Trial of the Infinera PXM

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LHC Workshop Recap

- Rather than maintaining distinct networks, the LHC community should aim to unify its network infrastructure
  - Traffic aggregation on few links

- Concerns
  - If the T1s and T2s upgrade to 100G, then the global infrastructure needs to follow

- LHCONE Evolution
  - Currently LHCONE exists side-by-side with general R&E infrastructure
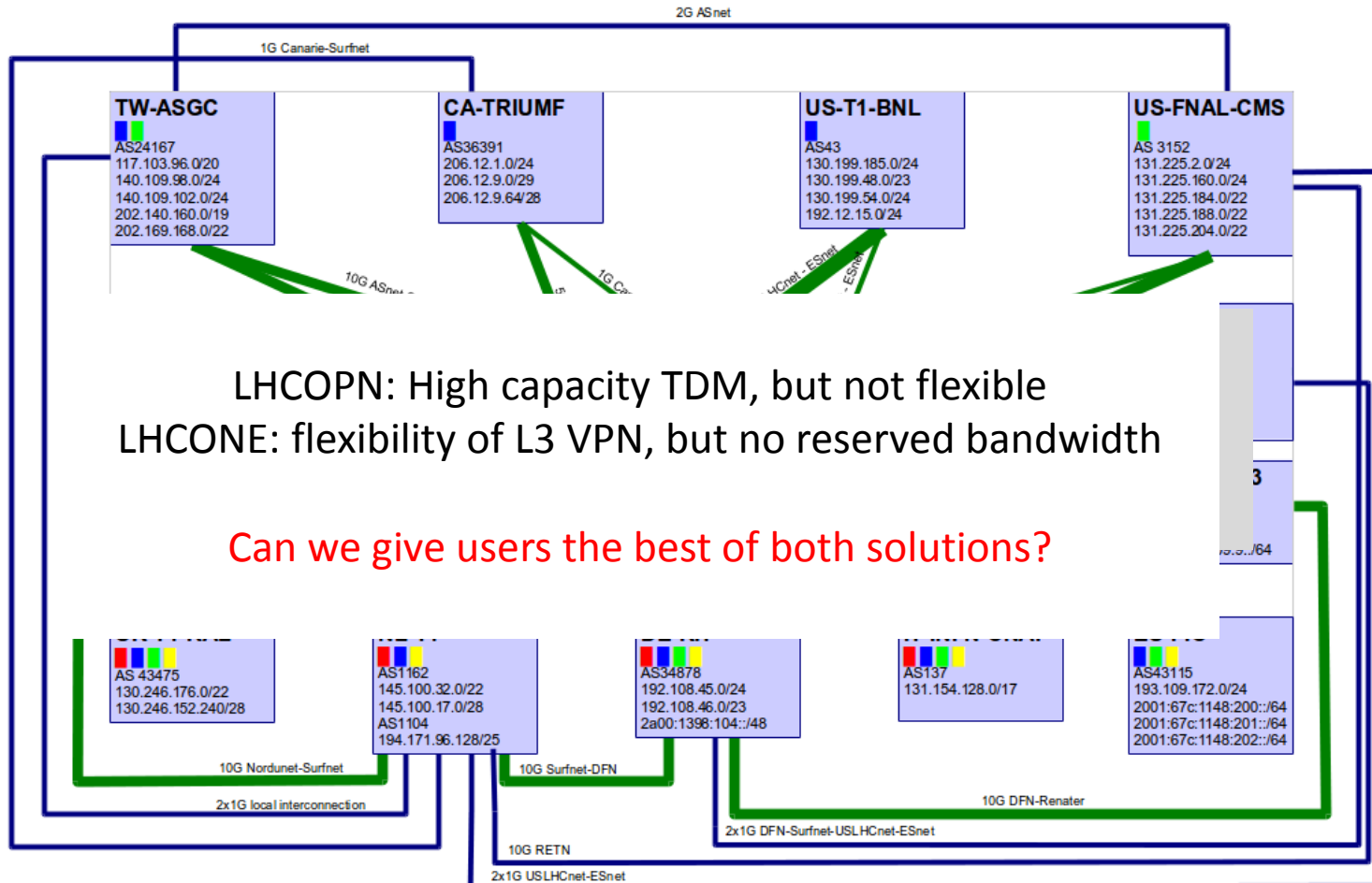 - Traffic is segregated but what's the real benefit?

