



TF-NOC flash presentation

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Network Infrastructure - Backbone

- Optical backbone
 - leased dark fibre
 - 53 PoPs in 30 towns
- L3 equipment (IPv4/IPv6)
 - Cisco
 - Juniper
- Optical transport
 - active DWDM: Adva
 - passive CWDM



Network Infrastructure - Backbone



Network Infrastructure - Access

- 1300 customer's LANs with L3 connections
 - Cisco routers
 - uplinks hired by customers
- Technology
 - dark or lit fiber to PoPs
 - VPN over FTTH, xDSL and CATV, via service provider's networks to main PoP in Ljubljana



Network Services

- L3 connectivity (IPv4, IPv6)
 - QoS and IP SLA
 - IP filtering (Access Control Lists - ACL)
- Point-to-Point circuits
 - L2
 - MPLS pseudo wire
 - EPL (Ethernet Private Line)
 - L1
 - DWDM/CWDM lambdas



Management/Monitoring tools

- Cacti – graphing
- Smokeping – active monitoring
- Icinga – passive monitoring
- Syslog – passive monitoring
- Rancid – configuration repository
- NDT, iperf – on-demand active monitoring
- in-house scripts:
 - routing control
 - multiple equal path detection
 - default route monitoring
- Observium – passive monitoring, in test phase



NOC structure

- Three level NOC
 - 1st level – helpdesk
 - 2nd level – network consultants
 - 3rd level – backbone experts
- non dedicated personnel
 - NOC hats are on when needed



NOC structure - Backbone NOC

- One expert available 24/7
- 3rd level support mainly for backbone and big customers (Uni-LJ, Uni-MB, IJS, GOV)
- Expertise:
 - intra and inter domain IP routing
 - switching
 - MPLS
 - optical transmission systems
 - QoS
 - performance issues (PERT)



NOC structure – Access NOC

- 1st level NOC – helpdesk
 - 5 operators – weekdays 8:00 – 20:00
- 2nd level NOC
 - 3 operators – weekdays 8:00 – 16:00
- Expertise:
 - intra-domain IP routing
 - switching
 - IPsec VPN
 - access technologies
 - xDSL, cable, FTTH, wireless



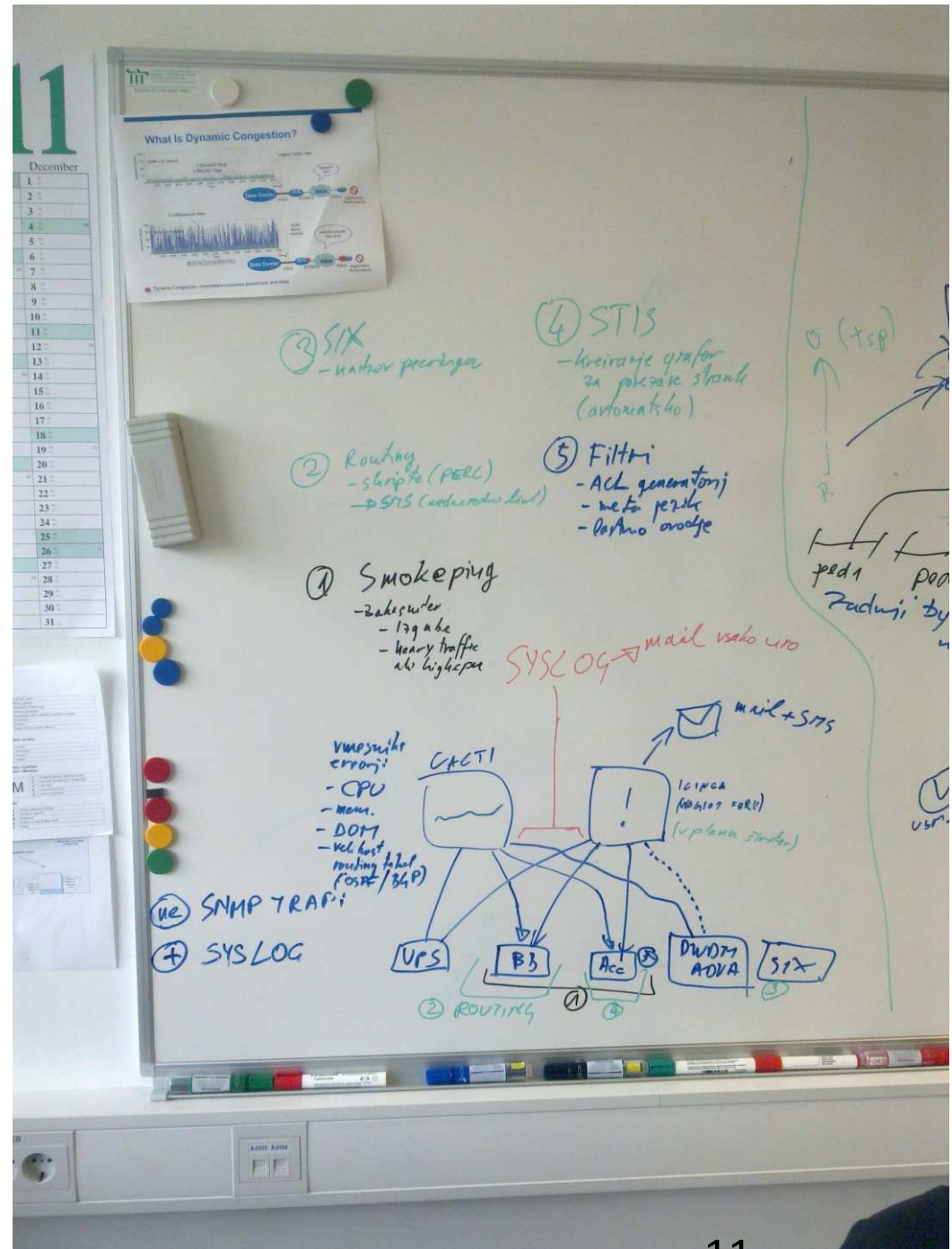
NOC structure – Joint activities

- PERT
 - Performance Enhancement and Response Team
- Backbone and Access NOC involved in:
 - operational procedures
 - net-admin procedures
 - maintenance
 - provisioning



