# Ranging Profile (RAP)

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

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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<br>Referred layer is supported | N/A |
| Lower HCI layer | HCI is supported | N/A |
| Upper HCI layer | Core-Host configuration, or<br>UHCI is supported | N/A |
| Host layer | Core-Host configuration, or<br>Core-Complete configuration, or<br>Referred layer is supported | N/A |
| X2Core layer | Core-Host configuration, or<br>Core-Complete configuration, or<br>Referred layer is supported | Core-Host configuration, or<br>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 (Ranging Responder)**

*Prerequisite: RAP 3/1 "Ranging Responder"*

| Item | Version | Reference | Status |
|---|---|---|---|
| 1 | RAP v1.0 | [1] | M |

**Table 0a: X.Y.Z Versions (Ranging Responder)**

**Table number reserved but not yet in use.**

**Table 1: X.Y Versions (Ranging Requester)**

*Prerequisite: RAP 3/2 "Ranging Requester"*

| Item | Version | Reference | Status |
|---|---|---|---|
| 1 | RAP v1.0 | [1] | M |

**Table 1a: X.Y.Z Versions (Ranging Requester)**

**Table number reserved but not yet in use.**

## 2.2 Transports

**Table 2: Transport Requirements**

| Item | Transport | Reference | Status |
|---|---|---|---|
| 1 | Profile supported over BR/EDR | [1] 2.6 | C.1 |
| 2 | Profile supported over LE | [1] 2.6 | C.2, C.3 |

C.1: Excluded for this Profile.

C.2: Excluded for this Profile IF CORE 41/1 "BR/EDR Core Configuration".

C.3: Mandatory for this Profile.

## 2.3 Roles

**Table 3: Role Requirements**

| Item | Role | Reference | Status |
|---|---|---|---|
| 1 | Ranging Responder | [1] 2.1 | C.1 |
| 2 | Ranging Requester | [1] 2.1 | C.1 |

C.1: Mandatory to support at least one.

## 2.4 Ranging Responder role

### 2.4.1 Service references (Ranging Responder)

**Table 4: Services Included in Ranging Responder**

*Prerequisite: RAP 3/1 "Ranging Responder"*

| Item | Service | Reference | Status | Inter-Layer Dependency |
|---|---|---|---|---|
| 1 | Ranging Service | [1] 3 | M | [2] RAS |

### 2.4.2 Ranging Service (Ranging Responder)

**Table 5: Main Features of Ranging Service**

*Prerequisite: RAP 3/1 "Ranging Responder"*

| Item | Capability | Reference | Status | Inter-Layer Dependency |
|---|---|---|---|---|
| 1 | Ranging Service UUID in AD Type field of Advertising Data | [1] 3.1.1 | O | N/A |
| 2 | Real-time Ranging Data characteristic | [1] 3 | O | [2] RAS 2/2 |
| 3 | Abort Operation | [1] 3 | O | [2] RAS 3/4 |
| 4 | Set Filter | [1] 3 | O | [2] RAS 3/5 |
| 5 | Support multiple connected RREQ simultaneously | [1] 3.2.1 | O | N/A |

### 2.4.3 GAP requirements (Ranging Responder)

**Table 6: GAP Requirements (Ranging Responder)**

*Prerequisite: RAP 3/1 "Ranging Responder"*

| Item | Capability | Reference | Status | Inter-Layer Dependency |
|---|---|---|---|---|
| 1 | Peripheral | [1] 2.4 | C.1 | [4] GAP 5/3 OR GAP 38/3 |
| 2 | Minimum 128-bit entropy key | [1] 6.2 | C.2 | [4] GAP 25/13 |
| 3 | LE Secure Connections | [1] 6.2 | C.2 | [4] GAP 27b/5 |
| 4 | CS Initiator Role | [1] 2.4 | C.3 | [4] GAP 23a/1 |
| 5 | CS Reflector Role | [1] 2.4 | C.3 | [4] GAP 23a/2 |
| 6 | Out of Band | [1] 6.3 | C.4 | [4] GAP 27b/9 |
| 7 | Central | [1] 2.4 | C.1 | [4] GAP 5/4 OR GAP 38/4 |
| 8 | Minimum 128-bit entropy key | [1] 6.2 | C.5 | [4] GAP 35/13 |
| 9 | LE Secure Connections | [1] 6.2 | C.5 | [4] GAP 37b/5 |
| 10 | CS Initiator Role | [1] 2.4 | C.6 | [4] GAP 33a/1 |

| Item | Capability | Reference | Status | Inter-Layer Dependency |
|---|---|---|---|---|
| 11 | CS Reflector Role | [1] 2.4 | C.6 | [4] GAP 33a/2 |
| 12 | Out of Band | [1] 6.3 | C.7 | [4] GAP 37b/9 |

