U.S. DEPARTMENT OF ENERGY

BERKELEY LAB

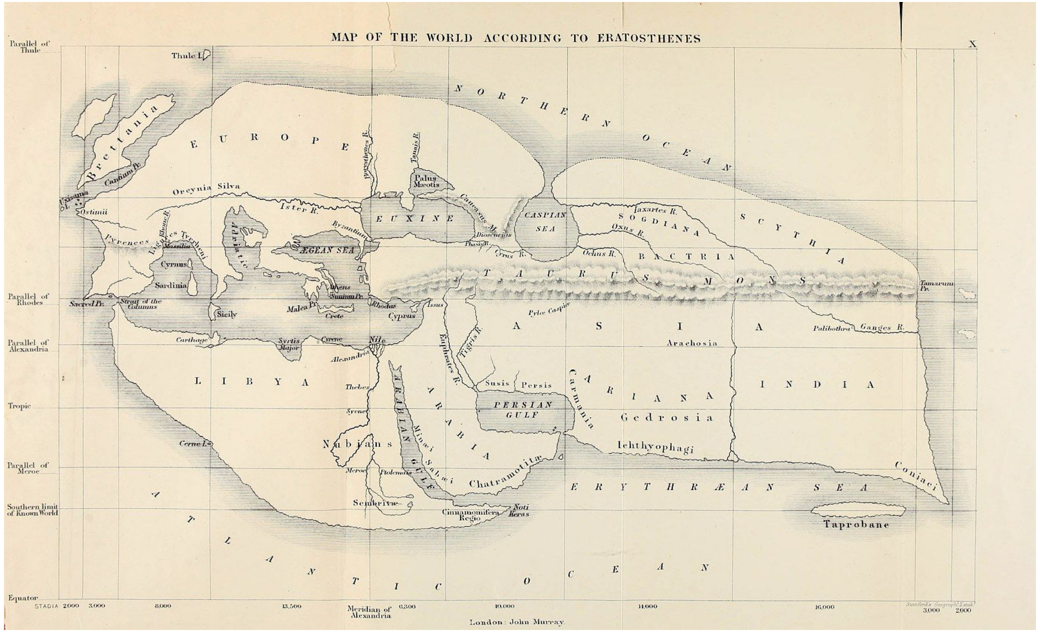
ESnet

Software Defined Network control for LHC Experiments

Justas Balcas
Software Engineer
ESnet

CHEP 2024
Krakow, Poland
2024-10-24

If a {human} was a packet, how did it travel?



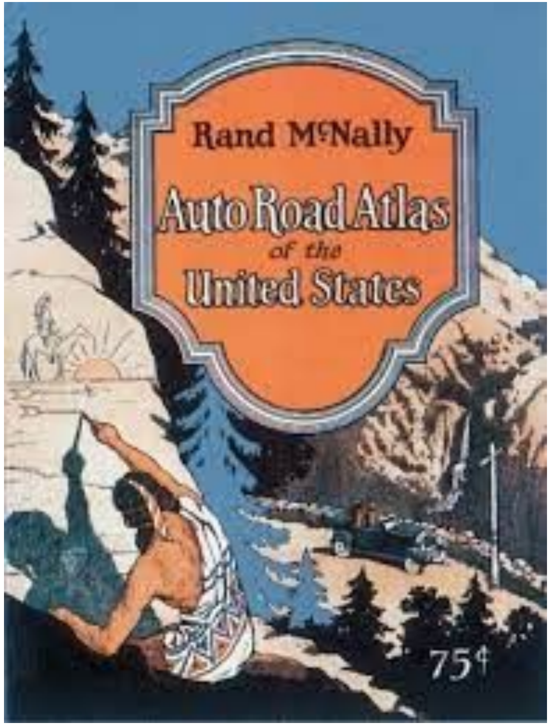
Map by
Eratosthenes of Cyrene
(276 B.C - ~194 B.C)

Father of Geography

Equivalent of hop-by-hop, store-forward routing

- Maps introduced rough guide on directions and location
- Tools helped to align to those directions
- Refinement of directions was based on observing intermediate landmarks or asking

If a {human+automobile} was a packet, how did it travel?



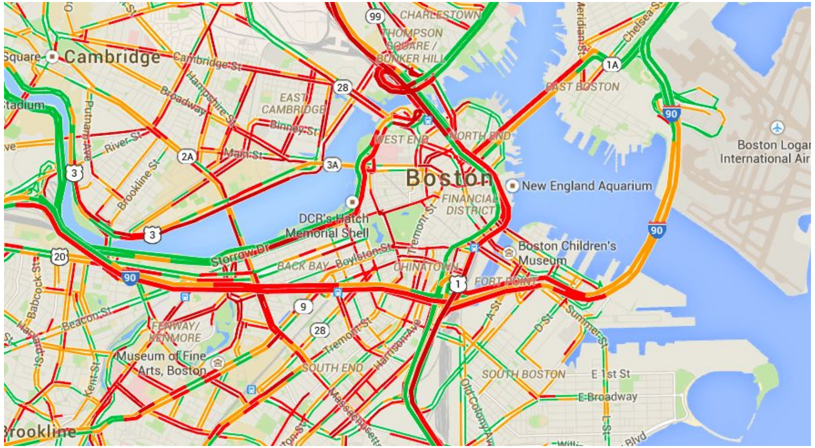
With the advent of automobiles, Rand McNally published its first road atlas called "Auto Chum" in 1924

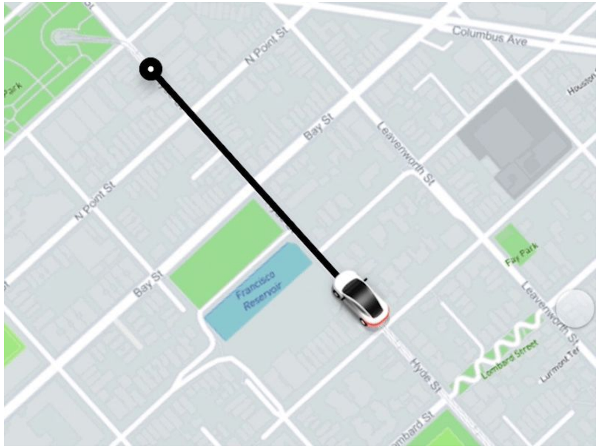
Routes were pre-computed by human brain before getting on the road, re-routing happened on the fly by stopping and manually determining the route again

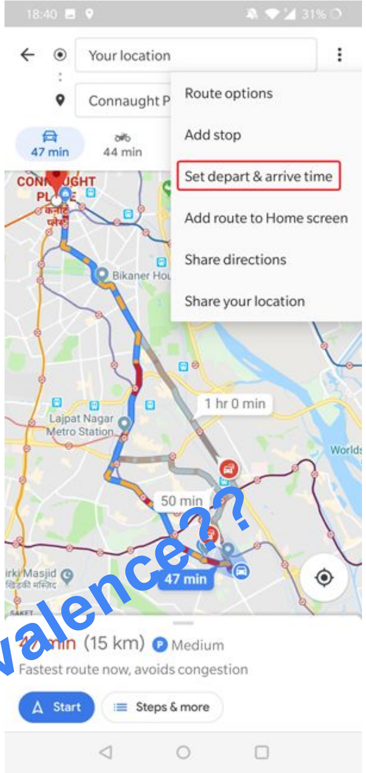
Equivalent of MPLS or Layer 2.5 based routing

Prediction and planning was hard, and depended on personal experience or hearsay

With the advent of digital technology, the {human + vehicle} packets have real-time + historical knowledge







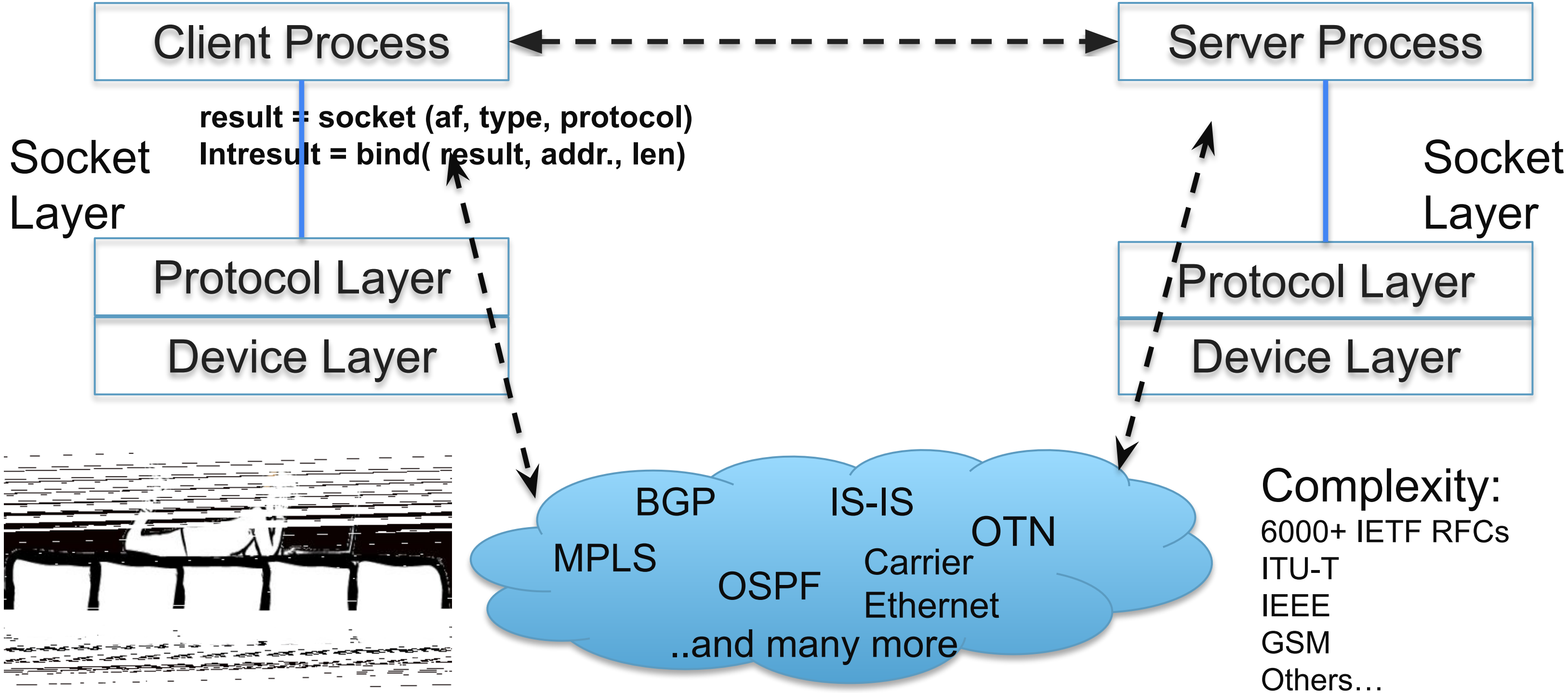
Real-time traffic and traffic prediction helps plan with just in time information, and features such as dynamic rerouting and updated accurate data on when the destination will be reached

Equivalence??

Inder Monga Keynote at 7th Rucio workshop (recording): https://indico.cern.ch/event/1343110/sessions/557886/#20241001

Aspirational Goal: How can we provide predictability and resilience to certain data flows given the huge variability of background traffic?

The Unix Socket Interface:



```
result = socket (af, type, protocol)
Intresult = bind( result, addr., len)
```

Complexity:

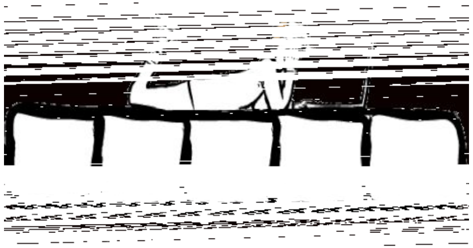
6000+ IETF RFCs
ITU-T
IEEE
GSM
Others…

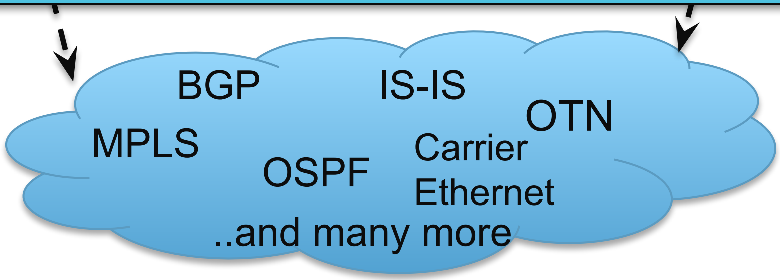
The Unix Socket Interface: Network became a “**black box**”

- Gives file system like abstraction to the network
- Hides the complexity of the network and its operations

result = socket (af, type, protocol)

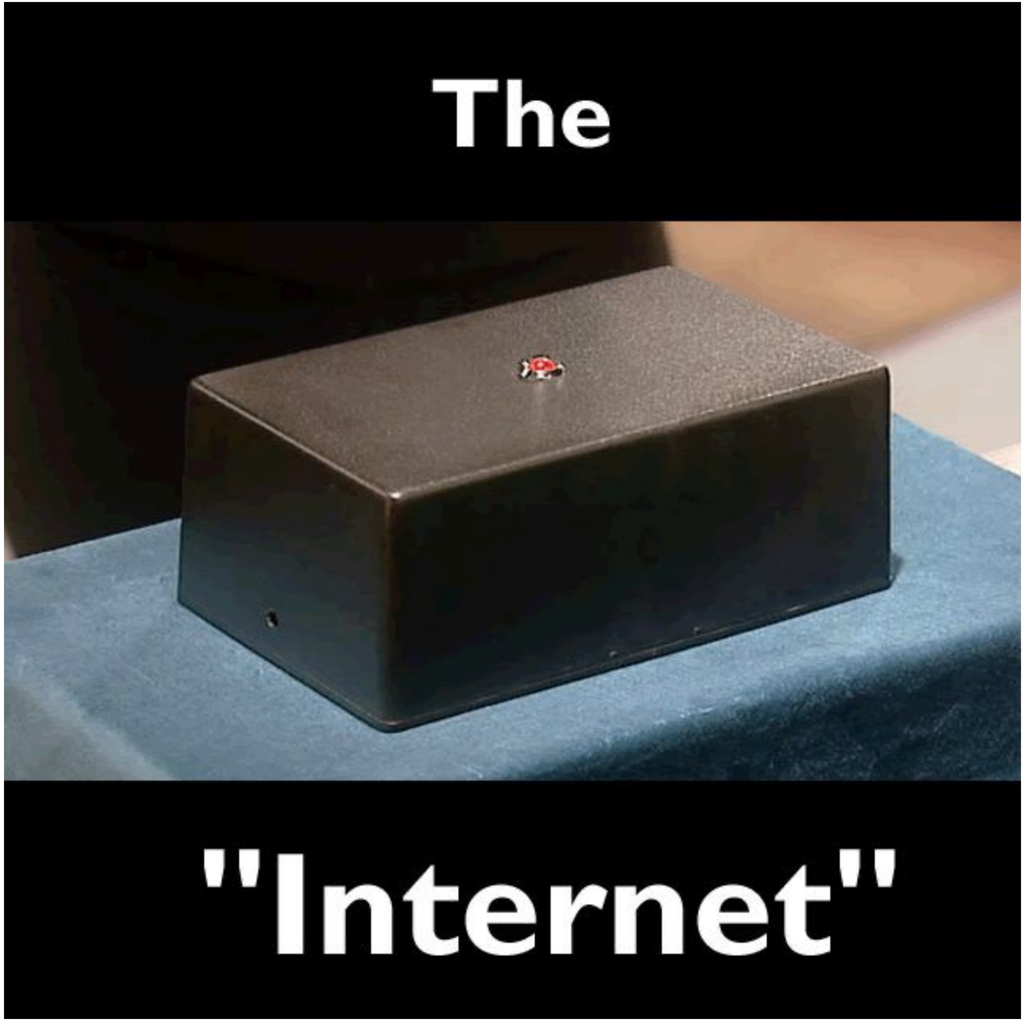
- Application gets no feedback on the progress of the transfer
- There is no reasons given when a transfer fails, the only approach is try again, and again…..
- Network has no responsibility (unlike UPS or Amazon…)



