

# Network activities

ESCAPE workshop - 1<sup>st</sup> of July 2019  
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# Content

- R&D: NOTED and multiONE
- Monitoring: perfSONAR

**NOTED**

Network-Optimized Transfer of Experimental Data

# Problem 1

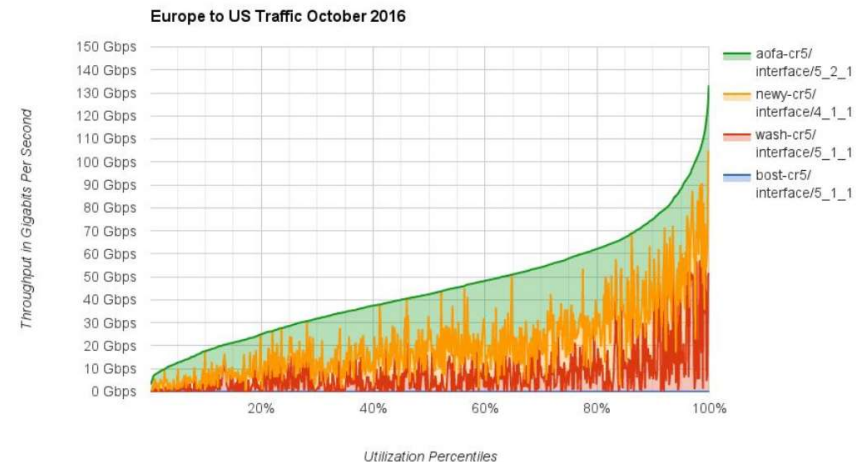
Traditional network routing selects best path based on few metrics. The Best-path is always preferred, even when congested. Existing alternatives are ignored

Consequences:

- Transfer rates capped by best-path bandwidth
- Networks are sized for peak utilization. Most of the time they are underutilized

Same data sorted by Utilization instead of Time

- Shaded area is used capacity
- Unshaded area is unused capacity



# NOTED

NOTED: Network-Optimized Transfer of Experimental Data

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

Dynamically re-model the network to improve transfer performances and effective utilization of networks

# Principles

## Shared knowledge:

- **Data transfers repository:** centralized repository of upcoming and ongoing major(\*) data transfers
- **Network status repository:** centralized repository with information of congested interconnecting links

## Act local:

- Network Providers can use this information to improve transfer rates and the effective use of their own networks

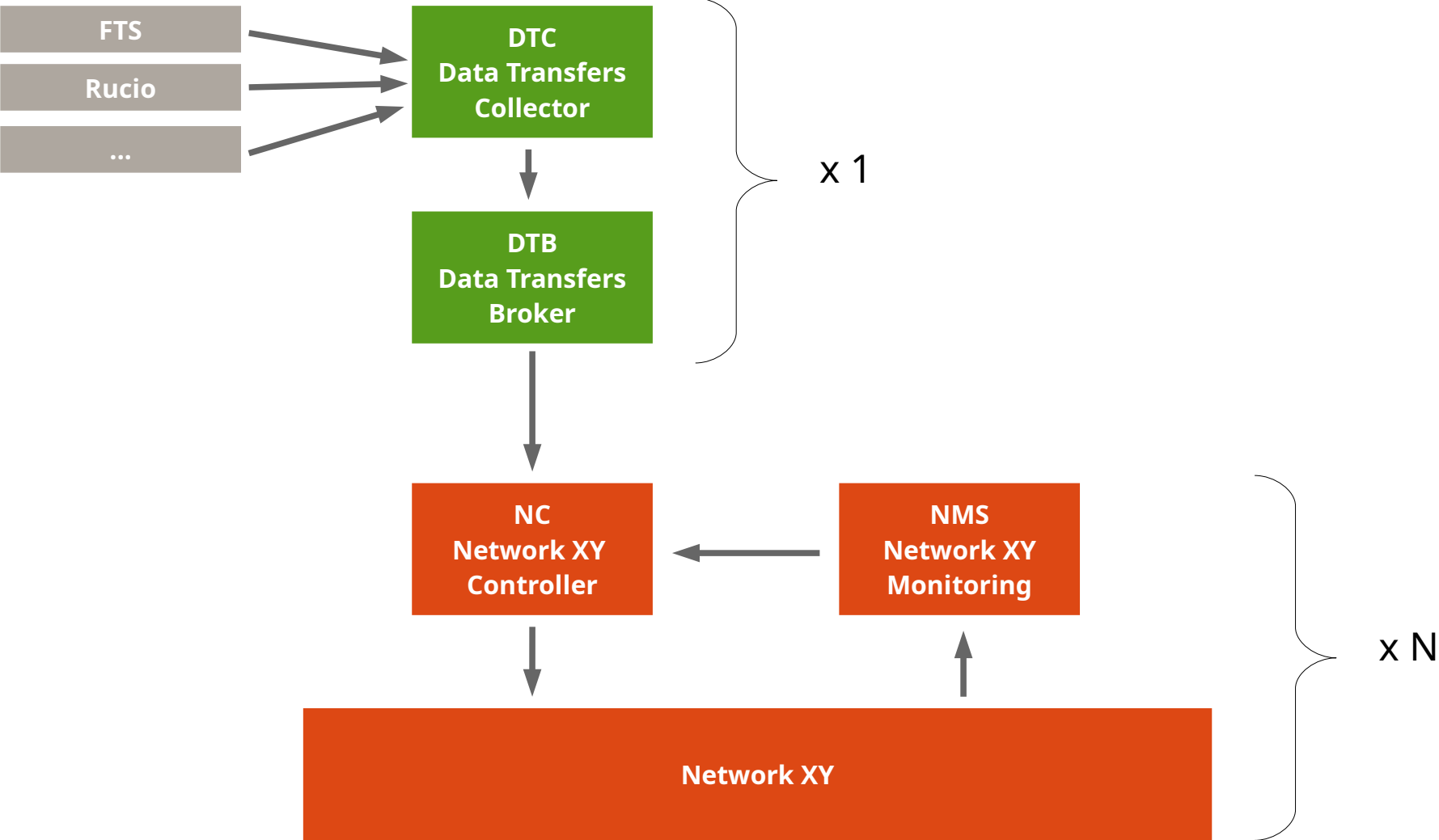
(\*) Terabytes, lasting more than tens of minutes

