

# Location and Navigation Service (LNS)

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

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# 1 Identification of the implementation

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## 1.1 Implementation Under Test (IUT) identification

Identification of the Implementation Under Test (IUT) is to be filled in to provide as much detail as possible regarding version numbers and configuration options.

An ICS contact person to respond to queries regarding information supplied in this ICS proforma is named in the Declaration of Compliance: Summary of Selected Specifications in Implementation.

## 1.2 Versions

Table 0: X.Y Versions

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

Table 0a: No longer used

Table 0b: X.Y.Z Versions

| Item | Version    | Reference | Status |
|------|------------|-----------|--------|
| 1    | LNS v1.0.1 | [3]       | O      |

## 1.3 Transports

Table 1: Transport Requirements

| Item | Transport                     | Reference | Status |
|------|-------------------------------|-----------|--------|
| 1    | Service supported over BR/EDR | [1] 1.5   | C.1    |
| 2    | Service supported over LE     | [1] 1.5   | C.1    |

C.1: Mandatory to support at least one.

## 1.4 Service requirements

Table 2: Feature Requirements

| Item | Capability                          | Reference            | Status |
|------|-------------------------------------|----------------------|--------|
| 1    | Instantaneous Speed                 | [1] 3.2.1.2          | O      |
| 2    | Total Distance                      | [1] 3.2.1.3, 3.4.2.1 | O      |
| 3    | Location                            | [1] 3.2.1.4          | O      |
| 4    | Elevation                           | [1] 3.2.1.5          | O      |
| 5    | Heading                             | [1] 3.2.1.6          | O      |
| 6    | Rolling Time                        | [1] 3.2.1.7          | O      |
| 7    | UTC Time                            | [1] 3.2.1.8          | O      |
| 8    | Remaining Distance                  | [1] 3.5.1.4          | C.1    |
| 9    | Remaining Vertical Distance         | [1] 3.5.1.5          | C.1    |
| 10   | Estimated Time of Arrival           | [1] 3.5.1.6          | C.1    |
| 11   | Number of Beacons in Solution       | [1] 3.3.1.2          | O      |
| 12   | Number of Beacons in View           | [1] 3.3.1.3          | O      |
| 13   | Time to First Fix                   | [1] 3.3.1.4          | O      |
| 14   | Estimated Horizontal Position Error | [1] 3.3.1.5          | O      |
| 15   | Estimated Vertical Position Error   | [1] 3.3.1.6          | O      |
| 16   | Horizontal Dilution of Precision    | [1] 3.3.1.7          | O      |

| Item | Capability                         | Reference                                   | Status |
|------|------------------------------------|---------------------------------------------|--------|
| 17   | Vertical Dilution of Precision     | [1] 3.3.1.8                                 | O      |
| 18   | Location and Speed Content Masking | [1] 3.4.2.2                                 | O      |
| 19   | Fix Rate Setting                   | [1] 3.4.2.7                                 | O      |
| 20   | Elevation Setting                  | [1] 3.4.2.8                                 | O      |
| 21   | Navigation                         | [1] 3.5, 3.4.2.3, 3.4.3.4, 3.4.2.5, 3.4.2.6 | O      |

C.1: Optional IF LNS 2/21 “Navigation”, otherwise Excluded.

