Implementation Guidelines

Wireless connections made easy

Mobile Phone

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Bluetooth®

Revision History

Rev	Date	Comments
0.7	May 28th 2003	
0.9r1	June 3rd 2003	Changes from review incorporated. Section about icons and marketing material deleted. All references to profiles that not reached 0.95 removed.
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Contributors

Anders Edlund	Bluetooth SIG
Brian Redding	Motorola
Dale Neuzil	Motorola
Jens-Uwe Söhner	Nokia
Hasan Karacelik	Siemens
Olaf Kautz	Siemens
Patric Lind	Sony Ericsson
Tomas Rahkonen	Sony Ericsson

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1 SCOPE

These guidelines are to be published as recommendations for mobile phone manufacturers intending to implement Bluetooth technology. This document will also provide information for manufacturers of devices intended to work together with mobile phones, as well as for mobile operators. Purchasers of mobile phones will have guidelines for expected interoperability and capabilities of Bluetooth enabled phones.

The recommendations are targeted at all kind of mobile phones (i.e. low-end to high-end) although it is assumed that for the next one-year period only high- to mid-range phones will have built-in Bluetooth technology. The guidelines herein also assume a mobile phone-centric view.

Level of recommendation:

- Basic recommendations (functionality that is to be implemented in all mobile phones)
- Extended recommendations (functionality to be considered depending on e.g. the positioning of the mobile phone).

Basic functionality present in all mobile phones allows implementation of complementary devices, which have a known market adoption potential. The recommendations are aligned with other application spaces ensuring that mobile phones with basic functionality will work in all spaces.

2 PROFILE AND FUNCTIONALITY RECOMMENDATION

All recommendations are based on Bluetooth specification v1.1 and adopted profiles [1].

It is recommended that mobile phones support only 1.0 or later versions of the profiles.

When adopted, it is recommended that mobile phones support the 1.2 version of the Bluetooth Core specification (volume 2 & 3) and also profiles supporting v1.2 functionality, if available in adopted versions.

It is also recommended that any adopted errata services release shall be implemented as soon as possible.

2.1 BASIC FUNCTIONALITY

These recommendations are based on the current understanding of the needs for phones to provide good connectivity with devices such as PC's, PDA's, headsets, car kits and cameras, as well as other mobile phones.

2.1.1 Bluetooth Audio (for car kits and headsets)

It is recommended that mobile phones implement both the Hands-free Profile (HFP) and the Headset Profile (HSP) in the audio gateway (AG) role in order to enable handsfree voice communication with car kits and headsets. The HFP is the preferred profile to use in case the other device supports both profiles.

Note: We recognize there is a problem with having two profiles for similar use cases. We recommend investigating the possibility of adding the headset use case to HFP and unneeded parts be made optional in the PICS for the headset use case.

2.1.2 Dial-up

It is recommended that mobile phones implement the gateway role of the Dial-up Networking Profile (DUN) to enable computers and other devices to access the Internet through a dial-up connection.

It is recommended that mobile phones implement the network access point (NAP) role of the Personal Area Network Profile (PAN) to improve IP end-to-end connectivity, with less complexity for user configuration.

Note: It is assumed that the DUN and PAN profiles exist in parallel.

2.1.3 Synchronization

It is recommended that mobile phones support synchronization by using the Synchronization Profile, SyncML, or other synchronization methods in order to enable synchronization of phone book and calender.

If SyncML is implemented, it is recommended to implement SyncML over OBEX (client role) as defined in the SyncML OBEX binding specification [2].

It is optional for mobile phones to implement the server role for SyncML (including sync engine).

Note: SyncML over HTTP/TCP/IP/PAN is an issue for future consideration.

2.1.4 Object push

It is recommended that mobile phones implement both the client and the server role of the Object Push Profile (OPP) to enable the exchange of objects of any content type (not only v-Formats) between phones and other devices.

Note: Mobile phones can act as a storage medium without necessarily having a launch application for all content types.

2.1.5 File transfer

It is recommended that mobile phones implement the server role of the File Transfer Profile (FTP), making files on the phone available to other devices.

