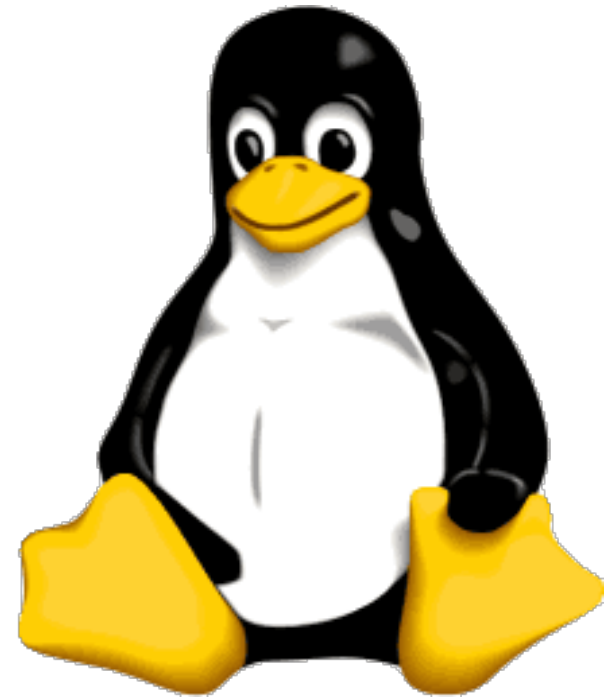


State and Future of Generic 6LoWPAN Branch

netdev 1.1

Alexander Aring
Pengutronix
<aar@pengutronix.de>



6LoWPAN

IPv6 over Low-Power Wireless Personal Area Networks



LoWPAN

Properties

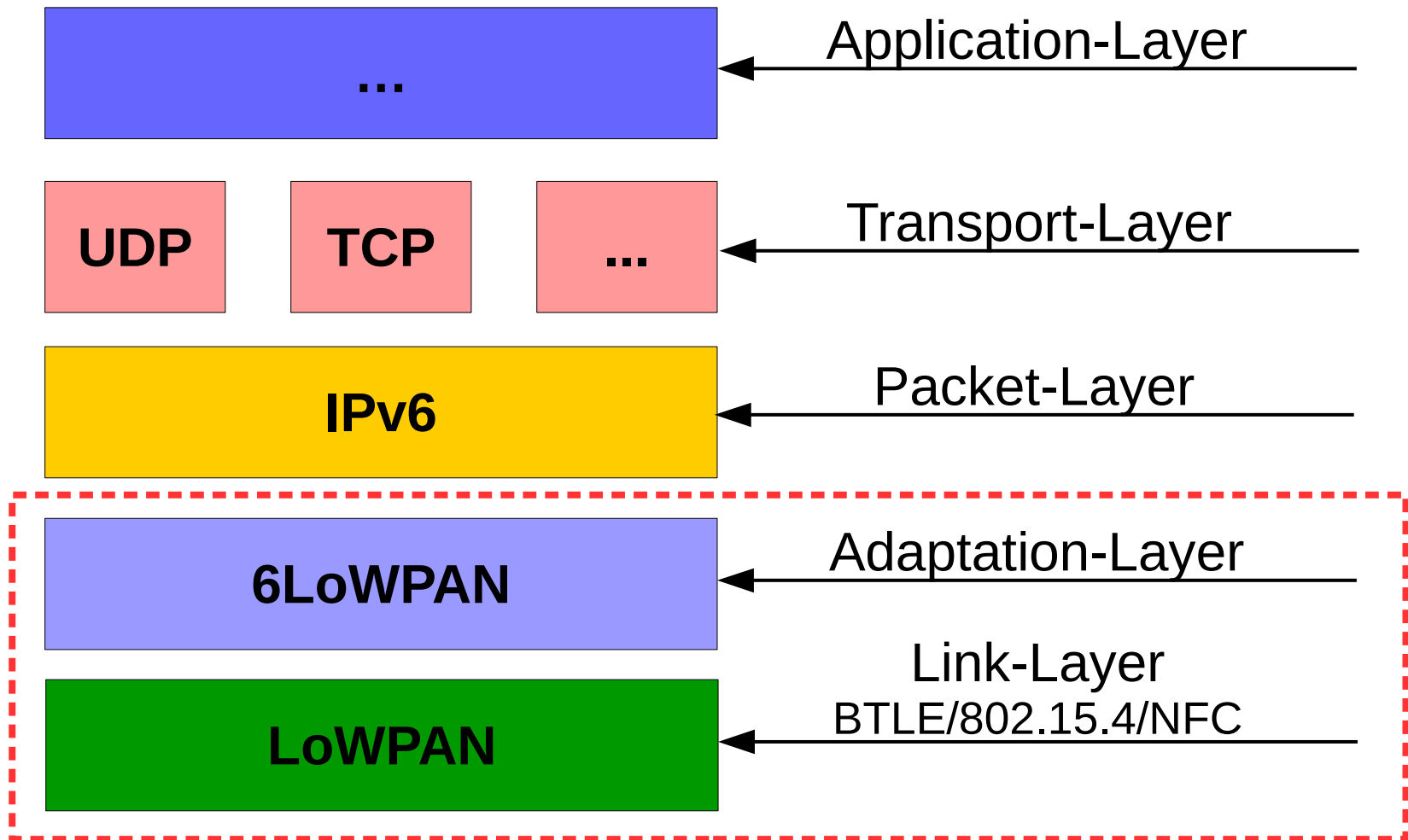
- Wireless
- Low-Range
- Low-Rate
- Low-Power

