

the fun part of becoming a wisp

ADDIX



nils dohse (nido009) - 20.11.2014

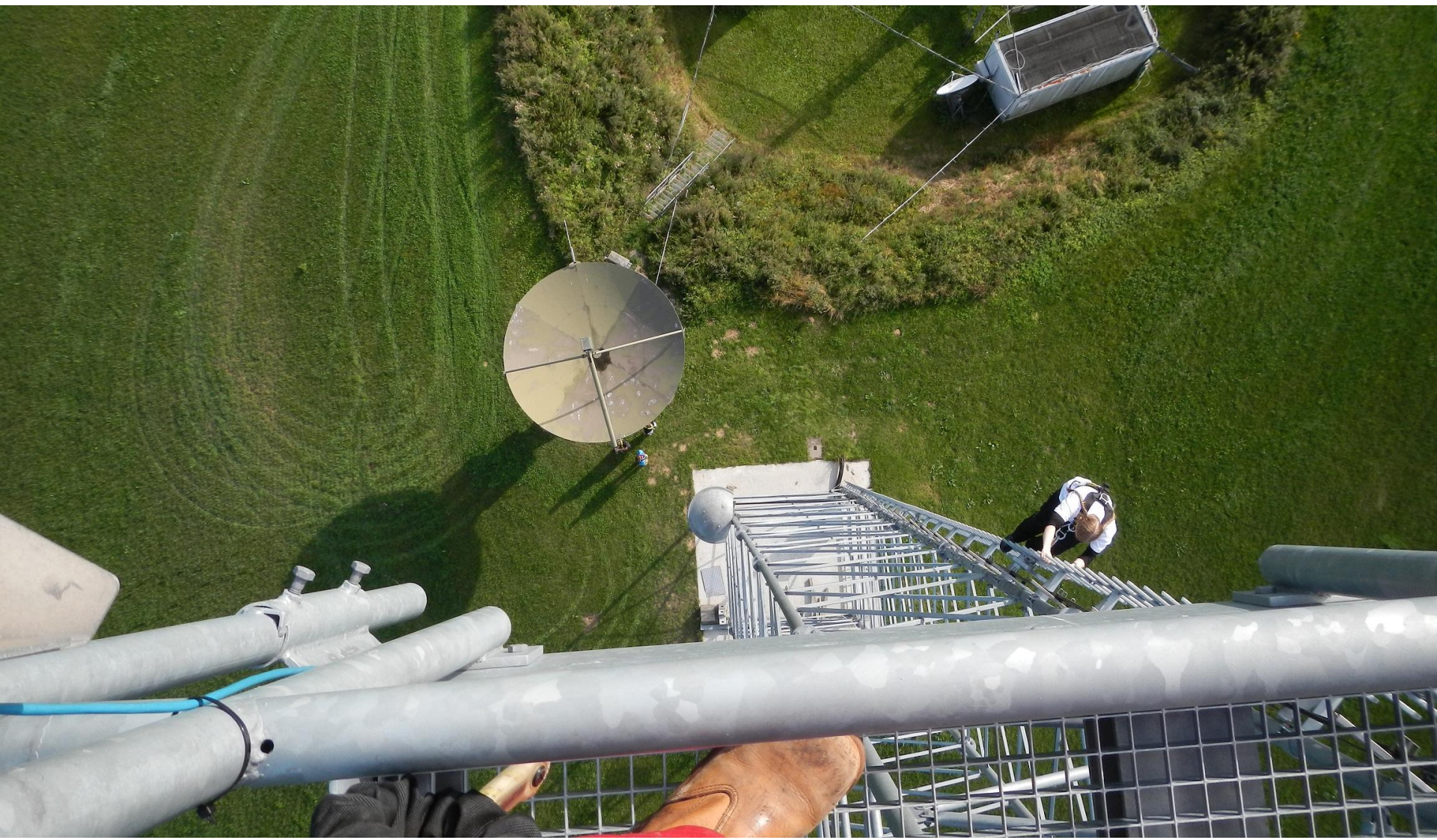


wisp - wireless internet service provider

imagine someone
takes a network
engineer from his
cosy datacenter and
sends him up this
ladder - 60 meters



look the other way - 60m down



A panoramic view of a harbor, likely in Stockholm, Sweden. A large white Stena Line ferry is docked in the center. The background features a city skyline with various buildings, including a prominent glass-fronted skyscraper on the right. The sky is overcast with grey clouds. In the foreground, there's a waterfront promenade with some low-lying structures and a few people.