C.1: Mandatory to support at least one.
C.2: Mandatory IF RAP 6/1 “Peripheral”, otherwise not defined.
C.3: Mandatory to support at least one IF RAP 6/1 “Peripheral”, otherwise not defined.
C.4: Optional IF RAP 6/1 “Peripheral”, otherwise not defined.
C.5: Mandatory IF RAP 6/7 “Central”, otherwise not defined.
C.6: Mandatory to support at least one IF RAP 6/7 “Central”, otherwise not defined.
C.7: Optional IF RAP 6/7 “Central”, otherwise not defined.

## 2.5 Ranging Requester role

### 2.5.1 Service references (Ranging Requester)

**Table 7: Services Included in Ranging Requester Role**

*Prerequisite: RAP 3/2 “Ranging Requester”*

| Item | Capability | Reference | Status |
|---|---|---|---|
| 1 | Discover Ranging Service | [1] 4.3 | M |

### 2.5.2 Ranging Service (Ranging Requester)

**Table 8: Discover Ranging Service Characteristics**

*Prerequisite: RAP 7/1 “Discover Ranging Service”*

| Item | Capability | Reference | Status |
|---|---|---|---|
| 1 | Discover Ranging Features characteristic | [1] 4.3.2 | M |
| 2 | Read Ranging Features characteristic | [1] 4.3.2 | M |
| 3 | Discover Real-time Ranging Data characteristic | [1] 4.4.1 | O |
| 4 | Receive Real-time Ranging Data characteristic indications | [1] 4.4.1 | C.1 |
| 5 | Receive Real-time Ranging Data characteristic notifications | [1] 4.4.1 | C.1 |
| 6 | Discover On-demand Ranging Data characteristic | [1] 4.4.2 | M |
| 7 | Receive On-demand Ranging Data characteristic indications | [1] 4.4.2 | M |
| 8 | Receive On-demand Ranging Data characteristic notifications | [1] 4.4.2 | M |
| 9 | Discover RAS Control Point characteristic | [1] 4.5 | M |
| 10 | Write RAS Control Point characteristic | [1] 4.5.1 | M |
| 11 | Receive RAS Control Point characteristic indications | [1] 4.5.2 | M |
| 12 | Discover Ranging Data Ready characteristic | [1] 4.4.3 | M |
| 13 | Receive Ranging Data Ready characteristic indications | [1] 4.4.3 | M |
| 14 | Receive Ranging Data Ready characteristic notifications | [1] 4.4.3 | O |
| 15 | Read Ranging Data Ready characteristic | [1] 4.4.3.1 | O |
| 16 | Discover Ranging Data Overwritten characteristic | [1] 4.4.4 | M |
| 17 | Receive Ranging Data Overwritten characteristic indications | [1] 4.4.4 | M |

| Item | Capability | Reference | Status |
|---|---|---|---|
| 18 | Receive Ranging Data Overwritten characteristic notifications | [1] 4.4.4 | O |
| 19 | Read Ranging Data Overwritten characteristic | [1] 4.4.4 | O |

C.1: Mandatory IF RAP 8/3 “Discover Real-time Ranging Data characteristic”, otherwise Excluded.

**Table 9: RAS Control Point Procedures**

*Prerequisite: RAP 8/10 “Write RAS Control Point characteristic”*

| Item | Capability | Reference | Status |
|---|---|---|---|
| 1 | Get Ranging Data | [1] 4.5.1 | M |
| 2 | ACK Ranging Data | [1] 4.5.1 | M |
| 3 | Retrieve Lost Ranging Data Segments | [1] 4.5.1 | O |
| 4 | Abort Operation | [1] 4.5.1.2 | O |
| 5 | Set Filter | [1] 4.5.1.1 | O |

