

Report on LHCOPN-LHCONE meeting at Fermilab (US) 30-31 October 2018

GDB – CERN 12th December 2018
edoardo.martelli@cern.ch



Venue

Hosted by Fermilab in Batavia (US)



Participants

- 35 Participants
- 23 Institutes
- 3 Collaborations
- 4 Research Networks



Day 1: updates and operations

LHCOPN update

- **LHCOPN traffic volume:** no major increase in the last 12 months
- **CH-CERN:**
 - Two new Juniper LHCOPN border routers in production
 - Second network hub completed. GEANT and ESnet already there, NORDUnet, SURFnet and PSNC will follow soon
 - LHC Long Shutdown 2 will start in December, will last 2 years
- **IT-INFN-CNAF:** new 100G link deployed. Second link will follow in Q4
- **DE-KIT:** new 100G link deployed
- **FR-CCIN2P3:** new 100G link deployed

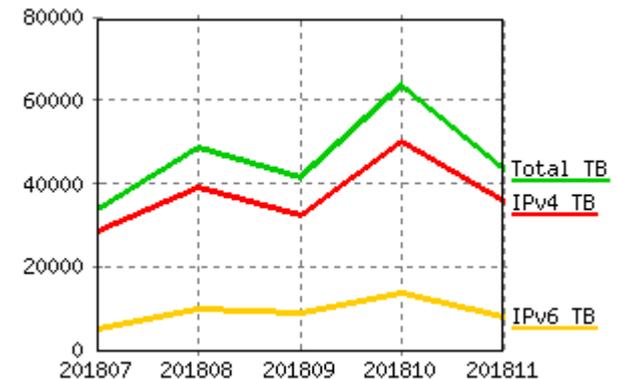
Slides: <https://indico.cern.ch/event/725706/contributions/3052893/attachments/1743559/2821822/LHCOPNE-20181030-FNAL-LHCOPN-update.pdf>

IPv6 in LHCOPN and LHCONE



LHCOPN: all Tier1s connected with IPv6. IPv6 transfers happening among CERN, IN2P3, JINR, NDGF, RAL, SARA-MATRIX, NIKHEF, CNAF, ASGC, PIC, TRIUMF

WLCG: majority of sites should meet the deadline of end-2018 to deploy dual-stack storage and dual-stack perfSONAR



LHCOPN+LHCONE traffic seen on CERN border routers

Graph: <https://twiki.cern.ch/twiki/bin/view/LHCOPN/LHCOPNEv4v6Traffic>

Slides: <https://indico.cern.ch/event/725706/contributions/3127327/attachments/1744101/2822941/ipv6-at-LHCOPNONE.pdf>

protoDUNE use of LHCOPN

The request to use Fermilab's LHCOPN link for protoDUNE traffic was presented to WLCG management board

No objection received

CERN and Fermilab will monitor the traffic to make sure the CMS data transfers are not impacted

Traffic shaping will be implemented to protect CMS transfers on CERN's Juniper routers



Photo: Bill Johnston

Slides: <https://indico.cern.ch/event/725706/contributions/3142301/attachments/1743560/2821824/LHCOPNE-20181030-FNAL-LHCOPN-for-protoDUNE.pdf>

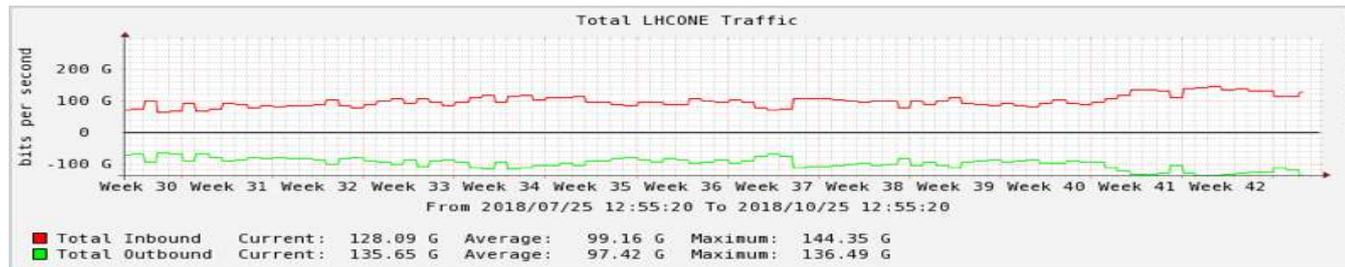
LHCONE L3VPN status - update

Presented updated statistics of LHCONE VRFs:

