

NOC Review 22c3

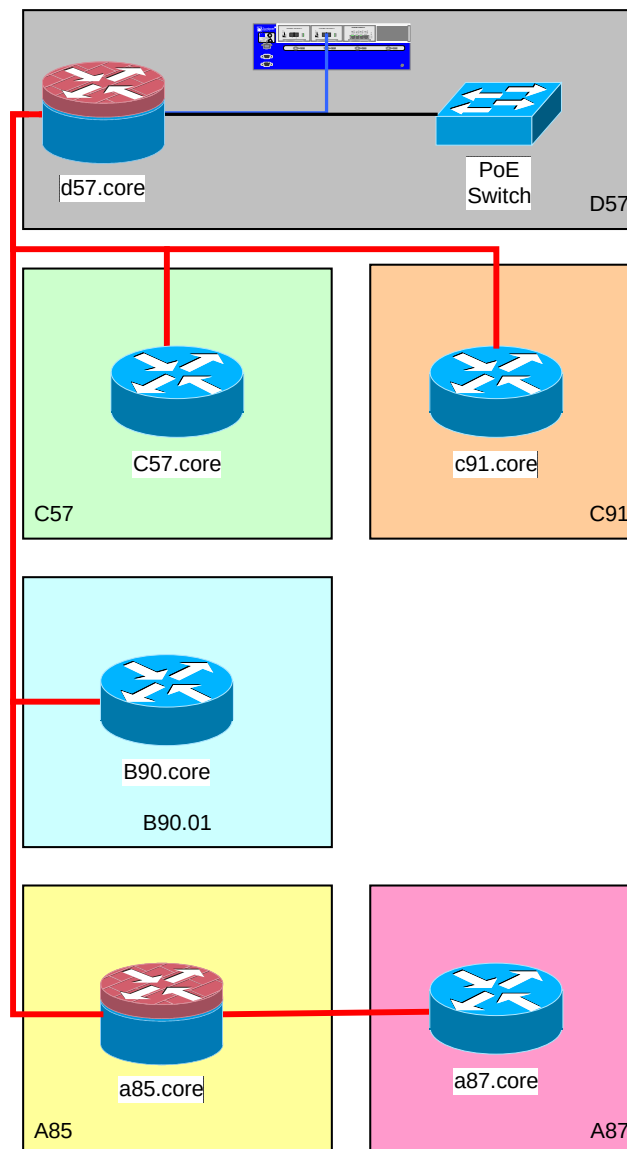
Stefan Wahl
Sebastian Werner
&
The 22c3 NOC Crew

- 21c3 Recall
- Technical Requirements
- Uplink Topology
- Network Topology
- Traffic Statistics
- Anomalies ;)
- Outlook

- Unforeseen hardware problems (Ever heard of „The *other* state“?)
- Enough LAN hardware
- In-House LAN working, but too late ☹
- Uplink worked (~600mbit avg)
- 802.11a WLAN worked „sub-optimal“
- 802.11b/g was not working
- Lack of information to guests
- Worked, but not good!

21c3 LAN Review

- 2 Cisco Catalyst 65xx Inter-VLAN routers
- About 2500 access-layer ports (HP / Cisco)
- Multi-Gbit Backbone (~4Gbit)
- 77 VLANs / Subnets
- Over 3400 DHCP leases



Requirements & Gimmicks

- High-Bandwidth LAN in entire building
- Independent Uplink with enough IPs
- „Any RJ45 Plug needs connectivity“
- Usable WLAN, especially in lecture rooms
- Simple, but redundant setup
- Native IPv6 Connectivity

Technical Implementation

- 10 Gbit In-House Backbone
- Many small Layer 2 domains (VLANs)
- Distributed Inter-VLAN routing
- Switching and Routing devices
- Multiple Internet Uplink Providers
- Centralised WLAN-Switching
- Various Vendors