agenda

- whoami
- motivation to do wireless
- legal stuff
- technical stuff
- real world
- recap
- furture
- q&a

whoami

- 33y old computer-networking loving dad
- from northern germany - kiel
- working at addix internet services
- first ip contact on netware4 server at univerity of applied science in kiel on 9600bps line in 1995 (pmail for email)



motivation

- in the beginning there was a 'bet'
- ham radio licensed
- datalinks with breezenet equipment and 10w amps starting 1997
- now affordable equipment on the market
- help of ham ops using their tower to build prototype network
- many spot without bandwidth in SH



legal stuff 1

focus on german employers

- employer's liability insurance coverage (Berufsgenossenschaft)
 - accident prevention regulation -> PSAgA
 - PSAgA training + G41 examination
 - first aid training for climbers
 - yearly refresh
 - documentation of inspection of PSAgA
- ask your employer's liability insurance



legal stuff 2 - wireless frequencies

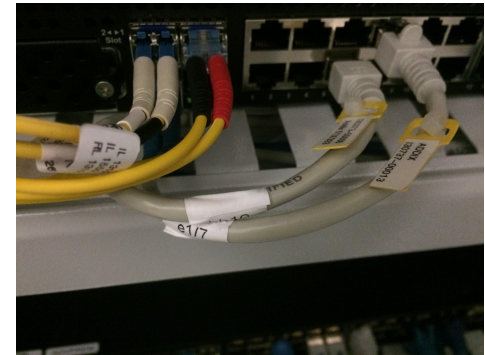
- free usable frequencies at 900 Mhz, 2.4 Ghz, 5Ghz and 24Ghz
- Licensed Radios
- 5.8Ghz for Internet Providers (BFWA)
- obey tx power, dfs and tpc
- work closely with 'Bundesnetzagentur'



technical stuff 1

we are an isp

- build an isp wireless network
- we'd like to have a mpls network hardware



- first try: mikrotik routerboard with wireless cards. Interference and instable
- second try: routerboard does routing, wireless externally. Much better and affordable



- # Dialup:

2nd try: mpls vpls (instable)

3rd try: dedicated dialin-boards on towers (no dialin to vrf possible)



technical stuff 3 - v6 challenges

- ipv6 - no support in 6pe yet
- testing in global routing table
- testing running v6 over vpls
- dhcpv6-pd on dialup works, but radius radius accounting incomplete

mikrotik downsides

- some routers-versions unstable
- routers testing done by customer
- no paid support (look at forum or ask consultants)

technical stuff 4 - hardware 1

mostly ubiquity for wireless links

>1.000 deployed devices

>1.100 km wireless links

in 4 years

running some commercial links on 38,26 and
18Ghz



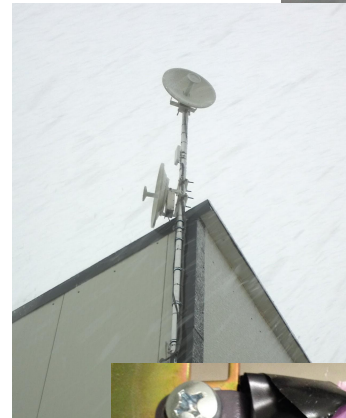


technical stuff 4 - hardware 2

- all equipment at tower top
- starting with custom build integrated boxes (not so flexible)
- now migrating to outdoor 19" racks
- custom build dc-power with battery backup

real world 1

- mobile phone company's pay \$\$\$ to mount antenna's
- do it right or do it twice - you don't want to work outdoor in winter
- always do a LOS-Check (G-Earth lies!)





- need for high places to mount antenna's
- be prepared to deploy towers
- you need at least two teams of two people each
- never trust the weather report



real world 3 - install a link



- first site visit to find install locations
- view topo data
- line of sight check (multicopter helps - obey legal stuff)
- do a test measurement
- order and install mounts and cabling
- install antenna's, test throughput



- wisp is fun - it is possible build stable, high bandwidth networks outdoor
- be prepared (tools, cars, equipment)
- real world is never like on google earth
- be your own carrier, solve issues yourself





- wireless to KVZ - then vdsl
 - downside: TAL-rent cost
 - upside: one link, many customers, customers know DSL
- higher bandwidth links in 5Ghz
 - lot of equipment testing (ubnt airfiber, mt netmetal ac)
 - more throughput by
 - higher snr
 - or more rf-bandwidth
- backend systems (excel is not the perfect tool)



Questions?

Are You Wireless?