

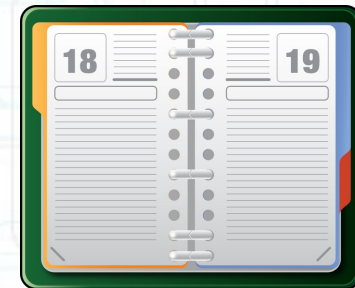
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Freifunk Mesh networking

How to connect 100's of smart phones, laptops, tablets, etc.
using a wireless mesh-network?

Agenda

1. Freifunk: Idea / requirements / historic overview
2. Architecture: concept / strategy / layers 1 and 2
3. Lessons learned



Requirements

Community

- Do-it-yourself (easy!)
- Non-commercial
- Local communities
- No restriction / security
- Internet

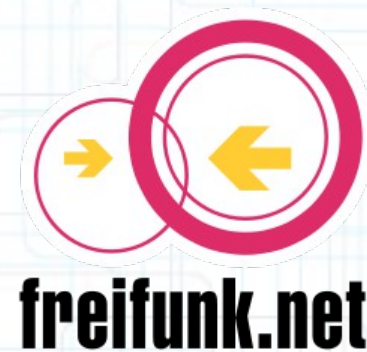
Technical side

- Wireless lan (wlan)
- Usually: Meshing
- Local divergence



Freifunk

- 06/2000 Seattle Wireless
- 10/2002 Pico-Peering-Agreement
- 2003 freifunk.net
- 2004 WRT54G OpenSource
(*GPL-Violation by Linksys / Cisco*)



Vision

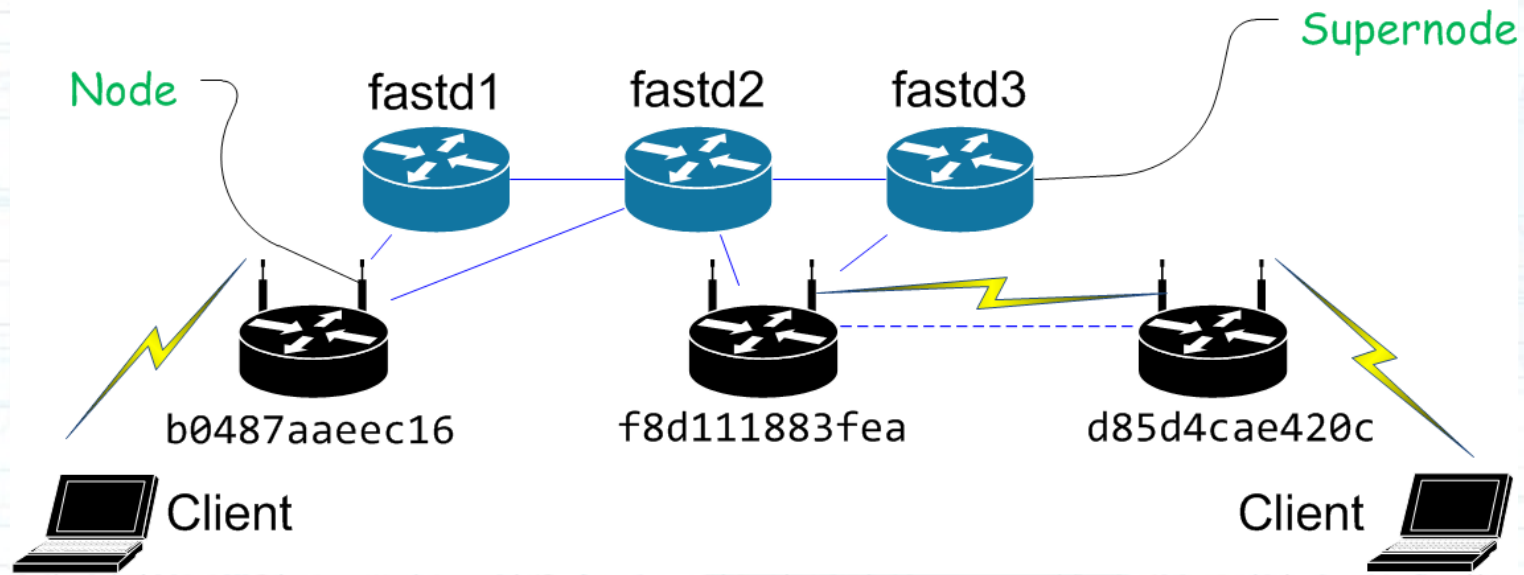
- End-User hardware (OpenWRT Linux)
- “Roaming” / meshing capabilities → batman-adv
- Private IPv4 / Public IPv6 Dual-Stack
- VPN to Internet
- 2 SSID per device
 - Ad-Hoc
 - Managed



