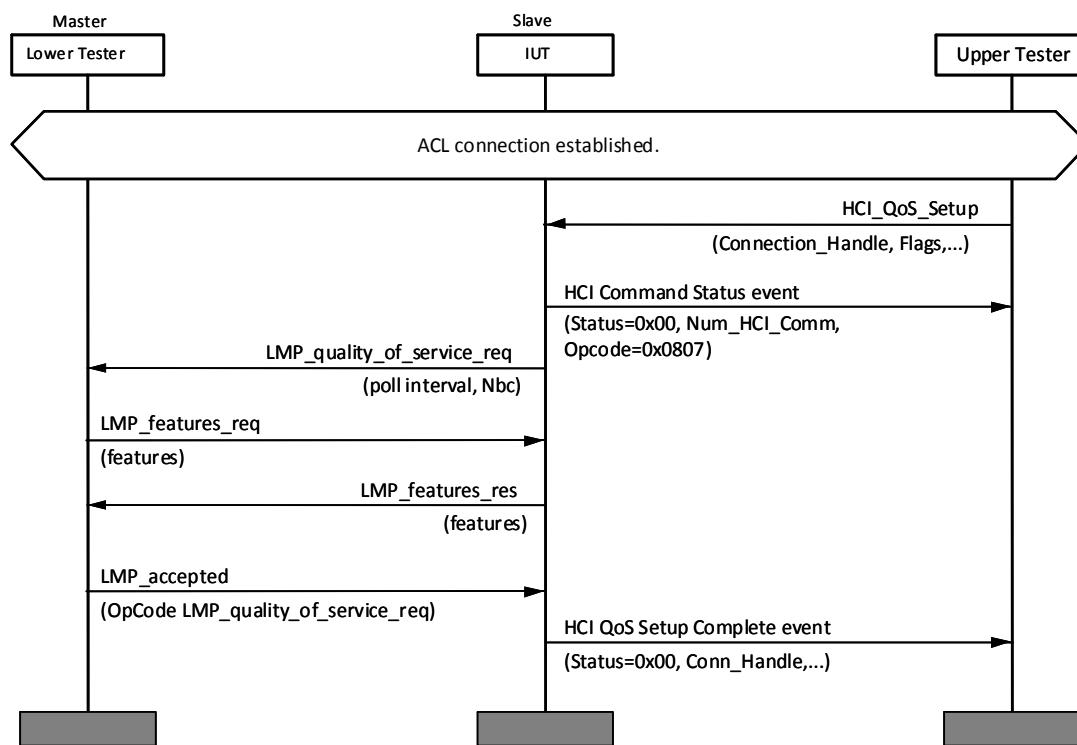


Figure 4.211: LMP/LIH/BV-81-C

- **Test Condition**

IUT statement gives IUT possible parameter values for HCI_QoS_Setup.

- **Expected Outcome**

Pass verdict

The IUT transmits LMP_features_res before receiving LMP_accepted.

The IUT sends HCI QoS Setup Complete event with Status = Success.



4.7.29 Test for Devices that do not Support Enhanced Data Rate

- Test subgroup objectives:

To verify that the devices that do not support Enhanced Data Rate do not accept Enhanced Data Rate initiation.

4.7.29.1 LMP/LIH/BV-83-C [Test for Devices that do not support Enhanced Data Rate]

- Test Purpose

Verify that the IUT does not set up an EDR ACL link upon request from the Lower Tester. Verify that the correct EDR ACL setup denial is used. IUT is slave. The Lower Tester is master and initiates the service.

Test is for devices that do not support Enhanced Data Rate ACL.

- Reference

[1] 4.1.11

- Initial Condition

See [Default Settings](#).

ACL link up and running, see [Preamble MSC](#).



- Test Procedure

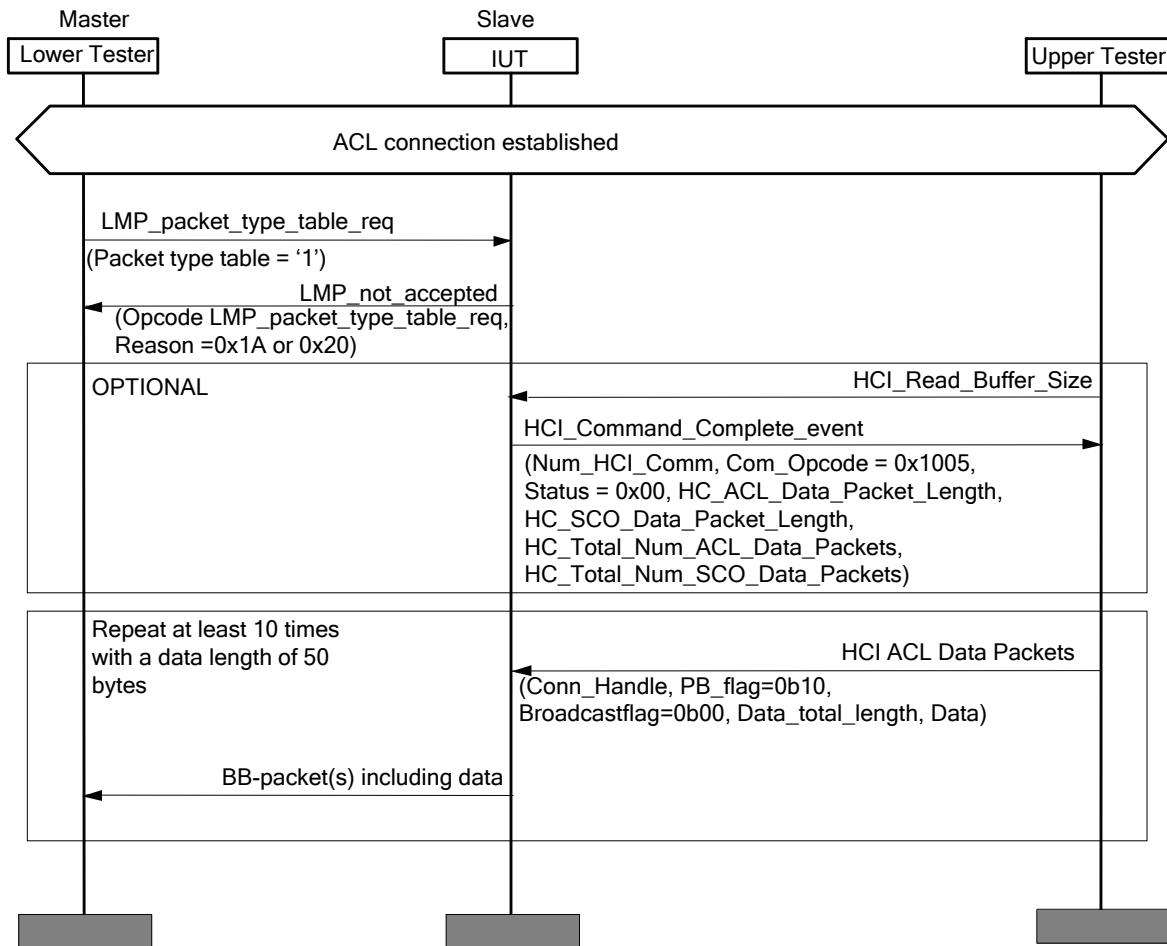


Figure 4.212: LMP/LIH/BV-83-C

- Expected Outcome

Pass verdict

The IUT transmits the PDU LMP_not_accepted containing “Unsupported LMP Feature Reason=0x1A” or “Unsupported LMP Parameter Reason=0x20” upon reception of PDU LMP_packet_type_table_req.

4.7.30 Setting up and Removing Enhanced Data Rate ACL connection

- Test subgroup objectives:

To verify that the unit can initiate and remove an Enhanced Data Rate ACL link. The IUT is slave

To test the behavior of the IUT in relation to syntactically and contextual correct behavior of the test system

4.7.30.1 LMP/LIH/BV-84-C [EDR ACL Link Set Up]

- Test Purpose

Verify that the IUT sets up an EDR ACL link upon request from the Lower Tester. Verify that the correct EDR ACL setup is used. IUT is slave. The Lower Tester is master and initiates the service.



Test is for devices that support Enhanced Data Rate ACL.

- Reference

[1] 4.1.11

- Initial Condition

See [Default Settings](#).

ACL link up and running See Preamble MSC in [Connection Establishment Lower Tester](#).

- Test Procedure

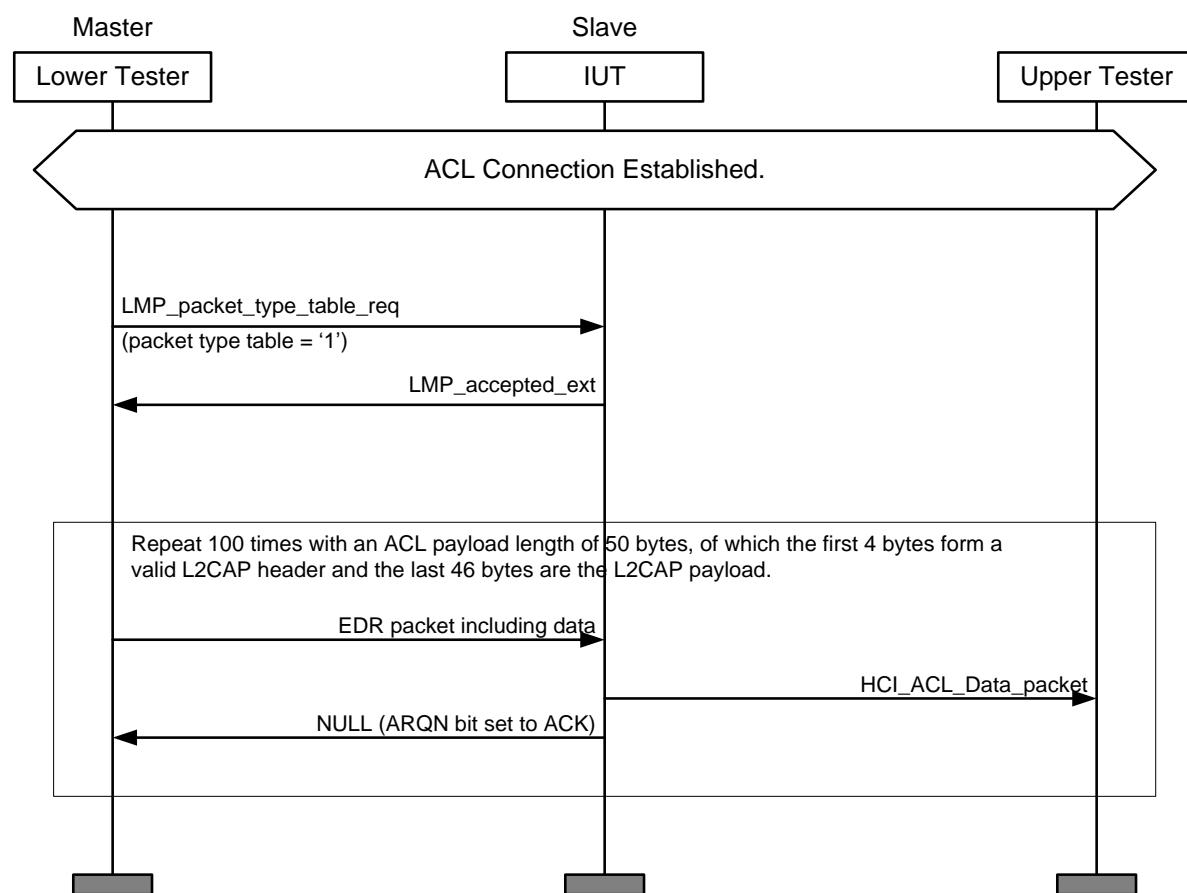


Figure 4.213: LMP/LIH/BV-84-C

- Expected Outcome

Pass verdict

The IUT accepts LMP_packet_type_table_req with LMP_accepted_ext. At least 90% of the EDR ACL packets are acknowledged and transferred to the Upper Tester.

- Notes

IUT may substitute a DM1 packet for any or all of the NULL packets shown in the MSC.



4.7.30.2 LMP/LIH/BV-85-C [EDR ACL Link Remove]

- Test Purpose

Verify that the IUT configured as slave, upon reception of an EDR packet including data, can either send a NAK or not answer. The Lower Tester is master and initiates the service.

Test is for devices that support Enhanced Data Rate ACL.

- Reference

[1] 4.1.11

- Initial Condition

See [Default Settings](#).

EDR ACL link up and running, See Preamble MSC in [Connection Establishment Lower Tester](#).

- Test Procedure

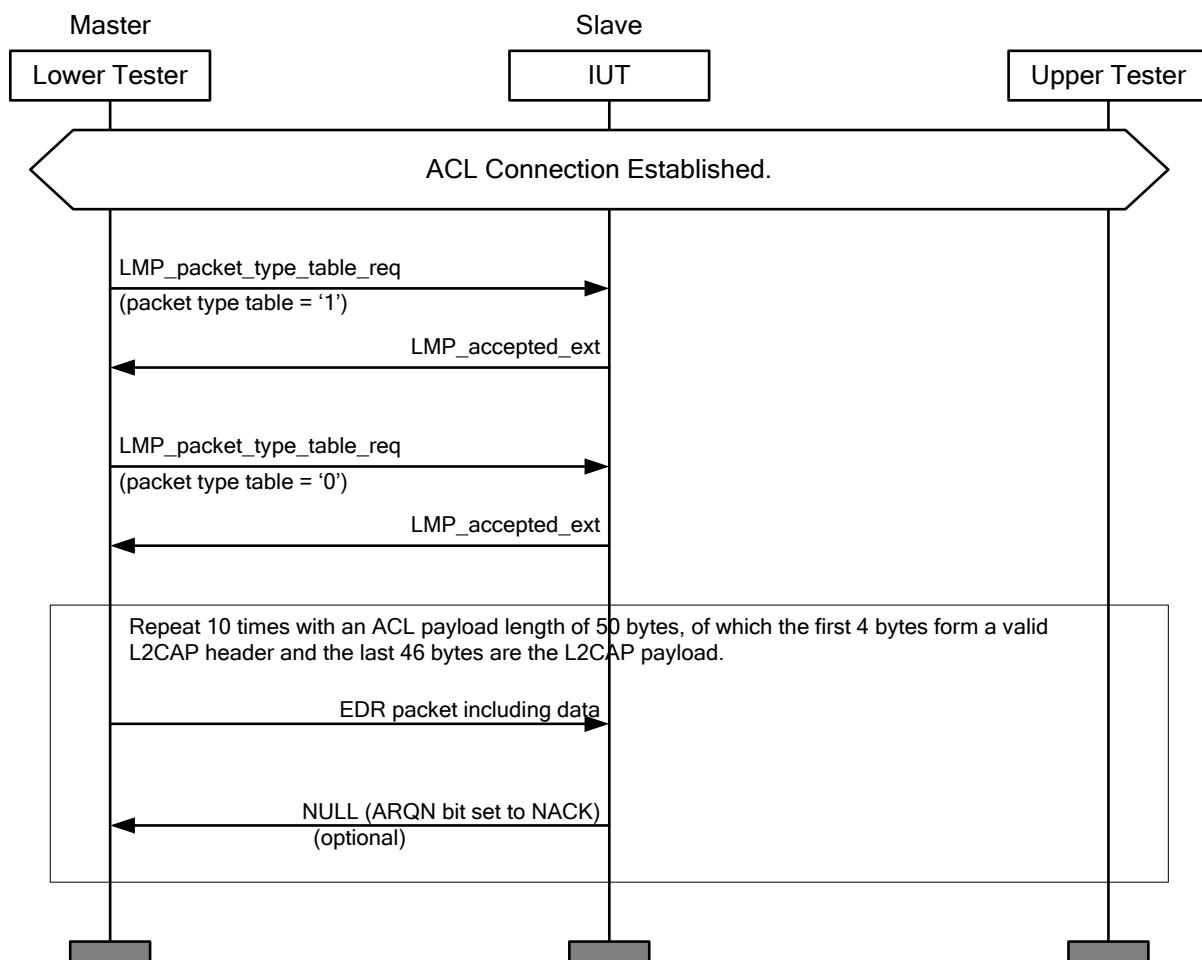


Figure 4.214: LMP/LIH/BV-85-C



- Expected Outcome

Pass verdict

The IUT accepts LMP_packet_type_table_req (with ptt='1') with LMP_accepted_ext. The IUT accepts LMP_packet_type_table_req (with ptt='0') with LMP_accepted_ext. Each EDR data packet is negatively acknowledged (explicitly or implicitly), and none is delivered to the Upper Tester.

- Notes

IUT may substitute a DM1 packet for any or all of the NULL packets shown in the MSC. Alternately, the IUT may send no packet at all in response to any or all of the NULL packets.

4.7.31 Setting Enhanced Data Rate eSCO Connection

- Test subgroup objectives:

To verify that the unit can initiate and remove an eSCO link.

4.7.31.1 LMP/LIH/BV-86-C [EDR 2-EV3 eSCO Link Setup]

- Test Purpose

Verify that the IUT sets up an Enhanced Data Rate 2-EV3 eSCO link upon request from the Lower Tester. Verify that the correct Enhanced Data Rate eSCO setup is used. IUT is slave. The Lower Tester is master and initiates the service.

Test is for devices that support Enhanced Data Rate eSCO.

- Reference

[1] 4.6.2

- Initial Condition

See [Default Settings](#).

ACL link up and running,

- Test Procedure

Verify that 2-EV3 packets are transmitted at the eSCO instants and retransmitted inside the retransmission window.



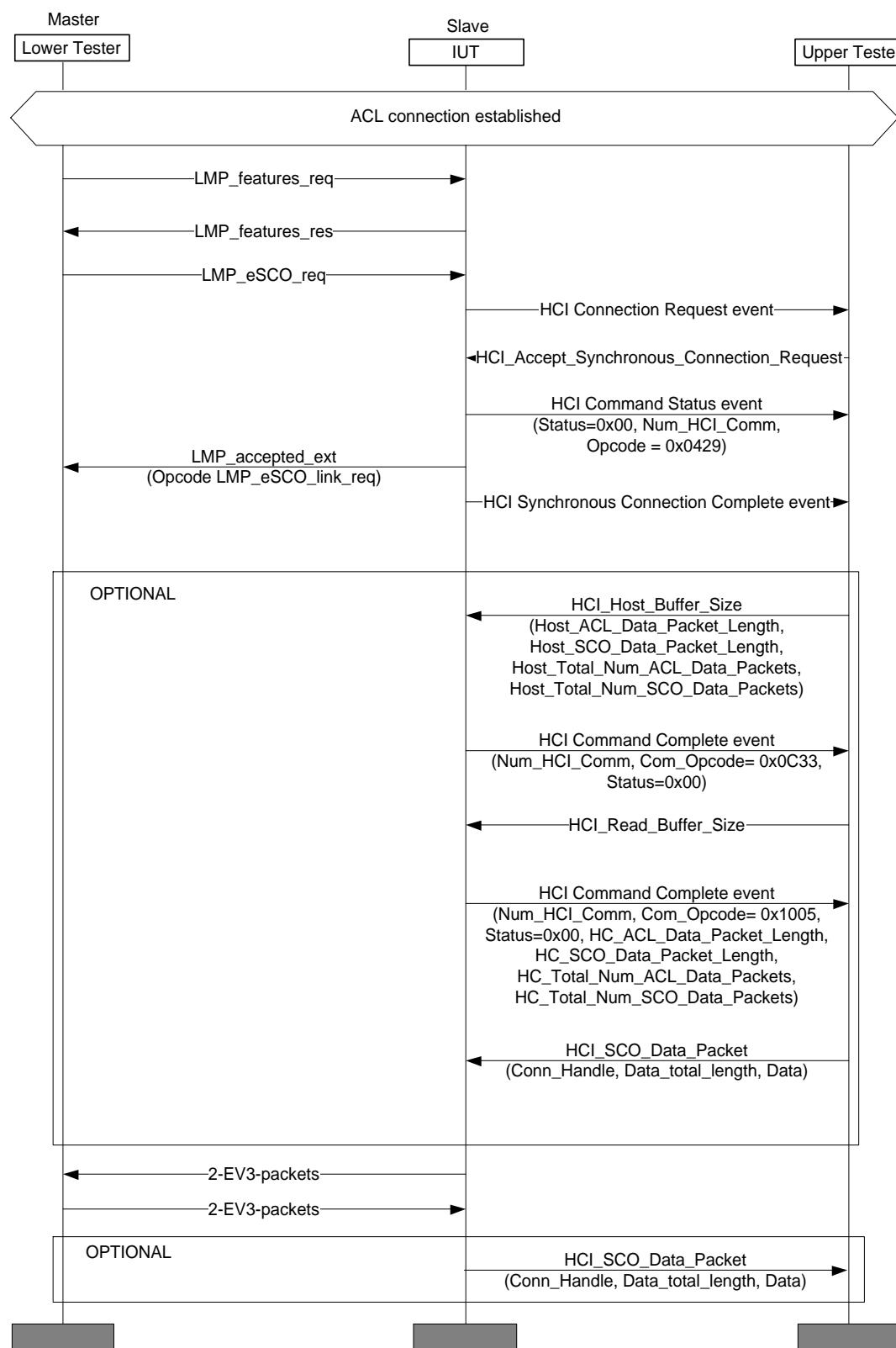


Figure 4.215: LMP/LIH/BV-86-C



2Mbps mode setup:

- The LMP_eSCO_link_req shall have the following content:
- eSCO handle: Any valid number
- eSCO LT_ADDR: Any valid number
- Timing control flags: Derived from master clock
- Desco: Any number in the range [0, Tesco - 2]
- Tesco: 12 slots
- Wesco: 2 slots
- Packet type M→S: 2-EV3
- Packet type S→M: 2-EV3
- Packet length M→S: 60 bytes
- Packet length S→M: 60 bytes
- Air mode: Any supported air mode
- Negotiation Flag: Initiate Negotiation

Verify that the indicated packets are used.

- Test Condition

The need to have HCI_Synchronous_Data packets to generate EV packets should be declared as IXIT. However, payload content is not verified.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted_ext upon reception of PDU LMP_eSCO_link_req. An eSCO links is established accordingly, and the negotiated eSCO packets are transmitted.

4.7.31.2 LMP/LIH/BV-87-C [EDR eSCO Link Remove]

- Test Purpose

Verify that the IUT accepts a request from the Lower Tester to remove the Enhanced Data Rate eSCO link.

- Reference

[1] 4.6.2

- Initial Condition

See [Default Settings](#).

[LMP/LIH/BV-86-C \[EDR 2-EV3 eSCO Link Setup\]](#)



- Test Procedure

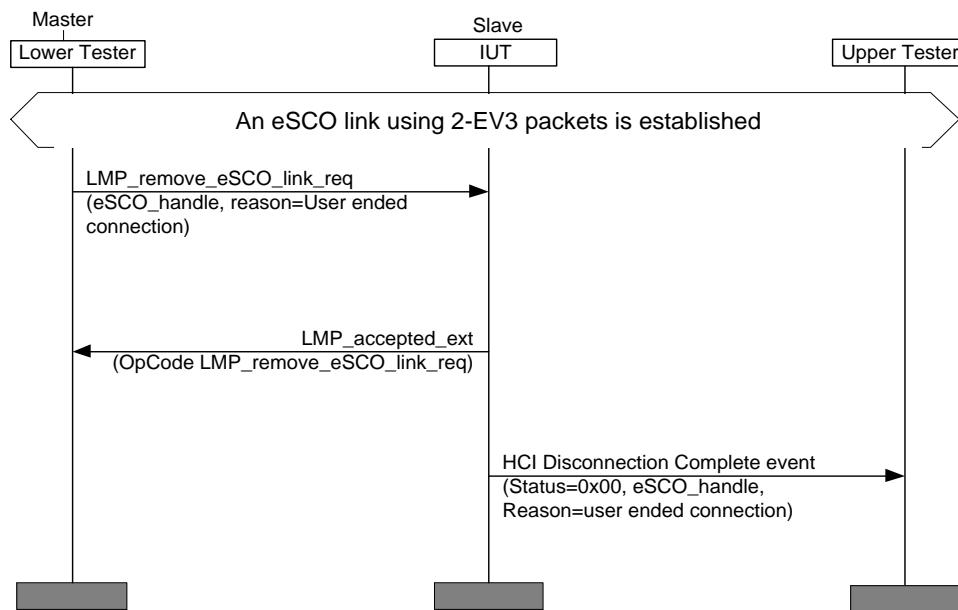


Figure 4.216: LMP/LIH/BV-87C

The LMP_remove_eSCO_link shall have the following content:

- eSCO handle: The handle of the current eSCO link
- Reason: 0x13 User ended connection

Verify that the eSCO link is removed.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted_ext upon reception of PDU LMP_remove_eSCO_link_req. The eSCO link must be closed, and the negotiated eSCO packets are not transmitted.

4.8 Test Modes

- Test group objectives:

To verify the correct implementation of the Test Modes services.

4.8.1 Enabled Mode - Slave

- Test subgroup objectives:

To verify that the IUT rejects a request to be put into Test Mode if not in enabled mode. The IUT is slave.

4.8.1.1 LMP/TEM/BV-01-C [Reject Test Mode Request]

- Test Purpose

Verify that the IUT rejects the request from the Lower Tester to be put into Test Mode. The IUT is slave and is not in enabled mode. The Lower Tester is master.



- Reference
[1] 4.7.1, 4.7.2.

- Initial Condition

See [Default Settings](#).

- Test Procedure

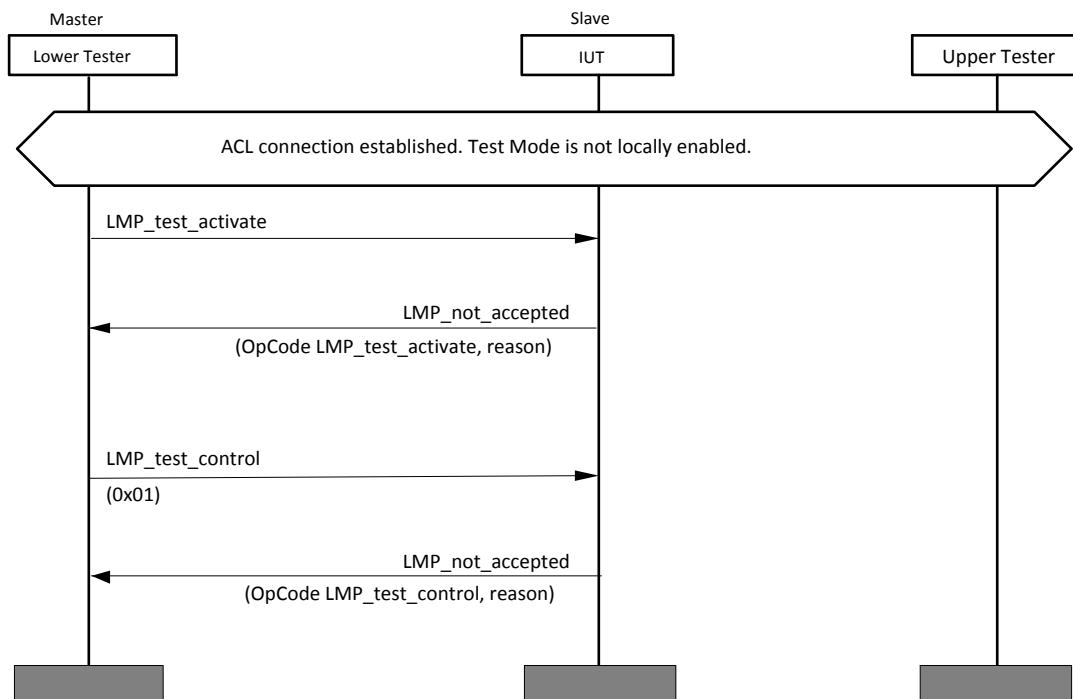


Figure 4.217: LMP/TEM/BV-01-C

- Test Condition

The IUT must not be in enabled Test Mode.

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_not_accepted upon reception of PDU LMP_test_activate.

The IUT must not enter Test Mode.

4.9 Adaptive Frequency Hopping

4.9.1 Adaptive Frequency Hopping Test Cases

4.9.1.1 LMP/AFH/BV-01-C [AFH Enable – Slave]

- Test Purpose

Verify that the IUT switches from AFH disabled (normal operation) to AFH enabled after the switch instant. The IUT is slave. The Lower Tester is master and initiates the AFH switch.



- Reference

[1] 4.1.4

- Initial Conditions

See [Default Settings](#).

The Lower Tester and the IUT are in a normal connected state.

The Lower Tester is the master and the IUT is a slave.

The IUT is in an AFH disabled state.

- Test Procedure

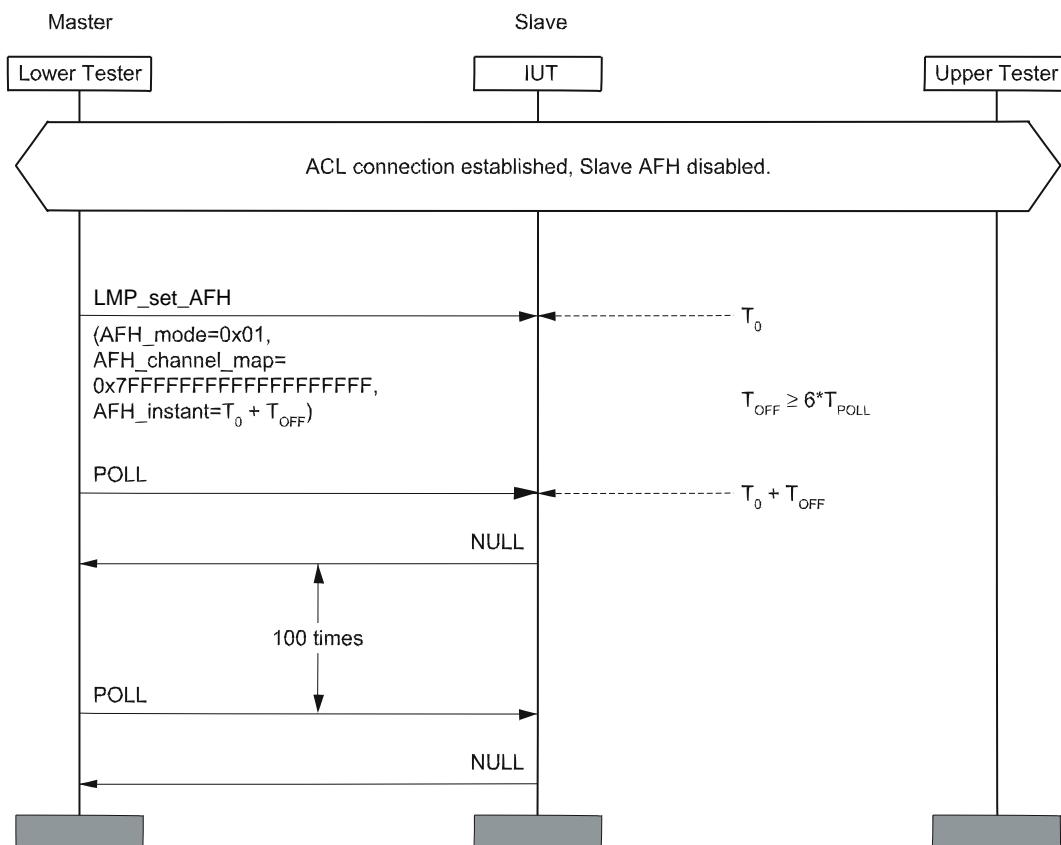


Figure 4.218: LMP/AFH/BV-01-C

The Lower Tester sends the IUT an LMP_set_AFH command specifying AFH_mode = AFH_enabled, the AFH_channel_map = AHS(79), and a switch instant, THS.

Each 1-bit field in the AFH channel map shall be set to 1, to indicate all channels are good.

The switch instant, THS, shall be set to a value consistent with a time difference of more than 6 * Tpoll slots from the first transmission of the LMP_set_AFH command.

Starting at the switch instant, the Lower Tester shall POLL the slave on 100 consecutive master-to-slave slots.



- Expected Outcome

Pass verdict

The test is successful if the IUT responds to at least 95% of the Lower Tester's POLLs.

- Notes

The test requirement of 95% returned packets is to take into account the imperfect radio path but not to allow for any errors due to an incorrect implementation of the hopping kernel.

A standardized cable interface is assumed for the baseband connection.

4.9.1.2 LMP/AFH/BV-02-C [AFH Disable - Slave]

- Test Purpose

Verify that the IUT switches from AFH enabled to AFH disabled after the switch instant. The IUT is slave. The Lower Tester is master and initiates the AFH switch.

- Reference

[1] 4.1.4

- Initial Condition

See [Default Settings](#).

The Lower Tester and the IUT are in a normal connected state.

The Lower Tester is the master and the IUT is the slave.

The IUT is in an AFH enabled state with AFH_channel_map = AHS(79).

Each 1-bit field in the AFH channel map used for the IUT shall be set to 1, to indicate all channels are good.



- Test Procedure

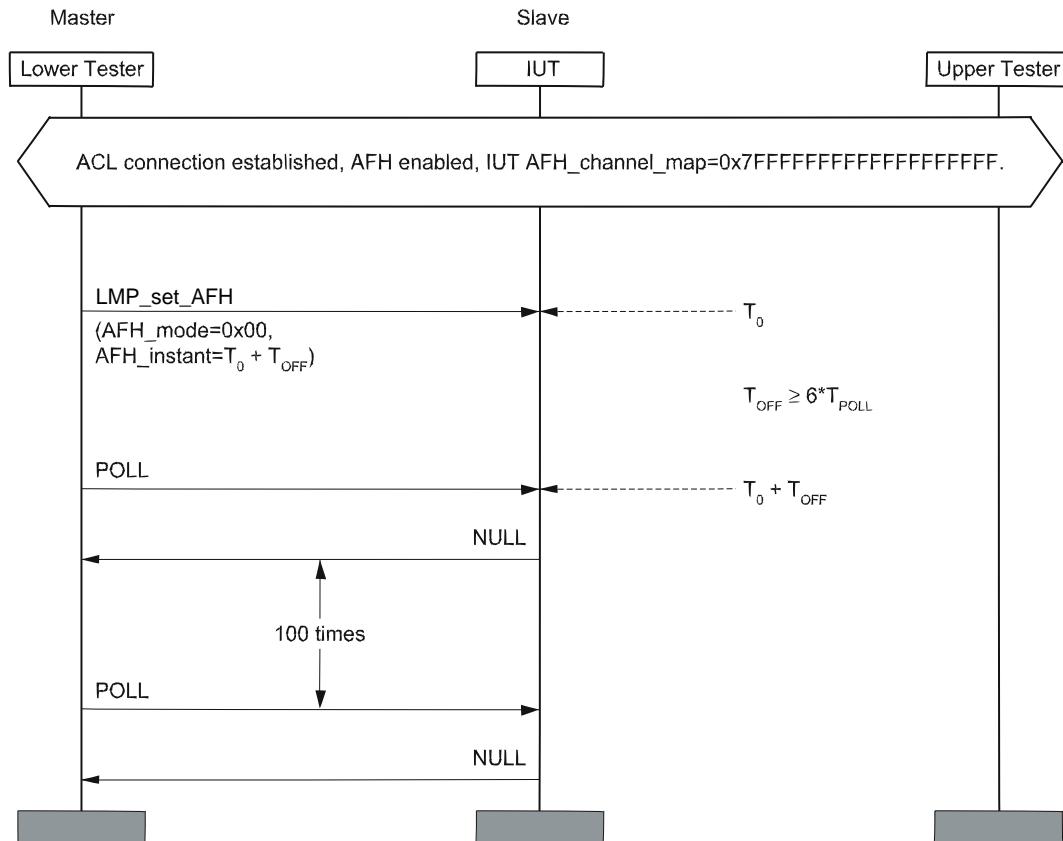


Figure 4.219: LMP/AFH/BV-02-C

The Lower Tester sends the IUT an LMP_set_AFH command specifying AFH_mode = AFH_disabled and a switch instant, THS.

The switch instant, THS, shall be set to a value consistent with a time difference of more than $6 * T_{\text{POLL}}$ slots from the first transmission of the LMP_set_AFH command.

Starting at the switch instant, the Lower Tester shall POLL the slave on 100 consecutive master-to-slave slots.

- Expected Outcome

Pass verdict

The test is successful if the IUT responds to at least 95% of the Lower Tester's POLLs.

- Notes

The test requirement of 95% returned packets is to take into account the imperfect radio path but not to allow for any errors due to an incorrect implementation of the hopping kernel.

A standardized cable interface is assumed for the baseband connection.



4.9.1.3 LMP/AFH/BV-03-C [AFH Switch – Slave]

- Test Purpose

Verify that the IUT switches from AFH enabled to AFH enabled with different channel masks after the switch instant. The IUT is slave. The Lower Tester is master and initiates the AFH switch.

- Reference

[1] 4.1.4

- Initial Conditions

See Default Settings.

The Lower Tester and IUT are in a normal connective state.

The Lower Tester is the master.

The IUT is AFH Enabled.

The 10 byte Channel mask established is set as: 0x5DDDDDDDDFFF77777777.

- Test Procedure

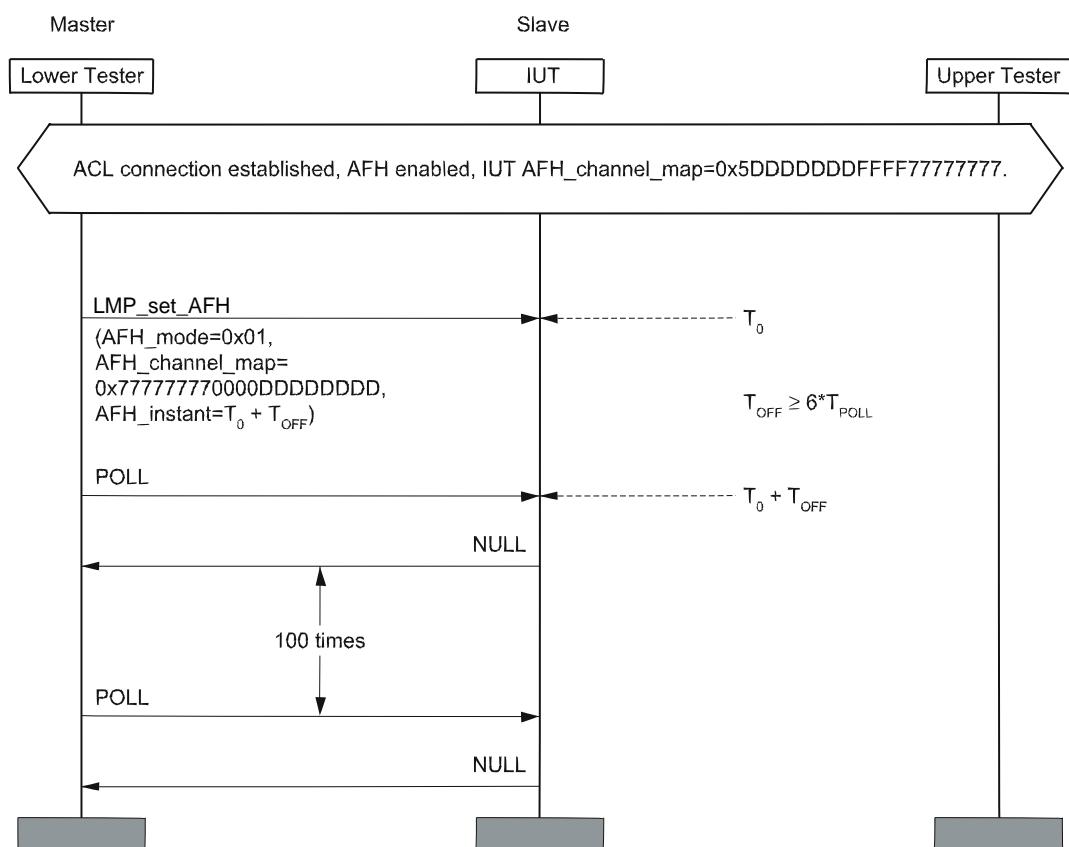


Figure 4.220: LMP/AFH/BV-03-C

The Lower Tester sends the IUT an LMP_set_AFH command specifying AFH_mode = AFH_enabled, a new channel map, and a switch instant, THS.

The new channel map shall be set to: 0x777777770000DDDDDDDD.

The switch instant, THS, shall be set to a value consistent with a time difference of more than 6 * Tpoll slots from the first transmission of the LMP_set_AFH command.

Starting at the switch instant, the Lower Tester shall POLL the slave on 100 consecutive master-to-slave slots.

- Expected Outcome

Pass verdict

The test is successful if after the switch instant the IUT responds to at least 95% of the Lower Tester's POLLS.

- Notes

The test requirement of 95% returned packets is to take into account the imperfect radio path but not to allow for any errors due to an incorrect implementation of the hopping kernel.

A standardized cable interface is assumed for the baseband connection.

4.9.1.4 LMP/AFH/BV-04-C [Classification Reporting – Normal Operation]

- Test Purpose

Verify that the IUT starts reporting channel classification messages when requested. The IUT is slave. The Lower Tester is master and enables the channel classification reporting on the slave.

- Reference

[1] 4.1.4

- Initial Condition

See [Default Settings](#).

The Lower Tester pages the IUT to become the master.

The Lower Tester and IUT are in normal connection state.

The Upper Tester disables via HCI the local channel assessment capabilities of the IUT using the HCI_Write_AFH_Channel_Assessment_Mode Command.

Adaptive frequency hopping is enabled by the Lower Tester using all channels: AHS(79).

The Lower Tester disables slave channel classification by sending LMP_channel_classification_req with AFH_Report set to Disabled.



- Test Procedure

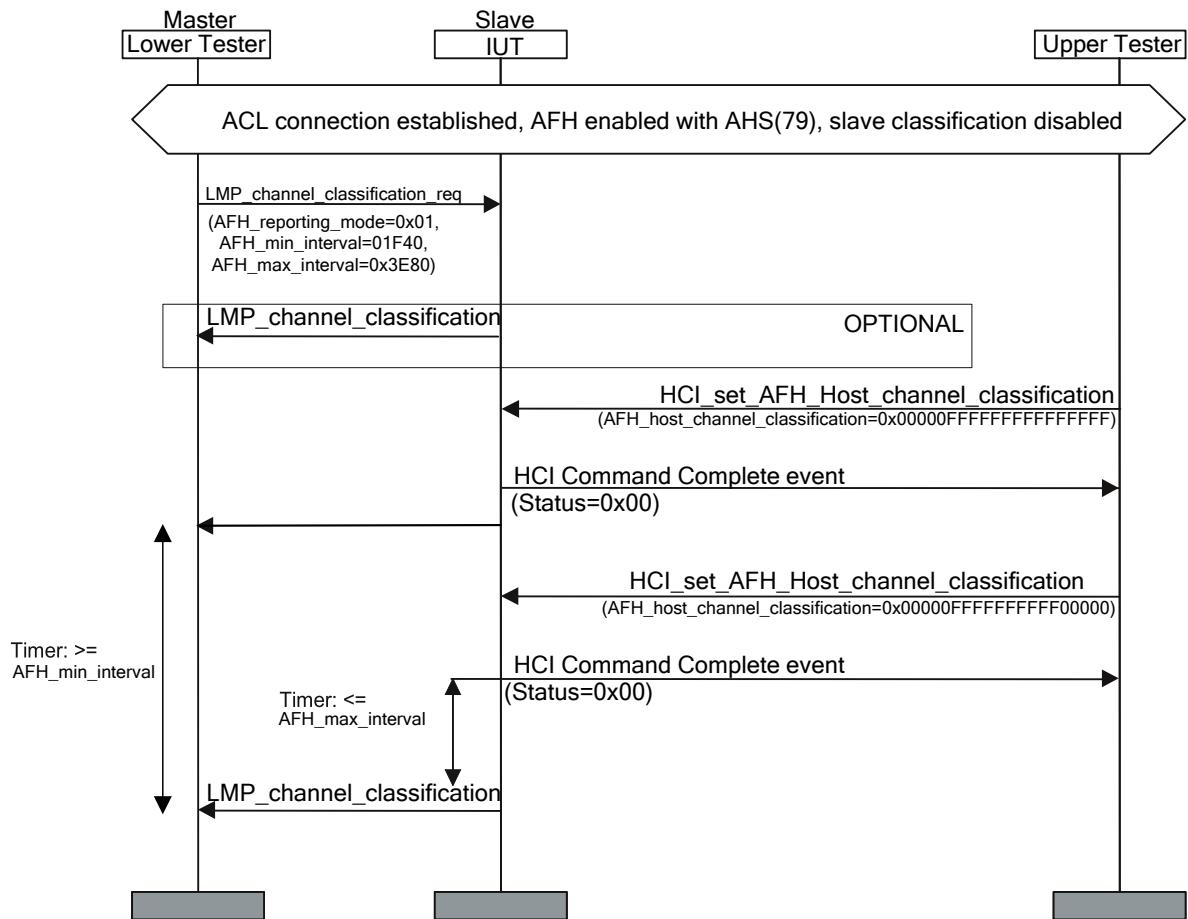


Figure 4.221: LMP/AFH/BV-04-C

The Lower Tester sends the LMP_channel_classification_req PDU with AFH_reporting set to enabled, AFH_min_interval set to 5 seconds and AFH_max_interval set to 10 seconds. The clock at which the LMP_channel_classification_req PDU is sent is recorded.

The Upper Tester forces via HCI the local hop set of the IUT to AHS(N1), N1<79.

The Lower Tester records the clock at which the first LMP_channel_classification PDU is received from the IUT.

The Upper Tester forces via HCI the local hop set of the IUT to AHS(N2), N1 \neq 2, N1<79, and N2<79.

The Lower Tester records the clock at which the second LMP_channel_classification PDU is received from the IUT.

- Expected Outcome

Pass verdict

The IUT transmits the second PDU LMP_channel_classification sometime and at end of AFH_min_interval at end of AFH_max_interval after transmitting the first PDU LMP_channel_classification.



- Notes

The POLL interval shall be the default value of 40 slots.

4.9.1.5 LMP/AFH/BV-05-C [Classification Reporting – After Successful Master Slave Switch]

- Test Purpose

Verify that the IUT implicitly disables reporting of channel classification after a successful master slave switch. The IUT starts as a master. The Lower Tester starts as a slave.

- Reference

[1] 4.1.4

- Initial Condition

See [Default Settings](#).

The IUT pages the Lower Tester to become the master.

The Lower Tester and IUT are in normal connection state.

The Upper Tester disables via HCI the channel classification capabilities of the IUT using the HCI_Write_AFH_Channel_Assessment_Mode Command.

Adaptive frequency hopping is enabled by the IUT using any channel map.



- Test Procedure

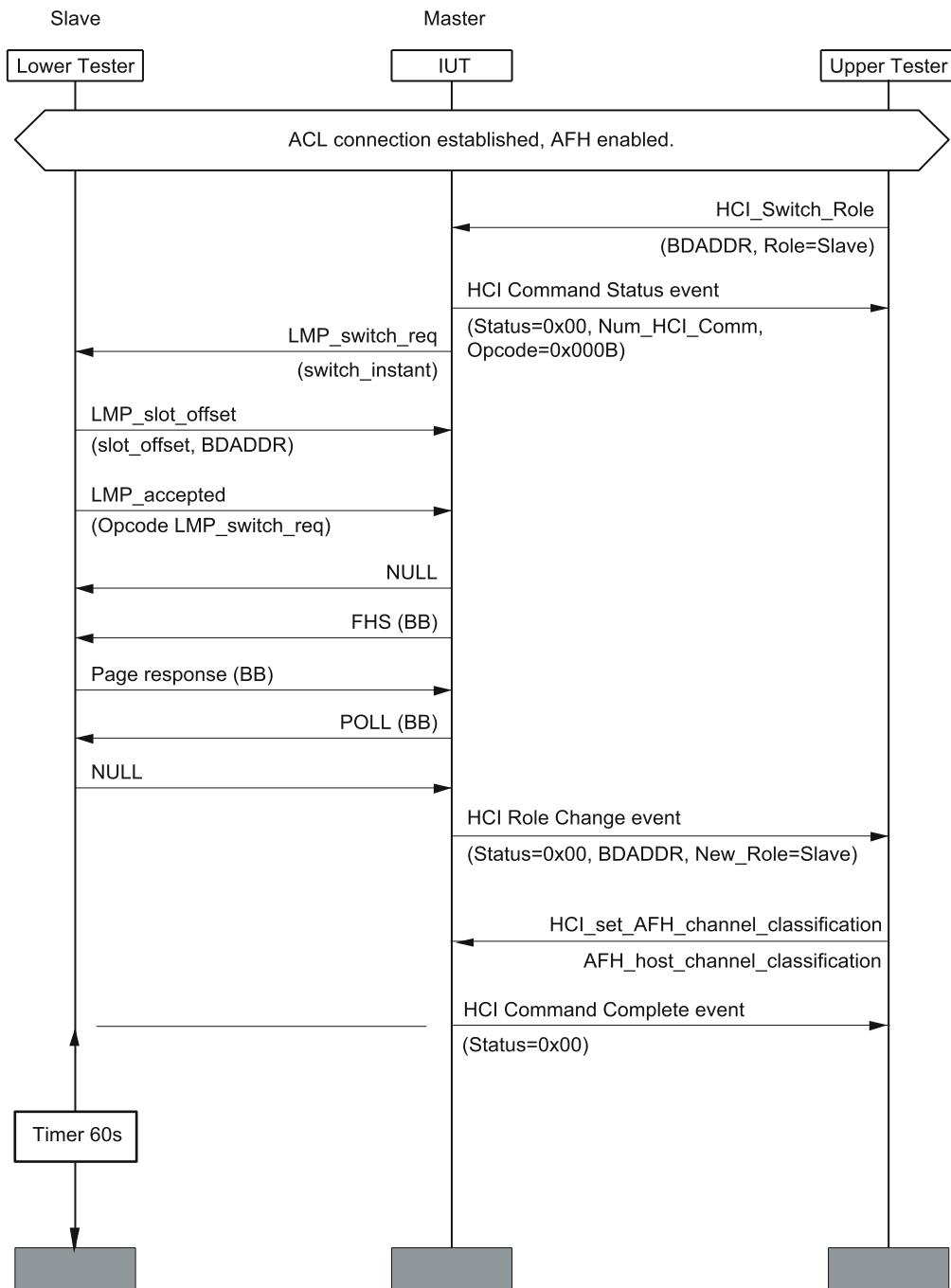


Figure 4.222: LMP/AFH/BV-05-C

The Upper Tester initiates a role switch.

After role switch, the Upper Tester forces via HCI a local hop set to the IUT to any value.

The Lower Tester listens for 60 seconds for an LMP_channel_classification PDU.



- Expected Outcome

Pass verdict

The IUT does not transmit an LMP_channel_classification PDU within 60 s after the master slave switch.

4.9.1.6 LMP/AFH/BV-06-C [Classification Reporting – After Unsuccessful Master Slave Switch]

- Test Purpose

Verify that the IUT implicitly restores the channel classification reporting mode after an unsuccessful master slave switch. The IUT starts as a slave. The Lower Tester starts as a master.

- Reference

[1] 4.1.5

- Initial Condition

See [Default Settings](#).

The Lower Tester pages IUT to become the master.

The Lower Tester and IUT are in normal connection state.

Adaptive frequency hopping is enabled by the Lower Tester using AHS(79).

The Upper Tester disables via HCI the channel classification capabilities of the IUT using the HCI_Write_AFH_Channel_Assessment_Mode Command.



- Test Procedure

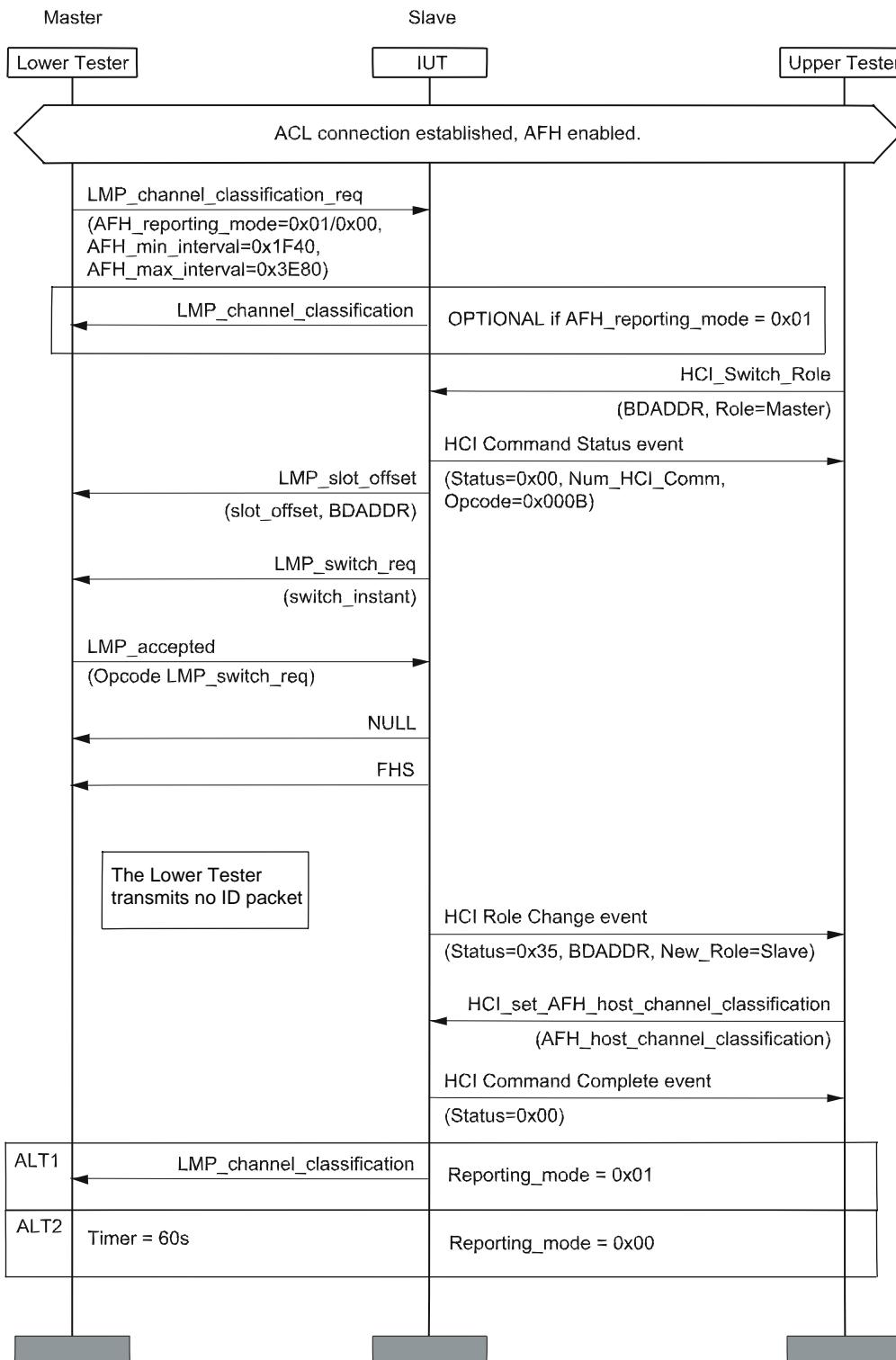


Figure 4.223: LMP/AFH/BV-06-C

1. The Lower Tester sends the LMP_channel_classification_req PDU with AFH_reporting set to enabled, AFH_min_interval set to 5 seconds and AFH_max_interval set to 10 seconds.
2. The Lower Tester initiates a role switch.
3. The Lower Tester does not respond to the FHS packet.



4. AHS(N), N<79.

Steps 2 through 4 are repeated with AFH_reporting set to disabled.

- Expected Outcome

Pass verdict

The IUT transmits an LMP_channel_classification PDU after the HCI_set_AFH_host_channel_classification when AFH_reporting is enabled and does not transmit LMP_channel_classification when AFH_reporting is disabled.

4.9.1.7 LMP/AFH/BV-07-C [Classification Reporting – After Unpark]

- Test Purpose

Verify that the IUT implicitly restores the channel classification reporting mode after a successful unpark. The IUT is a slave. The Lower Tester is a master.

- Reference

[1] 4.1.5

- Initial Condition

See [Default Settings](#).

The Lower Tester pages IUT to become the master.

The Lower Tester and IUT are in normal connection state.

Adaptive frequency hopping is enabled by the Lower Tester using AHS(79).

The Lower Tester enables classification reporting in the IUT.

The Upper Tester disables via HCI the channel classification capabilities of the IUT using the HCI_Write_AFH_Channel_Assessment_Mode Command.

The Lower Tester puts the IUT in parked mode.



- Test Procedure

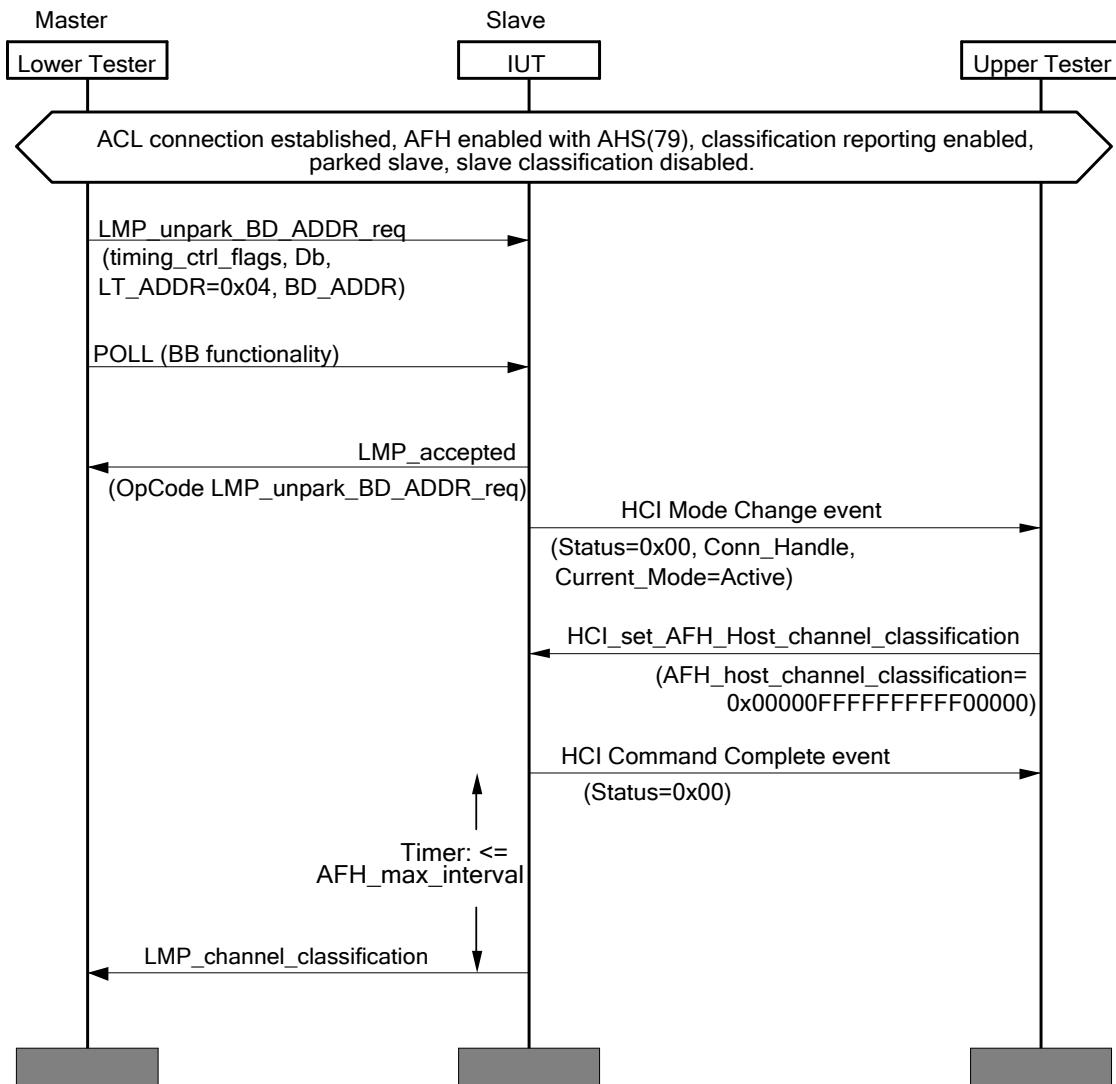


Figure 4.224: LMP/AFH/BV-07-C

The Lower Tester unparks the IUT.

The Upper Tester forces via HCI the local hop set of the IUT to AHS(N), N<79.

- Expected Outcome

Pass verdict

Upon reception of `HCI_set_AFH_host_channel_classification`, the IUT transmits a PDU `LMP_channel_classification` during `AFH_max_interval`.

4.9.1.8 LMP/AFH/BV-08-C [Classification Reporting – After Unhold]

- Test Purpose

Verify that the IUT implicitly restores the channel classification reporting mode after a successful unhold. The IUT is a slave. The Lower Tester is a master.



- Reference

[1] 4.1.5

- Initial Condition

See [Default Settings](#).

The Lower Tester pages IUT to become the master.

The Lower Tester and IUT are in normal connection state.

Adaptive frequency hopping is enabled by the Lower Tester using AHS(79).

The Upper Tester disables via HCI the channel classification capabilities of the IUT using the HCI_Write_AFH_Channel_Assessment_Mode Command.

The Lower Tester enables classification reporting in the IUT.

- Test Procedure

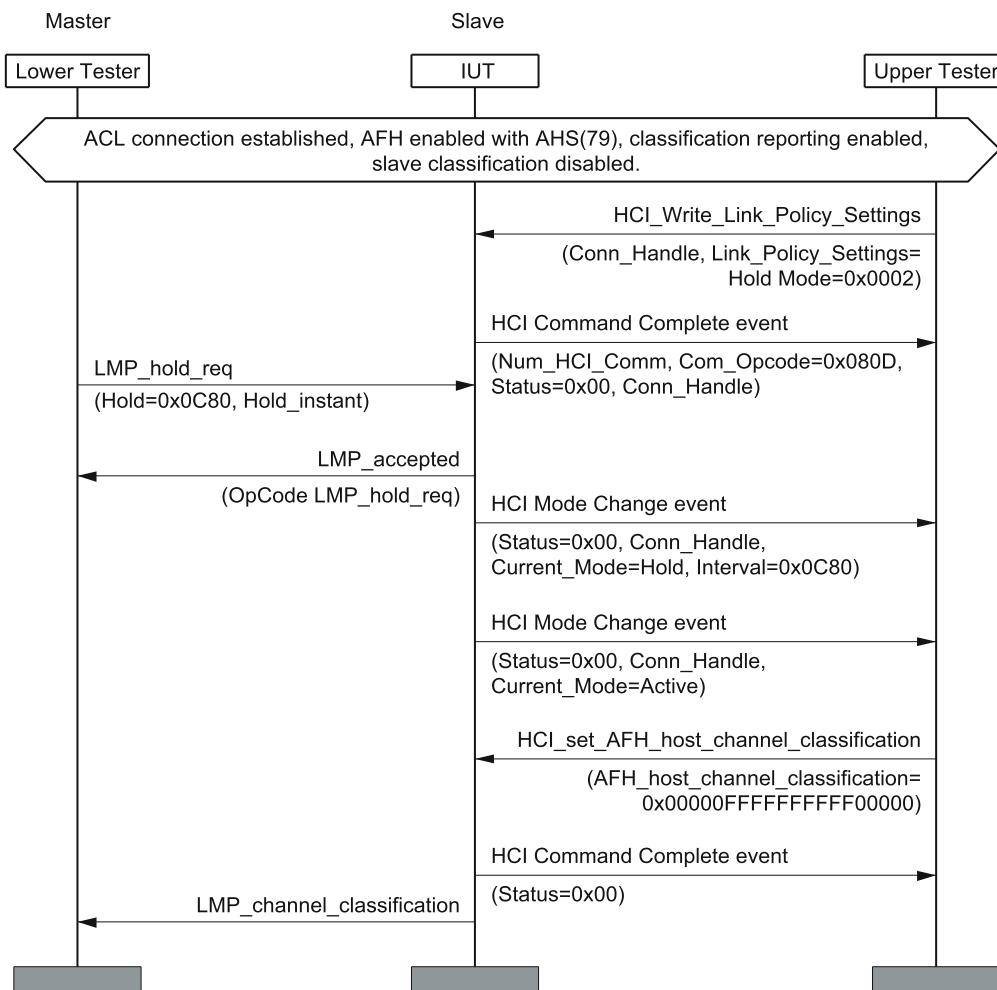


Figure 4.225: LMP/AFH/BV-08-C



The Lower Tester puts the IUT in hold mode for 2 seconds.

The Upper Tester forces via HCI the local hop set of the IUT to AHS(N), N<79.

- Expected Outcome

Pass verdict

Upon reception of HCI_set_AFH_host_channel_classification, the IUT transmits an LMP_channel_classification PDU before AFH_max_interval.

4.9.1.9 LMP/AFH/BV-09-C [Slave device does not send a LMP_Set_AFH PDU -after successful master slave switch]

- Test Purpose

Verify that the IUT does not send an LMP_Set_AFH PDU after a successful master slave switch in which the IUT becomes the slave after the master slave switch. The IUT starts as a master. The Lower Tester starts as a slave.

- Reference

[1] 4.1.4.1

- Initial Condition

The IUT pages the Lower Tester to become the master.

The Lower Tester and IUT are in normal connection state.

- Test Procedure

The IUT initiates a role switch (The IUT is now a slave and the Lower Tester is now a master).

After role switch, the Lower Tester listens for 60 seconds for an LMP_Set_AFH PDU.



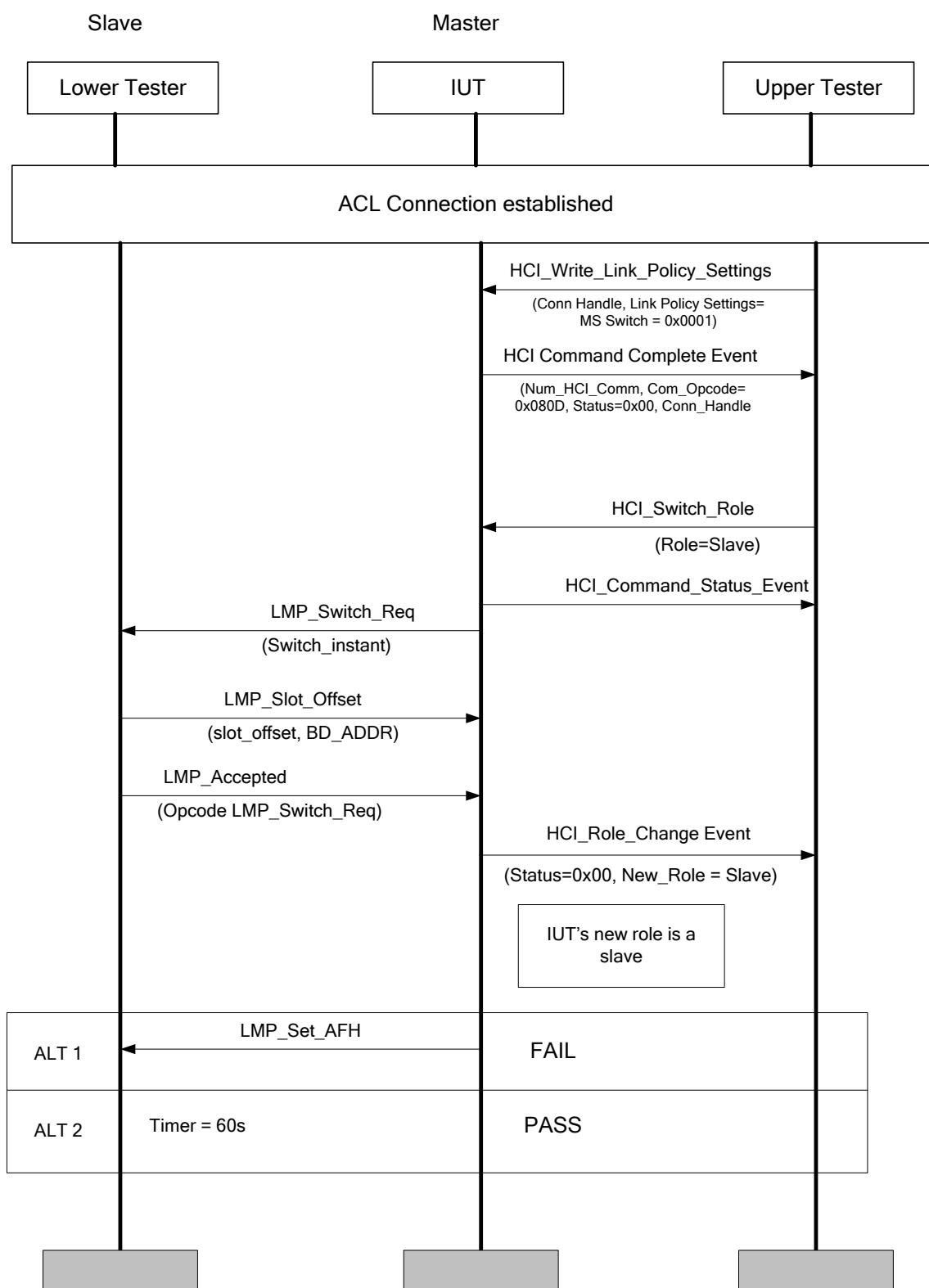


Figure 4.226: LMP/AFH/BV-09-C

- Expected Outcome

Pass verdict

The IUT does not transmit an LMP_Set_AFH PDU within 60 sec. after the master slave switch.

4.10 Simple Pairing Procedures

- Test Subgroup Objectives

To verify the Simple Pairing procedures.

4.10.1 Backward Compatibility Procedures

4.10.1.1 LMP/SP/BV-01-C [Simple Pairing Capable Controller - Pairing - IUT Initiator]

- Test Purpose

Verify that the IUT initiates legacy pairing when the remote Controller does not have the Simple Pairing LMP feature bit set.

IUT is initiator. Lower Tester is responder.

Lower Tester does not support Simple Pairing.

- Reference

[1] 4.1.4.1, 4.3.4

- Initial Condition

See [Section 4.2.5](#), IUT has the Simple Pairing feature (Controller Support and Host Support) Link Manager bits set.

- Test Procedure

Run the preamble in [Section 4.3.1](#).

Execute test procedure of [LMP/AUT/BV-04-C \[Pairing, IUT Initiator\], MSC 2](#).

- Expected Outcome

Pass verdict

Correct PDU LMP_in_rand is transmitted.

Correct PDU LMP_Comb_key is transmitted.

Correct Link key is created checked by an authentication (SRES is checked.)

4.10.1.2 LMP/SP/BV-02-C [Simple Pairing Capable Controller - Pairing - IUT Responder]

- Test Purpose

Verify that the IUT initiates legacy pairing when the remote device does not have the Simple Pairing LMP feature (Controller Support and Host Support) bits set.

Lower Tester is initiator. IUT is responder.



Lower Tester does not support Simple Pairing.

- Reference

[1] 4.2.2, 4.3.4

- Initial Condition

See Section 4.2.5, IUT has the Simple Pairing feature (Controller Support and Host Support) Link Manager bits set.

- Test Procedure

Run the preamble in Section 4.3.2.

Execute the test procedure of LMP/AUT/BV-03-C [Create Link Key].

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_accepted containing the opcode for PDU LMP_in_rand upon reception of PDU LMP_in_rand.

The IUT transmits PDU LMP_comb_key upon reception of PDU LMP_comb_key.

4.10.1.3 LMP/SP/BV-03-C [Simple Pairing Capable Controller - Legacy Host- IUT Initiator]

- Test Purpose

Verify that the IUT initiates pairing when the local Host does not set the Simple Pairing Mode to enabled.

IUT is initiator. Lower Tester is responder.

- Reference

[1] 4.2.7

- Initial Condition

See Default Settings.

Uses the Authentication default settings.



- Test Procedure

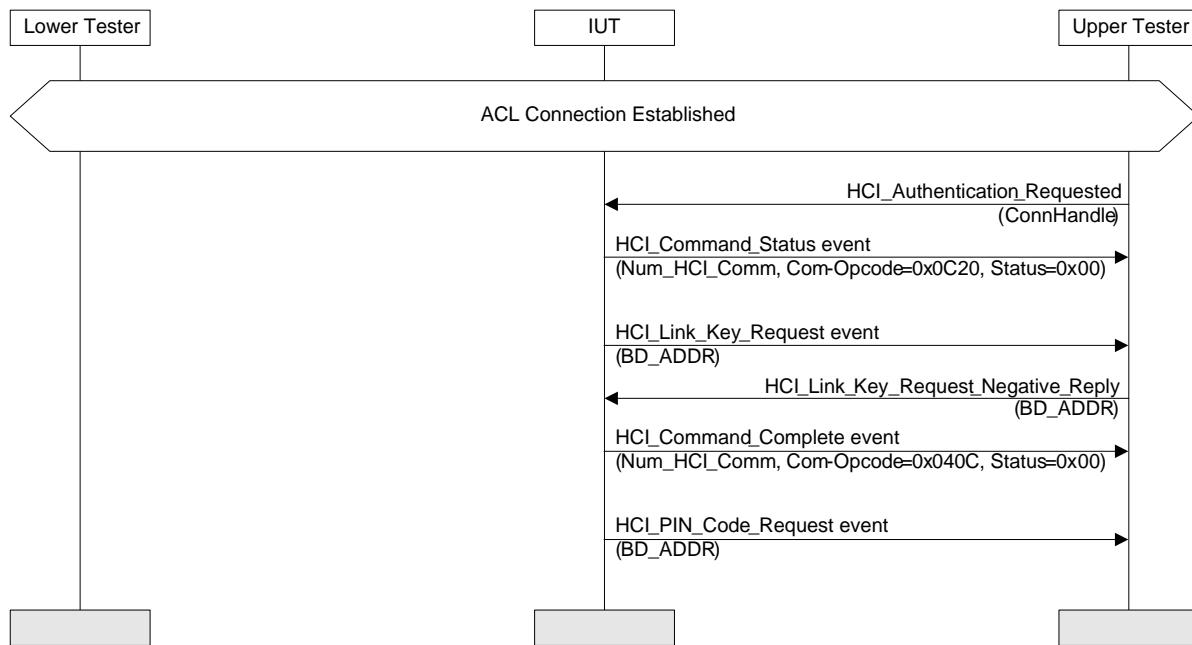


Figure 4.227: LMP/SP/BV-03-C

- Expected Outcome

Pass verdict

The IUT sends an HCI_PIN_Code_Request Event to the Upper Tester.

The IUT does not send an HCI_IO_Capability_Request Event to the Upper Tester.

The IUT does not set the Simple Pairing Mode (host support) bit.

4.10.1.4 LMP/SP/BV-04-C [Simple Pairing Capable Controller - Legacy Host - IUT Responder]

- Test Purpose

Verify that the IUT responds to pairing when the local Host has not set the support Simple Pairing Mode to enabled.

IUT is responder. Lower Tester is initiator.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).

Use the Authentication default settings. Lower Tester shall use Secure Simple Pairing (feature bit set to 1).



- Test Procedure

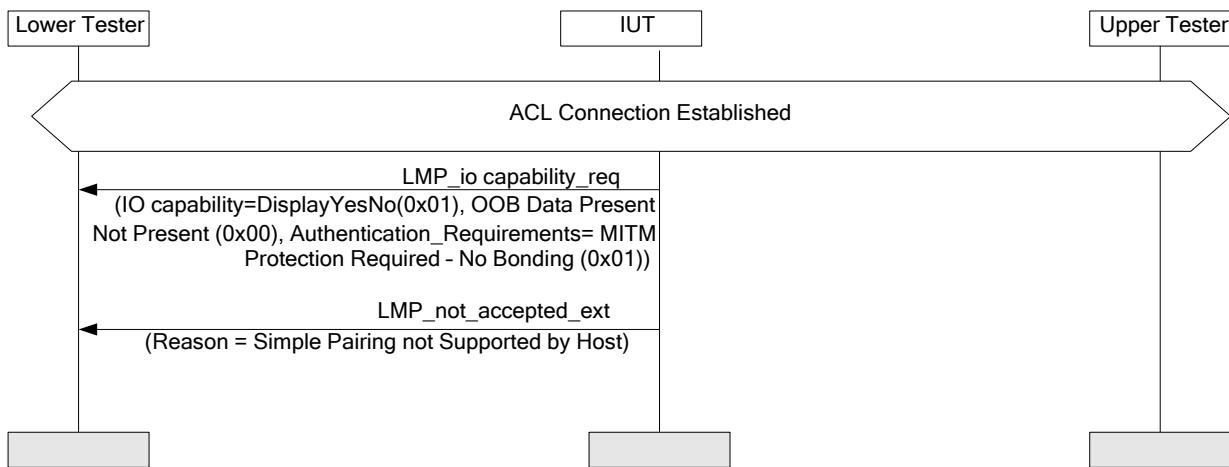


Figure 4.228: LMP/SP/BV-04-C

- Expected Outcome

Pass verdict

The IUT responds to the LMP_io_capability_res PDU with an LMP_not_accepted_ext PDU with the error code “Simple Pairing Not Supported by Host.”

The IUT does not set the Simple Pairing Mode (host support) bit.

4.10.1.5 LMP/SP/BV-05-C [Simple Pairing Capable Controller - Legacy Remote Host - IUT Initiator]

Verify that the IUT initiates pairing when the local Host sets the Simple Pairing Mode to enabled and the remote Controller's LMP feature bits indicate support for Simple Pairing in the Controller but not in the Host. IUT is initiator. Lower Tester is responder.

Remote Host does not support Simple Pairing, whereas the remote controller supports Simple Pairing.

- Reference
 - [1] 4.2.7
- Initial Condition
 - See Section 4.2.5.



- Test Procedure

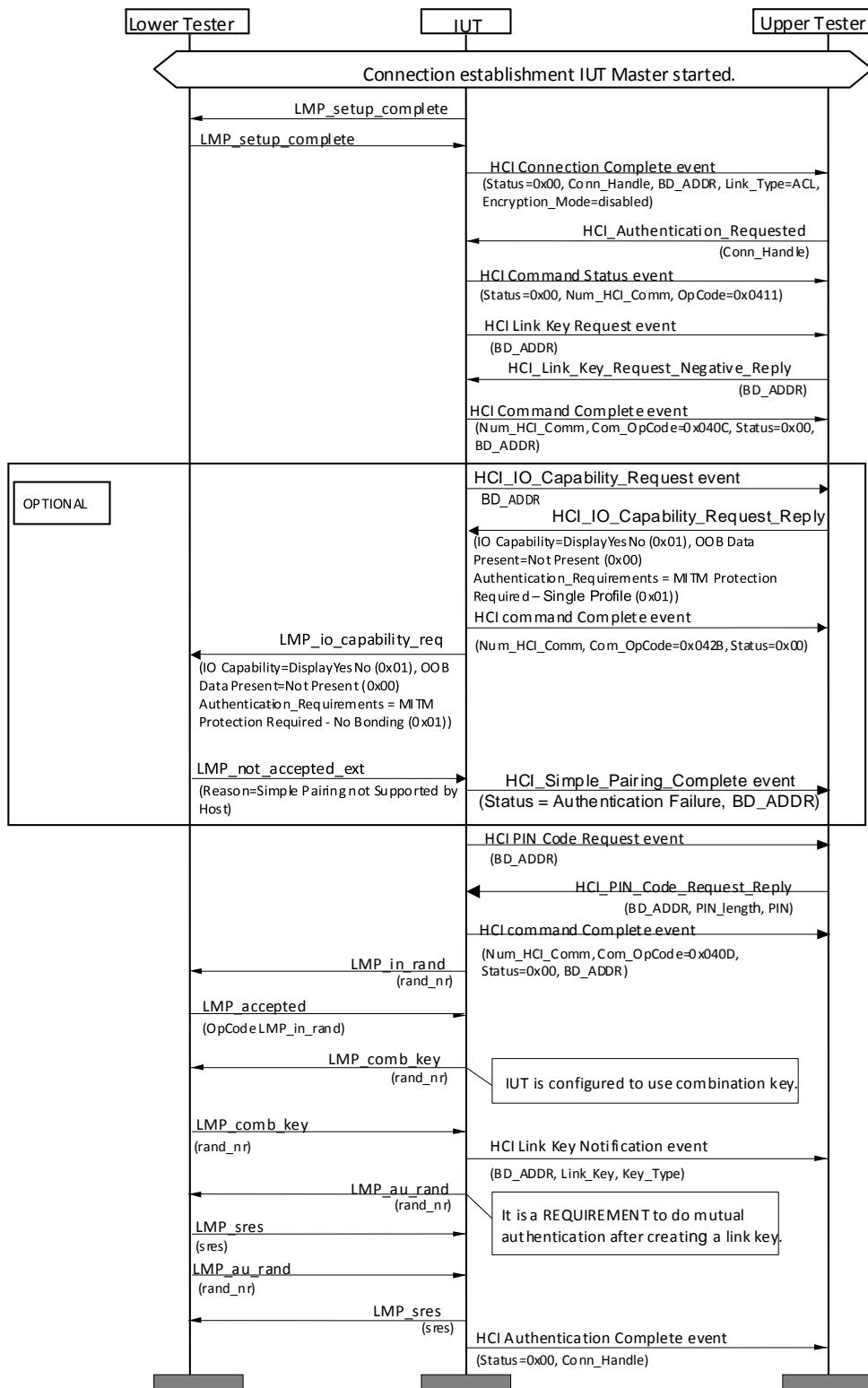


Figure 4.229: LMP/SP/BV-05-C, MSC



- Expected Outcome

Pass verdict

The IUT sends an HCI PIN Code Request Event to the Upper Tester.

IUT sends LMP_in_rand to the Lower Tester

Correct PDU LMP_Comb_key is transmitted by the IUT.

Correct Link key is created checked by an authentication (SRES is checked.)

4.10.1.6 LMP/SP/BV-37-C [Secure Connections Capable Controller – Legacy Host – IUT Initiator – Unauthenticated Link Key]

- Test Purpose

Verify that the IUT reports the correct Key_Type to a Legacy Host at the end of a successful Secure Simple Pairing using the P192 elliptic curve using the Numeric Comparison protocol that generates an unauthenticated link key.

Test procedure is run with IUT as the initiator. It doesn't matter if the IUT is master or slave or if the IUT is the initiator or responder.

- Reference

[1] 4.2.7

- Initial Condition

See [Baseband Assumptions](#).

The Upper Tester doesn't set the Secure Connections Host Support to enabled.