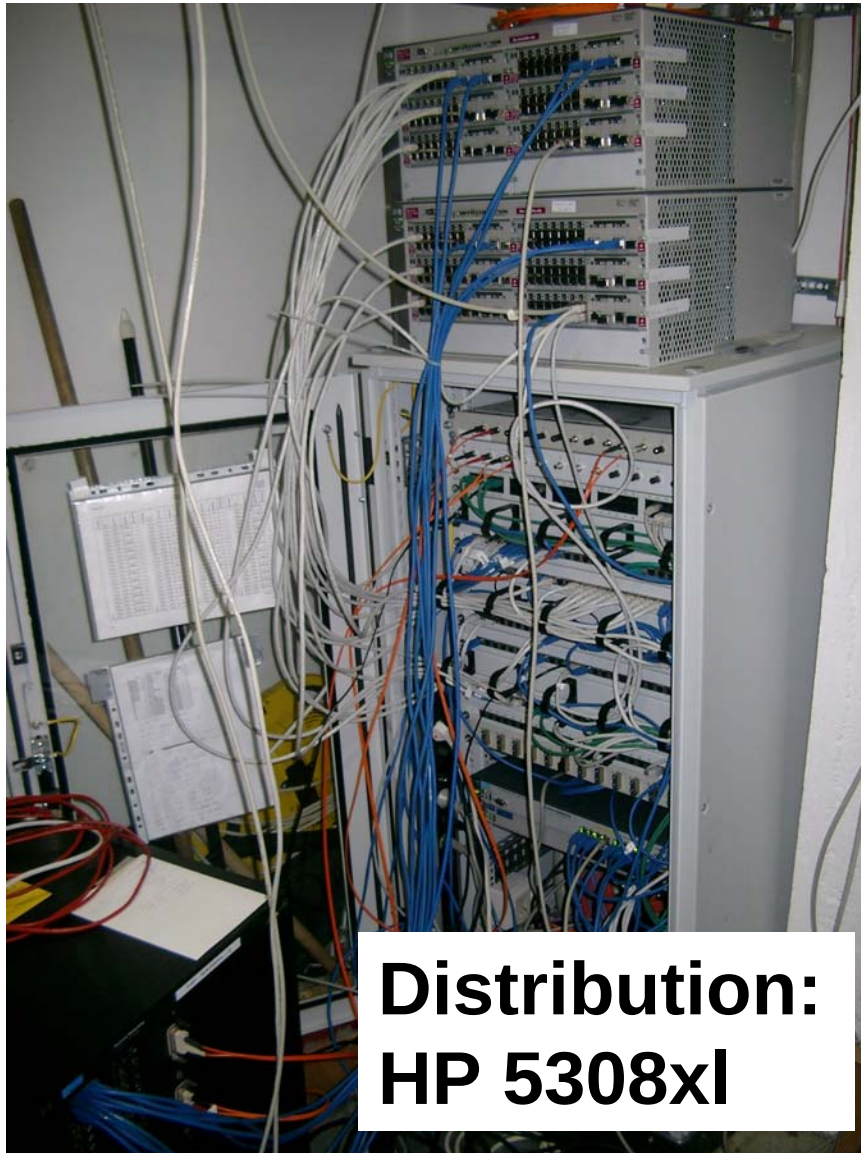
In-House LAN

- Access-layer switches: **HP 3400cl**
- 8x **HP 5308xl** Aggregation Switches
- 10 Gbit Backbone with Foundry BigIron and **HP 9408sl** Hardware
- Interconnection via 10Gbit Fiber Optics

