

ETHZ IP-Network

Dordaneh Arangeh

Derk Valenkamp

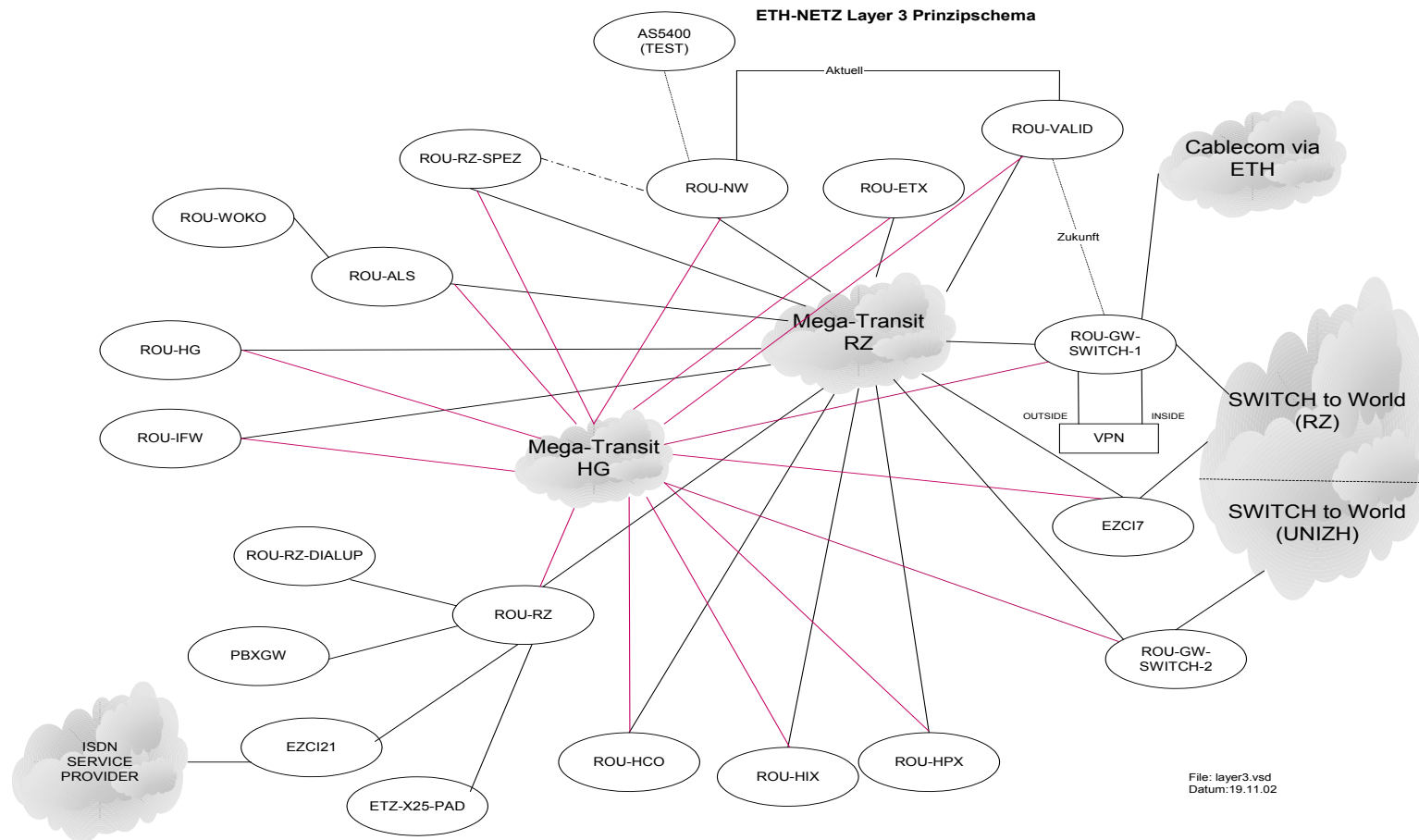
Agenda

- Network Topology
 - Backbone
 - VTP Domains
 - Internet Connection
 - Facts and Figures
- Connection through the ETHZ Docking
- Services around the Network
 - Network Management
 - Tools
 - DNS
 - DHCP
 - Database
 - Challenges

Backbone

- 2 switches where the routers (12) are connected with gigabit or fast Ethernet.
- routing protocol: OSPF
- No features are implemented in the BB to get the highest availability.
- Multicast enabled.