- Test Procedure

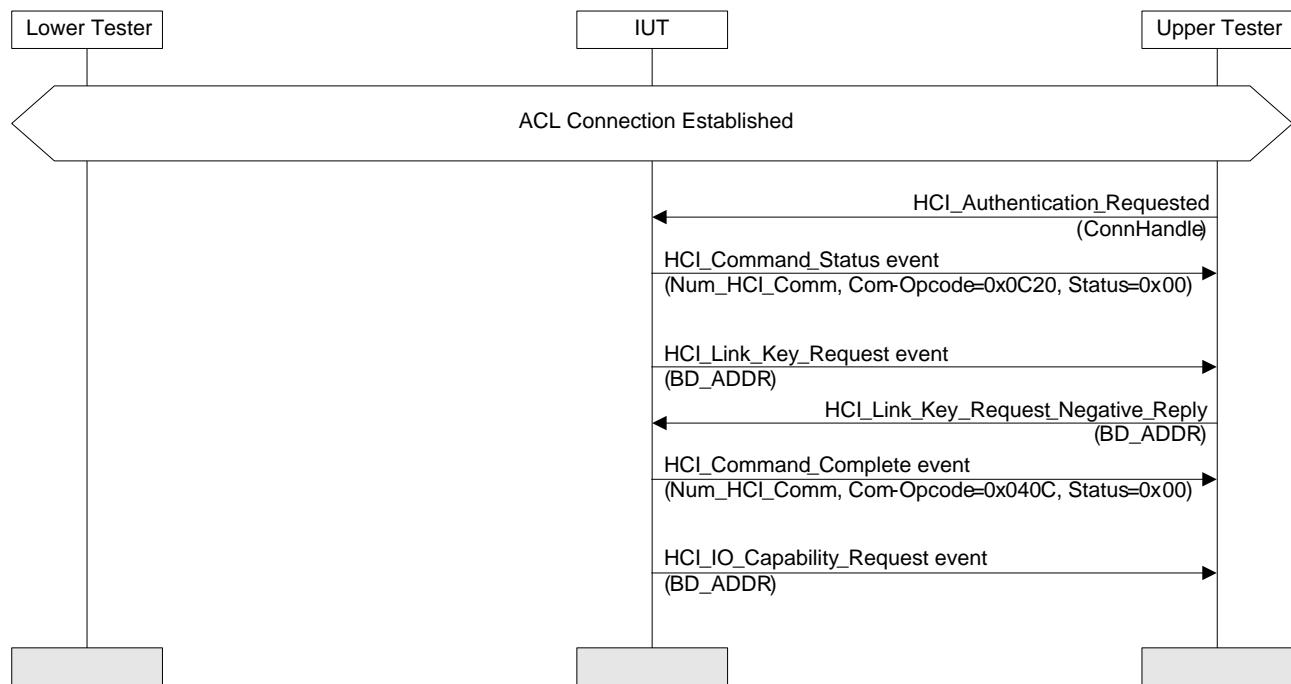


Figure 4.230: LMP/SP/BV-37-C MSC a



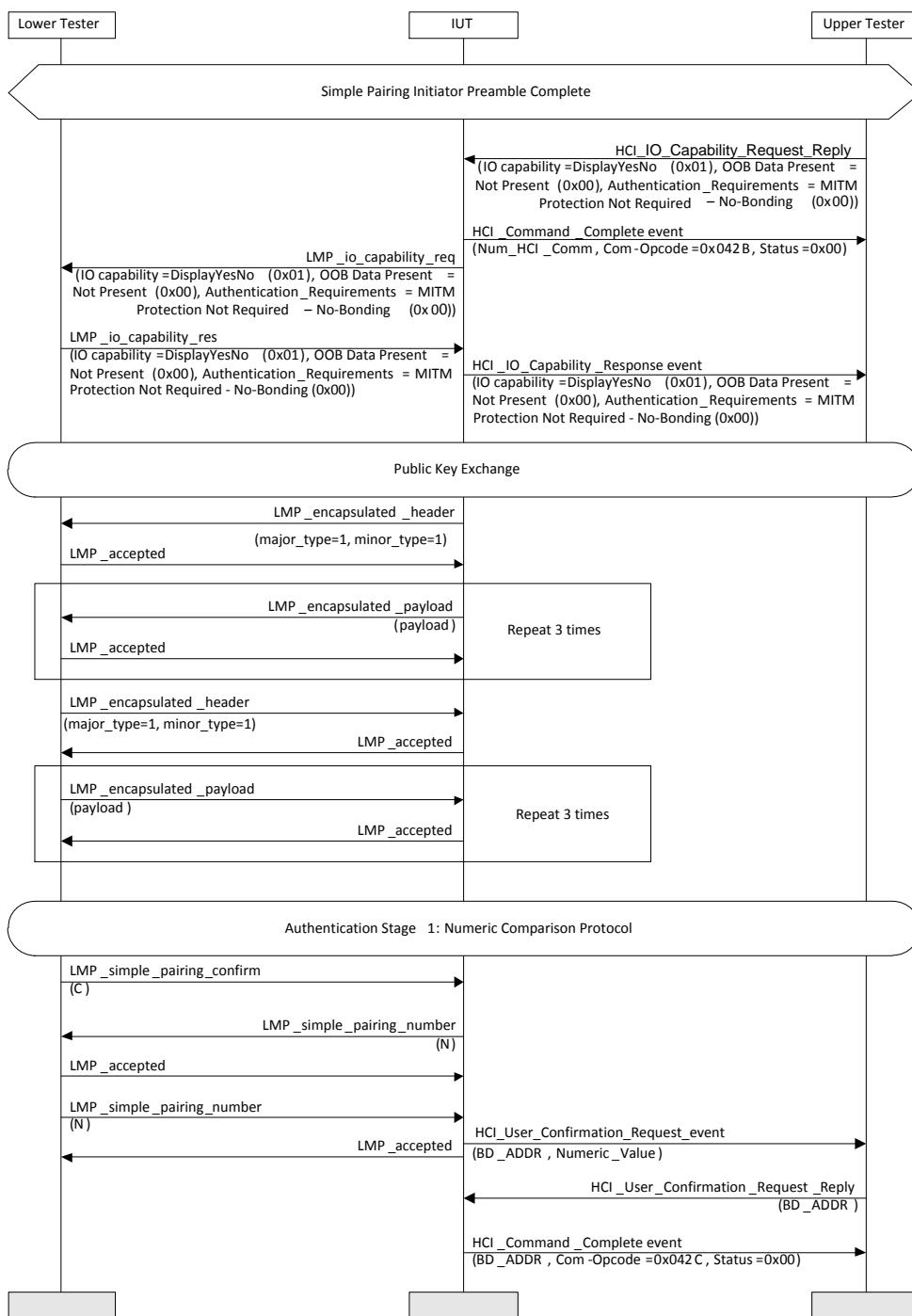


Figure 4.231: LMP/SP/BV-37-C MSC b



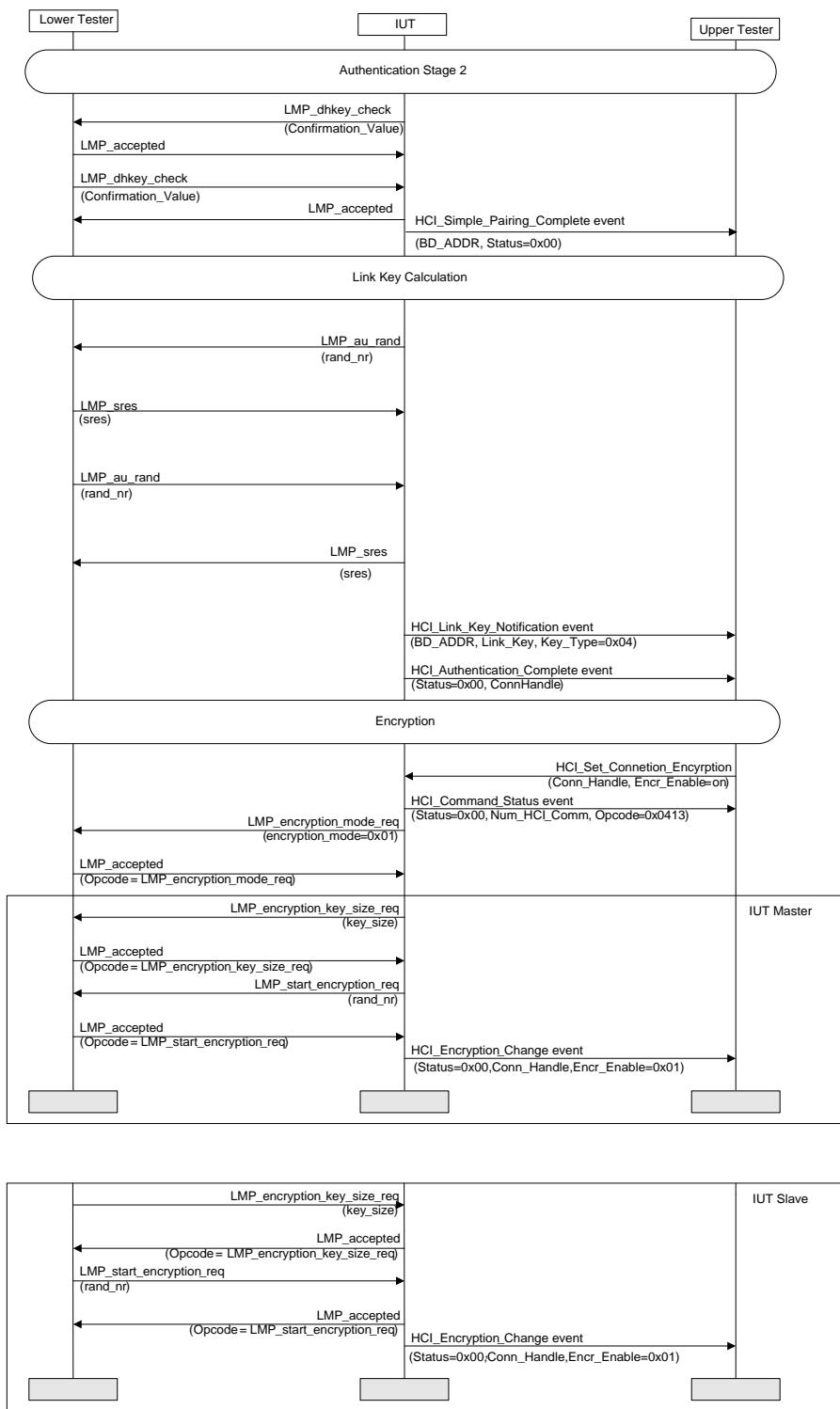


Figure 4.232: LMP/SP/BV-37-C MSC c

- Expected Outcome

Pass verdict

The IUT sends the LMP_DHkey_check PDU is with a valid Confirmation_Value.

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester.



The IUT sends the resulting Link Key and Key Type to the Host in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Unauthenticated Combination Key generated from P192'.

4.10.1.7 LMP/SP/BV-38-C [Secure Connections Capable Controller – Legacy Host – IUT Initiator – Authenticated Link Key]

- Test Purpose

Verify that the IUT reports the correct Key_Type to a Legacy Host at the end of a successful Secure Simple Pairing using the P192 elliptic curve using the Numeric Comparison protocol that generates an authenticated link key.

Test procedure is run with IUT as the initiator. It doesn't matter if the IUT is master or slave or if the IUT is the initiator or responder.

- Reference

[1] 4.2.7

- Initial Condition

See [Baseband Assumptions](#).

The Upper Tester doesn't set the Secure Connections Host Support to enabled.

- Test Procedure

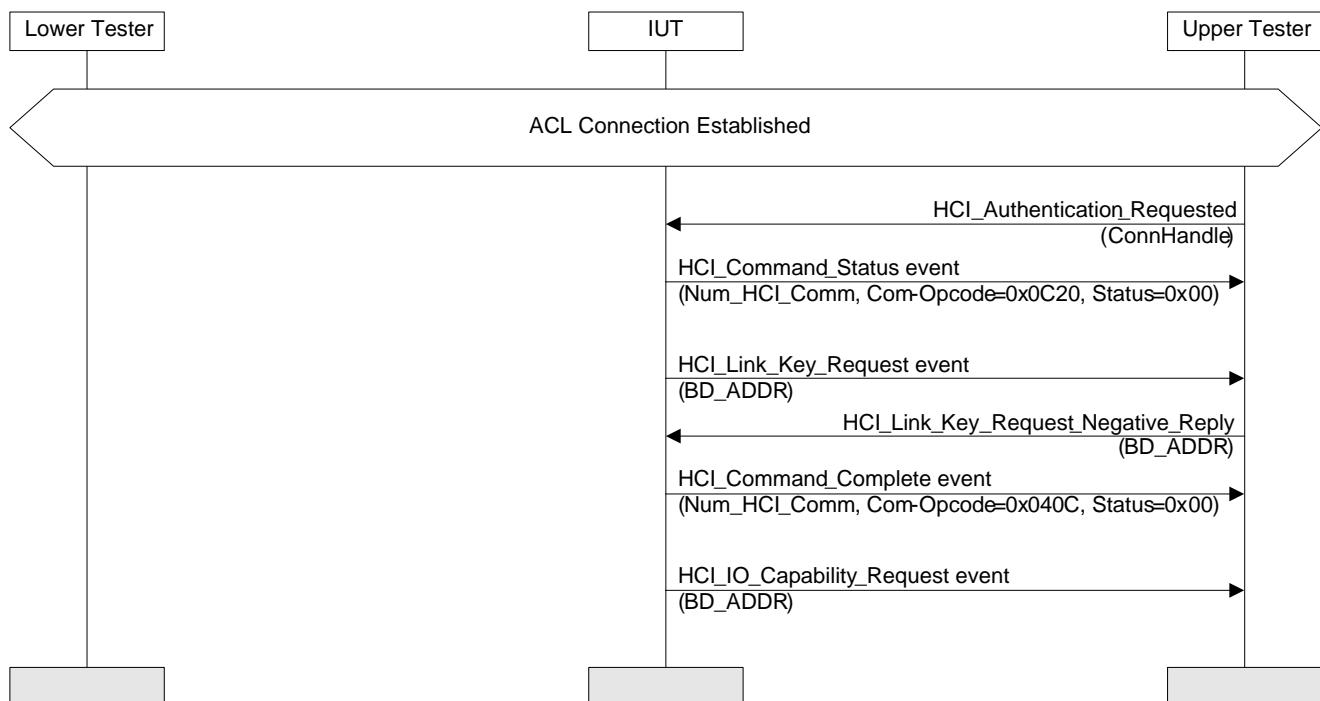


Figure 4.233: LMP/SP/BV-38-C MSC a



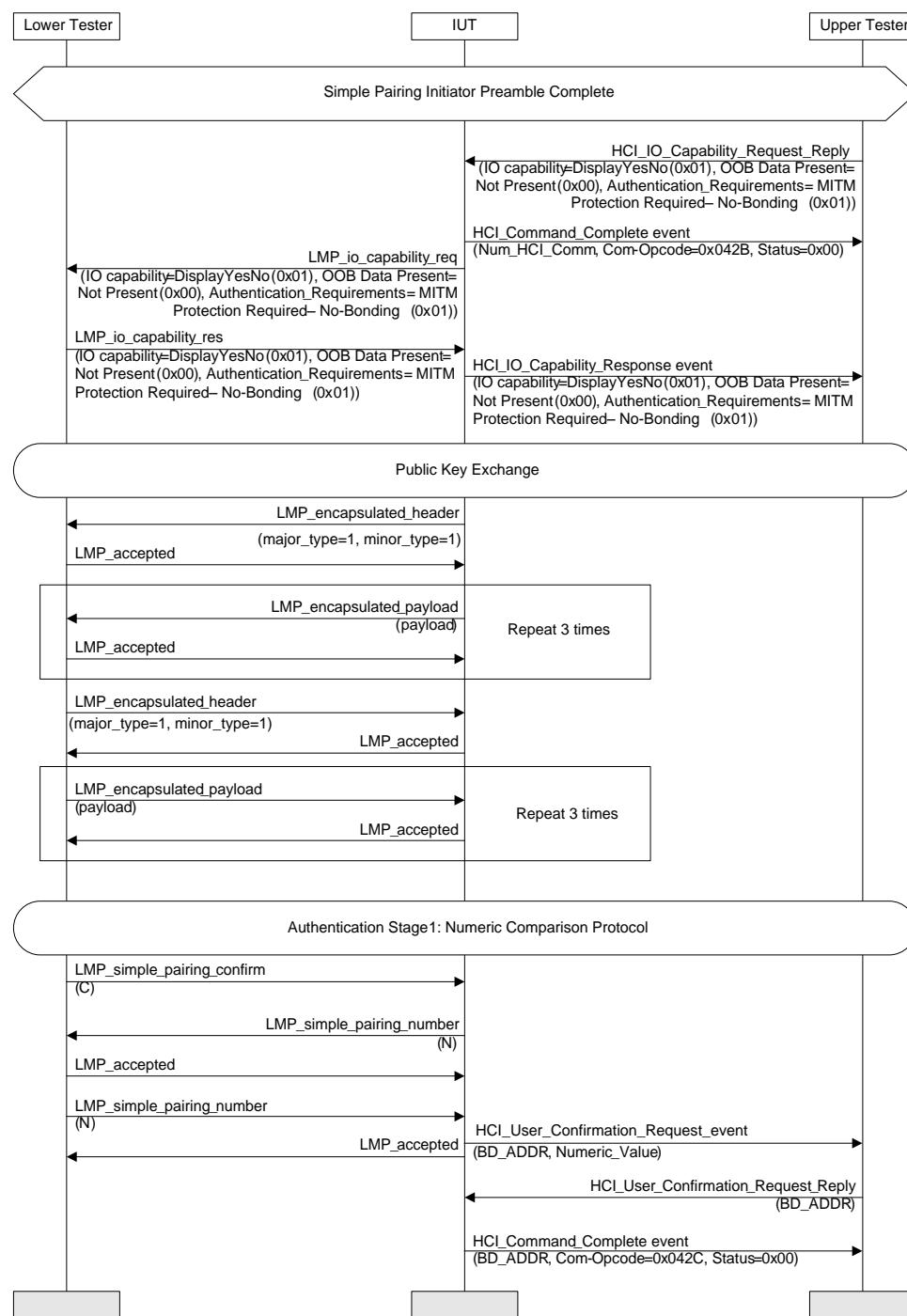


Figure 4.234: LMP/SP/BV-38-C MSC b



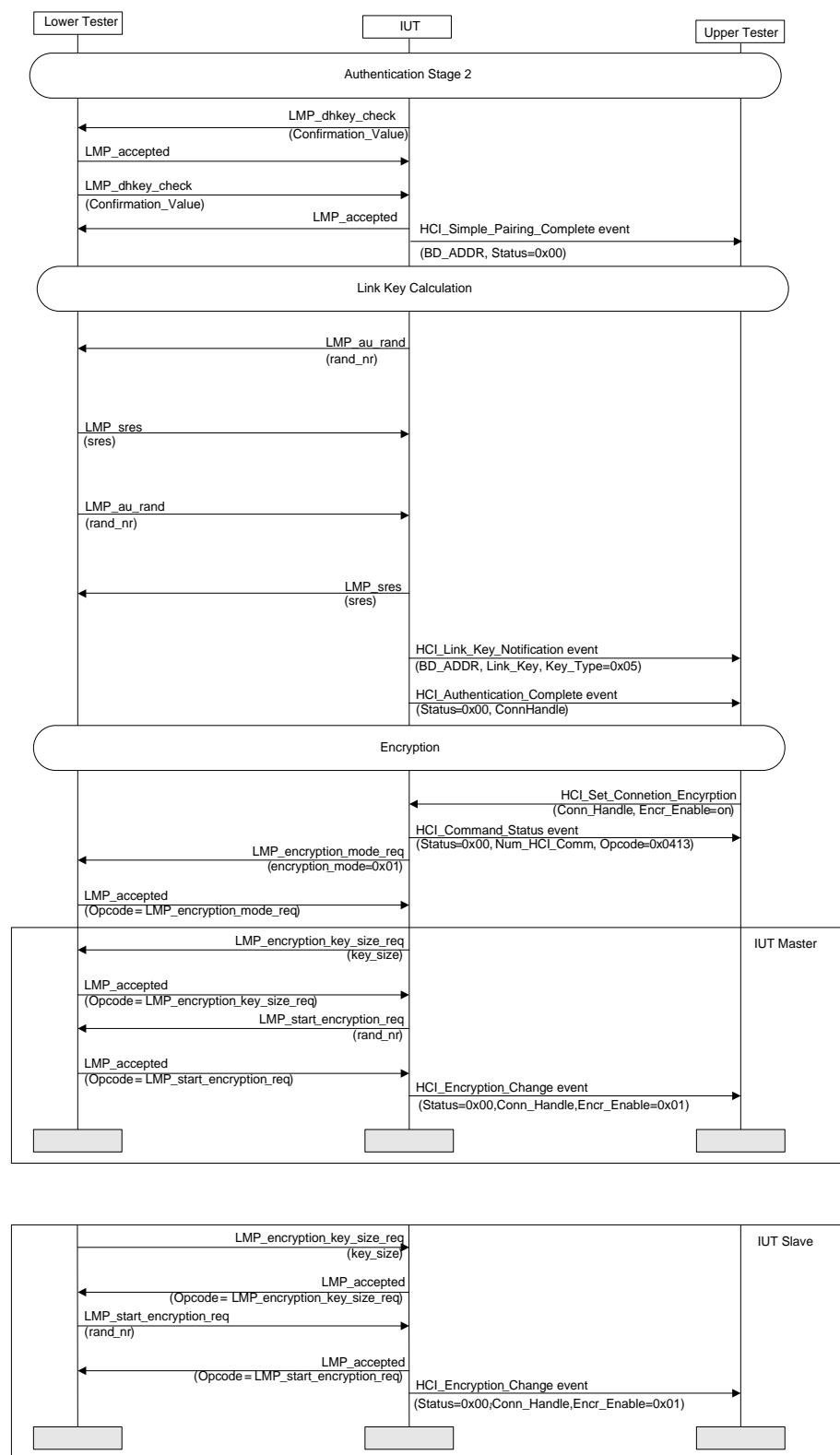


Figure 4.235: LMP/SP/BV-38-C MSC c



- Expected Outcome

Pass verdict

The IUT sends an HCI_User_Confirmation_Request Event with the same value calculated by the Lower Tester.

The IUT sends the LMP_DHkey_check PDU is with a valid Confirmation_Value.

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester.

The IUT sends the resulting Link Key and Key Type to the Host in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated Combination Key generated from P192'.

4.10.1.8 LMP/SP/BV-39-C [Secure Connections Capable Controller – Host has no P256 OOB data available – IUT Initiator – OOB]

- Test Purpose

Verify that the IUT switches to Numeric Comparison association model when the Upper Tester indicates that it only has P192 OOB data from the remote device available. Verify that the IUT reports the correct Key_Type to the Upper Tester at the end of a successful Secure Simple Pairing using the P256 elliptic curve.

Test procedure is run with IUT as the initiator. It doesn't matter if the IUT is master or slave or if the IUT is the initiator or responder.

- Reference

[1] 4.2.7.

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).



- Test Procedure

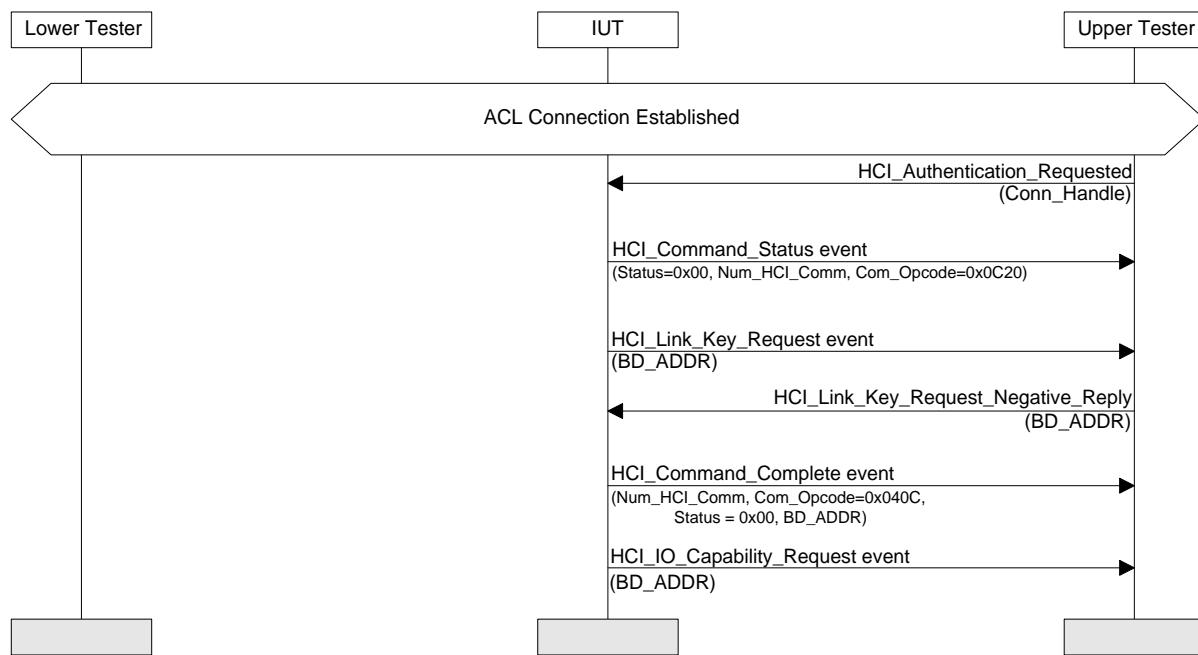


Figure 4.236: LMP/SP/BV-39-C MSC a



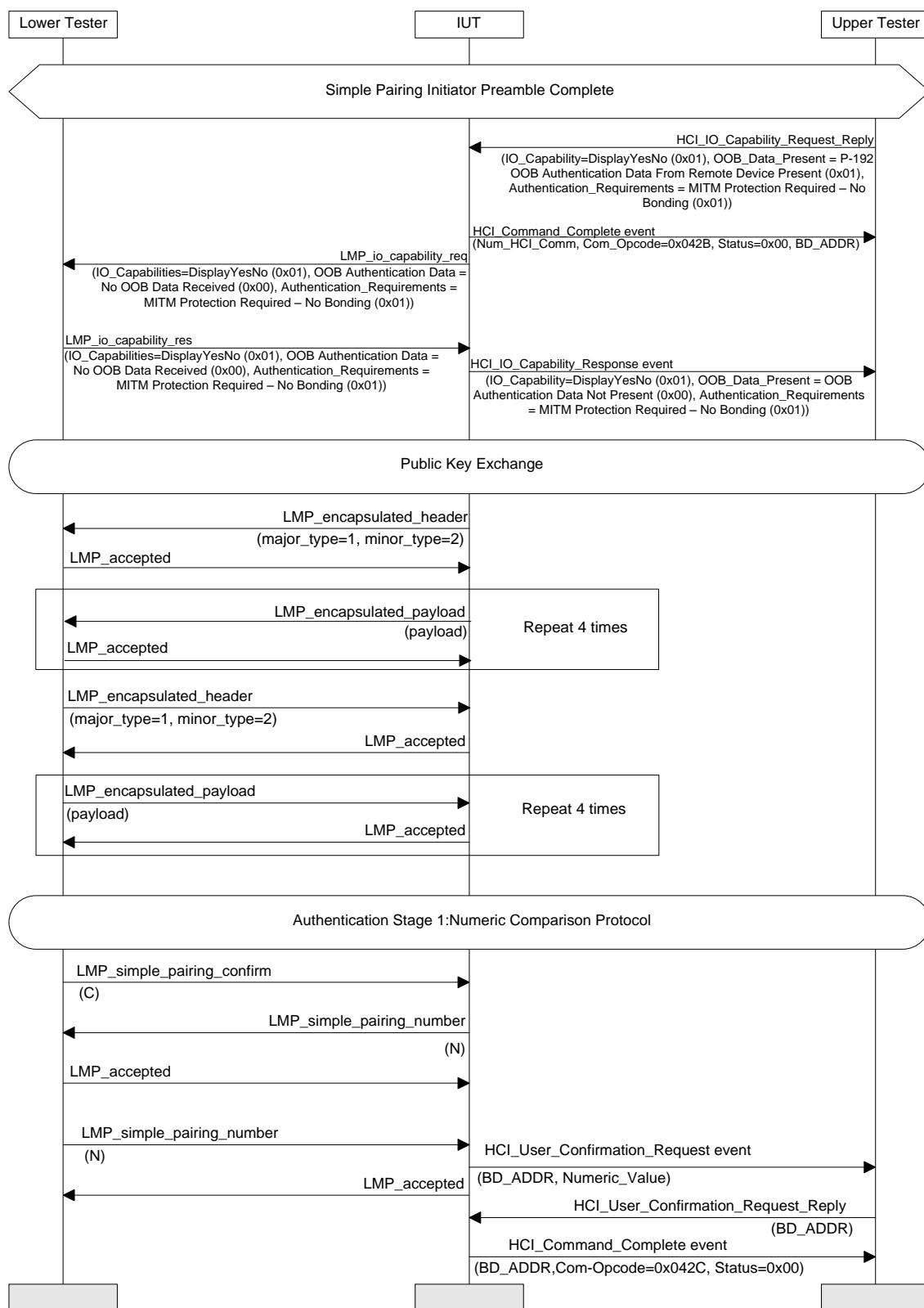


Figure 4.237: LMP/SP/BV-39-C MSC b



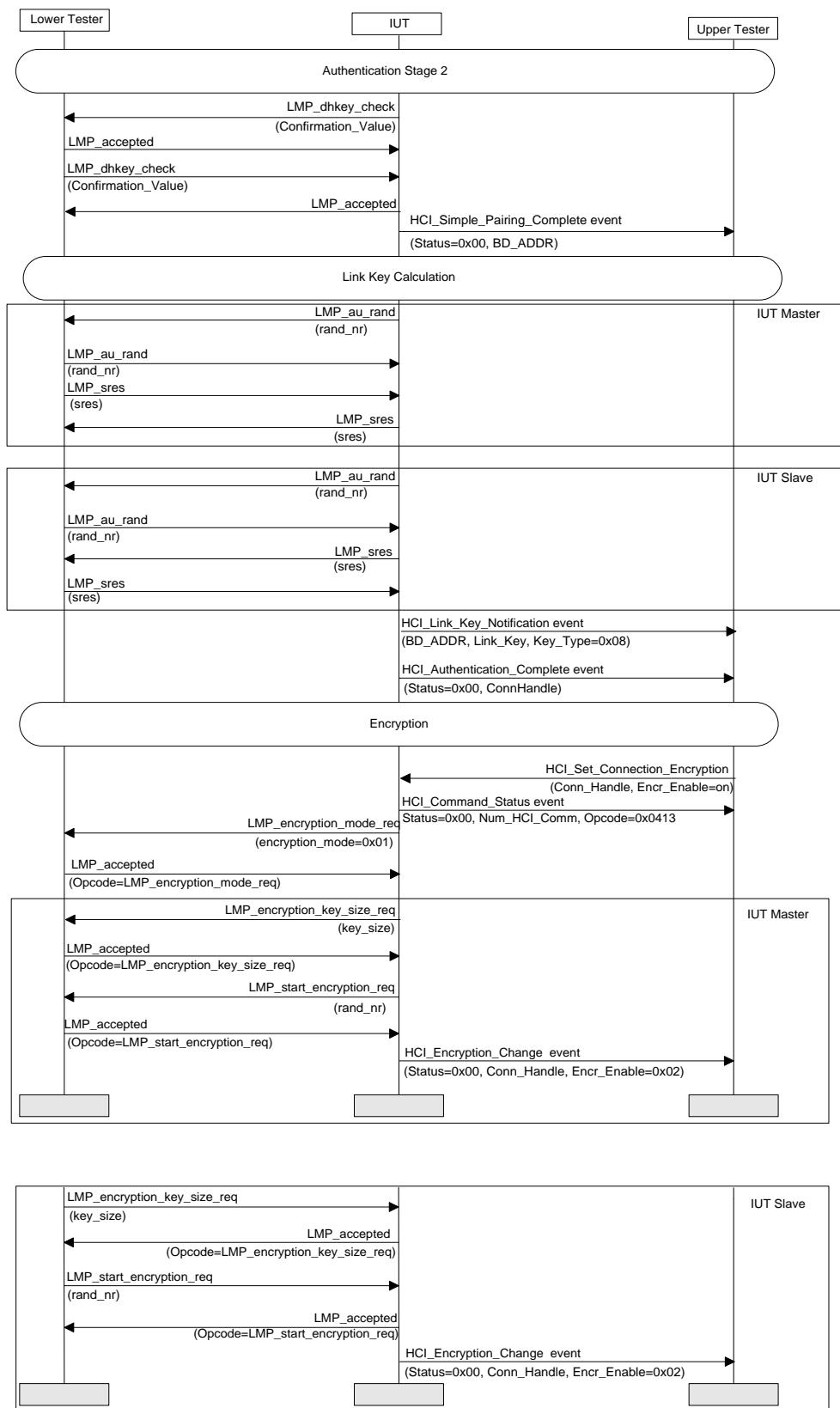


Figure 4.238: LMP/SP/BV-39-C MSC c



- Expected Outcome

Pass verdict

The IUT does not send an HCI_Remote_OOB_Data_Request Event to the Upper Tester.

The IUT sends an HCI_User_Confirmation_Request Event with the same value calculated by the Lower Tester.

The IUT sends the LMP_DHkey_check PDU is with a valid Confirmation_Value.

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester.

The IUT sends the resulting Link Key and Key Type to the Host in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated Combination Key generated from P256'.

4.10.1.9 LMP/SP/BV-40-C [Secure Connections Capable Controller and Host – Legacy Remote Controller – IUT Initiator]

- Test Purpose

Verify that the IUT initiates Secure Simple Pairing using the P192 Elliptic Curve when the remote controller doesn't have support for the Secure Connections (Controller Support) LMP feature bit.

Test procedure is run with IUT as the initiator. It doesn't matter if the IUT is master or slave or if the IUT is the initiator or responder.

- Reference

[1] 4.2.7

- Initial Condition

See [Baseband Assumptions](#).

The Lower Tester doesn't set the Secure Connections (Controller Support) to enabled.

- Notes

This test case is the same as [LMP/SP/BV-06-C \[Numeric Comparison - IUT Initiator – Success\]](#) except that the IUT has the Secure Connections (Controller Support) and Secure Connections (Host Support) LMP feature bits set.

4.10.2 Numeric Comparison Procedures

Note: In all the test cases in section [4.10.2 Numeric Comparison Procedures](#), it does not matter whether the IUT is master or slave.

4.10.2.1 LMP/SP/BV-06-C [Numeric Comparison - IUT Initiator – Success]

- Test Purpose

Verify that the IUT supports the Numeric Comparison protocol.

Test procedure is run with IUT as initiator.



- Reference
[1] 4.2.7
- Initial Condition
See [Default Settings](#).
- Test Procedure

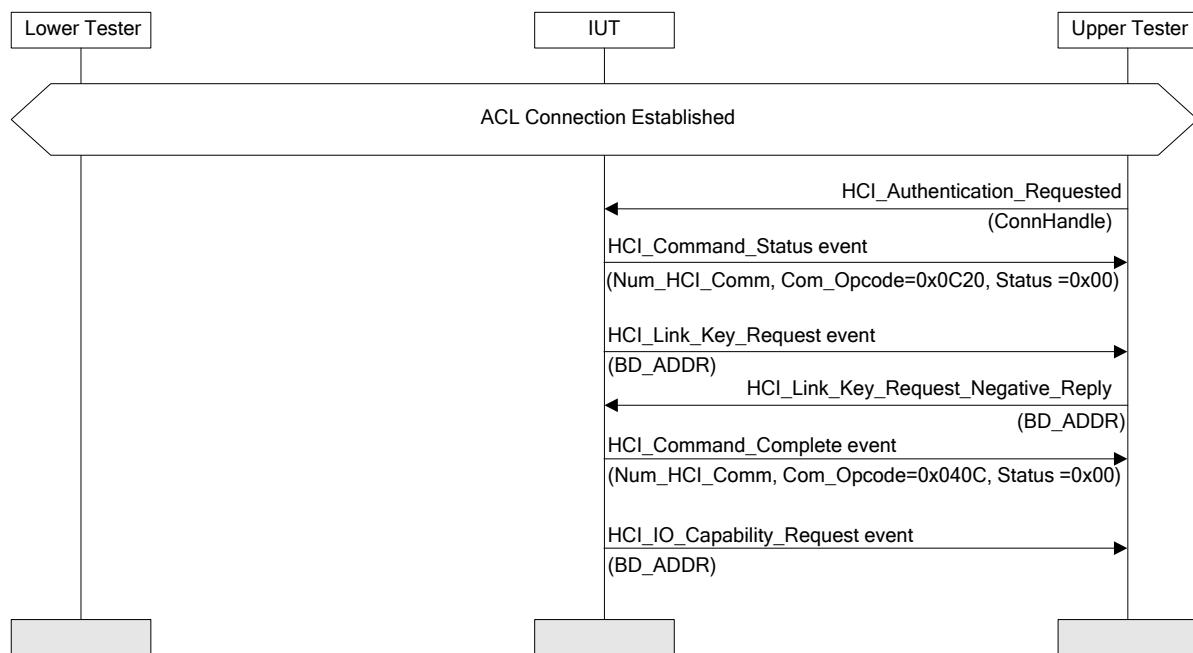


Figure 4.239: LMP/SP/BV-06-C MSC a



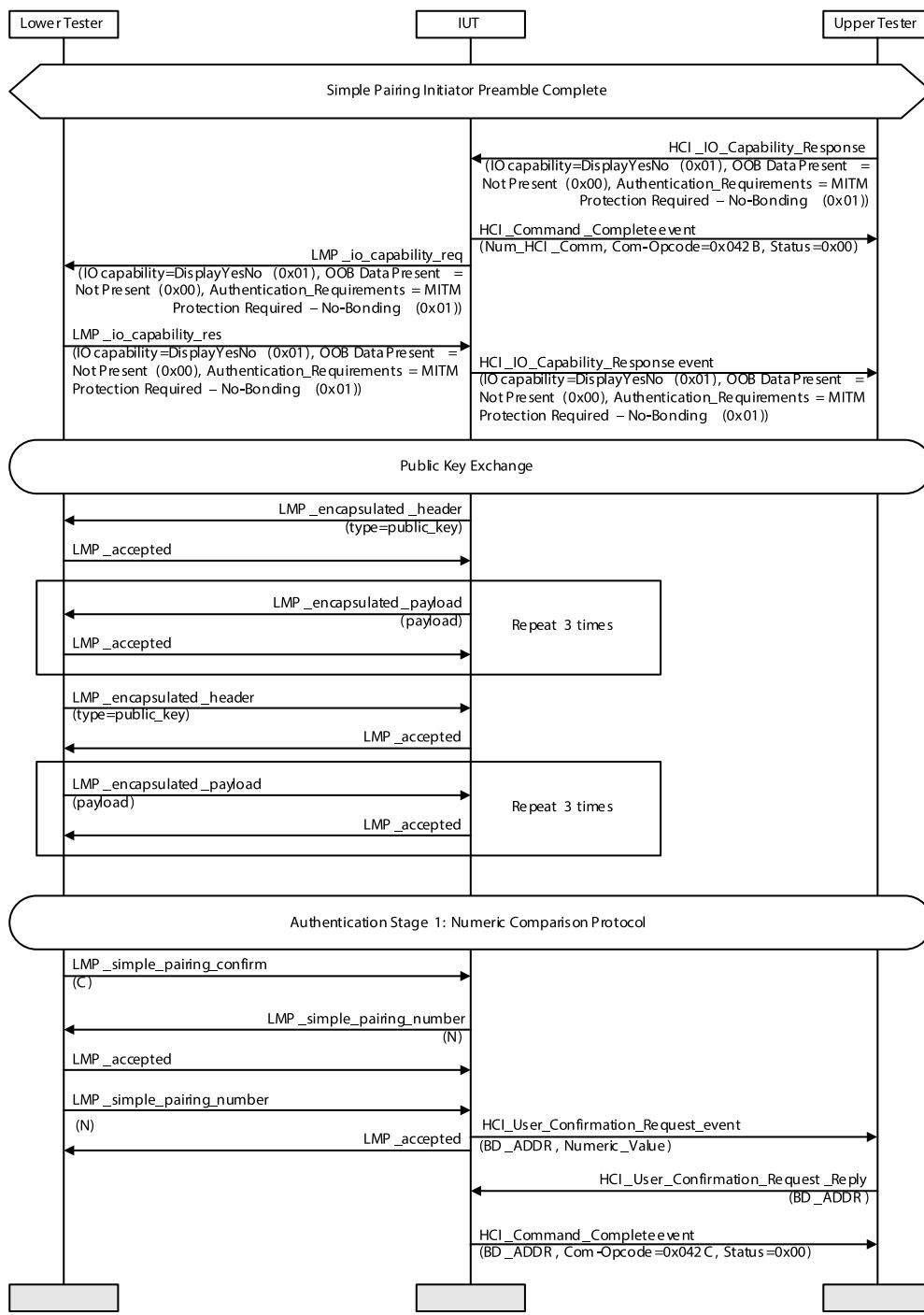


Figure 4.240: LMP/SP/BV-06-C MSC b



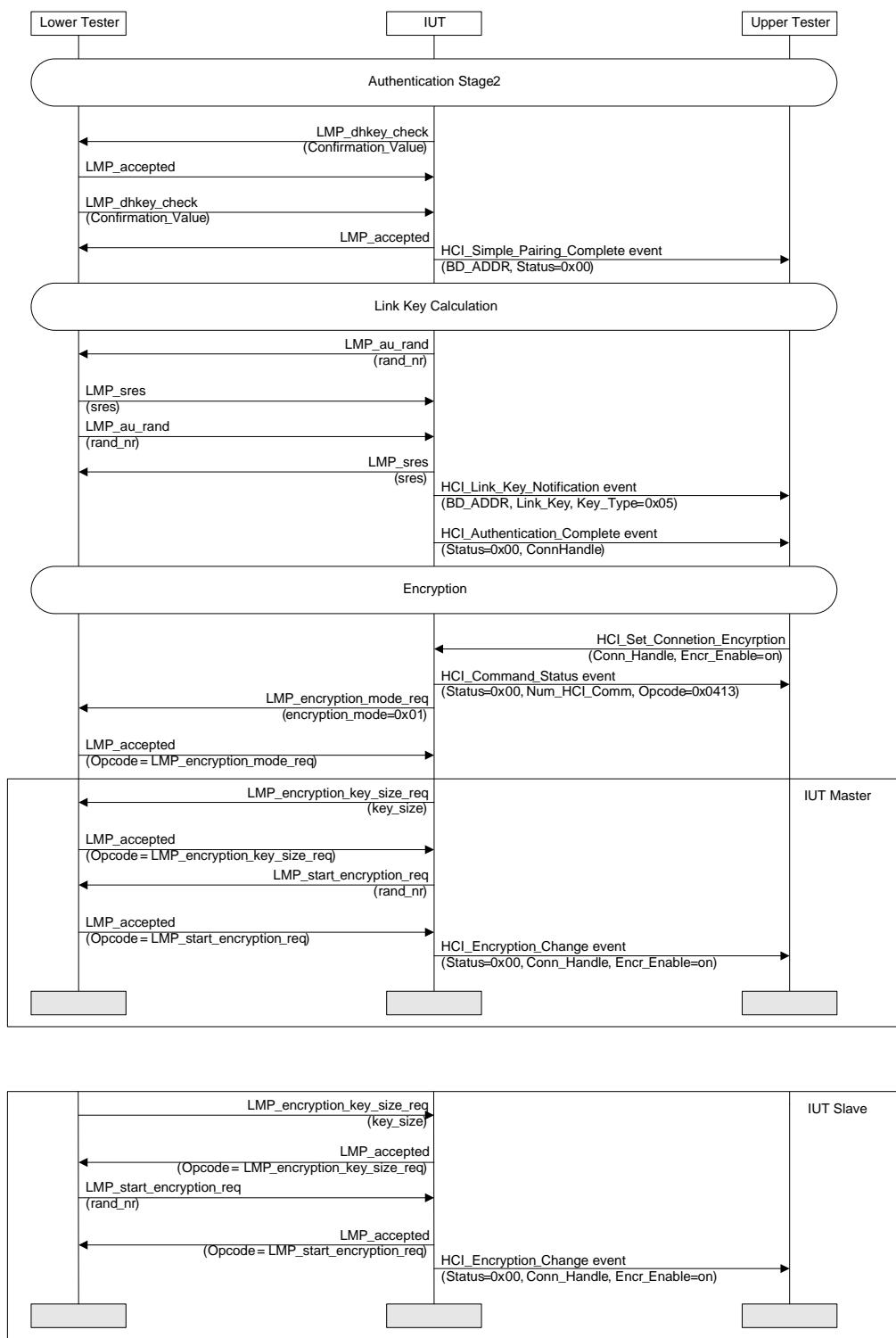


Figure 4.241: LMP/SP/BV-06-C MSC c

- Expected Outcome

Pass verdict

The IUT sends an HCI_Confirmation_Request Event with the same value calculated by the Lower Tester.



The IUT sends the LMP_DHkey_check PDU is with a valid Confirmation_Value.

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester.

The IUT sends the resulting Link Key and Key Type to the Host in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated'.

- Notes

The Lower Tester shall send an LMP_not_accepted to LMP_DHkey if the confirmation value that it calculates does not match with the confirmation value that the IUT has sent.

4.10.2.2 LMP/SP/BV-07-C [Numeric Comparison - IUT Responder – Success]

- Test Purpose

Verify that the IUT supports the Numeric Comparison protocol.

Test procedure is run with IUT as responder.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).



- Test Procedure

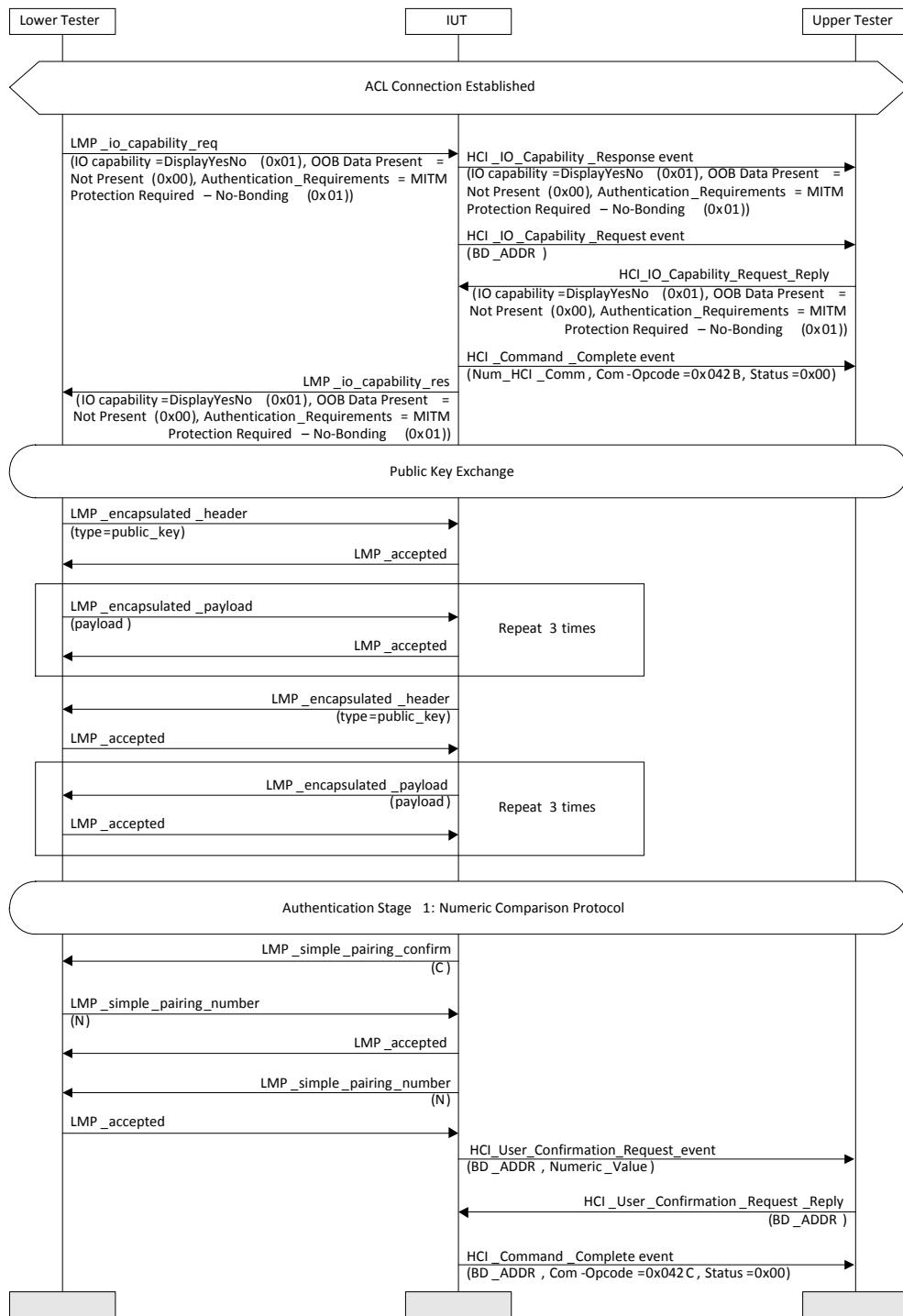


Figure 4.242: LMP/SP/BV-07-C MSC a



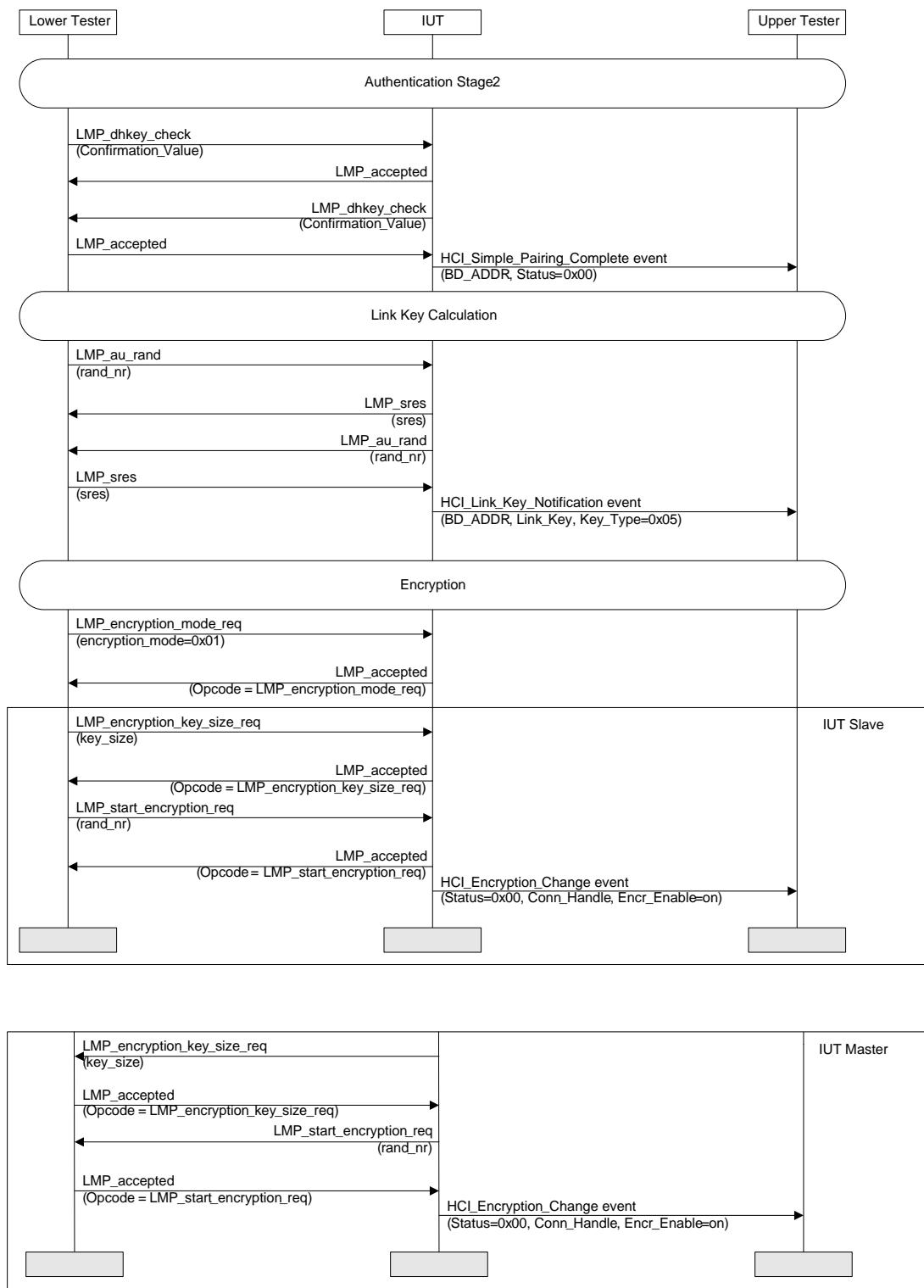


Figure 4.243: LMP/SP/BV-07-C MSC b

- Expected Outcome

Pass verdict

The IUT sends an HCI_Confirmation_Request Event with the same value calculated by the Lower Tester.



The IUT sends the LMP_DHkey_check PDU is with a valid Confirmation_Value.

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester.

The IUT sends the resulting Link Key and Key Type to the Host in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated'.

- Notes

If the commitment value calculated by the Lower Tester does not match the commitment value sent by the IUT, the Lower Tester will send LMP_not_accepted with the Authentication_Failure error code.

The Lower Tester shall send an LMP_not_accepted to LMP_DHkey if the confirmation value that it calculates does not match with the confirmation value that the IUT has sent.

4.10.2.3 LMP/SP/BV-08-C [Numeric Comparison - IUT Initiator - Failure on Initiating Side]

- Test Purpose

Verify that the IUT supports the Numeric Comparison protocol. Verify that the IUT responds correctly when the Upper Tester responds that the numeric comparison value did not verify correctly.

IUT is initiator.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).

- Test Procedure

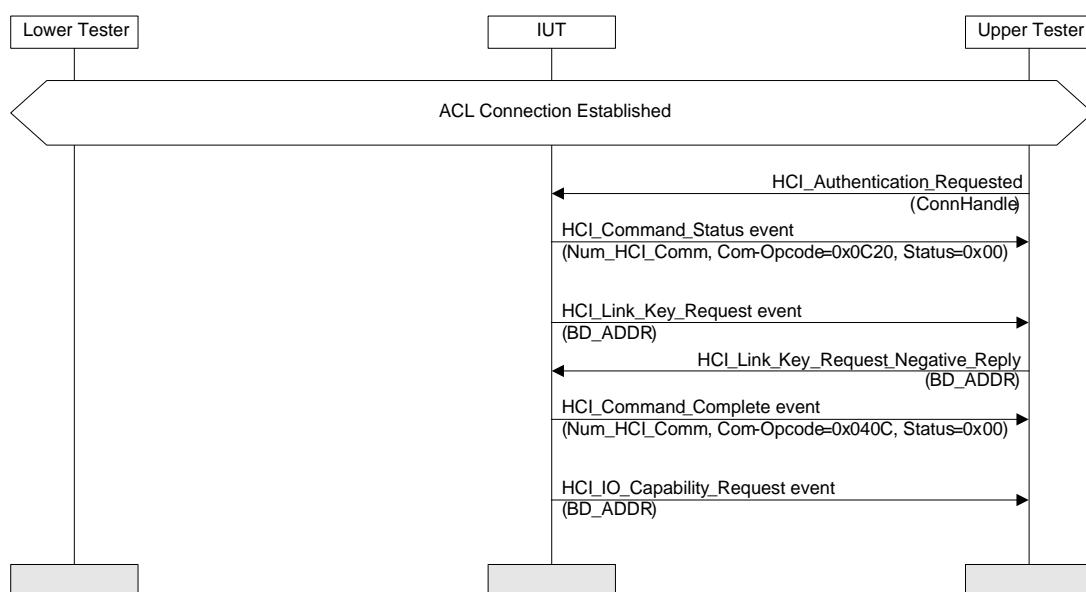


Figure 4.244: LMP/SP/BV-08-C MSC a



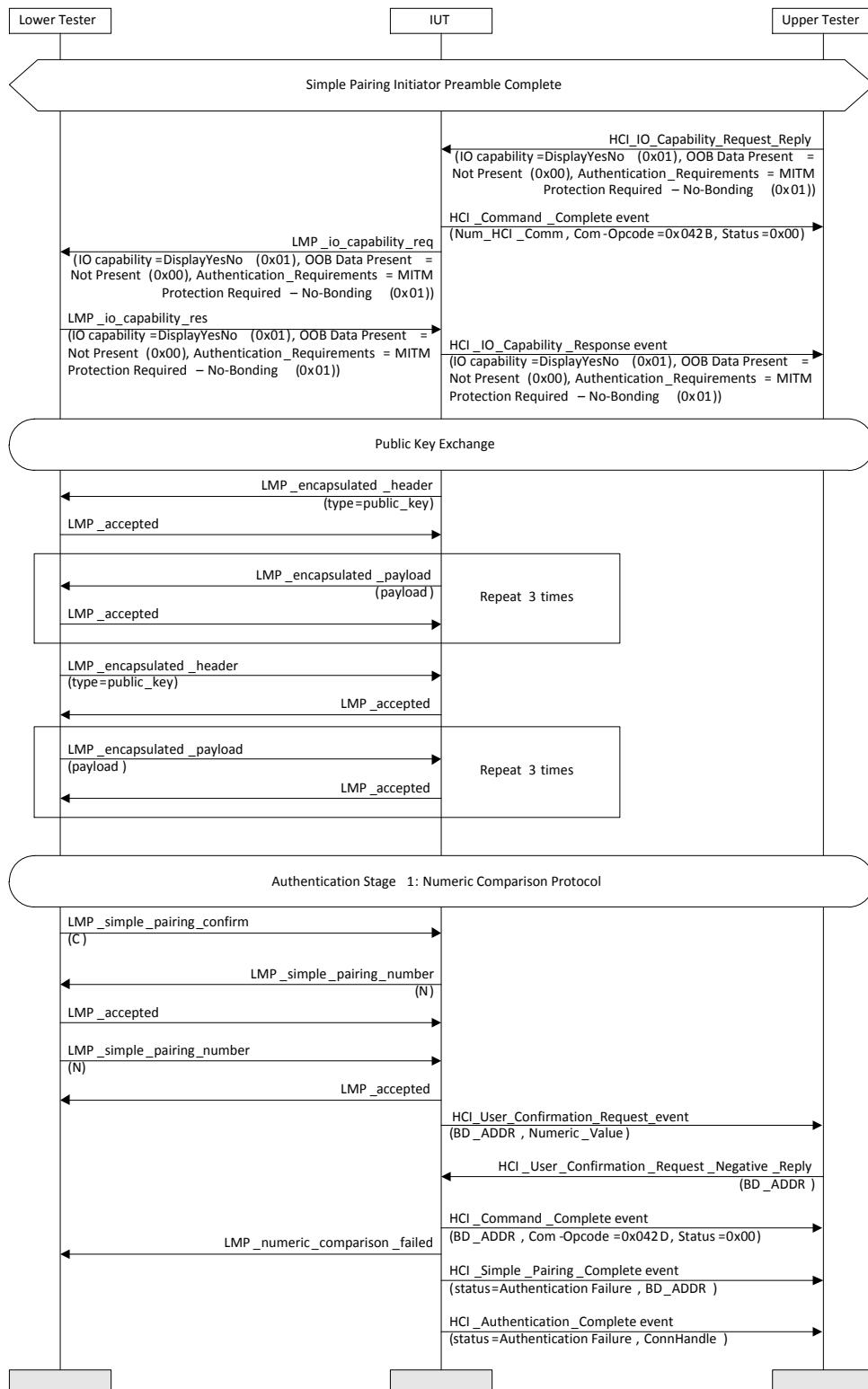


Figure 4.245: P/SP/BV-08-C MSC b



- Expected Outcome

Pass verdict

The IUT sends an LMP_numeric_comparison_failed PDU to the Lower Tester.

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester with status set to Authentication Failure.

4.10.2.4 LMP/SP/BV-09-C [Numeric Comparison - IUT Responder - Failure on Initiating Side]

- Test Purpose

Verify that the IUT supports the Numeric Comparison protocol. Verify that the IUT responds correctly when the Upper Tester responds that the numeric comparison value did not verify correctly.

IUT is responder.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).



- Test Procedure

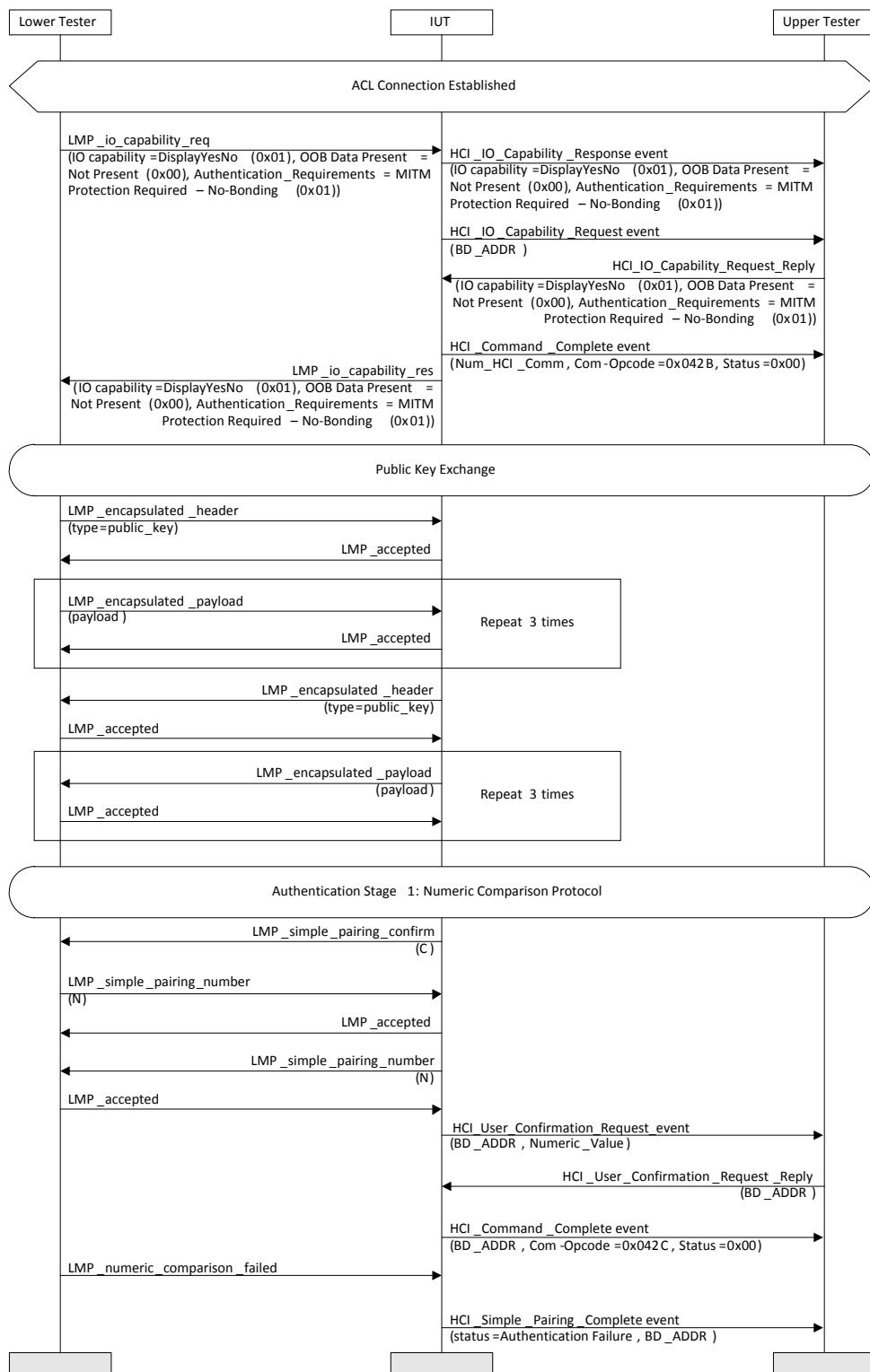


Figure 4.246: LMP/SP/BV-09-C



- Expected Outcome

Pass verdict

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester with status set to Authentication Failure after receiving an LMP_numeric_comparison_failed PDU from the Lower Tester.

4.10.2.5 LMP/SP/BV-10-C [Numeric Comparison - IUT Initiator - Failure on Responding Side]

- Test Purpose

Verify that the IUT supports the Numeric Comparison protocol. Verify that the IUT responds correctly when the responding side fails the numeric comparison check step.

IUT is initiator.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).

- Test Procedure

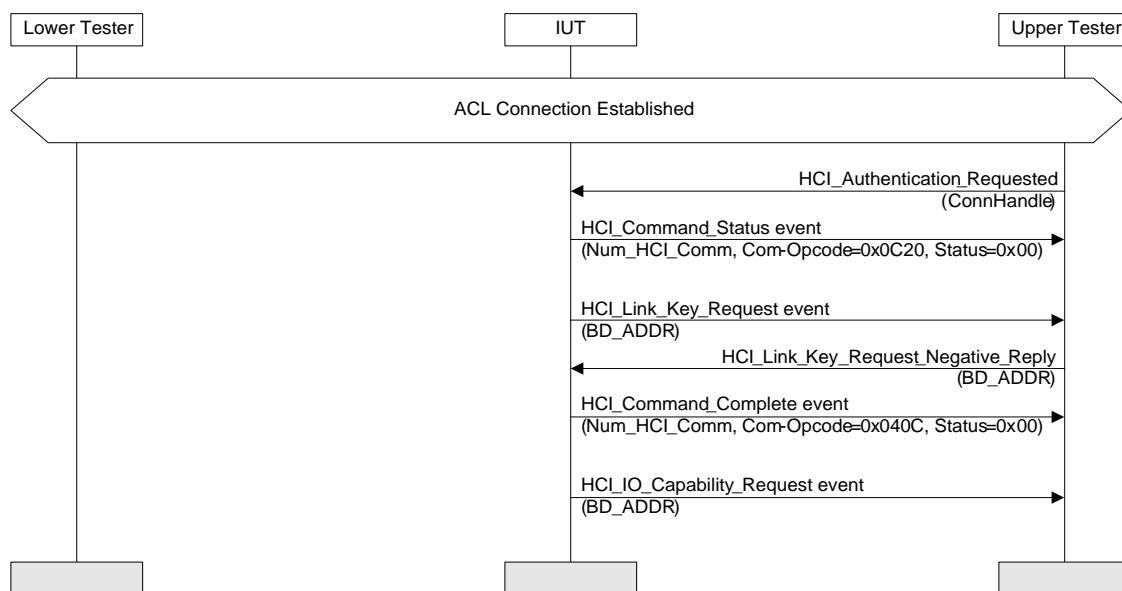


Figure 4.247: LMP/SP/BV-10-C MSC a



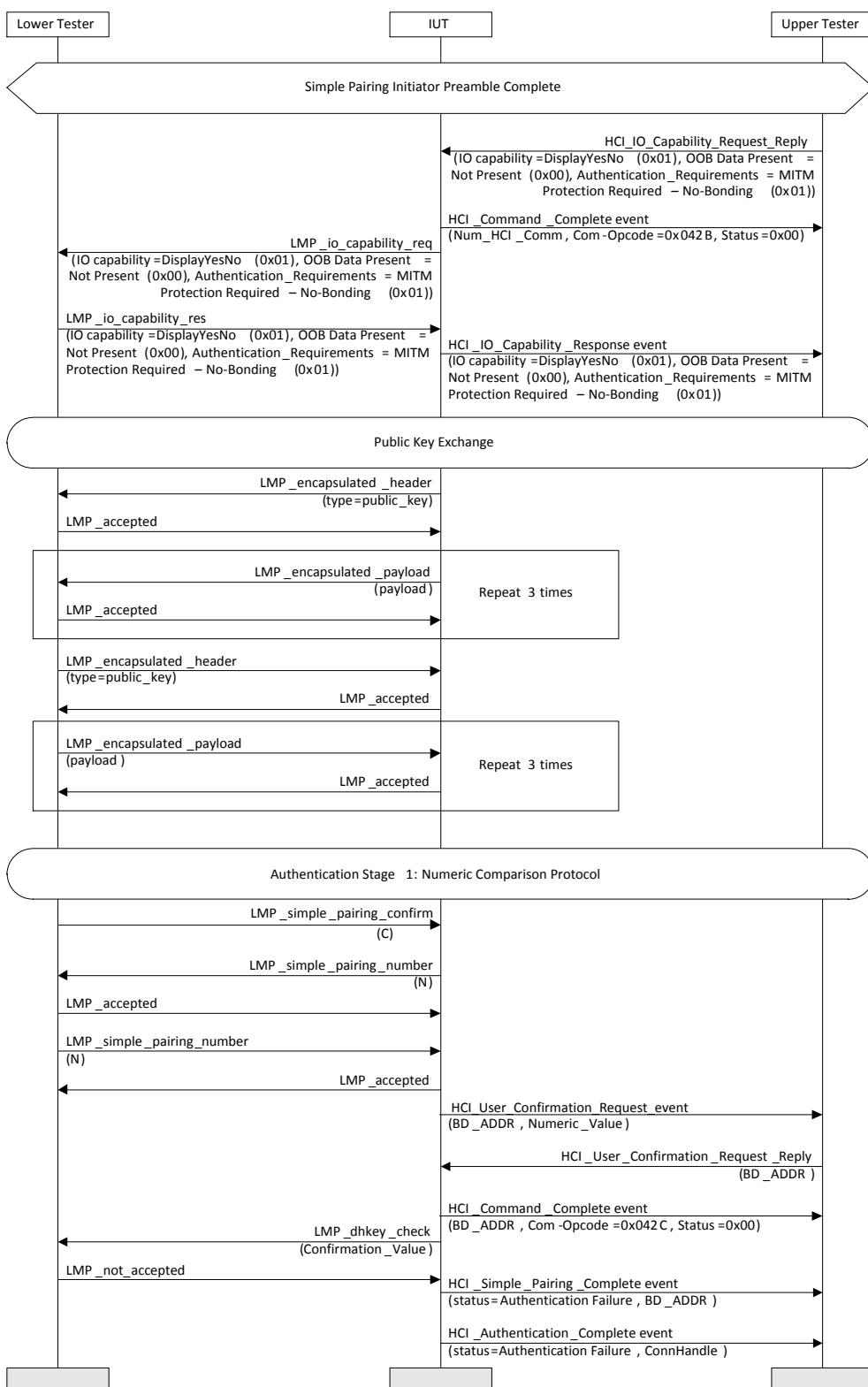


Figure 4.248: LMP/SP/BV-10-C MSC b



- Expected Outcome

Pass verdict

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester with status set to Authentication Failure after the Lower Tester responds to the LMP_dhkey_check PDU with an LMP_not_accepted PDU.

4.10.2.6 LMP/SP/BV-11-C [Numeric Comparison - IUT Responder - Failure on Responding Side]

- Test Purpose

Verify that the IUT supports the Numeric Comparison protocol. Verify that the IUT responds correctly when the responding side fails the numeric comparison check step.

IUT is responder.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).



- Test Procedure

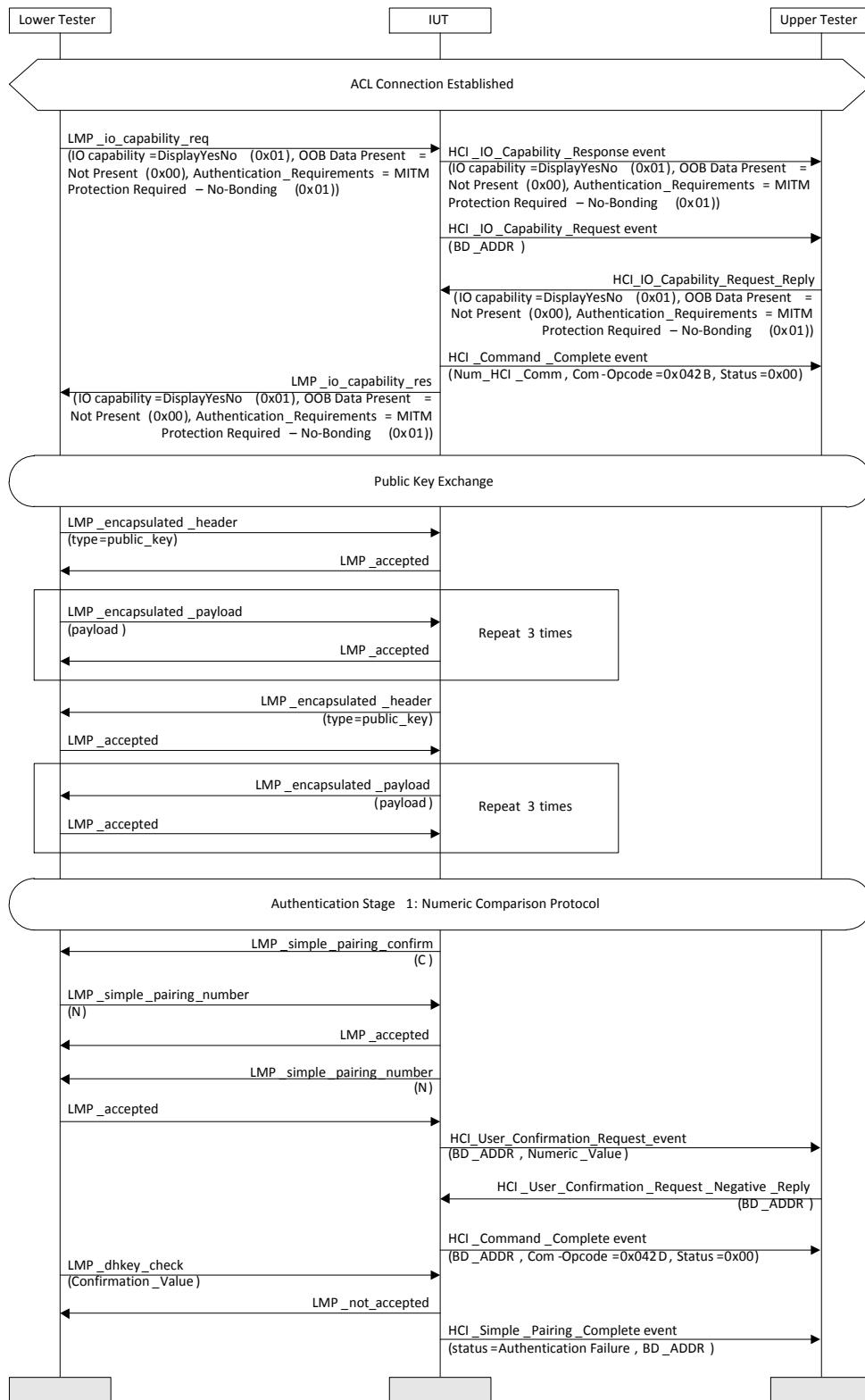


Figure 4.249: LMP/SP/BV-11-C



- Expected Outcome

Pass verdict

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester with status set to Authentication Failure after the IUT responds to the LMP_dhkey_check PDU with an LMP_not_accepted PDU.

4.10.2.7 LMP/SP/BV-41-C [Numeric Comparison – IUT Initiator – Success, P-256]

- Test Purpose

Verify that the IUT supports the Numeric Comparison protocol using the P-256 elliptic curve.

Test procedure is run with IUT as the initiator.

- Reference

[1] 4.2.7

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).

- Test Procedure

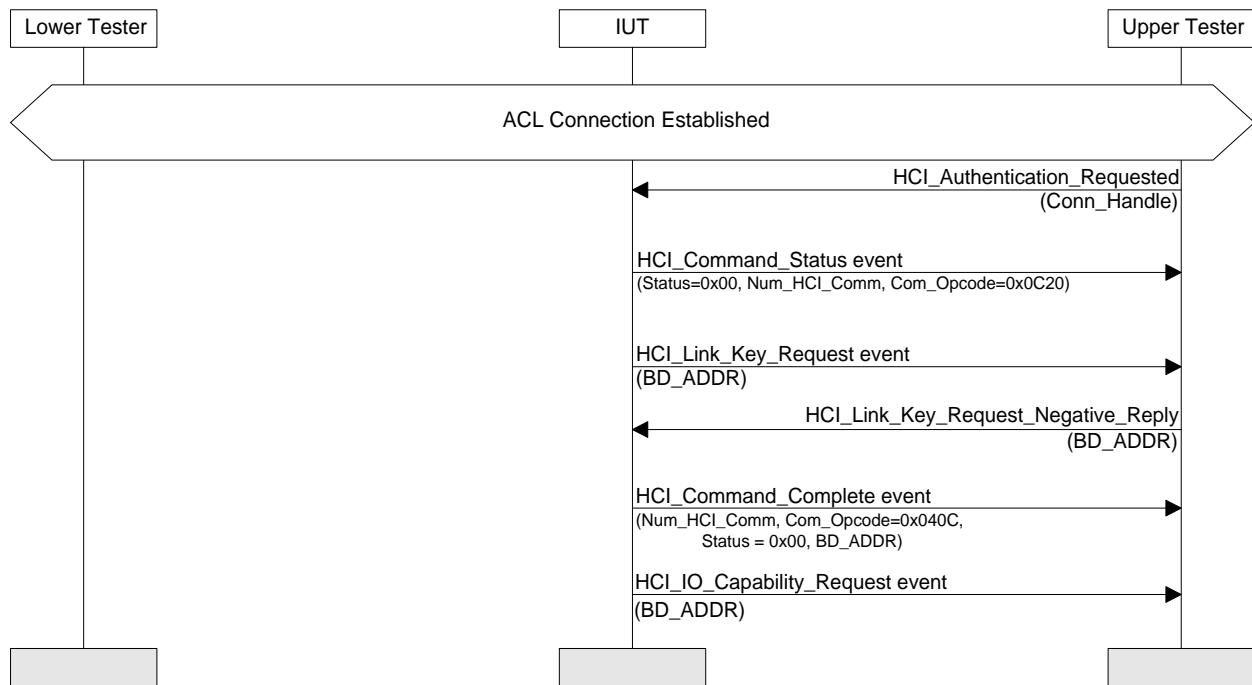


Figure 4.250: LMP/SP/BV-41-C MSC a



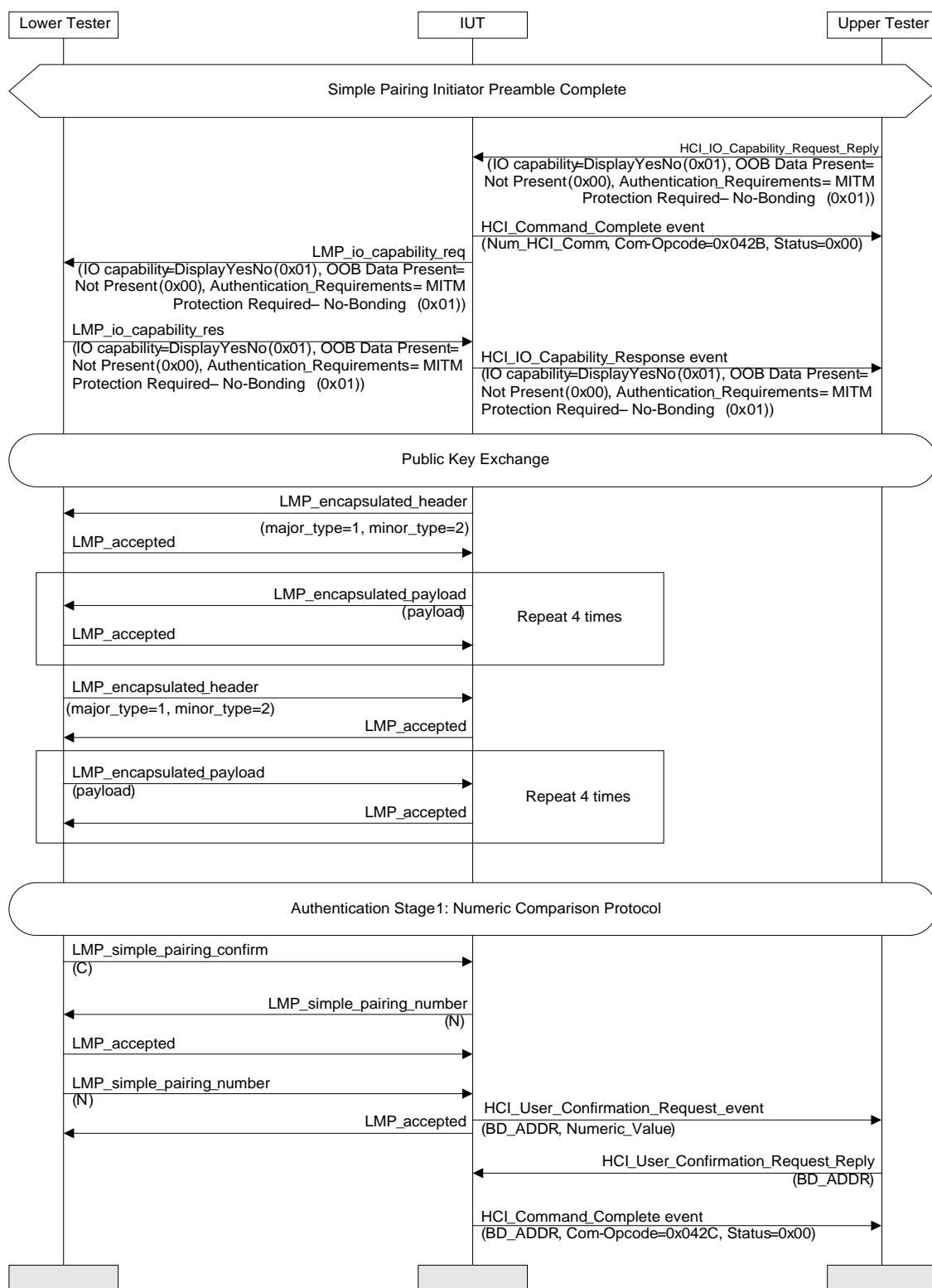


Figure 4.251: LMP/SP/BV-41-C MSC b



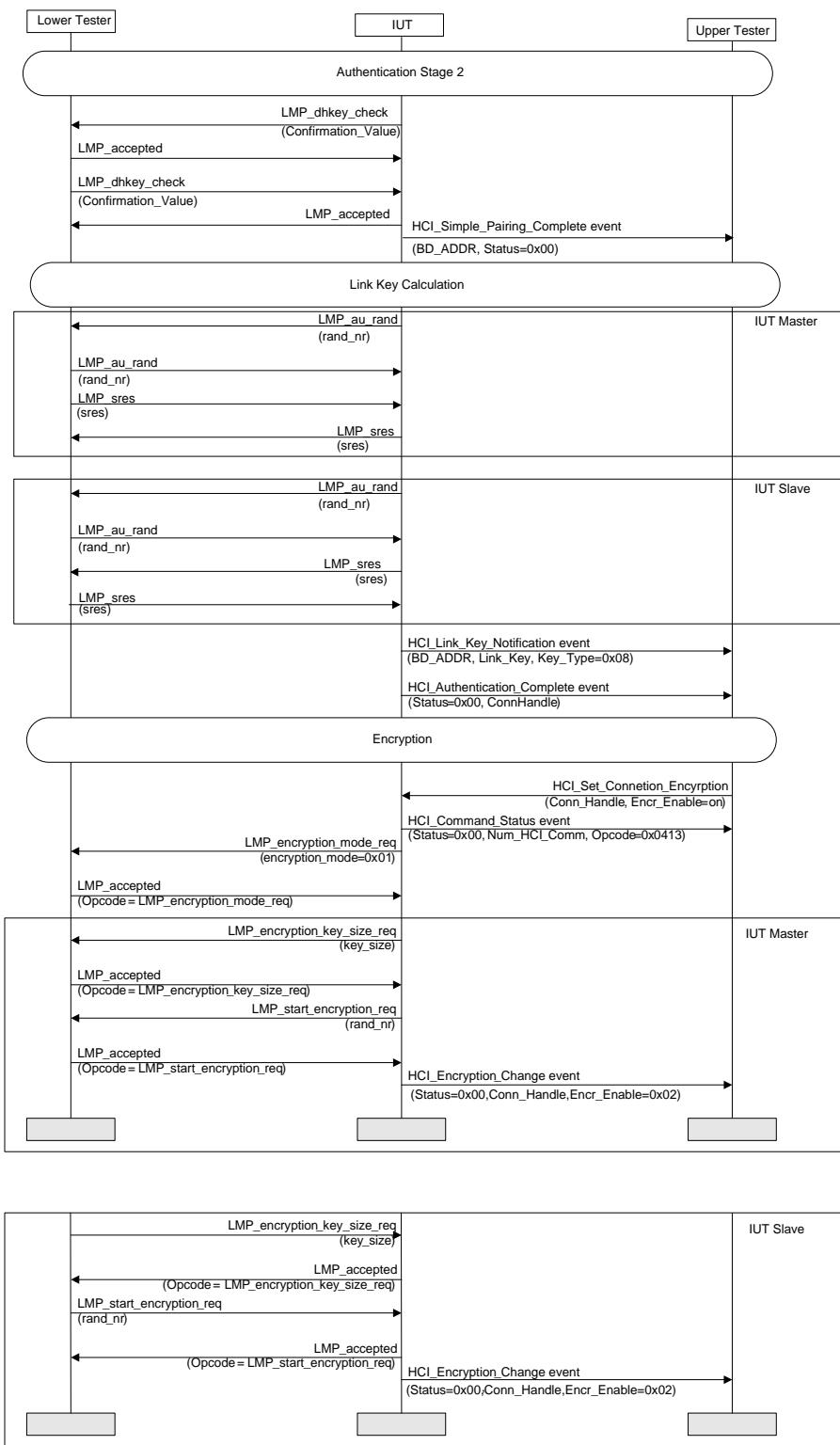


Figure 4.252: LMP/SP/BV-41-C MSC c



- Expected Outcome

Pass verdict

The IUT sends an HCI_User_Confirmation_Request Event with the same value calculated by the Lower Tester.

The IUT sends the LMP_DHkey_check PDU is with a valid Confirmation_Value.

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester.

The IUT sends the resulting Link Key and Key Type to the Host in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated Combination Key generated from P256'.

- Notes

The Lower Tester shall send an LMP_not_accepted to LMP_DHkey if the confirmation value that it calculates does not match with the confirmation value that the IUT has sent.

This test case is similar to [LMP/SP/BV-06-C \[Numeric Comparison - IUT Initiator – Success\]](#).

4.10.2.8 [LMP/SP/BV-42-C \[Numeric Comparison – IUT Responder – Success, P-256\]](#)

- Test Purpose

Verify that the IUT supports the Numeric Comparison protocol using the P-256 elliptic curve.

Test procedure is run with IUT as the responder.

- Reference

[\[1\] 4.2.7.](#)

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).



- Test Procedure

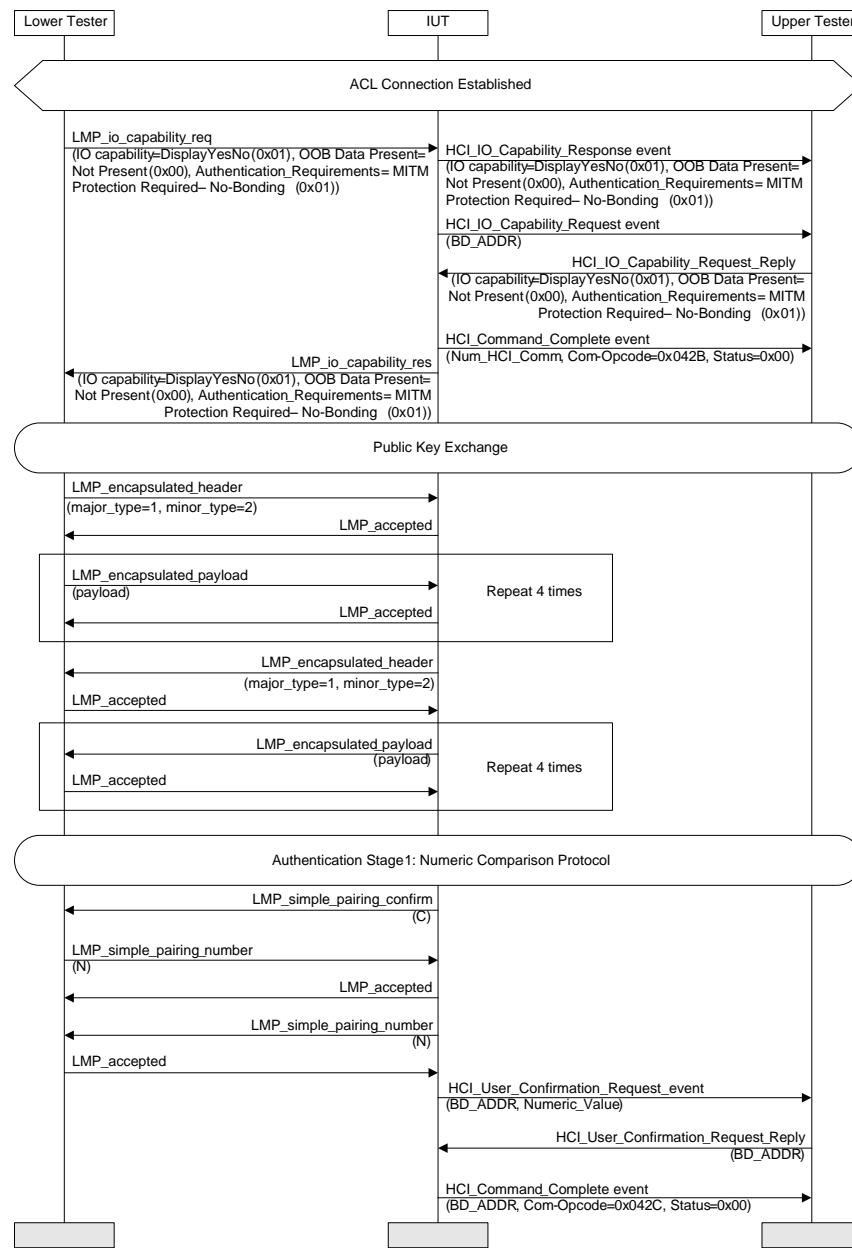


Figure 4.253: LMP/SP/BV-42-C MSC a



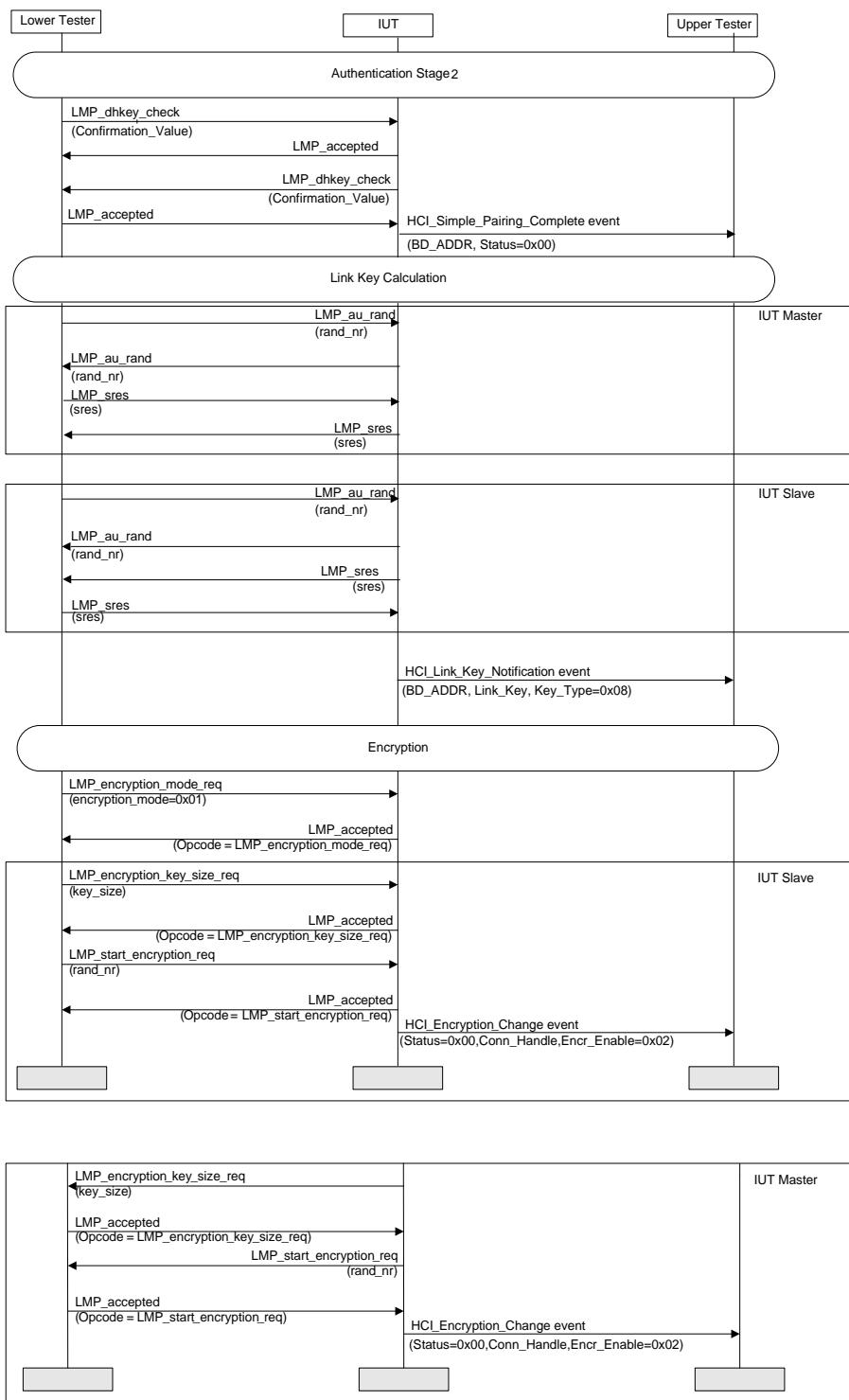


Figure 4.254: LMP/SP/BV-42-C MSC b

- Expected Outcome

Pass verdict

The IUT sends an HCI_User_Confirmation_Request Event with the same value calculated by the Lower Tester.



