



**SHA2017**  
STILL HACKING ANYWAY

...

# SHA2017 network infrastructure

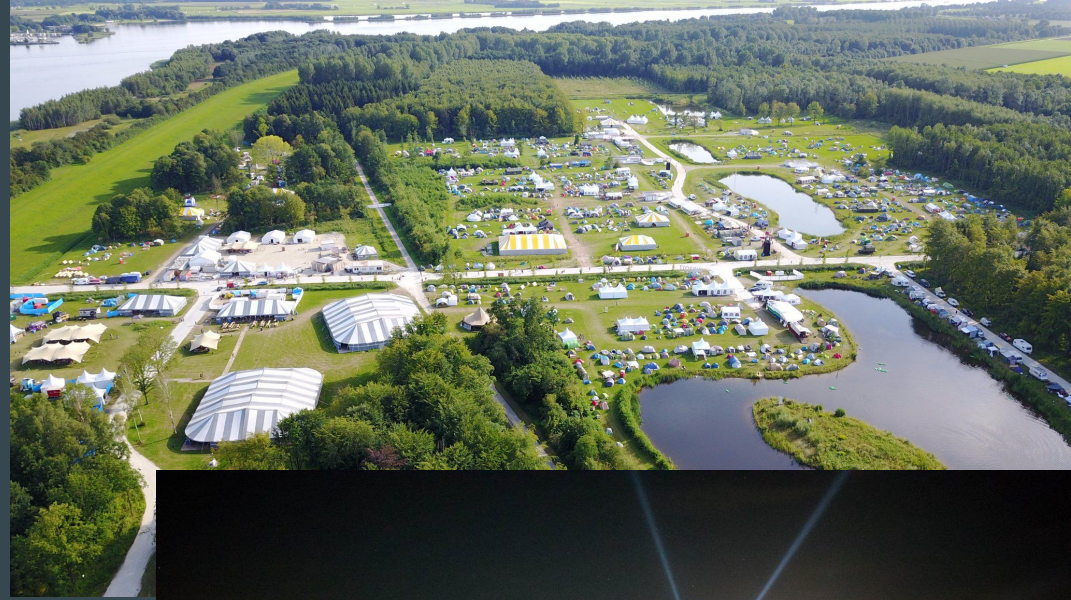
Fibre to the field, tent & boat

NLNOG day 2017

Arjan Koopen - Stichting IFCAT & Stichting EventInfra

# What is SHA2017?

- 5 day non-profit outdoor hacker camp, festival & conference
- ±3650 hackers
- Held at Scouting Landgoed Zeewolde, a 1 km<sup>2</sup> terrain next to Nuldernew
- ±200 presentations at 3 big stages
- Successor of other Dutch hacker camps held every four years - from 1989: GHP, HEU, HIP, HAL, WTH, HAR & OHM
- Similar events: CCC Camp (DE), CCC Congress (DE) & EMF (UK)



# The SHA2017 network infrastructure

- Operated by Team:NOC, a team with  $\pm 30$  volunteers
- International team with overlap with other events
- Small scale temporary ISP with own temporary ASN & IP-space
- Used for:
  - Public internet connectivity; wired & wireless
  - Video streaming/relay
  - VoIP
  - Local data centre facilities/colocation
  - ArtNet (“DMX over ethernet”)
  - Ticket scanning

... how do we “deliver”?

<https://map.sha2017.org> (enable NOC layer)

- 3 “data centres” in existing utility buildings
- Existing SMF infra from Scouting (11 boxes)
- Fibre uplink to our “PoPs”
- A PoP is serving 40m radius
- About 50 fibre cables deployed





# Our PoP: the datenklo

**48 datenklos deployed!**

Offering GigE copper or  
10GE fibre (for Fibre-to-the-Tent & Boat)

Arista 7048T

802.3at/af PoE(+) injector

10GBASE-BR (BiDi) Flexoptix  
SFP+ uplinks in Arista

Fibre spool and splice boxes for  
fibre coming in and out of the DK

OHM2013 Artnet LED sleeve (\*)