ETHZ-BB Diagramm



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OSPF

- Linkstate Protocol
 - In a OSPF domain there is no route filtering possible
 - CPU intensive
- Routing decisions based on costs
($100\text{Mbps}/\text{Bandwidth} = \text{cost}$)
- On Cisco routers are up to 4 equal paths allowed for load balancing.
- All inter Area traffic must go through the Backbone Area 0

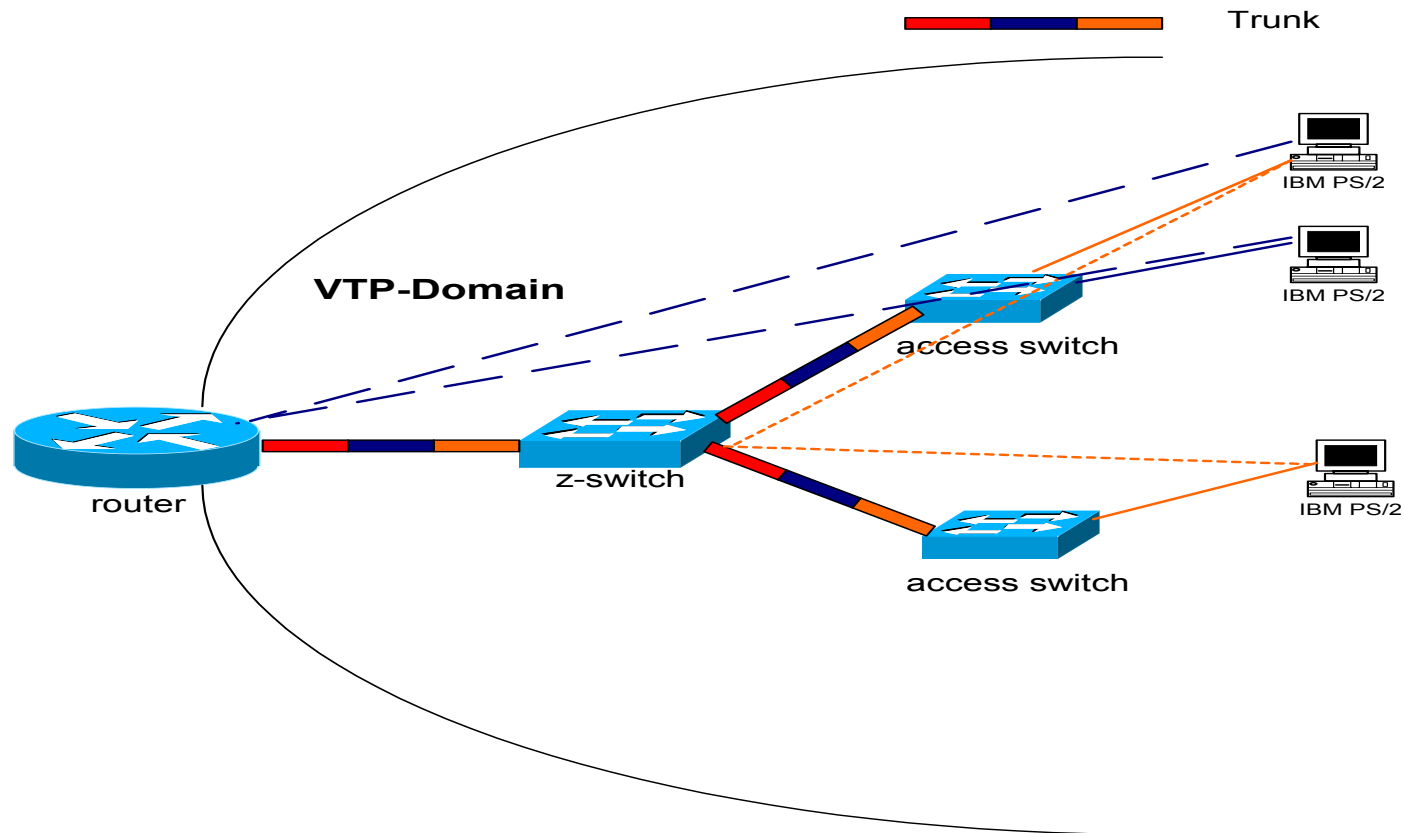
Access

- Star topology (loop free)
 - max. 3 Switches between Client and Router
- 1 VTP Domain per Router
- The switches are connected with 2 Gigabit Ethernet optical links (Gigaetherchannel).
- The clients are connected with 10 or 100Mbps Ethernet.