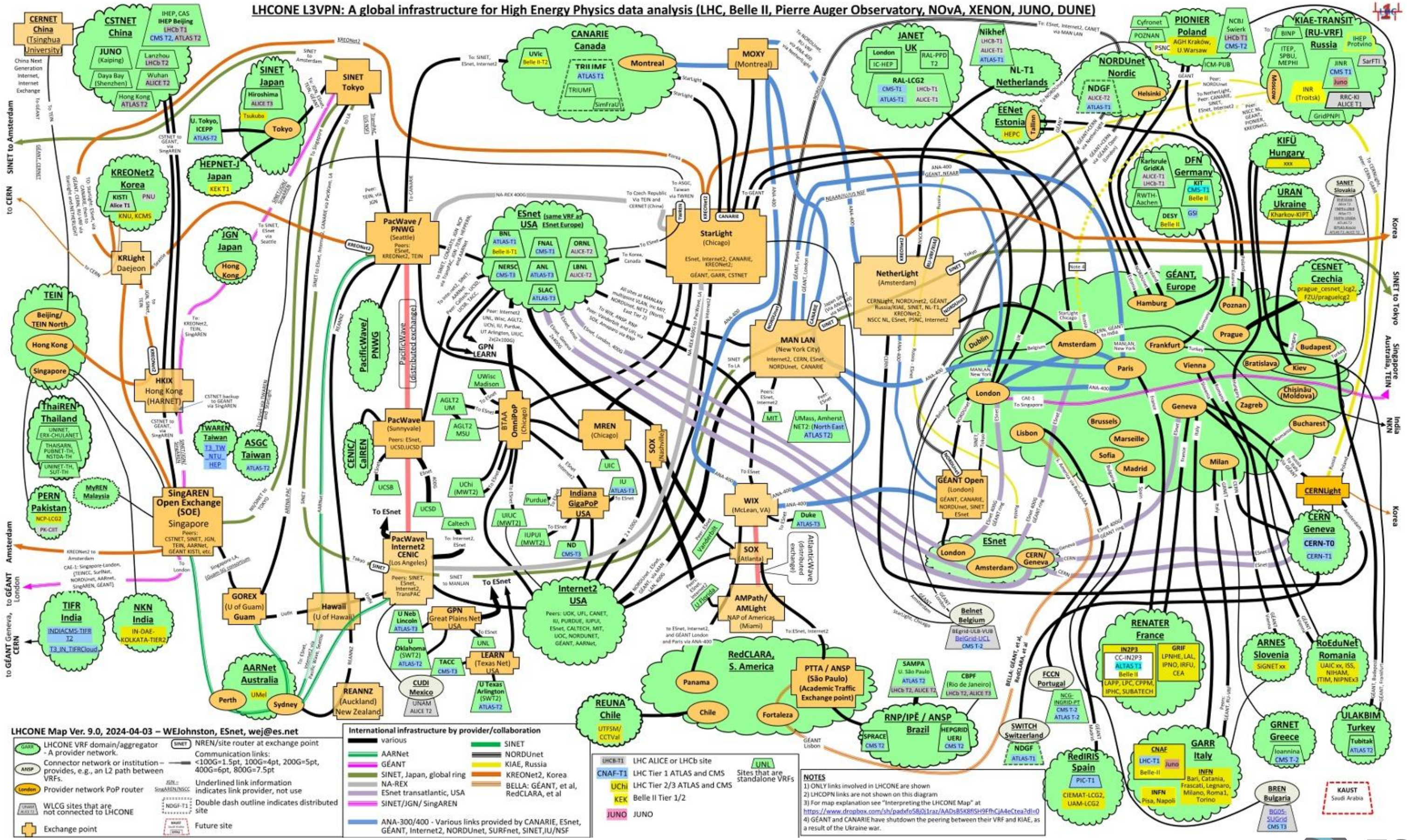


Complexity:

6000+ IETF RFCs
ITU-T
IEEE
GSM
Others…


The
"Internet"

LHCONE L3VPN



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

LHCONE Map Ver. 9.0, 2024-04-03 – WEJohnston, ESnet, wej@es.net

GARR	LHCONE VRF domain/aggregator - A provider network.
ANSP	Connector network or institution – provides, e.g., an L2 path between VRFs.
London	Provider network PoP router
UNAM ALICE T2	WLCG sites that are not connected to LHCONE
✚	Exchange point
SINET	NREN/site router at exchange point
	Communication links: <100G=1.5pt, 100G=4pt, 200G=5pt, 400G=6pt, 800G=7.5pt
JGN – SingAREN/NSCC	Underlined link information indicates link provider, not use
NDGF-T1	Double dash outline indicates distributed site
KAUST Saudi Arabia	Future site

International infrastructure by provider/collaboration

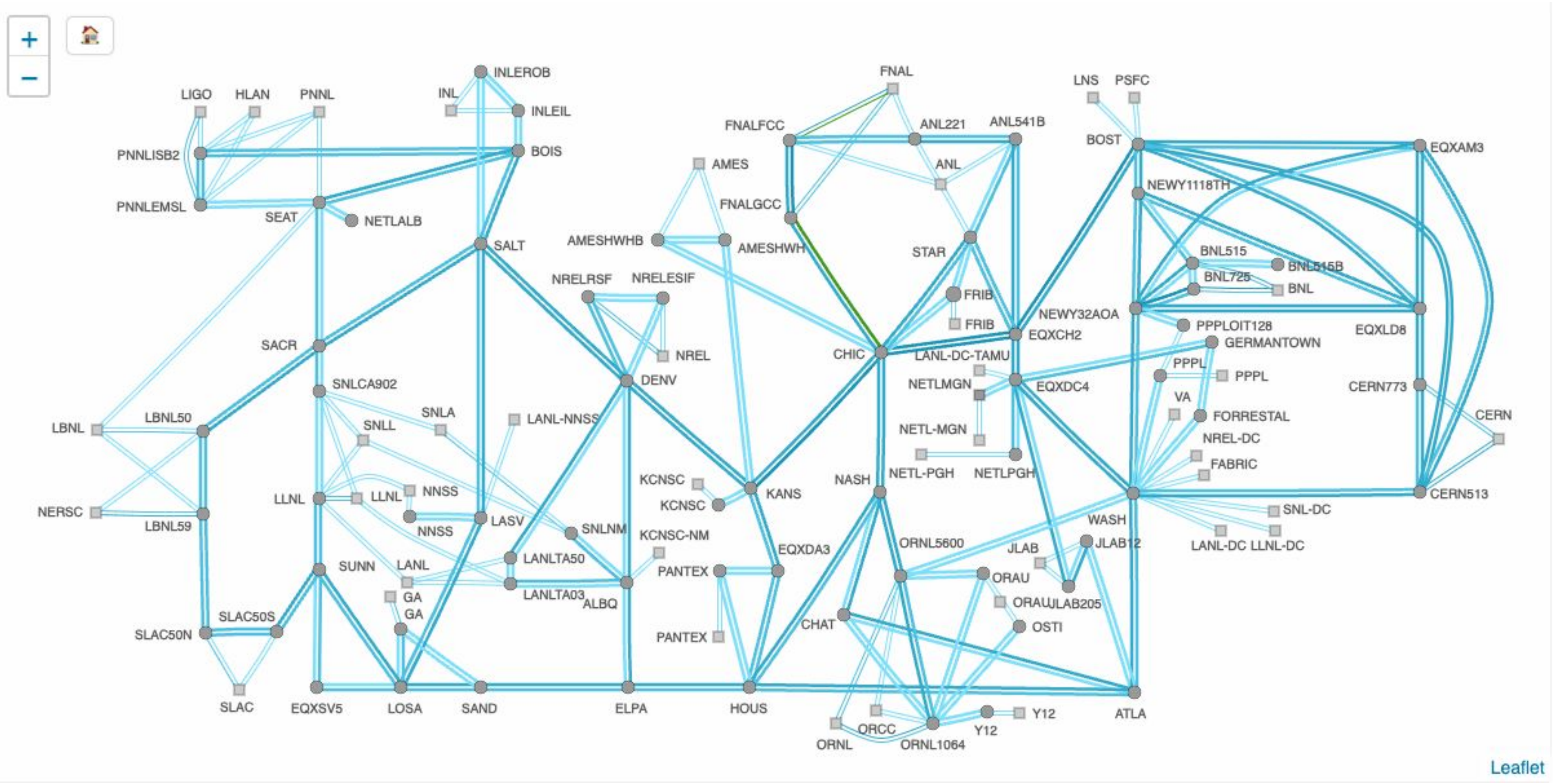
▬	various
▬	AARNet
▬	GÉANT
▬	SINET, Japan, global ring
▬	NA-REX
▬	ESnet transatlantic, USA
▬	SINET/JGN/ SingAREN
▬	ANA-300/400 - Various links provided by CANARIE, ESnet, GÉANT, Internet2, NORDUnet, SURFnet, SINET,IU/NSF
▬	SINET
▬	NORDUnet
▬	KIAE, Russia
▬	KREONet2, Korea
▬	BELLA: GÉANT, et al, RedCLARA, et al

LHCB-T1	LHC ALICE or LHCb site
CNAF-T1	LHC Tier 1 ATLAS and CMS
UChi	LHC Tier 2/3 ATLAS and CMS
KEK	Belle II Tier 1/2
JUNO	JUNO
UNL	Sites that are standalone VRFs

NOTES

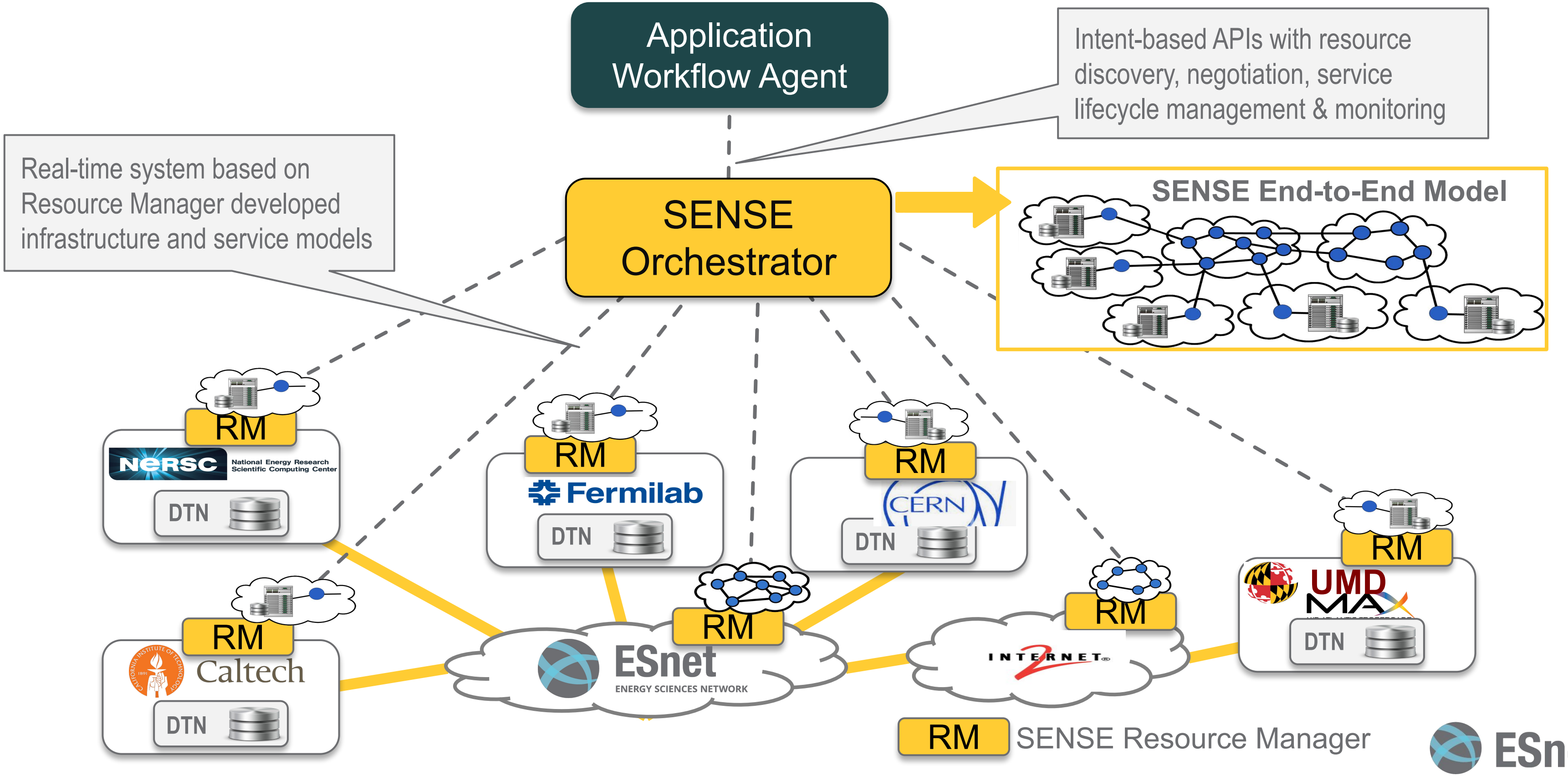
1) ONLY links involved in LHCONE are shown
2) LHCOPN links are not shown on this diagram
3) For map explanation see "Interpreting the LHCONE Map" at https://www.dropbox.com/sh/padxfo58j0j1raz/AADsB5K8fiSH9FfhCjA4eCtea?dl=0
4) GÉANT and CANARIE have shutdown the peering between their VRF and KIAE, as a result of the Ukraine war.

