### Funkfeuer.at

## & community wireless networks running MANET protocols

L.Aaron Kaplan (<u>aaron@lo-res.org</u>) Presentation held at IETF80 March 2011



### Clarification

 In my talk: "OLSR" = the OLSR.org implementation

### Funkfeuer Vienna network

Philosophy

It [radio] is purely an apparatus for distribution, for mere sharing out. So here is a positive suggestion: change this apparatus over from distribution to communication. The radio would be the finest possible communication apparatus in public life, a vast network of pipes.

> Bertolt Brecht «The Radio as an Apparatus of Communication»

(in Blätter des Hessischen Landestheaters, Darmstadt, No. 16, July 1932)

### Open Source

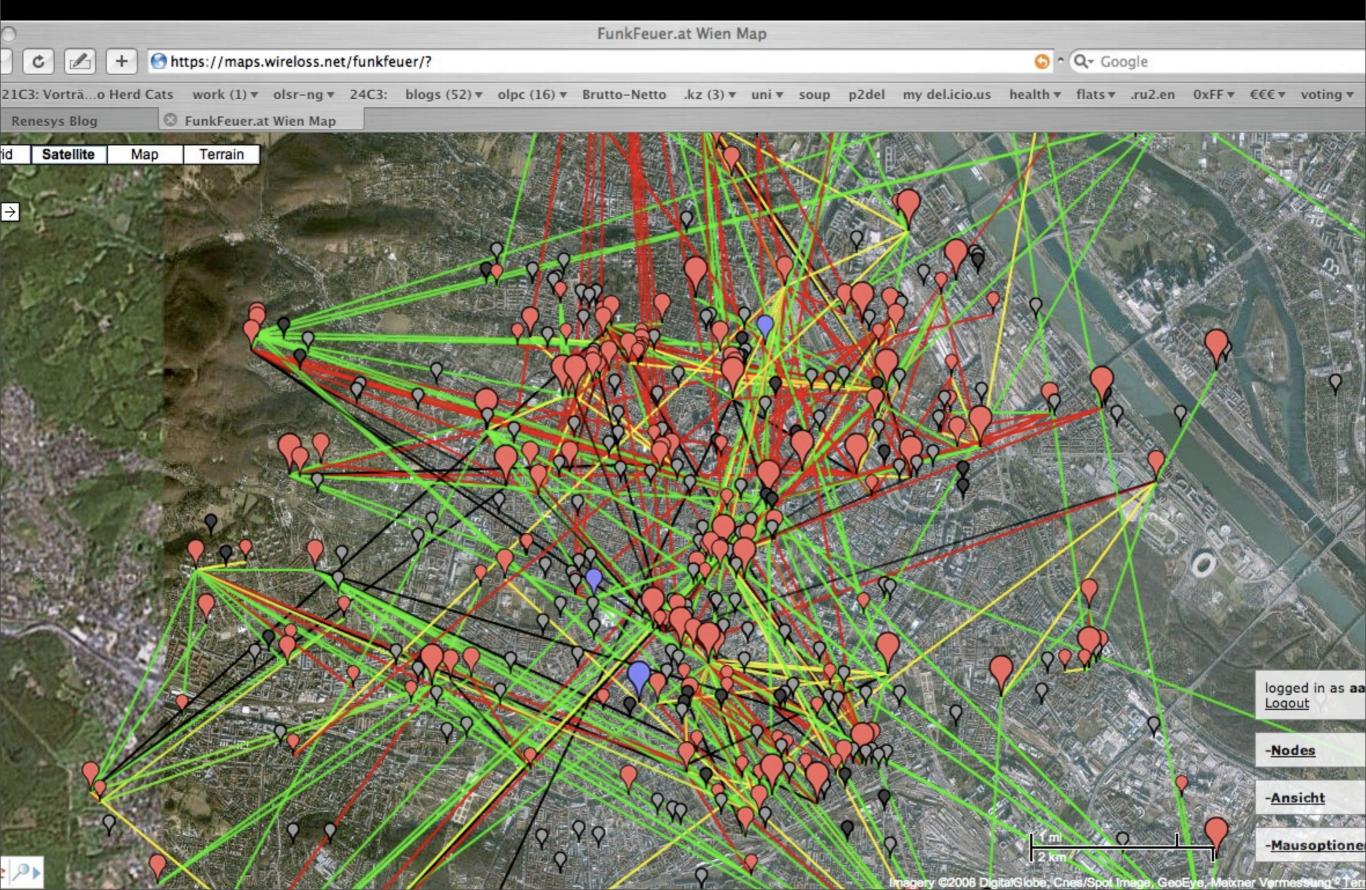
### Open Hardware

### "Free air" (ISM band)

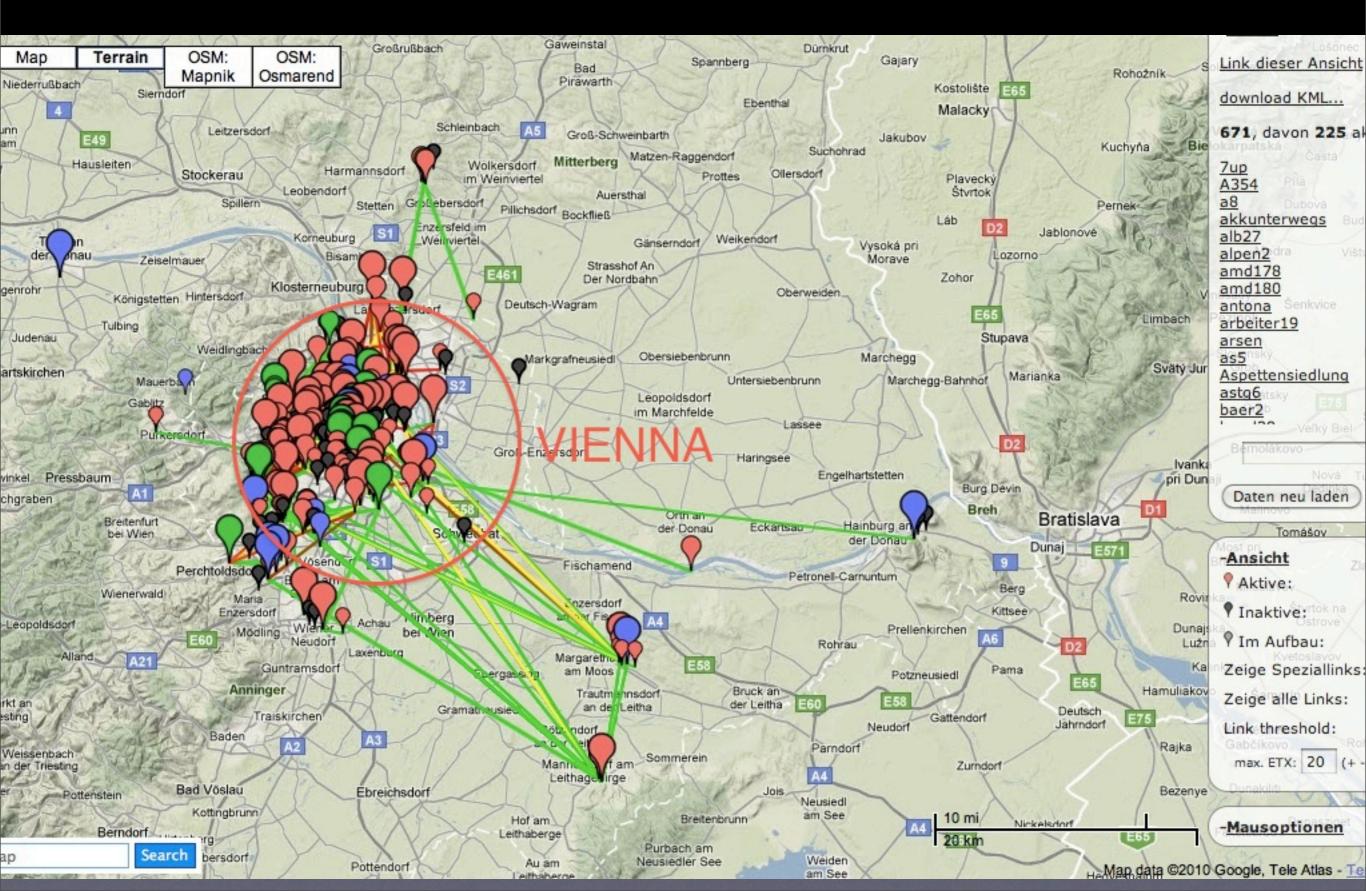
### Open Networks

### Pico-Peering Agreement

### Funkfeuer Vienna network



### Funkfeuer Vienna network



### Motivation

- Why does AT&T charge me for shaking electrons?
- We are allowed to talk freely in acoustic space
- Censorship resistant networks ("3 strikes out")
- Independence, running own network
- financially stable, self-sustaining

### How it started in Vienna

#### 2003

- q/spot history
- Book asked if we can use 10 existing locations for free
- Jaap @ scii.nl experimenting with "mobile mesh"
