Multi-Channel Adaptation Protocol (MCAP)

Abstract:
This document defines test structures and procedures for the interoperability and conformance testing of Bluetooth devices implementing the Multi-Channel Adaptation Protocol (MCAP).
Revision History

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Contents

1 Scope .............................................................................................................................................. 8

2 References, Definitions, and Abbreviations ...................................................................................... 9
  2.1 References ...................................................................................................................................... 9
  2.2 Definitions ....................................................................................................................................... 9
  2.3 Abbreviations ................................................................................................................................. 9

3 Test Suite Structure (TSS) .................................................................................................................. 11
  3.1 Overview ........................................................................................................................................ 11
  3.2 Test Strategy ................................................................................................................................... 11
  3.3 Test Groups ..................................................................................................................................... 11

4 Test Cases (TC) ................................................................................................................................. 13
  4.1 Introduction ..................................................................................................................................... 13
  4.1.1 Test Case Identification Conventions ....................................................................................... 13
  4.1.2 Conformance .............................................................................................................................. 14
  4.1.3 General Assumptions .................................................................................................................. 14
  4.1.4 Pass/Fail Verdict Conventions ................................................................................................... 14
  4.2 Connection Establishment ............................................................................................................... 15
    4.2.1 Control and Data Channel Establishment .............................................................................. 15
    4.2.1.1 MCAP/SRC-SNK/CE/BV-01-C [IUT initiates Control Channel and one or more Data Channels] .... 15
    4.2.1.2 MCAP/SRC-SNK/CE/BV-02-C [IUT accepts Control Channel and one or more Data Channels] .... 15
    4.2.1.3 MCAP/SRC-SNK/CE/BV-03-C [IUT initiates Control Channel and accepts one or more Data Channels] .......................................................................................................................................................................................... 16
    4.2.1.4 MCAP/SRC-SNK/CE/BV-04-C [IUT accepts Control Channel and initiates one or more Data Channels] .......................................................................................................................................................................................... 16
    4.3 Connection Management .............................................................................................................. 17
    4.3.1 MCL Disconnect ....................................................................................................................... 17
    4.3.1.1 MCAP/SRC-SNK/CM-DIS/BV-01-C [IUT initiates MCL Disconnect] ........................................ 17
    4.3.1.2 MCAP/SRC-SNK/CM-DIS/BV-02-C [IUT accepts MCL Disconnect] ........................................ 18
    4.3.1.3 MCAP/SRC-SNK/CM-DIS/BV-03-C [IUT in PENDING state while MCL is disconnected by the Lower Tester] ........................................................................................................................................ 18
    4.3.2 MDL Disconnect ....................................................................................................................... 19
    4.3.2.1 MCAP/SRC-SNK/CM-DIS/BV-04-C [IUT initiates MDL Disconnect] ........................................ 19
    4.3.2.2 MCAP/SRC-SNK/CM-DIS/BV-05-C [IUT accepts MDL Disconnect] ........................................ 19
    4.3.3 MDL Reconnect ....................................................................................................................... 20
    4.3.3.1 MCAP/SRC-SNK/CM-REC/BV-01-C [IUT initiates MDL Reconnect following Control Channel disconnect] ........................................................................................................................................ 20
    4.3.3.2 MCAP/SRC-SNK/CM-REC/BV-02-C [IUT accepts MDL Reconnect following Control Channel disconnect] ........................................................................................................................................ 21
    4.3.3.3 MCAP/SRC-SNK/CM-REC/BV-03-C [IUT initiates MDL Reconnect following unintentional disconnect] ........................................................................................................................................ 21
    4.3.3.4 MCAP/SRC-SNK/CM-REC/BV-04-C [IUT accepts MDL Reconnect following unintentional disconnect] ........................................................................................................................................ 22
    4.3.3.5 MCAP/SRC-SNK/CM-REC/BV-05-C [IUT initiates MDL Disconnect and Reconnect] ............... 22
    4.3.3.6 MCAP/SRC-SNK/CM-REC/BV-06-C [IUT accepts MDL Disconnect and Reconnect] ............... 23
    4.3.4 MDL Delete .............................................................................................................................. 24
    4.3.4.1 MCAP/SRC-SNK/CM-DEL/BV-01-C [IUT initiates MDL Delete] ............................................. 24
    4.3.4.2 MCAP/SRC-SNK/CM-DEL/BV-02-C [IUT accepts MDL Delete] ............................................. 24
    4.3.4.3 MCAP/SRC-SNK/CM-DEL/BV-03-C [IUT initiates Delete of all MDLs using MDL ID 0xFFFF] ...... 25
4.3.4.4 MCAP/SRC-SNK/CM-DEL/BV-04-C [IUT accepts Delete of all MDLs when MDL ID 0xFFFF is used]

4.3.5 MDL Abort..................................................................................................................................................26
4.3.5.1 MCAP/SRC-SNK/CM-ABT/BV-01-C [IUT sends MDL Abort].................................................................26
4.3.5.2 MCAP/SRC-SNK/CM-ABT/BV-02-C [IUT receives MDL Abort].............................................................27
4.3.5.3 MCAP/SRC-SNK/CM-ABT/BV-03-C [MDL opened following earlier Abort by the Lower Tester] ....27

4.4 MCAP Error Handling ....................................................................................................................................28
4.4.1 Situations Resulting in Response Codes ........................................................................................................28
4.4.1.1 MCAP/SRC-SNK/ERR/BI-01-C [IUT receives invalid op code and sends Response Code] ..........28
4.4.1.2 MCAP/SRC-SNK/ERR/BI-02-C [IUT receives Invalid Op Code Response Code].................................29
4.4.1.3 MCAP/SRC-SNK/ERR/BI-03-C [IUT receives invalid parameter and sends Response Code]...........29
4.4.1.4 MCAP/SRC-SNK/ERR/BI-04-C [IUT receives Invalid Parameter Value Response Code]............30
4.4.1.5 MCAP/SRC-SNK/ERR/BI-05-C [IUT receives Data Channel connection request with invalid MDEP ID and sends Response Code]..................................................................................30
4.4.1.6 MCAP/SRC-SNK/ERR/BI-06-C [IUT receives Invalid MDEP Response Code]...................................31
4.4.1.7 MCAP/SRC-SNK/ERR/BI-07-C [IUT is busy].........................................................................................31
4.4.1.8 MCAP/SRC-SNK/ERR/BI-08-C [IUT receives MDEP Busy Response Code].......................................32
4.4.1.9 MCAP/SRC-SNK/ERR/BI-09-C [IUT receives initial connection request with an invalid MDL ID and sends Response Code]........................................................................................................32
4.4.1.10 MCAP/SRC-SNK/ERR/BI-10-C [IUT receives reconnect request for MDL ID that is no longer valid and sends Response Code]..........................................................................................33
4.4.1.11 MCAP/SRC-SNK/ERR/BI-11-C [IUT receives Invalid MDL Response Code]...................................33
4.4.1.12 MCAP/SRC-SNK/ERR/BI-12-C [IUT receives MDL Busy Response Code]......................................34
4.4.1.13 MCAP/SRC-SNK/ERR/BI-13-C [IUT receives invalid command while not in PENDING state and sends Response Code]........................................................................................................34
4.4.1.14 MCAP/SRC-SNK/ERR/BI-14-C [IUT receives invalid command while in PENDING state and sends Response Code]..................................................................................................................35
4.4.1.15 MCAP/SRC-SNK/ERR/BI-15-C [IUT receives Invalid Operation Response Code].......................35
4.4.1.16 MCAP/SRC-SNK/ERR/BI-16-C [IUT is temporarily unavailable and sends Response Code] .......36
4.4.1.17 MCAP/SRC-SNK/ERR/BI-17-C [IUT receives Resource Unavailable Response Code]..................36
4.4.1.18 MCAP/SRC-SNK/ERR/BI-18-C [IUT receives Unspecified Error Response Code].......................37
4.4.1.19 MCAP/SRC-SNK/ERR/BI-19-C [IUT receives unsupported clock sync commands and sends Response Code]..........................................................................................................................37
4.4.1.20 MCAP/SRC-SNK/ERR/BI-20-C [IUT receives Request Not Supported Response Code] ............38
4.4.2 Situations Not Resulting in Response Codes ..................................................................................................38
4.4.2.1 MCAP/SRC-SNK/INV/BI-01-C [Control Channel is closed before a response is sent].........................38
4.4.2.2 MCAP/SRC-SNK/INV/BI-02-C [Out-of-sequence operation - IUT as Acceptor].................................39
4.4.2.3 MCAP/SRC-SNK/INV/BI-03-C [Out-of-sequence operation - IUT as Initiator].................................39
4.4.2.4 MCAP/SRC-SNK/INV/BI-04-C [Out-of-sequence operation - Response without corresponding Request]...............................................................................................................................40
4.4.2.5 MCAP/SRC-SNK/INV/BI-05-C [MDL ID already exists during an MDL Create by the Lower Tester] ...............................................................................................................................................40
4.4.2.6 MCAP/SRC-SNK/INV/BI-06-C [Lower Tester attempts to connect to Control Channel of same device using same PSM as open Control Channel]........................................................................41
4.4.2.7 MCAP/SRC-SNK/INV/BI-07-C [Lower Tester attempts to connect to Data Channel without having sent a Create or Reconnect request].............................................................................41

4.5 MCAP Clock Synchronization..........................................................................................................................42
4.5.1 IUT Initiates Synchronization (IUT as Sync-Master)....................................................................................42
4.5.1.1 MCAP/SRC-SNK/CS-I/BV-01-I [IUT requests clock synchronization]......................................................42
4.5.1.2 MCAP/SRC-SNK/CS-I/BV-02-I [IUT requests instant synchronization].....................................................43
4.5.1.3 MCAP/SRC-SNK/CS-I/BV-03-C [IUT acts as Sync-Master and Sync-Slave simultaneously]............44
4.5.1.4 MCAP/SRC-SNK/CS-I/BV-04-C [IUT initiates update of clock instances]...........................................45
4.5.2 IUT Responds to Synchronization Request (IUT as Sync-Slave) .............................................................45
4.5.2.1 MCAP/SRC-SNK/CS-R/BV-01-I [IUT responds to clock synchronization request] ..................................46
4.5.2.2 MCAP/SRC-SNK/CS-R/BV-02-I [IUT responds to instant synchronization request] ..............................46
4.5.2.3 MCAP/SRC-SNK/CS-R/BV-03-C [IUT responds to request for update of clock instances from Sync-Master] .............................................................................................................47
4.5.2.4 MCAP/SRC-SNK/CS-R/BV-04-C [IUT in PENDING state responds to clock synchronization request] ..........48
4.5.3 Multi-MCL Handling ....................................................................................................................................49
4.5.3.1 MCAP/SRC-SNK/CS-M/BV-01-C [IUT responds to clock synchronization when multiple MCLs exist] ....49
4.5.4 Clock Synchronization Error Handling .................................................................................................50
4.5.4.1 MCAP/SRC-SNK/CS-ERR/BI-01-C [IUT receives unsupported standard op code command and sends Response Code] ........................................................................................................50
4.5.4.2 MCAP/SRC-SNK/CS-ERR/BI-02-C [IUT detects invalid Bluetooth clock setting (Invalid slot number)] .........................................................................................................................50
4.5.4.3 MCAP/SRC-SNK/CS-ERR/BI-03-C [IUT detects invalid Bluetooth clock setting (slot number exceeds max value)] ..............................................................................................................51
4.5.4.4 MCAP/SRC-SNK/CS-ERR/BI-04-C [IUT detects invalid Bluetooth clock setting (slot number below min value)] ..............................................................................................................51

5 Test Case Mapping ........................................................................................................................................53
1 Scope

This Bluetooth document contains the Test Suite Structure (TSS) and Test Cases (TC) to test the Multi-Channel Adaptation Protocol Specification (MCAP).