- Slight increase during the last 6 months: ~10-20%
- Low number of new sites have joined recently

Proposed to build a global traffic graph based on input stats of all the VRFs

GEANT stats, last 3 months:

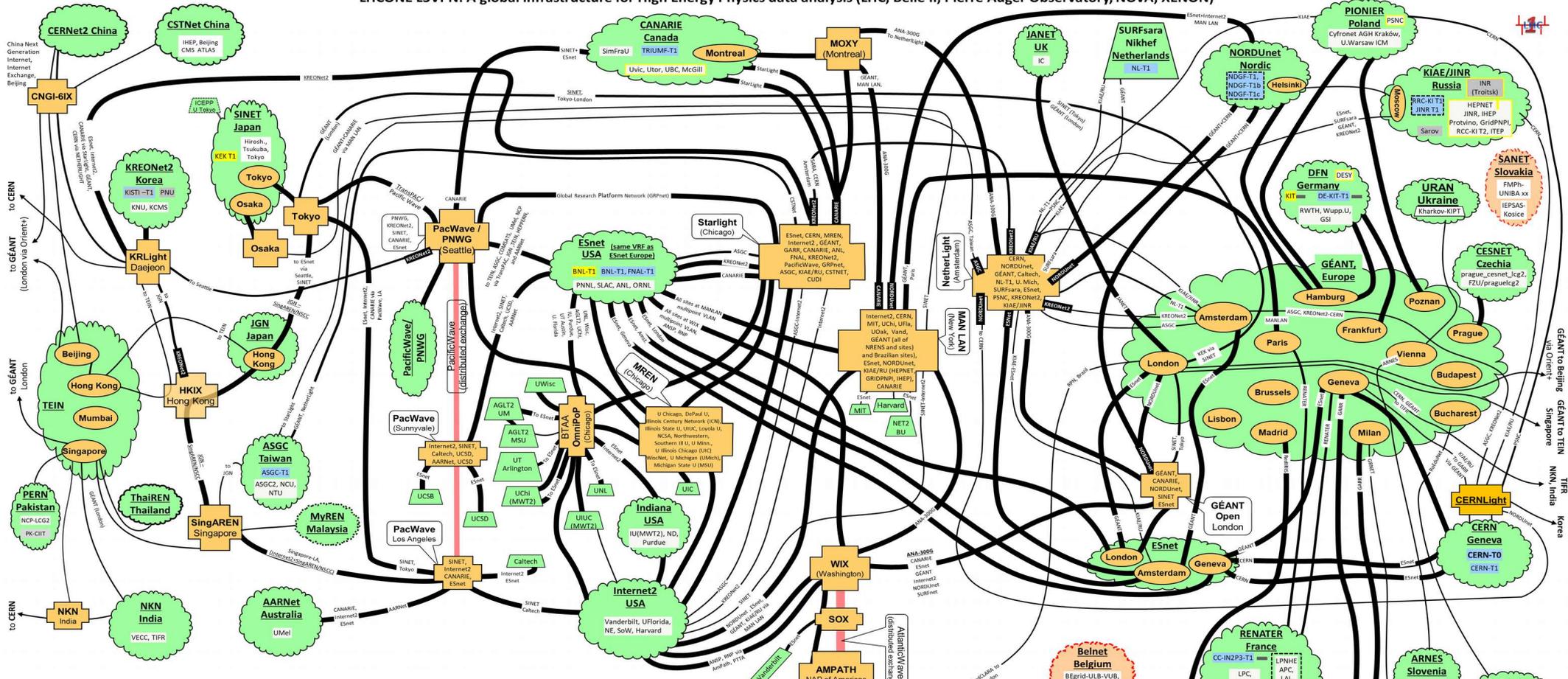


GEANT slides: https://indico.cern.ch/event/725706/contributions/3122036/attachments/1744177/2823119/2018-10-30_ECapone_LHCONE_L3VPN.pdf

ESnet slides: <https://indico.cern.ch/event/725706/contributions/3120051/attachments/1744121/2822980/LHCONE-Operations-Update-FNAL.pdf>

