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LOCAL *BLUETOOTH*® CONNECTIVITY

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CONTENTS

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1 INTRODUCTION

1.1 DOCUMENT PURPOSE

This document defines a minimum common suite of Bluetooth hardware and profile requirements for two classes of Bluetooth enabled mobile Terminals - Basic and Advanced.

The main purpose of the document is to improve user experience and expected functionality when using Bluetooth from a mobile Terminal.

This document specifies Bluetooth use cases for voice calling (e.g. using a headset or car kit) and local data transfer.

The document references existing and industry approved Bluetooth standards as defined by the Bluetooth Special Interest Group (SIG) together with their revised qualification process for cross vendor interoperability testing.

1.2 BUSINESS RATIONALE

A common approach by mobile operators for Bluetooth in Terminals would greatly improve the user experience for many customers. This would be achieved by increasing expected functionality, enabling better cross-vendor interoperability and encouraging better implementation of the most recent profiles.

Currently, a typical mobile operator's portfolio consists of dozens of Terminals, complemented with a large number of different peripherals such as mono headsets for voice calls, car kits, stereo headphones for music, external speakers, etc. Today, more than 30 Bluetooth profiles exist and many Terminals support a variety of these with different models normally implementing different revisions of the Bluetooth Core Specifications. This in turn, results in compatibility and interoperability issues for the various Bluetooth use cases.

Although the level of Bluetooth interoperability testing has increased, unless the same profiles with complementary roles are supported between the two Bluetooth devices being tested, there will be lack of interoperability. It is still possible for these devices to individually carry the Bluetooth logo but the compatibility and interoperability issues can lead to customer disappointment in terms of expected functionality over actual functionality.

This fragmentation creates unnecessary cost and complexity for the whole value chain, limits the freedom of selection for customers, impacts Terminal testing and restricts competition by creating barriers to market entry.

For an operator running a customer support centre, Bluetooth issues currently are costly and difficult to resolve.

This document defines a minimum set of standard Bluetooth profiles that are to be supported without restricting the freedom of innovation. This process should streamline the whole value chain and provide customers with a better user experience as well as reducing development and interoperability test costs for Terminal designs.

This document also provides valuable guidance for vendors with no expertise in the mobile market place. This would clearly benefit customers and also support new operator business cases; such as music delivery.

1.3 INTENDED AUDIENCE

The recommendations contained within this document are intended to be referenced by mobile operators in their Terminal requirement specifications.

There are two main audiences for this specification:

- Terminal designers and manufacturers; i.e. the equipment and technology vendors that will be required to create implementations of the requirements contained within this document.

- The Bluetooth SIG, who are invited to use these recommendations in their tools to specify best practice design guidelines for Bluetooth enabled Terminals for the benefit of their members.

1.4 CONVENTIONS

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC2119 [1].

- MUST: This word, or the terms "REQUIRED" or "SHALL", mean that the definition is an absolute requirement of the specification.

- MUST NOT: This phrase, or the phrase "SHALL NOT", mean that the definition is an absolute prohibition of the specification.

- SHOULD: This word, or the adjective "RECOMMENDED", mean that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.

- SHOULD NOT: This phrase, or the phrase "NOT RECOMMENDED" mean that there may exist valid reasons in particular circumstances when the particular behaviour is acceptable or even useful, but the full implications should be

understood and the case carefully weighed before implementing any behaviour described with this label.

- MAY: This word, or the adjective "OPTIONAL", mean that an item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because the vendor feels that it enhances the product while another vendor may omit the same item. An implementation which does not include a particular option MUST be prepared to interoperate with another implementation which does include the option, though perhaps with reduced functionality. In the same vein an implementation which does include a particular option MUST be prepared to interoperate with another implementation which does not include the option (except, of course, for the feature the option provides.)

The requirements within this document are uniquely identified using the following format:

LBTC-####, where:

- LBTC is the acronym used to identify the subject of this OMTP document (i.e. Local Bluetooth Connectivity)

- #### is a 4 digit number that identifies the requirement (e.g. 0020) and which is to be unique within the document.

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2 USE CASES

This recommendation document considers five common Bluetooth use cases. These five use cases reference the Bluetooth SIG's Experience Icon Program [2].

Although not mandatory, the Experience Icon programmes may help in marketing end product features to consumers more easily.

