Automation IO Profile (AIOP)

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

- **Revision:** AIOP.ICS.p6
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- **Prepared By:** BTI
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Contents

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 Versions

Table 0: X.Y Versions

Item	Version	Reference	Status
1	AIOP v1.0	[1] 2.1	M

2.2 Roles

Table 1: Role Requirements

Item	Role	Reference	Status
1	Automation IO Server	[1] 2.1	C.1
2	Automation IO Client	[1] 2.1	C.1

C.1: Mandatory to support at least one.

2.3 Transports

Table 2: Transport Requirements

Item	Transport	Reference	Status
1	Profile supported over BR/EDR	[1] 2.5	C.1, C.3
2	Profile supported over LE	[1] 2.5	C.2, C.3

C.1: Excluded for this Profile IF CORE 41/2 “LE Core Configuration” OR CORE 40/1 “Core-Controller”.

C.2: Excluded for this Profile IF CORE 41/1 “BR/EDR Core Configuration” OR CORE 40/1 “Core-Controller”.

C.3: Mandatory to support at least one.

3 Automation IO Server Role

3.1 Service requirements

Table 3: Service Requirements

Prerequisite: AIOP 1/1 "Automation IO Server"

Item	Feature	Reference	Status	Inter-Layer Dependency
1	Automation IO Service	[1] 3	M	[2] AIOS 2/1
2	Service UUID	[1] 3.1.1	C.1	[4] GAP 20a/1
3	Local Name	[1] 3.1.2	C.1	[4] GAP 20a/2
4	Writable Device Name	[1] 3.1.3	O	[4] GAP 27/6

C.1: Optional IF AIOP 2/2 "Profile supported over LE", otherwise not defined.

3.2 GAP requirements

Table 4: GAP Requirements

Prerequisite: AIOP 1/1 "Automation IO Server" AND AIOP 2/2 "Profile supported over LE"

Item	Feature	Reference	Status	Inter-Layer Dependency
1	Peripheral	[1] 2.4	C.1	[4] GAP 5/3
2	Central	[1] 2.4	C.1	[4] GAP 5/4
3	LE security mode 1	[1] 6.1	M	[4] GAP 25/1 OR GAP 35/1
4	No longer used	N/A	N/A	N/A
5	Unauthenticated Pairing (LE security mode 1 level 2)	[1] 6.1	C.3	[4] GAP 25/8 OR GAP 35/8
6	Authenticated Pairing (LE security mode 1 level 3)	[1] 6.1	C.3	[4] GAP 25/7 OR GAP 35/7
7	LE security mode 1 level 4	[1] 6.1	C.3	[4] GAP 25/9 OR GAP 35/9

C.1: Mandatory to support at least one.

C.2: No longer used.

C.3: Mandatory to support at least one.

Table 5: No longer used

4 Automation IO Client Role

Table 6: No longer used

4.1 Discover Services and Characteristics

Table 7: Automation IO Service and Characteristic Discovery

Prerequisite: AIOP 1/2 "Automation IO Client"

Item	Feature	Reference	Status
1	Discover Automation IO Service	[1] 4.2.1	M
2	Discover Digital Characteristic	[1] 4.3.1.1	C.1
3	Discover Digital Number of Digitals Descriptor	[1] 4.3.1.1	C.2
4	Discover Digital Client Configuration Descriptor	[1] 4.3.1.1	C.2
5	Discover Digital Value Trigger Setting Descriptor	[1] 4.3.1.1	C.2
6	Discover Digital Time Trigger Setting Descriptor	[1] 4.3.1.1	C.2
7	Discover Digital Characteristic Presentation Format Descriptor	[1] 4.3.1.1	C.2
8	Discover Digital Characteristic User Description Descriptor	[1] 4.3.1.1	C.2
9	Discover Digital Characteristic Extended Properties Descriptor	[1] 4.3.1.1	C.2
10	Discover Analog Characteristic	[1] 4.3.1.2	C.1
11	Discover Analog Client Configuration Descriptor	[1] 4.3.1.2	C.3
12	Discover Analog Value Trigger Setting Descriptor	[1] 4.3.1.2	C.3
13	Discover Analog Time Trigger Setting Descriptor	[1] 4.3.1.2	C.3
14	Discover Analog Characteristic Presentation Format Descriptor	[1] 4.3.1.2	C.3
15	Discover Analog Characteristic User Description Descriptor	[1] 4.3.1.2	C.3
16	Discover Analog Characteristic Extended Properties Descriptor	[1] 4.3.1.2	C.3
16a	Discover Analog Characteristic Value Range Descriptor	[1] 4.3.1.2	C.3
17	Discover Aggregate Characteristic	[1] 4.3.1.3	O
18	Discover Aggregate Client Configuration Descriptor	[1] 4.3.1.3	C.4

