



# Building a Realistic Orchestration Validation Environment for networks (ROVER)

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Network Automation Software Engineer

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Planning and Architecture

Energy Sciences Network (ESnet)

Lawrence Berkeley National Laboratory

TNC22

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# The ROVER Team

## Team Members, from Left to Right:

Nick Buraglio, Chris Cummings, Luke Baker, Scott Richmond, George Robb, Dhivakaran (Dhiva) Muruganantham, Marc Koerner, Derek Howard, Sam Oehlert, Eric Smith, Garrett Stewart, Brendan White (Not pictured)



# The Problem

- Testing of orchestration software before deploying to production in a full featured environment is difficult, but required for full awareness
- Lab with physical elements is *very* constrained for resources (too many people, not enough equipment)
- Physical equipment lab (qLAB) configuration and orientation does not resemble production
- qLAB may be in a state of transition from one project to the next
- Resetting qLAB to a known state is currently not easily accomplished

# ROVER: Origins

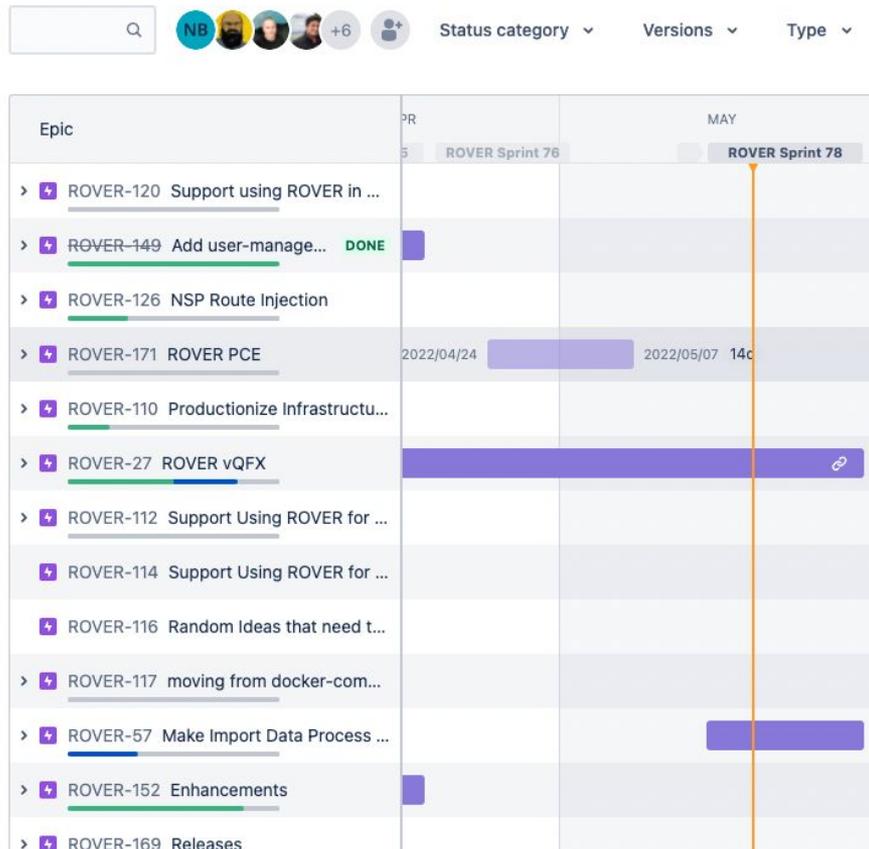
- "Wow, it would be nice to do automated tests on our full orchestration stack!"
- Tested various platforms such as Eve-NG, found them not well suited for consistent but ephemeral topologies *with associated services*\*\*
- Learned about [containerlab](#) by talking to Roman Dodin (creator)
- Internal development and orchestration teams acknowledged need for this tooling, brought Planning and Architecture Group (PAG) into project
- PAG brought in to build an overall plan and to take ROVER from concept to initial release

# ROVER: Origins

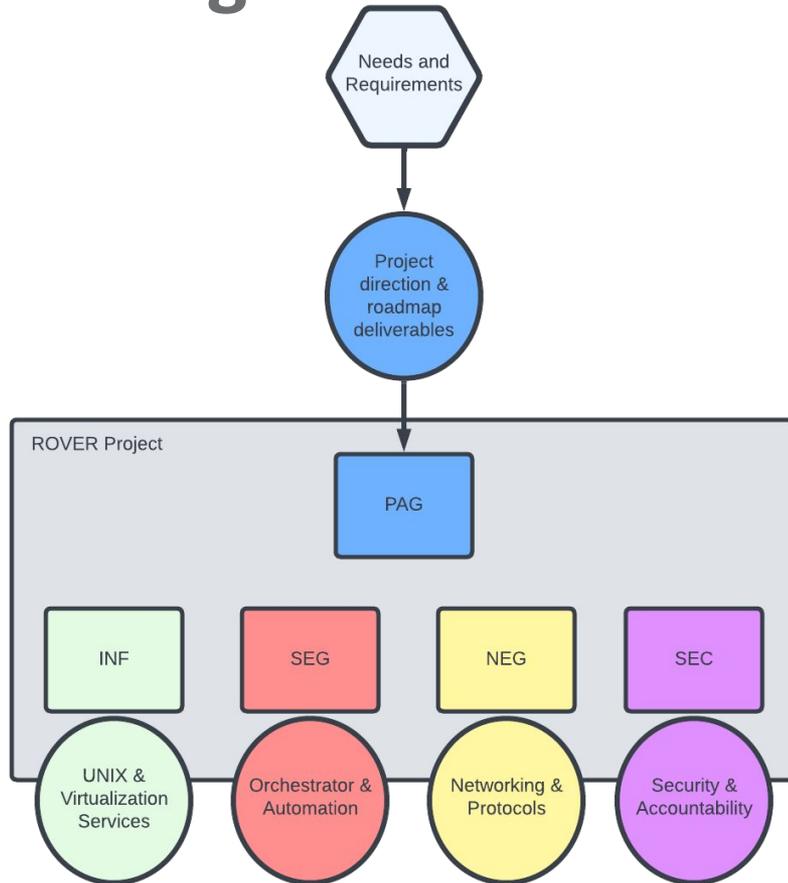
- Structured like a software project
- Clear and achievable deliverables
- Driven by needs and requirements gathered beforehand
- **No scope creep**

Projects / ROVER

## Roadmap



# ROVER: Origins



# Deliverables

- Develop a repeatable, supportable test env for VRF migrations
- MUST—A Network topology based off production configs
- MUST—Contain OCD software to run orchestrated workflows
- MUST—Support for swapping out versions of OCD software to test latest changes
- Stretch Goals—Support dataplane capabilities
  - a. Ping across links
  - b. BGP, IS-IS, etc.

# Categories of Users

-  Software Developers
-  Network Engineers
-  Trainers demonstrating our orchestration tooling
-  Users of OCD software who need to learn the tools
-  CI/CD Pipelines