The IUT sends the LMP_DHkey_check PDU is with a valid Confirmation_Value.

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester.

The IUT sends the resulting Link Key and Key Type to the Host in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated Combination Key generated from P256'.

- Notes

If the commitment value calculated by the Lower Tester does not match the commitment value sent by the IUT, the Lower Tester will send LMP_not_accepted with the Authentication_Failure error code.

The Lower Tester shall send an LMP_not_accepted to LMP_DHkey if the confirmation value that it calculates does not match with the confirmation value that the IUT has sent.

This test case is similar to [LMP/SP/BV-07-C \[Numeric Comparison - IUT Responder – Success\]](#).

4.10.2.9 [LMP/SP/BV-43-C \[Numeric Comparison – IUT Initiator, Failure on Initiating side, P-256\]](#)

- Test Purpose

Verify that the IUT supports the Numeric Comparison protocol using the P-256 elliptic curve. Verify that the IUT responds correctly when the Upper Tester responds that the numeric comparison value did not verify correctly.

IUT is initiator.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).



- Test Procedure

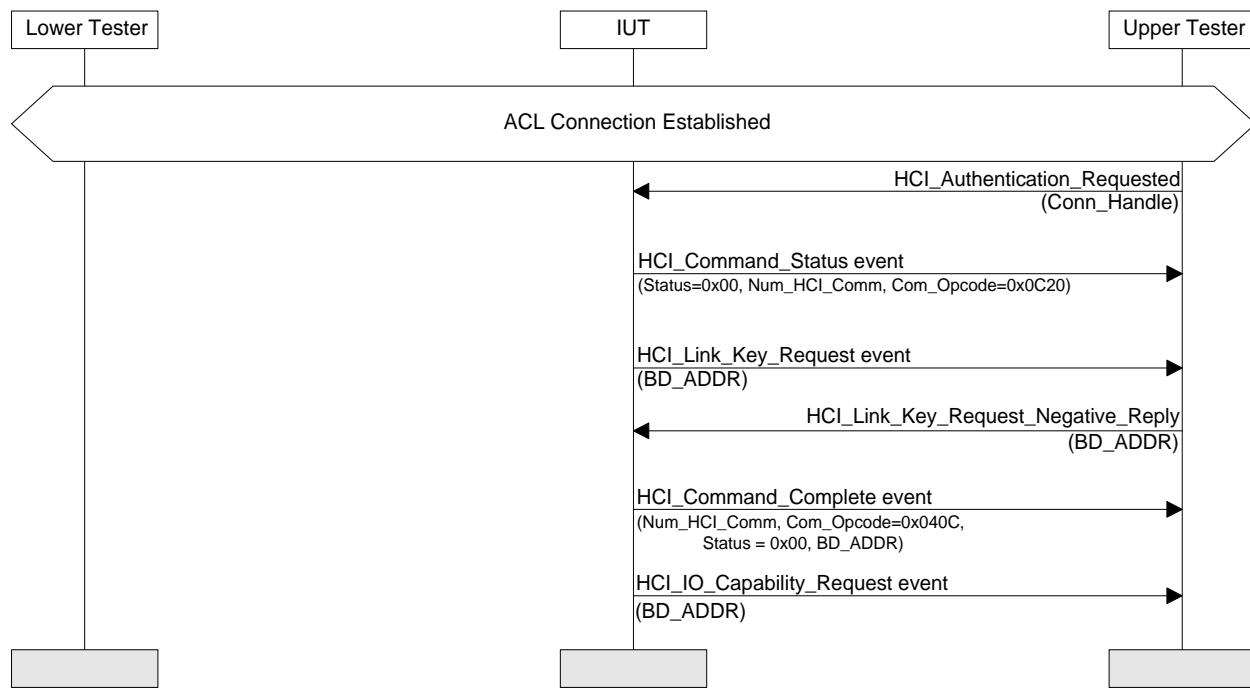


Figure 4.255: LMP/SP/BV-43-C MSC a



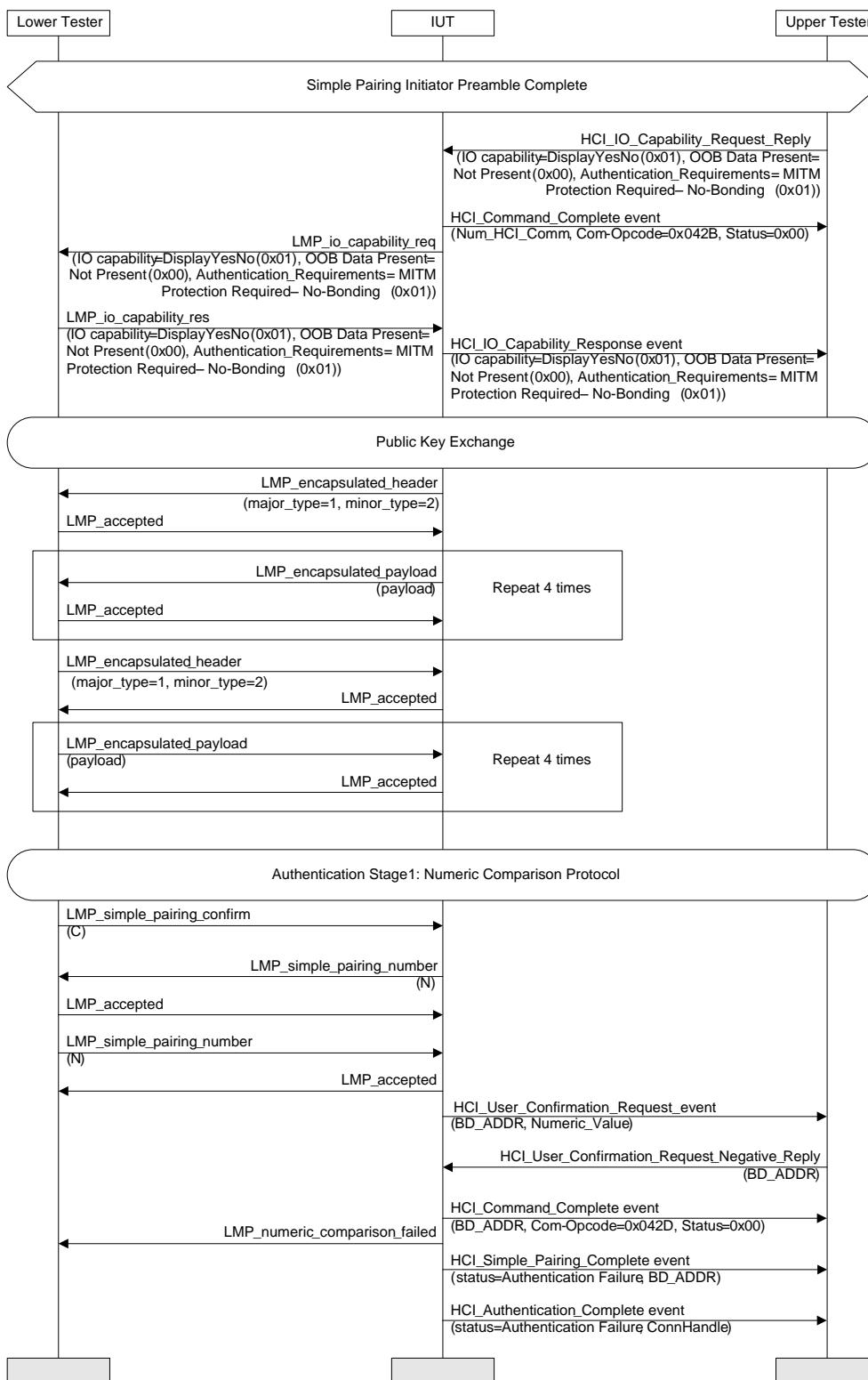


Figure 4.256: LMP/SP/BV-43-C MSC b

- Expected Outcome

Pass verdict

The IUT sends an LMP_numeric_comparison_failed PDU to the Lower Tester.



The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester with status set to Authentication Failure.

- Notes

This test case is similar to [LMP/SP/BV-08-C \[Numeric Comparison - IUT Initiator - Failure on Initiating Side\]](#).

4.10.2.10 LMP/SP/BV-44-C [Numeric Comparison – IUT Responder – Failure on Initiating Side, P-256]

- Test Purpose

Verify that the IUT supports the Numeric Comparison protocol using the P-256 elliptic curve. Verify that the IUT responds correctly when the Upper Tester responds that the numeric comparison value did not verify correctly.

IUT is responder.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).



- Test Procedure

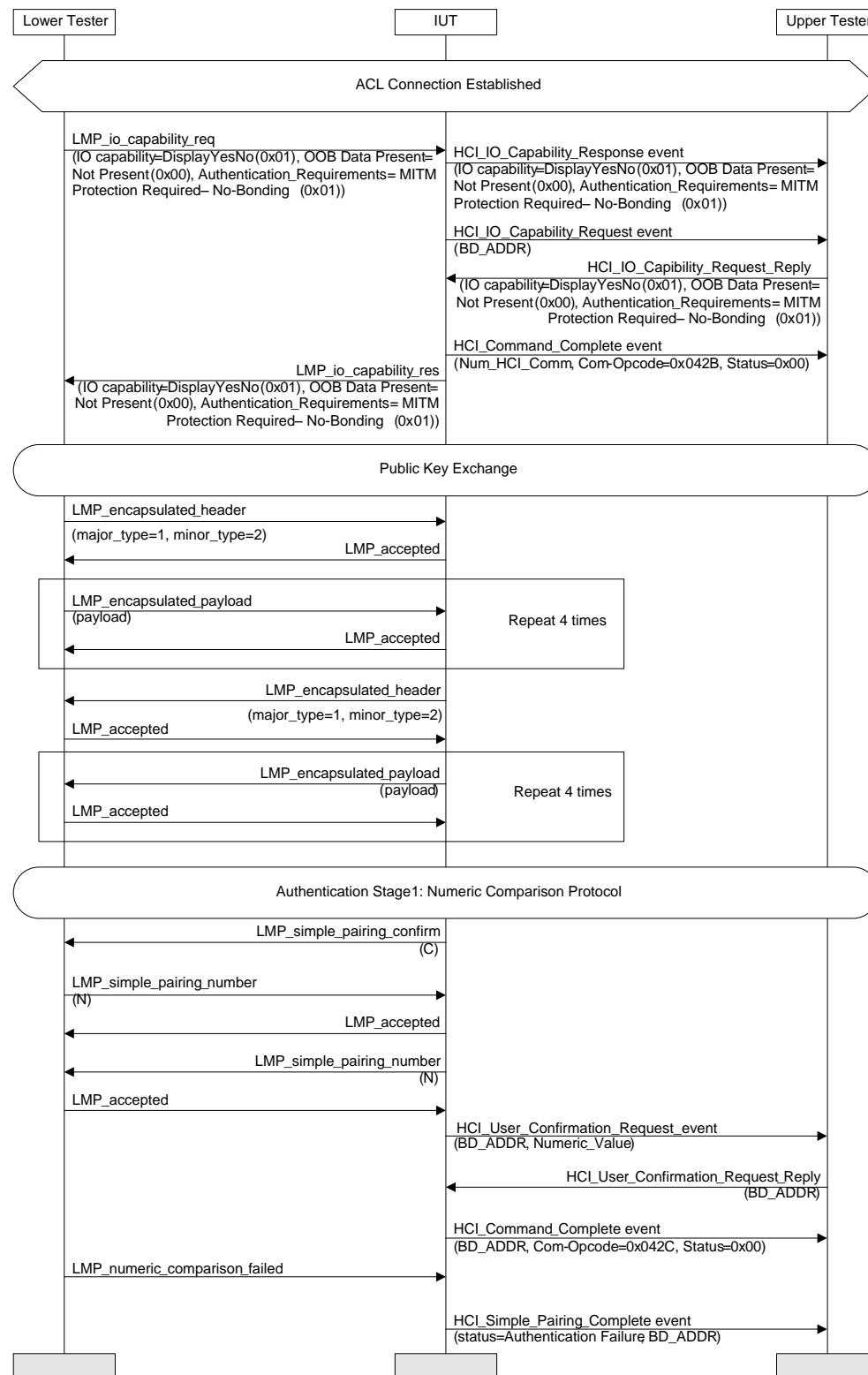


Figure 4.257: LMP/SP/BV-44-C



- Expected Outcome

Pass verdict

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester with status set to Authentication Failure after receiving an LMP_numeric_comparison_failed PDU from the Lower Tester.

- Notes

This test case is similar to [LMP/SP/BV-09-C \[Numeric Comparison - IUT Responder - Failure on Initiating Side\]](#).

4.10.2.11 LMP/SP/BV-45-C [Numeric Comparison – IUT Initiator – Failure on Responding Side, P-256]

- Test Purpose

Verify that the IUT supports the Numeric Comparison protocol using the P-256 elliptic curve. Verify that the IUT responds correctly when the responding side fails the numeric comparison check step.

IUT is initiator.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

See [Baseband Assumptions and Secure Simple Pairing P256](#).

- Test Procedure

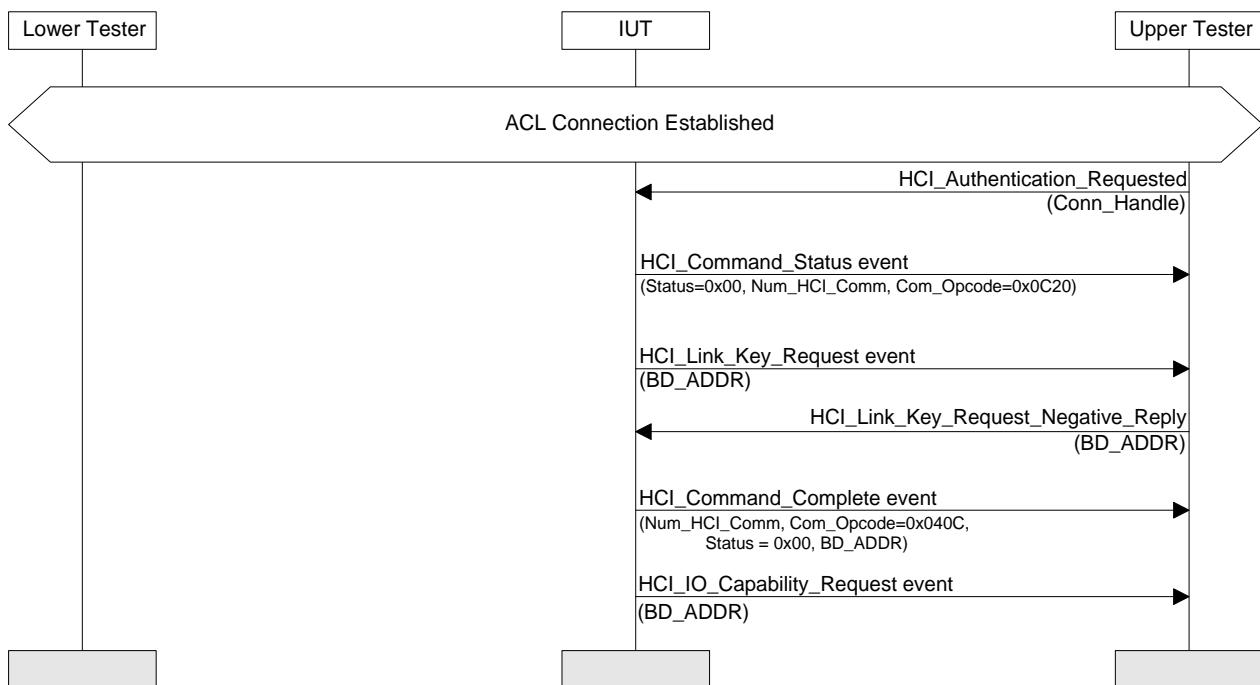


Figure 4.258: LMP/SP/BV-45-C MSC a



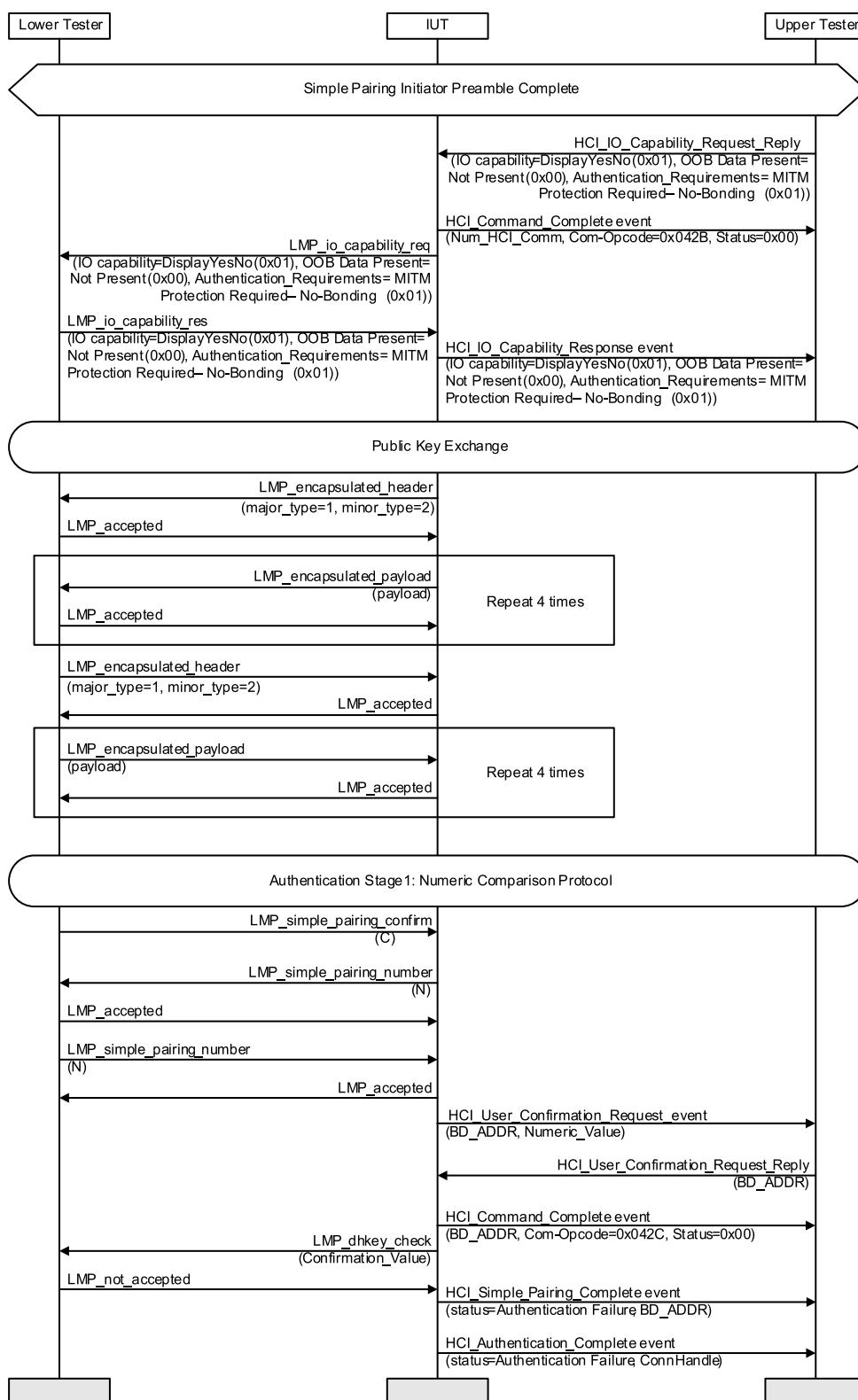


Figure 4.259: LMP/SP/BV-45-C MSC b



- Expected Outcome

Pass verdict

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester with status set to Authentication Failure after the Lower Tester responds to the LMP_dhkey_check PDU with an LMP_not_accepted PDU.

- Notes

This test case is similar to [LMP/SP/BV-10-C \[Numeric Comparison - IUT Initiator - Failure on Responding Side\]](#).

4.10.2.12 LMP/SP/BV-46-C [Numeric Comparison – IUT Responder – Failure on Responding Side, P-256]

- Test Purpose

Verify that the IUT supports the Numeric Comparison protocol using the P-256 elliptic curve. Verify that the IUT responds correctly when the responding side fails the numeric comparison check step.

IUT is responder.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).



- Test Procedure

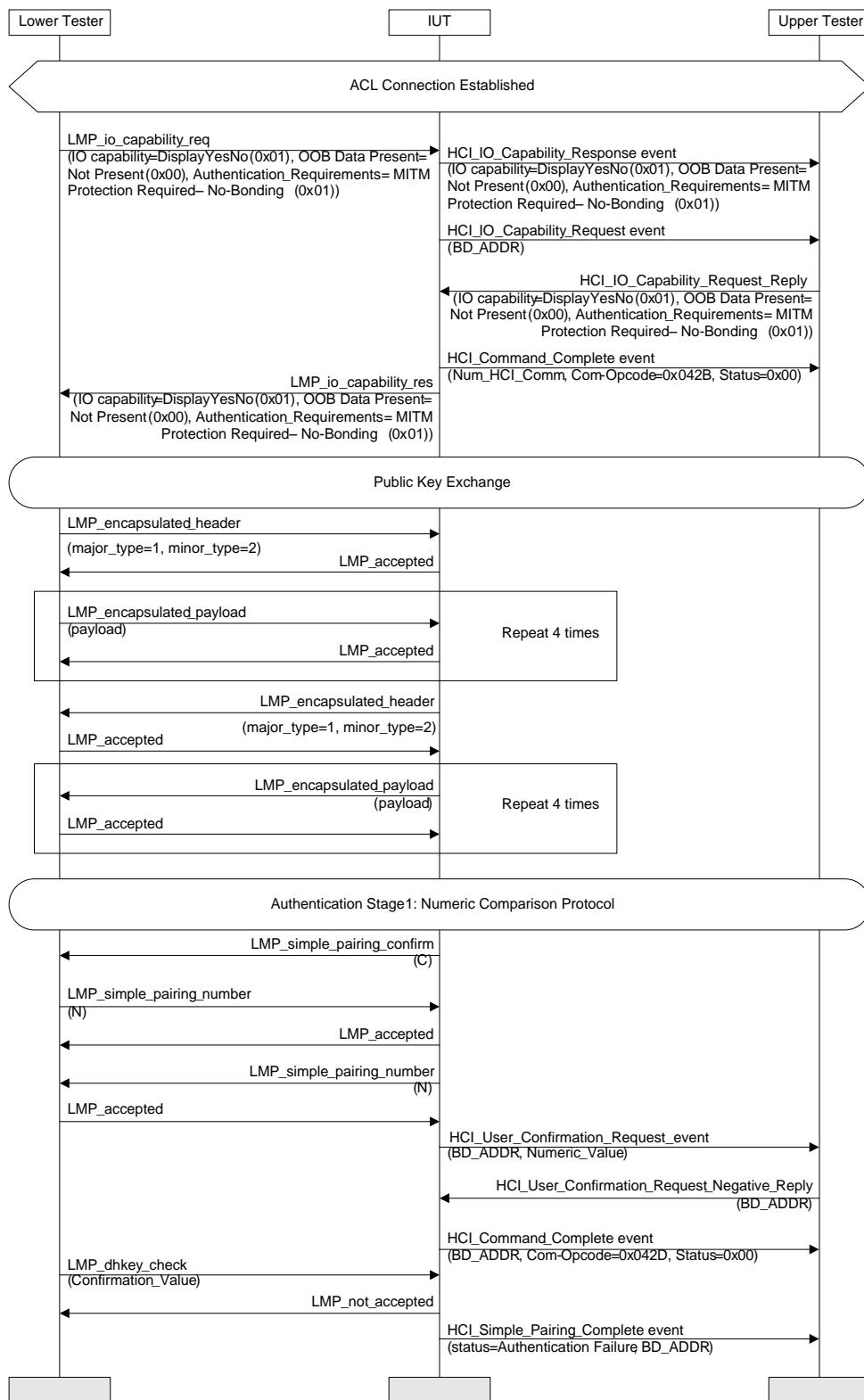


Figure 4.260: LMP/SP/BV-46-C



- Expected Outcome

Pass verdict

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester with status set to Authentication Failure after the IUT responds to the LMP_dhkey_check PDU with an LMP_not_accepted PDU.

- Notes

This test case is similar to [LMP/SP/BV-11-C \[Numeric Comparison - IUT Responder - Failure on Responding Side\]](#).

4.10.2.13 LMP/SP/BV-47-C [Pairing on encrypted ACL – Numeric Comparison – IUT Initiator – Success, P-256]

- Test Purpose

Verify that the IUT performs encryption pause and resume at the end of pairing using the Numeric Comparison protocol using the P-256 elliptic curve if the ACL connection was already encrypted.

Test procedure is run with IUT as the initiator.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).



- Test Procedure

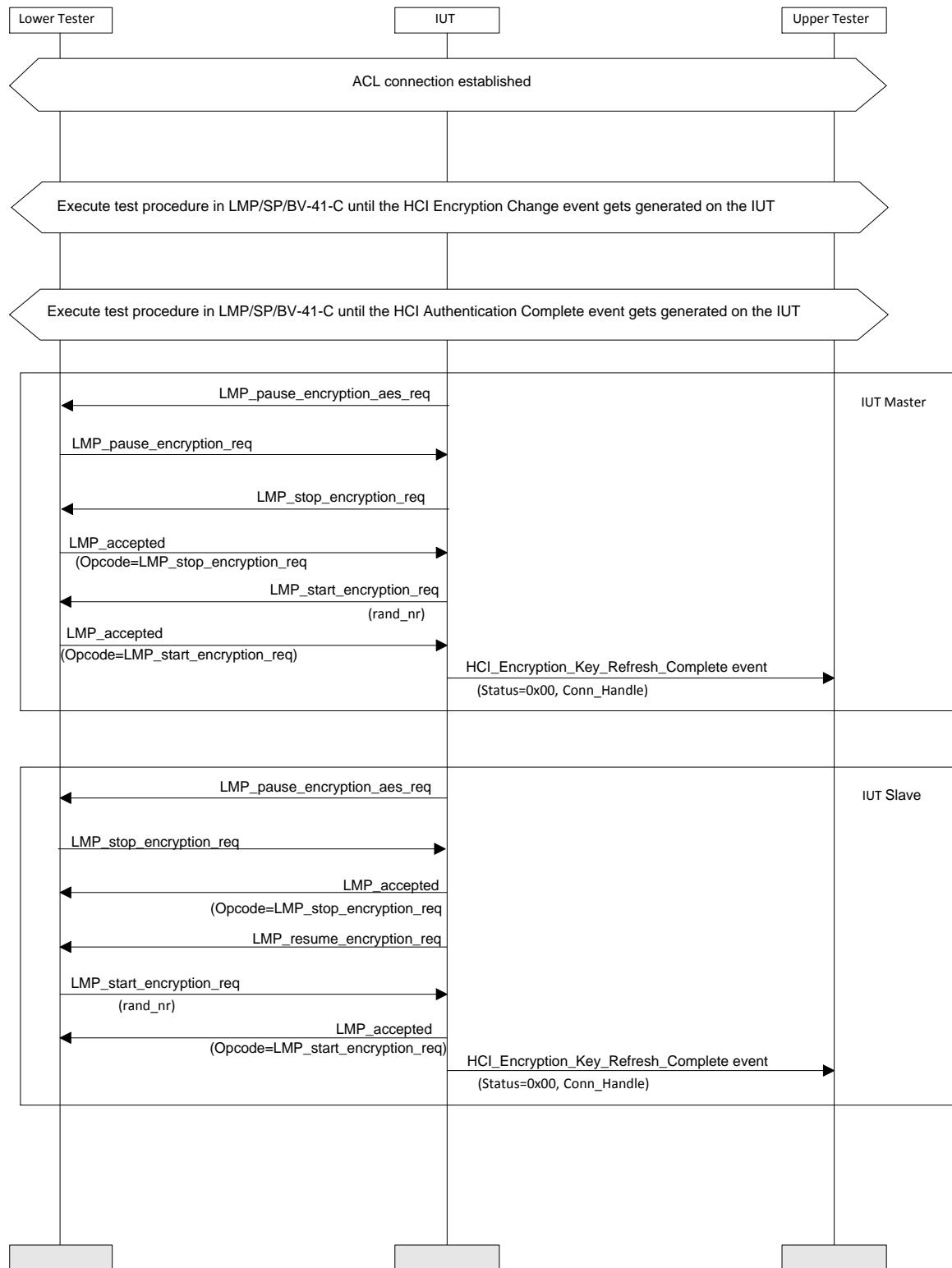


Figure 4.261: LMP/SP/BV-47-C



- Expected Outcome

Pass verdict

Both the pairing procedures are successful.

The IUT initiates an encryption pause resume at the end of the second pairing procedure and generates an HCI Encryption Key Refresh Complete event with status success.

4.10.3 Passkey Entry Procedures

Note: In all the test cases in section 4.10.3 Passkey Entry Procedures, it does not matter whether the IUT is master or slave.

4.10.3.1 LMP/SP/BV-12-C [Passkey Entry - IUT Initiator – Success]

- Test Purpose

Verify that the IUT supports the Passkey Entry protocol.

IUT is initiator.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).

- Test Procedure

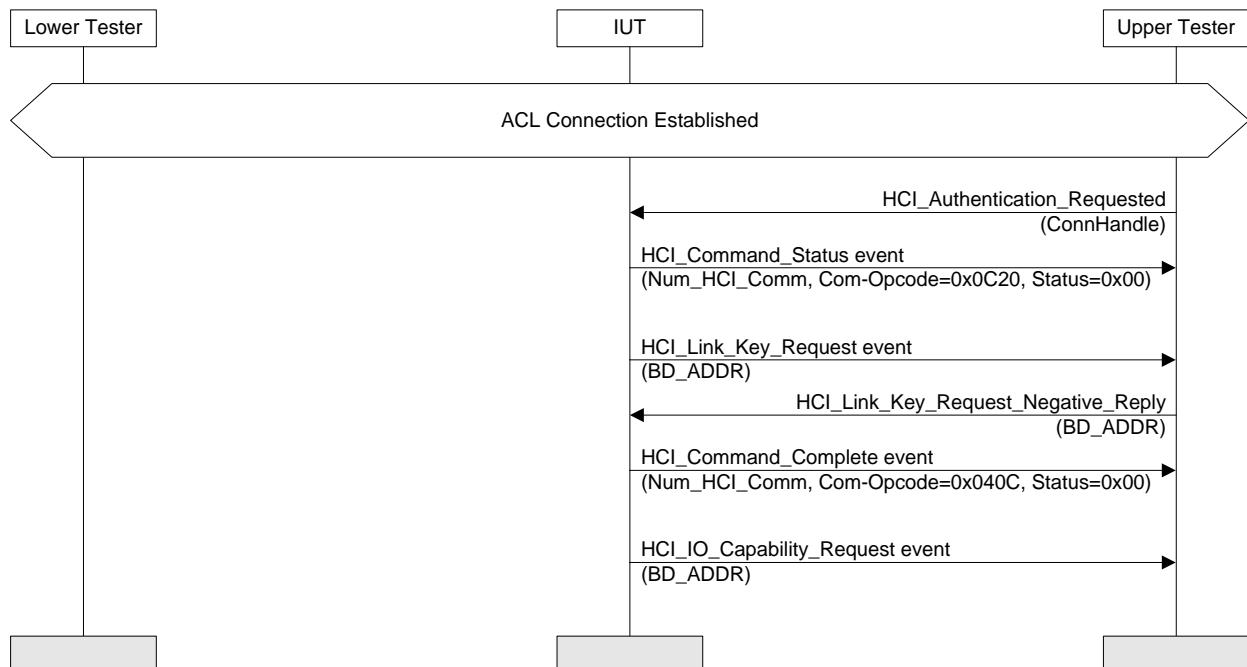


Figure 4.262: LMP/SP/BV-12-C MSC a



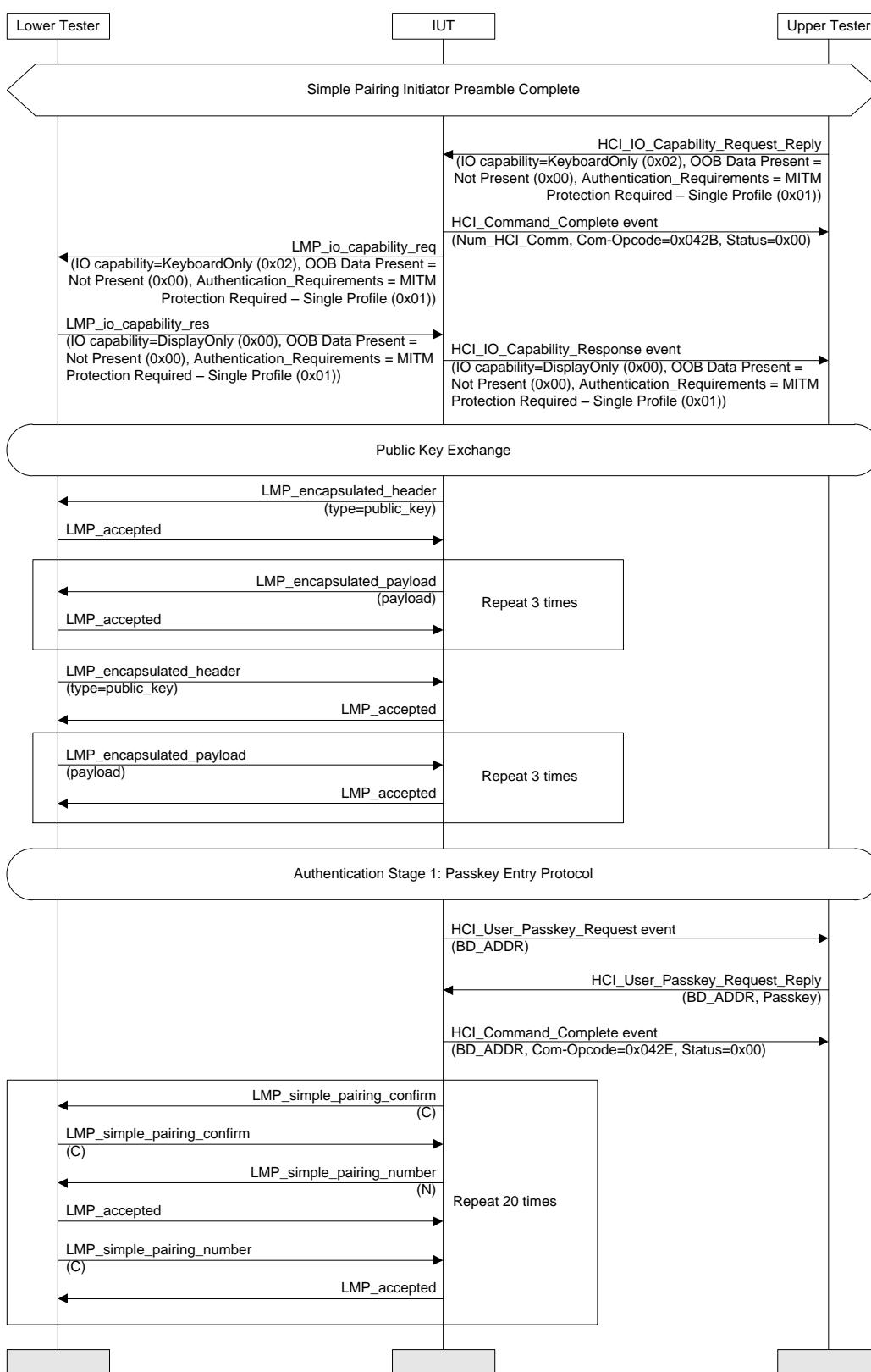


Figure 4.263: LMP/SP/BV-12-C MSC b



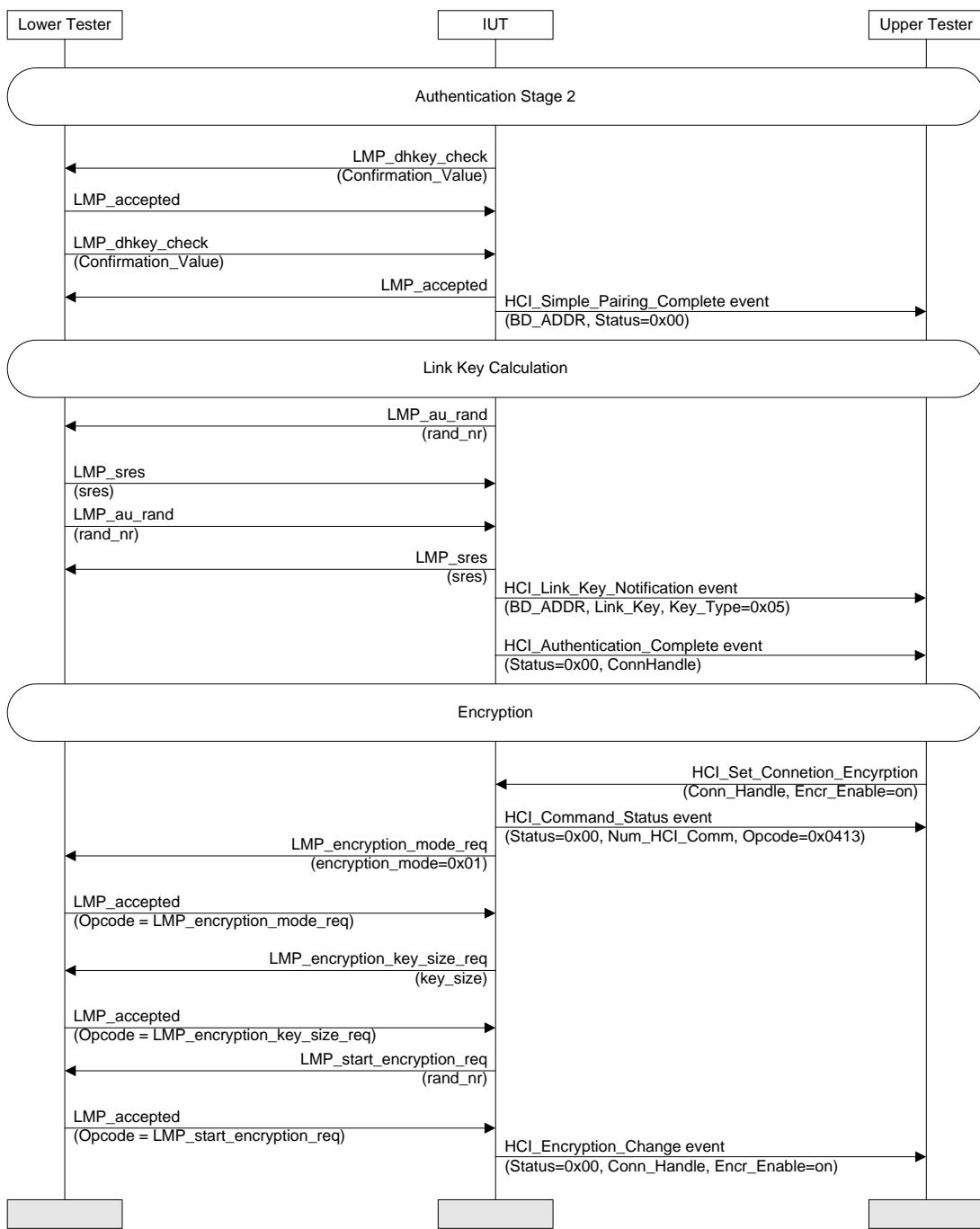


Figure 4.264: LMP/SP/BV-12-C MSC c

- Expected Outcome

Pass verdict

The IUT sends the LMP_DHkey_check PDU is with a valid Confirmation_Value.

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester.



The IUT sends the resulting Link Key and Key Type to the Host in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated'.

- Notes

The Lower Tester shall send an LMP_not_accepted to LMP_DHkey if the confirmation value that it calculates does not match with the confirmation value that the IUT has sent.

4.10.3.2 LMP/SP/BV-13-C [Passkey Entry - IUT Responder – Success]

- Test Purpose

Verify that the IUT supports the Passkey Entry protocol.

IUT is responder.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).



- Test Procedure

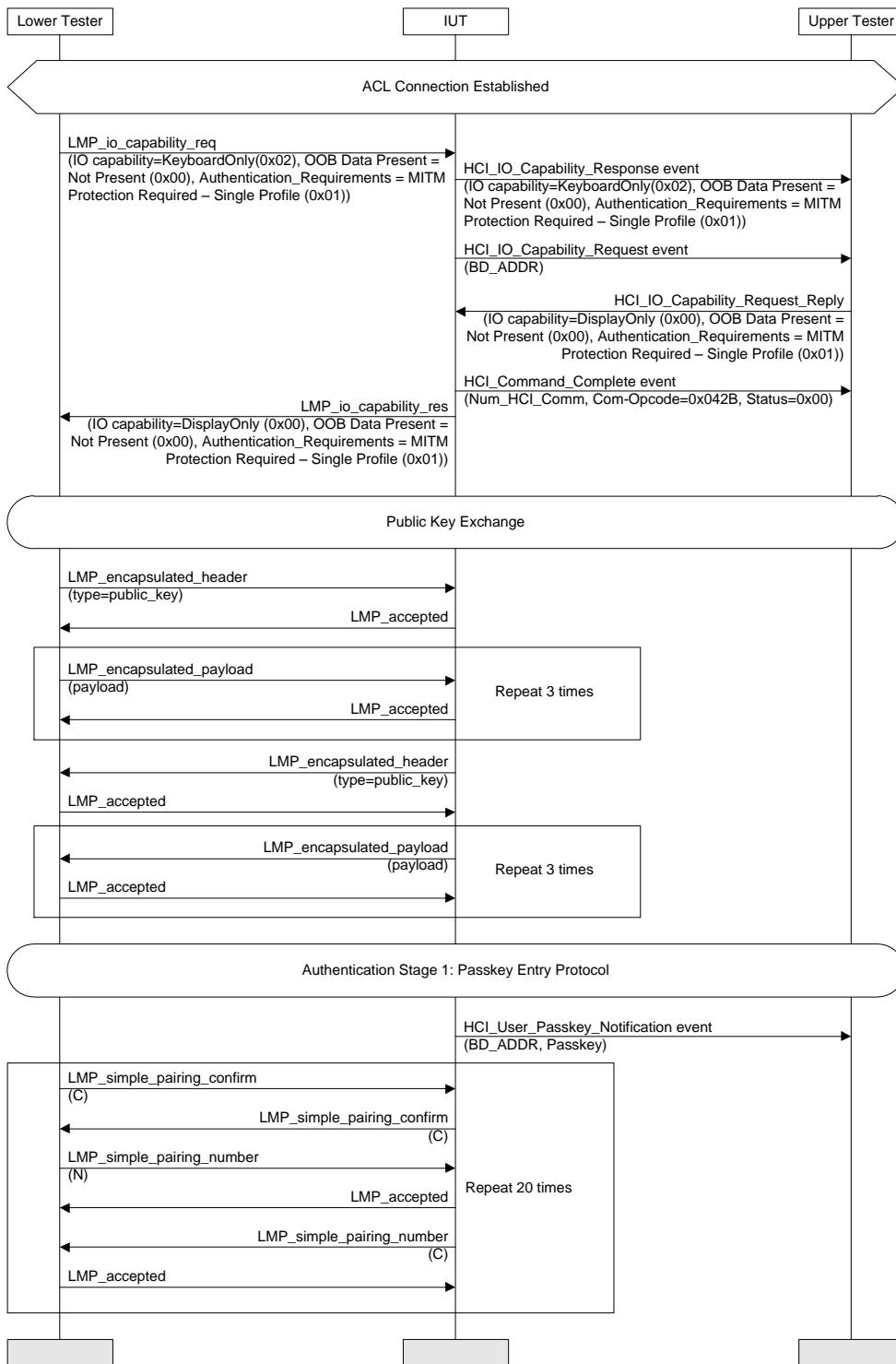


Figure 4.265: LMP/SP/BV-13-C MSC a



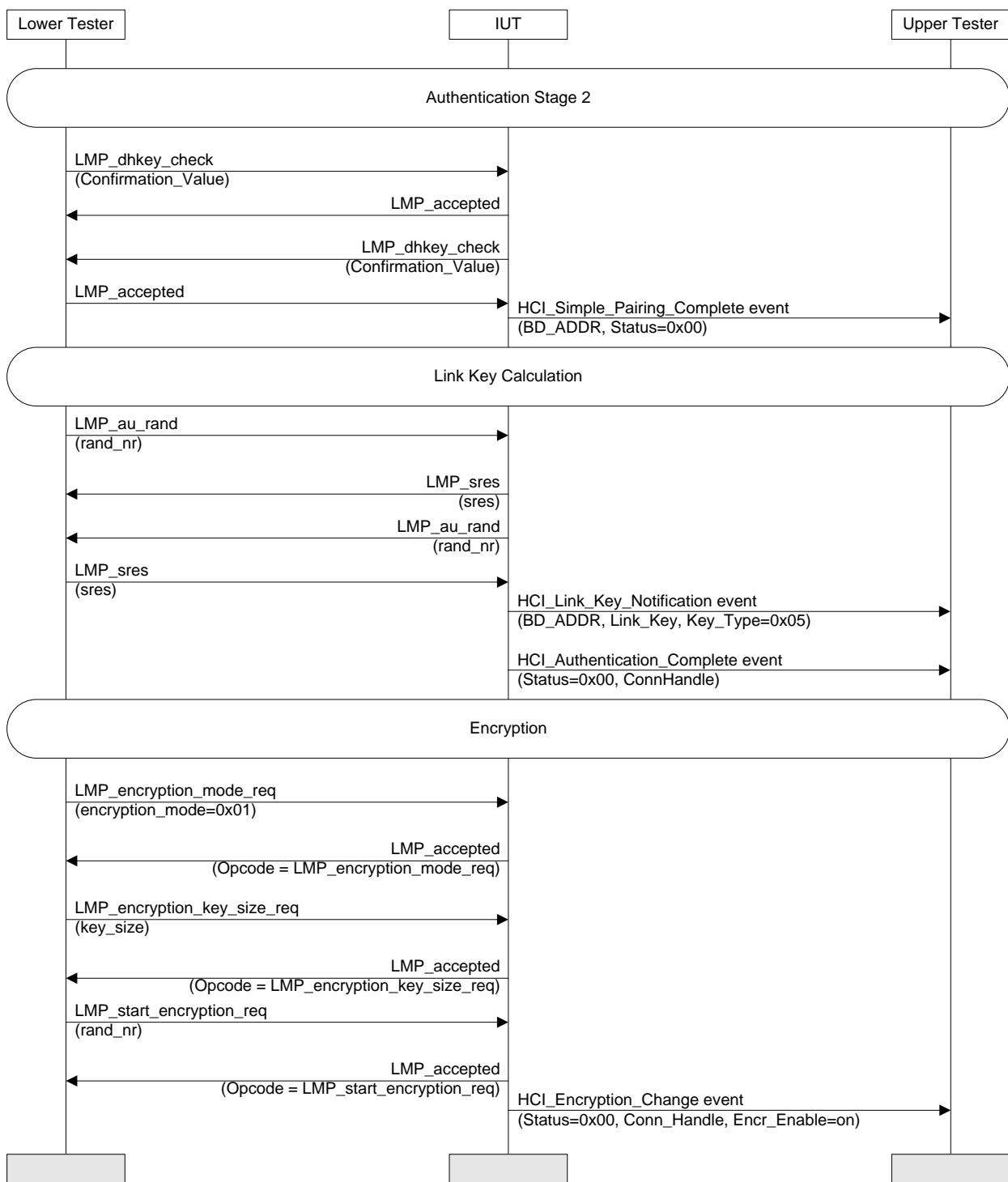


Figure 4.266: LMP/SP/BV-13-C MSC b

- Expected Outcome

Pass verdict

The IUT sends the LMP_DHkey_check PDU is with a valid Confirmation_Value.

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester.



The IUT sends the resulting Link Key and Key Type to the Host in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated'.

- Notes

If the commitment value calculated by the Lower Tester does not match the commitment value sent by the IUT, the Lower Tester will send LMP_not_accepted with the Authentication_Failure error code.

The Lower Tester shall send an LMP_not_accepted to LMP_DHkey if the confirmation value that it calculates does not match with the confirmation value that the IUT has sent.

4.10.3.3 LMP/SP/BV-14-C [Passkey Entry - IUT Initiator - Failure on Initiating Side]

- Test Purpose

Verify that the IUT supports the Passkey Entry protocol where the user on the initiating side does not enter the number.

IUT is initiator.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).

- Test Procedure

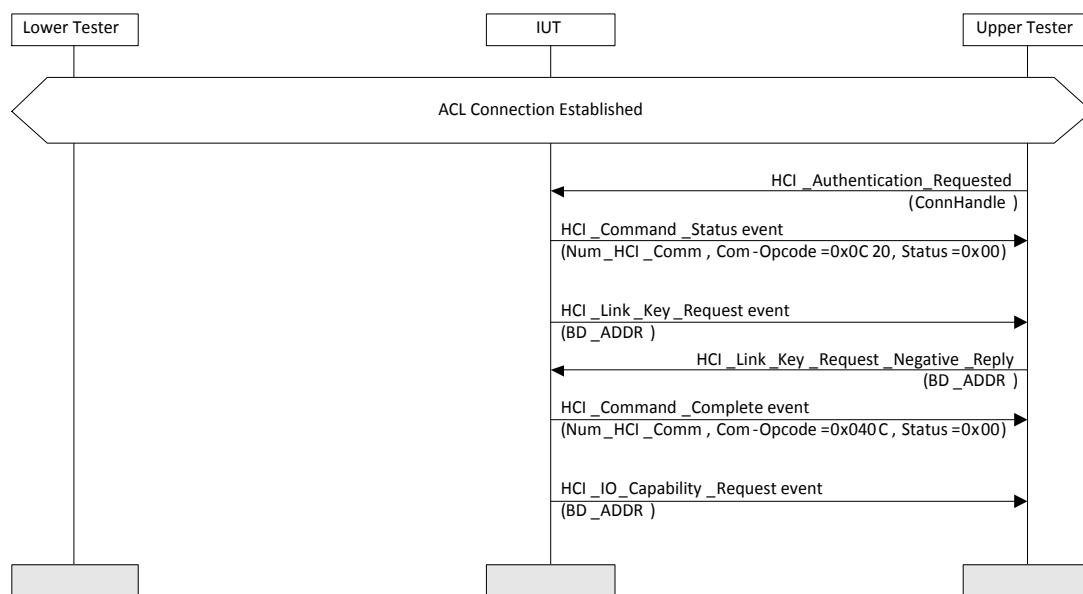


Figure 4.267: LMP/SP/BV-14-C MSC a



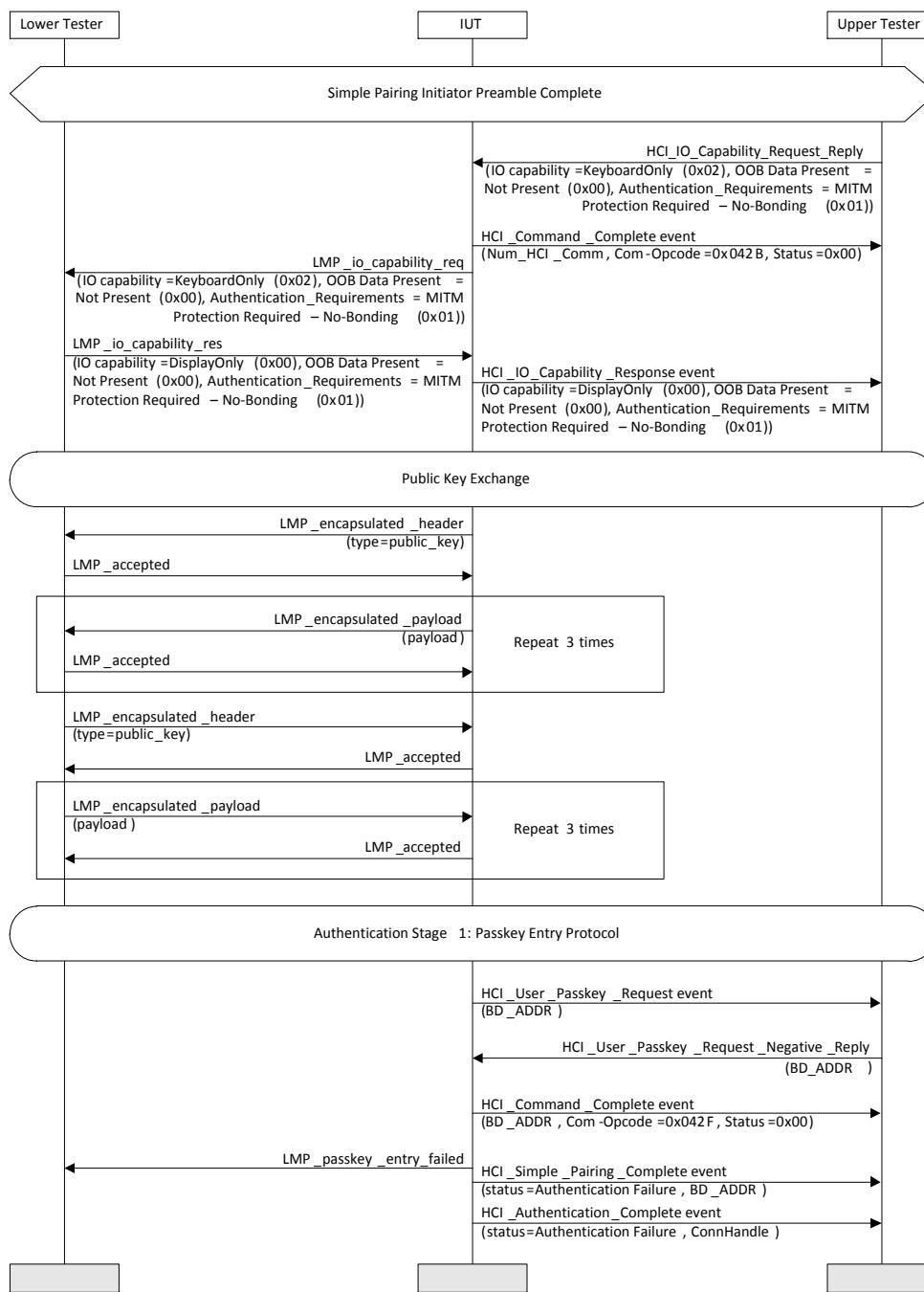


Figure 4.268: LMP/SP/BV-14-C MSC b

- Expected Outcome

Pass verdict

The IUT sends an LMP_passkey_entry_failed PDU to the Lower Tester.

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester with status set to Authentication Failure.

4.10.3.4 LMP/SP/BV-15-C [Passkey Entry - IUT Responder - Failure on Initiating Side]

- Test Purpose



Verify that the IUT supports the Passkey Entry protocol.

IUT is responder.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).

- Test Procedure

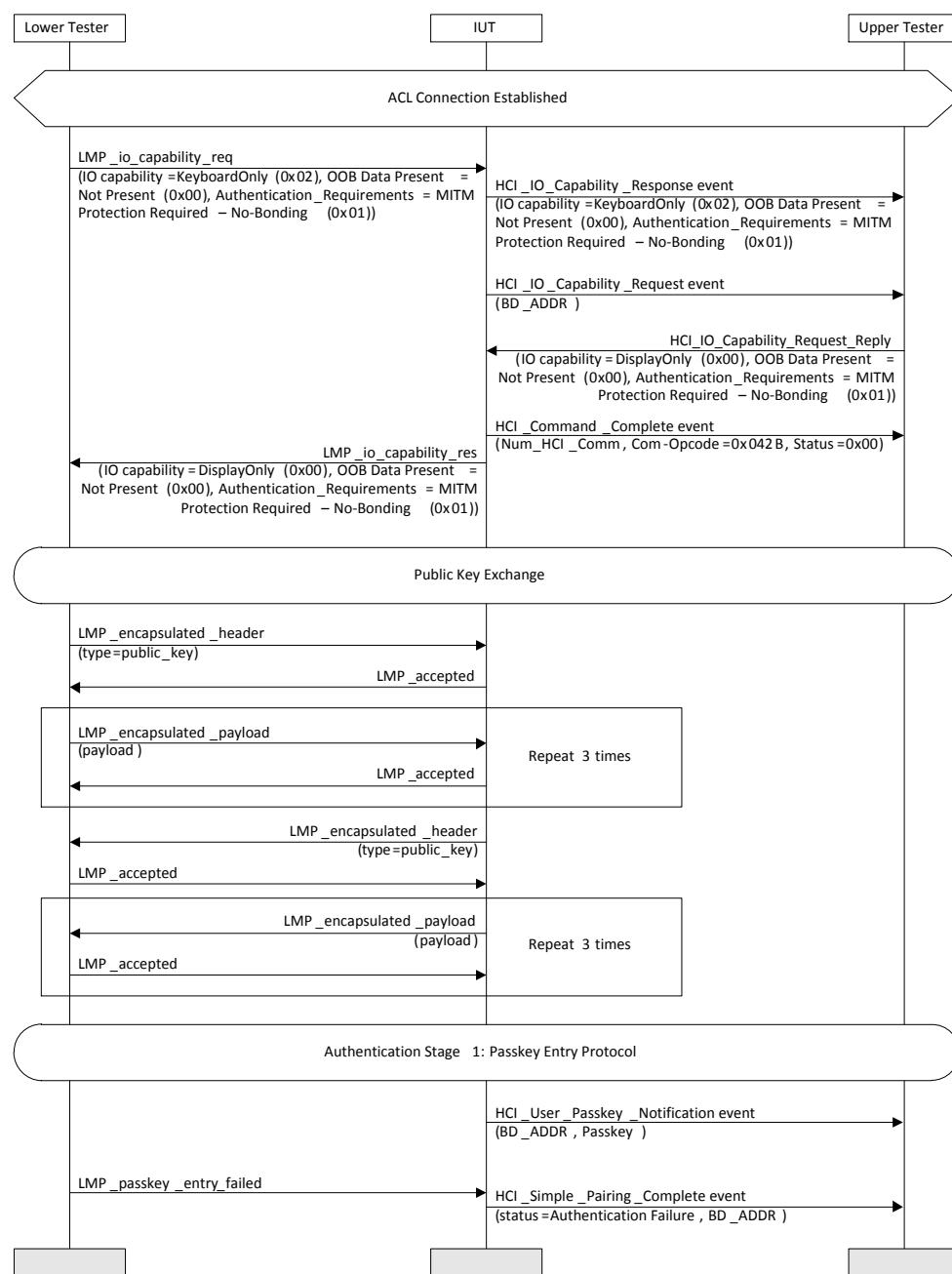


Figure 4.269: LMP/SP/BV-15-C



- Expected Outcome

Pass verdict

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester with status set to Authentication Failure after receiving an LMP_passkey_entry_failed PDU from the Lower Tester.

4.10.3.5 LMP/SP/BV-16-C [Passkey Entry - IUT Initiator - Failure on Responding Side]

- Test Purpose

Verify that the IUT supports the Passkey Entry protocol.

IUT is initiator.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).

- Test Procedure

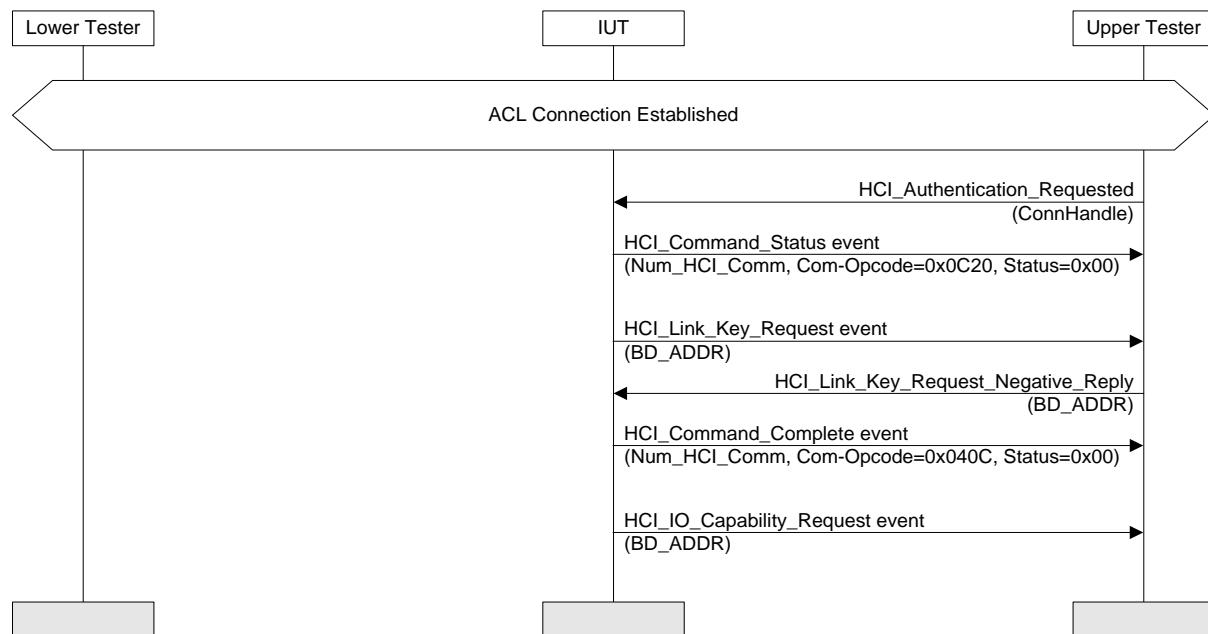


Figure 4.270: LMP/SP/BV-16-C MSC a



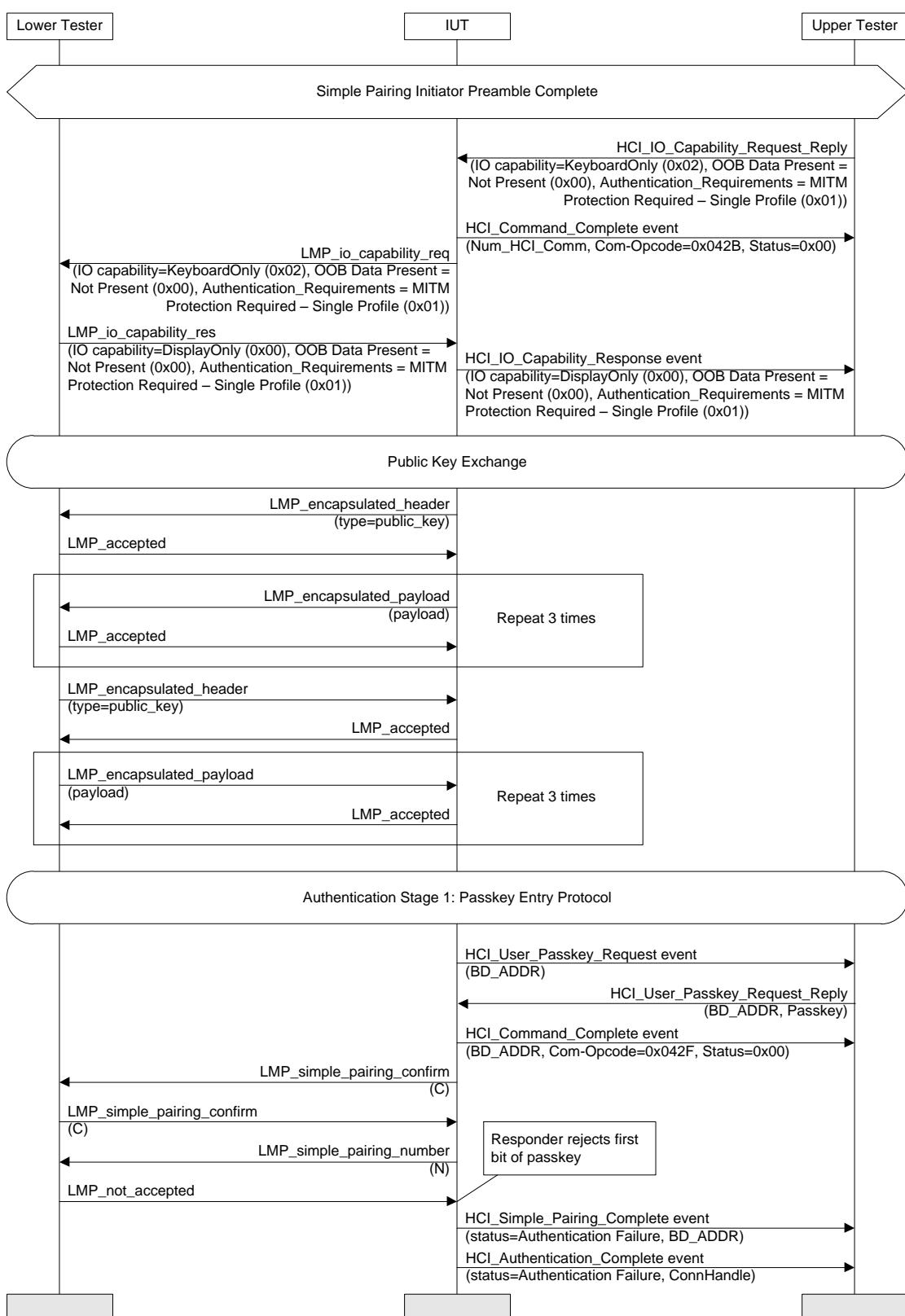


Figure 4.271: LMP/SP/BV-16-C MSC b



- Expected Outcome

Pass verdict

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester with status set to Authentication Failure after the Lower Tester responds with an LMP_not_accepted PDU in response to the LMP_simple_pairing_number PDU.

4.10.3.6 LMP/SP/BV-17-C [Passkey Entry - IUT Responder - Failure on Responding Side]

- Test Purpose

Verify that the IUT supports the Passkey Entry protocol.

IUT is responder.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).



- Test Procedure

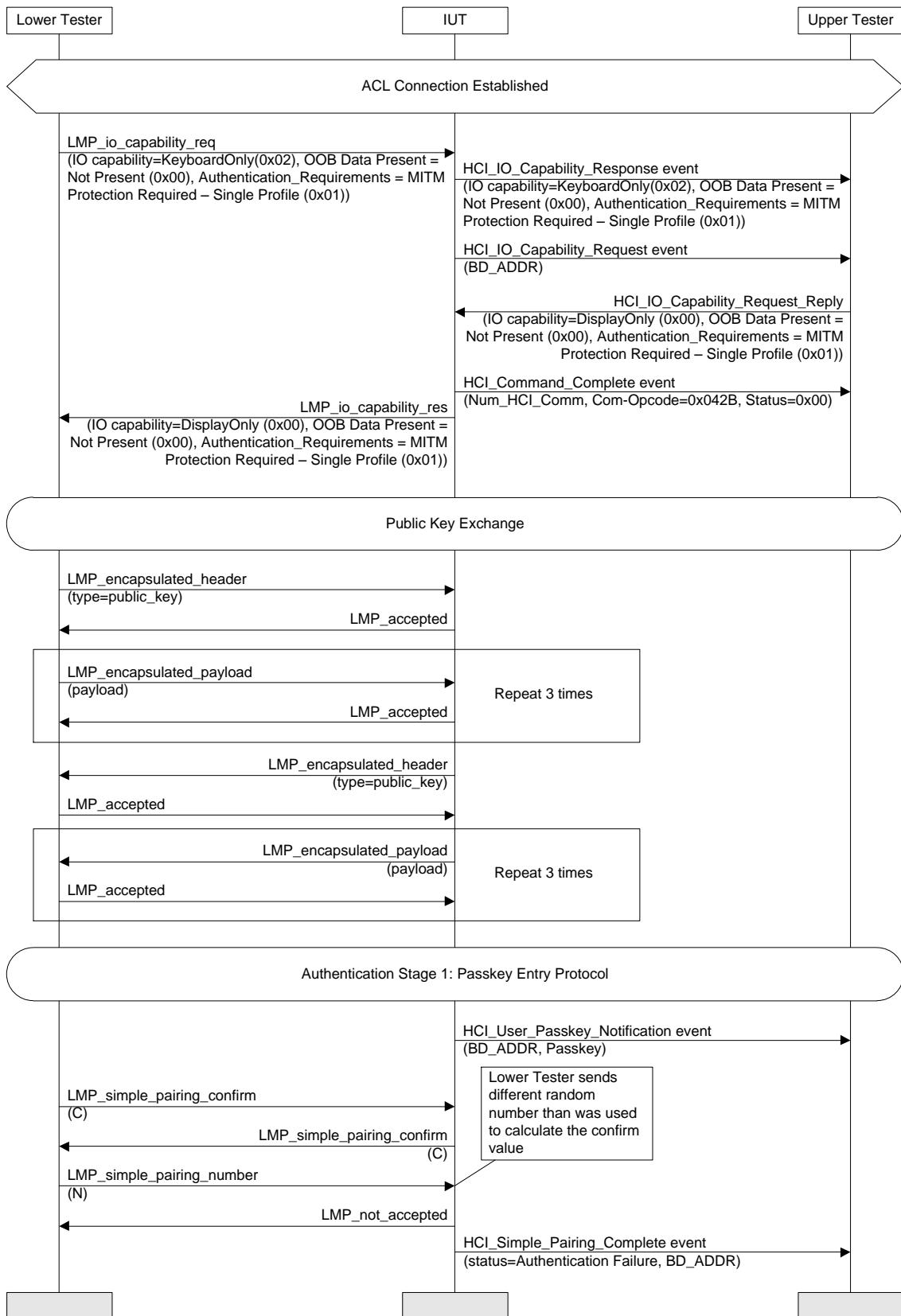


Figure 4.272: LMP/SP/BV-17-C



- Expected Outcome

Pass verdict

The IUT sends an LMP_not_accepted PDU in response to the LMP_simple_pairing_number PDU.

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester with status set to Authentication Failure.

4.10.3.7 LMP/SP/BV-48-C [Passkey Entry – IUT Initiator – Success, P-256]

- Test Purpose

Verify that the IUT as initiator supports the Passkey Entry protocol using the P-256 elliptic curve.

- Reference

[1] 4.2.7

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).

- Test Procedure

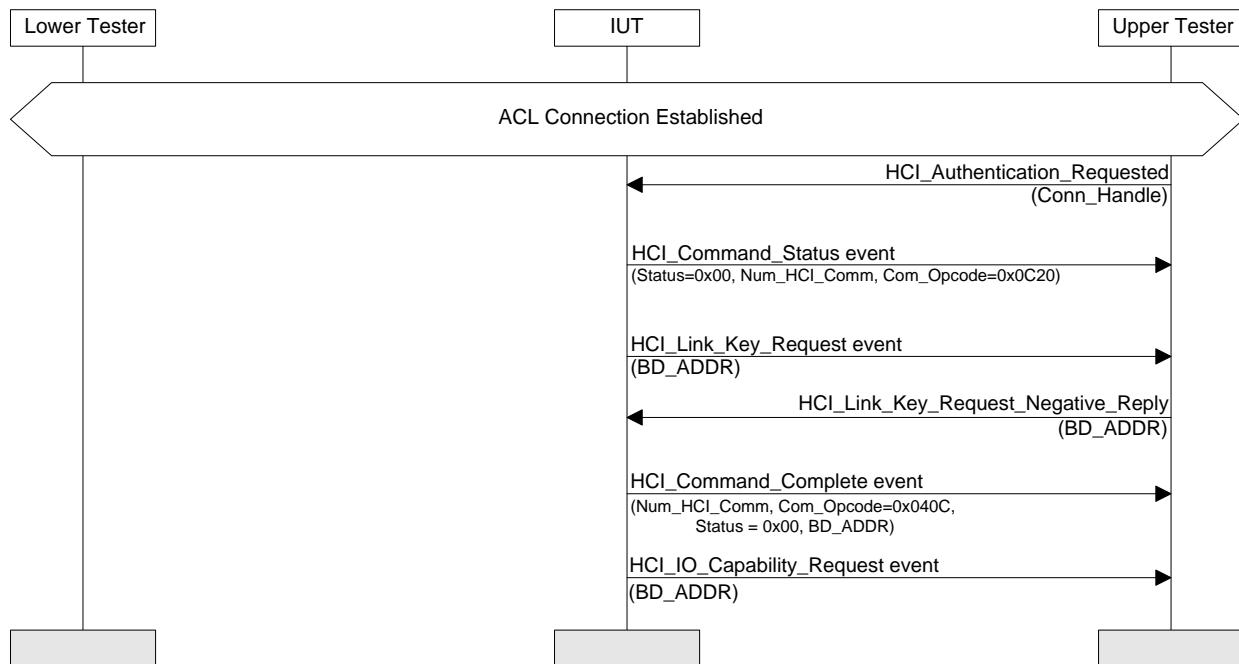


Figure 4.273: LMP/SP/BV-48-C MSC a



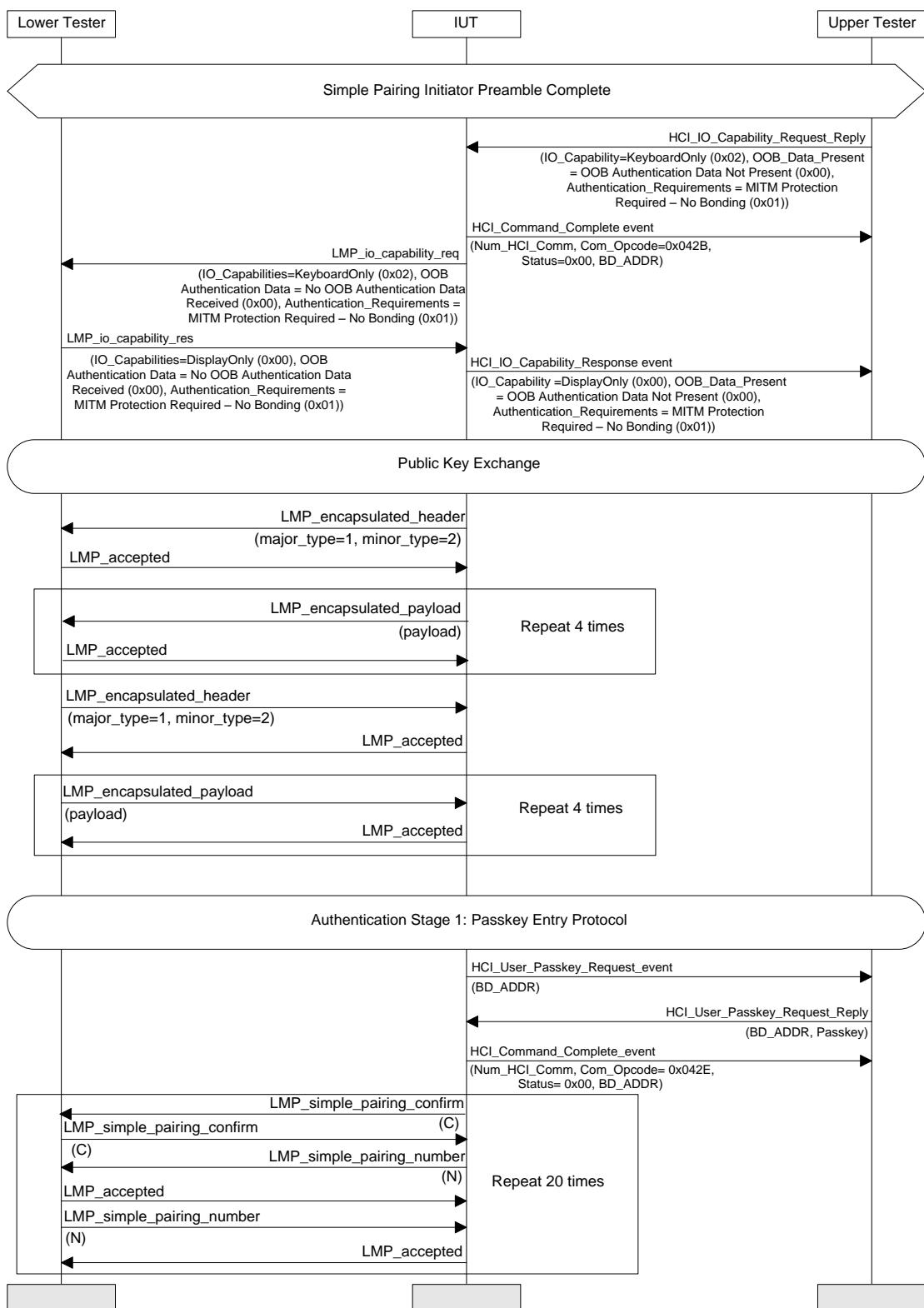


Figure 4.274: LMP/SP/BV-48-C MSC b



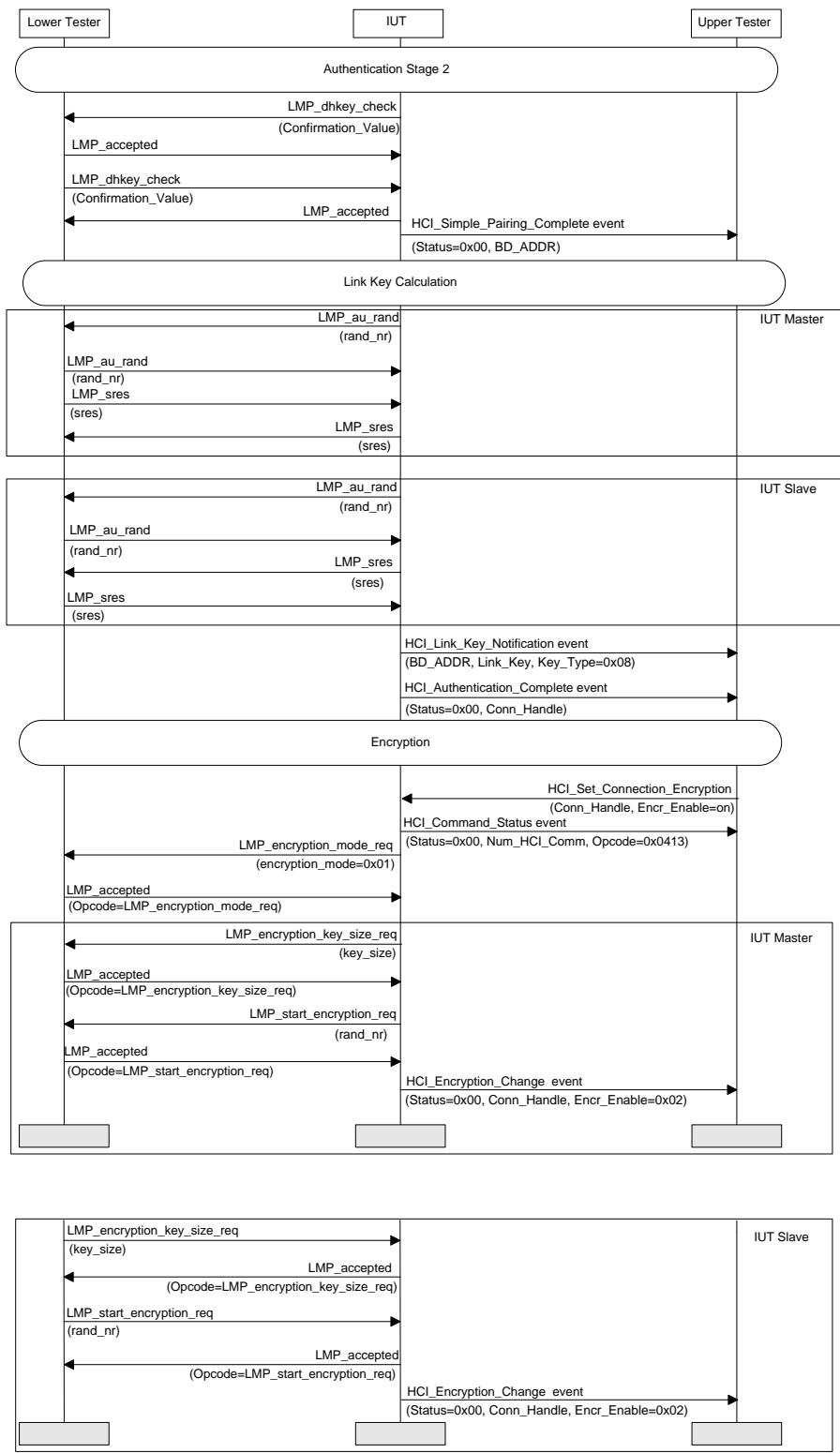


Figure 4.275: LMP/SP/BV-48-C MSC c



- Expected Outcome

Pass verdict

The IUT sends the LMP_DHkey_check PDU with a valid Confirmation_Value to the Lower Tester.

The IUT sends an HCI_Simple_Pairing_Complete event to the Upper Tester with Status=Simple Pairing succeeded.

The IUT sends the resulting Link_Key and Key_Type to the Upper Tester in an HCI_Link_Key_Notification event. Verify that the Link_Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated Combination Key generated from P256'.

- Notes

The Lower Tester shall send an LMP_not_accepted response PDU to a received LMP_DHkey_check PDU if the Confirmation_Value that it calculates does not match with the Confirmation_Value that the IUT has sent.

This test case is similar to [LMP/SP/BV-12-C \[Passkey Entry - IUT Initiator – Success\]](#).

4.10.3.8 [LMP/SP/BV-49-C \[Passkey Entry – IUT Responder – Success, P-256\]](#)

- Test Purpose

Verify that the IUT as responder supports the Passkey Entry protocol using the P-256 elliptic curve.

- Reference

[\[1\]](#) 4.2.7

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).



