



# Freifunk Hamburg

[hamburg.freifunk.net](http://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

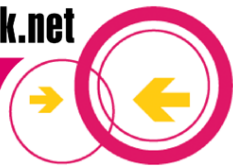
- public - accessible by everyone
- non-commercial
- community owned
- net neutrality - no manipulation of any data stream



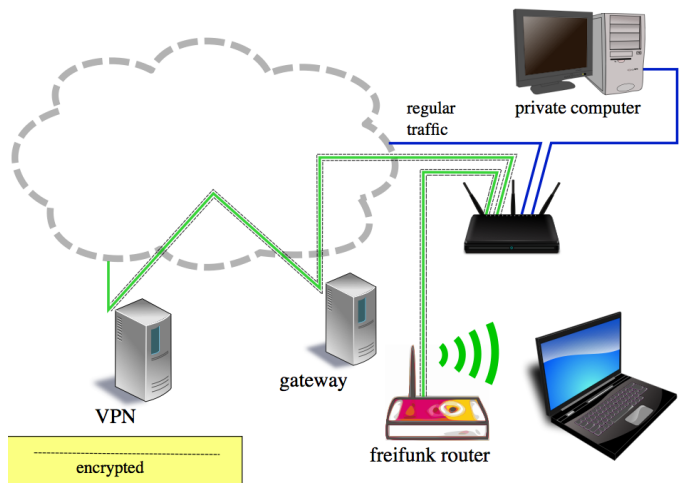
## History

- 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](http://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



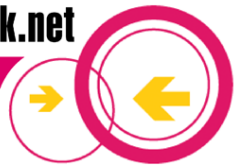
## How to access the Internet





## 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/>

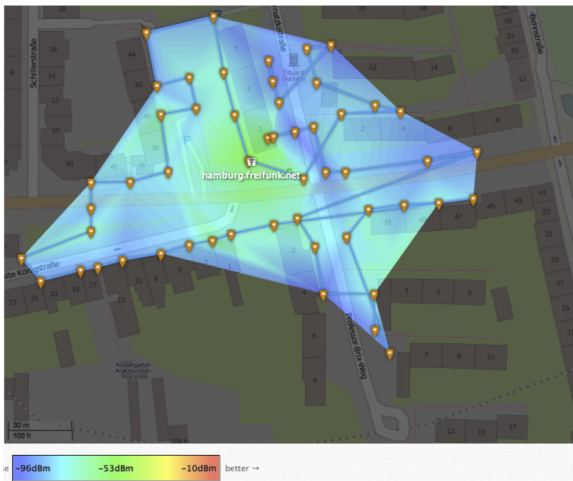


## Why WiFi?

- 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?

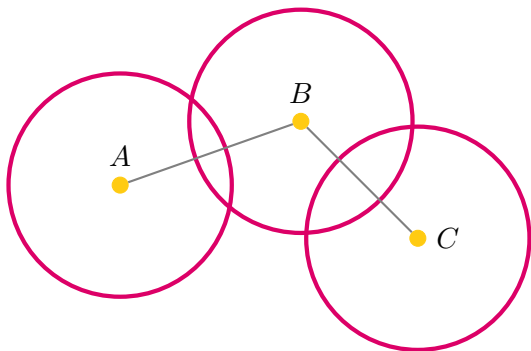
- self-organizing network
- every router is automatically part of the network
- hamburg.freifunk.net features the B.A.T.M.A.N.-adv. protocol

Two SSIDs

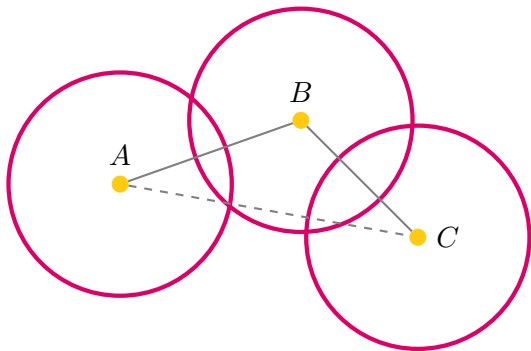
- freifunk access: hamburg.freifunk.net
- mashing (adhoc): f8:d1:11:87:52:2e