Network topology from my.es.net



ESnet

The SENSE Architecture



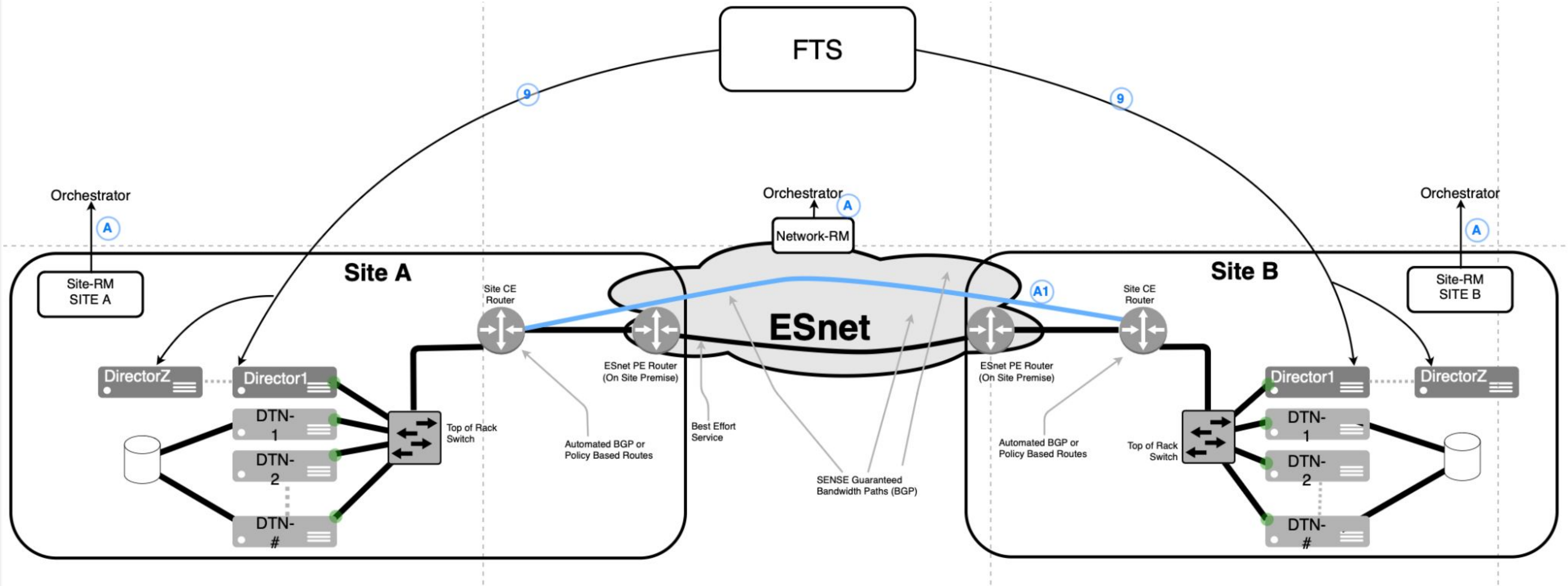
Application Workflow Agent
SENSE Orchestrator
SENSE End-to-End Model
RM
NERSC National Energy Research Scientific Computing Center
DTN
Fermilab
CERN
Caltech
ESnet ENERGY SCIENCES NETWORK
INTERNET2
UMD MAX

Intent-based APIs with resource discovery, negotiation, service lifecycle management & monitoring

Real-time system based on Resource Manager developed infrastructure and service models

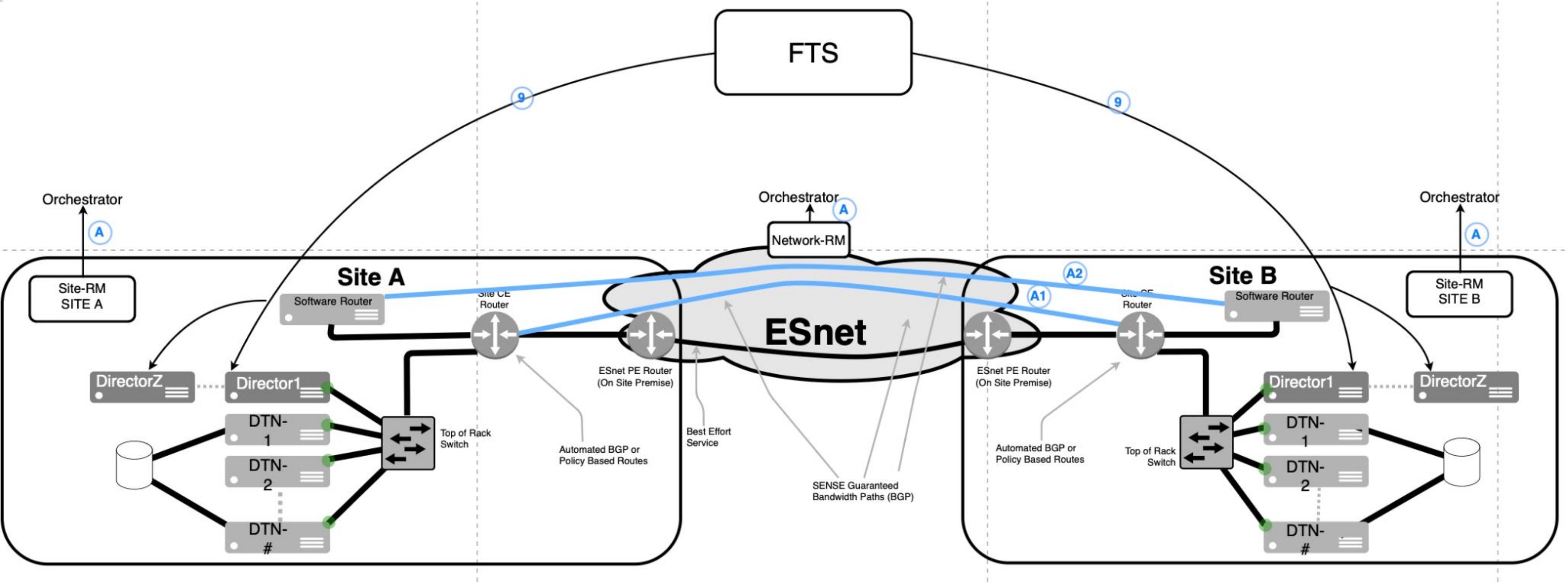
RM SENSE Resource Manager

What is possible via SENSE?



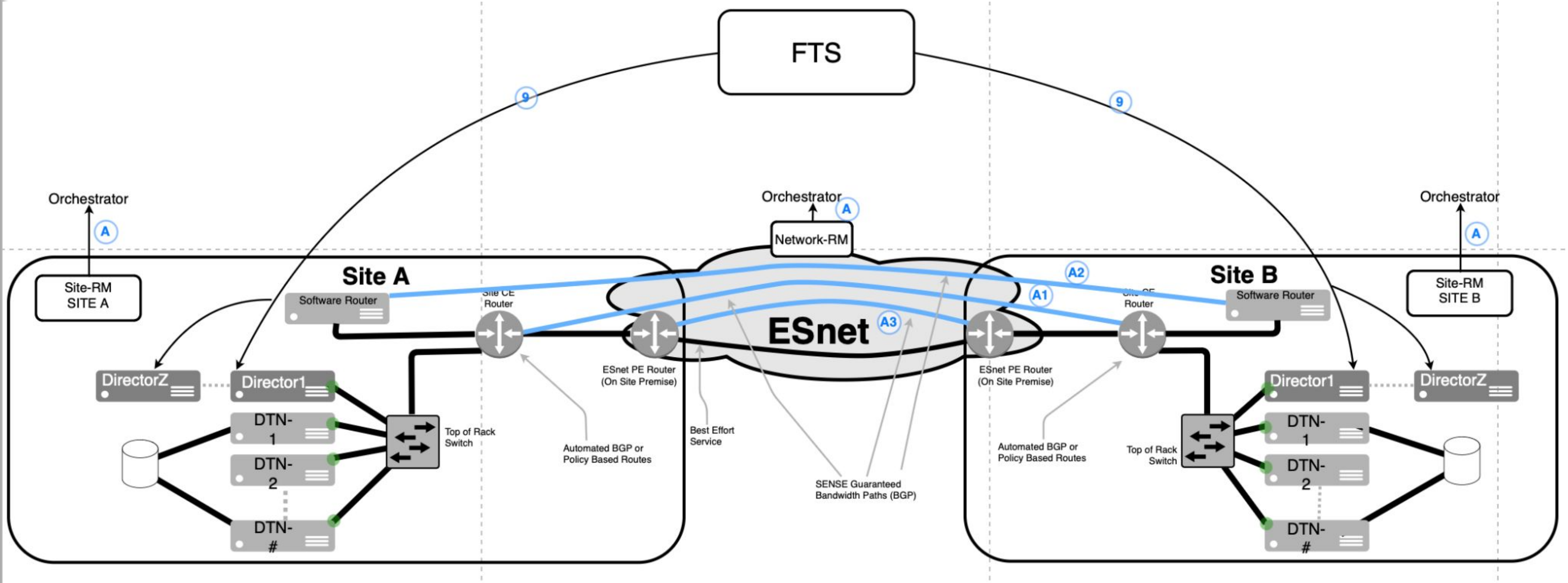
L2/L3/BGP/QoS/Modify/Vlan Translation (Dell, Arista, Cisco, Juniper, SONiC, FreeRTR)
End-to-End (last mile issue solved)

What is possible via SENSE?



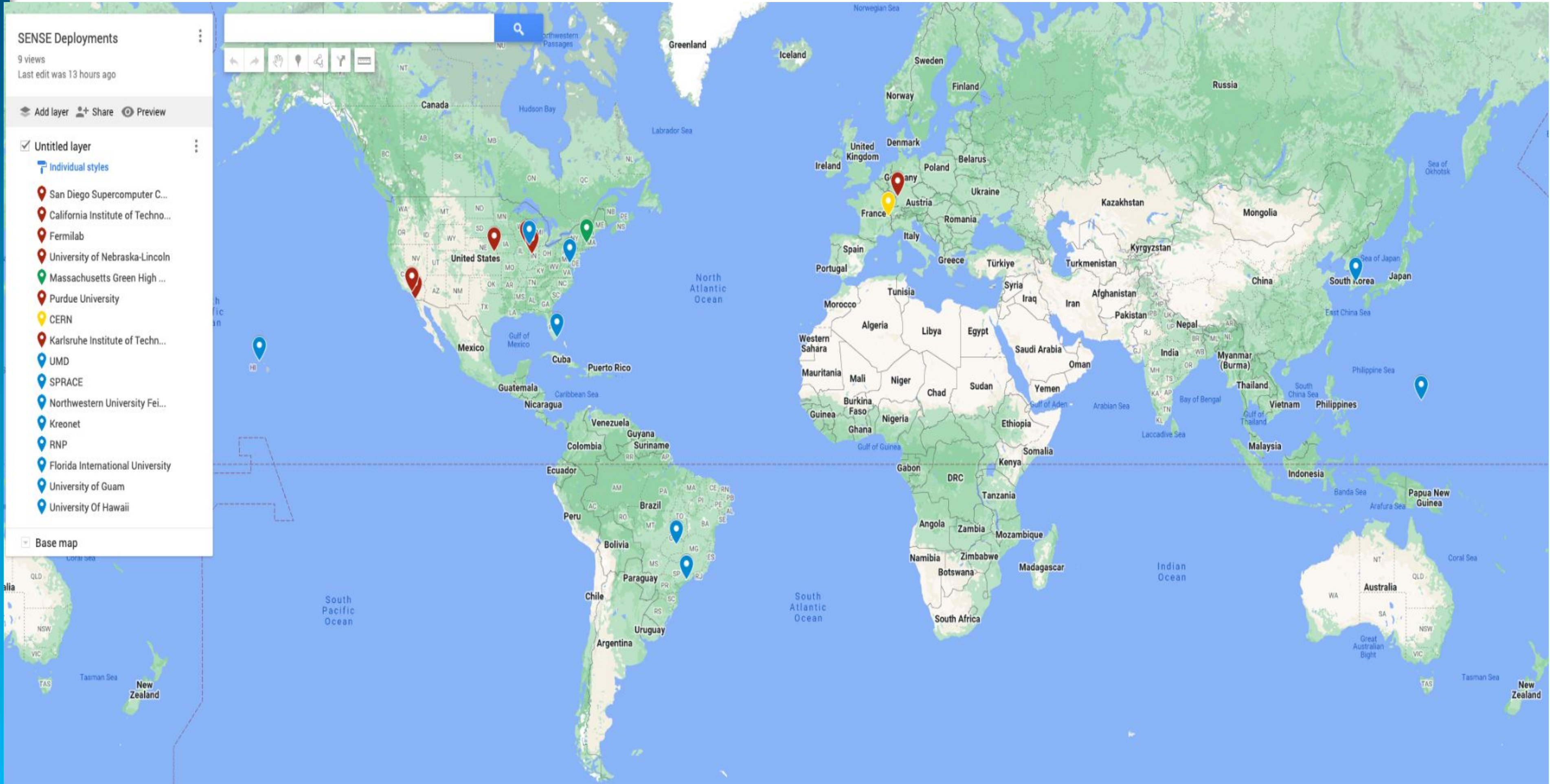
No vendor lock, no switch/router access. Support - FRR, FreeRTR, SONiC, OVS
DPDK/VPP offload with supported NICs

What is possible via SENSE?