- Tested AODV, mobilemesh, OLSR. OLSR sort of worked. Same results in Berlin Freifunk
- Public presentation, invitation to the public
- Support by ISPs!

### Where are we now?

- aaron@viviroof:~\$ ip route show table all | wc -l
   674
- ~ 240 roofs. ~ 500 devices.
- Repeated in Graz, Bad Ischl, Weinviertel, Linz
- 10km distance to Bratislava
- Planning link to Slovenija
- Planning connection to Hamnet
- Longest links ~ 40km
- Vibrant very active community
- our own fibre!

### Principles of Funkfeuer

• Free, everybody is allowed to join

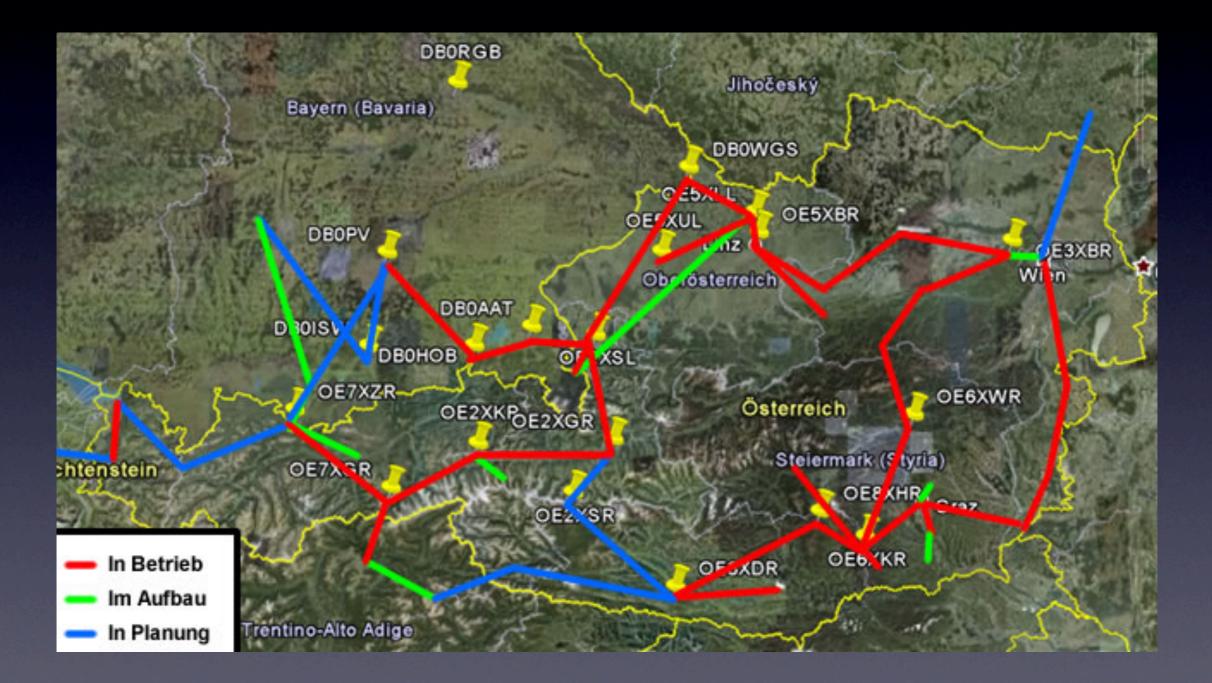
- Pico peering agreement. Free transit
- Bandwidth provided by association
- Experimental network
- Value is (in) the network

