ESnet
ENERGY SCIENCES NETWORK

A Real-World Approach to Intent-based Networking and Service Orchestration

Chris Cummings
Full Stack Network Automation Software Engineer

Energy Sciences Network (ESnet)
Lawrence Berkeley National Laboratory
U.S. Department of Energy

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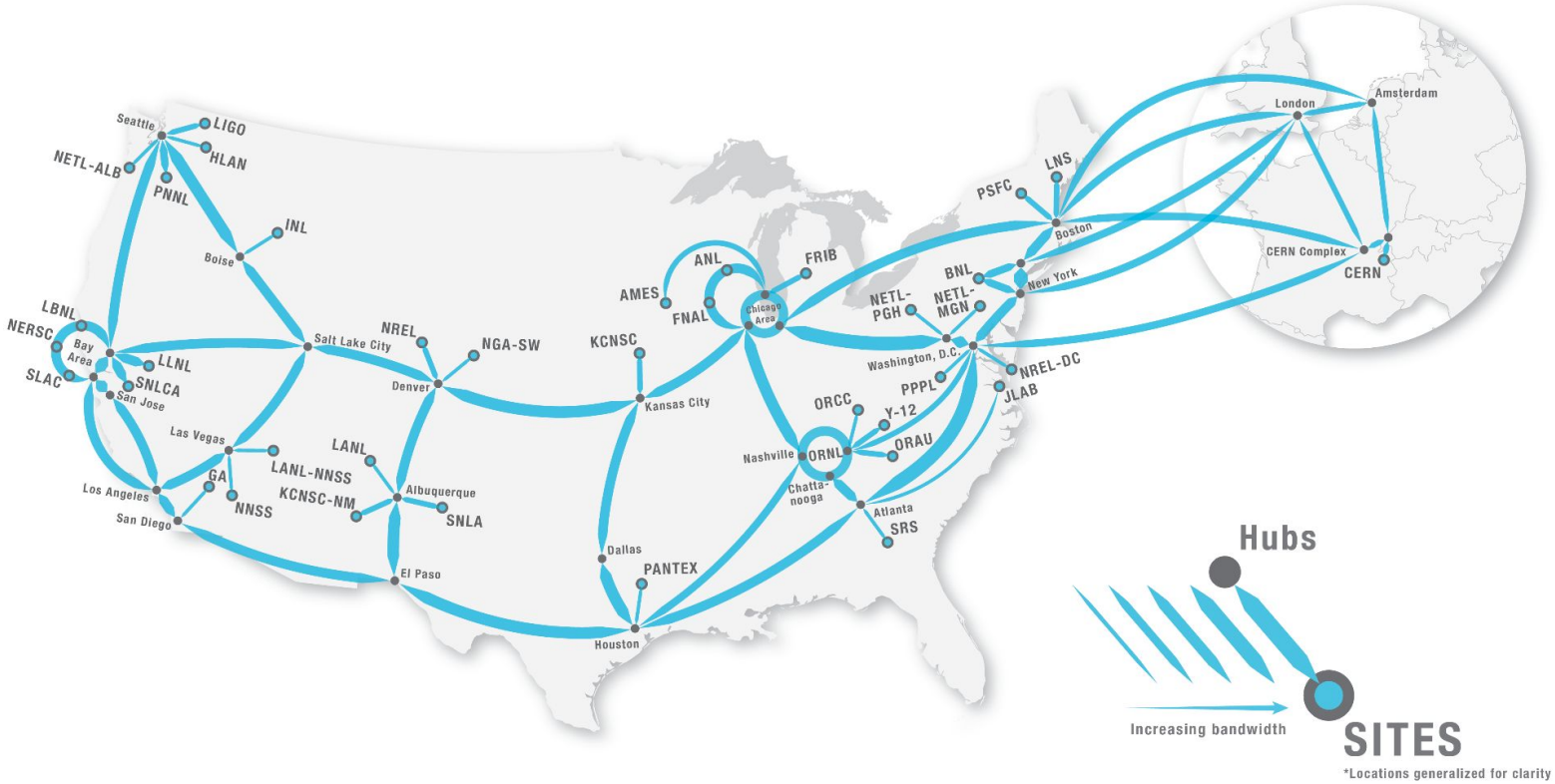
Overview

- ESnet and R&E Networks
- Intent Based Networking and Orchestration Concepts
- Orchestration in Practice
- ESnet Provisioning Stack
- Orchestration Demo