- Test Procedure

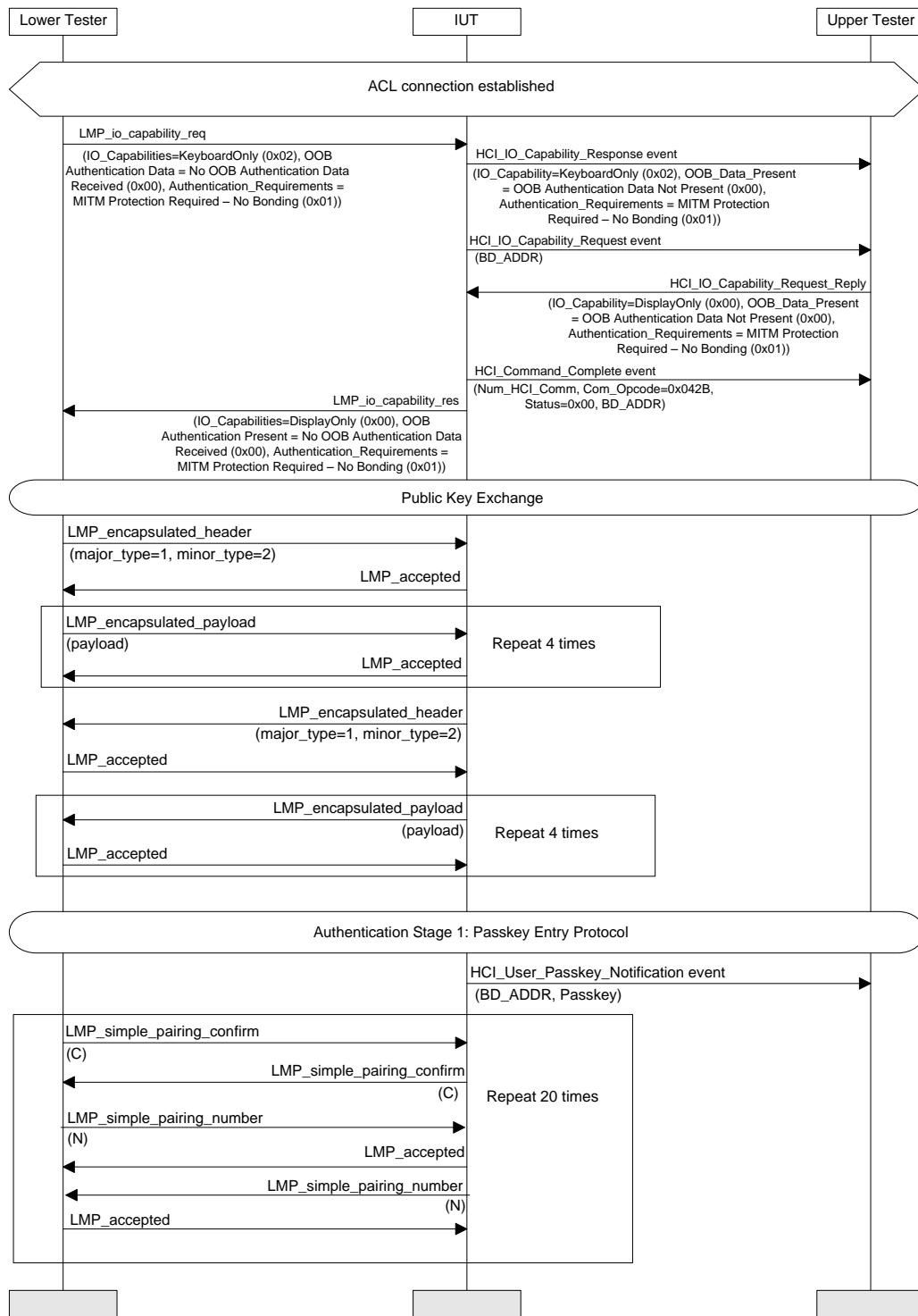


Figure 4.276: LMP/SP/BV-49-C MSC a



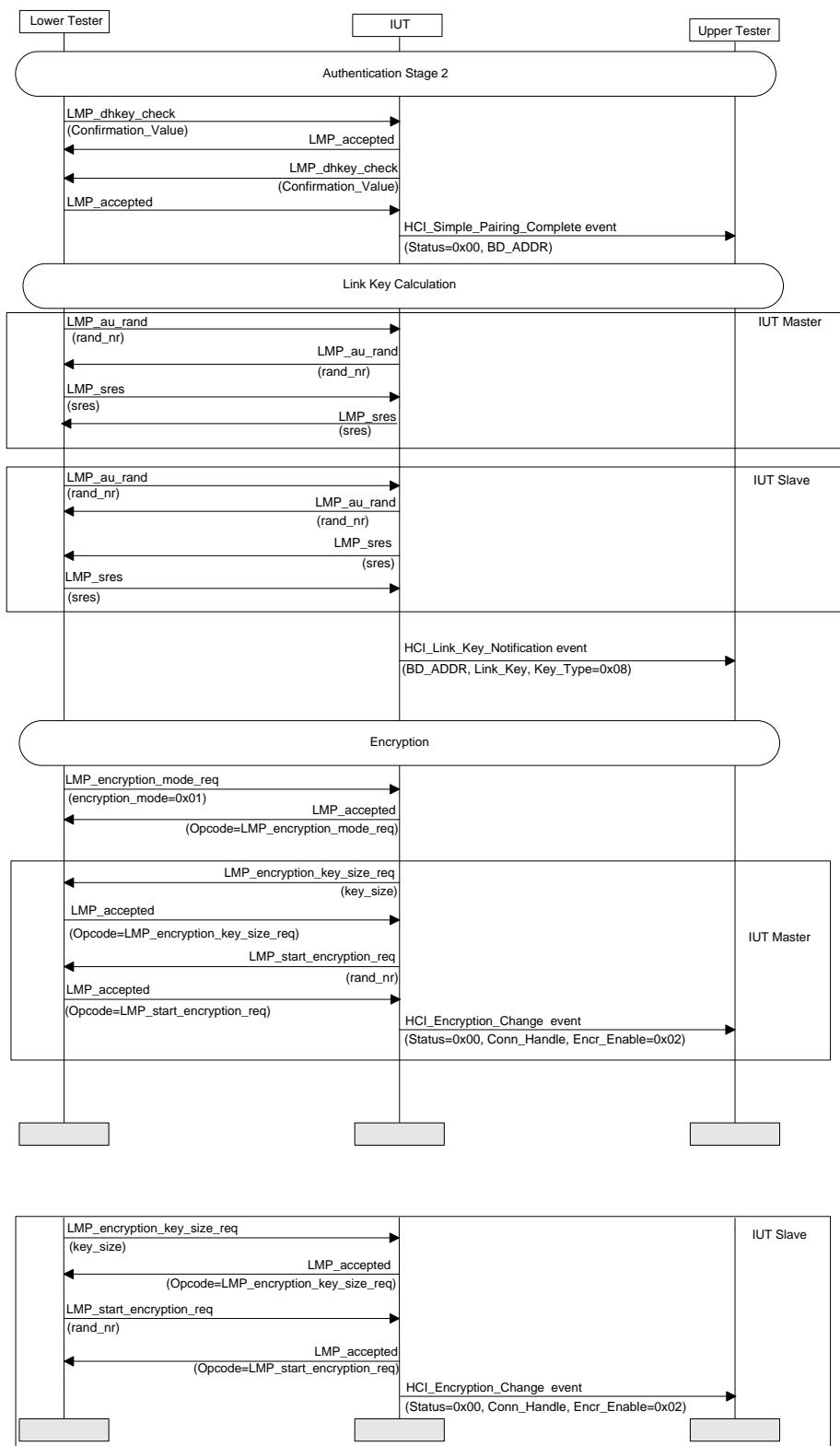


Figure 4.277: LMP/SP/BV-49-C MSC b



- Expected Outcome

Pass verdict

The IUT sends the LMP_DHkey_check PDU with a valid Confirmation_Value to the Lower Tester.

The IUT sends an HCI_User_Passkey_Notification_Event to the Upper Tester

The IUT sends an HCI_Simple_Pairing_Complete event to the Upper Tester with Status=Simple Pairing succeeded.

The IUT sends the resulting Link_Key and Key_Type to the Upper Tester in an HCI_Link_Key_Notation event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated Combination Key generated from P256'.

- Notes

If the commitment value calculated by the Lower Tester does not match the commitment value sent by the IUT, the Lower Tester will send an LMP_not_accepted PDU with the "Authentication_Failure" error code.

The Lower Tester shall send an LMP_not_accepted response PDU to a received LMP_DHkey_check PDU if the Confirmation_Value that it calculates does not match with the Confirmation_Value that the IUT has sent.

This test case is similar to [LMP/SP/BV-13-C \[Passkey Entry - IUT Responder – Success\]](#).

4.10.3.9 [LMP/SP/BV-50-C \[Passkey Entry – IUT Initiator – Failure on Initiating Side, P-256\]](#)

- Test Purpose

Verify that the IUT as initiator supports the Passkey Entry protocol using the P-256 elliptic curve, where the user on the initiating side does not enter the number.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).



- Test Procedure

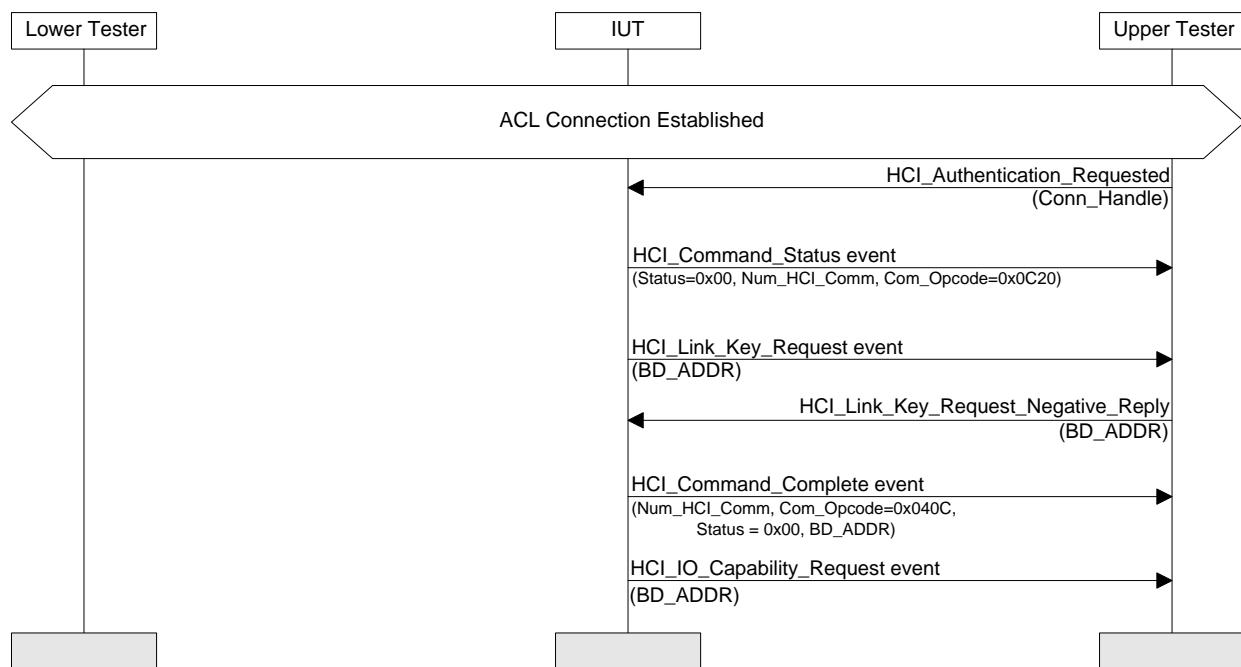


Figure 4.278: LMP/SP/BV-50-C MSC a



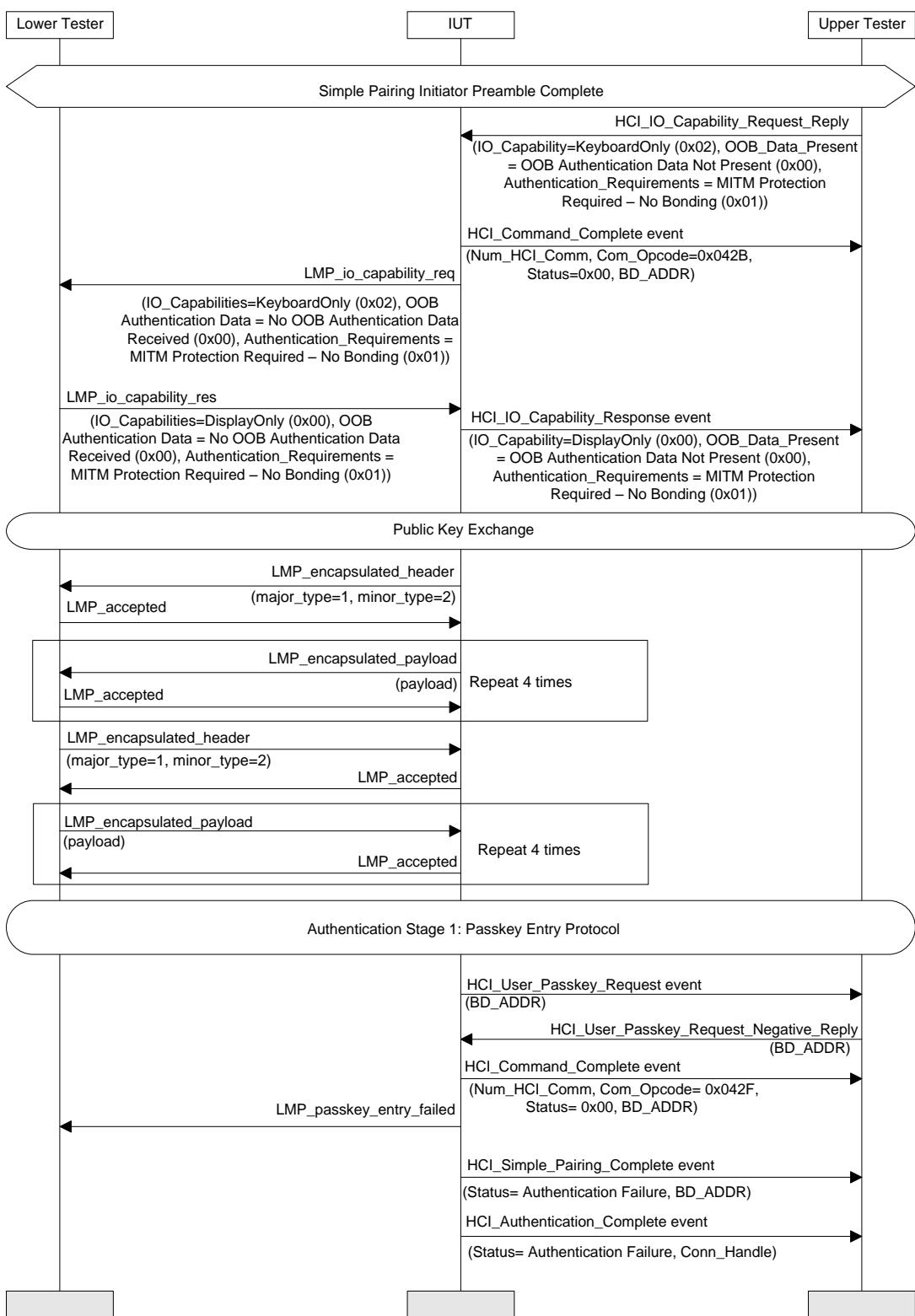


Figure 4.279: LMP/SP/BV-50-C MSC b



- Expected Outcome

Pass verdict

The IUT sends an LMP_passkey_entry_failed PDU to the Lower Tester after receiving an HCI_User_Passkey_Request_Negative_Reply command from the Upper Tester.

The IUT sends an HCI_Simple_Pairing_Complete event to the Upper Tester with Status=Authentication Failure.

- Notes

This test case is similar to [LMP/SP/BV-14-C \[Passkey Entry - IUT Initiator - Failure on Initiating Side\]](#).

4.10.3.10 LMP/SP/BV-51-C [Passkey Entry – IUT Responder – Failure on Initiating Side, P-256]

- Test Purpose

Verify that the IUT as responder supports the Passkey Entry protocol using the P-256 elliptic curve.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).



- Test Procedure

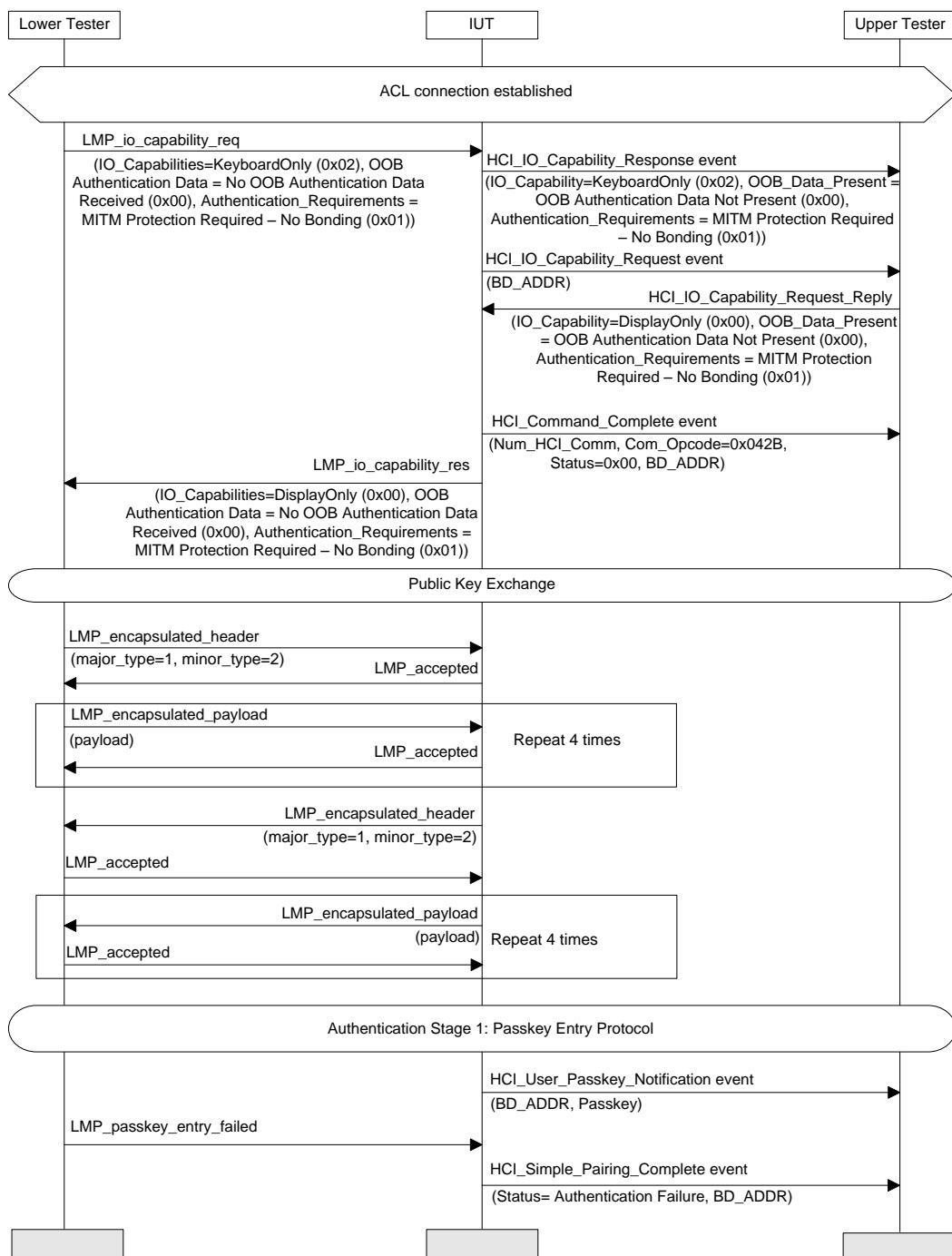


Figure 4.280: LMP/SP/BV-51-C

- Expected Outcome

Pass verdict

The IUT sends an HCI_Simple_Pairing_Complete event to the Upper Tester with Status = Authentication Failure after receiving an LMP_passkey_entry_failed PDU from the Lower Tester.



- Notes

This Test Case is similar to LMP/SP/BV-15-C [Passkey Entry - IUT Responder - Failure on Initiating Side].

4.10.3.11 LMP/SP/BV-52-C [Passkey Entry – IUT Initiator – Failure on Responding Side, P-256]

- Test Purpose

Verify that the IUT as initiator supports the Passkey Entry protocol using the P-256 elliptic curve.

- Reference

[1] 4.2.7

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).

- Test Procedure

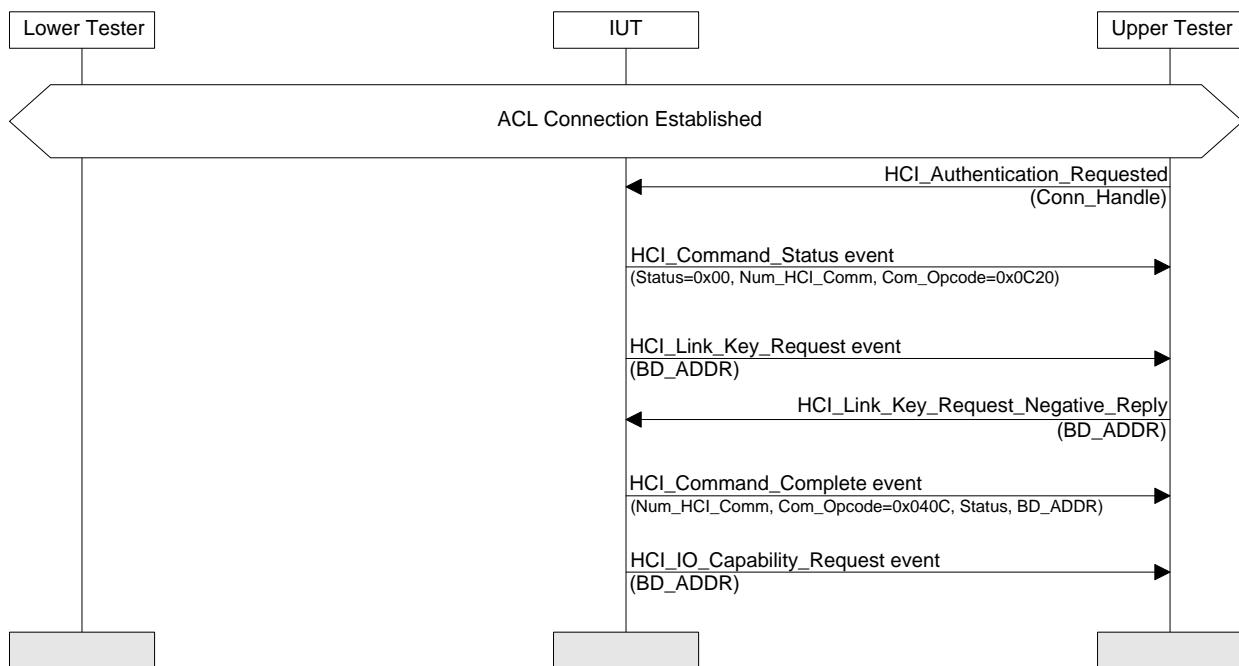


Figure 4.281: LMP/SP/BV-52-C MSC a



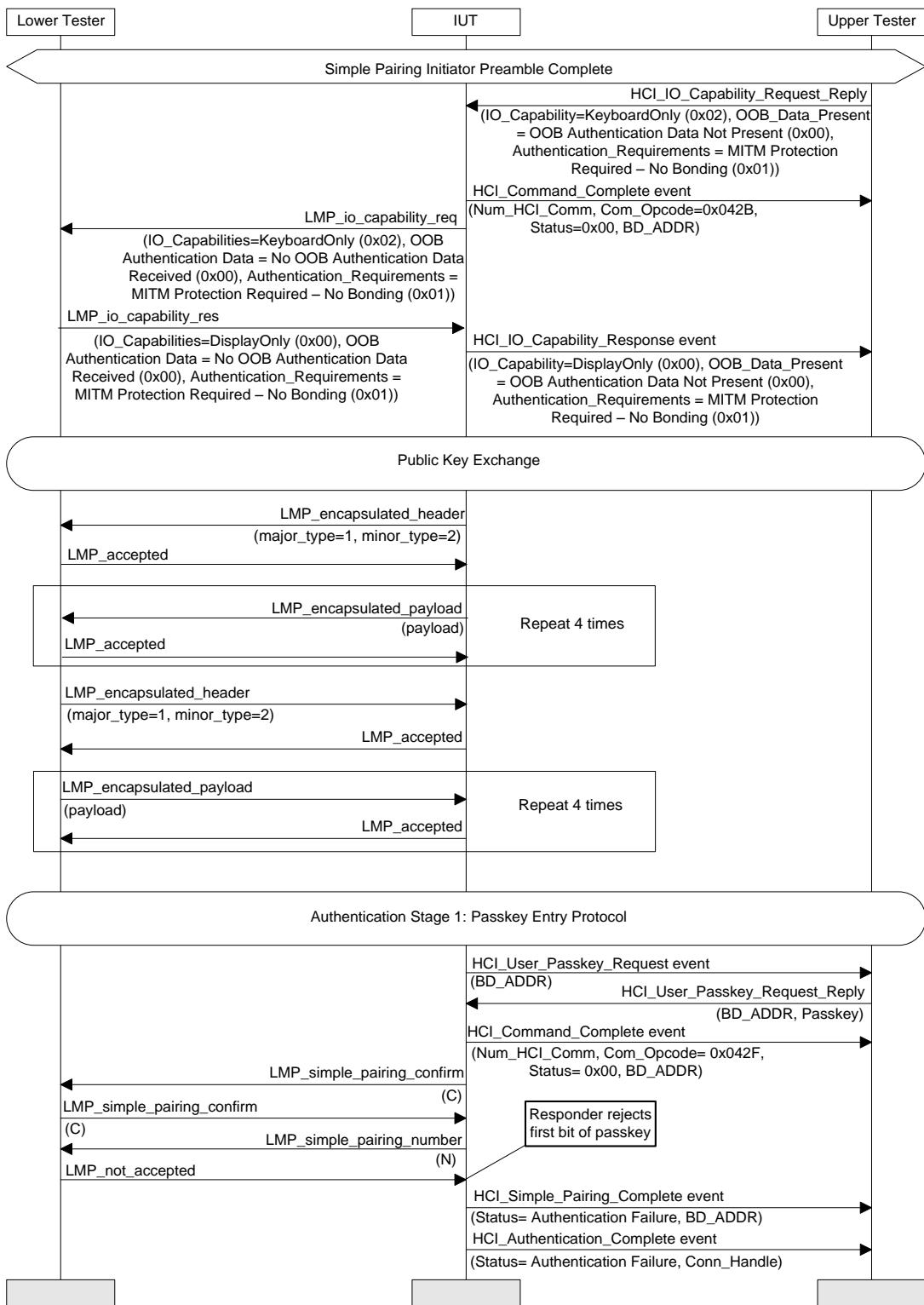


Figure 4.282: LMP/SP/BV-52-C MSC b



- Expected Outcome

Pass verdict

The IUT sends an HCI_Simple_Pairing_Complete event to the Upper Tester with Status = Authentication Failure after the Lower Tester sends an LMP_not_accepted PDU in response to the LMP_simple_pairing_number PDU sent by the IUT.

- Notes

This test case is similar to [LMP/SP/BV-16-C \[Passkey Entry - IUT Initiator - Failure on Responding Side\]](#).

4.10.3.12 LMP/SP/BV-53-C [Passkey Entry – IUT Responder – Failure on Responding Side, P-256]

- Test Purpose

Verify that the IUT as responder supports the Passkey Entry protocol using the P-256 elliptic curve.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).



- Test Procedure

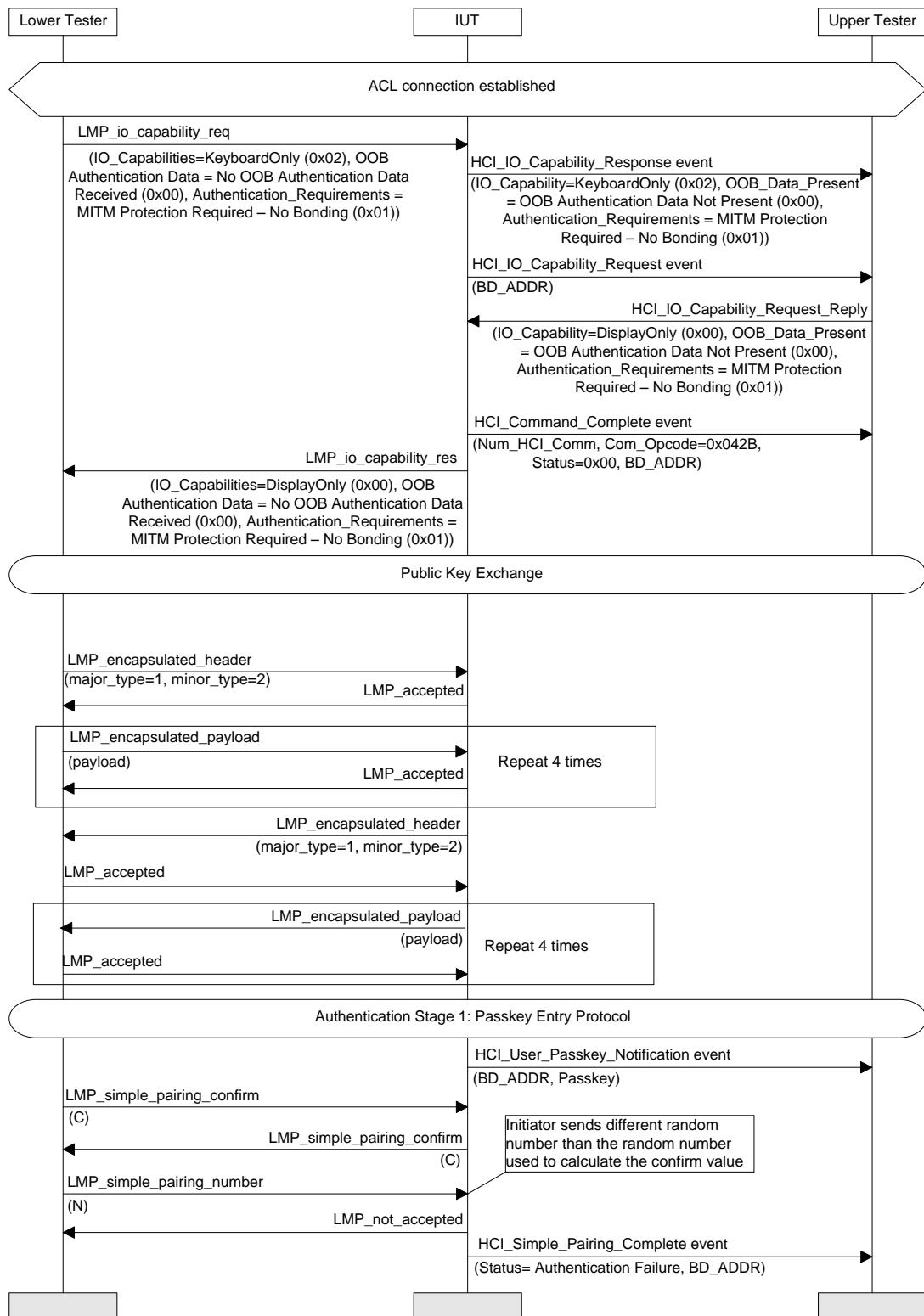


Figure 4.283: LMP/SP/BV-53-C



- Expected Outcome

Pass verdict

The IUT sends an LMP_not_accepted PDU to the Lower Tester in response to the received LMP_simple_pairing_number PDU.

The IUT sends an HCI_Simple_Pairing_Complete event to the Upper Tester with Status=Authentication Failure.

- Notes

This test case is similar to [LMP/SP/BV-17-C \[Passkey Entry - IUT Responder - Failure on Responding Side\]](#).

4.10.4 Out-of-Band Procedures

Note: In all the test cases in section [4.10.4 Out-of-Band Procedures](#), it does not matter whether the IUT is master or slave.

4.10.4.1 [LMP/SP/BV-18-C \[OOB Protocol - IUT Initiator - IUT with OOB Authentication Data – Success\]](#)

- Test Purpose

Verify that the IUT supports the OOB protocol where the IUT has OOB Authentication Data and the Lower Tester does not have OOB Authentication Data.

IUT is initiator.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

See [Default Settings](#).



- Test Procedure

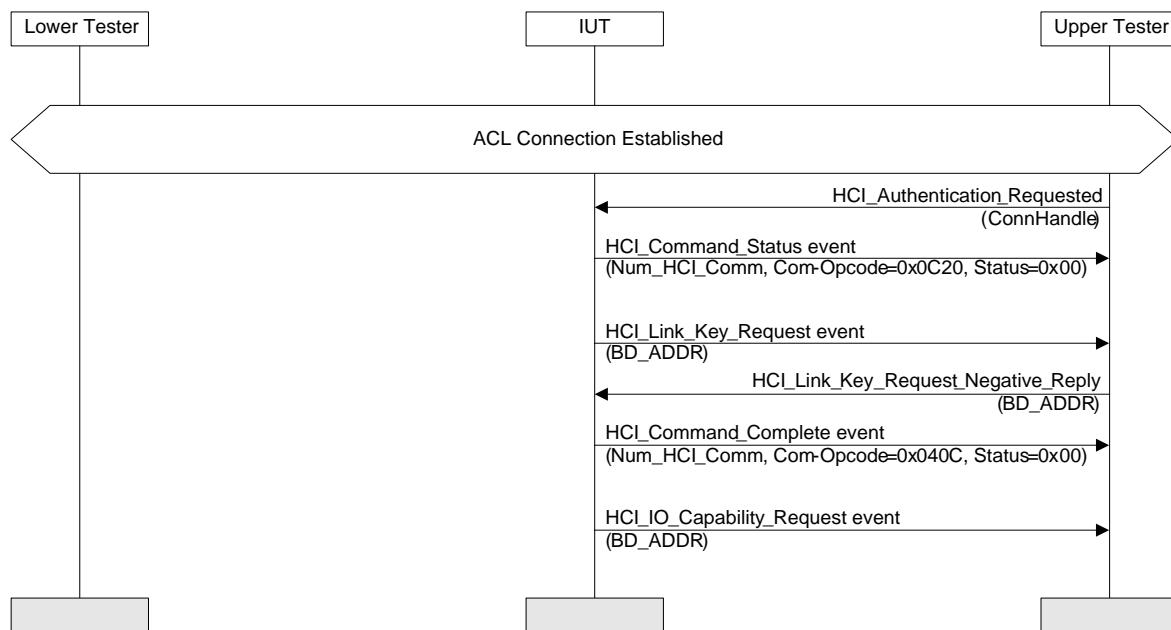


Figure 4.284: LMP/SP/BV-18-C MSC a

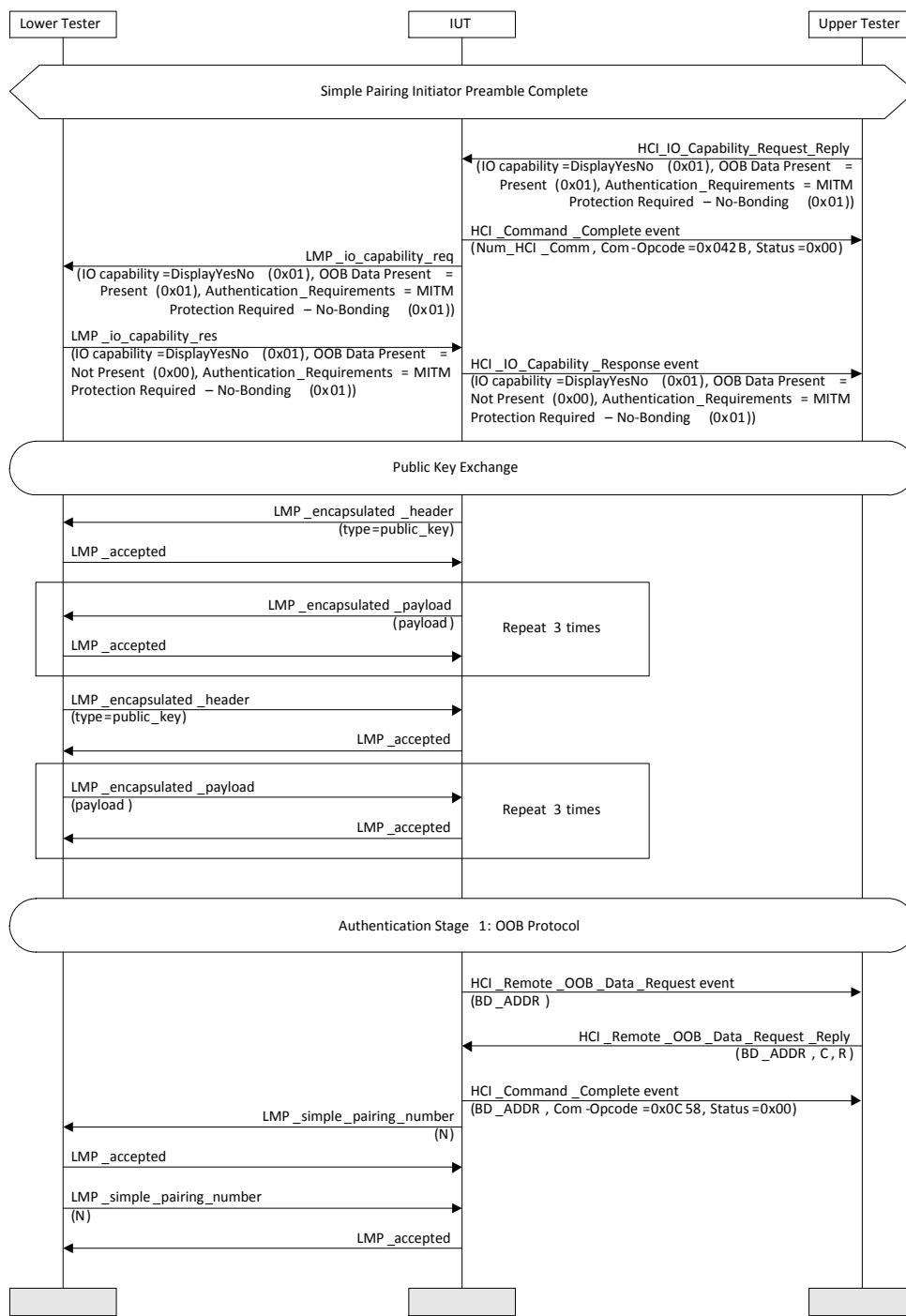


Figure 4.285: LMP/SP/BV-18-C MSC b



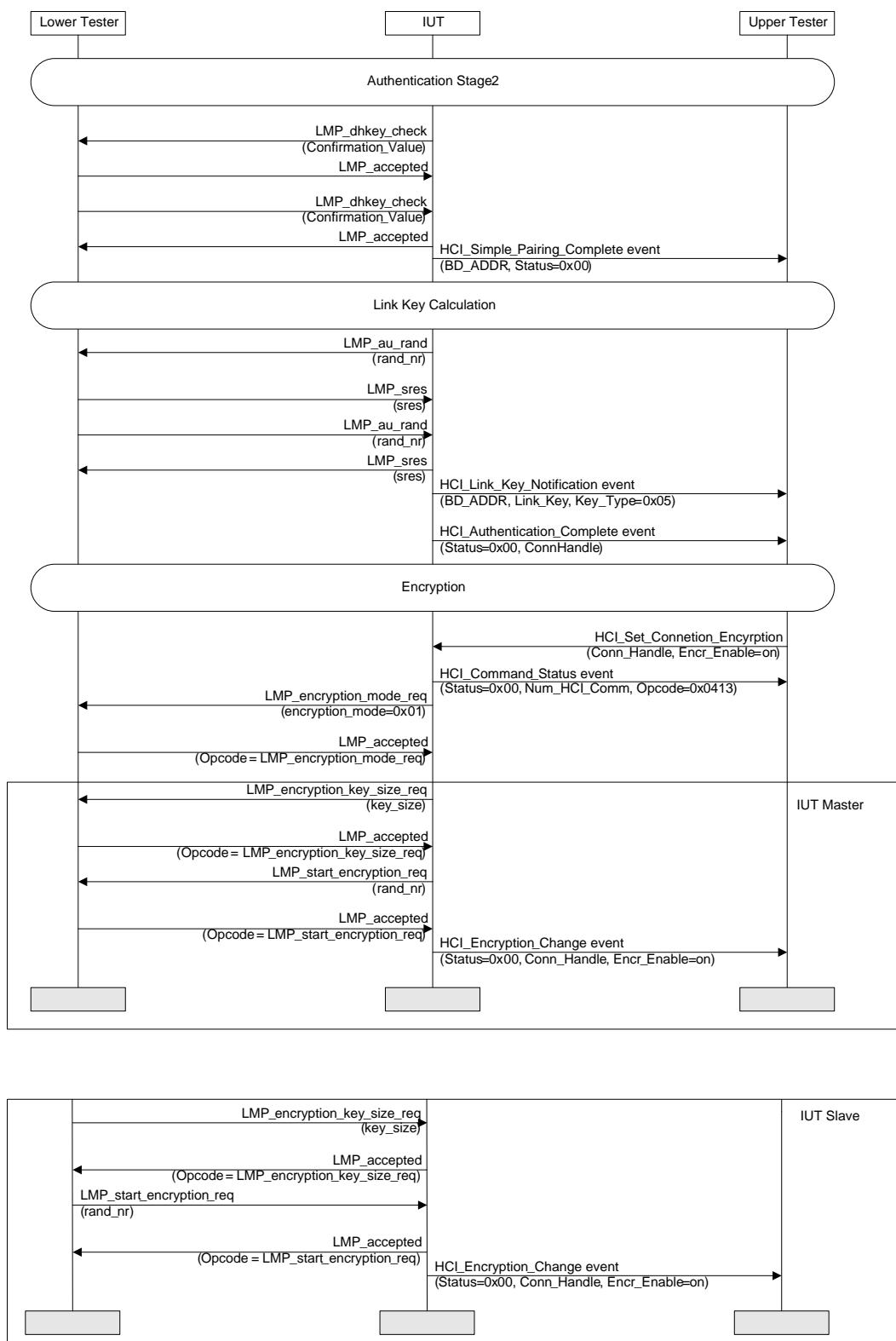


Figure 4.286:LMP/SP/BV-18-C MSC c



- Expected Outcome

Pass verdict

The IUT sends an HCI_Remote_OOB_Data_Request Event to the Upper Tester.

The IUT sends the LMP_DHkey_check PDU is with a valid Confirmation_Value.

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester.

The IUT sends the resulting Link Key and Key Type to the Host in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated'.

- Notes

The Lower Tester shall send an LMP_not_accepted to LMP_DHkey if the confirmation value that it calculates does not match with the confirmation value that the IUT has sent.

4.10.4.2 LMP/SP/BV-19-C [OOB Protocol - IUT Responder - IUT with OOB Authentication Data – Success]

- Test Purpose

Verify that the IUT supports the OOB protocol where the IUT has OOB Authentication Data.

IUT is responder.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).



- Test Procedure

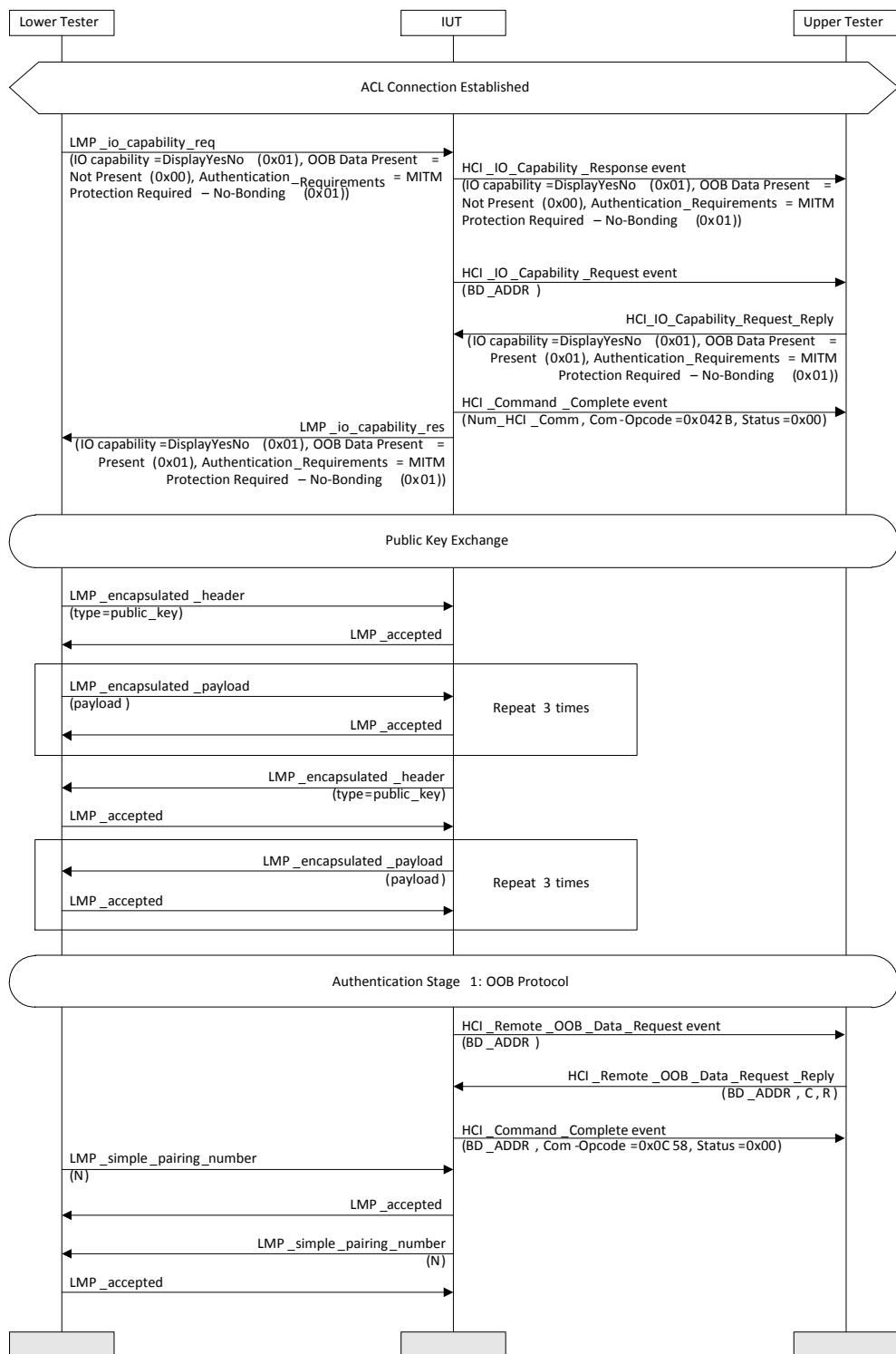


Figure 4.287: LMP/SP/BV-19-C MSC a



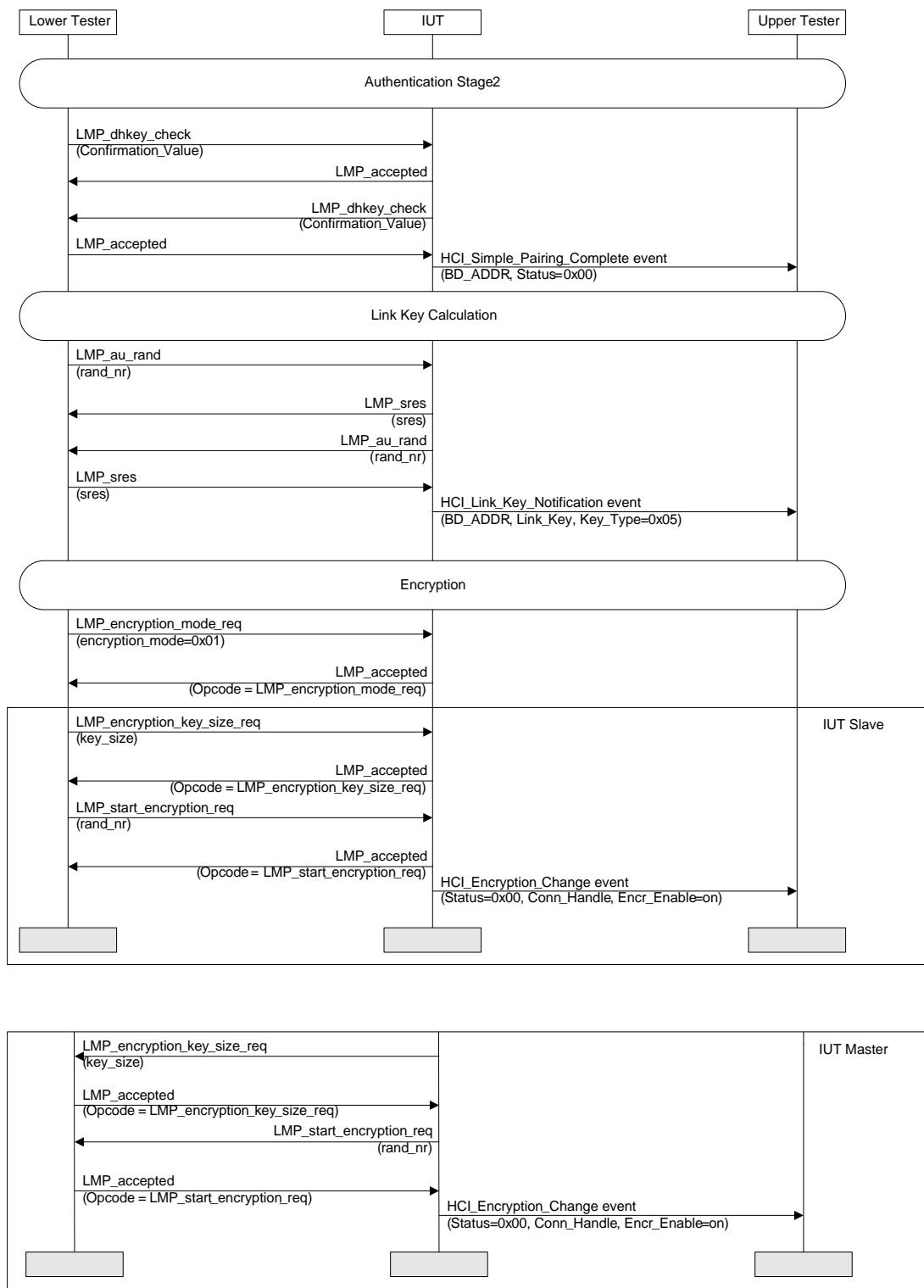


Figure 4.288: LMP/SP/BV-19-C MSC b

- Expected Outcome

Pass verdict

The IUT sends an HCI_Remote_OOB_Data_Request Event to the Upper Tester.



The IUT sends the LMP_DHkey_check PDU is with a valid Confirmation_Value.

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester.

The IUT sends the resulting Link Key and Key Type to the Host in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated'.

- Notes

The Lower Tester shall send an LMP_not_accepted to LMP_DHkey if the confirmation value that it calculates does not match with the confirmation value that the IUT has sent.

4.10.4.3 LMP/SP/BV-20-C [OOB Protocol - IUT Initiator – Lower Tester with OOB Authentication Data – Success]

- Test Purpose

Verify that the IUT supports the OOB protocol where the Lower Tester has OOB Authentication Data.

IUT is initiator.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).



- Test Procedure

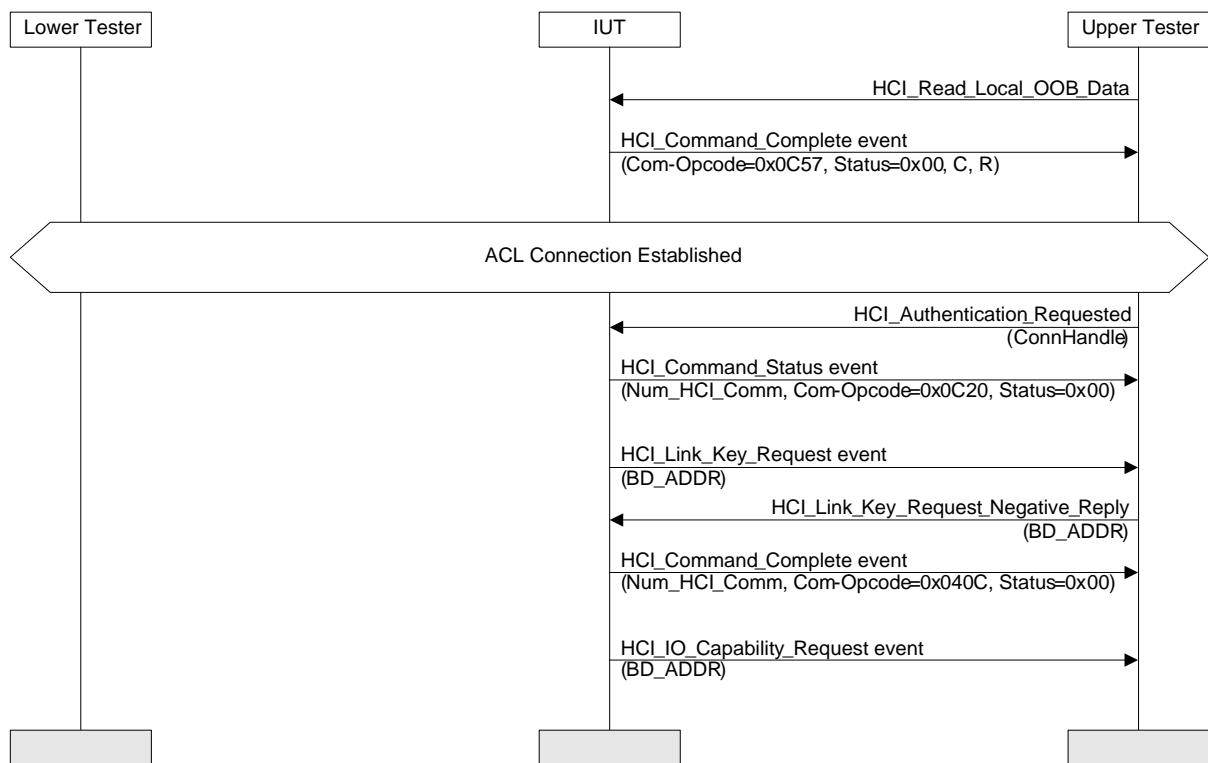


Figure 4.289: LMP/SP/BV-20-C MSC a

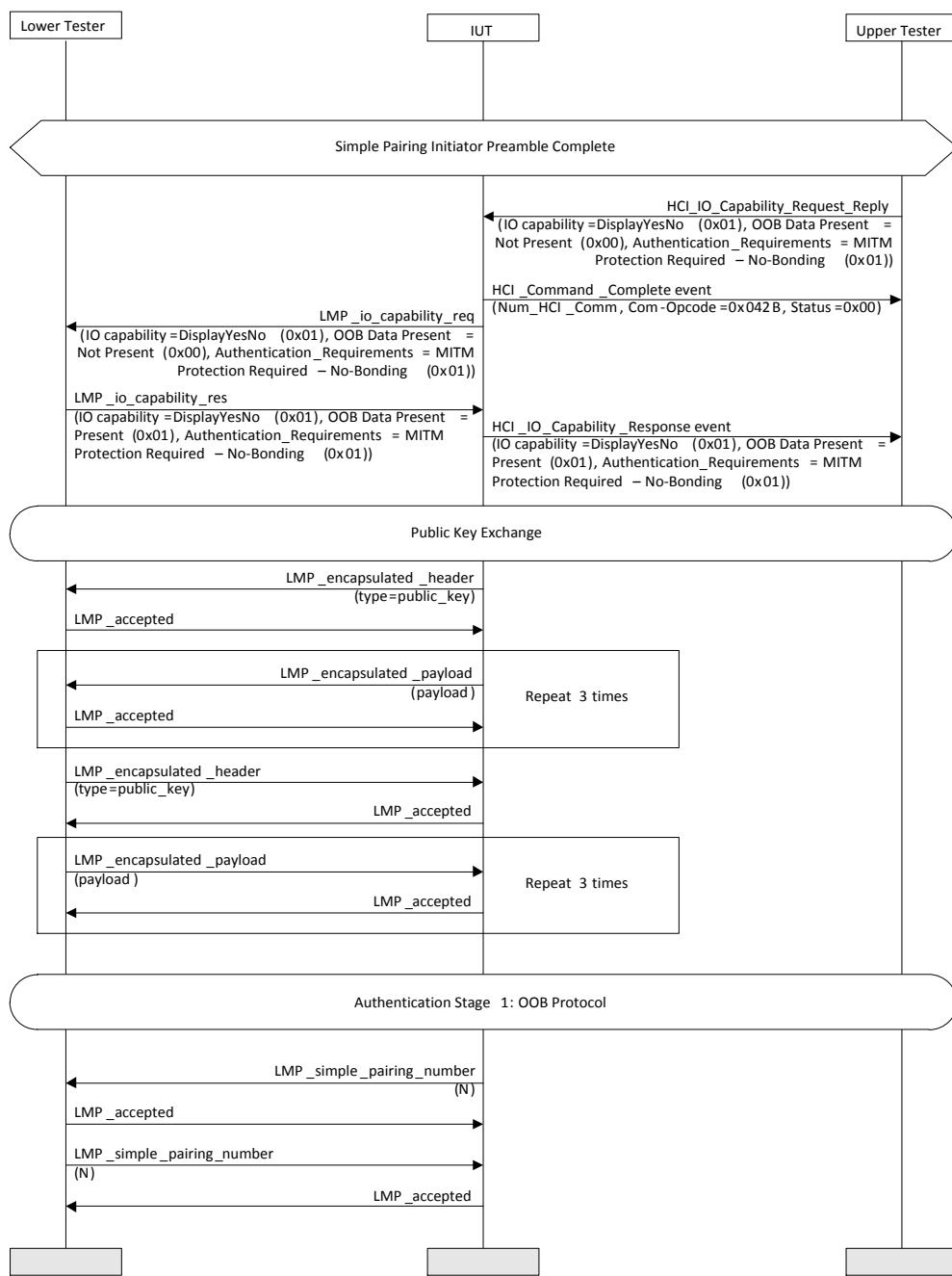


Figure 4.290: LMP/SP/BV-20-C MSC b



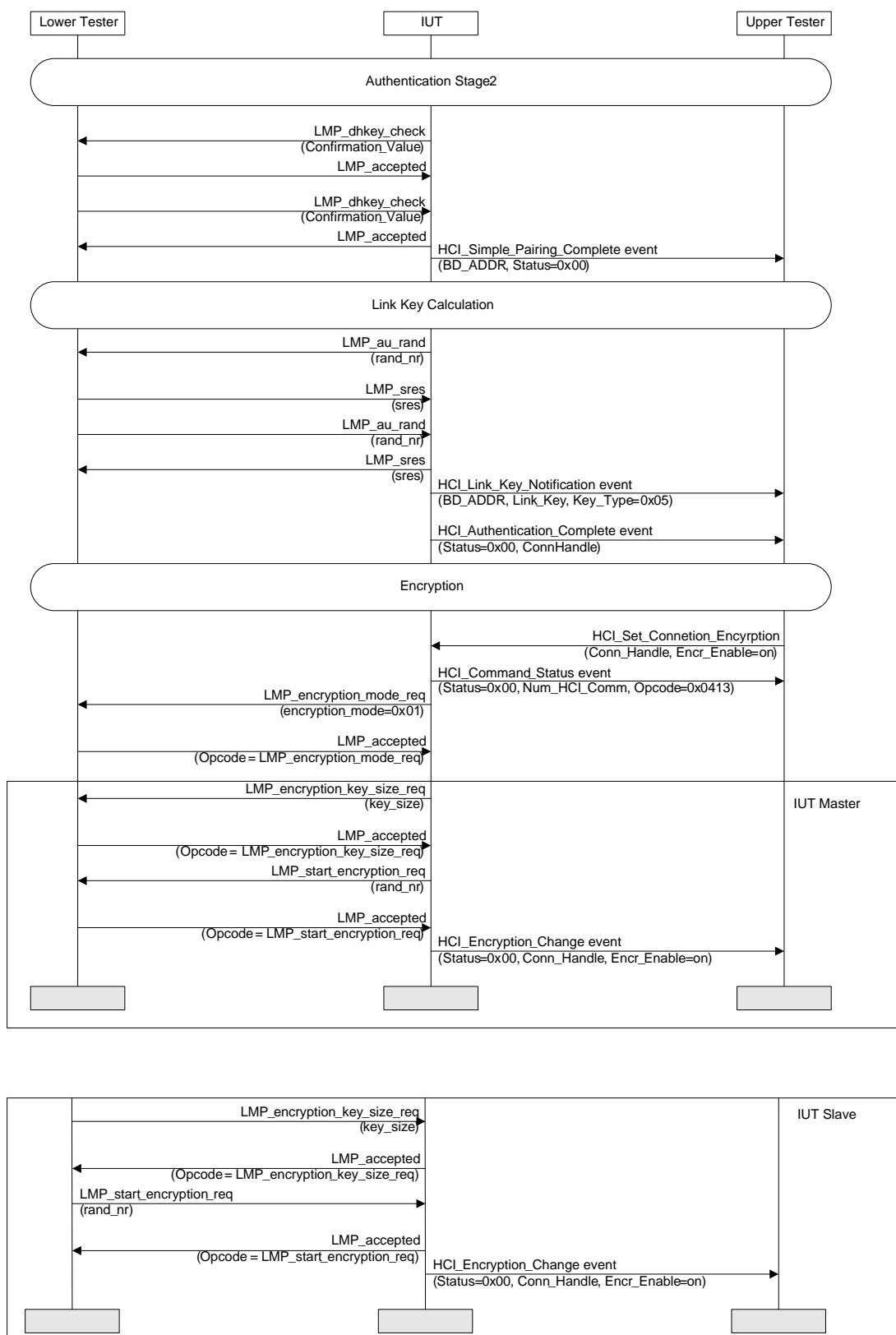


Figure 4.291: LMP/SP/BV-20-C MSC c



- Expected Outcome

Pass verdict

The IUT does not send an HCI_Remote_OOB_Data_Request event to the Upper Tester.

The IUT sends the LMP_dhkey_check PDU is with a valid Confirmation_Value. The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester.

The IUT sends the resulting Link Key and Key Type to the Host in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated'.

- Notes

The Lower Tester shall send an LMP_not_accepted to LMP_DHkey if the confirmation value that it calculates does not match with the confirmation value that the IUT has sent.

4.10.4.4 LMP/SP/BV-21-C [OOB Protocol - IUT Responder – Lower Tester with OOB Authentication Data – Success]

- Test Purpose

Verify that the IUT supports the OOB protocol where the Lower Tester has OOB Authentication Data.

IUT is responder.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).



- Test Procedure

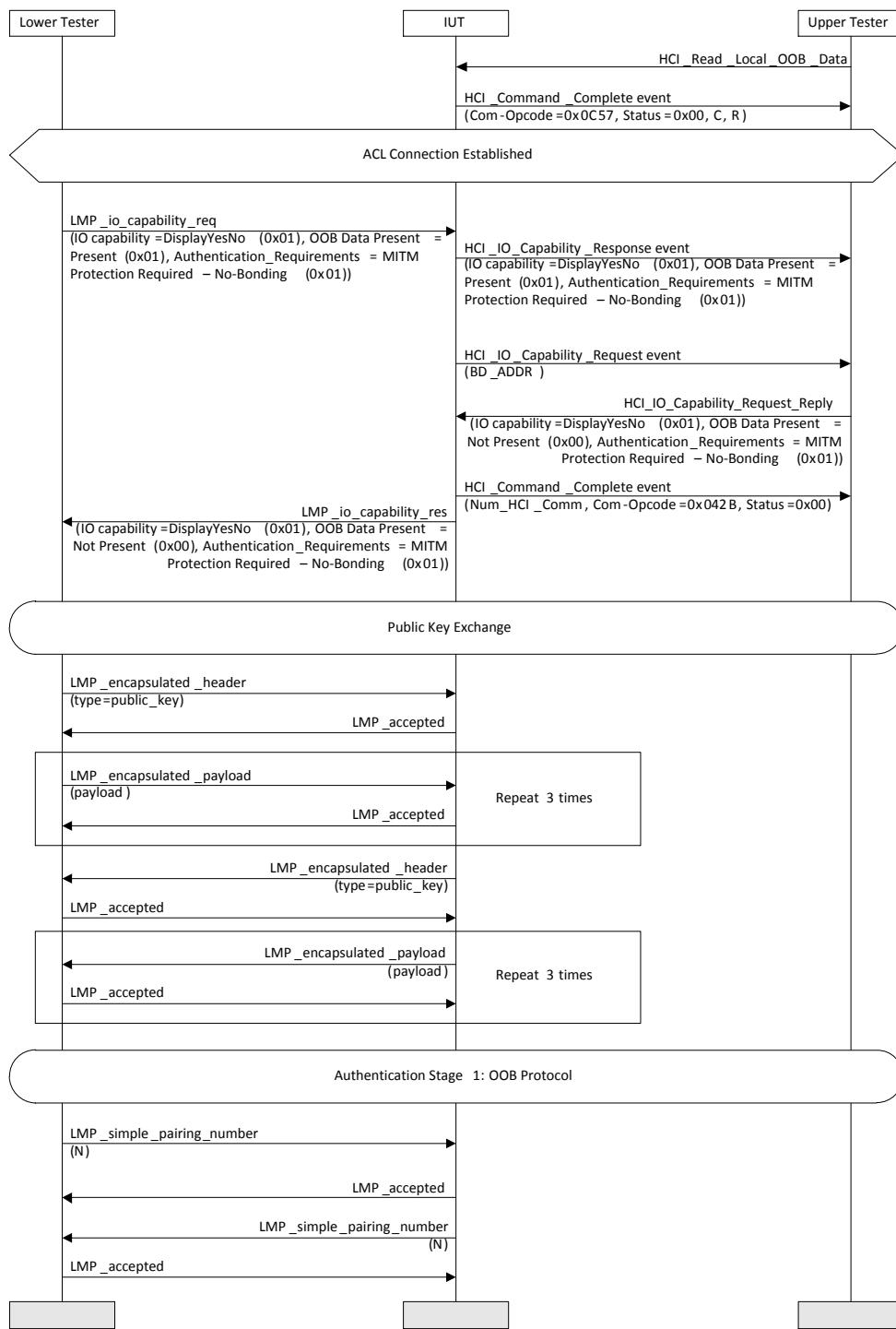


Figure 4.292: LMP/SP/BV-21-C – MSC a



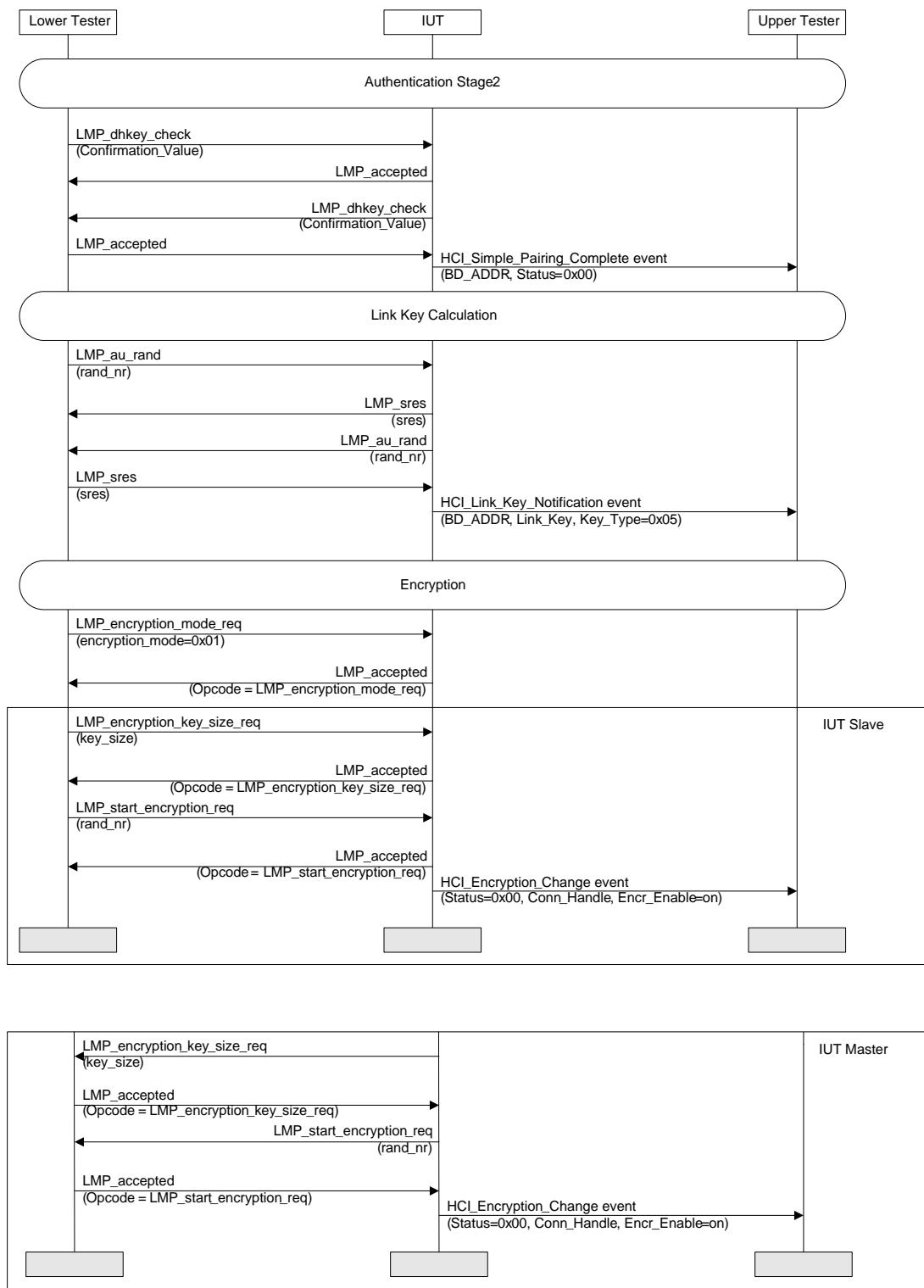


Figure 4.293: LMP/SP/BV-21-C – MSC b

- Expected Outcome

Pass verdict

The IUT does not send an HCI_Remote_OOB_Data_Request Event to the Upper Tester.



The IUT sends the LMP_dhkey_check PDU is with a valid Confirmation_Value.

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester.

The IUT sends the resulting Link Key and Key Type to the Host in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated'.

- Notes

The Lower Tester shall send an LMP_not_accepted to LMP_DHkey if the confirmation value that it calculates does not match with the confirmation value that the IUT has sent.

4.10.4.5 LMP/SP/BV-22-C [OOB Protocol - IUT Initiator - IUT and Lower Tester with OOB Authentication Data - Success]

- Test Purpose

Verify that the IUT supports the OOB protocol where the IUT and Lower Tester have OOB Authentication Data.

IUT is initiator.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).

- Test Procedure

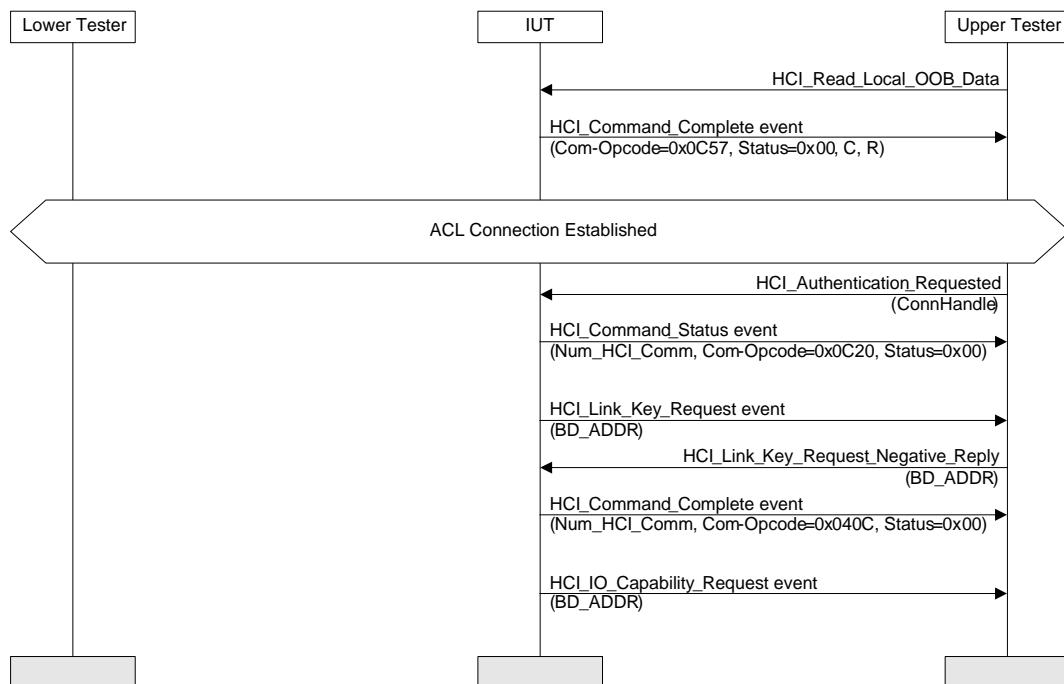


Figure 4.294: LMP/SP/BV-22-C MSc a



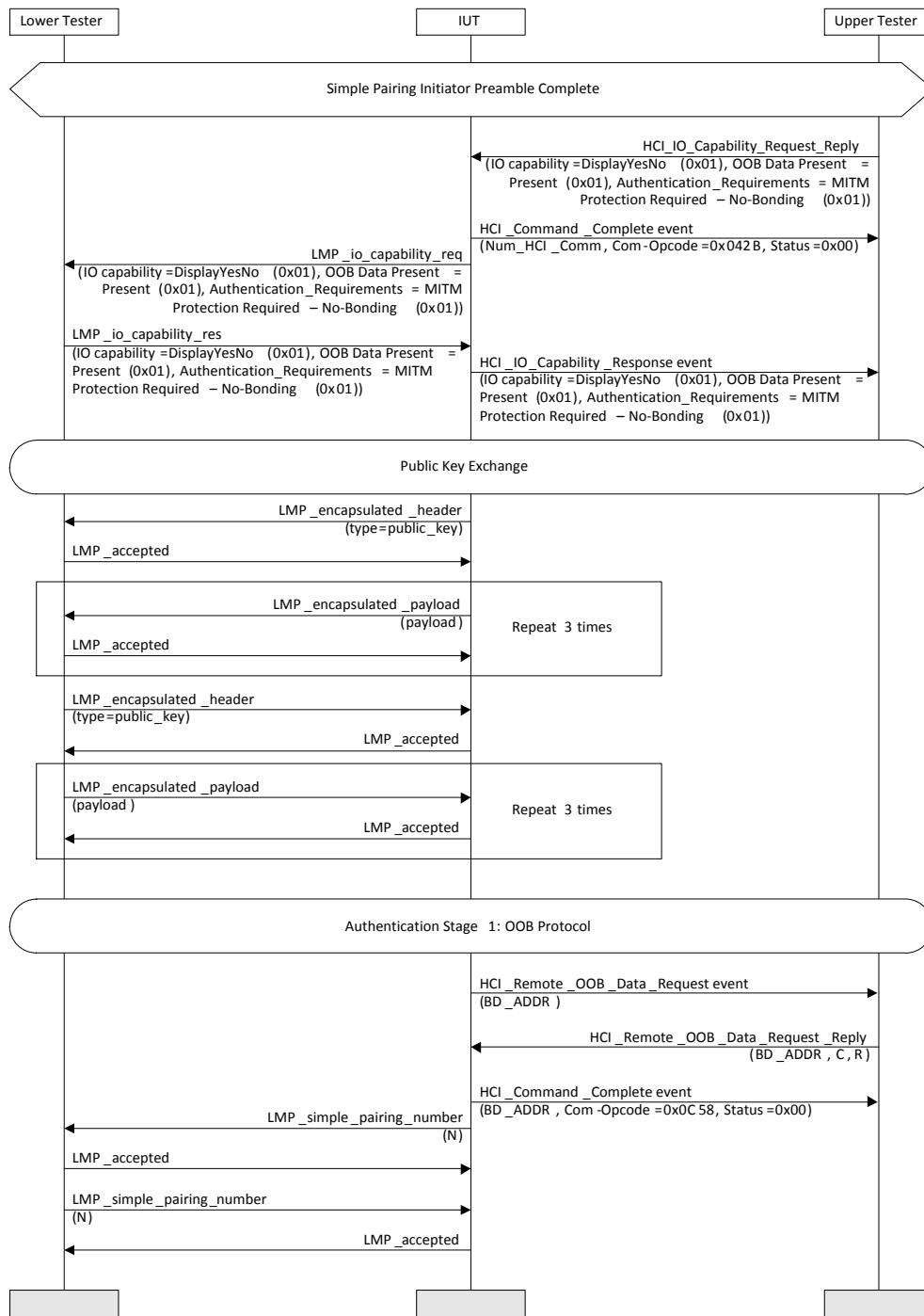


Figure 4.295: LMP/SP/BV-22-C MSC b



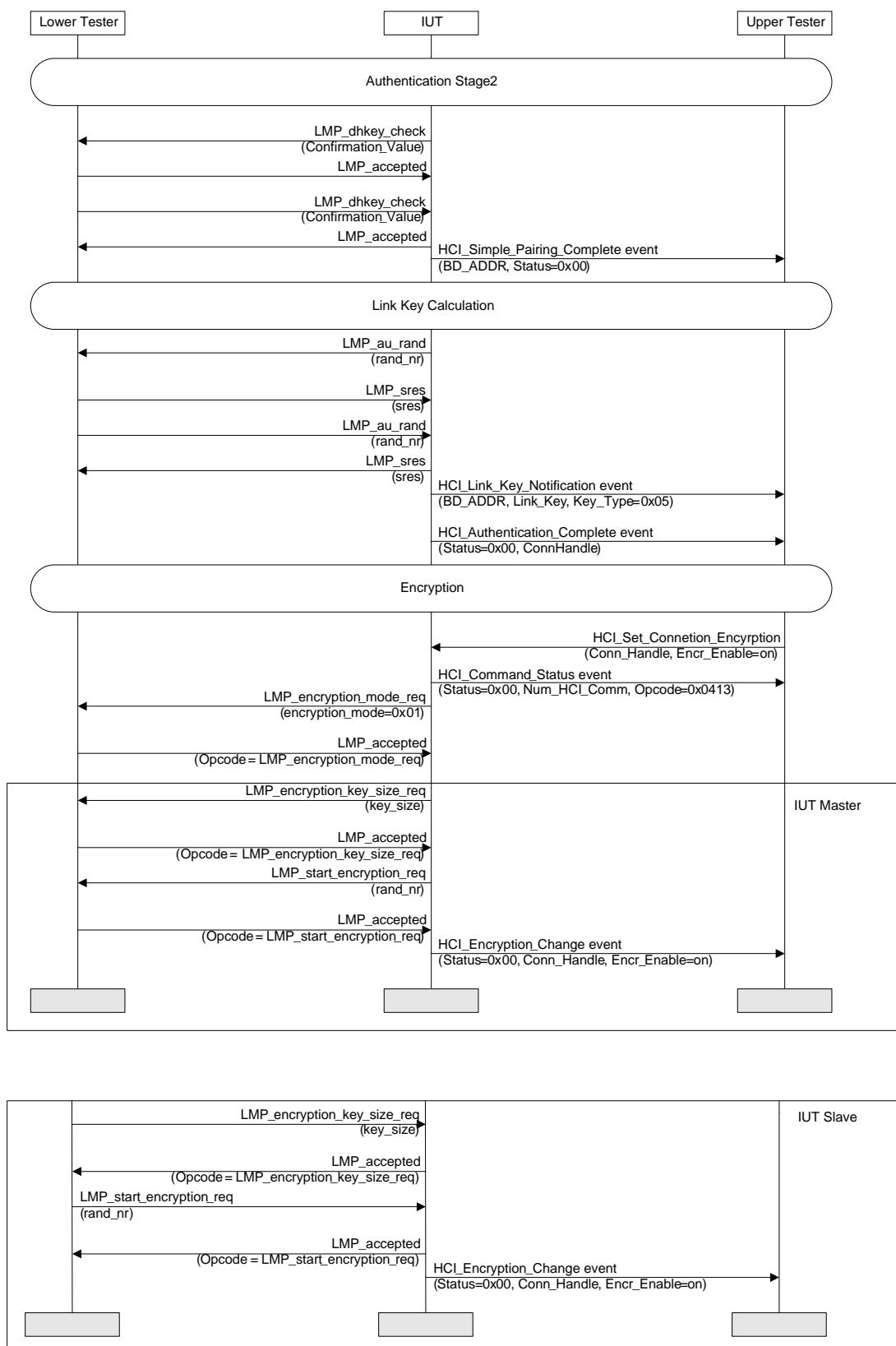


Figure 4.296: LMP/SP/BV-22-C MSC c



- Expected Outcome

Pass verdict

The IUT sends an HCI_Remote_OOB_Data_Request Event to the Upper Tester.

The IUT sends the LMP_dhkey_check PDU is with a valid Confirmation_Value

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester.

The IUT sends the resulting Link Key and Key Type to the Host in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated'.

- Notes

The Lower Tester shall send an LMP_not_accepted to LMP_DHkey if the confirmation value that it calculates does not match with the confirmation value that the IUT has sent.

4.10.4.6 LMP/SP/BV-23-C [OOB Protocol - IUT Responder - IUT and Lower Tester with OOB Authentication Data – Success]

- Test Purpose

Verify that the IUT supports the OOB protocol where the IUT and Lower Tester have OOB Authentication Data.

IUT is responder.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).



- Test Procedure

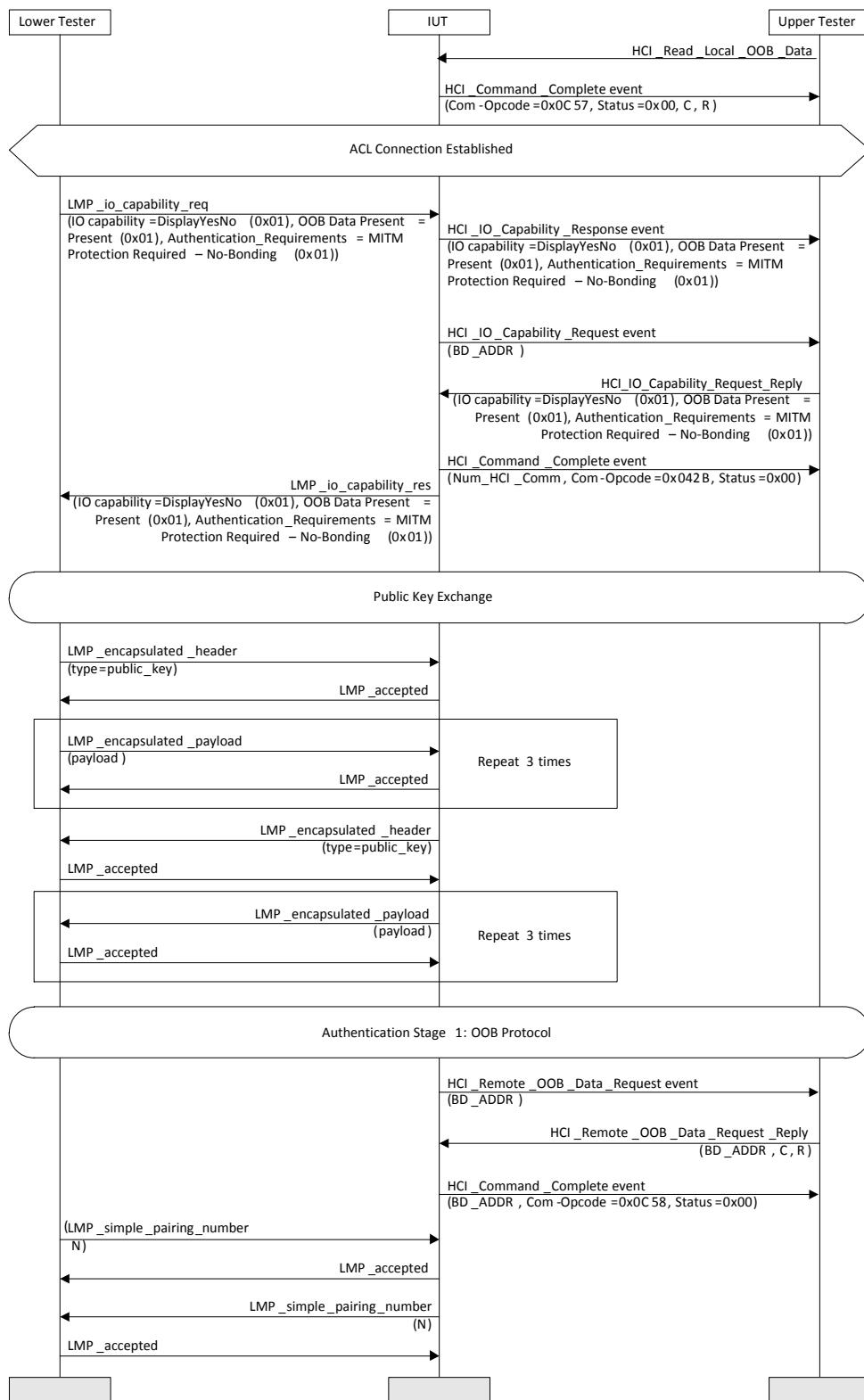


Figure 4.297: LMP/SP/BV-23-C MSC a



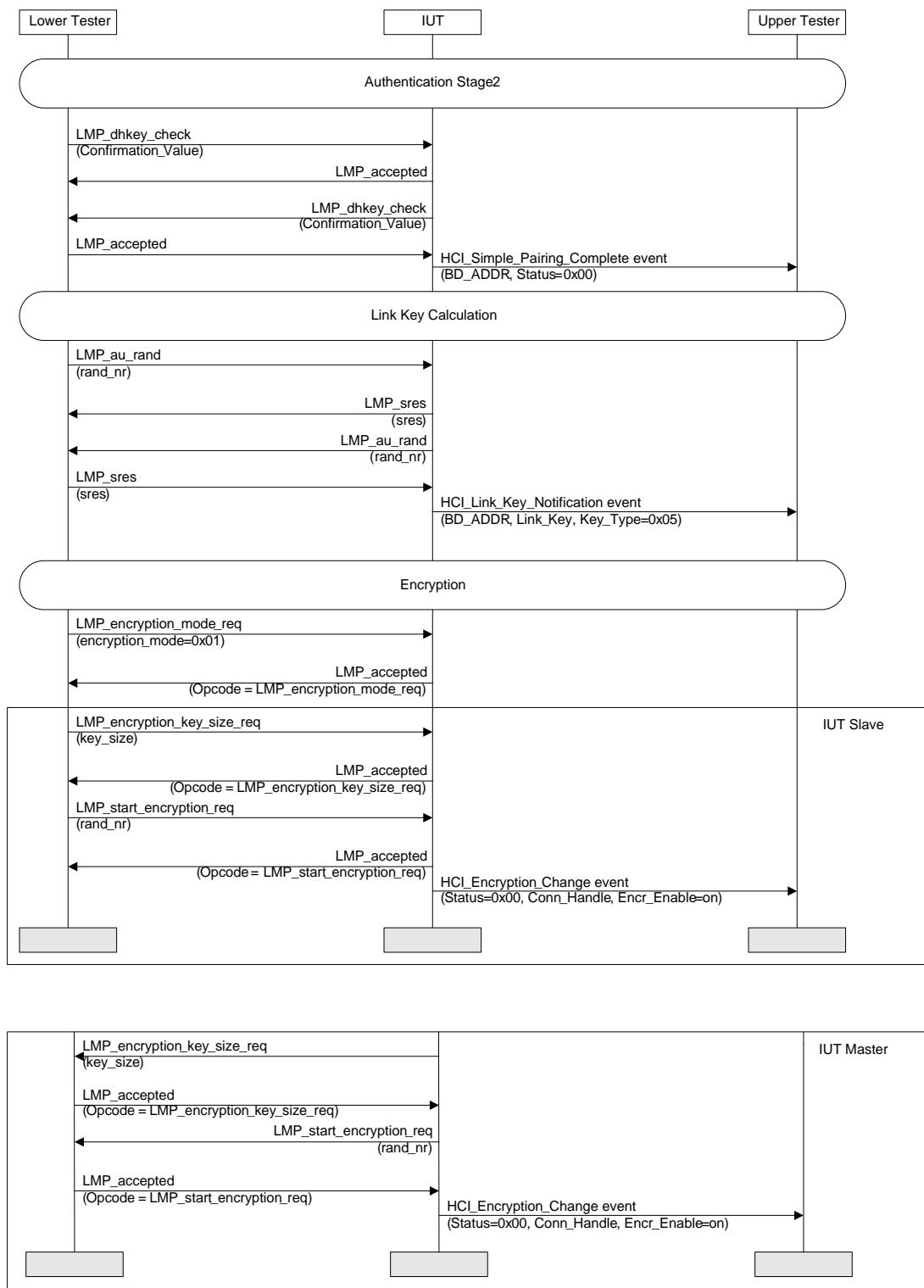


Figure 4.298: LMP/SP/BV-23-C MSC b

- Expected Outcome

Pass verdict

The IUT sends an HCI_Remote_OOB_Data_Request Event to the Upper Tester.



