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SHA2017

STILL HACKING ANYWAY

...

SHA2017 NOC review

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The vision

(like at CCC, EMF, etc)

- Gigabit & 10Gigabit for all
- Decent WiFi
- Privacy-enhanced
- Filter-free, net neutrality™
- Have fun :)

Mostly donated hardware

We're running on mostly donated hardware (Thanks Booking, Cumulus!).

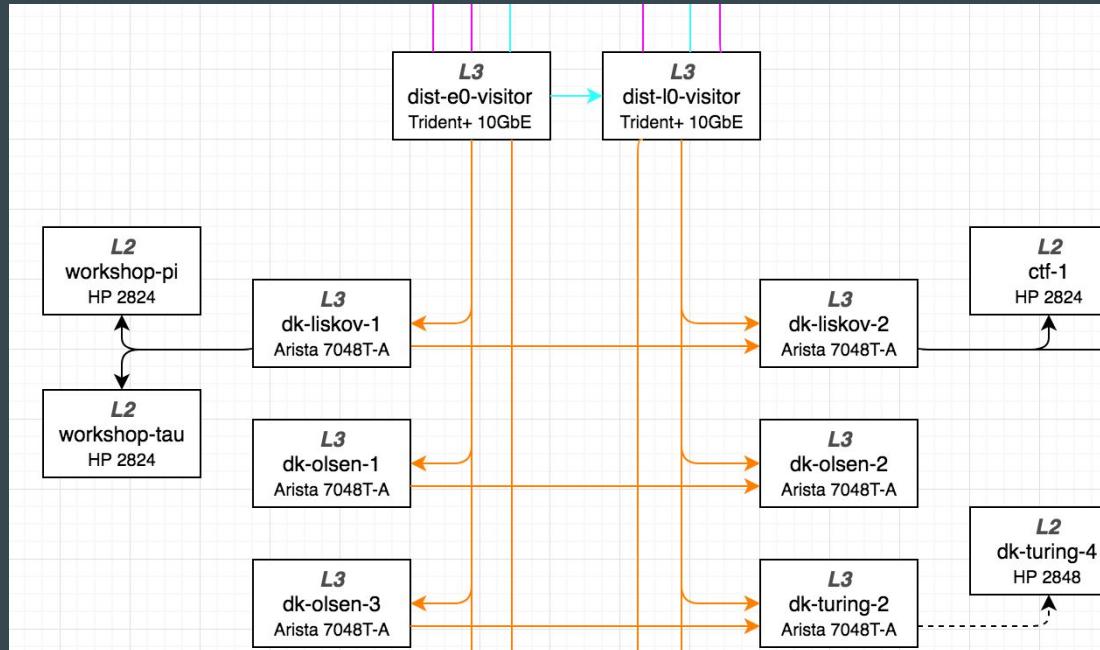
People were kind enough to give us datacenter switches/routers.

No campus routers, so we designed with small routed areas on every access switch.

Only filled some gaps with borrowed hardware by sponsors (2x Juniper MX240 with 100Gbps analog coherent line card and some edgecore switches)

Concept

- 3 datacenters (N0, E0 & L0)
- Datenklos are uplinked and interconnected with 10GBASE-BR (single fibre)
- Routing at the datenklo:
Route early, route often
- Off-load distribution routers by routing at the DKs
- Use routing protocols
- DHCP relay
- L2 switches are routed at nearest connected datenklo
- Tunneling of WiFi traffic to the Aruba controllers. APs sit in end-user VLAN



Planning

- Using QCAD for planning cable routes + DK locations, publishing also on <https://map.sha2017.org>
- Scripts for assigning fibres to paths
- <https://www.draw.io/> for diagrams
- Using Draw.io exports for generating topology for config generation
- NetBox for IP administration
- Scouting Landgoed already has lots of on-site fibre infrastructure
 - 3 utility buildings (“core sites”)
 - 11 field boxes with 8 single mode fibre cores each