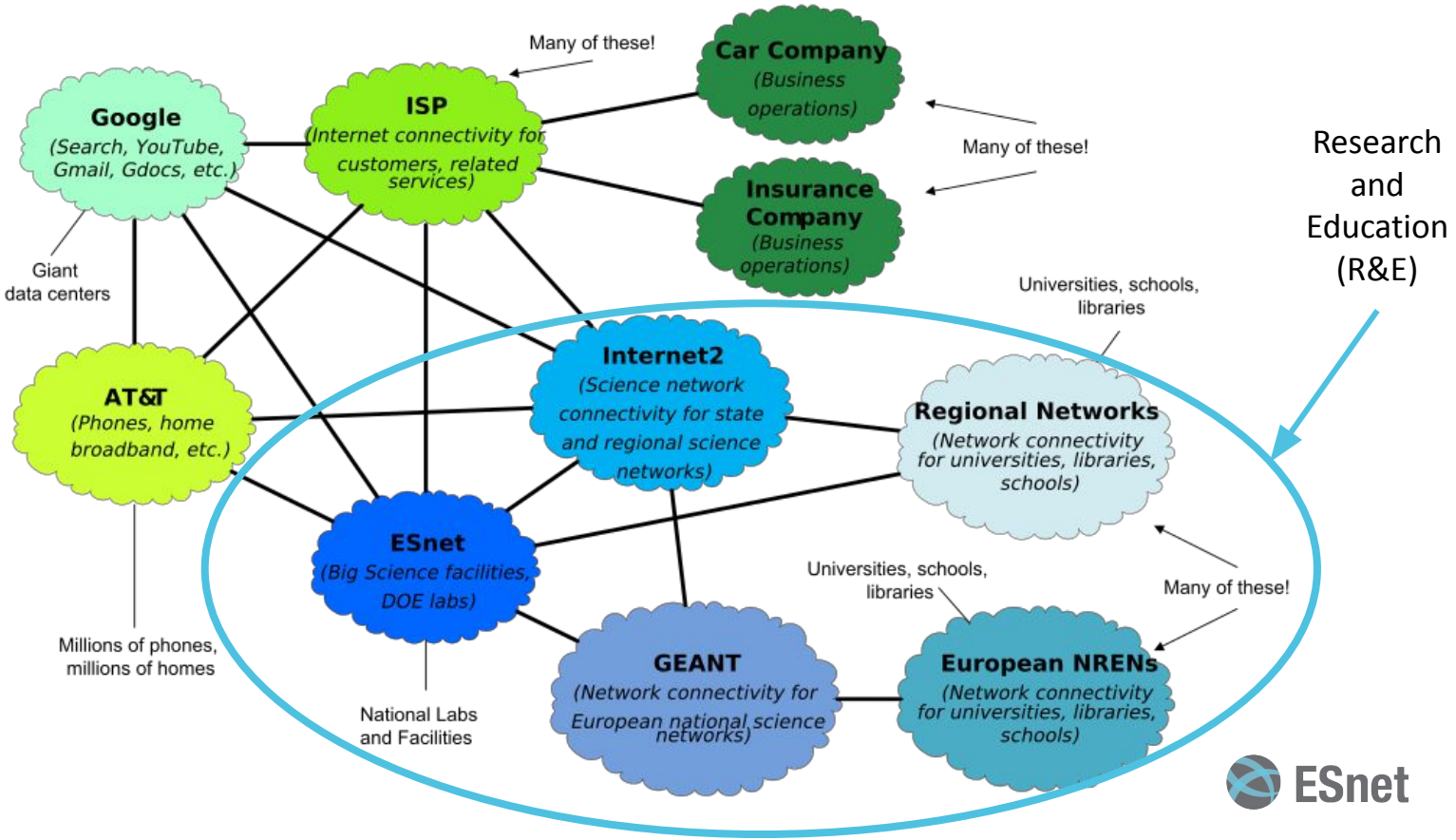
ESnet

ESnet6

What is ESnet?



What is an R&E Network?



R&E vs. Commercial ISPs:

Normal ISP:[1]

ESnet:[2]

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What is Intent Based Networking?

- A high level definition of a Network Service
- Describes a service, but not how to implement it.
- Abstracts service offerings from implementation details

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What is Orchestration?

- Coordination of multiple computer and network systems
- Translates network *intent* into network *configuration*
- Workflow-based method for provisioning services
- Method for ensuring consistency in service delivery

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What is Orchestration *NOT* ?