The IUT sends the LMP_dhkey_check PDU is with a valid Confirmation_Value. The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester.

The IUT sends the resulting Link Key and Key Type to the Host in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated'.

- Notes

The Lower Tester shall send an LMP_not_accepted to LMP_DHkey if the confirmation value that it calculates does not match with the confirmation value that the IUT has sent.

4.10.4.7 LMP/SP/BV-24-C [OOB Protocol - IUT Initiator - IUT with OOB Authentication Data - Failure]

- Test Purpose

Verify that the IUT supports the OOB protocol where the IUT has OOB Authentication Data that does not match the Lower Tester.

IUT is initiator.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).

- Test Procedure

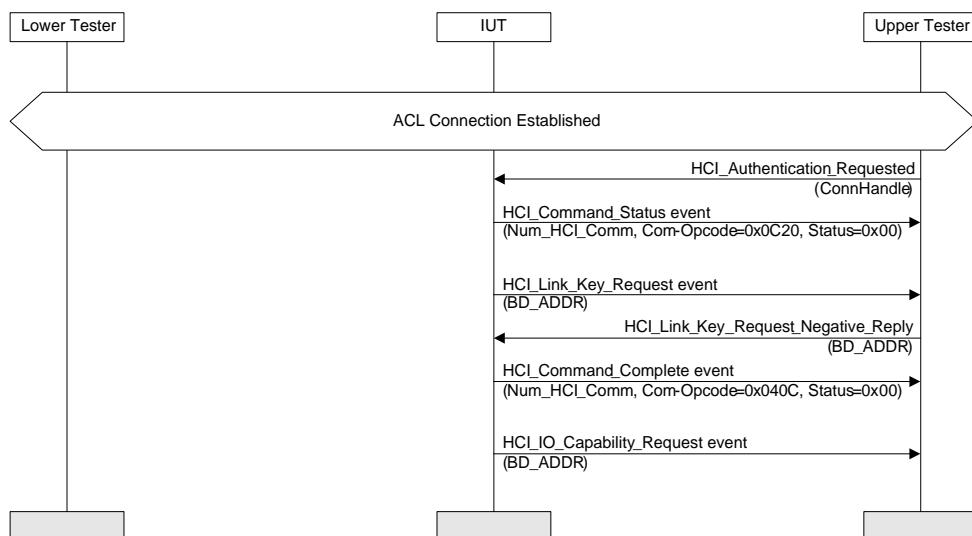


Figure 4.299: LMP/SP/BV-24-C MSC a



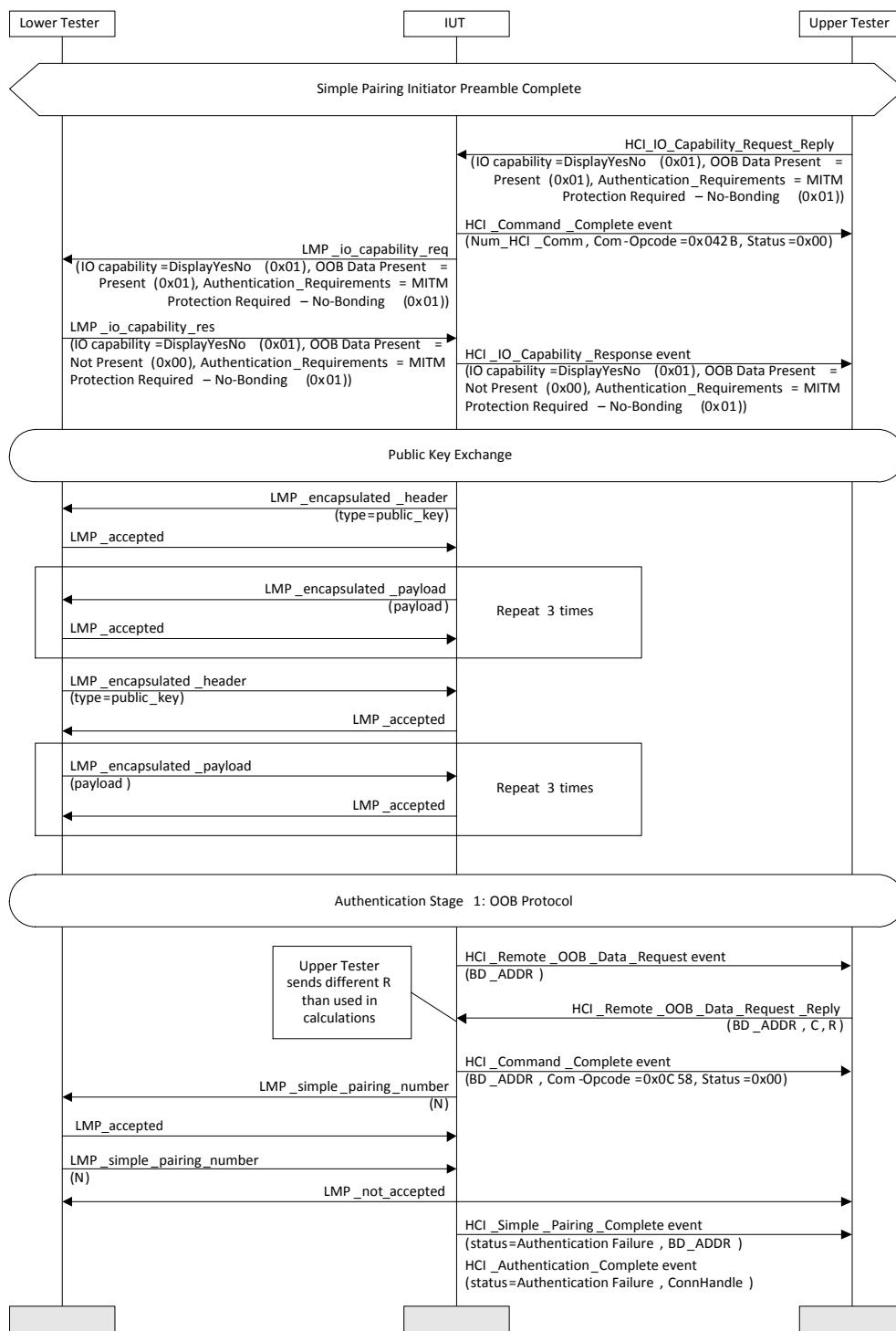


Figure 4.300: LMP/SP/BV-24-C MSC b

- Expected Outcome

Pass verdict

The IUT sends an HCI_Simple_Pairing_Complete Event with status = Authentication Failure to the Upper Tester after sending the LMP_not_accepted PDU.



4.10.4.8 LMP/SP/BV-25-C [OOB Protocol - IUT Responder - IUT with OOB Authentication Data - Failure]

- Test Purpose

Verify that the IUT supports the OOB protocol where the IUT has OOB Authentication Data.

IUT is responder.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).



- Test Procedure

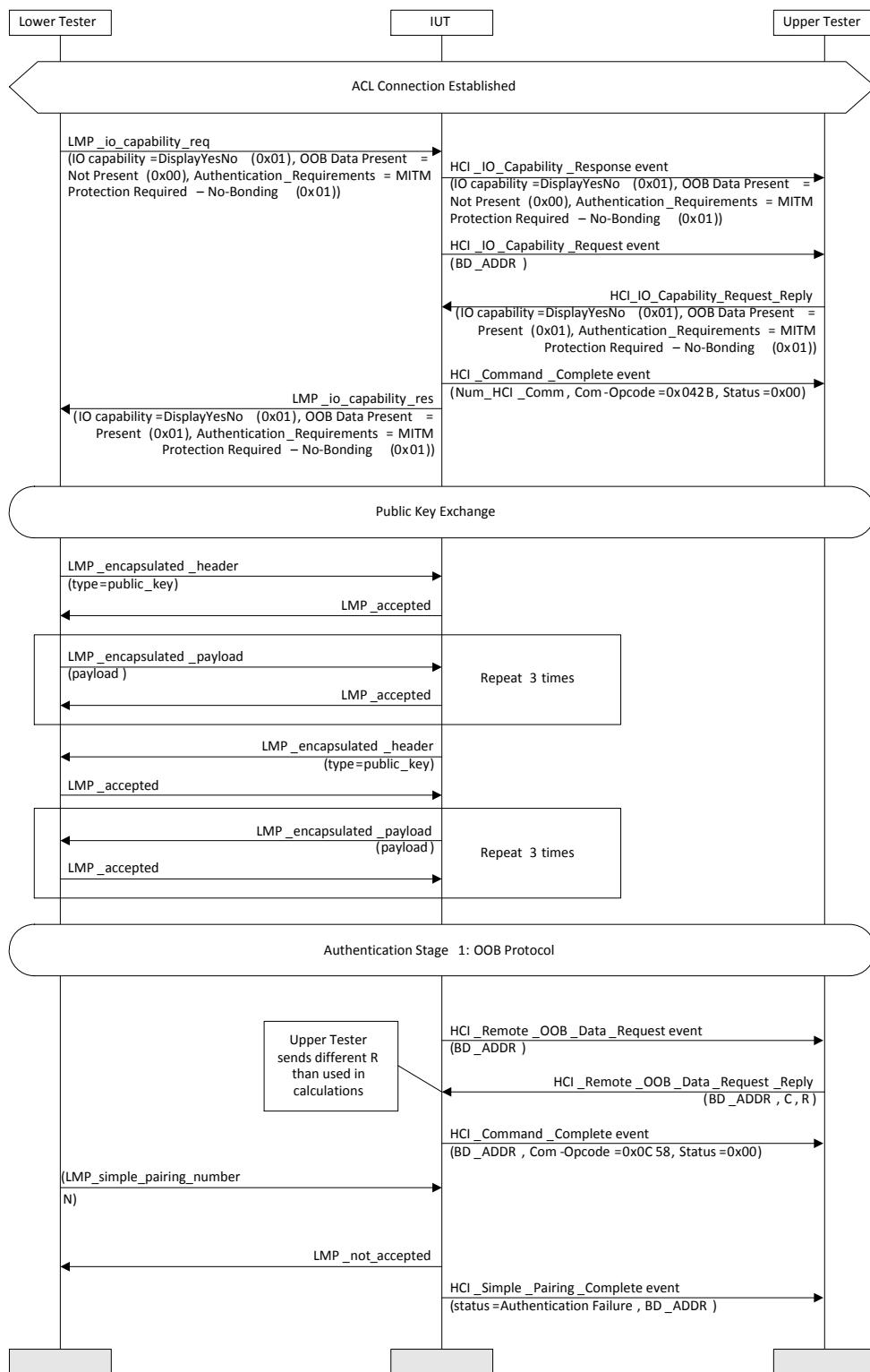


Figure 4.301: LMP/SP/BV-25-C



- Expected Outcome

Pass verdict

The IUT sends an HCI_Simple_Pairing_Complete Event with status = Authentication Failure to the Upper Tester after sending the LMP_not_accepted PDU.

4.10.4.9 LMP/SP/BV-26-C [OOB Protocol - IUT Initiator – Lower Tester with OOB Authentication Data - Failure]

- Test Purpose

Verify that the IUT supports the OOB protocol where the Lower Tester has OOB Authentication Data.

IUT is initiator.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).

- Test Procedure

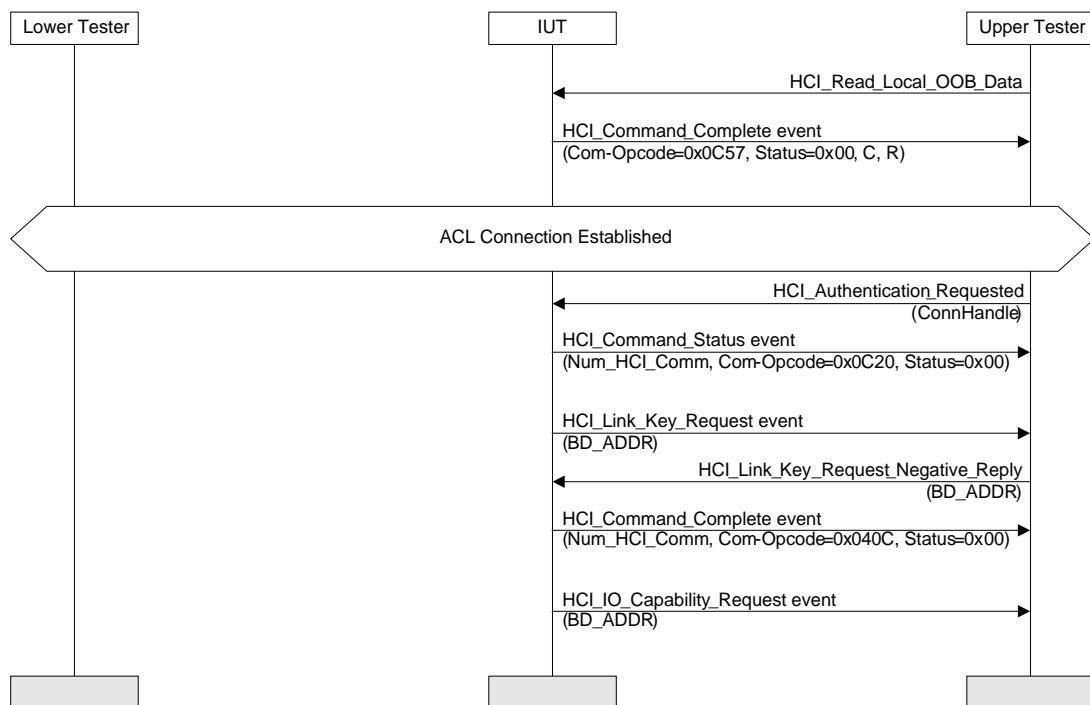


Figure 4.302: LMP/SP/BV-26-C MSC a



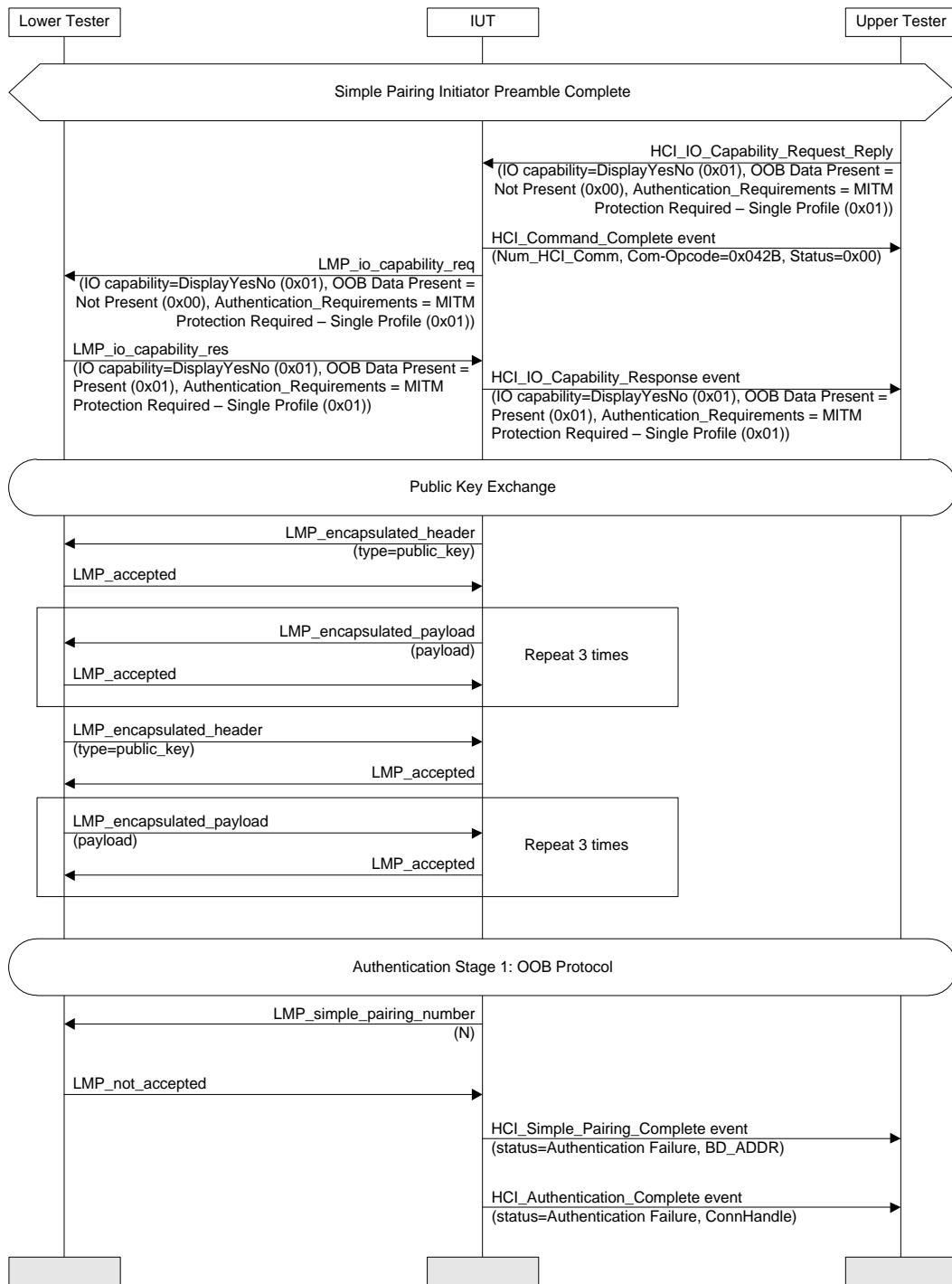


Figure 4.303: LMP/SP/BV-26-C MSC b

- Expected Outcome

Pass verdict

The IUT does not send an HCI_Remote_OOB_Data_Request event to the Upper Tester.



The IUT sends an HCI_Simple_Pairing_Complete Event with status = Authentication Failure to the Upper Tester after receiving the LMP_not_accepted PDU from the Lower Tester.

4.10.4.10 LMP/SP/BV-27-C [OOB Protocol - IUT Responder – Lower Tester with OOB Authentication Data - Failure]

- **Test Purpose**

Verify that the IUT supports the OOB protocol where the Lower Tester has OOB Authentication Data.

IUT is responder.

- **Reference**

[1] 4.2.7

- **Initial Condition**

See [Default Settings](#).

- **Test Procedure**

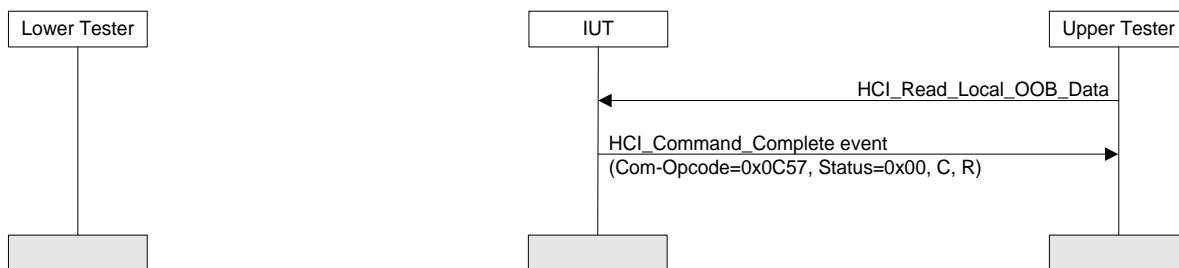


Figure 4.304: LMP/SP/BV-27-C MSC a

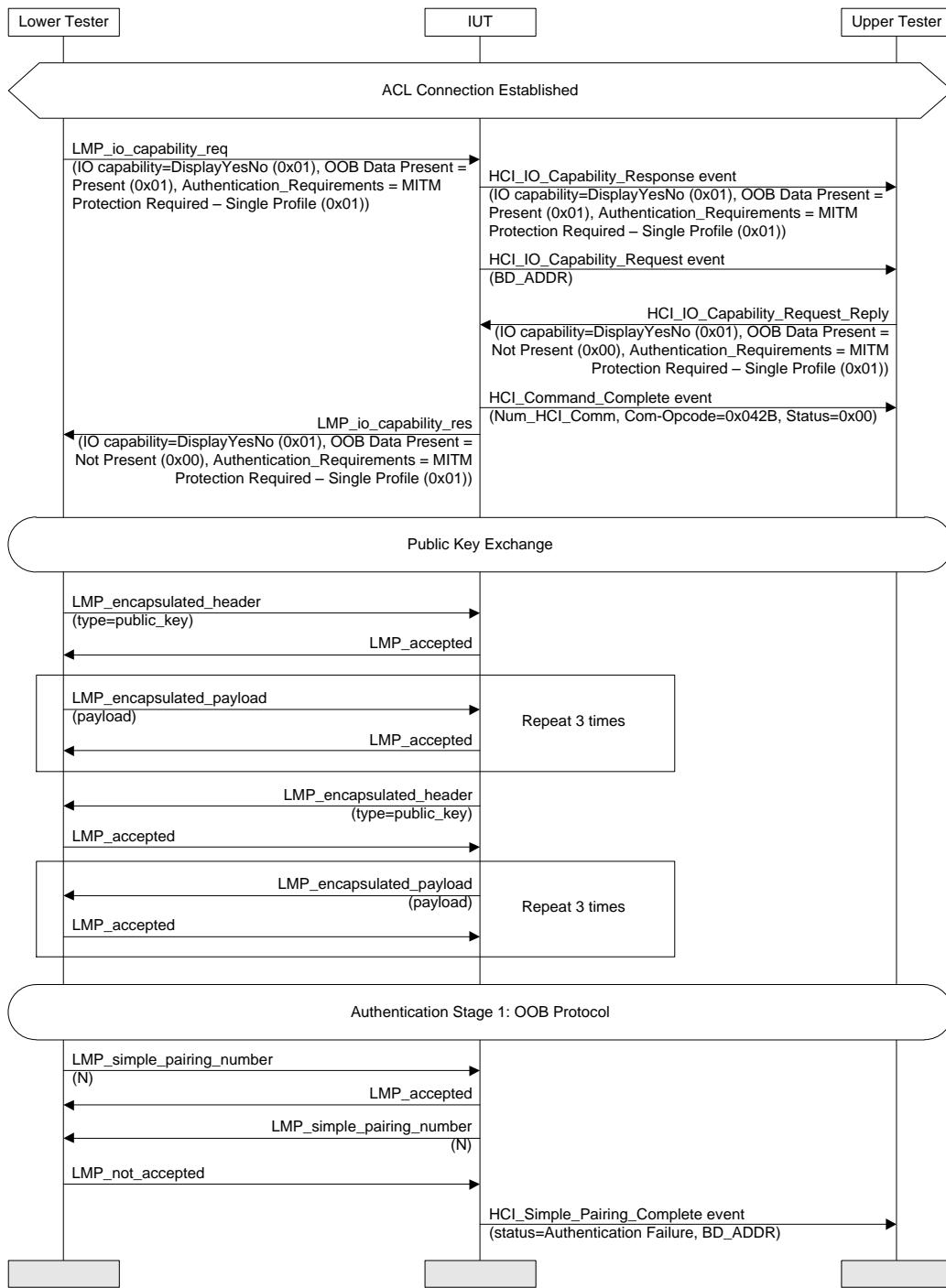


Figure 4.305: LMP/SP/BV-27-C MSC b

- Expected Outcome

Pass verdict

The IUT does not send an HCI_Remote_OOB_Data_Request event to the Upper Tester.



The IUT sends an HCI_Simple_Pairing_Complete Event with status = Authentication Failure to the Upper Tester after receiving the LMP_not_accepted PDU from the Lower Tester.

4.10.4.11 LMP/SP/BV-54-C [OOB Protocol – IUT Initiator – IUT with OOB Authentication Data - Success, P-256]

- Test Purpose

Verify that the IUT as initiator supports the OOB protocol using the P-256 elliptic curve where the IUT has OOB Authentication Data and the Lower Tester does not have OOB Authentication Data.

- Reference

[1] 4.2.7

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).

- Test Procedure

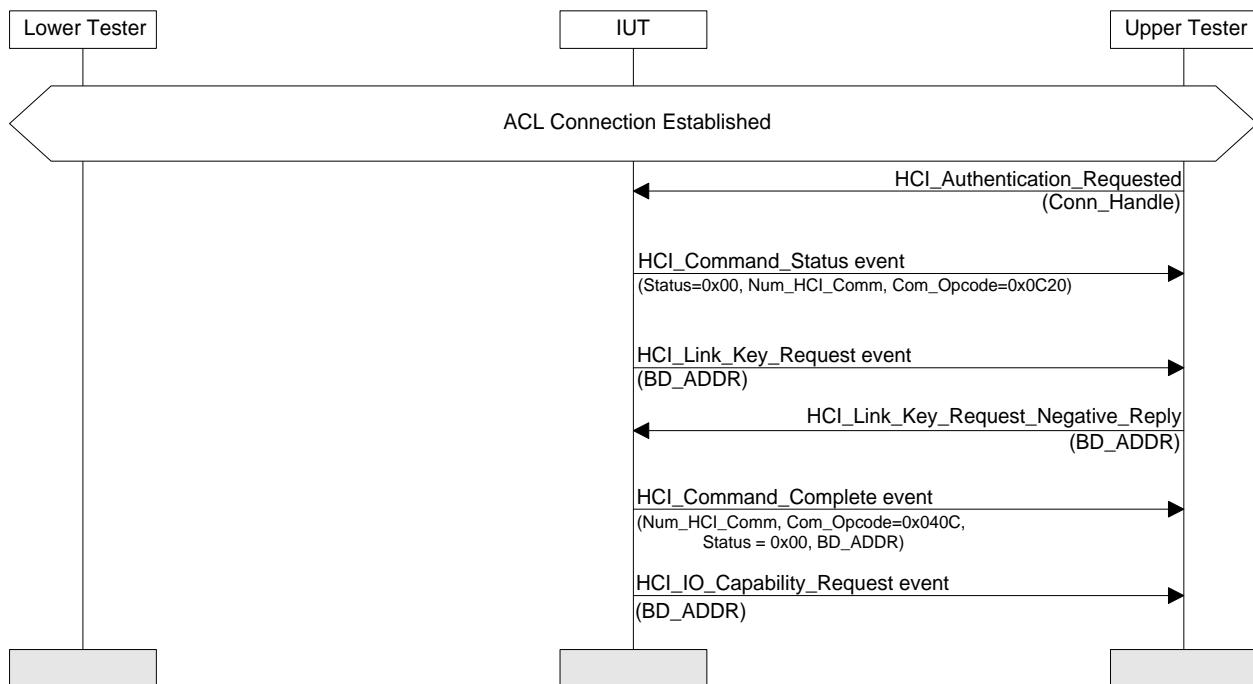


Figure 4.306: LMP/SP/BV-54-C MSC a



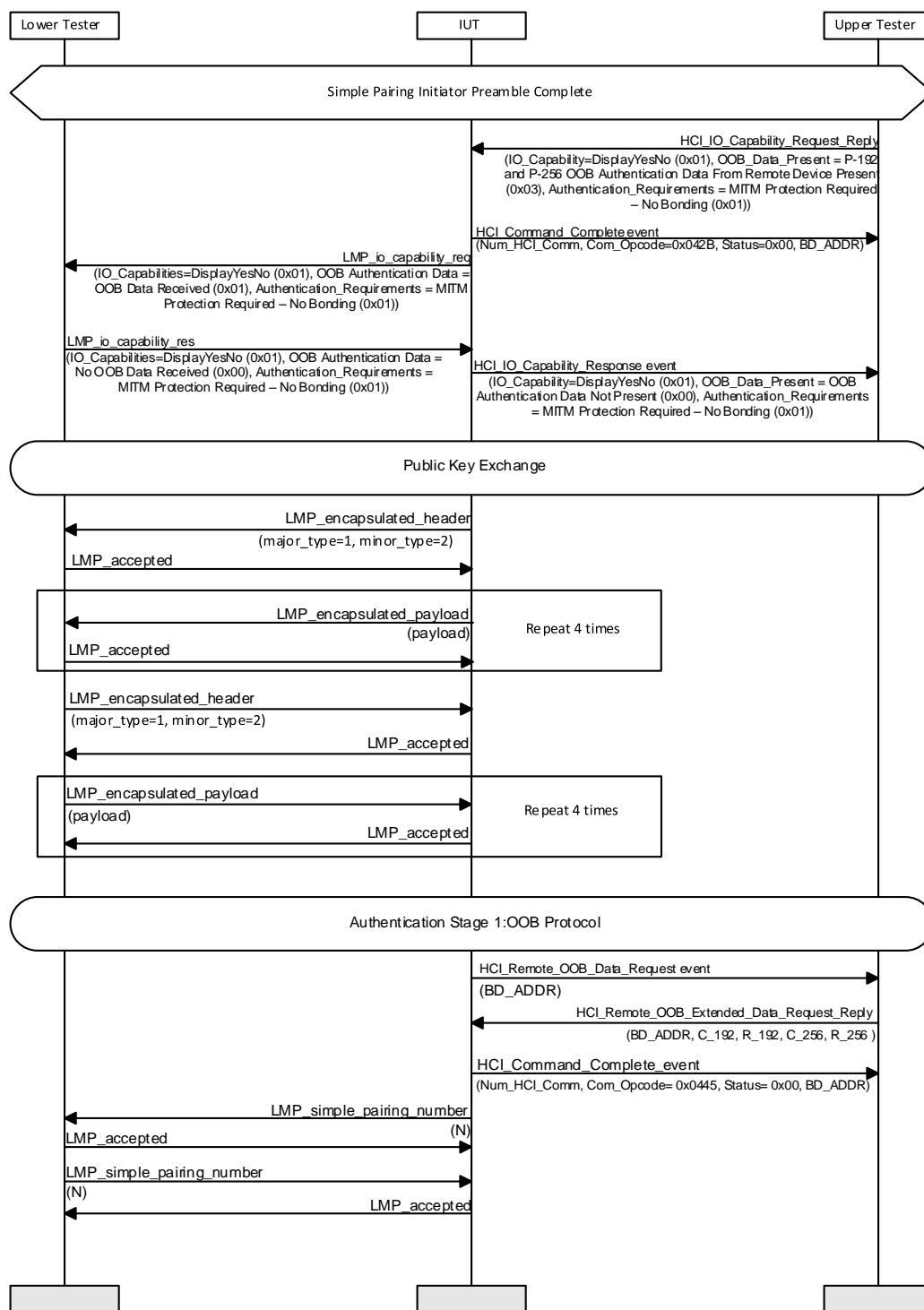


Figure 4.307: LMP/SP/BV-54-C MSC b



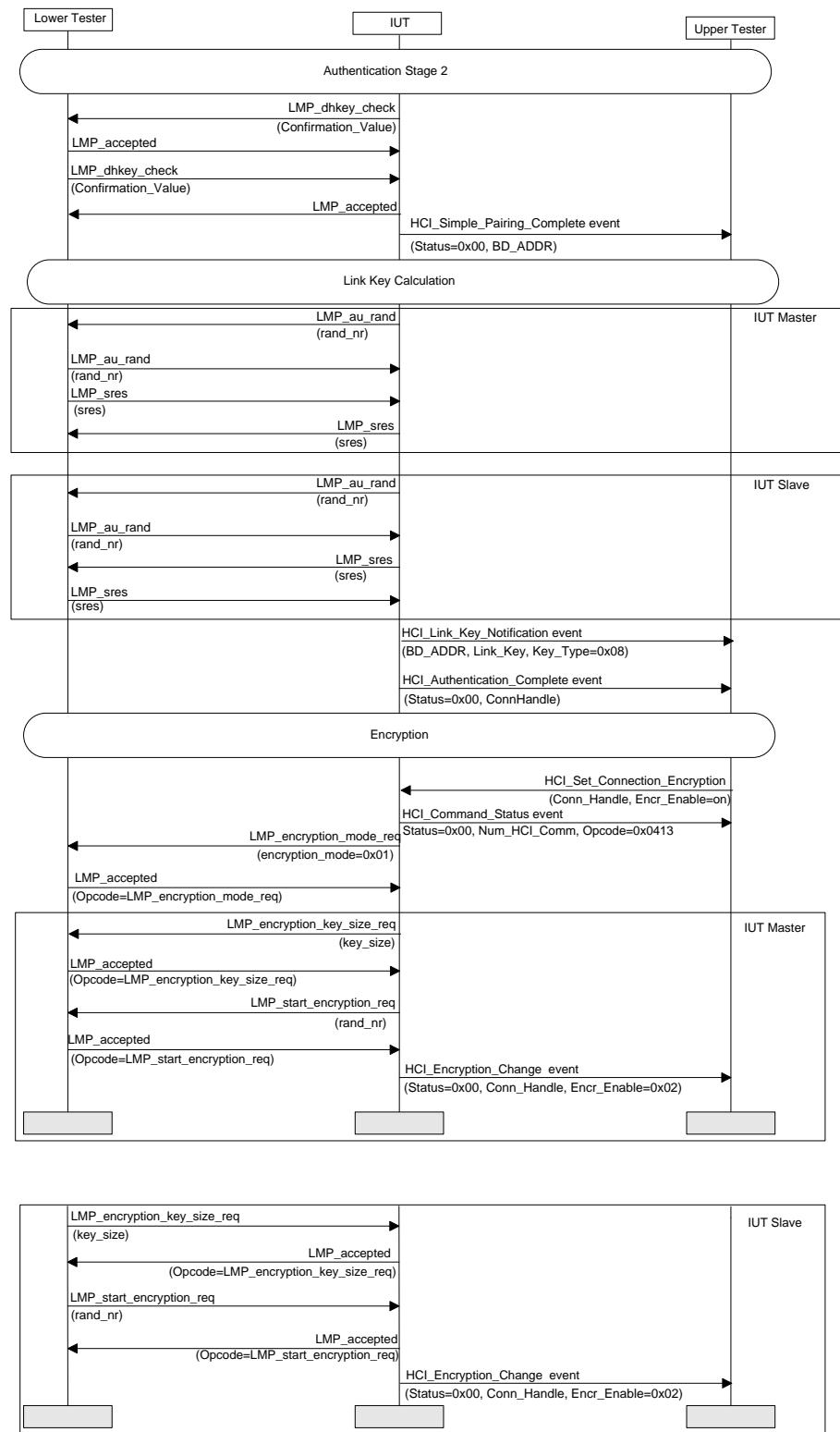


Figure 4.308: LMP/SP/BV-54-C MSC c

- Expected Outcome

Pass verdict

The IUT sends an HCI_Remote_OOB_Data_Request event to the Upper Tester.



The IUT sends the LMP_DHkey_check PDU with a valid Confirmation_Value to the Lower Tester.

The IUT sends an HCI_Simple_Pairing_Complete event to the Upper Tester with Status=Simple Pairing succeeded.

The IUT sends the resulting Link_Key and Key_Type to the Upper Tester in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated Combination Key generated from P256'.

- Notes

The Lower Tester shall send an LMP_not_accepted response PDU to a received LMP_DHkey_check PDU if the Confirmation_Value that it calculates does not match with the Confirmation_Value that the IUT has sent.

This test case is similar to [LMP/SP/BV-18-C \[OOB Protocol - IUT Initiator - IUT with OOB Authentication Data – Success\]](#).

4.10.4.12 LMP/SP/BV-55-C [OOB Protocol – IUT Responder – IUT with OOB Authentication Data – Success, P-256]

- Test Purpose

Verify that the IUT as responder supports the OOB protocol using the P-256 elliptic curve where the IUT has OOB Authentication Data.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).



- Test Procedure

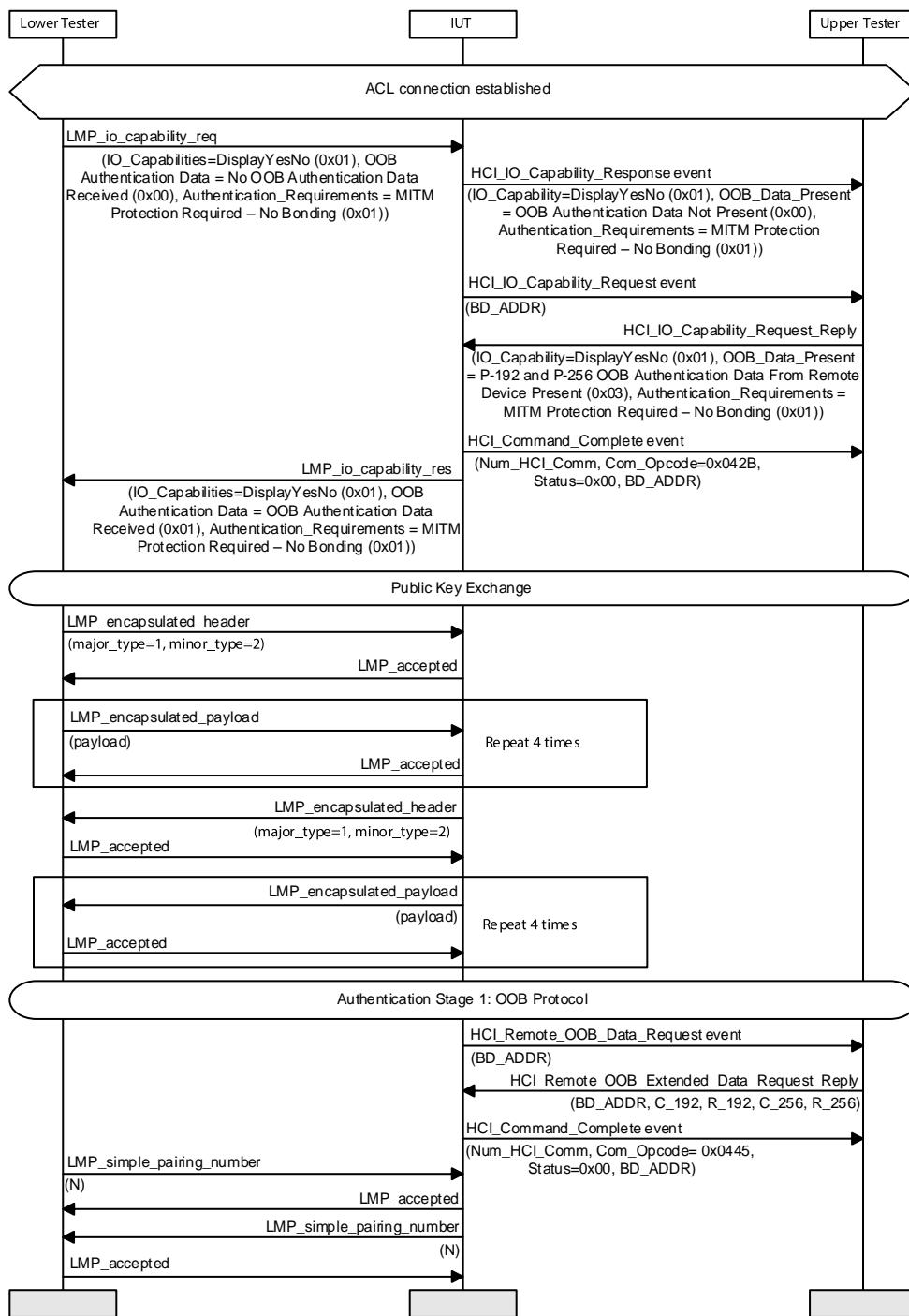


Figure 4.309: LMP/SP/BV-55-C MSC a



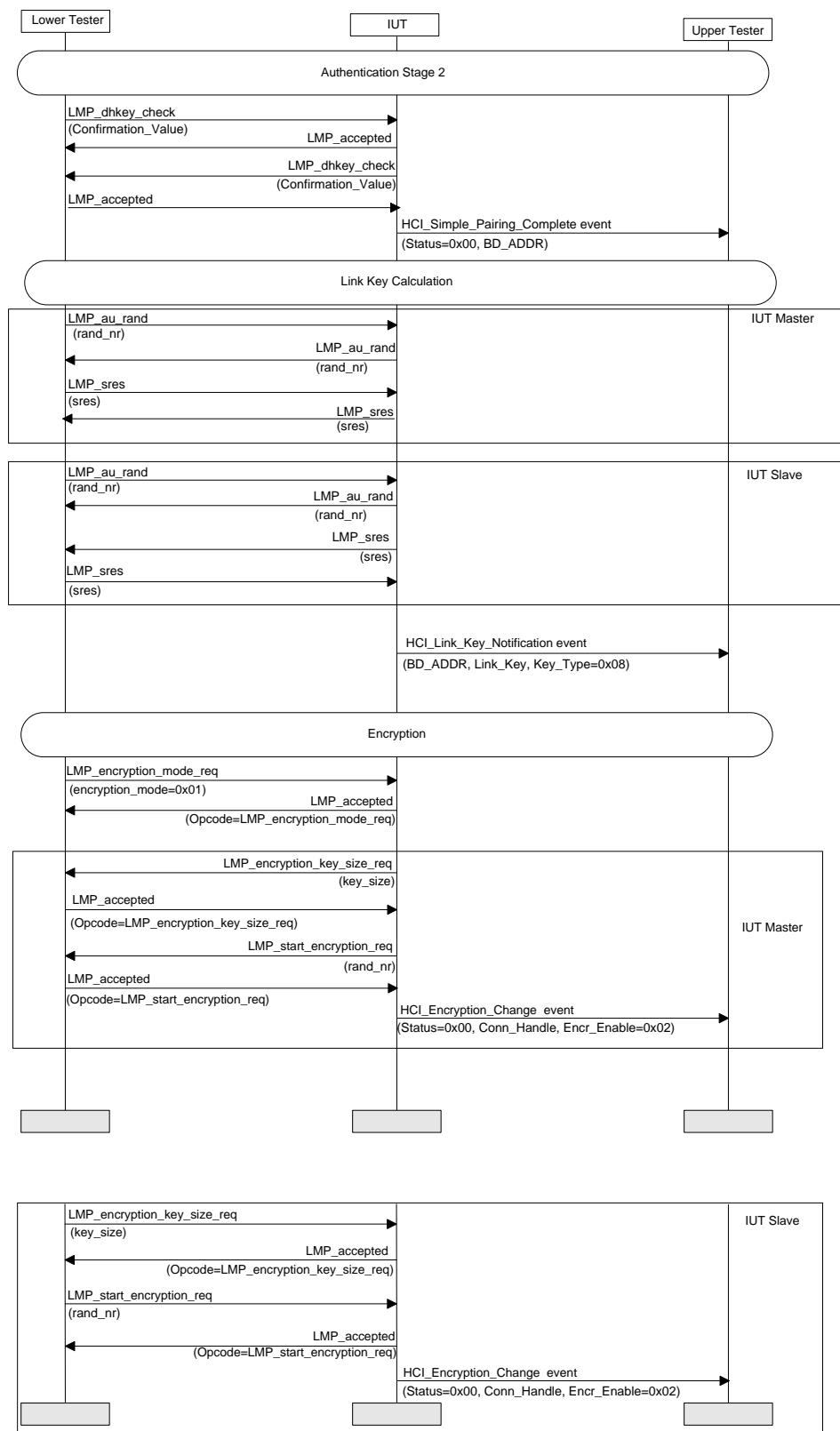


Figure 4.310: LMP/SP/BV-55-C MSC b



- Expected Outcome

Pass verdict

The IUT sends an HCI_Remote_OOB_Data_Request event to the Upper Tester.

The IUT sends an LMP_DHkey_check PDU with a valid Confirmation_Value to the Lower Tester.

The IUT sends an HCI_Simple_Pairing_Complete event to the Upper Tester with Status=Simple Pairing succeeded.

The IUT sends the resulting Link Key and Key Type to the Upper Tester in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated Combination Key generated from P256'.

- Notes

The Lower Tester shall send an LMP_not_accepted response PDU to a received LMP_DHkey_check PDU if the Confirmation_Value that it calculates does not match with the Confirmation_Value that the IUT has sent.

This test case is similar to [LMP/SP/BV-19-C \[OOB Protocol - IUT Responder - IUT with OOB Authentication Data – Success\]](#).

4.10.4.13 LMP/SP/BV-56-C [OOB Protocol – IUT Initiator – Lower Tester with OOB Authentication Data - Success, P-256]

- Test Purpose

Verify that the IUT as initiator supports the OOB protocol using the P-256 elliptic curve where the Lower Tester has OOB Authentication Data.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).



- Test Procedure

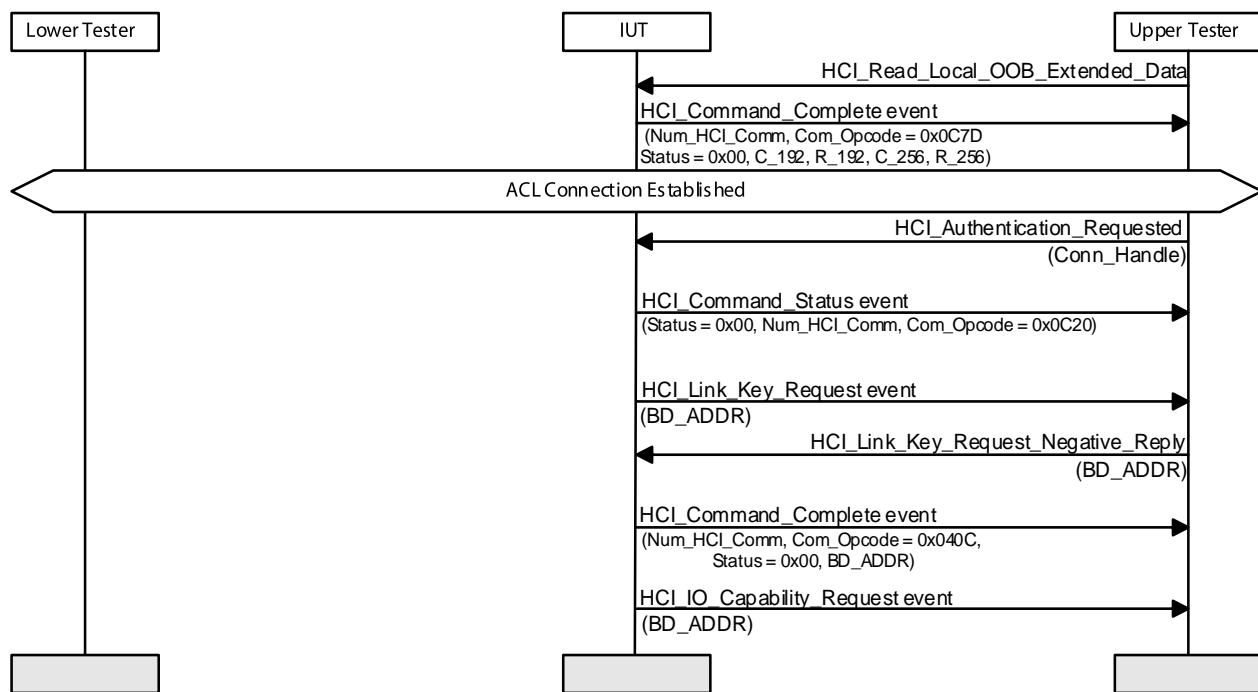


Figure 4.311: LMP/SP/BV-56-C MSC a



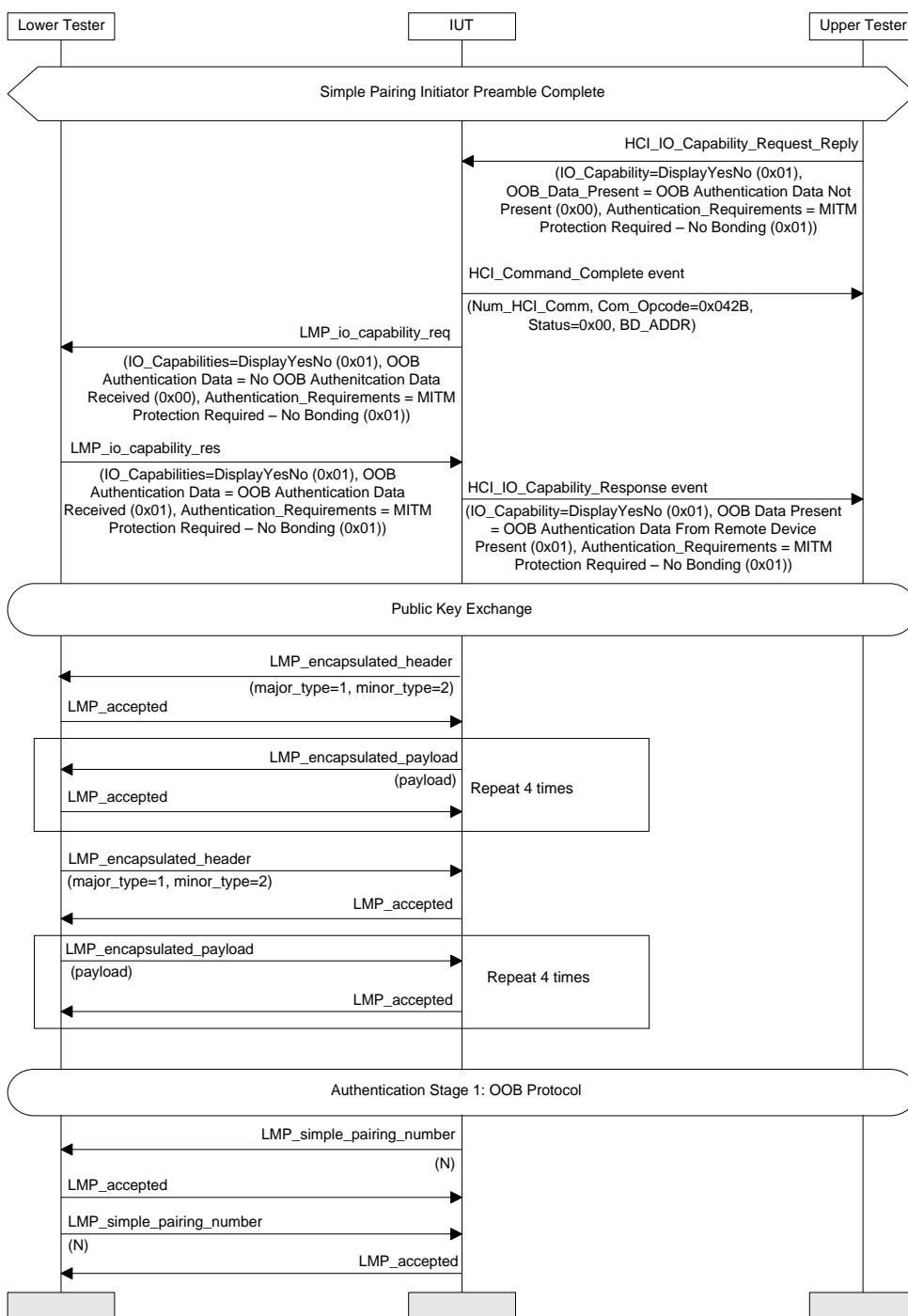


Figure 4.312: LMP/SP/BV-56-C MSC b



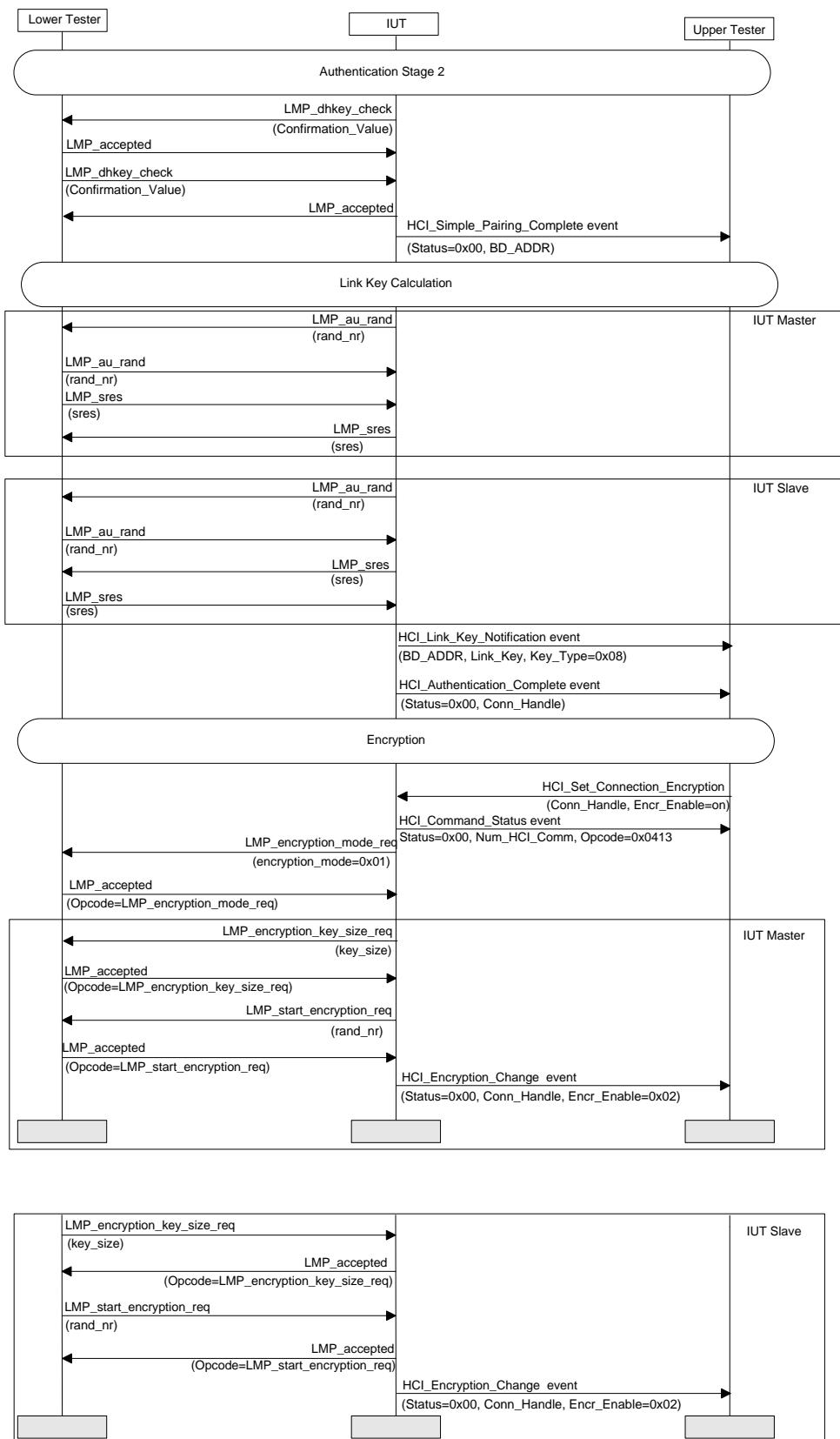


Figure 4.313: LMP/SP/BV-56-C MSC c



- Expected Outcome

Pass verdict

The IUT does not send an HCI_Remote_OOB_Data_Request event to the Upper Tester.

The IUT sends the LMP_DHkey_check PDU with a valid Confirmation_Value to the Lower Tester.

The IUT sends an HCI_Simple_Pairing_Complete event to the Upper Tester with Status=Simple Pairing succeeded.

The IUT sends the resulting Link Key and Key Type to the Upper Tester in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated Combination Key generated from P256'.

- Notes

The Lower Tester shall send an LMP_not_accepted response PDU to a received LMP_DHkey_check PDU if the Confirmation_Value that it calculates does not match with the Confirmation_Value that the IUT has sent.

This test case is similar to [LMP/SP/BV-20-C \[OOB Protocol - IUT Initiator – Lower Tester with OOB Authentication Data – Success\]](#).

4.10.4.14 LMP/SP/BV-57-C [OOB Protocol – IUT Responder – Lower Tester with OOB Authentication Data – Success, P-256]

- Test Purpose

Verify that the IUT as responder supports the OOB protocol using the P-256 elliptic curve where the Lower Tester has OOB Authentication Data.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).



- Test Procedure

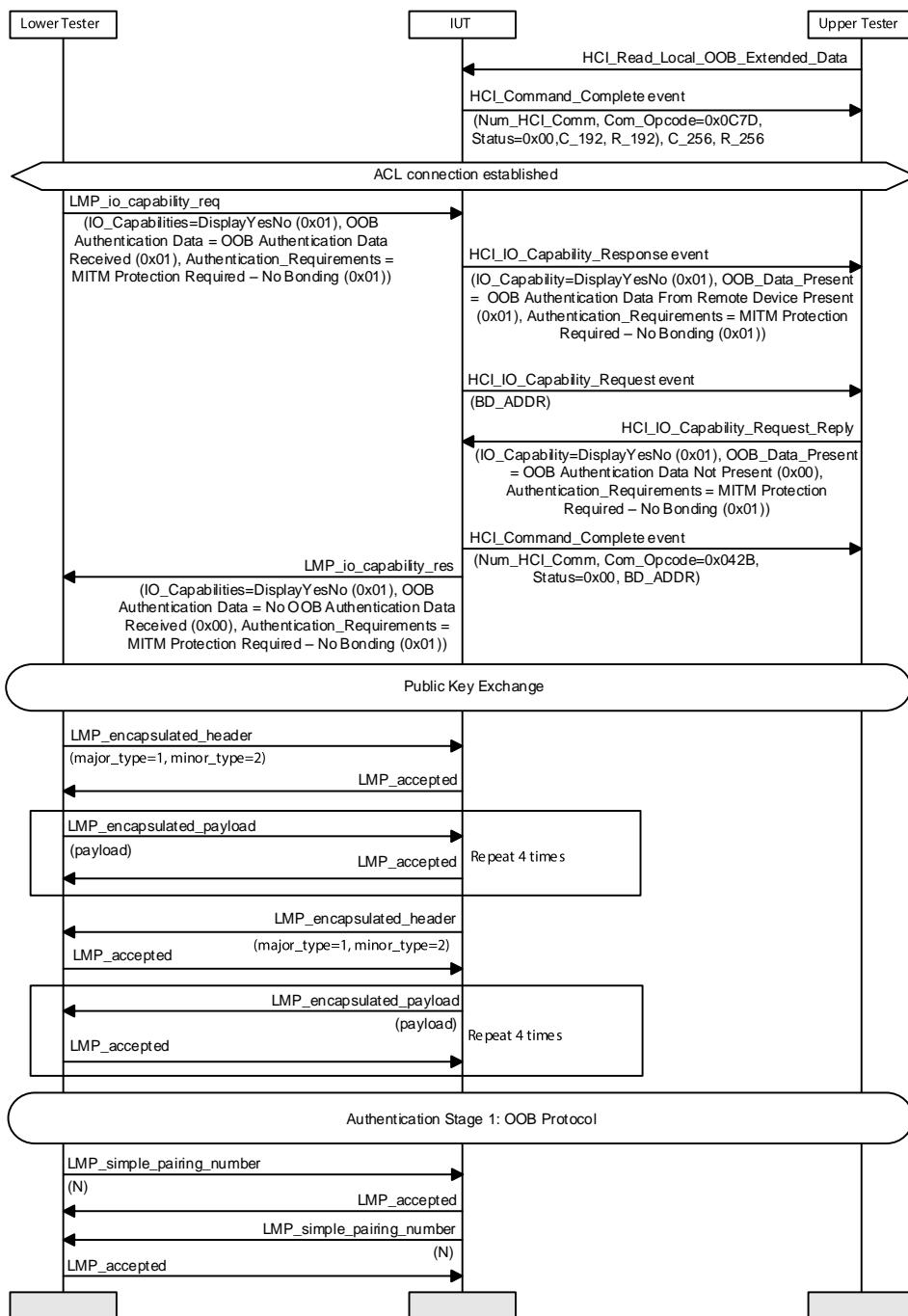


Figure 4.314: LMP/SP/BV-57-C MSC a



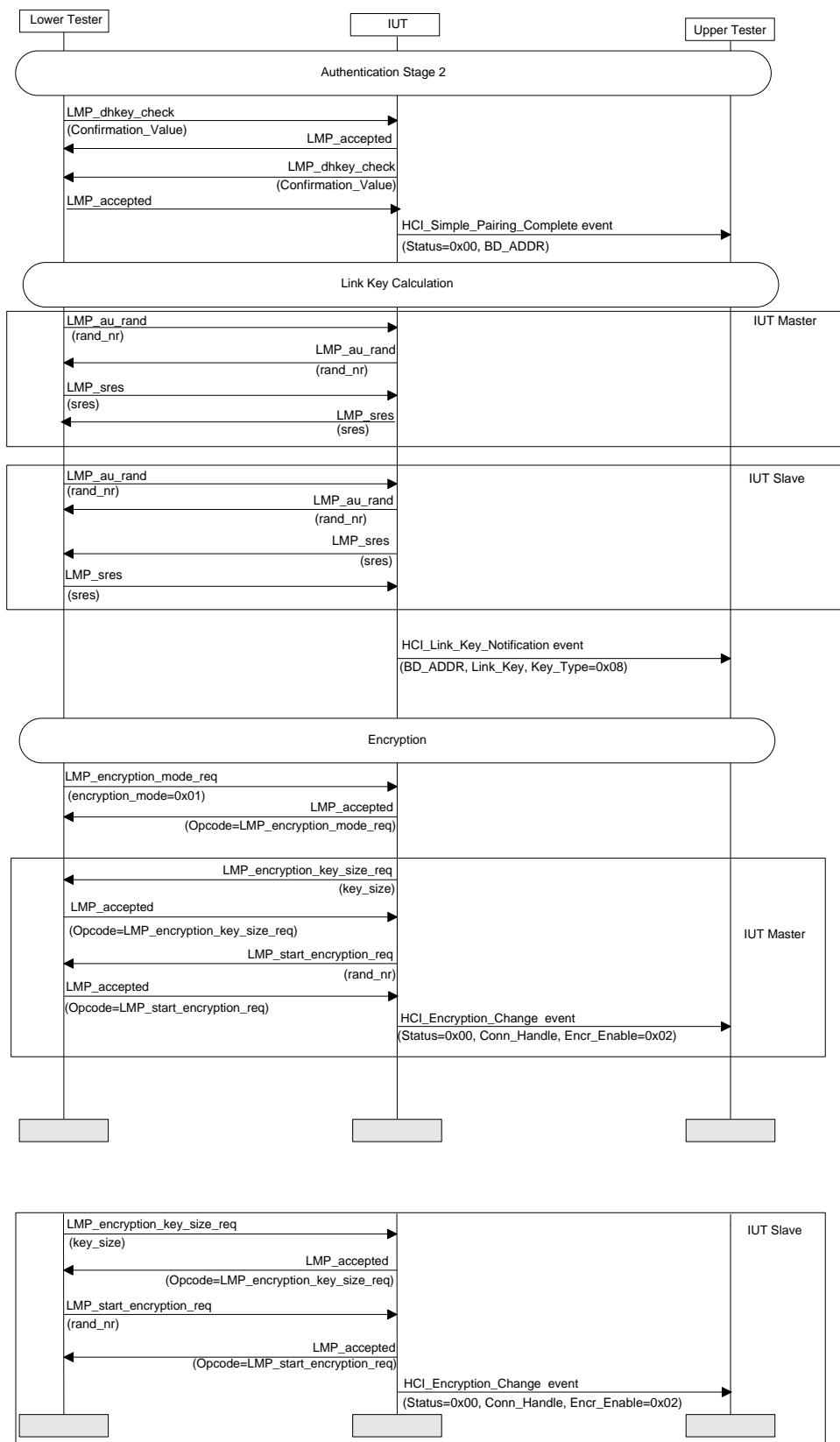


Figure 4.315: LMP/SP/BV-57-C MSC b



- Expected Outcome

Pass verdict

The IUT does not send an HCI_Remote_OOB_Data_Request event to the Upper Tester.

The IUT sends the LMP_DHkey_check PDU with a valid Confirmation_Value to the Lower Tester.

The IUT sends an HCI_Simple_Pairing_Complete event to the Upper Tester with Status=Simple Pairing succeeded.

The IUT sends the resulting Link Key and Key Type to the Upper Tester in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated Combination Key generated from P256'.

- Notes

The Lower Tester shall send an LMP_not_accepted response PDU to a received LMP_DHkey_check PDU if the Confirmation_Value that it calculates does not match with the Confirmation_Value that the IUT has sent.

This test case is similar to [LMP/SP/BV-21-C \[OOB Protocol - IUT Responder – Lower Tester with OOB Authentication Data – Success\]](#).

4.10.4.15 LMP/SP/BV-58-C [OOB Protocol – IUT Initiator – IUT and Lower Tester with OOB Authentication Data - Success, P-256]

- Test Purpose

Verify that the IUT as initiator supports the OOB protocol using the P-256 elliptic curve where the IUT and Lower Tester have OOB Authentication Data.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).



- Test Procedure

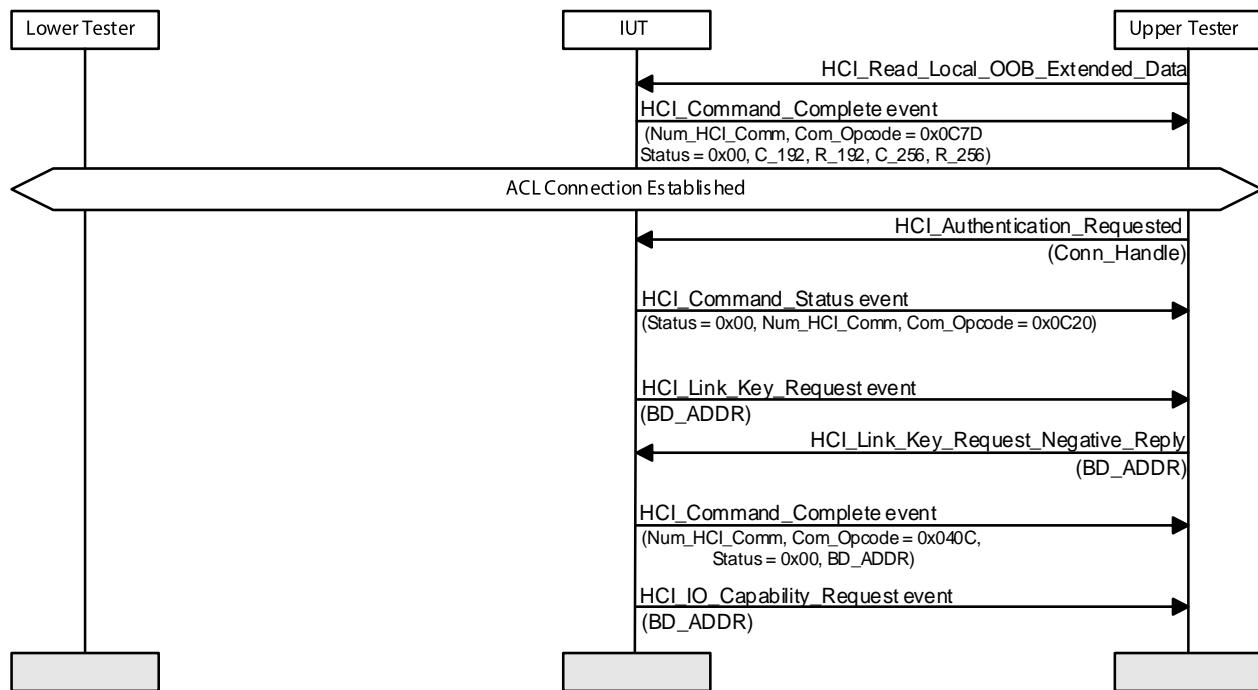


Figure 4.316: LMP/SP/BV-58-C MSC a



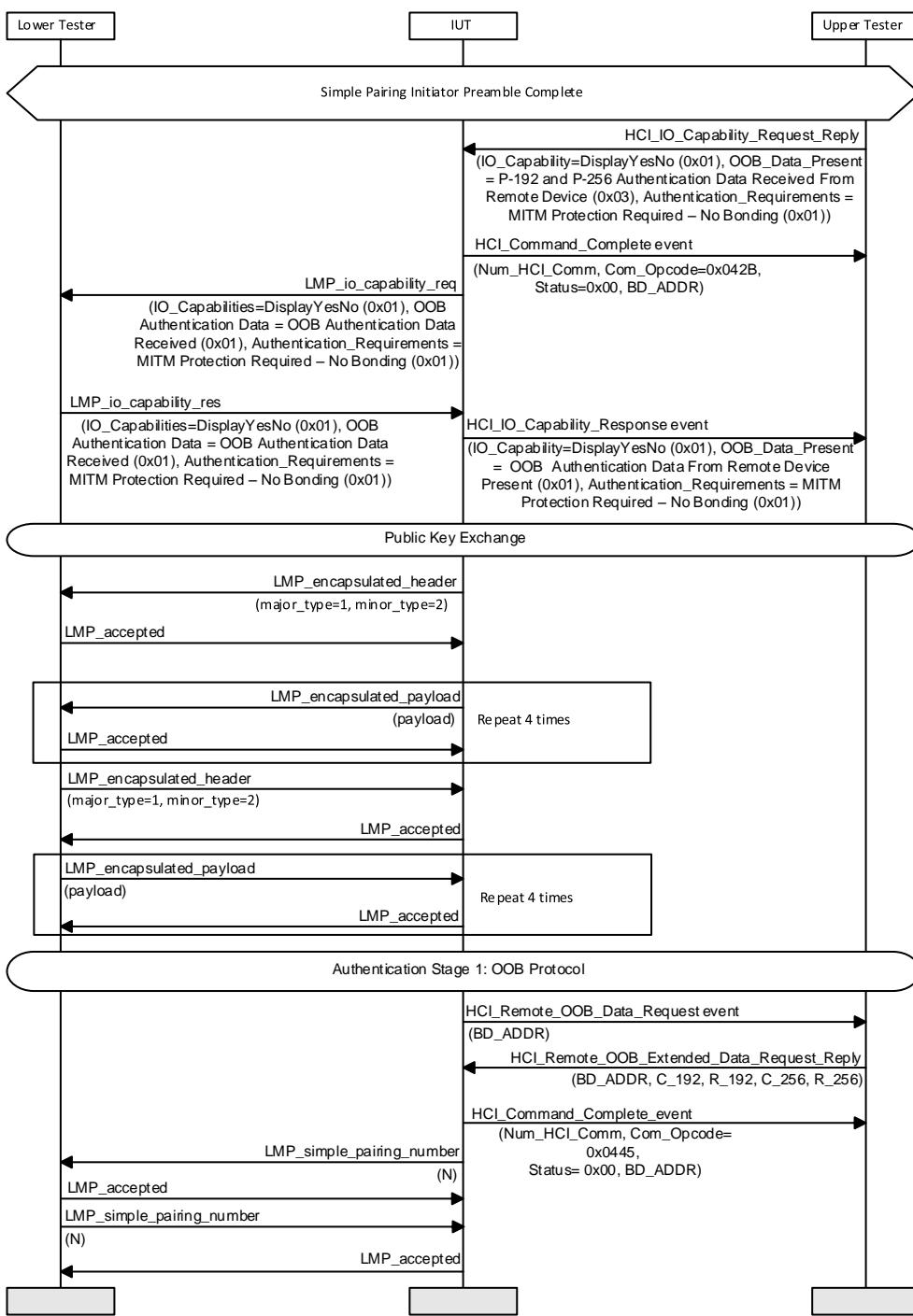


Figure 4.317: LMP/SP/BV-58-C MSC b



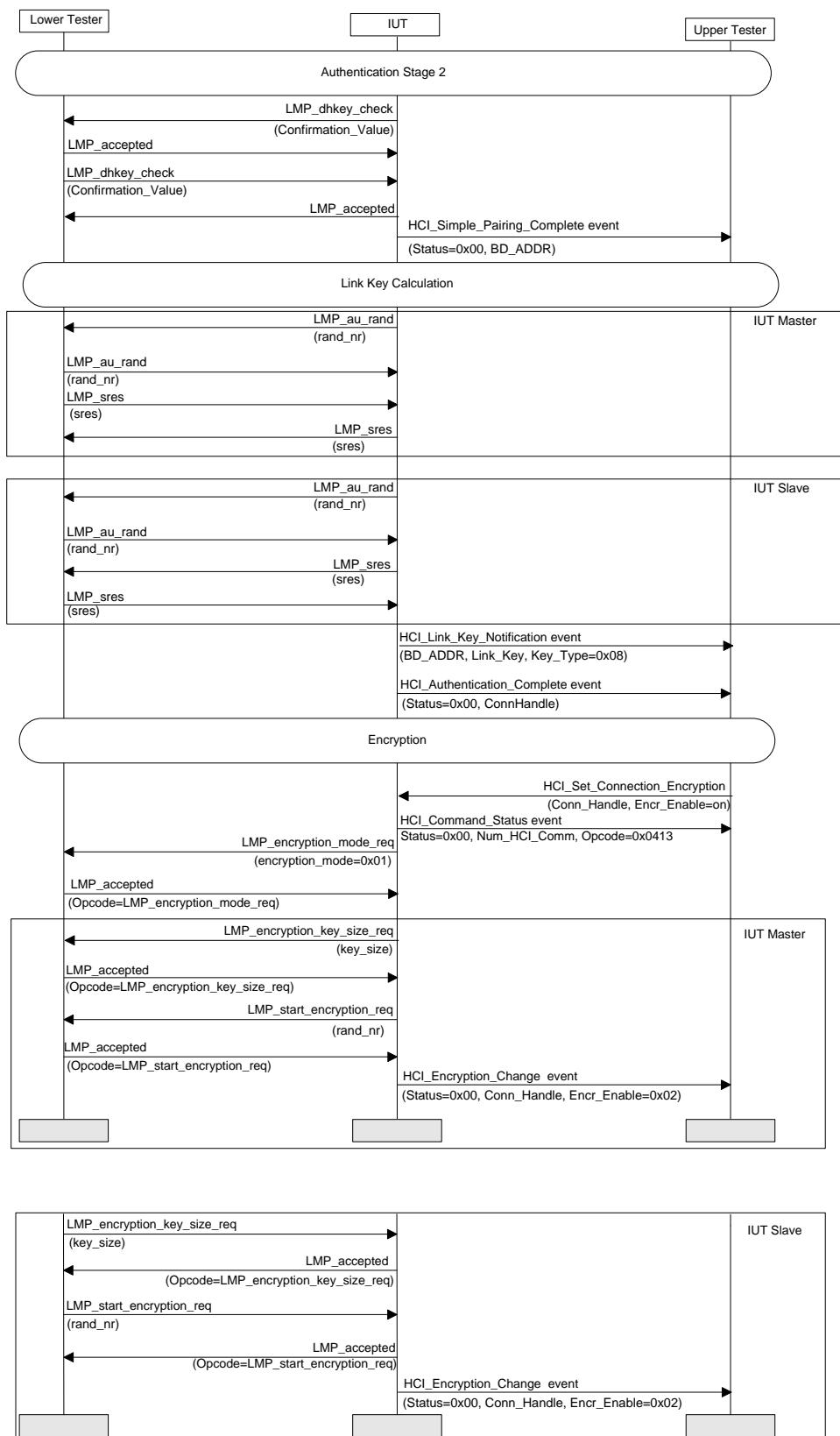


Figure 4.318: LMP/SP/BV-58-C MSC c



- Expected Outcome

Pass verdict

The IUT sends an HCI_Remote_OOB_Data_Request event to the Upper Tester.

The IUT sends the LMP_DHkey_check PDU with a valid Confirmation_Value to the Lower Tester.

The IUT sends an HCI_Simple_Pairing_Complete event to the Upper Tester with Status=Simple Pairing succeeded.

The IUT sends the resulting Link_Key and Key_Type to the Upper Tester in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated Combination Key generated from P256'.

- Notes

The Lower Tester shall send an LMP_not_accepted response PDU to a received LMP_DHkey_check PDU if the Confirmation_Value that it calculates does not match with the Confirmation_Value that the IUT has sent.

This test case is similar to [LMP/SP/BV-22-C \[OOB Protocol - IUT Initiator - IUT and Lower Tester with OOB Authentication Data - Success\]](#).

4.10.4.16 LMP/SP/BV-59-C [OOB Protocol – IUT Responder – IUT and Lower Tester with OOB Authentication Data – Success, P-256]

- Test Purpose

Verify that the IUT as responder supports the OOB protocol using the P-256 elliptic curve where the IUT and Lower Tester have OOB Authentication Data.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).



- Test Procedure

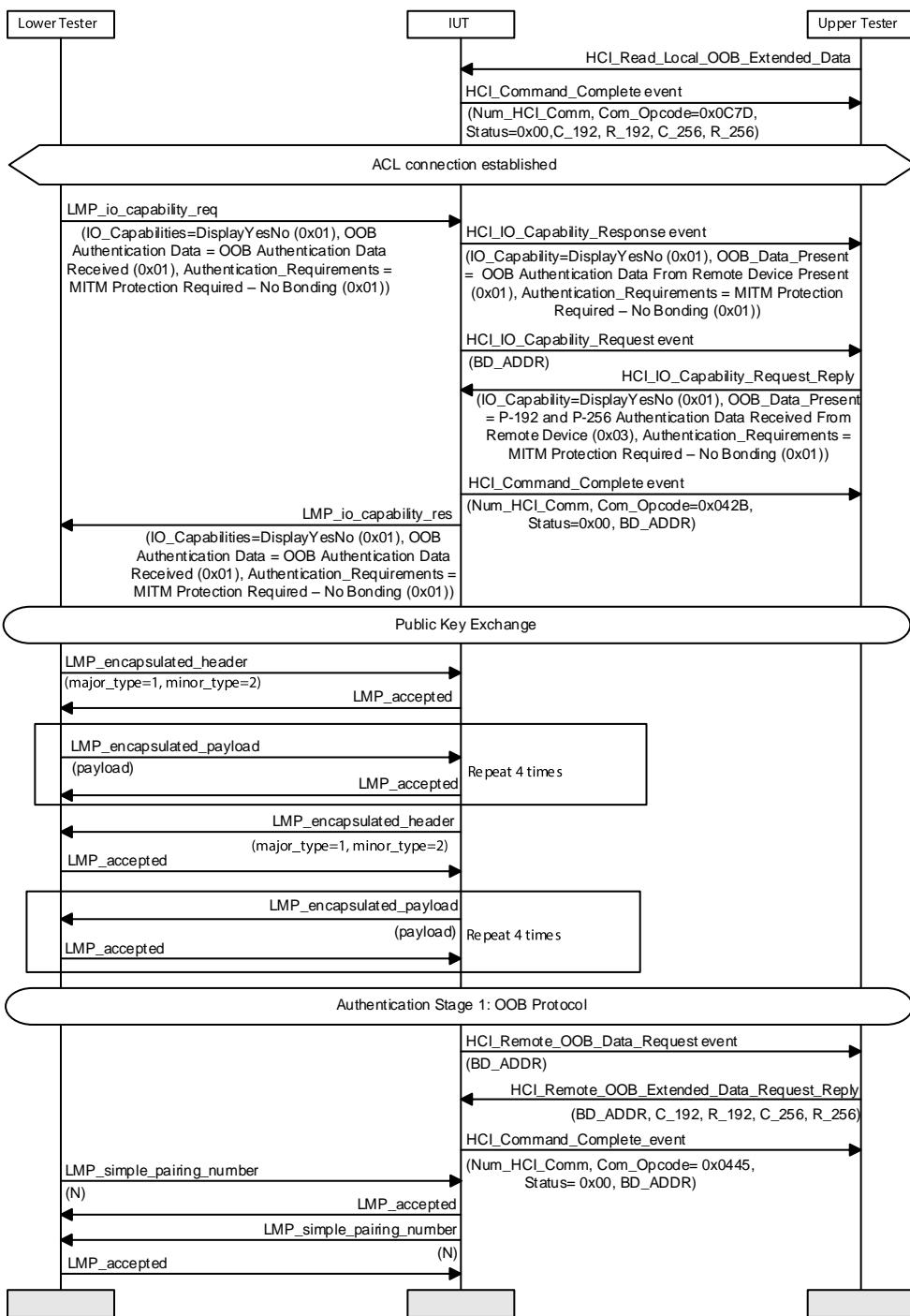


Figure 4.319: LMP/SP/BV-59-C MSC a



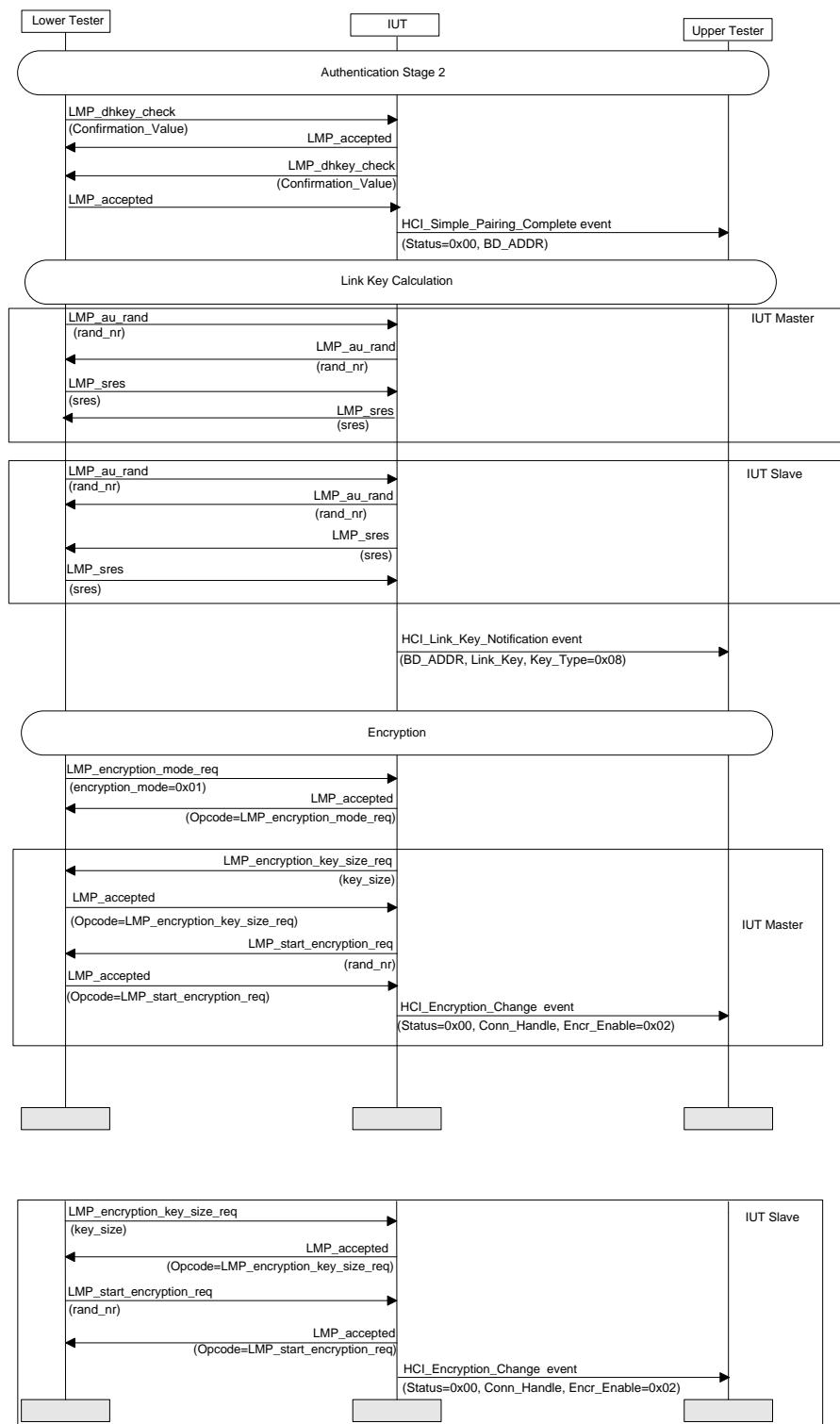


Figure 4.320: LMP/SP/BV-59-C MSC b

- Expected Outcome

Pass verdict

The IUT sends an HCI_Remote_OOB_Data_Request event to the Upper Tester.



The IUT sends an LMP_DHkey_check PDU with a valid Confirmation_Value to the Lower Tester.

The IUT sends an HCI_Simple_Pairing_Complete event to the Upper Tester with Status=Simple Pairing succeeded.

The IUT sends the resulting Link Key and Key Type to the Upper Tester in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated Combination Key generated from P256'.

- Notes

The Lower Tester shall send an LMP_not_accepted response PDU to a received LMP_DHkey_check PDU if the Confirmation_Value that it calculates does not match with the Confirmation_Value that the IUT has sent.

This test case is similar to [LMP/SP/BV-23-C \[OOB Protocol - IUT Responder - IUT and Lower Tester with OOB Authentication Data – Success\]](#).

4.10.4.17 LMP/SP/BV-60-C [OOB Protocol – IUT Initiator - IUT with OOB Authentication Data – Failure, P-256]

- Test Purpose

Verify that the IUT as initiator supports the OOB protocol using the P-256 elliptic curve where the IUT has OOB Authentication Data that does not match the Lower Tester.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).