The objective of this document is to provide a basis for the conformance tests for Bluetooth devices giving a high probability of air interface interoperability 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.

1. Bluetooth Core Specification, Version 2.0 or later
2. Test Strategy and Terminology Overview
4. ICS Proforma for Multi-Channel Adaptation Protocol (MCAP)
6. Multi-Channel Adaptation Protocol Implementation eXtra Information for Test, IXIT

## 2.2 Definitions

For the purpose of this Bluetooth document, the definitions from [1], [2], and [3] apply.

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<td>Initial Condition</td>
<td>Unless otherwise specified, the following Initial Conditions apply:</td>
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<td></td>
<td>Sink and Source are powered on, active, and within range of each other.</td>
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<tr>
<td></td>
<td>The Lower Tester supports all device types (indicated by MDEP Data Type)</td>
</tr>
<tr>
<td></td>
<td>that are also supported by the IUT (applies to test cases for standard op codes only).</td>
</tr>
<tr>
<td>Normal Condition</td>
<td>Unless otherwise specified, the following Normal Conditions apply:</td>
</tr>
<tr>
<td></td>
<td>Standard environmental conditions such as nominal voltage, temperature and</td>
</tr>
<tr>
<td></td>
<td>humidity for the IUT.</td>
</tr>
<tr>
<td>DCmax</td>
<td>Maximum number of simultaneously supported Data Channels. Refer to the</td>
</tr>
<tr>
<td></td>
<td>identification of this term in the IXIT [6].</td>
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## 2.3 Abbreviations

For the purpose of this Bluetooth document, the abbreviations from [1], [2], and [3] apply.

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<thead>
<tr>
<th>Abbreviation or Acronym</th>
<th>Meaning</th>
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<tr>
<td>CSP</td>
<td>Clock Synchronization Protocol</td>
</tr>
<tr>
<td>MCL</td>
<td>MCAP Communications Link</td>
</tr>
<tr>
<td>MDL</td>
<td>MCAP Data Link</td>
</tr>
<tr>
<td>MDEP</td>
<td>MCAP Data End Point</td>
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3 Test Suite Structure (TSS)

3.1 Overview
This section defines the tree structure of the tests specified for MCAP also referred to as the Test Suite Structure (TSS). The TSS is composed of nested test groups organized in a top down approach.

The test groups are organized in 3 levels. The first level defines the procedure groups representing the profile services. The second level separates the procedures in functional modules. The last level in each branch contains the standard ISO groups BV and BI (not shown in TSS table).

3.2 Test Strategy
The test objectives are to verify functionality of the Multi-Channel Adaptation Protocol within a Bluetooth Host and enable interoperability between Bluetooth Hosts on different devices. The testing approach is to cover mandatory and optional requirements in the service specification and to match these to the support of the IUT as described in the ICS Proforma.

The test equipment shall provide an implementation of the Radio Controller and the parts of the Host needed to perform the test cases defined in the Multi-Channel Adaptation Protocol Test Specification. For some test cases, it is necessary to stimulate the IUT from an Upper Tester. In practice, this could be implemented as a special test interface, an MMI, or another interface supported by the IUT.

The Multi-Channel Adaptation Protocol test suite contains Valid Behavior (BV) tests complemented with Invalid Behavior (BI) tests where required. The test coverage mirrored in the test suite structure is the result of a process that started with catalogued specification requirements that were logically grouped and assessed for testability enabling coverage in defined test purposes.

3.3 Test Groups
The following test groups have been defined:

Connection Establishment

- Control and Data Channel establishment

Connection Management

- MCL Disconnect
- MDL Disconnect
- MDL Reconnect
- MDL Delete
- MDL Abort

MCAP Error Handling

- Situations resulting in Response Codes
- Situations not resulting in Response Codes

Clock Synchronization Protocol
- Sync-Master
- Sync-Slave
- Multiple-MCL tests
- Error handling
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 [2]. The convention used here is `<spec abbreviation>/<IUT role>/<class>/<feat>/<func>/<subfunc>/<cap>/<xx>-<yy>`.

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 specification to test specification, but shall be consistent within each individual test specification.

<table>
<thead>
<tr>
<th>Identifier Abbreviation</th>
<th>Spec Identifier &lt;spec abbreviation&gt;</th>
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<tr>
<td>MCAP</td>
<td>Multi-Channel Adaptation Protocol</td>
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<thead>
<tr>
<th>Identifier Abbreviation</th>
<th>Role Identifier &lt;IUT role&gt;</th>
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<tr>
<td>SRC-SNK</td>
<td>Source-Sink Role¹</td>
</tr>
<tr>
<td>SS</td>
<td>Sync Slave</td>
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<tr>
<td>SM</td>
<td>Sync Master</td>
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<thead>
<tr>
<th>Identifier Abbreviation</th>
<th>Feature Identifier &lt;feat&gt;</th>
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<td>CE</td>
<td>Connection Establishment</td>
</tr>
<tr>
<td>CM-ABT</td>
<td>Connection Management - Abort</td>
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<td>CM-DEL</td>
<td>Connection Management - Delete</td>
</tr>
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<td>CM-DIS</td>
<td>Connection Management - Disconnect</td>
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<td>CM-REC</td>
<td>Connection Management - Reconnect</td>
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<td>CS-ERR</td>
<td>Clock Synchronization Error Handling</td>
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<tr>
<td>CS-I</td>
<td>Initiation of Clock Synchronization</td>
</tr>
<tr>
<td>CS-M</td>
<td>Clock Synchronization with Multiple MCLs</td>
</tr>
<tr>
<td>CS-R</td>
<td>Response to Clock Synchronization Request</td>
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<tr>
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</tr>
<tr>
<td>INV</td>
<td>MCAP Invalid Behavior Tests</td>
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¹ Test case where the IUT may be either Source or Sink, see also 4.1.3
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 Qualification 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 Specification, 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 General Assumptions

Unless otherwise specified, the following assumptions apply to this document:

- Only a single ACL link exists between two MCAP devices.
- A point-to-point connection is used for all test cases.
- The MCAP IUT (implementation under test) may be a Source or Sink unless specified otherwise in a test case. In the role specific test cases the MCAP IUT is required to be either in the Sync Slave or Sync Master role
- A suitable test system may be used for conformance tests.

4.1.4 Pass/Fail 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.
The convention in this test specification is that, unless there are a specific set of fail conditions outlined in the test case, the IUT fails the test case as soon as one of the pass criteria conditions cannot be met. If this occurs the outcome of the test shall be the Fail Verdict.

4.2 Connection Establishment

Test Group Objectives:

- Tests establishment of Data and Control Channels.

For this series of tests, the maximum number of simultaneously supported Data Channels that an IUT has declared in the IXIT [6] will be tested. The IXIT value defines DCmax to represent this quantity.

4.2.1 Control and Data Channel Establishment

Test Sub Group Objectives:

- Tests that support for establishment of Control and Data Channels is properly implemented.

4.2.1.1 MCAP/SRC-SNK/CE/BV-01-C [IUT initiates Control Channel and one or more Data Channels]

- Test Purpose
  Verify connection procedure when IUT initiates Control Channel connection as well as one or more Data Channel connections.

- Reference
  [3] 4.1, 4.3

- Initial Condition
  As defined in Section 2.2. Additionally, an ACL link has been established.

- Test Procedure
  1. IUT initiates Control Channel connection.
  2. The Lower Tester accepts the Control Channel connection.
  3. IUT uses MD_CREATE_MDL_REQ to initiate the maximum number of simultaneously supported Data Channel connections as declared in the PICS [4] (DCmax).
  4. The Lower Tester accepts the Data Channel connection(s).
  5. Data is exchanged on each of the Data Channels.

- Expected Outcome
  Pass verdict:
  - DCmax Data Channels can be opened simultaneously.
  - Data is successfully exchanged on each Data Channel.

4.2.1.2 MCAP/SRC-SNK/CE/BV-02-C [IUT accepts Control Channel and one or more Data Channels]

- Test Purpose
  Verify connection procedure when IUT accepts Control Channel connection as well as one or more Data Channel connections.
4.1.2 Initial Condition

As defined in Section 2.2. Additionally, an ACL link has been established.

Test Procedure

1. The Lower Tester initiates Control Channel connection.
2. IUT accepts the Control Channel connection.
3. The Lower Tester uses MD_CREATE_MDL_REQ to initiate the maximum number of simultaneously supported Data Channel connection as declared in the PICS [4] (DCmax).
4. IUT accepts the Data Channel connection(s).
5. Data is exchanged on each of the Data Channels.

Expected Outcome

Pass verdict:
- DCmax Data Channels can be opened simultaneously.
- Data is successfully exchanged on each Data Channel.

4.2.1.3 MCAP/SRC-SNK/CE/BV-03-C [IUT initiates Control Channel and accepts one or more Data Channels]

Test Purpose

Verify connection procedure when IUT initiates Control Channel connection and accepts one or more Data Channel connections.

Reference

[3] 4.1, 4.3

Initial Condition

As defined in Section 2.2. Additionally, an ACL link has been established.

Test Procedure

1. IUT initiates Control Channel connection.
2. The Lower Tester accepts the Control Channel connection.
3. The Lower Tester initiates the maximum number of simultaneously supported Data Channel connections as declared in the IXIT [6] (DCmax).
4. IUT accepts the Data Channel connection(s).
5. Data is exchanged on each of the Data Channels.

Expected Outcome

Pass verdict:
- DCmax Data Channels can be opened simultaneously.
- Data is successfully exchanged on each Data Channel.
4.2.1.4 MCAP/SRC-SNK/CE/BV-04-C [IUT accepts Control Channel and initiates one or more Data Channels]

- Test Purpose
  Verify connection procedure when IUT accepts Control Channel connection and initiates one or more Data Channel connections.