C.1: Mandatory to support at least one.

C.2: Optional IF AIOP 7/2 "Discover Digital Characteristic", otherwise Excluded.

C.3: Optional IF AIOP 7/10 "Discover Analog Characteristic", otherwise Excluded.

C.4: Optional IF AIOP 7/17 "Discover Aggregate Characteristic", otherwise Excluded.

4.2 Features

Table 8: Feature Requirements – Digital

Prerequisite: AIOP 1/2 "Automation IO Client" AND AIOP 7/2 "Discover Digital Characteristic"

Item	Feature	Reference	Status
1	Read Digital value	[1] 4.4	O
2	Configure Digital for notifications	[1] 4.4	C.5

Item	Feature	Reference	Status
3	Configure Digital for indications	[1] 4.4	C.5
4	Configure Value Trigger Settings descriptor	[1] 4.4	C.1
5	Configure Time Trigger Settings descriptor	[1] 4.4	C.4
6	Receive Digital notifications	[1] 4.4	C.2
7	Receive Digital indications	[1] 4.4	C.3
8	Update Digital Characteristic User Description descriptor	[1] 4.4	O
9	Write Digital value	[1] 4.4	O
10	Write Digital without Response	[1] 4.4	O

C.1: Optional IF AIOP 8/2 “Configure Digital for notifications” OR AIOP 8/3 “Configure Digital for indications”, otherwise Excluded.

C.2: Mandatory IF AIOP 8/2 “Configure Digital for notifications”, otherwise Excluded.

C.3: Mandatory IF AIOP 8/3 “Configure Digital for indications”, otherwise Excluded.

C.4: Optional IF AIOP 8/4 “Configure Value Trigger Settings descriptor”, otherwise Excluded.

C.5: Mandatory to support one and only one IF AIOP 7/4 “Discover Digital Client Configuration Descriptor” AND AIOP 8/1 “Read Digital value” AND NOT AIOP 7/18 “Discover Aggregate Client Configuration Descriptor”, otherwise Excluded.

Table 9: Feature Requirements – Analog

Prerequisite: AIOP 1/2 “Automation IO Client” AND AIOP 7/10 “Discover Analog Characteristic”

Item	Feature	Reference	Status
1	Read Analog value	[1] 4.5	O
2	Configure Analog for notifications	[1] 4.5	C.5
3	Configure Analog for indications	[1] 4.5	C.5
4	Configure Value Trigger Settings descriptor	[1] 4.5	C.1
5	Configure Time Trigger Settings descriptor	[1] 4.5	C.4
6	Receive Analog notifications	[1] 4.5	C.2
7	Receive Analog indications	[1] 4.5	C.3
8	Update Analog Characteristic User Description descriptor	[1] 4.5	O
9	Write Analog value	[1] 4.5	O
10	Write Analog without Response	[1] 4.5	O

C.1: Optional IF AIOP 9/2 “Configure Analog for notifications” OR AIOP 10/3 “Configure Aggregate for indications”, otherwise Excluded.

