

3D Synchronization Profile (3DSP)

Bluetooth® Test Suite

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1 Scope

This Bluetooth document contains the Test Suite Structure (TSS) and test cases to test the implementation of the Bluetooth 3D Synchronization Profile (3DSP) with the objective to provide a high probability of air interface interoperability between the tested implementation and other manufacturers' Bluetooth devices.

2 References, definitions, and abbreviations

2.1 References

This document incorporates provisions from other publications by dated or undated reference. These references are cited at the appropriate places in the text, and the publications are listed hereinafter. Additional definitions and abbreviations can be found in [1], [2], [3], and [4].

- [1] Bluetooth Core Specification, Version 4.0 or later
- [2] Bluetooth Core Specification Addendum 4
- [3] Test Strategy and Terminology Overview
- [4] 3D Synchronization Profile Specification
- [5] 3D Synchronization Profile ICS
- [6] Bluetooth Specification Guidelines
- [7] ITU-T X.290 series, OSI CONFORMANCE TESTING METHODOLOGY AND FRAMEWORK
PROTOCOL RECOMMENDATIONS FOR ITU-T APPLICATIONS, ITU Recommendation X.290
series (equivalent to ISO 9646)
- [8] ITU-T Z.120, Formal description techniques (FDT) - Message Sequence Chart
- [9] 3D Synchronization Profile Implementation eXtra Information for Test, IXIT
- [10] SDP Test Suite, SDP.TS

2.2 Definitions

In this Bluetooth document, the definitions from [1], [2], [3], and [4] apply.

In this Bluetooth document, the following definitions also apply.

Lower Tester 3DD – a lower level tester that implements all of the features of the Bluetooth 3D Synchronization Profile and operates in the Role of a Bluetooth 3D Display in order to be used to test Bluetooth 3D Glasses IUTs.

Lower Tester 3DG – a lower level tester that implements all of the features of the Bluetooth 3D Synchronization Profile and operates in the Role of a Bluetooth 3D Glasses in order to be used to test Bluetooth 3D Display IUTs.

Role - Bluetooth devices conforming to the Bluetooth 3D Synchronization Profile may act in the role of a Bluetooth 3D Display or a pair of Bluetooth 3D Glasses. For a given test, the Implementation Under Test will act in either the role of a Bluetooth 3D Display or a pair of Bluetooth 3D Glasses while the Tester will act in the opposite role as the Implementation Under Test.

2.3 Acronyms and abbreviations

In this Bluetooth document, the definitions, acronyms, and abbreviations from [1], [2], [3], and [4] apply.

3 Test Suite Structure (TSS)

3.1 Test setup descriptions

The testing of Bluetooth 3D Displays and Bluetooth 3D Glasses requires a square wave signal generator that is capable of generating an analog 0 - 10 volt peak-to-peak square wave signal in the frequency range of 1-240 Hz. This signal generator generates the reference Frame Sync signal that is supplied to the external Frame Sync input on a 3DD IUT and on a Lower Tester 3DD in the test setups.

The testing also requires an oscilloscope for measuring and observing the left and right lens shutter control signal outputs from a 3DG IUT and from the Lower Tester 3DG in the test setups. The oscilloscope has a minimum bandwidth of 20 MHz, a minimum of four channels, two of which are capable of performing channel math, i.e., Channel A minus Channel B to measure the differential voltage applied to the shutter.

3.1.1 3DD IUT test setup

Figure 3.1 describes the test setup for testing a 3DD IUT.

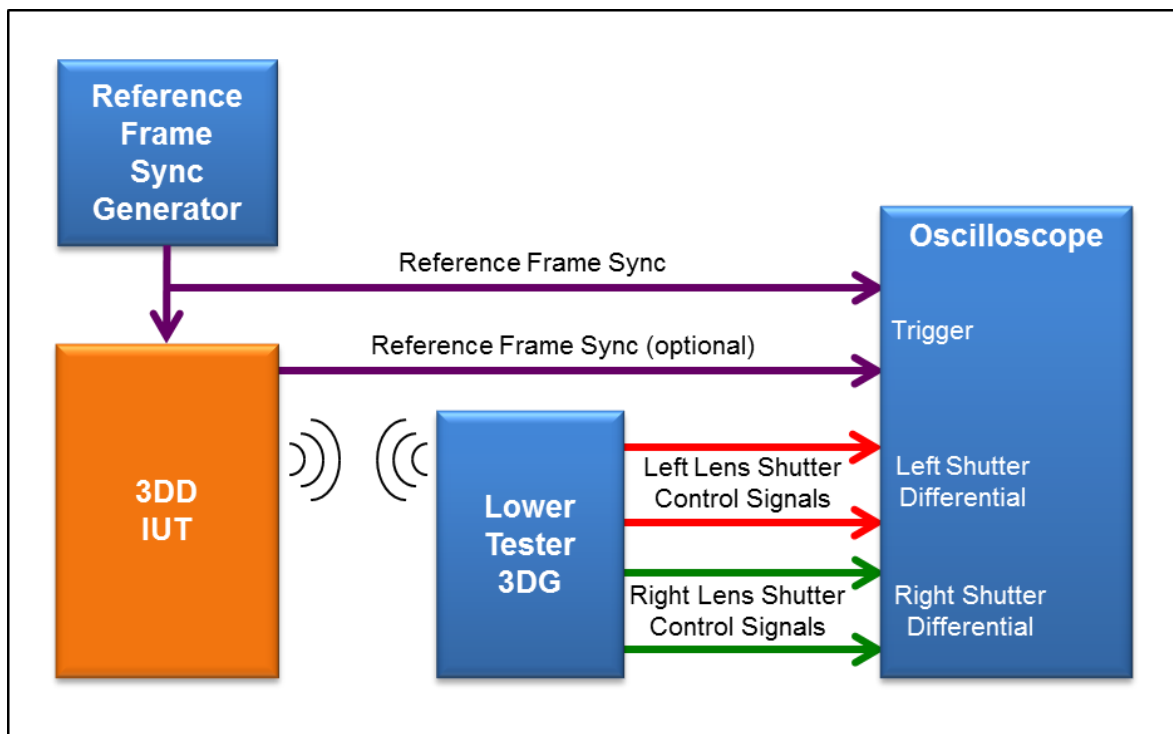


Figure 3.1: 3DD IUT Test Setup

3.1.1.1 Reference Frame Sync Generator setup

The Reference Frame Sync Generator is configured as follows:

- Frequency: as required by the test procedure
- Waveform: Square Wave
- Output Voltage: as specified in the 3DD IUT's IXIT identifiers:
TSPX_frame_sync_input_signal_lower_voltage and
TSPX_frame_sync_input_signal_upper_voltage.

3.1.1.2 3DD IUT setup

The 3DD IUT submitted for qualification is provided as follows:

- The 3DD IUT has a signal input for an external Frame Sync signal with the parameters for this external Frame Sync input signal specified in the 3DD IUT's IXIT.
- The Reference Frame Sync Generator is connected the 3DD IUT's external Frame Sync input.

3.1.1.3 Lower Tester 3DG setup

The Lower Tester 3DG is configured as follows:

- The Lower Tester 3DG is configured with the following shutter timing adjustments set to zero.
- TSPX_shutter_open_3DG_timing_offset_adjustment
- TSPX_shutter_close_3DG_timing_offset_adjustment
- The 3DD Lower Tester is connected to an oscilloscope per Section 3.1.1.4.

3.1.1.4 Lower Tester 3DG oscilloscope setup

The setup of the oscilloscope is unique to the make and model chosen to perform the testing. The following is a general guideline for setting up an oscilloscope to measure the Left Lens Shutter Control Signals and their timing parameters. The Right Lens Shutter Control Signals are tested likewise. The voltage level parameters for measuring these signals are defined in the Lower Tester 3DG's operational specifications.

- Channel A: Reference Frame Sync
- Channel B: Not used
- Channel C: Left Lens Shutter Control Signal A (1 of 2)
- Channel D: Left Lens Shutter Control Signal B (2 of 2)
- Trigger Source: Channel A
- Channel Math: Channel C minus Channel D
- Timebase: 4ms/division initially, 2ms/division for measurement.
- Channel volts/division: Refer to the voltage level parameters specified in the Lower Tester 3DG's operational specifications. Set the volts/division for each channel accordingly.

3.1.1.4.1 Oscilloscope measured parameters

The oscilloscope will be used to measure: 1) the time that the shutters open and close relative to the Reference Frame Sync instance and 2) the average Regenerated Frame Sync period.

When the shutter open instance (or the shutter close instance) occurs before the leading edge of the Reference Frame Sync instance, the time difference between them is recorded as a negative value, otherwise it is recorded as a positive value.

The following are the terms and their definitions for the shutter timing parameters measured using the oscilloscope. These terms are depicted in the oscilloscope waveforms examples shown in Section 3.1.2.5.

- tLeftOpen – The time from the leading edge of the Frame Sync instance to the leading edge of the left shutter open voltage instance.
- tLeftClose - The time from the leading edge of the Frame Sync instance to the leading edge of the left shutter close voltage instance.

- tRightOpen – The time from the leading edge of the Frame Sync instance to the leading edge of the right shutter open voltage instance.
- tRightClose – The time from the leading edge of the Frame the Sync instance to the leading edge of the right shutter close voltage instance.
- tRegenerated Frame Sync Period X 10 – The total time of ten cycles of the left shutter opening and closing.

3.1.2 3DG IUT test setup

Figure 3.2 describes the test setup for testing a 3DG IUT.

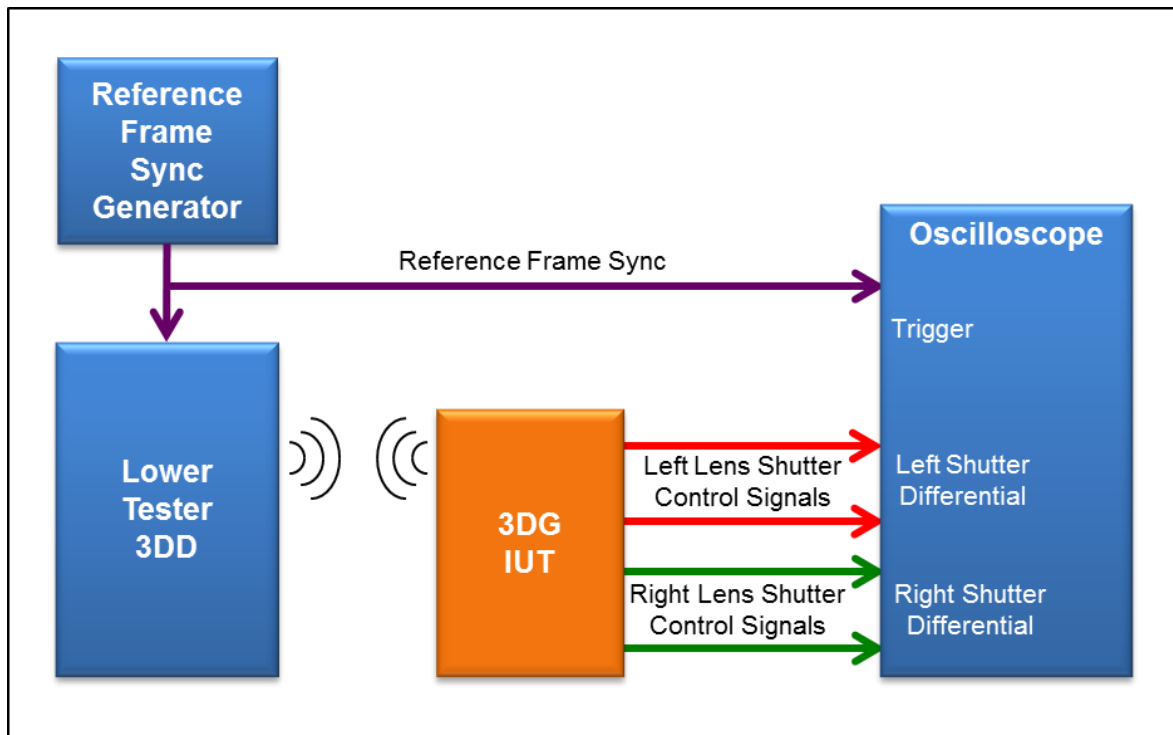


Figure 3.2: 3DG IUT Test Setup

3.1.2.1 Reference Frame Sync Generator setup

The Reference Frame Sync Generator is configured as follows:

- Frequency: as required by the test procedure
- Waveform: Square Wave
- Output Voltage: as required by the Lower Tester 3DD

3.1.2.2 3DG IUT setup

The 3DG IUT submitted for qualification is provided as follows:

- The LCD lens shutters are disconnected from the analog control drive signals in order to eliminate any distortion of the lens shutter control signal waveforms caused by the capacitance of the LCD shutters. This improves the accuracy of measuring the timing associated with these signals.
- Test Points are provided for the following signals and are suitable for attaching oscilloscope probes and probe ground leads.

- Left Shutter Control Signal A (1 of 2)
- Left Shutter Control Signal B (2 of 2)
- Right Shutter Control Signal A (1 of 2)
- Right Shutter Control Signal B (2 of 2)
- Common Voltage Reference, i.e., Ground
- Representative drawings or oscilloscope photographs of the expected waveforms for 3D and 2D modes of operations are provided by the 3DG implementer to aid in the oscilloscope setup and observation of the shutter control waveforms.

3.1.2.3 Lower Tester 3DD setup

The Lower Tester 3DD is configured as follows:

- The Reference Frame Sync Generator is connected to the Lower Tester 3DD Frame Sync Input with the parameters for this Frame Sync input signal defined in the Lower Tester 3DD's operational specifications.
- The Lower Tester 3DD Lens Shutter Timing Parameters are set according to the following rules:
 - Use [Table 3.1](#) for test procedures specifying a Reference Frame Sync Frequency of 50 Hz.
 - Use [Table 3.2](#) for test procedures specifying a Reference Frame Sync frequency of 59.94 Hz.
 - Use [Table 3.2](#) for test procedures specifying a Reference Frame Sync other than 59.94 Hz or 50 Hz.
- Randomly select one of the Shutter Timing Test Sets from [Table 3.1](#) or [Table 3.2](#) based upon the Reference Frame Sync Frequency required by the test procedure. Configure the following Lower Tester 3DD's 3D Broadcast Message payload parameters with the values from the respective table. If multiple tests are performed, do not reuse the same values until all Shutter Timing Test Sets have been used at least once.
 - Left Lens Shutter Open Offset
 - Left Lens Shutter Close Offset
 - Right Lens Shutter Open Offset
 - Right Lens Shutter Close Offset

50 Hz Reference Frame Sync Frequency Shutter Timing Offsets				
Shutter Timing Test Set #	Left lens shutter open offset (μsec)	Left lens shutter close offset (μsec)	Right lens shutter open offset (μsec)	Right lens shutter close offset (μsec)
1	-750	10000	9250	20000
2	-500	9750	9500	19750
3	-250	9500	9750	19500
4	0	9250	10000	19250
5	250	9000	10250	19000
6	500	8750	10500	18750
7	750	8500	10750	18500

Table 3.1: Lower Tester 3DD Shutter Timing Offsets - 50 Hz

59.94 Hz Reference Frame Sync Frequency Shutter Timing Offsets				
Shutter Timing Test Set #	Left lens shutter open offset (μsec)	Left lens shutter close offset (μsec)	Right lens shutter open offset (μsec)	Right lens shutter close offset (μsec)
1	-750	8341	7593	16683
2	-500	8092	7842	16432
3	-250	7843	8093	16183
4	0	7592	8342	15932
5	250	7343	8593	15683
6	500	7092	8842	15432
7	750	6843	9093	15183

Table 3.2: Lower Tester 3DD Shutter Timing Offsets – 59.94 Hz

3.1.2.4 3DG IUT oscilloscope setup

The setup of the oscilloscope specified in Section 3.1.1.4 for the Lower Tester 3DG should be used for the oscilloscope setup for the 3DG IUT. The Channel volts/division should be set according to the expected signal voltage levels specified in the 3DG IUT's IXIT.

3.1.2.5 3DG lens shutter control signal example waveforms

The lens shutter control waveform and voltage requirements are unique to the liquid crystal technology implemented in the 3DG lens shutters. Currently available Twisted Nematic (TN) liquid crystal shutters typically require several volts applied to the shutter to close. Conversely, the TN shutter is open when the voltage applied to the shutter is zero. Since a constant DC voltage differential will damage the liquid crystal material, liquid crystal shutters are typically driven by a bipolar DC differential voltage for closing the shutter and a zero DC differential voltage for open.

The oscilloscope photos shown in Figure 3.3 through Figure 3.9 are representative of the lens shutter control signals for a hypothetical 3DG's TN shutter implementation as well as for the Lower Tester 3DG. Each shutter control signal has three voltage states, +5 volts, -5 volts and 0 volts relative to a common ground. When observed on the oscilloscope without channel math, the values shown in Table 3.3 columns A & B will be observed as two waveforms for Lens Shutter Control Signal A and Lens Shutter Control Signal B, respectively. With channel math set to A-B, the values shown in Table 3.3 column A-B will be observed with a single waveform depicting the actual differential voltage applied to the liquid crystal shutter being seen on the oscilloscope.