No Site changes, all routing at NRE (currently L2/QoS support, L3/BGP/QoS - soon)

SENSE deployments: 52 Servers, 16 sites, 20 network domains



SENSE Deployments

9 views

Last edit was 13 hours ago

Add layer   Share   Preview

☑ Untitled layer

Individual styles

- San Diego Supercomputer C...
- California Institute of Techno...
- Fermilab
- University of Nebraska-Lincoln
- Massachusetts Green High ...
- Purdue University
- CERN
- Karlsruhe Institute of Techn...
- UMD
- SPRACE
- Northwestern University Fei...
- Kreonet
- RNP
- Florida International University
- University of Guam
- University Of Hawaii

Base map

U.S. DEPARTMENT OF ENERGY

BERKELEY LAB

ESnet

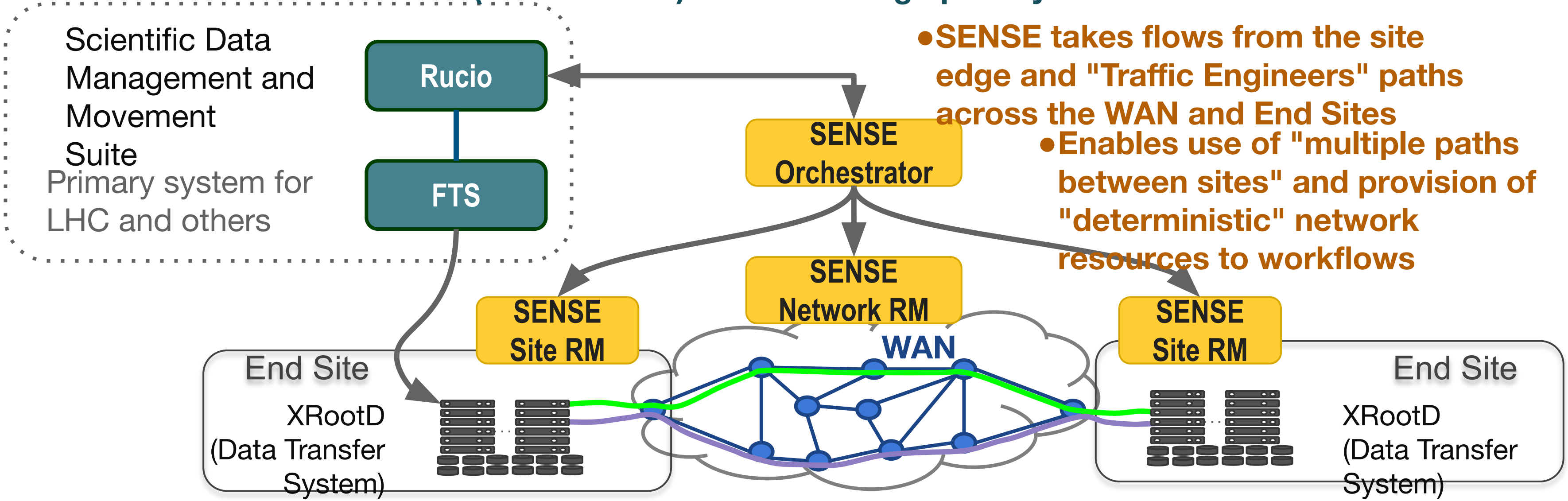
SENSE

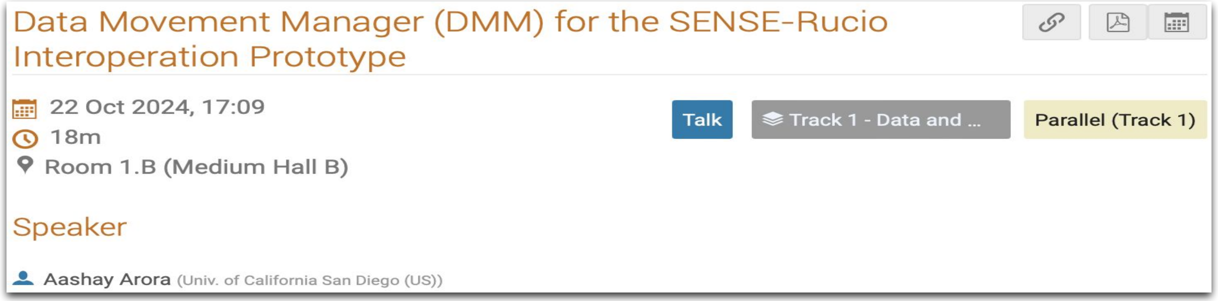
Latest developments and results

SENSE and Rucio/FTS/XRootD Interoperation (DC24 and beyond)

- **Rucio identifies groups of data flows (IPv6 subnets) which are "high priority"**

- **SENSE takes flows from the site edge and "Traffic Engineers" paths across the WAN and End Sites**
  - **Enables use of "multiple paths between sites" and provision of "deterministic" network resources to workflows**


Scientific Data Management and Movement Suite
Primary system for LHC and others
Rucio
FTS
SENSE Orchestrator
SENSE Site RM
SENSE Network RM
SENSE Site RM
WAN
End Site
XRootD (Data Transfer System)
End Site
XRootD (Data Transfer System)


Data Movement Manager (DMM) for the SENSE-Rucio Interoperation Prototype

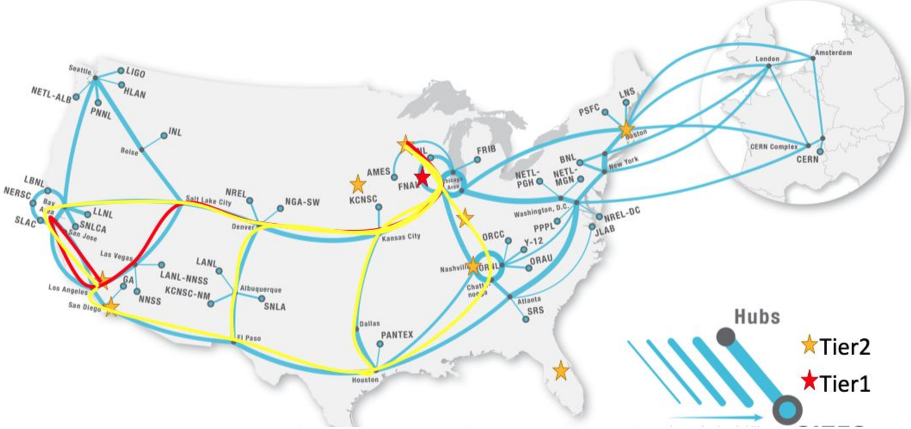
22 Oct 2024, 17:09
18m
Room 1.B (Medium Hall B)

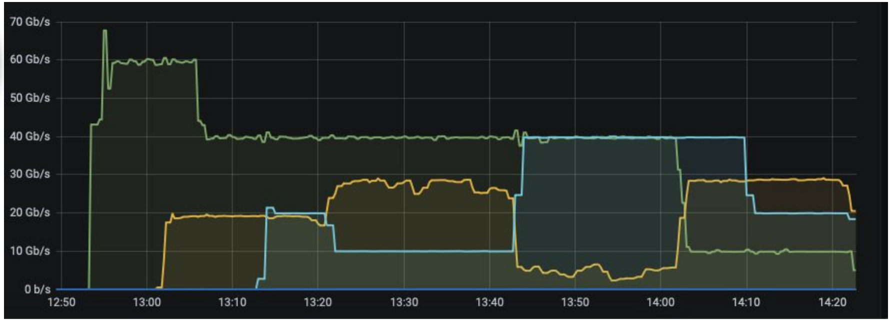
Speaker

Aashay Arora (Univ. of California San Diego (US))

SENSE/Rucio (Network Orchestration)

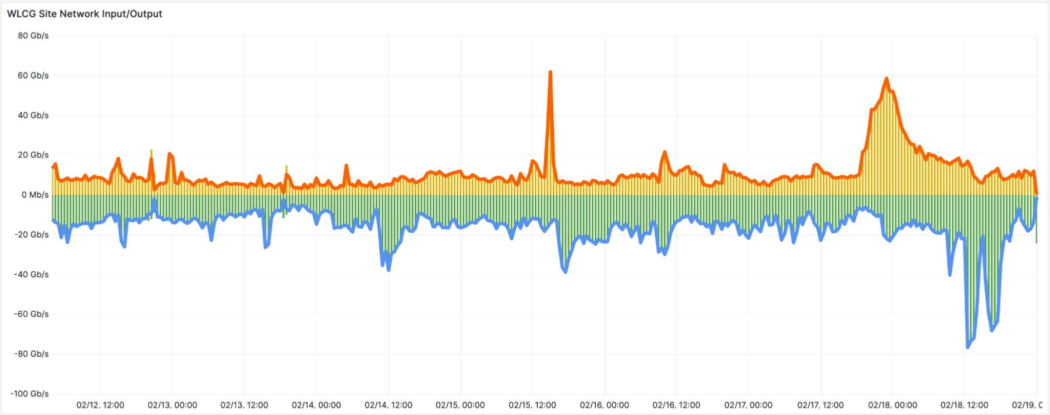
The objective is to provide Rucio with capabilities to request network services via SENSE in order to:
a) improve accountability, b) increase predictability, and c) isolate and prioritize transfer requests.
This project uses a dedicated Rucio as well as XRootD instances so it would not interfere with Production systems. Data was transferred across a mix of production and next generation network paths.



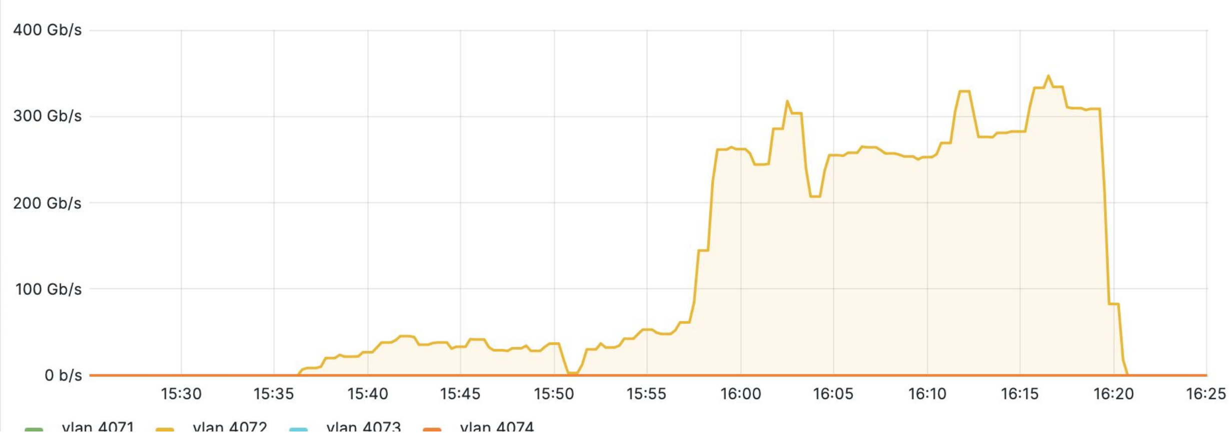


Between Fermilab, Caltech, UCSD Rucio-DMM/SENSE-FTS-XRootD multiple Rucio-triggered data flows were managed between multiple pairs of sites; The modify feature of DMM was used to change bandwidth allocation on the fly in response to Rucio requests. The following Quality of Service policies were demonstrated: Hard QoS / Soft QoS on Server; Hard QoS at the network level. DMM Real time API-driven FTS tuning was used to adjust active/max transfers settings. Additional US-CMS Tier2 sites are evaluated for deployment.

DC24 and after (CMS Caltech Tier2 Production)

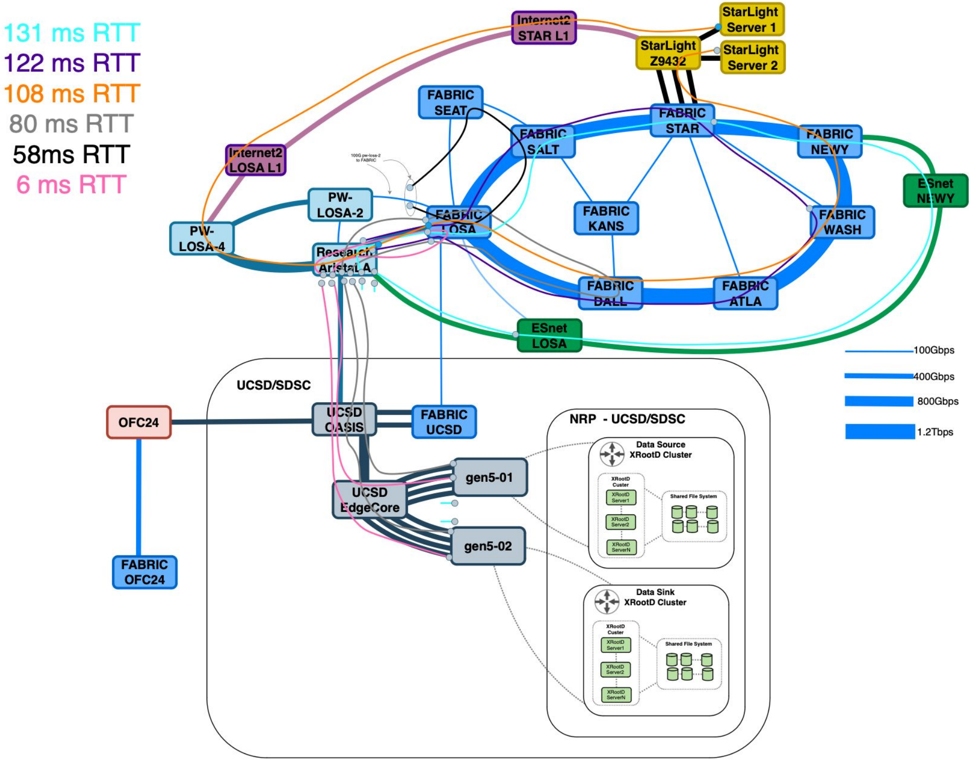


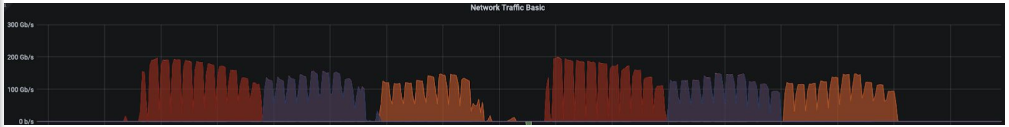
Caltech Tier2 During DC24
80gbit/s max



June 2024 via SENSE
Tunings:
New transfer nodes (2×100G)
Network limit removals;
NIC replacements;
JBOD SAS Configuration;
Ceph Object Size Increase 4MB-16MB;

SENSE/Fabric/XRootD/NRP/Kubernetes/Multus



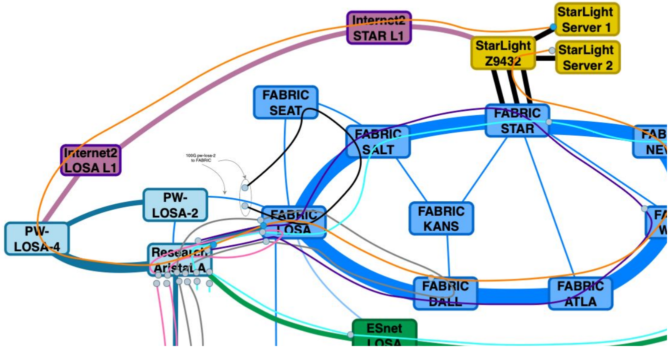


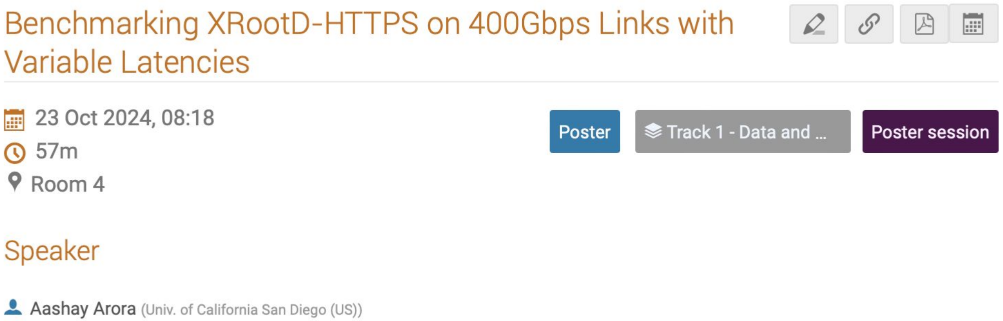
2 Servers:
2U Supermicro (SYS-621H-TN12R)
2× 32 core CPU (Intel Gold 6430)
1TB DDR5 (64GB DDR5-5600)
12x Samsung PM1733A (Raid0, 42TB)
400G NVIDIA CX7

- Can we sustain 400Gbps to/from the site using XRootD HTTPs?
- Where are the Software limitations?
- How does latency affects throughput?
- How do jumbo frames affect throughput?
- Should hyperthreading be ON or OFF for storage endpoints?
- What are CPU and Memory Requirements?
- What is the overhead when adding storage (Memdisk, local NVMe Raid, DFS)?