The requirements in section 3 aim to standardise Bluetooth Interoperability (IOT) testing between different vendor reference designs, thereby meeting the expectation of Bluetooth feature support from consumers and improving the reliability of Bluetooth links.

2.1 COMMON USER CASE SCENARIOS

The key operator use cases are listed below in priority order:

2.1.1 HEADSET

This logo indicates connectivity in the following user scenarios

- Using a mobile Terminal paired with a Bluetooth wireless headset.
- Talking hands-free in a car; either with an aftermarket kit or an integrated in-car system.
- Using a headset paired with a personal computer for VoIP communication.

2.1.2 MUSIC

This logo indicates that a user can listen to streamed stereo audio through Bluetooth enabled speakers, headsets and personal computers from a Bluetooth enabled source such as;

- Computers
- Audio Players
- Mobile Phones
- Other devices

2.1.3 FILE TRANSFER

This indicates the user will be able to transfer digital files, such as photos, calendar events and business cards between a variety of devices including the following:

- Computers
- Mobile Phones
- PDAs
- Cameras
- Media Players

2.1.4 PRINT

This indicates the user will be able to print images or documents to a Bluetooth enabled printer from:

- Mobile phones
- Computers
- PDAs
- Cameras

2.1.5 INPUT

This indicates the device connects a:

- Mouse
- Keyboard
- Game Controller
- Other input/output device

To a:

- Computer
- Game Console

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- PDA
- Other Bluetooth Enabled device

2.2 POSSIBLE FUTURE OPERATOR USE CASES

Bluetooth is evolving and developing new profiles to cover more mobile user scenarios. Revised and/or additional profiles will be addressed as applicable.

3 GENERAL REQUIREMENTS

This section defines the generic hardware requirements followed by two Bluetooth class definitions. The Bluetooth classes are named 'Basic' and 'Advanced'. The 'Basic' class is a subset of the 'Advanced' class.

The Basic class requirements should be considered as a minimum design.

These classes are defined by this OMTP document and therefore do not refer to Bluetooth SIG requirements or recommendations.

THE FOLLOWING REQUIRMENTS APPLY TO ALL TERMINALS.

REQ. ID	REQUIREMENT
LBTC-0010	Terminal MUST support Bluetooth Core specification v2.1 [3]
LBTC-0020	Terminal SHOULD use extended Synchronous Connection Oriented (eSCO) connections when LBTC-0130 (Hands Free Profile) is implemented.
LBTC -0030	The Terminal MUST support simultaneous multi profile usage via one Bluetooth link. The Bluetooth SIG paper, simultaneous use of hands free profile (HFP), Advanced Audio Distribution Profile (A2DP) and A/V Remote Control Profile (AVRCP) profiles provides guidance in this area [4] (For example; 1,The Hands Free Profile and the Phone Book Access Profile can be used simultaneously. 2,The Hands Free Profile and the Advanced Audio Distribution Profile can be used together simultaneously) 3. The Hands Free Profile and the Message Access Profile.
LBTC -0035	The Terminal SHALL support each profile connection independently from other profile connections. For example, the Terminal SHALL NOT require HFP to establish Phone Book Access Profile (PBAP); PBAP SHALL be available regardless of other profile connections.
LBTC -0040	The Terminal SHOULD implement the minimum power class required for the Terminal to operate in its designed usage scenario. For example class 2 (4dBm) or less [3].

REQ. ID	REQUIREMENT
LBTC -0050	The Terminal manufacturer MUST be able to quote device QDL for Program Reference Document (PRD) 2 [6] OR Qualified Product Listing (QPL) for PRD 1.0 [7]. This allows product traceability through the Bluetooth SIG qualification and End Product Listing (EPL) programs [6].
LBTC -0060	The Terminal MUST implement the Bluetooth SIG secure simple pairing user interface flow whitepaper [9].
LBTC -0070	The Bluetooth transceiver SHOULD be disabled by default after the Terminal is powered on for the first time. The user SHALL be required to turn Bluetooth on and the terminal enters discoverable mode. When Bluetooth is turned on, the Terminal shall be made visible to other Bluetooth devices. The 'Simple pairing and User Interface flow whitepaper' [9] gives guidance in this area.
LBTC -0080	In addition to obtaining Bluetooth Qualified Design Listing (QDL) by running all applicable Profile Tuning Suite (PTS) and non-PTS tests the Bluetooth platform MUST have been tested with device-to-device [10] and Enhanced Interoperability Testing (E-IOT) (Bluetooth SIG optional enhanced test cases) with at least 3 other different vendor platforms [11] for all the profiles supported.