LHCOPN

- NRENs are providing LHC with point-to-point Layer2 circuits

- LHC centers built a virtual routed network out of the circuits

- LHC centers are providing Network Services to each other:
  - CERN is providing un-restricted transit
  - Some centers are providing limited transit
  - Some LHC centers are peering

- NRENs support individual link operations & management

- LHC Sites are responsible for network management (layer 3 configurations) including operations, monitoring, troubleshooting, capacity planning, security management, AUP enforcement, etc.

LHCONE – as it exists at the moment

- LHCONE is currently setup as an overlay VRF on existing NREN infrastructure which are interconnected via regional networks and Open Exchanges

- NRENs provide the network including core links and routers as a virtual overlay on their regular infrastructure

- NRENs have a peering or transit relationship with each other

- LHC centers are strictly users of the services

- Restrictions apply to the advertised IP Space

- LHCONE infrastructure includes dedicated access, Trans-Atlantic and some backbone links

GÉANT
ASSOCIATION

LHCOPN

2G ASnet

1G Canarie-Surfnet

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
206.12.9.0/29
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

10G ASnet

1G Ca

Cnet - ESnet

ESn

LHCOPN: High capacity TDM, but not flexible
LHCONE: flexibility of L3 VPN, but no reserved bandwidth

Can we give users the best of both solutions?

AS 43475
130.246.176.0/22
130.246.152.240/28

AS1162
145.100.32.0/22
145.100.17.0/28
AS1104
194.171.96.128/25

AS34878
192.108.45.0/24
192.108.46.0/23
2a00:1398:104::/48

AS137
131.154.128.0/17

AS43115
193.109.172.0/24
2001:67c:1148:200::/64
2001:67c:1148:201::/64
2001:67c:1148:202::/64

10G Nordunet-Surfnet

2x1G local interconnection

10G Surfnet-DFN

10G DFN-Renater

2x1G DFN-Surfnet-USLHCnet-ESnet

10G RETN

2x1G USLHCnet-ESnet

	T0-T1 and T1-T1 traffic		= Alice		= Atlas
	T1-T1 traffic only		= CMS		= LHCb
	Not deployed yet				
	(thick) >=10Gbps	p2p prefix: 192.16.166.0/24 - 2001:1458:302::/48			
	(thin) <10Gbps	edoardo.martelli@cern.ch 20140620			

PXM – available 1Q 2015

DTN-X Family
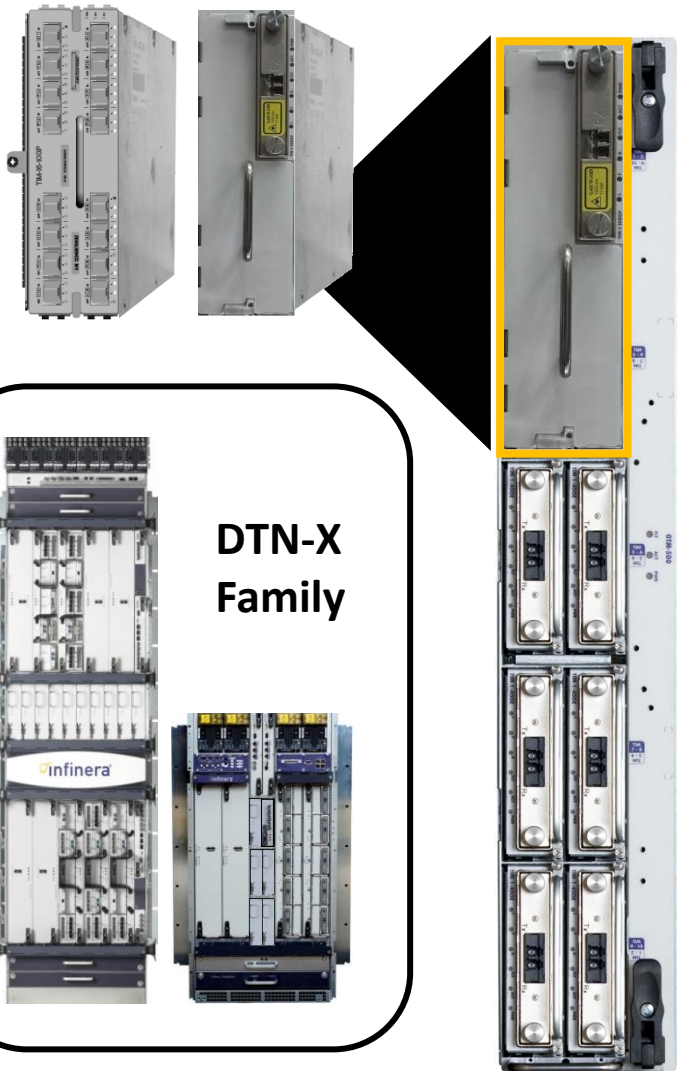
> ## Packet Switching Module
>> ➤ 16x10GE or 16x1GE
>> ➤ 1 x 100GE

