

Attribute Protocol (ATT)

Bluetooth® Implementation Conformance Statement (ICS) Proforma

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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	Role	Reference	Status
1	Attribute Protocol Client	[1] 2	O
2	Attribute Protocol Server	[1] 2	M

2.2 Transports

Table 2: Transport Requirements

Item	Transport	Reference	Status
1	Unenhanced ATT bearer over BR/EDR	[1] 2	C.1, C.4
2	Unenhanced ATT bearer over LE	[1] 2	C.2, C.4
3	No longer used	N/A	N/A
3a	Enhanced ATT bearer over LE	[2] 2, 3.2.11	C.5
3b	Enhanced ATT bearer over BR/EDR	[2] 2, 3.2.11	C.3, C.4

C.1: Optional IF CORE 20/2 “BR/EDR Host Layers”, otherwise Excluded.

C.2: Mandatory IF CORE 20/4 “LE Host Layers” AND ATT 7/1 “LE Connections”, otherwise Excluded.

C.3: Optional IF CORE 2a/52 “Host Core v5.2 or later” AND CORE 20/2 “BR/EDR Host Layers”, otherwise Excluded.

C.4: Mandatory to support at least one.

C.5: Optional IF CORE 2a/52 “Host Core v5.2 or later” AND ATT 2/2 “Unenhanced ATT bearer over LE”, otherwise Excluded.

Note: In Core versions prior to v5.2, there was only one type of ATT bearer, which is now called the “Unenhanced ATT bearer”.

2.3 Attribute Protocol Messages

2.3.1 Attribute Client

Table 3: Attribute Protocol Client Messages

Prerequisite: ATT 1/1 “Attribute Protocol Client”

Item	Capability	Reference	Status
1	Attribute Error Response	[1] 3.4.1.1	M
2	Exchange MTU Request	[1] 3.4.2.1	O
3	Exchange MTU Response	[1] 3.4.2.2	C.1
4	Find Information Request	[1] 3.4.3.1	O
5	Find Information Response	[1] 3.4.3.2	C.9
6	Find by Type Value Request	[1] 3.4.3.3	O
7	Find by Type Value Response	[1] 3.4.3.4	C.2
8	Read by Type Request	[1] 3.4.4.1	O
9	Read by Type Response	[1] 3.4.4.2	C.3

Item	Capability	Reference	Status
10	Read Request	[1] 3.4.4.3	O
11	Read Response	[1] 3.4.4.4	C.10
12	Read Blob Request	[1] 3.4.4.5	O
13	Read Blob Response	[1] 3.4.4.6	C.4
14	Read Multiple Request	[1] 3.4.4.7	O
15	Read Multiple Response	[1] 3.4.4.8	C.5
16	Read by Group Type Request	[1] 3.4.4.9	O
17	Read by Group Type Response	[1] 3.4.4.10	C.6
18	Write Request	[1] 3.4.5.1	O
19	Write Response	[1] 3.4.5.2	C.7
20	Write Command	[1] 3.4.5.3	O
21	Signed Write Command	[1] 3.4.5.4	O
22	Prepare Write Request	[1] 3.4.6.1	O
23	Prepare Write Response	[1] 3.4.6.2	C.8
24	Execute Write Request	[1] 3.4.6.3	C.8
25	Execute Write Response	[1] 3.4.6.4	C.8
26	Handle Value Notification	[1] 3.4.7.1	C.22
27	Handle Value Indication	[1] 3.4.7.2	O
28	Handle Value Confirmation	[1] 3.4.7.3	C.24
29	No longer used	N/A	N/A
30	Read Multiple Variable Length Request	[2] 3.4.4.11	C.22
31	Read Multiple Variable Length Response	[2] 3.4.4.12	C.26
32	Handle Value Multiple Notification	[2] 3.4.7.4	C.22