- Reference
  [3] 4.1, 4.3

- Initial Condition
  As defined in Section 2.2. Additionally, an ACL link has been established.

- Test Procedure
  1. The Lower Tester initiates Control Channel connection.
  2. IUT accepts the Control Channel connection.
  3. IUT initiates the maximum number of simultaneously supported Data Channel connections as declared in the IXIT [6] (DCmax).
  4. The Lower Tester accepts the Data Channel connection(s).
  5. Data is exchanged on each of the Data Channels.

- Expected Outcome
  Pass verdict:
  - DCmax Data Channels can be opened simultaneously.
  - Data is successfully exchanged on each Data Channel.

4.3 Connection Management

Test Group Objectives:

- Tests MCAP connection management procedures such as opening and disconnecting logical connections to devices, reconnecting, deleting MDLs and aborting MDL connections. This set of tests validates support for the control commands as defined in MCAP other than the connection establishment commands.

For this series of tests, the maximum number of simultaneously supported Data Channels that an IUT has declared in the IXIT [6] will be tested. The IXIT value defines DCmax to represent this quantity.

4.3.1 MCL Disconnect

Test Sub Group Objectives:

- Tests that support for MCL Disconnect is properly implemented.

4.3.1.1 MCAP/SRC-SNK/CM-DIS/BV-01-C [IUT initiates MCL Disconnect]

- Test Purpose
  Verify proper behavior when IUT initiates graceful MCL Disconnect.

- Reference
4.1, 4.3

- Initial Condition
  As defined in Section 2.2. Additionally, Control Channel and the maximum number of simultaneously supported Data Channel connections (DCmax) have been established.

- Test Procedure
  IUT initiates MCL disconnection.

- Expected Outcome
  Pass verdict:
  - All associated Data Channels are closed in addition to the Control Channel.

4.3.1.2 MCAP/SRC-SNK/CM-DIS/BV-02-C [IUT accepts MCL Disconnect]

- Test Purpose
  Verify proper behavior when IUT accepts graceful MCL Disconnect.

- Reference
  [3] 4.1, 4.3

- Initial Condition
  As defined in Section 2.2. Additionally, Control Channel and the maximum number of simultaneously supported Data Channel connections (DCmax) have been established.

- Test Procedure
  The Lower Tester initiates disconnection of all associated Data Channels followed by Control Channel disconnection.

- Expected Outcome
  Pass verdict:
  - All associated Data Channels are closed followed by the Control Channel.
  - IUT accepts the disconnection of the corresponding L2CAP channels.

4.3.1.3 MCAP/SRC-SNK/CM-DIS/BV-03-C [IUT in PENDING state while MCL is disconnected by the Lower Tester]

- Test Purpose
  Verify proper response when the IUT is in PENDING state while the Control Channel is closed by the Lower Tester.

- Reference
  [3] 4.1, 4.3

- Initial Condition
As defined in Section 2.2. Additionally, Control Channel has been established.

- Test Procedure
  1. The Lower Tester sends MD_CREATE_MDL to the IUT.
  2. IUT sends “Success” response code and enters PENDING state.
  3. The Lower Tester closes Control Channel.
  4. The Lower Tester reopens Control Channel.

- Expected Outcome
  Pass verdict:
  - Control Channel is closed.
  - Control Channel is successfully re-opened.
  - IUT returns to stable state and can process commands normally.

4.3.2 MDL Disconnect
Test Sub Group Objectives:

- Tests that support for MDL Disconnect is properly implemented

4.3.2.1 MCAP/SRC-SNK/CM-DIS/BV-04-C [IUT initiates MDL Disconnect]

- Test Purpose
  Verify proper behavior when IUT initiates graceful MDL Disconnect.

- Reference
  [3] 4.1.2

- Initial Condition
  As defined in Section 2.2. Additionally, Control Channel and at least one Data Channel connection has been established.

- Test Procedure
  IUT initiates MDL disconnection.

- Expected Outcome
  Pass verdict:
  - Associated Data Channel is closed by IUT.

4.3.2.2 MCAP/SRC-SNK/CM-DIS/BV-05-C [IUT accepts MDL Disconnect]

- Test Purpose
  Verify proper behavior when IUT accepts graceful MDL Disconnect.

- Reference
  [3] 4.1, 4.3
• Initial Condition
  As defined in Section 2.2. Additionally, Control Channel and at least one Data Channel connection has been established.

• Test Procedure
  The Lower Tester initiates MDL disconnection.

• Expected Outcome
  Pass verdict:
  - Associated Data Channel is closed by the Lower Tester.
  - IUT accepts the disconnection of the corresponding L2CAP Data Channel.

4.3.3 MDL Reconnect
  Test Sub Group Objectives:

• Tests that MDL Reconnect command has been properly implemented.

4.3.3.1 MCAP/SRC-SNK/CM-REC/BV-01-C [IUT initiates MDL Reconnect following Control Channel disconnect]

• Test Purpose
  Verify proper behavior when IUT initiates MDL Reconnect following graceful disconnection of Control Channel.

• Reference
  [3] 4.1.3.7.2, 4.3

• Initial Condition
  As defined in Section 2.2. Additionally, Control Channel and the maximum number of simultaneously supported Data Channel connections (DCmax) have been established and data has been exchanged on each Data Channel.

• Test Procedure
  1. All Data Channel are gracefully disconnected by IUT followed by the disconnection of the Control Channel (e.g. disconnect request before IUT powers down).
  2. Conditions change to facilitate reconnection (e.g. IUT is powered back on).
  3. Control Channel connection is recreated by IUT.
  4. IUT initiates MDL Reconnection of at least one Data Channel and the Lower Tester accepts (one reconnection request for each restored Channel).
  5. Data is exchanged on each of the restored Data Channels.

• Expected Outcome
  Pass verdict:
  - All associated Data Channels were disconnected by IUT followed by the disconnection of the Control Channel.
- Control Channel and at least one of the associated Data Channels are successfully restored.
- Data can be exchanged on each restored Data Channel.

4.3.3.2 MCAP/SRC-SNK/CM-REC/BV-02-C [IUT accepts MDL Reconnect following Control Channel disconnect]

• Test Purpose
  Verify proper behavior when IUT accepts MDL Reconnect following graceful disconnection of Control Channel.

• Reference
  [3] 4.1.3.7.2, 4.3

• Initial Condition
  As defined in Section 2.2. Additionally, Control Channel and the maximum number of simultaneously supported Data Channel connections (DCmax) have been established and data has been exchanged on each Data Channel.

• Test Procedure
  1. All Data Channel are gracefully disconnected by the Lower Tester (e.g. disconnect request before it powers down).
  2. Conditions change to facilitate reconnection (e.g. Lower Tester is powered back on).
  3. Control Channel connection is recreated by the Lower Tester.
  4. The Lower Tester initiates MDL Reconnection of at least one Data Channel and IUT accepts (one reconnection request for each restored Channel).
  5. Data is exchanged on each of the restored Data Channels.

• Expected Outcome
  Pass verdict:
  - Control Channel and all associated Data Channels were disconnected by the Lower Tester followed by the disconnection of the Control Channel.
  - Control Channel and at least one of the associated Data Channels are successfully restored.
  - Data can be exchanged on each restored Data Channel.

4.3.3.3 MCAP/SRC-SNK/CM-REC/BV-03-C [IUT initiates MDL Reconnect following unintentional disconnect]

• Test Purpose
  Verify proper behavior when IUT initiates MDL Reconnect following unintentional disconnect

• Reference
  [3] 4.1.3.7.2, 4.3

• Initial Condition
  As defined in Section 2.2. Additionally, Control Channel and the maximum number of simultaneously supported Data Channel connections (DCmax) have been established by the IUT and data has been exchanged on each Data Channel.
• Test Procedure
  1. Control and Data Channels are unintentionally (non-gracefully) disconnected (e.g. devices become "out of range").
  2. Conditions change to facilitate reconnection (e.g. devices back "in range").
  3. Control Channel connection is recreated by IUT.
  4. IUT initiates MDL Reconnection of at least one Data Channel and the Lower Tester accepts (one reconnection request for each restored Channel).
  5. Data is exchanged on each of the restored Data Channels.

• Expected Outcome
  Pass verdict:
  - Control Channel and at least one of the associated Data Channels are successfully restored.
  - Data can be exchanged on each restored Data Channel.

4.3.3.4 MCAP/SRC-SNK/CM-REC/BV-04-C [IUT accepts MDL Reconnect following unintentional disconnect]

• Test Purpose
  Verify proper behavior when IUT accepts MDL Reconnect following unintentional disconnect

• Reference
  [3] 4.1.3.7.2, 4.3

• Initial Condition
  As defined in Section 2.2. Additionally, Control Channel and the maximum number of simultaneously supported Data Channel connections (DCmax) have been established by the Lower Tester and data has been exchanged on each Data Channel.

• Test Procedure
  1. Control and Data Channels are unintentionally (non-gracefully) disconnected (e.g. devices become "out of range").
  2. Conditions change to facilitate reconnection (e.g. devices back "in range").
  3. Control Channel connection is recreated by the Lower Tester.
  4. The Lower Tester initiates MDL Reconnection of at least one Data Channel and IUT accepts (one reconnection request for each restored Channel).
  5. Data is exchanged on each of the restored Data Channels.

• Expected Outcome
  Pass verdict:
  - Control Channel and at least one of the associated Data Channels are successfully restored.
  - Data can be exchanged on each restored Data Channel.

4.3.3.5 MCAP/SRC-SNK/CM-REC/BV-05-C [IUT initiates MDL Disconnect and Reconnect]

• Test Purpose
  Verify that an IUT can initiate MDL Disconnect and Reconnect.
• **Reference**
  [3] 4.1.3.7.2, 4.3

• **Initial Condition**
  As defined in Section 2.2. Additionally, Control Channel and the maximum number of simultaneously supported Data Channel connections (DCmax) have been established and data has been exchanged on each Data Channel.

• **Test Procedure**
  1. One or more Data Channels is gracefully disconnected by IUT by disconnecting the underlying L2CAP channels. For implementations that close all MDLs, the Control Channel may optionally be closed by the IUT.
  2. Once the IUT is prepared to reconnect, (after several seconds) the IUT initiates MDL Reconnect of one or more Data Channels and the Lower Tester accepts (one reconnect request for each restored Channel). If the Control Channel was disconnected by the IUT in the previous step, the IUT may need to re-establish the Control Channel before the MDL Reconnect.
  3. Data is exchanged on each of the restored Data Channels.

