Bluetooth Profiles

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Bluetooth Profiles

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Content – Part 1

- Profiles in General
  - Definition
  - Interoperability
  - Profile roles
  - Usage Models

- Foundation Profiles

- New Profiles
Definition

- Specification
  - Bluetooth specification includes a profile document
    - Foundation Profiles were released with version 1.0b of the Bluetooth specification and are still the only incorporated profiles (v1.1)
  - SIG continues to define profiles to support further applications
    - SIG ... Special Interest Group
    - Profile working groups
  - A template for new profiles is available
    - to ensure a common structure
Definition

- A Profile
  - Provides a clear description of how a full specification of a standard system should be used to implement a given end-user function
  - Achieve interoperability
    - A Bluetooth headset purchased from Manufacturer A will interwork with a Bluetooth enabled cellular phone purchased from Manufacturer B
- Standardisation
Interoperability

Interoperability on different levels

- On radio level
  - to ensure Bluetooth devices can get in contact with each other

- On protocol level
  - to ensure that Bluetooth devices can talk with each other

- On usage level
  - to ensure that Bluetooth devices can execute applications together and meet end-users’ expectations
Interoperability

- Vertical slice through the protocol stack

- Each Bluetooth device supports one or more profiles
Profile roles

- When involved in radio communication according to a Bluetooth profile, each device take one of the roles specified in the profile, e.g.
  - Gateway or voice terminal (Cordless Telephony Profile)
  - Gateway or data terminal (Dial-up Networking Profile)
  - Headset or audio gateway (Headset profile)
  - OBEX client or OBEX server (General Object Exchange profile)
Usage Models

Examples of Usage Models

- The Ultimate Headset
  - Headset Profile
  - Serial Port Profile
- Interactive Conference (point-to-point)
  - Object Push Profile
  - File Transfer Profile
  - Generic Object Exchange Profile
  - Serial Port Profile
Profiles in General

Foundation Profiles
- Overview
- GAP
- Serial Port Profile
- Dial Up Networking
- ...

New Profiles
Overview

- Intercom
  - Cordless Telephony
    - Telephony profiles
- Headset
  - Fax
  - Dial-up Networking
- LAN Access
  - Networking profiles
- Synchronization
  - File Transfer
  - Object Push
    - ObEx profiles
- Generic ObEx
- Serial Port
  - Transport profiles
- Generic Access
- Service Discovery Application
General Access Profile (GAP)

- GAP
  - most basic profile – all other profiles are built upon it and use its facilities
  - make sure that all devices can successfully establish a baseband link
    - Minimum conformance requirement for Bluetooth devices
    - Generic Procedures for Discovering Bluetooth devices
    - Link Management Facilities for connection to Bluetooth devices
    - Naming Conventions
    - Modes of Operation
General Access Profile (GAP)

- Modes of Operation
  - Discoverability
    - Governs the use of inquiry scan and whether other devices can discover a Bluetooth device when it comes within their area of radio coverage.
    - non-discoverable device
    - limited discoverable device
    - general discoverable device
General Access Profile (GAP)

- **Connectability**
  - Governs the use of page scan and whether other devices can connect to a Bluetooth device when it comes within their area of radio coverage.
    - non-connectable
    - connectable

- **Pairability**
  - Governs the use of the link manager’s pairing facilities, which are used to create link keys for use on encrypted links.
    - non-pairable
    - pairable
General Access Profile (GAP)

- Security
  - Governs when and how encryption is initiated on a link.
  - Mode 1: non-secure
    - authentication is optional
  - Mode 2: service level enforced security
    - Security is not initiated until an L2CAP channel is established, then it is established according to the requirements of services.
    - authentication is required
  - Mode 3: link level enforced security
    - Security is initiated when the baseband ACL link is established.
    - authentication is required
Serial Port Profile

- provides RS-232 serial cable emulation for Bluetooth devices
- basis for:
  - Dial Up Networking, FAX, Headset, LAN access, Generic object exchange, File transfer, Object push and Synchronisation Profile
Dial Up Networking

- provides a dialup data connection
Dial Up Networking

- Protocol Stack

![Protocol Stack Diagram]

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17
Dial Up Networking

- Protocol Stack

![Diagram showing the protocol stack for Dial Up Networking]
Headset Profile

- establishing a call to a Bluetooth headset
Headset Profile

User accepts call

Set up ACL connection

Ring Signal on ACL Link

Repeated Rings Sent

Ring Signal on ACL Link

AT +CkPD

SCO voice link established
LAN Access Profile

- allows a Bluetooth enabled device to access a fixed network via a LAN Access Point
- Master / Slave
OBEX based Profiles

- Generic Object Exchange Profile
  - Object Push Profile
    - provides facilities for exchanging business cards between client and server
  - File Transfer Profile
    - provides wireless data transfer between a variety of devices
- Synchronisation Profile
  - provides a standard way to synchronise personal data between Bluetooth enabled devices
Telephony Profiles

- Cordless Telephony Profile

1 or more “Bluetooth only” speech Phone-to-Phones
Cellular phone with Bluetooth speech
Multi-media PC with Bluetooth speech
Telephony Profiles

- Intercom Profile
  - Two cellular phones on a direct phone-to-phone connection using Bluetooth wireless technology only
Content – Part 3

- Profiles in General
- Foundation Profiles
- New Profiles
  - developing profiles
  - some draft profiles
    - HID, HFP, BPP, HCCP, ESDP for UPnP (protocol)
  - draft profiles adopted into the specification
    - PAN, BIP, BNEP (protocol)
developing profiles

- the Bluetooth SIG
  - series of working groups
  - series of drafts
  - from version 0.9 upwards the draft is public
  - feedback from prototyping is included
  - some time later the draft is adopted into the bluetooth specification
some draft profiles

- Human Interface Device (HID)
  - mouse, keyboard, trackball, joystick
  - fast response

- Hands Free Profile (HFP)
  - similar to the headset profile
  - supports remote control of the mobile phone

- Hard Copy Cable Replacement Profile (HCCP)
  - replaces a printer cable
  - using a printer driver on the client side
some draft profiles
draft profiles adopted

- Personal Area Networking (PAN)
  - supports IP stack
  - similar features as the LAN access profile
  - but protocol stack is completely different
  - Bluetooth Network Encapsulation Protocol (BNEP)
    - is used from PAN

- Basic Imaging Profile (BIP)
  - e.g. a camera transfers images
  - relies upon OBEX
end of lecture

questions?