- A replacement for network engineers
- A way to have one network engineer do the job of multiple engineers
- A single tool to run all of ESnet

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Benefits of Orchestration

- Forces you to ***design*** and ***plan*** services, not config
- Creates consistent configurations for complex services
- Reduces the chance for human error
- Makes the network more reliable
- Allows engineers to focus on more design than deployment (less busy-work)

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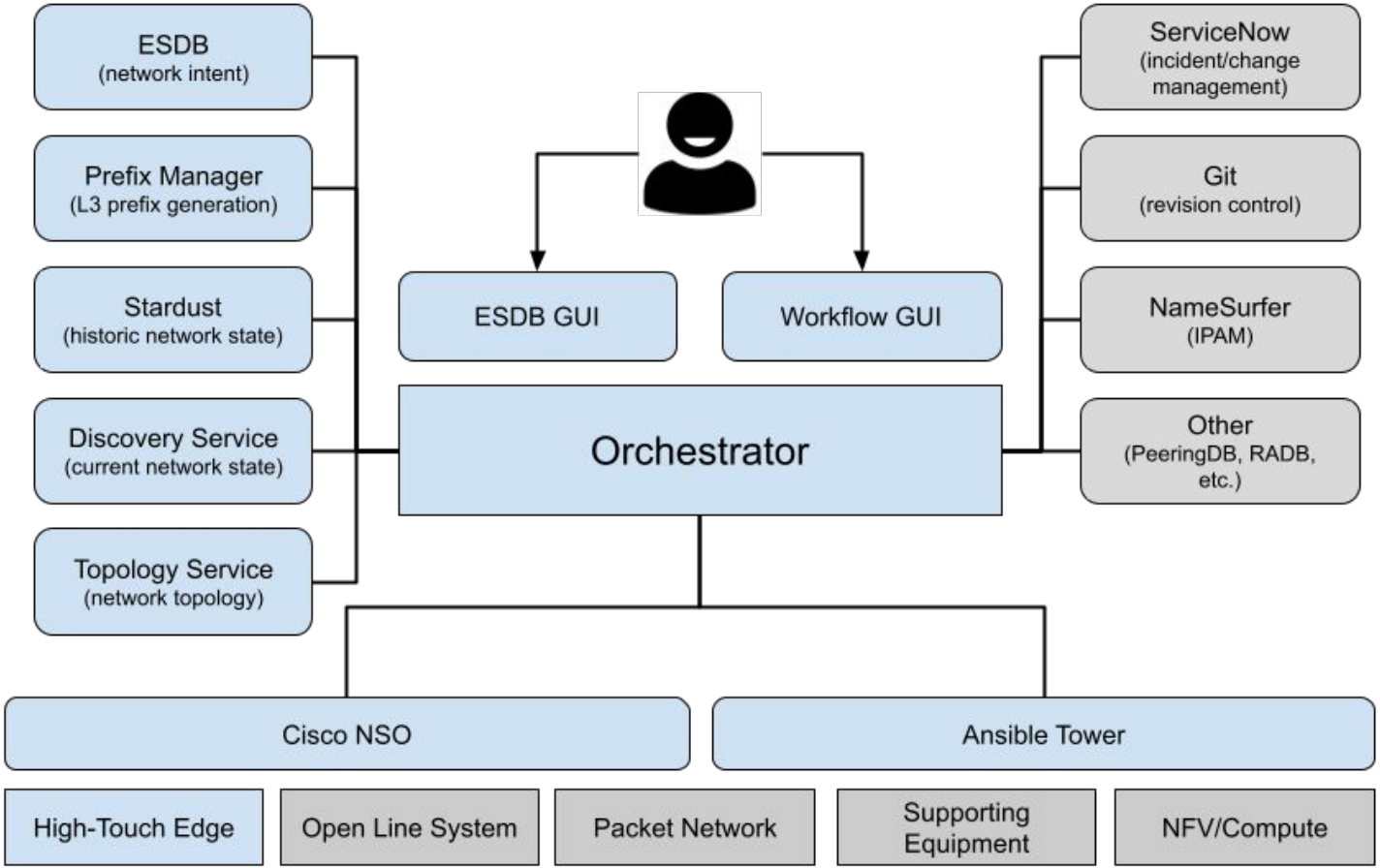
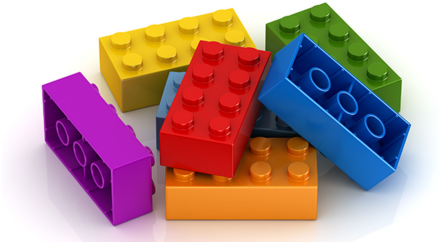
ESnet6 Provisioning Stack

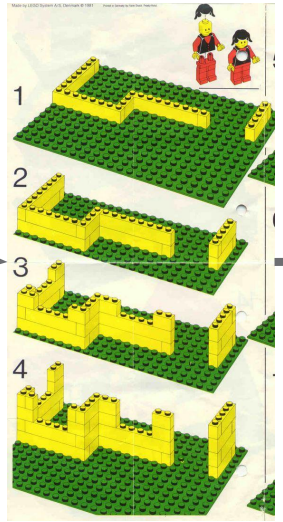


What are workflows?