Lens Shutter State	Lens Shutter Control Signals		
	A	B	A - B
Closed	+5 Volts	-5 Volts	+10 Volts
Open	0 Volts	0 Volts	0 Volts
Closed	-5 Volts	+5 Volts	-10 Volts

Table 3.3: Example shutter state voltages

This differential voltage measurement method has been used for all of the following oscilloscope photos shown in Figure 3.3 through Figure 3.9 below.

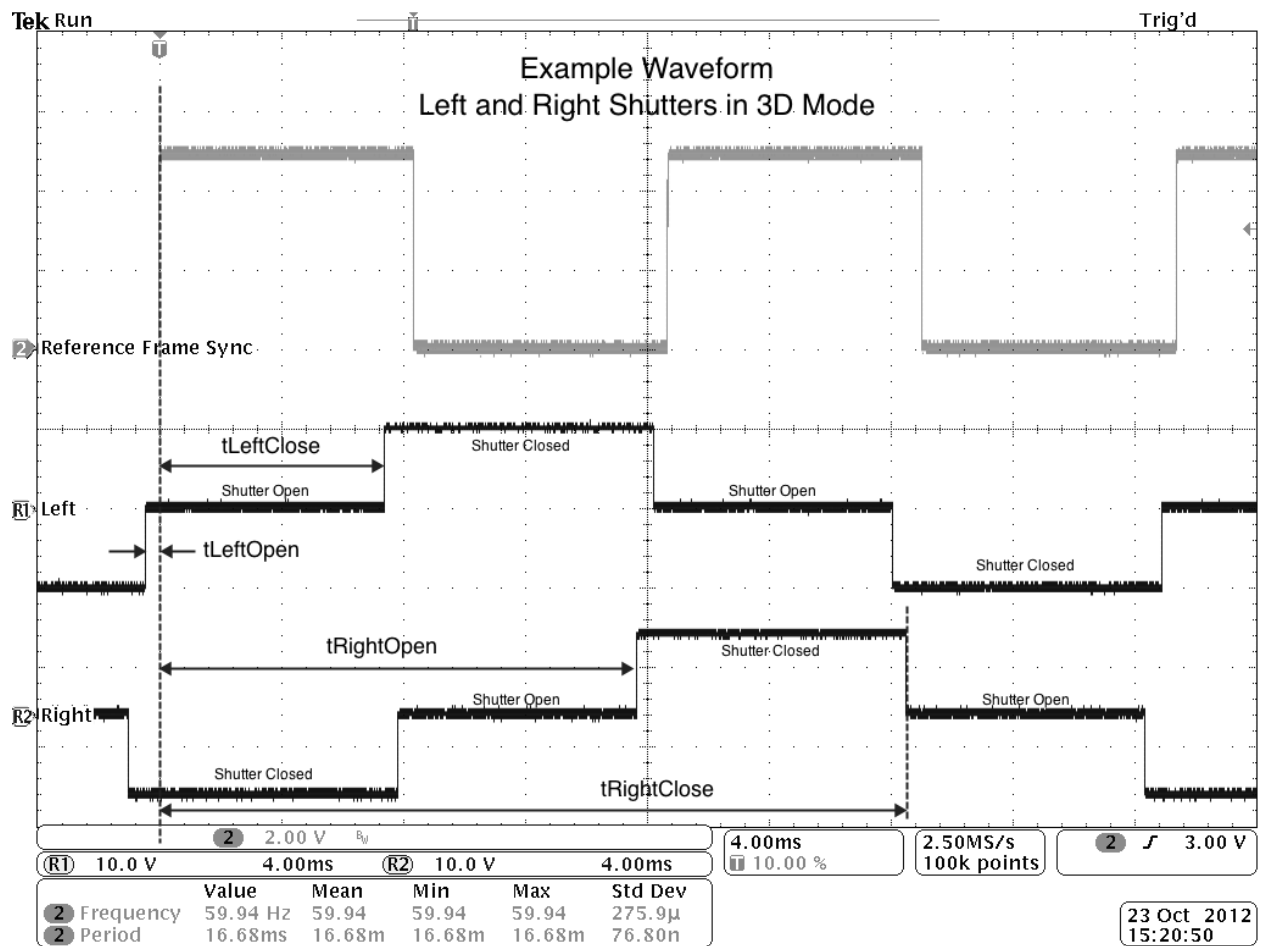


Figure 3.3: 3D Mode Lens Shutter Control Signal Waveforms

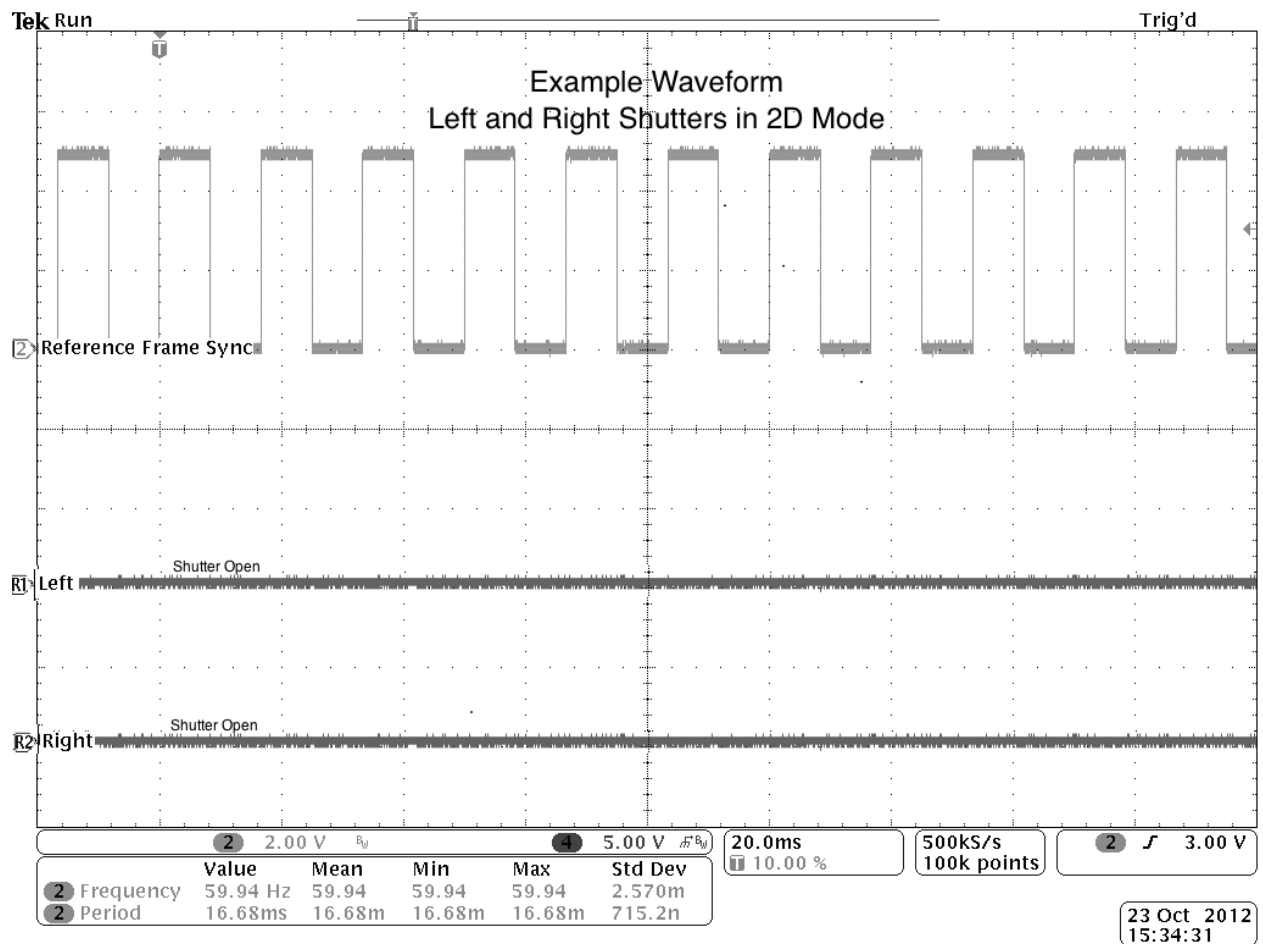


Figure 3.4: 2D Mode Lens Shutter Control Signal Waveforms

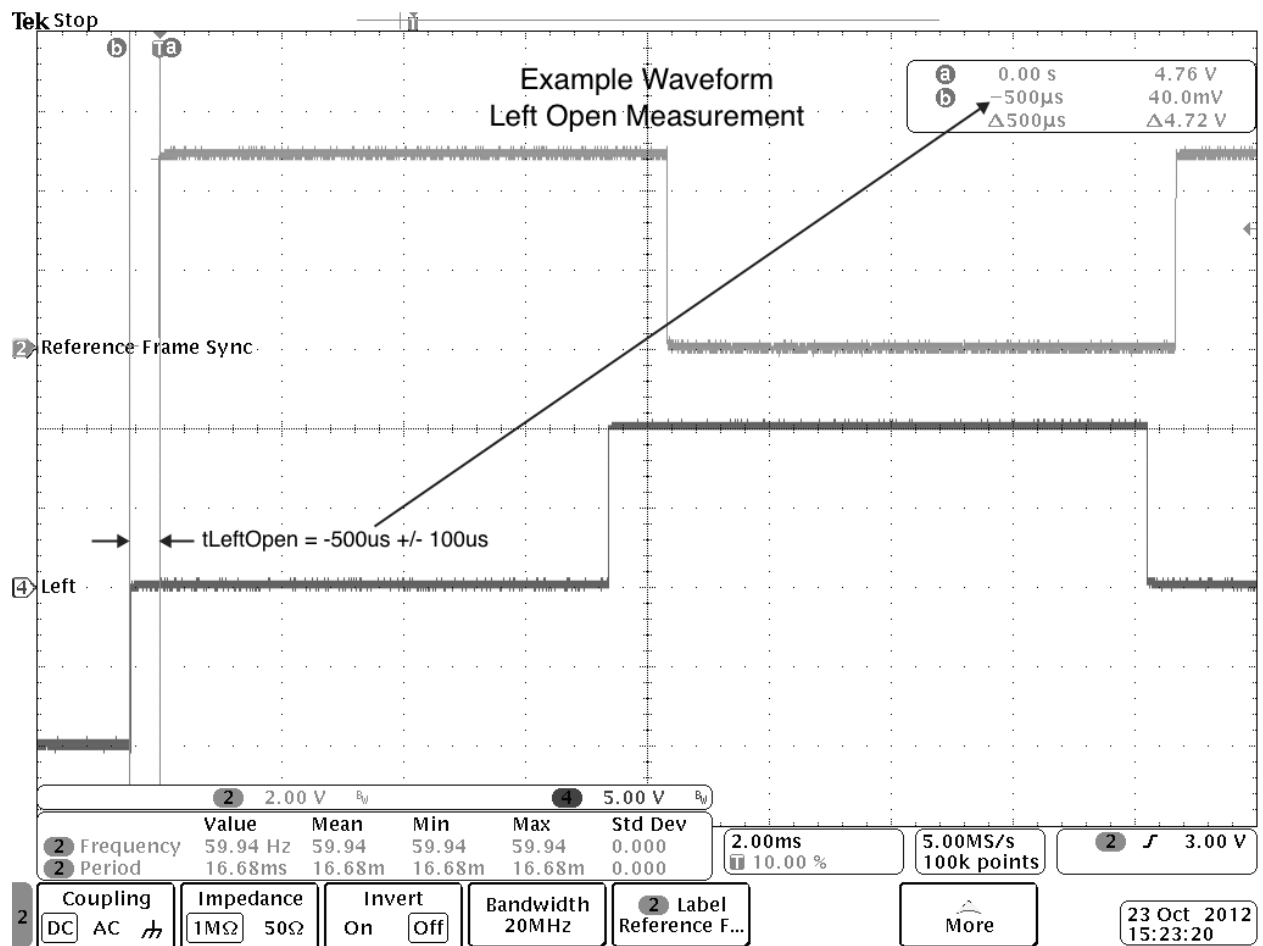


Figure 3.5: Left Lens Shutter Open Timing Measurement

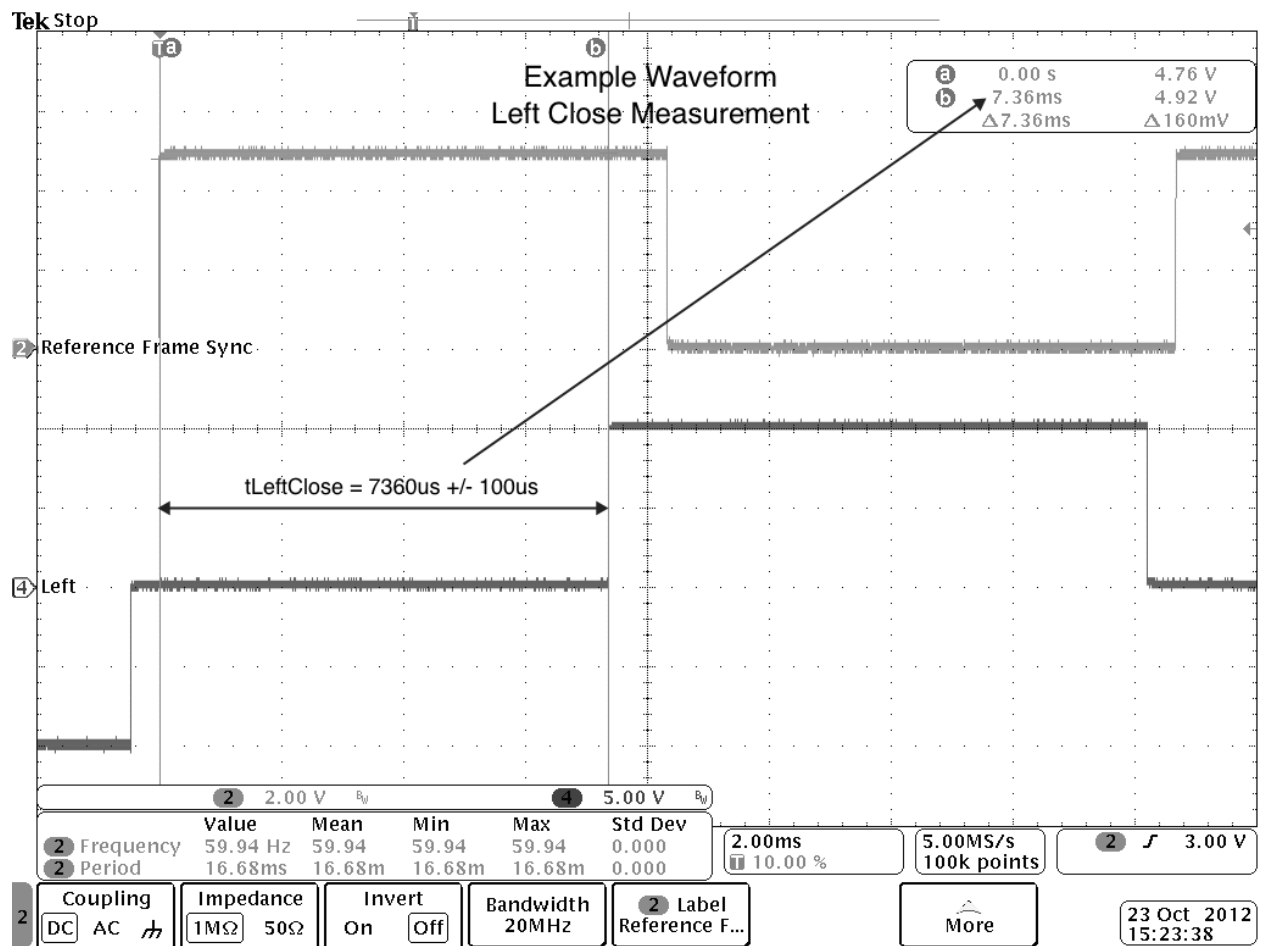


Figure 3.6: Left Lens Shutter Close Timing Measurement

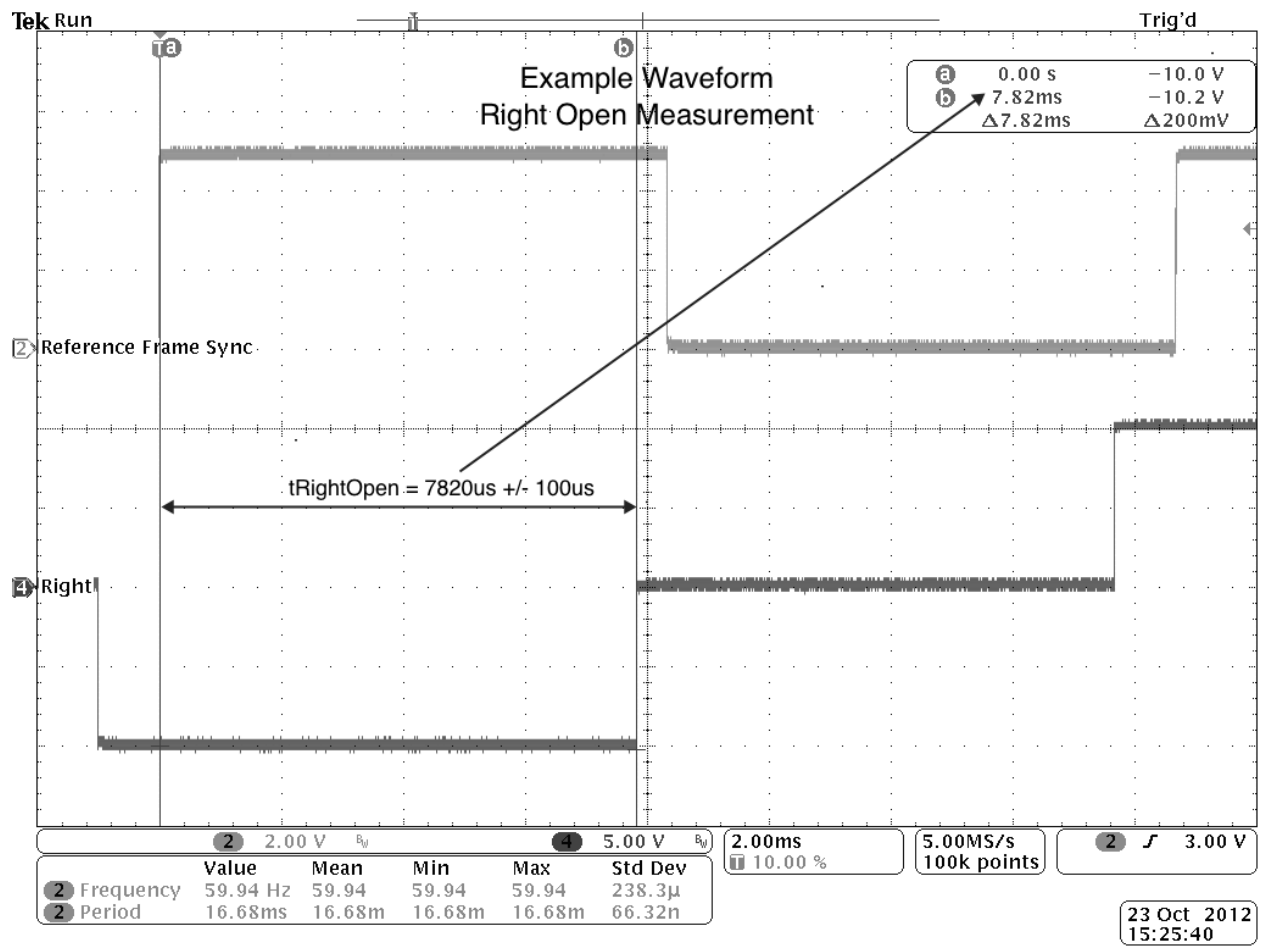


Figure 3.7: Right Lens Shutter Open Timing Measurement

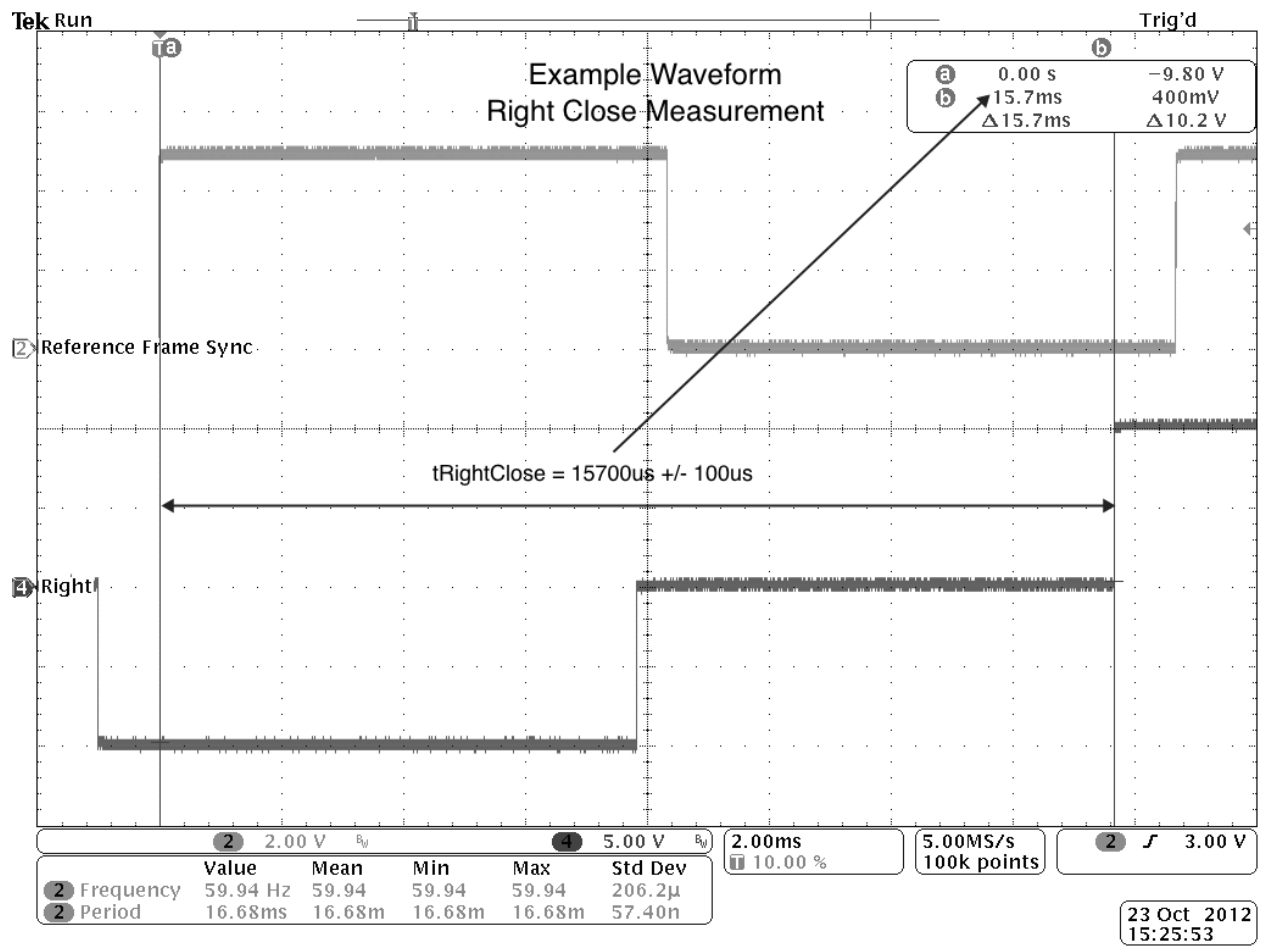


Figure 3.8: Right Lens Shutter Close Timing Measurement

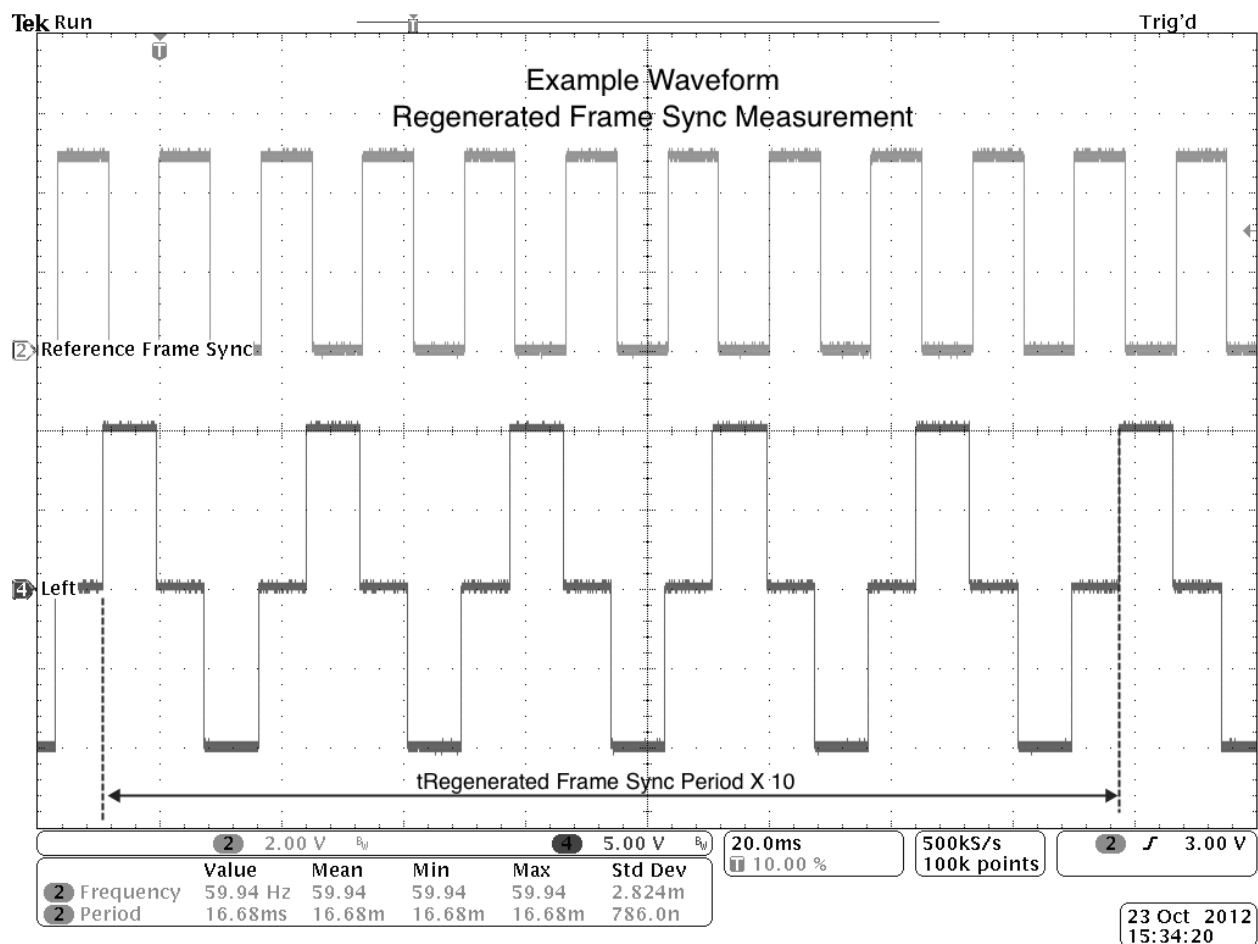


Figure 3.9: Frame Sync Period Timing Accuracy Measurement

3.2 Test Strategy

The test objectives are to verify the functionality of the Bluetooth 3D Synchronization Profile as specified for both 3DD and 3DG and to ensure interoperability between 3DD and 3DG made by different manufacturers or different models of 3DG and 3DD made by the same manufacturer. The testing approach covers mandatory and optional requirements in the 3D Synchronization Profile and also verifies recovery mechanisms for common errors.

The test equipment provides an implementation of the Radio Controller and the parts of the Host needed to perform the test cases defined in this Test Suite. A Lower Tester acts as the IUT's peer device and interacts with the IUT over-the-air interface. The configuration, including the IUT, needs to implement similar capabilities to communicate with the test equipment. For some test cases, it is necessary to stimulate the IUT from an Upper Tester. In practice, this could be implemented as a special test interface, a Man Machine Interface (MMI), or another interface supported by the IUT. The test equipment is expected to handle tests for IUT as either 3DD or 3DG.

This Test Suite contains Valid Behavior (BV) tests complemented with Invalid Behavior (BI) tests where required. The Profile ICS includes any requirements on lower layer features that go beyond what supporting the nominal requirements of the lower layer means.

Testing will be limited to the over the air portion of the behavior and the mandatory lens shutter rates. Testing of the optical performance of 3DG is outside the scope of Bluetooth testing.

When testing the Bluetooth 3DD role on an IUT, a suitable test system is used to emulate the role of a Bluetooth 3DG.



When testing the Bluetooth 3DG role on an IUT, a suitable test system is used to emulate the role of a Bluetooth 3DD tests.

Certain tests within this Test Suite require the presence of multiple Lower Tester 3DDs in order to verify the functionality of the 3DG IUT.

Table 3.4 shows the Test Suite Structure for the 3D Synchronization Profile tests.

Test Group	IUT Role	Test Purposes
Proximity Association	3DG	Association to 3DD
		Association to Legacy 3DD
		Class of Device Ignored During Proximity Association
		Association Failure on Excess Path Loss
		Association Failure on Missing EIR Data
		Ignore Additional Data in an Extended 3D Information EIR Field
	3DD	Reporting Class of Device
		Valid EIR Data Format – 3D Information EIR Field
		Valid EIR Data Format – TX Power Level Field
		Valid EIR Data Format – Legacy 3D Information EIR Field
3DG Connection Announcement	3DD	Invalid 3D Communications Channel Message Opcode
Association Notification	3DG	Association Notification Transmission
		Association Notification Not Transmitted when Not Supported by 3DD
		Legacy Association Notification Not Transmitted to 3DD
	3DD	Association Notification Reception
		Reference Protocol Association Notification Reception
Battery Level Reporting	3DG	Battery Level Transmission at Association Notification
		Battery Level Transmission at Start-up Synchronization
		Battery Level Transmission at User Action requesting Battery Level Display
		Battery Level Report Not Transmitted at Start-up Synchronization when Not Supported by 3DD
		Battery Level Reporting Not Supported indicated when sending 3DG Connection Announcement message
	3DD	Battery Level Reception at Association Notification
		Battery Level Reception at Start-up Synchronization
		Battery Level Reception at User Request for Battery Level Display
3D Broadcast	3DG	3D Broadcast Message Reception
	3DD	3D Broadcast Message Transmission
Frame Sync	3DD	3DD Timing Accuracy
		Invalid Frame Sync Period
Shutter Control	3DG	3DG Timing Accuracy
		3D-to-2D Switch on Exceeding Maximum Timing Error
		3D-to-2D Switch on Invalid Frame Sync Period