- Test Procedure

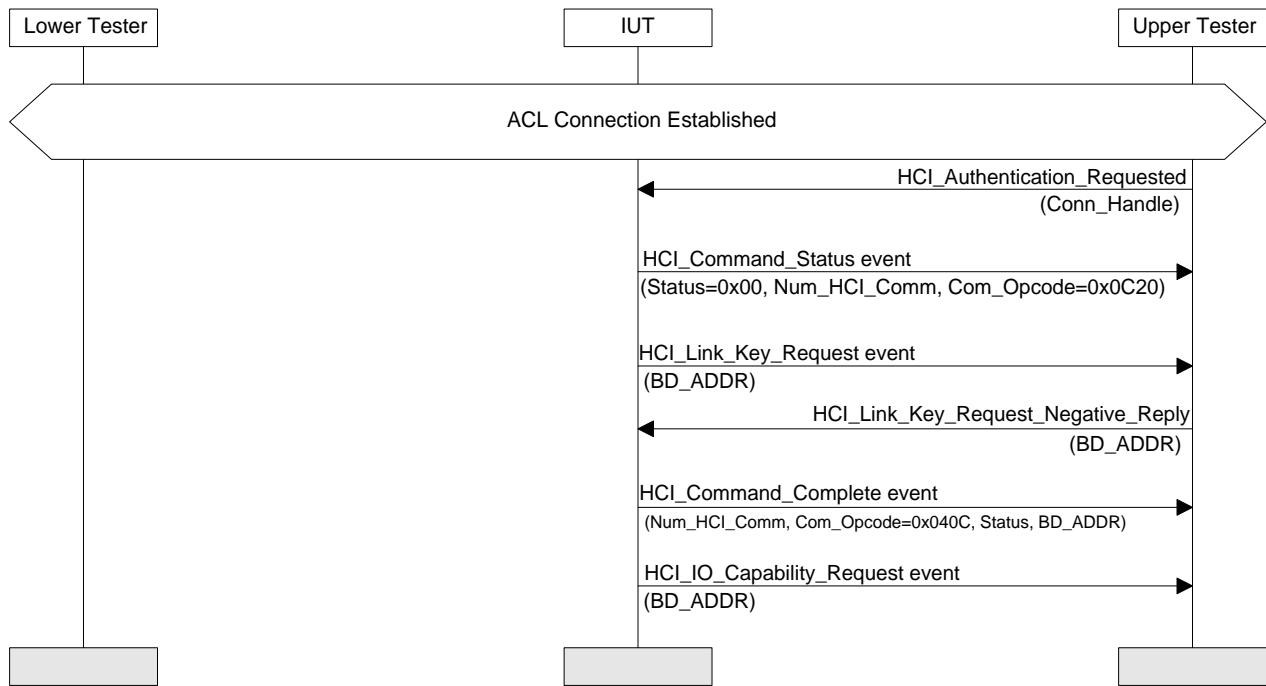


Figure 4.321: LMP/SP/BV-60-CMSC a



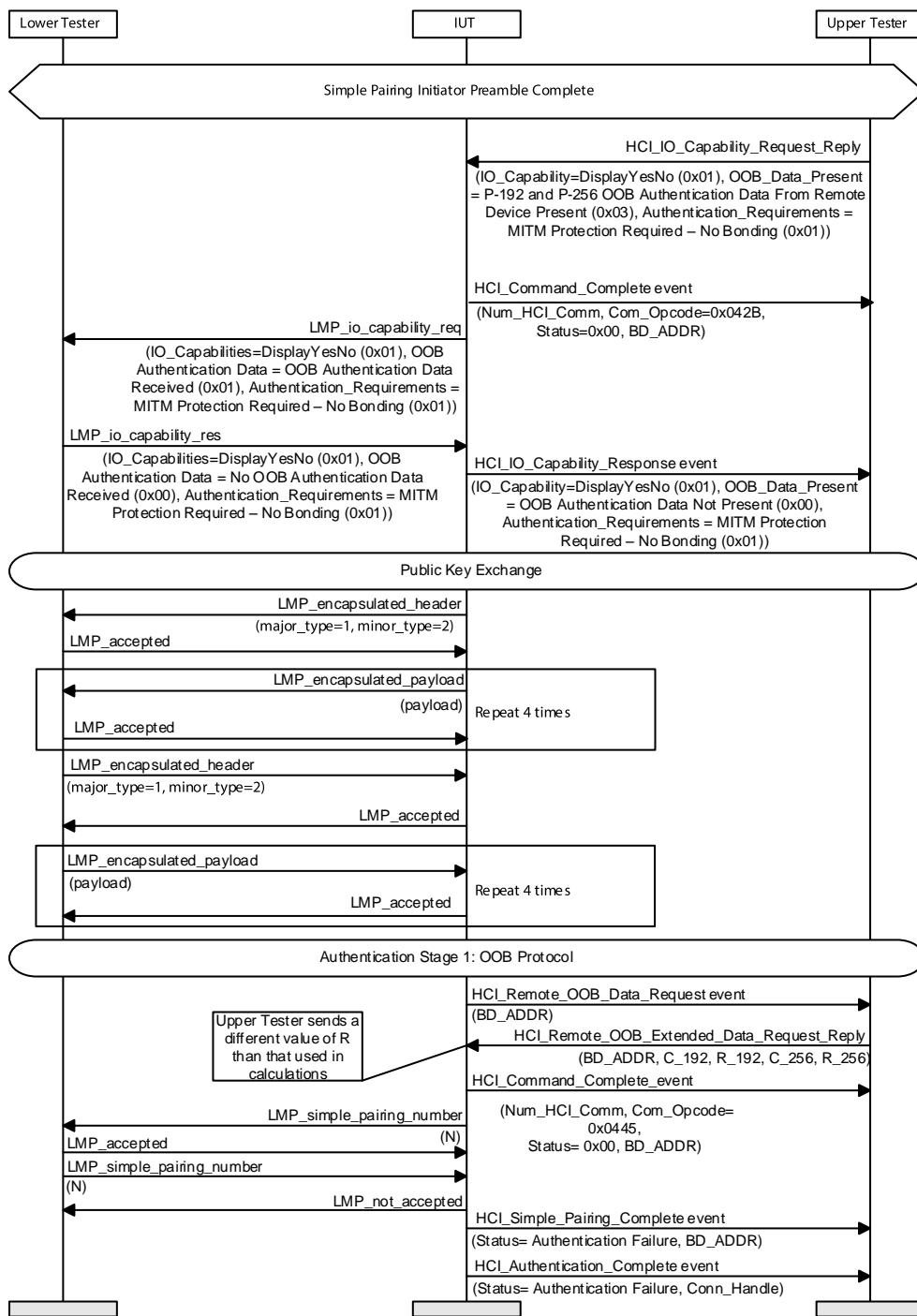


Figure 4.322: LMP/SP/BV-60-C MSC b

- Expected Outcome

Pass verdict

The IUT sends an HCl_Remote_OOB_Data_Request event to the Upper Tester.

The IUT sends an HCl_Simple_Pairing_Complete event to the Upper Tester with Status=Authentication Failure after sending an LMP_not_accepted PDU to the Lower Tester.



- Notes

This test case is similar to [LMP/SP/BV-24-C \[OOB Protocol - IUT Initiator - IUT with OOB Authentication Data - Failure\]](#).

4.10.4.18 LMP/SP/BV-61-C [OOB Protocol – IUT Responder - IUT with OOB Authentication Data – Failure, P-256]

- Test Purpose

Verify that the IUT as responder supports the OOB protocol using the P-256 elliptic curve where the IUT has OOB Authentication Data.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).



- Test Procedure

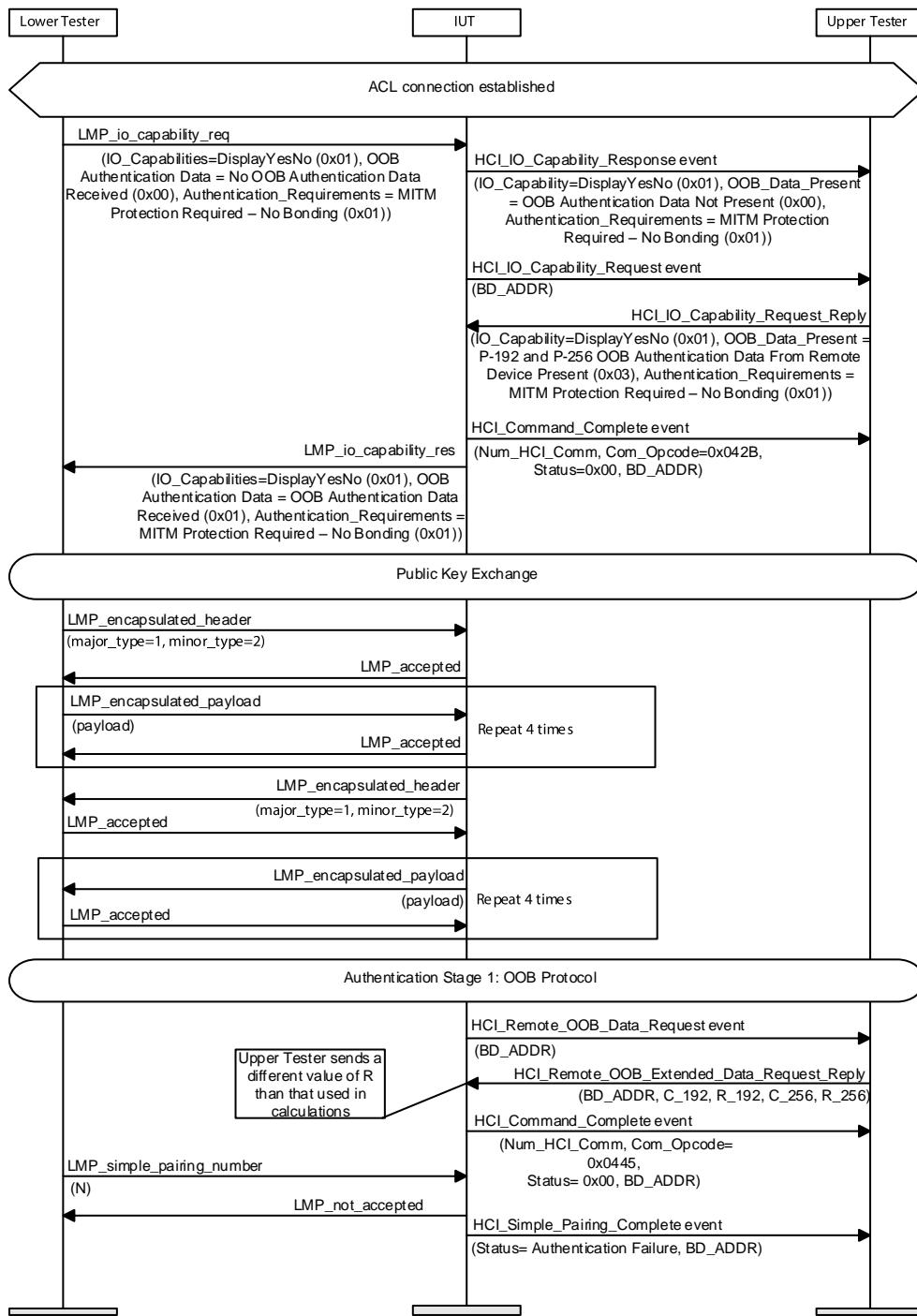


Figure 4.323: LMP/SP/BV-61-C

- Expected Outcome

Pass verdict

The IUT sends an HCI_Remote_OOB_Data_Request event to the Upper Tester.



The IUT sends an HCI_Simple_Pairing_Complete event to the Upper Tester with Status=Authentication Failure after sending an LMP_not_accepted PDU to the Lower Tester.

- Notes

This test case is similar to LMP/SP/BV-25-C [OOB Protocol - IUT Responder - IUT with OOB Authentication Data - Failure].

4.10.4.19 LMP/SP/BV-62-C [OOB Protocol – IUT Initiator – Lower Tester with OOB Authentication Data – Failure, P-256]

- Test Purpose

Verify that the IUT as initiator supports the OOB protocol using the P-256 elliptic curve where the Lower Tester has OOB Authentication Data.

- Reference

[1] 4.2.7

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).

- Test Procedure

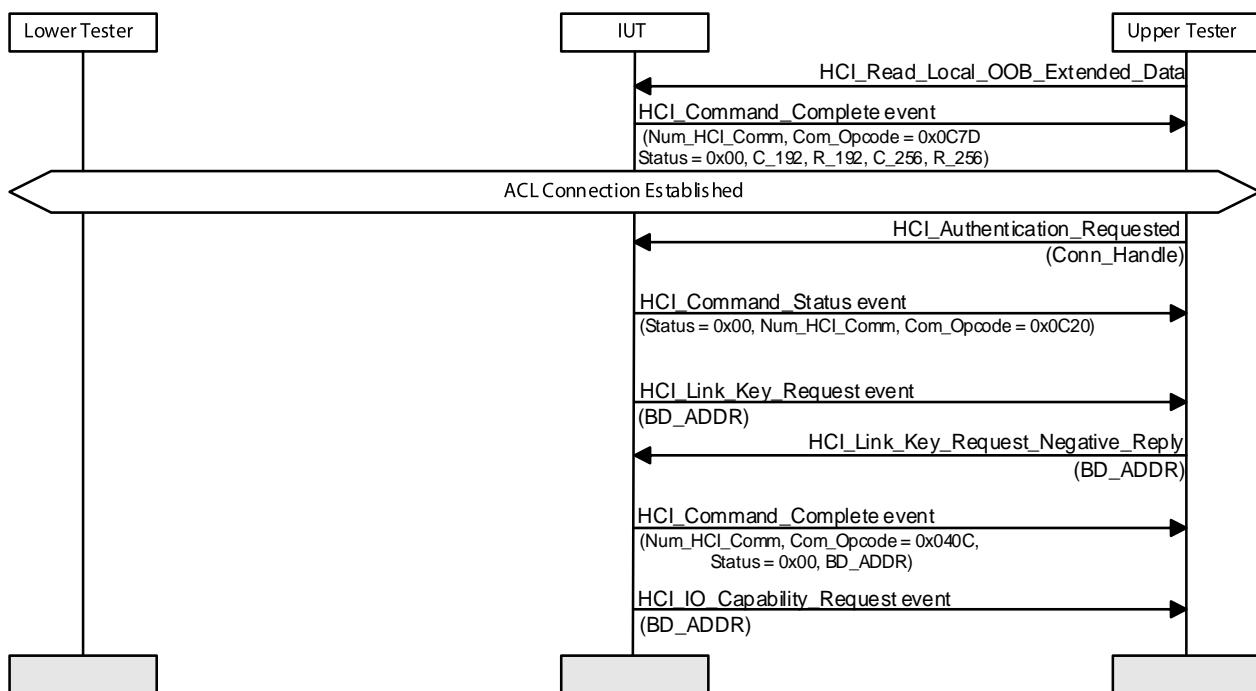


Figure 4.324: LMP/SP/BV-62-C MSC a

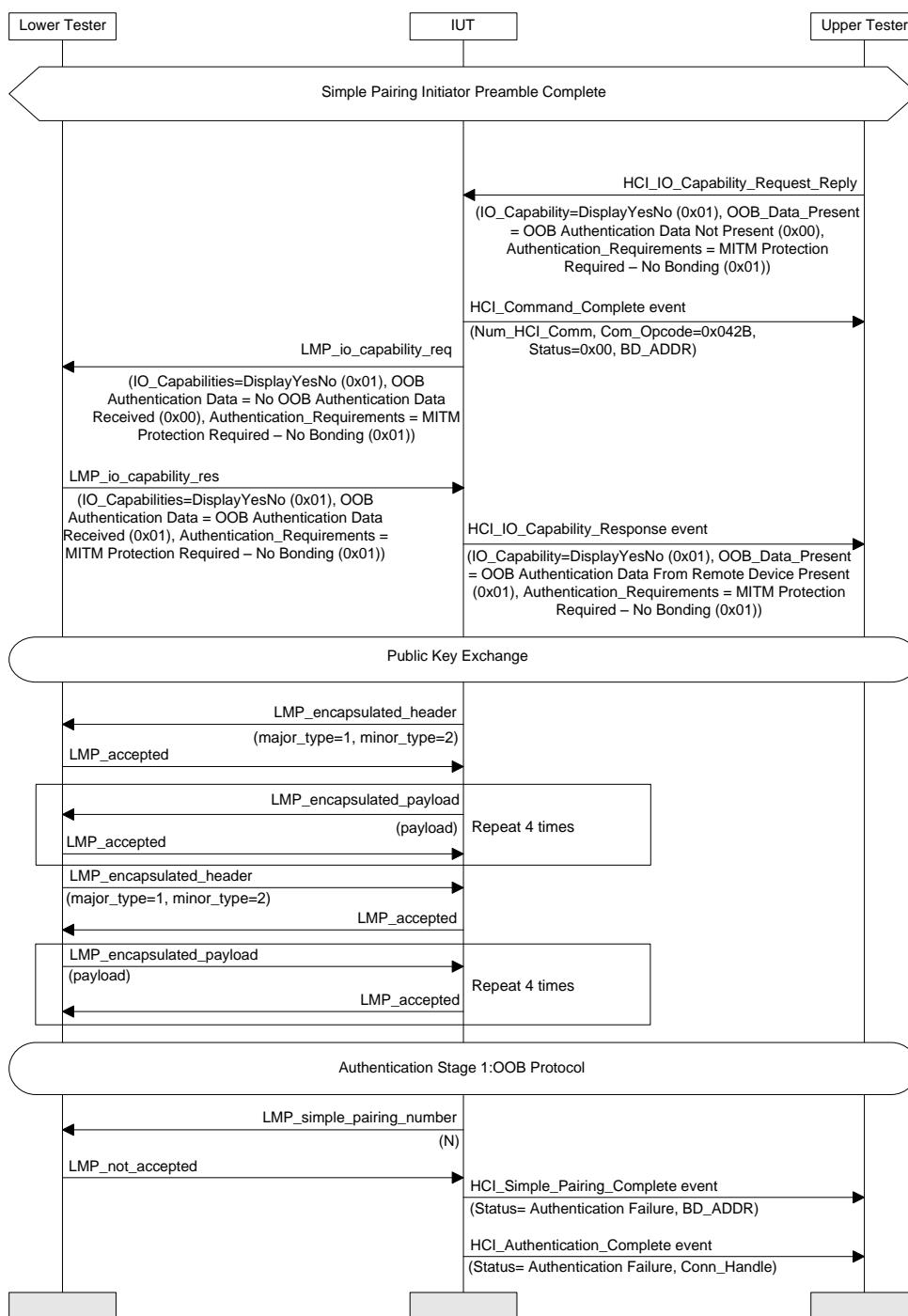


Figure 4.325: LMP/SP/BV-62-C MSC b

- Expected Outcome

Pass verdict

The IUT does not send an HCI_Remote_OOB_Data_Request event to the Upper Tester.

The IUT sends an HCI_Simple_Pairing_Complete event to the Upper Tester with Status=Authentication Failure after receiving an LMP_not_accepted PDU from the Lower Tester.



- Notes

This test case is similar to [LMP/SP/BV-26-C \[OOB Protocol - IUT Initiator – Lower Tester with OOB Authentication Data - Failure\]](#).

4.10.4.20 LMP/SP/BV-63-C [OOB Protocol – IUT Responder – Lower Tester with OOB Authentication Data – Failure, P-256]

- Test Purpose

Verify that the IUT as responder supports the OOB protocol using the P-256 elliptic curve where the Lower Tester has OOB Authentication Data.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).



- Test Procedure

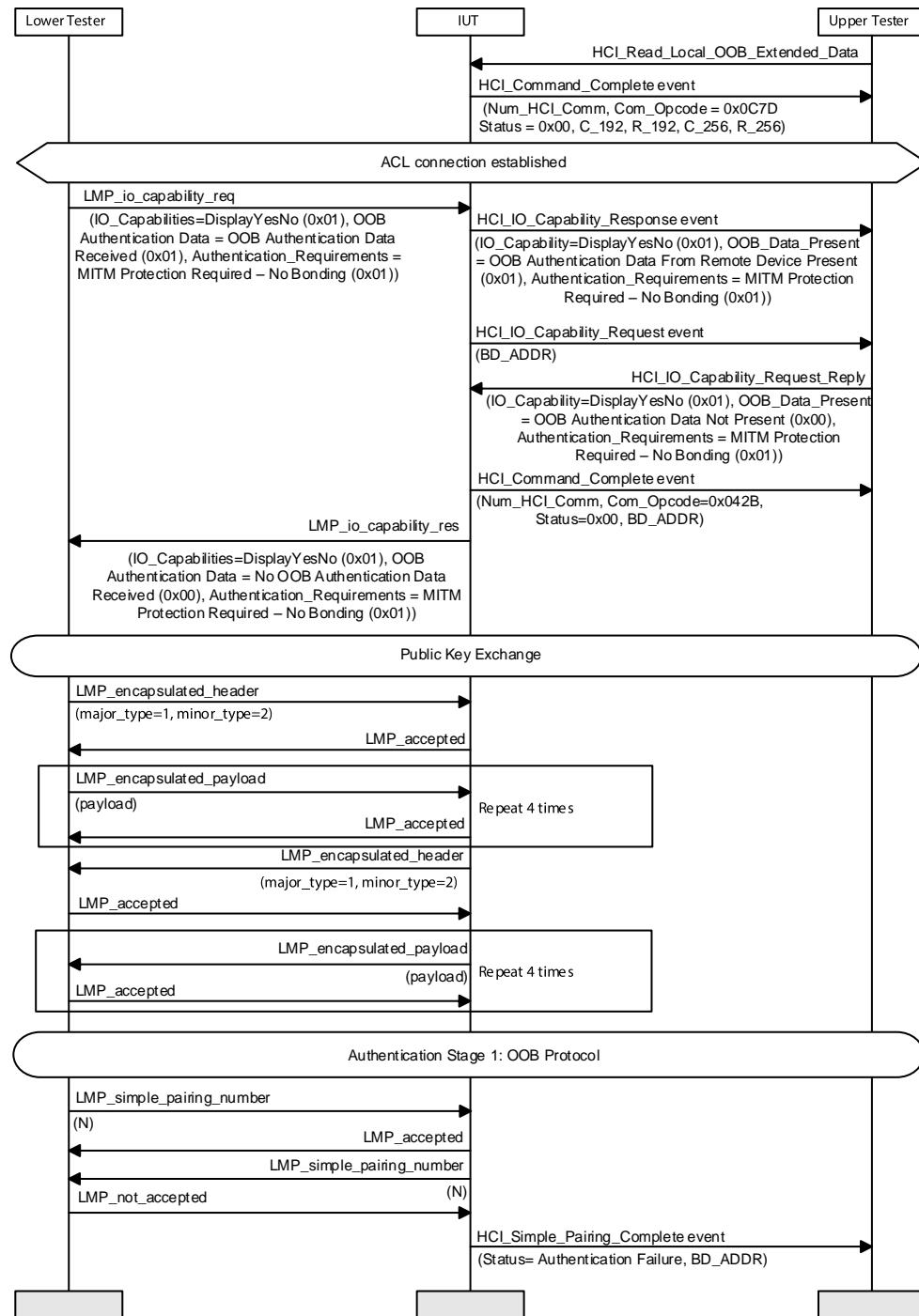


Figure 4.326: LMP/SP/BV-63-C

- Expected Outcome

Pass verdict

The IUT does not send an **HCI_Remote_OOB_Data_Request** event to the Upper Tester.



The IUT sends an HCI_Simple_Pairing_Complete event to the Upper Tester with Status=Authentication Failure after receiving an LMP_not_accepted PDU from the Lower Tester.

- Notes

This test case is similar to [LMP/SP/BV-27-C \[OOB Protocol - IUT Responder – Lower Tester with OOB Authentication Data - Failure\]](#).

4.10.5 Test Mode Procedures

Note: In all the test cases in section [4.10.5 Test Mode Procedures](#), it does not matter whether the IUT is master or slave.

4.10.5.1 LMP/SP/BV-28-C [Simple Pairing Debug Mode - Fixed Private Key]

- Test Purpose

Verify that the IUT supports the Simple Pairing Debug Mode where the fixed private/public key pair is used.

IUT is initiator.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

See [Default Settings](#).

- Test Procedure

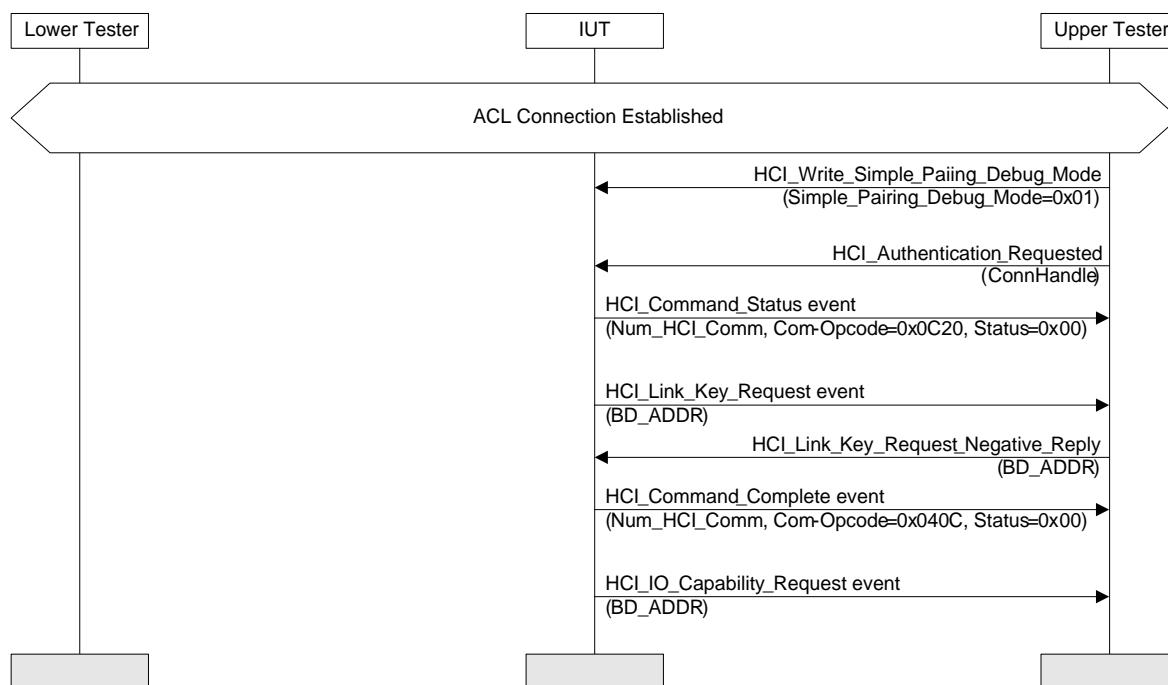


Figure 4.327: LMP/SP/BV-28-C MSC a



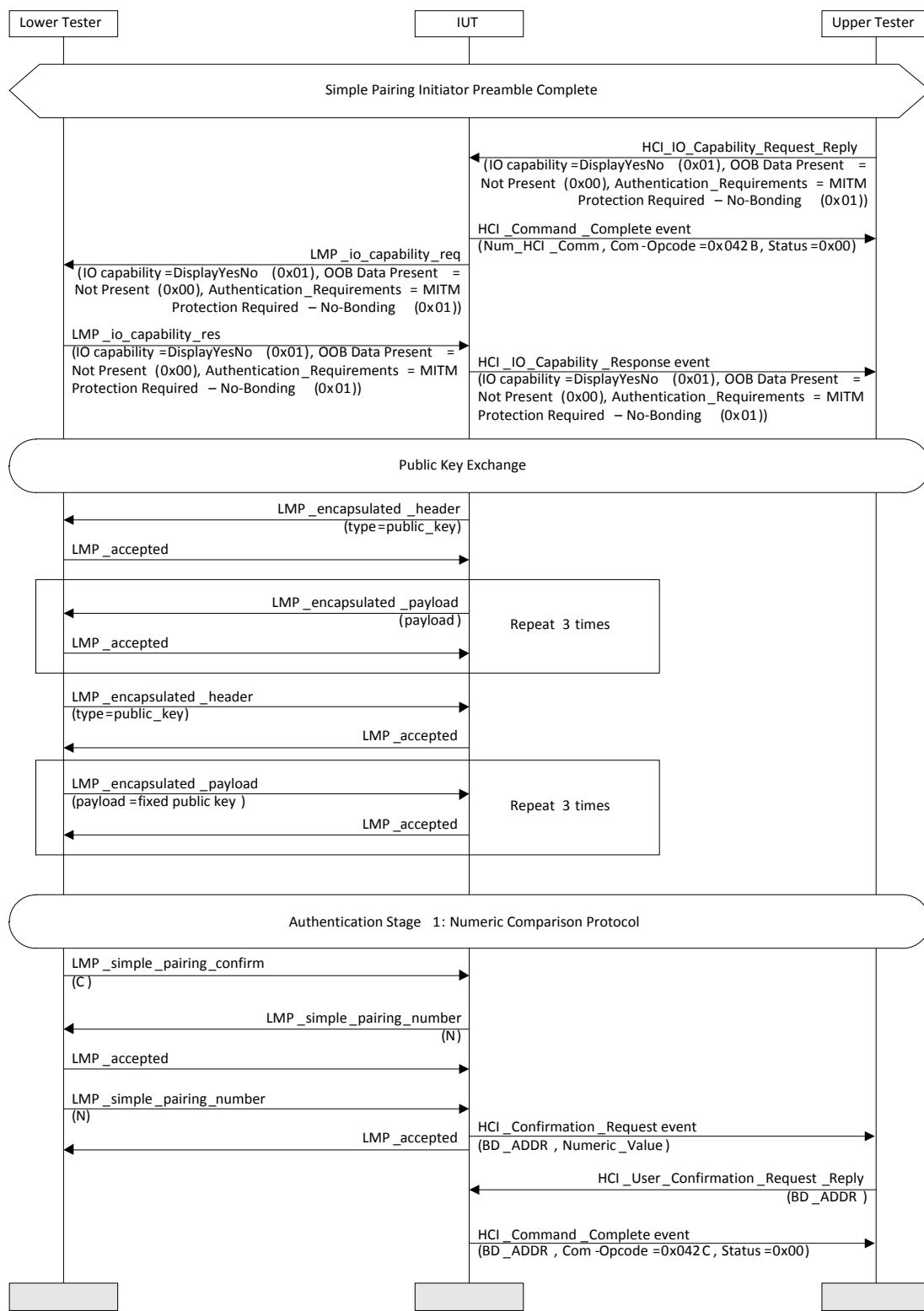


Figure 4.328: LMP/SP/BV-28-C MSC b



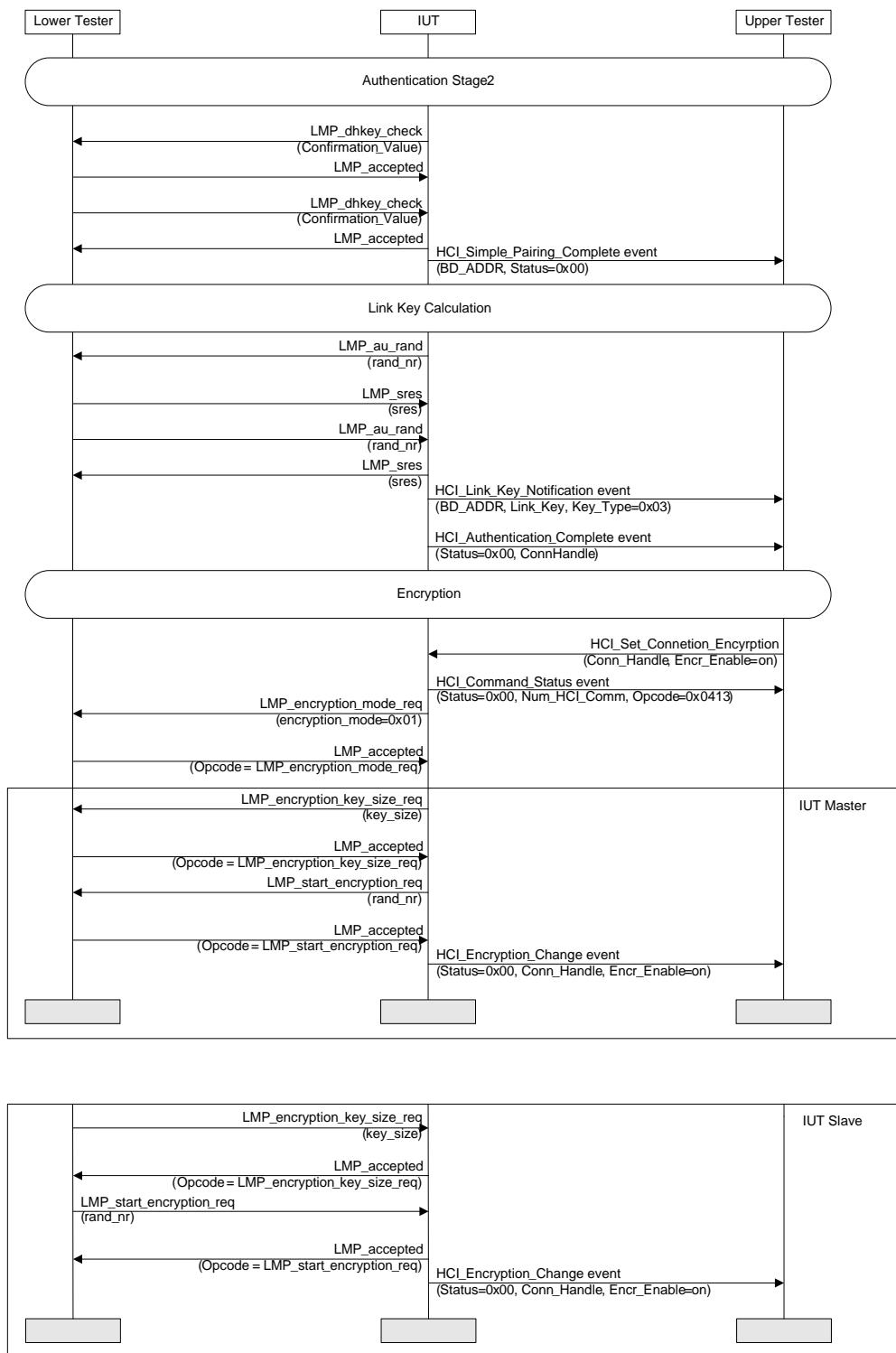


Figure 4.329: LMP/SP/BV-28-C MSC c

- Expected Outcome

Pass verdict

Verify that the IUT reports that the Link Key Type is Debug Combination Key in the Link_Key_Notification event.



4.10.5.2 LMP/SP/BV-29-C [Simple Pairing Debug Mode - Responding Device Uses Fixed Private Key]

- Test Purpose

Verify that the IUT reports a Link Key Type of Debug Combination Key when the remote device uses the Simple Pairing Debug Mode where the fixed private/public key pair.

IUT is initiator.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).

- Test Procedure

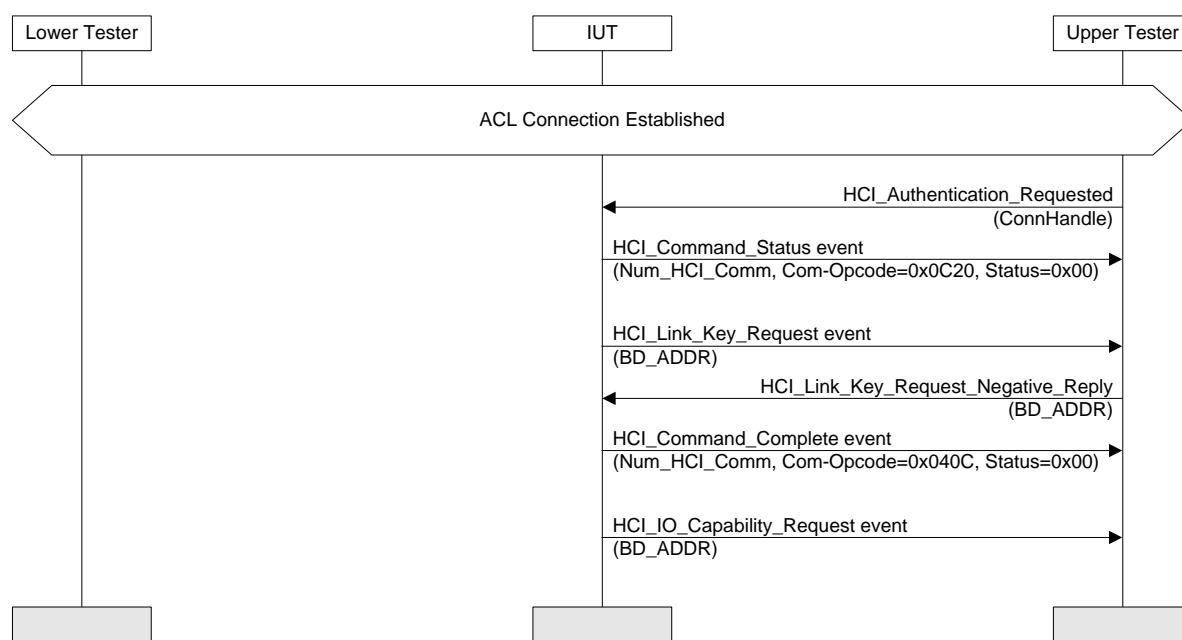


Figure 4.330: LMP/SP/BV-29-C MSC a



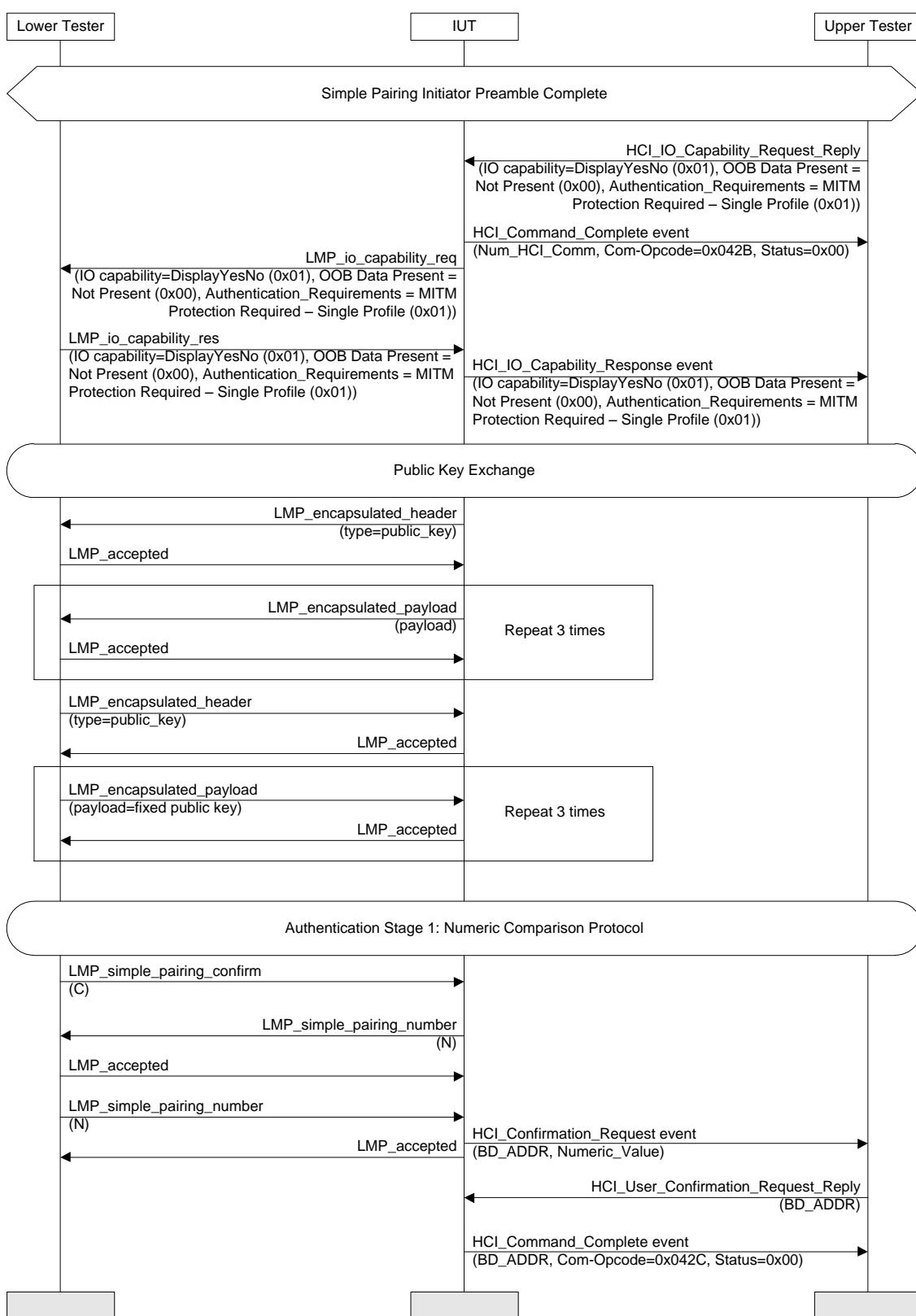


Figure 4.331: LMP/SP/BV-29-C MSC b



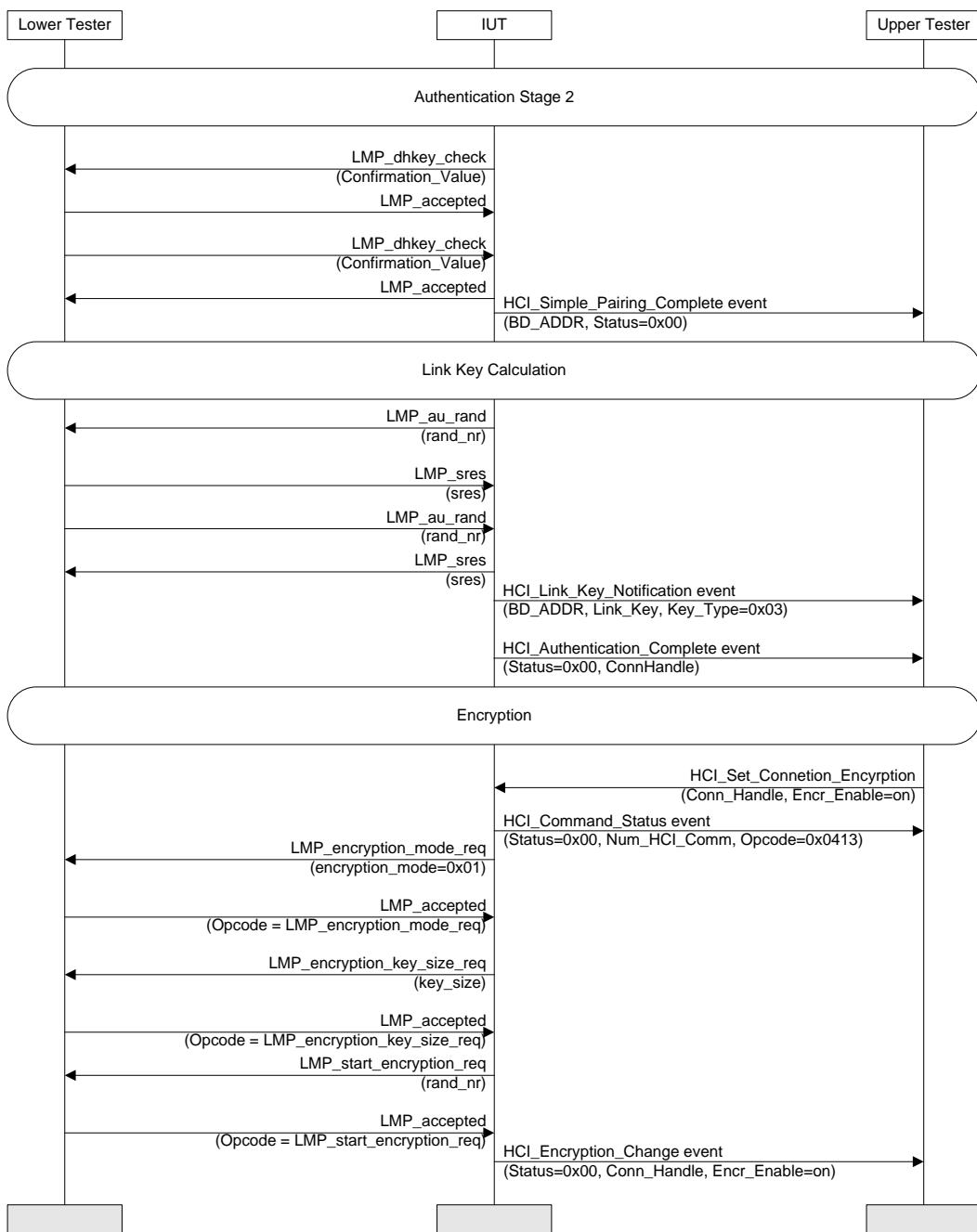


Figure 4.332: LMP/SP/BV-29-C MSC c

- Expected Outcome

Pass verdict

Verify that the IUT reports that the Link Key Type is Debug Combination Key in the **Link_Key_Notation** event

- Notes

The Lower Tester shall send an **LMP_not_accepted** to **LMP_DHkey** if the confirmation value that it calculates does not match with the confirmation value that the IUT has sent.



4.10.5.3 LMP/SP/BV-64-C [Simple Pairing Debug Mode – Fixed Private Key, P256]

- **Test Purpose**

Verify that the IUT supports the Simple Pairing Debug Mode where the fixed P256 private/public key pair is used and reports the Link Key Type of Debug Combination Key.

IUT is initiator.

- **Reference**

[1] 4.2.7

- **Initial Condition**

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).

- **Test Procedure**

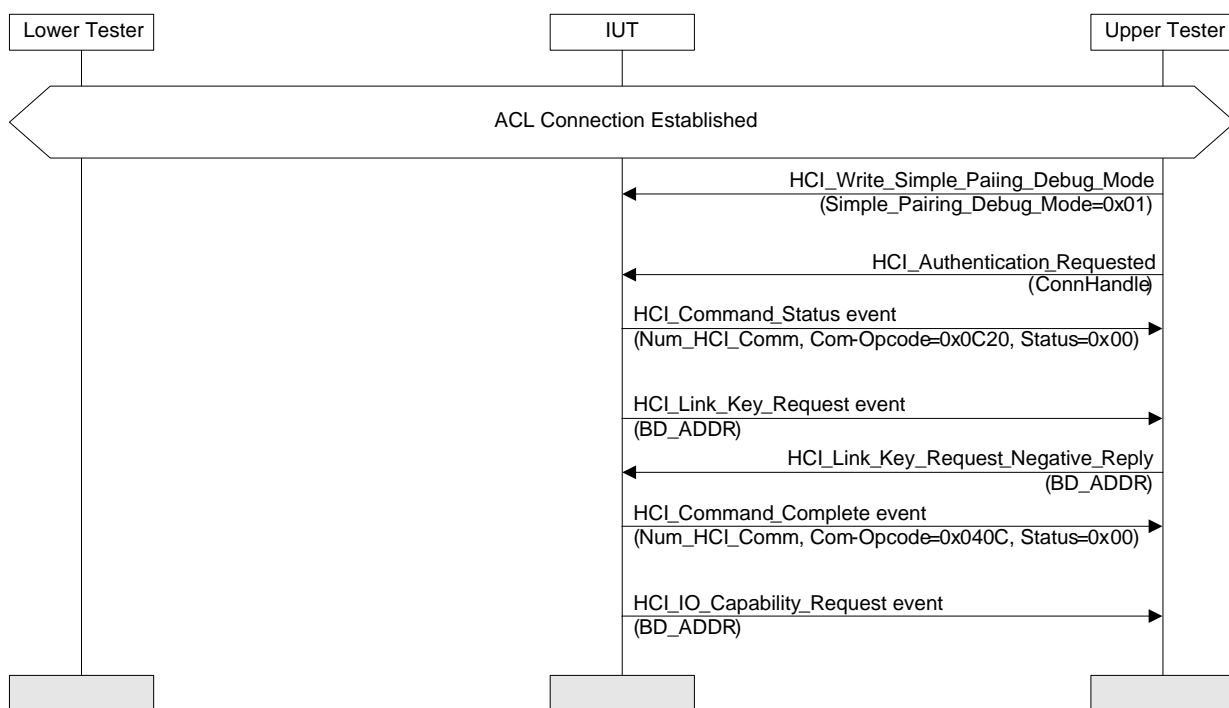


Figure 4.333: LMP/SP/BV-64-C MSC a



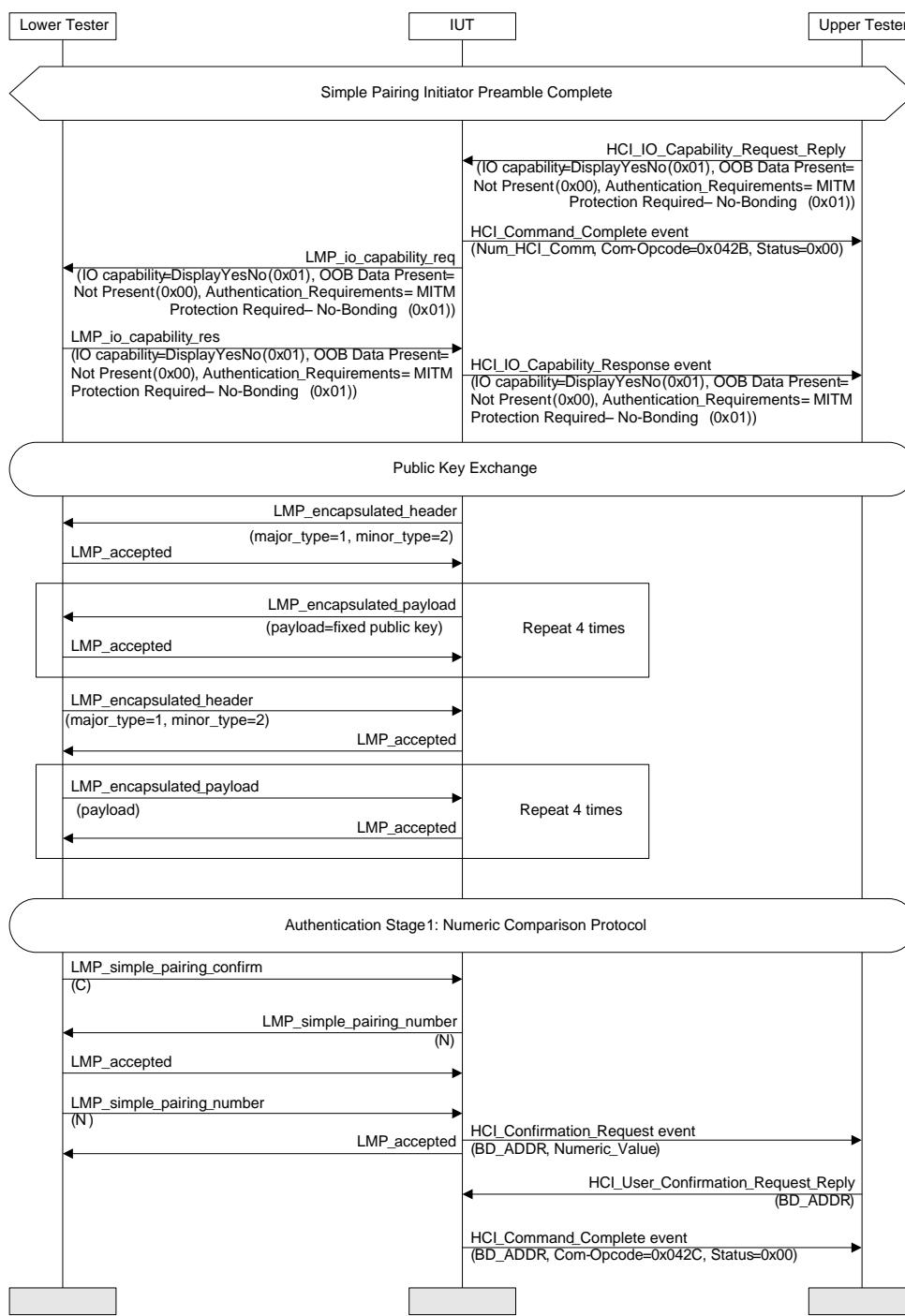


Figure 4.334: LMP/SP/BV-64-C MSC b



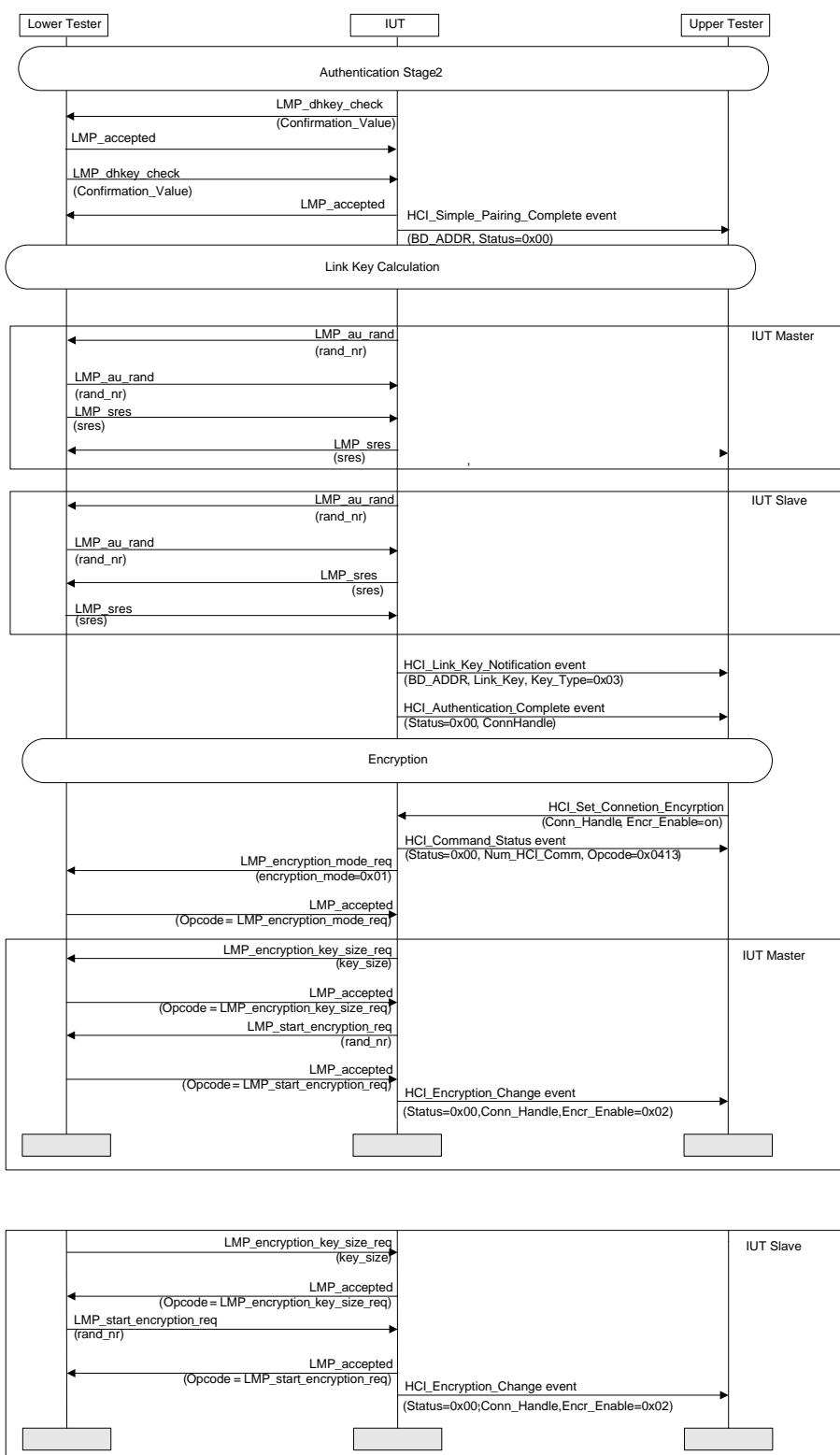


Figure 4.335: LMP/SP/BV-64-C MSC c



- Expected Outcome

Pass verdict

Verify that the IUT reports that the Link Key Type is Debug Combination Key in the Link_Key_Notification event.

- Notes

This test case is similar to [LMP/SP/BV-28-C \[Simple Pairing Debug Mode - Fixed Private Key\]](#).

4.10.5.4 LMP/SP/BV-65-C [Simple Pairing Debug Mode – Responding Device Uses Fixed Private Key, P256]

- Test Purpose

Verify that the IUT reports a Link Key Type of Debug Combination Key when the remote device uses the Simple Pairing Debug Mode where the fixed P256 private/public key pair is used.

IUT is initiator.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

See [Baseband Assumptions](#) and [Secure Simple Pairing P256](#).

- Test Procedure

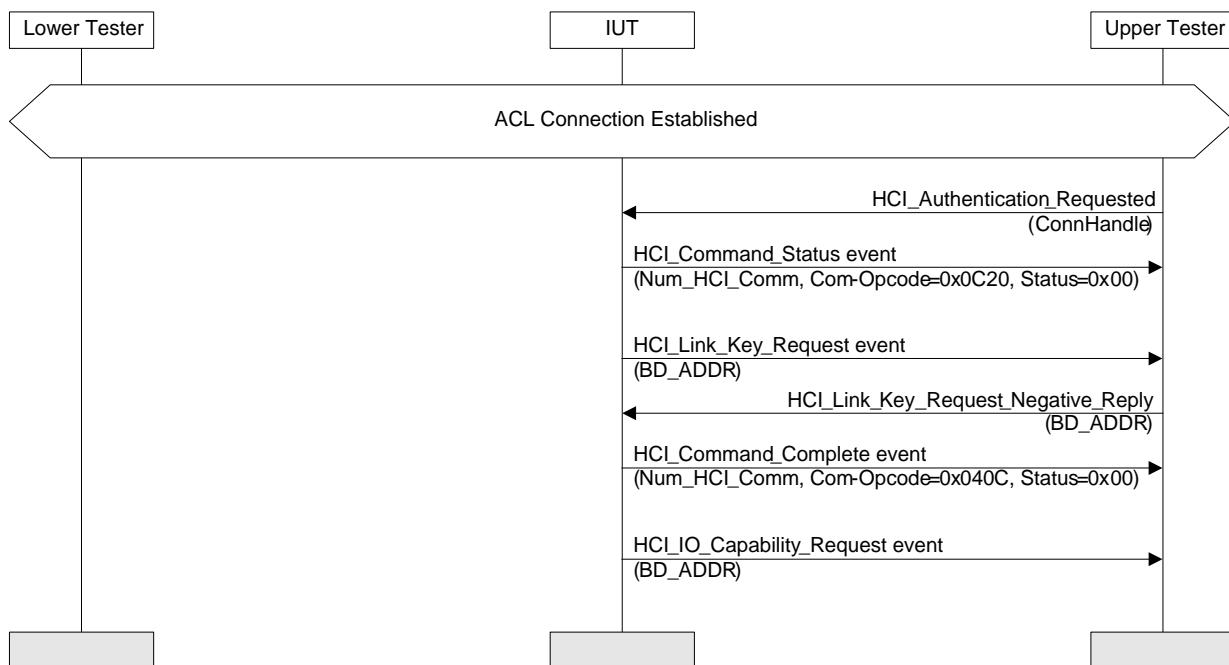


Figure 4.336: LMP/SP/BV-65-C MSC a



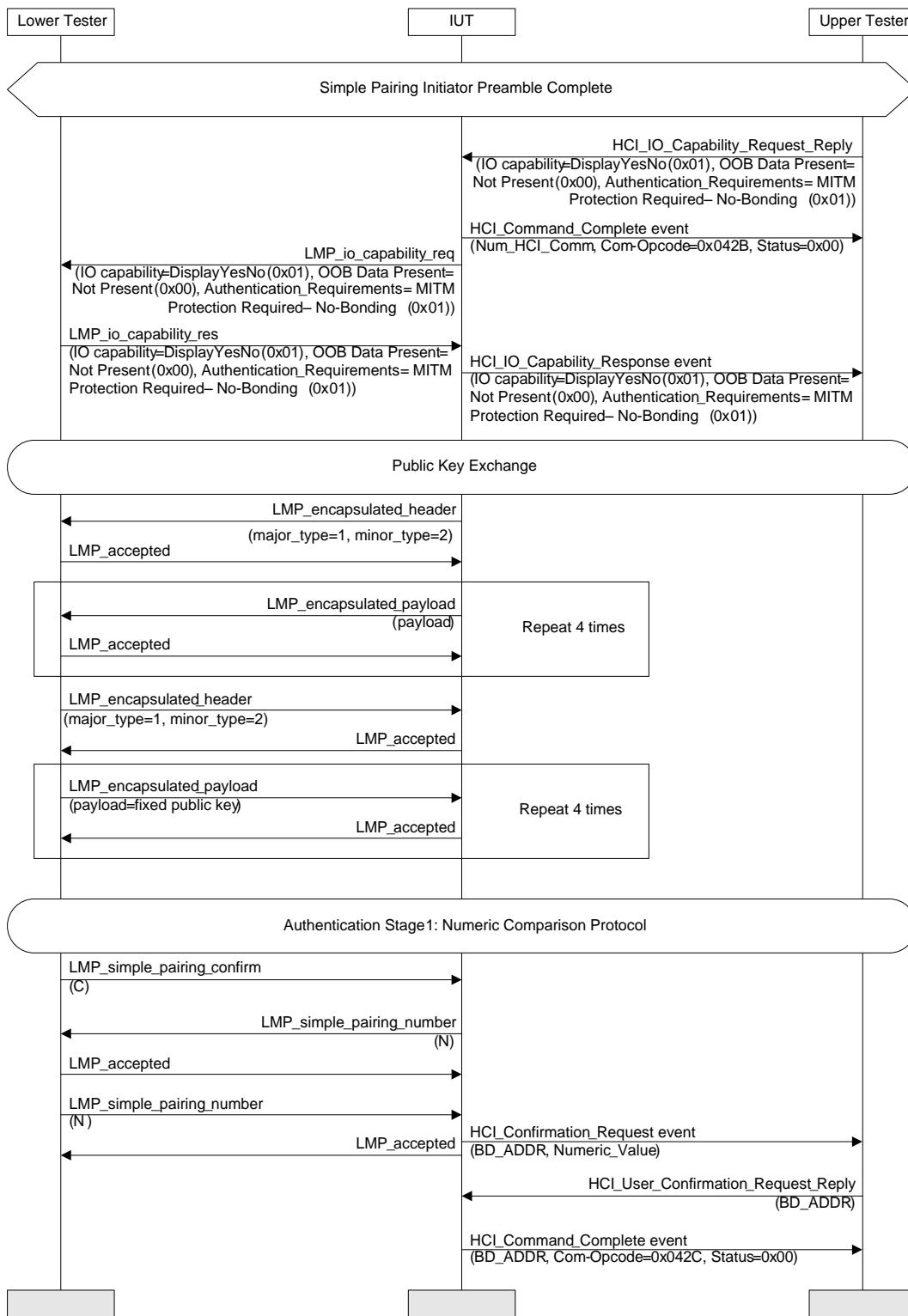


Figure 4.337: LMP/SP/BV-65-C MSC b



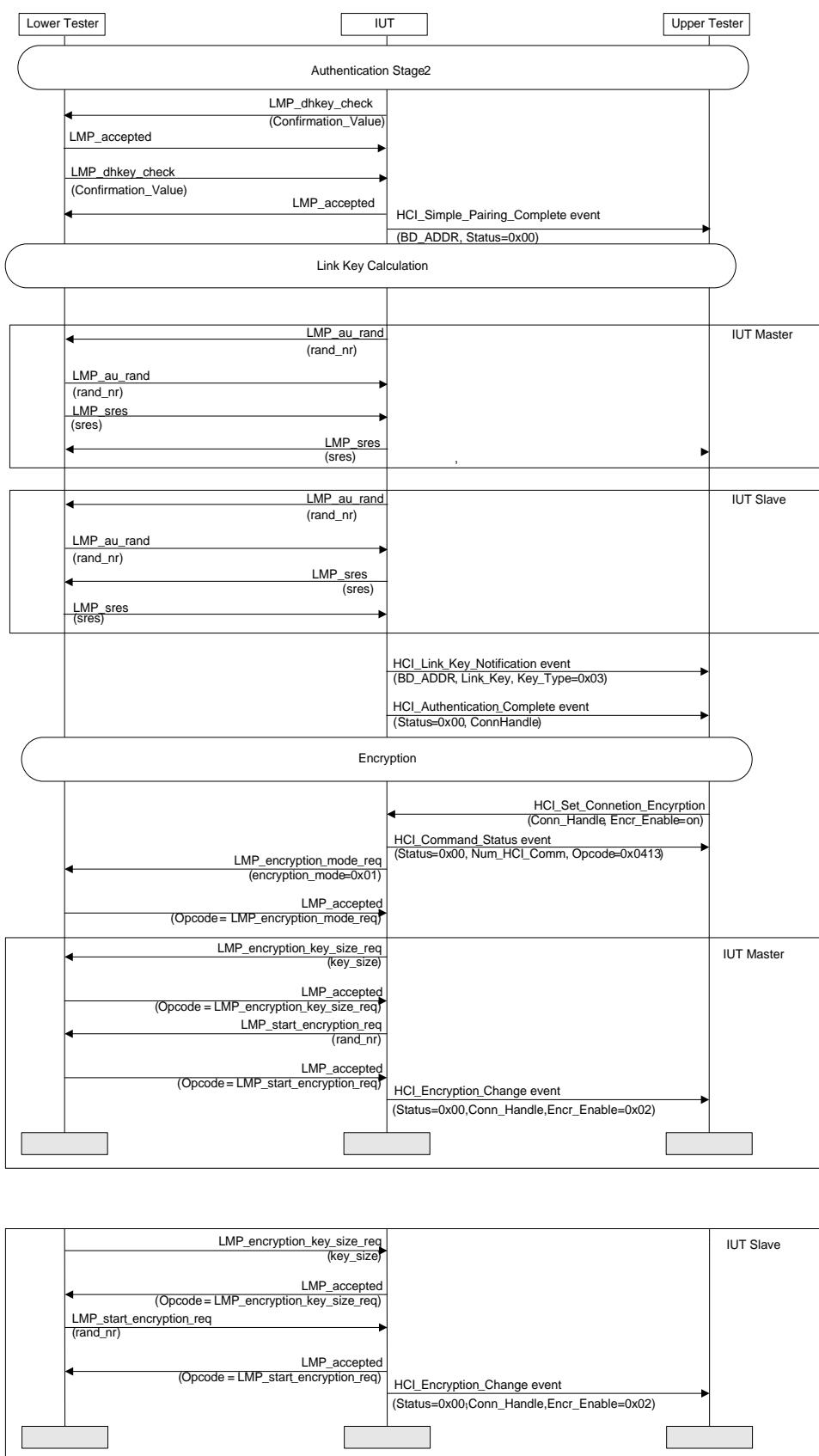


Figure 4.338: LMP/SP/BV-65-C MSC c



- Expected Outcome

Pass verdict

Verify that the IUT reports that the Link Key Type is Debug Combination Key in the Link_Key_Notification event.

- Notes

The Lower Tester shall send an LMP_not_accepted to LMP_DHkey if the confirmation value that it calculates does not match with the confirmation value that the IUT has sent.

This test case is similar to [LMP/SP/BV-29-C \[Simple Pairing Debug Mode - Responding Device Uses Fixed Private Key\]](#).

4.10.6 Simple Pairing Failure Procedures

4.10.6.1 LMP/SP/BV-30-C [Simple Pairing Failed - IUT Responder]

- Test Purpose

To verify that the controller responds correctly when the IO capability exchange procedure fails. IUT is initiator.

- Reference

[\[8\] 7.7.45](#)

- Initial Condition

See [Default Settings](#).

Lower Tester supports Secure Simple Pairing. IUT is Responder.



- Test Procedure

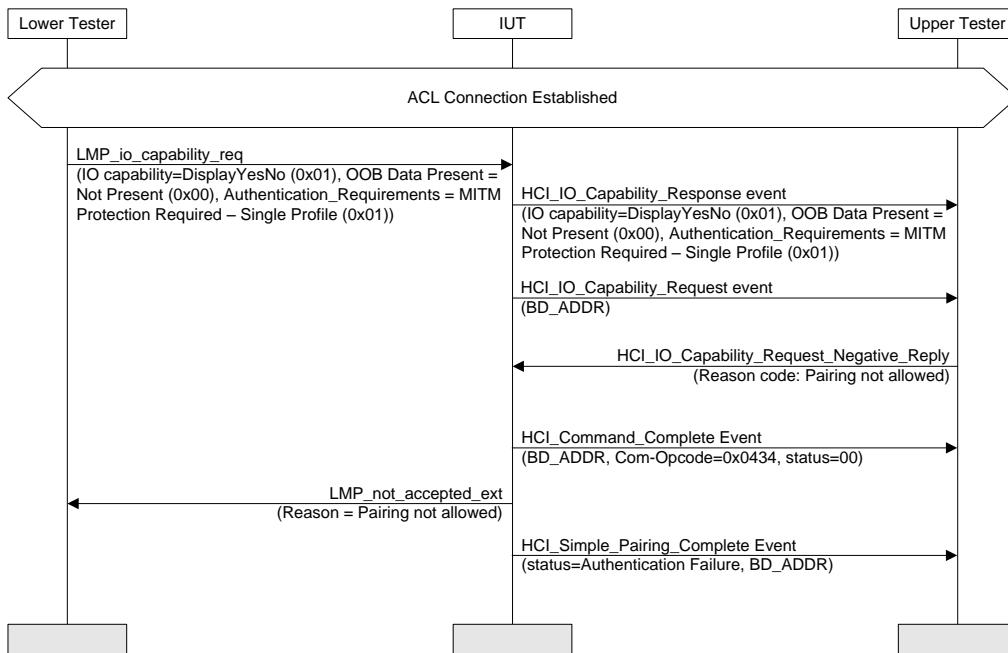


Figure 4.339: LMP/SP/BV-30-C

- Expected Outcome

Pass verdict

IUT sends LMP_not_accepted_ext with reason code provided by the local host. IUT sends HCI_Simple_Pairing_Complete Event with failure code Authentication Failure.

4.10.6.2 LMP/SP/BV-31-C [Simple Pairing Capable Controller–Host rejects Simple Pairing–IUT Initiator]

- Test Purpose

Verify that the LM on IUT accepts the rejection of Simple Pairing when Host sends IO Capability Request Negative Reply command. Lower Tester is an SSP enabled initiator. Lower Tester supports Secure Simple Pairing. IUT is Responder.

- Reference

[8] 7.7.50

- Initial Condition

See [Default Settings](#).

ACL connection established. IUT is Simple pairing capable controller. Upper Tester is Simple pairing capable Host. Lower Tester is an SSP enabled responder.



- Test Procedure

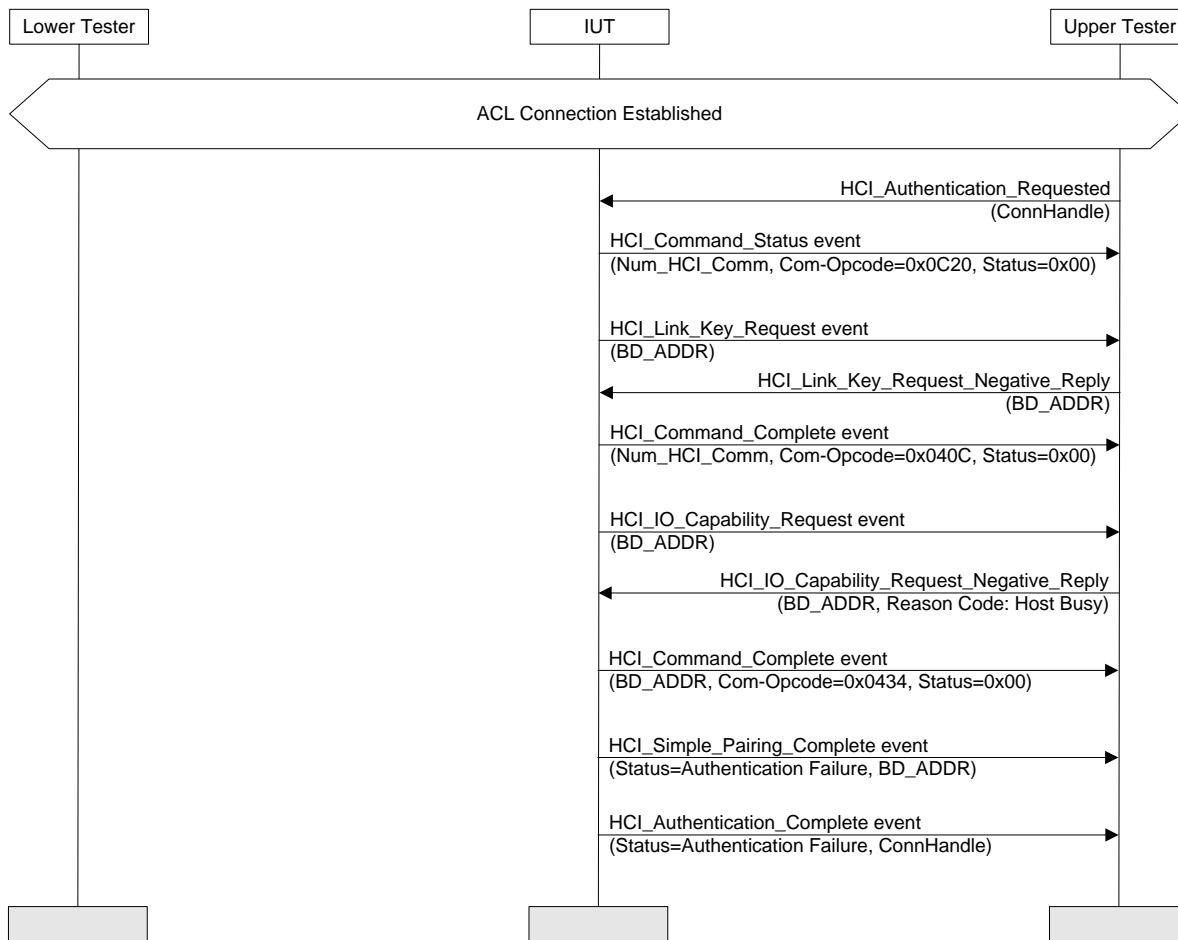


Figure 4.340: LMP/SP/BV-31-C

- Expected Outcome

Pass verdict

The IUT responds to the IO Capability Request Negative Reply command received from the Upper Tester with an HCI_Command_Complete Event. IUT also sends an HCI_Simple_Pairing_Complete event with the reason code Authentication Failure.

4.10.6.3 LMP/SP/BV-32-C [Simple Pairing Capable Controller–Host rejects Simple Pairing–IUT Responder]

- Test Purpose

Verify that the LM on IUT rejects Simple Pairing when Host sends IO Capability Request Negative Reply command. Lower Tester is an SSP enabled initiator.

- Reference

[8] 7.71.36

- Initial Condition

See [Default Settings](#).



ACL connection established. IUT is Simple pairing capable controller. Upper Tester is Simple pairing capable Host. Lower Tester is an SSP enabled initiator.

- Test Procedure

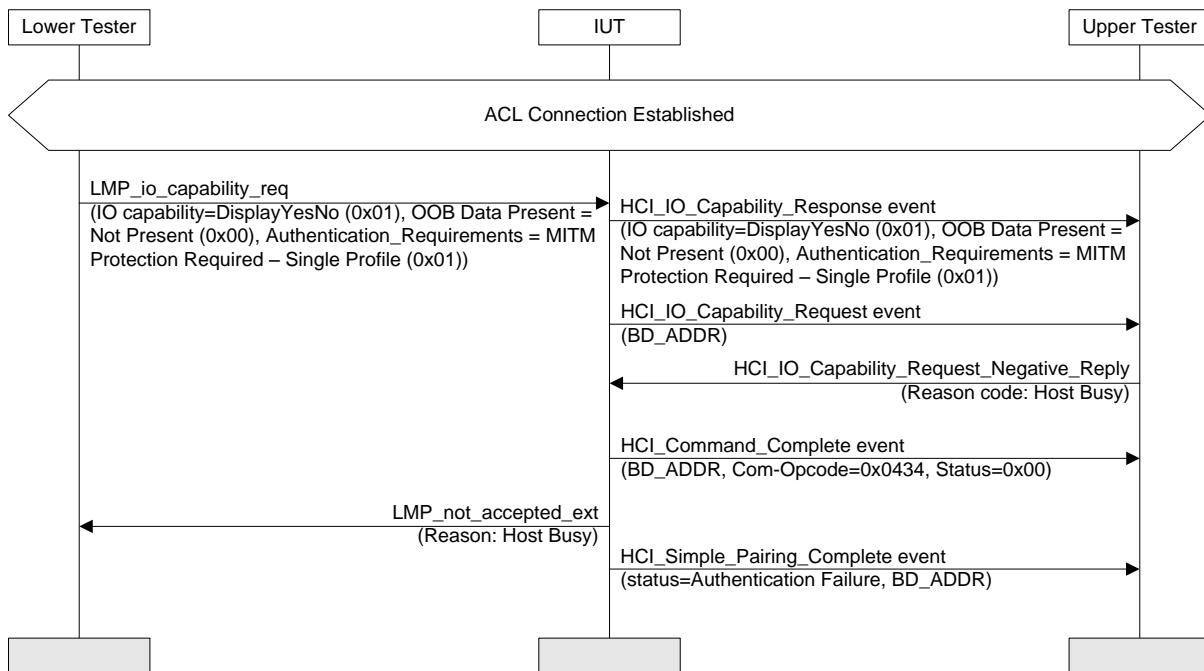


Figure 4.341: LMP/SP/BV-32-C

- Expected Outcome

Pass verdict

The IUT responds to the LMP_io_capability_req PDU with an LMP_not_accepted_ext PDU with the Reason code Authentication Failure.

4.10.6.4 LMP/SP/BV-33-C [Passkey Entry with Keypress notification - IUT Initiator - Success]

- Test Purpose

Verify that the IUT supports the Passkey Entry protocol. IUT is initiator.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).



- Test Procedure

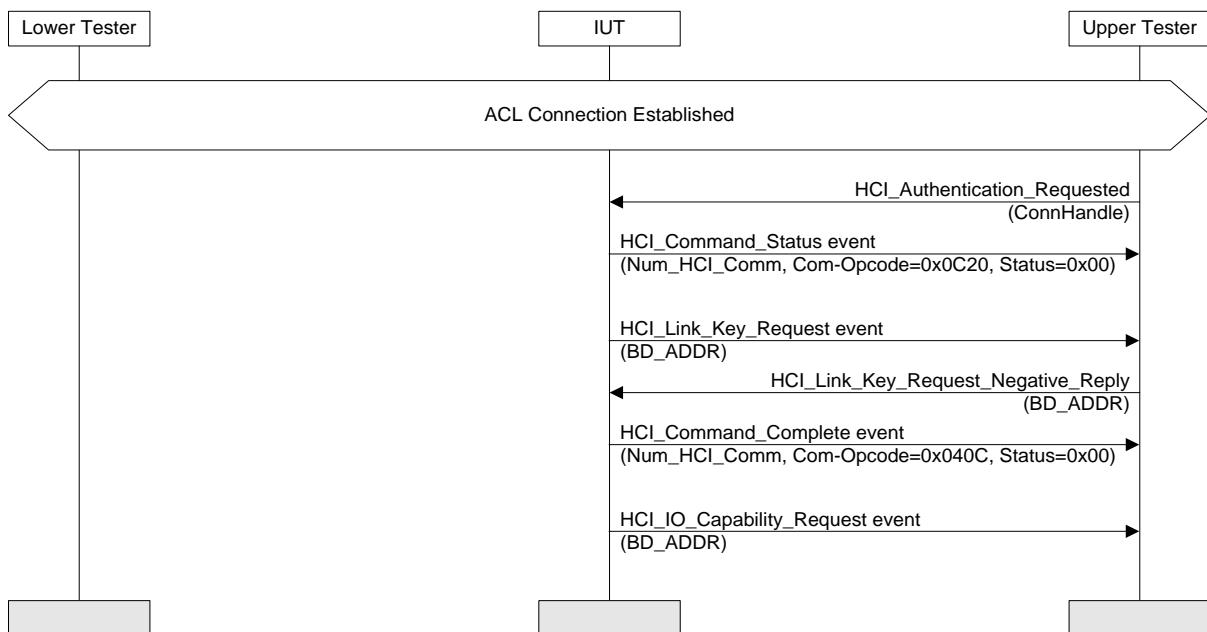


Figure 4.342: LMP/SP/BV-33-C MSC a



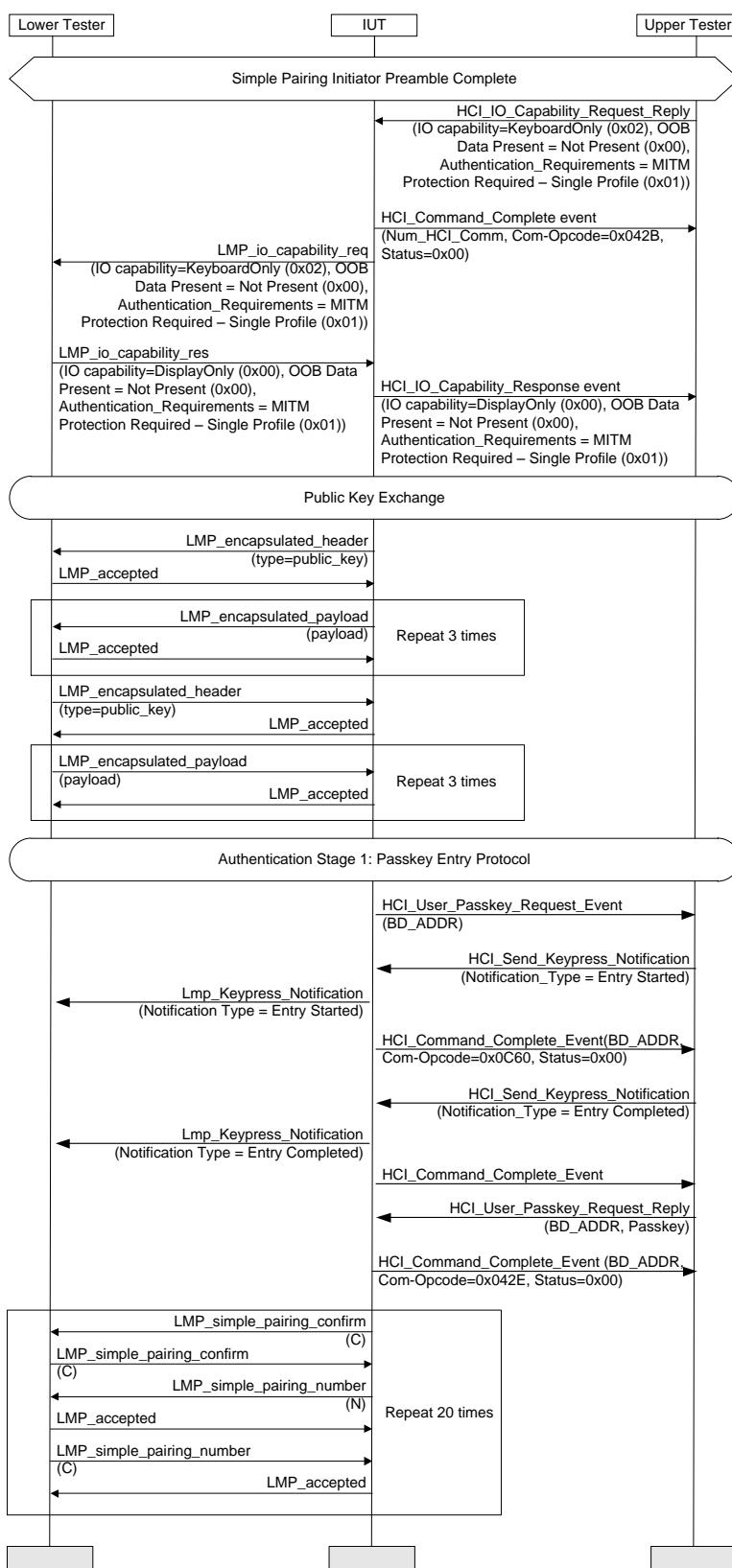


Figure 4.343: LMP/SP/BV-33-C MSC b



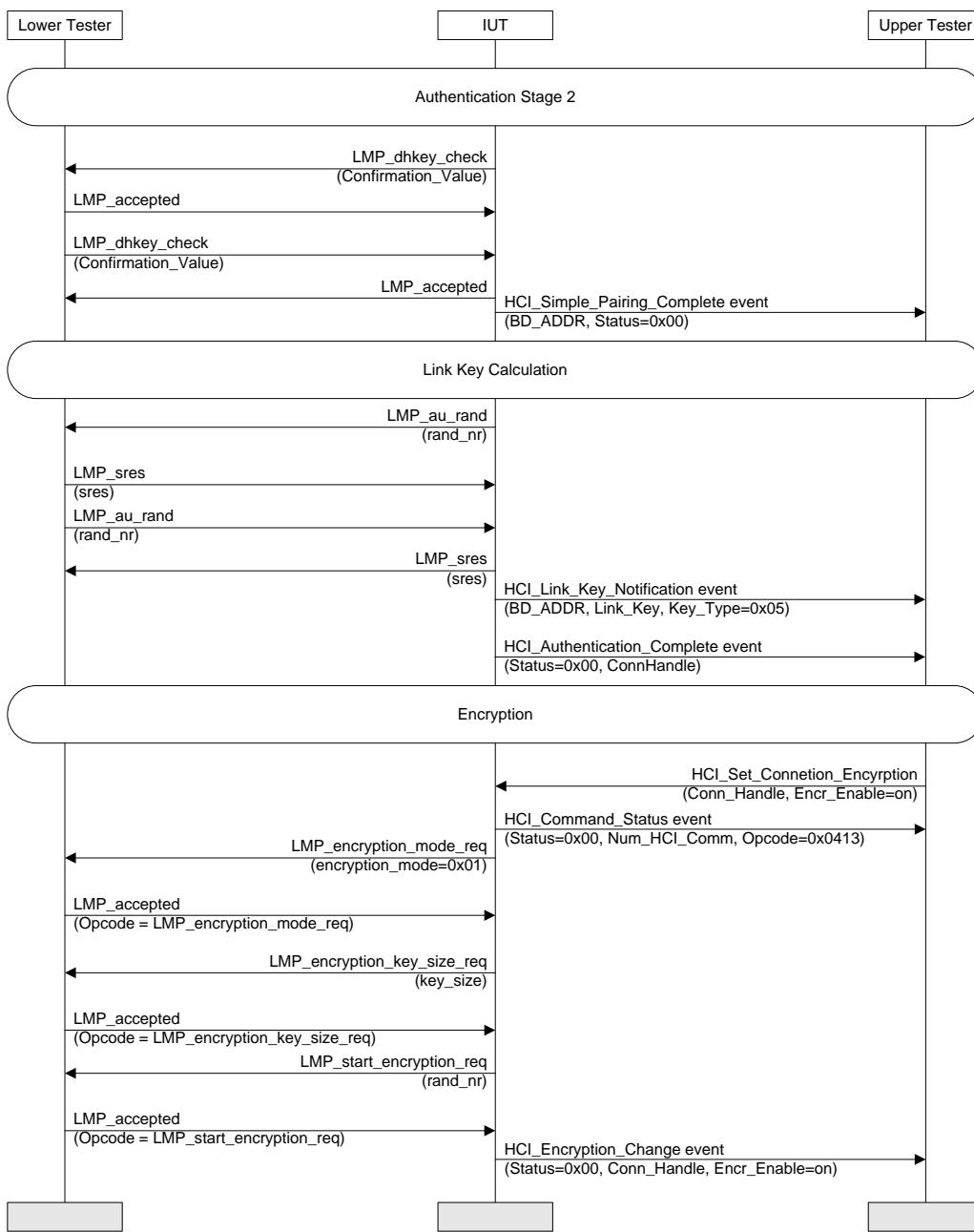


Figure 4.344: LMP/SP/BV-33-C MSC c

- Expected Outcome

Pass verdict

The IUT sends the LMP_DHkey_check PDU is with a valid Confirmation_Value.

