OMTP

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 Terminal - Basic and Advanced.

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

Bluetooth connectivity for the main use cases of voice calling (e.g. headsets and car kits) and local data transfer are specified.

The document references existing and approved industry Bluetooth standards as defined by the Bluetooth Special Interest Group (BT 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 of many customers. It would achieve this by increasing expected functionality, enable better cross-vendor interoperability and encourage 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 usually implementing different revisions of the Bluetooth 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 are supported between the two Bluetooth Terminals being tested, they cannot be fully tested. It is still possible for these Terminals 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.

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From an operator customer support centre perspective, Bluetooth issues are currently costly and difficult to resolve.

This document defines a minimum set of standard Bluetooth profiles to be supported, without restricting the freedom of innovation. This 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, which would clearly benefit customers and 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 three main audiences for this specification:

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

- The Bluetooth SIG, who are invited to use these recommendations in future updates to specify best practice design guidelines for Bluetooth enabled Terminals.

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

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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 will consider five common Bluetooth use cases. These five use cases align with the Bluetooth SIG's Experience Icon programme [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 simplify Bluetooth IOT testing between different vendor's reference designs, thereby increasing 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 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 after market kit or and integrated in car system.
- Using a headset paired with a personal computer for VoIP communication.

2.1.2 MUSIC

This indicates the user will be able to listen to stereo audio which is sourced from:

- Computers
- Audio Players
- Mobile Phones
- Other devices

The user will be able to stream music to Bluetooth enabled speakers, headsets and personal computers.

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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 connectivity in the following user scenarios:

- Printing images or documents from a mobile phone, computer, PDA, camera to a Bluetooth enabled printer

2.1.5 INPUT

This indicates the device connects:

- Mice
- Keyboard
- Game Controllers
- Other input/output devices

to

- Computers
- Game Controllers
- PDAs
- Other Bluetooth Enabled devices

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 the two Bluetooth class definitions. The two Bluetooth classes are called 'Basic' and 'Advanced'. The Advanced class is a superset of the 'Basic' class.

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

ALL OF THE FOLLOWING REQUIRMENTS APPLY TO ALL TERMINALS

REQ. ID	REQUIREMENT
LBTC-0010	Terminal MUST support Bluetooth Core specification v2.0 [3]
LBTC-0020	Terminal SHOULD support eSCO when LBTC-0130 (Hands Free Profile) is implemented.
LBTC -0030	The Terminal MUST support simultaneous multi profile usage via one BT link. The BT SIG paper, simultaneous use of HFP, A2DP and AVRCP profiles provides guidance in this area. [4] (For example; The Hands Free Profile and the Phone Book Access Profile can be used simultaneously. The Hands Free Profile and the Advanced Audio Distribution Profile can be used together simultaneously) Multi profile support with SAP (see LBTC-0240) MAY NOT be supported.
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 [5].
LBTC -0050	The Terminal manufacturer MUST be able to quote device QDL for PRD 2.0 [6] OR QPL for PRD 1.0 [7]. This allows for product traceability through the BT SIG qualification and End Product Listing (EPL) programs. [6].
LBTC -0060	The Terminal MUST implement the BT SIG security guidelines and design standards as recommended by the security expert group [8].

REQ. ID	REQUIREMENT
LBTC -0070	The Bluetooth transceiver SHOULD be disabled by default. The user SHALL be required to turn Bluetooth on and enter discovery mode. When first turned on, Bluetooth shall be visible. The 'Simple pairing and User Interface flow whitepaper' [9] gives guidance in this area
LBTC -0080	The Bluetooth platform MUST have been tested with device-to-device [10] and E-IOT with at least 3 other different vendor platforms [11].

DIFFERENT REQUIREMENTS APPLY TO DIFFERENT TYPES OF TERMINAL

In the columns defining the classes a 'x' 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 BT devices. At time of writing version 1.3 [12] is REQUIRED.	✓	✓
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. At time of writing version 1.1 [14] is REQUIRED. This profile is required to qualify for the File transfer experience icon.	✓	✓

REQ. ID	REQUIREMENT	BASIC	ADVANCED
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. At time of writing version 1.5 [16] 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. At time of writing version 1.1 [17] is REQUIRED. This profile is required to qualify for the Headset experience icon.	✓	✓
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.	✓	✓

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REQ. ID	REQUIREMENT	BASIC	ADVANCED
LBTC -0170	Service Discovery Application Profile, SDAP The Terminal MAY support this profile with the Roles of Client and Server. At time of writing version 1.1 [20] is REQUIRED.	✓	✓
LBTC -0180	The Terminal MAY support EDR	✓	✗
LBTC-0185	The Terminal MUST support EDR	✗	✓
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 BT 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.	✗	✓
LBTC -0200	Generic A/V Distribution Profile, GAVDP The Terminal MUST support this profile with the Roles of Initiator and Acceptor. At time of writing version 1.2 [22] is REQUIRED.	✗	✓