### Who?

- Students (IT, EE)
- Doctors
- Journalists
- Dentist
- Construction workers
- Unemployed
- Radio amateurs
- Nerdfactor++;

### Just a hobby?

### Hamnet



### Wireless networks don't scale?

### Yeah, right!

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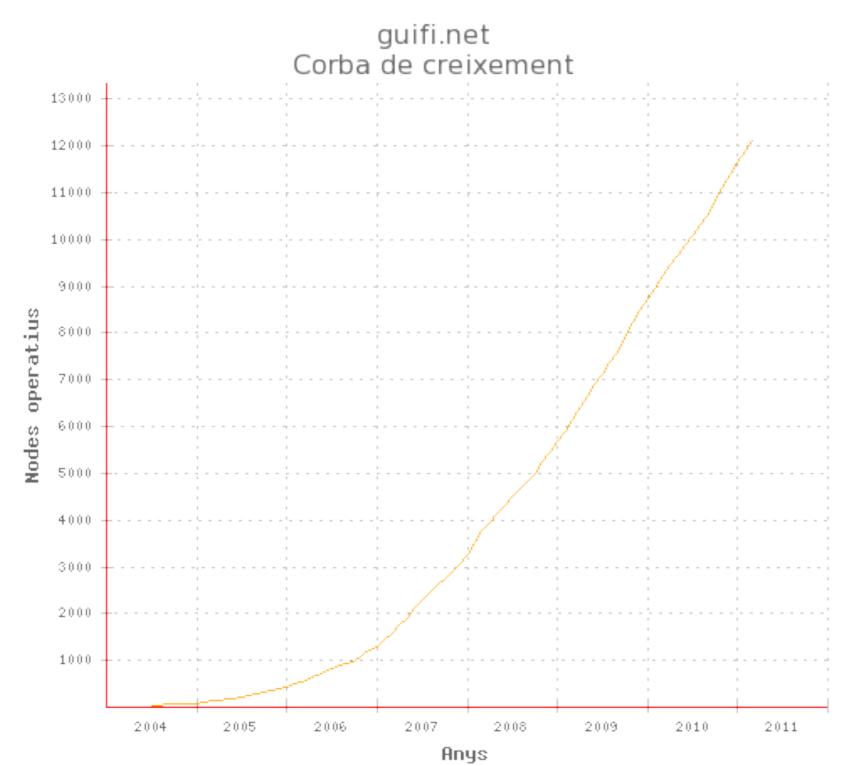