It is recommended that mobile phones implement the client role of the OPP in order to send files to other devices.

Note: It may be recommended in the future to also implement the FTP client role in order to support the usage of the mobile phone with external storage media.

2.1.6 Imaging

It is recommended that mobile phones implement the image push responder role of the Basic Imaging Profile (BIP) in order to be able to receive still images from cameras.

It is recommended that mobile phones, which come with a high-resolution camera, implement the initiator role of the BIP Image Push feature.

It is recommended that mobile phones implement the client role of the OPP in order to send images to other devices.

2.2 EXTENDED FUNCTIONALITY

This section covers functionality that is not recommended for all mobile phones at the moment. This includes segment features or future recommendations.

2.2.1 Printing

It is recommended for mobile phones that want to support printing capabilities to implement the sender role of the Basic Printing Profile (BPP).

It is recommended for mobile phones that want to connect to specific image printers to implement either the image push initiator role or the advanced image printing initiator role of the BIP.

Note: Printer manufacturers are assumed to implement multiple printing profiles (OPP, BIP, BPP, HCRP), though the BPP will be the preferred profile for general usage with mobile devices.

2.2.2 Personal area network

It is recommended for mobile phones that want to connect to access points to implement the PAN user (PANU) role of the Personal Area Network (PAN) profile.

It is recommended for mobile phones that want to provide Internet access for other devices to implement the NAP role of the PAN profile (see Section 2.1.2 on page 7).

It is recommended for mobile phones that want to participate in ad-hoc networks, either point-to-point or point-to-multipoint, to implement the PAN user (PANU) and group network (GN) roles of the PAN profile and scatternet functionality.

2.2.3 Cordless telephony

It is recommended for mobile phones that want to connect to other telephony networks to implement the terminal role of the Cordless Telephony Profile (CTP).

To assure that the CTP implementation in the mobile phone meets user expectations on the operating range, it is recommended to use class 1 radio.

It is recommended for mobile phones that want to enable voice communication directly to other terminals (“walkie talkie”) to implement the Intercom Profile (ICP).

2.2.4 Human Interface Device

It is recommended for mobile phones that want to act as a host for wireless mouse or keyboard to implement the host role of the Human Interface Device (HID) profile.

It is recommended for mobile phones that want to act as a HID device (phone acts as mouse/keyboard) to implement the device role of the HID profile.

2.2.5 High quality audio

It is recommended for mobile phones that want to act as an audio source (towards a stereo headset or speakers) to implement the source role of the Advanced Audio Distribution Profile (A2DP).

It is recommended for mobile phones that implement A2DP also to implement both target and controller role of the A/V Remote Control Profile (AVRCP). The target role enables track control from e.g. a headset, and the controller role enables the control of the volume in e.g. a headset.

2.2.6 Java over Bluetooth

It is recommended for mobile phones supporting Bluetooth and Java to implement JSR 82 [4] to provide Bluetooth functionality for Java applications. Mobile phones that implement JSR 82 should implement both the Java Bluetooth API and the Java OBEX API.

It is recommended for mobile phones that support the PANU and GN roles of the PAN profile and Java to also implement the Socket API as defined in JSR 118 [5] to enable Java applications to communicate over IP and Bluetooth.

2.2.7 SIM access

It is recommended for mobile phones that want to provide access to the SIM card to implement the server role of the SIM Access Profile (SAP).

2.2.8 Fax

It is recommended for phones that want to act as a fax modem to implement the gateway role of the Fax Profile (FAX).

2.3 CONCURRENT APPLICATIONS

It is recommended that mobile phones support at least the following concurrent applications:

- Receiving pushed data (OPP) while having a voice call in the hands-free or a dial-up session;
- Handling a voice call in the hands-free while having a packet switched dial-up session;
- Handling an audio connection handover between the headset and the car kit;
- Handling a voice call in the hands-free while synchronizing or transferring files.

In order to implement all of the given concurrent applications, scatternet functionality is needed.