### 2.5.3 GATT requirements (Ranging Requester)

**Table 10: GATT Requirements (Ranging Requester)**

*Prerequisite: RAP 3/2 “Ranging Requester”*

| Item | Capability | Reference | Status | Inter-Layer Dependency |
|---|---|---|---|---|
| 1 | GATT Client over LE | [1] 2.2 | M | [3] GATT 1a/1 |
| 2 | Discover All Primary Services | [1] 4.6 | C.1 | [3] GATT 3/2 |
| 3 | Discover Primary Services by Service UUID | [1] 4.6 | C.1 | [3] GATT 3/3 |
| 4 | Discover All Characteristic Descriptors | [1] 4.6 | M | [3] GATT 3/7 |
| 5 | Find Included Services | [1] 4.6 | M | [3] GATT 3/4 |
| 6 | Discover All Characteristics of a Service | [1] 4.6 | C.2 | [3] GATT 3/5 |
| 7 | Discover Characteristics by UUID | [1] 4.6 | C.2 | [3] GATT 3/6 |
| 8 | Read Characteristic Value | [1] 4.6 | M | [3] GATT 3/8 |
| 9 | Write without Response | [1] 4.6 | M | [3] GATT 3/12 |
| 10 | Single Notification | [1] 4.6 | M | [3] GATT 3/17 |
| 11 | Indications | [1] 4.6 | M | [3] GATT 3/18 |
| 12 | Read Characteristic Descriptors | [1] 4.6 | M | [3] GATT 3/19 |
| 13 | Write Characteristic Descriptors | [1] 4.6 | M | [3] GATT 3/21 |

C.1: Mandatory to support at least one.

C.2: Mandatory to support at least one.

### 2.5.4 GAP requirements (Ranging Requester)

**Table 11: GAP Requirements (Ranging Requester)**

*Prerequisite: RAP 3/2 "Ranging Requester"*

| Item | Capability | Reference | Status | Inter-Layer Dependency |
|---|---|---|---|---|
| 1 | Peripheral | [1] 2.4 | C.1 | [4] GAP 5/3 OR GAP 38/3 |
| 2 | Minimum 128-bit entropy key | [1] 6.1, 6.1.1 | C.2 | [4] GAP 25/13 |
| 3 | LE Secure Connections | [1] 6.1, 6.1.3 | C.2 | [4] GAP 27b/5 |
| 4 | CS Initiator Role | [1] 2.4 | C.3 | [4] GAP 23a/1 |
| 5 | CS Reflector Role | [1] 2.4 | C.3 | [4] GAP 23a/2 |
| 6 | Out of Band | [1] 6.3 | C.4 | [4] GAP 27b/9 |
| 7 | Central | [1] 2.4 | C.1 | [4] GAP 5/4 OR GAP 38/4 |
| 8 | Minimum 128-bit entropy key | [1] 6.1, 6.1.1 | C.5 | [4] GAP 35/13 |
| 9 | LE Secure Connections | [1] 6.1, 6.1.3 | C.5 | [4] GAP 37b/5 |
| 10 | CS Initiator Role | [1] 2.4 | C.6 | [4] GAP 33a/1 |
| 11 | CS Reflector Role | [1] 2.4 | C.6 | [4] GAP 33a/2 |
| 12 | Out of Band | [1] 6.3 | C.7 | [4] GAP 37b/9 |

C.1: Mandatory to support at least one.

C.2: Mandatory IF RAP 11/1 "Peripheral", otherwise not defined.

C.3: Mandatory to support at least one IF RAP 11/1 "Peripheral", otherwise not defined.

C.4: Optional IF RAP 11/1 "Peripheral", otherwise not defined.

C.5: Mandatory IF RAP 11/7 "Central", otherwise not defined.

C.6: Mandatory to support at least one IF RAP 11/7 "Central", otherwise not defined.

C.7: Optional IF RAP 11/7 "Central", otherwise not defined.

# 3 References

[1] Ranging Profile Specification, Version 1.0

[2] ICS Proforma for Ranging Service (RAS)

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

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

# 4 Revision history and acknowledgments

***Revision History***

| Publication Number | Revision Number | Date | Comments |
|---|---|---|---|
| 0 | p0 | 2024-11-19 | Approved by BTI on 2024-10-29. RAP v1.0 adopted by the BoD on 2024-11-12. Prepared for initial publication. |
| | p1r00–r01 | 2025-02-26 – 2025-04-28 | TSE 27149 (rating 2): Added Item RAP 5/5.<br>TSE 27360 (rating 1): Updated the Status value for RAP 2/2. In Table 2, added conditions C.2 and C.3.<br>Incorporated editorials to align the document with the latest ICS template: Updated Section 1 and added a section heading for the ICS declarations section. |
| 1 | p1 | 2025-07-08 | Approved by BTI on 2025-06-15. Prepared for TCRL pkg100 publication. |

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