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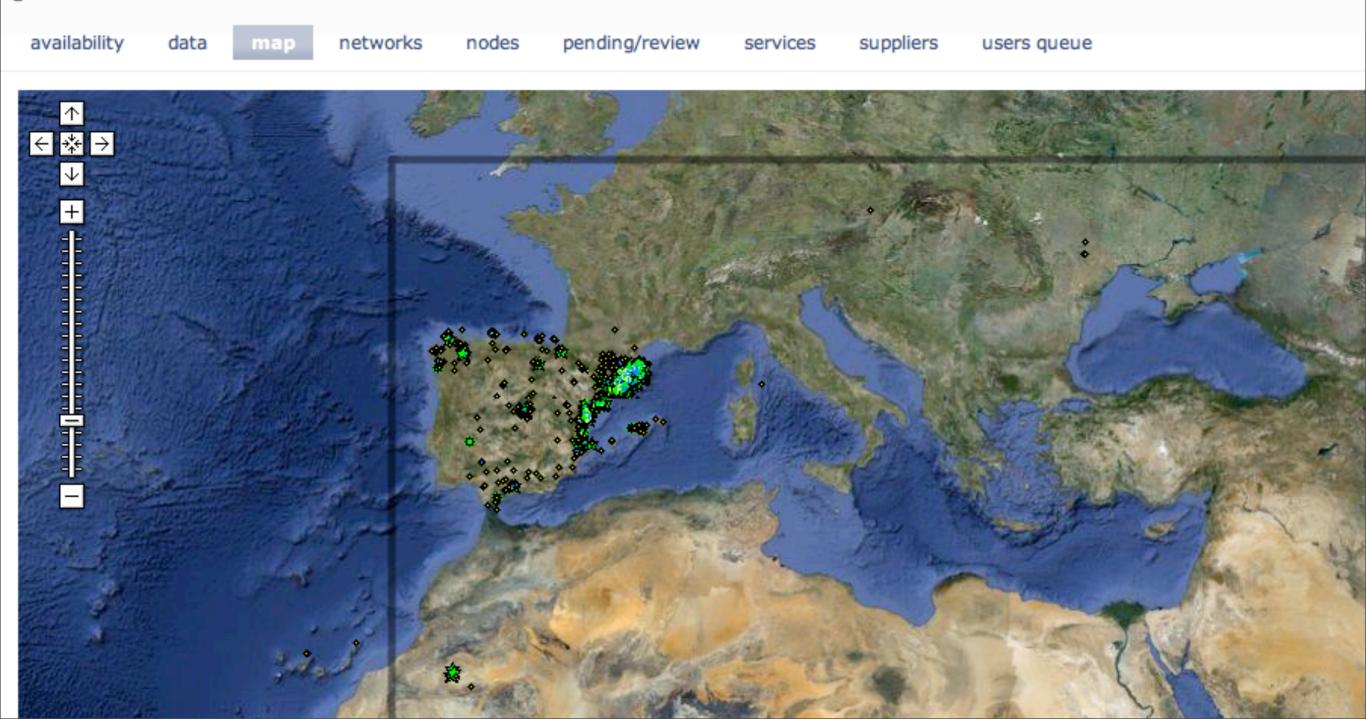
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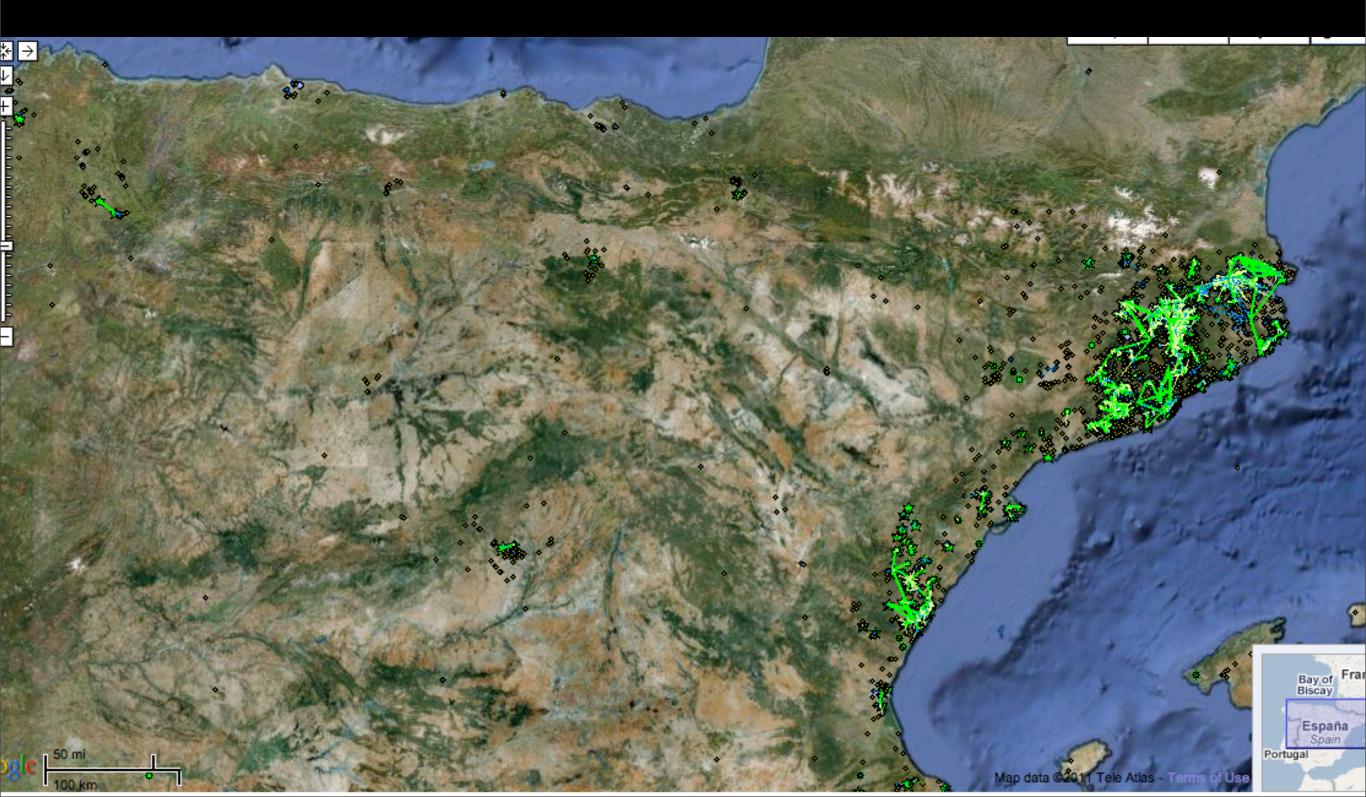
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#### guifi.net World





