



Network Architecture

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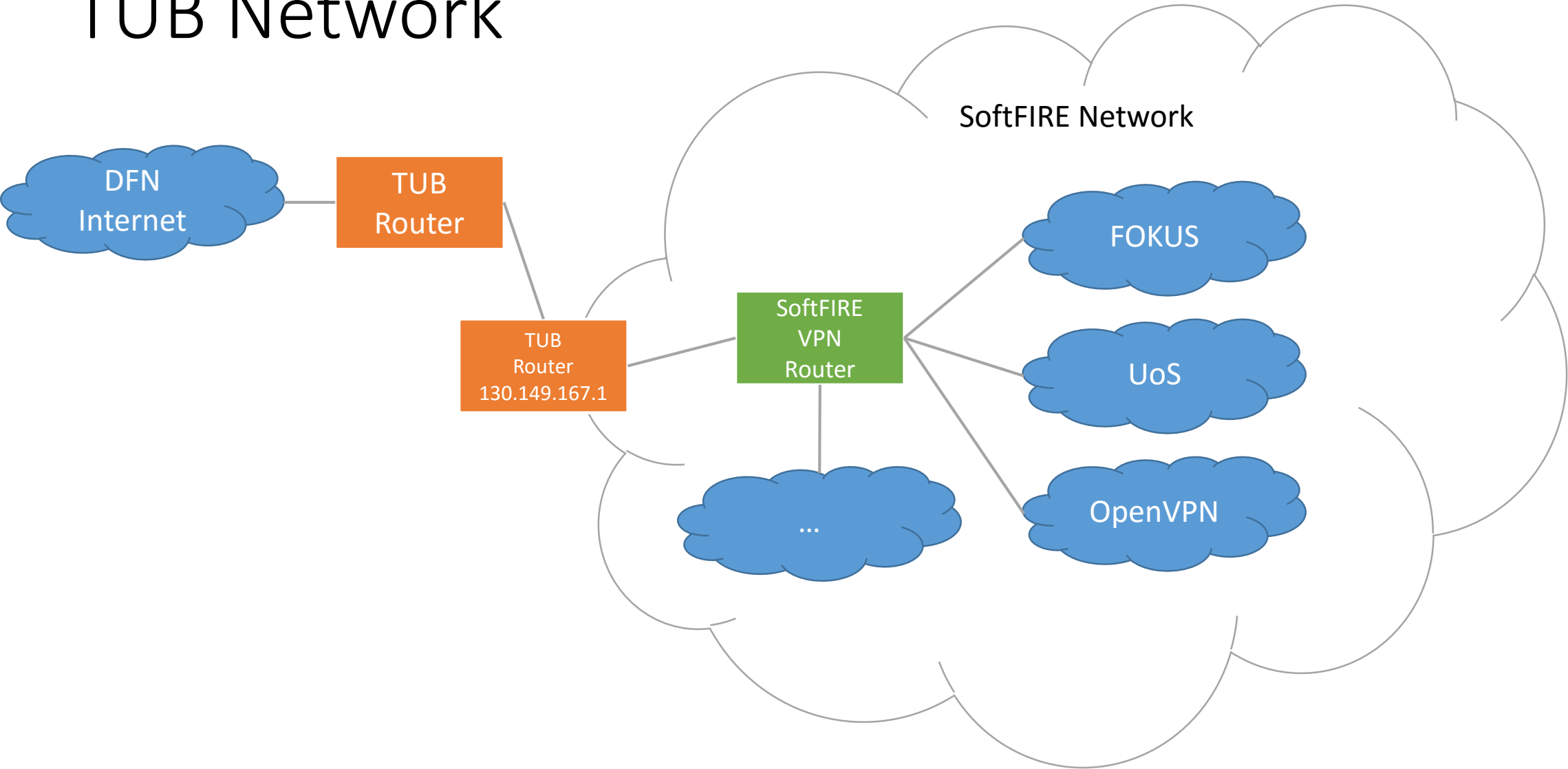
SoftFire network

- VPN with star topology
 - Central HUB is located in TU-Berlin
 - IPSec IKEv1 encryption
 - Optional GRE tunnel for routing
- Experimenter VPN
 - OpenVPN server located at TUB
 - Certificate Authentication
- 1+ subnet for each Testbed
- Internet access for experiments
 - provided by some testbeds
 - Whitelist based
 - NAT or Proxy
- Extra Features
 - 5G RAN at UoS
 - SDN components at some Testbeds