Table 3.4: Test Suite Structure

3.3 Test groups

The following test groups have been defined:

- Generic SDP Integrated Tests
- Proximity Association
- 3DG Connection Announcement
- Association Notification
- Battery Level Reporting
- 3D Broadcast
- Frame Sync
- Shutter Control

4 Test cases (TC)

4.1 Introduction

4.1.1 Test case identification conventions

Test cases are assigned unique identifiers per the conventions in [3]. The convention used here is:

<spec abbreviation>/<IUT role>/<class>/<feat>/<func>/<subfunc>/<cap>/<xx>-<nn>-<y>.

Additionally, testing of this specification includes tests from the SDP Test Suite [10] referred to as Generic SDP Integrated Tests (GSIT); when used, the test cases in GSIT are referred to through a TCID string using the following convention:

<spec abbreviation>/<IUT role>/<GSIT test group>/< GSIT class >/<xx>-<nn>-<y>.

Identifier Abbreviation	Spec Identifier <spec abbreviation>
3DSP	3D Synchronization Profile
Identifier Abbreviation	Role Identifier <IUT role>
3DD	Bluetooth 3D Display role
3DG	Bluetooth 3D Glasses role
Identifier Abbreviation	Reference Identifier <GSIT test group>
SGSIT	Server Generic SDP Integrated Tests
Identifier Abbreviation	Reference Identifier <GSIT class>
ATTR	Attribute
OFFS	Attribute ID Offset String
SERR	Service Record
Identifier Abbreviation	Feature Identifier <feat>
3DB	3D Broadcast
AN	Association Notification
BLR	Battery Level Reporting
CA	3DG Connection Announcement
FS	Frame Sync
PA	Proximity Association
SC	Shutter Control

Table 4.1: 3DSP TC feature naming conventions

4.1.2 Conformance

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

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

Such tests may verify:

- That claimed capabilities may be used in any order and any number of repetitions not excluded by the specification

- That capabilities enabled by the implementations are sustained over durations expected by the use case
- That the implementation gracefully handles any quantity of data expected by the use case
- That in cases where more than one valid interpretation of the specification exists, the implementation complies with at least one interpretation and gracefully handles other interpretations
- That the implementation is immune to attempted security exploits

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

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

4.1.3 Pass/Fail verdict conventions

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

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

4.2 Generic SDP Integrated Tests

4.2.1 3DD

Execute the Generic SDP Integrated Tests defined in Section 6.3, Server test procedures (SGSIT), in [10] using Table 4.2 below as input:

TCID	Reference	Attribute ID name	Attribute ID definition source (Universal, Profile)	Value/secondary value	Attribute presence (Present/Present for [role], Optionally present, TCMT defined)
3DSP/3DD/SGSIT/SERR/BV-01-C [Service record GSIT – 3DSP 3DD]	[4] 10.4.1	ServiceClassIDList	Universal	“3D Display” (UUID)	Present for 3DD
3DSP/3DD/SGSIT/ATTR/BV-01-C [Attribute GSIT – Bluetooth Profile Descriptor List]	[4] 10.4.1	BluetoothProfileDescriptorList	Universal	“3D Sync Profile” (UUID): Version – “0x0100” (Uint16)	Present for 3DD

Table 4.2: Input for the 3DD SGSIT SDP test procedure

4.2.2 3DG

Execute the Generic SDP Integrated Tests defined in Section 6.3, Server test procedures (SGSIT), in [10] using Table 4.3 below as input:

TCID	Reference	Attribute ID name	Attribute ID definition source (Universal, Profile)	Value/secondary value	Attribute presence (Present/Present for [role], Optionally present, TCMT defined)
3DSP/3DG/SGSIT/SERR/BV-01-C [Service record GSIT – 3DSP 3DG]	[4] 10.4.2	ServiceClassIDList	Universal	“3D Glasses” (UUID)	Present for 3DG
3DSP/3DG/SGSIT/ATTR/BV-01-C [Attribute GSIT – Bluetooth Profile Descriptor List]	[4] 10.4.2	BluetoothProfileDescriptorList	Universal	“3D Sync Profile” (UUID): Version – “0x0100” (Uint16)	Present for 3DG

Table 4.3: Input for the 3DG SGSIT SDP test procedure

4.2.3 3D Synchronization Profile – Attribute ID Offset String tests

Execute the Generic SDP Integrated Tests defined in Section 6.3, Server test procedures (SGSIT), in [10] using Table 4.4 below as input:

TCID	Reference	ServiceSearchPattern	Attribute ID name	Attribute ID Offset	Attribute presence (Present/Present for [role], Optionally present, TCMT defined)
3DSP/3DD/SGSIT/OFFS/BV-01-C [Attribute ID Offset String GSIT – Service Name]	[4] 10.4.1	3D Display	ServiceName	0x0000	TCMT defined
3DSP/3DG/SGSIT/OFFS/BV-02-C [Attribute ID Offset String GSIT – Service Name]	[4] 10.4.2	3D Glasses	ServiceName	0x0000	TCMT defined

Table 4.4: Input for the 3D Synchronization Profile SGSIT Attribute ID Offset String tests

4.3 Proximity Association

Verify that 3DD and 3DG can properly perform Proximity Association.

