

# 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)