Looking at layer-2

Whole network

OSI-2 Overview



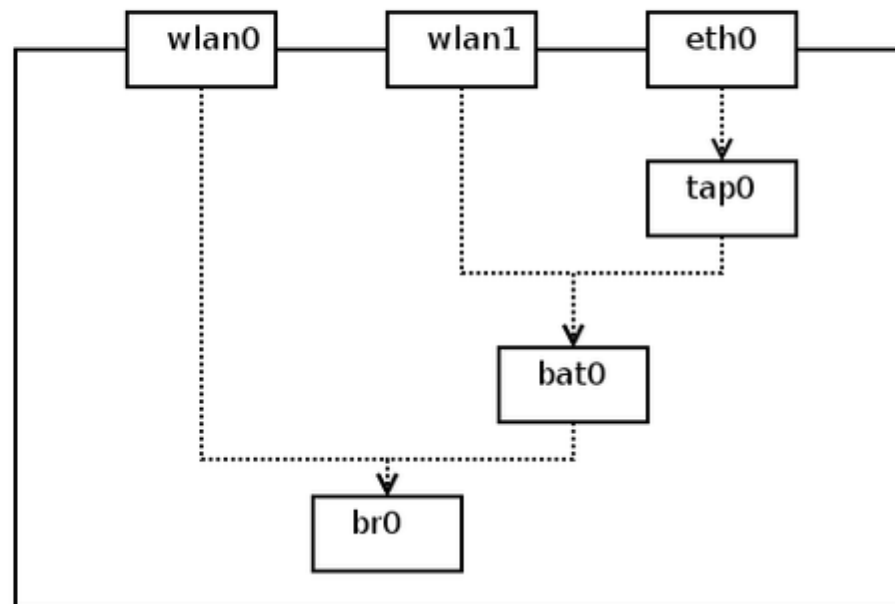
Looking at layer-2

Single Node

All-Bridging

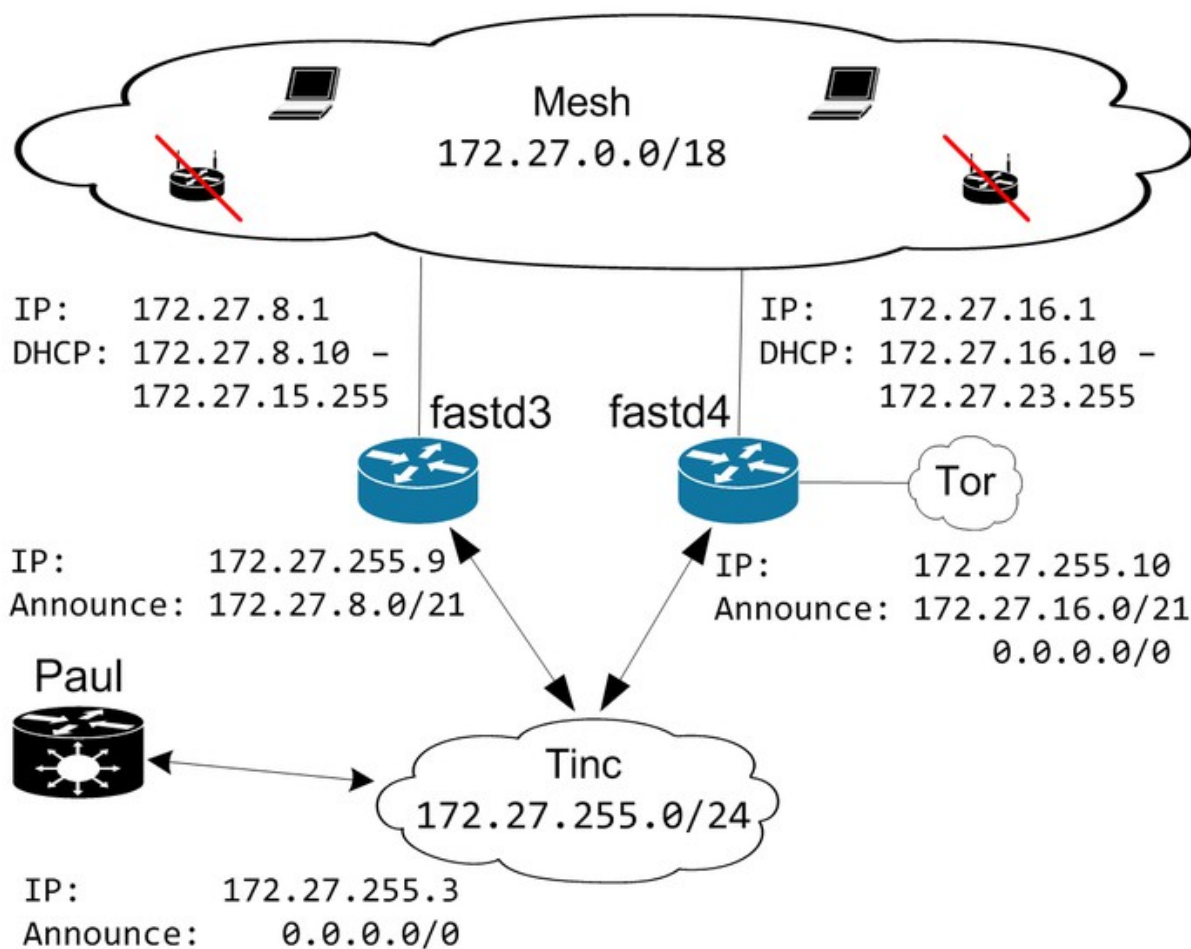
wlan0: Master
wlan1: Adhoc
eth0: Internet (optional)
tap0: layer 2 VPN to other mesh clouds
(tinc, OpenVPN, IPSec+L2TP, ...)
bat0: batman-adv mesh interface
br0: bridge