# Possible outcome

Build a **repository of on-going data transfers** that network operators can look up to optimize their own network utilization

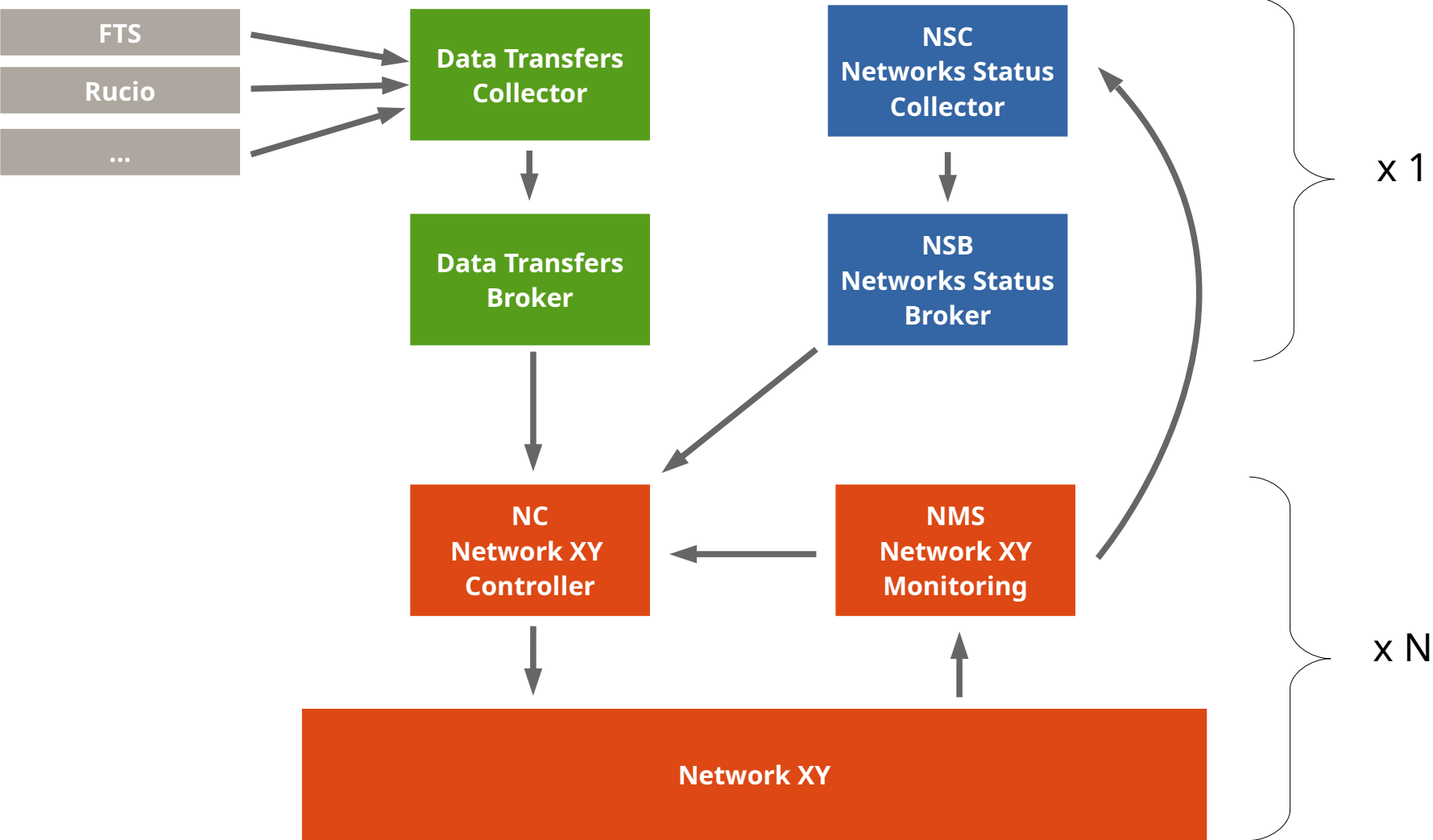
Enhance it with global **network status information** so to make better next-domain decision