> ## Built-In 200G Packet Switch
>> ➤ Enables QoS
>> ➤ Packet Classification
>> ➤ VLAN and QinQ
>> ➤ MPLS-TP on network side

> ## MEF services
>> ➤ Point-to-point services EP-LINE, EVP-LINE
>> ➤ Multipoint services EP/EVP-LAN, EP/EVP-TREE

Networking • Services • People

ꞬInfinera®

Open Transport Switch

- Open Transport Switch (OTS) provides an Open Flow interface to the DTN-X

- OTS adds transport extensions to the Open Flow interface

- Initially REST based interface

- On Infinera roadmap for Q4 2015 (R12), however, early versions available now for evaluation.

- Using OTS to control OTN transport circuits – not that useful

OTS would make a useful API to allow big science users to request EVP-LINE and EVP-LAN services via PXM

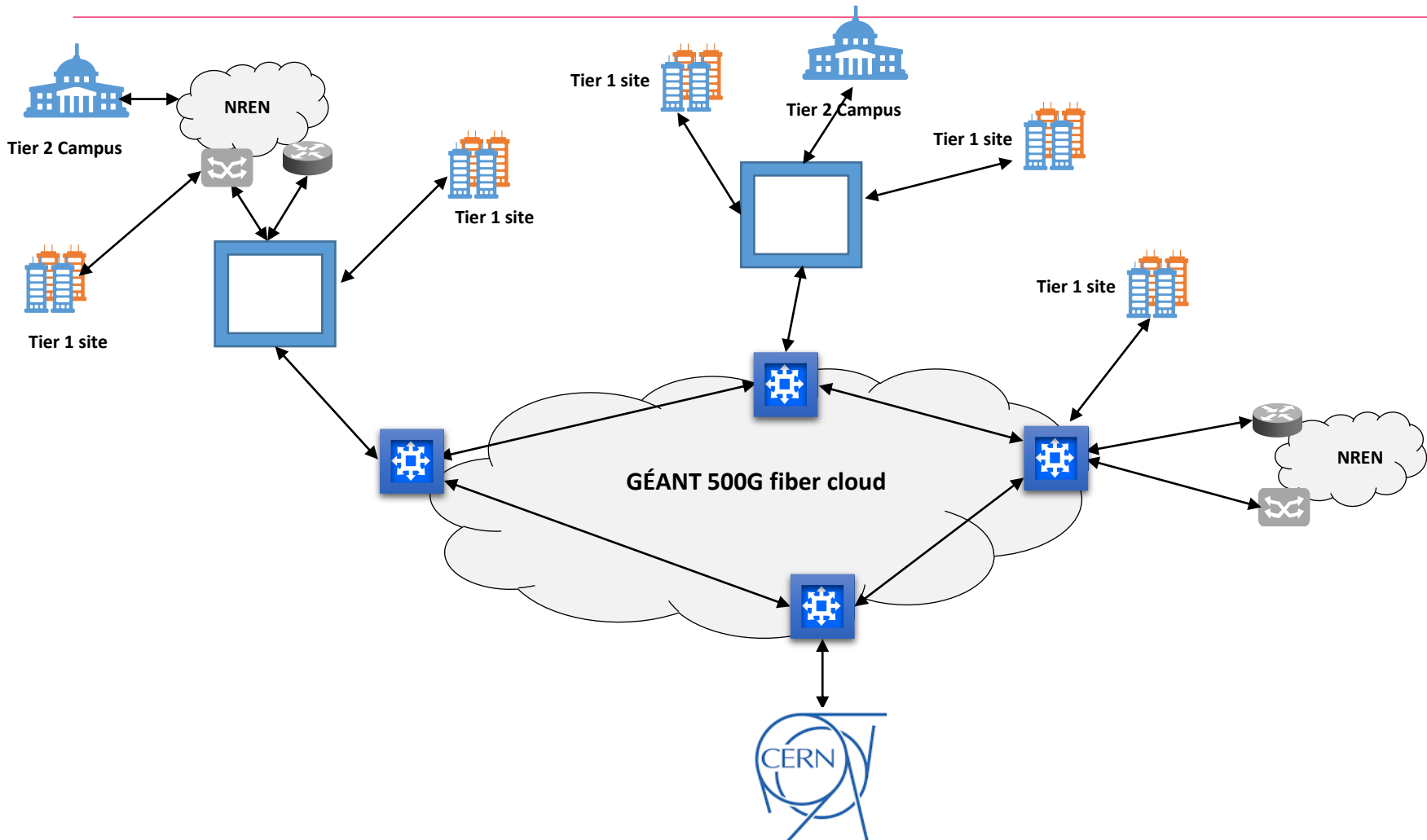# Packet OPX optimized EPL & EVPL Services over Layer 1 VPN
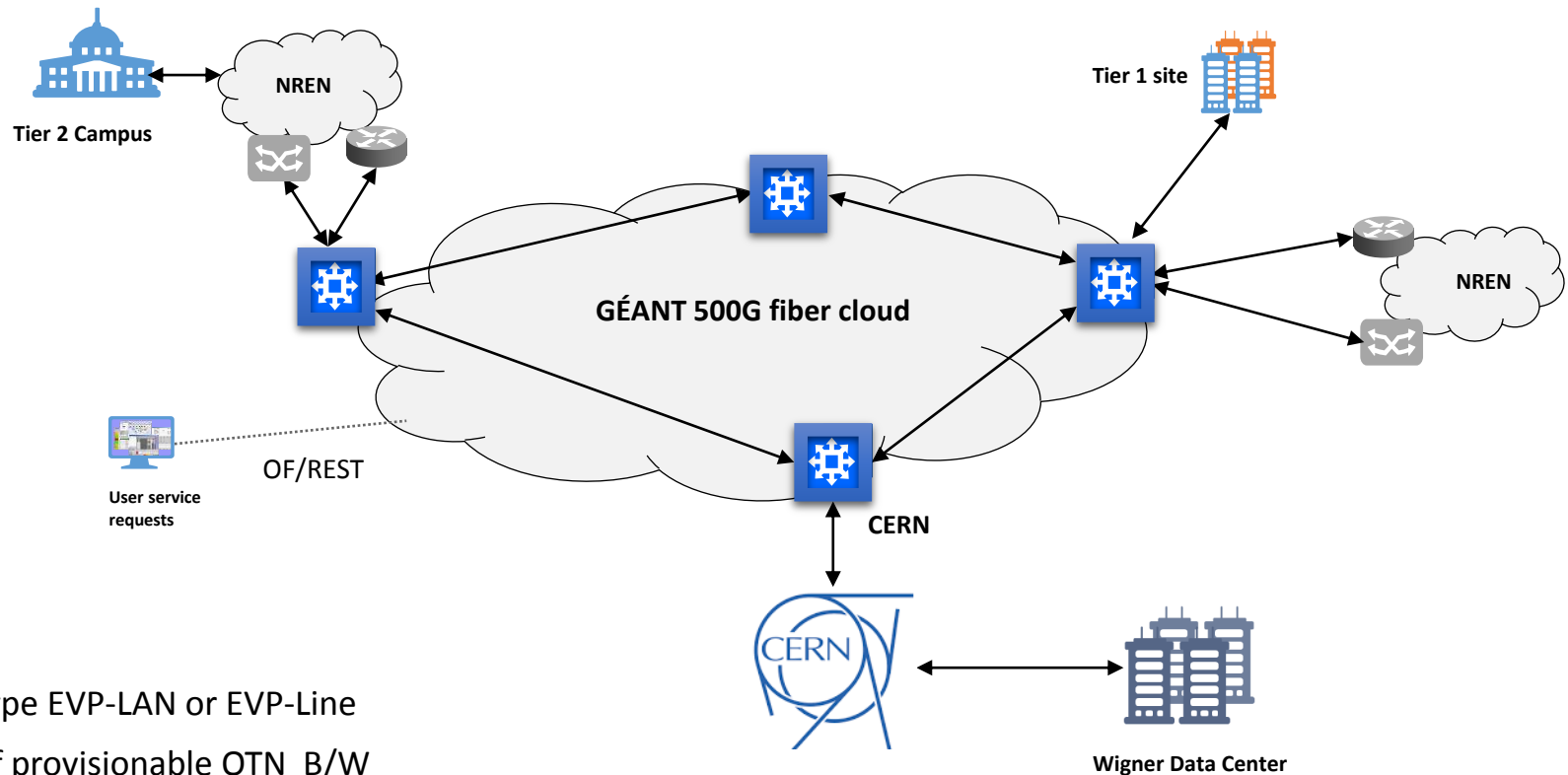
- ➢ MEF type EVP-LAN or EVP-Line
- ➢ pool of provisionable OTN B/W
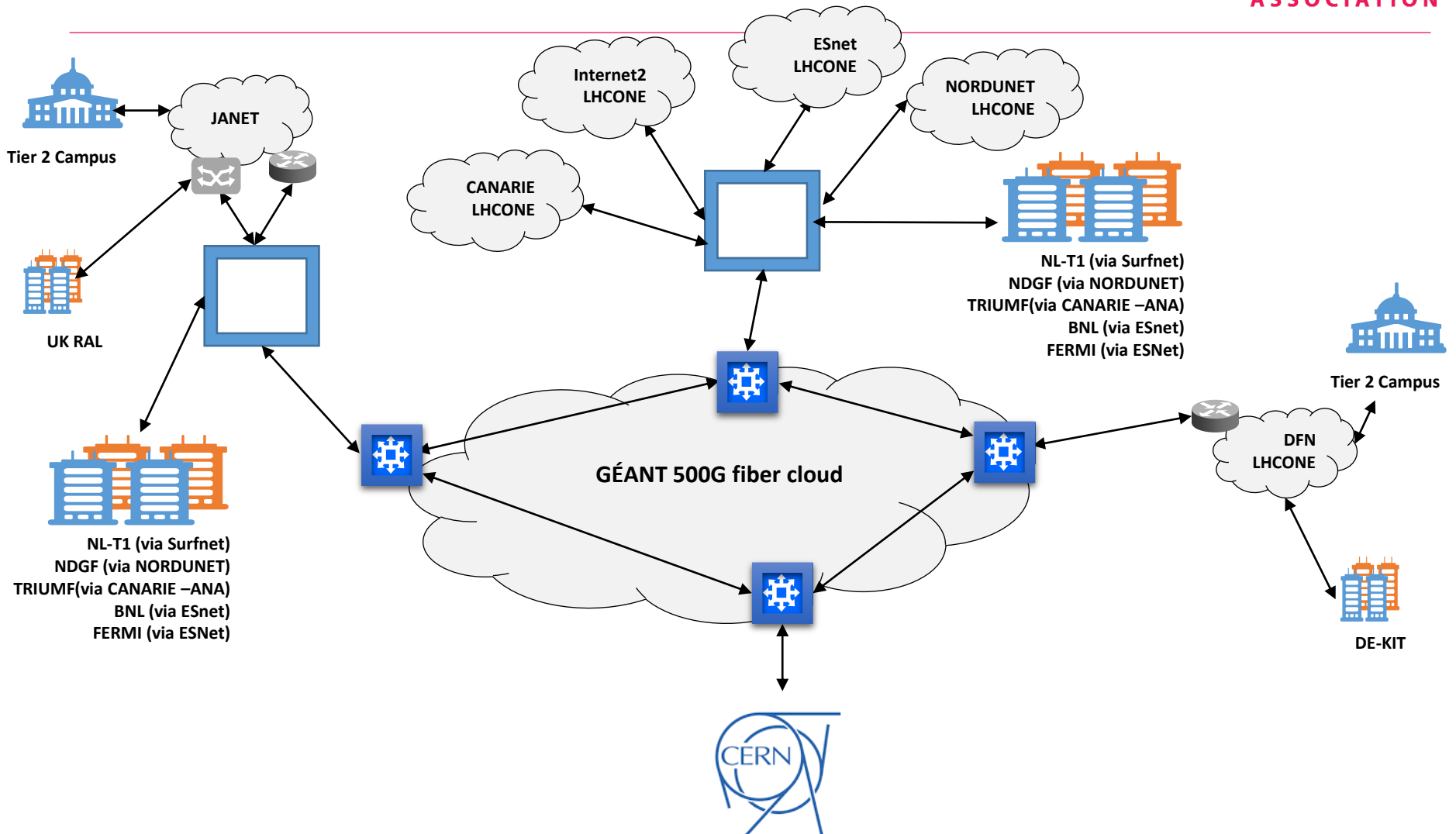- ➢ OTS REST/OF API to allow experimenter's applications to manage connectivity