.....> : is used by
(for bat0/tap0:
is being encapsulated)

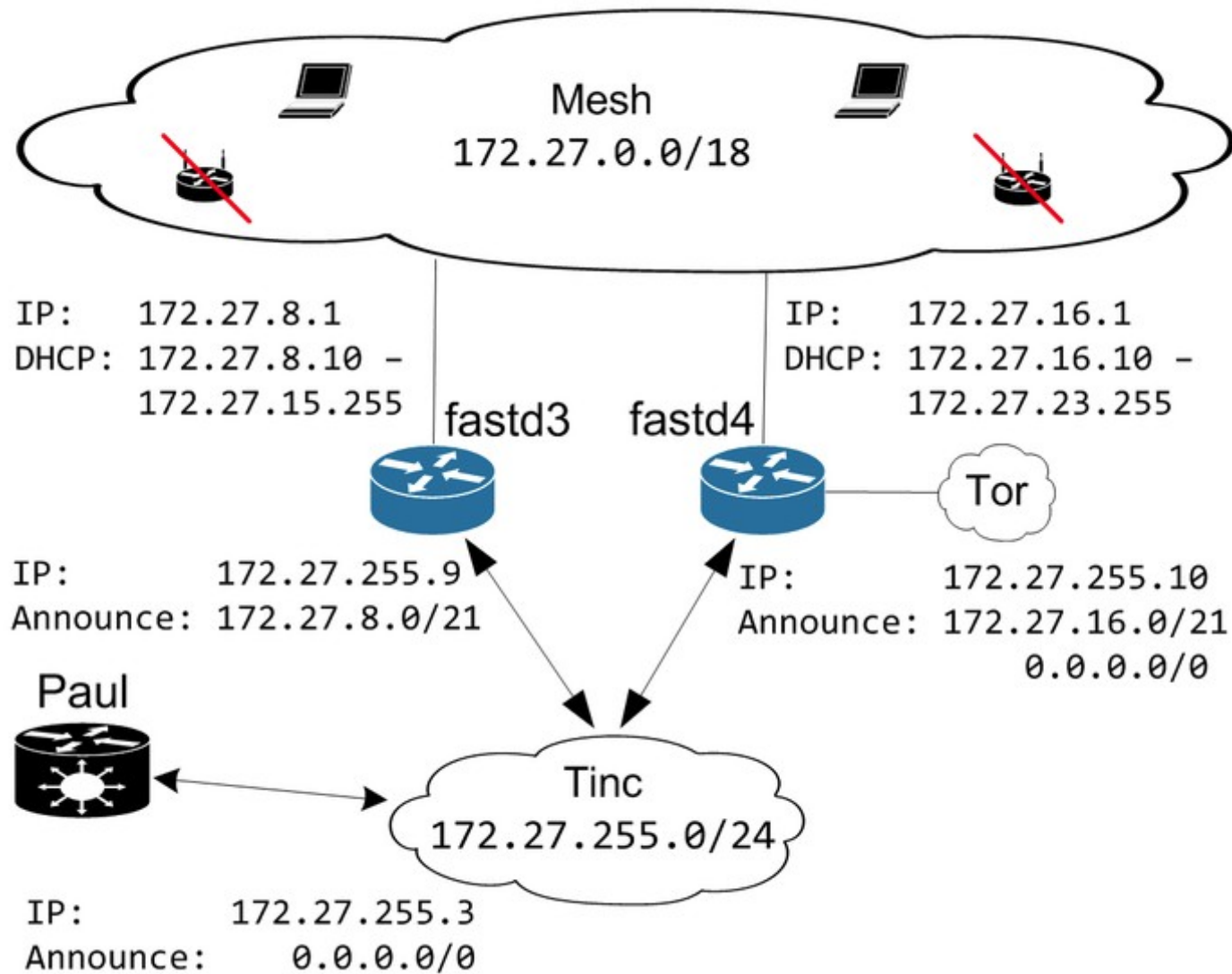


Looking at layer-3

OSI-3 – IPv4

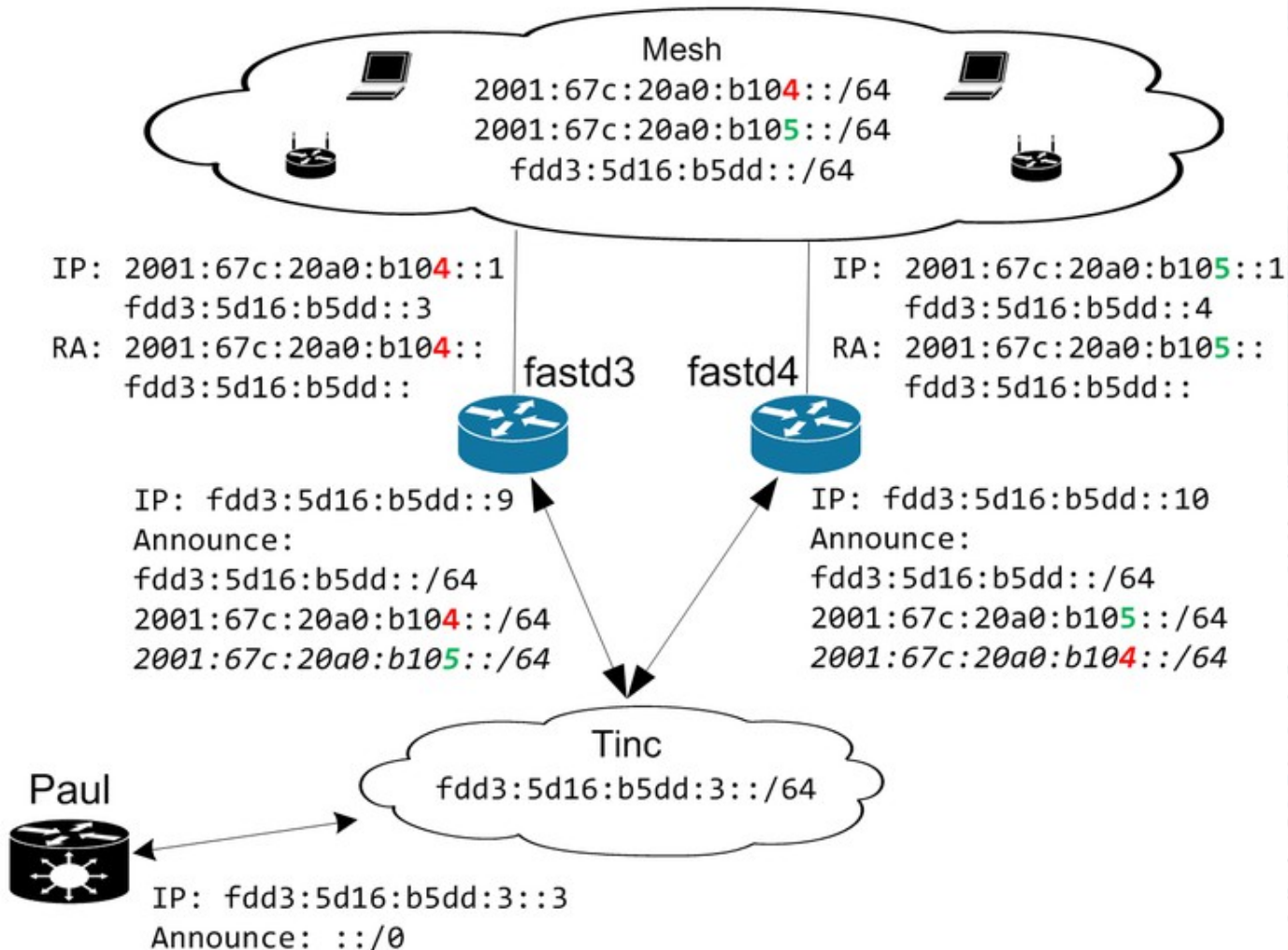


