LHCOPN/ONE status and plans

GDB, 8th of May 2013

edoardo.martelli@cern.ch

CERN IT Department
CH-1211 Genève 23
Switzerland
www.cern.ch/it

LHCOPN

LHCOPN - update

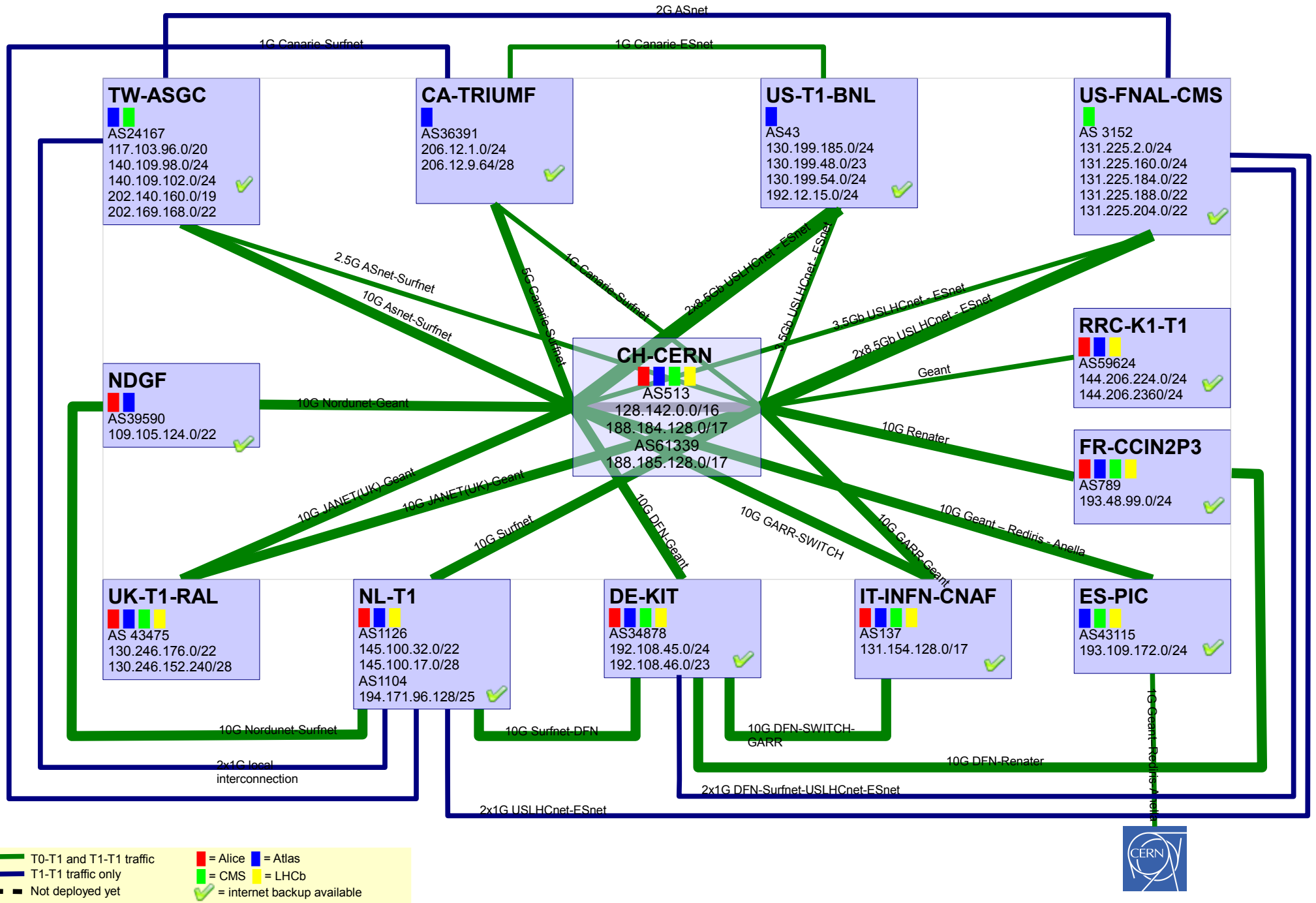
Still regular **LHCOPN meetings** (held together with LHCONE), but with low activity

Russian Tier 1 now testing connectivity:
- 2Gbps link from Moscow to CERN
- Connected to LHCOPN, but no transit to other Tier1s