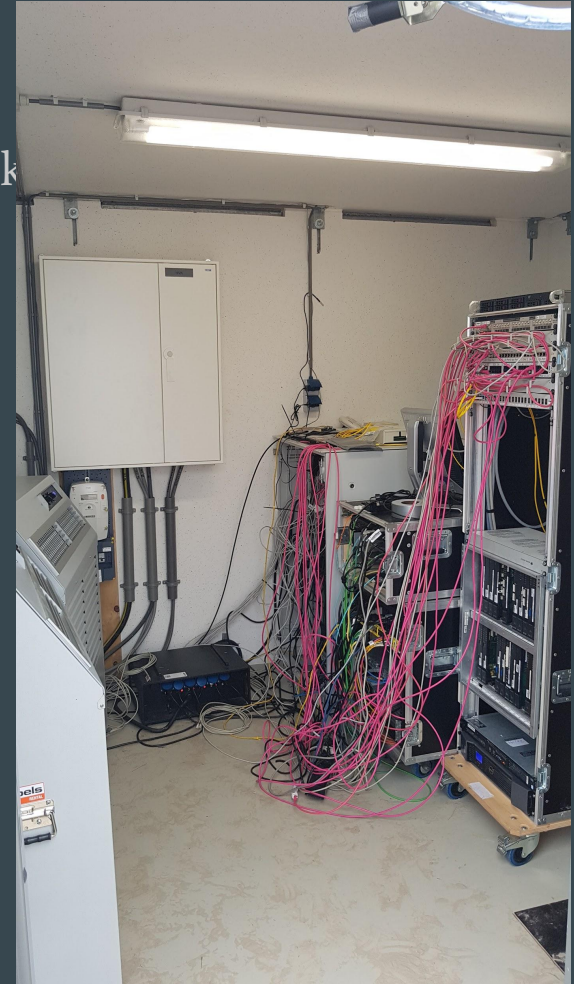
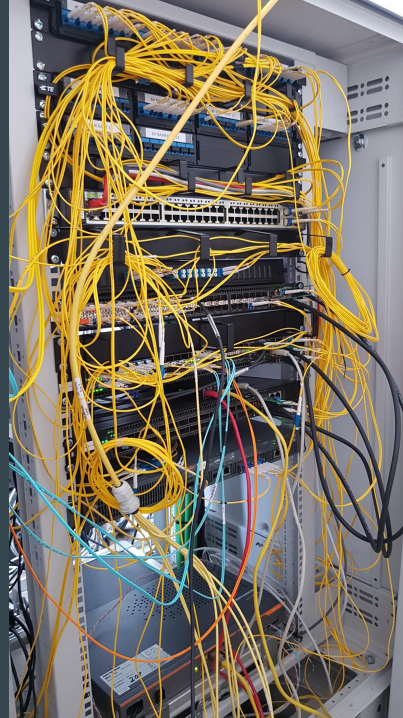
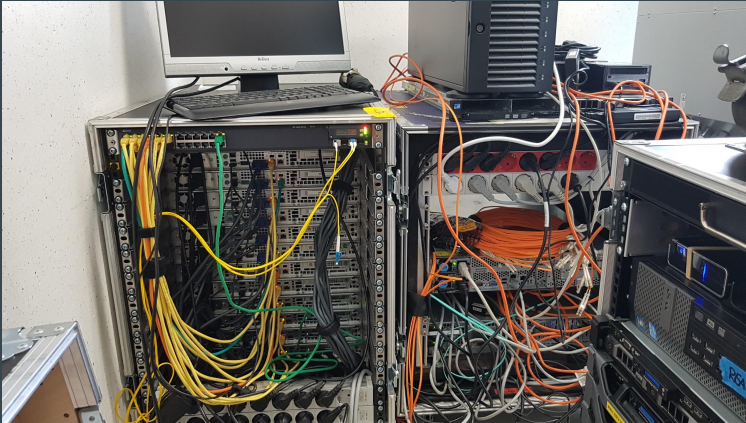
Aruba AP-135 in “Fibox”  
offering WiFi



(\*) [https://wiki.bitlair.nl/Pages/Projects/Ohm\\_led\\_strip\\_sleeves](https://wiki.bitlair.nl/Pages/Projects/Ohm_led_strip_sleeves)

