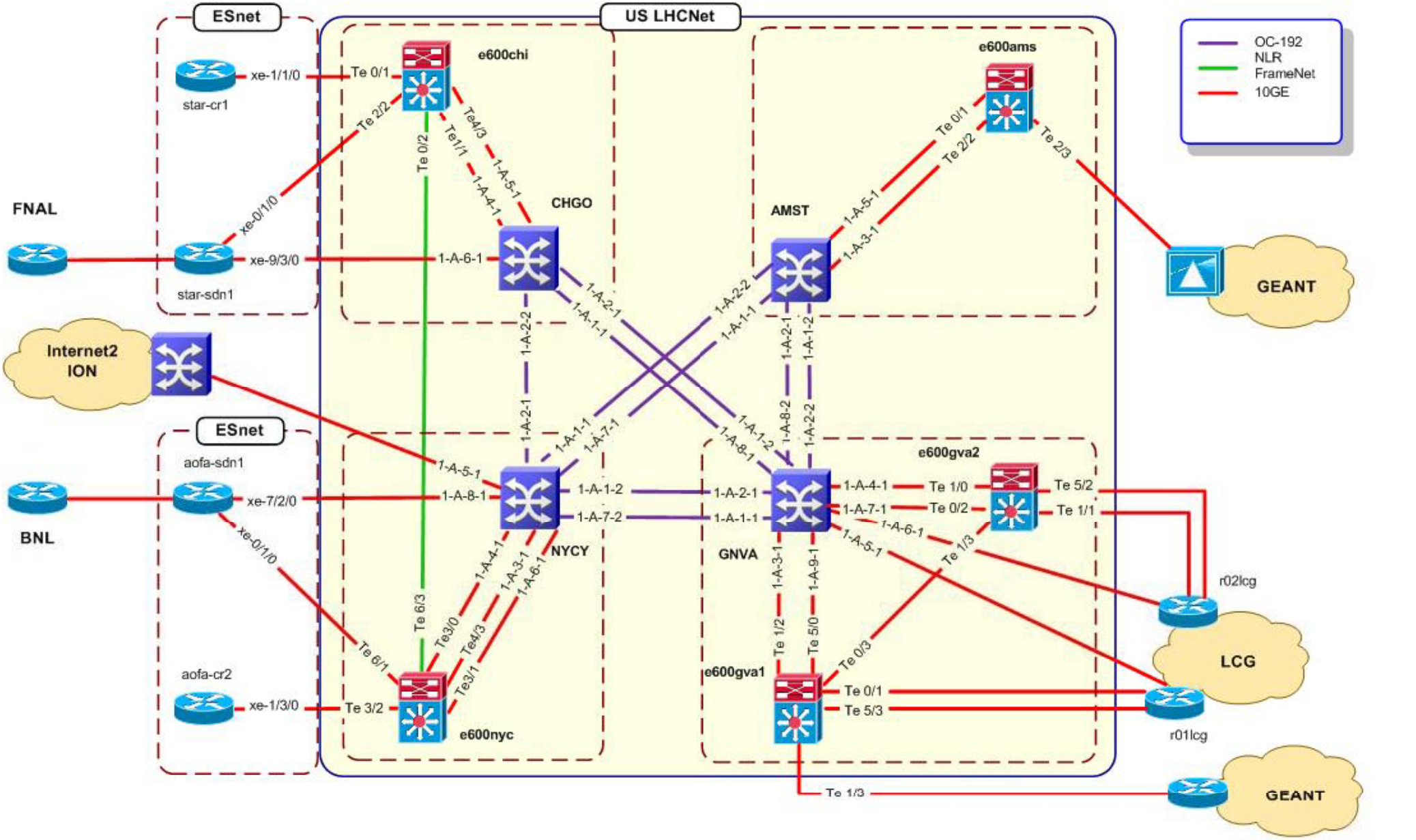
TF-NOC flash presentation

Sándor Rózsa
US LHCNET

Network

- **US LHCNET mission – providing CERN T0 and US T1 network connectivity**
- **Transatlantic network managing multiple leased OC-192 lines**
  - 6 transatlantic OC-192 links
  - 3 continental OC-192 links
- **Layer 2 and Layer 3 services**
  - E2E protected layer 2 services
    - VCAT/LCAS over SONET
    - Mesh restorable
  - IP services: IPv4 and IPv6
    - IPv4 and IPv6 access for LHC related projects
  - Dynamic circuit services
    - OSCARS
    - ION
  - Additional services
    - DNS
    - E-mail