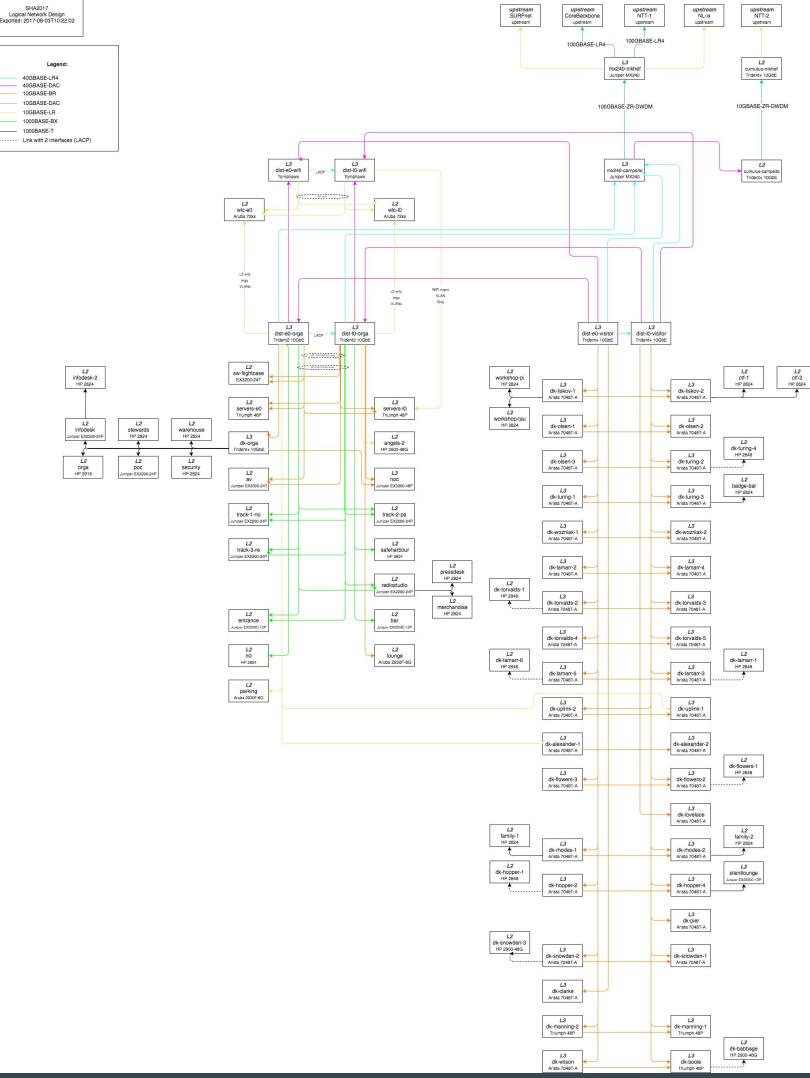
Design: some figures

- 3 Datacenters
- 46 Datenklos (new record, CCCamp2015: 37)
- 50 fibre cables totalling over 9000m
- 75 access switches, 6 distribution switches
- 2 edge routers
- 120 access points
- 300 transceivers

Logical diagram

(you cannot read this :-))

- Separation of visitor, orga and WiFi network
- Distribution routers for each domain
- 4x 40GE uplinks to edge router
- 100% routed network in visitor network
- MLAG in orga network for layer-2 redundancy



We took some advice from the local village people



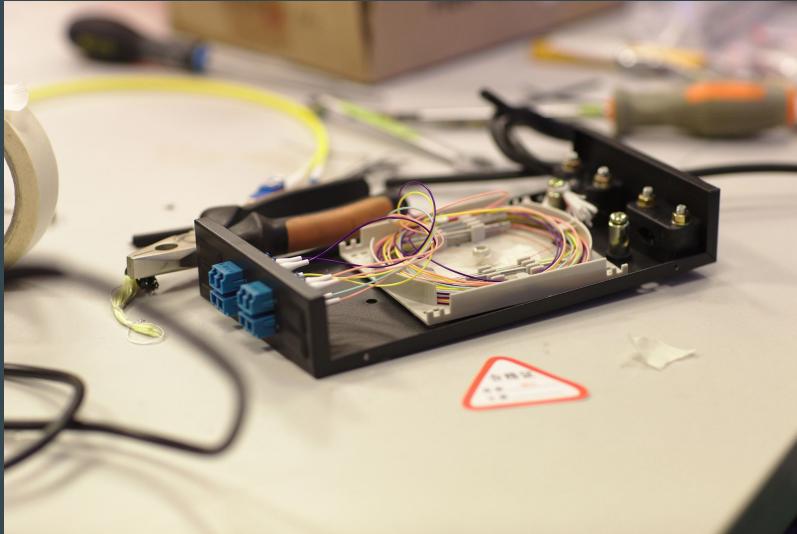
Route your network with O-S-P-F

Fibre splicing

July 8th, fixing fibres, splicing new fibres

Approximately 100 splices done :)