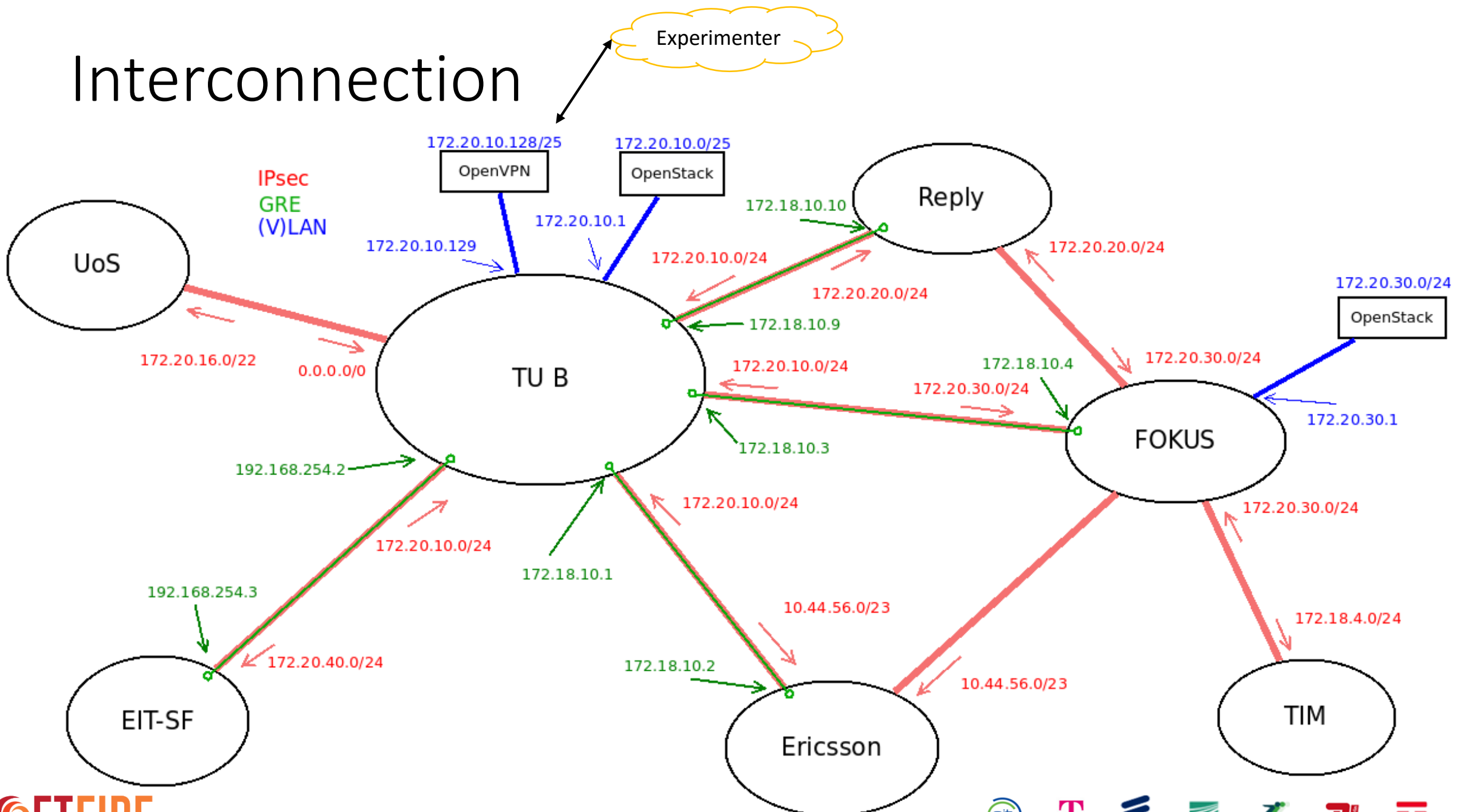
IP Subnet Addresses

Partner	IP Subnet(s)
FOKUS	172.20.30.0/24
TUB	172.20.10.0/24
Ericsson	10.44.56.0/24 10.44.57.0/24
UoS	172.20.16.0/24 (10.5.20.0) 172.20.17.0/24 (10.5.21.0) 172.20.18.0/24 (10.5.22.0) 172.20.19.0/24 (10.5.23.0)
TI	172.18.4.0/24
EIT-SF	172.20.40.0/24
Reply	172.20.20.0/24

TUB Network



Interconnection



IPSec & GRE

- IPSec IKEv1 supports only one flow per connection
- IPSec IKEv2 allows multiple but is not everywhere available
 - Can't use v2 and v1 in parallel
- Additional GRE tunnels used for routing multiple subnet via a single IPSec connection
 - „UoS reaches Ericsson via TUB“
- GRE Tunnel can be terminated directly on the OpenStack controller (used by Ericsson)