The network


ESnet
US LHCNet
OC-192
NLR
FrameNet
10GE
e600chi
e600ams
star-cr1
xe-1/1/0
Te 0/1
Te 2/2
Te 0/2
Te4/3
Te1/1
1-A-5-1
1-A-4-1
CHGO
AMST
FNAL
xe-0/1/0
xe-9/3/0
1-A-6-1
star-sdn1
1-A-2-1
1-A-1-1
1-A-2-2
1-A-1-2
1-A-8-2
1-A-7-1
1-A-8-1
1-A-3-1
Te 2/3
GEANT
Internet2
ION
ESnet
aofa-sdn1
e600gva2
1-A-5-1
1-A-8-1
1-A-1-2
1-A-7-2
1-A-2-1
1-A-1-1
1-A-4-1
Te 1/0
Te 0/2
Te 5/2
Te 1/1
1-A-6-1
1-A-5-1
Te 1/3
BNL
xe-7/2/0
xe-0/1/0
NYCY
GNVA
r02lcg
LCG
1-A-4-1
1-A-3-1
1-A-6-1
Te 6/3
Te3/0
Te4/3
Te3/1
1-A-3-1
1-A-9-1
Te 1/2
Te 5/0
Te 0/3
aofa-cr2
xe-1/3/0
Te 6/1
Te 3/2
e600nyc
e600gva1
Te 0/1
Te 5/3
r01lcg
Te 1/3
GEANT

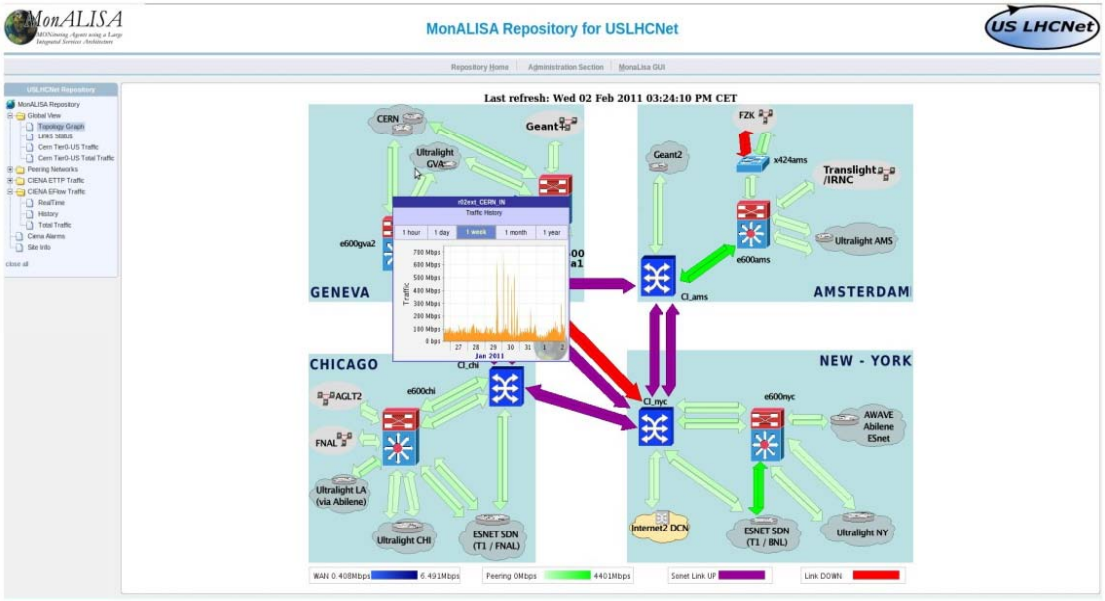
Network monitoring

MonaLisa

- Internal Monitoring
  - Ciena CD
  - Force10 E600
  - Access network devices
- Public – repository.uslhcnet.org