Updated LHCONe map

LHCONe L3VPN: A global infrastructure for High Energy Physics data analysis (LHC, Belle II, Pierre Auger Observatory, NOvA, XENON)



Ver. 4.31, Oct. 25, 2018 – WJohnston, ESNET, wj@es.net

LHCONE VRF domain/aggregator	NREN/site router at exchange point
Network provider	Communication links: 1/10, 20/30/40, and 100Gbps
PoP router	Connection internal to a domain, and of unspecified bandwidth
Collaborating sites not yet connected to LHCONe	Underlined link information indicates link provider, not use
Exchange point/regional R&E communication nexus w/ switch providing VLAN connections	IGIN: SINGAREN/SCC
LHC ALICE or LHCb site	Sites that are standalone VRFs
LHC Tier 1 ATLAS and CMS	yellow outline indicates LHC+Belle II site
LHC Tier 2/3 ATLAS and CMS	Dashed outline indicates distributed site
Belle II Tier 1/2	LPNHE
	CLARA

NOTES
 1) LHCOIPN paths are not shown on this diagram
 2) The "LHCONE peerings" at the exchange points indicate who has a presence there and not that all peer with each other (see <https://twiki.cern.ch/twiki/bin/view/LHCONe/LhcOneVRF>)
 3) See <http://lhconet.net> for more details.

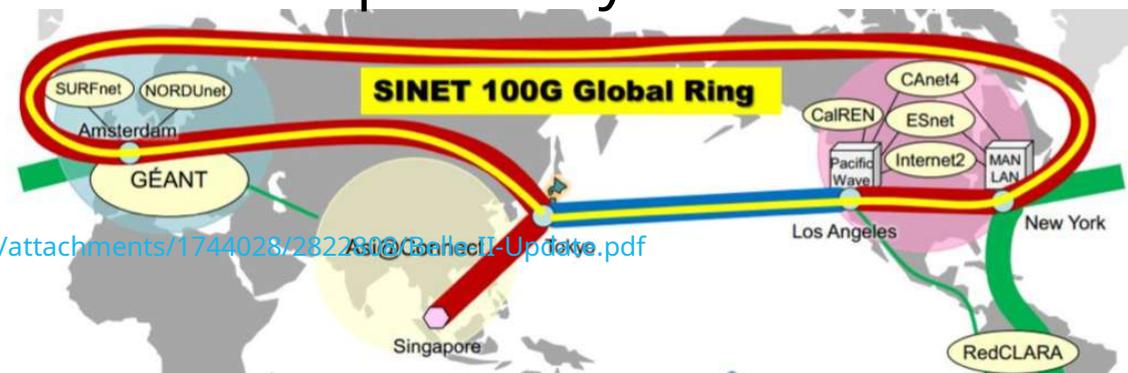


CUDI Mexico	REUNA Chile	ANSP	SAMPRA
UNAM	RNP/IPÉ Brazil	Redecompe	CBPF
ANSA	PTSA	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA	AMPATH	Redecompe	HEPGrid (UR)
ANSA	NAP of Americas (Miami)	Redecompe	HEPGrid (UR)
ANSA	WIX	Redecompe	HEPGrid (UR)
ANSA	SOX	Redecompe	HEPGrid (UR)
ANSA			

BelleII update



- Phase 2 has been completed and first RAW data are now available
- Phase 3 will start in March 2019
- Data Challenge 2018 have shown large improvement to respect the previous measurement done in the past (2013-2017)
- The only possible bottleneck represented by the link KEK to EU that will be update next year within the SINET 100Gb Global Ring
- Network Monitoring tools have been setup to analyze traffic and check links status



Slides: <https://indico.cern.ch/event/725706/contributions/3120028/attachments/1744028/2822800/Belle-II-Update.pdf>

ESnet - update

Working on ESnet6, the next-generation ESnet network

Esnet6 project:

- Currently in conceptual design and fibre procurement phase
- ESnet6 optical layer will be upgraded in 2020 (during LS2)
- ESnet6 packet layer will be upgraded in 2021 (during Run3)