Packet OPX optimized EPL & EVPL Services over Layer 1 VPN
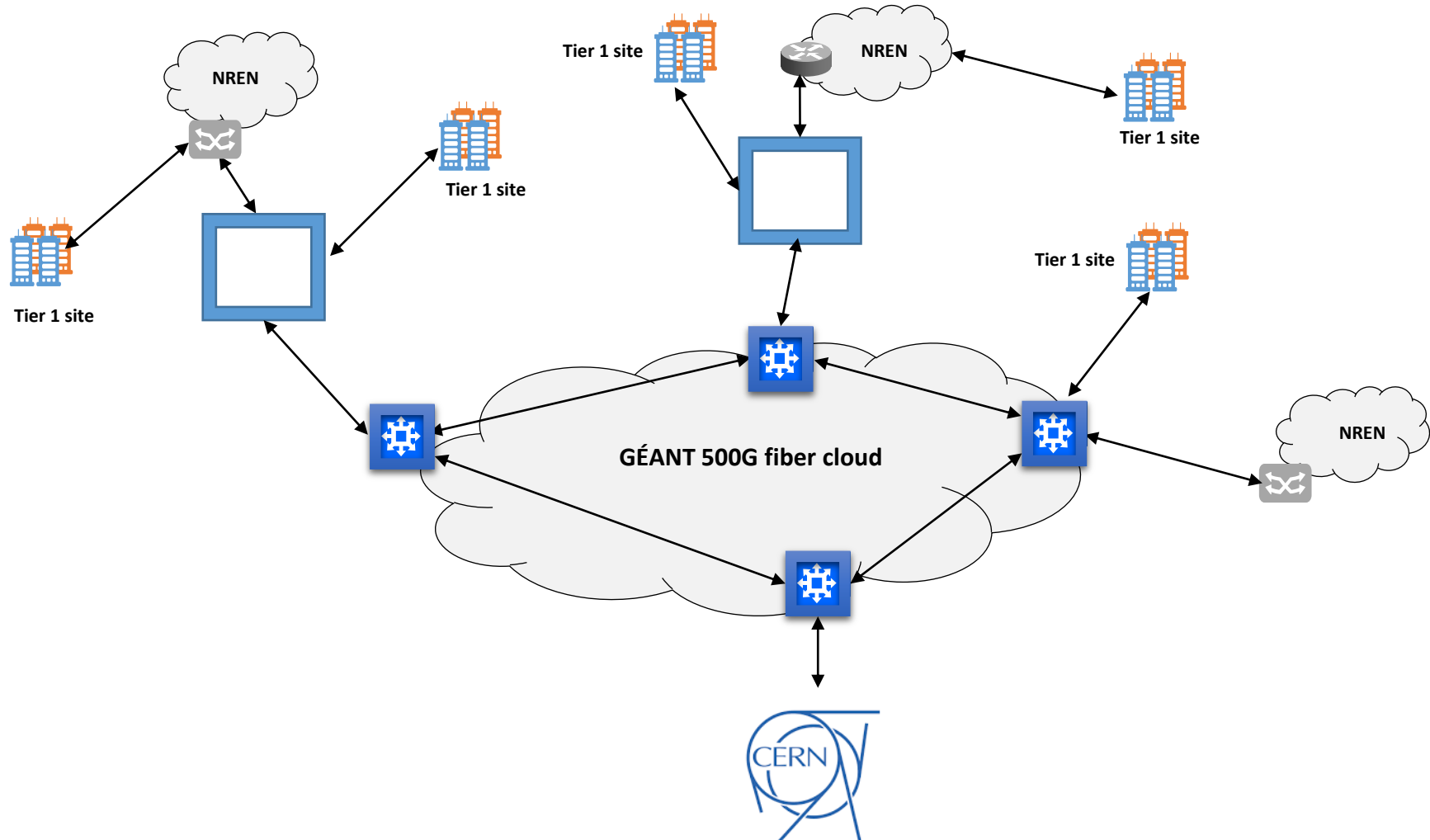
GÉANT 500G fiber cloud