PerfSonar

- Provides service status information to E2Emon
- All the LHCOPN links are monitored
- The collected information is available at stats.geant2.net



Services

Our users are US T1 research centers

- FERMILAB – CMS experiment
- BNL – ATLAS experiment
- Other LHC related projects

SLA

- 2x8.55Gbps (primary and secondary) for each connected Tier1 center
  - CERN-FERMI-LHCOPN-001
  - CERN-FERMI-LHCOPN-003
  - CERN-BNL-LHCOPN-001
  - CERN-BNL-LHCOPN-003
- 4.2Gbps backup connections
  - CERN-FERMI-LHCOPN-002
  - CERN-BNL-LHCOPN-002
- 1Gbps FERMI-SARA connection
  - FERMI-SARA-LHCOPN-001

Users have access to the monitoring system

Distributed NOC

24/7 network support and operations

Distributed NOC – engineers in 2 timezones

- Geneva, CH - CET
- Pasdena, CA - PT

PoPs in:

- Geneva - CERN
- Amsterdam – SARA
- New York – ManLan
- Chicago – Starlight

Remote hand operations

- Required in the remotely managed PoPs: Amsterdam, New York, Chicago

NOC operations

- **NOC personnel**
  - Network engineers
    - Network maintenance
    - Network development
  - Software developer
    - Monitoring system integration
- **NOC operations are documented**
- **Trouble ticketing**
  - RT – used mainly for internal purposes
- **Other tools**

Intra/Inter-NOC communication

Intra NOC communication

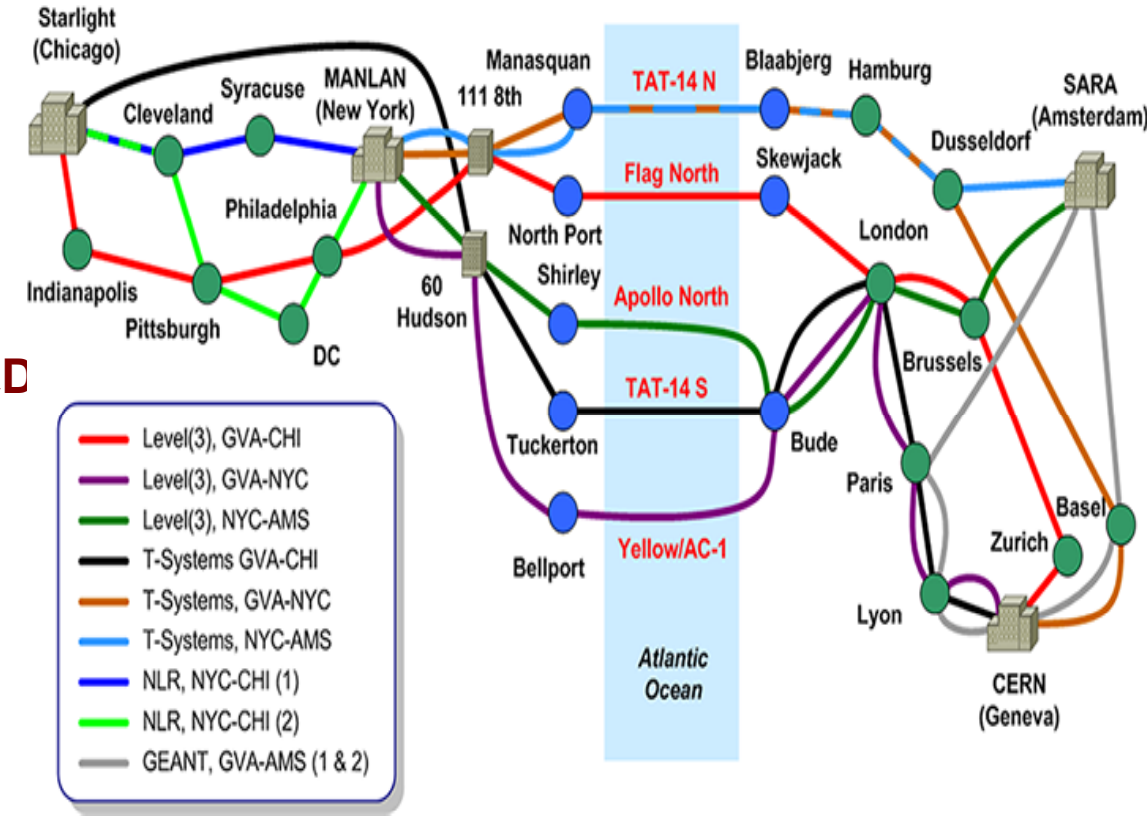
- Periodic (weekly) technical videoconference meetings over EVO
- Ad-hoc meetings on request
  - Private phone network
- RT is used to keep track of the current issues and to pass the operational information between the shifts