**Table 3: Service Requirements**

| Item | Capability                                                                       | Reference   | Status |
|------|----------------------------------------------------------------------------------|-------------|--------|
| 1    | Location and Navigation Service                                                  | [1] 2       | M      |
| 2    | Location and Navigation Feature Characteristic                                   | [1] 3.1     | M      |
| 3    | Location and Speed Characteristic                                                | [1] 3.2     | M      |
| 4    | Instantaneous Speed Field of Location and Speed Characteristic                   | [1] 3.2.1.2 | C.1    |
| 5    | Total Distance Field of Location and Speed Characteristic                        | [1] 3.2.1.3 | C.2    |
| 6    | Total Distance Field of Location and Speed Characteristic                        | [1] 3.2.1.4 | C.3    |
| 7    | Elevation Field of Location and Speed Characteristic                             | [1] 3.2.1.5 | C.4    |
| 8    | Heading Field of Location and Speed Characteristic                               | [1] 3.2.1.6 | C.5    |
| 9    | Rolling Time Field of Location and Speed Characteristic                          | [1] 3.2.1.7 | C.6    |
| 10   | UTC Time Field of Location and Speed Characteristic                              | [1] 3.2.1.8 | C.7    |
| 11   | Navigation Characteristic                                                        | [1] 3.5     | O      |
| 12   | Bearing Field of the Navigation Characteristic                                   | [1] 3.5.1.2 | C.8    |
| 13   | Heading Field of the Navigation Characteristic                                   | [1] 3.5.1.3 | C.8    |
| 14   | Remaining Distance Field of the Navigation Characteristic                        | [1] 3.5.1.4 | C.9    |
| 15   | Remaining Vertical Distance Field of the Navigation Characteristic               | [1] 3.5.1.5 | C.10   |
| 16   | Estimated Time of Arrival Field of the Navigation Characteristic                 | [1] 3.5.1.6 | C.11   |
| 17   | Position Quality Characteristic                                                  | [1] 3.3     | O      |
| 18   | Number of Satellites in Solution Field of the Position Quality characteristic    | [1] 3.3.1.2 | C.12   |
| 19   | Number of Satellites in View Field of the Position Quality Characteristic        | [1] 3.3.1.3 | C.13   |
| 20   | Time to First Fix Field of the Position Quality Characteristic                   | [1] 3.3.1.4 | C.14   |
| 21   | Estimated Horizontal Position Error Field of the Position Quality Characteristic | [1] 3.3.1.5 | C.15   |

| Item | Capability                                                                     | Reference          | Status |
|------|--------------------------------------------------------------------------------|--------------------|--------|
| 22   | Estimated Vertical Position Error Field of the Position Quality Characteristic | [1] 3.3.1.6        | C.16   |
| 23   | Horizontal Dilution Of Precision Field of the Position Quality Characteristic  | [1] 3.3.1.7        | C.17   |
| 24   | Vertical Dilution Of Precision Field of the Position Quality Characteristic    | [1] 3.3.1.8        | C.18   |
| 25   | LN Control Point Characteristic                                                | [1] 3.4            | C.19   |
| 26   | Set Cumulative Value Procedure – Set to zero                                   | [1] 3.4.1, 3.4.2.1 | C.2    |
| 27   | Set Cumulative Value Procedure – Set to non-zero                               | [1] 3.4.1, 3.4.2.1 | C.2    |
| 28   | Mask Location and Speed Characteristic Content                                 | [1] 3.4.1, 3.4.2.2 | C.20   |
| 29   | Navigation Control Procedure                                                   | [1] 3.4.1, 3.4.2.3 | C.8    |
| 30   | Request Number of Routes Procedure                                             | [1] 3.4.1, 3.4.2.4 | C.8    |
| 31   | Request Name of Route Procedure                                                | [1] 3.4.1, 3.4.2.5 | C.8    |
| 32   | Select Route Procedure                                                         | [1] 3.4.1, 3.4.2.6 | C.8    |
| 33   | Set Fix Rate Procedure                                                         | [1] 3.4.1, 3.4.2.7 | C.21   |
| 34   | Set Elevation Procedure                                                        | [1] 3.4.1, 3.4.2.8 | C.22   |
| 35   | Indications for changes of supported features                                  | [3] 3, 3.1.1       | C.23   |