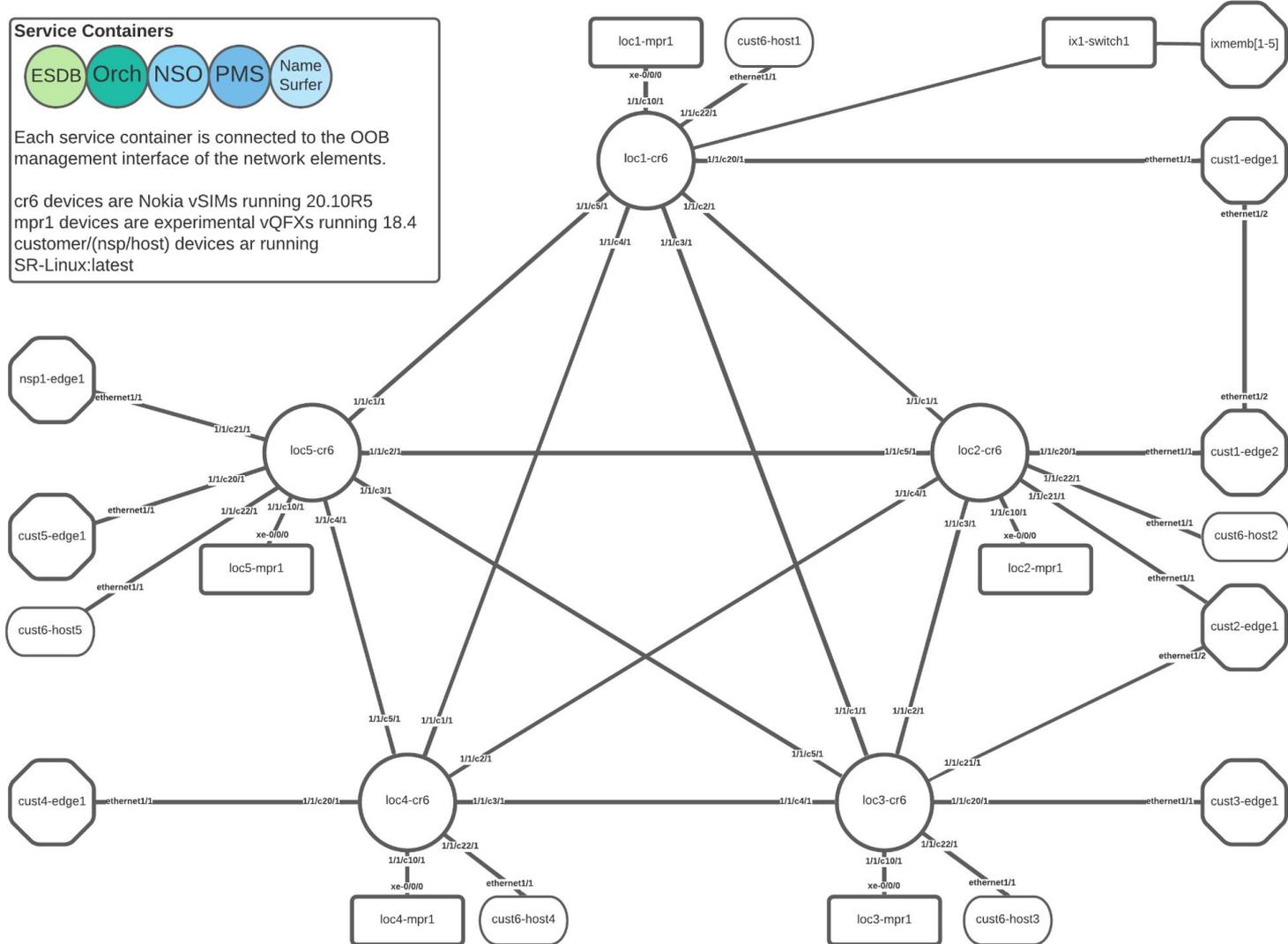
# Topology

## Service Containers

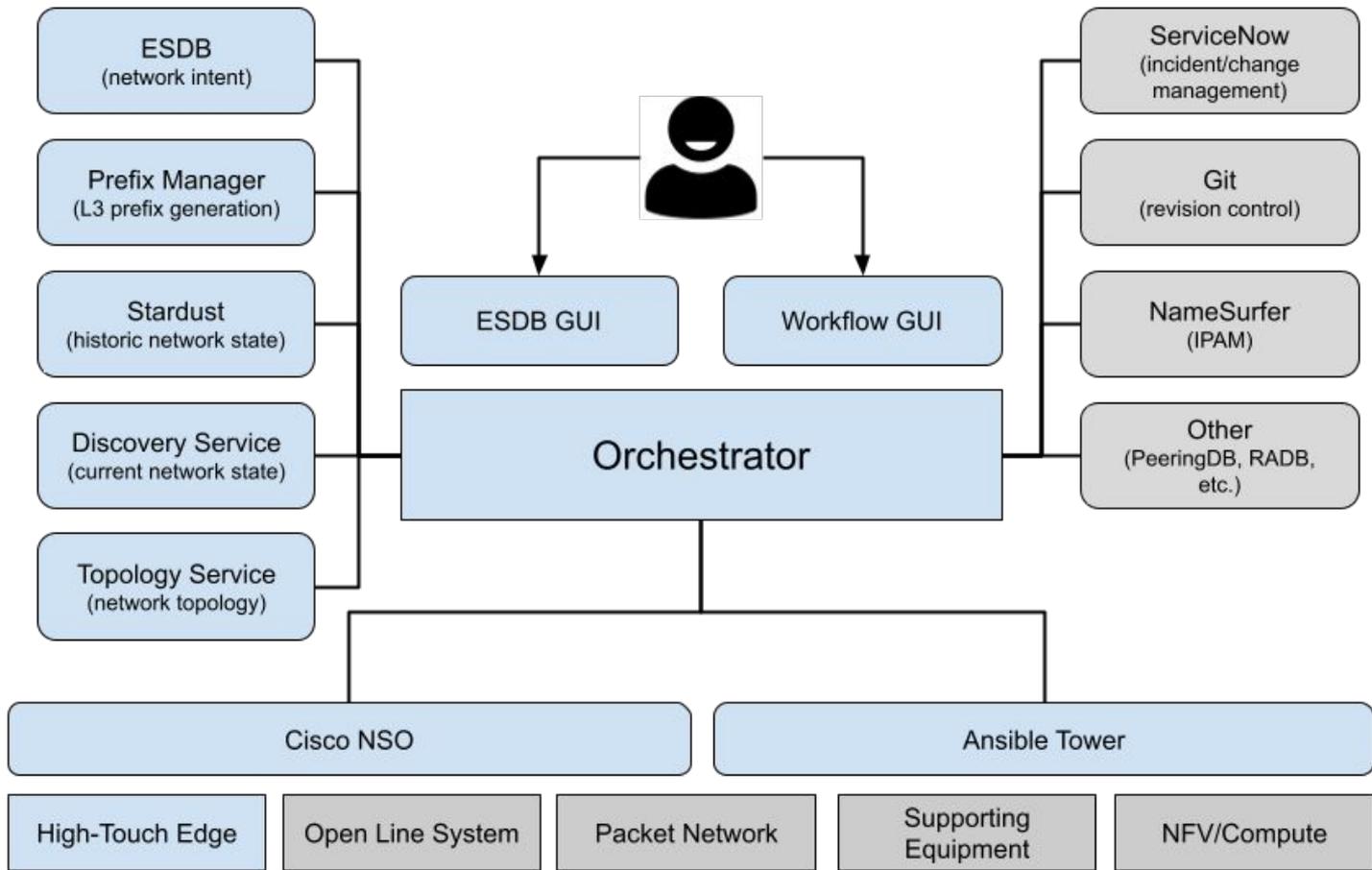


Each service container is connected to the OOB management interface of the network elements.

cr6 devices are Nokia vSIMs running 20.10R5  
mpr1 devices are experimental vQFXs running 18.4  
customer/(nsp/host) devices are running SR-Linux:latest

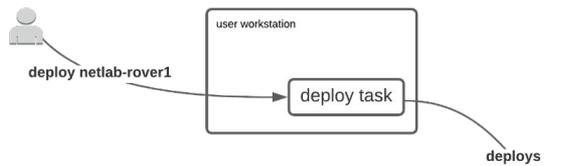


# ESnet6 Provisioning Stack



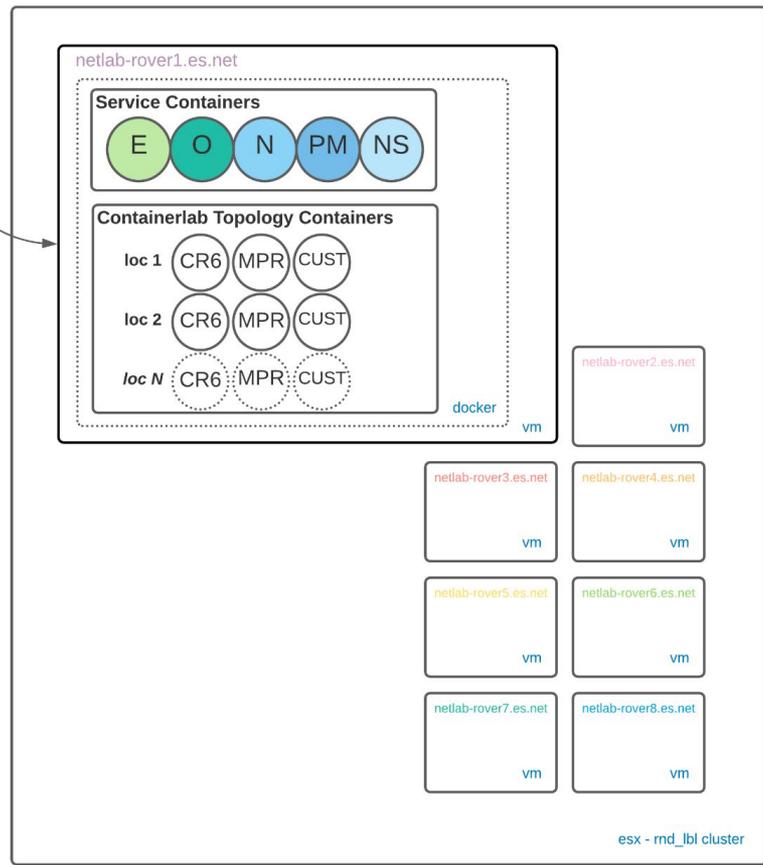
# Deployment

Legend  
ESDB  
Orchestrator  
NSO  
Prefix-Manager  
NameSurfer



```
[I] └─[chrisummings@chrisummings-mbp:~/D/c/rover]─[G:develop=]  
└─$ make deploy-rover LIMIT=netlab-rover1.es.net
```

deploys



# Demonstration

- Walkthrough of a Backbone Link Deployment Workflow
- Walkthrough of BGP Peer Deployment Workflow

# ECMP Group (Backbone Link)

### Active Processes ?

Assignee	Status	Workflow	Target	Abbr.	Subscription(s)	Started	Modified
	✔	workflow name...			description...		

