

# Channel Sounding (CS)

## **Bluetooth® Implementation Conformance Statement (ICS) Proforma**

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- **Revision:** CS.ICS.p4
- **Revision Date:** 2026-05-05
- **Prepared By:** Core Specification Working Group
- **Published during TCRL:** TCRL.pkg103



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# Contents

<b>1</b>	<b>General principles</b> .....	<b>4</b>
1.1	Implementation Under Test (IUT) identification .....	4
1.2	Enforcement of inter-layer dependencies .....	4
<b>2</b>	<b>ICS declarations</b> .....	<b>5</b>
2.1	Roles .....	5
2.2	Supported features .....	5
<b>3</b>	<b>References</b> .....	<b>7</b>
<b>4</b>	<b>Revision history and acknowledgments</b> .....	<b>8</b>



# 1 General principles

## 1.1 Implementation Under Test (IUT) identification

Using the Bluetooth SIG qualification tool, the implementer is expected to declare details about what will be implemented.

## 1.2 Enforcement of inter-layer dependencies

This ICS includes one or more tables with inter-layer dependencies (ILDs). ILDs are used for specification requirements that are dependent on other supporting specifications. ILDs can refer to an individual ICS item in a separate layer (individual ILD), or it can refer to the full layer (full-layer ILD).

ILDs residing in an X2Core layer will be enforced from the Bluetooth SIG qualification tool in the following conditions, depending on where the referred ILD is residing:

Referred ILD resides in	Individual ILD	Full-layer ILD
Controller layer	Core-Complete configuration, or Referred layer is supported	N/A
Lower HCI layer	HCI is supported	N/A
Upper HCI layer	Core-Host configuration, or UHCI is supported	N/A
Host layer	Core-Host configuration, or Core-Complete configuration, or Referred layer is supported	N/A
X2Core layer	Core-Host configuration, or Core-Complete configuration, or Referred layer is supported	Core-Host configuration, or Core-Complete configuration

Table 1.1: Enforcement of an ILD within the Bluetooth SIG qualification tool

## 2 ICS declarations

### 2.1 Roles

Table 1: Role Requirements

Item	Version	Reference	Status	Inter-Layer Dependency
1	CS Initiator	[1] 4.3	C.1	[2] LL 1/7
2	CS Reflector	[1] 4.3	C.1	[2] LL 1/8

C.1: Mandatory to support at least one.

### 2.2 Supported features

Table 2: Supported Features

Item	Feature	Reference	Status	Inter-Layer Dependency
1	Channel Sounding	[1]	M	[2] LL 9/56
2	CS LE 2M PHY	[1] 2	O	[2] LL 13/10
3	CS Mode-0	[1] 4.3.1	M	N/A
4	CS Mode-1	[1] 4.3.2	M	[2] LL 13/1
5	CS Mode-2	[1] 4.3.3	M	[2] LL 13/2
6	CS Mode-3	[1] 4.3.4	O	[2] LL 13/3
7	Round Trip Time	[1] 3.2	M	N/A
8	More than one antenna element	[1] 4.7	O	N/A
9	Multiple CS Configurations	[1] 4.2	O	N/A
10	Procedure Repeat	[1] 2.4	O	[2] LL 13/12
11	Channel Selection #3c	[1] 4.1.4	O	[2] LL 13/13
12	Phase-based Distance Estimate with Sounding Sequence	[1] 3.3.1.1	O	N/A
13	CS LE 2M 2BT PHY	[1] 2	O	[3] RFPHY 3/9
14	No longer used	N/A	N/A	N/A
14a	Phase-based Normalized Attack Detector Metric – Sounding Sequence	[1] 3.5.1	C.1	N/A
14b	Phase-based Normalized Attack Detector Metric – Random Bit Sequence	[1] 3.5.1	C.2	N/A
15	CS Tone Quality Indication	[1] 4.6	O	[2] LL 9/57
16	Amplitude-based Normalized Attack Detector Metric	[4] 3.5.4	C.3	N/A
17	CS Inline PCT	[5] 4.3, 4.7	O	[2] LL 13/22

C.1: Optional IF CS 3/2 “RTT w/ Sounding Sequence, 32-bit” OR CS 3/3 “RTT w/ Sounding Sequence, 96-bit”, otherwise Excluded.

C.2: Optional IF CS 3/4 “RTT w/ Random Bit Sequence, 32-bit” OR CS 3/5 “RTT w/ Random Bit Sequence, 64-bit” OR CS 3/6 “RTT w/ Random Bit Sequence, 96-bit” OR CS 3/7 “RTT w/ Random Bit Sequence, 128-bit”, otherwise Excluded.



- C.3: Optional IF CS 3/2 “RTT w/ Sounding Sequence, 32-bit” OR CS 3/3 “RTT w/ Sounding Sequence, 96-bit” OR CS 3/4 “RTT w/ Random Bit Sequence, 32-bit” OR CS 3/5 “RTT w/ Random Bit Sequence, 64-bit” OR CS 3/6 “RTT w/ Random Bit Sequence, 96-bit” OR CS 3/7 “RTT w/ Random Bit Sequence, 128-bit”, otherwise Excluded.