Inter NOC communication with other R&D networks, organizations

- Phone
- E-mail
- Videoconference

Service provider

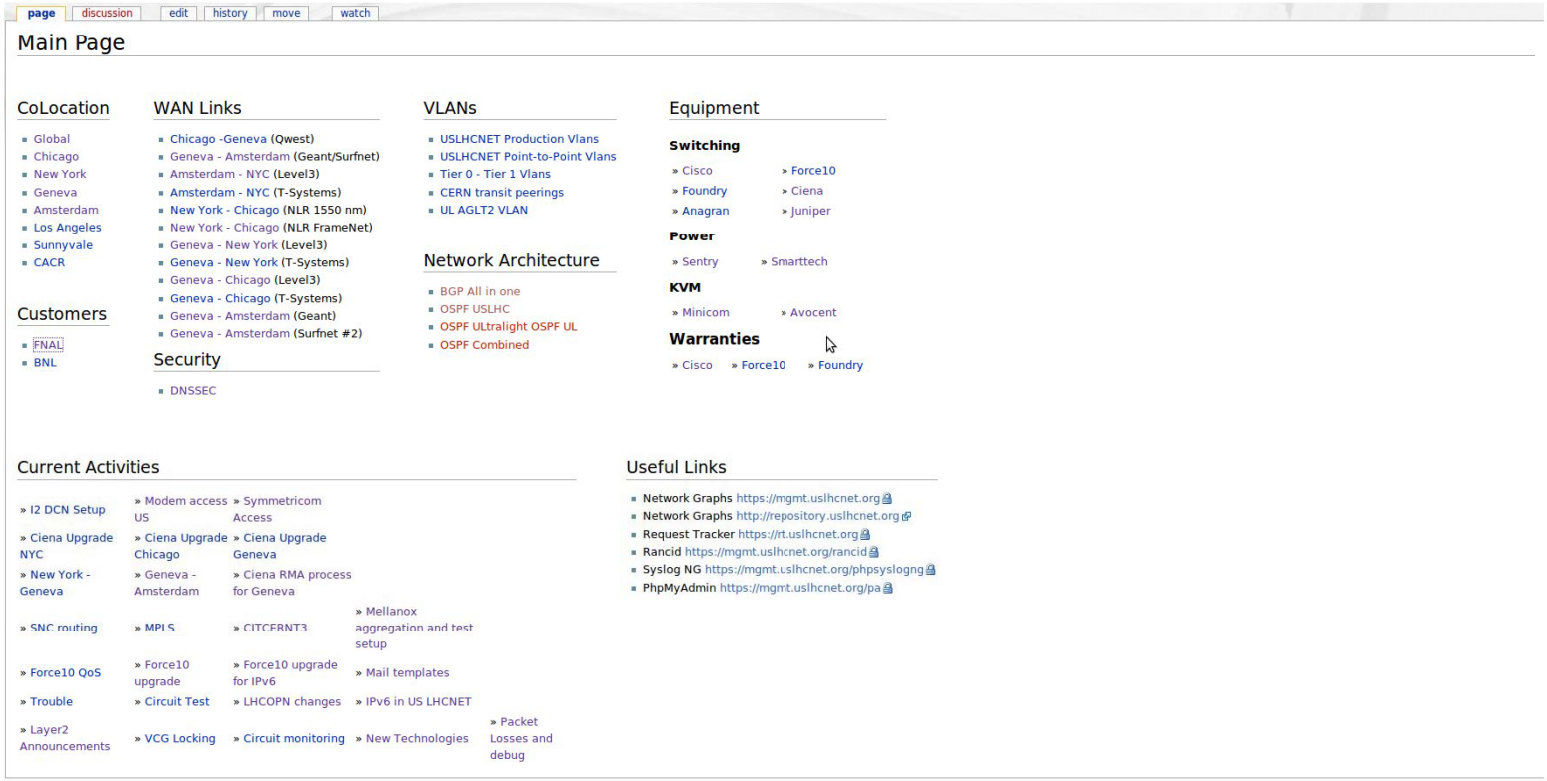
- Service provider portal
  - 4 different service providers
- Telephone