Examples

- IEEE 802.15.4
- Bluetooth Low-Energy
- NFC

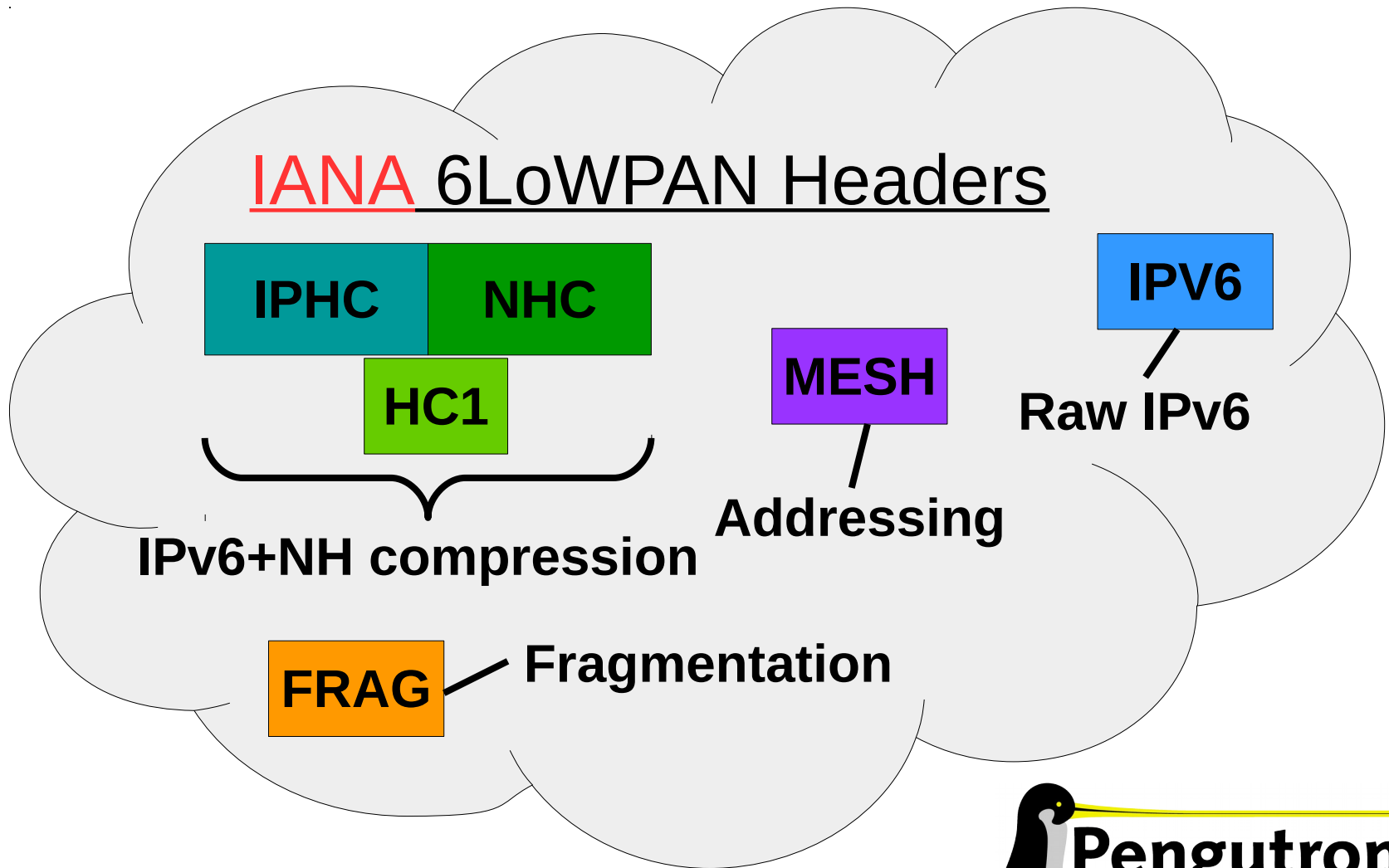


6LoWPAN – Adaptation



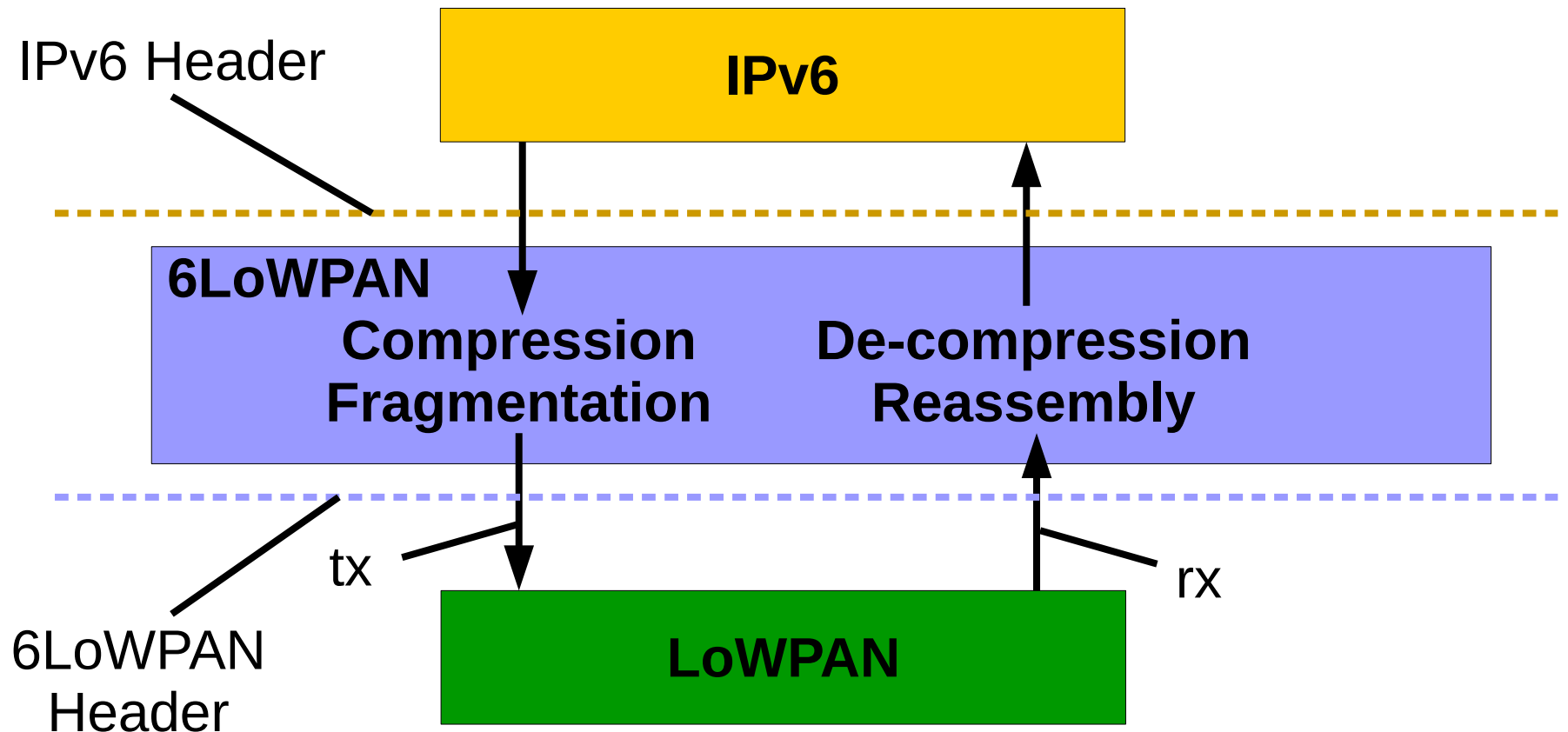
6LoWPAN – Adaptation

What is 6LoWPAN?



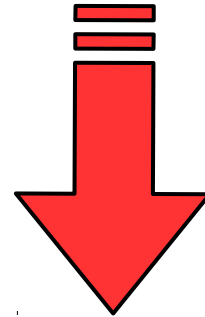
6LoWPAN – Adaptation

What does 6LoWPAN do?



6LoWPAN – Adaptation

6LoWPAN headers are defined
originally for 802.15.4



Newly introduced 6LoWPAN
adaptations (e.g. BTLE)
use them!