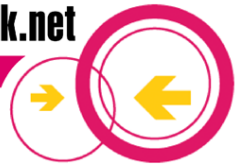
→ *Demo [inSSIDer]*

## Mesh

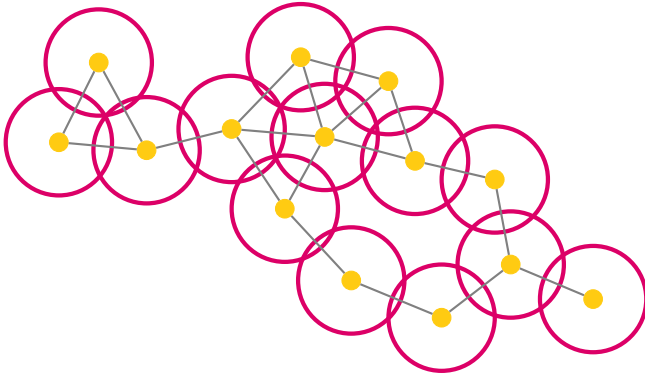


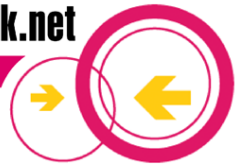
## Mesh



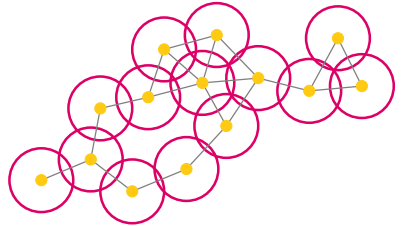
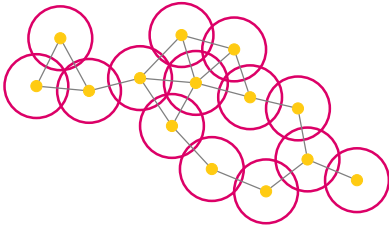


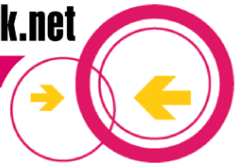
## Network Is Growing



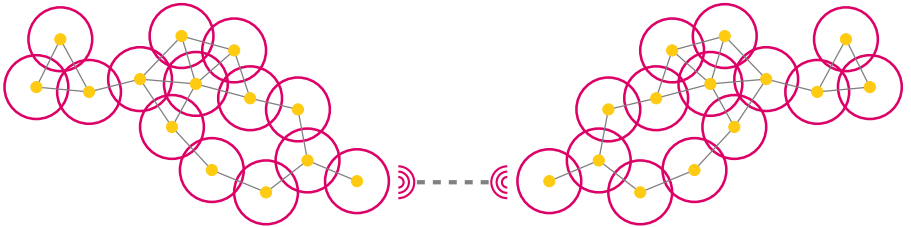


## Networks Are Interconnecting



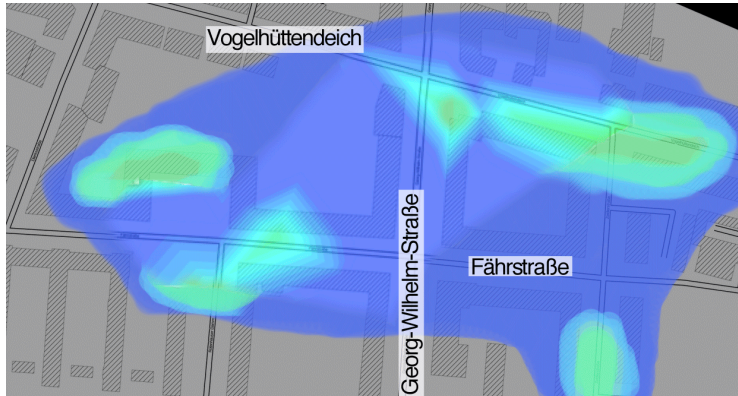


## Networks Are Interconnecting





## 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
- ...



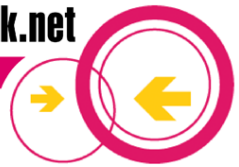
## Projects

- 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](mailto:kontakt@hamburg.freifunk.net)