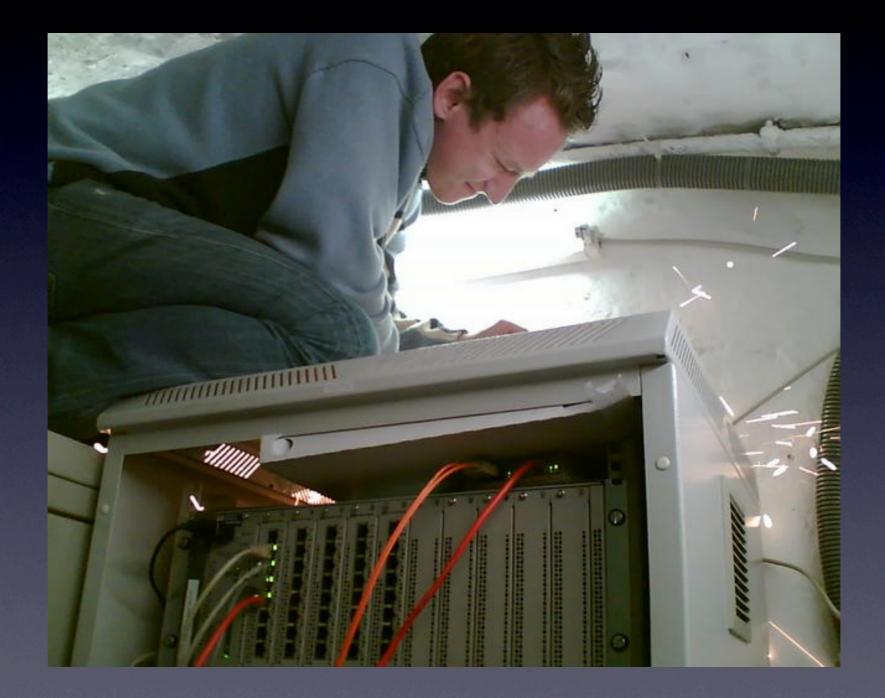


### Summary

- Guifi.net Barcelona ~ I2300 nodes (BGP, OSPF, OLSR, BATMAN)
- Djursland forgotten by the telco industry
- Berlin Freifunk (OLSR + BATMAN)
- Athens wireless ~ 5000 nodes (OLSR, BGP)
- Funkfeuer.at (OLSR, OSPF, BGP)
- czfree.cz little info
- ninux Roma (OLSR)