SENSE/Fabric/XRootD/PRP/Kubernetes/Multus

131 ms RTT
122 ms RTT
108 ms RTT
80 ms RTT
58ms RTT
6 ms RTT





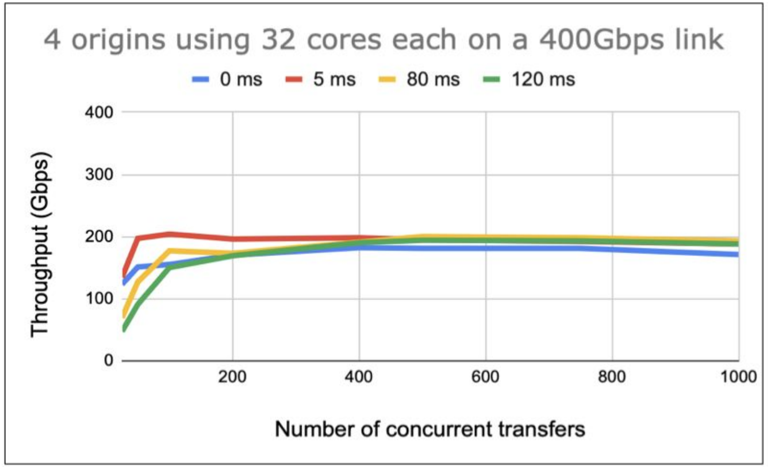
Benchmarking XRootD-HTTPS on 400Gbps Links with Variable Latencies

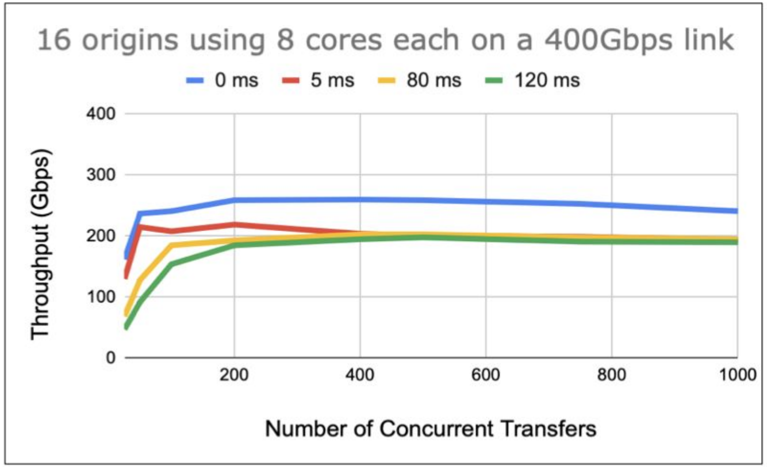
23 Oct 2024, 08:18
57m
Room 4

Poster | Track 1 - Data and ... | Poster session

Speaker

Aashay Arora (Univ. of California San Diego (US))


4 origins using 32 cores each on a 400Gbps link

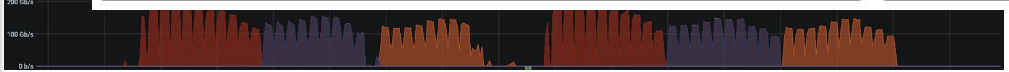

16 origins using 8 cores each on a 400Gbps link

m the site

ons?

ghput?
roughput?
r OFF for

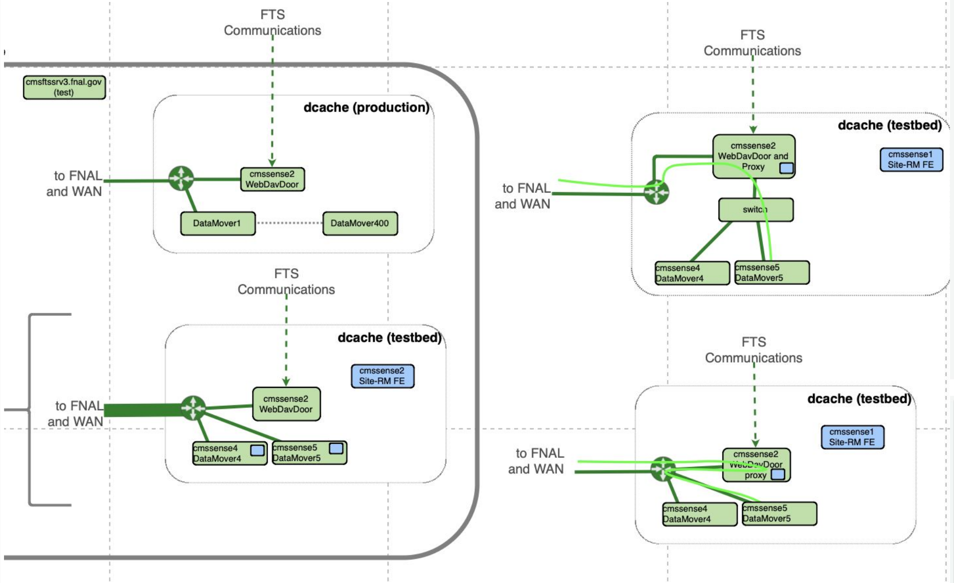
ding
storage (local NVMe Raid, DFS)?

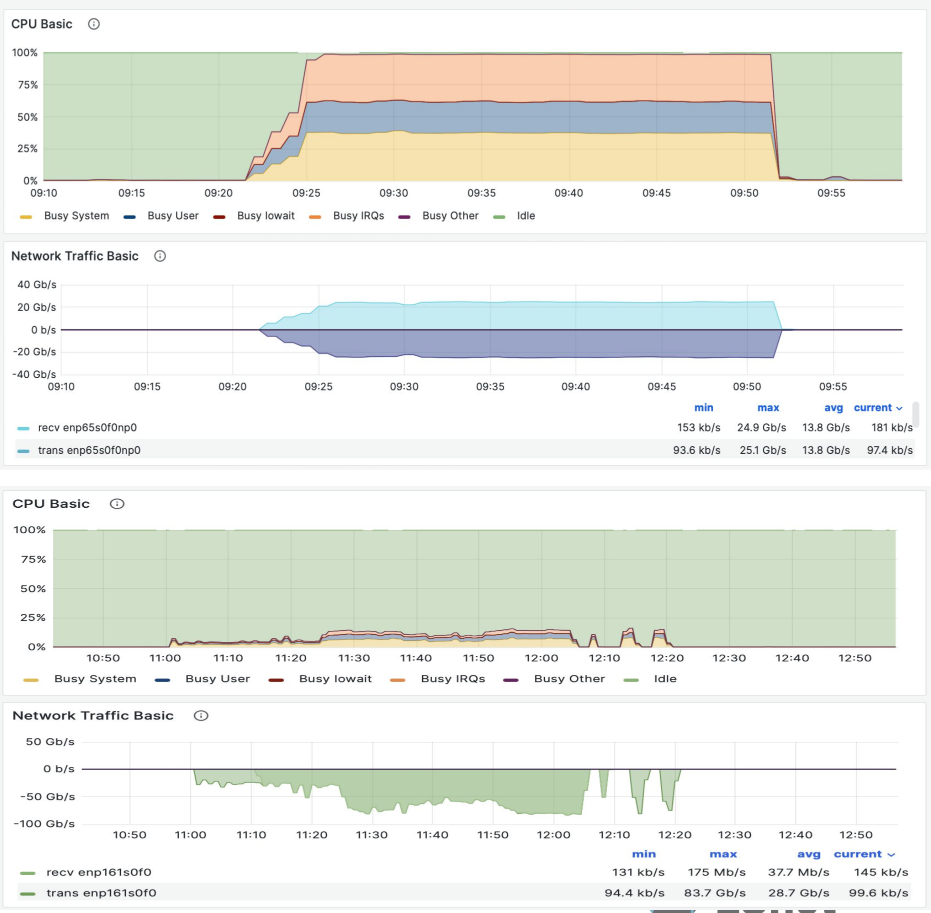


https://indico.cern.ch/event/1338689/contributions/6010884/attachments/2952346/5190108/CHEP_XRootD_poster.pdf

ESnet

Fermilab Dcache (Proxy/NoProxy) to SoCal



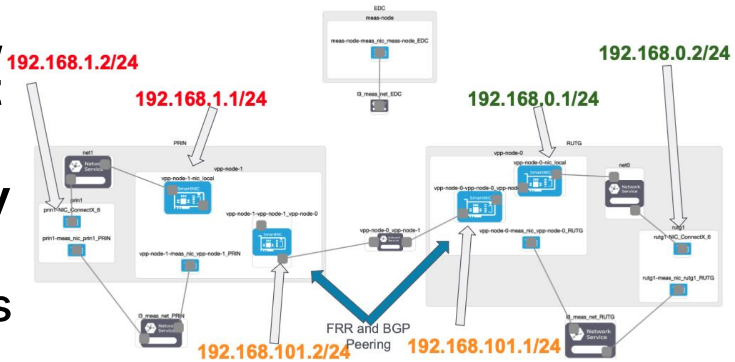


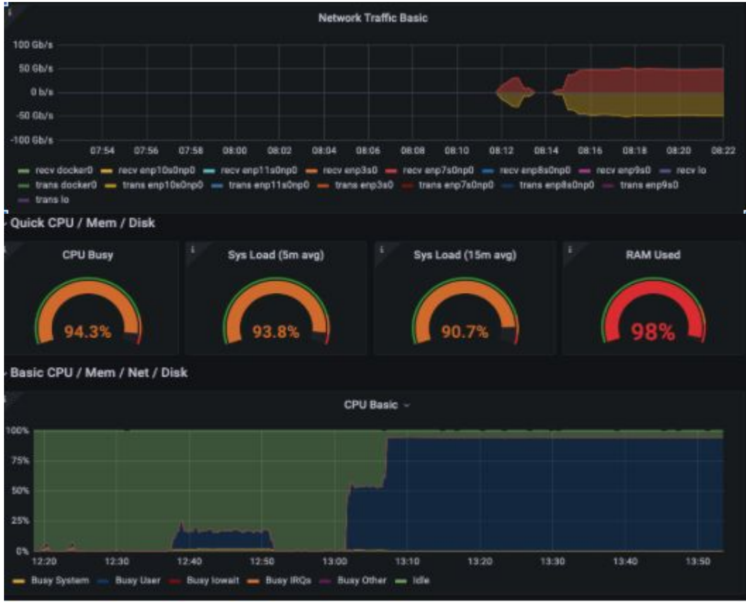
	min	max	avg	current
recv enp65s0f0np0	153 kb/s	24.9 Gb/s	13.8 Gb/s	181 kb/s
trans enp65s0f0np0	93.6 kb/s	25.1 Gb/s	13.8 Gb/s	97.4 kb/s

	min	max	avg	current
recv enp161s0f0	131 kb/s	175 Mb/s	37.7 Mb/s	145 kb/s
trans enp161s0f0	94.4 kb/s	83.7 Gb/s	28.7 Gb/s	99.6 kb/s

Software Router for SENSE/Rucio on FABRIC

- **FABRIC** - Nation wide programmable network, provides **GPU, FPGAs, NICs, QoS, Interconnect national facilities. Allows to design, test applications, protocols and services at any node in the network**
- SENSE/Rucio need to support control at Sites without network device access.
- Hardware/Software in use:
  - ConnectX-6 (PCI passthrough, 2×100G)
  - VPP with DPDK
  - FRRouting (without/with DPDK via VPP)
  - FreeRTR with DPDK
- Stable 50Gbps with 2 cores/4gb RAM VM (FRRouting only, no DPDK)
- VPP - 60 Gbps (with DPDK)
- FreeRTR - 30 Gbps (no Jumbo frames support)

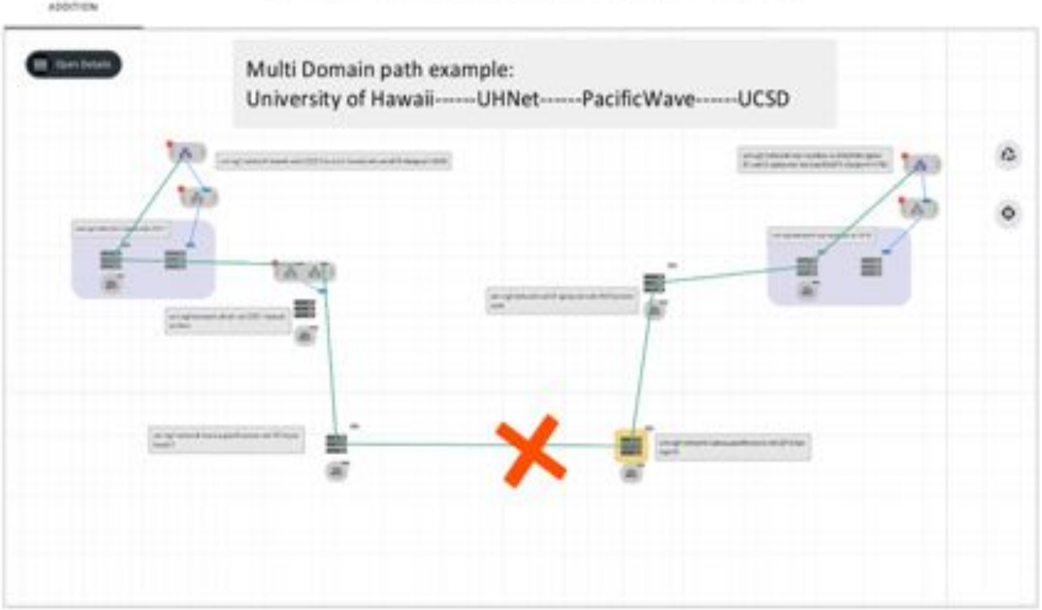




https://github.com/sdn-sense/vpp-frr

Real Time Debugging

Imagine knowing where the network path is broken at a glance!