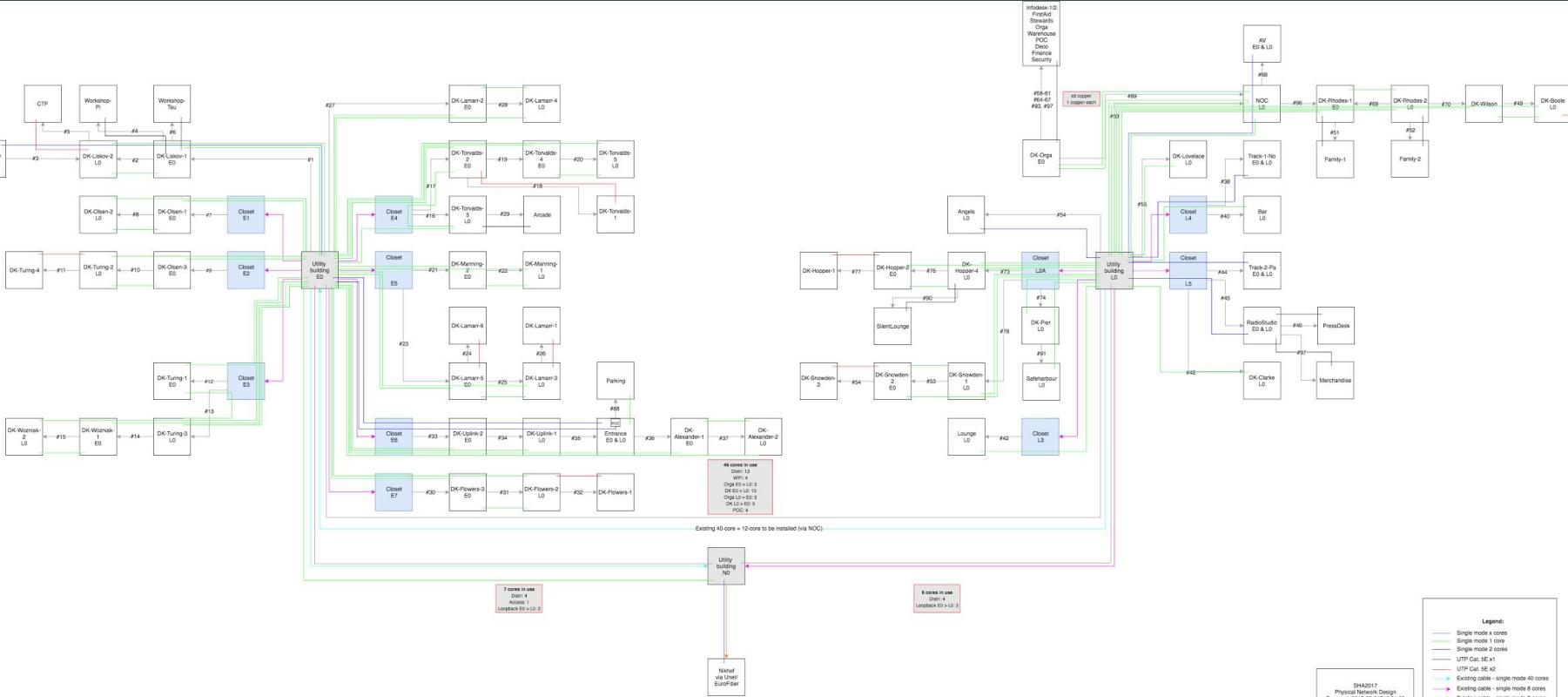
New 666 metre fibre for parking lot



CC-BY-SA: Dennis van Zuijlekom
<https://www.flickr.com/groups/sha2017/>

Physical design

(you cannot read this either :-))