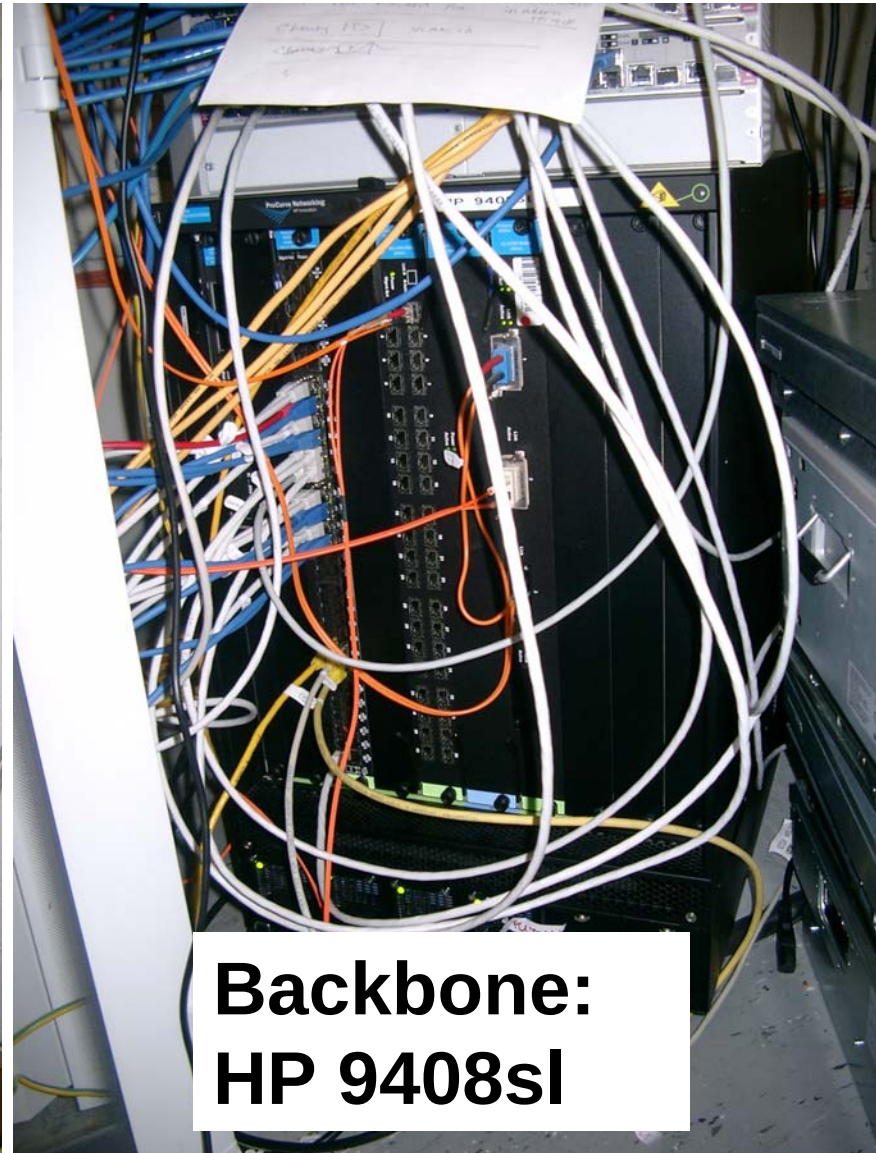
Routing is done by the HP9408 layer!
Worked excellent!

Hard-Facts :)

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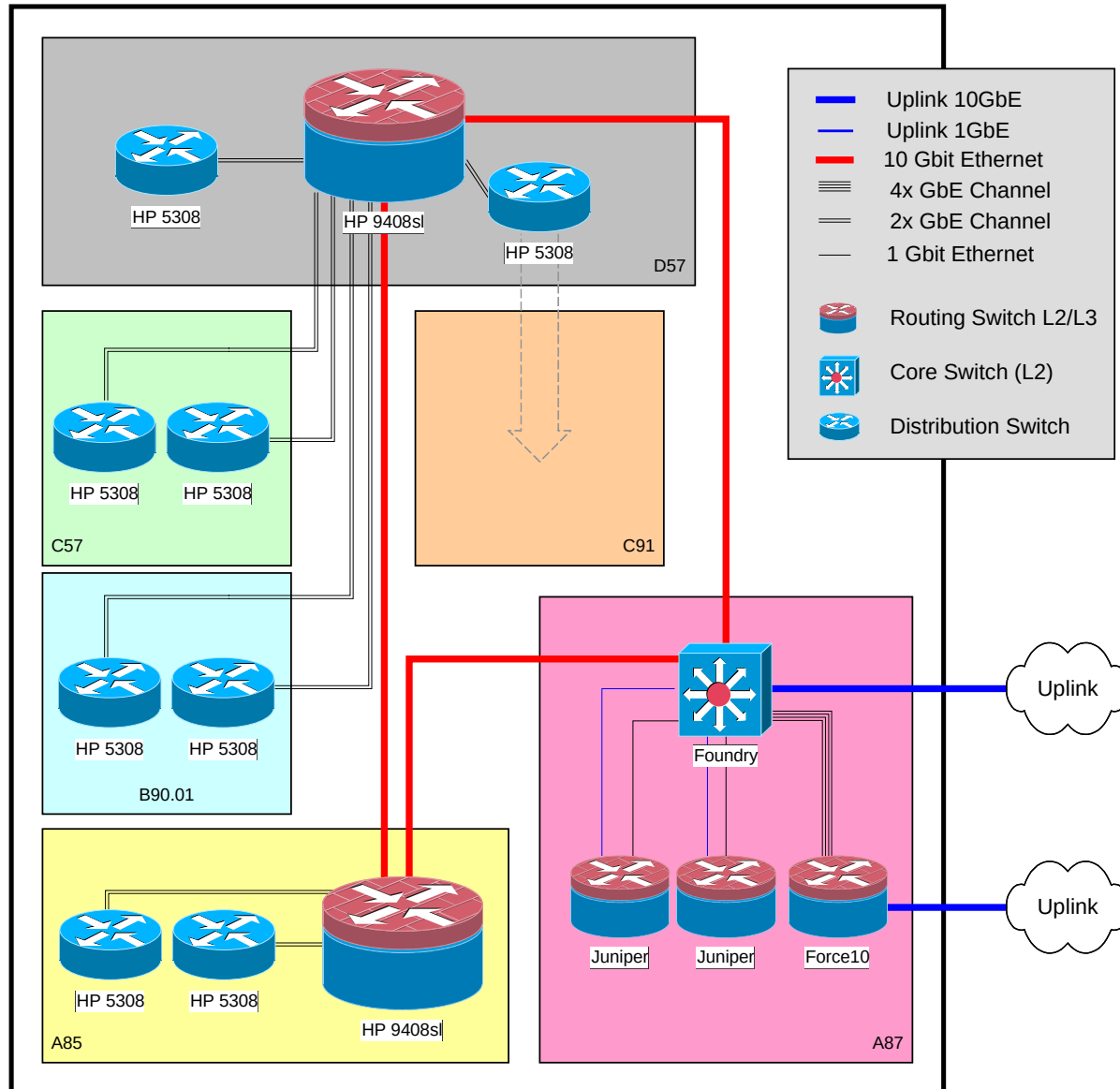
**Distribution:
HP 5308xl**