4.3.1 3DG

Verify that 3DG can properly perform Proximity Association.

The following Message Sequence Chart (MSC) depicts the generic message sequence for 3DG IUT Proximity Association test cases.

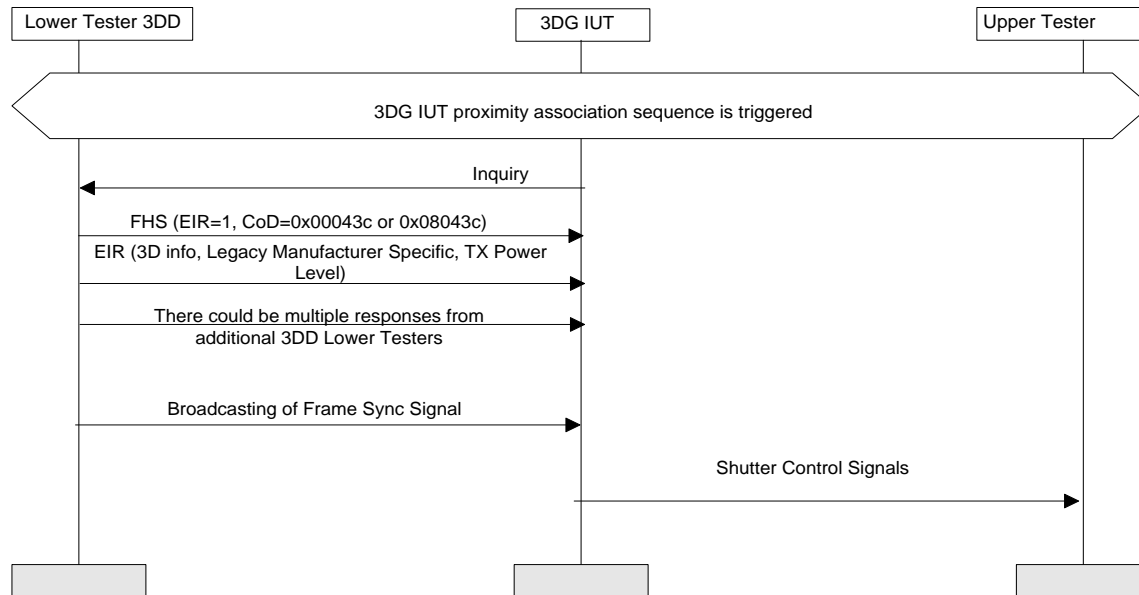


Figure 4.1: MSC for 3DG IUT Proximity Association test cases

3DSP/3DG/PA/BV-01-C [Association to 3DD]

- Test Purpose

Verify that a 3DG can properly associate with a 3DD.
- Reference

[4] 5.3
- Initial Condition
 - The 3DG IUT is in OFF mode and is not currently associated with either Lower Tester 3DD #1 or Lower Tester 3DD #2.
 - Both Lower Tester 3DD #1 and Lower Tester 3DD #2 are in the ON mode, are configured as described in Section 3.1.2, and are ready to perform Proximity Association.
 - The Lower Tester 3DD #1 and Lower Tester 3DD #2 are each being supplied a different Reference Frame Sync frequency both of which are within the supported lens shutter frequency range specified in the 3DG IUT's IXIT.
 - The Lower Tester 3DD #1 is set to operate at a TX power level of 0 dBm and the Path Loss Threshold value set to 80 dB in both its 3D Information EIR Field and its Legacy 3D Information EIR Field.

- The Lower Tester 3DD #2 is set to operate at a TX power level of -20 dBm and the Path Loss Threshold value set to 80 dB in both its 3D Information EIR Field and its Legacy 3D Information EIR Field.
- The 3DG IUT is placed at a distance of 50 cm from both the Lower Tester 3DD #1 and Lower Tester 3DD #2.
- Test Procedure
 1. The 3DG IUT is triggered to turn on and begin Proximity Association.
 2. Both Lower Tester 3DD #1 and Lower Tester 3DD #2 respond to 3DG IUT's inquiry with correct Class of Device, followed by EIR with properly formatted 3D Information EIR Field, Legacy 3D Information EIR Field, and TX Power Level Field.
 3. The 3DG IUT receives the response from both Lower Tester 3DD #1 and Lower Tester 3DD #2 and selects Lower Tester 3DD #1 with which to associate based on its higher TX power level.

- Expected Outcome

Pass verdict

The 3DG IUT lens shutter timing signals is in synchronization with the Reference Frame Sync being fed into the Lower Tester 3DD #1 thus indicating that the 3DG IUT has properly associated with Lower Tester 3DD #1 having a higher TX power level than Lower Tester 3DD #2.

3DSP/3DG/PA/BV-02-C [Association to Legacy 3DD]

- Test Purpose

Verify that a 3DG can properly associate with a Legacy 3DD.
- Reference

[4] 5.3
- Initial Condition
 - The 3DG IUT is in OFF mode and is not currently associated with either Lower Tester 3DD #1 or Lower Tester 3DD #2.
 - Both Lower Tester 3DD #1 and Lower Tester 3DD #2 are in the ON mode, are configured as described in Section 3.1.2, and are ready to perform Proximity Association.
 - Both Lower Tester 3DD #1 and Lower Tester 3DD #2 are configured to send only the Legacy 3D Information EIR Field and not the 3D Information EIR Field.
 - The Lower Tester 3DD #1 and Lower Tester 3DD #2 are each being supplied a different Reference Frame Sync frequency both of which are within the supported lens shutter frequency range specified in the 3DG IUT's IXIT.
 - The Lower Tester 3DD #1 is set to operate at a TX power level of 0 dBm and its Legacy 3D Information EIR Field Path Loss Threshold value set to 80 dB.
 - The Lower Tester 3DD #2 is set to operate at a TX power level of -20 dBm and its Legacy 3D Information EIR Field Path Loss Threshold value set to 80 dB.
 - The 3DG IUT is placed at a distance of 50 cm from both the Lower Tester 3DD #1 and Lower Tester 3DD #2.
- Test Procedure
 1. The 3DG IUT is triggered to turn on and begin Proximity Association.

2. Both Lower Tester 3DD #1 and Lower Tester 3DD #2 respond to 3DG IUT's inquiry with properly formatted Class of Device field, TX Power Level Field, and the Legacy 3D Information EIR Field but does not respond with the 3D Information EIR Field.
3. The 3DG IUT receives the response from both Lower Tester 3DD #1 and Lower Tester 3DD #2 and selects Lower Tester 3DD #1 with which to associate based on its higher TX power level.

- Expected Outcome

Pass verdict

The 3DG IUT lens shutter timing signals are in synchronization with the Reference Frame Sync being fed into the Lower Tester 3DD #1 thus indicating that the 3DG IUT has properly associated with Lower Tester 3DD #1 having a higher TX power level than Lower Tester 3DD #2.

3DSP/3DG/PA/BV-03-C [Class of Device Ignored During Proximity Association]

- Test Purpose

Verify that a 3DG ignores Class of Device during Proximity Association.

- Reference

[4] 5.1.1, 5.3

- Initial Condition

- The 3DG IUT is in OFF mode and is not currently associated with the Lower Tester 3DD.
- The Lower Tester 3DD is in the ON mode, is configured as described in Section 3.1.2, and is ready to perform Proximity Association.
- The Lower Tester 3DD is set to operate with its maximum TX power level.
- The Lower Tester 3DD is being supplied a Reference Frame Sync frequency which is within the supported lens shutter frequency range specified in the 3DG IUT's IXIT.
- The 3DG IUT is placed at a distance of 50 cm from the Lower Tester 3DD.

- Test Procedure

1. The 3DG IUT is triggered to turn on and begin Proximity Association.
2. The Lower Tester 3DD responds to 3DG IUT's inquiry with a Class of Device field set to one of the following values 0x400204, 0x40020C, or 0x00010C followed by EIR that has properly formatted 3D Information EIR Field, Legacy 3D Information EIR Field, and TX Power Level Field.

- Expected Outcome

Pass verdict

The 3DG IUT lens shutter timing signals are in synchronization with the Reference Frame Sync being fed into the Lower Tester 3DD thus indicating that the 3DG IUT has properly associated with the Lower Tester 3DD.

3DSP/3DG/PA/BV-04-C [Association Failure on Excess Path Loss]

- Test Purpose

Verify that a 3DG will not associate with a 3DD having a path loss that is greater than the Path Loss Threshold specified by the 3DD.

- Reference
[4] 5.1, 5.3
- Initial Condition
 - The 3DG IUT is in OFF mode and is not currently associated with the Lower Tester 3DD.
 - The Lower Tester 3DD is in the ON mode, is configured as described in Section 3.1.2, and is ready to perform Proximity Association.
 - The Lower Tester 3DD is set to operate with a TX power level of -20 dBm.
 - The Lower Tester 3DD is being supplied a Reference Frame Sync frequency which is within the supported lens shutter frequency range specified in the 3DG IUT's IXIT.
 - The 3DG IUT is placed at a distance of 50 cm from the Lower Tester 3DD.
- Test Procedure
 1. The 3DG IUT is triggered to turn on and begin Proximity Association.
 2. The Lower Tester 3DD responds to 3DG IUT's inquiry with properly formatted 3D Information EIR Field and Legacy 3D Information EIR Field both with a Path Loss Threshold set to 0 dB and TX Power Level Field set to a TX Power Level = 0 dBm.
 3. The 3DG IUT receives the response from Lower Tester 3DD.
- Expected Outcome
Pass verdict
The 3DG IUT lens shutter timing signals are not switching in synchronization with the Reference Frame Sync being fed into the Lower Tester 3DD thus indicating that the 3DG IUT has not associated with Lower Tester 3DD.

3DSP/3DG/PA/BI-05-C [Association Failure on Missing EIR Data]

- Test Purpose
Verify that a 3DG will not associate with a 3DD when receiving from the 3DD an EIR packet that does not contain the 3D Information EIR Field and the Legacy 3D Information EIR Field.
- Reference
[4] 5.1.2.2, 5.3
- Initial Condition
 - The 3DG IUT is in OFF mode and is not currently associated with the Lower Tester 3DD.
 - The Lower Tester 3DD is in the ON mode, is configured as described in Section 3.1.2, and is ready to perform Proximity Association.
 - The Lower Tester 3DD is set to operate with a TX power level of 0 dBm.
 - The Lower Tester 3DD is being supplied a Reference Frame Sync frequency which is within the supported lens shutter frequency range specified in the 3DG IUT's IXIT.
 - The 3DG IUT is placed at a distance of 50 cm from the Lower Tester 3DD.
- Test Procedure
 1. The 3DG IUT is triggered to turn on and begin Proximity Association.

2. The Lower Tester 3DD responds to 3DG IUT's inquiry with a properly formatted Class of Device field and TX Power Level Field, but with no 3D Information EIR Field and no Legacy 3D Information EIR Field.
3. The 3DG IUT receives the response from Lower Tester 3DD.

- Expected Outcome

Pass verdict

The 3DG IUT lens shutter timing signals are not switching in synchronization with the Reference Frame Sync being fed into the Lower Tester 3DD thus indicating that the 3DG IUT has not associated with Lower Tester 3DD.

3DSP/3DG/PA/BV-06-C [Ignore Additional Data in an Extended 3D Information EIR Field]

- Test Purpose

Verify that a 3DG will properly associate with a 3DD when receiving from the 3DD an extended 3D Information EIR Field.

- Reference

[4] 5.1, 5.3

- Initial Condition

- The 3DG IUT is in OFF mode and is not currently associated with the Lower Tester 3DD.
- The Lower Tester 3DD is in the ON mode, is configured as described in Section 3.1.2, and is ready to perform Proximity Association.
- The Lower Tester 3DD is set to operate with a TX power level of 0 dBm.
- The Lower Tester 3DD is being supplied a Reference Frame Sync frequency which is within the supported lens shutter frequency range specified in the 3DG IUT's IXIT.
- The 3DG IUT is placed at a distance of 50 cm from the Lower Tester 3DD.

- Test Procedure

1. The 3DG IUT is triggered to turn on and begin Proximity Association.
2. The Lower Tester 3DD responds to the 3DG IUT inquiry with properly formatted Class of Device Field, Legacy 3D Information EIR Field, TX Power Level Field, but is transmitting a 3D Information EIR Field indicating support for Association Notification and Battery Level Reporting and having four additional bytes of data (Byte 4 = 0xFF, Byte 5 = 0, Byte 6 = 0xFF, Byte 7 = 0).

- Expected Outcome

Pass verdict

The 3DG IUT properly associates with the Lower Tester 3DD, the lens shutter timing signals are in synchronization with the Reference Frame Sync being fed into the Lower Tester 3DD, and the 3DG IUT sends a properly formatted Association Notification and Battery Level Report, if supported, thus indicating that the additional data in the 3D Information EIR Field had no effect on the 3DG IUT.

4.3.2 3DD

Verify that 3DD can properly perform Proximity Association.

The following Message Sequence Chart (MSC) depicts the generic message sequence for 3DD IUT Proximity Association test cases.



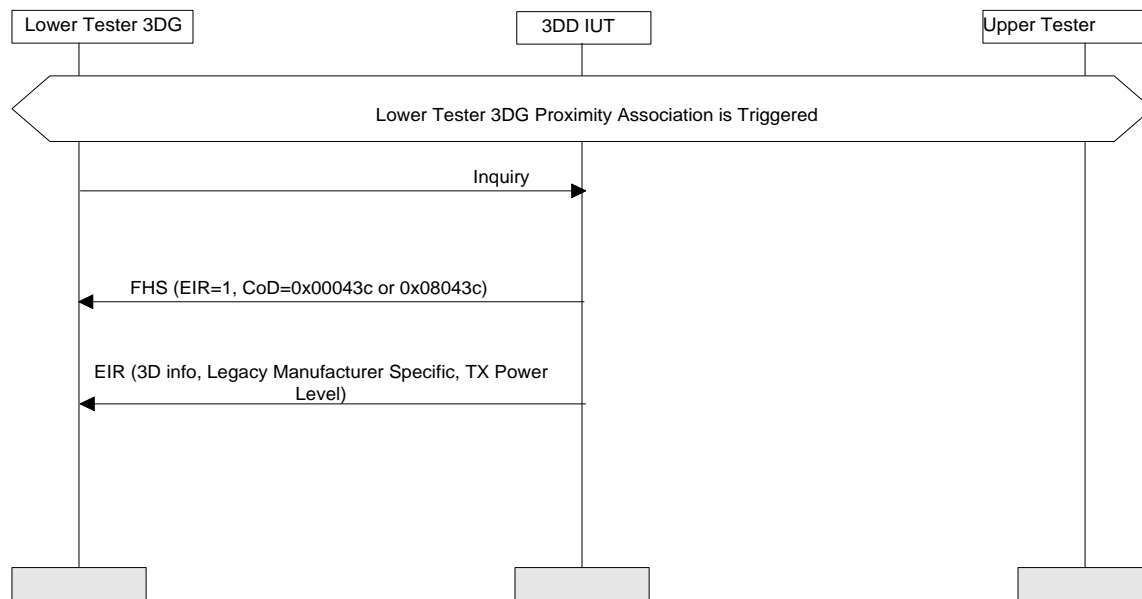


Figure 4.2: MSC for 3DD IUT Proximity Association test cases

3DSP/3DD/PA/BV-07-C [Reporting Class of Device]

- Test Purpose

Verify that a 3DD properly reports Class of Device that is necessary for supporting Proximity Association with a Legacy 3DG.

- Reference

[4] 5.1.1

- Initial Condition

- The Lower Tester 3DG and the 3DD IUT are in ON mode.