Uplink (to the site)

- 59km dark-fibre provided by UNET
- Fibre already on-site! (easiest uplink ever!)
- Only 13.5dB loss at 1550nm!
- 2x Juniper MX240 (one in Nikhef, one on-site)
- Tunable coherent 100Gbit/s solution (DP-QPSK, fits in a 50Ghz channel)
- Passive DWDM muxes used
For backup 10Gigabit



Uplink (IP & transit)

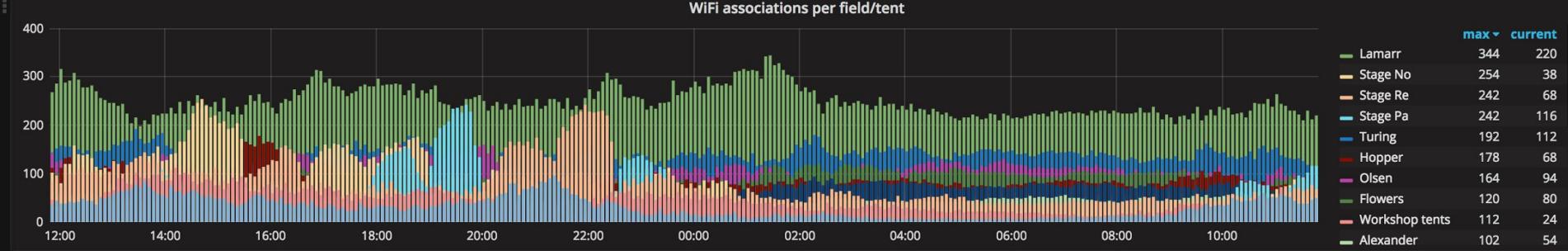
- AS1150 and /20 IPv4 provided by SURFnet
- Temp /16 IPv4 assignment by RIPE
- /32 IPv6 owned by EventInfra
- Upstreams:
 - NTT (100GE + 10GE for backup)
 - CoreBackbone (100GE)
 - SURFnet (10GE)
 - NL-ix (10GE peering)

WiFi

- 2x Aruba 7210 controllers
- ArubaOS 8.1 trial setup with Mobility Master and AP load balancing
- Some issues with auto-channel assignment (AirMatch)
- 120 APs deployed
- Peak 2800 clients & 1Gbit/s (rx+tx) of traffic
- 7400 unique devices seen



