Arnes NOC
TF-NOC flash presentation

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ARNES as a network

- PoPs: 55 in 51 cities
- Datacenters: 2
- Organisations/locations connected: 1483

<table>
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<tr>
<th>Type</th>
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<td>Research</td>
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<td>Culture</td>
<td>256</td>
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<td>.gov</td>
<td>27</td>
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Arnes as a team – NOC and BB

- backbone team – 5 engineers
  - backbone
  - datacenter infrastructure
  - PoPs
  - SIX

- Access team – internally called NOC – 8 engineers
  - access connections
  - CPE distribution and config
  - ACLs, QoS
ARNES - optical backbone
ARNES - L3 connections
Network – fibre + equipment

- backbone
  - leased fibre
  - ADVA DWDM
  - CWDM and BiDi SFP+
  - Juniper + Cisco

- access
  - state owned dark fibre to 750 locations
  - leased fibre
  - xDSL/ethernet and other VPN solutions from ISPs
  - Cisco CPEs
Network – services and tools

- services
  - connectivity (IPv4, IPv6, L2 VPN (P2P))
  - eduroam
  - DHCP
  - security/ACLs
  - QoS
  - maintaining CPEs

- tools used
  - Cacti, Kibana, Grafana, Elastic Search, Icinga, NetDOT, Ansible, Napalm, many home-grown scripts
NOC structure - roles, coverage and responsibility

- backbone
  - engineer on-call 24/7
  - backbone
  - datacenter
  - some major customers (UNI, some institutes, .gov)
  - SIX

- access
  - first and second level from 8:00 till 20:00 (helpdesk)
  - third level from 8:00 till 16:00 (NOC)
  - ACLs/filters, QoS, IPREG
  - troubleshooting
  - brokering of connections
NOC structure/tools

- scripts – lots of them, developed in-house
- Ansible – mass upgrades and config changes
- In development:
  - Central network database including device config – ANSO
  - dashboards (TV)
Front end – users and SLAs

- Users
  - preschool, primary and secondary education
  - universities and research institutes
  - libraries, museums, archives, state galleries
  - .gov

- Agreements, SLA
  - no SLAs towards our customers
  - a signed agreement with each organisation
    - complete and correct organisation and contact data
    - sort of a contract „you are a member of ARNES“
Inter-NOC communication

• internally
  • OTRS, mail, phone, jabber, walk-in 😊

• outside
  • OTRS, mail, phone (and walk-in, sometimes 😊 😊)
Documentation – what and how

• trying to document everything
  • states and procedures
  • work in progress (very early stages 😊):
    • policies, procedures, best practices

• tools:
  • wiki (Confluence)
  • NetDOT
Documentation

- best practice documents
  - technical recommendation for network cabling and equipment (for new school buildings and for refits)
  - WiFi AP placement in schools (in progress)
- technical requirements for network equipment tenders
  - CPEs, switches
  - WiFi APs
Ongoing projects

• WLAN-2020
  • eduroam on 955 locations
  • managing LANs on locations
  • central management
    • 15,000 wifi access points
    • 2,000 switches
  • in-house network orchestration solution - ANSO
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