OSI-3 / Network-Layer (IPv4)



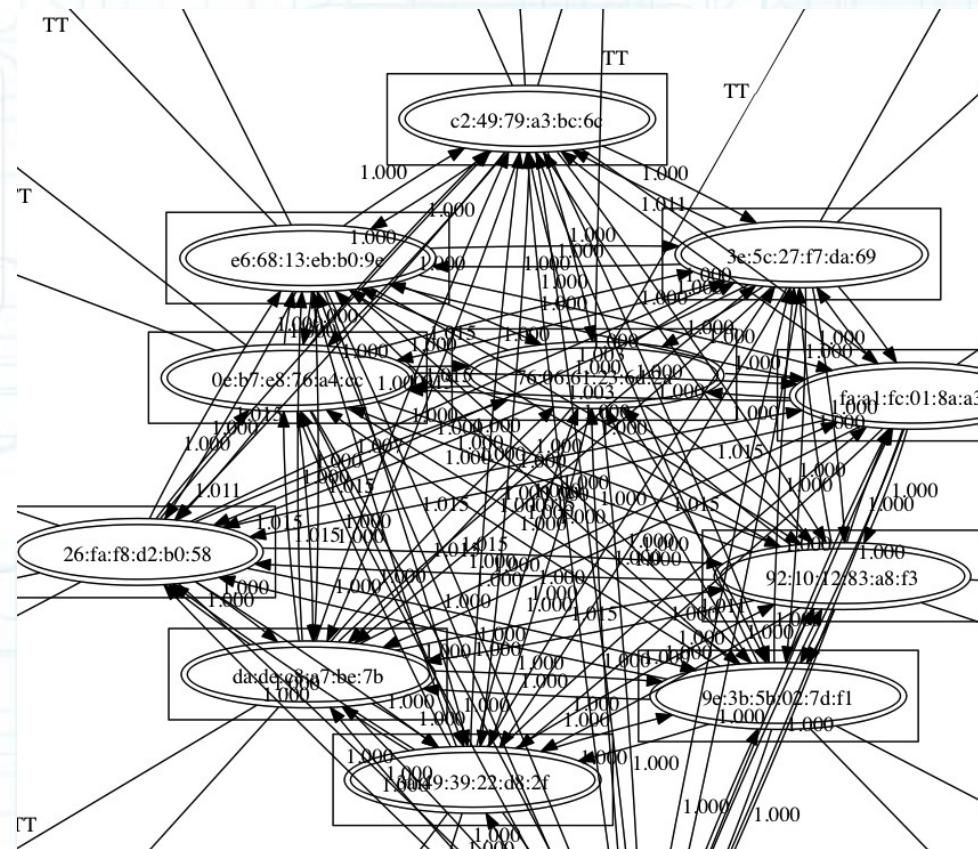
OSI-3 / Network-Layer (IPv6)

OSI-3 – IPv6



Lessons learned

- It's fun
- Biggest effort: Scaling
 - Broadcast- / Multicast-Traffic!
 - VPN-Load
 - We're not at the limit ... yet



Questions?

- Thanks for your interest.