**Backbone:
HP 9408sl**

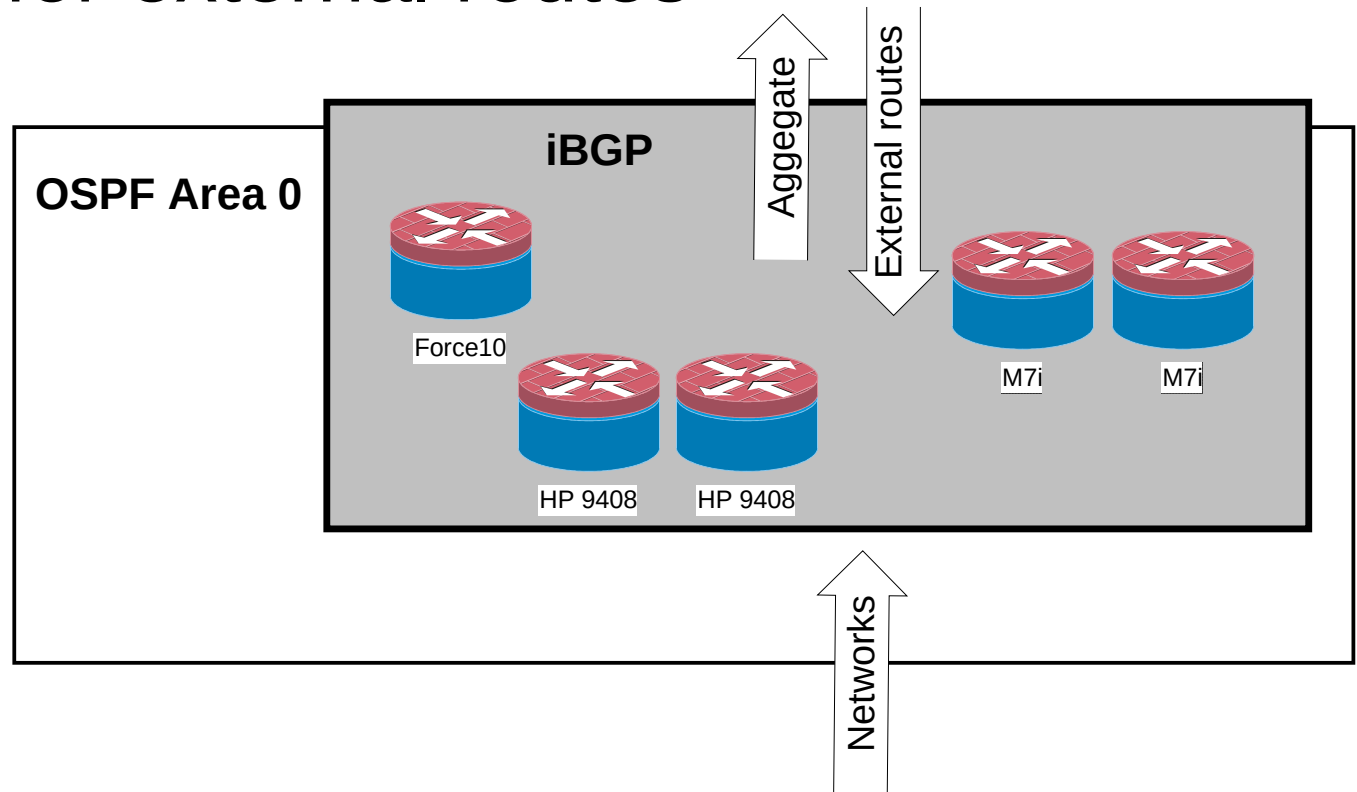
Network Setup 22c3

NOC Review 22c3



Implementation – OSPF / iBGP

- All routers speak OSPF for connected networks
- iBGP for external routes



Internet Uplink

Uncomplicated step-by-step recipe!

