

node-config: Status Update

A simple approach for roaming in I3-meshes

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Wireless Community Weekend 2018
Berlin

May 12, 2018



Agenda

- 1 Recap: Motivation & Requirements
- 2 Sketching node-config's network
- 3 New features (since WCW 2017)
- 4 Outlook & future work



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Back in 2011

- We need a Freifunk network in Cologne!
- How is it supposed to look like?
 - B.a.t.m.a.n. Advanced sounds interesting — go for it.
 - CCC e.V. provides Internet-Exit
- Requirements ...



Ideas back in 2011

Requirements

- 1 Hackerspace project, No service mentality — no Service-Level-Agreements
- 2 Philosophy: We build our network.
- 3 Scaling: a few hundred nodes
- 4 Feature: IP address of node-owner is masked
- 5 Easy to set up, no configuration of nodes, updates are easy

Basic principle:

- Network for education, hacking, research, non-commercial
- *Mistrust authority — promote decentralization*

If: we build network good enough
and write a proper documentation

Then: others will build the same network
and we can connect



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What happened next?

- Forked Freifunk Lübeck's firmware (2011), joined work on docs.
- Others started building similar networks
 - Düsseldorf (FFRL e.V. 2012)
 - Frankfurt / Magdeburg (a.M. 2012)
 - Troisdorf (2014)
 - Euskirchen (2014)
 - ...

Alright?



Service mentality

Date: Mon, 6 Jul 2015 18:49:05 +0200

Subject: [Freifunk-Bonn] Internet-Durchsatz

Hallo, liebe Mitstreiter!

Ich habe heute an prominenter Stelle (Hohenzollernring) mit viel Außengastronomie einen WDR-3600 temporär in Betrieb genommen.

Erste Tests gerade waren sehr ernüchternd.

Speed-Tests lieferten um die 0,3 mbit downstream oder brachen dank Paketverlusten vorzeitig ab. Eine Nutzung des Internets -- unserer Haupt-Anwendung nicht sinnvoll möglich.

Es scheint, als sei unsere Infrastruktur endgültig ausgereizt.

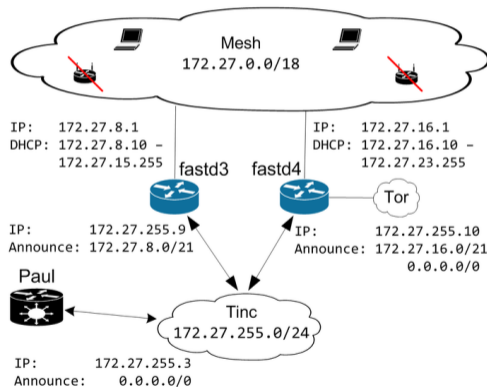
Hat jemand von euch Ambitionen und / oder einen Plan, die Situation zu verbessern?

Ich bitte um Vorschläge!



How does it look like: IPv4 on top of batman-adv

OSI-3 – IPv4



Service quality

Back to the complainer's mail

- No answer as of today
- Diagnosis: futile
- WTF? - Just use \$vpn-provider for your node.

But there's a different in culture:

- Use-case: hacking vs. providing high speed internet access
- Is 300 KBit/s slow?
- I fix a problem vs. who fixes my problem?

Resume:

- People can build networks, now
- But they depend on a hackerspace's infrastructure
- ... and it is fragile :- (
- We became administrators → the authority :- (



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What's problem?

- Technically
 - Overloaded supernodes, gateways
 - `batman-adv` on `vpn`: Well, ..
 - `single default route`, `single server` in a `single datacenter`.
- Socially
 - Only a few understand technical details & internals.
 - Steep learning curve
(server, infrastructure, technology)



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What should be different?

In the design

- Keep it simple and stupid (KISS)
- Sharing internet using an arbitrary ISP / VPN-Provider
- Scales up to $n * 10000$ nodes
 - Communities: no need for infrastructure (server, datacenter,...)
 - Less technology needed (Ansible, BGP, ...)

In the architecture

- No separation nodes ↔ Supernodes
- Routing using babel, roaming using batman-adv
- Firmware: Just lede + configuration



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1 Recap: Motivation & Requirements

Recap

Requirements back in 2011

2 Sketching node-config's network

Requirements

Network design: Some details

Network Interface Configuration

IPv6 / Multihoming

Roaming

Routing (Freifunk community)

3 New features (since WCW 2017)

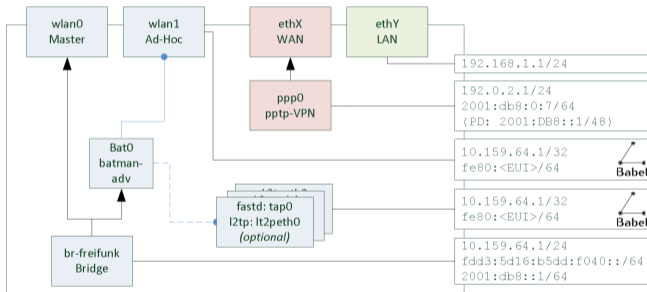
New features

Demo

4 Outlook & future work



Network Interface Configuration



IPv6 / Multihoming

Dealing with different IPv6-networks (ISPs / VPN-Providers)

- Different internet uplinks → different subnets
- ISPs distribute IPv6 using prefix delegation (DHCPv6 PD)
- Challenge: Re-distribute IPv6 prefixes & routing
 - Babel supports source specific routing
 - Prefix-delegation using the ad-hoc (or 802.11s) network



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Roaming

Dealing with clients moving from one node to another

- Roaming using batman-adv → two different mesh protocols
- No broadcasts within a batman-adv-segment
 - ARP via distributed ARP-Table (DAT)
 - ICMPv6 NS via cache (Assumption: works)



Roaming: batman-adv vs. L3roamd on gluon

- Using l3roamd as an option
 - 1 Publish a babel host routes for each client
 - 2 Maintain state: Using different daemons (l3roamd)
 - 3 Distributed anycast setup for dhcp and default routes
- Consequences
 - 1 No soft migration path — no integration into batman-adv / gluon networks.
 - 2 Large babel routing tables carrying host routes
 - 3 Less load nodes: No ebttables required



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Freifunk-Routing

How to reach clients in to different segments?

- End-To-End: Client, Nodes
 - Connecting segments with no wireless contact?
 - Using the Inter-City-VPN (ICVPN)
- Idee:
 - IPv6 ULA FTW!
 - Babel as IGP (i.e. using fastd)
 - BGP as EGP, iBGP (eventually)



New features (since WCW 2017)

- 1 Sharing internet without VPN-providers
- 2 VPN offloader / supernode configuration template
- 3 Integration of Freifunk Berlin's AngularJS wizard
- 4 Package feed
- 5 Binary firmware images for ar71xx devices



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Outlook & future work

- 1 Housekeeping (JavaScript: size, old dependencies)
- 2 Further testing (multihoming, roaming)
- 3 Map & monitoring integration (data submission, tiles download)
- 4 End-user documentation

Contributors welcome :-)

<https://github.com/yanosz/node-config>



Thanks for your time

Any questions?