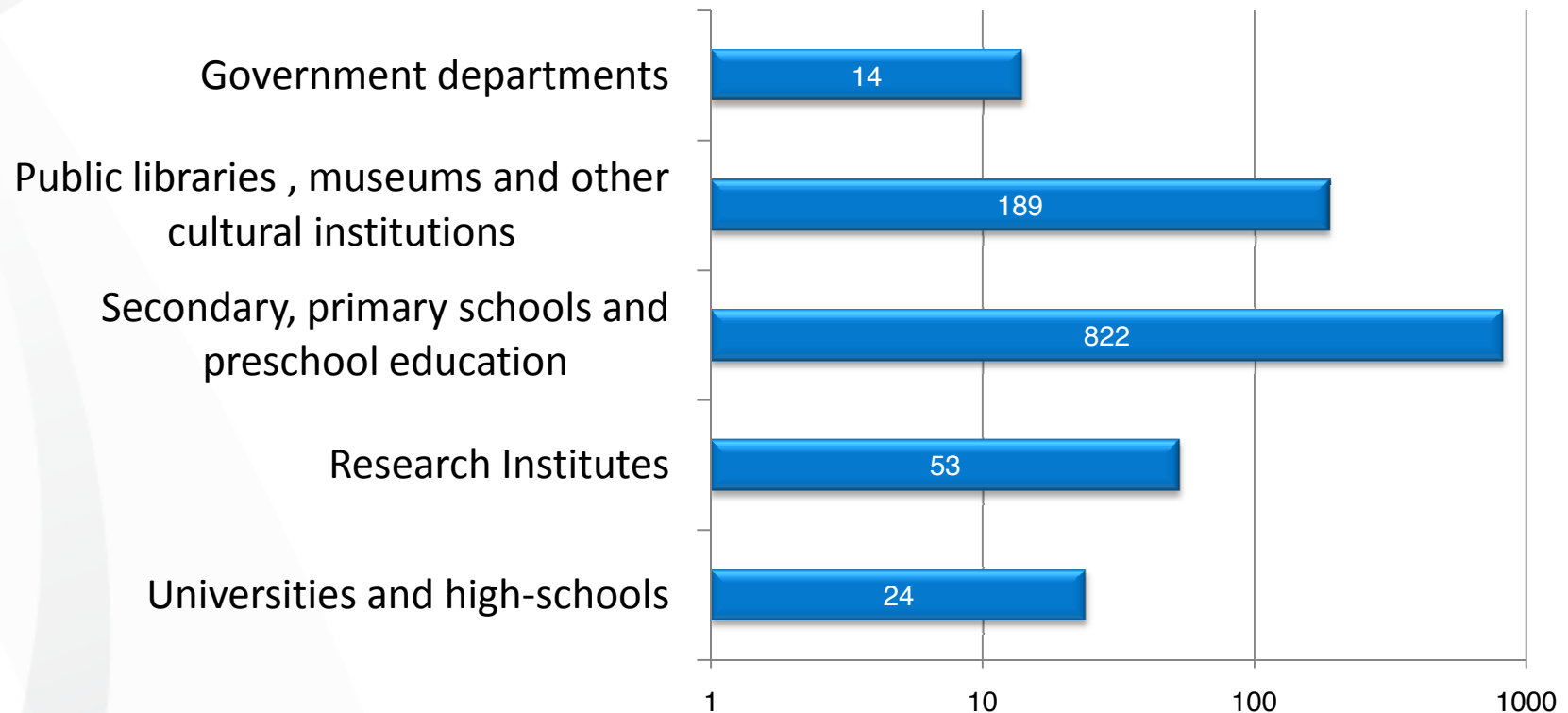
NOC tools

- All the monitoring tools
- Vi
- Big question:
 - tool integration
- Goal:
creating a common network information base and API for management and monitoring applications



Front End – Users

Number of connected customers – log scale



- estimated 200.000 end users



Front End – SLAs and agreements

- No SLA agreements
 - monitoring IP SLA parameters on some links
- We are very much interested in what is the role of other NOCs between access providers and organizations in term of SLA



Front End – Communication

- Communication:
 - e-mail
 - phone
- Keeping track:
 - Trouble Ticket – proprietary tool
 - OTRS
- Question:
 - skilled contact person on customer's side?
 - education, workshops?



Inter-NOC Communication

- Inside
 - OTRS, email, IM chat, phone
 - shouting to the nearest colleague 😊
- Outside
 - email, phone
- Inter-NOC
 - email, OTRS



Documentation – What, Tools

- Network documentation
 - organization's data (address, contacts, equipment, network information)
 - equipment configuration files
 - access provider's contact information
- Tools:
 - Proprietary information system (ARIS)
 - Wiki



Documentation – Best practice

- Mostly checklists
 - some were done for transfer of activities to 1st level support helpdesk
- Bunch of documents, but not structured (yet!).
- Short answer
 - Not enough
 - Difficult to keep up-to-date



NREN – NOC questions

- How to integrate NOC into an NREN?
- Dilemma
 - designated operators for NOC or not?