NO RESULTS FOUND.

Rows per page: 10

### Completed Processes

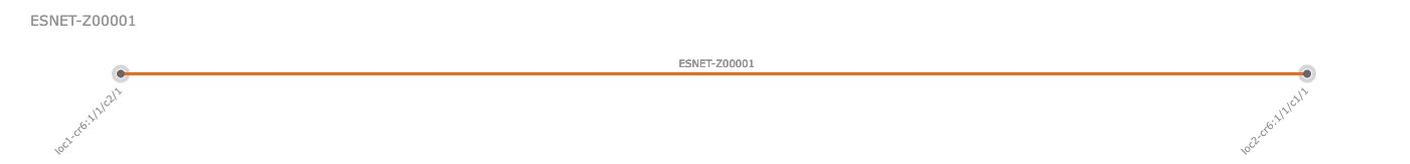
Workflow	Target	Customer	Product(s)	Tag(s)	Subscription(s)	Modified
provision_node_enrollment	MODIFY	789d6406-eea6-4f6a-af82-68106200d6e1	Enroll Core Router	NodeEnrollment	Node loc2-cr6 Provisioned: Ready for Backbone Link	11:57 CET
provision_node_enrollment	MODIFY	789d6406-eea6-4f6a-af82-68106200d6e1	Enroll Core Router	NodeEnrollment	Node loc1-cr6 Provisioned: Ready for Backbone Link	11:56 CET
create_node_enrollment	CREATE	789d6406-eea6-4f6a-af82-68106200d6e1	Enroll Core Router	NodeEnrollment	Node loc2-cr6 Provisioned: Ready for Backbone Link	11:56 CET
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Rows per page: 5

HOME > CIRCUITS >

# ESNET-Z00001

loc1-loc2 BB-A



## Basic

CIRCUIT ID	ESNET-Z00001
ORCHESTRATOR ID	
TAGS	Backbone
CIRCUIT TYPE	Equipment-Equipment
CIRCUIT STATE	Planning
LAST STATE CHANGE	Circuit state changed on Tue Jun 07 2022 11:11:57 GMT-0500 (Central Daylight Time)
DESCRIPTION	loc1-loc2 BB-A

## Related Circuits

DEPENDS ON	
DEPENDENTS	None

## Organizations

PROVIDER	
PROVIDER FUNDING AGENCY	
PROVIDER CIRCUIT ID	
CUSTOMER OF RECORD	ESNET - Energy Sciences Network
CUSTOMER OF RECORD CIRCUIT ID	

## Contacts

- + SWAP CIRCUIT ENDPOINT
- ✓ SAVE CHANGES
- 🔄 RESET PAGE
- 🗑️ DELETE

Summary
Hierarchy
Dependent Circuits

CREATED  
an hour ago by Unknown  
Jun 07 2022 11:11 AM

## Circuit State Log

CURRENT	Planning
PREVIOUS	None
DATE CHANGED	Tue Jun 07 2022 11:11:57 GMT-0500 (Central Daylight Time)



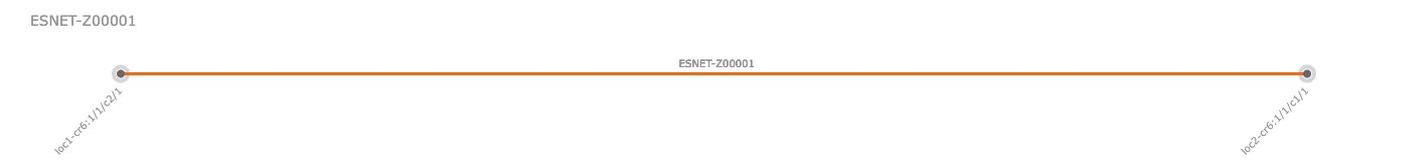
A:loc1-cr6#

A:loc2-cr6#

HOME > CIRCUITS >

# ESNET-Z00001

loc1-loc2 BB-A



## Basic

CIRCUIT ID	ESNET-Z00001
ORCHESTRATOR ID	
TAGS	Backbone
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DEPENDENTS	None

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PREVIOUS	None
DATE CHANGED	Tue Jun 07 2022 11:11:57 GMT-0500 (Central Daylight Time)

### Create new process / subscription

#### Choose Product

**Product**  
Search and select the product

- Circuit Transition Service
- ECMP Group**
- Enroll Core Router
- Enroll Management Router
- Enroll Transponder
- Internal Host Connectivity
- L2 VPN Member
- Layer 3 Service

### Create new process / subscription

#### Choose Product

**Product**  
Search and select the product

Cancel Next

Network Automation x ESDB Circuit ESNET-Z00001 x ESDB Interface loc1-cr6:1/1/c2 x ESDB Peer 3152 x ESDB Physical Connection con x ESDB Service Edge to\_cust1-p x ESDB Prefix Group CUST1-Mai x

Not Secure | http://netlab-rover1.es.net:3000/new-process

NAVIGATED TO NEXT STEP IN FORM WIZARD

Network Automation Orchestrator Engine is Running 0.0 Logout

Processes Subscriptions Metadata Tasks Settings

New Process

### Create new process / subscription

**Customer**  
Search and select the customer for the product.

Search and select a customer...

**ESDB Circuit \***  
Select the circuit from ESDB

Search and select a value...

**Circuit preference**  
To be used in the IGP calculation, along with latency

core

**Circuit Latency**  
Configured round-trip latency of this circuit, to be used in ISIS ECMP calculation. Leave value as 0 to automatically calculate latency

0

**Ignore Duplicate ECMP Group**  
If an ECMP group exists between the two chosen endpoints, click this checkbox to create another. Should only be used in cases when another circuit with a different latency/preference combination is needed

ignore\_duplicate\_detection

Previous Submit

### Create new process / subscription

**Customer**  
Search and select the customer for the product.

**ESDB Circuit \***  
Select the circuit from ESDB

- ESNET-Z00001 :: loc1-cr6:1/1/c2/1 to loc2-cr6:1/1/c1/1
- ESNET-Z00002 :: loc1-cr6:1/1/c3/1 to loc3-cr6:1/1/c1/1
- ESNET-Z00003 :: loc1-cr6:1/1/c4/1 to loc4-cr6:1/1/c1/1
- ESNET-Z00004 :: loc1-cr6:1/1/c5/1 to loc5-cr6:1/1/c1/1
- ESNET-Z00005 :: loc2-cr6:1/1/c3/1 to loc3-cr6:1/1/c2/1
- ESNET-Z00006 :: loc2-cr6:1/1/c4/1 to loc4-cr6:1/1/c2/1
- ESNET-Z00007 :: loc2-cr6:1/1/c5/1 to loc5-cr6:1/1/c2/1
- ESNET-Z00008 :: loc3-cr6:1/1/c4/1 to loc4-cr6:1/1/c3/1

**Ignore Duplicate ECMP Group**

If an ECMP group exists between the two chosen endpoints, click this checkbox to create another. Should only be used in cases when another circuit with a different latency/preference combination is needed

 ignore\_duplicate\_detection

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 ignore\_duplicate\_detection

Active Processes ?

Assignee	Status	Workflow	Target	Abbr.	Subscription(s)	Started	Modified
SYSTEM	Running	create_backbone_link	CREATE	789d6406-eea6-4f6a-af82-68106200d6e1	loc1-cr6 to loc2-cr6	12:06 CET	12:06 CET

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Completed Processes

Workflow	Target	Customer	Product(s)	Tag(s)	Subscription(s)	Modified
provision_node_enrollment	MODIFY	789d6406-eea6-4f6a-af82-68106200d6e1	Enroll Core Router	NodeEnrollment	Node loc2-cr6 Provisioned: Ready for Backbone Link	11:57 CET
provision_node_enrollment	MODIFY	789d6406-eea6-4f6a-af82-68106200d6e1	Enroll Core Router	NodeEnrollment	Node loc1-cr6 Provisioned: Ready for Backbone Link	11:56 CET
create_node_enrollment	CREATE	789d6406-eea6-4f6a-af82-68106200d6e1	Enroll Core Router	NodeEnrollment	Node loc2-cr6 Provisioned: Ready for Backbone Link	11:56 CET
create_node_enrollment	CREATE	789d6406-eea6-4f6a-af82-68106200d6e1	Enroll Core Router	NodeEnrollment	Node loc1-cr6 Provisioned: Ready for Backbone Link	11:55 CET