- C.1: Mandatory IF LNS 2/1 “Instantaneous Speed”, otherwise Excluded.
- C.2: Mandatory IF LNS 2/2 “Total Distance”, otherwise Excluded.
- C.3: Mandatory IF LNS 2/3 “Location”, otherwise Excluded.
- C.4: Mandatory IF LNS 2/4 “Elevation”, otherwise Excluded.
- C.5: Mandatory IF LNS 2/5 “Heading”, otherwise Excluded.
- C.6: Mandatory IF LNS 2/6 “Rolling Time”, otherwise Excluded.
- C.7: Mandatory IF LNS 2/7 “UTC Time”, otherwise Excluded.
- C.8: Mandatory IF LNS 2/21 “Navigation”, otherwise Excluded.
- C.9: Mandatory IF LNS 2/8 “Remaining Distance”, otherwise Excluded.
- C.10: Mandatory IF LNS 2/9 “Remaining Vertical Distance”, otherwise Excluded.
- C.11: Mandatory IF LNS 2/10 “Estimated Time of Arrival”, otherwise Excluded.
- C.12: Mandatory IF LNS 2/11 “Number of Beacons in Solution”, otherwise Excluded.
- C.13: Mandatory IF LNS 2/12 “Number of Beacons in View”, otherwise Excluded.
- C.14: Mandatory IF LNS 2/13 “Time to First Fix”, otherwise Excluded.
- C.15: Mandatory IF LNS 2/14 “Estimated Horizontal Position Error”, otherwise Excluded.
- C.16: Mandatory IF LNS 2/15 “Estimated Vertical Position Error”, otherwise Excluded.
- C.17: Mandatory IF LNS 2/16 “Horizontal Dilution of Precision”, otherwise Excluded.
- C.18: Mandatory IF LNS 2/17 “Vertical Dilution of Precision”, otherwise Excluded.
- C.19: Mandatory IF LNS 2/2 “Total Distance” OR LNS 2/18 “Location and Speed Content Masking” OR LNS 2/19 “Fix Rate Setting” OR LNS 2/20 “Elevation Setting” OR LNS 2/21 “Navigation”, otherwise Excluded.
- C.20: Mandatory IF LNS 2/18 “Location and Speed Content Masking”, otherwise Excluded.
- C.21: Mandatory IF LNS 2/19 “Fix Rate Setting”, otherwise Excluded.
- C.22: Mandatory IF LNS 2/20 “Elevation Setting”, otherwise Excluded.
- C.23: Optional IF LNS 0/1 “LNS v1.0” AND NOT LNS 0b/1 “LNS v1.0.1”, otherwise Mandatory.

**Table 3a: Indications for changes of supported features**

*Prerequisite: LNS 3/35 “Indications for changes of supported features”*

| Item | Capability                            | Reference | Status |
|------|---------------------------------------|-----------|--------|
| 1    | Changeable LNS Feature                | [3] 3     | O      |
| 2    | LNS Feature characteristic indication | [3] 3.1.1 | C.1    |

C.1: Mandatory IF LNS 3a/1 “Changeable LNS Feature” AND (LNS 6/1 “Bondable mode (BR/EDR)” OR LNS 6/2 “Bondable mode (LE)” ), otherwise Excluded.

## 1.5 GATT requirements

**Table 4: GATT Requirements**

| Item | Capability                       | Reference | Status | Inter-Layer Dependency |
|------|----------------------------------|-----------|--------|------------------------|
| 1    | No longer used                   | N/A       | N/A    | N/A                    |
| 1a   | GATT Server over BR/EDR          | [1] 1.4   | C.2    | [2] GATT 1a/4          |
| 1b   | GATT Server over LE              | [1] 1.4   | C.3    | [2] GATT 1a/3          |
| 2    | Write Characteristic Value       | [1] 1.4   | C.1    | [2] GATT 4/14          |
| 3    | Notifications                    | [1] 1.4   | M      | [2] GATT 4/17          |
| 4    | Indications                      | [1] 1.4   | C.1    | [2] GATT 4/18          |
| 5    | Read Characteristic Descriptors  | [1] 1.4   | M      | [2] GATT 4/19          |
| 6    | Write Characteristic Descriptors | [1] 1.4   | M      | [2] GATT 4/21          |

C.1: Mandatory IF LNS 3/25 “LN Control Point Characteristic”, otherwise not defined.

C.2: Mandatory IF LNS 1/1 “Service supported over BR/EDR”, otherwise not defined.

C.3: Mandatory IF LNS 1/2 “Service supported over LE”, otherwise not defined.

## 1.6 SDP requirements

**Table 5: SDP Requirements**

*Prerequisite: LNS 1/1 “Service supported over BR/EDR”*

| Item | Capability                 | Reference | Status |
|------|----------------------------|-----------|--------|
| 1    | SDP record present for LNS | [1] 4     | M      |
| 2–3  | No longer used             | N/A       | N/A    |



## 1.7 GAP requirements

Table 6: GAP Requirements

| Item | Capability             | Reference | Status | Inter-Layer Dependency |
|------|------------------------|-----------|--------|------------------------|
| 1    | Bondable mode (BR/EDR) | [1] 3     | O      | [4] GAP 1/7            |
| 2    | Bondable mode (LE)     | [1] 3     | O      | [4] GAP 24/2           |
| 3    | Bonding procedure      | [1] 3     | C.1    | [4] GAP 24/3           |

C.1: Mandatory IF LNS 6/2 “Bondable mode (LE)”, otherwise not defined.