RAL will soon update the network infrastructure and upgrade the LHCOPN routers

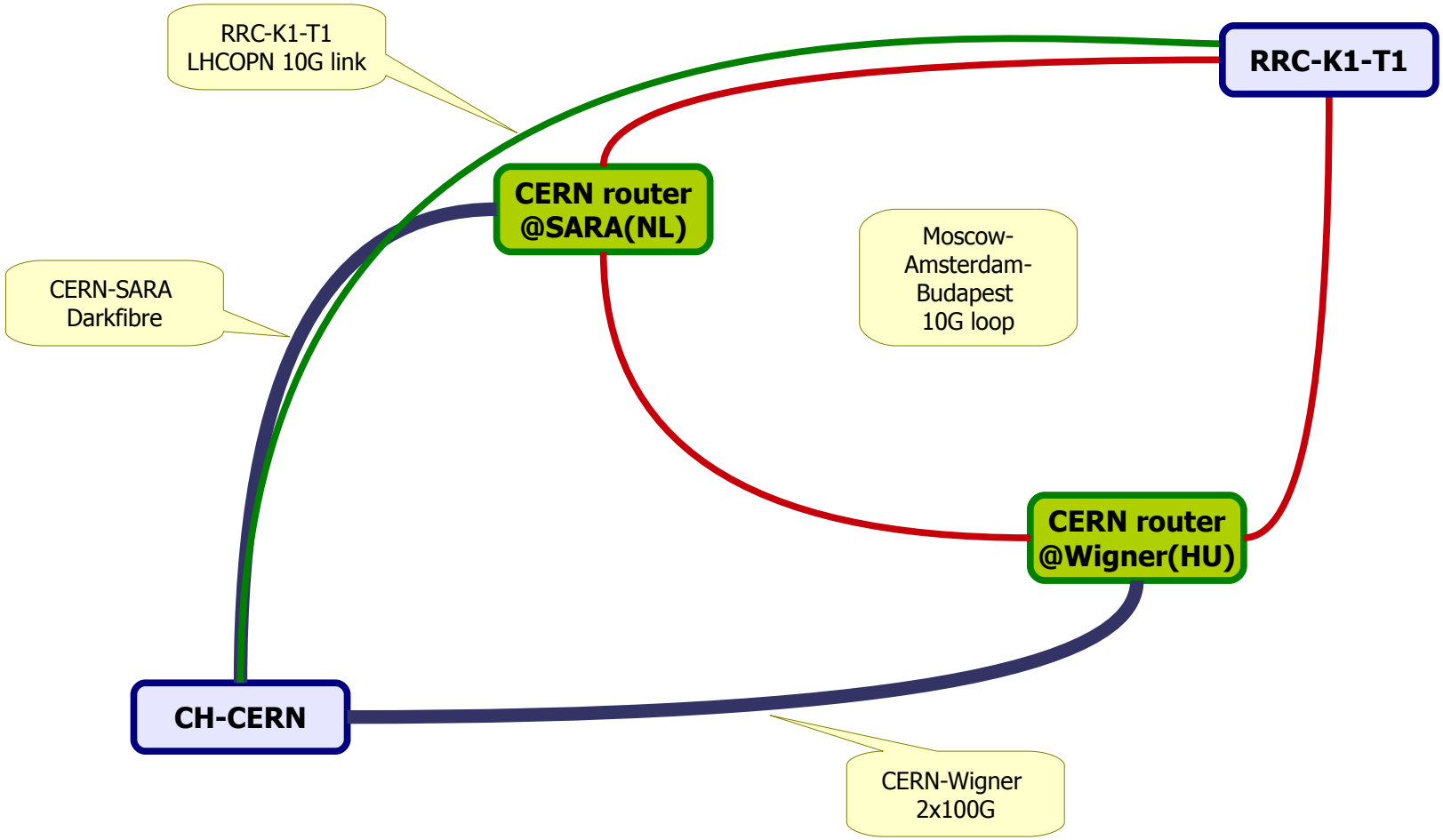
IPv6 routing enabled among these sites: CERN, KIT, PIC, NDGF