- C.1: Mandatory IF ATT 3/2 “Exchange MTU Request”, otherwise Excluded.
- C.2: Mandatory IF ATT 3/6 “Find by Type Value Request”, otherwise Excluded.
- C.3: Mandatory IF ATT 3/8 “Read by Type Request”, otherwise Excluded.
- C.4: Mandatory IF ATT 3/12 “Read Blob Request”, otherwise Excluded.
- C.5: Mandatory IF ATT 3/14 “Read Multiple Request”, otherwise Excluded.
- C.6: Mandatory IF ATT 3/16 “Read by Group Type Request”, otherwise Excluded.
- C.7: Mandatory IF ATT 3/18 “Write Request”, otherwise Excluded.
- C.8: Mandatory IF ATT 3/22 “Prepare Write Request”, otherwise Excluded.
- C.9: Mandatory IF ATT 3/4 “Find Information Request”, otherwise Excluded.
- C.10: Mandatory IF ATT 3/10 “Read Request”, otherwise Excluded.
- C.11–C.21: No longer used.
- C.22: Mandatory IF ATT 2/3a “Enhanced ATT bearer over LE” OR ATT 2/3b “Enhanced ATT bearer over BR/EDR”, otherwise Optional.
- C.23: No longer used.
- C.24: Mandatory IF ATT 3/27 “Handle Value Indication”, otherwise Excluded.
- C.25: No longer used.
- C.26: Mandatory IF ATT 3/30 “Read Multiple Variable Length Request” OR ATT 2/3a “Enhanced ATT bearer over LE” OR ATT 2/3b “Enhanced ATT bearer over BR/EDR”, otherwise Optional.

2.3.2 Attribute Server

Table 4: Attribute Protocol Server Messages

Prerequisite: ATT 1/2 “Attribute Protocol Server”

Item	Capability	Reference	Status
1	Attribute Error Response	[1] 3.4.1.1	M
2	Exchange MTU Request	[1] 3.4.2.1	O
3	Exchange MTU Response	[1] 3.4.2.2	C.19
4	Find Information Request	[1] 3.4.3.1	M
5	Find Information Response	[1] 3.4.3.2	M
6	Find by Type Value Request	[1] 3.4.3.3	M
7	Find by Type Value Response	[1] 3.4.3.4	M
8	Read by Type Request	[1] 3.4.4.1	M
9	Read by Type Response	[1] 3.4.4.2	M
10	Read Request	[1] 3.4.4.3	M
11	Read Response	[1] 3.4.4.4	M
12	Read Blob Request	[1] 3.4.4.5	C.6
13	Read Blob Response	[1] 3.4.4.6	C.1
14	Read Multiple Request	[1] 3.4.4.7	O
15	Read Multiple Response	[1] 3.4.4.8	C.2
16	Read by Group Type Request	[1] 3.4.4.9	M
17	Read by Group Type Response	[1] 3.4.4.10	M
18	Write Request	[1] 3.4.5.1	C.6
19	Write Response	[1] 3.4.5.2	C.3
20	Write Command	[1] 3.4.5.3	C.6
21	Signed Write Command	[1] 3.4.5.3	O
22	Prepare Write Request	[1] 3.4.6.1	C.6
23	Prepare Write Response	[1] 3.4.6.2	C.4
24	Execute Write Request	[1] 3.4.6.3	C.4
25	Execute Write Response	[1] 3.4.6.4	C.4
26	Handle Value Notification	[1] 3.4.7.1	C.6
27	Handle Value Indication	[1] 3.4.7.2	O
28	Handle Value Confirmation	[1] 3.4.7.3	C.5
29–30	No longer used	N/A	N/A
31	Read Multiple Variable Length Request	[2] 3.4.4.11	C.6
32	Read Multiple Variable Length Response	[2] 3.4.4.12	C.16
33	Handle Value Multiple Notification	[2] 3.4.7.4	C.6

C.1: Mandatory IF ATT 4/12 “Read Blob Request”, otherwise Excluded.

C.2: Mandatory IF ATT 4/14 “Read Multiple Request”, otherwise Excluded.

C.3: Mandatory IF ATT 4/18 “Write Request”, otherwise Excluded.

C.4: Mandatory IF ATT 4/22 “Prepare Write Request”, otherwise Excluded.



- C.5: Mandatory IF ATT 4/27 “Handle Value Indication”, otherwise Excluded.
- C.6: Mandatory IF ATT 2/3a “Enhanced ATT bearer over LE” OR ATT 2/3b “Enhanced ATT bearer over BR/EDR”, otherwise Optional.
- C.7–C.15: No longer used.
- C.16: Mandatory IF ATT 4/31 “Read Multiple Variable Length Request” OR ATT 2/3a “Enhanced ATT bearer over LE” OR ATT 2/3b “Enhanced ATT bearer over BR/EDR”, otherwise Optional.
- C.17–C.18: No longer used.
- C.19: Mandatory IF ATT 4/2 “Exchange MTU Request”, otherwise Excluded.