# Architecture proposal – phase 1, transfer information





# Architecture proposal – phase 2: add network status



**multiONE (name TBC)**

# Problem 2

LHCONE is a VPN (private network) that connects only WLCG sites.

Thanks to shared security practices, sites can trust their high-speed LHCONE uplink to bypass slow perimeter firewalls.

If other large collaborations would be allowed to use LHCONE, its security could decrease. Each collaboration should use their own dedicated VPN

Problem: if a pair of sites works for two collaborations and computing resources are shared, it may be difficult to put data transfers in the right VPN

# multiONE

Problem discussed several time at LHCONE meeting

Agreed to start a project to verify if it is possible to use multiple VPNs for sites that participate to several science collaborations

Discussions on going to check if DUNE could be a possible use-case

Contacts established with GNA-G to define a possible collaboration using their virtual testbed

# Problem to be solved

How to route differently traffic between two identical sets of servers, maybe using the same data transfer applications

The network should solve the issue, without requiring major changes on the servers' software

**perfSONAR monitoring**

# WLCG perfSONAR deployment

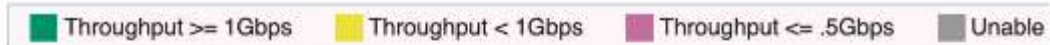


- 288 Active perfSONAR instances
- 207 production endpoints
- T1/T2 coverage
- Continuously testing over 5000 links
- Testing coordinated and managed from central place
- Dedicated latency and bandwidth nodes at each site
- **Open platform** - tests can be scheduled by anyone who participates in our network and runs perfSONAR

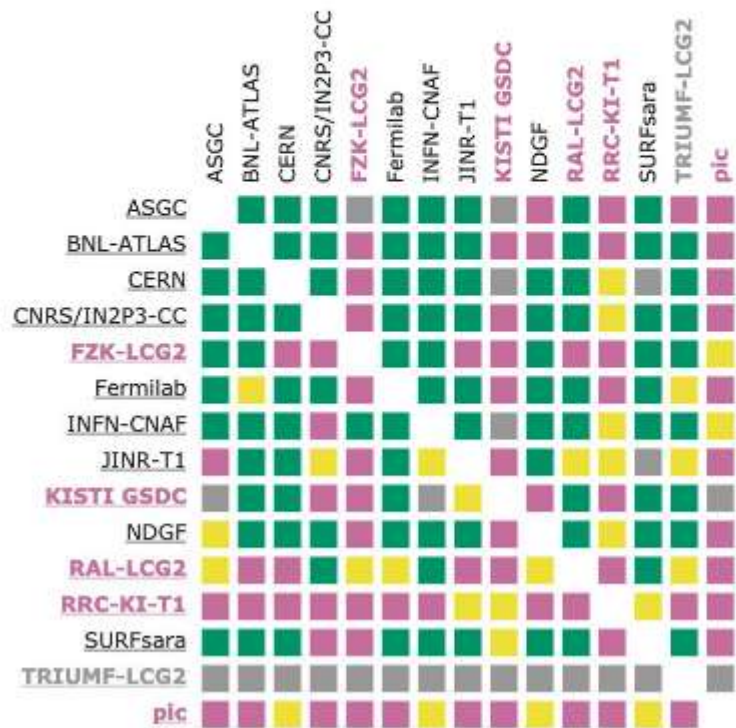
Credit: perfSONAR slides produced by [Marian Babik and Shawn McKee](#)