• **Expected Outcome**
  **Pass verdict:**
  - One or more Data Channels were disconnected by the IUT.
  - One or more Data Channels were successfully reconnected by the IUT.
  - Data was successfully exchanged on each restored Data Channel.

4.3.3.6 **MCAP/SRC-SNK/CM-REC/BV-06-C [IUT accepts MDL Disconnect and Reconnect]**

• **Test Purpose**
  Verify that an IUT can accept MDL Disconnect and Reconnect.

• **Reference**
  [3] 4.1.3.7.2, 4.3

• **Initial Condition**
  As defined in Section 2.2. Additionally, Control Channel and the maximum number of simultaneously supported Data Channel connections (DCmax) have been established and data has been exchanged on each Data Channel.

• **Test Procedure**
  1. One of the open Data Channels is gracefully disconnected by the Lower Tester by disconnecting the underlying L2CAP channel. For single MDL implementations, the Control Channel may optionally be closed by the IUT in reaction to all MDLs being disconnected.
  2. The Lower Tester initiates MDL Reconnection of the Data Channel and IUT accepts. If the Control Channel was disconnected by the IUT in the previous step, the Lower Tester will need to re-establish the Control Channel before the MDL Reconnect.
  3. Data is exchanged on the restored Data Channel.
4.3.4 MDL Delete

Test Sub Group Objectives:

• Tests that MDL Delete command has been properly implemented.

4.3.4.1 MCAP/SRC-SNK/CM-DEL/BV-01-C [IUT initiates MDL Delete]

• Test Purpose
  Verify proper behavior when IUT initiates MDL Delete

• Reference
  [3] 4.1.3.7.4, 4.3

• Initial Condition
  As defined in Section 2.2. Additionally, Control Channel and one Data Channel have been established.

• Test Procedure
  1. IUT initiates delete of MDL ID.
  2. If there is a Data Channel open that is associated with MDL ID, the Lower Tester closes the associated Data Channel.
  3. The Lower Tester sends “Success” response code.
  4. The Lower Tester initiates reconnect of the MDL ID that was deleted.

• Expected Outcome
  Pass verdict:
  - Reconnect attempt fails and IUT sends “Invalid MDL” response code.
  - IUT continues to operate normally following a successful delete operation.
  - IUT returns to stable state and can process commands normally.

4.3.4.2 MCAP/SRC-SNK/CM-DEL/BV-02-C [IUT accepts MDL Delete]

• Test Purpose
  Verify proper behavior when IUT accepts MDL Delete.

• Reference
  [3] 4.1.3.7.4/3, 4.3

• Initial Condition
As defined in Section 2.2. Additionally, Control Channel and one Data Channel have been established.

- **Test Procedure**
  1. The Lower Tester initiates delete of MDL ID associated with the open Data Channel.
  2. IUT closes the Data Channel.
  3. IUT sends “Success” response code.
  4. The Lower Tester initiates reconnect of the MDL ID that was deleted.
  5. IUT sends “Invalid MDL” response code.

- **Expected Outcome**
  **Pass verdict:**
  - IUT closes Data Channel before the “Success” response code is sent.
  - IUT sends “Success” response code.
  - Reconnect attempt fails and IUT sends “Invalid MDL” response code.
  - IUT returns to stable state and can process commands normally.

**4.3.4.3 MCAP/SRC-SNK/CM-DEL/BV-03-C [IUT initiates Delete of all MDLs using MDL ID 0xFFFF]**

- **Test Purpose**
  Verify proper behavior when IUT initiates use of reserved MDL ID 0xFFFF to delete all MDLs.

- **Reference**
  [3] 4.1.3.7.4/1

- **Initial Condition**
  As defined in Section 2.2. Additionally, Control Channel and the maximum number of simultaneously supported Data Channel connections (DCmax) have been established.

- **Test Procedure**
  1. IUT initiates delete of all MDLs by using MDL ID 0xFFFF and the Lower Tester accepts.
  2. If any Data Channels are open, the Lower Tester closes these.
  3. The Lower Tester sends “Success” response code.

- **Expected Outcome**
  **Pass verdict:**
  - IUT continues to operate normally following a successful delete operation.
  - IUT returns to stable state and can process commands normally.

**4.3.4.4 MCAP/SRC-SNK/CM-DEL/BV-04-C [IUT accepts Delete of all MDLs when MDL ID 0xFFFF is used]**

- **Test Purpose**
  Verify proper behavior when the Lower Tester Initiates use of reserved MDL ID 0xFFFF to delete all MDLs.
• Reference

[3] 4.1.3.7.4/1, 4.1.3.7.4/3

• Initial Condition

As defined in Section 2.2. Additionally, Control Channel and the maximum number of simultaneously supported Data Channel connections (DCmax) have been established.

• Test Procedure

1. The Lower Tester initiates delete of all MDLs by using MDL ID 0xFFFF and IUT accepts
2. IUT closes all Data Channels.
3. IUT sends “Success” response code.
4. The Lower Tester initiates reconnect of each MDL ID that was deleted.
5. IUT sends “Invalid MDL” response code for each request.

• Expected Outcome

Pass verdict:
- IUT closes all Data Channels before the “Success” response code is sent.
- IUT sends “Success” response code.
- All reconnect attempts fail and IUT sends “Invalid MDL” response codes for each request.
- IUT returns to stable state and can process commands normally.

4.3.5 MDL Abort

Test Sub Group Objectives:

• Tests that the MDL Abort command has been properly implemented.

4.3.5.1 MCAP/SRC-SNK/CM-ABT/BV-01-C [IUT sends MDL Abort]

• Test Purpose

Verify proper behavior when IUT sends MDL Abort to the Lower Tester.

• Reference

[3] 4.1.3.7.3, 4.3

• Initial Condition

As defined in Section 2.2. Additionally, Control Channel has been established.

• Test Procedure

1. IUT sends MD_CREATE_MDL to the Lower Tester.
2. The Lower Tester sends “Success” response code and enters PENDING state.
3. IUT does not initiate the L2CAP connection.
4. IUT sends an Abort request for the same MDL used in the create request because of a) an Upper Tester (e.g. MMI action), or b) triggered by other means.
5. The Lower Tester sends “Success” response code.

• Expected Outcome
Pass verdict:
- Abort results in “Success” response code from the Lower Tester.
- IUT returns to stable state and can process commands normally.

Notes
This test is applicable for IUTs which can support the ability to simulate sending of an Abort by some means; otherwise this test is not applicable.

4.3.5.2 MCAP/SRC-SNK/CM-ABT/BV-02-C [IUT receives MDL Abort]

- Test Purpose
  Verify proper behavior when IUT receives MDL Abort from the Lower Tester.

- Reference
  [3] 4.1.3.7.3, 4.3

- Initial Condition
  As defined in Section 2.2. Additionally, Control Channel has been established

- Test Procedure
  1. The Lower Tester sends MD_CREATE_MDL to the IUT.
  2. IUT sends “Success” response code.
  3. The Lower Tester sends an Abort request for the same MDL used in the Create request.
  4. IUT sends “Success” response code.
  5. The Lower Tester attempts to open a Data Channel, but the connection is either refused or closed by IUT immediately after being opened.

- Expected Outcome
  Pass verdict:
  - Create and Abort operations both result in “Success” response codes from the IUT.
  - Attempt to open a Data Channel fails (either connection is refused, or channel is closed immediately after it is opened).
  - IUT returns to stable state and can process commands normally.

4.3.5.3 MCAP/SRC-SNK/CM-ABT/BV-03-C [MDL opened following earlier Abort by the Lower Tester]

- Test Purpose
  Verify proper behavior following an Abort by the Lower Tester.

- Reference
  [3] 4.1.3.7.3/2, 4.3

- Initial Condition
  As defined in Section 2.2. Additionally, Control Channel has been established.
Multi-Channel Adaptation Protocol (MCAP) / Test Specification

• Test Procedure
  1. The Lower Tester sends MD_CREATE_MDL to the IUT.
  2. IUT Responds with “Success” Response Code.
  3. The Lower Tester sends an abort request for the same MDL used in the create request.
  4. IUT Responds with “Success” Response Code.
  5. The Lower Tester sends a valid create request to IUT (same or different MDL ID that was used in the create request of step 1.)
  6. IUT sends “Success” response code.
  7. The Lower Tester opens a Data Channel, and successfully exchanges data with the MDEP identified in the create operation of step 5.

• Expected Outcome
  Pass verdict:
  - IUT responds to all operations with “Success” response code.
  - Data is exchanged with the correct MDL and correct MDEP.

4.4 MCAP Error Handling
Test Group Objectives:

• Tests situations where protocol procedures may not be followed or cases such as race conditions where abnormal situations may arise. Some of the situations result in response codes and some do not. This set of tests provides further validation for the MCAP protocol.

4.4.1 Situations Resulting in Response Codes
Test Sub Group Objectives:

• Tests that support for error handling that involve response codes has been properly implemented. This includes situations where a response code is received by an IUT and situations which result in the generation of a response code by the IUT.

4.4.1.1 MCAP/SRC-SNK/ERR/BI-01-C [IUT receives invalid op code and sends Response Code]

• Test Purpose
  Verify proper response when IUT receives an invalid op code.

• Reference
  [3] 4.1.3.2/3, 4.1.3.2/4, 4.1.3.4/1

• Initial Condition
  As defined in Section 2.2. Additionally, Control Channel connection has been established.

• Test Procedure
  1. The Lower Tester sends a command to the IUT with an invalid op code (i.e. one that is not assigned in MCAP).

• Expected Outcome
Pass verdict:
- IUT Response Packet includes Op Code of ERROR_RSP.
- IUT Response Packet includes MDL ID of 0x0000.
- IUT Response Packet Response Parameter Field is length zero.
- IUT returns to stable state and can process commands normally.

4.4.1.2 MCAP/SRC-SNK/ERR/BI-02-C [IUT receives Invalid Op Code Response Code]

- Test Purpose
- Reference
  [3] 4.1.3.2/4, 4.1.3.4/1
- Initial Condition
  As defined in Section 2.2. Additionally, Control Channel connection has been established.
- Test Procedure
  1. The IUT sends a command to the Lower Tester (i.e. any standard or clock synchronization command if clock synchronization is supported).
  2. The Lower Tester sends an "Invalid Op Code" response code to the IUT.
- Expected Outcome
  Pass verdict:
  - IUT returns to stable state and can process commands normally.

4.4.1.3 MCAP/SRC-SNK/ERR/BI-03-C [IUT receives invalid parameter and sends Response Code]

- Test Purpose
  Verify proper response when IUT receives an invalid parameter.
- Reference
  [3] 4.1.3.4/2
- Initial Condition
  As defined in Section 2.2. Additionally, Control Channel connection has been established.
- Test Procedure
  1. The Lower Tester sends a command to the IUT with invalid parameters (e.g. a MD_CREATE_MDL_REQ with 2 Bytes for the MDEP ID field).
  2. IUT sends the "Invalid Parameter Value" response code.
- Expected Outcome
Pass verdict:
- IUT sends the “Invalid Parameter Value” response code.
- IUT Response Packet Response Parameter Field is length zero unless MD_CREATE_MDL command is used then this field is length of 1 octet.
- IUT returns to stable state and can process commands normally.