LHCOPN


2G ASnet
1G Canarie-Surfnet
1G Canarie-ESnet
TW-ASGC
AS24167
117.103.96.0/20
140.109.98.0/24
140.109.102.0/24
202.140.160.0/19
202.169.168.0/22
CA-TRIUMF
AS36391
206.12.1.0/24
206.12.9.64/28
US-T1-BNL
AS43
130.199.185.0/24
130.199.48.0/23
130.199.54.0/24
192.12.15.0/24
US-FNAL-CMS
AS 3152
131.225.2.0/24
131.225.160.0/24
131.225.184.0/22
131.225.188.0/22
131.225.204.0/22
2.5G ASnet-Surfnet
10G Asnet-Surfnet
5G Canarie-Surfnet
1G Canarie-Surfnet
2x8.5Gb USLHCnet - ESnet
3.5Gb USLHCnet - ESnet
CH-CERN
AS513
128.142.0.0/16
188.184.128.0/17
AS61339
188.185.128.0/17
RRC-K1-T1
AS59624
144.206.224.0/24
144.206.2360/24
Geant
NDGF
AS39590
109.105.124.0/22
10G Nordunet-Geant
10G Renater
FR-CCIN2P3
AS789
193.48.99.0/24
10G IANET(UK)-Geant
10G IANET(UK)-Geant
10G Surfnet
10G DFN-Geant
10G GARR-SWITCH
10G GARR-Geant
10G Geant – Rediris - Anella
UK-T1-RAL
AS 43475
130.246.176.0/22
130.246.152.240/28
NL-T1
AS1126
145.100.32.0/22
145.100.17.0/28
AS1104
194.171.96.128/25
DE-KIT
AS34878
192.108.45.0/24
192.108.46.0/23
IT-INFN-CNAF
AS137
131.154.128.0/17
ES-PIC
AS43115
193.109.172.0/24
10G Nordunet-Surfnet
10G Surfnet-DFN
10G DFN-SWITCH-GARR
10G DFN-Renater
2x1G local interconnection
2x1G DFN-Surfnet-USLHCnet-ESnet
2x1G USLHCnet-ESnet
10G Geant-Rediris-Anella
CERN
T0-T1 and T1-T1 traffic
T1-T1 traffic only
Not deployed yet
(thick) >=10Gbps
(thin) <10Gbps
= Alice
= Atlas
= CMS
= LHCb
= internet backup available
p2p prefix: 192.16.166.0/24
edoardo.martelli@cern.ch 20130507

LHCOPN - upcoming

Russian Tier1 LHCOPN 10G connection



LHCONE

LHCONE activities

Two main activities:

LHCONE L3VPN (aka VRF)

LHCONE R&D:
- Dynamic P2P links
- Openflow, SDN

Glossary
L3VPN: Layer 3 Virtual Private Network
aka: also known as
VRF: Virtual Routing and Forwarding
P2P: Point to Point
SDN: Software Defined Networks