# LHCOPN dashboard

## OPN Mesh Config - OPN IPv4 Bandwidth - Throughput



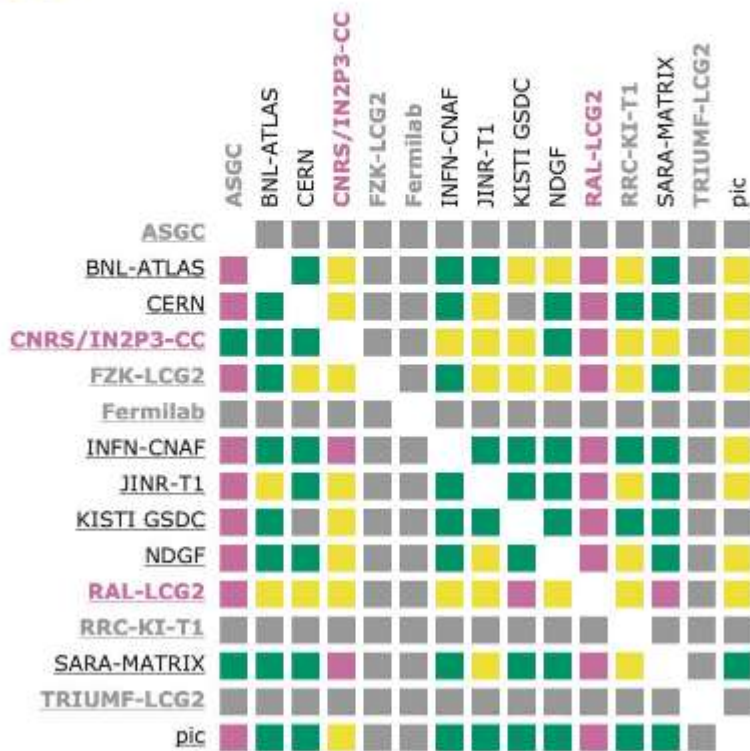
! Found a total of 8 problems involving 6 hosts in the grid



## OPN Mesh Config - OPN Latency - Loss



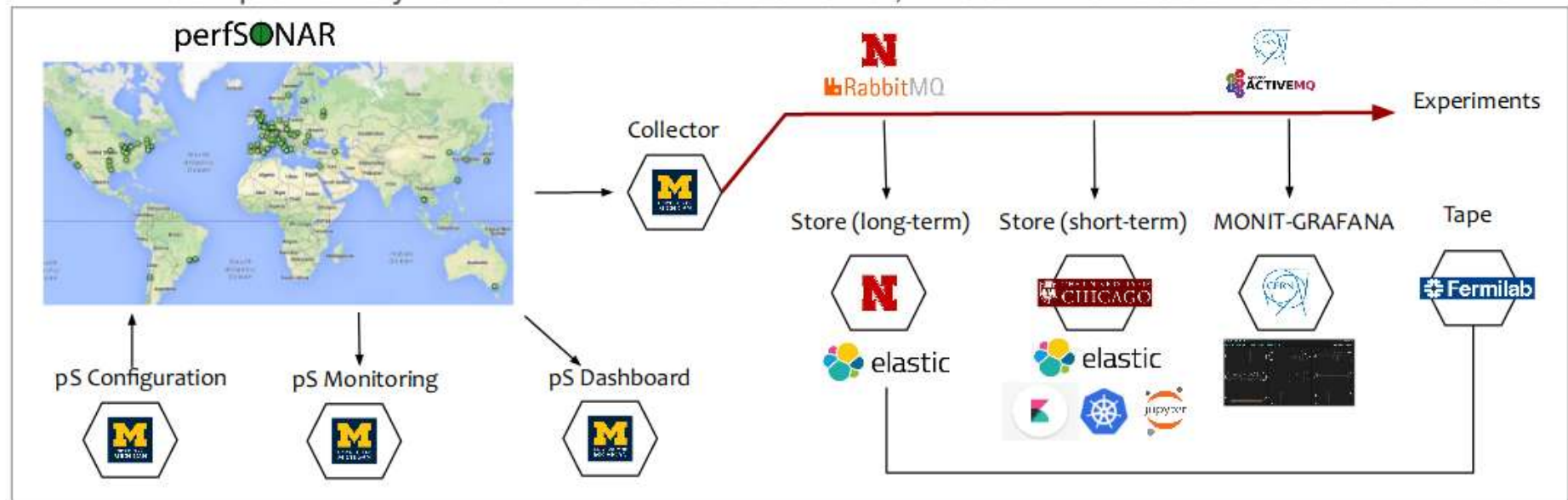
! Found a total of 8 problems involving 7 hosts in the grid





# Network platform overview

- Collects, stores, configures and transports all network metrics
  - Distributed deployment - operated in collaboration
- All perfSONAR metrics are available via **API**, live stream or directly on the **analytical platforms**
  - Complementary network metrics such as ESNNet, LHCOPN traffic also via same channels



# perfSONAR at Data Lake prototype sites

CERN:	yes
INFN CNAF:	yes
SURFSara:	yes
CCIN2P3 Lyon:	yes
IFAE-PIC:	yes
DESY Hamburg:	yes
DESY Zeuthen:	yes
LAPP-MUS:	yes
GSI:	no
Nikhef:	no
INAF-OATs:	no
RUG:	unknown

*Questions?*

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