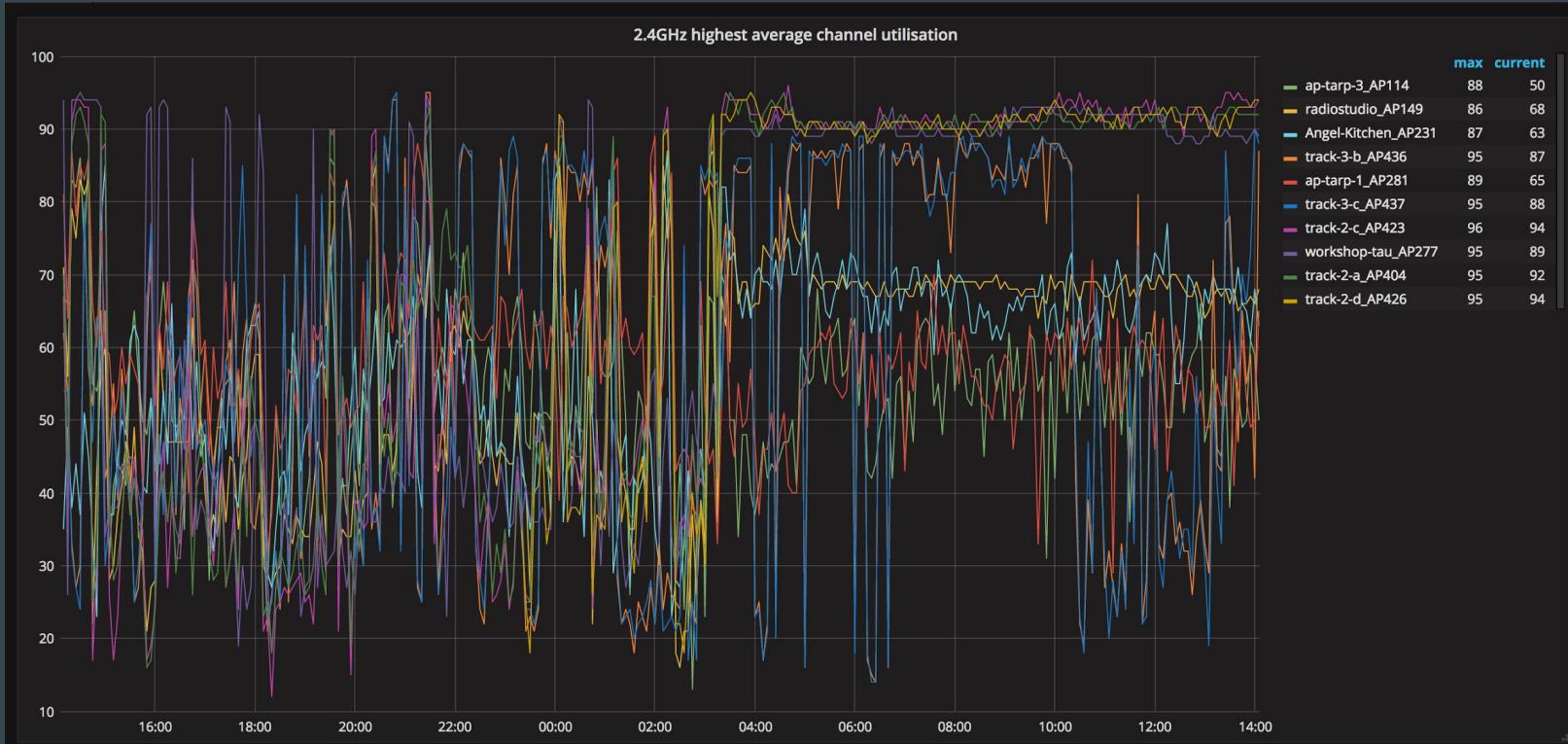
WiFi associations per field/tent



2.4GHz is dead?