## 2 References

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- [1] Location and Navigation Service Specification, Version 1.0 or later
- [2] ICS Proforma for Generic Attribute Profile (GATT)
- [3] Location and Navigation Service Specification, Version 1.0.1
- [4] ICS Proforma for Generic Access Profile (GAP)

### 3 Revision history and acknowledgments

#### Revision History

| Publication Number | Revision Number    | Date       | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------|--------------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0                  | 1.0.0              | 2013-04-30 | Release for publication.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                    | 1.0.1r00           | 2014-10-06 | TSE 5641: Removed references to CSA in the Core Specification Version table (0a) and Core Specification Reference [1].                                                                                                                                                                                                                                                                                                                                               |
| 1                  | 1.0.1              | 2014-12-05 | Prepare for TCRL 2014-2 publication                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                    | 1.0.2r00           | 2015-05-10 | TSE 5998: Revised statuses and conditionals in Table 3 to remove duplicate entries                                                                                                                                                                                                                                                                                                                                                                                   |
|                    | 1.0.2r01           | 2015-06-04 | Deleted Section 1.2 (Global Statement of Conformance) per current ICS template standards.                                                                                                                                                                                                                                                                                                                                                                            |
|                    | 1.0.2r02           | 2015-06-09 | Review by Alicia Courtney. Converted to current document template.                                                                                                                                                                                                                                                                                                                                                                                                   |
| 2                  | 1.0.2              | 2015-07-14 | Prepared for TCRL 2015-1 publication.                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                    | 1.0.2 edition 2r00 | 2018-11-26 | Editorial changes only. Template updated. Revision History and contributors moved to the end of the document.                                                                                                                                                                                                                                                                                                                                                        |
|                    | 1.0.2 edition 2    | 2020-01-07 | 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.                                                                                                                                                                                                                                                    |
|                    | p3r00              | 2022-03-23 | TSE 18674 (rating 1): Removed Table 0a because it is no longer used.<br>TSE 18721 (rating 1): Editorials to align the document with the latest ICS template in anticipation of a future .Z release.<br>Editorials, including assigning publication number 2 to previous v1.0.2, consistency checker updates, and aligning the copyright page with v2 of the DNMD.                                                                                                    |
| 3                  | p3                 | 2022-06-28 | Approved by BTI on 2022-05-31. Prepared for TCRL 2022-1 publication.                                                                                                                                                                                                                                                                                                                                                                                                 |
|                    | p4r00              | 2023-10-05 | TSE 23670 (rating 2): Resolved GATT and SDP inter-layer dependencies. In Table 4, marked Item 4 as no longer used and added Items 1a and 1b and conditionals C.2 and C.3. In Table 5, deleted the ILD column, updated the Capability and Reference values for Item 1, and marked Items 2 and 3 as no longer used. Updated the references.<br>Made editorial edits to align the document with the latest ICS template, including updates to section and table titles. |
| 4                  | p4                 | 2024-07-01 | Approved by BTI on 2024-04-21. Prepared for TCRL 2024-1 publication.                                                                                                                                                                                                                                                                                                                                                                                                 |

| Publication Number | Revision Number | Date                    | Comments                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------|-----------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | p5r00–r04       | 2024-08-02 – 2024-08-28 | <p>TSE 16707 (rating 4): Per E16267, added Tables 0b and 3a. Added Item 3/35 and C.23 to Table 3. Added new section and Table 6 for GAP requirements. Updated the references list and the acknowledgments.</p> <p>TSE 25580 (rating 1): Per E16267, E16268, and E18753, added new X.Y.Z version as part of the .Z release. Added a reference for Location and Navigation Service Specification, Version 1.0.1.</p> |
| 5                  | p5              | 2024-10-08              | Approved by BTI on 2024-09-11. LNS v1.0.1 adopted by the BoD on 2024-10-01. Prepared for TCRL 2024-2-addition publication.                                                                                                                                                                                                                                                                                         |

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