**Table 3: Round Trip Time Feature**

*Prerequisite: CS 2/7 “Round Trip Time”*

Item	Version	Reference	Status	Inter-Layer Dependency
1	RTT AA Only	[1] 3.2	M	N/A
2	RTT w/ Sounding Sequence, 32-bit	[1] 3.3	C.3	N/A
3	RTT w/ Sounding Sequence, 96-bit	[1] 3.3	O	N/A
4	RTT w/ Random Bit Sequence, 32-bit	[1] 3.4	O	N/A
5	RTT w/ Random Bit Sequence, 64-bit	[1] 3.4	O	N/A
6	RTT w/ Random Bit Sequence, 96-bit	[1] 3.4	O	N/A
7	RTT w/ Random Bit Sequence, 128-bit	[1] 3.4	O	N/A
8	CS RTT Access Address, 10 ns	[1] 3.2	O	[2] LL 13/4
9	CS RTT Sounding Sequence, 10 ns	[1] 3.3	C.1	[2] LL 13/6
10	CS RTT Random Payload, 10 ns	[1] 3.4	C.2	[2] LL 13/8
11	Channel Sounding PHY-specific RTT Accuracy	[5] 2.4.2.44	C.4	[2] LL 13/23

- C.1: Optional IF CS 3/2 “RTT w/ Sounding Sequence, 32-bit” OR CS 3/3 “RTT w/ Sounding Sequence, 96-bit”, otherwise not defined.
- C.2: Optional IF CS 3/4 “RTT w/ Random Bit Sequence, 32-bit” OR CS 3/5 “RTT w/ Random Bit Sequence, 64-bit” OR CS 3/6 “RTT w/ Random Bit Sequence, 96-bit” OR CS 3/7 “RTT w/ Random Bit Sequence, 128-bit”, otherwise not defined.
- C.3: Mandatory IF CS 2/12 “Phase-based Distance Estimate with Sounding Sequence”, otherwise Optional.
- C.4: Optional IF CS 3/1 “RTT AA Only” OR CS 3/2 “RTT w/ Sounding Sequence, 32-bit” OR CS 3/3 “RTT w/ Sounding Sequence, 96-bit” OR CS 3/4 “RTT w/ Random Bit Sequence, 32-bit” OR CS 3/5 “RTT w/ Random Bit Sequence, 64-bit” OR CS 3/6 “RTT w/ Random Bit Sequence, 96-bit” OR CS 3/7 “RTT w/ Random Bit Sequence, 128-bit”, otherwise not defined.

**Table 4: Antenna Configuration**

*Prerequisite: CS 2/8 “More than one antenna element”*

Item	Version	Reference	Status
1	2 antennae	[1] 4.7	C.1
2	3 antennae	[1] 4.7	C.1
3	4 antennae	[1] 4.7	C.1

- C.1: Mandatory to support one and only one.

## 3 References

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- [1] Specification of the Bluetooth System, Volume 6, Part H (Channel Sounding), Version 6.0 or later
- [2] ICS Proforma for Link Layer (LL)
- [3] ICS Proforma for Radio Frequency Physical Layer (RFPHY)
- [4] Specification of the Bluetooth System, Volume 6, Part H (Channel Sounding), Version 6.2 or later
- [5] Specification of the Bluetooth System, Volume 6, Part H (Channel Sounding), Version 6.3 or later

## 4 Revision history and acknowledgments

### Revision History

Publication Number	Revision Number	Date	Comments
0	p0	2024-09-04	Approved by BTI on 2024-08-14. Prepared for TCRL 2024-2 publication.
	p1r00–r03	2024-10-30 – 2024-12-13	TSE 26157 (rating 1): Corrected an ICS item number in the prerequisite and in C.3 for Table 3 and corrected an ICS item number in the prerequisite and fixed the table title for Table 4. TSE 26238 (rating 2): Split 2/14 into 2/14a and 2/14b to distinguish Sounding Sequence and Random Bit Sequence. TSE 26691: Per E26162, updated “antennas” to “antennae” in 4/1, 4/2, and 4/3.
1	p1	2025-02-18	Approved by BTI on 2024-12-26. Prepared for TCRL 2025-1 publication.
	p2r00–r01	2025-02-10 – 2025-03-24	TSE 26663 (rating 1): Added LL ILDs for 3/8, 3/9, and 3/10.
2	p2	2025-05-06	Approved by BTI on 2025-04-16. Prepared for TCRL 2025-2 publication.
	p3r00–p01	2025-07-08 – 2025-08-04	TSE 27907 (rating 4): To support the CSAA feature added for Core v6.2, added 2/16 and associated conditional C.3.
3	p3	2025-11-04	Approved by BTI on 2025-10-05. Prepared for TCRL pkg101 publication.
	p4r00–r06	2026-01-23 – 2026-02-12	TSE 28685 (rating 2): Incorporated material for the Channel Sounding Inline PCT Transfer feature of Core v6.3. Added new item 2/17 and a reference to Core v6.3 to the References section. TSE 28688 (rating 2): Incorporated material for the Channel Sounding RTT-PHY feature of Core v6.3. Added new item 3/11 and coordinating conditional C.4.
4	p4	2026-05-05	Approved by BTI on 2026-04-07. Prepared for TCRL pkg103 publication.

### Acknowledgments

Name	Company
Matt Canavan	Bluetooth SIG, Inc.
Gene Chang	Bluetooth SIG, Inc.