6LoWPAN – Adaptation

Example

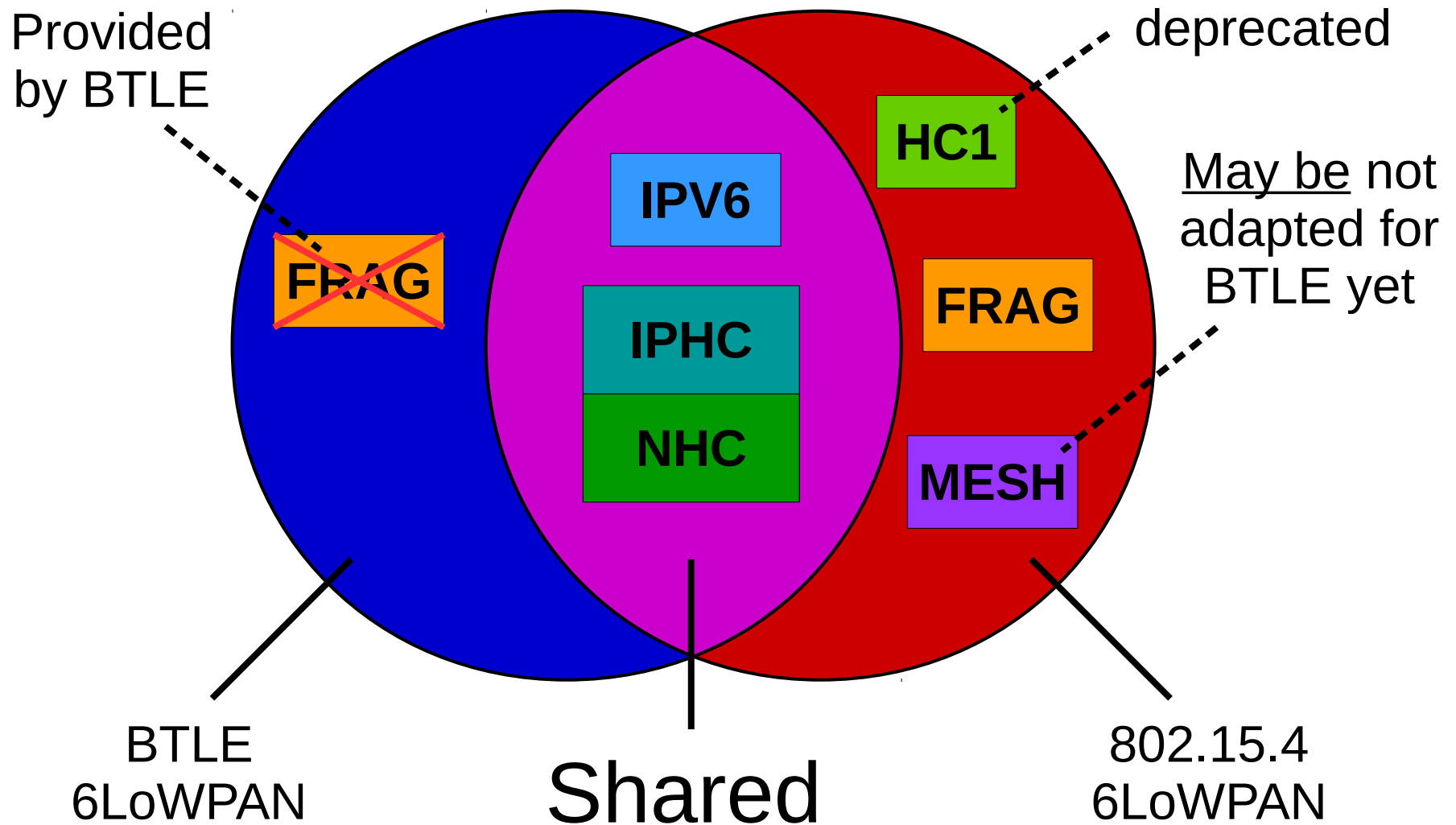
BTLE 6LoWPAN – RFC 7668

*“... the **IPv6** header
compression format specified
in **RFC 6282** **MUST** be used.”*

802.15.4 IPHC 6LoWPAN



6LoWPAN – Adaptation



Linux – 6LoWPAN

IMPORTANT

There are two approaches to provide 6LoWPAN under Linux

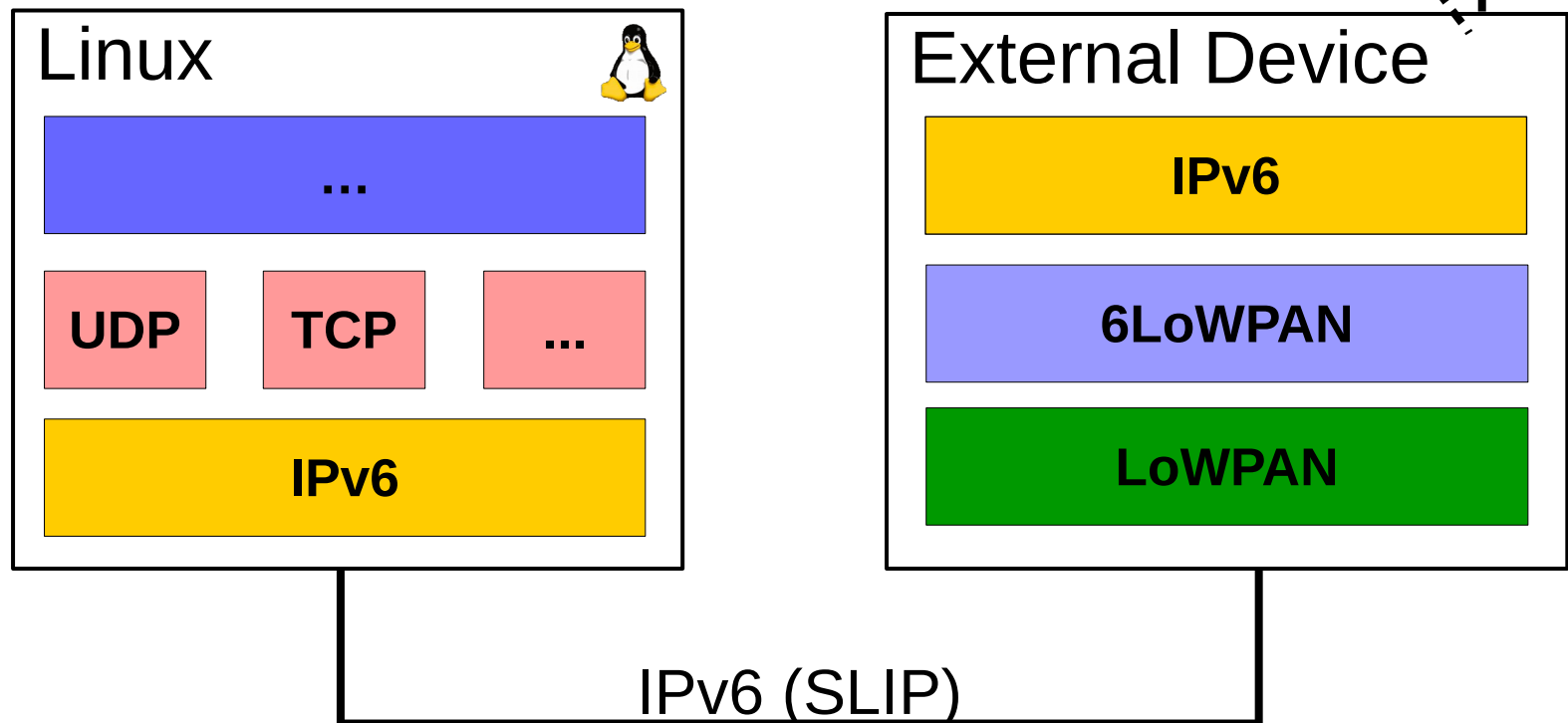
- 1) External Routing Device
- 2) The full Linux way