### Financial Sustainability of Funkfeuer

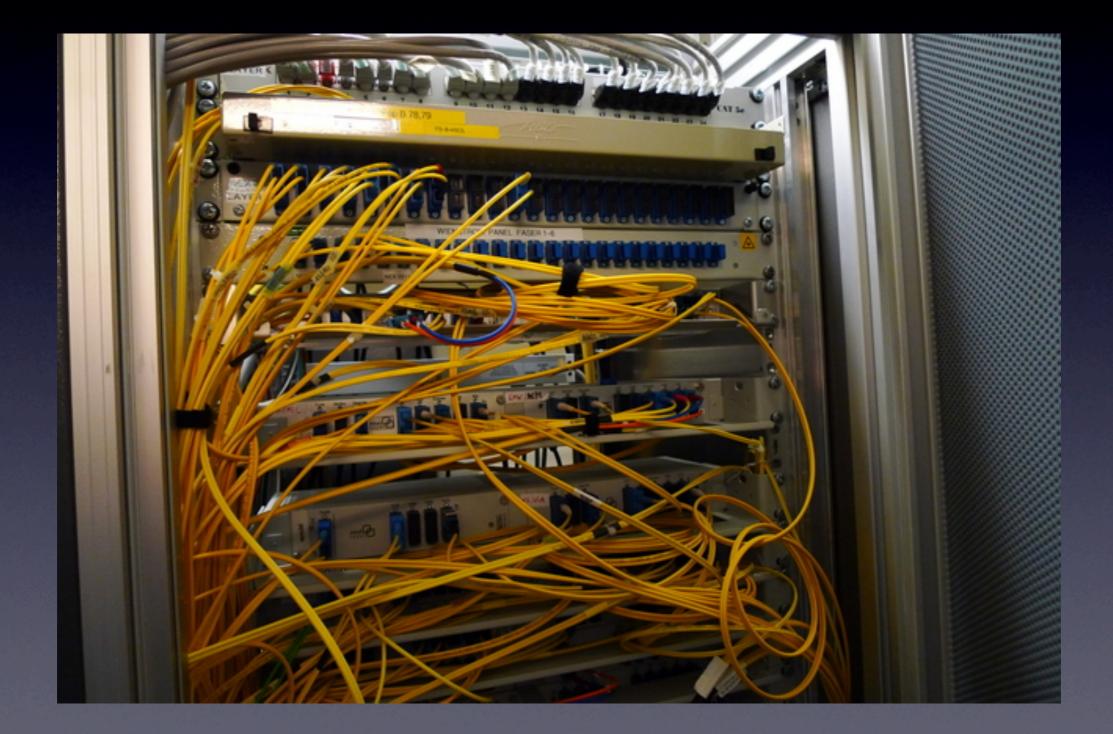
### Colocation center



## Facts about the colo center

- I GB uplink directly to the VIX
- multihomed
- LIR. Ripe member, public IPs (v6, v4)
- slightly below market rates for server colo