- 1 VLAN (subnet) per Department

VLAN; VTP

- VLAN = virtual LAN
 - Layer 2 communication within a VLAN
 - Layer 3 communication between VLANs
- VTP = Virtual Trunk Protocol (Cisco-proprietary)
- VTP Domain: Area where VLAN information is spread. (Cisco-proprietary)
- Trunk = Ethernet link which transports different VLANs

VLAN; VTP



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Internet Connection

- 2 Gigabit Ethernet links to SWITCH
- One is active, the other is only for backup.
- BGP and MBGP routing between SWITCH and ETHZ.
- Peer to Peer is limited to 10 Mbps
- Not all tcp and udp ports are allowed for communication to the internet.

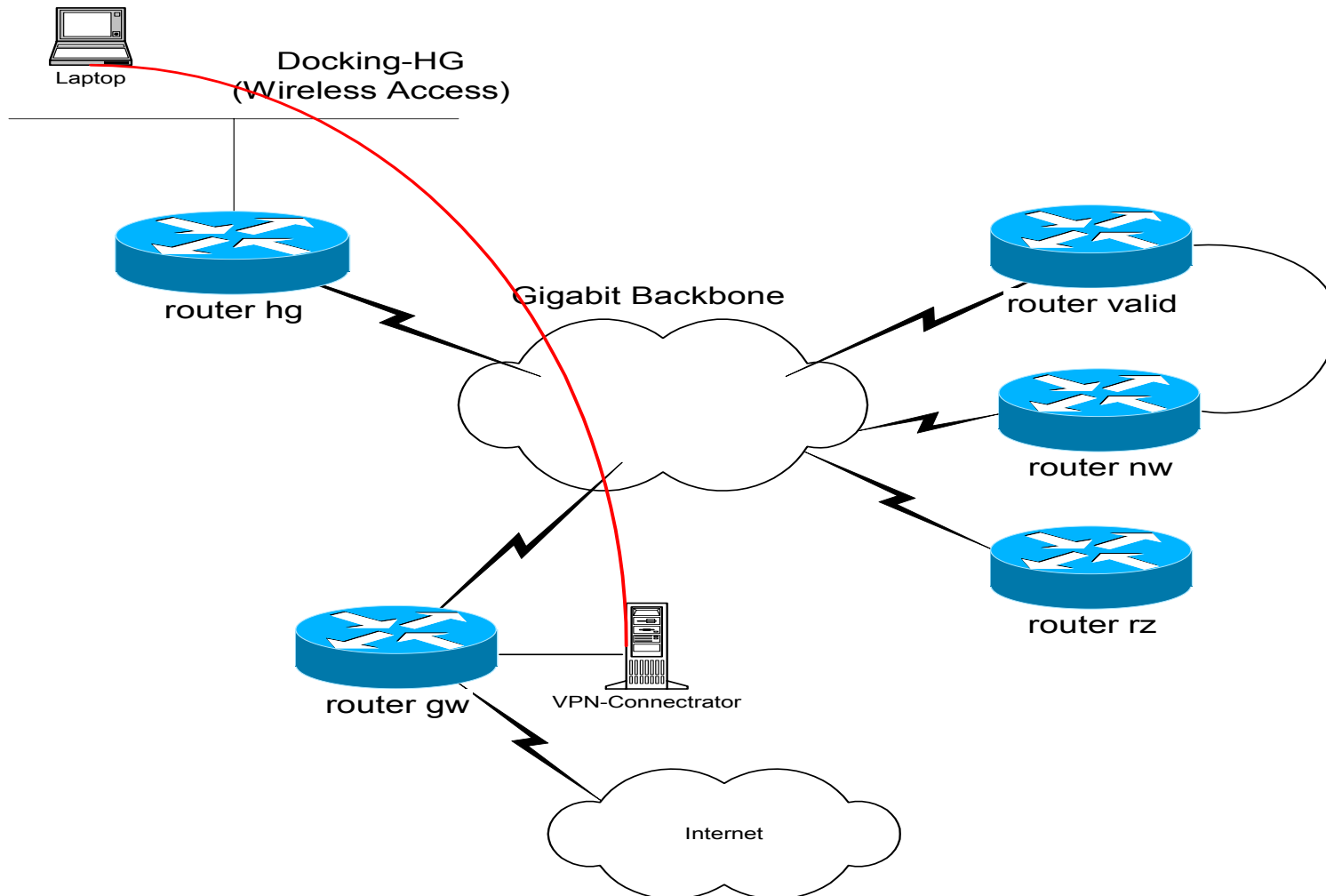
BGP (MBGP)