4.4.1.4 **MCAP/SRC-SNK/ERR/BI-04-C [IUT receives Invalid Parameter Value Response Code]**

- **Test Purpose**
  Verify proper response when IUT receives an “Invalid Parameter Value” response code.

- **Reference**
  [3] 4.1.3.4/2

- **Initial Condition**
  As defined in Section 2.2. Additionally, Control Channel connection has been established.

- **Test Procedure**
  1. The IUT sends a command to the Lower Tester (i.e. any standard or clock synchronization command if clock synchronization is supported)
  2. The Lower Tester sends IUT “Invalid Parameter Value” response code.

- **Expected Outcome**
  **Pass verdict:**
  - IUT returns to stable state and can process commands normally.

4.4.1.5 **MCAP/SRC-SNK/ERR/BI-05-C [IUT receives Data Channel connection request with invalid MDEP ID and sends Response Code]**

- **Test Purpose**
  Verify proper response when IUT receives initial Data Channel connection request with an invalid MDEP ID.

- **Reference**
  [3] 4.1.3.4/3

- **Initial Condition**
  As defined in Section 2.2. Additionally, Control Channel connection has been established.

- **Test Procedure**
  1. The Lower Tester sends MD_CREATE_MDL_REQ with invalid MDEP ID (i.e., an MDEP ID which is not present in the device or an MDEP ID in the reserved range).
  2. IUT sends “Invalid MDEP” response code.

- **Expected Outcome**
Pass verdict:
- IUT rejects Data Channel connection.
- IUT sends the “Invalid MDEP” response code.
- IUT Response Packet Response Parameter Field is one octet length.
- IUT returns to stable state and can process commands normally.

4.4.1.6 MCAP/SRC-SNK/ERR/BI-06-C [IUT receives Invalid MDEP Response Code]
- Test Purpose
  Verify proper response to “Invalid MDEP” response code.

- Reference
  [3] 4.1.3.4/3

- Initial Condition
  As defined in Section 2.2. Additionally, Control Channel connection has been established.

- Test Procedure
  1. IUT sends the Lower Tester the MD_CREATE_MDL_REQ command.
  2. The Lower Tester sends an “Invalid MDEP” response code to IUT.

- Expected Outcome
  Pass verdict:
  - IUT returns to stable state and can process commands normally.

4.4.1.7 MCAP/SRC-SNK/ERR/BI-07-C [IUT is busy]
- Test Purpose
  Verify proper response when IUT is busy.

- Reference
  [3] 4.1.3.4/4

- Initial Condition
  As defined in Section 2.2. Additionally, Control Channel connection has been established.

- Test Procedure
  1. The Lower Tester creates significantly more MDLs to a single MDEP than IUT would typically manage simultaneously.
  2. IUT opens all MDLs or sends an appropriate error response code.

- Expected Outcome
  Pass verdict:
  - IUT sends “MDEP Busy” or “MDL Busy” or “Resource Unavailable” response code or succeeds in opening all MDLs.
- IUT returns to stable state and can process commands normally.

4.4.1.8 MCAP/SRC-SNK/ERR/BI-08-C [IUT receives MDEP Busy Response Code]

• Test Purpose
  Verify proper response to “MDEP Busy” response code.

• Reference
  [3] 4.1.3.4/4

• Initial Condition
  As defined in Section 2.2. Additionally, Control Channel connection has been established.

• Test Procedure
  1. IUT sends the MD_CREATE_MDL_REQ or MD_RECONNECT_MDL_REQ commands to the Lower Tester.
  2. The Lower Tester sends “MDEP Busy” response code to IUT.

• Expected Outcome
  Pass verdict:
  - IUT returns to stable state and can process commands normally.

4.4.1.9 MCAP/SRC-SNK/ERR/BI-09-C [IUT receives initial connection request with an invalid MDL ID and sends Response Code]

• Test Purpose
  Verify proper response when IUT receives initial Data Channel connection request with an invalid MDL ID (i.e., 0x0000 or 0xFF00 - 0xFFFF).

• Reference
  [3] 4.1.3.4/5

• Initial Condition
  As defined in Section 2.2. Additionally, Control Channel connection has been established.

• Test Procedure
  1. The Lower Tester sends MD_CREATE_MDL_REQ with invalid MDL (i.e., 0x0000 or 0xFF00 - 0xFFFF).
  2. IUT rejects MDL connection.
  3. IUT sends “Invalid MDL” response code.

• Expected Outcome
  Pass verdict:
  - IUT sends the “Invalid MDL” response code.
  - IUT Response Packet Response Parameter Field is one octet in length.
  - IUT returns to stable state and can process commands normally.
4.4.1.10 MCAP/SRC-SNK/ERR/BI-10-C [IUT receives reconnect request for MDL ID that is no longer valid and sends Response Code]

- **Test Purpose**
  Verify proper response when a device attempts to reconnect to an MDL that has been deleted and is no longer valid.

- **Reference**
  [3] 4.1.3.4/5

- **Initial Condition**
  As defined in Section 2.2. Additionally, Control Channel and one Data Channel connection have been established.

- **Test Procedure**
  1. The Lower Tester deletes an MDL.
  2. The Lower Tester attempts to reconnect to the deleted MDL.
  3. IUT sends “Invalid MDL” response code.

- **Expected Outcome**
  **Pass verdict:**
  - IUT sends “Invalid MDL” response code.
  - IUT Response Packet Response Parameter Field is length zero unless MD_CREATE_MDL command was used; then, this field is length of 1 octet.
  - IUT returns to stable state and can process commands normally.

4.4.1.11 MCAP/SRC-SNK/ERR/BI-11-C [IUT receives Invalid MDL Response Code]

- **Test Purpose**
  Verify proper response to “Invalid MDL” response code.

- **Reference**
  [3] 4.1.3.4/5

- **Initial Condition**
  As defined in Section 2.2. Additionally, Control Channel connection has been established.

- **Test Procedure**
  1. IUT sends the MD_CREATE_MDL_REQ or MD_RECONNECT_MDL_REQ commands to the Lower Tester.
  2. The Lower Tester sends "Invalid MDL" response code to IUT.

- **Expected Outcome**
  **Pass verdict:**
  - IUT returns to stable state and can process commands normally.
4.4.1.12 MCAP/SRC-SNK/ERR/BI-12-C [IUT receives MDL Busy Response Code]

- **Test Purpose**
  Verify proper response to “MDL Busy” response code.

- **Reference**
  [3] 4.1.3.4/6

- **Initial Condition**
  As defined in Section 2.2. Additionally, Control Channel connection has been established.

- **Test Procedure**
  1. IUT sends the MD_CREATE_MDL_REQ or MD_RECONNECT_MDL_REQ commands to the Lower Tester.
  2. The Lower Tester sends “MDL Busy” response code.

- **Expected Outcome**
  **Pass verdict:**
  - IUT returns to stable state and can process commands normally.

4.4.1.13 MCAP/SRC-SNK/ERR/BI-13-C [IUT receives invalid command while not in PENDING state and sends Response Code]

- **Test Purpose**
  Verify proper response when IUT receives a MD_ABORT_MDL command while not in PENDING state.

- **Reference**
  [3] 4.1.3.4/7

- **Initial Condition**
  As defined in Section 2.2. Additionally, Control Channel connection has been established.

- **Test Procedure**
  1. IUT is not in PENDING state.
  2. The Lower Tester sends IUT an Abort request.

- **Expected Outcome**
  **Pass verdict:**
  - IUT sends “Invalid Operation” response code.
  - IUT Response Packet Response Parameter Field is length zero.
  - IUT returns to stable state and can process commands normally.
4.4.1.14 MCAP/SRC-SNK/ERR/BI-14-C [IUT receives invalid command while in PENDING state and sends Response Code]

• Test Purpose
  Verify proper response when IUT receives standard (i.e. not clock synchronization) command other than MD_ABORT_MDL while in PENDING state.

• Reference
  [3] 4.1.3.7/2

• Initial Condition
  As defined in Section 2.2. Additionally, Control Channel connection has been established

• Test Procedure
  1. The Lower Tester sends MD_CREATE_MDL to the IUT.
  2. IUT sends “Success” response code and enters PENDING state.
  3. The Lower Tester sends the invalid commands MD_CREATE_MDL, MD_RECONNECT_MDL, and MD_DELETE_MDL (i.e. any command other than MD_ABORT_MDL and clock synchronization commands).
  4. IUT sends “Invalid Operation” response code for each invalid command sent.

• Expected Outcome
  Pass verdict:
  - IUT sends “Invalid Operation” response code for each invalid command received.
  - IUT Response Packet Response Parameter Field is length zero unless MD_CREATE_MDL command was used; then, this field is length of 1 octet.
  - IUT returns to stable state and can process commands normally.

4.4.1.15 MCAP/SRC-SNK/ERR/BI-15-C [IUT receives Invalid Operation Response Code]

• Test Purpose

• Reference
  [3] 4.1.3.4/7

• Initial Condition
  As defined in Section 2.2. Additionally, Control Channel connection has been established.

• Test Procedure
  1. IUT sends the Lower Tester any standard command or any clock synchronization command.
  2. The Lower Tester sends Invalid Operation response code.

• Expected Outcome
  Pass verdict:
Multi-Channel Adaptation Protocol (MCAP) / Test Specification

- IUT returns to stable state and can process commands normally.

4.4.1.16 MCAP/SRC-SNK/ERR/BI-16-C [IUT is temporarily unavailable and sends Response Code]

• Test Purpose
  Verify proper response when the Lower Tester attempts to communicate with IUT that is temporarily unavailable.

• Reference
  [3] 4.1.3.4/8

• Initial Condition
  As defined in Section 2.2. Additionally, Control Channel connection has been established.

• Test Procedure
  1. Set the IUT in a condition which will result in it being “temporarily unavailable” (see Notes section).
  2. The Lower Tester attempts to communicate with the IUT by sending any command.
  3. IUT sends “Resource Unavailable” response code.

• Expected Outcome
  Pass verdict:
  - IUT sends “Resource Unavailable” response code.
  - IUT Response Packet Response Parameter Field is length zero unless MD_CREATE_MDL command was used; then, this field is length of 1 octet.
  - IUT returns to stable state and can process commands normally.

• Notes
  This test is applicable for IUTs which can support the ability to get into a “temporarily unavailable” condition by some means; otherwise this test is not applicable.