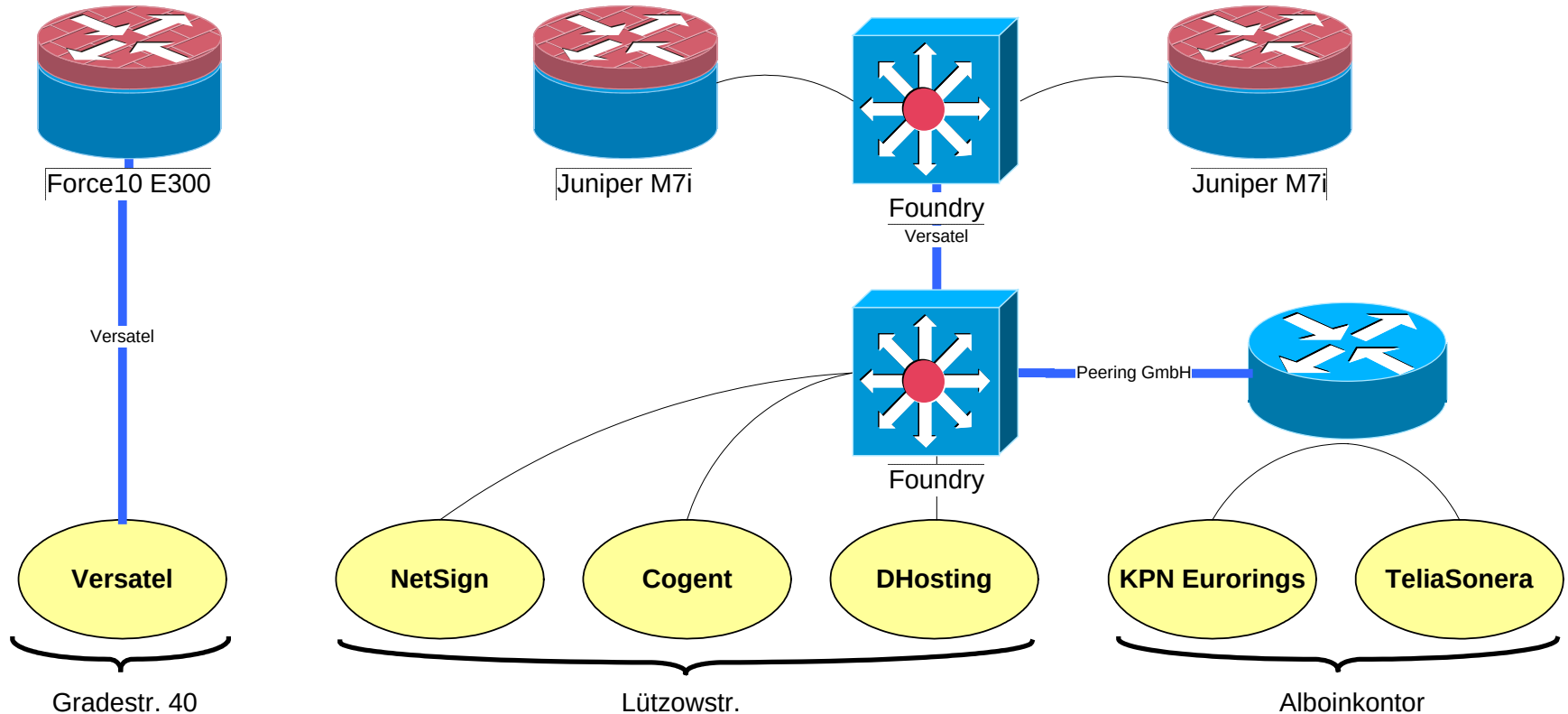
1. Socialising with Carriers
(e.g. RIPE, De-CIX Meetings)
2. „Hackers are NOT evil!“
3. Burocratical stuff
4. Setup before christmas