- Test Procedure

1. The Lower Tester 3DG sends an inquiry to the 3DD IUT.

- Expected Outcome

Pass verdict

The Lower Tester 3DG receives a properly formatted Class of Device field from the 3DD IUT.

3DSP/3DD/PA/BV-08-C [Valid EIR Data Format – 3D Information EIR Field]

- Test Purpose

Verify that a 3DD properly reports the 3D Information EIR Field in its EIR data.

- Reference

[4] 5.1.2

- Initial Condition

- The Lower Tester 3DG and the 3DD IUT are in ON mode.

- Test Procedure
 1. The Lower Tester 3DG sends an inquiry to the 3DD IUT.
- Expected Outcome

Pass verdict

The Lower Tester 3DG receives a properly formatted 3D Information EIR Field from the 3DD IUT in an EIR packet.

3DSP/3DD/PA/BV-09-C [Valid EIR Data Format – TX Power Level Field]

- Test Purpose

Verify that a 3DD properly reports the TX Power Level Field in its EIR data.
- Reference

[1] Volume 3, Part C, Section 8.1.5

[4] 5.1.2.3
- Initial Condition
 - The Lower Tester 3DG and the 3DD IUT are in ON mode.
- Test Procedure
 1. The Lower Tester 3DG sends an inquiry to the 3DD IUT.
- Expected Outcome

Pass verdict

The Lower Tester 3DG receives a properly formatted TX Power Level Field from the 3DD IUT in an EIR packet.

3DSP/3DD/PA/BV-10-C [Valid EIR Data Format – Legacy 3D Information EIR Field]

- Test Purpose

Verify that a 3DD properly reports the Legacy 3D Information EIR Field in its EIR data.
- Reference

[4] 5.1.2.2
- Initial Condition
 - The Lower Tester 3DG and the 3DD IUT are in ON mode.
- Test Procedure
 1. The Lower Tester 3DG sends an inquiry to the 3DD IUT.
- Expected Outcome

Pass verdict

The Lower Tester 3DG receives a properly formatted Legacy 3D Information EIR Field from the 3DD IUT in an EIR packet.

4.4 3DG Connection Announcement

Verify that 3DD can filter based on the value of the 3D Opcode field in the 3DG Connection Announcement message.

4.4.1 3DD

3DSP/3DD/CA/BI-01-C [Invalid 3D Communications Channel Message Opcode]

- Test Purpose

Verify that a 3DD will ignore a received 3D Communications Channel message that appears to be a 3DG Connection Announcement message except such message has a non-zero 3D Communications Channel Message Opcode field.

- Reference

[1] Volume 3, Part A, Section 7.6

[4] 6.2

- Initial Condition

- An ACL connection exists between the Lower Tester 3DG and the 3DD IUT.

- Test Procedure

The Lower Tester 3DG sends a 3D Communications Channel Message to the 3DD IUT with the 3D Communications Channel Message Opcode set to a non-zero value.

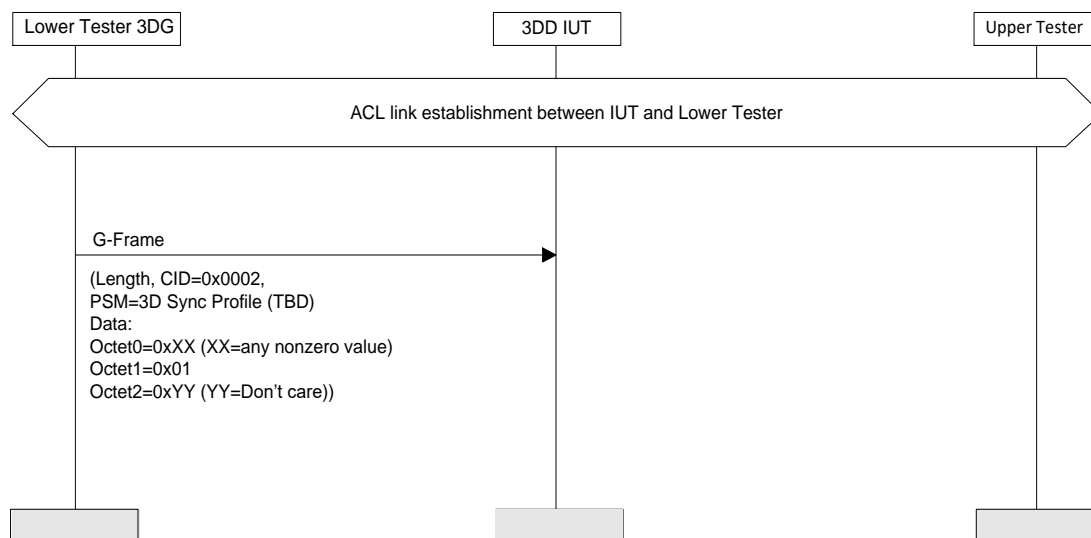


Figure 4.3: 3DSP/3DD/CA/BI-01-C [Invalid 3D Communications Channel Message Opcode] MSC

- Expected Outcome

Pass verdict

The 3DD IUT does not send a message to the Upper Tester indicating reception of a 3D Communications Channel Message.

4.5 Association Notification

Verify that 3DD and 3DG can properly perform Association Notification and Legacy Association Notification.

4.5.1 3DG

Verify that 3DG can properly perform various functions associated with Association Notification.

3DSP/3DG/AN/BV-01-C [Association Notification Transmission]

- Test Purpose

Verify that a 3DG can properly transmit the Association Notification.
- Reference

[1] Volume 3, Part A, Section 7.6

[4] 6.3.1
- Initial Condition
 - Proximity Association has been performed by the 3DG IUT and the 3DG IUT has selected the Lower Tester 3DD to associate with.
 - The Lower Tester 3DD has indicated support for Association Notification and no support for Battery Level Reporting in its 3D Information EIR Field.
 - An ACL connection exists between the Lower Tester 3DD and the 3DG IUT.
- Test Procedure

The 3DG IUT sends a 3D Connection Announcement Message to the Lower Tester 3DD.

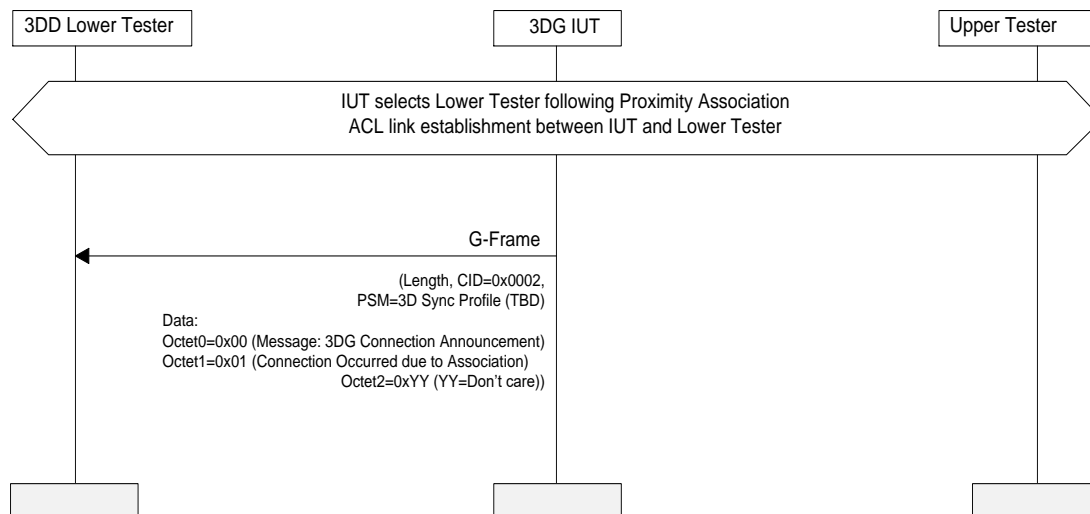


Figure 4.4: 3DSP/3DG/AN/BV-01-C [Association Notification Transmission] MSC

- Expected Outcome

Pass verdict

The 3DG IUT sends a properly formatted 3D Communications Channel Message with the Association Notification bit set to "Connection Occurred due to Association".

3DSP/3DG/AN/BV-02-C [Association Notification Not Transmitted when Not Supported by 3DD]

- Test Purpose

Verify that a 3DG does not transmit the Association Notification to a 3DD that does not support Association Notification.

- Reference

[1] Volume 3, Part A, Section 7.6

[4] 6.3.1

- Initial Condition

- Proximity Association has been performed by the 3DG IUT and the 3DG IUT has selected the Lower Tester 3DD to associate with.
- The Lower Tester 3DD has indicated no support for Association Notification in the 3D Information EIR Field.

- Test Procedure

The Lower Tester 3DD waits for 5 seconds to determine if the 3DG IUT attempts to establish an ACL connection.

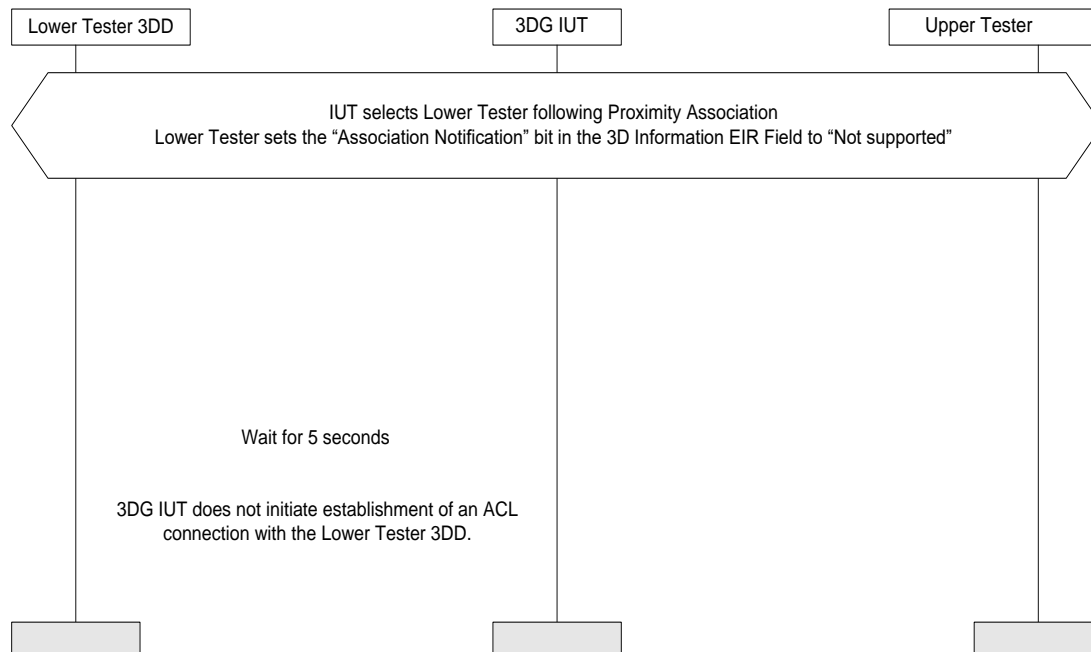


Figure 4.5: 3DSP/3DG/AN/BV-02-C [Association Notification Not Transmitted when Not Supported by 3DD] MSC

- Expected Outcome

Pass verdict

The 3DG IUT does not initiate establishment of an ACL connection with the Lower Tester 3DD.

3DSP/3DG/AN/BV-03-C [Legacy Association Notification Not Transmitted to 3DD]

- Test Purpose
Verify that a 3DG does not transmit the Legacy Association Notification to a 3DD that is not a Legacy 3DD.
- Reference
[\[4\]](#) 7, 7.1, 7.5
- Initial Condition
 - The 3DG IUT is in OFF mode and is not currently associated with the Lower Tester 3DD.
 - The Lower Tester 3DD is in the ON mode, is configured as described in Section 3.1.2, and is ready to perform Proximity Association.
 - The Lower Tester 3DD is set to operate with a properly formatted Class of Device, Legacy 3D Information EIR Field, TX Power Level Field, and 3D Information EIR Field indicating support for Association Notification and no support for Battery Level Reporting.
 - The Lower Tester 3DD is set to operate with a TX power level of 0 dBm.
 - The 3DG IUT is placed at a distance of 50 cm from the Lower Tester 3DD.
- Test Procedure
The 3DG IUT is triggered to turn on and to successfully complete Proximity Association.

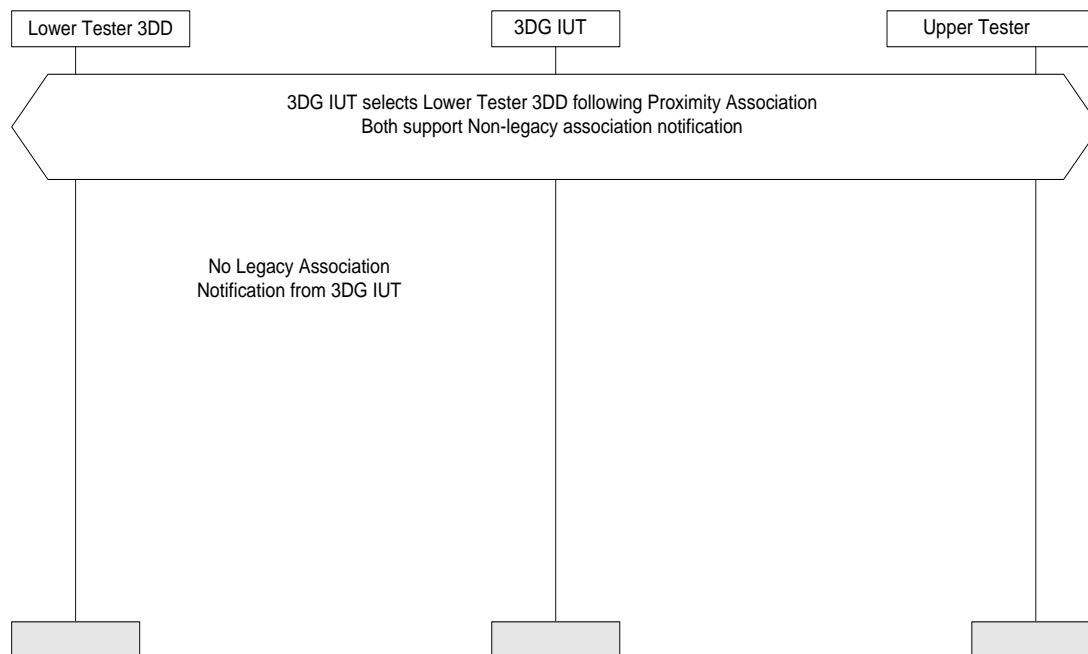


Figure 4.6: 3DSP/3DG/AN/BV-03-C [Legacy Association Notification Not Transmitted to 3DD] MSC

- Expected Outcome
Pass verdict
The Lower Tester 3DD confirms that the 3DG IUT does not transmit a Legacy Association Notification message.

4.5.2 3DD

Verify that 3DD can properly perform Association Notification.

3DSP/3DD/AN/BV-04-C [Association Notification Reception]

- Test Purpose
Verify that a 3DD can properly receive the Association Notification.
- Reference
[1] Volume 3, Part A, Section 7.6
[4] 6.3.2
- Initial Condition
 - Proximity Association has been performed by the Lower Tester 3DG and the Lower Tester 3DG has selected the 3DD IUT to associate with.
 - An ACL connection exists between the Lower Tester 3DG and the 3DD IUT.
- Test Procedure
The Lower Tester 3DG sends a 3D Communications Channel Message to the 3DD IUT with the 3D Communications Channel Message Opcode field set to 0x00.

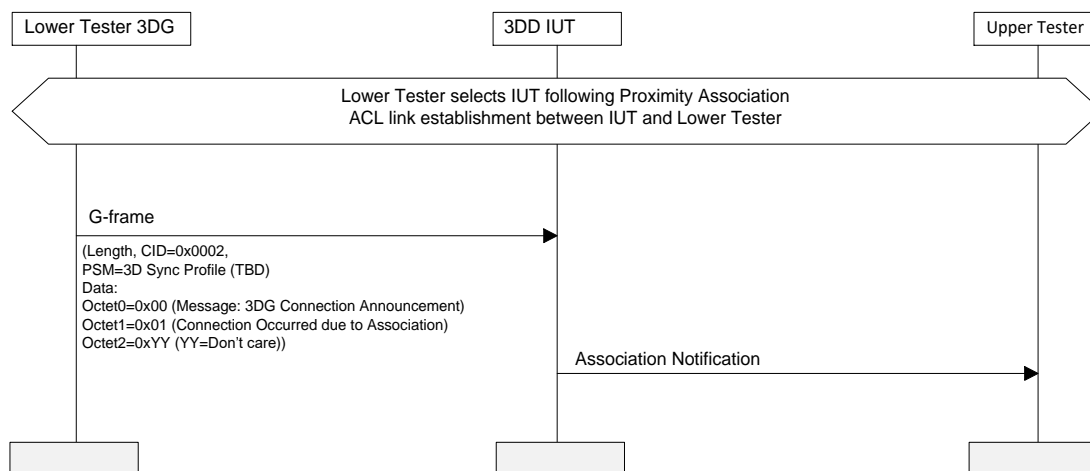


Figure 4.7: 3DSP/3DD/AN/BV-04-C [Association Notification Reception] MSC

- Expected Outcome
Pass verdict
The 3DD IUT indicates to the Upper Tester confirming reception of the Association Notification.