Very high channel utilisation

Lots of neighboring/rogue APs (about 200!) not sticking to any channel plan

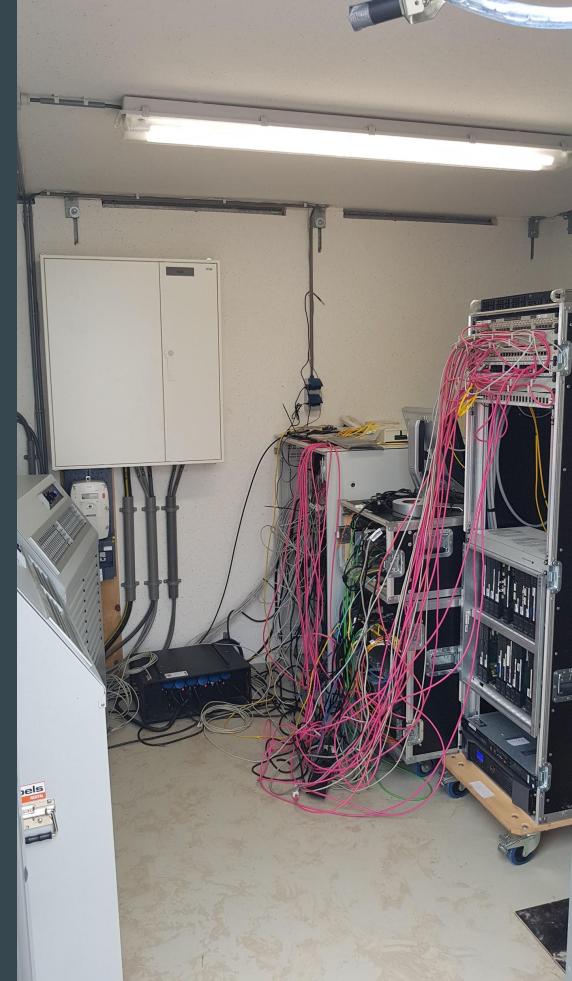
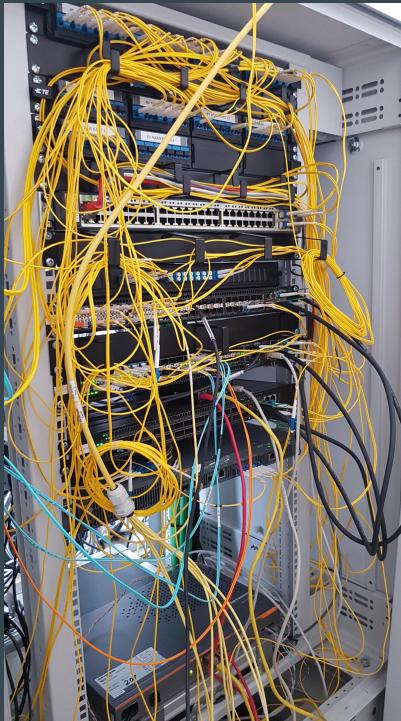
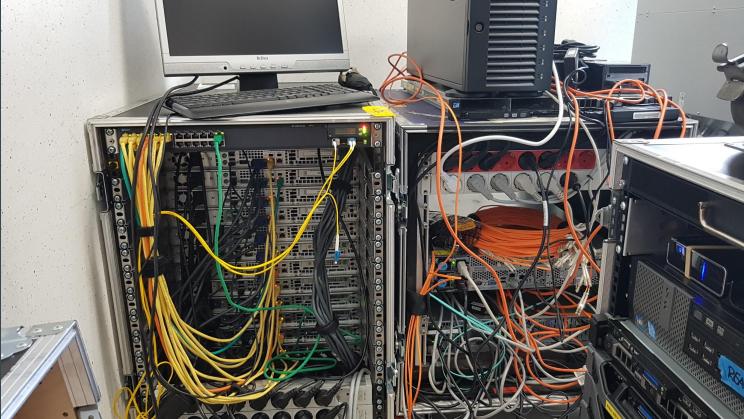


Obligatory username & realm stats (SHA2017, eduroam & spacenet)

1. sha2017: 2283 (57.3%)
2. anonymous: 351 (8.8%)
3. SHA2017: 209 (5.2%)
4. @uiو.no: 109 (2.7%)
5. \$_ANONYMOUS_IDENTITY: 39 (1%)
6. edward: 36 (0.9%)
7. guest: 27 (0.7%)
8. foo: 19 (0.5%)
9. @bitlair.nl: 18 (0.5%)
10. @science.ru.nl: 17 (0.4%)
11. @revspace.nl: 17 (0.4%)
12. @utwente.nl: 15 (0.4%)
13. @noc: 15 (0.4%)
14. @rwth-aachen.de: 15 (0.4%)
15. @ru.nl: 15 (0.4%)
16. @sha2017.org: 14 (0.4%)
17. @jku.at: 12 (0.3%)
18. @kit.edu: 11 (0.3%)
19. @techinc.nl: 11 (0.3%)
20. @win.tu-berlin.de: 11 (0.3%)
21. @tudelft.nl: 11 (0.3%)
22. tickets: 10 (0.3%)
23. sha: 10 (0.3%)
24. @ruhr-uni-bochum.de: 9 (0.2%)
25. @surfnet.nl: 9 (0.2%)
26. penis: 8 (0.2%)
27. @uva.nl: 8 (0.2%)
28. ijdsijoiij: 7 (0.2%)
29. test: 6 (0.2%)
30. anon: 6 (0.2%)

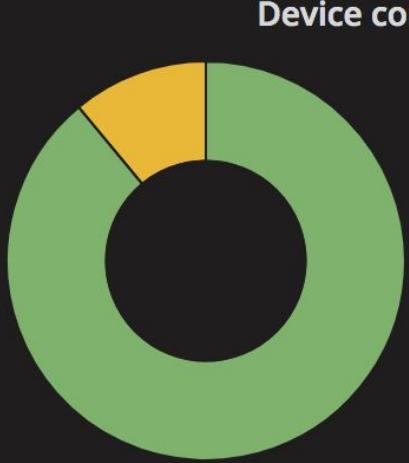
Datacenters

- 3 datacentres spread over three sites with existing telco rack
- 30kw of cooling capacity
- Colocation hosting for
 - NOC (2 flightcases)
 - Sysadmin (2 flightcases)
 - POC (2 huge flightcases)
 - VOC/AV/Productiehuis (1 flightcase)