Documentation

- Internal WIKI
  - PoP contact information
  - Topology information
  - Service configuration
  - Ongoing development documentation
- Operational procedures
  - How to handle day by day operations
- Contingency plan
  - Workaround for each major failure scenario
  - What to do?
  - How to do?
  - How long it takes?
  - Who is involved in the changes?
- Security document – based on NIST Special Publication 800-18-Rev1 and FIPS 199
  - Remote access
  - Network management architecture
  - Operating systems
    - Network equipment
    - Servers
    - Security advisories – CERT, announcements from vendors
  - Physical access
  - Unauthorized network functions

Wiki



page | discussion | edit | history | move | watch

Main Page

CoLocation

- Global
- Chicago
- New York
- Geneva
- Amsterdam
- Los Angeles
- Sunnyvale
- CACR

Customers

- FNAL
- BNL

WAN Links

- Chicago -Geneva (Qwest)
- Geneva - Amsterdam (Geant/Surfnet)
- Amsterdam - NYC (Level3)
- Amsterdam - NYC (T-Systems)
- New York - Chicago (NLR 1550 nm)
- New York - Chicago (NLR FrameNet)
- Geneva - New York (Level3)
- Geneva - New York (T-Systems)
- Geneva - Chicago (Level3)
- Geneva - Chicago (T-Systems)
- Geneva - Amsterdam (Geant)
- Geneva - Amsterdam (Surfnet #2)

Security

- DNSSEC

VLANs

- USLHCNET Production Vlans
- USLHCNET Point-to-Point Vlans
- Tier 0 - Tier 1 Vlans
- CERN transit peerings
- UL AGLT2 VLAN

