BlueZ meets Zephyr

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BlueZ - Linux Bluetooth

Session

System

Userspace

Kernel

obexd

bluetoothd

Audio  Input  Control  Network  External

MGMT  L2CAP  RFCOMM  SCO  BNEP  6LoWPAN

HCl  SMP  Drivers

Bluetooth Subsystem
Proxy

- tools/btproxy
- Use user-channel
- HCI UART proxying
- Local/Unix and TCP socket
Monitoring

- HCI tracer
- Replaces hcidump
- Support multiple adapters
- Logs early commands including setup phase
- Support including logs such as syslog and crash backtrace
- Can monitor adapters connected to virtual machines
- Can monitor using a TTY
Management

- Replaces hciconfig
- Low level interface - kernel
- Requires permissions
- Can tweak settings such as mode, etc.
- Changing settings may interfere with bluetoothd
Controlling

- BlueZ command line tool client
- Replaces hcitool
- Can exercise most of the BlueZ APIs:
  - Scan
  - Advertise
  - Connect
  - Pair
  - Read/Write attributes
  - Enable notifications
Zephyr Tests and Samples

- tests/bluetooth:
  - shell
  - tester
- samples/bluetooth:
  - beacon
  - central
  - eddystone
  - ipsp
  - peripheral_{csc, dis, esp, hr, hids}
Demos
Bluetooth PTS

- **Bluetooth Profile Tuning Suite:**
  - software-based black-box testing tool that automates protocol and profile interoperability testing.
- Implements test specifications
- Mandatory for qualification
- Windows only
- Requires some level of expertise in order to execute tests with its user interface
- Newer versions support PTSCo ntrol COM API for extended automating
PTS automation architecture

- **server**: It is implemented in Python and executed using IronPython.
- **client**: runs on GNU/Linux, communicates with the auto-pts server (to start/stop test cases, to send response to PTS inquiries) and communicates with the IUT (Implementation Under Test) to take appropriate actions. It is implemented in Python and executed using CPython.
- **Implementation Under Test (IUT)**: It is the host running Zephyr Bluetooth stack to be tested, this could be an emulator or real hardware.
- **Bluetooth Test Protocol (BTP)**: Used to communicate with the IUT.
Architecture diagram

Windows host running PTS in COM server mode and Auto-PTS Server

XML RPC

GNU/Linux host Running Auto-PTS Test Client

BTP

Zephyr Bluetooth Tester (IUT) running in QEMU emulator or real HW
Example test case

ZTestCase("GAP", "TC_DISC_NONM_BV_02_C",
[TestFunc(btp.core_reg_svc_gap),
 TestFunc(btp.gap_read_ctrl_info),
 TestFunc(btp.wrap, pts.update_pixit_param,
 "GAP", "TSPX_bd_addr_iut",
 btp.get_stored_bd_addr),
 TestFunc(btp.gap_adv_ind_on, start_wid=72)])}
Current results

- **260 test cases automated:**
  - GAP 41
  - GATT client 76
  - GATT server 87
  - SM 34
  - L2CAP 22

- **Pass rate:**
  - PASS 248 (95.38%)
  - FAIL 5 (1.92%)
  - PTS ISSUE 7 (2.69%)
Questions?