C.2: Mandatory IF AIOP 9/2 “Configure Analog for notifications”, otherwise Excluded.

C.3: Mandatory IF AIOP 9/3 “Configure Analog for indications”, otherwise Excluded.

C.4: Optional IF AIOP 9/4 “Configure Value Trigger Settings descriptor”, otherwise Excluded.

C.5: Mandatory to support one and only one IF AIOP 7/11 “Discover Analog Client Configuration Descriptor” AND AIOP 9/1 “Read Analog value” AND NOT AIOP 7/18 “Discover Aggregate Client Configuration Descriptor”, otherwise Excluded.

Table 10: Feature Requirements – Aggregate

Prerequisite: AIOP 1/2 "Automation IO Client" AND AIOP 7/17 "Discover Aggregate Characteristic"

Item	Feature	Reference	Status
1	Read Aggregate value	[1] 4.6	O
2	Configure Aggregate for notifications	[1] 4.6	C.3
3	Configure Aggregate for indications	[1] 4.6	C.3
4	Receive Aggregate notifications	[1] 4.6	C.1
5	Receive Aggregate indications	[1] 4.6	C.2

C.1: Mandatory IF AIOP 10/2 "Configure Aggregate for notifications", otherwise Excluded.

C.2: Mandatory IF AIOP 10/3 "Configure Aggregate for indications", otherwise Excluded.

C.3: Mandatory to support one and only one IF AIOP 7/18 "Discover Aggregate Client Configuration Descriptor" AND AIOP 10/1 "Read Aggregate value", otherwise Excluded.

4.3 GATT requirements

Table 11: GATT Requirements

Prerequisite: AIOP 1/2 "Automation IO Client"

Item	Feature	Reference	Status	Inter-Layer Dependency
1	No longer used	N/A	N/A	N/A
2	GATT Client over BR/EDR	[1] 4.2	C.1	[2] GATT 1a/2
3	GATT Client over LE	[1] 4.2	C.2	[3] GATT 1a/1
4	Discover All Primary Services	[1] 4.1	C.3	[2] GATT 3/2
5	Discover Primary Service by Service UUID	[1] 4.1	C.3	[3] GATT 3/3
6	Discover All Characteristics of a Service	[1] 4.1	C.4	[3] GATT 3/5
7	Discover Characteristics by UUID	[1] 4.1	C.4	[3] GATT 3/6
8	Discover All Characteristic Descriptors	[1] 4.1	C.5	[3] GATT 3/7
9	Read Characteristic Value	[1] 4.1	C.6	[3] GATT 3/8
10	Write Characteristic Value	[1] 4.1	C.7	[3] GATT 3/14
11	Single Notification	[1] 4.1	C.8	[3] GATT 3/17
12	Indication	[1] 4.1	C.9	[3] GATT 3/18
13	Read Characteristic Descriptor	[1] 4.1	O	[3] GATT 3/19
14	Write Characteristic Descriptor	[1] 4.1	C.10	[3] GATT 3/21
15	Write Without Response	[1] 4.1	C.11	[3] GATT 3/12

C.1: Mandatory IF AIOP 2/1 "Profile supported over BR/EDR", otherwise not defined.

C.2: Mandatory IF AIOP 2/2 "Profile supported over LE", otherwise not defined.

C.3: Mandatory to support at least one IF AIOP 2/2 "Profile supported over LE", otherwise Optional.

C.4: Mandatory to support at least one IF AIOP 2/2 "Profile supported over LE", otherwise Optional.