- Distance Vector Protocol
- Peers have to be configured. (TCP)
- Routing decisions are mainly based on:
 - AS-path
 - Lokal distance (configured by administrator)
- MBGP is needed for Multicast RPF-Check

Facts and Figures

- 25 Routers
- 324 Switches
- 34400 Ports
- 728 Subnets
- 561 VLANs
- 44213 registriert IP-addresses
- 139 Wireless Access Points
- 179 Buildings

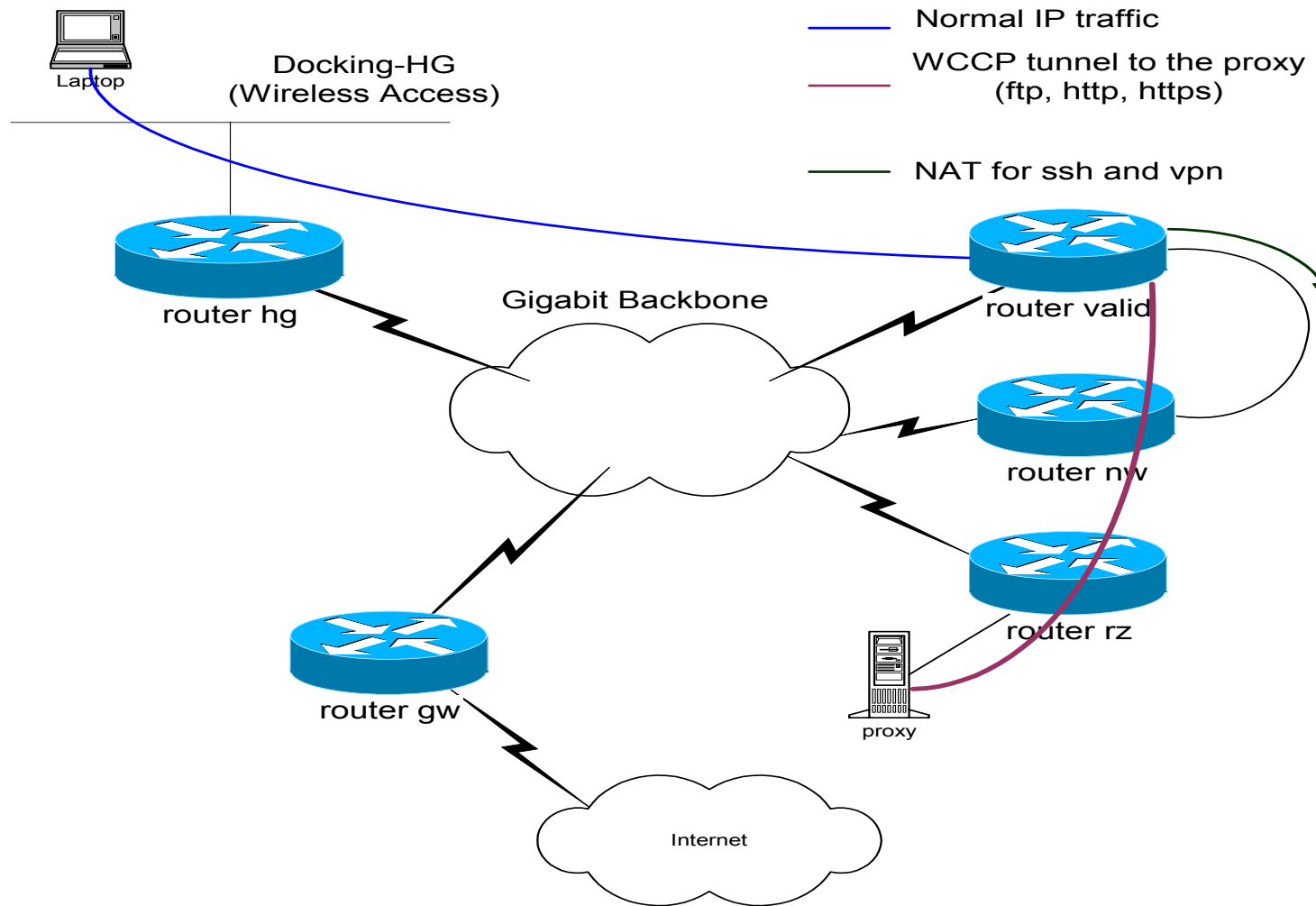
Docking Net (VPN)