4.4.1.17 MCAP/SRC-SNK/ERR/BI-17-C [IUT receives Resource Unavailable Response Code]

• Test Purpose
  Verify proper response to “Resource Unavailable” response code.

• Reference
  [3] 4.1.3.4/8

• Initial Condition
  As defined in Section 2.2. Additionally, Control Channel connection has been established.

• Test Procedure
  1. IUT sends any command to the Lower Tester.
  2. The Lower Tester sends “Resource Unavailable” response code.
• Expected Outcome
  Pass verdict:
  - IUT returns to stable state and can process commands normally.

4.4.1.18 MCAP/SRC-SNK/ERR/BI-18-C [IUT receives Unspecified Error Response Code]
• Test Purpose
  Verify proper response to “Unspecified Error” response code.

• Reference
  [3] 4.1.3.4, 4.1.3.4/9

• Initial Condition
  As defined in Section 2.2. Additionally, Control Channel connection has been established.

• Test Procedure
  1. IUT sends any command to the Lower Tester.
  2. The Lower Tester sends “Unspecified Error” response code.

• Expected Outcome
  Pass verdict:
  - IUT returns to stable state and can process commands normally.

4.4.1.19 MCAP/SRC-SNK/ERR/BI-19-C [IUT receives unsupported clock sync commands and sends Response Code]
• Test Purpose
  Verify proper response when IUT that does not support the Clock Synchronization Protocol receives clock synchronization commands.

• Reference
  [3] 4.1.3.2/4, 4.1.3.4/10, 5.0/1

• Initial Condition
  As defined in Section 2.2. Additionally, Control Channel connection has been established.

• Test Procedure
  1. The Lower Tester attempts to initiate clock synchronization with IUT that does not support the Clock Synchronization Protocol (e.g. the Lower Tester sends unsupported clock synchronization command).

• Expected Outcome
  Pass verdict:
  - IUT sends “Request Not Supported” response code.
- IUT Response Packet Response Parameter Field (bytes 3-9 for MD_SYNC_CAP_RSP or bytes 3-16 of MD_SYNC_SET_RSP) is set to zero.
- IUT returns to stable state and can process commands normally.

4.4.1.20 MCAP/SRC-SNK/ERR/BI-20-C [IUT receives Request Not Supported Response Code]

- Test Purpose
  Verify proper response when IUT requests clock synchronization with the Lower Tester that does not support the Clock Synchronization Protocol and receives “Request Not Supported” response code.

- Reference
  [3] 4.1.3.4/10, 5.0/2

- Initial Condition
  As defined in Section 2.2. Additionally, Control Channel connection has been established.

- Test Procedure
  1. IUT requests clock synchronization with a Lower Tester that advertises support for the Clock Synchronization Protocol, but does not support the Clock Synchronization Protocol (see Notes section).
  2. The Lower Tester sends “Request Not Supported” response code.
  3. IUT reacts by not continuing to send clock synchronization commands.

- Expected Outcome
  Pass verdict:
  - IUT no longer sends clock synchronization commands.
  - IUT remains in stable state and can process commands normally.

- Notes
  In this test, the Lower Tester may advertise support for the Clock Synchronization Protocol in SDP, but may respond that it does not support the Clock Synchronization Protocol for the purpose of the Invalid Behavior test.

4.4.2 Situations Not Resulting in Response Codes

Test Sub Group Objective:

- Verifies that procedures for handling uncommon cases and corner cases in MCAP have been properly considered in implementation.

4.4.2.1 MCAP/SRC-SNK/INV/BI-01-C [Control Channel is closed before a response is sent]

- Test Purpose
  Verify proper response when Control Channel is closed by the Lower Tester while the IUT is waiting for a response.
4.1.3/3

Initial Condition
As defined in Section 2.2. Additionally, Control Channel connection has been established by the IUT.

Test Procedure
1. IUT sends a command on the Control Channel.
2. The Lower Tester does not respond and closes the Control Channel.

Expected Outcome
Pass verdict:
- IUT returns to stable state and can process commands normally.

4.4.2.2 MCAP/SRC-SNK/INV/BI-02-C [Out-of-sequence operation - IUT as Acceptor]

Test Purpose
Verify proper response for case when IUT is the Control Channel Acceptor and receives a request from the Lower Tester while the IUT is waiting for a response from it.

Reference
[3] 4.1.3/5

Initial Condition
As defined in Section 2.2. Additionally, Control Channel connection has been established by the Lower Tester.

Test Procedure
1. IUT sends any request command on the Control Channel.
2. The Lower Tester does not respond to the request, but sends a request on the Control Channel.
3. IUT responds to the request from the Lower Tester.

Expected Outcome
Pass verdict:
- IUT processes the request from the Lower Tester as usual.
- IUT remains in stable state and can process commands normally.

4.4.2.3 MCAP/SRC-SNK/INV/BI-03-C [Out-of-sequence operation - IUT as Initiator]

Test Purpose
Verify proper response for the case when the IUT is the Control Channel Initiator and receives a request from the Lower Tester while waiting for a response from it.

Reference
[3] 4.1.3/5
• Initial Condition
  As defined in Section 2.2. Additionally, Control Channel connection has been established by the IUT

• Test Procedure
  1. IUT sends any request command on the Control Channel.
  2. The Lower Tester does not respond to the request, but sends a request on the Control Channel.
  3. IUT does not respond to the request from the Lower Tester.
  4. After some delay, the Lower Tester responds to the original request as normal.

• Expected Outcome
  Pass verdict:
  - IUT ignores extraneous request from the Lower Tester.
  - IUT receives the response and processes it as usual.
  - IUT remains in stable state and can process commands normally.

4.4.2.4 MCAP/SRC-SNK/INV/BI-04-C [Out-of-sequence operation - Response without corresponding Request]

• Test Purpose
  Verify proper response for case when IUT receives a response from the Lower Tester that does not correspond to an outstanding request.

• Reference
  [3] 4.1.3/6

• Initial Condition
  As defined in Section 2.2. Additionally, Control Channel connection has been established by the IUT, no request is outstanding.

• Test Procedure
  1. The Lower Tester sends a response packet on the Control Channel.

• Expected Outcome
  Pass verdict:
  - IUT ignores response packet.
  - IUT remains in stable state and can process commands normally.

4.4.2.5 MCAP/SRC-SNK/INV/BI-05-C [MDL ID already exists during an MDL Create by the Lower Tester]

• Test Purpose
  Verify proper response when MDL ID already exists for an MDL during an MD_CREATE_MDL by the Lower Tester.

• Reference
  [3] 4.1.3.7.1/2
Multi-Channel Adaptation Protocol (MCAP) / Test Specification

- **Initial Condition**
  As defined in Section 2.2. Additionally, Control Channel connection has been established.

- **Test Procedure**
  1. The Lower Tester creates MDL ID 3.
  2. The Lower Tester creates MDL ID 3 again (without closing) with a fresh context.

- **Expected Outcome**
  **Pass verdict:**
  - At Step 1, Data Channel is opened and “Success” is returned.
  - At Step 2, Data Channel is closed by IUT and “Success” is returned. Another Data Channel is accepted by the IUT according to the new context.
  - IUT returns to stable state and can process commands normally.

4.4.2.6 **MCAP/SRC-SNK/INV/BI-06-C [Lower Tester attempts to connect to Control Channel of same device using same PSM as open Control Channel]**

- **Test Purpose**
  Verify proper response when the Lower Tester attempts to connect to the Control Channel of the same device using the same PSM as an already open channel.

- **Reference**
  [3] 4.1

- **Initial Condition**
  As defined in Section 2.2. Additionally, Control Channel has been established.

- **Test Procedure**
  1. The Lower Tester attempts to connect to the Control Channel of an IUT using the same PSM as the Control Channel that is already open on the same device.
  2. IUT either:
     a) Refuses L2CAP connection and sends “Resource Unavailable” response code.
     b) OR quickly closes down the L2CAP connection without sending or responding to any data traffic.

- **Expected Outcome**
  **Pass verdict:**
  - Second connection attempt does not succeed (either refused, or closed immediately by IUT).
  - IUT returns to stable state and can process commands normally.

4.4.2.7 **MCAP/SRC-SNK/INV/BI-07-C [Lower Tester attempts to connect to Data Channel without having sent a Create or Reconnect request]**

- **Test Purpose**
Verify proper response when the Lower Tester attempts to connect to the Data Channel of device without having sent a CREATE_MDL or RECONNECT_MDL request.

• Reference
  [3] 4.2

• Initial Condition
  As defined in Section 2.2. Additionally, Control Channel has been established.

• Test Procedure
  1. The Lower Tester attempts to create an L2CAP channel to the Data Channel PSM without first sending a CREATE_MDL or RECONNECT_MDL request.
  2. IUT either:
     a) Refuses L2CAP connection using L2CAP Connection Response “Connection refused – no resources available”.
     b) OR quickly closes down the L2CAP connection without sending or responding to any data traffic.

• Expected Outcome
  Pass verdict:
  - Data Channel connection attempt does not succeed (either refused, or closed immediately by IUT).
  - IUT returns to stable state and can process commands normally.

4.5 MCAP Clock Synchronization
Test Group Objectives:
• Tests Clock Synchronization Protocol procedures.

4.5.1 IUT Initiates Synchronization (IUT as Sync-Master)
Test Sub Group Objectives:
• Tests that clock synchronization has been properly implemented for the case where IUT acts as the Sync-Master.

4.5.1.1 MCAP/SM/CS-I/BV-01-I [IUT requests clock synchronization]
• Test Purpose
  Verify proper behavior when IUT requests clock synchronization for case when Bluetooth half-slot set to valid number and TimeStamp_SyncTime differs from 0xFFFFFFFF FFFFFFFF (64 bits).

• Reference
  [3] 5.2.3.1, 5.2.3.2

• Initial Condition
As defined in Section 2.2. Additionally, Control Channel has been established. IUT supports the Clock Synchronization Protocol.

- **Test Procedure**
  1. IUT requests clock synchronization capability and the Lower Tester responds.
  2. IUT requests clock synchronization and the Lower Tester responds.
  3. Synchronization is performed.

- **Expected Outcome**
  
  **Pass verdict:**
  
  - IUT sends a MD_SYNC_CAP_REQ to the Lower Tester with a TimeStamp_RequiredAccuracy value that will be accepted by the Lower Tester.
  - IUT receives the MD_SYNC_CAP_RSP from the Lower Tester.
  - IUT sends a MD_SYNC_SET_REQ with BluetoothClock_SyncTime to a valid Bluetooth clock value (Bluetooth clock might wrap around) that is at least SyncLeadTime but less than 60 seconds in the future of the current Bluetooth clock value so that the Lower Tester will be able to perform the operation. TimeStamp_SyncTime shall be set to a value that differs from 0xFFFFFFFF FFFFFFF (64 bits).
  - IUT receives the MD_SYNC_SET_RSP.
  - Time-Stamp Clock is normalized to microseconds.
  - IUT does not perform piconet Role switch during the synchronization operation.