DIFFERENT REQUIREMENTS APPLY TO DIFFERENT TYPES OF TERMINAL

In the columns defining the classes a '✘' indicates that the requirement does not apply to this class. A '✔' indicates that the requirement does apply to this class.

Req. ID	Requirement	Basic	Advanced
LBTC -0090	Profile Device ID (DID). The Terminal SHOULD support this profile which is intended for all Bluetooth devices. Version 1.3 [12] or later is REQUIRED.	✔	✔

Req. ID	Requirement	Basic	Advanced
LBTC -0100	Profile Dial Up Networking (DUN). The Terminal MUST support this profile with the Role of Gateway. At time of writing version 1.1 [13] is REQUIRED	✓	✓
LBTC -0110	File Transfer Profile (FTP). The Terminal MUST support this profile with the Role of Server. The Terminal SHOULD support this profile with the Role of Client. At time of writing version 1.1 [14] is REQUIRED. This profile is required to qualify for the File transfer experience icon.	✓	✓
LBTC -0120	Generic Object Exchange Profile (GOEP). The Terminal MUST support this profile with the Roles of Client and Server. At time of writing version 1.1 [15] is REQUIRED.	✓	✓
LBTC -0130	Hands-Free Profile (HFP). The Terminal MUST support this profile with the Role of Gateway. Version 1.5 [16] or later is REQUIRED. This profile is required to qualify for the Headset experience icon.	✓	✓
LBTC -0140	Headset Profile (HSP). The Terminal MAY support this profile with the Role of Gateway. Version 1.2 [17] or later is REQUIRED. This profile is required to qualify for the Headset experience icon.	✓	✓

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Req. ID	Requirement	Basic	Advanced
LBTC -0150	Object Push Profile (OPP). The Terminal MUST support this profile with the Roles of Client and Server. At time of writing version 1.1 [18] is REQUIRED. This profile is required to qualify for the Printer and File Transfer experience icon.	✓	✓
LBTC -0160	Serial Port Profile (SPP). The Terminal MAY support this profile with the Roles of DevA and DevB. At time of writing version 1.1 [19] is REQUIRED.	✓	✓
LBTC -0180	The Terminal MAY support Enhanced Data Rate (EDR). Refer to Bluetooth Core Specification 2.1 + EDR [3] or later.	✓	✗
LBTC-0185	The Terminal MUST support Enhanced Data Rate (EDR). Refer to Bluetooth Core Specification 2.1 + EDR [3] or later.	✗	✓
LBTC -0190	Advanced Audio Distribution Profile (A2DP). The Terminal MUST support this profile with the Role of Source At time of writing version 1.2 [21] is REQUIRED. The Bluetooth SIG White paper on the simultaneous use of HFP/A2DP and AVRCP [4] gives guidance in this area. This profile is required to qualify for the Music experience icon.	✗	✓

Req. ID	Requirement	Basic	Advanced
LBTC -0200	Generic A/V Distribution Profile (GAVDP). The Terminal MUST support this profile with the Roles of Initiator and Acceptor. Version 1.2 [22] or later is REQUIRED. This is mandatory for products supporting A2DP or Video Distribution Profile (VDP).	✘	✓
LBTC -0210	A/V Remote Control Profile, (AVRCP). The Terminal MUST support this profile with the Roles of Target and Controller. Version 1.4 [23] or later is REQUIRED. Target category 1 MUST at least support play and stop [4]. Controller category 2 SHOULD at least support volume up and down [4]. Play list browsing SHOULD be supported [4].	✘	✓
LBTC -0220	Basic Imaging Profile (BIP). The Terminal MUST support this profile with the Role of image Initiator. At time of writing version 1.2 [24] is REQUIRED. Terminals shall attempt to use BIP when sending picture files to other devices. Terminals may only default to Object Push Profile (OPP) when BIP is not supported by counterpart devices. The Bluetooth SIG has implementation guidelines in this area [25]. This profile is required to qualify for the Print experience icon.	✘	✓