Although concurrent applications are not explicitly covered by the Bluetooth specifications, support for these concurrent applications are natural user expectations.

3 RECOMMENDATIONS ON GENERIC FUNCTIONALITY

3.1 OPERATION MODE HANDLING (Recommended Settings)

The following recommendations for operation mode handling are made to enable a good out-of-the-box experience, requiring a minimum of user interaction.

3.1.1 Visibility setting

When Bluetooth functionality is turned on, the mobile phone should be discoverable according to its visibility setting. The default value of the visibility setting should be set such that the phone is in discoverable mode. The user should be able to set the value of the visibility setting to either discoverable or non-discoverable. The value of the setting remains as set after powering the phone off and on.

Note: "Visibility" is a term used on user interface level while "discoverable" is the property defined in the Generic Access Profile (GAP).

3.1.2 Connectable mode

When Bluetooth functionality is turned on, it is recommended that the mobile phone should be connectable. Whether Bluetooth is turned on or off is dependent on a user setting. The value of the setting remains the same after powering the phone off and on. The default value of the setting (i.e. Bluetooth turned on or off) is product dependant.

3.1.3 Pairable mode

When Bluetooth functionality is turned on, it is recommended that the mobile phone should be pairable.

Note: This means that mobile phones should handle incoming authentication requests that lead to passkey entries. It does not mean that phones need to handle pairing as a dedicated procedure.

3.2 SECURITY CONSIDERATIONS

3.2.1 Security mode

It is recommended for mobile phones to implement security mode 2 (i.e. service level enforced security) in order to be able to handle both services that require security and those that do not.

Each application defines the level of security that is required. On the following services, it is recommended that authentication and encryption should be invoked:

- Audio (HSP, HFP);
- Dial–up Networking (DUN, FAX);
- Synchronization;
- File transfer (FTP Server role at least);
- Personal Area Networking (PAN NAP role at least);
- Cordless telephony (CTP);
- Human interface devices (HID);
- High Quality Audio (A2DP);
- SIM Access (SAP)

3.2.2 Passkey recommendations

Entering of characters is not natural for phones. It is therefore recommended to use digits only. For those phones that have enhanced means for character input (e.g. touch screens), it is recommended to also support character-based passkeys.

It is recommended that mobile phones can handle full length passkeys (16 digits).

It is recommended that mobile phone manufacturers instruct users to use passkeys of a minimum length of at least 7 digits.

It is recommended to not use predefined passkeys, neither manufacturer defined nor user defined.

It is recommended not to use unit keys.

3.3 MASTER/SLAVE ROLE SWITCH

It is recommended that mobile phones do not have a too rigid role switch policy, but that they should accept role switch requests from another device as long as it doesn’t compromise other ongoing connections.

4 USER EXPERIENCE ASPECTS

See separate Bluetooth User Experience document [3].

4.1 DEVICE TYPE DEFINITIONS

4.1.1 Recommended basic device types

The following table defines device types in terms of the Major and Minor device class fields of the Class of Device/Service field as defined in Assigned Numbers [1]. It is recommended that mobile phones should be able to distinguish between these device types, e.g. in lists of paired and discovered devices, by indicating each entry with a device-type-specific icon, in addition to the device name.

Device type	Major device class	Minor device class
PC[1]	Computer	All but: HPC/PDA *or* Palm/PDA *or* Laptop
Laptop[1]	Computer	Laptop
PDA	Computer	HPC/PDA *or* Palm/PDA
Phone	Phone	Cellular *or* Smart phone
Headset[2]	Audio/Video	Headset
Hands-free[2]	Audio/Video	Hands-free
Video Camera[3]	Audio/Video	Video camera *or* Camcorder
Camera[3]	Imaging	Camera
Other	All other combinations	

Table 4.1: Recommended basic device types

1. It is acceptable to not distinguish between the “PC” and “Laptop” types. If no distinction is made, the common term should be “Computer” and the common icon should be the same as for “PC”.
2. It is acceptable to not distinguish between the “Headset” and “Hands-free types”. If no distinction is made, the common term should be “Hands-free” and the common icon should be the same as for “Headset”.
   Note: Distinction can only be made when it has been corrected in Assigned Numbers that “Headset” type is a physical device type and does not imply compliance with the Headset Profile.
3. It is acceptable to not distinguish between the “Camera” and “Video camera” types. If no distinction is made, the common term should be “Camera” and the common icon should be the same as for “Camera”.