Table 5: No longer used

2.4 L2CAP requirements

Table 6: L2CAP Requirements

Item	Capability	Reference	Status	Inter-Layer Dependency
1	Enhanced Credit Based Flow Control Mode – LE	[2] 2, 3.2.11	C.1	[3] L2CAP 2/48b
2	Enhanced Credit Based Flow Control Mode – BR/EDR	[2] 2, 3.2.11	C.2	[3] L2CAP 2/48a

C.1: Mandatory IF ATT 2/3a “Enhanced ATT bearer over LE”, otherwise not defined.

C.2: Mandatory IF ATT 2/3b “Enhanced ATT bearer over BR/EDR”, otherwise not defined.

2.5 GAP requirements

Table 7: GAP Requirements

Item	Capability	Reference	Status	Inter-Layer Dependency
1	LE Connections	[5] 2.2.2	C.1	N/A
2	Peripheral	[5] 2.2.2	O	[4] GAP 5/3 OR GAP 38/3
3	Central	[5] 2.2.2	O	[4] GAP 5/4 OR GAP 38/4

C.1: Mandatory IF ATT 7/2 “Peripheral” OR ATT 7/3 “Central”, otherwise Excluded.

3 References

- [1] Specification of the Bluetooth System, Volume 3, Part F (Attribute Protocol), Version 4.0 or later
- [2] Specification of the Bluetooth System, Volume 3, Part F (Attribute Protocol), Version 5.2 or later
- [3] ICS Proforma for Logical Link Control and Adaptation Protocol (L2CAP)
- [4] ICS Proforma for Generic Access Profile (GAP)
- [5] Specification of the Bluetooth System, Volume 3, Part C (Generic Access Profile), Version 4.2 or later

4 Revision history and acknowledgments

Revision History

Publication Number	Revision Number	Date	Comments
0	4.0.0	2010-06-30	Publication.
	4.0.1r0	2011-04-14	TSE 4331: Add row 29 to Table 3 for Client Timeout and Table 4 for Server Timeout
1	4.0.1	2011-07-15	Prepare for publication.
	4.0.2r0	2011-09-12	TSE 4263: Table 2: Clarify descriptions and add C.1 and C.2
	4.0.2r1	2011-10-21	TSE 4559 Table 1. Client is optional; server is mandatory
	4.0.2r2	2012-02-08	TSE 4502: Update Table 3
2	4.0.2	2012-03-30	Prepare for publication.
	4.1.0r01	2013-11-11	Updated revision to 4.1.0 Updated top sheet to include version 4.1
3	4.1.0	2013-12-03	Prepare for Publication
	4.2.0r00	2014-11-17	Revved version to align with Core Specification Version 4.2 Release.
	4.2.0r01	2014-11-20	Updated title to say “4.2”
	4.2.0r02	2014-11-23	Alicia’s review, updated status to align with 4.2.
4	4.2.0	2014-12-03	Prepare for TCRL 2014-2 publication
	4.2.1r00	2016-03-04	TSE 6651: Section 1.2 deleted. For Tables 3 & 4, statuses updated. For Tables 3 & 4, conditional statements added.
5	4.2.1	2016-07-13	Prepared for TCRL 2016-1 publication.
	5.0.0r00	2016-10-17	TSE 7573 (erratum 5610): Added item 4/30 – Execute Write Request with no pending prepared write values
	5.0.0r01	2016-11-08	Updated to current template. Removed unnecessary parentheses and replaced with quotation marks.
6	5.0.0	2016-12-13	Approved by BTI. Prepared for TCRL 2016-2 publication.
	5.1.0r00	2018-11-13	Updated revision number to 5.1.0 to align with the adoption of Core Specification version 5.1
7	5.1.0	2018-12-07	Approved by BTI. Prepared for TCRL 2018-2 publication.
	5.1.1r00–r01	2019-04-15– 2019-05-27	TSE 11795 (rating 1): Updated item 1 in Table 2 to reflect that there is no fixed channel on BR-EDR.
8	5.1.1	2019-08-01	Approved by BTI. Prepared for TCRL 2019-1 publication.