C.5: Mandatory IF AIOP 7/3 "Discover Digital Number of Digitals Descriptor" OR AIOP 7/4 "Discover Digital Client Configuration Descriptor" OR AIOP 7/5 "Discover Digital Value Trigger Setting Descriptor" OR AIOP 7/6 "Discover Digital Time Trigger Setting Descriptor" OR AIOP 7/7

"Discover Digital Characteristic Presentation Format Descriptor" OR AIOP 7/8 "Discover Digital Characteristic User Description Descriptor" OR AIOP 7/9 "Discover Digital Characteristic Extended Properties Descriptor" OR AIOP 7/11 "Discover Analog Client Configuration Descriptor" OR AIOP 7/12 "Discover Analog Value Trigger Setting Descriptor" OR AIOP 7/14 "Discover Analog Characteristic Presentation Format Descriptor" OR AIOP 7/15 "Discover Analog Characteristic User Description Descriptor" OR AIOP 7/16 "Discover Analog Characteristic Extended Properties Descriptor" OR AIOP 7/17 "Discover Aggregate Characteristic" OR AIOP 7/18 "Discover Aggregate Client Configuration Descriptor", otherwise Optional.

C.6: Mandatory IF AIOP 8/1 "Read Digital value" OR AIOP 9/1 "Read Analog value" OR AIOP 10/1 "Read Aggregate value", otherwise Optional.

C.7: Mandatory IF AIOP 8/9 "Write Digital value" OR AIOP 9/9 "Write Analog value", otherwise Optional.

C.8: Mandatory IF AIOP 8/6 "Receive Digital notifications" OR AIOP 9/6 "Receive Analog notifications" OR AIOP 10/4 "Receive Aggregate notifications", otherwise Optional.

C.9: Mandatory IF AIOP 8/7 "Receive Digital indications" OR AIOP 9/7 "Receive Analog indications" OR AIOP 10/5 "Receive Aggregate indications", otherwise Optional.

C.10: Mandatory IF AIOP 8/2 "Configure Digital for notifications" OR AIOP 8/3 "Configure Digital for indications" OR AIOP 8/4 "Configure Value Trigger Settings descriptor" OR AIOP 8/5 "Configure Time Trigger Settings descriptor" OR AIOP 8/8 "Update Digital Characteristic User Description descriptor" OR AIOP 9/2 "Configure Analog for notifications" OR AIOP 9/3 "Configure Analog for indications" OR AIOP 9/4 "Configure Value Trigger Settings descriptor" OR AIOP 9/5 "Configure Time Trigger Settings descriptor" OR AIOP 9/8 "Update Analog Characteristic User Description descriptor" OR AIOP 10/2 "Configure Aggregate for notifications" OR AIOP 10/3 "Configure Aggregate for indications", otherwise Optional.

C.11: Mandatory IF AIOP 8/10 "Write Digital without Response" OR AIOP 9/10 "Write Analog without Response", otherwise Optional.

4.4 GAP requirements

Table 12: GAP Requirements

Prerequisite: AIOP 1/2 "Automation IO Client" AND AIOP 2/2 "Profile supported over LE"

Item	Feature	Reference	Status	Inter-Layer Dependency
1	Peripheral	[1] 2.4	C.1	[4] GAP 5/3
2	Central	[1] 2.4	C.1	[4] GAP 5/4
3	LE security mode 1	[1] 6.1	M	[4] GAP 25/1 OR GAP 35/1
4	Unauthenticated Pairing (LE security mode 1 level 2)	[1] 6.1	C.2	[4] GAP 25/8 OR GAP 35/8
5	Authenticated Pairing (LE security mode 1 level 3)	[1] 6.1	C.2	[4] GAP 25/7 OR GAP 35/7
6	LE security mode 1 level 4	[1] 6.1	C.2	[4] GAP 25/9 OR GAP 35/9

C.1: Mandatory to support at least one.

C.2: Mandatory to support at least one.