# Data centres (kabelsalat)

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





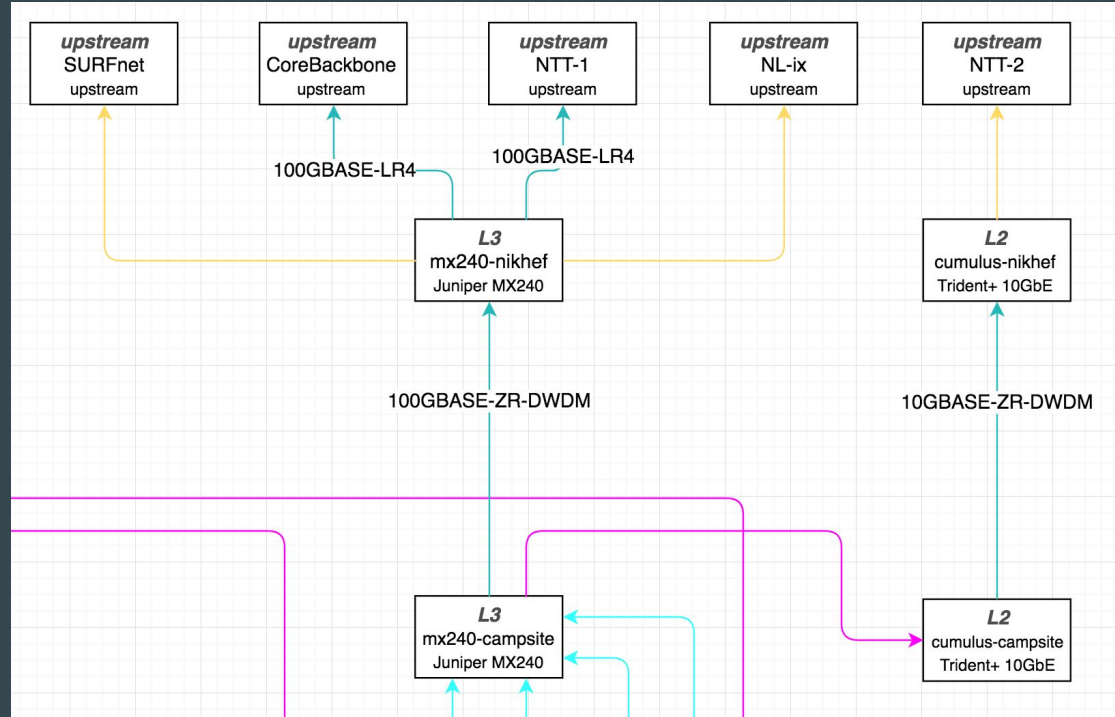
# Uplink (to the site)

- 59km dark-fibre provided by UNET
- Fibre already on-site! (easiest uplink ever!)
  - No need for pulling km's of our own fibre
- 2x Juniper MX240 (one in Nikhef, one on-site). Loan from Juniper.
- Tunable coherent 100Gbit/s solution
  - MIC3-100G-DWDM + TCFP2-100G-C
- Only 13.5dB loss at 1550nm!
- Passive DWDM muxes used
- For backup 10Gigabit
- Peak Rx just over 11Gbit/s



# Uplink (IP & transit)

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





# Devices

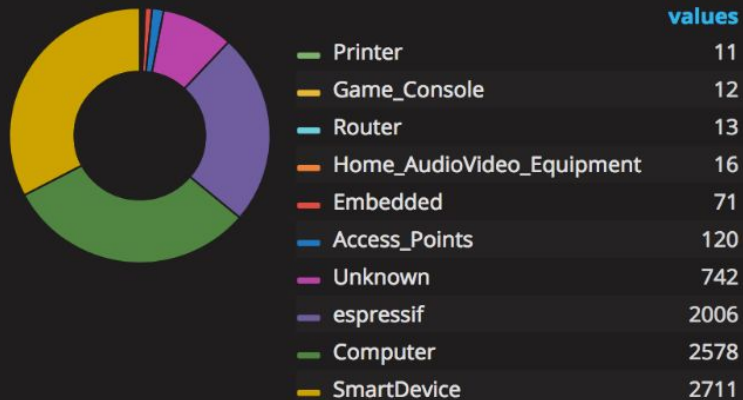
Unique devices seen

8300

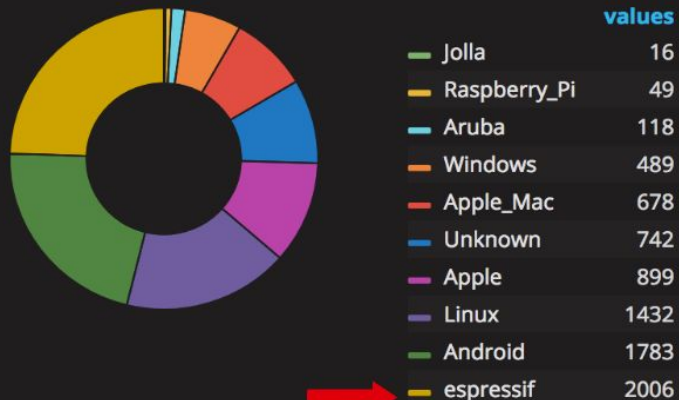
- 89% of devices are on WiFi
- >2000 of conference badges have been connected
- Badges have 802.11n 2.4GHz ESP chip