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester.

The IUT sends the resulting Link Key and Key Type to the Host in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated'.



- Notes

The Lower Tester shall send an LMP_not_accepted to LMP_DHkey if the confirmation value that it calculates does not match with the confirmation value that the IUT has sent.

4.10.6.5 LMP/SP/BV-34-C [Passkey Entry with Keypress notification - IUT Responder – Success]

- Test Purpose

Verify that the IUT supports the Passkey Entry protocol.

IUT is responder.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).



- Test Procedure

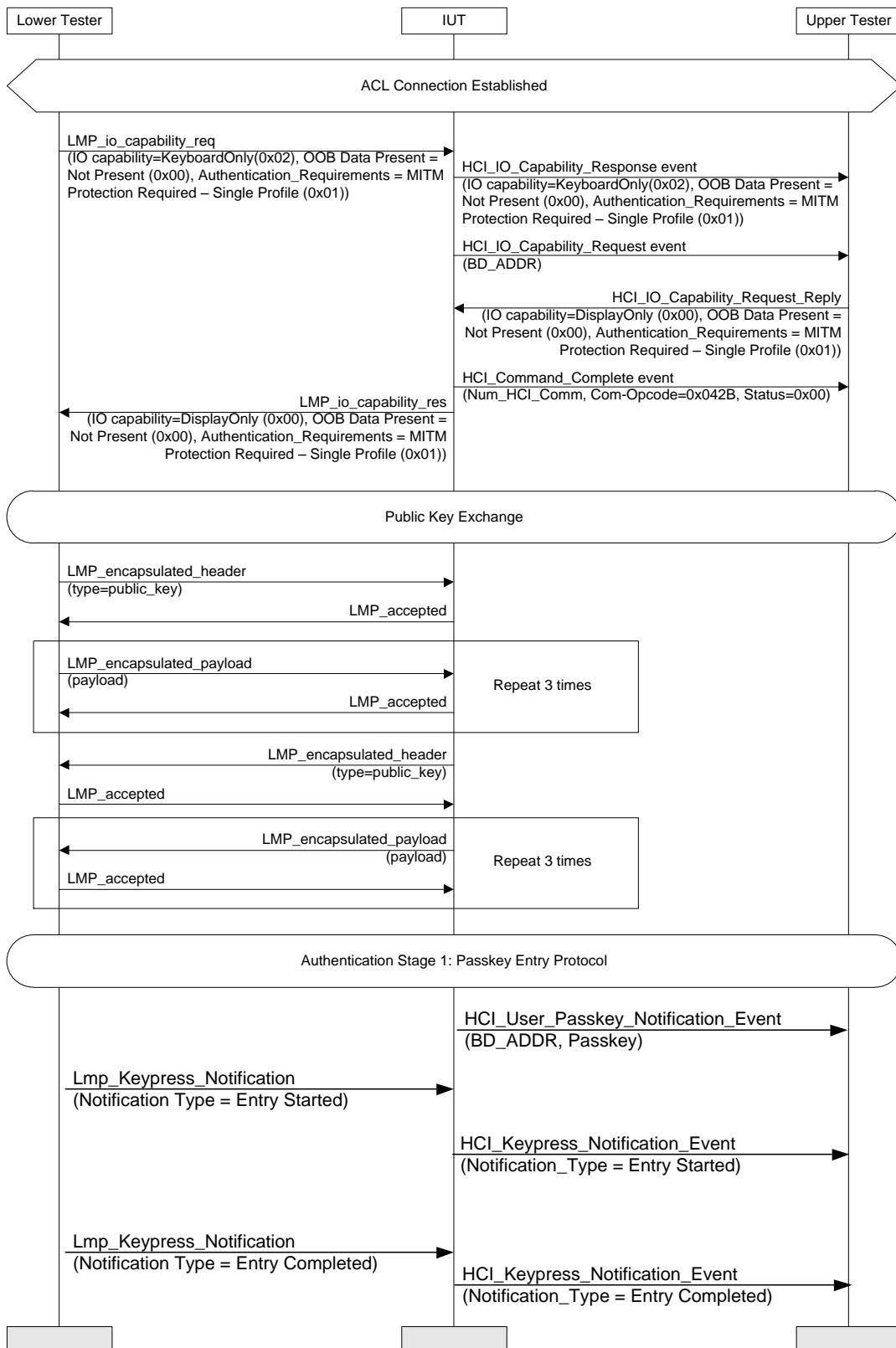


Figure 4.345: LMP/SP/BV-34-C MSC a



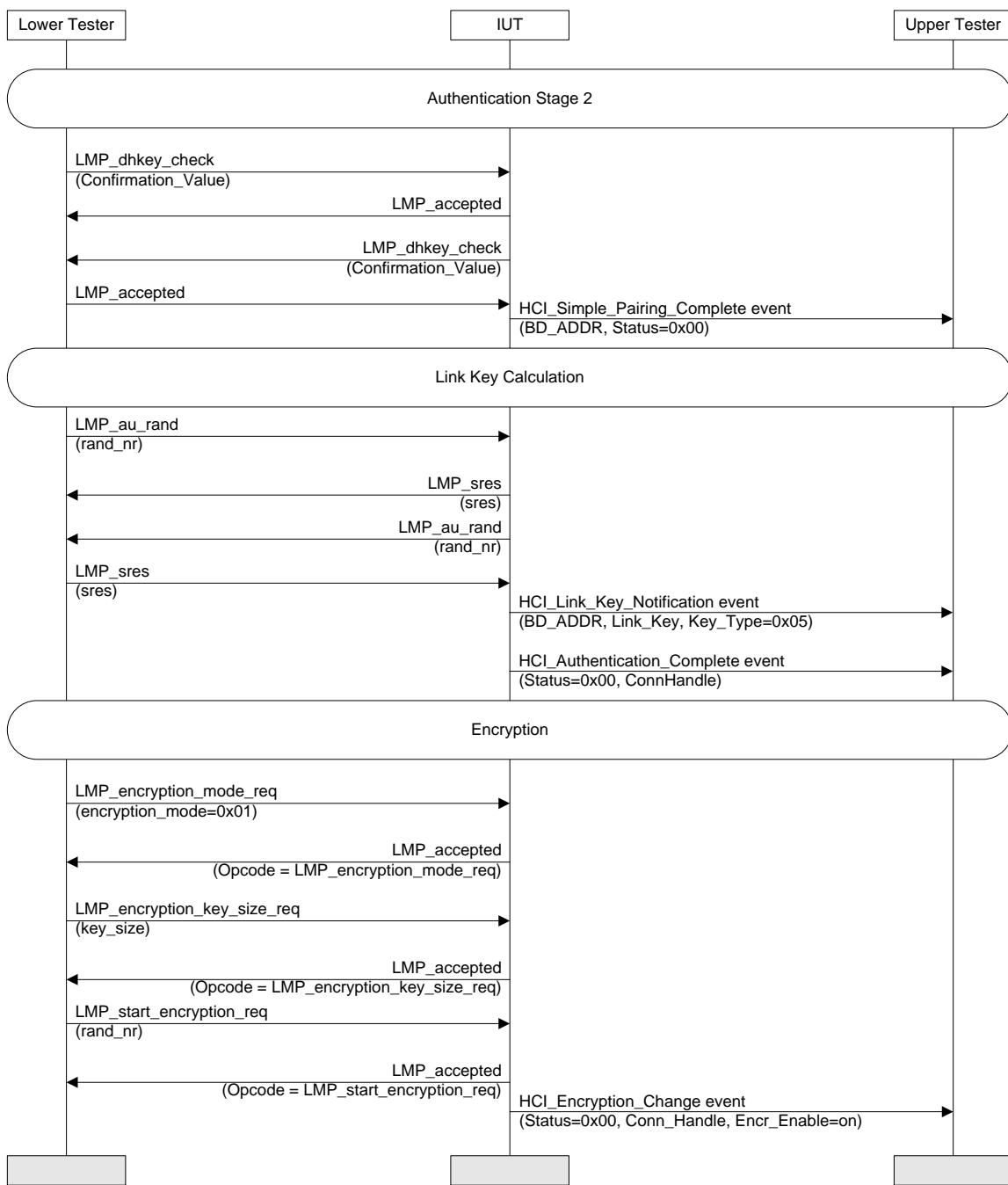


Figure 4.346: LMP/SP/BV-34-C MSC b

- Expected Outcome

Pass verdict

The IUT sends the LMP_DHkey_check PDU is with a valid Confirmation_Value.

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester.

The IUT sends the resulting Link Key and Key Type to the Host in an HCI_Link_Key_Notification event. Verify that the Link Key matches at the Upper and Lower Testers. Verify that the Key_Type is 'Authenticated'.



- Notes

If the commitment value calculated by the Lower Tester does not match the commitment value sent by the IUT, the Lower Tester will send LMP_not_accepted with the Authentication_Failure error code.

The Lower Tester shall send an LMP_not_accepted to LMP_DHkey if the confirmation value that it calculates does not match with the confirmation value that the IUT has sent.

4.10.6.6 LMP/SP/BV-35-C [Passkey Entry with Keypress notification - IUT Initiator - Failure on Responding Side]

- Test Purpose

Verify that the IUT supports the Passkey Entry protocol.

IUT is initiator.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).

- Test Procedure

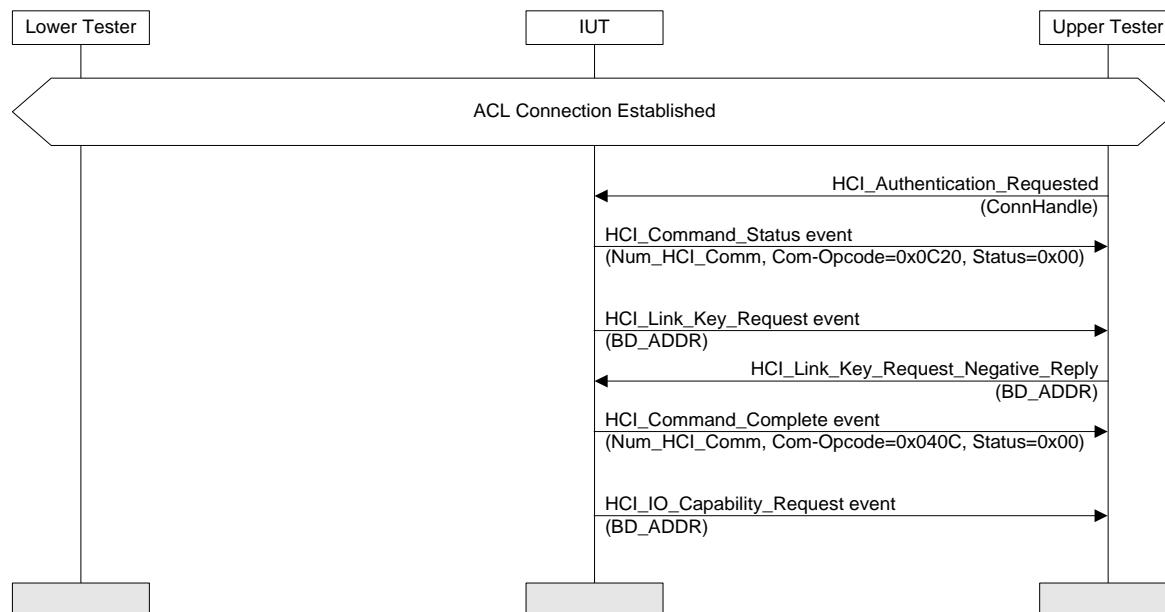


Figure 4.347: LMP/SP/BV-35-C MSC a



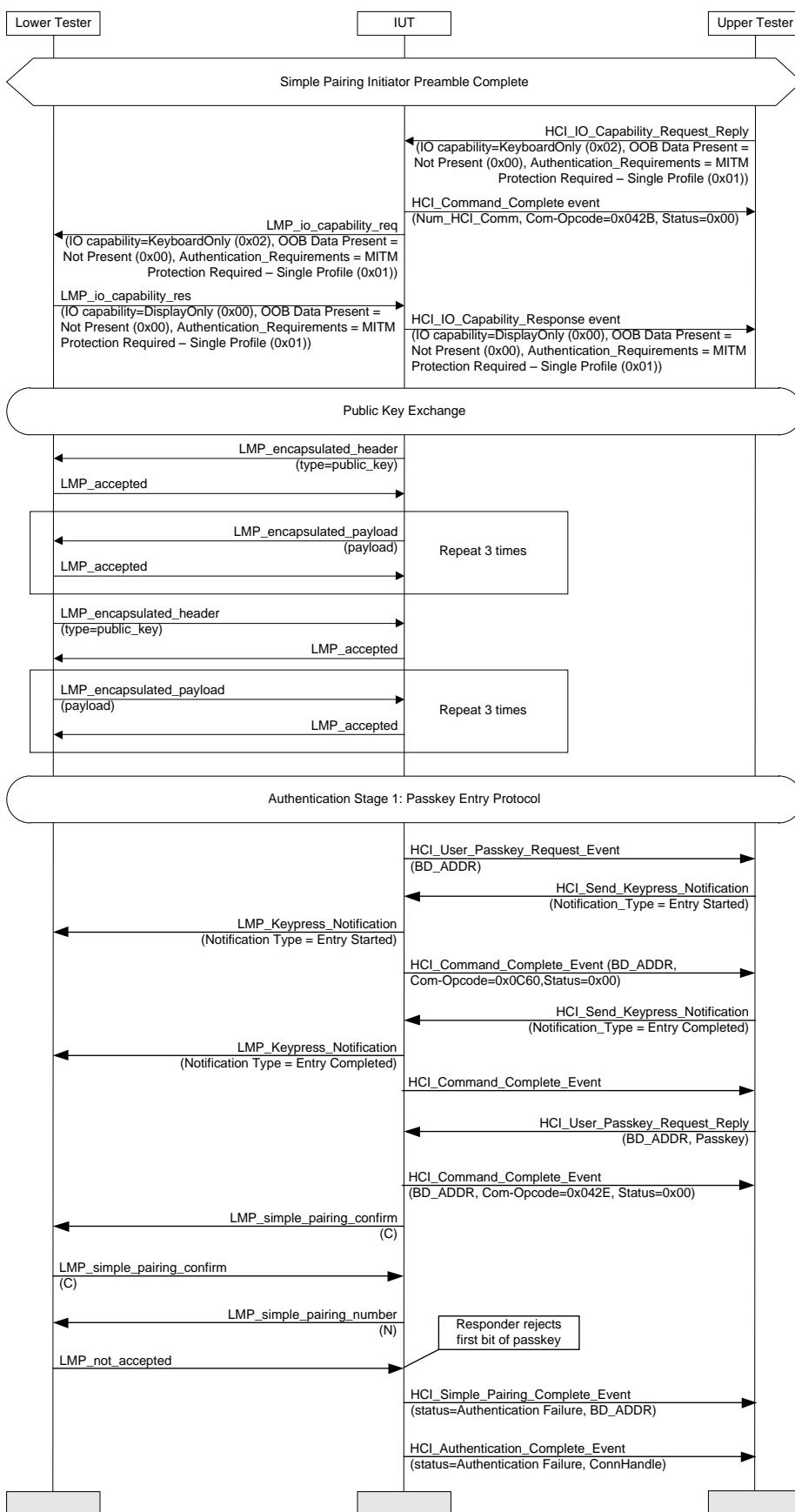


Figure 4.348: LMP/SP/BV-35-C MSC b



- Expected Outcome

Pass verdict

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester with status set to Authentication Failure after the Lower Tester responds with an LMP_not_accepted PDU in response to the LMP_simple_pairing_number PDU.

4.10.6.7 LMP/SP/BV-36-C [Passkey Entry with Keypress notification - IUT Responder - Failure on Responding Side]

- Test Purpose

Verify that the IUT supports the Passkey Entry protocol.

IUT is responder.

- Reference

[1] 4.2.7

- Initial Condition

See [Default Settings](#).



- Test Procedure

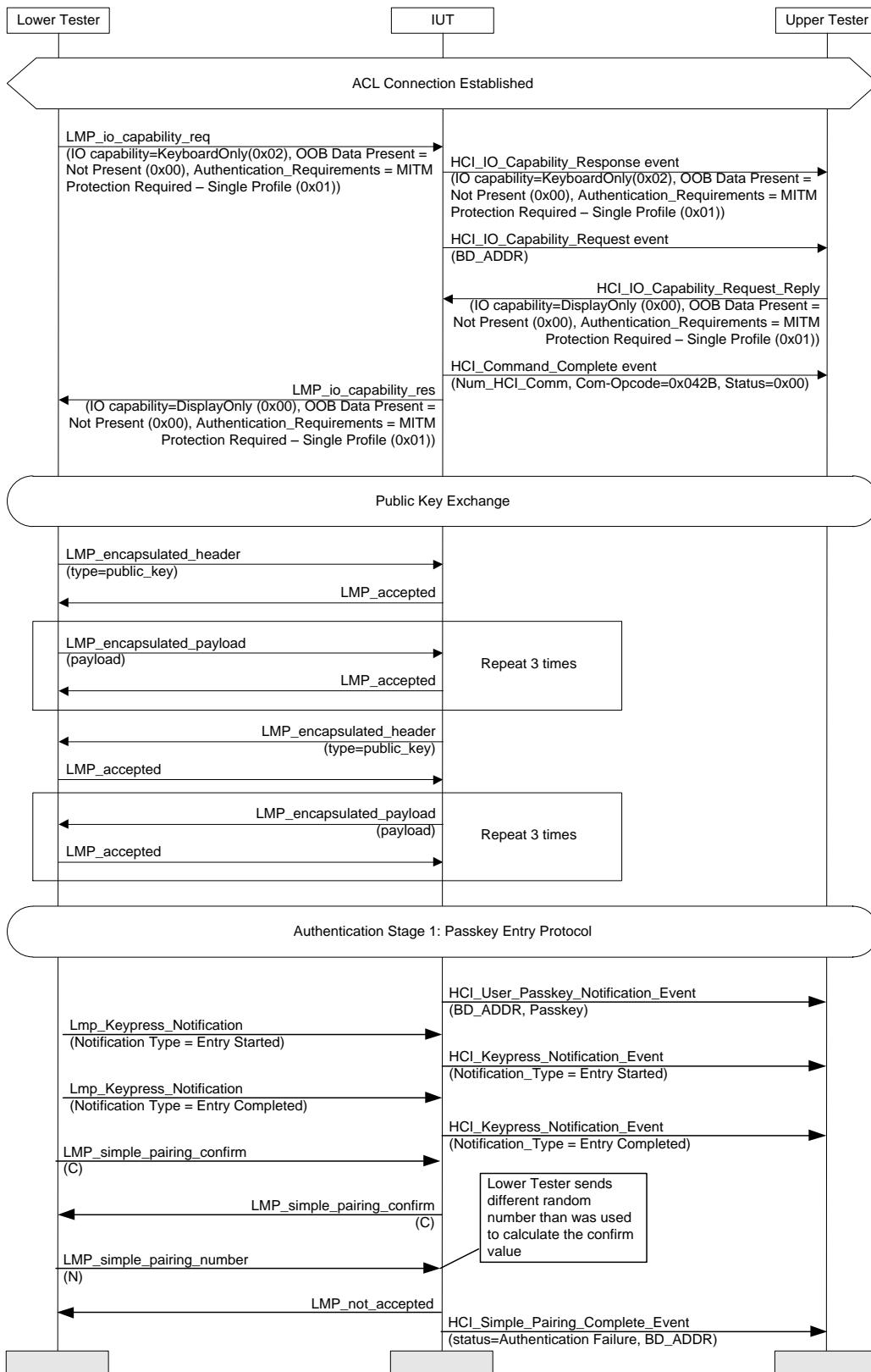


Figure 4.349: LMP/SP/BV-36-C



- Expected Outcome

Pass verdict

The IUT sends an LMP_Not_Accepted PDU in response to the LMP_simple_pairing_number PDU.

The IUT sends an HCI_Simple_Pairing_Complete Event to the Upper Tester with status set to Authentication Failure.

4.10.6.8 LMP/SP/BI-01-C [Numeric Comparison - IUT Initiator – Invalid Public Key Failure, P-192]

- Test Purpose

Verify that the IUT detects an invalid public key using the Numeric Comparison protocol and fails the pairing procedure using P-192 key size.

Test procedure is run with IUT as initiator.

- Reference

[1] 4.2.7

- Initial Condition

An IXIT statement gives the number of failed pairing attempts before a new pairing key is generated for [Table 4.2](#).

The Lower Tester generates and uses only private/public key pairs where bit 0 of the private key is set to 0.

- Test Procedure

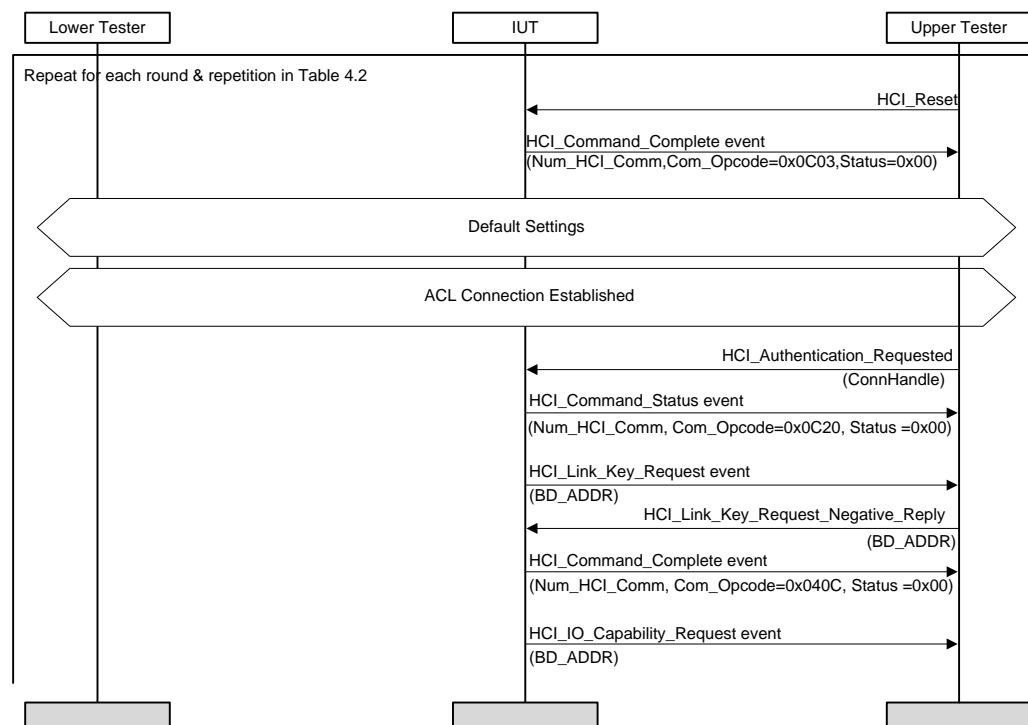


Figure 4.350: LMP/SP/BI-01-C MSC a

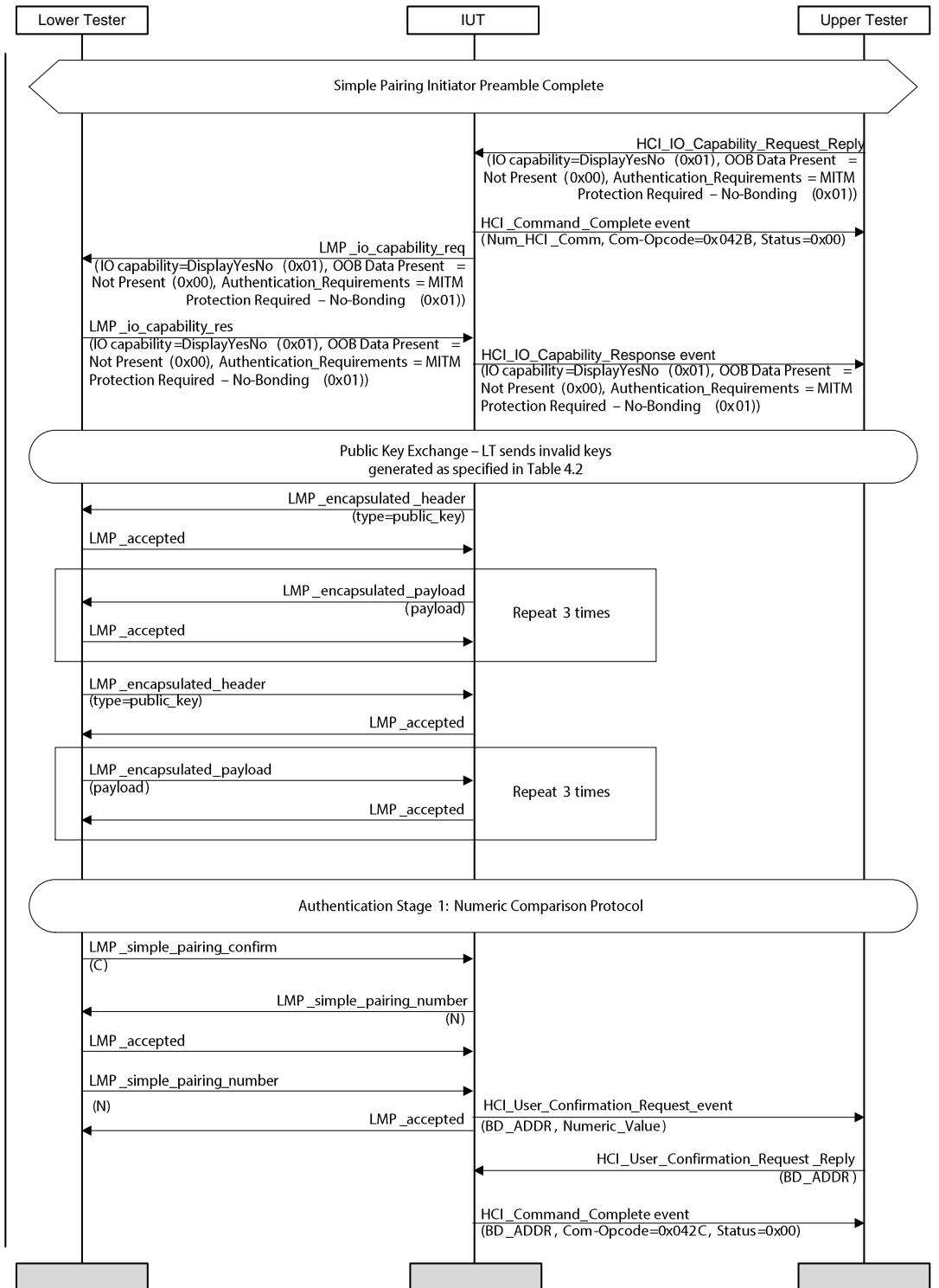


Figure 4.351: LMP/SP/BI-01-C MSC b



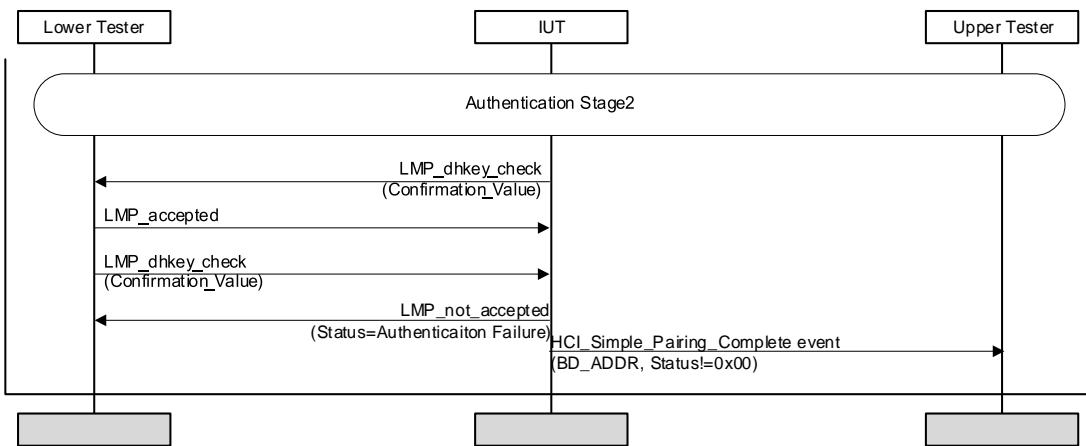


Figure 4.352: LMP/SP/BI-01-C MSC c

Round	Key Size	Invalid Key Type	Repeat # of times	Lower Tester DHKey
1	P-192	Generate valid public key and set y-coordinate = 0	Max(20* TSPX_new_key_failed_count, 20)	0
2	P-192	Generate valid public key and set y-coordinate = 0	1	Computed DHKey
3	P-192	Generate valid public key and flip a bit in y-coordinate	1	Computed DHKey
4	P-192	Public Key coordinates (0, 0)	1	0

Note: In Authentication Stage 2, the Lower Tester either uses the computed DHKey or DHKey = 0 as specified in [Table 4.2](#).

Table 4.2: Invalid Public Key generation for each round

- Expected Outcome

Pass verdict

The IUT responds to the LT's LMP_dhkey_check PDU with an LMP_not_accepted PDU with error code Authentication Failure (0x05).

The IUT sends an HCI_Simple_Pairing_Complete Event with an error code different than success (0x00).



If TSPX_new_key_failed_count > 0, a different public key is used by the IUT after at most TSPX_new_key_failed_count pairings.

Inconclusive verdict

The IUT interrupts the pairing process by:

- Responding LMP_not_accepted PDU with a different error code than Authentication Failure (0x05) to a LMP_dhkey_check PDU
- Responding LMP_not_accepted PDU to a LMP_encapsulated_payload containing an invalid public key
- Responding LMP_not_accepted PDU to a LMP_simple_pairing_number PDU
- Responding LMP_numeric_comparison_failed PDU during the Numeric Comparison Protocol Phase
- Notes

The test verifies the recommendation of the specification that an IUT should return an LMP_not_accepted PDU to the LT's LMP_dhkey_check PDU if the LT's public key is invalid. Other potentially valid ways of rejecting the invalid key are listed in the expected outcome and will yield an inconclusive verdict.

To simulate an attacker, the Lower Tester may send an LMP_accepted PDU in response to all calculated values sent by the IUT, even if the LMP_simple_pairing_confirm, the LMP_simple_pairing_number, or the LMP_dhkey values sent by the IUT do not match the expected calculations.

4.10.6.9 LMP/SP/BI-02-C [Numeric Comparison - IUT Responder – Invalid Public Key Failure, P-192]

- Test Purpose

Verify that the IUT detects an invalid public key using the Numeric Comparison protocol and fails the pairing procedure using P-192 key size.

Test procedure is run with IUT as responder.

- Reference

[1] 4.2.7

- Initial Condition

An IXIT statement gives the number of failed pairing attempts before a new pairing key is generated for [Table 4.2](#).

The Lower Tester generates and uses only private/public key pairs where bit 0 of the private key is set to 0.



- Test Procedure

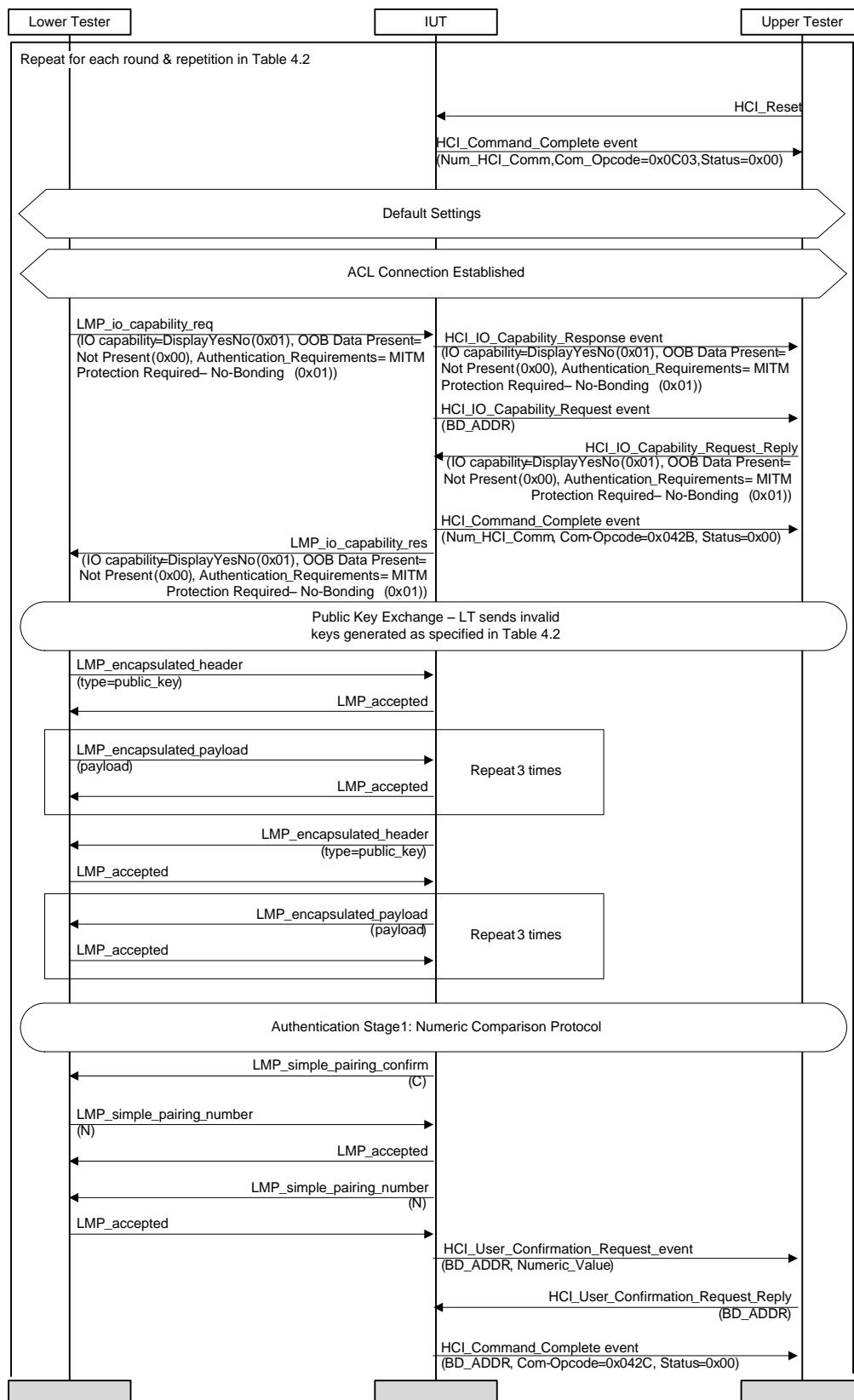


Figure 4.353: LMP/SP/BI-02-C MSC a



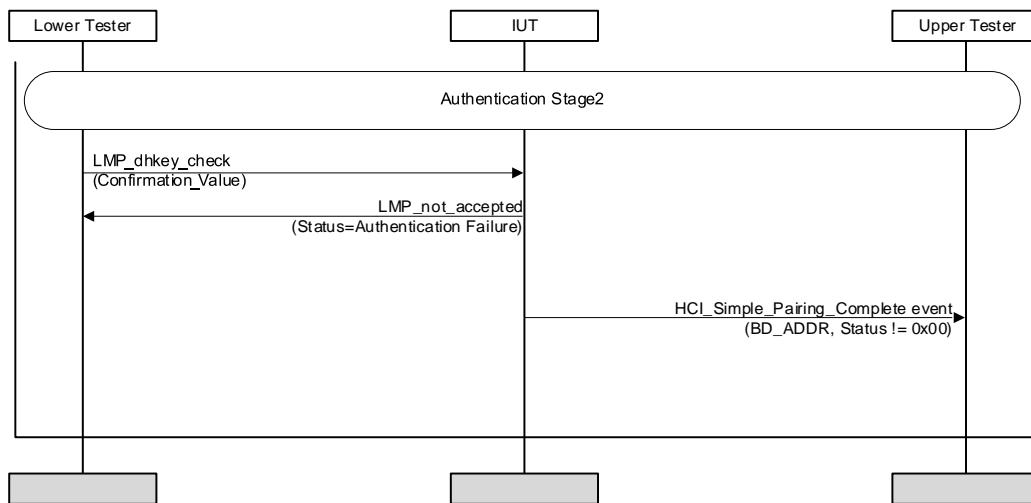


Figure 4.354: LMP/SP/BI-02-C MSC b

- Expected Outcome

Pass verdict

The IUT responds to the LT's LMP_dhkey_check PDU with an LMP_not_accepted PDU with error code Authentication Failure (0x05).

The IUT sends an HCI_Simple_Pairing_Complete Event with an error code different than success (0x00).

If TSPX_new_key_failed_count > 0, a different public key is used by the IUT after at most TSPX_new_key_failed_count pairings.

Inconclusive verdict

The IUT interrupts the pairing process by:

- Responding LMP_not_accepted PDU with a different error code than Authentication Failure (0x05) to a LMP_dhkey_check PDU
- Responding LMP_not_accepted PDU to a LMP_encapsulated_payload containing an invalid public key
- Responding LMP_not_accepted PDU to a LMP_simple_pairing_number PDU
- Responding LMP_numeric_comparison_failed PDU during the Numeric Comparison Protocol Phase
- Notes

See Notes in [LMP/SP/BI-01-C \[Numeric Comparison - IUT Initiator – Invalid Public Key Failure, P-192\]](#).

4.10.6.10 LMP/SP/BI-03-C [Passkey Entry - IUT Initiator – Invalid Public Key Failure, P-192]

- Test Purpose

Verify that the IUT detects an invalid public key using the Passkey Entry protocol and fails the pairing procedure using P-192 key size.



IUT is initiator.

- Reference

[1] 4.2.7

- Initial Condition

An IXIT statement gives the number of failed pairing attempts before a new pairing key is generated for [Table 4.2](#).

The Lower Tester generates and uses only private/public key pairs where bit 0 of the private key is set to 0.

- Test Procedure

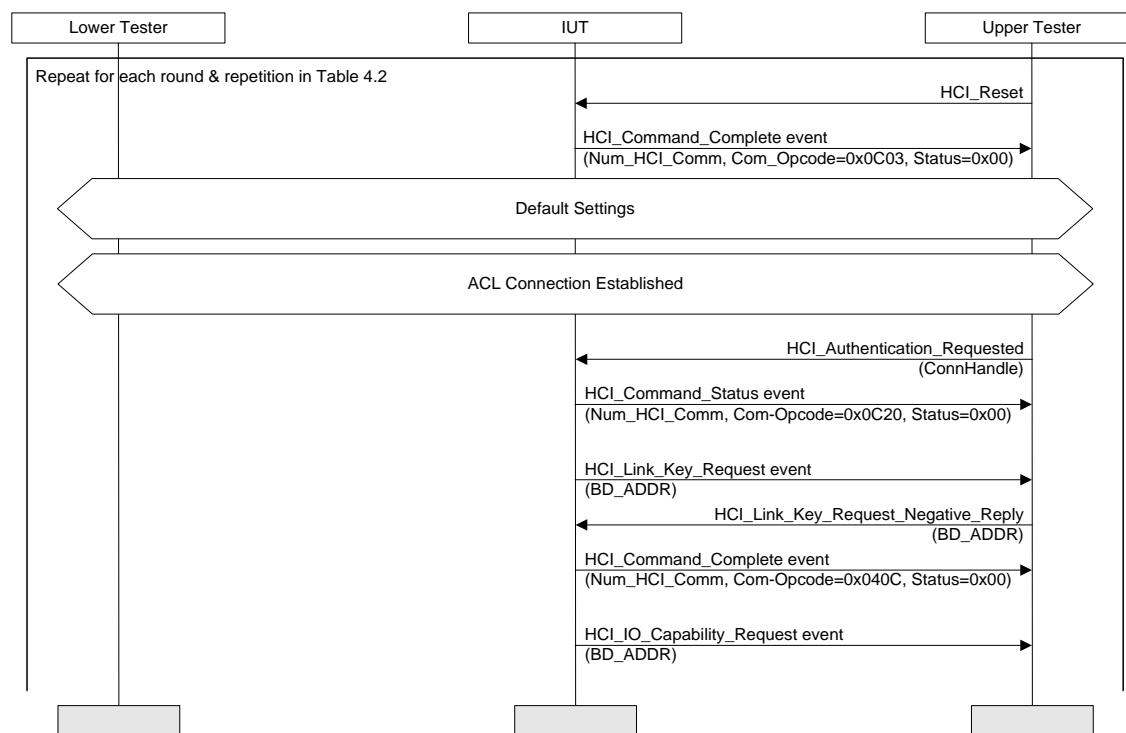


Figure 4.355: LMP/SP/BI-03-C MSC a



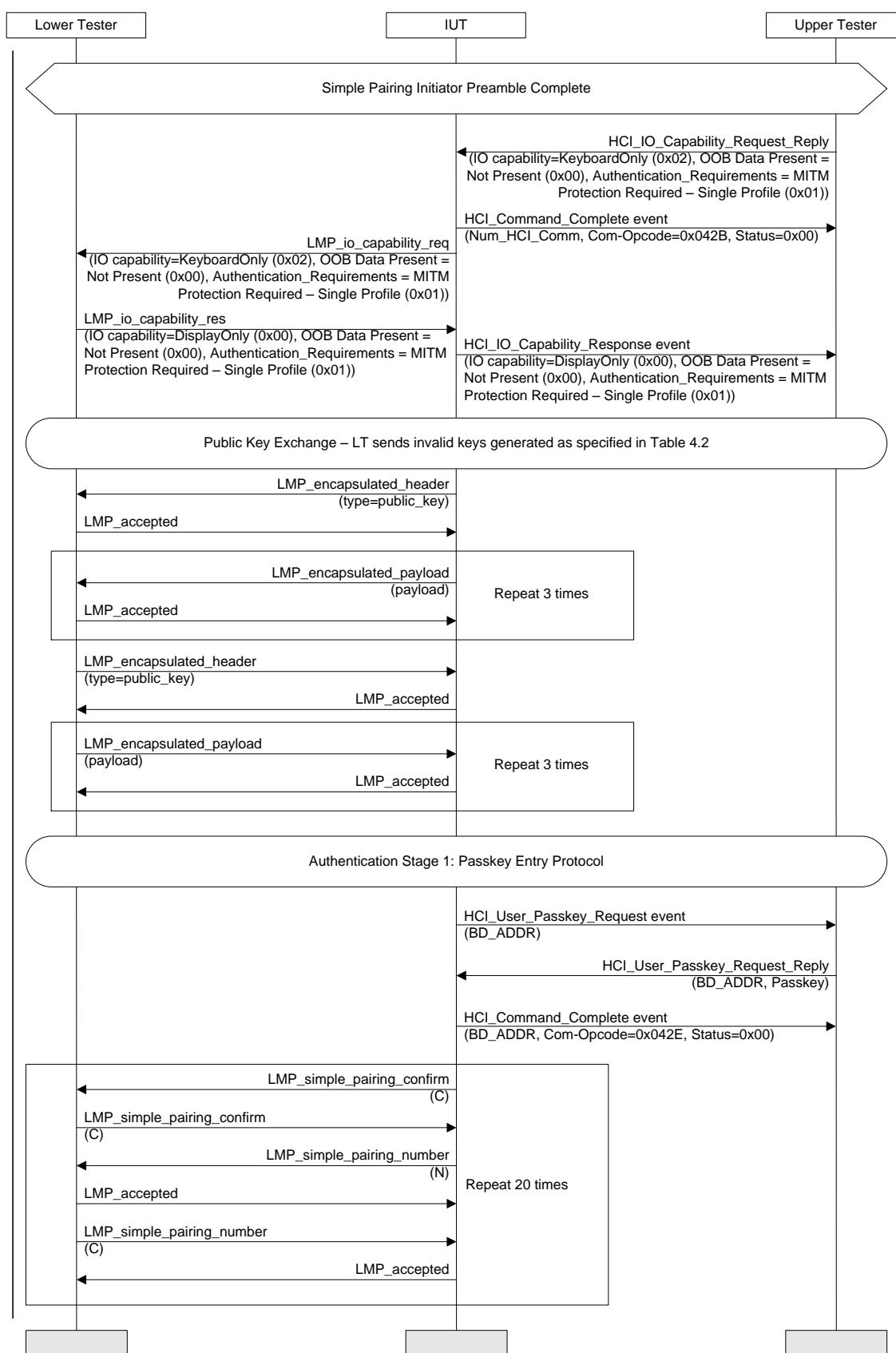


Figure 4.356: LMP/SP/BI-03-C MSC b



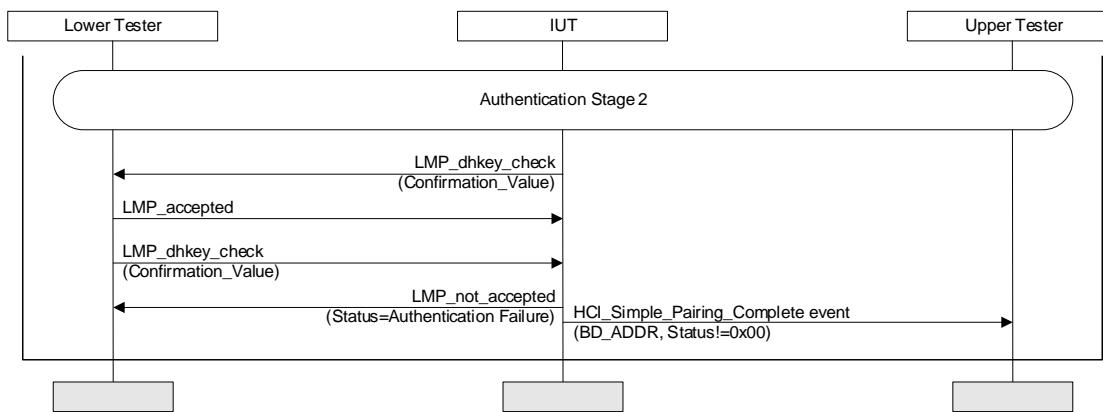


Figure 4.357: LMP/SP/BI-03-C MSC c

- Expected Outcome

Pass verdict

The IUT responds to the LT's LMP_dhkey_check PDU with an LMP_not_accepted PDU with error code Authentication Failure (0x05).

The IUT sends an HCI_Simple_Pairing_Complete Event with an error code different than success (0x00).

If TSPX_new_key_failed_count > 0, a different public key is used by the IUT after at most TSPX_new_key_failed_count pairings.

Inconclusive verdict

The IUT interrupts the pairing process by:

- Responding LMP_not_accepted PDU with a different error code than Authentication Failure (0x05) to a LMP_dhkey_check PDU
- Responding LMP_not_accepted PDU to a LMP_encapsulated_payload containing an invalid public key
- Responding LMP_not_accepted PDU to a LMP_simple_pairing_number PDU
- Responding LMP_passkey_entry_failed PDU during the Passkey Entry Protocol Phase
- Notes

See Notes in [LMP/SP/BI-01-C \[Numeric Comparison - IUT Initiator – Invalid Public Key Failure, P-192\]](#).

4.10.6.11 LMP/SP/BI-04-C [Passkey Entry - IUT Responder – Invalid Public Key Failure, P-192]

- Test Purpose

Verify that the IUT detects an invalid public key using the Passkey Entry protocol and fails the pairing procedure using P-192 key size.

IUT is responder.



- Reference

[1] 4.2.7

- Initial Condition

An IXIT statement gives the number of failed pairing attempts before a new pairing key is generated for [Table 4.2](#).

The Lower Tester generates and uses only private/public key pairs where bit 0 of the private key is set to 0.



- Test Procedure

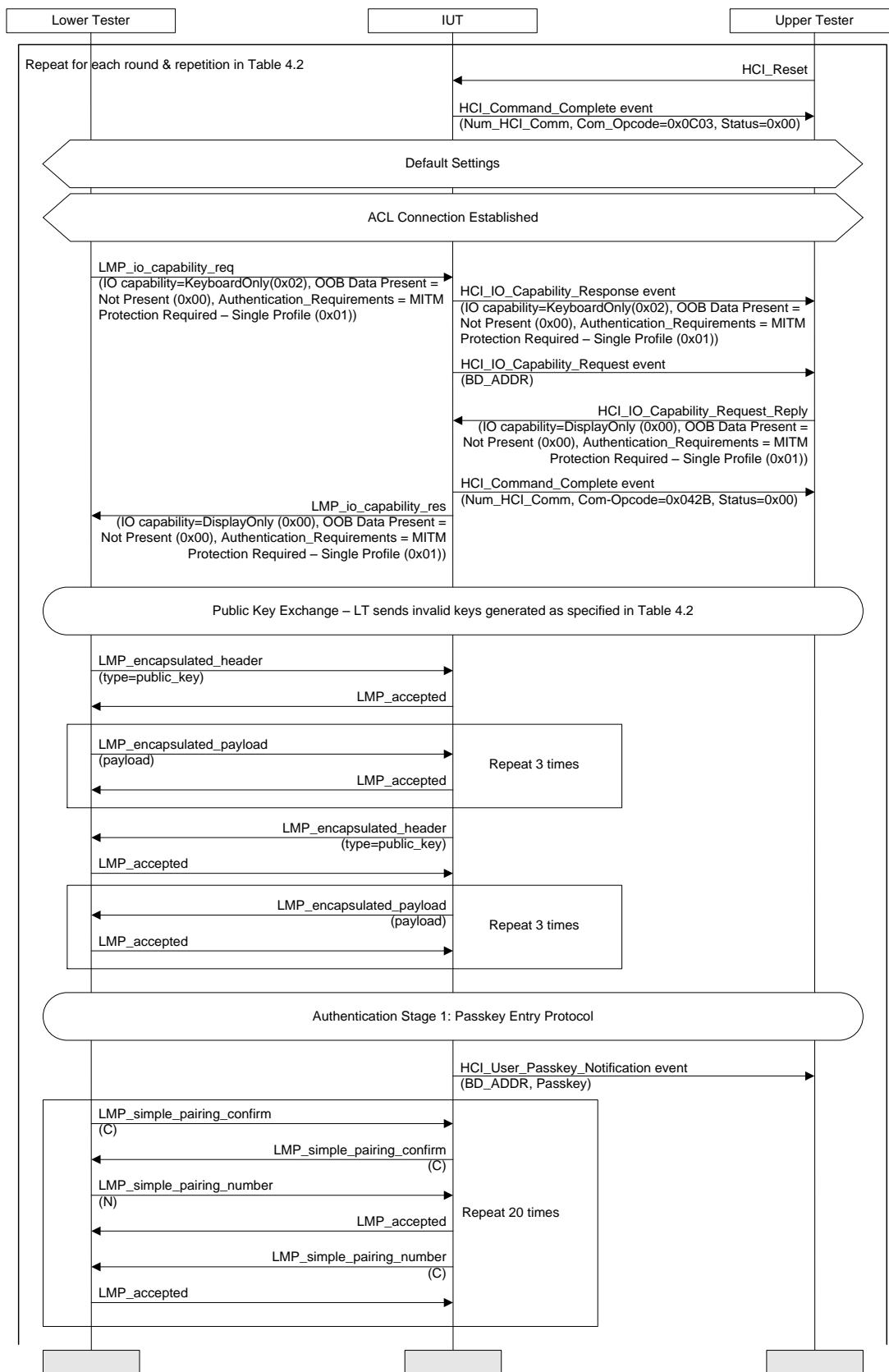


Figure 4.358: LMP/SP/BI-04-C MSC a



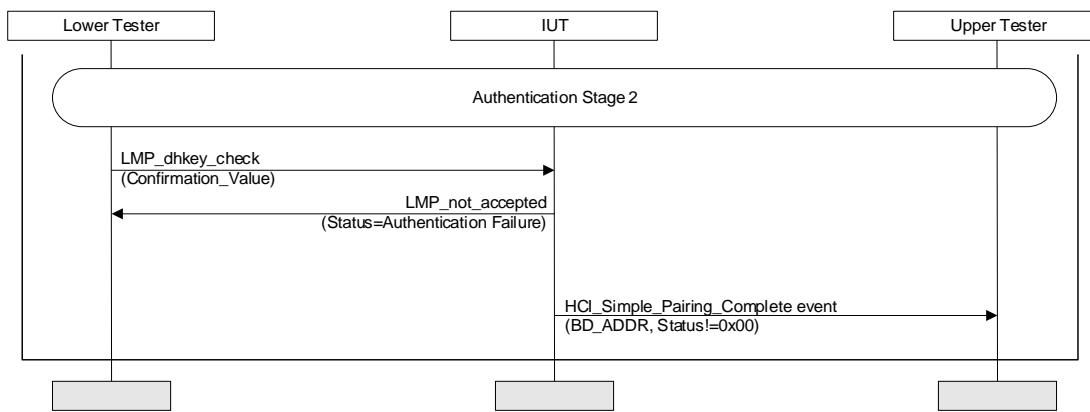


Figure 4.359: LMP/SP/BI-04-C MSC b

- Expected Outcome

Pass verdict

The IUT responds to the LT's LMP_dhkey_check PDU with an LMP_not_accepted PDU with error code Authentication Failure (0x05).

The IUT sends an HCI_Simple_Pairing_Complete Event with an error code different than success (0x00).

If TSPX_new_key_failed_count > 0, a different public key is used by the IUT after at most TSPX_new_key_failed_count pairings.

Inconclusive verdict

The IUT interrupts the pairing process by:

- Responding LMP_not_accepted PDU with a different error code than Authentication Failure (0x05) to a LMP_dhkey_check PDU
- Responding LMP_not_accepted PDU to a LMP_encapsulated_payload containing an invalid public key
- Responding LMP_not_accepted PDU to a LMP_simple_pairing_number PDU
- Responding LMP_passkey_entry_failed PDU during the Passkey Entry Protocol Phase

- Notes

See Notes in [LMP/SP/BI-01-C \[Numeric Comparison - IUT Initiator – Invalid Public Key Failure, P-192\]](#).

4.10.6.12 LMP/SP/BI-05-C [OOB Protocol - IUT Initiator - IUT with OOB Authentication Data – Invalid Public Key Failure, P-192]

- Test Purpose

Verify that the IUT detects an invalid public key using the OOB protocol and fails the pairing procedure using P-192 key size.

IUT is initiator.



- Reference

[1] 4.2.7

- Initial Condition

An IXIT statement gives the number of failed pairing attempts before a new pairing key is generated for [Table 4.2](#).

The Lower Tester generates and uses only private/public key pairs where bit 0 of the private key is set to 0.

- Test Procedure

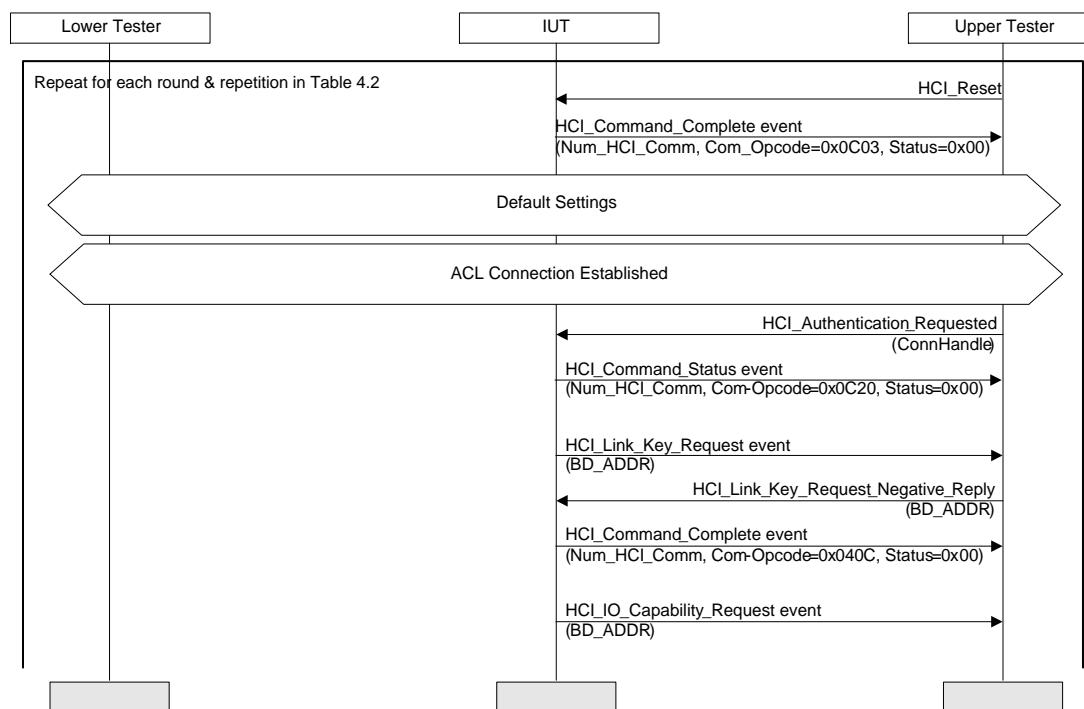


Figure 4.360: LMP/SP/BI-05-C MSC a



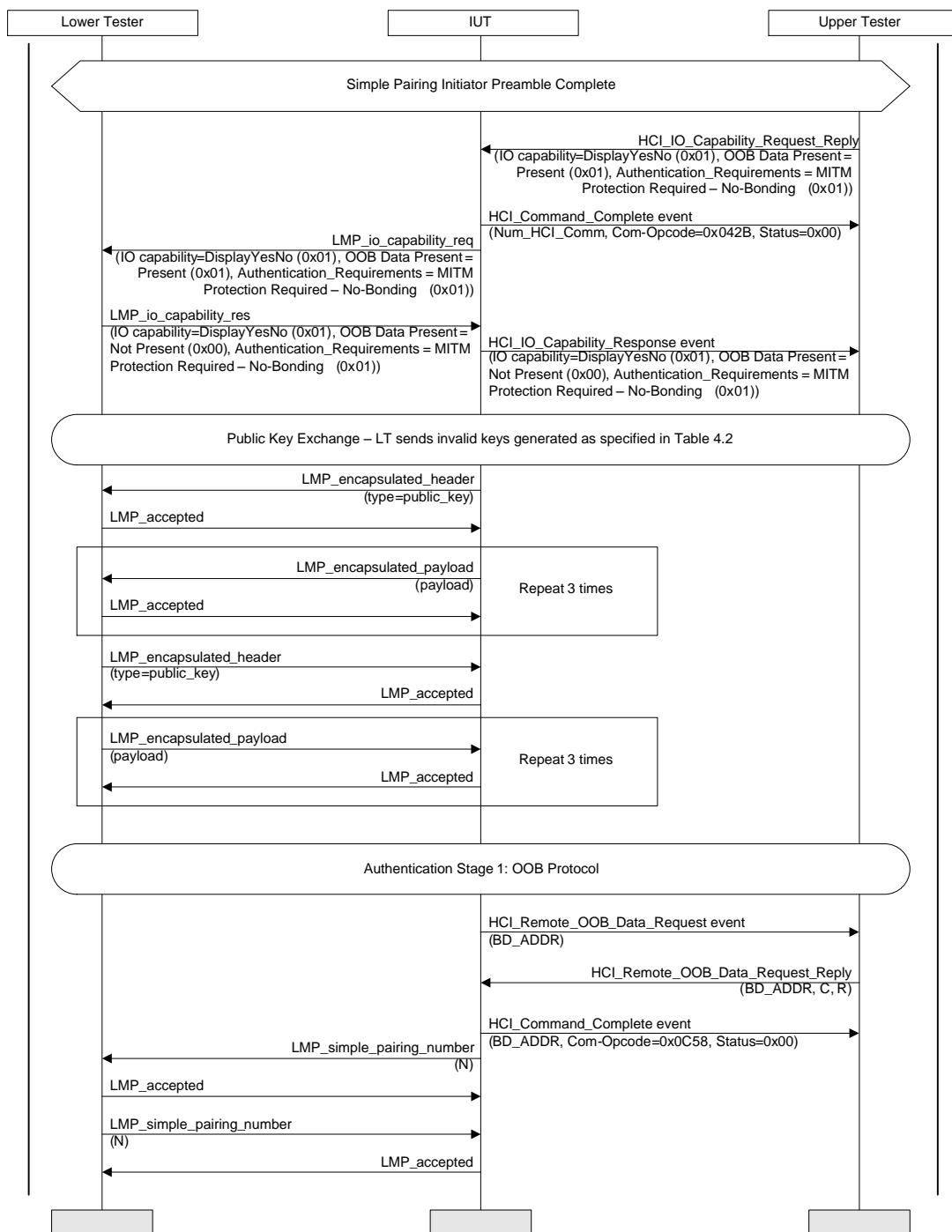


Figure 4.361: LMP/SP/BI-05-C MSC b



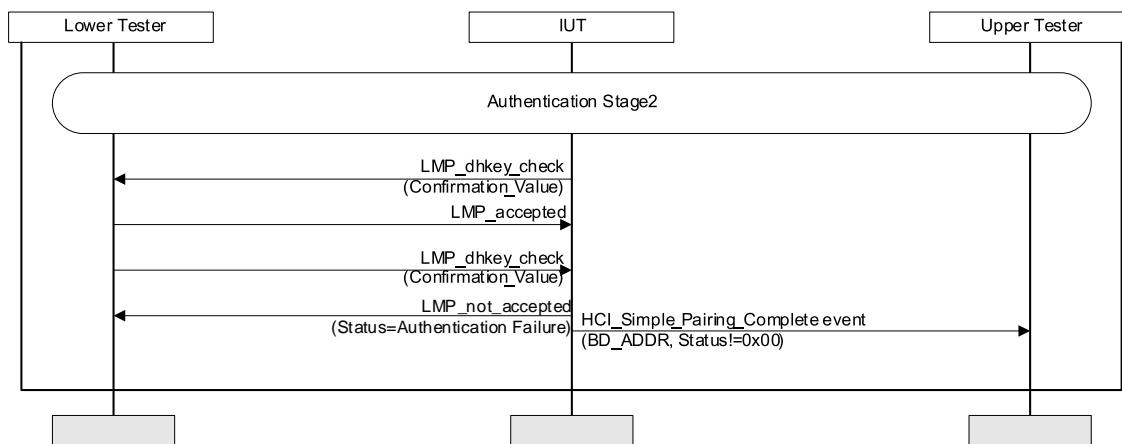


Figure 4.362: LMP/SP/BI-05-C MSC c

- Expected Outcome

Pass verdict

The IUT responds to the LT's LMP_dhkey_check PDU with an LMP_not_accepted PDU with error code Authentication Failure (0x05).

The IUT sends an HCI_Simple_Pairing_Complete Event with an error code different than success (0x00).

If TSPX_new_key_failed_count > 0, a different public key is used by the IUT after at most TSPX_new_key_failed_count pairings.

Inconclusive verdict

The IUT interrupts the pairing process by:

- Responding LMP_not_accepted PDU with a different error code than Authentication Failure (0x05) to a LMP_dhkey_check PDU
- Responding LMP_not_accepted PDU to a LMP_encapsulated_payload containing an invalid public key
- Responding LMP_not_accepted PDU to a LMP_simple_pairing_number PDU
- Notes

See Notes in [LMP/SP/BI-01-C \[Numeric Comparison - IUT Initiator – Invalid Public Key Failure, P-192\]](#).

4.10.6.13 LMP/SP/BI-06-C [OOB Protocol - IUT Responder - IUT with OOB Authentication Data – Invalid Public Key Failure, P-192]

- Test Purpose

Verify that the IUT supports the OOB protocol where the IUT has OOB Authentication Data.

IUT is responder.



- Reference

[1] 4.2.7

- Initial Condition

An IXIT statement gives the number of failed pairing attempts before a new pairing key is generated for [Table 4.2](#).

The Lower Tester generates and uses only private/public key pairs where bit 0 of the private key is set to 0.



- Test Procedure

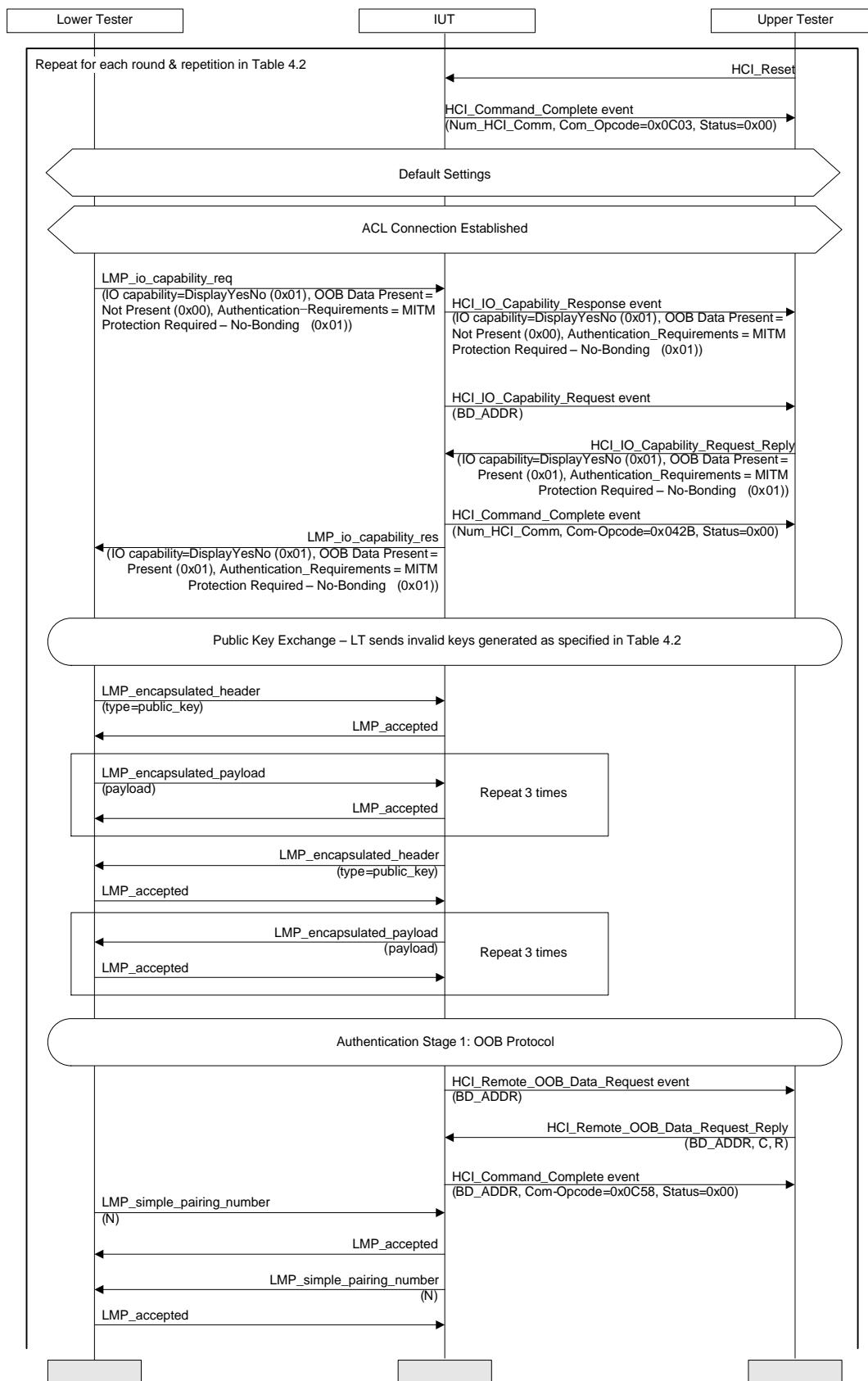


Figure 4.363: LMP/SP/BI-06-C MSC a



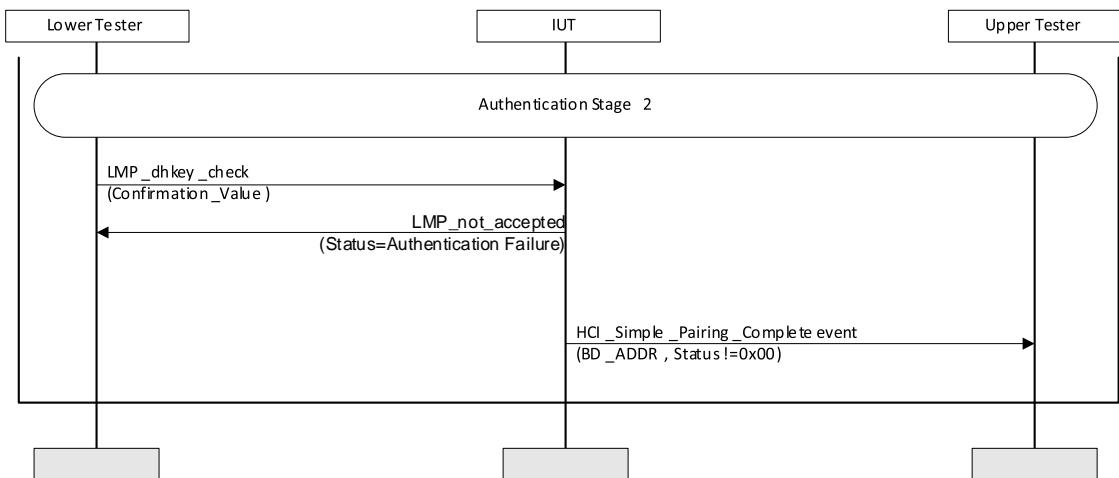


Figure 4.364: LMP/SP/BI-06-C MSC a

- Expected Outcome

Pass verdict

The IUT responds to the LT's LMP_dhkey_check PDU with an LMP_not_accepted PDU with error code Authentication Failure (0x05).

The IUT sends an HCI_Simple_Pairing_Complete Event with an error code different than success (0x00).

If TSPX_new_key_failed_count > 0, a different public key is used by the IUT after at most TSPX_new_key_failed_count pairings.

Inconclusive verdict

The IUT interrupts the pairing process by:

- Responding LMP_not_accepted PDU with a different error code than Authentication Failure (0x05) to a LMP_dhkey_check PDU
- Responding LMP_not_accepted PDU to a LMP_encapsulated_payload containing an invalid public key
- Responding LMP_not_accepted PDU to a LMP_simple_pairing_number PDU
- Notes

See Notes in [LMP/SP/BI-01-C \[Numeric Comparison - IUT Initiator – Invalid Public Key Failure, P-192\]](#).

4.10.6.14 LMP/SP/BI-07-C [Numeric Comparison - IUT Initiator – Invalid Public Key Failure, P-256]

- Test Purpose

Verify that the IUT detects an invalid public key using the Numeric Comparison protocol and fails the pairing procedure using P-256 key size.

Test procedure is run with IUT as initiator.



- Reference

[1] 4.2.7

- Initial Condition

An IXIT statement gives the number of failed pairing attempts before a new pairing key is generated for [Table 4.2](#).

The Lower Tester generates and uses only private/public key pairs where bit 0 of the private key is set to 0.

- Test Procedure

Run the Test Procedure in [LMP/SP/BI-01-C \[Numeric Comparison - IUT Initiator – Invalid Public Key Failure, P-192\]](#) using Default Settings and Simple Pairing P256 with a P-256 Key Size in [Table 4.2](#) and the LMP_encapsulated_payload repeated 4 times.

- Expected Outcome

See Expected Outcome in [LMP/SP/BI-01-C \[Numeric Comparison - IUT Initiator – Invalid Public Key Failure, P-192\]](#).

- Notes

See Notes in [LMP/SP/BI-01-C \[Numeric Comparison - IUT Initiator – Invalid Public Key Failure, P-192\]](#).

4.10.6.15 LMP/SP/BI-08-C [Numeric Comparison - IUT Responder – Invalid Public Key Failure, P-256]

- Test Purpose

Verify that the IUT detects an invalid public key using the Numeric Comparison protocol and fails the pairing procedure using P-256 key size.

Test procedure is run with IUT as responder.

- Reference

[1] 4.2.7

- Initial Condition

An IXIT statement gives the number of failed pairing attempts before a new pairing key is generated for [Table 4.2](#).

The Lower Tester generates and uses only private/public key pairs where bit 0 of the private key is set to 0.

- Test Procedure

Run the Test Procedure in [LMP/SP/BI-02-C \[Numeric Comparison - IUT Responder – Invalid Public Key Failure, P-192\]](#) using Default Settings and Simple Pairing P256 with a P-256 Key Size in [Table 4.2](#) and the LMP_encapsulated_payload repeated 4 times.



- Expected Outcome

See Expected Outcome in LMP/SP/BI-02-C [Numeric Comparison - IUT Responder – Invalid Public Key Failure, P-192].

- Notes

See Notes in LMP/SP/BI-01-C [Numeric Comparison - IUT Initiator – Invalid Public Key Failure, P-192]

4.10.6.16 LMP/SP/BI-09-C [Passkey Entry - IUT Initiator – Invalid Public Key Failure, P-256]

- Test Purpose

Verify that the IUT detects an invalid public key using the Passkey Entry protocol and fails the pairing procedure using P-256 key size.

Test procedure is run with IUT as initiator.

- Reference

[1] 4.2.7

- Initial Condition

An IXIT statement gives the number of failed pairing attempts before a new pairing key is generated for Table 4.2.

The Lower Tester generates and uses only private/public key pairs where bit 0 of the private key is set to 0.

- Test Procedure

Run the Test Procedure in LMP/SP/BI-03-C [Passkey Entry - IUT Initiator – Invalid Public Key Failure, P-192] using Default Settings and Simple Pairing P256 with a P-256 Key Size in Table 4.2 and the LMP_encapsulated_payload repeated 4 times.

- Expected Outcome

See Expected Outcome in LMP/SP/BI-03-C [Passkey Entry - IUT Initiator – Invalid Public Key Failure, P-192].

- Notes

See Notes in LMP/SP/BI-01-C [Numeric Comparison - IUT Initiator – Invalid Public Key Failure, P-192].

4.10.6.17 LMP/SP/BI-10-C [Passkey Entry - IUT Responder – Invalid Public Key Failure, P-256]

- Test Purpose

Verify that the IUT detects an invalid public key using the Passkey Entry protocol and fails the pairing procedure using P-256 key size.

Test procedure is run with IUT as responder.



- Reference

[1] 4.2.7

- Initial Condition

An IXIT statement gives the number of failed pairing attempts before a new pairing key is generated for [Table 4.2](#).

The Lower Tester generates and uses only private/public key pairs where bit 0 of the private key is set to 0.

- Test Procedure

Run the Test Procedure in [LMP/SP/BI-04-C \[Passkey Entry - IUT Responder – Invalid Public Key Failure, P-192\]](#) using Default Settings and Simple Pairing P256 with a P-256 Key Size in [Table 4.2](#) and the LMP_encapsulated_payload repeated 4 times.

- Expected Outcome

See Expected Outcome in [LMP/SP/BI-04-C \[Passkey Entry - IUT Responder – Invalid Public Key Failure, P-192\]](#).

- Notes

See Notes in [LMP/SP/BI-01-C \[Numeric Comparison - IUT Initiator – Invalid Public Key Failure, P-192\]](#).

4.10.6.18 LMP/SP/BI-11-C [OOB Protocol - IUT Initiator - IUT with OOB Authentication Data – Invalid Public Key Failure, P-256]

- Test Purpose

Verify that the IUT detects an invalid public key using the OOB protocol and fails the pairing procedure using P-256 key size.

Test procedure is run with IUT as initiator.

- Reference

[1] 4.2.7

- Initial Condition

An IXIT statement gives the number of failed pairing attempts before a new pairing key is generated for [Table 4.2](#).

The Lower Tester generates and uses only private/public key pairs where bit 0 of the private key is set to 0.

- Test Procedure

Run the Test Procedure in [LMP/SP/BI-05-C \[OOB Protocol - IUT Initiator - IUT with OOB Authentication Data – Invalid Public Key Failure, P-192\]](#) using Default Settings and Simple Pairing P256 with a P-256 Key Size in [Table 4.2](#), using P-256 OOB Data Present (0x02) in the HCI IO Capability Request Reply Command, and the LMP_encapsulated_payload repeated 4 times.



- Expected Outcome

See Expected Outcome in [LMP/SP/BI-05-C \[OOB Protocol - IUT Initiator - IUT with OOB Authentication Data – Invalid Public Key Failure, P-192\]](#).

- Notes

See Notes in [LMP/SP/BI-01-C \[Numeric Comparison - IUT Initiator – Invalid Public Key Failure, P-192\]](#).

4.10.6.19 LMP/SP/BI-12-C [OOB Protocol - IUT Responder - IUT with OOB Authentication Data – Invalid Public Key Failure, P-256]

- Test Purpose

Verify that the IUT detects an invalid public key using the OOB protocol and fails the pairing procedure using P-256 key size.

Test procedure is run with IUT as responder.

- Reference

[\[1\] 4.2.7](#)

- Initial Condition

An IXIT statement gives the number of failed pairing attempts before a new pairing key is generated for [Table 4.2](#).

The Lower Tester generates and uses only private/public key pairs where bit 0 of the private key is set to 0.

- Test Procedure

Run the Test Procedure in [LMP/SP/BI-06-C \[OOB Protocol - IUT Responder - IUT with OOB Authentication Data – Invalid Public Key Failure, P-192\]](#) using Default Settings and Simple Pairing P256 with a P-256 Key Size in [Table 4.2](#), using P-256 OOB Data Present (0x02) in the HCI IO Capability Request Reply Command, and the LMP_encapsulated_payload repeated 4 times.

- Expected Outcome

See Expected Outcome in [LMP/SP/BI-06-C \[OOB Protocol - IUT Responder - IUT with OOB Authentication Data – Invalid Public Key Failure, P-192\]](#).

- Notes

See Notes in [LMP/SP/BI-01-C \[Numeric Comparison - IUT Initiator – Invalid Public Key Failure, P-192\]](#).

4.11 Piconet Clock Adjust

4.11.1 LMP/XCL/BV-01-C [Master Initiates Coarse Clock Adjustment]

- Test Purpose

Verify that the IUT as master will correctly initiate a Coarse Clock Adjustment.



This test shall be performed only on a device that declares support for the Coarse Clock Adjustment feature and the MWS Coexistence Logical Signaling Specification.

- Reference

[1] Vol 2, Part C, 4.1.14.1

- Initial Condition

Lower Tester: Configured as Slave in state CONNECTION (active mode, ACL link).

Upper Tester: Configured to issue MWS FRAME_SYNC

IUT: Configured as Master in state CONNECTION (active mode, ACL link).

- Test Procedure

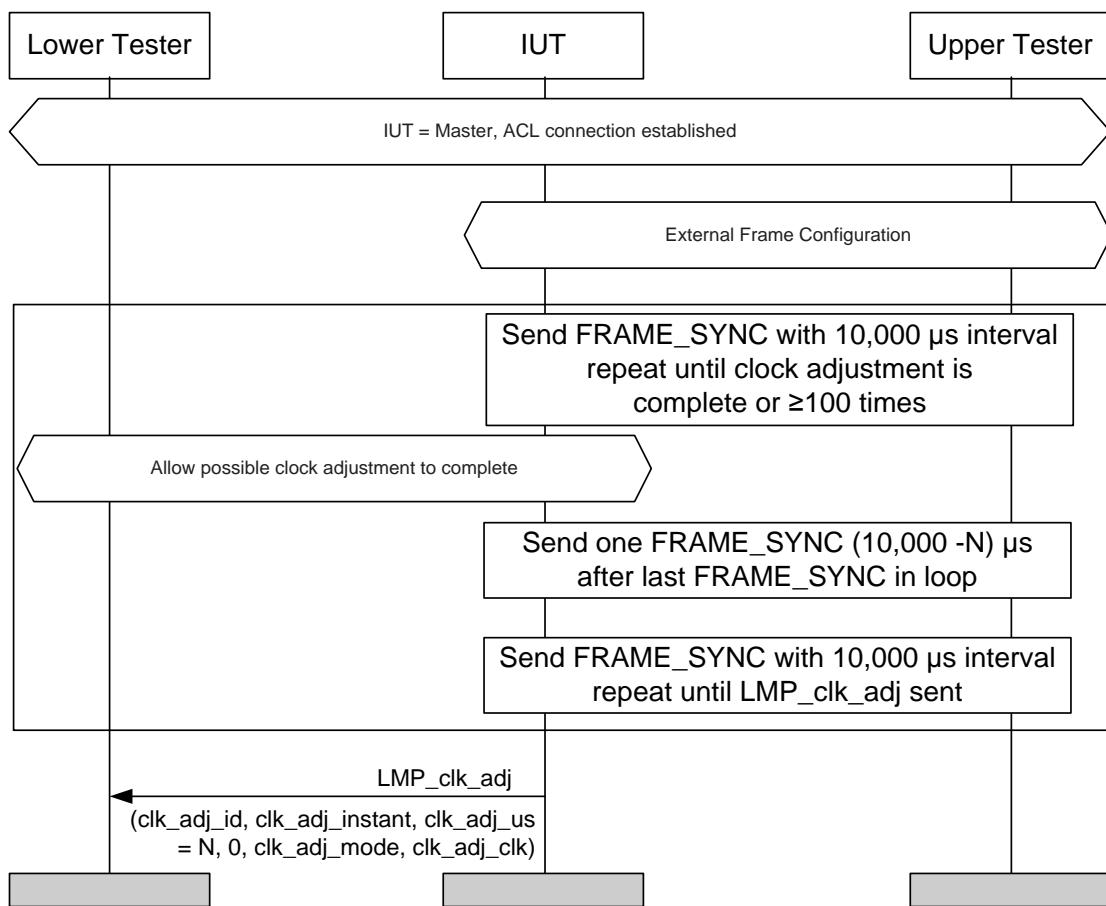


Figure 4.365: –LMP/XCL/BV-01-C

1. Start issuing FRAME_SYNC with exact 10 ms interval.
2. If this initial FRAME_SYNCs leads to a Coarse Clock Adjustment, wait for action to complete.
3. Send one FRAME_SYNC ($10,000 - N$) μs after the previous one, $100 \leq N \leq 300$.
4. Keep sending FRAME_SYNC with 10 ms intervals.
5. Observe transmission of LMP_clk_adj.



- Expected Outcome

Pass verdict

LMP_clk_adj: The value of clk_adj_slot_offset shall be $N \mu s \pm 5\%$

LMP_clk_adj: Shall be transmitted as broadcast at least 6 times

The IUT enabled AFH as part of the connection establishment and kept it enabled throughout the test. Throughout the test, channels 0, 24, and 78 were marked as unused in the AFH_channel_map.

If IUT performed a Coarse Clock Adjustment, $clk_{adj_instant} = CLK_p + X$, where CLK_p is CLK of the first LMP_clk_adj packet, and X is ≥ 12 slots and < 12 hours.

4.11.2 LMP/XCL/BV-02-C [Slave Coarse Clock Adjustment Request]

- Test Purpose

Verify that the IUT as slave will correctly initiate a request Coarse Clock Adjustment. The Lower Tester will accept the request.

This test shall be performed only on a device that declares support for the Coarse Clock Adjustment feature and the MWS Coexistence Logical Signaling Specification.

- Reference

[1] Vol 2, Part C, 4.1.14.2

- Initial Condition

Lower Tester: Configured as Master in state CONNECTION (active mode, ACL link).

The Bluetooth clock of the Lower Tester is chosen to include clock wrap-around ($2^{27}-1$ to 0) during the test procedure.

Upper Tester: Configured to issue MWS FRAME_SYNC

IUT:Configured as Slave in state CONNECTION (active mode, ACL link).



- Test Procedure

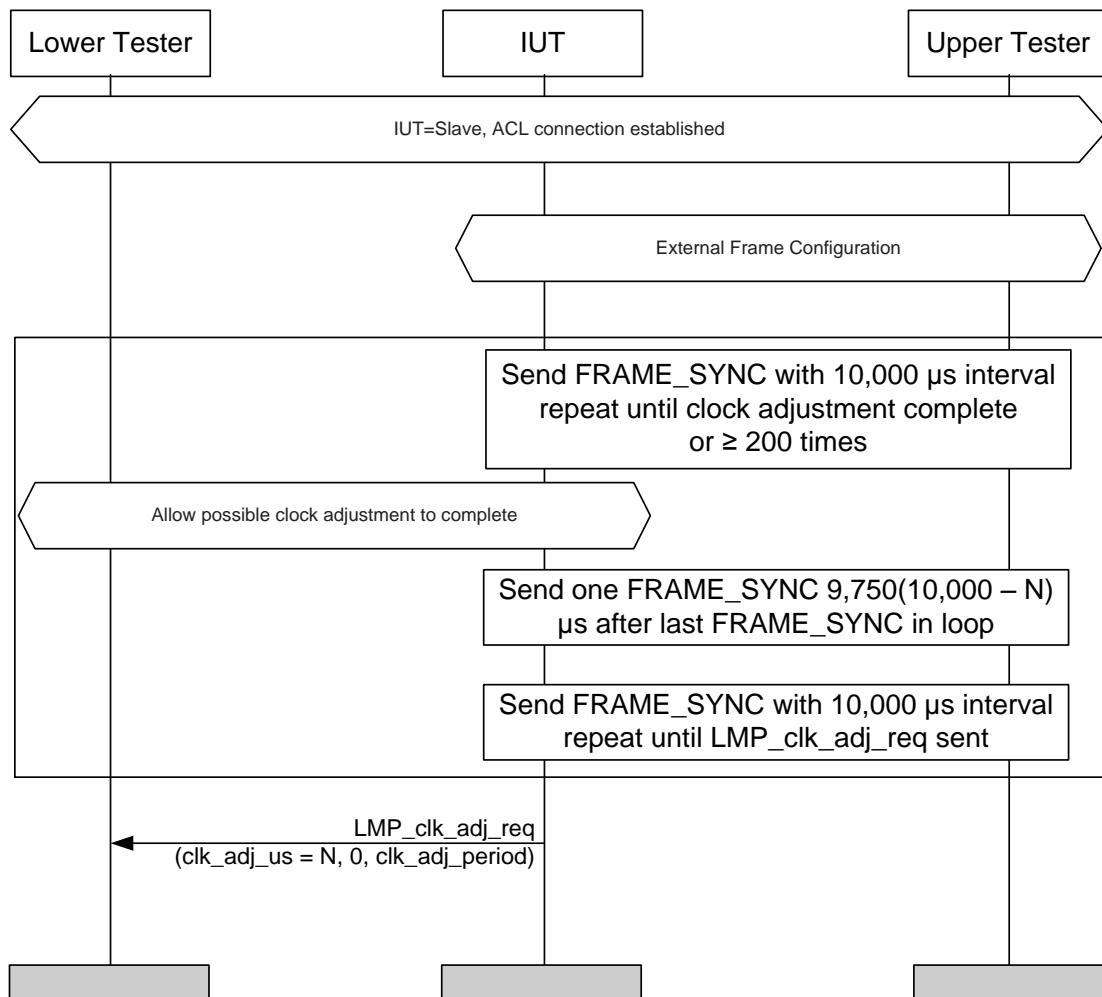


Figure 4.366: LMP/XCL/BV-02-C

1. Start issuing FRAME_SYNC with exact 10 ms interval.
 2. If this initial FRAME_SYNCs leads to a Coarse Clock Adjustment request, wait for clock adjustment to complete.
 3. Send one FRAME_SYNC ($10,000 - N$) μs after the previous one, $100 \leq N \leq 300$.
 4. Keep sending FRAME_SYNC with 10 ms intervals
 5. Observe transmission of LMP_clk_adj_req
- Expected Outcome

Pass verdict

LMP_clk_adj: The value of clk_adj_us shall be $N \mu s \pm 5\%$.