Table 13: No longer used

5 References

[1] Automation IO Profile Specification, Version 1.0

[2] ICS Proforma for Automation IOP Service (AIOS)

[3] ICS Proforma for Generic Attribute Profile (GATT)

[4] ICS Proforma for Generic Access Profile (GAP)

6 Revision history and acknowledgments

Revision History

Publication Number	Revision Number	Date	Comments
0	1.0.0	2015-07-21	Prepared for publication.
	1.0.0 edition 2r00	2018-11-20	Editorial changes only. Template updated. Revision History and Contributors moved to the end of the document. Table of Contents updated.
	1.0.0 edition 2	2019-11-11	Updated copyright page and confidentiality markings to support new Documentation Marking Requirements, performed minor formatting updates, and accepted all tracked changes to prepare for edition 2 publication.
	p1r00–r02	2022-09-06 – 2022-11-15	TSE 19176 (rating 3): Updated to align with current ICS conventions/template. Removed Support columns and added an Inter-Layer Dependency column where appropriate. In Table 0, updated the title, reference, and Item 1. In Table 1, updated the title, references, and C.1. In Table 2, updated the references and C.1. In Table 3, updated the prerequisite, Items 1–4, and C.1. In Table 4, updated the prerequisite, Items 1–4, and C.1–C.2; deleted C.3. In Table 5, updated the prerequisite, Items 1–3, and C.1; added Item 4. In Table 6, updated the prerequisite and Item 1. In Table 7, updated the prerequisite, references, and C.2–C.4. In Table 8, updated the prerequisite, references, Item 10, and C.1–C.4. In Table 9, updated the prerequisite, references, and C.1–C.4. In Table 10, updated the prerequisite, references, C.1, and C.2. In Table 11, updated the prerequisite, references, C.1–C.11, and Items 1, 2, 7, 9, 10, and 15. In Table 12, updated the prerequisite, references, and Item 3. In Table 13, updated the prerequisite, references, C.1, and Items 1–3; added Item 4. Updated the references list. Added Publication Number column to Revision History. Revised the document numbering convention, setting last release publication of 1.0.0 as p0. Aligned copyright page with v2 of the DNMD.
1	p1	2023-02-07	Approved by BTI on 2022-12-28. Prepared for TCRL 2022-2 publication.
	p2r00–r01	2023-05-08 – 2023-05-12	TSE 22787 (rating 2): Changes required to support GGIT conversion. Updated the status for 8/2 and 8/3 with new conditional C.5; updated the status for 9/2 and 9/3 with new conditional C.5; updated the status for 10/2 and 10/3 with new conditional C.3.
2	p2	2023-06-29	Approved by BTI on 2023-05-28. Prepared for TCRL 2023-1 publication.
	p3r00–r02	2023-08-08 – 2023-12-05	TSE 23150 (rating 4): Added item 16a to Table 7 for Analog Characteristic Valid Range Descriptor discovery.

Publication Number	Revision Number	Date	Comments
3	p3	2024-07-01	Approved by BTI on 2024-04-21. Prepared for TCRL 2024-1 publication.
	p4r00–r01	2025-04-21 – 2025-04-22	TSE 27364 (rating 1): Updated the Status value for AIOP 2/1 and AIOP 2/2. Added conditions C.1 and C.2 to Table 2 and renumbered C.1 as C.3. Incorporated editorials to align the document with the latest ICS template, including updates to Section 1 and the addition of a section heading for the ICS declarations section.
4	p4	2025-07-08	Approved by BTI on 2025-06-15. Prepared for TCRL pkg100 publication.
	p5r00	2025-07-16	TSE 27529 (rating 1): Updated ILD in AIOP 4/1, AIOP 4/2, AIOP 12/1, and AIOP 12/2.
5	p5	2025-11-04	Approved by BTI on 2025-10-02. Prepared for TCRL pkg101 publication.
	p6r00–r01	2025-12-04 – 2025-12-29	TSE 28169 (rating 1): Updated the conditions in the transport table to make sure the layer is excluded when the design is an implementation of the Core-Controller Configuration by adding "OR CORE 40/1 “Core-Controller”" to an already excluded transport based on Core Configuration support. Deleted draft revision history comments prior to p0.
6	p6	2026-02-17	Approved by BTI on 2026-01-21. Prepared for TCRL pkg102 publication.

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