Publication Number	Revision Number	Date	Comments
	p9r00–r04	2019-08-19 – 2019-11-12	<p>Added test groups to accommodate adoption of Core Specification V5.2 with regard to EATT CR r07. Added item 3 and note C.3 to Table 2; added items 31–33 and notes C.25–C.27 to Table 3 and updated notes C.1, C.11, C.19, and C.22; added items 31–33 and notes C.15–C.18 to Table 4 and updated notes C.6, C.8–C.12 and status of items 2 and 3; updated references section with new Core Specification.</p> <p>TSE 12421 (rating 1): Updated conditionals in Tables 3 and 4 to make wording more consistent with conventions.</p> <p>TSE 12753 (rating 1): Updated conditionals C.3 in Table 2 and C.14 in Table 4 to fix SUM.ICS references per TSE 12647.</p> <p>TSE 12739 (rating 2): Changed conditional C.1 for Table 2 from Mandatory to Optional.</p> <p>Updated .X and “Milan” references to valid numbers.</p> <p>Revised document numbering convention, setting last release publication of 5.1.1 as p8; added publication number column to Revision History.</p>
9	p9	2020-01-07	Approved by BTI on 2019-12-22. Prepared for TCRL 2019-2 publication.
	p10r00–r02	2020-02-25 – 2020-11-12	<p>TSE 13343 (rating 2): Updated conditionals in Table 3 and updated item 3 and conditionals in Table 4 to address issue with exchange MTU features being excluded if legacy ATT protocol based on L2CAP channel with a fixed CID is supported.</p> <p>TSE 14883 (rating 2): Corrected C.3 in Table 2 after the additions from TSE 13111. Added items 2/3a and 2/3b to align with GATT ICS changes from TSE 13111. Added a reference to the GATT Specification.</p> <p>Consistency Checker fixes and minor editorials.</p>
10	p10	2020-12-22	Approved by BTI on 2020-12-03. Prepared for TCRL 2020-1 publication.
	p11r00	2022-09-29 – 2022-09-30	<p>TSE 20593 (rating 3): Resolved GATT inter-layer dependencies by simplifying the EATT conditions in Table 2, removing references to GATT, and removing Table 5.</p> <p>TSE 20622 (rating 3): Added Table 6 for L2CAP Requirements and a reference item for the L2CAP ICS.</p> <p>Editorials to align with the latest ICS template.</p>
	p11r01–r03	2022-11-21 – 2022-12-06	<p>TSE 22224 (rating 3): Updated naming of 2/1, 2/2, 2/3a, and 2/3b; set 2/3 to “No longer used”; and updated Table 2’s C.2, C.3, C.4, C.5, deleted C.6, and added a note about Core versioning. Updated Table 3’s C.22, C.25, and C.26. Updated Table 4’s C.6 and C.16. Added a new GAP Requirements table as Table 7. Added references for the GAP ICS and Core v4.2.</p> <p>Editorials to align with the latest ICS template.</p>

Publication Number	Revision Number	Date	Comments
11	p11	2023-02-07	Approved by BTI on 2022-12-28. Prepared for TCRL 2022-2 publication.
	p12r00–r01	2023-09-25 – 2023-10-30	TSE 24068 (rating 1): Replaced SUM ICS references with CORE ICS references. Updated Table 2 conditionals C.1–C.3 and C.5 (affecting 2/1, 2/2, 2/3a, and 2/3b) and Table 4 conditional C.14 (affecting 4/30). Updated document to align with latest standards.
12	p12	2024-07-01	Approved by BTI on 2024-05-22. Prepared for TCRL 2024-1 publication.
	p13r00–r01	2024-07-16 – 2024-07-19	TSE 25734 (rating 1): Removed ATT 4/30 and associated C.14. Removed unused reference per consistency check.
13	p13	2024-09-04	Approved by BTI on 2024-08-14. Prepared for TCRL 2024-2 publication.
	p14r00	2024-10-24	TSE 26012 (rating 1): Updated the references in Table 7 to point to GATT rather than Volume 0 Part B; updated the Core v4.2 reference accordingly.
14	p14	2025-02-18	Approved by BTI on 2024-12-26. Prepared for TCRL 2025-1 publication.

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