Linux – 6LoWPAN

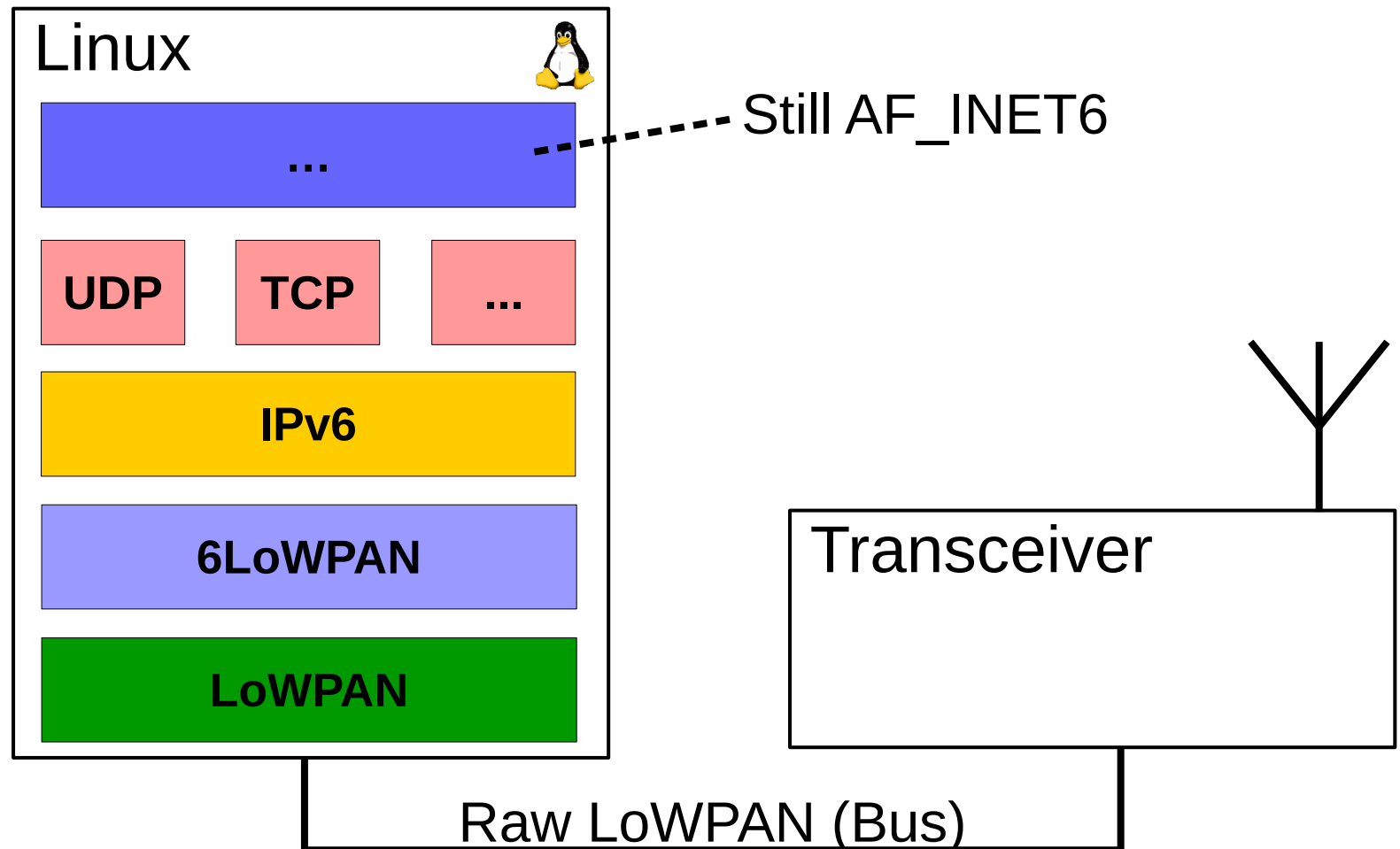
Just a “small”
routing device

What we **don't** do!



