



Freifunk Hamburg

hamburg.freifunk.net

2013/July/28



What is freifunk?

- an initiative for free, cost-free and open, wireless networks
- everyone may take part in freifunk as client, provider or both
- WiFi routers are access points to the freifunk network
- freifunk is available in many places (Berlin, Wien, Augsburg, Lübeck, Kiel, Rheinland, Hamburg...)



What is freifunk?

Free means

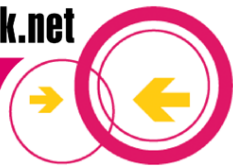
- public - accessible by everyone
- non-commercial
- community owned
- net neutrality - no manipulation of any data stream



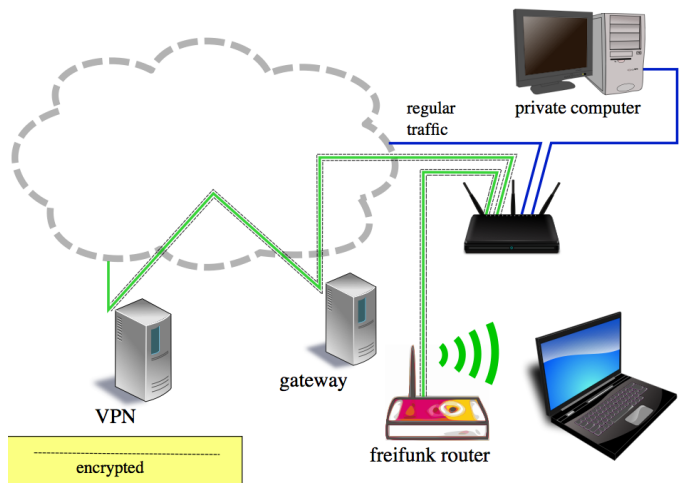
History

- in the early 2000s the fibre optic network in Berlin-Friedrichshain caused a demand for affordable broadband access
- Linksys WRT54g → Harald Welte gpl-violations.org → OpenWRT (Jan. 2004)
- development of various meshing protocols (OLSR, B.A.T.M.A.N., 802.11s...)

The combination of these three aspects resulted in the demand and the technical prerequisites for freifunk



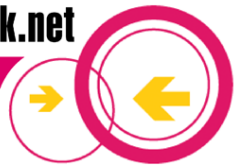
How to access the Internet





Project Goals

- spreading open wireless networks
- minimize access barriers to the net
- push people's sensitivity on freedom of information
- enable people to build their own networks
- form and support social structures



Demo

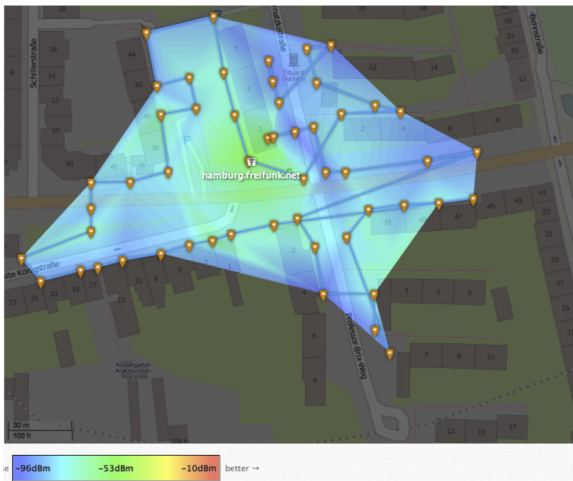
- node map <http://knotenkarte.de/>



Why WiFi?

- high data rate mobile solution
- hardware and maintenance are reasonably priced (router starting at 15 €, energy for less than 10 € p.a.)
- WiFi can be used where no wiring is available / too pricy

Range





Mesh

What is a mesh?