Finite resources exist in other systems



The workflow contains the “Steps” needed to complete the work



Orchestrator stores the final product until we break it all apart again

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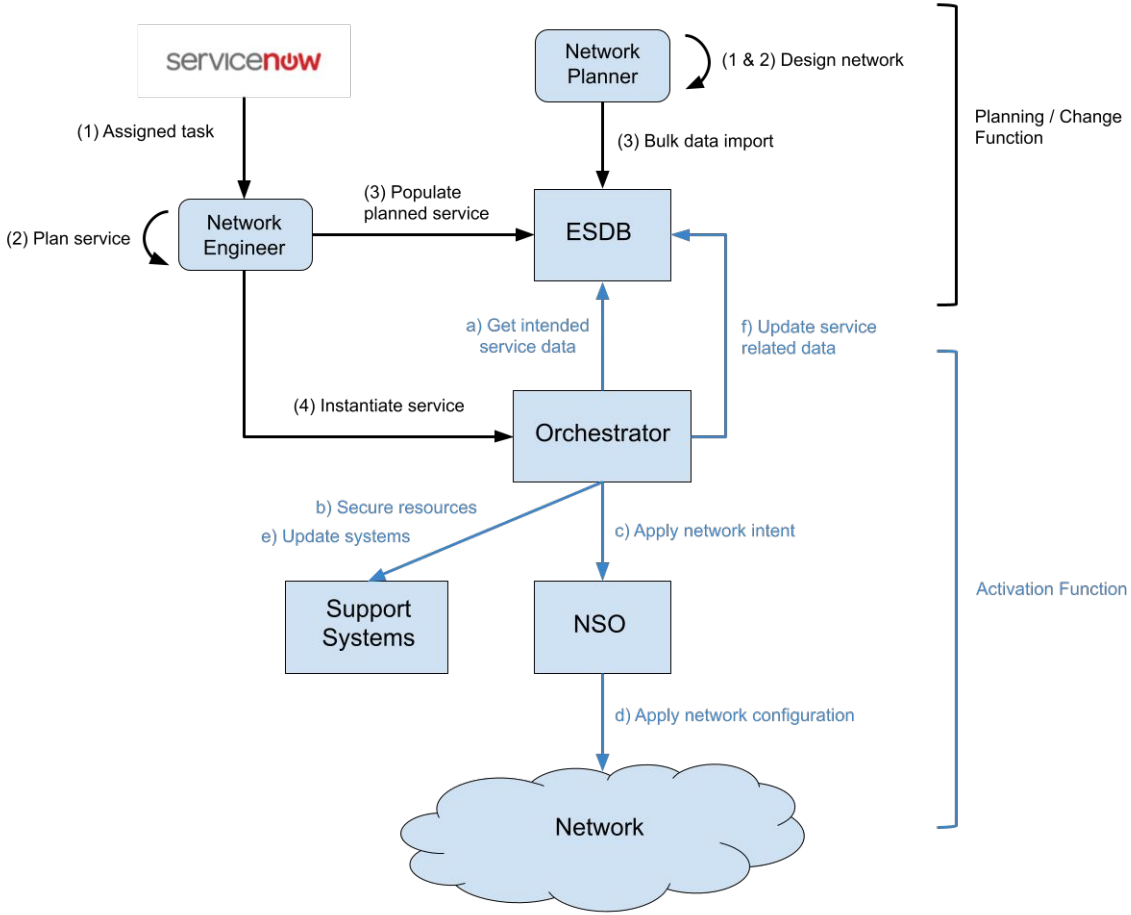
ESnet6 Provisioning Workflow