4.5.1.2 **MCAP/SM/CS-I/BV-02-I [IUT requests instant synchronization]**

- **Test Purpose**
  Verify proper behavior when IUT requests instant synchronization for case when Bluetooth Clock set to 0xFFFFFFFF and TimeStamp_SyncTime differs from 0xFFFFFFFF FFFFFFF (64 bits).

- **Reference**
  [3] 5.2.3.1, 5.2.3.2

- **Initial Condition**
  As defined in Section 2.2. Additionally, Control Channel has been established. IUT supports the Clock Synchronization Protocol.

- **Test Procedure**
  1. IUT requests clock synchronization capability and the Lower Tester responds.
  2. IUT requests instant clock synchronization by setting the Bluetooth Clock to 0xFFFFFFFF and the Lower Tester responds.
  3. Synchronization is performed.

- **Expected Outcome**
  
  **Pass verdict:**
  
  - IUT sends a MD_SYNC_CAP_REQ to the Lower Tester with a TimeStamp_RequiredAccuracy value that will be accepted by the Lower Tester.
- IUT receives a MD_SYNC_CAP_RSP from the Lower Tester.
- IUT sends a MD_SYNC_SET_REQ with Bluetooth Clock set to 0xFFFFFFFF to the Lower Tester. TimeStamp_SyncTime shall be set to a value that differs from 0xFFFFFFFF FFFFFFFF (64 bits).
- IUT receives a MD_SYNC_SET_RSP from the Lower Tester.
- TimeStamp_SyncTime does match parameter of the MD_SYNC_SET_REQ (with the TimeStamp_SampleAccuracy parameter taken in account).
- Time-Stamp Clock is normalized to microseconds.
- IUT does not perform piconet Role switch during the synchronization operation.

4.5.1.3 MCAP/SM/CS-I/BV-03-C [IUT acts as Sync-Master and Sync-Slave simultaneously]

- Test Purpose
  Verify proper behavior when IUT acts as Sync-Master and Sync-Slave simultaneously.

- Reference
  [3] 5.2.3.1, 5.2.3.2

- Initial Condition
  As defined in Section 2.2. Additionally, Control Channel has been established. IUT supports the Clock Synchronization Protocol.

- Test Procedure
  1. IUT requests clock synchronization capability and the Lower Tester responds.
  2. IUT requests clock synchronization with a Lower Tester that supports the CSP.
  3. The Lower Tester requests clock synchronization capability and IUT responds.
  4. The Lower Tester requests clock synchronization with an IUT that supports the CSP and IUT responds.
  5. The Lower Tester responds to the IUT clock synchronization request from step 2. This may occur before the IUT responds in step 4 depending on how the actual synchronization time is set.
  6. Synchronization is performed.

- Expected Outcome
  Pass verdict:
  - IUT sends a MD_SYNC_CAP_REQ to the Lower Tester with a TimeStamp_RequiredAccuracy value that will be accepted by the Lower Tester.
  - IUT receives the MD_SYNC_CAP_RSP from the Lower Tester.
  - IUT sends a MD_SYNC_SET_REQ with BluetoothClock_SyncTime to a valid Bluetooth clock value (Bluetooth clock might wrap around) that is at least SyncLeadTime but less than 60 seconds in the future of the current Bluetooth clock value so that the Lower Tester will be able to perform the operation. TimeStamp_SyncTime shall be set to a value that differs from 0xFFFFFFFF FFFFFFFF (64 bits).
  - IUT receives the MD_SYNC_CAP_REQ from the Lower Tester with a TimeStamp_RequiredAccuracy value that will be accepted by the IUT.
- IUT sends the MD_SYNC_CAP_RSP to the Lower Tester.
- IUT receives a MD_SYNC_SET_REQ with BluetoothClock.SyncTime to a valid Bluetooth clock value (Bluetooth clock might wrap around) that is at least SyncLeadTime but less than 60 seconds in the future of the current Bluetooth clock value so that the IUT will be able to perform the operation. TimeStamp.SyncTime shall be set to a value that differs from 0xFFFFFFFF FFFFFFFF (64 bits).
- IUT sends the MD_SYNC_SET_RSP to the Lower Tester.
- IUT receives the MD_SYNC_SET_RSP from the Lower Tester.
- Time-Stamp Clock is normalized to microseconds.
- IUT does not perform piconet Role switch during the synchronization operation.
- TimeStamp.SyncTime does match parameter of the MD_SYNC_SET_REQ (with the TimeStamp_SampleAccuracy parameter taken in account).

4.5.1.4 MCAP/SM/CS-I/BV-04-C [IUT initiates update of clock instances]

- **Test Purpose**
  Verify proper behavior when IUT initiates an update of the clock instances to the Sync-Slave.

- **Reference**
  [3] 5.2.3.1, 5.2.3.2, 5.2.3.3

- **Initial Condition**
  As defined in Section 2.2. Additionally, Control Channel has been established. Clock synchronization was previously performed successfully.

- **Test Procedure**
  1. IUT initiates an update of the clock instances to the Lower Tester and the Lower Tester responds.
  2. Synchronization update is performed.

- **Expected Outcome**
  Pass verdict:
  - IUT sends a MD_SYNC_SET_REQ with BluetoothClock.SyncTime to a valid Bluetooth clock value (Bluetooth clock might wrap around) that is at least SyncLeadTime but less than 60 seconds in the future of the current Bluetooth clock value so that the Lower Tester will be able to perform the operation. TimeStamp.SyncTime shall be set to a value that differs from 0xFFFFFFFF FFFFFFFF (64 bits). TimeStamp.UpdateInformation shall be set to 1.
  - IUT receives the MD_SYNC_SET_RSP from the Lower Tester.
  - IUT receives the MD_SYNC_INFO_IND from the Lower Tester.
  - Time-Stamp Clock is normalized to microseconds.
  - IUT does not perform piconet Role switch during the synchronization operation.

4.5.2 IUT Responds to Synchronization Request (IUT as Sync-Slave)
• Tests that clock synchronization has been properly implemented for case where IUT acts as the Sync-Slave.

4.5.2.1 MCAP/SS/CS-R/BV-01-I [IUT responds to clock synchronization request]

• Test Purpose

Verify proper behavior when IUT responds to a clock synchronization request when Bluetooth half-slot set to valid number and TimeStamp_SyncTime differs from 0xFFFFFFFF FFFFFFFF (64 bits).

• Reference

[3] 5.2.3.1, 5.2.3.2

• Initial Condition

As defined in Section 2.2. Additionally, Control Channel has been established. IUT supports the Clock Synchronization Protocol.

• Test Procedure

1. The Lower Tester requests clock synchronization capability and IUT responds.
2. The Lower Tester requests clock synchronization and IUT responds.
3. Synchronization is performed.

• Expected Outcome

Pass verdict:

- IUT receives the MD_SYNC_CAP_REQ from the Lower Tester with a TimeStamp_RequiredAccuracy value that will be accepted by the IUT.
- IUT sends the MD_SYNC_CAP_RSP to the Lower Tester.
- IUT receives a MD_SYNC_SET_REQ with BluetoothClock_SyncTime to a valid Bluetooth clock value (Bluetooth clock might wrap around) that is at least SyncLeadTime but less than 60 seconds in the future of the current Bluetooth clock value so that the IUT will be able to perform the operation. TimeStamp_SyncTime shall be set to a value that differs from 0xFFFFFFFF FFFFFFFF (64 bits).
- IUT sends the MD_SYNC_SET_RSP.
- Time-Stamp Clock is normalized to microseconds.
- IUT does not perform piconet Role switch during the synchronization operation.
- TimeStamp_SyncTime does match parameter of the MD_SYNC_SET_REQ (with the TimeStamp_SampleAccuracy parameter taken in account).

4.5.2.2 MCAP/SS/CS-R/BV-02-I [IUT responds to instant synchronization request]

• Test Purpose

Verify proper behavior when the Lower Tester requests instant synchronization for case when Bluetooth Clock set to 0xFFFFFFFF and TimeStamp_SyncTime differs from 0xFFFFFFFF FFFFFFFF (64 bits).

• Reference

[3] 5.2.3.1, 5.2.3.2
• Initial Condition
As defined in Section 2.2. Additionally, Control Channel has been established. IUT supports the Clock Synchronization Protocol.

• Test Procedure
1. The Lower Tester requests clock synchronization capability and IUT responds.
2. The Lower Tester requests instant clock synchronization by setting the Bluetooth Clock to 0xFFFFFFFF and IUT responds.
3. Synchronization is performed.

• Expected Outcome
Pass verdict:
- IUT receives the MD_SYNC_CAP_REQ from the Lower Tester with a TimeStamp_RequiredAccuracy value that will be accepted by the IUT.
- IUT sends the MD_SYNC_CAP_RSP to the Lower Tester.
- IUT receives the MD_SYNC_SET_REQ with Bluetooth Clock set to 0xFFFFFFFF. TimeStamp_SyncTime shall be set to a value that differs from 0xFFFFFFFF FFFFFFFF (64 bits).
- IUT sends the MD_SYNC_SET_RSP.
- Time-Stamp Clock is normalized to microseconds.
- IUT does not perform piconet Role switch during the synchronization operation.
- TimeStamp_SyncTime does match parameter of the MD_SYNC_SET_REQ (with the TimeStamp_SampleAccuracy parameter taken in account).

4.5.2.3 MCAP/SS/CS-R/BV-03-C [IUT responds to request for update of clock instances from Sync-Master]

• Test Purpose
Verify proper behavior when IUT responds to a request for an update of the clock instances from the Sync-Master.

• Reference
[3] 5.2.3.1, 5.2.3.2

• Initial Condition
As defined in Section 2.2. Additionally, Control Channel has been established. IUT supports the Clock Synchronization Protocol.

• Test Procedure
1. The Lower Tester (Sync-Master) initiates an update of the clock instances to the IUT (Sync-Slave) and IUT responds.
2. Synchronization update is performed.

• Expected Outcome
Pass verdict:
- TimeStamp_SyncTime shall be set to a value that differs from 0xFFFFFFFF FFFFFFFF (64 bits). TimeStamp_UpdateInformation shall be set to 1.

- IUT sends the MD_SYNC_SET_RSP to the Lower Tester.

- IUT sends the MD_SYNC_INFO_IND to the Lower Tester within the SyncLeadTime.

- IUT sends the MD_SYNC_INFO_IND to the Lower Tester again within the Time-Stamp Update Interval (See Note below).