Linux – 6LoWPAN

What we do!



Linux – 6LoWPAN

Current Kernel Situation

- Supported 6LoWPAN Link-Layers
 - IEEE 802.15.4
 - Bluetooth Low-Energy

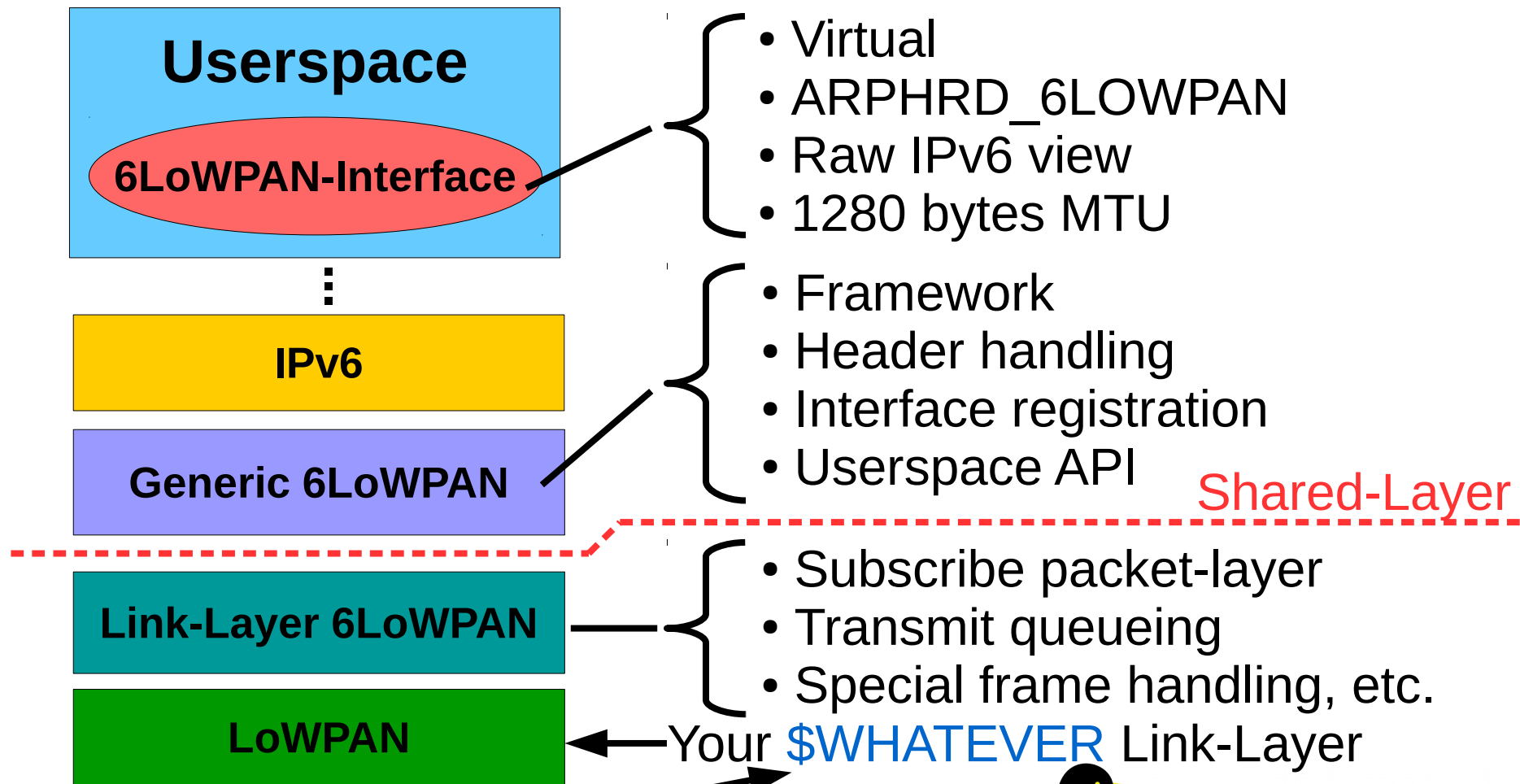
Directories

- Generic 6LoWPAN
 - net/6lowpan/
- Link-Layer 6LoWPAN specific
 - net/ieee802154/6lowpan/
 - net/bluetooth/6lowpan.c