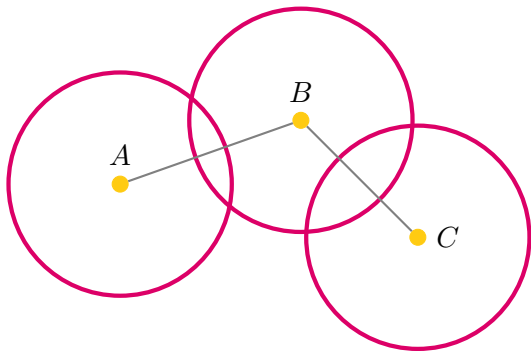
- self-organizing network
- every router is automatically part of the network
- hamburg.freifunk.net features the B.A.T.M.A.N.-adv. protocol

Two SSIDs

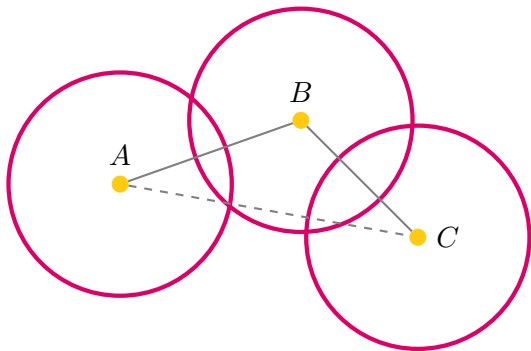
- freifunk access: hamburg.freifunk.net
- mashing (adhoc): f8:d1:11:87:52:2e

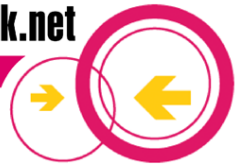
→ *Demo [inSSIDer]*

Mesh

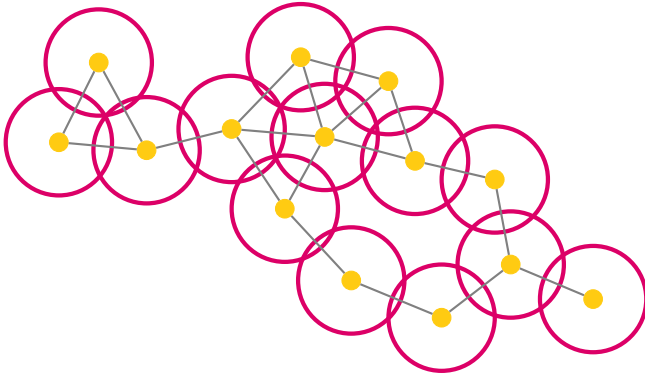


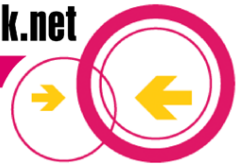
Mesh



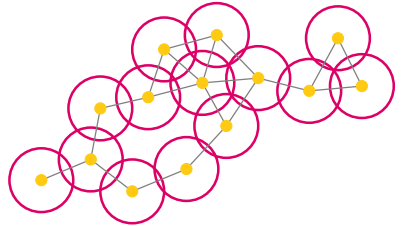
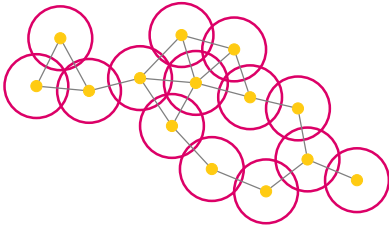