3DSP/3DD/AN/BV-05-C [Reference Protocol Association Notification Reception]

- Test Purpose
Verify that a 3DD can properly receive the Reference Protocol Association Notification.
- Reference
[4] 7, 7.1, 7.3, 7.4

- Initial Condition
 - Proximity Association has been performed by the Lower Tester 3DG and the Lower Tester 3DG has selected the 3DD IUT to associate with.
- Test Procedure

The Lower Tester 3DG sends Reference Protocol Association Notification to 3DD IUT after receiving the EIR packet from the 3DD IUT.

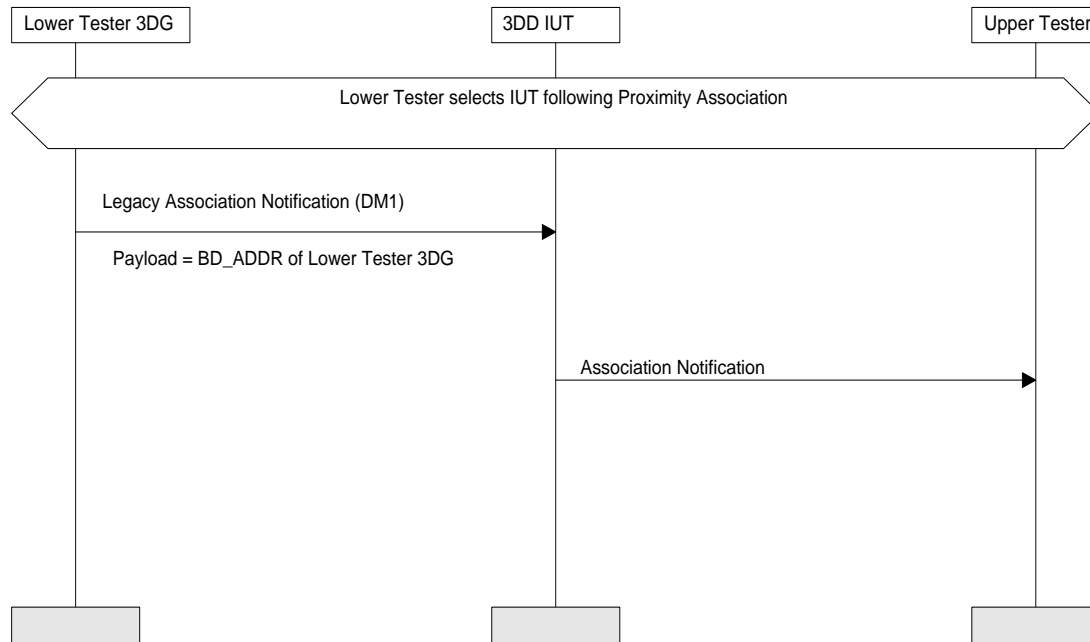


Figure 4.8: 3DSP/3DD/AN/BV-05-C [Reference Protocol Association Notification Reception] MSC

- Expected Outcome
 - Pass verdict
 - The 3DD IUT reports reception of Reference Protocol Association Notification message to the Upper Tester.
- Notes
 - If the 3DD IUT does not report reception of Reference Protocol Association Notification message, the Test Procedure can be rerun up to three times with a 10 second time out between re-tries.

4.6 Battery Level Reporting

Verify that 3DD and 3DG can properly perform Battery Level reporting.

4.6.1 3DG

Verify that 3DG can properly perform the Battery Level reporting function.

3DSP/3DG/BLR/BV-01-C [Battery Level Transmission at Association Notification]

- Test Purpose
 - Verify that a 3DG properly transmits its Battery Level at the time of transmitting Association Notification.

- Reference

[1] Volume 3, Part A, Section 7.6

[4] 6.3.1

- Initial Condition

- Proximity Association has been performed by the 3DG IUT and the 3DG IUT has selected the Lower Tester 3DD to associate with.
- Lower Tester 3DD indicates support for Association Notification and Battery Level Reporting in its 3D Information EIR Field.
- Lower Tester 3DD sets “Send Battery Level Report on Start-up Synchronization” bit set to 0 in its 3D Information EIR Field.
- An ACL connection exists between the Lower Tester 3DD and the 3DG IUT.

- Test Procedure

The 3DG IUT sends a 3D Connection Announcement Message to the Lower Tester 3DD.

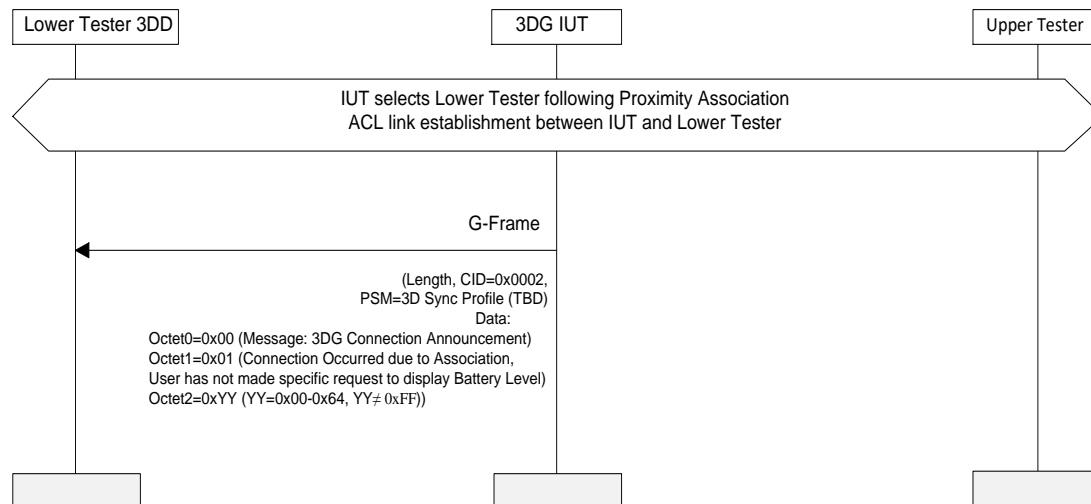


Figure 4.9: 3DSP/3DG/BLR/BV-01-C [Battery Level Transmission at Association Notification] MSC

- Expected Outcome

Pass verdict

The 3DG IUT sends a properly formatted 3D Communications Channel Message with the Association Notification bit set to “Connection Occurred due to Association”.

The 3DG IUT sets the Battery Level field in the 3DG Connection Announcement message to its current value.

The 3DG IUT sets the “User Request for Battery Level Display” bit to 0.

3DSP/3DG/BLR/BV-02-C [Battery Level Transmission at Start-up Synchronization]

- Test Purpose

Verify that a 3DG properly transmits its Battery Level following the 3DG’s transition from standby or powered-off state to a powered-on and synchronized state when the 3DD has the “Send Battery Level Report on Start-up Synchronization” bit set in its 3D Information EIR Field.

- Reference
 - [4] 5.1.2.1, 6.2, 6.4
- Initial Condition
 - Proximity Association has been performed by the 3DG IUT and the 3DG IUT has selected the Lower Tester 3DD to associate with.
 - Lower Tester 3DD indicates support for Association Notification and Battery Level Reporting in its 3D Information EIR Field.
 - Lower Tester 3DD sets “Send Battery Level Report on Start-up Synchronization” bit set to 1 in its 3D Information EIR Field.
 - The 3DG IUT is in OFF mode and is currently associated with the Lower Tester 3DD.
 - The Lower Tester 3DD is in the ON mode and is configured as specified in Section 3.1.2.
- Test Procedure
 1. The 3DG IUT is turned on and allowed to synchronize with the Lower Tester 3DD.
 2. The 3DG IUT establishes an ACL link connection with Lower Tester 3DD.
 3. The 3DG IUT sends the 3DG Connection Announcement Message to Lower Tester 3DD.
 4. The Lower Tester 3DD indicates the reception of the 3DG Connection Announcement Message.
 5. The Lower Tester 3DD disconnects 3DG IUT.

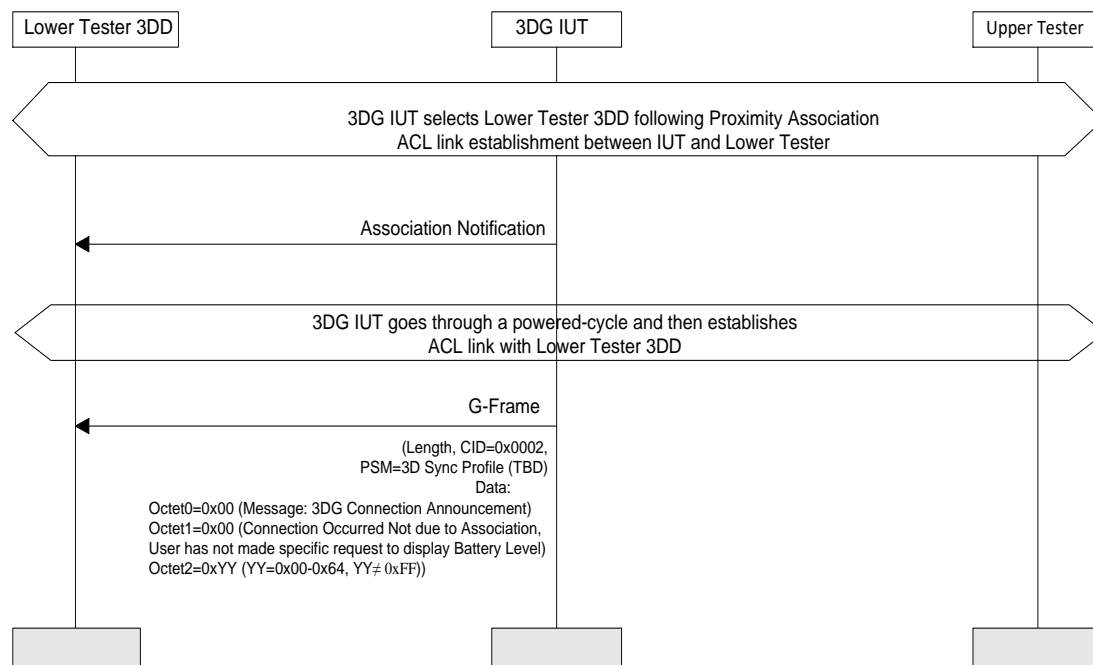


Figure 4.10: 3DSP/3DG/BLR/BV-02-C [Battery Level Transmission at Start-up Synchronization] MSC

- Expected Outcome

Pass verdict

The 3DG IUT transmits a 3DG Connection Announcement Message to the Lower Tester 3DD with the 3D Communications Channel Message Opcode field set to 0x00, the Association Notification bit set to 0, the User Request for Battery Level Display bit set to 0, and the Battery Level field indicating the current battery level of the 3DG IUT.

3DSP/3DG/BLR/BV-03-C [Battery Level Transmission at User Action requesting Battery Level Display]

- Test Purpose

Verify that a 3DG properly transmits its Battery Level at the time of an implementation-specific user action that triggers Battery Level reporting.

- Reference

[4] 5.1.2.1, 6.2, 6.4

- Initial Condition

- Proximity Association has been performed by the 3DG IUT and the 3DG IUT has selected the Lower Tester 3DD to associate with.
- Lower Tester 3DD indicates support for Association Notification and Battery Level Reporting in its 3D Information EIR Field.
- Lower Tester 3DD sets “Send Battery Level Report on Start-up Synchronization” bit set to 0 in its 3D Information EIR Field.

- Test Procedure

1. The 3DG IUT is powered on.
2. A user action is initiated on the 3DG IUT, as specified in the 3DG IUT IXIT, to specifically request the 3DG IUT to send its Battery Level report.

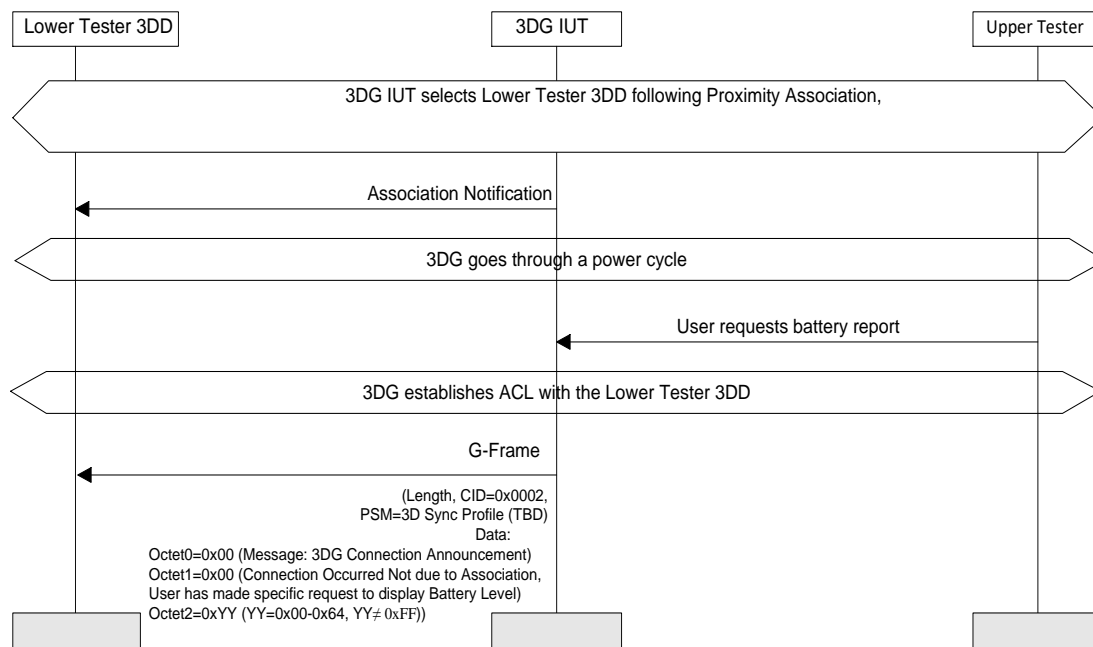


Figure 4.11: 3DSP/3DG/BLR/BV-03-C [Battery Level Transmission at User Action requesting Battery Level Display] MSC

- Expected Outcome

Pass verdict

The 3DG IUT transmits a 3DG Connection Announcement Message with the 3D Communications Channel Message Opcode field set to 0x00, the Association Notification bit set to 0, the User Request

for Battery Level Display bit set to 1, and the Battery Level field indicating the current battery level of the 3DG IUT.

3DSP/3DG/BLR/BV-04-C [Battery Level Report Not Transmitted at Start-up Synchronization when Not Supported by 3DD]

- Test Purpose

Verify that a 3DG does not send a 3DG Connection Announcement with the Battery Level report sent as part of Start-up Synchronization when the 3DD indicates in its 3D Information EIR Field that it does not support Battery Level reporting during Start-up Synchronization.

- Reference

[4] 5.1.2.1, 6.2, 6.4

- Initial Condition

- Proximity Association has been performed by the 3DG IUT and the 3DG IUT has selected the Lower Tester 3DD to associate with.
- Lower Tester 3DD indicates support for Association Notification and Battery Level Reporting in its 3D Information EIR Field.
- Lower Tester 3DD sets "Send Battery Level Report on Start-up Synchronization" bit to 0 in its 3D Information EIR Field.

- Test Procedure

1. The 3DG IUT sends correct Association Notification message to Lower Tester 3DD.
2. The 3DG IUT is placed in a stand-by or powered-off state.
3. The 3DG IUT is powered on.
4. The 3DG IUT does not send Association Notification to Lower Tester 3DD within 2 seconds.

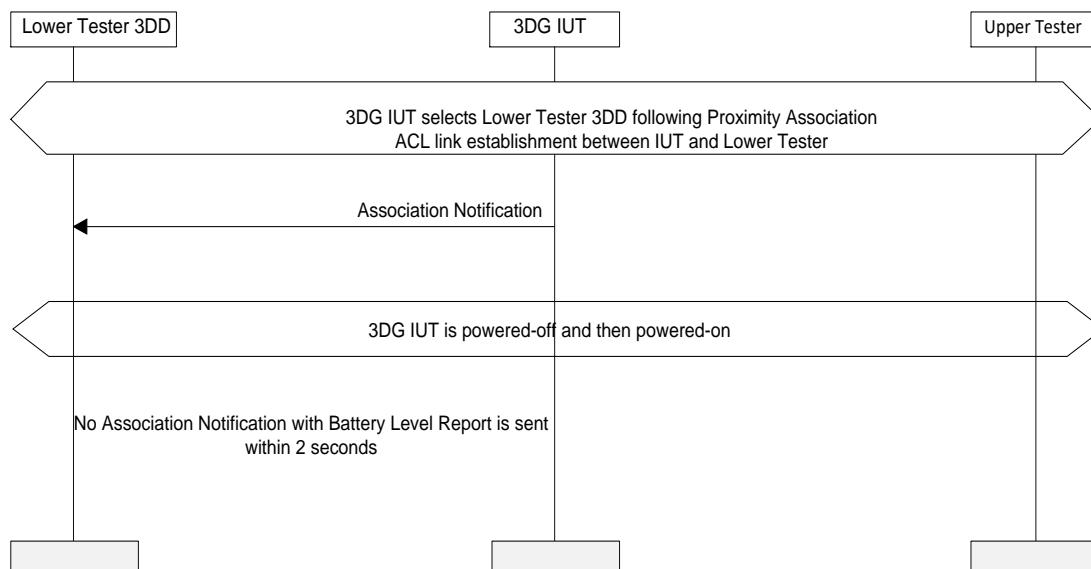


Figure 4.12: 3DSP/3DG/BLR/BV-04-C [Battery Level Report Not Transmitted at Start-up Synchronization when Not Supported by 3DD] MSC

- Expected Outcome

Pass verdict

The 3DG IUT does not transmit a 3DG Connection Announcement Message to the Lower Tester 3DD.