Req. ID	Requirement	Basic	Advanced
LBTC -0230	Basic Printing Profile (BPP). The Terminal MUST support this profile with the Role of Sender. At time of writing version 1.2 [26] is REQUIRED. Terminals shall attempt to use BPP for any "Print" function that is supported. Terminals may default to OPP when BPP is not supported by counterpart products. The Bluetooth SIG White Paper, Minimal basic printing profile requirements for a sender, offers guidance [25]. This profile is required to qualify for the Print experience icon.	✘	✓
LBTC -0240	SIM Access Profile (SAP). The Terminal MUST support this profile with the Role of Server, if the terminal supports SIM cards. At time of writing version 1.1 [27] is REQUIRED. LBTC-0030 refers to multi profile support when implementing this profile. Bluetooth SIG white paper User Interface and security recommendations.	✘	✓
LBTC -0250	Phone Book Access Profile (PBAP). The Terminal MUST support this profile with the Role of Server. Version 1.0 [28] or later is REQUIRED.	✘	✓

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Req. ID	Requirement	Basic	Advanced
LBTC -0260	Human Interface Device Profile (HID). The Terminal MAY support this profile with the Role of HID-Host. Version 1.0 [29] or later is REQUIRED. This profile is required to qualify for the Input experience icon.	✘	✓
LBTC -0270	Personal Area Network Profile (PAN). The Terminal MAY support this profile with the Roles of Network Access Point (NAP), Group ad-hoc Network (GN) and Personal area Network User (PANU). At time of writing version 1.0 [30] is REQUIRED.	✘	✓
LBTC-0280	Hardcopy Replacement Profile (HCRP). The Terminal MAY support this profile with the Role of Client. At time of writing version 1.2 [31] is REQUIRED.	✘	✓
LBTC-0290	Message Access Profile (MAP). The Terminal SHOULD support this profile with the Role of Message Server Equipment. Version 1.0 [5] or later is REQUIRED.	✘	✓

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4 FUTURE SHORT TO MID TERM REQUIREMENTS

Bluetooth Core Version 3.0 + HS [8] was adopted by the Bluetooth SIG in April 2009.

In addition, Bluetooth Low Energy is expected to have adopted profiles towards the end of 2009. Support for Dual mode and Host controller would be expected at the terminal. Low Energy Bluetooth transceiver may be enabled by default whilst the classic Bluetooth transceiver is disabled by default, subject to final specification by Bluetooth SIG.

Once the profile is formally adopted, support within the terminal for HID USB would be recommended.

Once Wide band Speech is adopted, support for both basic and advanced terminal classes would be recommended.

If a future Bluetooth Core Version is supported by a terminal it MUST be backwards compatible with core versions 2.0/2.1 products and be fully IOT tested against existing devices.

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5 Definition of Terms

The Bluetooth SIG has published a terminology guideline document which is available in 34 different languages.

These terms in the guide were not developed for Bluetooth technical communication, (e.g. specifications, profiles). However, developers may wish to utilise these terms to avoid confusion within their own documentation. The proposed terms are intended to be used in materials for consumer consumption, e.g. marketing materials, press releases, packaging, user manuals, documentation, help desk training, user interface software and hardware labelling.

This document can be downloaded from the following URL / hyperlink.

https://www.bluetooth.org/Marketing/Technology/user_terminology.htm

Term	Description
Acceptor	This is the device that shall respond to the incoming request from the Initiator
Client	The Client device retrieves the source objects from the server
Controller	A device that initiates a transaction by sending a command frame to a target device.
DevA	A device that initiates a connection to another device
DevB	A device that waits for another device to initiate a connection.
Gateway	Device providing access to the public network
Hid-Host	The device using or requesting the services of a Human Interface Device
Initiator	The device that initiates a signalling procedure
Role	Device configuration mode
Sender	This is the Client device that pushes an object to the printer

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Term	Description
Server	The Server device has direct access to the Source objects
Source	A device is the Source when it acts as a source of a digital audio stream
Target	A device that receives a command frame and accordingly generates a response frame.
Terminal	Used as an alternative term for a cellular telephone or handset.