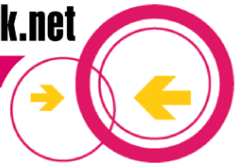
Network Is Growing



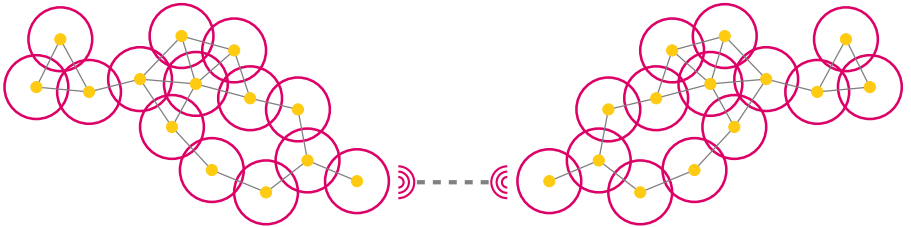


Networks Are Interconnecting



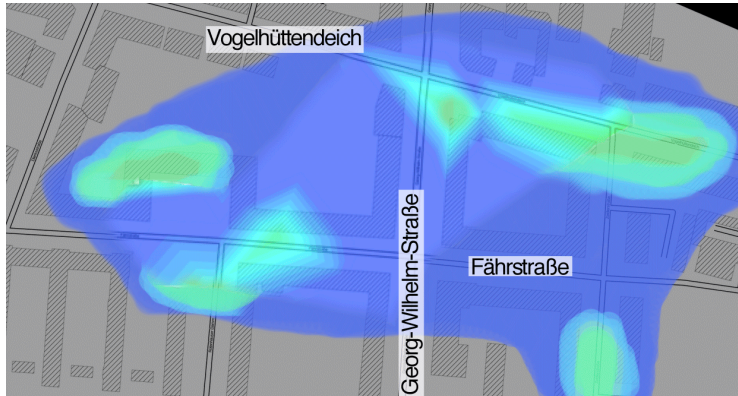


Networks Are Interconnecting





An Example in Wilhelmsburg



← worse

-74dBm

-56dBm

-38dBm

better →



Security

- Since freifunk uses no password, the connection over the air is unencrypted - just like any other open network
- It is recommended to make use of encrypted protocols (<https://>, <ftps://>, <ssh>, or your own VPN) – just like anywhere else on the internet
- Connections to the gateways are encrypted (fastd) → no access to the home network possible



Störerhaftung (liability for disturbance)

- access points do not directly route traffic into the internet
- a fastd encrypted connection (VPN) to the gateways is set up over the internet
- even the gateways do not directly drop their traffic into the internet, but VPN it abroad

Consequences:

- *Advantage*: Störerhaftung cannot be enforced
- *Disadvantage*: limited bandwidth due to encryption effort (ca. 6Mb/s on smaller router models)



Community Agreement

- be fair!
- watchout for your security!
- don't do anything unlawful!



Devices

Hardware requirement for Hamburg's freifunk software

- supporting OpenWRT *Attitude Adjustment*
- 4 MB flash, 32 MB RAM
- It is highly recommended to use routers w/ a current Atheros wireless chip (ath9k-drive, 802.11n-enabled) - they support meshing very well



Devices

- TP-Link 741nd (starting at 15 €)
- TP-Link 841nd
- TP-Link 842nd (starting at 25 €)
 - Atheros AR7241 SOC
 - 8 MB flash
 - 32MB RAM
 - 300Mbit/s
- TP-Link 1043nd
- TP-Link 3600



Services

Implemented

- internet
- city-wide intranet (IPv4 & IPv6)

Partially Implemented

- IC-VPN, Chaos-VPN, DN42...

Yet to Be Implemented

- DNS (for the intranet)
- voice over IP (SIP)
- anything else you would like to offer...



Network topology

Currently five gateways / DHCP-servers

Intranet IP ranges

- v4 RFC 1918 range: 10.112.0.0/16
- v6 Unique Local Unicast range: fd51:2bb2:fd0d::/48

VPN tunnel to <https://www.mullvad.net/>



Demo

- Checking out / OpenWRT *Attitude Adjustment*
- *Node statistics at <http://www.ohrensessel.net/ffhh/>*



Outlook

- increasing number of access points in cafés, restaurants, etc.
- cooperations w/ the city of Hamburg (WiFi in parks, tourism...)
- cooperation w/ public transportation (HVV)
- universities, student union
- ...



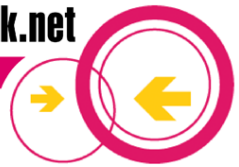
Projects

- customizing antennas
- outdoor housings
- solar-powered routers
- flash workshops
- PPPoE
- private wireless network
- uplink over wireless
- remote monitoring and updates of nodes
- setting up a mail server on srv01
- form to alter your own router settings in the DB
- ...



How Can I Participate?

- freifunk is open to everyone - no technical expertise required
- become part of the network by setting up a router
- meet up Monday's at 19:00 at the CCCHH
- promote the idea!



Thanks for Your Attention!

- [web hamburg.freifunk.net](http://web.hamburg.freifunk.net)
- mail: kontakt@hamburg.freifunk.net