More statistics

<http://dashboard.sha2017.camp/>



IPv6 Usage

21%

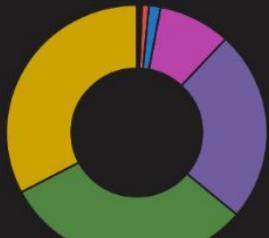
Badges

Unique devices seen

8300



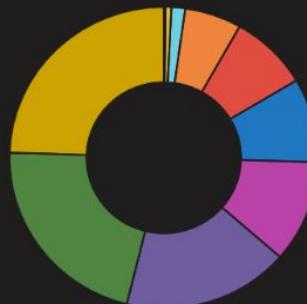
Device categories



values

Printer	11
Game_Console	12
Router	13
Home_AudioVideo_Equipment	16
Embedded	71
Access_Points	120
Unknown	742
espressif	2006
Computer	2578
SmartDevice	2711

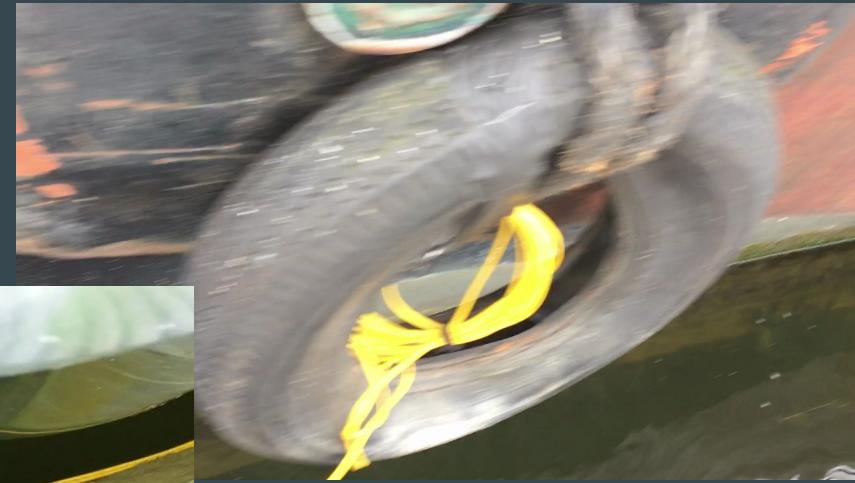
Device OS families



values

Jolla	16
Raspberry_Pi	49
Aruba	118
Windows	489
Apple_Mac	678
Unknown	742
Apple	899
Linux	1432
Android	1783
espressif	2006