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6 Abbreviations

Abbreviation	Description
A2DP	Advanced Audio Distribution Profile
A/V	Audio Visual
AVCTP	A/V Control Transport Protocol
AVDTP	A/V Distribution Transport Protocol
AVRCP	A/V Remote Control Profile
BT	Bluetooth
BT SIG	Bluetooth Special Interest Group
BIP	Basic Imaging profile
BPP	Basic Printing profile
DID	Device ID
DUN	Dial Up Networking
EDR	Enhanced Data Rate
ᴇSCO	Extended Synchronous Connection Oriented
E-IOT	Enhanced Interoperability Testing
EPL	End Product Listing
FTP	File Transfer profile
GAVDP	Generic A/V Distribution Profile
GN	Group ad-hoc Network
GOEP	Generic Object Exchange Profile
HCRP	Hard Copy Replacement Profile
HFP	Hands-Free Profile
HID	Human Interface Device

Abbreviation	Description
HSP	Headset Profile
IOT	Interoperability Testing
NAP	Network Access Point
MAP	Message Access Profile
OPP	Object Push Profile
PAN	Personal area Network
PANU	Personal area Network User
PBAP	Phone Book Access Profile
PDA	Personal Digital Assistant
PRD	Program Reference Document (Bluetooth SIG Qualification Program)
PTS	Profile Tuning Suite
QDL	Qualified Design Listing
QPL	Qualified Product Listing
SAP	SIM Access Profile
SDAP	Service Discovery Application Profile
SIG	Special Interest Group
SPP	Serial Port Profile
VDP	Video Distribution Profile

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7 Referenced Documents

No.	Document	Author	Date
1	RFC 2119 - Key words for use in RFCs to Indicate Requirement Levels	IETF	
2	BT SIG Experience Icons Programme https://www.bluetooth.org/Marketing/Icon/home.htm	BT SIG	2006
3	Bluetooth Core v2.1 + EDR https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=66471	BT SIG	July 2007
4	Simultaneous use of HFP, A2DP, and AVRCP_WP https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=49216	BT SIG	January 2007
5	Message Access Profile v1.0 https://www.bluetooth.org/DocMan/handlers/DownloadDoc.ashx?doc_id=215400	BT SIG	June 2009
6	Qualification program reference document PRD v2.0 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=40972	BT SIG	March 2008
7	Program reference document PRD v1.0	BT SIG	1996
8	Core Version 3.0 + HS https://www.bluetooth.org/DocMan/handlers/DownloadDoc.ashx?doc_id=174214	BT SIG	April 2009
9	Simple pairing and user interface flow whitepaper. https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=86173	BT SIG	Sep 2007
10	Device to Device IOT test case hyperlink https://www.bluetooth.org/apps/content/?doc_id=62088#Device2DeviceTests	BT SIG	2006

No.	Document	Author	Date
11	E-IOT white paper hyperlink https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=69604	BT SIG	June 2007
12	Profile Device ID v1.3 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=75536	BT SIG	July 2007
13	Profile Dial Up Networking v1.1 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=8702	BT SIG	February 2001
14	File Transfer Profile v1.1 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=8707	BT SIG	October 2005
15	Generic Object Exchange Profile v1.1 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=8705	BT SIG	February 2005
16	Hands Free Profile v1.5 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=41181	BT SIG	Nov 2005
17	Headset Profile v1.1 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=8701	BT SIG	February 2001
18	Object Push Profile v1.1 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=8706	BT SIG	February 2001
19	Serial Port Profile v1.1 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=8700	BT SIG	February 2001
20	Service Discovery Application Profile v1.1 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=8697	BT SIG	February 2001

No.	Document	Author	Date
21	Advanced Audio Distribution Profile v1.2 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=66605	BT SIG	April 2007
22	Generic A/V Distribution Profile v1.2 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=66608	BT SIG	March 2005
23	A/V Remote Control Profile v1.3 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=66609	BT SIG	June 2006
24	Basic Imaging Profile v1.2 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=6394	BT SIG	October 2005
25	Minimal Basic Printing Profile Requirements for a Sender. White paper. https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=87&vId=126	BT SIG	Sept 2002
26	Basic Printing Profile v1.2 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=41501	BT SIG	June 2006
27	SIM Access Profile v1.0 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=40826	BT SIG	May 2006
28	Phone Book Access Profile v1.0 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=41503	BT SIG	March 2006
29	Human Interface Device Profile v1.0 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=7108	BT SIG	June 2006
30	Personal Area Network Profile v1.0 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=6554	BT SIG	October 2005

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No.	Document	Author	Date
31	Hardcopy Replacement Profile v1.2 https://www.bluetooth.org/docman/handlers/ DownloadDoc.ashx?doc_id=41502	BT SIG	April 2006

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