Network Architecture

- BGP All in one
- OSPF USLHC
- OSPF ULtralight OSPF UL
- OSPF Combined

Equipment

Switching

» Cisco » Force10
» Foundry » Ciena
» Anagran » Juniper

Power

» Sentry » Smarttech

KVM

» Minicom » Avocent

Warranties

» Cisco » Force10 » Foundry

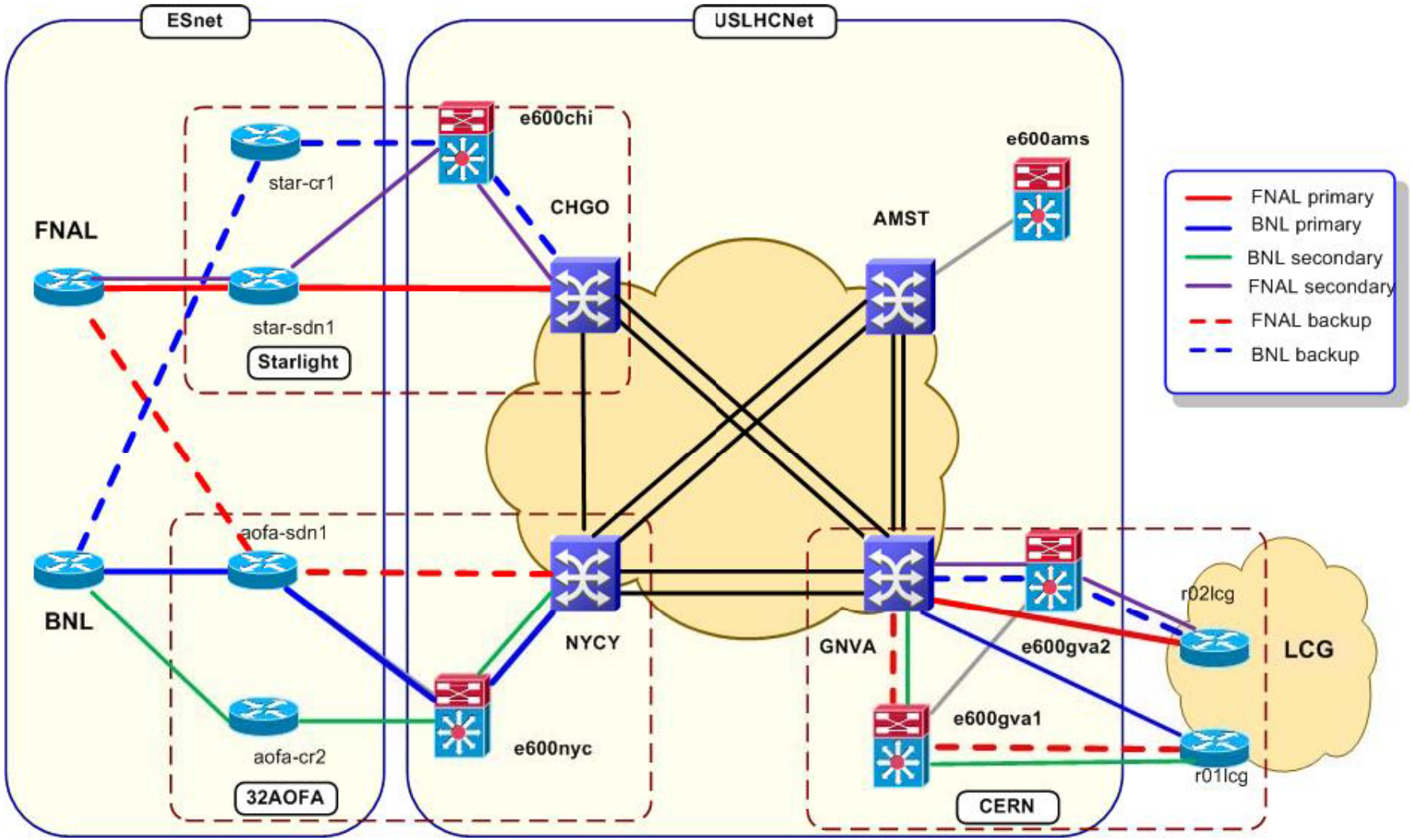
Current Activities

» I2 DCN Setup	» Modem access US	» Symmetricom Access		
» Ciena Upgrade NYC	» Ciena Upgrade Chicago	» Ciena Upgrade Geneva		
» New York - Geneva	» Geneva - Amsterdam	» Ciena RMA process for Geneva		
» SNC routing	» MPLS	» CITCFRNT3	» Mellanox aggregation and test setup	
» Force10 QoS	» Force10 upgrade	» Force10 upgrade for IPv6	» Mail templates	
» Trouble	» Circuit Test	» LHCOPN changes	» IPv6 in US LHCNET	
» Layer2 Announcements	» VCG Locking	» Circuit monitoring	» New Technologies	» Packet Losses and debug