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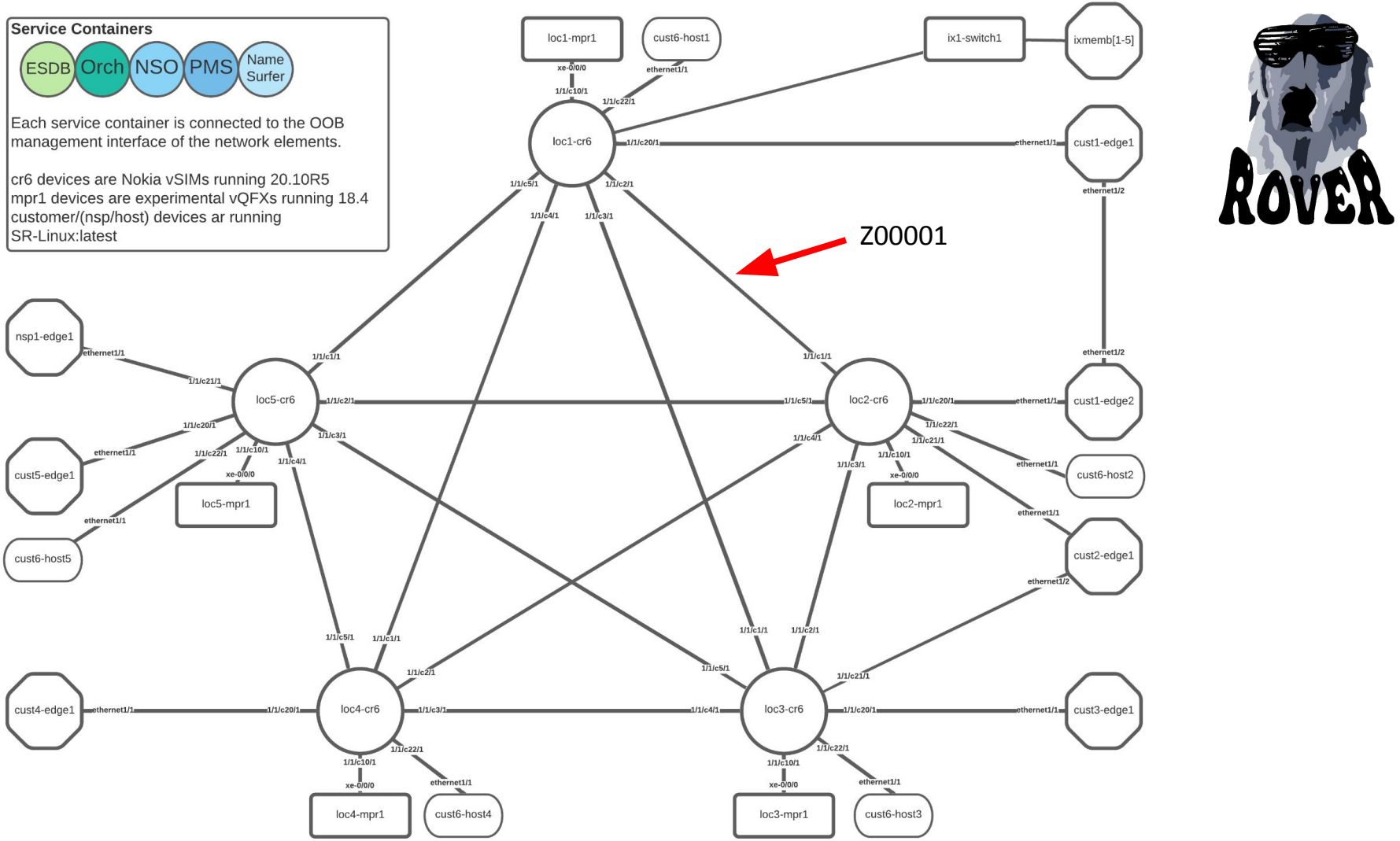
Service Containers
ESDB
Orch
NSO
PMS
Name Surfer
Each service container is connected to the OOB management interface of the network elements.
cr6 devices are Nokia vSIMs running 20.10R5
mpr1 devices are experimental vQFXs running 18.4
customer/(nsp/host) devices ar running SR-Linux:latest
Z00001
loc1-mpr1
cust6-host1
ix1-switch1
ixmemb[1-5]
loc1-cr6
cust1-edge1
nsp1-edge1
loc5-cr6
loc2-cr6
cust1-edge2
cust5-edge1
loc5-mpr1
loc2-mpr1
cust6-host2
cust6-host5
cust2-edge1
cust4-edge1
loc4-cr6
loc3-cr6
cust3-edge1
loc4-mpr1
cust6-host4
loc3-mpr1
cust6-host3
ROVER

Demonstration

- Backbone Link (ECMP Group)

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References

- [1] Title: “High Five”, Author: austrini, Source: WikiMedia Commons, License: CC BY 2.0
- [2] Title: “Shinkansen N700 with Mount Fuji”, Author: tansaisuketti, Source: WikiMedia Commons, License: CC BY-SA 3.0

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