Uplink Implementation

- 2 Uplink Fibers to BCC (by Versatel)
- Both „enlighted“ with 10 GbE (!)
- Link 1 carries Versatel IP-Transit
- Link 2 carries other IP-Transit
- All uplink routers are in BCC
- Transfer networks get VLAN trunked from all over Berlin

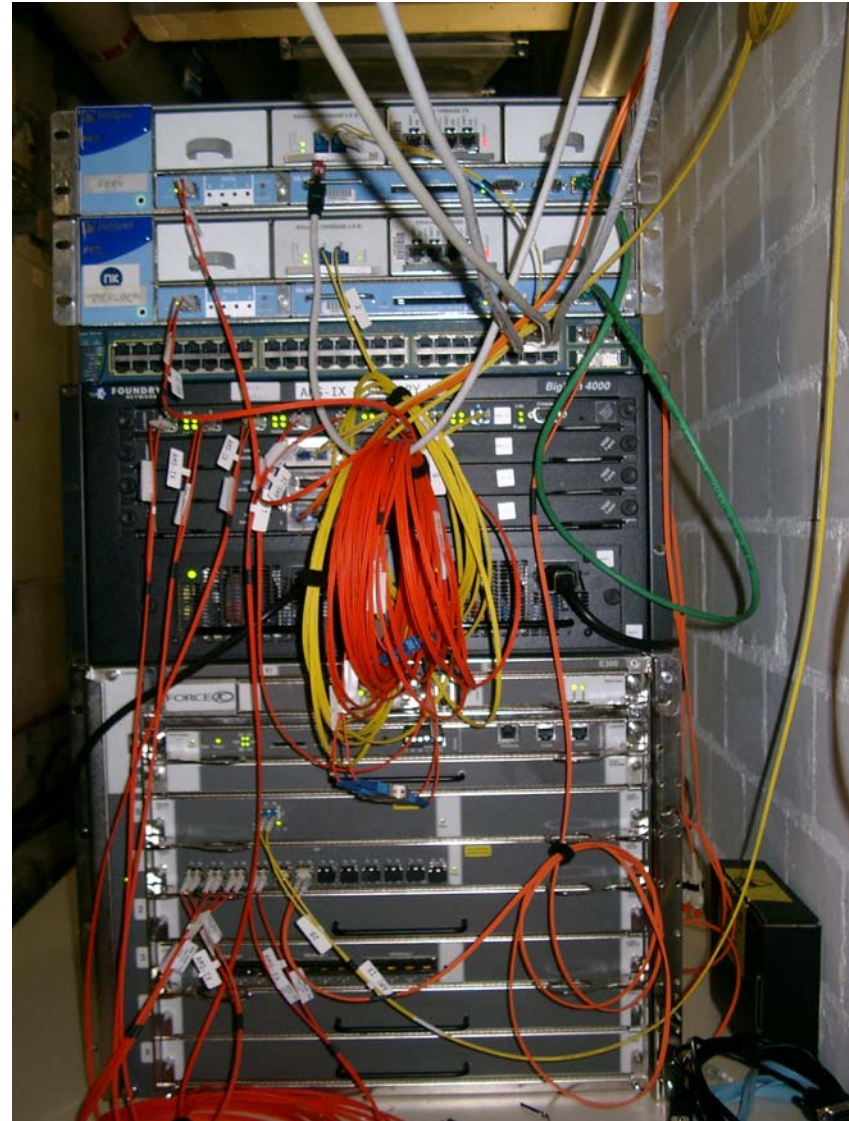
Uplink Topology

- Foundry as Layer-2 „Workhorses“
- Co-Lo Space in Lützowstr., Alboinkontor and Gradestr. terminating peers



Uplink Hardware

- 1x Force10 E300
 - 1x 10GbE LR
 - 12x 1GbE Gbics
 - 24x 10/100/100
- 2x Juniper M7i
 - 1x Gbit SFP
 - 1x Gbit PIC
 - 4x 10/100



- IP-Uplink with high bandwidth (1-10Gbit)
 - 1x 10Gbit Versatel
 - Nx 1Gbit CogentCo, KPN, Telia
 - Mx 100Mbit Dhosting, NetSign
- Different speed and several providers in IP-Uplink needs

Traffic engineering!