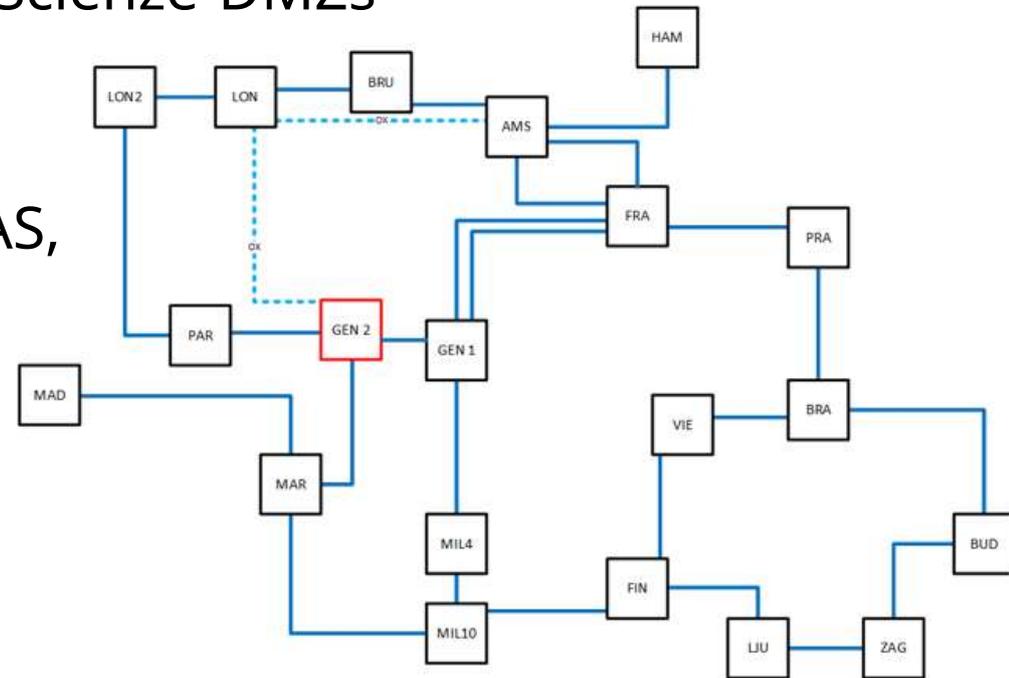


Slides: https://indico.cern.ch/event/725706/contributions/3145077/attachments/1744231/2823238/2018-10_ESnet6_-_LHCONE_1.pdf

GEANT - update

DTN Testing Tools:

- Can be used to validate and tune Scienze-DMZs
- Different performance and file transfer tools available
- Already being used by LRZ, AENEAS, WLCG

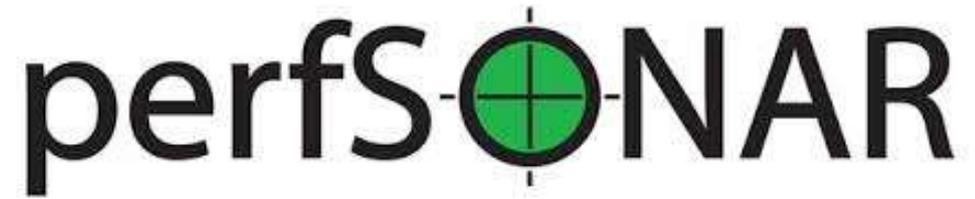


CERN 2nd POP deployment:

- transmission devices installed
- connected to fibres from Paris, Marseille and London

Slides: https://indico.cern.ch/event/725706/contributions/3122038/attachments/1744181/2823125/2018-10-30_ECapone_GEANT-Updates.pdf

perfSONAR update



PerfSONAR 4.1 released in August 2018:

- dropped SLC6 support
- new central web interface for configuration
- new pScheduler that replaces BWCTL
- support for Docker

GRAFANA dashboards:

- now includes all WLCG sites that run perfSONAR
- added IPv6 dashboard

IRIS-HEP: new institute funded by NSF and focusing on preparing for HL-LHC:

- innovative algorithms for data reconstruction and triggering
- High performance analysis systems
- Data organization, management and access systems

The institute also funds the LHC part of OSG, including the networking area

Slides: https://indico.cern.ch/event/725706/contributions/3127984/attachments/1744180/2823419/LHCOPN2FLHCONE_perfSONAR_Update_2.pdf

LHCONE in Asia - update

ASGC (TW): now reaches Europe directly via Singapore (shorter RTT)

KREONET (KR): planning 100G links to Seattle, Chicago and Hong Kong

LHCONE:

- Sinet (JP) now connected to ESnet and Internet2
- JGN (JP) now connected to TEIN and ESnet
- ASGC now connected to NORDUnet , TWAREN

Plan for a 100G ring Asia-Europe via Siberia and Indian Ocean

Slides: <https://indico.cern.ch/event/725706/contributions/3138088/attachments/1744278/2823335/LHCONE-Asia-update.pdf>

Slides: https://indico.cern.ch/event/725706/contributions/3138088/attachments/1744278/2823435/NDN_Asia-Europe_30.10.2018.pdf



Chasing unwanted packets in LHCONE

DE-KIT and ESnet have run an investigation on unwanted packets coming from LHCONE connections

Fewer LHCONE unroutable source packets are being detected by ESnet since the March meeting (i.e. when the investigation was started)

Still room for improvement, particularly in the private IP ranges

Monitoring will continue and progresses will be reported at next meeting

Internet Exchanges are supporting LHCONE and need to be considered as an additional connection type in the LHCONE connection documents

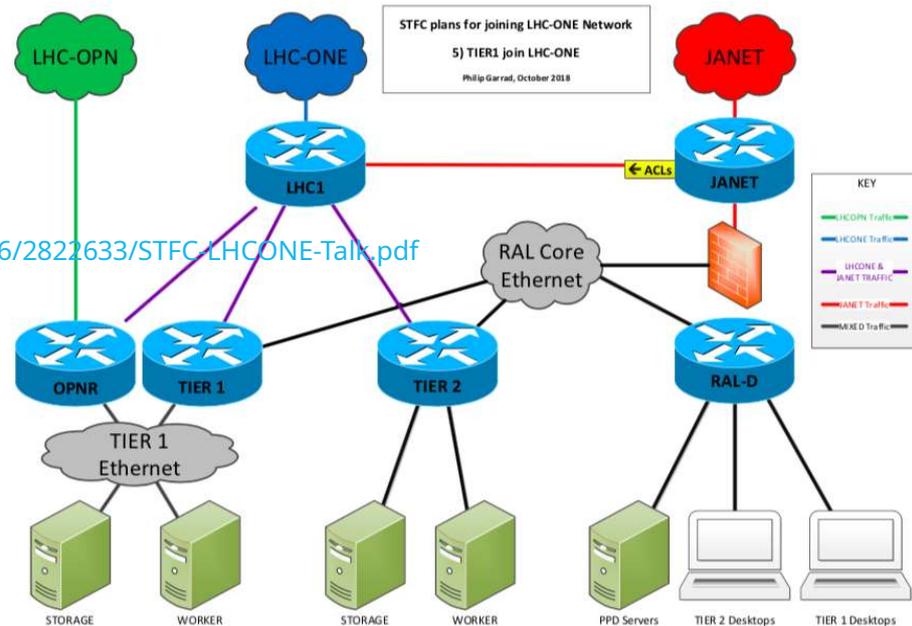
Slides: <https://indico.cern.ch/event/725706/contributions/3120050/attachments/1744129/2822995/Chasing-unwanted-packets-in-LHCONEOPN.pdf>

RAL preparations to join LHCONE

RAL explained its plan to connect the Tier1 and Tier2 to LHCONE

- 1) Create new virtual router for LHCONE
- 2) Tidy Tier2 addresses
- 3) Connect the Tier2 to LHCONE first
- 4) Connect the Tier1 to LHCONE

Slides: <https://indico.cern.ch/event/725706/contributions/3142229/attachments/1743946/2822633/STFC-LHCONE-Talk.pdf>



LHCONE for Chilean WLCG sites

UTFSM, ATLAS Tier2 at CCTVal in Valparaiso, expressed the intention to join LHCONE

CCTVal has involved REUNA, the Chilean education network, RedCLARA, the South American backbone network, and GEANT for the implementation of LHCONE in South America

RedCLARA will implement a LHCONE VRF for South America and connect to GEANT in Miami

Slides: <https://indico.cern.ch/event/725706/contributions/3138217/attachments/1741566/2817871/LHCONE-2018-UTFSM-REUNA.pdf>



MTU size recommendation

The working working group analyzed the problem and have come up with this recommendation:

LHCONE/LHCOPN network paths should allow MTU size up to 9000 bytes and not block PMTUD packets (RFCs 1911, 1981 and 4821)

- In practice this means that the frame size should be at least 9080 bytes for all devices on the path
- ICMP "Fragmentation Needed" (Type 3, Code 4) should not be blocked by any devices on the path

The working group will produce a document with configuration examples for different Operating Systems

Details of the study in this Google doc: <https://docs.google.com/document/d/1Iut-ncRsV1-9Z4o56S9vLVuc3IHbR-0uIx9IiXVLXpY/edit?usp=sharing>

Slides: <https://indico.cern.ch/event/725706/contributions/3120030/attachments/1743507/2821722/LHCONE-MTU-recommendation.pdf>

Digging in the LHCONE routing table

NORDUnet made an analyses of the routing tables of most of the LHCONE VRFs.