< 1 > Rows per page: 5

```
ssh clab-ipt-loc1-cr6 /Users/chriscummins (ssh -W [netlab-rover1.es.net]:22 lbnl-gw.es.net)
A:loc1-cr6# show system lldp neighbor
Link Layer Discovery Protocol (LLDP) System Information

=====
NB = nearest-bridge  NTPMR = nearest-non-tpmr  NC = nearest-customer
=====
Lcl Port      Scope Remote Chassis ID  Index RemotePort  Remote Sys Name
-----
No Matching Entries
=====
A:loc1-cr6#
```

```
ssh clab-ipt-loc2-cr6 /Users/chriscummins (ssh -W [netlab-rover1.es.net]:22 lbnl-gw.es.net)
A:loc2-cr6#
```

```
ssh clab-ipt-loc1-cr6 /Users/chriscummins (ssh -W [netlab-rover1.es.net]:22 lbl-gw.es.net)

A:loc1-cr6# show system lldp neighbor
Link Layer Discovery Protocol (LLDP) System Information

=====
NB = nearest-bridge  NTPMR = nearest-non-tpmr  NC = nearest-customer
=====
Lcl Port      Scope Remote Chassis ID  Index  Remote Port  Remote Sys Name
-----
No Matching Entries
=====
A:loc1-cr6#
```

```
ssh clab-ipt-loc2-cr6 /Users/chriscummins (ssh -W [netlab-rover1.es.net]:22 lbl-gw.es.net)

A:loc2-cr6# show system lldp neighbor
Link Layer Discovery Protocol (LLDP) System Information

=====
NB = nearest-bridge  NTPMR = nearest-non-tpmr  NC = nearest-customer
=====
Lcl Port      Scope Remote Chassis ID  Index  Remote Port  Remote Sys Name
-----
No Matching Entries
=====
A:loc2-cr6#
```

```
A:loc1-cr6# show system lldp neighbor
Link Layer Discovery Protocol (LLDP) System Information
```

```
=====
NB = nearest-bridge  NTPMR = nearest-non-tpmr  NC = nearest-customer
=====
Lcl Port      Scope Remote Chassis ID  Index  Remote Port  Remote Sys Name
-----
No Matching Entries
=====
```

```
A:loc1-cr6# show router interface
```

```
=====
Interface Table (Router: Base)
=====
```

Interface-Name IP-Address	Adm	Opr(v4/v6)	Mode	Port/SapId PfxState
system 134.55.200.10/32 2001:400:0:40::200:10/128	Up	Up/Up	Network	system n/a PREFERRED

```
Interfaces : 1
```

```
A:loc1-cr6#
```

```
A:loc2-cr6# show system lldp neighbor
Link Layer Discovery Protocol (LLDP) System Information
```

```
=====
NB = nearest-bridge  NTPMR = nearest-non-tpmr  NC = nearest-customer
=====
Lcl Port      Scope Remote Chassis ID  Index  Remote Port  Remote Sys Name
-----
No Matching Entries
=====
```

```
A:loc2-cr6# show router interface
```

```
=====
Interface Table (Router: Base)
=====
```

Interface-Name IP-Address	Adm	Opr(v4/v6)	Mode	Port/SapId PfxState
system 134.55.200.20/32 2001:400:0:40::200:20/128	Up	Up/Up	Network	system n/a PREFERRED

```
Interfaces : 1
```

```
A:loc2-cr6#
```

```
ssh clab-ipt-loc1-cr6 /Users/chrisummings/documents/Code/rover (-fish) #1
Lcl Port Scope Remote Chassis ID Index Remote Port Remote Sys Name
-----
No Matching Entries
=====
A:loc1-cr6# show router interface
=====
Interface Table (Router: Base)
=====
Interface-Name      Adm      Opr(v4/v6)  Mode      Port/SapId
IP-Address          PfxState
-----
system              Up       Up/Up       Network   system
134.55.200.10/32    n/a
2001:400:0:40::200:10/128  PREFERRED
-----
Interfaces : 1
=====
A:loc1-cr6# show router isis
all
<isis-instance>
0
adjacency          bier-info      capabilities
database           flex-algo       hostname
interface          lfa-coverage   link-group-member-status
link-group-status  mapping-server  prefix-sids
routes             sid-stats      spf-log
sr-adj-sets        sr-lfa-coverage statistics
status             summary-address topology
A:loc1-cr6# show router isis adjacency
=====
Rtr Base ISIS Instance 0 Adjacency
=====
System ID          Usage State Hold Interface      MT-ID
-----
No Matching Entries
=====
A:loc1-cr6#
```

```
ssh clab-ipt-loc2-cr6 /Users/chrisummings (ssh -W [[netlab-rover1.es.net]:22 lbln-gw.es.net) #2
No Matching Entries
=====
A:loc2-cr6# show router interface
=====
Interface Table (Router: Base)
=====
Interface-Name      Adm      Opr(v4/v6)  Mode      Port/SapId
IP-Address          PfxState
-----
system              Up       Up/Up       Network   system
134.55.200.20/32    n/a
2001:400:0:40::200:20/128  PREFERRED
-----
Interfaces : 1
=====
A:loc2-cr6# show router isis
all
<isis-instance>
0
adjacency          bier-info      capabilities
database           flex-algo       hostname
interface          lfa-coverage   link-group-member-status
link-group-status  mapping-server  prefix-sids
routes             sid-stats      spf-log
sr-adj-sets        sr-lfa-coverage statistics
status             summary-address topology
A:loc2-cr6# show router isis a
adjacency all
A:loc2-cr6# show router isis adjacency
=====
Rtr Base ISIS Instance 0 Adjacency
=====
System ID          Usage State Hold Interface      MT-ID
-----
No Matching Entries
=====
A:loc2-cr6#
```

[+ New Process](#)

Active Processes

Assignee	Status	Workflow	Target	Abbr.	Subscription(s)	Started	Modified
NOC	Suspended	<a href="#">create_backbone_link</a>	CREATE	789d6406-eea6-4f6a-af82-68106200d6e1	loc1-cr6 to loc2-cr6	12:06 CET	12:07 CET

Rows per page: 10

Completed Processes

Workflow	Target	Customer	Product(s)	Tag(s)	Subscription(s)	Modified
<a href="#">provision_node_enrollment</a>	MODIFY	789d6406-eea6-4f6a-af82-68106200d6e1	Enroll Core Router	NodeEnrollment	<a href="#">Node loc2-cr6 Provisioned: Ready for Backbone Link</a>	11:57 CET
<a href="#">provision_node_enrollment</a>	MODIFY	789d6406-eea6-4f6a-af82-68106200d6e1	Enroll Core Router	NodeEnrollment	<a href="#">Node loc1-cr6 Provisioned: Ready for Backbone Link</a>	11:56 CET
<a href="#">create_node_enrollment</a>	CREATE	789d6406-eea6-4f6a-af82-68106200d6e1	Enroll Core Router	NodeEnrollment	<a href="#">Node loc2-cr6 Provisioned: Ready for Backbone Link</a>	11:56 CET
<a href="#">create_node_enrollment</a>	CREATE	789d6406-eea6-4f6a-af82-68106200d6e1	Enroll Core Router	NodeEnrollment	<a href="#">Node loc1-cr6 Provisioned: Ready for Backbone Link</a>	11:55 CET

Rows per page: 5

### Process instance of workflow create\_backbone\_link

#### User input for step Confirm NSO Dry Run Results for product ECMP Group

```
NSO 'dry run' results
devices {
  global-settings {
    ned-settings {
      alu-sr {
        transaction {
+         config-abort-warning ".*Cannot modify the port binding, remove the port binding first*" {
+         }
+         config-abort-warning ".*Port has network egress queue-groups defined.*" {
+         }
        }
      }
    }
  }
  device loc1-cr6 {
    config {
      port 1/1/c2/1 {
+      description loc1-cr6---loc2-cr6:bbl-bffcaf28::ESNET-Z00001:na;
      ethernet {
```