Linux – Generic 6LoWPAN

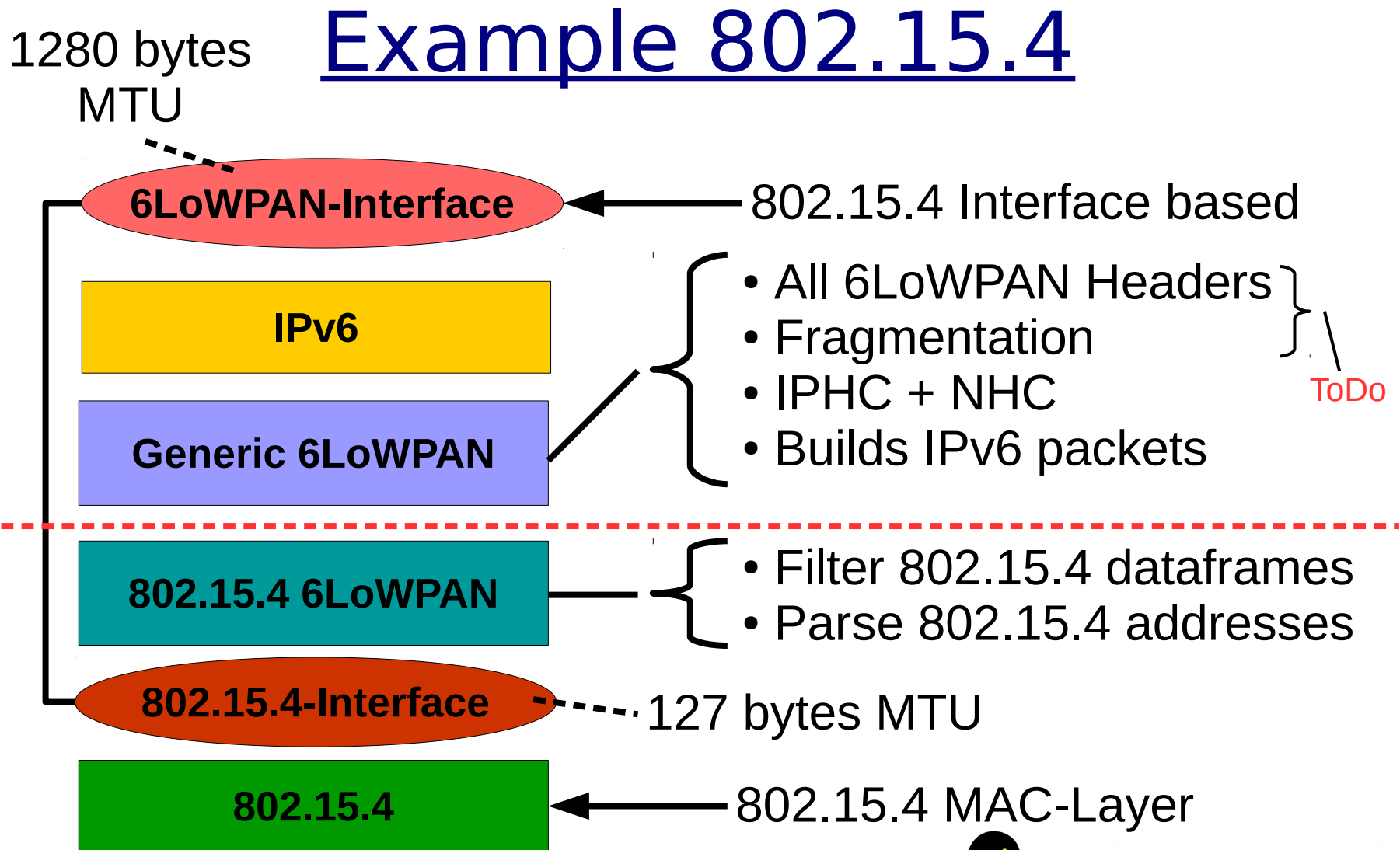
Provide a 6LoWPAN Framework



Can be not specified by IETF for 6LoWPAN yet



Linux – Generic 6LoWPAN



Linux – Generic 6LoWPAN

Generic 6LoWPAN

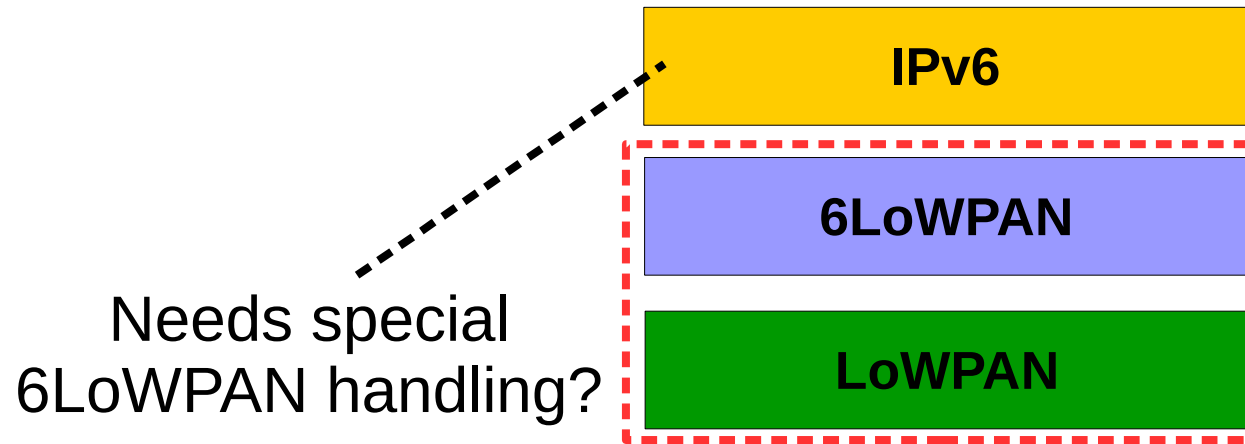
Put all 6LoWPAN handling there
and make it modular! (ToDo)

- Load necessary modules only
- Small link-layer specific handling
- Abstract one userspace API
- One interface type from userspace



Linux – 6LoWPAN

Remember this?