3DSP/3DG/BLR/BV-05-C [Battery Level Reporting Not Supported indicated when sending 3DG Connection Announcement message]

- Test Purpose

Verify that a 3DG not supporting Battery Level Reporting Transmission will set the “Battery Level” field in the 3DG Connection Announcement message to “Battery Level Reporting not supported”.

- Reference

[4] 5.1.2.1, 6.2, 6.4

- Initial Condition

- Proximity Association has been performed by the 3DG IUT and the 3DG IUT has selected the Lower Tester 3DD to associate with.
- Lower Tester 3DD indicates support for Association Notification and Battery Level Reporting in its 3D Information EIR Field.
- Lower Tester 3DD sets “Send Battery Level Report on Start-up Synchronization” bit set to 0 in its 3D Information EIR Field.
- An ACL connection exists between the Lower Tester 3DD and the 3DG IUT.

- Test Procedure

The 3DG IUT sends a 3DG Connection Announcement Message to the Lower Tester 3DD.

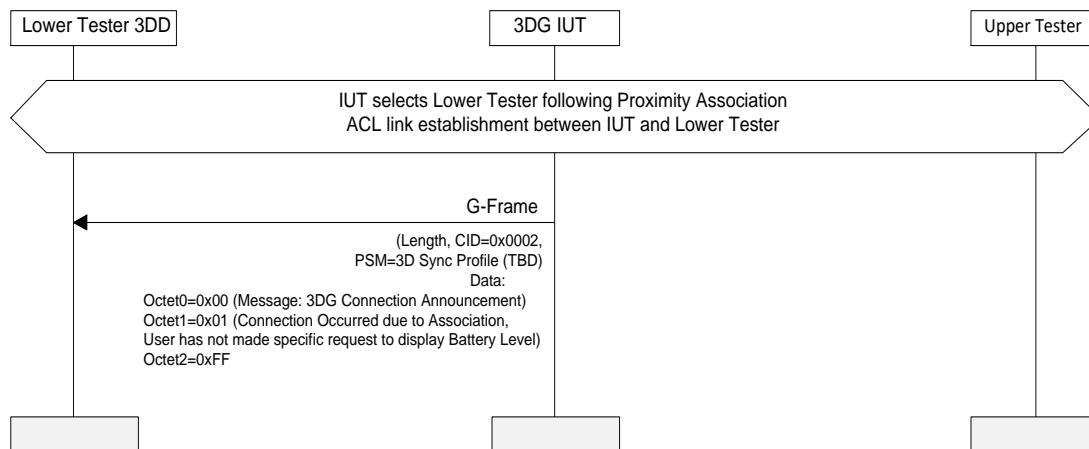


Figure 4.13: 3DSP/3DG/BLR/BV-05-C [Battery Level Reporting Not Supported indicated when sending 3DG Connection Announcement message] MSC

- Expected Outcome

Pass verdict

The 3DG IUT transmits a 3DG Connection Announcement Message to the Lower Tester 3DD with the 3D Communications Channel Message Opcode field set to 0x00, the Association Notification bit

set to 1, the User Request for Battery Level Display bit set to 0, and the Battery Level field set to 0xFF indicating Battery Level Reporting is not supported.

4.6.2 3DD

Verify that 3DD can properly perform the Battery Level Reporting function.

3DSP/3DD/BLR/BV-06-C [Battery Level Reception at Association Notification]

- Test Purpose

Verify that a 3DD can properly receive the Battery Level report from a 3DG at the time of transmitting Association Notification.

- Reference

[4] 5.1.2.1, 6.2, 6.4

- Initial Condition

- Proximity Association has been performed by the 3DD IUT and the Lower Tester 3DG has selected the IUT 3DD to associate with.
- The 3DD IUT indicates support for Association Notification and Battery Level Reporting in its 3D Information EIR Field.

- Test Procedure

The Lower Tester 3DG is triggered to send a 3DG Connection Announcement Message with the 3D Communications Channel Message Opcode field set to 0x00, the Association Notification bit set to 1, the User Request for Battery Level Display bit set to 0, and the Battery Level field set to a random number between 0-100.

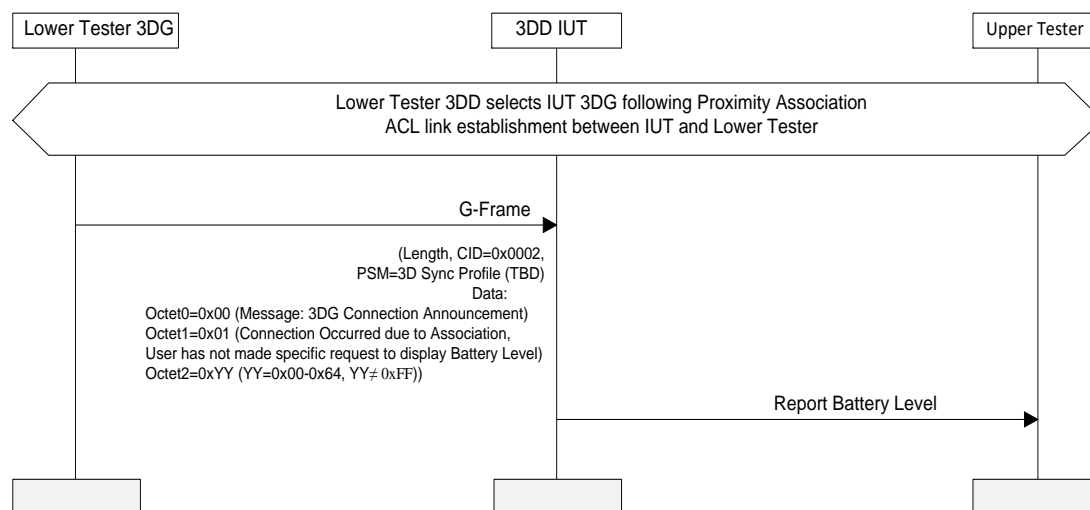


Figure 4.14: 3DSP/3DD/BLR/BV-06-C [Battery Level Reception at Association Notification] MSC

- Expected Outcome

Pass verdict

The 3DD IUT reports the Association Notification and the random number value for the Battery Level field sent by the Lower Tester 3DG to the Upper Tester.

- Notes

The random number value used by the Lower Tester 3DG for its Battery Level should be changed to a different value each time the Lower Tester 3DG sends a 3DG Connection Announcement message.

3DSP/3DD/BLR/BV-07-C [Battery Level Reception at Start-up Synchronization]

- Test Purpose

Verify that a 3DD can properly receive the Battery Level report from a 3DG following the 3DG's transition from standby or powered-off state to a powered-on and synchronized state when the 3DD has the "Send Battery Level Report on Start-up Synchronization" bit set in its 3D Information EIR Field.

- Reference

[4] 5.1.2.1, 6.2, 6.4

- Initial Condition

- Proximity Association has been performed by the Lower Tester 3DG and the Lower Tester 3DG has selected the 3DD IUT to associate with.
- The 3DD IUT indicates support for Association Notification and Battery Level Reporting in its 3D Information EIR Field.
- The 3DD IUT sets "Send Battery Level Report on Start-up Synchronization" bit = 1 in its 3D Information EIR Field.

- Test Procedure

1. The Lower Tester 3DG sends Association Notification message to 3DD IUT.
2. The Lower Tester 3DG is placed in a stand-by or powered-off state.
3. The Lower Tester 3DG is powered on.
4. The Lower Tester 3DG is triggered to send a 3DG Connection Announcement Message with the 3D Communications Channel Message Opcode field set to 0x00, the Association Notification bit set to 0, the User Request for Battery Level Display bit set to 0, and the Battery Level field set to a random number between 0-100.
5. The 3DD IUT indicates the reception of Association Notification with properly formatted Battery Level report.
6. The 3DD IUT disconnects from Lower Tester 3DG.

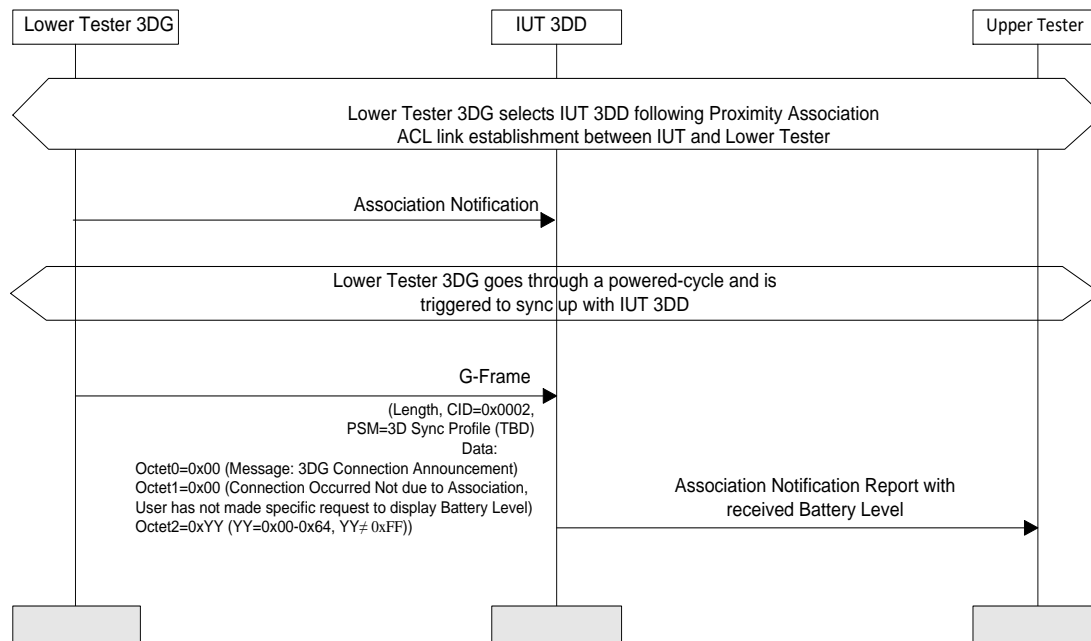


Figure 4.15: 3DSP/3DD/BLR/BV-07-C [Battery Level Reception at Start-up Synchronization] MSC

- Expected Outcome

Pass verdict

The 3DD IUT reports the same random number value for the Battery Level field sent by the Lower Tester 3DG to the Upper Tester.

- Notes

The random number value used by the Lower Tester 3DG for its Battery Level should be changed to a different value each time the Lower Tester 3DG sends a 3DG Connection Announcement message.

3DSP/3DD/BLR/BV-08-C [Battery Level Reception at User Request for Battery Level Display]

- Test Purpose

Verify that a 3DD can properly receive the Battery Level report from a 3DG whose 3DG Connection Announcement Message indicates the user requests Battery Level display.

- Reference

[4] 5.1.2.1, 6.2, 6.4

- Initial Condition

- Proximity Association has been performed by the Lower Tester 3DG and the Lower Tester 3DG has selected the 3DD IUT to associate with.
- 3DD IUT indicates support for Association Notification and Battery Level Reporting in its 3D Information EIR Field.

- Test Procedure

1. The Lower Tester 3DG is triggered to send a 3DG Connection Announcement Message with the 3D Communications Channel Message Opcode field set to 0x00, the Association Notification bit

set to 0, the User Request for Battery Level Display bit set to 1, and the Battery Level field set to a random number between 0–100.

2. The 3DD IUT indicates the reception of Association Notification with correct Battery Level report.
3. The 3DD IUT disconnects Lower Tester 3DG.

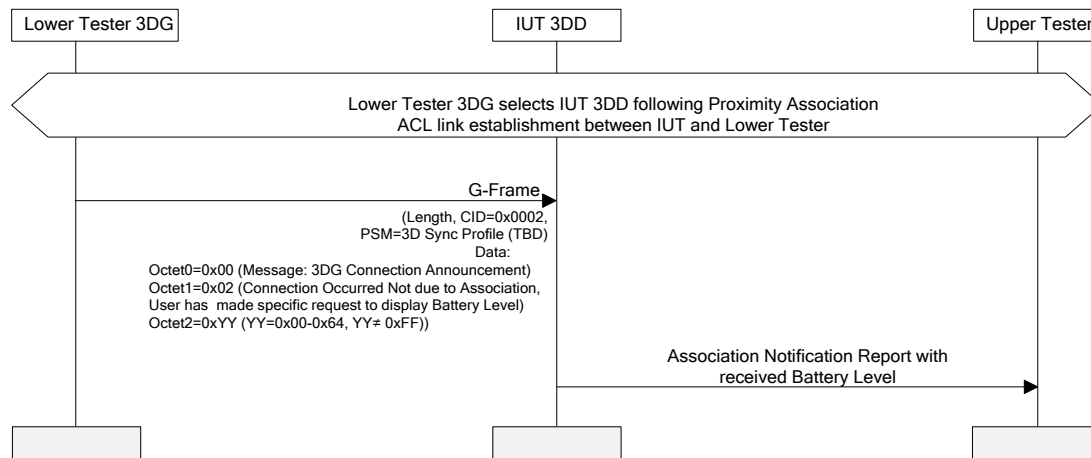


Figure 4.16: 3DSP/3DD/BLR/BV-08-C [Battery Level Reception at User Request for Battery Level Display] MSC

- Expected Outcome

Pass verdict

The 3DD IUT reports the same random number value for the Battery Level field sent by the Lower Tester 3DG to the Upper Tester.

- Notes

The random number value used by the Lower Tester 3DG for its Battery Level should be changed to a different value each time the Lower Tester 3DG sends a 3DG Connection Announcement message.

4.7 3D Broadcast

Verify that 3DD can properly perform 3D Broadcast Message transmission and 3DG can properly perform 3D Broadcast Message reception.

4.7.1 3DG

Verify that 3DG can properly receive the 3D Broadcast Message.

3DSP/3DG/3DB/BV-01-C [3D Broadcast Message Reception]

- Test Purpose

Verify that a 3DG can properly perform Synchronization establishment and then receive and decode the 3D Broadcast Message sent from a 3DD.

- Reference

[2] Volume 3, Part C, Section 7.5

[4] 8.5

- Initial Condition

- The 3DG IUT is in OFF mode, is configured as described in Section 3.1.2, and is currently associated with the Lower Tester 3DD.



- The Lower Tester 3DD is in the ON mode and is configured as described in Section 3.1.2.
- The Lower Tester 3DD is set to operate with a properly formatted Class of Device, Legacy 3D Information EIR Field, TX Power Level Field, and 3D Information EIR Field indicating support for Association Notification and no support for Battery Level Reporting.
- The Lower Tester 3DD is set to operate with a TX power level of 0 dBm.
- The Lower Tester 3DD is being supplied a Reference Frame Sync frequency which is within the supported lens shutter frequency range specified in the 3DG IUT's IXIT.
- Test Procedure
 1. The 3DG IUT is turned on and performs Synchronization establishment with the Associated Lower Tester 3DD.
 2. After successfully completing Synchronization establishment, the 3DG IUT starts receiving the 3D Broadcast Messages.
 3. The Lower Tester 3DD continuously broadcasts 3D Broadcast Messages at a 100% duty cycle and containing Frame Sync Instant, Frame Sync Period, and Lens Shutter offsets in synchronization with its Bluetooth Clock.
 4. After confirming the 3DG IUT is successfully receiving the 3D Broadcast Messages and is synchronized with the Lower Tester 3DD, the Lower Tester 3DD is adjusted to transmit 3D Broadcast Messages at a 33% duty cycle (only 1 out of 3 3D Broadcast Messages are transmitted).
- Expected Outcome

Pass verdict

While the Lower Tester 3DD is broadcasting at a 100% duty cycle, the 3DG IUT lens shutter timing signals are in synchronization with the Reference Frame Sync being fed into the Lower Tester 3DD.

When the Lower Tester 3DD begins broadcasting at a 33% duty cycle, the 3DG IUT repeats Synchronization establishment with the Associated Lower Tester 3DD.

4.7.2 3DD

Verify that 3DD can properly enter Synchronizable mode and transmit the 3D Broadcast Message.

3DSP/3DD/3DB/BV-02-C [3D Broadcast Message Transmission]

- Test Purpose

Verify that a 3DD can operate in Synchronizable mode and properly format and transmit the 3D Broadcast Message.
- Reference

[2] Volume 3, Part C, Section 4.4.2

[4] 8.1, 8.2, 8.3, 8.4
- Initial Condition
 - The Lower Tester 3DG is in OFF mode, is configured as described in Section 3.1.2, and is currently associated with the 3DD IUT.
 - The 3DD IUT is in the ON mode and is configured as described in Section 3.1.2.