**Confirm NSO 'dry run' results**

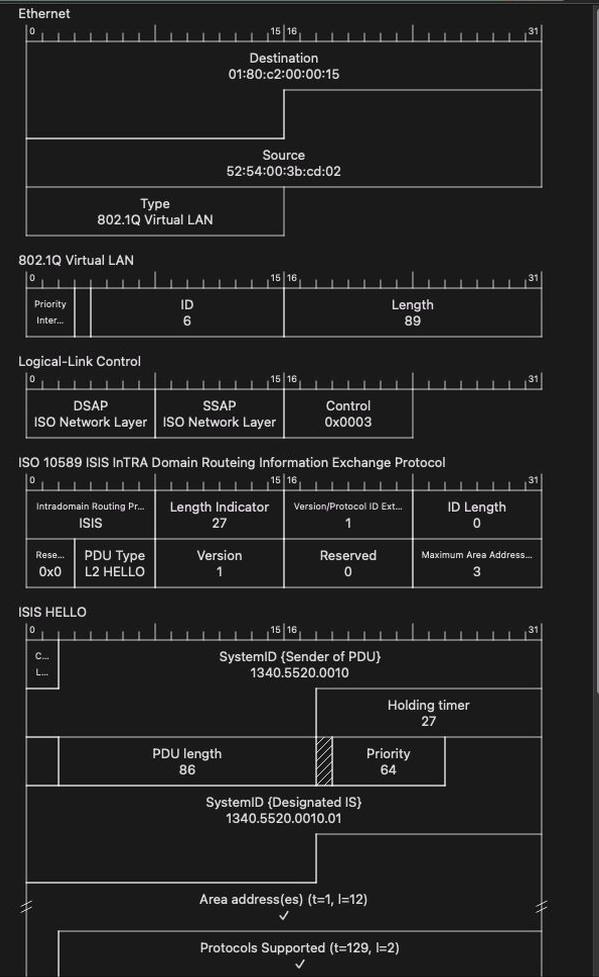
Confirm NSO 'dry run' results

Cancel Submit

No.	Time	Source	Destination	Protocol	Length	Info
10	1.026143	RealtekU_3b:cd:02	ISIS-all-level-2-IS's	ISIS HELLO	107	L2 HELLO, System-ID: 1340.5520.0010
11	1.216400	RealtekU_c9:a8:01	ISIS-all-level-2-IS's	ISIS HELLO	107	L2 HELLO, System-ID: 1340.5520.0020
12	1.219788	RealtekU_c9:a8:01	ISIS-all-level-2-IS's	ISIS HELLO	107	L2 HELLO, System-ID: 1340.5520.0020
13	1.219834	RealtekU_c9:a8:01	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS HELLO	107	P2P HELLO, System-ID: 1340.5520.002
14	1.220190	RealtekU_3b:cd:02	ISIS-all-level-2-IS's	ISIS HELLO	115	L2 HELLO, System-ID: 1340.5520.0010
15	1.246467	RealtekU_3b:cd:02	ISIS-all-level-2-IS's	ISIS HELLO	107	L2 HELLO, System-ID: 1340.5520.0010
16	1.246479	RealtekU_3b:cd:02	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS HELLO	107	P2P HELLO, System-ID: 1340.5520.001
17	1.248206	RealtekU_c9:a8:01	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS HELLO	117	P2P HELLO, System-ID: 1340.5520.002
19	1.252712	RealtekU_3b:cd:02	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS HELLO	117	P2P HELLO, System-ID: 1340.5520.001
22	1.253537	RealtekU_3b:cd:02	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS LSP	211	L2 LSP, LSP-ID: 1340.5520.0010.00-0
23	1.253543	RealtekU_3b:cd:02	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS CSNP	83	L2 CSNP, Source-ID: 1340.5520.0010.
25	1.257025	RealtekU_c9:a8:01	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS HELLO	117	P2P HELLO, System-ID: 1340.5520.002
26	1.258276	RealtekU_c9:a8:01	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS LSP	211	L2 LSP, LSP-ID: 1340.5520.0020.00-0
27	1.258333	RealtekU_c9:a8:01	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS CSNP	83	L2 CSNP, Source-ID: 1340.5520.0020.
33	1.585532	RealtekU_c9:a8:01	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS HELLO	107	P2P HELLO, System-ID: 1340.5520.002
34	1.585548	RealtekU_c9:a8:01	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS HELLO	107	P2P HELLO, System-ID: 1340.5520.002
36	1.587431	RealtekU_3b:cd:02	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS HELLO	117	P2P HELLO, System-ID: 1340.5520.001
37	1.587447	RealtekU_3b:cd:02	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS HELLO	117	P2P HELLO, System-ID: 1340.5520.001
39	1.588869	RealtekU_c9:a8:01	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS HELLO	117	P2P HELLO, System-ID: 1340.5520.002
40	1.589113	RealtekU_c9:a8:01	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS HELLO	117	P2P HELLO, System-ID: 1340.5520.002
41	1.589201	RealtekU_c9:a8:01	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS LSP	211	L2 LSP, LSP-ID: 1340.5520.0020.00-0
42	1.589208	RealtekU_c9:a8:01	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS CSNP	83	L2 CSNP, Source-ID: 1340.5520.0020.
43	1.594985	RealtekU_3b:cd:02	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS HELLO	117	P2P HELLO, System-ID: 1340.5520.001
44	1.594999	RealtekU_3b:cd:02	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS LSP	211	L2 LSP, LSP-ID: 1340.5520.0010.00-0
45	1.595002	RealtekU_3b:cd:02	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS CSNP	99	L2 CSNP, Source-ID: 1340.5520.0010.
48	1.608417	RealtekU_3b:cd:02	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS HELLO	107	P2P HELLO, System-ID: 1340.5520.001
49	1.608429	RealtekU_3b:cd:02	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS HELLO	107	P2P HELLO, System-ID: 1340.5520.001
51	1.609561	RealtekU_c9:a8:01	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS HELLO	117	P2P HELLO, System-ID: 1340.5520.002
52	1.609571	RealtekU_c9:a8:01	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS HELLO	117	P2P HELLO, System-ID: 1340.5520.002
54	1.611329	RealtekU_3b:cd:02	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS HELLO	117	P2P HELLO, System-ID: 1340.5520.001
55	1.611339	RealtekU_3b:cd:02	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS HELLO	117	P2P HELLO, System-ID: 1340.5520.001
56	1.611342	RealtekU_3b:cd:02	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS CSNP	99	L2 CSNP, Source-ID: 1340.5520.0010.
57	1.614805	RealtekU_c9:a8:01	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS HELLO	117	P2P HELLO, System-ID: 1340.5520.002
58	1.614818	RealtekU_c9:a8:01	DEC-MAP-(or-OSI7)-Intermediate-Sys...	ISIS CSNP	99	L2 CSNP, Source-ID: 1340.5520.0020.

```

> Frame 10: 107 bytes on wire (856 bits), 107 bytes captured (856 bits) on interface -, id 0
> Ethernet II, Src: RealtekU_3b:cd:02 (52:54:00:3b:cd:02), Dst: ISIS-all-level-2-IS's (01:80:c2:00:00:15)
> 802.1Q Virtual LAN, PRI: 6, DEI: 0, ID: 6
> Logical-Link Control
> ISO 10589 ISIS InTRA Domain Routing Information Exchange Protocol
> ISIS HELLO
    
```



```

ssh clab-ipt-loc1-cr6 /Users/chrisummings/documents/Code/rover (-fish) #1
status summary-address topology
A:loc1-cr6# show router isis adjacency

=====
Rtr Base ISIS Instance 0 Adjacency
=====
System ID Usage State Hold Interface MT-ID
-----
No Matching Entries
=====
A:loc1-cr6# show system lldp neighbor
Link Layer Discovery Protocol (LLDP) System Information

=====
NB = nearest-bridge NTPMR = nearest-non-tpmr NC = nearest-customer
=====
Lcl Port Scope Remote Chassis ID Index Remote Port Remote Sys Name
-----
1/1/c2/1 NB 52:54:00:A3:CF:00 1 1/1/c1/1 loc2-cr6
=====
Number of neighbors : 1
A:loc1-cr6# show router interface

=====
Interface Table (Router: Base)
=====
Interface-Name Adm Opr(v4/v6) Mode Port/SapId
IP-Address PfxState
-----
loc2-bb-a Up Up/Up Network 1/1/c2/1:6
134.55.56.124/31 n/a
2001:400:0:63e::/127 PREFERRED
fe80::5054:ff:fe3b:cd02/64 PREFERRED
system Up Up/Up Network system
134.55.200.10/32 n/a
2001:400:0:40::200:10/128 PREFERRED
-----
Interfaces : 2
A:loc1-cr6#

```

```

ssh clab-ipt-loc2-cr6 /Users/chrisummings (ssh -W [netlab-rover1.es.net]:22 lbln-gw.es.net) #2
No Matching Entries
=====
A:loc2-cr6# show router interface

=====
Interface Table (Router: Base)
=====
Interface-Name Adm Opr(v4/v6) Mode Port/SapId
IP-Address PfxState
-----
system Up Up/Up Network system
134.55.200.20/32 n/a
2001:400:0:40::200:20/128 PREFERRED
-----
Interfaces : 1
A:loc2-cr6# show router isis
all
<isis-instance>
0

adjacency bier-info capabilities
database flex-algo hostname
interface lfa-coverage link-group-member-status
link-group-status mapping-server prefix-sids
routes sid-stats spf-log
sr-adj-sets sr-lfa-coverage statistics
status summary-address topology
A:loc2-cr6# show router isis a
adjacency all
A:loc2-cr6# show router isis adjacency

=====
Rtr Base ISIS Instance 0 Adjacency
=====
System ID Usage State Hold Interface MT-ID
-----
No Matching Entries
=====
A:loc2-cr6#