Is 6LoWPAN an adaptation layer only?



Linux – 6LoWPAN

Most parts can be done by
adaptation but there exist...,

RFC 6775 - Neighbor Discovery
Optimization for 6LoWPANs
(TODO)



Linux – 6LoWPAN and Ndisc

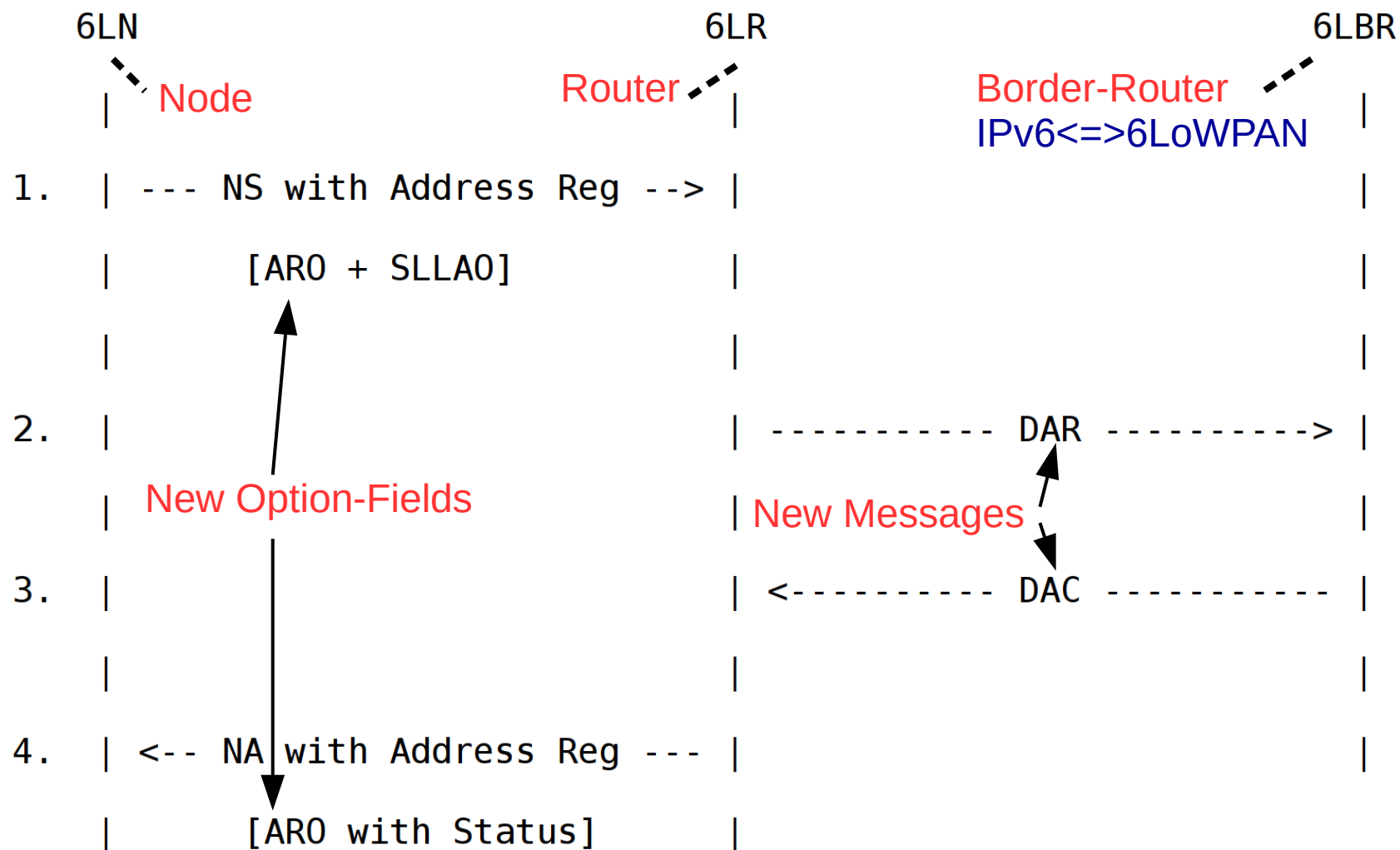


Image-Source: RFC 6775 - Address Registration Multihop DAD



Linux – 6LoWPAN and Ndisc

Don't Worry!

We are for a friendly
co-existence inside IPv6!

- 1) Talking with the Maintainers!
- 2) We need a plan!
- 3) Kernel space vs userspace?
- 4) Roles and kernel space?



Linux – 6LoWPAN Routing

IETF **ROLL** Group

Routing **O**ver **L**ow-Power and **L**ossy networks

Candidate: RPL (*pronounced: “ripple”*)

- Open Standard (IETF)
- Route over: ICMPv6 based
- OS userspace implementation

unstrung.sandelman.ca



Questions?

Mailinglists:

`linux-wpan@vger.kernel.org`
`linux-bluetooth@vger.kernel.org`