Useful Links

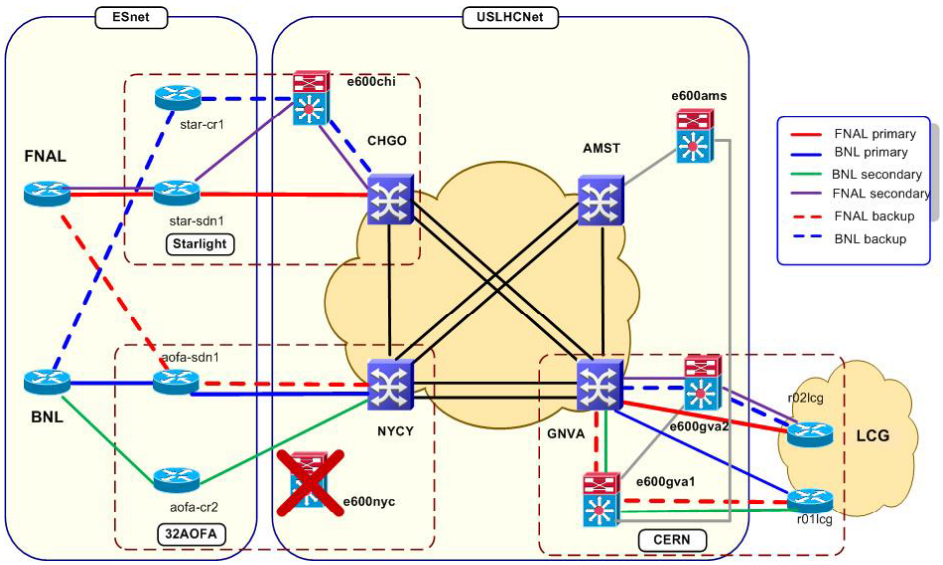
- Network Graphs https://mgmt.uslhcnet.org
- Network Graphs http://repository.uslhcnet.org
- Request Tracker https://rt.uslhcnet.org
- Rancid https://mgmt.uslhcnet.org/rancid
- Syslog NG https://mgmt.uslhcnet.org/phpsyslogng
- PhpMyAdmin https://mgmt.uslhcnet.org/pa

Contingency plan - examples

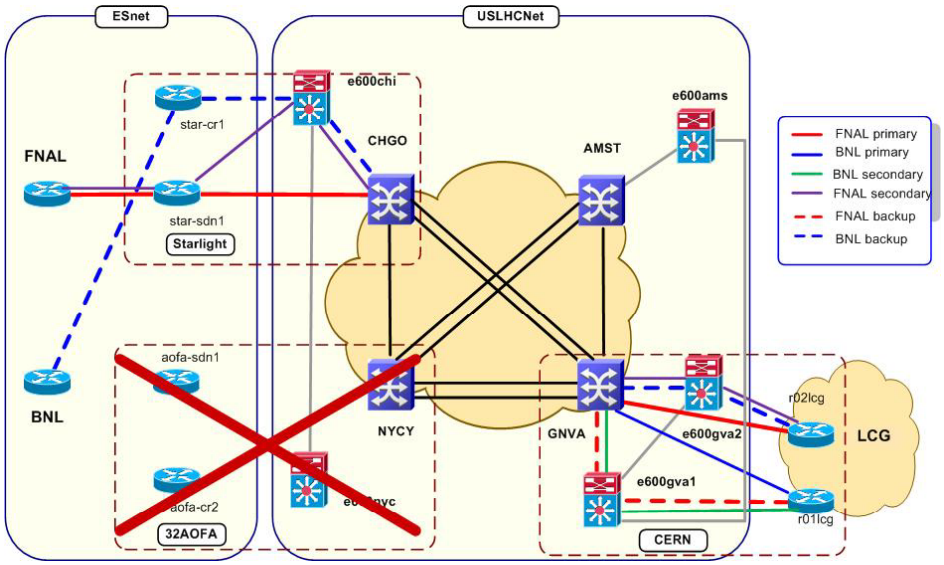


Contingency plan - examples

Device failure



PoP failure



Questions???

More details on www.uslhcnet.org