```

```
ssh clab-ipt-loc1-cr6 /Users/chriscommings/documents/Code/rover (-fish) #1
Link Layer Discovery Protocol (LLDP) System Information
=====
NB = nearest-bridge  NTPMR = nearest-non-tpmr  NC = nearest-customer
=====
Lcl Port      Scope Remote Chassis ID  Index  Remote Port  Remote Sys Name
-----
1/1/c2/1     NB    52:54:00:A3:CF:00  1      1/1/c1/1     loc2-cr6
=====
Number of neighbors : 1
A:loc1-cr6# show router interface
=====
Interface Table (Router: Base)
=====
Interface-Name      Adm      Opr(v4/v6)  Mode  Port/SapId  PfxState
-----
loc2-bb-a           Up       Up/Up       Network  1/1/c2/1:6  n/a
134.55.56.124/31    n/a
2001:400:0:63e::/127  PREFERRED
fe80::5054:ff:fe3b:cd02/64  PREFERRED
system              Up       Up/Up       Network  system      n/a
134.55.200.10/32    n/a
2001:400:0:40::200:10/128  PREFERRED
=====
Interfaces : 2
=====
A:loc1-cr6# show router isis adjacency
=====
Rtr Base ISIS Instance 0 Adjacency
=====
System ID          Usage State Hold Interface          MT-ID
-----
loc2-cr6           L2    Up    23    loc2-bb-a          0,2
=====
Adjacencies : 1
=====
A:loc1-cr6#
```

```
ssh clab-ipt-loc2-cr6 /Users/chriscommings (ssh -W [netlab-rover1.es.net]:22 lbln-gw.es.net) #2
No Matching Entries
=====
A:loc2-cr6# show router interface
=====
Interface Table (Router: Base)
=====
Interface-Name      Adm      Opr(v4/v6)  Mode  Port/SapId  PfxState
-----
system              Up       Up/Up       Network  system      n/a
134.55.200.20/32    n/a
2001:400:0:40::200:20/128  PREFERRED
=====
Interfaces : 1
=====
A:loc2-cr6# show router isis
all
<isis-instance>
0
adjacency           bier-info           capabilities
database            flex-algo            hostname
interface            lfa-coverage        link-group-member-status
link-group-status    mapping-server       prefix-sids
routes               sid-stats            spf-log
sr-adj-sets          sr-lfa-coverage      statistics
status               summary-address      topology
=====
A:loc2-cr6# show router isis a
adjacency all
A:loc2-cr6# show router isis adjacency
=====
Rtr Base ISIS Instance 0 Adjacency
=====
System ID          Usage State Hold Interface          MT-ID
-----
No Matching Entries
=====
A:loc2-cr6#
```

```

ssh clab-ipt-loc1-cr6 /Users/chriscommings/documents/Code/rover (-fish) #1
Link Layer Discovery Protocol (LLDP) System Information
=====
NB = nearest-bridge  NTPMR = nearest-non-tpmr  NC = nearest-customer
=====
Lcl Port      Scope Remote Chassis ID  Index  Remote Port  Remote Sys Name
-----
1/1/c2/1     NB    52:54:00:A3:CF:00  1      1/1/c1/1     loc2-cr6
=====
Number of neighbors : 1
A:loc1-cr6# show router interface
=====
Interface Table (Router: Base)
=====
Interface-Name      Adm      Opr(v4/v6)  Mode  Port/SapId  PfxState
-----
loc2-bb-a           Up       Up/Up       Network  1/1/c2/1:6  n/a
134.55.56.124/31    n/a
2001:400:0:63e::/127  PREFERRED
fe80::5054:ff:fe3b:cd02/64  PREFERRED
system             Up       Up/Up       Network  system      n/a
134.55.200.10/32    n/a
2001:400:0:40::200:10/128  PREFERRED
=====
Interfaces : 2
A:loc1-cr6# show router isis adjacency
=====
Rtr Base ISIS Instance 0 Adjacency
=====
System ID          Usage State Hold Interface          MT-ID
-----
loc2-cr6           L2    Up    23    loc2-bb-a          0,2
=====
Adjacencies : 1
A:loc1-cr6#

```

```

ssh clab-ipt-loc2-cr6 /Users/chriscommings (ssh -W [[netlab-rover1.es.net]:22 lbln-gw.es.net) #2
134.55.200.20/32
2001:400:0:40::200:20/128
n/a
PREFERRED
-----
Interfaces : 1
A:loc2-cr6# show router isis
all
<isis-instance>
0
adjacency          bier-info          capabilities
database           flex-algo           hostname
interface          lfa-coverage       link-group-member-status
link-group-status  mapping-server      prefix-sids
routes            sid-stats          spf-log
sr-adj-sets       sr-lfa-coverage    statistics
status            summary-address     topology
A:loc2-cr6# show router isis a
adjacency all
A:loc2-cr6# show router isis adjacency
=====
Rtr Base ISIS Instance 0 Adjacency
=====
System ID          Usage State Hold Interface          MT-ID
-----
No Matching Entries
A:loc2-cr6# show router isis adjacency
=====
Rtr Base ISIS Instance 0 Adjacency
=====
System ID          Usage State Hold Interface          MT-ID
-----
loc1-cr6           L2    Up    24    loc1-bb-a          0,2
=====
Adjacencies : 1
A:loc2-cr6#

```

# Layer3 Service (BGP Transit)

HOME > PEERS >

# AS3152 CUST1

## General Information

ASN	3152
ORGANIZATION	CUST1 - CUST1
DIFFERENTIATOR	
ACL UID	1
PEER CONTACT	
NOC CONTACT	
JUSTIFICATION	Because of reasons
AS SET	
START DATE	
TERM DATE	
PEER STATUS	<b>Active</b>

## Orchestration Subscriptions for this AS

ORCHESTRATOR IDS

## Services using this AS

SERVICES

CUST1-Main-LHCONEv6  
IPv6 LHCONE L3VPN

Service Edges - *Orchestrator IDs:*

- loc1-cr6:to\_cust1-lhcone-primary
- loc2-cr6:to\_cust1-lhcone-secondary

Static Routing: *No*

CUST1-Main-LHCONEv4  
IPv4 LHCONE L3VPN

Service Edges - *Orchestrator IDs:*

- loc1-cr6:to\_cust1-lhcone-primary
- loc2-cr6:to\_cust1-lhcone-secondary

Static Routing: *No*

CUST1-Main-v6  
IPv6 Internet Transit

Service Edges - *Orchestrator IDs:*

- loc2-cr6:to\_cust1-secondary
- loc1-cr6:to\_cust1-primary

Static Routing: *No*

- ✓ SAVE CHANGES
- 🔄 RESET PAGE
- 🗑️ DELETE

CREATED  
3 hours ago by Unknown  
Jun 07 2022 11:11 AM

HOME > PEERS >

# AS3152 CUST1

## General Information

ASN	3152
ORGANIZATION	CUST1 - CUST1
DIFFERENTIATOR	
ACL UID	1
PEER CONTACT	
NOC CONTACT	
JUSTIFICATION	Because of reasons
AS SET	
START DATE	
TERM DATE	
PEER STATUS	<b>Active</b>

## Orchestration Subscriptions for this AS

ORCHESTRATOR IDS

## Services using this AS

SERVICES

CUST1-Main-LHCONEv6  
IPv6 LHCONE L3VPN

Service Edges - *Orchestrator IDs:*

- loc1-cr6:to\_cust1-lhcone-primary
- loc2-cr6:to\_cust1-lhcone-secondary

Static Routing: *No*

CUST1-Main-LHCONEv4  
IPv4 LHCONE L3VPN

Service Edges - *Orchestrator IDs:*

- loc1-cr6:to\_cust1-lhcone-primary
- loc2-cr6:to\_cust1-lhcone-secondary

Static Routing: *No*

CUST1-Main-v6  
IPv6 Internet Transit

Service Edges - *Orchestrator IDs:*

- loc2-cr6:to\_cust1-secondary
- loc1-cr6:to\_cust1-primary

Static Routing: *No*

- ✓ SAVE CHANGES
- 🔄 RESET PAGE
- 🗑️ DELETE

CREATED  
3 hours ago by Unknown  
Jun 07 2022 11:11 AM

HOME > PHYSICAL CONNECTIONS >

# CUST1 conn-a

## General Information

ORGANIZATION CUST1 - CUST1

## Connection Details

CONNECTION NAME conn-a  
ORCHESTRATOR ID loc1-cr6  
DEVICE loc1-cr6  
INTERFACE 1/1/c20/1  
INTERFACE DETAILS  
Description  
Monitored True  
Tagged True  
CAPACITY 100G

SAVE CHANGES  
RESET PAGE

Cannot delete Physical Connection:  
Physical Connection is in use by Service Edges

CREATED  
4 hours ago by Unknown  
Jun 07 2022 11:11 AM

LAST MODIFIED  
9 minutes ago by Unknown  
Jun 07 2022 02:33 PM

SERVICE EDGES	Service Edge Name	Orchestrator ID	Organization	Local IPs	Services
	to_cust1-primary		CUST1	192.0.2.101/30, 2001:db8::1:0/127	CUST1-Main-v4, CUST1-Main-v6
	to_cust1-lhcone-primary		CUST1	192.0.2.109/30, 2001:db8::3:0/127	CUST1-Main-LHCONEv4, CUST1-Main-LHCONEv6

### Create new process / subscription

#### Choose Product

Product  
Search and select the product

- Enroll Transponder
- Internal Host Connectivity
- L2 VPN Member
- Layer 3 Service
- Management Link
- Physical Connection
- Prefix List
- Service Edge

### Create new process / subscription

#### Choose Product

**Product**  
Search and select the product

Cancel Next

### Create new process / subscription

#### Physical Connection

Select a physical connection \*

Search and select a value... ▼

- CUST1 conn-a: loc1-cr6:1/1/c20/1 100G
- CUST1 conn-b: loc2-cr6:1/1/c20/1 100G
- CUST2 conn-a: loc2-cr6:1/1/c21/1 100G
- CUST2 conn-b: loc3-cr6:1/1/c21/1 100G
- CUST3 conn-a: loc3-cr6:1/1/c20/1 100G
- CUST4 conn-a: loc4-cr6:1/1/c20/1 100G
- CUST5 conn-a: loc5-cr6:1/1/c20/1 100G
- NSP1 conn-a: loc5-cr6:1/1/c21/1 100G

### Create new process / subscription

#### Physical Connection

Select a physical connection \*

Previous

Submit

Active Processes ?