Fiber To The Boat

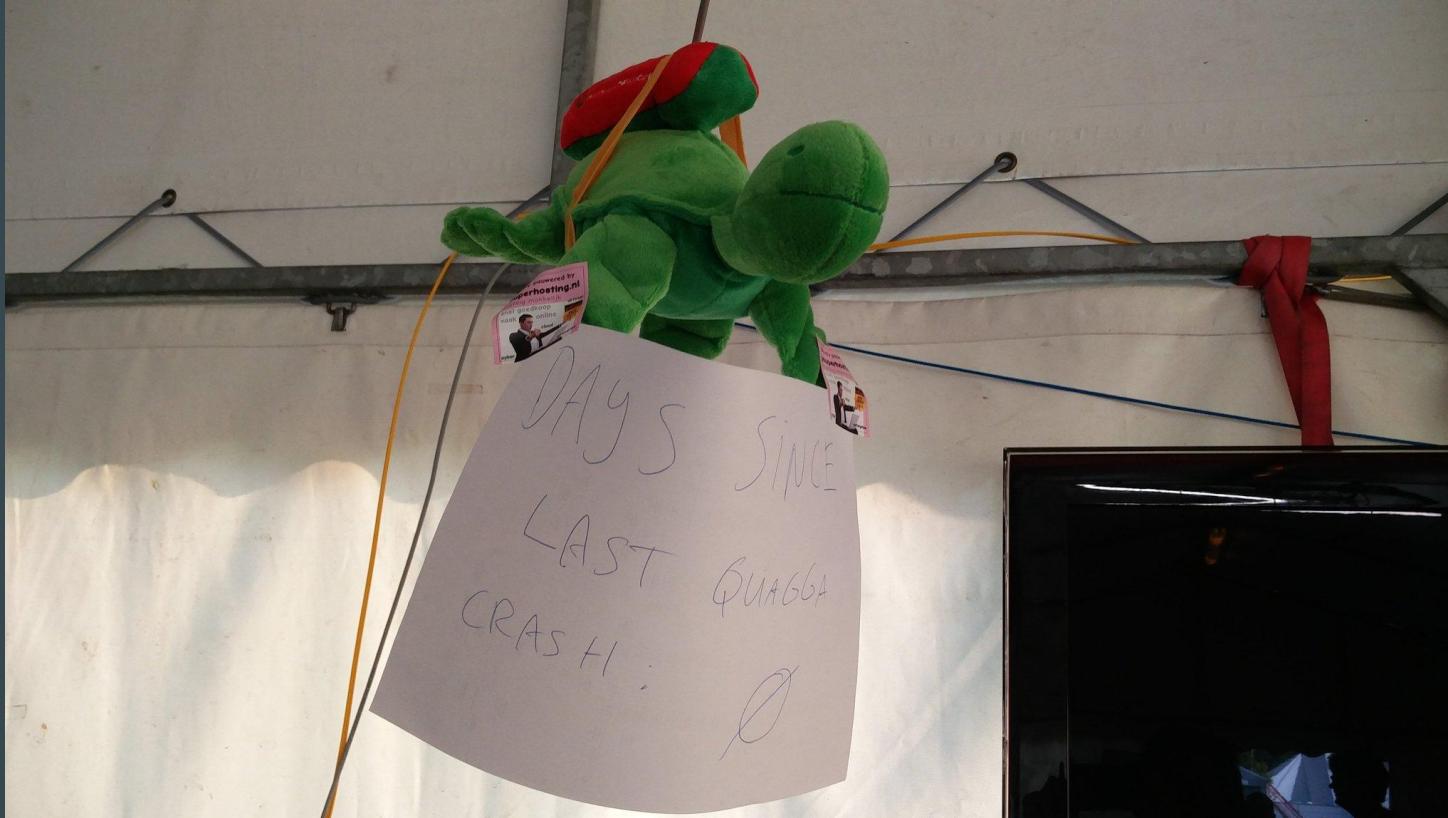


Lessons learned

Terminating campus WiFi on datacenter routing switches, even with tuning, does not really work. Fortunately, the juniper MX240 could do it.

OSPF with 4 vendors on hundreds of links is a bit of a pain

Quagga and OSPFv3



BIRD is the word!



Secure CAT5e (SCAT5e)

Don't poop on our cables. KTHXBYE



Secure hosting

Don't poop in the datenklos either...



ArtNet infrastructure compromised :)

- Italian Embassy discovered our ArtNet infrastructure does not have much security
- Nice hack! :)
- Check: <https://wiki.sha2017.org/images/4/48/Slideshows%20-%20Day%201%20-%2016%20of%2016.pdf>
- ArtNet = DMX over ethernet
- All nodes were routed because of routed network design and addresses via unicast



Abuse

- About 380 abuse emails received
- Mostly automated
- Some serious requests we had to act upon

Supporters

- Many services/hardware cannot be bought or rented for money
- Uplink/housing: NTT, Core-Backbone, SURFnet, NL-ix, UNET, Nikhef
- Hardware: Juniper Networks, Cumulus Networks, Flexoptix, HPE/Aruba Networks, BIT, Babiel, Edgecore Networks, EventInfra, Chaos Computer Club, EMF



Goodbye!

- Network at camping fields will be torn down starting 18:00 today
- Everything is gone on Thursday
- Please be kind to our fibres and see you at 34C3!