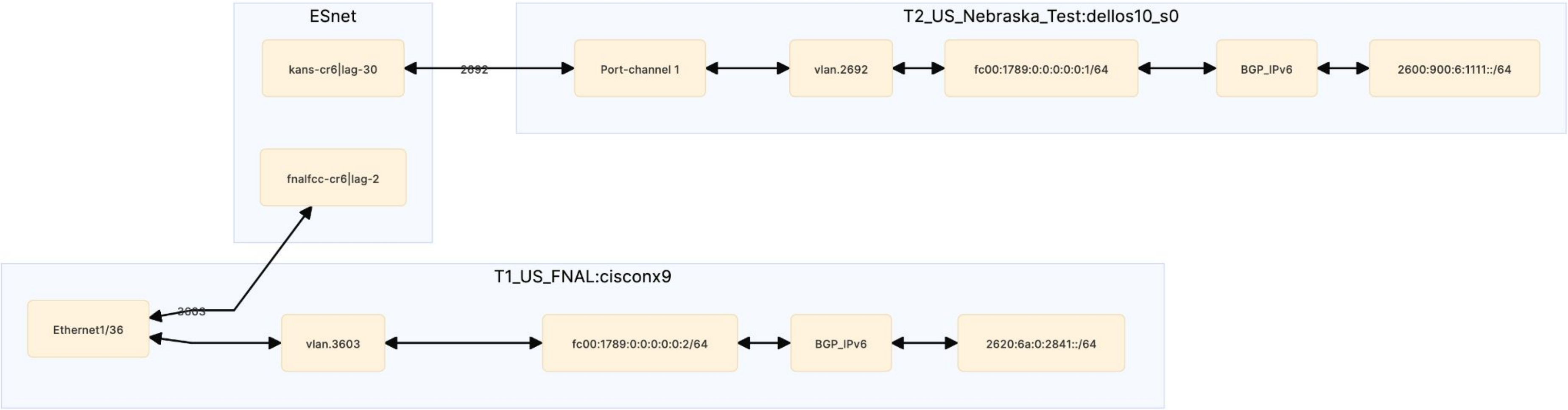


Multi Domain path example:
University of Hawaii------UHNet------PacificWave------UCSD

Sharks' attraction to undersea fiber-optic cables has been well-documented over the years.

Screenshot / YouTube

L3 BGP peering (end-to-end real time)



ESnet

kans-cr6|lag-30

fnalfcc-cr6|lag-2

T2_US_Nebraska_Test:dellos10_s0

Port-channel 1

vlan.2692

fc00:1789:0:0:0:0:0:1/64

BGP_IPv6

2600:900:6:1111::/64

T1_US_FNAL:cisconx9

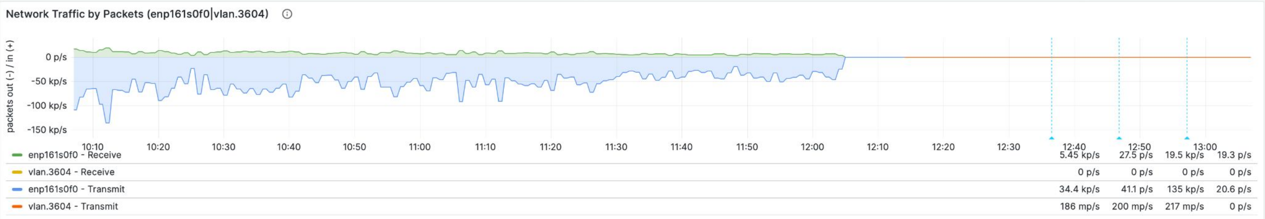
Ethernet1/36

vlan.3603

fc00:1789:0:0:0:0:0:2/64

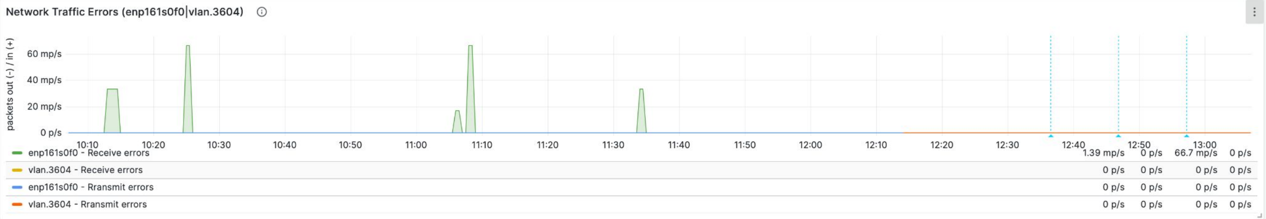
BGP_IPv6

2620:6a:0:2841::/64



Network Traffic by Packets (enp161s0f0|vlan.3604)

enp161s0f0 - Receive	5.45 kp/s	27.5 p/s	19.5 kp/s	19.3 p/s
vlan.3604 - Receive	0 p/s	0 p/s	0 p/s	0 p/s
enp161s0f0 - Transmit	34.4 kp/s	41.1 p/s	135 kp/s	20.6 p/s
vlan.3604 - Transmit	186 mp/s	200 mp/s	217 mp/s	0 p/s



Network Traffic Errors (enp161s0f0|vlan.3604)

enp161s0f0 - Receive errors	1.39 mp/s	0 p/s	66.7 mp/s	0 p/s
vlan.3604 - Receive errors	0 p/s	0 p/s	0 p/s	0 p/s
enp161s0f0 - Rransmit errors	0 p/s	0 p/s	0 p/s	0 p/s
vlan.3604 - Rransmit errors	0 p/s	0 p/s	0 p/s	0 p/s

Special thank you to many colleagues

Frank Würthwein, Jonathan Guiang, Aashay Arora, Diego Davila, John Graham, Dima Mishin, Thomas Hutton, Igor Sfiligoi, Harvey Newman, Maria Spiropulu, Justas Balcas, Raimondas Sirvinskas, Preeti Bhat, Marcos Schwarz, Sravya Uppalapati, Andres Moya, Tom Lehman, Inder Monga, Xi Yang, Chin Guok, John MacAuley, Hans Trompert, Evangelos Chaniotakis, Joe Mambretti, Sana Bellamine, Christopher Bruton, Oliver Gutsche, Asif Shah, Chih-Hao Huang, Dmitry Litvinsev, Phil Demar, Andrew Melo, David A Mason, Garhan Attebury, Hans Trompert, Rafael Coelho, Jessa Westclark, Moya Andres

and many others from NRE communities

Argonne NATIONAL LABORATORY

ESnet ENERGY SCIENCES NETWORK

NERSC

Virnao

BERKELEY LAB

Fermilab

MAX MID-ATLANTIC CROSSROADS

SDSC SAN DIEGO SUPERCOMPUTER CENTER

Caltech

UNIVERSITY OF MARYLAND

UC San Diego

U.S. DEPARTMENT OF ENERGY

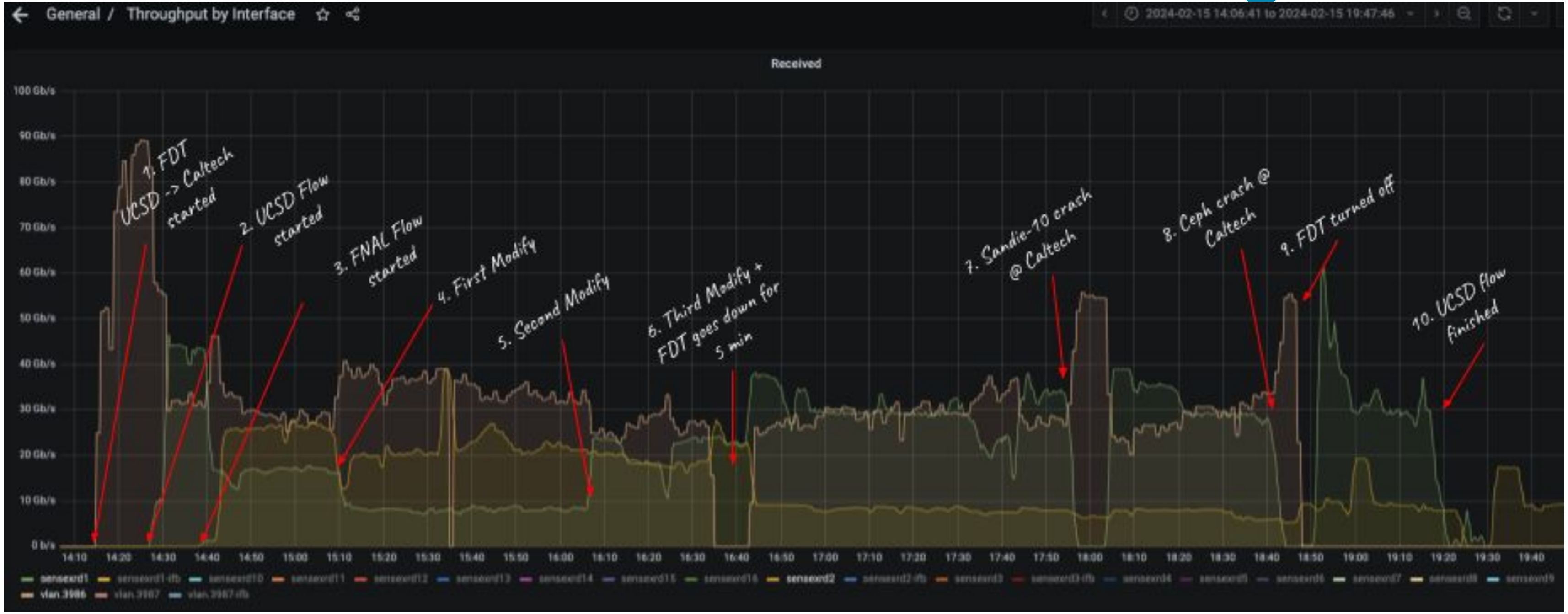
BERKELEY LAB

ESnet

SENSE

Backup slides

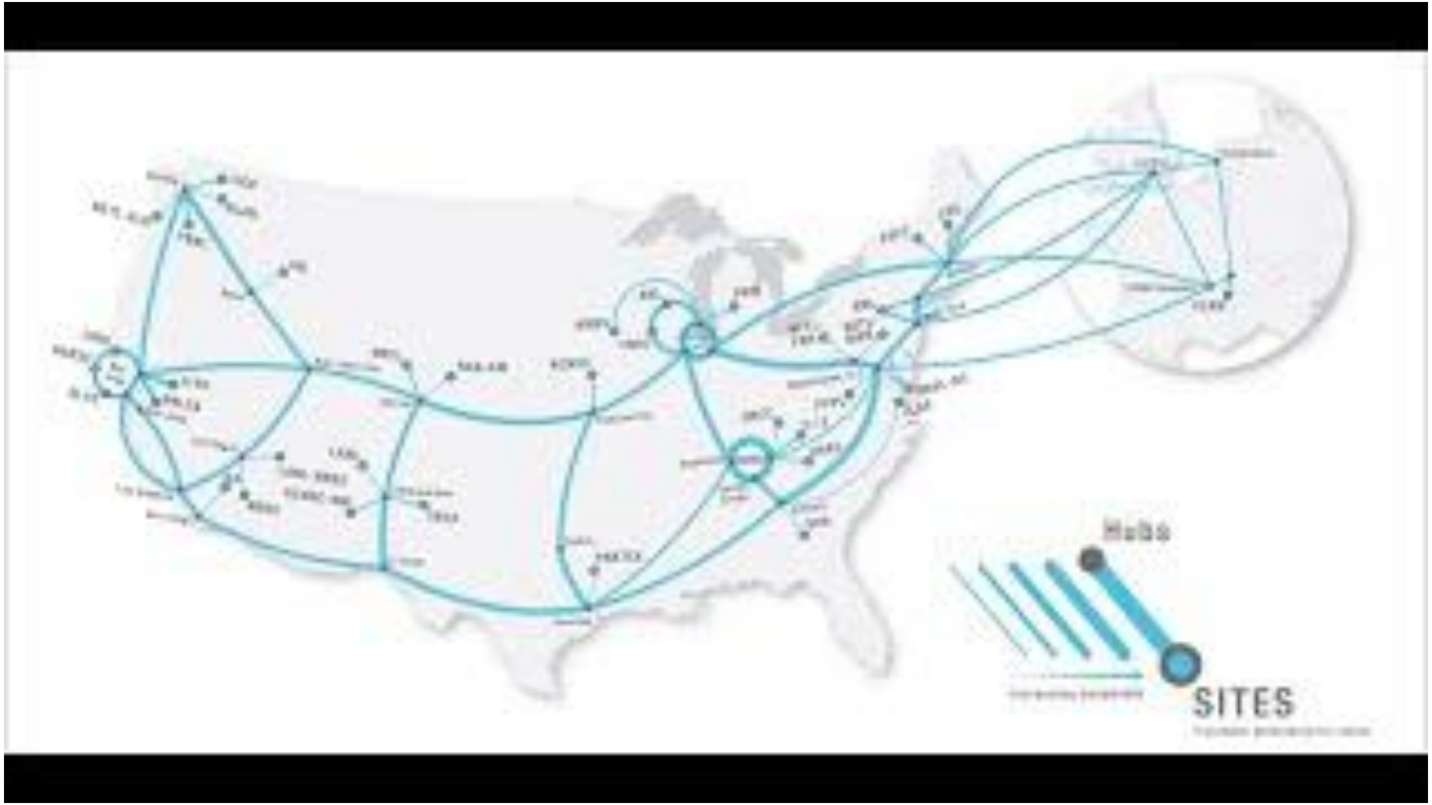
SENSE and Rucio for USCMS (During DC24)