Device categories

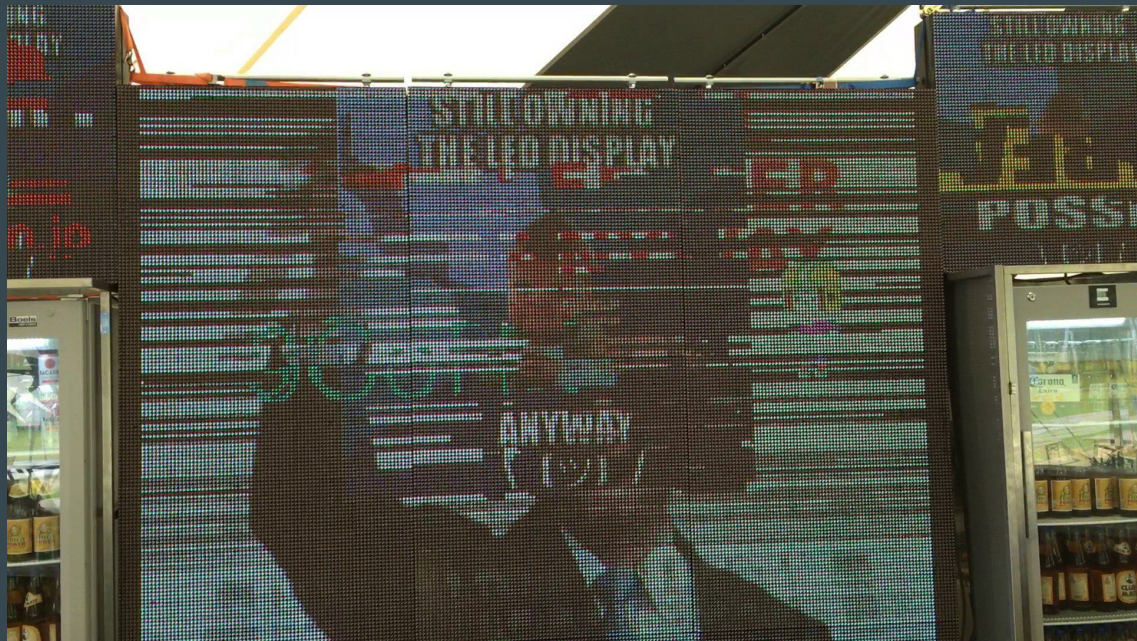


Device OS families



# Pixelflut

- LED-wall at the bar with publically network addressable LEDs
- Luckily, we deployed Fibre-to-the-Bar
- LED-wall driven by 10GE connected machine
- Peaking a 4Gbit/s



# Lessons learned: Deployed heavily routed network

- We are dependent on hardware donations (thanks Booking.com & Cumulus!).
- Mostly data centre switches available.
- Route early, route often. Routing at every datenklo.
- Different from previous events.
- IPv4 /24 subnet + /64 subnet per datenklo
- OSPFv2 & OSPFv3
- Only WiFi had layer2-stretching requirements - Solved by deploying Aruba APs with tunneling features.

This concept worked well!



# Lessons learned: white-label switches (1)

- Used white-label switches (Trident+, Trident2 & Tomahawk) for first time on an event running CumulusLinux
- Cumulus syncs state in Linux kernel (routing, bridging, iptables) to Broadcom hardware
- Worked well for us as distribution routers & data centre switches
- MC-LAG with VRR (which we deployed in our Orga-network) worked solid
- Quagga crashed when using OSPFv3. Replaced with BIRD.

## Lessons learned: white-label switches (2)

- Control plane of Tomahawk switches did not handle routing of /19 public IPv4 subnet for WiFi too well. High load due to excessive number of ARP / IPv6 ND requests.
- Resulted in BIRD dropping its OSPFv3 adjacencies
- We had to move this subnet to the on-site Juniper MX240.



# Lessons learned: Automation

- Automation & docu is important when build up & preparation time is limited:
- Config generation & provisioning for Cumulus, Arista, Juniper & HP Prokur..
  - Really needed with “Route early”-setup
  - Integration with NetBox IPAM
  - Generate parseable topology from Draw.io diagrams
  - Limited use of Ansible on Cumulus switches
- Employing Git (powered by Gogs) for sharing docu, scripts & issue tracking



Some of our docu & scripts are available at  
<https://github.com/sha2017/noc>

Many services/hardware cannot be bought or  
rented for money - our sponsors:

- Uplink/housing: NTT Communications, Core-Backbone, SURFnet, NL-ix, UNET, Nikhef
- Hardware: Juniper Networks, Cumulus Networks, Flexoptix, HPE/Aruba Networks, BIT, Babel, Edgecore Networks, Booking.com, Chaos Computer Club, EMF

Do have you old/spare hardware to donate?  
Want to volunteer at events like this? Looking  
for hardware for your event? Check:  
<https://eventinfra.org>

# Thanks!