- The 3DD IUT is being supplied a Reference Frame Sync frequency which is one of the supported frame sync frequencies specified in the 3DD IUT's IXIT.
- The 3DD IUT is continuously operating in or enters into Synchronizable mode and begins sending 3D Broadcast Messages.
- Test Procedure
 1. The Lower Tester 3DG is turned on and performs Synchronization establishment with the 3DD IUT.
 2. After successfully completing Synchronization establishment, the Lower Tester 3DG starts receiving the 3D Broadcast Messages being sent from the 3DD IUT.
- Expected Outcome

Pass verdict

The Lower Tester 3DG's lens shutter timing signals are in synchronization with the Reference Frame Sync being fed into the 3DD IUT.

4.8 Frame Sync

Verify that 3DD can properly and accurately perform the operations of capturing and formatting frame sync timing information associated with the displayed image.

4.8.1 3DD

Verify that 3DD can properly and accurately perform the operations of capturing and formatting frame sync timing.

3DSP/3DD/FS/BV-01-C [3DD Timing Accuracy]

- Test Purpose

Verify that a 3DD can properly and accurately perform the operations of capturing and formatting frame sync timing information within the required accuracy.
- Reference

[4] 4.1.2.1, 4.1.3, 4.1.3.1, 9.3
- Initial Condition
 - The Lower Tester 3DG is in OFF mode, is configured as described in Section 3.1.2, and is currently associated with the 3DD IUT.
 - The 3DD IUT is in the ON mode and is configured as described in Section 3.1.2.
 - The 3DD IUT is being supplied a Reference Frame Sync frequency which is one of the supported frame sync frequencies specified in the 3DD IUT's IXIT.
- Test Procedure
 1. The Lower Tester 3DG is turned on and allowed to synchronize with the 3DD IUT.
- Expected Outcome

Pass verdict

The Lower Tester 3DG's lens shutter timing signals are stable and in synchronization with the Reference Frame Sync being fed into the 3DD IUT within the specified Lens Shutter Control Timing Accuracy requirement.

3DSP/3DD/FS/BI-02-C [Invalid Frame Sync Period]

- Test Purpose

Verify that a 3DD will not broadcast a value for the Frame Sync Period greater than the maximum allowed limit.
- Reference

[4] 4.1.3
- Initial Condition
 - The Lower Tester 3DG is in OFF mode, is configured as described in Section 3.1.2, and is currently associated with the 3DD IUT.
 - The 3DD IUT is in the ON mode and is configured as described in Section 3.1.2.
 - The 3DD IUT is being supplied a Reference Frame Sync signal that is set at a random frequency which is one of the supported frame sync frequencies specified in the 3DD IUT's IXIT.
- Test Procedure
 1. The Lower Tester 3DG is turned on and allowed to synchronize with the 3DD IUT.
 2. The Reference Frame Sync signal being fed to the 3DD IUT is then changed to a random frequency between 1–24 Hz.
- Expected Outcome

Pass verdict

The 3DD IUT sends 3D Broadcast Message with the Left Lens Shutter Open Offset field set to the value of 0xFFFF and the Frame Sync Period and the Frame Sync Period Fraction fields set to a value of 0.

4.9 Shutter Control

Verify that a 3DG can properly and accurately perform the operation of lens shutter control based on frame sync timing information received in the 3D Broadcast Message.

4.9.1 3DG

Verify that 3DG can properly and accurately perform the operation of lens shutter control based on frame sync timing information.

3DSP/3DG/SC/BV-01-C [3DG Timing Accuracy]

- Test Purpose

Verify that a 3DG can properly perform the operation of lens shutter control within the required accuracy.
- Reference

[4] 9.2, 9.3
- Initial Condition
 - The 3DG IUT is in OFF mode, is configured as described in Section 3.1.2, and is currently associated with the Lower Tester 3DD.

- The Lower Tester 3DD is in the ON mode and is configured to operate with a Frame Sync frequency of 50 Hz as described in Section 3.1.2.
- The Lower Tester 3DD is set to operate with a properly formatted Class of Device, Legacy 3D Information EIR Field, TX Power Level Field, and 3D Information EIR Field indicating support for Association Notification and no support for Battery Level Reporting.
- The Lower Tester 3DD is set to operate with a TX power level of 0 dBm.
- The Lower Tester 3DD is supplied a Reference Frame Sync frequency of 50 Hz.
- Test Procedure
 1. Record the Lower Tester 3DD's shutter open and close delay parameters selected from Table 3.1 for use during the 50 Hz test and from Table 3.2 for use during the 59.94 Hz test.
 2. The 3DG IUT is powered on and allowed to synchronize with the Lower Tester 3DD operating at 50 Hz.
 3. Using the oscilloscope, measure and record the shutter timing parameters specified in Section 3.1.1.4.1 for 50Hz operation.
 4. After confirming that the 3DG IUT has synchronized with the Lower Tester 3DD at 50 Hz, the Lower Tester 3DD is configured to operate with a Frame Sync frequency of 59.94 Hz as described in Section 3.1.2 by changing the Reference Frame Sync signal being fed to the Lower Tester 3DD to 59.94 Hz.
 5. The 3DG IUT is powered off.
 6. The 3DG IUT is powered on and allowed to synchronize with Lower Tester 3DD operating at 59.94 Hz.
 7. Using the oscilloscope, measure and record the shutter timing parameters specified in Section 3.1.1.4.1 for 59.94Hz operation.
- Expected Outcome

Pass verdict

The 3DG IUT's lens shutter timing signals are stable and in synchronization with the Reference Frame Sync signal at both 50 Hz and 59.94 Hz within the specified Lens Shutter Control Timing Accuracy requirement. The test passes if all of the following five equations are true for synchronized operation for 50 Hz and for 59.94 Hz Reference Frame Sync frequencies.

- Left Shutter Open Delay = $t_{\text{LeftOpen}} + \text{TSPX_shutter_open_adjustment} \pm 100\mu\text{s}$.
- Left Shutter Close Delay = $t_{\text{LeftClose}} + \text{TSPX_shutter_close_adjustment} \pm 100\mu\text{s}$.
- Right Shutter Open Delay = $t_{\text{RightOpen}} + \text{TSPX_shutter_open_adjustment} \pm 100\mu\text{s}$.
- Right Shutter Close Delay = $t_{\text{RightClose}} + \text{TSPX_shutter_close_adjustment} \pm 100\mu\text{s}$.
- Reference Frame Sync Period = $(t_{\text{Regenerated Frame Sync Period}} \times 10) \div 10 \pm 5\mu\text{s}$.

3DSP/3DG/SC/BV-02-C [3D-to-2D Switch on Exceeding Maximum Timing Error]

- Test Purpose

Verify that a 3DG switches from 3D to 2D mode (both lens shutters open) when the maximum timing error is exceeded.

- Reference

[4] 8.4, 9.3



- Initial Condition
 - The 3DG IUT is in OFF mode, is configured as described in Section 3.1.2, and is currently associated with the Lower Tester 3DD.
 - The Lower Tester 3DD is in the ON mode and is configured as described in Section 3.1.2.
 - The Lower Tester 3DD is set to operate with a properly formatted Class of Device, Legacy 3D Information EIR Field, TX Power Level Field, and 3D Information EIR Field indicating support for Association Notification and no support for Battery Level Reporting.
 - The Lower Tester 3DD is set to operate with a TX power level of 0 dBm.
 - The Lower Tester 3DD is being supplied a Reference Frame Sync frequency of 59.94 Hz.
- Test Procedure
 1. The 3DG IUT is turned on and allowed to synchronize with the Lower Tester 3DD operating at 59.94 Hz.
 2. The Lower Tester 3DD is triggered to stop transmitting 3D Broadcasts and a timer is started.
 3. Plot the 3DG IUT's average lens shutter timing error over the elapsed time since stopping the Lower Tester 3DD's transmission of the 3D Broadcasts.
 4. Note the time on the timer when the 3DG IUT switches to the 2D mode (both lens shutters open).
 5. If the average lens shutter timing error does not exceed the specified Lens Shutter Control Timing Accuracy requirement after 60 seconds from stopping the 3D Broadcasts, then end the test.

- Expected Outcome

Pass verdict

The 3DG IUT's lens shutter timing signals are stable and in synchronization with the Reference Frame Sync signal at 59.94 Hz.

After two seconds since stopping the transmission of the 3D Broadcasts, the 3DG IUT's lens shutter timing signals are still stable and in synchronization with the Reference Frame Sync signal at 59.94 Hz and within the specified Lens Shutter Control Timing Accuracy requirement.

When the average lens shutter timing error exceeds the specified Lens Shutter Control Timing Accuracy requirement, the 3DG IUT switch into 2D mode (both lens shutters open).

If the average lens shutter timing error does not exceed the specified Lens Shutter Control Timing Accuracy requirement after 60 seconds from stopping the 3D Broadcasts, then the test passes.

3DSP/3DG/SC/BV-03-C [3D-to-2D Switch on Invalid Frame Sync Period]

- Test Purpose

Verify that a 3DG switches from 3D to 2D mode (both lens shutters open) when it receives a 3D Broadcast Message with an invalid value for the Frame Sync Period.
- Reference

[4] 9.3
- Initial Condition
 - The 3DG IUT is in OFF mode, is configured as described in Section 3.1.2, and is currently associated with the Lower Tester 3DD.
 - The Lower Tester 3DD is in the ON mode and is configured as described in Section 3.1.2.

- The Lower Tester 3DD is set to operate with a properly formatted Class of Device, Legacy 3D Information EIR Field, TX Power Level Field, and 3D Information EIR Field indicating support for Association Notification and no support for Battery Level Reporting.
- The Lower Tester 3DD is set to operate with a TX power level of 0 dBm.
- The Lower Tester 3DD is being supplied a Reference Frame Sync frequency of 59.94 Hz.
- Test Procedure
 1. The 3DG IUT is turned on and allowed to synchronize with the Lower Tester 3DD operating at 59.94 Hz.
 2. The Lower Tester 3DD is triggered to begin transmitting 3D Broadcast Messages with a Frame Sync Period set to 50,000.
- Expected Outcome

Pass verdict

The 3DG IUT's lens shutter timing signals are stable and in synchronization with the Reference Frame Sync signal at 59.94 Hz.

Upon sending 3D Broadcast Messages with the Frame Sync Period set to 50,000, the 3DG IUT switches into 2D mode (both lens shutters open).

5 Test case mapping

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

The columns for the TCMT are defined as follows:

Item: Contains a logical expression based on specific entries from the associated ICS document. Contains a logical expression (using the operators AND, OR, NOT as needed) based on specific entries from the applicable ICS document(s). The entries are in the form of y/x references, where y corresponds to the table number and x corresponds to the feature number as defined in the ICS document for 3D Synchronization Profile (3DSP) [5].

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

Test Case(s): The applicable test case identifiers are required for Bluetooth Qualification if the corresponding y/x references defined in the Item column are supported. Further details about the function of the TCMT are elaborated in [3].

For the purpose and structure of the ICS/IXIT, refer to [3].

Item	Feature	Test Case(s)
3DSP 4/1	Proximity Association 3DG	3DSP/3DG/PA/BV-01-C 3DSP/3DG/PA/BV-02-C
3DSP 5/1	Proximity Association 3DG: Class of Device	3DSP/3DG/PA/BV-03-C
3DSP 5/2	Proximity Association 3DG: Path Loss Threshold	3DSP/3DG/PA/BV-04-C
3DSP 5/3	Proximity Association 3DG: 3D Information EIR Field	3DSP/3DG/PA/BI-05-C 3DSP/3DG/PA/BV-06-C
3DSP 3/1	Proximity Association 3DD: Class of Device	3DSP/3DD/PA/BV-07-C
3DSP 3/2	Proximity Association 3DD: 3D Information EIR Field	3DSP/3DD/PA/BV-08-C
3DSP 3/4	Proximity Association 3DD: TX Power Level Field	3DSP/3DD/PA/BV-09-C
3DSP 3/3	Proximity Association 3DD: Legacy 3D Information EIR Field	3DSP/3DD/PA/BV-10-C
3DSP 2/4	3DG Connection Announcement: Invalid 3D Opcode	3DSP/3DD/CA/BI-01-C
3DSP 4/3 AND 3DSP 4/5	Association Notification 3DG	3DSP/3DG/AN/BV-01-C 3DSP/3DG/AN/BV-02-C
3DSP 4/2	Legacy Association Notification 3DG	3DSP/3DG/AN/BV-03-C
3DSP 2/4 AND 3DSP 2/6	Association Notification 3DD	3DSP/3DD/AN/BV-04-C
3DSP 2/3	Reference Protocol Association Notification 3DD	3DSP/3DD/AN/BV-05-C
3DSP 4/3 AND 3DSP 4/4	Battery Level Reporting 3DG	3DSP/3DG/BLR/BV-01-C 3DSP/3DG/BLR/BV-02-C 3DSP/3DG/BLR/BV-04-C

Item	Feature	Test Case(s)
3DSP 4/3 AND 3DSP 4/4 AND 3DSP 4/4a	Battery Level Reporting 3DG – User Requests Display	3DSP/3DG/BLR/BV-03-C
3DSP 4/3 AND NOT 3DSP 4/4	Battery Level Reporting not supported by 3DG	3DSP/3DG/BLR/BV-05-C
3DSP 2/4 AND 3DSP 2/5	Battery Level Reporting 3DD	3DSP/3DD/BLR/BV-06-C 3DSP/3DD/BLR/BV-07-C 3DSP/3DD/BLR/BV-08-C
3DSP 4/6	3D Broadcast 3DG	3DSP/3DG/3DB/BV-01-C
3DSP 2/7	3D Broadcast 3DD	3DSP/3DD/3DB/BV-02-C
3DSP 2/1	Frame Sync	3DSP/3DD/FS/BV-01-C 3DSP/3DD/FS/BI-02-C
3DSP 4/7	Shutter Control	3DSP/3DG/SC/BV-01-C 3DSP/3DG/SC/BV-02-C 3DSP/3DG/SC/BV-03-C
3DSP 1/1	3DD Service Discovery	3DSP/3DD/SGSIT/SERR/BV-01-C 3DSP/3DD/SGSIT/ATTR/BV-01-C
3DSP 1/1 AND 3DSP 12/5	3DD SDP attribute: ServiceName	3DSP/3DD/SGSIT/OFFS/BV-01-C
3DSP 1/2	3DG Service Discovery	3DSP/3DG/SGSIT/SERR/BV-01-C 3DSP/3DG/SGSIT/ATTR/BV-01-C
3DSP 1/2 AND 3DSP 12/5	3DG SDP attribute: ServiceName	3DSP/3DG/SGSIT/OFFS/BV-02-C

Table 5.1: Test case mapping

6 Revision history and acknowledgments

Revision History

Publication Number	Revision Number	Date	Comments
0	1.0.0	2013-03-18	Prepare for Publication
	1.0.1r1	2013-08-15	TCRL 2013-2 TSE 5241: Addition of line item for TP/BLR/BV-03-C in the TCMT.
1	1.0.1	2013-12-03	Prepare for Publication
	1.0.2.0r00	2015-05-20	TSE 6283: Updated Octet1 value in MSC for TP/BLR/BV-08-C ESR08: Incremented revision number to match spec (1.0.2) and added 4th digit for TS revision (1.0.2.0).
2	1.0.2.0	2015-07-14	Prepared for TCRL 2015-1 publication
	1.0.3.0r00	2015-10-28	Updated version numbering to align with Specification version change to 1.0.3 for ESR09.
3	1.0.3.0	2015-12-22	Prepared for TCRL 2015-2 publication.
	1.0.3.1r00	2017-02-02	Updated TS Template.
	1.0.3.1r01	2017-04-05	Converted to new Test Case ID conventions as defined in TSTO v4.1
4	1.0.3.1	2017-07-03	Approved by BTI. Prepared for TCRL 2017-1 publication.
	p5r00–r08	2023-08-29 – 2024-03-25	TSE 23918 (rating 1): Converted -I tests to -C tests as appropriate; updated the TCMT and TCRL accordingly. TSE 24539 (rating 4): Added new GSIT section with new TCs 3DSP/3DD/SGSIT/ATTR/BV-01-C, 3DSP/3DD/SGSIT/OFFS/BV-01-C, 3DSP/3DD/SGSIT/SERR/BV-01-C, 3DSP/3DG/SGSIT/ATTR/BV-01-C, 3DSP/3DG/SGSIT/OFFS/BV-02-C, and 3DSP/3DG/SGSIT/SERR/BV-01-C. Removed previous SDP-related section and related test cases 3DSP/3DD/SDP/BV-01-I and 3DSP/3DG/SDP/BV-01-I. Updated the TCMT accordingly. Added a reference to the SDP.TS, removed Service Discovery tests from the TSS, added GSIT to and removed SDP from the Test Groups list, and updated the TCID Conventions section. Template-based editorials, including aligning the disclaimer with the latest DNMD, setting previous version 1.0.3.1 to p4, reformatting TCID headings, moving TCIDs to TC Config tables, updating the references section headings/verbiage, simplifying the Test groups section, aligning test purposes with current language conventions, fixing heading capitalization, updating table/figure/section references to proper cross-references, updating MSC captions.
5	p5	2024-07-01	Approved by BTI on 2024-05-22. Prepared for TCRL 2024-1 publication.

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