Packet OPX optimized EPL & EVPL Services over Layer 1 VPN

PXM Evaluation and trial

➢ **Field trial in Q2 2015**.

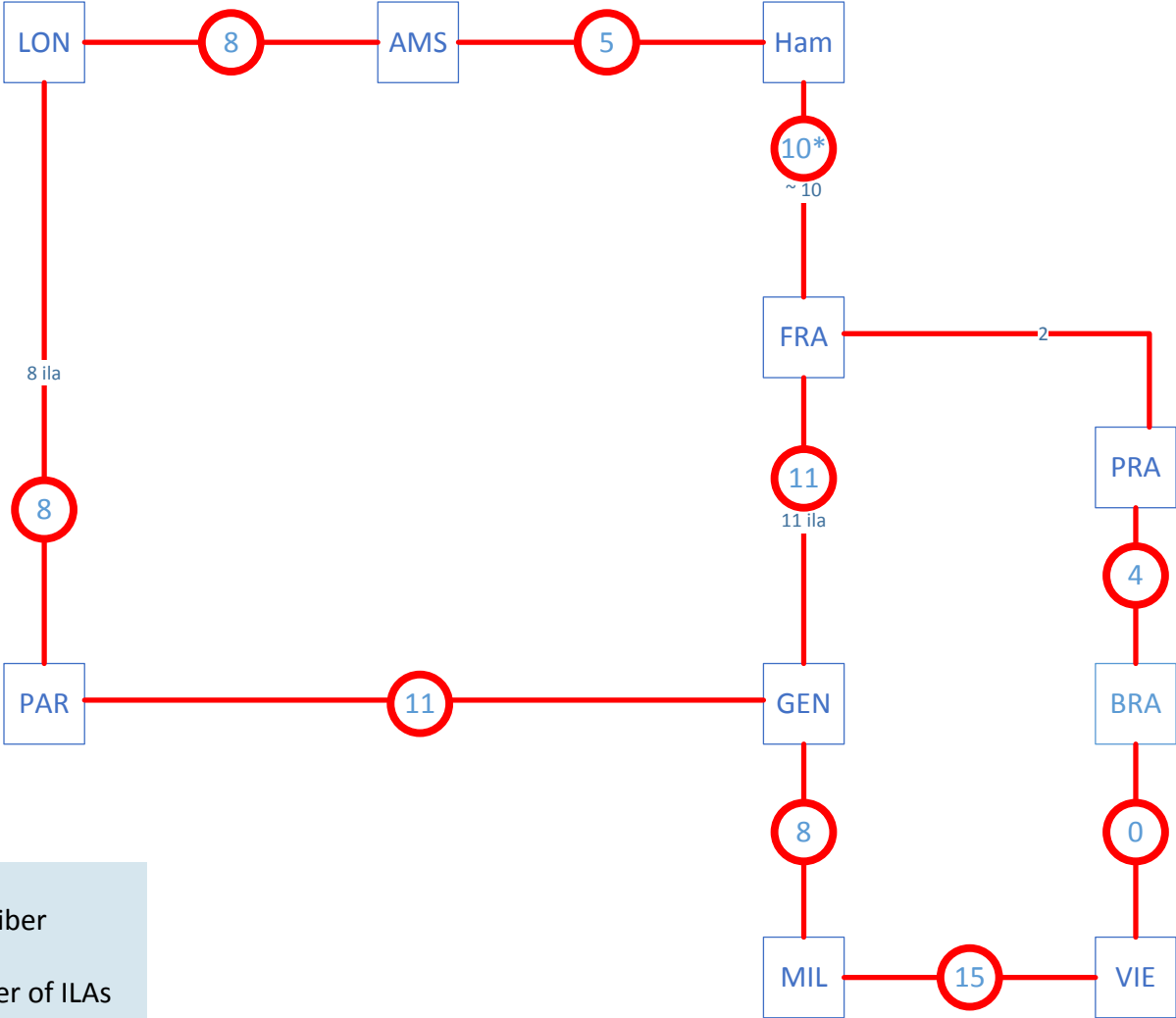   ➢ Pre-release PXM cards could be trialled.

Evaluation and service development

➢ **Field trial integration of PXM and OTS**.

   ➢ Evaluate OTS and PXM together.

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Questions?

GEANT IP Backbone

GEANT Dark Fibre Foot Print