Agenda

- What’s Bluetooth?
- What’s BlueZ?
- Linux and The Bluetooth Stack
- L2CAP Extended Features
- Bluetooth 3.0 + High Speed
- Bluetooth Low Energy
What’s Bluetooth

- Use the unlicensed 2.4GHz ISM band
- Designed as a cable replacement
- Designed for short-distance data exchange
- Many uses cases (profiles)
- Specified by the Bluetooth SIG
- Low power, low cost
Bluetooth specifications

- Bluetooth 1.0 and 1.0b
  - first versions, many problems

- Bluetooth 1.1
  - fixed 1.0 problems
  - Ratified as IEEE standard

- Bluetooth 1.2
  - fast connection and discovery
  - eSCO, to improve audio links
Bluetooth specifications

- Bluetooth 2.0 + EDR
- Bluetooth 2.1 + EDR
  - Secure Simple Pairing (SSP) - Bluetooth 2.1 addendum (Extended L2CAP)
- Bluetooth 3.0 + HS
- Bluetooth 4.0 (a.k.a. Low Energy)

All specification are backward compatible.
The Bluetooth Stack

TCP/IP
SDP
BNEP
HID
A2DP/VDP
AVDTP
AVRCP
AVCTP
RFCOMM
OPP/FTP
HSP/
HFP

L2CAP
SCO

HCl

LMP

Baseband

Bluetooth RF
What’s BlueZ

- Official Linux Bluetooth Protocol Stack
- Project started in 2001 by Qualcomm
- Not planned for the final user
- D-Bus API
- Used by gnome-bluez, kbluez, gnome-phone-manager, BlueMaemo, etc
BlueZ features

- Complete modular implementation
- Real hardware abstraction
- Support for multiple Bluetooth devices
- Device and service level security support
- Standard socket interface to all layers
Who develops BlueZ?

Marcel Holtmann
Johan Hedberg
Luiz Augusto von Dentz
Gustavo F. Padovan
Claudio Takahasi
Vinícius Gomes
... and others
Linux and the Bluetooth Stack

- `netdev_register()`
  - `tty_register_device()`
- `input_register_device()`
- `hid_add_device()`
- `OPP/FTP`
- `OBEX`
- `HSP/`
- `HFP`
- `SCO`
- `L2CAP`
- `HCI`
- `Bluetooth drivers`
  - `usb_register()`
  - `pcmcia_register_drive()`
  - `s dio_register_driver()`
  - `tty_register_idisc()`
L2CAP extended features

- Add segmentation and reassembly of L2CAP packets
- Add a reliable protocol (Enhanced Retransmission Mode)
- Add a streaming protocol (Streaming Mode)
- Add checksum (Frame Check Sequence)
- Needed by High Speed and Health Profiles
Bluetooth 3.0 + hs

- Add support to use others radio like the 802.11
- Increase the Bluetooth transfer bandwidth
- Need a layer to translate HCL <-> mac80211
- Still need the BR/EDR radio
Bluetooth 3.0 + hs

AMP Manager

L2CAP

BR/EDR HCI
Primary BR/EDR controller

AMP HCI
AMP PAL
AMP MAC/PHY
Bluetooth 3.0 + hs on Linux

- Still under development
- Abstraction of the change of controller
- No visible changes for the user
Bluetooth 4.0

- a.k.a. Bluetooth Low Energy
- Add a new 2.4GHz radio
- Can be Single Mode or Dual Mode
- Can use the same radio for LE and BR/EDR
- Coin cell battery devices
- Exchange low amount of data
Bluetooth Low Energy on Linux

- Still under development
- Abstraction of the LE controller
- No visible changes for the user
The End!

Gustavo F. Padovan
padovan at #bluez (irc.freenode.net)
padovan@profusion.mobi
http://padovan.org
http://profusion.mobi