Balancing via LocalPreferences

- Direct Peers get LocalPref 500
- PeerOfPeer get 200, but 300 at *Versatel*
- Special Paths known to be fast, get LocalPref of 400 (e.g. Berlin Peers via DHosting)
- Prepend *Cogent* twice, *Telia* once

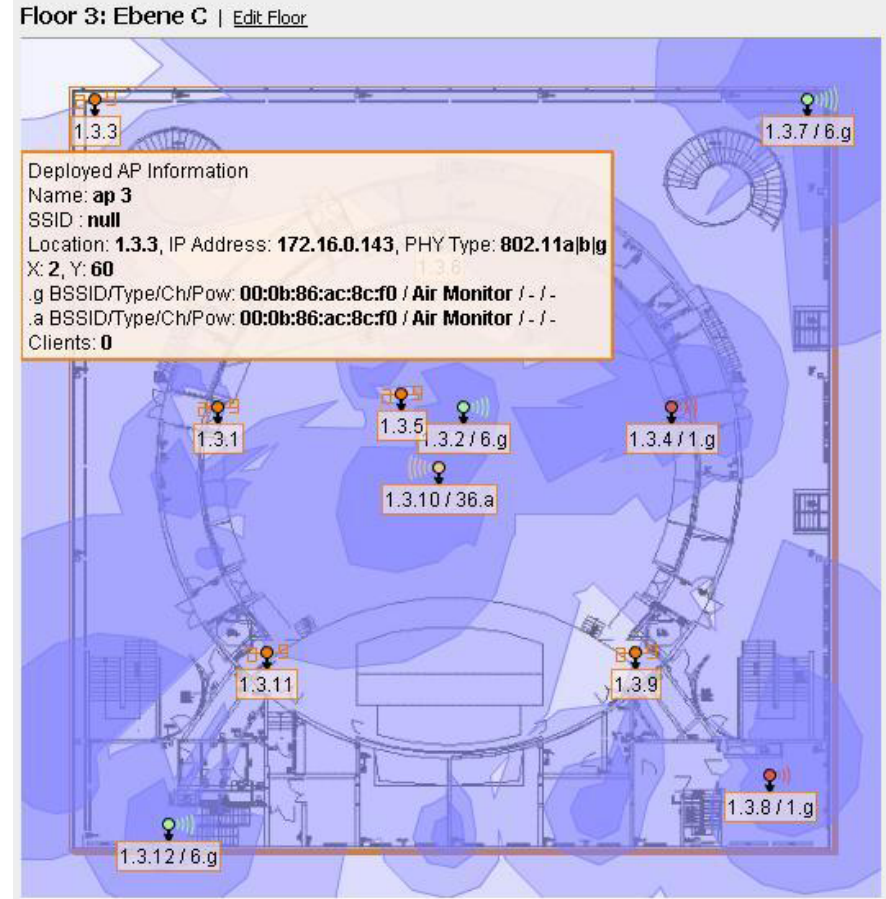
➔ **Outbound Traffic nicely distributed!**

Wireless LAN

- Complete solution from Aruba Networks (2400 switch and 38 APs)
- Worked at Defcon & Blackhat in 802.11a/b/g
- Centralised „WLAN-Switching“ architecture
- Detection and Defense of rogue & fake AccessPoints, MitM attacks, Ad-Hoc networks, ...

Special Features

- Automatic radio calibration and heatmaps
- Triangulation of Access-Points
- Planning tools



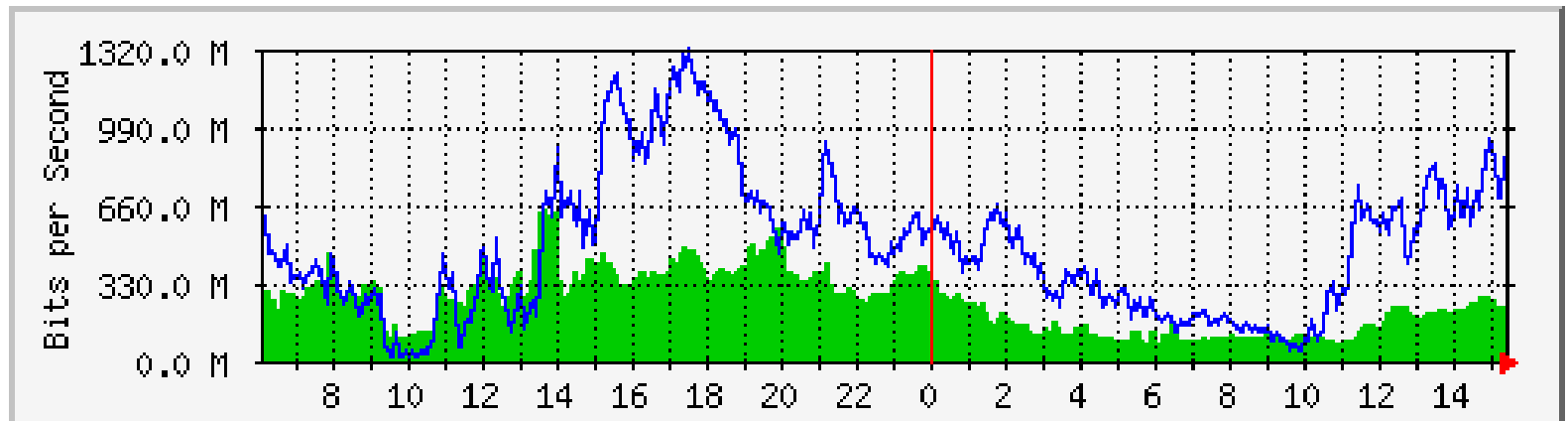
Conclusion: Average users: 350 day, 130 night,
User peak: 509 users!
➔ WORKED!