4.11.3 LMP/XCL/BV-03-C [Test that master does not reuse clk_adj_id within LSTO]

- Test Procedure

Verify that the IUT as master will not reuse the same clk_adj_id within the longest LSTO of all connected slaves.



This test shall be performed only on a device that declares support for the Coarse Clock Adjustment feature

- Reference

[1] Vol 2, Part C, 4.1.14.1

- Initial Condition

Lower Tester: Configured as Slave in state CONNECTION (active mode, ACL link).

IUT: Configured as Master in state CONNECTION (active mode, ACL link).

- Test Procedure

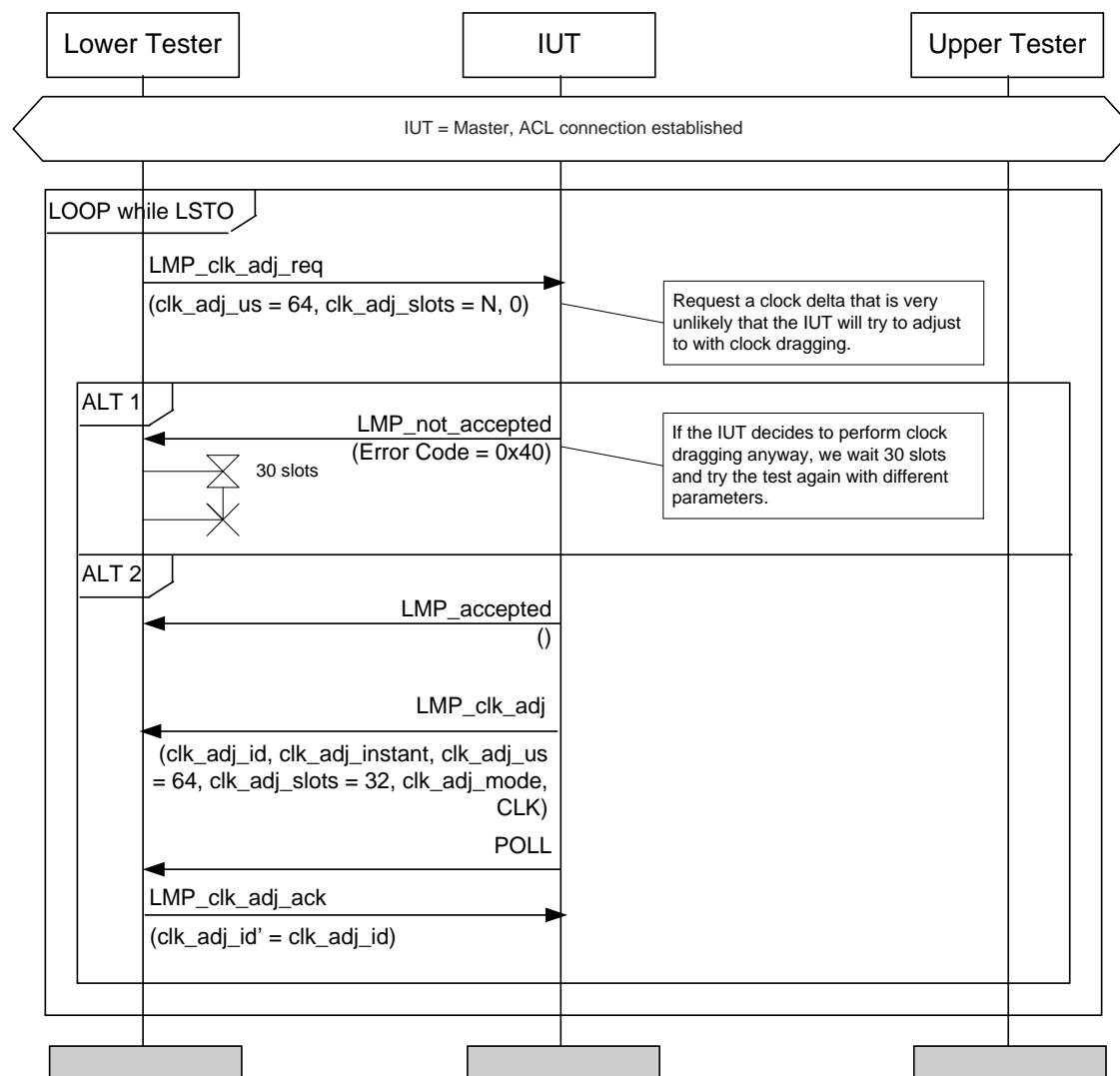


Figure 4.367: LMP/XCL/BV-03-C

1. Set N = 32
2. Configure the Lower Tester to issue LMP_clk_adj_req and handle responses for a period of its LSTO
3. Lower Tester sends LMP_clk_adj_req to IUT.
4. IUT may accept the request or deny it and instead attempt to change CLK by dragging.



- i. If IUT accepts the coarse clock adjustment, it will send LMP_accepted to the Lower Tester.
 - ii. If IUT rejects the coarse clock adjustment but indicates that it will perform clock dragging, the Lower Tester waits 30 slots, increments $N = N + 1$ and starts over from b).
 - iii. If the IUT rejects the request with any other error code before the 256th request, this test will fail.
 - 5. IUT sends LMP_clk_adj.
 - 6. The Lower Tester stores the value of the clk_adj_id parameter. If the received value is the same as any previously received value of clk_adj_id during this test, the test is terminated with a 'fail' verdict.
 - 7. When polled, the Lower Tester responds with LMP_clk_adj_ack with clk_adj_id set to the same value as in LMP_clk_adj.
 - 8. While less time than LSTO has passed since test started, repeat steps 3) to 7).
- Expected Outcome

Pass verdict

IUT does not reuse the same clk_adj_id value during the test.

The IUT enabled AFH as part of the connection establishment and kept it enabled throughout the test. Throughout the test, channels 0, 24, and 78 were marked as unused in the AFH_channel_map.

If IUT performed a Coarse Clock Adjustment, clk_adj_instant = CLK_p + X, where CLK_p is CLK of the first LMP_clk_adj packet, and X is ≥ 12 slots and < 12 hours.

- Notes

In the event that the timing of LSTO and the duration of a complete Coarse Clock Adjustment makes it possible to perform 256 iterations or more it is unavoidable that at least one value will be repeated. In this case, the master may delay the clk_adj_instant of the LMP_clk_adj with the duplicate value to beyond the time of the longest LSTO of the piconet after the previous instant where the same value was used. It may also solve the problem by dragging the last request or by rejecting the last request altogether.

4.12 Slot Availability Mask

4.12.1 LMP/SAM/BV-01-C [Respond to three SAM instances]

- Test Purpose

Verify that the IUT accepts SAM type 0 submap configuration and SAM slot map define sequences for three SAM instances initiated by the Lower Tester, and correctly responds to SAM switch sequence.

- Reference

[10] Section 4.1.15

- Initial Condition

Lower Tester: Configured as Master in state CONNECTION (active mode, ACL link).



IUT: Configured as Slave in state CONNECTION (active mode, ACL link).

SAM disabled on the Lower Tester and the IUT.

- Test Procedure

1. The Lower Tester sends an LMP_SAM_set_type0 PDU to the IUT with the following parameters:

Update Mode = 0,

SAM_Type0Submap = 0x4A, 0x55, 0xA9, 0xAA, 0x00, 0x00

2. The Lower Tester sends the first LMP_SAM_define_map PDU to the IUT with the following parameters:

SAM_Index = 0,

T_{SAM-SM} = 16,

N_{SAM-SM} = 1,

SAM_Submaps = 0x00, 0x00

3. The Lower Tester sends the second LMP_SAM_define_map PDU to the IUT with the following parameters:

SAM_Index = 1,

T_{SAM-SM} = 56,

N_{SAM-SM} = 2,

SAM_Submaps = 0x09, 0x00, 0x00

4. The Lower Tester sends the third LMP_SAM_define_map PDU to the IUT with the following parameters:

SAM_Index = 2,

T_{SAM-SM} = 2,

N_{SAM-SM} = 48,

SAM_Submaps = 0x09, 0x55, 0x55

5. The Lower Tester sends an LMP_SAM_switch PDU to the IUT with SAM_Index = 0, timing control flag is determined by CLK27 of the master.

6. The Lower Tester sends an LMP_SAM_switch PDU to the IUT with SAM_Index = 1, timing control flag is determined by CLK27 of the master.

7. The Lower Tester sends an LMP_SAM_switch PDU to the IUT with SAM_Index = 2, timing control flag is determined by CLK27 of the master.



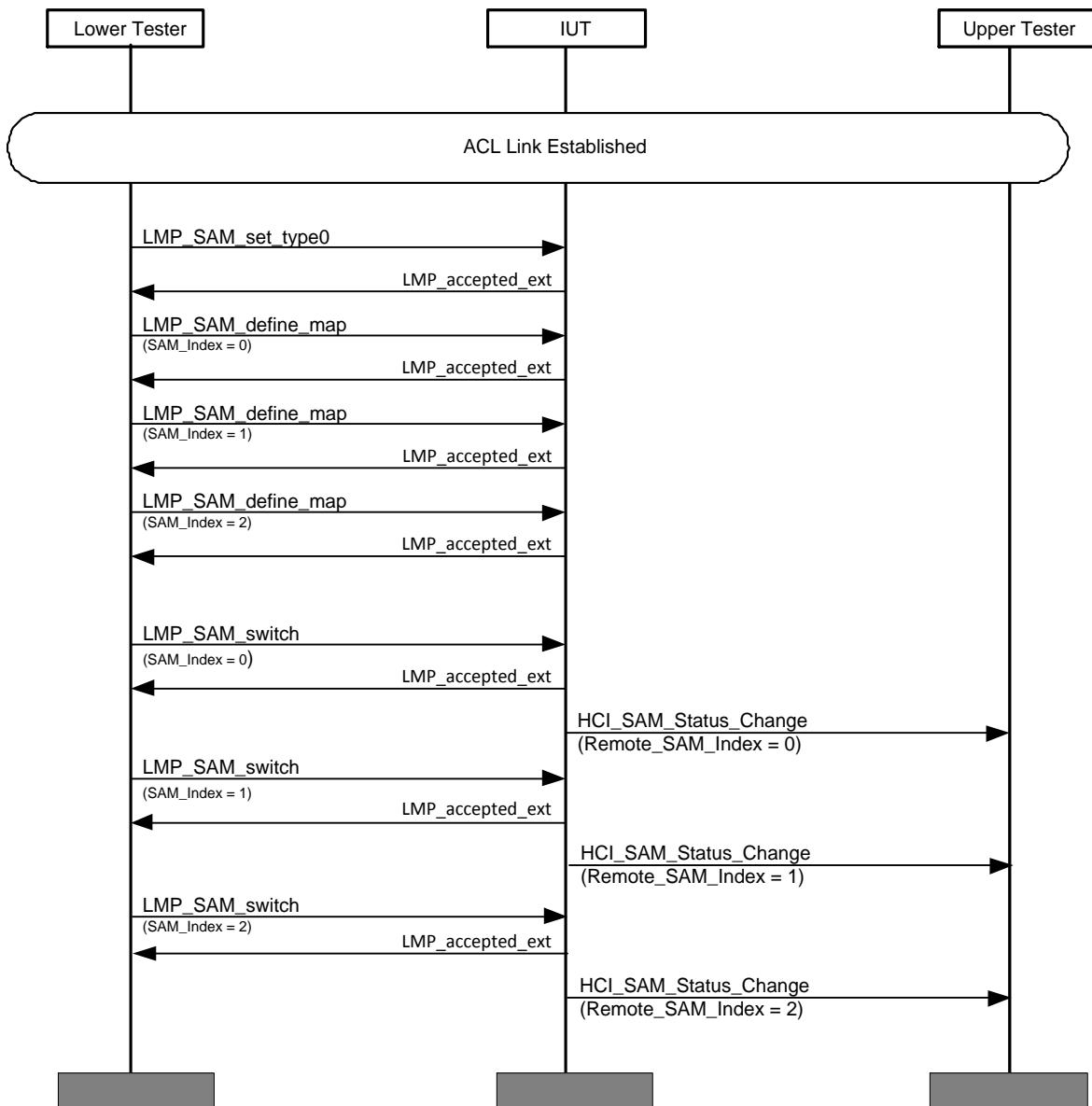


Figure 4.368: LMP/SAM/BV-01-C

- Expected Outcome

Pass verdict

The IUT accepts SAM type 0 submap configuration and SAM slot map define sequences for three SAM instances initiated by the Lower Tester correctly.

The IUT responds to SAM switch sequences initiated by the Lower Tester and generated HCI_SAM_Status_Change events correctly.

The first HCI_SAM_Status_Change event is generated with the following parameters:

- Connection_handle,
- Local_SAM_Index = 0xFF,



- Local_SAM_TX_Availability = 0xFF,
- Local_SAM_RX_Availability = 0xFF,
- Remote_SAM_Index = 0x00,
- Remote_SAM_TX_Availability = 0x5F,
- Remote_SAM_RX_Availability = 0x8F

The second HCI_SAM_Status_Change event is generated with the following parameters:

- Connection_handle,
- Local_SAM_Index = 0xFF,
- Local_SAM_TX_Availability = 0xFF,
- Local_SAM_RX_Availability = 0xFF,
- Remote_SAM_Index = 0x01,
- Remote_SAM_TX_Availability = 0x7F,
- Remote_SAM_RX_Availability = 0x7F

The third HCI_SAM_Status_Change event is generated with the following parameters:

- Connection_handle,
- Local_SAM_Index = 0xFF,
- Local_SAM_TX_Availability = 0xFF,
- Local_SAM_RX_Availability = 0xFF,
- Remote_SAM_Index = 0x02,
- Remote_SAM_TX_Availability = 0xEF,
- Remote_SAM_RX_Availability = 0xF9

4.12.2 LMP/SAM/BV-02-C [Initiate three SAM instances]

- Test Purpose

Verify that the IUT will correctly initiate SAM type 0 submap configuration and SAM slot map define sequences for three SAM instances, can correctly initiate SAM switch sequence.

- Reference

[\[10\]](#) Section 4.1.15

- Initial Condition

Lower Tester: Configured as Master in state CONNECTION (active mode, ACL link).

IUT: Configured as Slave in state CONNECTION (active mode, ACL link).

SAM disabled on the Lower Tester and the IUT.

SAM negotiations are triggered by the IUT with pre-defined parameters.



- Test Procedure

- The IUT sends an LMP_SAM_set_type0 PDU to the Lower Tester to configure a type 0 submap.
- The LMP_SAM_set_type0 and LMP_SAM_define_map PDUs may be triggered by the HCI commands HCI_Set_External_Frame_Configuration and HCI_Set_MWS_PATTERN_Configuration respectively. The LMP_SAM_switch PDUs may be triggered by the facilities specified in Volume 7 of the Core Specification. Alternatively, some or all of these PDUs may be triggered by vendor-specific features.
- The IUT sends three LMP_SAM_define_map PDUs to define three SAM slot maps with SAM_Index = 0, 1, 2.
- The IUT enables three SAM slot maps by sending LMP_SAM_Switch PDUs with SAM_Index = 0, 1, 2. Timing control flag is determined by CLK₂₇ of the master.

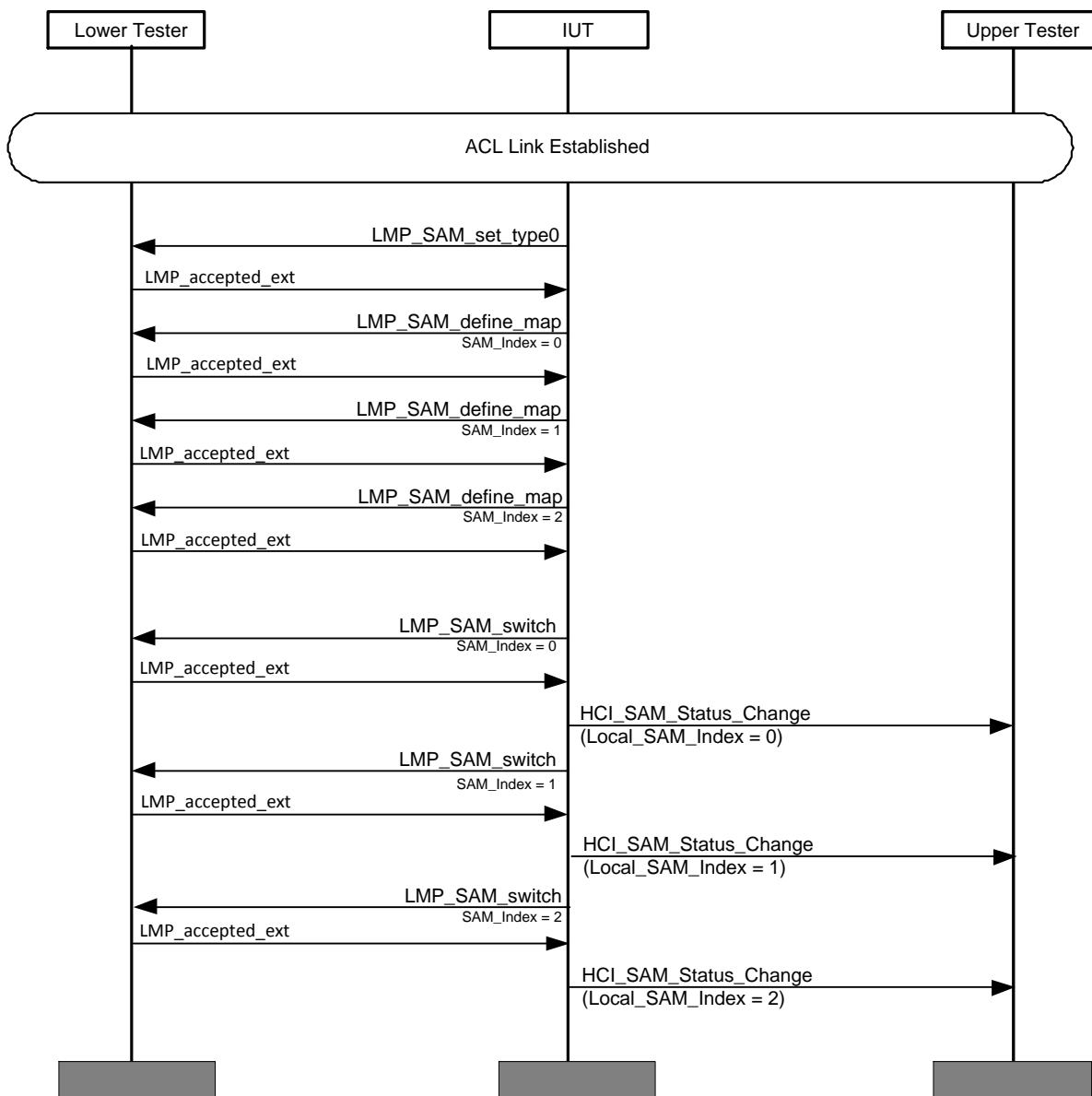


Figure 4.369: LMP/SAM/BV-02-C



- Expected Outcome

Pass verdict

The IUT correctly initiates SAM type 0 submap configuration and SAM slot map define sequences for three SAM instances and correctly initiates SAM switch sequence.

The IUT generates HCI_SAM_Status_Change events correctly.

4.12.3 LMP/SAM/BI-03-C [Respond to invalid SAM type 0 submap configuration sequence]

- Test Purpose

Verify that the IUT does not accept SAM type 0 submap configuration sequence from the Lower Tester when the Update Mode is set to 0 and the SAM slot map in use contains the type 0 submap.

- Reference

[10] Section 4.1.15.1

- Initial Condition

Lower Tester: Configured as Master in state CONNECTION (active mode, ACL link).

IUT: Configured as Slave in state CONNECTION (active mode, ACL link).

SAM is disabled on the Lower Tester and the IUT.

- Test Procedure

1. The Lower Tester sends an LMP_SAM_set_type0 PDU with the following parameters to the IUT to configure a type 0 submap.

Update Mode = 0,

SAM_Type0Submap = 0x4A, 0x55, 0xA9, 0xAA, 0x00, 0x00

2. The Lower Tester sends an LMP_SAM_define_map PDUs with the following parameters to define one SAM slot map containing the type 0 submap.

SAM_Index = 0,

T_{SAM-SM} = 16,

N_{SAM-SM} = 1,

SAM_Submaps = 0x00, 0x00

3. The Lower Tester sends an LMP_SAM_Switch PDU to enable the SAM slot map. Timing control flag is determined by CLK₂₇ of the master.

4. The Lower Tester sends an LMP_SAM_set_type0 PDU with the following parameters to reconfigure the type 0 submap.

Update Mode = 0,

SAM_Type0Submap = 0x4A, 0x55, 0xA9, 0xAA, 0x00, 0x00

5. The Lower Tester sends an LMP_SAM_set_type0 PDU with the following parameters to reconfigure the type 0 submap.



Update Mode = 1,

SAM_Type0Submap = 0xA9, 0xAA, 0x4A, 0x55, 0x00, 0x00

6. The Lower Tester sends an LMP_SAM_set_type0 PDU with the following parameters to reconfigure the type 0 submap.

Update Mode = 2,

SAM_Type0Submap = 0x4A, 0x55, 0xA9, 0xAA, 0x00, 0x00

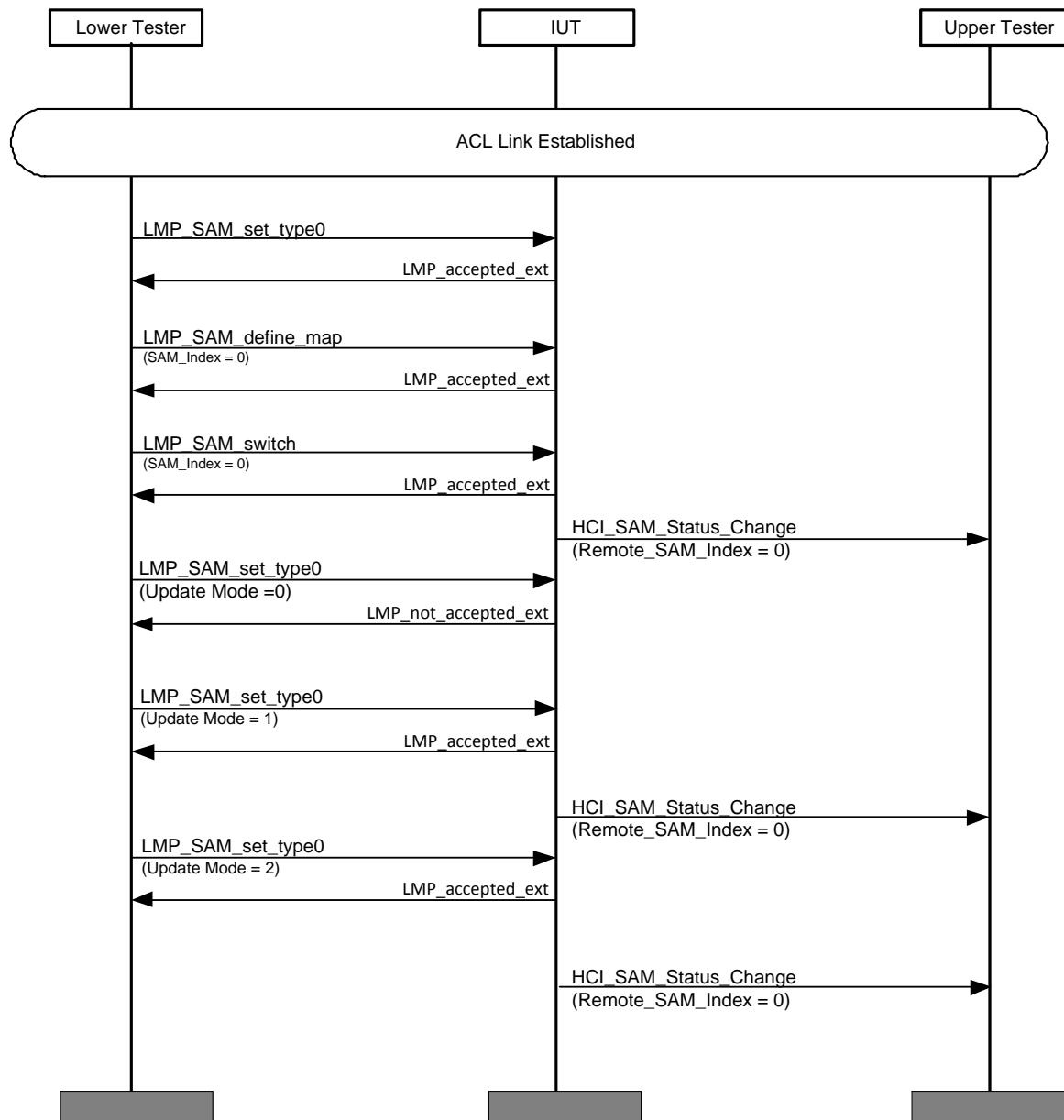


Figure 4.370: LMP/SAM/BI-03-C



- Expected Outcome

Pass verdict

The IUT accepts SAM type 0 submap configuration, SAM slot map define sequence, and responds to SAM switch sequence initiated by the Lower Tester correctly.

The IUT transmits PDU LMP_not_accepted with error code Invalid LMP Parameters (0x1E) upon reception of PDU LMP_SAM_set_type0 with the Update Mode parameter set to 0.

The IUT generates HCI_SAM_Status_Change events correctly.

4.12.4 LMP/SAM/BI-04-C [Respond to invalid SAM type 0 submap]

- Test Purpose

Verify that the IUT does not accept SAM slot map define request from the Lower Tester when SAM type 0 submap is carried by the LMP_SAM_define_map PDU without prior configuration.

- Reference

[10] Section 4.1.15.1

- Initial Condition

Lower Tester: Configured as Master in state CONNECTION (active mode, ACL link).

IUT: Configured as Slave in state CONNECTION (active mode, ACL link).

SAM disabled on the Lower Tester and the IUT.

- Test Procedure

1. The Lower Tester sends an LMP_SAM_define_map PDUs with the following parameters to define one SAM slot map containing a type 0 submap.

SAM_Index = 0,

T_{SAM-SM} = 16,

N_{SAM-SM} = 1,

SAM_Submaps = 0x00, 0x00

2. The Lower Tester sends an LMP_SAM_set_type0 PDU with the following parameters to the IUT to configure a type 0 submap.

Update Mode = 0,

SAM_Type0Submap = 0x4A, 0x55, 0xA9, 0xAA, 0x00, 0x00

3. The Lower Tester sends an LMP_SAM_define_map PDUs with the following parameters to define one SAM slot map containing a type 0 submap.

SAM_Index = 0,

T_{SAM-SM} = 16,

N_{SAM-SM} = 1,



SAM_Submaps = 0x00, 0x00

4. The Lower Tester sends an LMP_SAM_Switch PDU to enable the SAM slot map with SAM_Index = 0. Timing control flag is determined by CLK₂₇ of the master.
5. The Lower Tester sends an LMP_SAM_define_map PDUs with the following parameters to define one SAM slot map without a type 0 submap.

SAM_Index = 1,

T_{SAM-SM} = 56,

N_{SAM-SM} = 2,

SAM_Submaps = 0x09, 0x00, 0x00

6. The Lower Tester sends an LMP_SAM_Switch PDU to enable the SAM slot map with SAM_Index = 1. Timing control flag is determined by CLK₂₇ of the master.
7. The Lower Tester sends an LMP_SAM_set_type0 PDU with the following parameters to the IUT to configure a new type 0 submap.

Update Mode = 0,

SAM_Type0Submap = 0x4A, 0x55, 0xA9, 0xAA, 0x00, 0x00

8. The Lower Tester sends an LMP_SAM_Switch PDU to enable the SAM slot map with SAM_Index = 0. Timing control flag is determined by CLK₂₇ of the master.
9. The Lower Tester sends an LMP_SAM_Switch PDU with a valid SAM_Index = 0xFF to disable SAM.



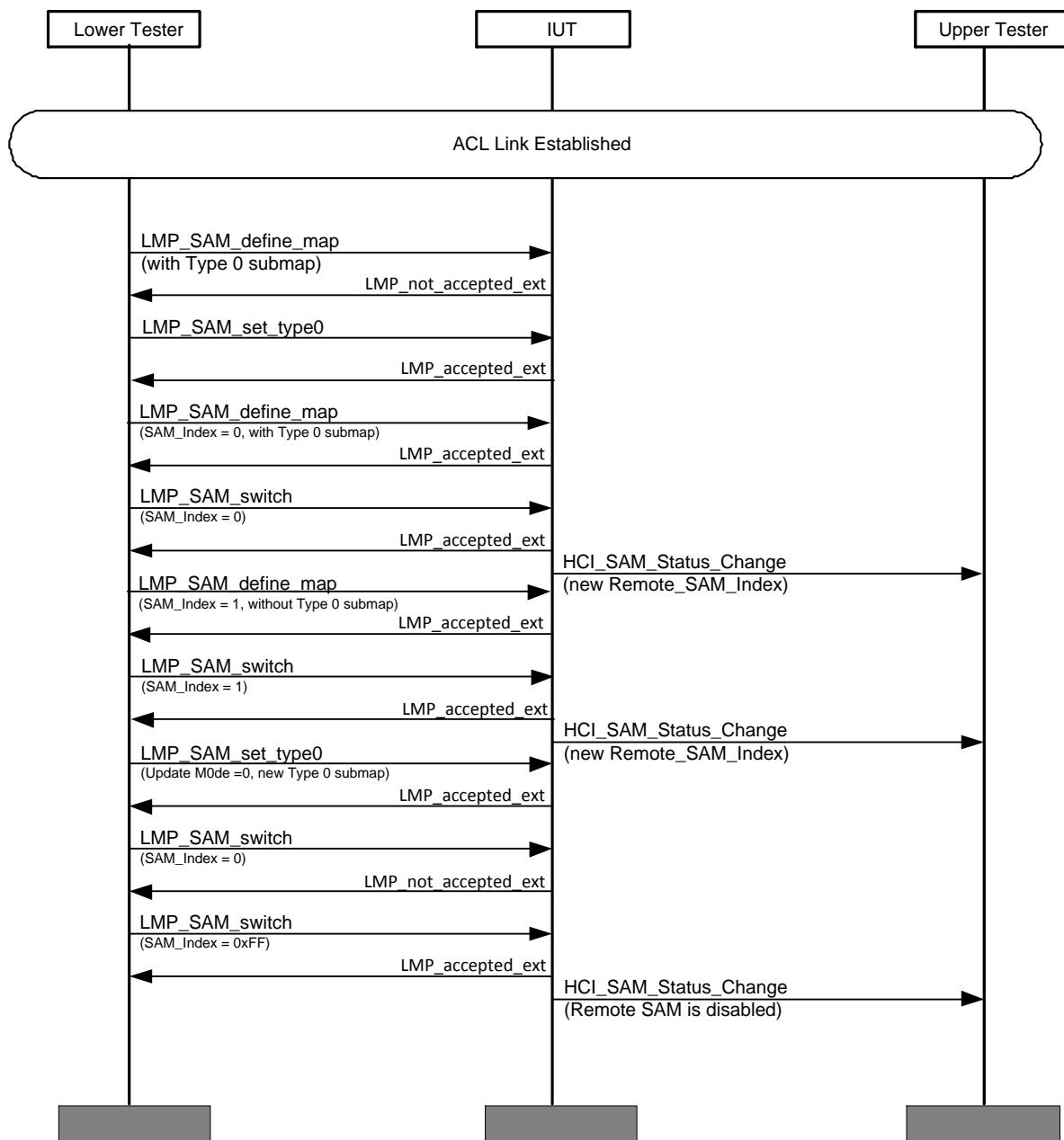


Figure 4.371: LMP/SAM/BI-04-C

- Expected Outcome

Pass verdict

The IUT transmits PDU LMP_not_accepted with error code *Type 0 Submap Not Defined* (0x41) upon reception of PDU LMP_SAM_define_map containing an undefined SAM type 0 submap.

The IUT accepts slot map define sequence and responds to SAM switch sequence initiated by the Lower Tester correctly.

The IUT transmits PDU LMP_not_accepted with error code *Invalid LMP Parameters* (0x1E) upon reception of PDU LMP_SAM_switch with SAM_Index = 1 after type 0 submap is reconfigured with Update Mode = 0.



The IUT continues on the current SAM slot map after a failed LMP_SAM_switch. No HCI_SAM_Status_Change event is generated.

The IUT generates HCI_SAM_Status_Change events correctly.

4.12.5 LMP/SAM/BI-05-C [Respond to invalid SAM index]

- Test Purpose

Verify that the IUT does not accept SAM switch request from the Lower Tester when the SAM index carried by the LMP_SAM_define_map PDU is not defined.

- Reference

[10] Section 4.1.15

- Initial Condition

Lower Tester: Configured as Master in state CONNECTION (active mode, ACL link).

IUT: Configured as Slave in state CONNECTION (active mode, ACL link).

SAM is disabled on the Lower Tester and the IUT.

- Test Procedure

1. The Lower Tester sends an LMP_SAM_define_map PDUs with the following parameters:

SAM_Index = 0,

T_{SAM-SM} = 56,

N_{SAM-SM} = 2,

SAM_Submaps = 0x09, 0x00, 0x00

2. The Lower Tester sends the second LMP_SAM_define_map PDU to the IUT with the following parameters:

SAM_Index = 1,

T_{SAM-SM} = 56,

N_{SAM-SM} = 2,

SAM_Submaps = 0x06, 0x00, 0x00

3. The Lower Tester sends an LMP_SAM_Switch PDU with a SAM_Index = 0 to enable the SAM slot map. Timing control flag is determined by CLK₂₇ of the master.

4. The Lower Tester sends an LMP_SAM_define_map PDUs with the following parameters to delete the SAM slot map with SAM_Index = 0.

SAM_Index = 0,

T_{SAM-SM} = 56,

N_{SAM-SM} = 0,

SAM_Submaps = SAM_Submaps can have any value.

The Lower Tester sends an LMP_SAM_Switch PDU with SAM_Index = 1 to enable the SAM slot map.



5. The Lower Tester sends an LMP_SAM_define_map PDUs with the following parameters again to delete the SAM slot map with SAM_Index = 0.

SAM_Index = 0,

T_{SAM-SM} = 56,

N_{SAM-SM} = 0,

SAM_Submaps = SAM_Submaps can have any value.

6. The Lower Tester sends an LMP_SAM_Switch PDU with an invalid SAM_Index = 0 to enable the SAM slot map.

7. The Lower Tester sends an LMP_SAM_Switch PDU with SAM_Index = 0xFF to disable SAM.



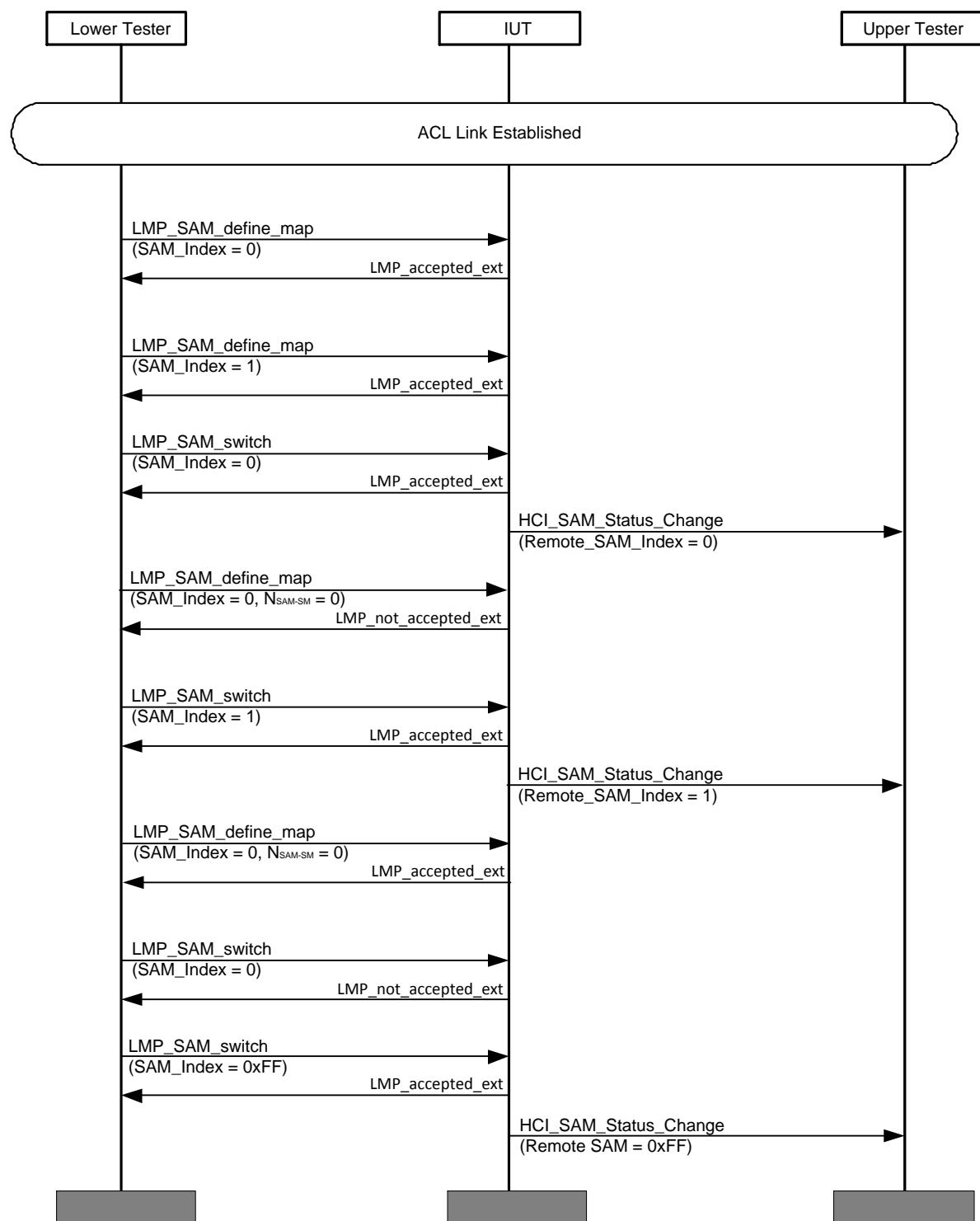


Figure 4.372: LMP/SAM/BI-05-C

- Expected Outcome

Pass verdict

The IUT accepts slot map define sequence and responds to SAM switch sequence initiated by the Lower Tester correctly.



The IUT transmits PDU LMP_not_accepted with error code *Invalid LMP Parameters (0x1E)* upon reception of PDU LMP_SAM_define_map with $N_{SAM-SM} = 0$ containing a currently selected SAM_Index.

The IUT transmits PDU LMP_not_accepted with error code *Invalid LMP Parameters (0x1E)* upon reception of PDU LMP_SAM_switch containing an invalid SAM_Index.

The IUT continues on the current SAM slot map after a failed LMP_SAM_switch. No HCI_SAM_Status_Change event is generated.

The IUT generates HCI_SAM_Status_Change events correctly.

4.12.6 LMP/SAM/BV-06-C [SAM is disabled after a successful role switch]

- Test Purpose

Verify that SAM is disabled by the IUT after a successful role switch.

- Reference

[10] Section 4.1.15.5

- Initial Condition

Lower Tester: Configured as Master in state CONNECTION (active mode, ACL link).

IUT: Configured as Slave in state CONNECTION (active mode, ACL link).

SAM is disabled on the Lower Tester and the IUT.

- Test Procedure

1. The Lower Tester sends an LMP_SAM_define_map PDU with the following parameters to define one SAM slot map.

$SAM_Index = 0$,

$T_{SAM-SM} = 56$,

$N_{SAM-SM} = 2$,

$SAM_Submaps = 0x09, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00$

2. The Lower Tester sends an LMP_SAM_Switch PDU to enable the SAM slot map. Timing control flag is determined by CLK_{27} of the master.

3. Role switch is initiated by the Upper Tester.



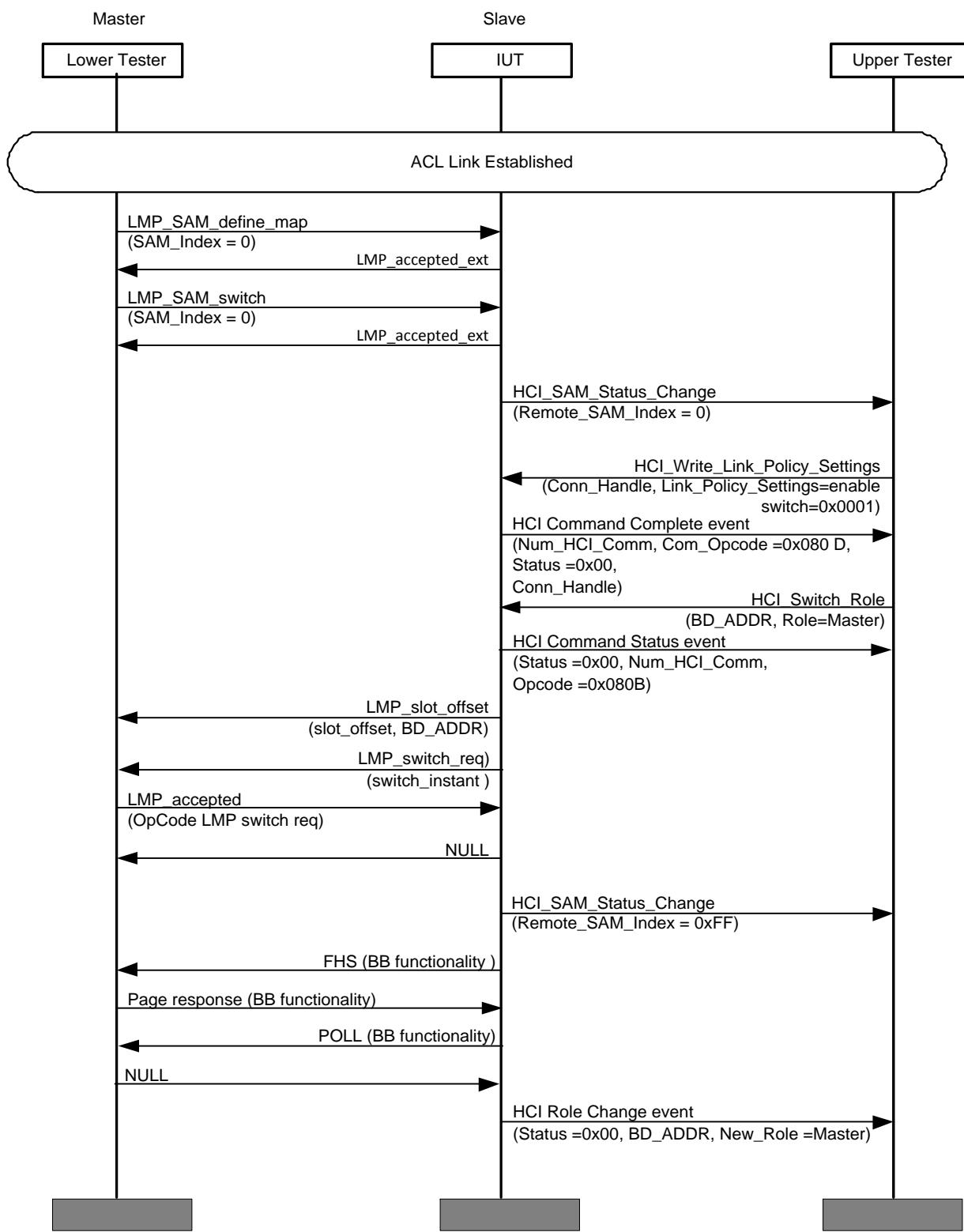


Figure 4.373: LMP/SAM/BI-06-C



- Expected Outcome

Pass verdict

The IUT accepts slot map define sequence and responds to the SAM switch sequence initiated by the Lower Tester correctly.

The IUT generates HCI_SAM_Status_Change events correctly and SAM is disabled by the IUT when the role switch succeeds.

4.12.7 LMP/SAM/BV-07-C [SAM is resumed after a failed role switch]

- Test Purpose

Verify that SAM is resumed by the IUT after a failed role switch.

- Reference

[10] Section 4.1.15.5

- Initial Condition

Lower Tester: Configured as Master in state CONNECTION (active mode, ACL link).

IUT: Configured as Slave in state CONNECTION (active mode, ACL link).

SAM disabled on the Lower Tester and the IUT.

- Test Procedure

1. The Lower Tester sends an LMP_SAM_define_map PDU with the following parameters to define one SAM slot map.

SAM_Index = 0,

T_{SAM-SM} = 56,

N_{SAM-SM} = 2,

SAM_Submaps = 0x09, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00

2. The Lower Tester sends an LMP_SAM_Switch PDU to enable the SAM slot map. Timing control flag is determined by CLK₂₇ of the master.

3. Role switch is initiated by the Upper Tester.



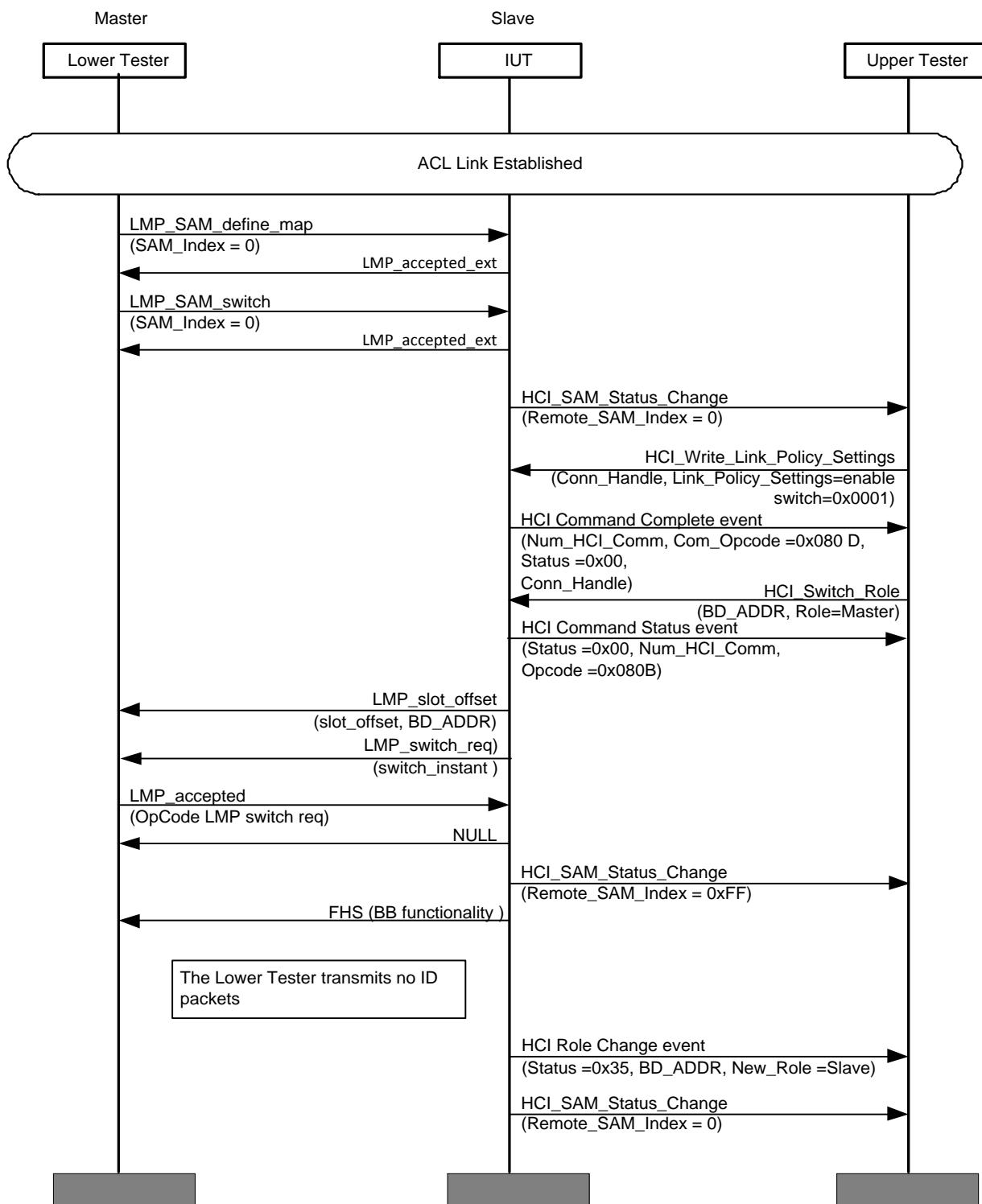


Figure 4.374: LMP/SAM/BV-07-C



- Expected Outcome

Pass verdict

The IUT accepts slot map define sequence and responds to SAM switch sequence initiated by the Lower Tester correctly.

SAM is resumed when the role switch fails.

4.12.8 LMP/SAM/BV-08-C [SAM and sniff mode]

- Test Purpose

Verify that the sniff mode shall take precedence over SAM and SAM shall be reinstated on exit from the sniff mode.

- Reference

[10] Section 4.1.15.6

- Initial Condition

Lower Tester: Configured as Master in state CONNECTION (active mode, ACL link).

IUT: Configured as Slave in state CONNECTION (active mode, ACL link).

SAM disabled on the Lower Tester and the IUT.

- Test Procedure

1. The Lower Tester sends the first LMP_SAM_define_map PDU to the IUT with the following parameters:

SAM_Index = 0,

T_{SAM-SM} = 20,

N_{SAM-SM} = 2,

SAM_Submaps = 0x09, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00

2. The Lower Tester sends the first LMP_SAM_switch PDU to the IUT with SAM_Index = 0, timing control flag is determined by CLK₂₇ of the master.

3. The Lower Tester initiates sniff mode.



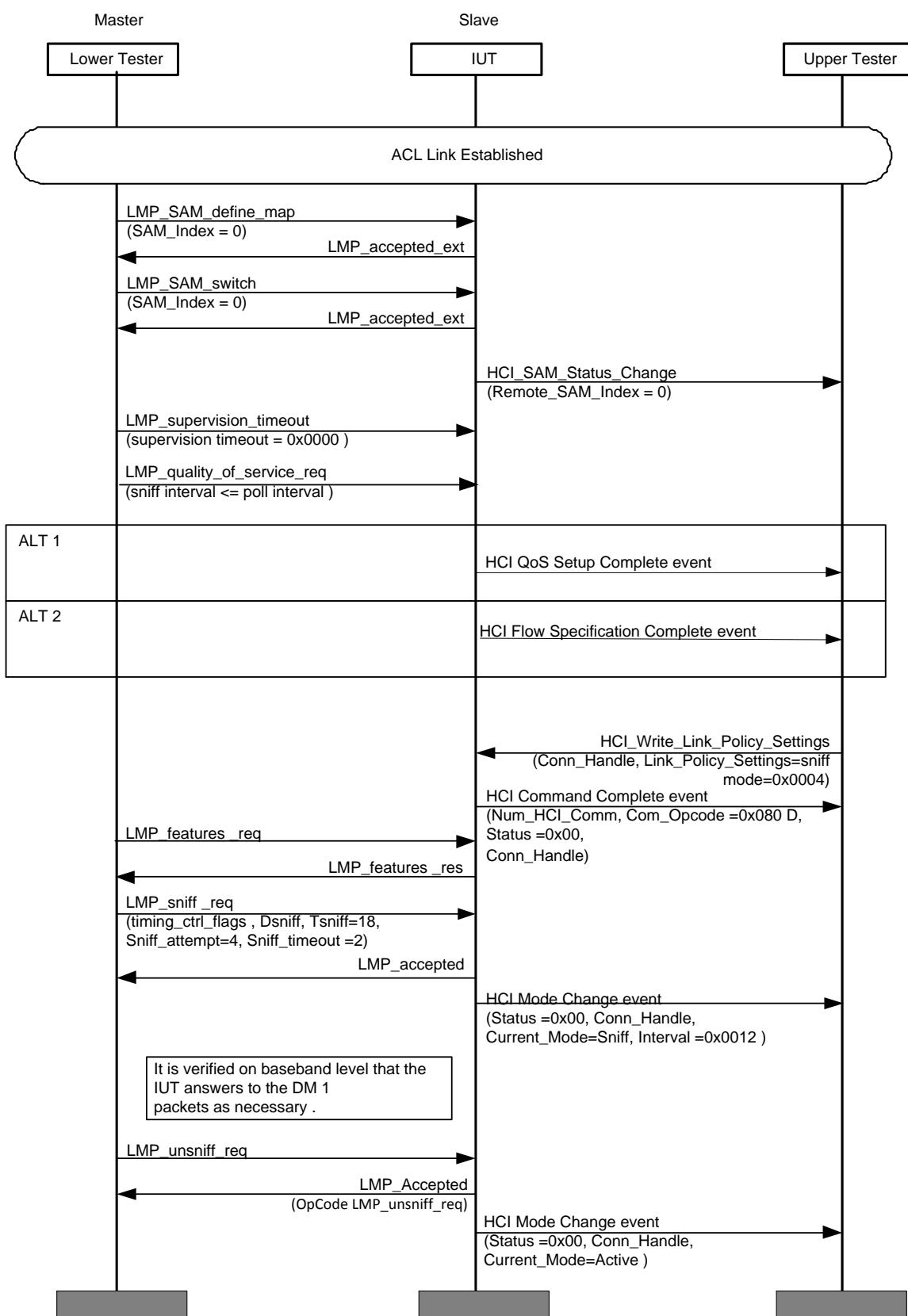


Figure 4.375: LMP/SAM/BV-08-C, MSC



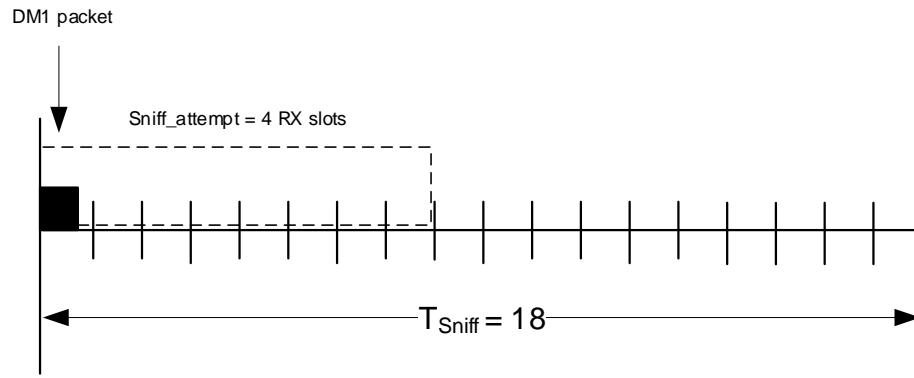


Figure 4.376: LMP/SAM/BV-08-C, Polling

4. The Lower Tester must start polling the IUT according to [Figure 4.376: LMP/SAM/BV-08-C, Polling](#). DM1 packets transmitted by the Lower Tester contain data. Verify that the DM1 packet is always acknowledged. This is checked on baseband level.
 5. Monitor the result for a period of $20 \times T_{\text{sniff}}$ slots.
 6. The Lower Tester then requests to exit sniff mode.
- Expected Outcome

Pass verdict

The IUT responds to SAM switch sequences initiated by the Lower Tester and generated HCI_SAM_Status_Change events correctly.

The IUT must enter sniff mode and acknowledge DM1 packets.

No HCI_SAM_Status_Change event is generated after the IUT enters or exits sniff mode.

4.12.9 LMP/SAM/BV-09-C [Respond to request for SAM Anchor Point using Initialization Procedure 2]

- Test Purpose

Verify that the IUT correctly responds to SAM Anchor Point with SAM switch sequence to DSAM initialization procedure 2.

- Reference

[\[10\] Section 4.1.15](#)

- Initial Condition

Lower Tester: Configured as Master in state CONNECTION (active mode, ACL link).

IUT: Configured as Slave in state CONNECTION (active mode, ACL link).

SAM disabled on the Lower Tester and the IUT.



- Test Procedure

- The Lower Tester sends an LMP_SAM_set_type0 PDU to the IUT with the following parameters:
Update Mode = 0,
SAM_Type0Submap = 0x4A, 0x55, 0xA9, 0xAA, 0x00, 0x00
- The Lower Tester sends the first LMP_SAM_define_map PDU to the IUT with the following parameters:
SAM_Index = 0,
TSAM-SM = 16,
NSAM-SM = 1,
SAM_Submaps = 0x00, 0x00
- The Lower Tester sends an LMP_SAM_switch PDU to the IUT with SAM_Index = 0 at the precise time such that the MLB of the current master clock (CLK27) is 1; timing control flags = initialization procedure 2.
- The IUT sends an LMP_accepted_ext PDU to accept initialization 2 procedure.

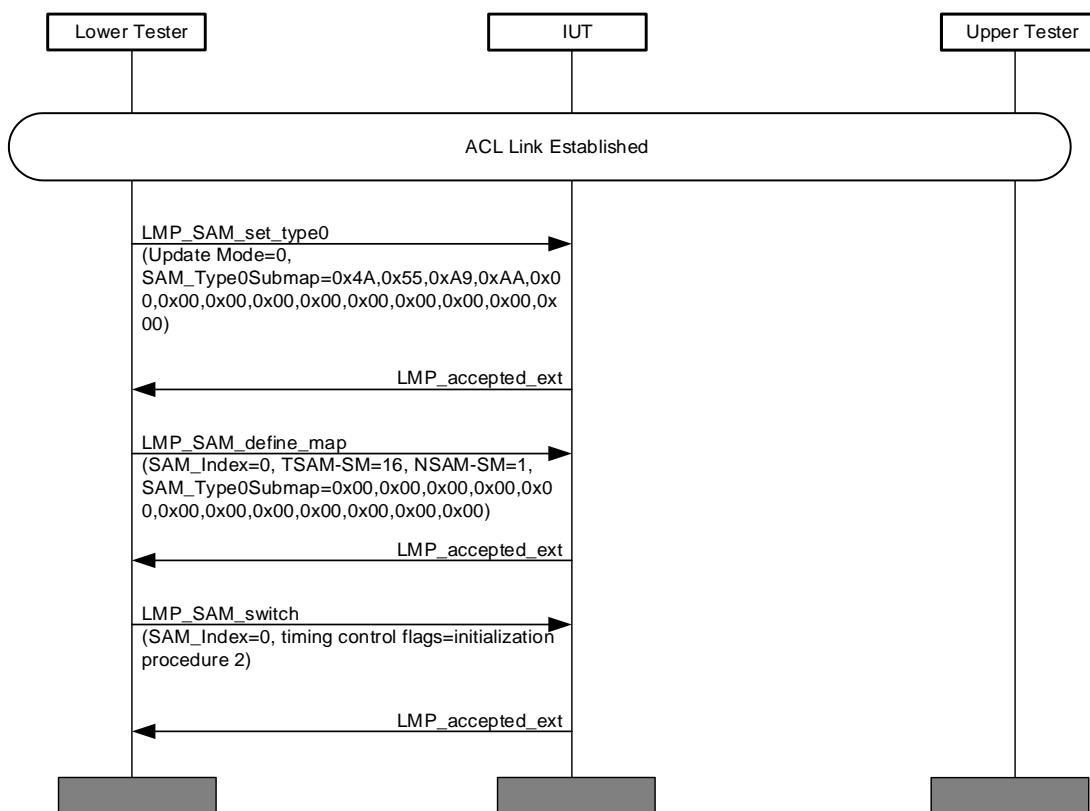


Figure 4.377: LMP/SAM/BV-09-C

- Expected Outcome

Pass verdict

The IUT accepts the SAM Switch to initialization procedure 2.



The IUT generates an HCI_SAM_Status_Change event correctly.

4.12.10 LMP/SAM/BV-10-C [Initiate SAM Anchor Point using Initialization Procedure 2]

- **Test Purpose**

Verify that the IUT will correctly initiate SAM Anchor Point with SAM switch sequence to DSAM using initialization procedure 2.

- **Reference**

[10] Section 4.1.15

- **Initial Condition**

Lower Tester: Configured as Master in state CONNECTION (active mode, ACL link).

IUT: Configured as Slave in state CONNECTION (active mode, ACL link).

SAM disabled on the Lower Tester and the IUT.SAM negotiations are triggered by the IUT with pre-defined parameters.

- **Test Procedure**

1. The IUT sends an LMP_SAM_set_type0 PDU to the Lower Tester to configure a type 0 submap.
2. The LMP_SAM_set_type0 and LMP_SAM_define_map PDUs may be triggered by the HCI commands HCI_Set_External_Frame_Configuration and HCI_Set_MWS_PATTERN_Configuration respectively. The LMP_SAM_switch PDUs may be triggered by the facilities specified in Volume 7 of the Core Specification. Alternatively, some or all of these PDUs may be triggered by vendor-specific features.
3. The IUT sends one LMP_SAM_define_map PDUs to define three SAM slot maps with SAM_Index = 0.
4. The IUT enables one SAM slot maps by sending LMP_SAM_Switch PDUs with SAM_Index = 0.
5. The IUT sends an LMP_SAM_switch PDU to the IUT with SAM_Index = 0 at the precise time such that the MLB of the current master clock (CLK27) is 1; timing control flags = initialization procedure 2.
6. The LT sends an LMP_accepted_ext PDU to accept initialization 2 procedure.



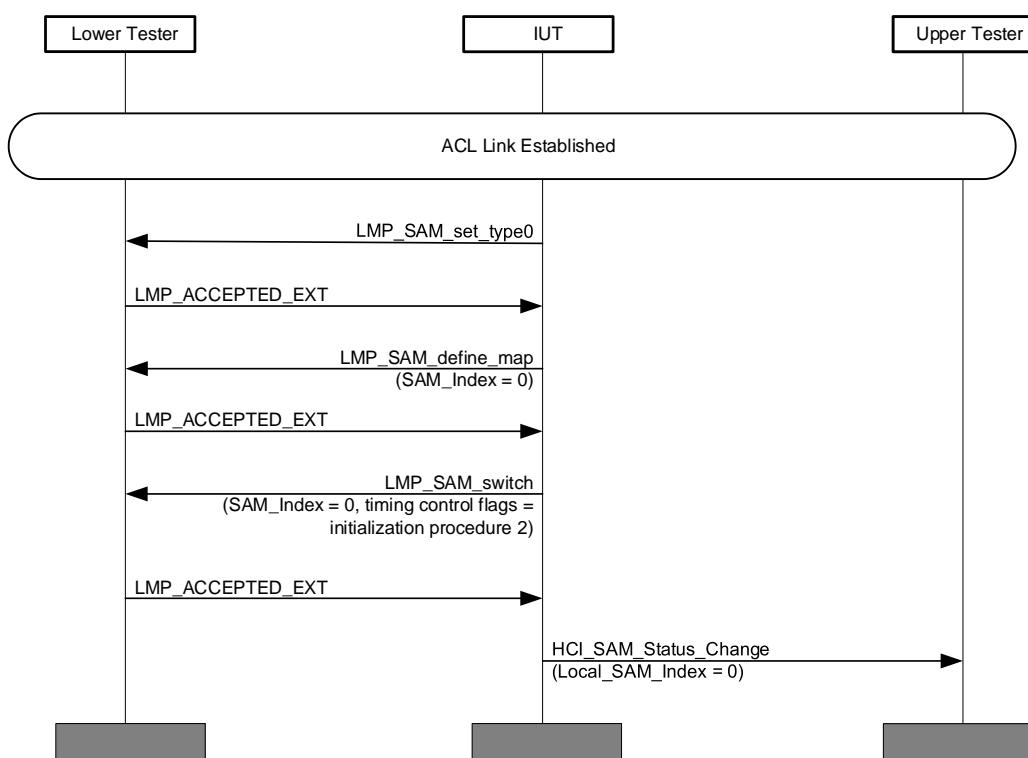


Figure 4.378: LMP/SAM/BV-10-C

- Expected Outcome

Pass verdict

The LT accepts the SAM Switch to initialization procedure 2.

The IUT generates an HCI_SAM_Status_Change event correctly.

5 Test Case Mapping

The Test Case Mapping Table (TCMT) maps test cases to specific capabilities in the ICS. Profiles, protocols and services may define multiple roles, and it is possible that a product may implement more than one role. The product shall be tested in all roles for which support is declared in the ICS document. For products which support more than one role, a separate TCMT shall be filled out for each role, and separate tests shall be conducted for each role.

The columns for the TCMT are defined as follows:

Item: contains a y/x reference, where y corresponds to the table number and x corresponds to the feature number as defined in the LMP ICS Proforma [3]. If the item is defined with Protocol, Profile or Service abbreviation before y/x, the table and feature number referenced are defined in the abbreviated ICS proforma document.

Feature: recommended to be the primary feature defined in the ICS being tested or may be the test case name.

Test Case(s): the applicable test case identifiers required for Bluetooth Qualification if the corresponding y/x references defined in the Item column are supported.

For purpose and structure of the ICS/IXIT proforma and instructions for completing the ICS/IXIT proforma refer to the Bluetooth ICS and IXIT proforma document.

Item	Feature	Test Case(s)
<i>Deadlock Avoidance</i>		
LMP 1/1	Accept Message	LMP/LIH/BV-80-C LMP/LIH/BV-81-C
<i>Authentication</i>		
LMP 3/3	Respond to authentication request	LMP/AUT/BV-01-C
LMP 4/3 AND NOT (SUM 21/9 OR SUM 21/13 OR SUM 21/14 OR SUM 21/16)	Error Return When a Unit Key is Requested	LMP/AUT/BI-01-C
<i>Pairing</i>		
LMP 4/1 OR LMP 4/2	Initiate Pairing	LMP/AUT/BV-04-C
LMP 4/3 AND LMP 4/5 AND LMP 5/2	Respond to Pairing Request (variable PIN code)	LMP/AUT/BV-03-C



Item	Feature	Test Case(s)
LMP 4/3 AND LMP 4/4 AND LMP 5/2	Respond to Pairing Request (Fixed PIN code)	LMP/AUT/BV-05-C
(LMP 4/1 OR LMP 4/2) AND LMP 4/5 AND LMP 4/6 AND LMP 5/2	Accept Switch (initiator becomes responder)	LMP/AUT/BV-06-C
<i>Link Keys</i>		
LMP 5/3 AND LMP 5/2	Initiate Change of Link Key	LMP/AUT/BV-13-C
LMP 5/4 AND LMP 5/2	Accept Change of Link Key	LMP/AUT/BV-12-C
<i>Encryption</i>		
LMP 6/1 AND LMP 6/6	Initiate Encryption	LMP/ENC/BV-05-C LMP/ENC/BV-06-C LMP/ENC/BV-09-C
LMP 6/2	Accept Encryption Requests	LMP/ENC/BV-01-C
NOT LMP 6/2	Accept Encryption Requests	LMP/ENC/BV-03-C
LMP 6/8	Stop Encryption	LMP/ENC/BV-07-C
LMP 6/9	Accept Stop of Encryption	LMP/ENC/BV-04-C LMP/ENC/BV-08-C
LMP 2/14 AND LMP 6/6	Initiate Broadcast Encryption	LMP/ENC/BV-10-C LMP/ENC/BV-13-C
LMP 2/14	Accept Broadcast Encryption	LMP/ENC/BV-02-C LMP/ENC/BV-11-C
NOT LMP 2/14	Accept Broadcast Encryption	LMP/ENC/BV-12-C
LMP 6/10	Encryption Pause/Resume	LMP/ENC/BV-14-C LMP/ENC/BV-15-C LMP/ENC/BV-16-C LMP/ENC/BV-17-C LMP/ENC/BV-18-C LMP/ENC/BV-19-C LMP/ENC/BV-20-C LMP/ENC/BV-21-C



Item	Feature	Test Case(s)
		LMP/ENC/BV-23-C LMP/ENC/BV-24-C
LMP 6/1	Initiate Encryption as Slave	LMP/ENC/BV-22-C
<i>Clock Offset Information</i>		
LMP 7/1	Request Clock Offset Information	LMP/INF/BV-02-C
LMP 7/2	Respond to Clock Offset Requests	LMP/INF/BV-01-C
<i>Timing Accuracy Information</i>		
LMP 9/2	Respond to Timing Accuracy Information Requests	LMP/INF/BV-05-C
<i>LM Version Information</i>		
LMP 10/1	Request LM version information	LMP/INF/BV-09-C
LMP 10/2	Respond to LM Version Information Requests	LMP/INF/BV-08-C
<i>Feature Support</i>		
LMP 11/1	Request Supported Features	LMP/INF/BV-11-C
LMP 11/1 AND LMP 18/3 AND RF 1/1	Request Supported Features	LMP/INF/BV-14-C
LMP 11/2	Respond to Supported Features Requests	LMP/INF/BV-10-C
LMP 11/3	Request Extended Features	LMP/INF/BV-16-C
LMP 11/4	Respond to Extended Features Requests	LMP/INF/BV-17-C
LMP 2/22 AND LMP 2/23	Request Extended Features	LMP/INF/BV-22-C
<i>Name Information</i>		
LMP 12/1	Request Name Information	LMP/INF/BV-13-C
LMP 12/2	Respond to Name Requests	LMP/INF/BV-12-C
LMP 12/1 AND LMP 2/19	Remote Name Request/Response	LMP/INF/BV-18-C LMP/INF/BV-19-C LMP/INF/BV-20-C LMP/INF/BV-21-C



Item	Feature	Test Case(s)
<i>Role Switch</i>		
LMP 8/1 AND LMP 13/1	Request Master Slave Switch	LMP/LIH/BV-01-C LMP/LIH/BV-79-C
LMP 13/2	Accept Master Slave Switch Requests	LMP/LIH/BV-02-C LMP/LIH/BV-78-C
NOT LMP 13/2	Accept Master Slave Switch Requests	LMP/LIH/BV-03-C
<i>Detach</i>		
LMP 14/1	Detach Connection	LMP/LIH/BV-04-C LMP/LIH/BV-05-C LMP/LIH/BV-82-C
<i>Hold Mode</i>		
LMP 15/1 OR LMP 15/2 OR LMP 15/3	Force or Request Hold Mode, Slave	LMP/LIH/BV-09-C
LMP 15/1 OR LMP 15/2	Force or Request Hold Mode, Master	LMP/LIH/BV-10-C
LMP 15/1 OR LMP 15/3 OR LMP 15/4	Accept Hold Mode Request, Master	LMP/LIH/BV-11-C
LMP 15/3 OR LMP 15/4	Verify Hold Mode	LMP/LIH/BV-06-C
NOT LMP 2/7	Respond to Hold Mode Requests	LMP/LIH/BV-12-C
<i>Sniff Mode</i>		
LMP 16/2	Request Sniff Mode	LMP/LIH/BV-15-C LMP/LIH/BV-17-C
LMP 16/2	Request Sniff Mode and Name	LMP/LIH/BV-18-C
LMP 16/3	Respond to Sniff Mode Requests	LMP/LIH/BV-14-C
NOT LMP 16/3	Respond to Sniff Mode Requests	LMP/LIH/BV-20-C
LMP 16/5	Request Un-sniff	LMP/LIH/BV-19-C
LMP 16/6	Accept Un-sniff Requests	LMP/LIH/BV-16-C



Item	Feature	Test Case(s)
<i>Park Mode</i>		
LMP 17/2	Request Park Mode	LMP/LIH/BV-23-C LMP/LIH/BV-27-C
LMP 17/3	Respond to Park Mode Requests	LMP/LIH/BV-22-C LMP/LIH/BV-29-C
LMP 2/9 AND NOT LMP 17/3	Respond to Park Mode Requests	LMP/LIH/BV-34-C
LMP 17/6 AND LMP 17/12	Accept changes to the Broadcast Scan Window	LMP/LIH/BV-24-C
LMP 17/8 AND LMP 17/12	Accept Modification of Beacon Parameters	LMP/LIH/BV-25-C
LMP 17/9 OR LMP 17/10	Request Unpark	LMP/LIH/BV-32-C
LMP 17/11	Slave Activated Unparking	LMP/LIH/BV-75-C
LMP 17/13	Accept Unpark using BD_ADDR	LMP/LIH/BV-26-C
<i>Power Control</i>		
LMP 18/1	Request to Increase Power	LMP/LIH/BV-77-C
LMP 18/2	Request to Decrease Power	LMP/LIH/BV-76-C
LMP 18/3	Respond when Max. Power Reached	LMP/LIH/BV-36-C
LMP 18/4	Respond when Min. Power Reached	LMP/LIH/BV-35-C
<i>Link Supervision Timeout</i>		
LMP 19/1	Set Link Supervision Timeout Value	LMP/LIH/BV-74-C
LMP 19/2 AND NOT (HCI 13/7)	Accept Link Supervision Timeout Setting	LMP/LIH/BV-73-C
LMP 19/2 AND HCI 13/7	Accept Link Supervision Timeout Setting with Event Reporting	LMP/LIH/BV-126-C



Item	Feature	Test Case(s)
<i>Simple Pairing</i>		
LMP 2/19 AND (NOT LMP 4/7)	Simple Pairing with Keyboard I/O Capabilities	LMP/SP/BV-12-C LMP/SP/BV-13-C LMP/SP/BV-16-C LMP/SP/BV-17-C
LMP 2/19	Simple Pairing	LMP/SP/BV-01-C LMP/SP/BV-02-C LMP/SP/BV-03-C LMP/SP/BV-04-C LMP/SP/BV-05-C LMP/SP/BV-06-C LMP/SP/BV-07-C LMP/SP/BV-08-C LMP/SP/BV-09-C LMP/SP/BV-10-C LMP/SP/BV-11-C LMP/SP/BV-14-C LMP/SP/BV-15-C LMP/SP/BV-18-C LMP/SP/BV-19-C LMP/SP/BV-20-C LMP/SP/BV-21-C LMP/SP/BV-22-C LMP/SP/BV-23-C LMP/SP/BV-24-C LMP/SP/BV-25-C LMP/SP/BV-26-C LMP/SP/BV-27-C LMP/SP/BV-28-C LMP/SP/BV-29-C LMP/SP/BV-30-C LMP/SP/BV-31-C LMP/SP/BV-32-C



Item	Feature	Test Case(s)
LMP 2/19 AND LMP 4/7	Simple Pairing with keyboard I/O capabilities	LMP/SP/BV-33-C LMP/SP/BV-34-C LMP/SP/BV-35-C LMP/SP/BV-36-C
SUM ICS 21/17 AND LMP 2/19 AND (NOT LMP 4/7)	Pairing Key Validation with Keyboard I/O Capabilities	LMP/SP/BI-03-C LMP/SP/BI-04-C
SUM ICS 21/17 AND LMP 2/19	Pairing Key Validation	LMP/SP/BI-01-C LMP/SP/BI-02-C LMP/SP/BI-05-C LMP/SP/BI-06-C
SUM ICS 21/17 AND LMP 2/19 AND LMP 2/26	Pairing Key Validation – P256	LMP/SP/BI-07-C LMP/SP/BI-08-C LMP/SP/BI-09-C LMP/SP/BI-10-C LMP/SP/BI-11-C LMP/SP/BI-12-C
<i>Sniff Subrating</i>		
LMP 16/7	Sniff Subrating	LMP/LIH/BV-117-C LMP/LIH/BV-118-C LMP/LIH/BV-119-C LMP/LIH/BV-120-C LMP/LIH/BV-121-C LMP/LIH/BV-122-C LMP/LIH/BV-123-C LMP/LIH/BV-124-C LMP/LIH/BV-125-C
<i>Quality of Service</i>		
LMP 20/2	Force Change of Quality of Service	LMP/LIH/BV-39-C LMP/LIH/BV-42-C
LMP 20/3	Request Change of Quality of Service	LMP/LIH/BV-40-C LMP/LIH/BV-41-C
<i>SCO Links</i>		



Item	Feature	Test Case(s)
LMP 21/1	Initiate SCO Links, as Master	LMP/LIH/BV-53-C
LMP 21/2	Initiate SCO Links, as Slave	LMP/LIH/BV-46-C
LMP 21/3	Accept SCO Links	LMP/LIH/BV-43-C LMP/LIH/BV-54-C
LMP 21/3 AND BB 6/2	Accept SCO Links, HV2 packets	LMP/LIH/BV-44-C
LMP 21/3 AND BB 6/3	Accept SCO Links, HV3 packets	LMP/LIH/BV-45-C
NOT LMP 21/3	Reject SCO Links	LMP/LIH/BV-60-C
LMP 21/4	Remove SCO Links, as Master	LMP/LIH/BV-58-C LMP/LIH/BV-59-C
LMP 21/5	Remove SCO Links, as Slave	LMP/LIH/BV-51-C LMP/LIH/BV-52-C
LMP 21/6 AND BB 6/2	Negotiate SCO Link Parameters, Master, HV2 Packets	LMP/LIH/BV-57-C
LMP 21/6 AND BB 6/3	Negotiate SCO Link Parameters, Master, HV3 Packets	LMP/LIH/BV-55-C LMP/LIH/BV-56-C
LMP 21/7 AND BB 6/2	Negotiate SCO Link Parameters, Slave, HV2 Packets	LMP/LIH/BV-47-C LMP/LIH/BV-49-C LMP/LIH/BV-50-C
LMP 21/7 AND BB 6/3	Negotiate SCO Link Parameters, Slave, HV3 Packets	LMP/LIH/BV-48-C
<i>eSCO Links</i>		
LMP 2/15	ESCO Support	LMP/LIH/BV-100-C LMP/LIH/BV-108-C LMP/LIH/BV-111-C LMP/LIH/BV-115-C LMP/LIH/BV-103-C LMP/LIH/BV-109-C LMP/LIH/BV-110-C LMP/LIH/BV-114-C
NOT LMP 2/15	No ESCO Support	LMP/LIH/BV-116-C



Item	Feature	Test Case(s)
LMP 2/15 AND BB 6/6	EV4 Packet	LMP/LIH/BV-101-C LMP/LIH/BV-104-C LMP/LIH/BV-106-C LMP/LIH/BV-107-C
LMP 2/15 AND BB 6/7	EV5 Packet	LMP/LIH/BV-102-C LMP/LIH/BV-105-C
LMP 2/15 AND (BB 6/6 OR BB 6/7)	Modify ESCO	LMP/LIH/BV-112-C LMP/LIH/BV-113-C
<i>Multi-Slot Packages</i>		
LMP 22/1 OR LMP 22/2	Allow/Request Maximum Number of Slots to be used	LMP/LIH/BV-61-C LMP/LIH/BV-64-C
LMP 22/3	Accept Request of Maximum Number of slots to be used	LMP/LIH/BV-63-C
<i>Paging Scheme</i>		
NOT LMP 23/2	Reject Suggested Page mode	LMP/LIH/BV-71-C
NOT LMP 23/4	Reject Suggested Page Scan mode	LMP/LIH/BV-72-C
<i>Test Mode</i>		
LMP 25/2 AND LMP 25/4	Ability to reject Test Mode when Test mode is disabled	LMP/TEM/BV-01-C
<i>AFH</i>		
LMP 2/16	Adaptive Frequency Hopping	LMP/AFH/BV-01-C LMP/AFH/BV-02-C LMP/AFH/BV-03-C
LMP 2/6 AND LMP 26/1 AND LMP 26/3 AND LMP 26/4	AFH and M/S Switch	LMP/AFH/BV-05-C LMP/AFH/BV-06-C
LMP 2/6 AND LMP 26/1	AFH and M/S Switch	LMP/AFH/BV-09-C
LMP 2/9 AND LMP 26/4	AFH and Park Mode	LMP/AFH/BV-07-C



Item	Feature	Test Case(s)
LMP 2/7 AND LMP 26/4	AFH and Hold Mode	LMP/AFH/BV-08-C
LMP 26/4	Channel Classification	LMP/AFH/BV-04-C
<i>EDR</i>		
NOT LMP 2/17	Device does not support Enhanced Data Rate	LMP/LIH/BV-83-C
LMP 14a/1	Enter Enhanced Data Rate	LMP/LIH/BV-84-C
LMP 14a/2	Exit Enhanced Data Rate	LMP/LIH/BV-85-C
LMP 14b/1	Enter and Exit eSCO Enhanced Data Rate Connection	LMP/LIH/BV-86-C LMP/LIH/BV-87-C
<i>EPC</i>		
LMP 18/8	Respond to EPC Increase Requests	LMP/LIH/BV-127-C
LMP 18/9	Respond to EPC Decrease Requests	LMP/LIH/BV-128-C
LMP 18/10	Respond to EPC go to Max Requests	LMP/LIH/BV-129-C
LMP 18/5	Request EPC Increase	LMP/LIH/BV-130-C
LMP 18/6	Request EPC Decrease	LMP/LIH/BV-131-C
LMP 18/7	Request EPC go to Max	LMP/LIH/BV-132-C
LMP 2/20 AND ((NOT BB 1a/2) OR (NOT BB 1a/3))	Report Unsupported Modulations Correctly	LMP/LIH/BV-133-C
<i>BR/EDR Secure Connections</i>		
LMP 2/26	Secure Authentication	LMP/AUT/BV-14-C LMP/AUT/BV-15-C LMP/AUT/BV-16-C LMP/AUT/BV-17-C
LMP 6/2 AND LMP 6/11	Accept AES-CCM Encryption Request	LMP/ENC/BV-26-C LMP/ENC/BV-33-C
LMP 6/9 AND LMP 6/11	Stop AES-CCM Encryption from master	LMP/ENC/BV-27-C



Item	Feature	Test Case(s)
LMP 6/1 AND LMP 6/11	Stop AES-CCM Encryption from host	LMP/ENC/BV-28-C
LMP 6/11 AND LMP 27/1	Initiate LMP Ping (IUT slave)	LMP/ENC/BV-29-C LMP/ENC/BV-31-C LMP/ENC/BV-32-C
LMP 6/11 AND LMP 21/2	SCO Connection creation fails when AES-CCM encryption is enabled (IUT slave)	LMP/LIH/BV-134-C
LMP 6/11 AND LMP 21/1	SCO Connection creation fails when AES-CCM encryption is enabled (IUT master)	LMP/LIH/BV-138-C
LMP 6/11 AND LMP 21/3	Accepting SCO Connection creation fails when AES-CCM encryption is enabled	LMP/LIH/BV-135-C LMP/LIH/BV-139-C
LMP 6/11 AND HCI 9/10	SCO Connection creation fails when AES-CCM encryption is enabled – enhanced setup synchronous command	LMP/LIH/BV-136-C LMP/LIH/BV-140-C
LMP 6/11 AND HCI 9/11	SCO Connection creation fails when AES-CCM encryption is enabled – enhanced accept synchronous connection request command	LMP/LIH/BV-137-C LMP/LIH/BV-141-C
LMP 6/1 AND LMP 6/6 AND LMP 6/11	Initiate AES-CCM Encryption as master	LMP/ENC/BV-34-C LMP/ENC/BV-50-C
LMP 6/1 AND LMP 6/11	Initiate AES-CCM Encryption as slave	LMP/ENC/BV-25-C
LMP 6/8 AND LMP 6/11	Initiate AES-CCM Encryption Stop	LMP/ENC/BV-35-C
LMP 6/9 AND LMP 6/11	Stop AES-CCM Encryption, slave request	LMP/ENC/BV-36-C
LMP 6/10 AND LMP 6/11	Encryption Pause/Resume	LMP/ENC/BV-37-C LMP/ENC/BV-38-C LMP/ENC/BV-39-C LMP/ENC/BV-40-C
LMP 2/14 AND LMP 6/6 AND LMP 6/11	Broadcast Encryption	LMP/ENC/BV-45-C



Item	Feature	Test Case(s)
LMP 6/11 AND LMP 27/1	Initiate LMP Ping (IUT master)	LMP/ENC/BV-46-C LMP/ENC/BV-48-C LMP/ENC/BV-49-C
LMP 6/11 AND LMP 27/1	Respond to LMP_ping_req	LMP/ENC/BV-30-C LMP/ENC/BV-47-C
LMP 2/19 AND LMP 2/26	Simple Pairing – P256	LMP/SP/BV-41-C LMP/SP/BV-42-C LMP/SP/BV-43-C LMP/SP/BV-44-C LMP/SP/BV-45-C LMP/SP/BV-46-C LMP/SP/BV-48-C LMP/SP/BV-49-C LMP/SP/BV-50-C LMP/SP/BV-51-C LMP/SP/BV-52-C LMP/SP/BV-53-C LMP/SP/BV-54-C LMP/SP/BV-55-C LMP/SP/BV-56-C LMP/SP/BV-57-C LMP/SP/BV-58-C LMP/SP/BV-59-C LMP/SP/BV-60-C LMP/SP/BV-61-C LMP/SP/BV-62-C LMP/SP/BV-63-C LMP/SP/BV-64-C LMP/SP/BV-65-C LMP/SP/BV-37-C LMP/SP/BV-38-C LMP/SP/BV-39-C LMP/SP/BV-40-C LMP/SP/BV-47-C



Item	Feature	Test Case(s)
LMP 2/6 AND LMP 2/26 AND LMP 6/10 AND LMP 6/11	Secure Connections and role switch	LMP/ENC/BV-41-C LMP/ENC/BV-42-C LMP/ENC/BV-43-C LMP/ENC/BV-44-C
<i>Piconet Clock Adjust</i>		
LMP 2/28		LMP/XCL/BV-01-C LMP/XCL/BV-02-C LMP/XCL/BV-03-C
<i>Slot Availability Mask</i>		
LMP 29/1	Initiate SAM negotiations	LMP/SAM/BV-02-C LMP/SAM/BV-10-C
LMP 29/2	Respond to SAM negotiations	LMP/SAM/BV-01-C LMP/SAM/BI-03-C LMP/SAM/BI-04-C LMP/SAM/BI-05-C LMP/SAM/BV-09-C
LMP 2/6 AND LMP 2/29	SAM and role switch	LMP/SAM/BV-06-C LMP/SAM/BV-07-C
LMP 2/8 AND LMP 2/29	SAM and sniff mode	LMP/SAM/BV-08-C

Table 5.1: Test Case Mapping