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Req. ID	Requirement	Basic	Advanced
LBTC -0210	A/V Remote Control Profile, AVRCP The Terminal MUST support this profile with the Roles of Target and Controller. At time of writing version 1.3 [23] is REQUIRED. Target category 1 SHOULD at least support play and stop. [4] Controller category 2 SHOULD at least support volume up and down in headsets. [4] V1.3 or V1.4 SHOULD support play list browsing. [4]	✘	✓
LBTC -0220	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 default to OPP when BIP is not supported by counterpart products. The BT SIG has implementation guidelines in this area [25]. This profile is required to qualify for the Printer experience icon.	✘	✓

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REQ. ID	REQUIREMENT	BASIC	ADVANCED
LBTC -0230	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 BT SIG White Paper, Minimal basic printing profile requirements for a sender, offers guidance [25]. This profile is required to qualify for the Printer experience icon.	✘	✓
LBTC -0240	SIM Access Profile, SAP The Terminal MUST support this profile with the Role of Server. At time of writing version 1.0 [27] is REQUIRED. LBTC-0030 refers to multi profile support when implementing this profile. BT 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. At time of writing version 1.0 [28] is REQUIRED.	✘	✓

REQ. ID	REQUIREMENT	BASIC	ADVANCED
LBTC -0260	Human Interface Device Profile, HID The Terminal MAY support this profile with the Role of HID-Host At time of writing version 1.0 [29] 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 NAP, GN and 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.	✘	✓

4 FUTURE SHORT TO MID TERM REQUIREMENTS

Bluetooth Core Version 2.1+EDR [32] was adopted by the BT SIG in 2007.

Several profiles are in the process of being updated to take advantage of the enhancements defined in the 2.1 release. At time of writing these profiles are expected to be adopted in the second half of 2008.

Version 2.1+EDR [32] promises many improvements including easy pairing; however assuming this benefit is seen, the next goal would be improved functionality and reliability of the supported profiles.

Consideration should be given as to when the manufactures of both Terminals and accessories will be ready to supply the market with Bluetooth Core Version 2.1 core products. This will ensure that not just pairing but the whole user experience is enriched.

Ready for market should mean that both the core and revised profiles are implemented. Testing is carried out; device to device and E-IOT testing with different vendor reference platform designs.

The estimated timescale for commercial availability of Bluetooth Core Version 2.1+EDR devices is the second half of 2009.

As such, in the future the impact to the requirements defined in this document would be updated to reflect the following;

- Core version (LBTC-0010) will be updated to reflect 2.1 MUST be supported.

- The following profiles will have there versions updated to reflect 2.1+EDR enhancements, within AVRCP, AVCTP, AVDTP, GAVDP, HID, HSP, PBAP and SAP.

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5 DEFINITION OF TERMS

The Bluetooth SIG has prepared a user terminology guideline document and translated it into 34 different languages.

These terms are not developed for Bluetooth technical communication e.g. specifications, profiles. However, developers may wish to use these terms to avoid confusion in their own documentation. The proposed terms are intended to be used in consumer audience materials: marketing materials, press releases, packaging, user manuals and 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	The 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
AVDTP	A/V Distribution Transport
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
FTP	File Transfer profile
GAVDP	Generic A/V Distribution Profile
GN	Group Ad-hoc Network
GOEP	Generic Object Exchange Profile
HCRP	Hardcopy Replacement Profile
HFP	Hands-free profile
HID	Human Interface device
HSP	Headset profile

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ABBREVIATION	DESCRIPTION
IOT	Interoperability Testing
NAP	Network Access Point
OPP	Object Push profile
PAN	Personal Ad-hoc Network
PANU	Personal Ad-hoc Network User
PBAP	Phone Book Access Profile
PDA	Personal digital assistant
PRD	Program Reference Document
QDL	Qualified Design Listing
QPL	Qualified Product Listing
SAP	SIM Access Profile
SDAP	Service Discovery Application Profile
SPP	Serial Port 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 Specification v2.0 + EDR https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=40560	BT SIG	October 2004
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	Bluetooth core specification version 2.0 + EDR, Radio Specification, 3 transmitter characteristics.	BT SIG	October 2004
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	'Recommendations to Early Implementers: Encrypting Broadcast Transmissions in Bluetooth™ Piconets' https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=82&vId=121	BT SIG	May 2002
9	Simple pairing and user interface flow whitepaper. https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=86173	BT SIG	Sep 2007

OMTP PUBLISHED

No.	Document	Author	Date
10	Device to Device IOT test case hyperlink https://www.bluetooth.org/apps/content/?doc_id=62088#Device2DeviceTests	BT SIG	2006
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

No.	Document	Author	Date
20	Service Discovery Application Profile v1.1 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=8697	BT SIG	February 2001
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

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No.	Document	Author	Date
30	Personal Area Network Profile v1.0 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=6554	BT SIG	October 2005
31	Hardcopy Replacement Profile v1.2 https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=41502	BT SIG	April 2006
32	Bluetooth Core v2.1 + EDR https://www.bluetooth.org/docman/handlers/DownloadDoc.ashx?doc_id=66471	BT SIG	July 2007

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