Statistics

The Wiggly Lines

- 2342 client ports ($48 \times 48 + 38$)
All had Gigabit capability!
- 40 subnets / VLANs (/20-/24)

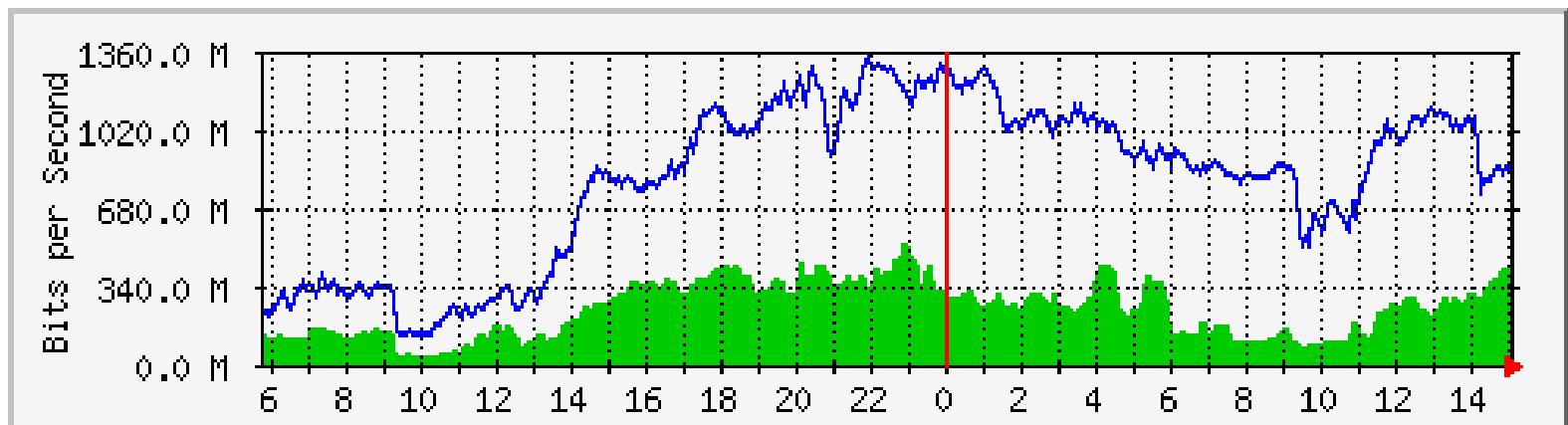
10GbE Link A-D Level



Detailed stats @ <http://mgmt.congress.ccc.de>

Uplink Traffic

- **Average** 802 out / 233 in Mbit/s
- **Peak** (5min) 1325 out / 526 in Mbit/s
- **Σ Traffic** ~40TB out / ~ 10TB in



Details of Traffic Distribution per Peer @
<http://mgmt.congress.ccc.de/uplink>

- Channeling and Trunking – Endless story
- MAC aging times
- Forwarding engine of one Juniper died
- Some DoS Attacks & Defacements triggered Abuse-Phone
- Many, many rogue Access-Points

- What hardware?
- Bigger or a step back?
- Same building or new one?
- Wire(less|d) LAN?
- So much uplink, or less effort?

Hooray! They helped us!

- **Hardware**
 - Hewlett-Packard ProCurve Networking
 - Foundry (AmSIX)
 - Juniper Networks (NK Networks)
 - Force10 Networks
 - Aruba Networks
- **Uplink connectivity**
 - Cogent Communications
 - Dhosting
 - KPN Eurorings
 - Netsign
 - Telia Sonera
 - Versatel

Thanks for your attention!

Questions or Suggestions?!