Benchmarks

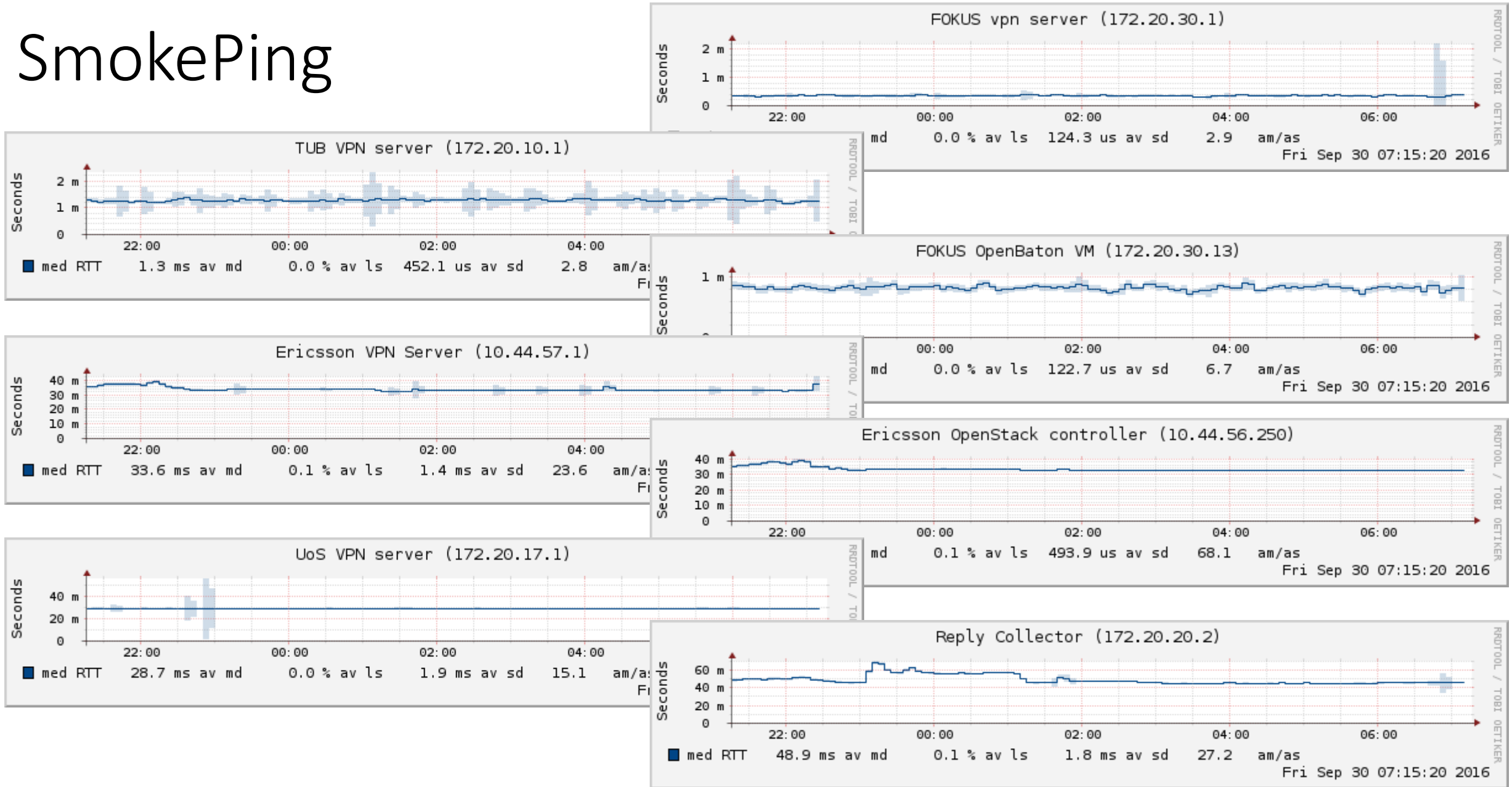
TCP bandwidth (iperf)

- TUB<->FOKUS: 71.8 M
- TUB<->UoS: 5.12 M
- FOKUS<->UoS: 6.5 M
- FOKUS<->TIM: 70 M

Ping latency

- TUB<->FOKUS: 2 ms
- FOKUS<->UoS: 28 ms
- FOKUS<->TIM: 39 ms
- ER <-> FOKUS: 33 ms
- FOKUS<->Reply: 48 ms

SmokePing



FOKUS Testbed

