What's new inside the Linux IEEE 802.15.4 subsystem?

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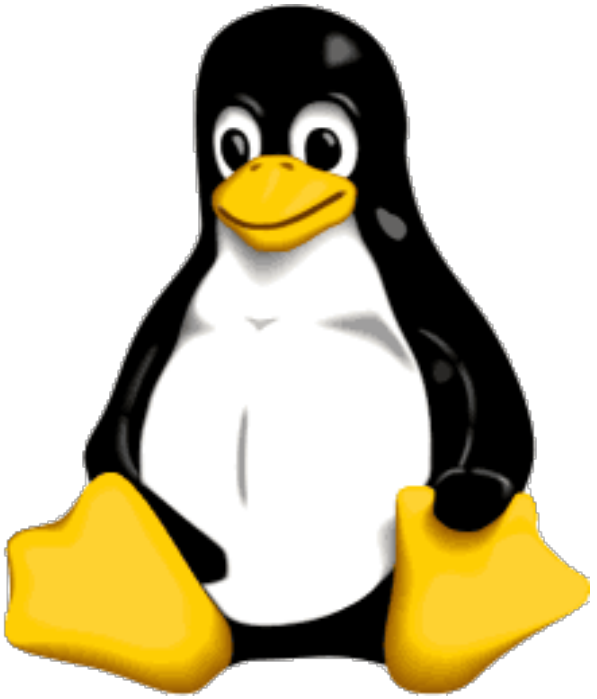

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Introduction

Project Information

- Important new updates
  - Project name „linux-wpan“
  - Mailinglist: linux-wpan@vger.kernel.org
  - Website: http://wpan.cakelab.org
- Subsytem rework in progress
  - Netlink framework nl802154: DONE
  - Crypto-Layer over nl802154: WIP
  - Frame parsing/creation: WIP

New Frameworks

Basic Idea

Cherry-pick the good things from wireless stack!

wireless	Description	wpan
wlan#	Default interface naming	wpan#
station	Default interface type registration	node
iw	Command framework	iwpan
nl80211	Netlink kernel framework	nl802154
cfg80211_ops	Soft- and Hard-MAC Interface	cfg802154_ops

New Frameworks

nl802154

- What is nl802154?
  - Kernelspace 802154 netlink framework
  - Netlink is socket communication
    - Userspace ↔ Kernelspace
    - Used mostly for configuration
  - Goal: Easy to add new 802.15.4 netlink cmds

- Why we add it?
  - Code looks almost the same like wireless
  - Wireless people get easier familiar
  - Already well-established frameworks
  - Getting wireless community for 802.15.4 IoT Use-Cases

New Frameworks

nl802154 code example

Shell iwpan (wpan-tools) call

```
iwpan dev wpan0 set pan_id 0xabcd
```

Userspace iwpan command framework implementation

```
COMMAND(set, pan_id, "<panid_arg>",
                     NL802154_CMD_SET_PANID, 0, CIB_NETDEV,
                     handle_panid_set, NULL)
```

Kernelspace nl802154 framework

```
1. static const struct genl_ops nl802154_ops[] = {
2.     …
3.     {
4.         .cmd = NL802154_CMD_SET_PANID,
5.         .doit = nl802154_set_panid,
6.         .flags = GENL_ADMIN_PERM,
7.         .internal_flags = NL802154_FLAG_NEED_NETDEV |
8.                           NL802154_FLAG_NEED_RTNL,
9.     },
10.    …
11. };
```

New Frameworks

6LoWPAN Next Header Compression (NHC)

- What is 6LoWPAN NHC?
  - 6LoWPAN describes compression formats
  - IPv6 compression and NH compressions
  - Like UDP, IPv6 Extension Headers, etc.
- NHC Framework
  - One compression format per module
  - Easy to handle: Simple callbacks
    - Compression
    - Uncompression
  - Only NHC UDP is currently available

Future Work

IEEE 802.15.4 and 6LoWPAN

- IEEE 802.15.4
  - Remove the old netlink interface
  - Implement the still WIP rework parts
  - More MAC-Functionality
    - Coordinator support
    - Management-Layer triggered by netlink
      - Like MLME-SCAN for identifying PANs

- 6LoWPAN
  - Configuration Interface for NHC
  - Implement more NHC modules :-)

Summary

What you know and can do now!

- Interested? What you could do now!
  - Visit: http://wpan.cakelab.org
  - Get the IEEE 802.15.4 Standard
  - Setup some test environment
- Possible hacking tasks
  - As a newbie
    - Start simple tasks like: number → “const char *”
    - Finally: become a wireless-guru!
  - As a wireless-guru
    - Look for similar paradigms in 802.15.4
    - Friendly-copy solutions from wireless subsystem

Questions?