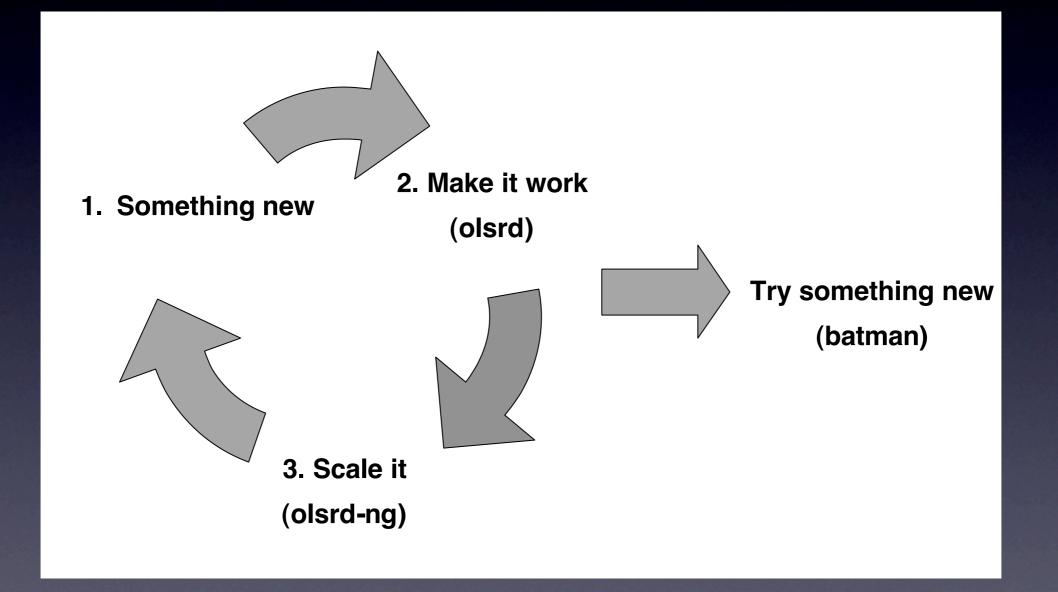
### Colocation hosts

- local TV and radio stations
- VOIP server
- network mgmt servers

### OLSR.org history

- RFC 3626, etc etc.. you know this part
- Andreas Tønnesen, UNIK Oslo (Norway) implemented it as diploma thesis for Thales
- licensed as BSD. Freifunk + Funkfeuer took the code and made it work in practice
- First extension: LQ (=ETX metric from MIT roofnet)
- Second extension: Fisheye (=HSLS)
- Third coding project for OLSR: "OLSR-NG". (cleaning up the code base, make it **fast** and scalable)

### Code maturity cycle



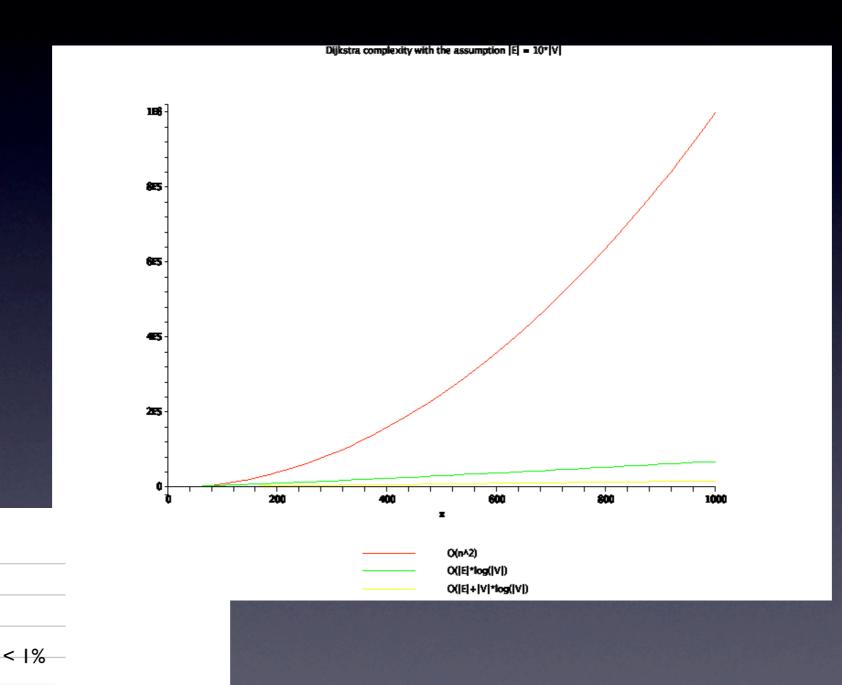
# CPU load improvements

- I. Dijsktra was shamefully inefficent!
- 2. Work with in place datastrucutres
- 3. avoid malloc() thrashing
- 4. olsr polls, times used to be very inefficient

#### 5. clean up

Effect: under 1% CPU load on a 200MHz linksys in a 400 node mesh

### CPU load



before after load (in % CPU) on a 400 node mesh

60%

60

45

30

15

0

### Wishlist

Metrics!
More Interops
avanti avanti MANET WG!! (OLSRv2)



### Avanti-MANET WG!

Cost Halling