It resulted that reachability is fragmented, especially on IPv6:

- Only GEANT has a full view of all LHCONE destinations
- Especially sites behind TEIN cannot reach a fraction of LHCONE

IPv4 reachability map: <https://indico.cern.ch/event/725706/contributions/3149436/attachments/1744301/2823447/go>

IPv6 reachability map: <https://indico.cern.ch/event/725706/contributions/3149436/attachments/1744301/2823448/go>

The community will work in improving this situation, which will be monitored in the future meetings

Slides: https://indico.cern.ch/event/725706/contributions/3149436/attachments/1744301/2823417/LHCone_routing_digging.pdf

LHCONE Looking Glass

The outcome of the LHCONE looking glass trial was presented:

- A route server has been installed at CERN. It peers with CERNlight and NORDUnet VRFs at the moment
- A looking glass that can query the route server has been configured in a VM at CERN

The looking glass can show the prefixes known in the different VRFs and the attributes of the routes

It will be enhanced with more peerings to VRFs.

The looking glass is accessible here: <http://lhcone-lg.cern.ch/>

Slides: <https://indico.cern.ch/event/725706/contributions/3142302/attachments/1743561/2821827/LHCOPNE-20181030-FNAL-LHCONE-looking-glass.pdf>

Day 2: R&D

Networking activities around WLCG

Presented a list of Networking research activities happening around WLCG:

- DTN Nodes (a-la ESnet) and Test Nodes (a-la GEANT)
- High level protocol alternatives (DOMA)
- Low level protocol alternatives (AENEAS SKA)
- Efficient use of WAN connections (NOTED)
- Adding additional bandwidth with Bandwidth on Demand and P2P (NOTED, LHCONE-P2P)
- Network Function Virtualization (HEPiX NFV Working group)
- Connectivity for commercial service providers (LHCONE)

Slides: <https://indico.cern.ch/event/725706/contributions/3118915/attachments/1744145/2823038/DataTransfer.pdf>

LHCONE P2P and AutoGOLE activities - update

AutoGOLE:

- MEICAN has been chosen for the dynamic provisioning of circuits on a multi domain network
- Actively supported by RNP (Brazilian NREN)
- Proof of Concepts demonstrated in several conferences
- Collaboration with GNA to grow MEICAN adoption in Global Exchange Points

Slides: https://indico.cern.ch/event/725706/contributions/3169180/attachments/1744627/2824053/AutoGOLE_P2P.pdf

DTN activities - update

Data Transfers Nodes (DTNs)

- lot of interests on DTN research projects
- focusing on 100G
- international test setup with nodes installed in SURFnet, UvA, Starlight, KISTI, CERN
- demonstration planned for Super Computing 2018 (done)



BigData Express:

- project supported by FNAL and ORNL
- aims to provide schedulable, predictable, and high-performance data transfer service for large-scale science computing facilities
- web interface and data transfer demoed live at the meeting

DTN slides: https://indico.cern.ch/event/725706/contributions/3169179/attachments/1744631/2824058/Next_Gen_DTNs.pdf