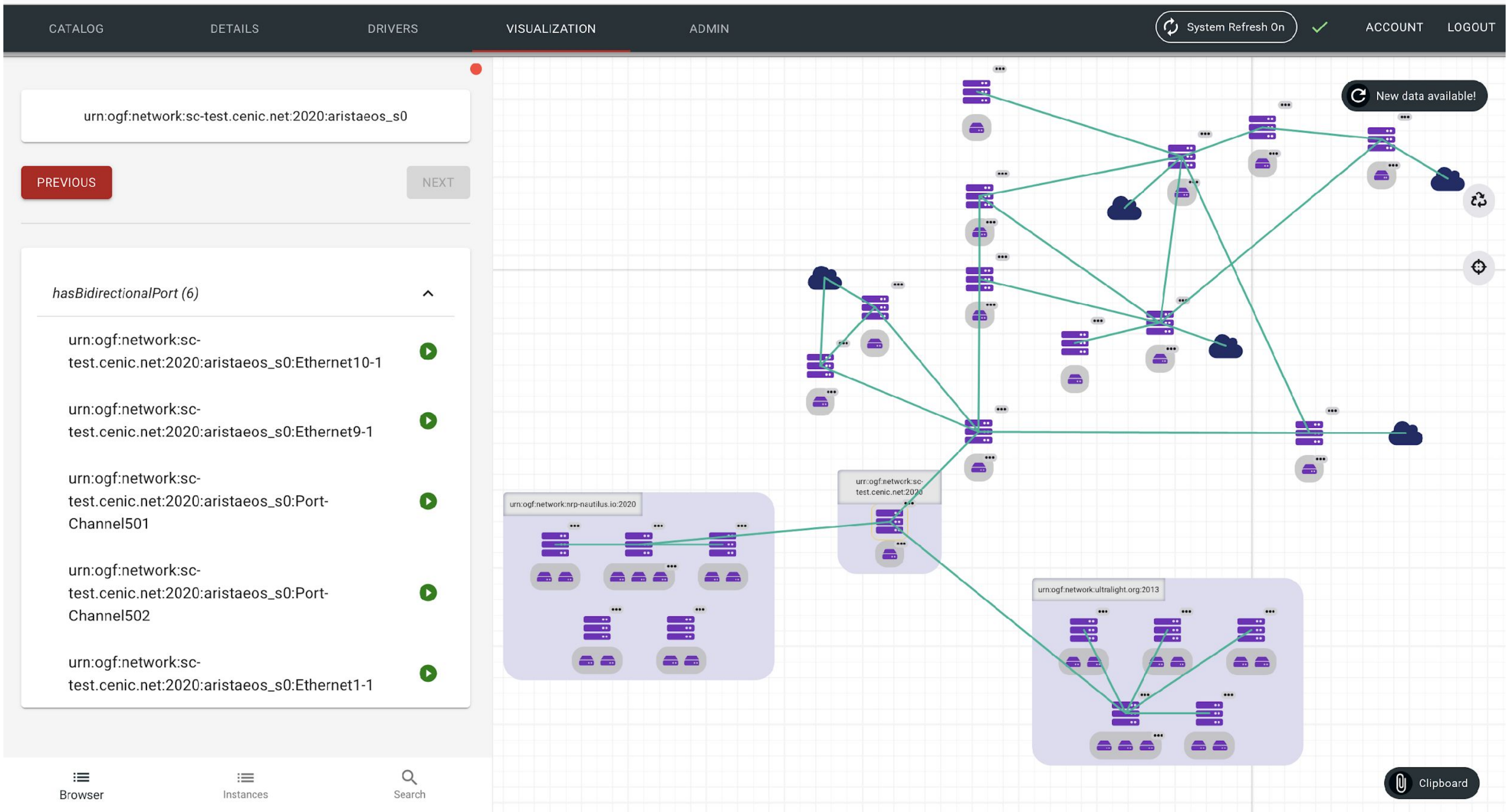
```
interface eth1 req-123 input/output rate 100gbit
        class flow1 commit 40gbit   # Hard QoS
                  Match 2620:fc00::/64
        Class flow2 commit 60gbit  # Hard QoS
                  default
```

```
interface eth1 req-123 input/output rate 100gbit
        class flow1 commit 40gbit max 100gbit  # Soft QoS
                  Match 2620:fc00::/64
        class flow2 commit 10gbit max 100gbit  # Soft QoS
                  default
```

Demo time (Recorded during SC23)



SENSE - Semantic Modeling of Global Resources in Real Time



urn:ogf:network:sc-test.cenic.net:2020:aristaeos_s0

hasBidirectionalPort (6)

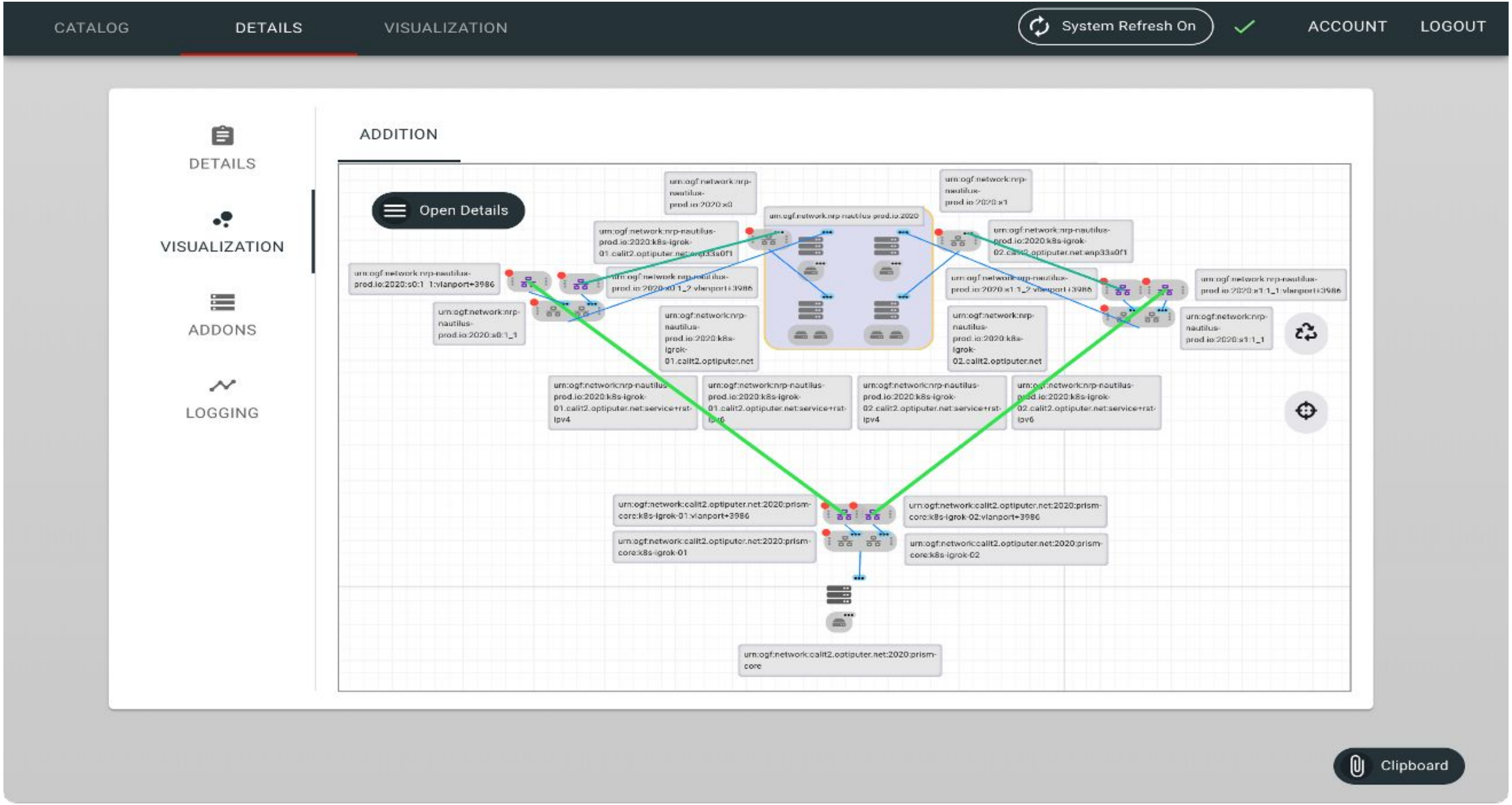
- urn:ogf:network:sc-test.cenic.net:2020:aristaeos_s0:Ethernet10-1
- urn:ogf:network:sc-test.cenic.net:2020:aristaeos_s0:Ethernet9-1
- urn:ogf:network:sc-test.cenic.net:2020:aristaeos_s0:Port-Channel501
- urn:ogf:network:sc-test.cenic.net:2020:aristaeos_s0:Port-Channel502
- urn:ogf:network:sc-test.cenic.net:2020:aristaeos_s0:Ethernet1-1

Science Focused Automation and Orchestration with SENSE

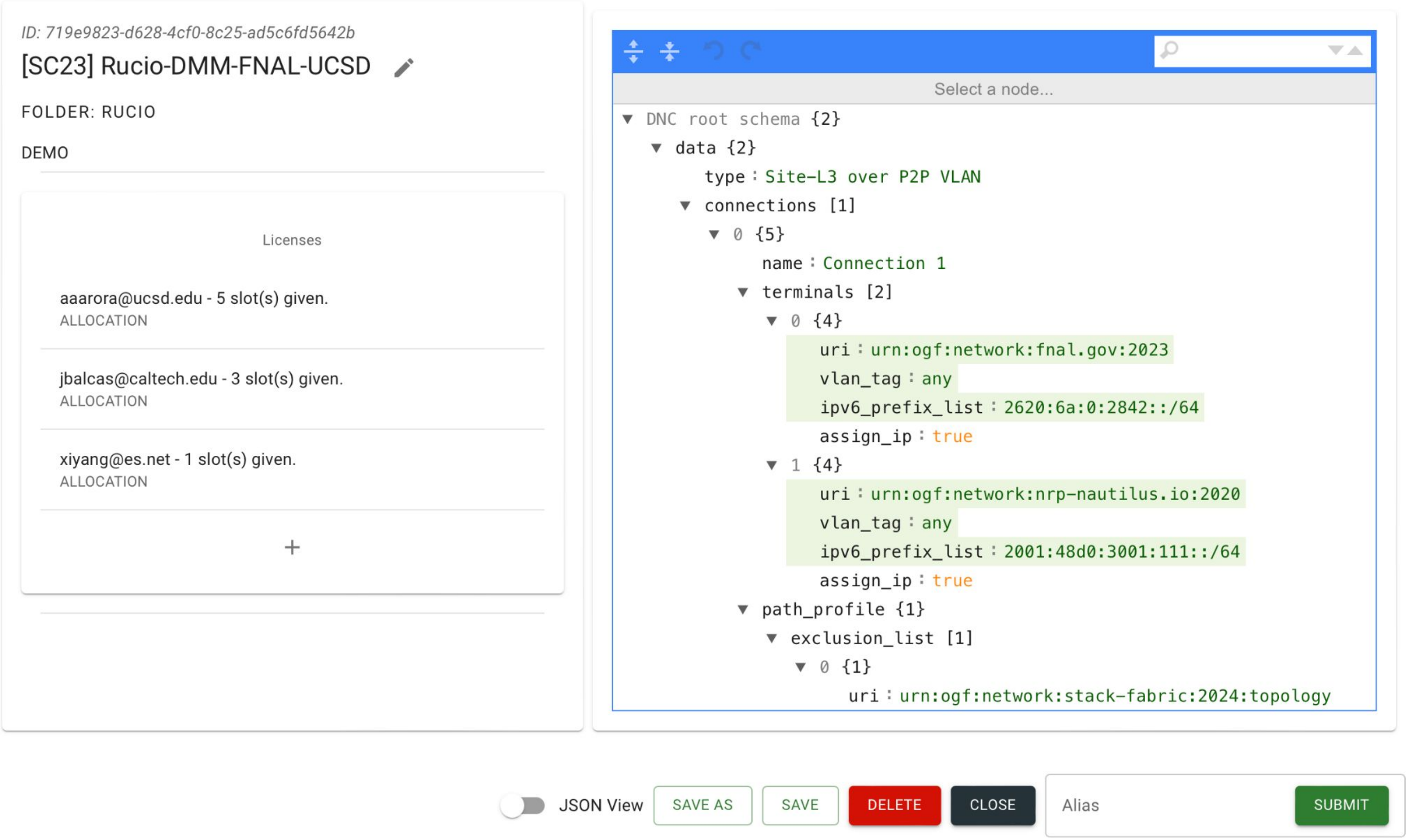
- History of the SENSE Orchestrator
  - The development of Multi-Resource Markup Language (MRML) as a SENSE precursor and foundation of “semantic modeling of everything in the cyberinfrastructure”.
  - 2015-2019, “SDN for End-to-end Networked Science at the Exascale” (SENSE) sponsored by DOE with a focus on orchestration and automation of end-to-end SDN networks across WAN domains, end-sites and host servers.
  - SENSE today is specialized in integrating multi-facility, multi-network, multi-cloud infrastructures and presenting as normalized, abstracted, single-point-of-touch services to the workflows.

- A taste of the SENSE orchestration service
  - Allocate a data transfer host in a DOE lab and a VM cluster in Amazon AWS cloud
  - Interconnect them into an overlay of interconnected L2VPN and L3VPN across the lab site, ESnet, Internet2 and cloud provider networks.
  - The end-to-end automation and orchestration is API driven by an application workflow agent with an intent-based service definition that is customized and abstract.
  - Interactive workflow assistance is provided with negotiation, co-scheduling, auditing and full service lifecycle management.

