

Bluetooth Profiles

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What is a Bluetooth profile?

- Clear description of how the standard provides certain user functions
- Creates interoperability between different standard deployments
- Notion comes from ISO/IEC TR10000

Notion of a profile

Notion of a profile includes:

- Implementation options reduced to sharing same features
- Definiton of parameters
- Standard mechanisms for combining standards
- User **interface guidelines**

Definition

Bluetooth profiles ensure interoperability by providing a well defined set of higher layer procedures and uniform ways of using the lower layers

Some Bluetooth profiles

- Organized in groups
- Each profiles builds upon the one beneath and inherits features from below
- LAN \leq Serial Port Profile \leq GAP

List of some profiles

- **GAP**
 - **Serial Port profile**
 - Dial up networking
 - FAX
 - Headset
 - **LAN access**
 - Generic object exchange
 - File transfer
 - Object push
 - Synchronisation

Intro to GAP profile

- Core on which all the other profiles are based.
- Generic procedures related to discovery of BT devices and link management aspects of connection BT devices.
- Defines procedures related to use of different security levels.
- Describes how lower layers (LM/Baseband) and LMP are used.

Intro to GAP profile

- Defines modes of operation that are common and generic to all profiles
- Defines the general procedure for how to create bonds between BT devices
- Defines the requirements on names, values, and coding schemes for names of parameters and procedures on the user interface level

GAP User Interface aspects

Generic user interface terms

- BD_ADDR (12 hex chars, 48 bits)
- BT Device Name (max. 248 chars)
- BT Pass-key
- BT Device Type

Pairing Procedures

- User initiates (perform bonding)
- User is requested to authenticate

GAP modes

- Discoverable (inquiry scan)
- Connectable (page scan)
- Pairable (LM pairing, creation of link keys)
- Security (encryption, when and how)

GAP Discoverability

- Discoverability modes
 - Non–discoverable mode (no INQUIRY_RESPONSE)
 - Limited discoverable mode (specific event, certain time, LIAC)
 - General discoverable mode (response to general inquiry, GIAC)

GAP Connectivity

- Connectivity Modes
 - Non-connectable mode (never enters PAGE_SCAN, but listen to his ID)
 - Connectable mode (periodically enters the PAGE_SCAN state)

GAP Pairing

- Pairing modes
 - Non-pairable mode (doesn't accept creation of bonds initialized by a remote device)
 - LMP_in_rand => LMP_not_accepted
 - Pairable mode (accepts bonding)
 - LMP_in_rand => LMP_accepted

GAP & Security

- Security modes
 - Mode 1 (security is never initiated)
 - Mode 2 (security is not initiated until L2CAP)
 - Mode 3 (security is initiated when ACL is established)

Connecting to a LAN AP

- Terminal inquiries and discovers LAN AP
- Terminal pages LAN AP and establishes a ACL link
- LMP sets:
 - Master/Slave switch
 - Encryption
- L2CAP link setup, service record retrieve (LANAccessUsingPPP)

Serial Profile

- Provides RS–232 serial cable emulation
- Profile based on GSM 07.10 standard
- Allows multiplexing of multiple serial connections over one serial link
- RFCOMM provides serial port emulation

Steps to setup a virtual serial cable

or how to connected to an emulated serial port

- Find the BT device address at the other end
 - Inquire and select or
 - Enter the address directly or
 - The device is already pre-paired
- Paging (create a baseband ACL)
- L2CAP creates a channel to the SDP

Steps to setup a virtual serial cable–II

or how to connected to an emulated serial port

- SDP retrieves the RFCOMM server channel number of the serial port service
- An LS2CAP channel is created to the RFCOMM of responder
- Applications can now send UIH frames on the RFCOMM channel

LAN Access Point Profile

- Allows access to a fixed network via a BT link to a LAN Access Point (LAP)
- LAN Access profile specifies using PPP over RFCOMM
- LAN Access profile specifies how to layer an IP stack on the BT stack

Connecting to a LAN AP

- Terminal inquiries and discovers LAN AP
- Terminal pages LAN AP and establishes a ACL link
- LMP sets:
 - Master/Slave switch
 - Encryption
- L2CAP link setup, service record retrieve (LANAccessUsingPPP)

Connecting to a LAN AP

- PPP authentication (optional)
- PPP negotiation (get IP)
- Exchange traffic over PPP

LAN AP (PPP server)

Terminal (PPP client)