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Docking Net (Valid)



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Network Management Areas

- Fault and Problem Management
- Performance Management
- Configuration and Change Management
- Accounting Management
- Security Management

Network Management in Practice

- Network Audit
- Network Performance
 - Availability
 - Response Time
 - Accuracy
 - Utilization
- Thresholding
- Events
- Network statistic and Data Manipulation
- Technologies: SNMP, RMON, etc.

Tools

- HP OpenView NNM
- CiscoWorks2000
- ACS
- DB-related Tools:
 - JOM + TOM
 - IP-Tool
 - Network

DB

- Network Data (static , 2-3 Mio. instances, 2 GB)
 - TOM/JOM
 - IP
 - „Network“
- Live Data (dynamic, 50-60 Mio. Instances, 15 GB)
 - Port statistic
 - Syslog

DNS

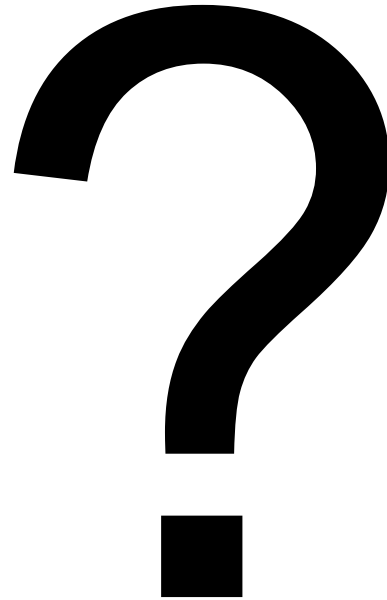
- 3 Main DNS (Domain Name Server)
 - DNS1 : Zentrum
 - DNS2 : Elektrotechnik
 - DNS3 : Hoenggerberg
- External Domains on dns-ext1
- All DNS secondaries of DB-server, Data are updated first in DB

Dynamic Host Configuration Protocol DHCP

- PCs must not be configured one by one
- Flexibility in Network regarding changes such as subnet address, subnet size, etc.
- New services such as WINS or DNS servers can be activated without changing PCs configuration
- Mobility
- Saving IP-Addresses

Challenges

- Connectivity
 - Interconnectivity
 - Interoperability
- Reliability
- Network management
- Flexibility
- Security
- Performance



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