SENSE Orchestrated Service Instance as a Resource Model "Delta"


CATALOG
DETAILS
VISUALIZATION
System Refresh On
ACCOUNT
LOGOUT
DETAILS
VISUALIZATION
ADDONS
LOGGING
ADDITION
Open Details
urn:ogf:network:nrp-nautilus-prod.io:2020:s0
urn:ogf:network:nrp-nautilus-prod.io:2020:s1
urn:ogf:network:nrp-nautilus-prod.io:2020
urn:ogf:network:nrp-nautilus-prod.io:2020:k8s-igrok-01.calit2.optiputer.net:enp33s0f1
urn:ogf:network:nrp-nautilus-prod.io:2020:k8s-igrok-02.calit2.optiputer.net:enp33s0f1
urn:ogf:network:nrp-nautilus-prod.io:2020:s0:1_1:vlanport+3986
urn:ogf:network:nrp-nautilus-prod.io:2020:s0:1_2:vlanport+3986
urn:ogf:network:nrp-nautilus-prod.io:2020:s1:1_2:vlanport+3986
urn:ogf:network:nrp-nautilus-prod.io:2020:s1:1_1:vlanport+3986
urn:ogf:network:nrp-nautilus-prod.io:2020:s0:1_1
urn:ogf:network:nrp-nautilus-prod.io:2020:k8s-igrok-01.calit2.optiputer.net
urn:ogf:network:nrp-nautilus-prod.io:2020:k8s-igrok-02.calit2.optiputer.net
urn:ogf:network:nrp-nautilus-prod.io:2020:s1:1_1
urn:ogf:network:nrp-nautilus-prod.io:2020:k8s-igrok-01.calit2.optiputer.net:service+rst-ipv4
urn:ogf:network:nrp-nautilus-prod.io:2020:k8s-igrok-01.calit2.optiputer.net:service+rst-ipv6
urn:ogf:network:nrp-nautilus-prod.io:2020:k8s-igrok-02.calit2.optiputer.net:service+rst-ipv4
urn:ogf:network:nrp-nautilus-prod.io:2020:k8s-igrok-02.calit2.optiputer.net:service+rst-ipv6
urn:ogf:network:calit2.optiputer.net:2020:prism-core:k8s-igrok-01:vlanport+3986
urn:ogf:network:calit2.optiputer.net:2020:prism-core:k8s-igrok-02:vlanport+3986
urn:ogf:network:calit2.optiputer.net:2020:prism-core:k8s-igrok-01
urn:ogf:network:calit2.optiputer.net:2020:prism-core:k8s-igrok-02
urn:ogf:network:calit2.optiputer.net:2020:prism-core
Clipboard

SENSE Service Profile - Workflow Intent for End-to-End CI Needs



ID: 719e9823-d628-4cf0-8c25-ad5c6fd5642b

[SC23] Rucio-DMM-FNAL-UCSD

FOLDER: RUCIO

DEMO

Licenses

aaarora@ucsd.edu - 5 slot(s) given.
ALLOCATION

jbalcas@caltech.edu - 3 slot(s) given.
ALLOCATION

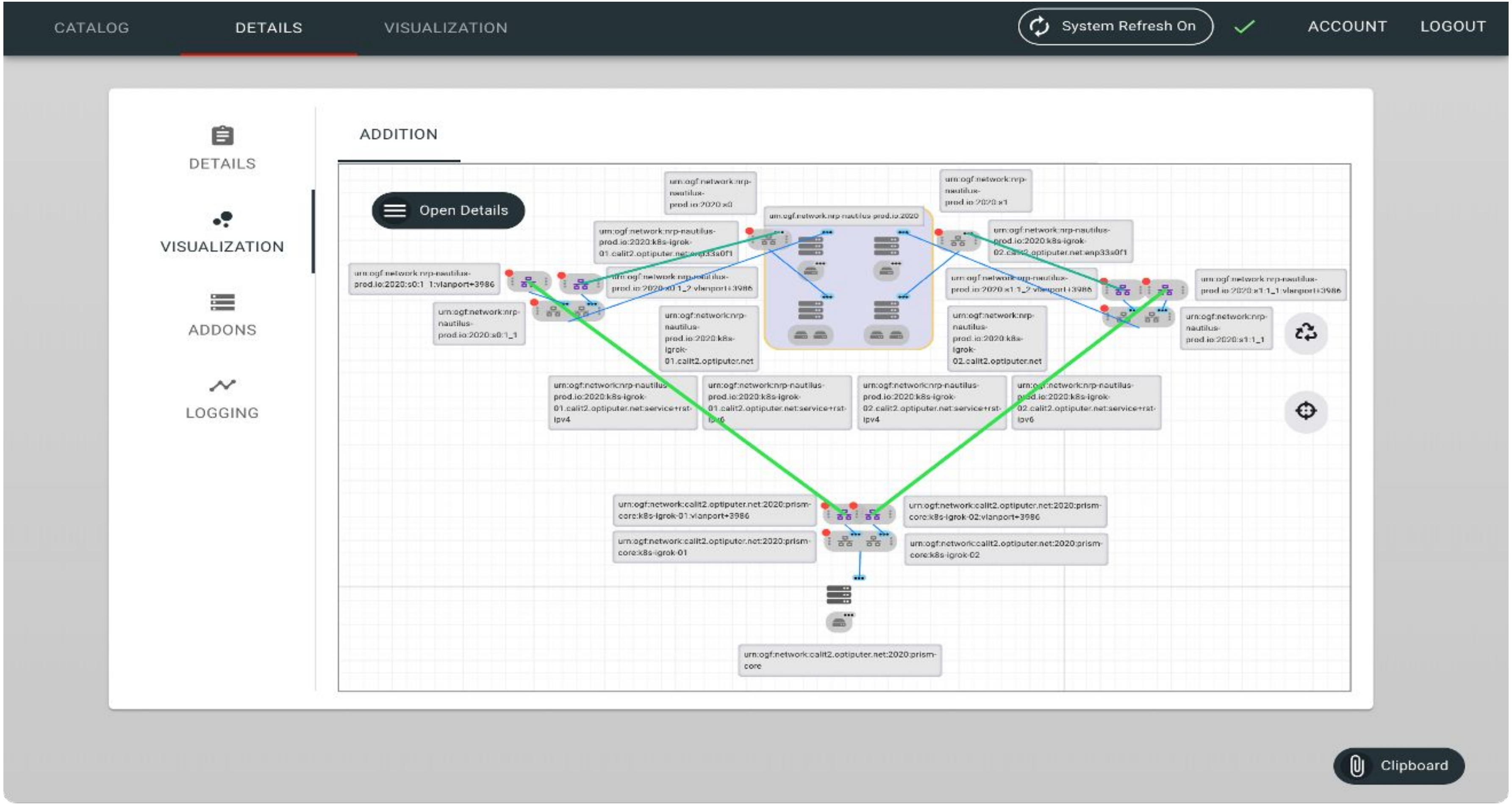
xiyang@es.net - 1 slot(s) given.
ALLOCATION

Select a node...

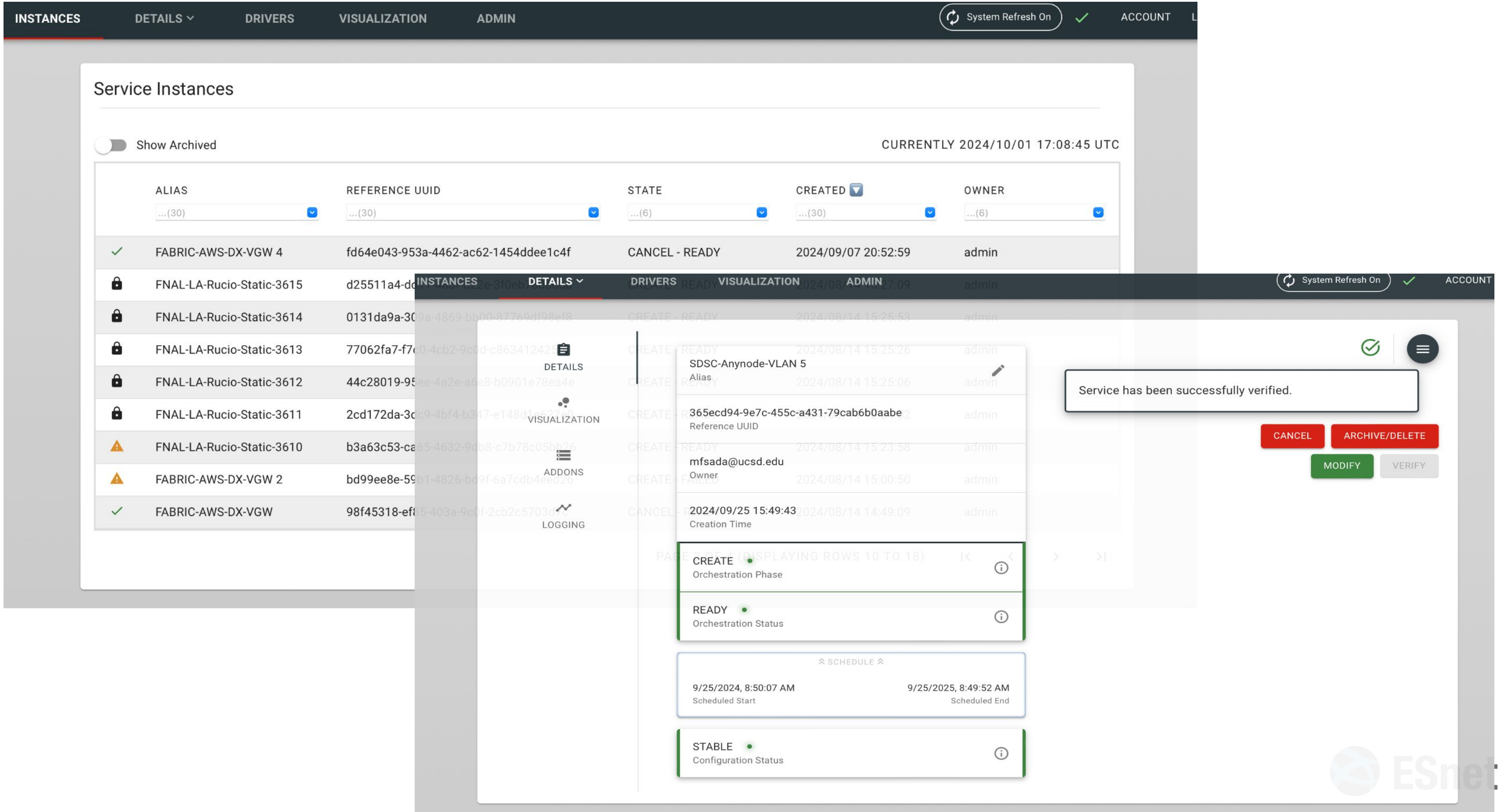
```
▼ DNC root schema {2}
  ▼ data {2}
      type : Site-L3 over P2P VLAN
    ▼ connections [1]
      ▼ 0 {5}
          name : Connection 1
        ▼ terminals [2]
          ▼ 0 {4}
              uri : urn:ogf:network:fnal.gov:2023
              vlan_tag : any
              ipv6_prefix_list : 2620:6a:0:2842::/64
              assign_ip : true
          ▼ 1 {4}
              uri : urn:ogf:network:nrp-nautilus.io:2020
              vlan_tag : any
              ipv6_prefix_list : 2001:48d0:3001:111::/64
              assign_ip : true
        ▼ path_profile {1}
          ▼ exclusion_list [1]
            ▼ 0 {1}
                uri : urn:ogf:network:stack-fabric:2024:topology
```

ESnet

SENSE Orchestrated Service Instance as a Resource Model "Delta"


CATALOG
DETAILS
VISUALIZATION
System Refresh On
ACCOUNT
LOGOUT
DETAILS
VISUALIZATION
ADDONS
LOGGING
ADDITION
Open Details
urn:ogf:network:nrp-nautilus-prod.io:2020:s0
urn:ogf:network:nrp-nautilus-prod.io:2020:s1
urn:ogf:network:nrp-nautilus-prod.io:2020
urn:ogf:network:nrp-nautilus-prod.io:2020:k8s-igrok-01.calit2.optiputer.net:enp33s0f1
urn:ogf:network:nrp-nautilus-prod.io:2020:k8s-igrok-02.calit2.optiputer.net:enp33s0f1
urn:ogf:network:nrp-nautilus-prod.io:2020:s0:1_1:vlanport+3986
urn:ogf:network:nrp-nautilus-prod.io:2020:s0:1_2:vlanport+3986
urn:ogf:network:nrp-nautilus-prod.io:2020:s1:1_2:vlanport+3986
urn:ogf:network:nrp-nautilus-prod.io:2020:s1:1_1:vlanport+3986
urn:ogf:network:nrp-nautilus-prod.io:2020:s0:1_1
urn:ogf:network:nrp-nautilus-prod.io:2020:k8s-igrok-01.calit2.optiputer.net
urn:ogf:network:nrp-nautilus-prod.io:2020:k8s-igrok-02.calit2.optiputer.net
urn:ogf:network:nrp-nautilus-prod.io:2020:s1:1_1
urn:ogf:network:nrp-nautilus-prod.io:2020:k8s-igrok-01.calit2.optiputer.net:service+rst-ipv4
urn:ogf:network:nrp-nautilus-prod.io:2020:k8s-igrok-01.calit2.optiputer.net:service+rst-ipv6
urn:ogf:network:nrp-nautilus-prod.io:2020:k8s-igrok-02.calit2.optiputer.net:service+rst-ipv4
urn:ogf:network:nrp-nautilus-prod.io:2020:k8s-igrok-02.calit2.optiputer.net:service+rst-ipv6
urn:ogf:network:calit2.optiputer.net:2020:prism-core:k8s-igrok-01:vlanport+3986
urn:ogf:network:calit2.optiputer.net:2020:prism-core:k8s-igrok-02:vlanport+3986
urn:ogf:network:calit2.optiputer.net:2020:prism-core:k8s-igrok-01
urn:ogf:network:calit2.optiputer.net:2020:prism-core:k8s-igrok-02
urn:ogf:network:calit2.optiputer.net:2020:prism-core
Clipboard

SENSE Service Instance - API Driven Full Lifecycle Management



Service Instances

Show Archived

CURRENTLY 2024/10/01 17:08:45 UTC

	ALIAS	REFERENCE UUID	STATE	CREATED	OWNER
	...(30)	...(30)	...(6)	...(30)	...(6)
✓	FABRIC-AWS-DX-VGW 4	fd64e043-953a-4462-ac62-1454ddee1c4f	CANCEL - READY	2024/09/07 20:52:59	admin
🔒	FNAL-LA-Rucio-Static-3615	d25511a4-dc	CREATE - READY	2024/08/14 15:27:09	admin
🔒	FNAL-LA-Rucio-Static-3614	0131da9a-3c	CREATE - READY	2024/08/14 15:25:53	admin
🔒	FNAL-LA-Rucio-Static-3613	77062fa7-f7c	CREATE - READY	2024/08/14 15:25:26	admin
🔒	FNAL-LA-Rucio-Static-3612	44c28019-95	CREATE - READY	2024/08/14 15:25:06	admin
🔒	FNAL-LA-Rucio-Static-3611	2cd172da-3c	CREATE - R	[illegible]	admin
⚠	FNAL-LA-Rucio-Static-3610	b3a63c53-ca	CREATE - READY	2024/08/14 15:23:58	admin
⚠	FABRIC-AWS-DX-VGW 2	bd99ee8e-59	CREATE - FAILED	2024/08/14 15:00:50	admin
✓	FABRIC-AWS-DX-VGW	98f45318-ef	CANCEL - READY	2024/08/14 14:49:09	admin

PAGE 2 OF 4 (DISPLAYING ROWS 10 TO 18)

SDSC-Anynode-VLAN 5
Alias

365ecd94-9e7c-455c-a431-79cab6b0aabe
Reference UUID

mfsada@ucsd.edu
Owner

2024/09/25 15:49:43
Creation Time

CREATE ●
Orchestration Phase

READY ●
Orchestration Status

SCHEDULE

9/25/2024, 8:50:07 AM
Scheduled Start

9/25/2025, 8:49:52 AM
Scheduled End

STABLE ●
Configuration Status

Service has been successfully verified.