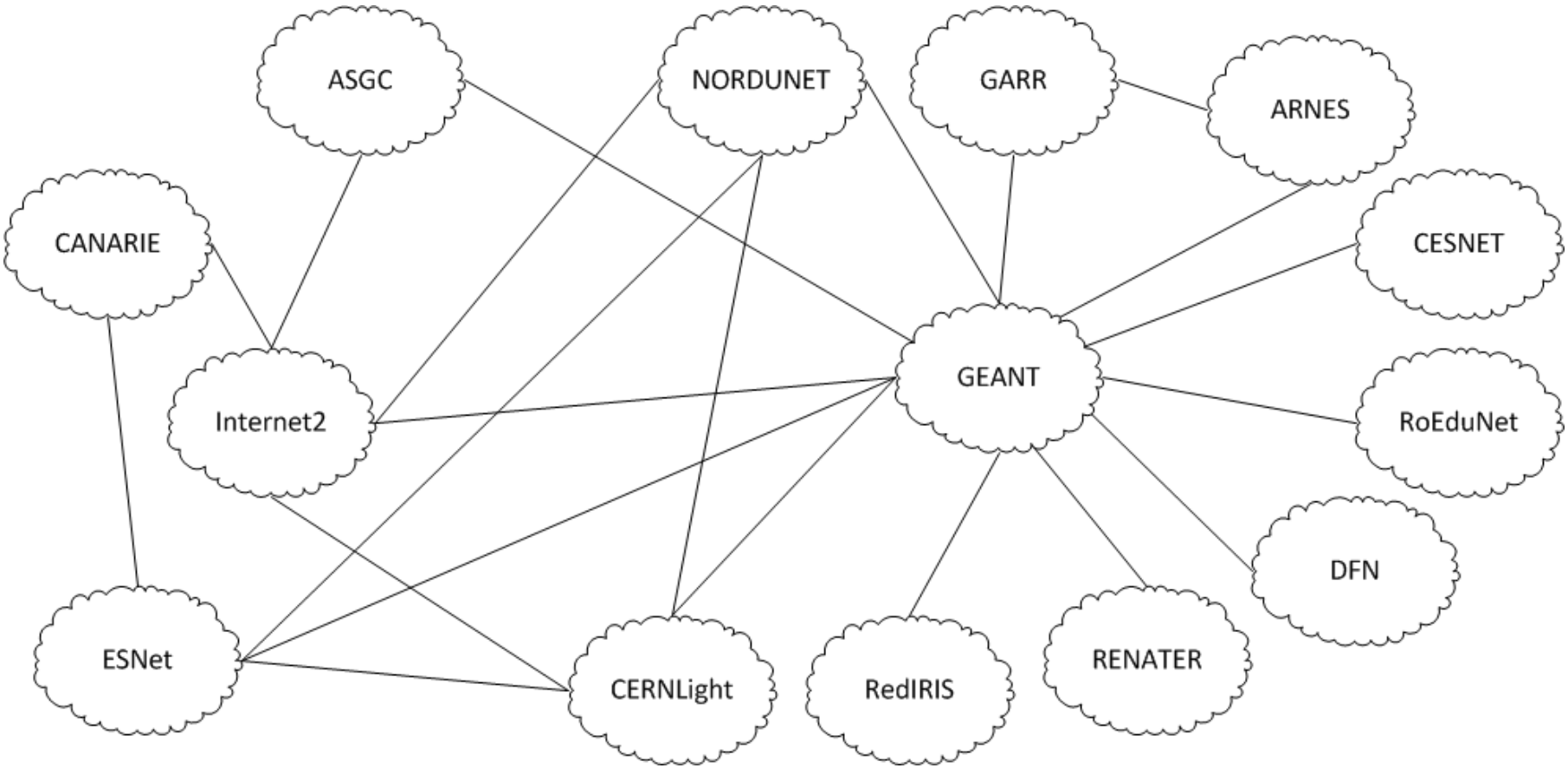
L3VPN service

Private Routed Network dedicate to WLCG traffic

- In production
- 44 Tier1/2 sites connected
- 17 countries (Canada, Czech Republic, Denmark, Finland, France, Germany, Italy, Korea, Norway, Netherlands, Romania, Slovenia, Spain, Sweden, Switzerland, Taiwan, USA)
- 15 R&E Network operators
- Estimated aggregated traffic over 50Gbps

More information:
https://twiki.cern.ch/twiki/bin/view/LHCONE/LhcOneVRF

L3VPN VRFs interconnections



Courtesy of Mian Usman: https://indico.cern.ch/getFile.py/access?contribId=1&resId=0&materialId=slides&confId=212656

LHCONE P2P service

On demand p2p link established when two sites need to exchange data

Needs: not today, but when (if) the network will become a bottleneck.

Advantages: guaranteed bandwidth, deterministic transfer

Challenges:

- multi-domain network infrastructure and provisioning system
- API for WLCG software
- WLCG software adaptation
- Last mile (interconnection from circuit end-point to servers)
- Routing
- Billing

P2P service trial

A trial will be run to compare P2P performance vs today's networks.

Few static links will be set up between few pairs of Tier2s in US and Europe.

More information:
https://indico.cern.ch/getFile.py/access?contribId=5&resId=0&materialId=slides&confId=241490

SDN for LHCONE

Most of the LHCONE network providers have SDN projects.

They are exploring SDN applications for LHCONE

SDN use case: WAN Load Balancing

Intelligent traffic load sharing among expensive links

Needs: effective use of expensive transatlantic links

Advantages: resource optimization, cost savings

Challenges:

- Openflow is an emerging technology
- multi-domain coordination

More information:
https://indico.cern.ch/getFile.py/access?contribId=8&sessionId=1&resId=0&materialId=slides&con

IPv6

IPv6 activities

IPv4 shortage may hit new CERN VMs in 2014

- CERN IPv6 network deployment progressing well (http://cern.ch/ipv6)

- HEPiX IPv6 working group is surveying the IPv6 compatibility of the WLCG applications (draft web site: http://cern.ch/hepix-ipv6)

- WLCG community is urged to consider using IPv6 and help with the testing. Already contacted the Operation Coordination team for collaboration.

Comments?
Questions?