- Time-Stamp Clock is normalized to microseconds.

- IUT does not perform piconet Role switch during the synchronization operation.

- TimeStamp_SyncTime does match parameter of the MD_SYNC_SET_REQ (with the TimeStamp_SampleAccuracy parameter taken in account).

**Notes**

The Time-Stamp Update Interval value is not directly available, but can be easily calculated as TimeStamp_RequiredAccuracy (from Sync-Master) divided by TimeStamp_NativeAccuracy (from Sync-Slave).

### 4.5.2.4 MCAP/SS/CS-R/BV-04-C [IUT in PENDING state responds to clock synchronization request]

**Test Purpose**

Verify proper behavior when IUT in PENDING state responds to a clock synchronization request when Bluetooth half-slot set to 0xFFFFFFFF and TimeStamp_SyncTime differs from 0xFFFFFFFF FFFFFFFF (64 bits).

**Reference**

[3] 5.2.3.1, 5.2.3.2, 4.1.2

**Initial Condition**

As defined in Section 2.2. Additionally, Control Channel has been established. IUT supports the Clock Synchronization Protocol in addition to MCAP standard op codes.

**Test Procedure**

1. The Lower Tester sends MD_CREATE_MDL to the IUT.
2. IUT sends “Success” response code and enters PENDING state (awaiting L2CAP connection request).
3. The Lower Tester requests clock synchronization capability and IUT responds.
4. The Lower Tester requests clock synchronization and IUT responds.
5. Synchronization is performed.
6. The Lower Tester sends L2CAP connection request and IUT accepts.
7. Data is exchanged on the created Data Channel.

**Expected Outcome**

Pass verdict:

- IUT responds with “Success” for the MD_CREATE_MDL.
- IUT receives the MD_SYNC_CAP_REQ from the Lower Tester with a TimeStamp_RequiredAccuracy value that will be accepted by the IUT.
- IUT sends the MD_SYNC_CAP_RSP to the Lower Tester.
- IUT receives a MD_SYNC_SET_REQ with BluetoothClock_SyncTime to 0xFFFFFFFF.
  TimeStamp_SyncTime shall be set to a value that differs from 0xFFFFFFFF FFFFFFFF (64 bits).
- IUT sends the MD_SYNC_SET_RSP.
- Time-Stamp Clock is normalized to microseconds.
- IUT does not perform piconet Role switch during the synchronization operation.
- TimeStamp_SyncTime does match parameter of the MD_SYNC_SET_REQ (with the
  TimeStamp_SampleAccuracy parameter taken in account).
- Following clock synchronization, the IUT accepts the Data Channel connection.
- Data is successfully exchanged on the created Data Channel.

4.5.3 Multi-MCL Handling

Test Sub Group Objectives:

- Verify proper behavior when IUT supports multiple MCLs simultaneously.

4.5.3.1 MCAP/SRC-SNK/CS-M/BV-01-C [IUT responds to clock synchronization when multiple MCLs exist]

- Test Purpose
  Verify proper behavior when IUT as Sync-Slave receives clock synchronization with device when two or more MCLs exist.

- Reference
  [3] 5.3

- Initial Condition
  As defined in Section 2.2. Additionally, the Control Channels for two MCLs (MCL-A, MCL-B) and optional additional MCLs have been established. IUT supports the Clock Synchronization Protocol.

- Test Procedure
  1. The Lower Tester requests clock synchronization capability on MCL-A and IUT responds.
  2. The Lower Tester requests clock synchronization capability on MCL-B and IUT responds.
  3. The Lower Tester requests clock synchronization on MCL-A with TimeStamp_SyncTime to 0x00000000 00000000 (64 bits) and IUT responds.
  4. The Lower Tester requests clock synchronization on MCL-B with TimeStamp_SyncTime to 0x80000000 00000000 (64 bits) and IUT responds.
  5. The Lower Tester requests clock synchronization on MCL-A with BluetoothClock_SyncTime to 0xFFFFFFFF. TimeStamp_SyncTime shall be set to 0xFFFFFFFF FFFFFFFF (64 bits)
  6. The Lower Tester requests clock synchronization on MCL-B with BluetoothClock_SyncTime to 0xFFFFFFFF. TimeStamp_SyncTime shall be set to 0xFFFFFFFF FFFFFFFF (64 bits).
  7. Synchronization is performed for MCL-A and MCL-B.

- Expected Outcome
  Pass verdict:
Time-Stamp Clocks are normalized to microseconds.
- IUT does not perform piconet Role switch during the synchronization operation.
- TimeStamp_SyncTimes in IUT responses match parameter of the MD_SYNC_SET_REQs (with the TimeStamp_SampleAccuracy parameter taken in account).

4.5.4 Clock Synchronization Error Handling

Test Sub Group Objectives:

- Tests that support for error handling has been properly implemented. This includes situations where a response code is received by an IUT and situations which result in the generation of a response code.

4.5.4.1 Multi-Channel Adaptation Protocol (MCAP) / SRC-SNK/CS-ERR/BI-01-C [IUT receives unsupported standard op code command and sends Response Code]

Test Purpose

Verify proper response when IUT that does not support Standard Op Codes receives an unsupported standard op code command.

Reference

[3] 4.1.3.2/4, 4.1.3.4/10, 5.0/1

Initial Condition

As defined in Section 2.2. Additionally, Control Channel connection has been established.

Test Procedure

1. The Lower Tester sends standard op codes (Create, Reconnect and Abort) to an IUT that does not support standard op codes.

Expected Outcome

Pass verdict:
- IUT sends “Request Not Supported” response code for each unsupported op code.
- IUT returns to stable state and can process commands normally.

4.5.4.2 MCAP/SS/CS-ERR/BI-02-C [IUT detects invalid Bluetooth clock setting (Invalid slot number)]

Test Purpose

Verify proper response when invalid Bluetooth clock setting is detected by IUT (Invalid slot number).

Reference

[3] 5.2.3.1, 5.2.3.2

Initial Condition
As defined in Section 2.2. Additionally, Control Channel has been established.

- **Test Procedure**
  1. The Lower Tester initiates clock synchronization with IUT with a Bluetooth clock set to an invalid Bluetooth Clock time slot number (i.e. any value between 0x10000000 to i.e.0xFFFFFFFF).
  2. IUT sends “Invalid Parameter Value” response code.

- **Expected Outcome**

  **Pass verdict:**
  - TimeStamp_SyncTime shall be set to a value other than 0xFFFFFFFF FFFFFFFF (64 bits).
  - IUT sends a MD_SYNC_SET_RSP with response code set to 0x02 (Invalid Parameter Value).
  - Response Parameters in the Response Packet (bytes 3-16) are set to zero.
  - IUT returns to stable state and can process commands normally.

4.5.4.3 MCAP/SS/CS-ERR/BI-03-C [IUT detects invalid Bluetooth clock setting (slot number exceeds max value)]

- **Test Purpose**
  Verify proper response when an invalid Bluetooth clock setting is detected by the IUT due to a Bluetooth Clock time slot number that exceeds the maximum value.

- **Reference**
  [3] 5.2.3.1, 5.2.3.2

- **Initial Condition**
  As defined in Section 2.2. Additionally, Control Channel has been established.

- **Test Procedure**
  1. The Lower Tester initiates clock synchronization with IUT with a Bluetooth clock set to a valid slot number, but a slot number that the piconet Bluetooth clock will reach after more than 60 seconds in the future (i.e. the Baseband Half-Slot Instant indicated by BluetoothClock_SyncTime was more than SyncLeadTime plus 60 seconds in the future at the time the request was received).
  2. IUT sends “Invalid Parameter Value” response code.

- **Expected Outcome**

  **Pass verdict:**
  - TimeStamp_SyncTime shall be set to a value other than 0xFFFFFFFF FFFFFFFF (64 bits).
  - IUT sends a MD_SYNC_SET_RSP with response code set to 0x02 (Invalid Parameter Value).
  - Response Parameters in the Response Packet (bytes 3-16) are set to zero.
  - IUT returns to stable state and can process commands normally.

4.5.4.4 MCAP/SS/CS-ERR/BI-04-C [IUT detects invalid Bluetooth clock setting (slot number below min value)]

- **Test Purpose**
Verify proper response when an invalid Bluetooth clock setting is detected by the IUT due to a Bluetooth Clock time slot number that is below the minimum value.

- Reference
  [3] 5.2.3.1, 5.2.3.2

- Initial Condition
  As defined in Section 2.2. Additionally, Control Channel has been established.

- Test Procedure
  1. The Lower Tester initiates clock synchronization with IUT with a Bluetooth clock set to a valid slot number, but a slot number that the piconet Bluetooth clock will reach to before the indicated synchronization preparation time in the future (i.e. the Baseband Half-Slot Instant indicated by BluetoothClock_SyncTime was less than SyncLeadTime in the future at the time the request was received).
  2. IUT sends “Invalid Parameter” response code.

- Expected Outcome
  Pass verdict:
  - TimeStamp.SyncTime shall be set to a value other than 0xFFFFFFFF FFFFFFFF (64 bits).
  - IUT sends a MD_SYNC_SET_RSP with response code set to 0x02 (Invalid Parameter Value).
  - Response Parameters in the Response Packet (bytes 3-16) are set to zero.
  - IUT returns to stable state and can process commands normally.
## 5 Test Case Mapping

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

The columns for the TCMT are defined as follows:

**Item:** Contains a y/x reference, where y corresponds to the table number and x corresponds to the feature number as defined in the ICS Proforma for Multi-Channel; Adaptation Protocol (MCAP) [4]. 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.

**Test Case Applicable:** May be used to note if a test is required based on the supported features.

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.

<table>
<thead>
<tr>
<th>Item</th>
<th>Feature</th>
<th>Test Case(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCAP 3/2 OR MCAP 5/2</td>
<td>Control and Data Channel Establishment</td>
<td>MCAP/SRC-SNK/CE/BV-01-C</td>
</tr>
<tr>
<td>MCAP 3/3 OR MCAP 5/3</td>
<td>Control and Data Channel Establishment</td>
<td>MCAP/SRC-SNK/CE/BV-02-C</td>
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<td>(MCAP 3/2 AND MCAP 3/3) OR (MCAP 5/2 AND MCAP 5/3)</td>
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</tr>
<tr>
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<td>MCAP/SRC-SNK/CM-DIS/BV-01-C</td>
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<tr>
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<td>Item</td>
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<td>MCAP/SRC-SNK/CM-DEL/BV-01-C</td>
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<td>MCAP/SRC-SNK/CM-DEL/BV-02-C</td>
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<td>Clock Synchronization - Error Handling</td>
<td>MCAP/SS/CS-ERR/BI-04-C</td>
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</table>

*Table 5.1: Test Case Mapping*