4.1.2 Recommended extended device types

Device type	Major device class	Minor device class
Access point[1, 2, 3]	LAN Access Point	-
Access point[1]	Phone	Fixed modem or gateway
Printer	Imaging	Printer

Table 4.2: Recommended extended device types

1. It is difficult to assign different terms/icons to “data access point” and “voice access point”.
2. It is recommended to not display access points that indicate “No service available” in the Minor device class field.
3. It is recommended to display the access points that are least utilized in the beginning of the list.

4.2 BLUETOOTH DEVICE ADDRESS

It is recommended that mobile phones should not display Bluetooth device addresses (neither its own nor that of a remote device) to the user. Instead, interaction with users should be based on more natural entities such as device names and device type icons.

5 INTEROPERABILITY

Mobile phone manufacturers are encouraged to submit dedicated profile interoperability testing unit (DPIT) applications for the recommended profiles.

Mobile phone manufacturers are recommended to attend the Unplug Fests [6] arranged by the Bluetooth SIG.

6 REFERENCES

[1] Bluetooth SIG, “Bluetooth Specification”, https://www.bluetooth.org

[2] Open Mobile Alliance / SyncML, “SyncML OBEX Binding”, http://www.openmobilealliance.org/syncml

[3] Bluetooth SIG, “User Experience Guidelines”, https://www.bluetooth.org

[4] Java Community Process, “Java Bluetooth API” (JSR 82), http://www.jcp.org

[5] Java Community Process, “Mobile Information Device Profile 2.0” (JSR 118), http://www.jcp.org

[6] Unplug Fest website, https://www.bluetooth.org/foundry/sitecontent/document/unplugfest_main

7 DEFINITIONS AND ABBREVIATIONS

Acronym or abbreviation	Writing out in full	Placement in Specification
A2DP	Advanced Audio Distribution Profile	vol 10 part C
AG	Audio Gateway	NA
AVRCP	A/V Remote Control Profile	vol 10 part G
BIP	Basic Imaging Profile	vol 8 part E
BPP	Basic Printing Profile	vol 8 part F
CTP	Cordless Telephony Profile	vol 9 part B
DPIT	Dedicated Profile Interoperability Testing (Unit)	NA
DUN	Dial-Up Networking Profile	vol 7 part C
FAX	Fax Profile	vol 7 part D
FTP	File Transfer Profile	vol 8 part C

Table 7.1: Definitions and abbreviations

Acronym or abbreviation	Writing out in full	Placement in Specification
GAP	Generic Access Profile	vol 3 part C
GN	Group Network	NA
GW	Gateway	NA
HCRP	Hardcopy Cable Replacement Profile	vol 11 part B
HFP	Hands-Free Profile	vol 7 part E
HID	Human Interface Device Profile	vol 11 part A
HSP	Headset Profile	vol 7 part F
ICP	Intercom Profile	vol 9 part C
J2ME	Java 2 Micro Edition	NA
JSR	Java Specification Request	NA
LAN	Local Area Network	NA
MIDlet	Mobile Information Device application (Java)	NA
MIDP	Mobile Information Device Profile (Java)	NA
NAP	Network Access Point	NA
OPP	Object Push Profile	vol 8 part B
PAN	Personal Area Networking Profile	vol 6 part B
PANU	Personal Area Network User	NA
PICS	Profile Interoperability Conformance Statement	NA
SAP	SIM Access Profile	vol 12 part C
SIG	(Bluetooth) Special Interest Group	NA
SIM	Subscriber Identity Module	NA
SPP	Serial Port Profile	vol 7 part B

Table 7.1: Definitions and abbreviations