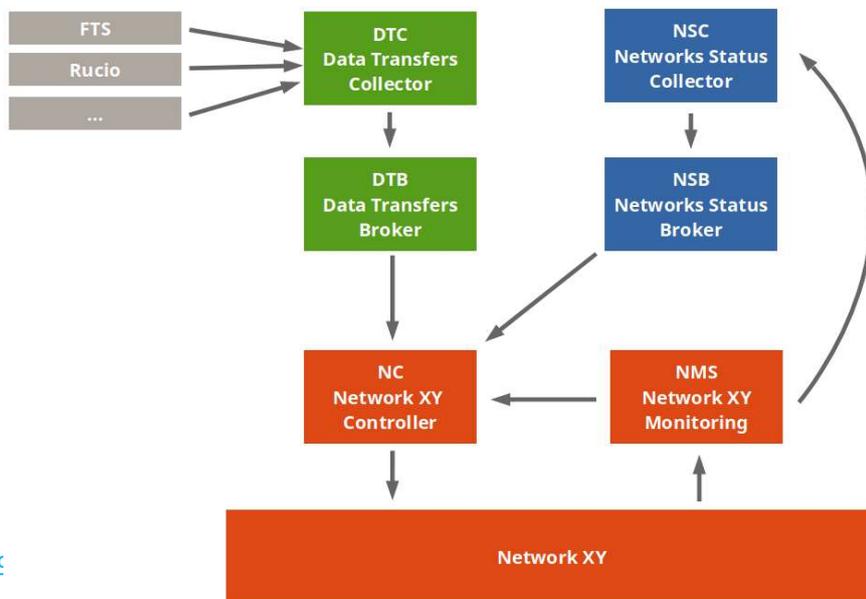
BigData Express slides: <https://indico.cern.ch/event/725706/contributions/3172460/attachments/1744865/2824485/20181031-LHC-2.pdf>

NOTED activity

Network activity in the **WLCG DOMA** contest

Exploring options to load balance outgoing traffic across all available links, to smooth peaks and increase usable bandwidth

Uses information from transfer services (FTS, Rucio ...) to identify “significant” data transfers



Slides: <https://indico.cern.ch/event/725706/contributions/3169200/attachments/174465/>

CERN-NLT1 WAN efficiency test

Proof of concept of the NOTED project

Successfully demonstrated the possibility to off-load traffic over LHCONE when LHCOPN link to a Tier1 is congested, by tweaking routing metrics

Routing tweaking could be automated and triggered by FTS, by signaling any on-going major transfer



Slides: <https://indico.cern.ch/event/725706/contributions/3169200/attachments/1744659/2824103/LHCOPNE-20181031-FNAL-CERN-NLT1-test.pdf>

FTS transfer speed increase when added LHCONE link

HEPiX NFV Working Group

Co-located HEPiX NFV Working Group meeting.

The WG is mandated to identify use cases, survey existing approaches and evaluate whether and how SDN/NFV should be deployed in HEP.

Activities:

- CERN and Nikhef leading pilot projects for SDN-based Compute
- AGLT2, KIT, MWT2 looking into OVS-based end-to-end transfers
- Explored several existing SDN/NFV approaches and their use cases
- Introductory tutorial and material to help sites establish their testbed ready
- **Kick-starting white-paper process**

Slides: https://indico.cern.ch/event/725706/contributions/3169183/attachments/1744902/2824548/HEPiX_Network_Functions_Virtualisation_Working_Group_F2F_Meeting.pdf

Conclusion

Summary

- LHCOPN:
 - links being updated to 100G
- LHCONE:
 - Chile has requested to join
 - Progress in Asia with more interconnections
 - Global reachability still not fulfilled
 - Proposed recommendation for MTU size
- Monitoring:
 - perfSONAR v4.1 released
 - More IPv6 stats
 - Prototype of looking glass for LHCONE presented
- R&D:
 - Several projects based on DTNs. Presented BigData Express service
 - Demonstrated offload of LHCOPN traffic into LHCONE
- HEPiX NFV WG:
 - will produce a white paper to help sites deploy NFV and SDN

Actions for next meeting

- CERN-FNAL: protect CMS traffic from protoDUNE
- EEnet, KIT: Review status of LHCONE unwanted packets
- ESnet: document case of Internet Exchanges supporting LHCONE
- CERN: Review status of LHCONE in South America
- MTU WG: Produce document with configuration examples for MTU setting
- NORDUnet: report on status of LHCONE reachability
- CERN: make the route-server peers with more VRFs
- NRENs: implement total stats (input from all the VRFs)

Next Meeting

Next meeting:

- 4th-5th of June 2019
- Venue: University of Umeå, Sweden

Following meeting:

- Proposal to have a workshop with LHC Experiments at CERN in January 2020. Possible dates: 13-14 of January 2020, before the GDB

Links

Meeting agenda and presentations:

<https://indico.cern.ch/event/725706/>

Questions?

edoardo.martelli@cern.ch