Assignee	Status	Workflow	Target	Abbr.	Subscription(s)	Started	Modified
NOC	Suspended	create_physical_connection	CREATE	CUST1	CUST1 conn-a: loc1-cr6:1/1/c20/1 100G	14:43 CET	14:44 CET

< 1 > Rows per page: 10

Completed Processes

Workflow	Target	Customer	Product(s)	Tag(s)	Subscription(s)	Modified
create_backbone_link	CREATE	789d6406-eea6-4f6a-af82-68106200d6e1	ECMP Group	BBL	loc1-cr6 to loc2-cr6	12:09 CET
provision_node_enrollment	MODIFY	789d6406-eea6-4f6a-af82-68106200d6e1	Enroll Core Router	NodeEnrollment	Node loc2-cr6 Provisioned: Ready for Backbone Link	11:57 CET
provision_node_enrollment	MODIFY	789d6406-eea6-4f6a-af82-68106200d6e1	Enroll Core Router	NodeEnrollment	Node loc1-cr6 Provisioned: Ready for Backbone Link	11:56 CET
create_node_enrollment	CREATE	789d6406-eea6-4f6a-af82-68106200d6e1	Enroll Core Router	NodeEnrollment	Node loc2-cr6 Provisioned: Ready for Backbone Link	11:56 CET
create_node_enrollment	CREATE	789d6406-eea6-4f6a-af82-68106200d6e1	Enroll Core Router	NodeEnrollment	Node loc1-cr6 Provisioned: Ready for Backbone Link	11:55 CET

< 1 > Rows per page: 5

```
A:loc1-cr6# show port description | match 1/1/c20
1/1/c20      breakout port
1/1/c20/1    100-Gig Ethernet
A:loc1-cr6#
```

```
ssh clab-ipt-cust1-edge1 /Users/chrisummings (ssh -W [netlab-rover1.es.net]:22 lbln-gw.es.net)
--{ running }--[ ]--
A:cust1-edge1#

Current mode: running admin (5) Tue 07:36PM
```

USER INPUT PROCESS

### Process instance of workflow create\_physical\_connection

User input for step Confirm NSO Dry Run Results for product Physical Connection

**NSO 'dry run' results**

```
devices {
  device loc1-cr6 {
    config {
      port 1/1/c20/1 {
+      description loc1-cr6---CUST1::conn-a:show:na;
        ethernet {
+          mode access;
+          report-alarm signal-fail no-frame-lock high-ber;
+          encap-type dot1q;
+          mtu 9212;
        }
+      shutdown false;
    }
  }
}
services {
+ port loc1-cr6 1/1/c20/1 {
+   orch-id 00e8e72e-e9f9-44f7-ba26-ee0da2c7909a;
```

**Confirm NSO 'dry run' results**

- Confirm NSO 'dry run' results

Cancel Submit

```
A:loc1-cr6# show port description | match 1/1/c20
1/1/c20      breakout port
1/1/c20/1    100-Gig Ethernet
A:loc1-cr6# show port description | match 1/1/c20
1/1/c20      breakout port
1/1/c20/1    loc1-cr6---CUST1::conn-a:show:na
A:loc1-cr6#
```

```
--{ running }--[ ]--
A:cust1-edge1#

Current mode: running admin (5) Tue 07:36PM
```

HOME > PHYSICAL CONNECTIONS >

# CUST1 conn-a

Physical Connection managed by Orchestrator. Terminate Orchestrator Subscription to allow full editing

## General Information

ORGANIZATION CUST1 - CUST1

## Connection Details

CONNECTION NAME conn-a  
ORCHESTRATOR ID 00e8e72e-e9f9-44f7-ba26-ee0da2c7909a  
DEVICE loc1-cr6  
INTERFACE 1/1/c20/1  
INTERFACE DETAILS  
Description  
Monitored True  
Tagged True  
CAPACITY 100G

SERVICE EDGES	Service Edge Name	Orchestrator ID	Organization	Local IPs	Services
	to_cust1-primary		CUST1	192.0.2.101/30, 2001:db8::1:0/127	CUST1-Main-v4, CUST1-Main-v6
	to_cust1-lhcone-primary		CUST1	192.0.2.109/30, 2001:db8::3:0/127	CUST1-Main-LHCONEv4, CUST1-Main-LHCONEv6

✓ SAVE CHANGES

🔄 RESET PAGE

Cannot delete Physical Connection:

- Physical Connection is in use by Service Edges

---

CREATED  
4 hours ago by Unknown  
Jun 07 2022 11:11 AM

LAST MODIFIED  
a few seconds ago by Unknown  
Jun 07 2022 02:45 PM

HOME > SERVICE EDGES >

# to\_cust1-primary

## General Information

NAME	to_cust1-primary
ORCHESTRATOR ID	
ORGANIZATION	CUST1 - CUST1
SERVICE EDGE TYPE	Layer 3 Virtual Interface
ROUTING INSTANCE	Base
NON STANDARD CONFIG	<input type="checkbox"/> CHECK THIS BOX TO INDICATE THIS SERVICE EDGE HAS A NON-STANDARD CONFIGURATION. REQUIRES RELATED JIRA ISSUE.
RELATED JIRA ISSUE	

## Orchestration Subscriptions using this Service Edge

ORCHESTRATOR IDS

## Connection

PHYSICAL CONNECTION	CUST1 conn-a (loc1-cr6:1/1/c20/1)
INTERFACE	1/1/c20/1
SWITCH UPLINK	
DEVICE	loc1-cr6
VLAN	2000
VLAN DESCRIPTION	
IP MTU	9000 - Jumbo
L3 DESCRIPTION	loc1-cr6---cust1 (as3152):l3edge-(ORCH-ID):conn-asite_~show:intercloud
L2 DESCRIPTION	loc1-cr6---cust1 (as3152):l3edge-(ORCH-ID):conn-asite_~show:na
LOCAL IPS	192.0.2.101/30
	2001:db8::1:0/127
BGP NEIGHBORS	192.0.2.102 AS3152 (CUST1)
	Orchestrator Subscriptions:

✓ SAVE CHANGES

🔄 RESET PAGE

Cannot delete Service Edge:

- Service Edge is in use by BGP Neighbors

👤 MIGRATE FUTURE DATA

✗ DELETE LEGACY NAME

---

CREATED  
4 hours ago by Unknown  
Jun 07 2022 11:11 AM

LAST MODIFIED  
15 minutes ago by Unknown  
Jun 07 2022 02:30 PM

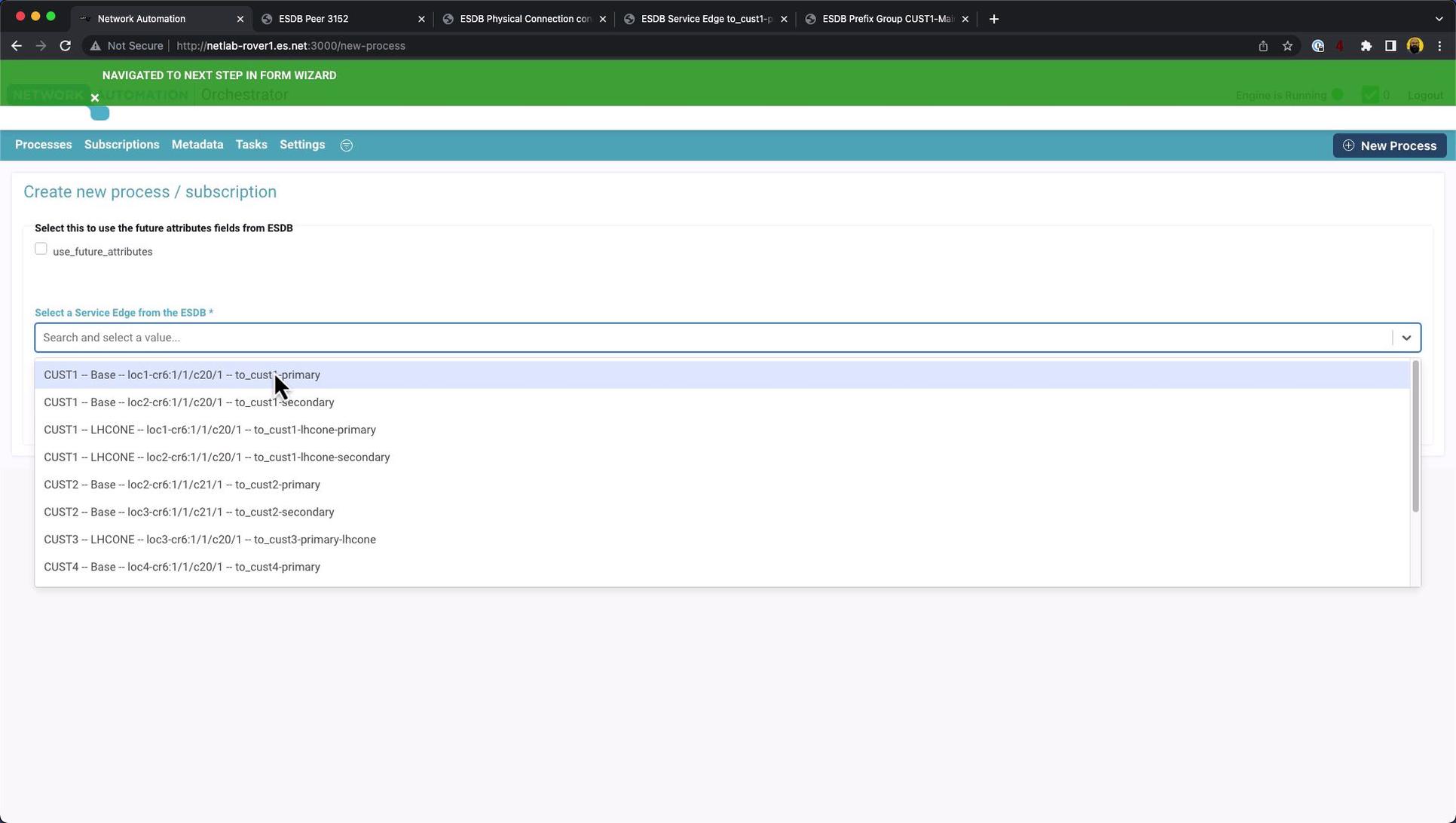
### Create new process / subscription

#### Choose Product

**Product**  
Search and select the product

[Cancel](#) [Next](#)





NAVIGATED TO NEXT STEP IN FORM WIZARD

NETWORK AUTOMATION | Orchestrator

Engine is Running ✔ 0. Logout

Processes Subscriptions Metadata Tasks Settings ⊖

+ New Process

## Create new process / subscription

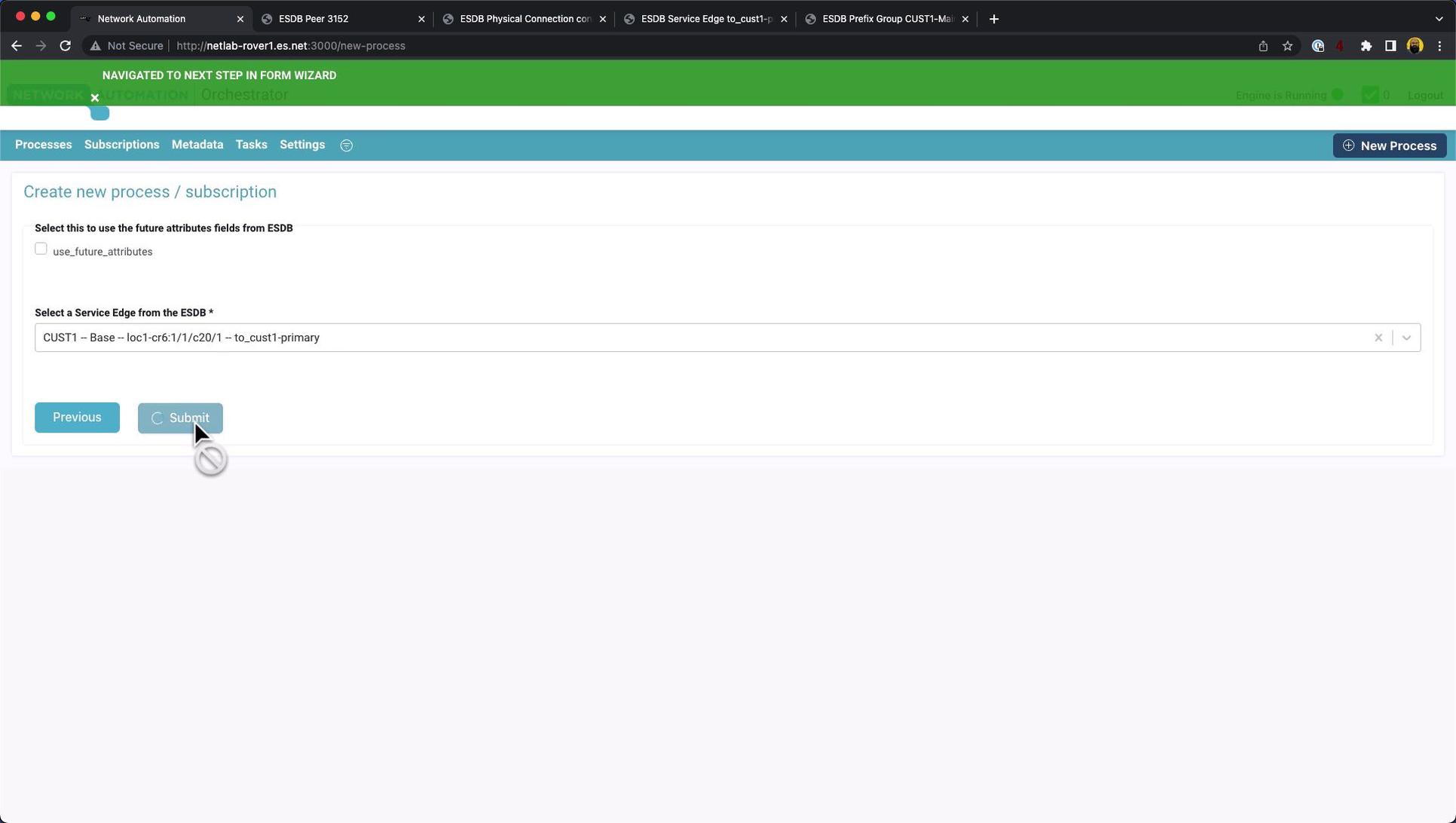
Select this to use the future attributes fields from ESDB

use\_future\_attributes

Select a Service Edge from the ESDB \*

Search and select a value...

- CUST1 - Base -- loc1-cr6:1/1/c20/1 -- to\_cust1-primary
- CUST1 - Base -- loc2-cr6:1/1/c20/1 -- to\_cust1-secondary
- CUST1 - LHCONE -- loc1-cr6:1/1/c20/1 -- to\_cust1-lhcone-primary
- CUST1 - LHCONE -- loc2-cr6:1/1/c20/1 -- to\_cust1-lhcone-secondary
- CUST2 - Base -- loc2-cr6:1/1/c21/1 -- to\_cust2-primary
- CUST2 - Base -- loc3-cr6:1/1/c21/1 -- to\_cust2-secondary
- CUST3 - LHCONE -- loc3-cr6:1/1/c20/1 -- to\_cust3-primary-lhcone
- CUST4 - Base -- loc4-cr6:1/1/c20/1 -- to\_cust4-primary



NAVIGATED TO NEXT STEP IN FORM WIZARD

Network Automation > Orchestrator

Engine is Running ✔ 0. Logout

Processes Subscriptions Metadata Tasks Settings

New Process

### Create new process / subscription

Select this to use the future attributes fields from ESDB

use\_future\_attributes

Select a Service Edge from the ESDB \*

CUST1 - Base - loc1-cr6:1/1/c20/1 - to\_cust1-primary

Previous

Submit



```
ssh clab-ipt-loc1-cr6 /Users/chrisummings (ssh -W [netlab-rover1.es.net]:22 lbln-gw.es.net)
A:loc1-cr6# show router interface

=====
Interface Table (Router: Base)
=====
Interface-Name      Adm    Opr(v4/v6)  Mode   Port/SapId
IP-Address          PfxState
-----
loc2-bb-a           Up     Up/Up       Network 1/1/c2/1:6
134.55.56.124/31    n/a
2001:400:0:63e::/127  PREFERRED
fe80::5054:ff:fe3b:cd02/64  PREFERRED
system             Up     Up/Up       Network system
134.55.200.10/32    n/a
2001:400:0:40::200:10/128  PREFERRED
-----
Interfaces : 2
=====
A:loc1-cr6#
```

```
ssh netlab-rover1.es.net *sudo ip netns exec clab-ipt-loc1-cr6 topdump -U -nli eth20 -w -* | wireshark -k -i - /Users/chrisummings (ssh -W [netlab-rover1.es.net]:22 lbln-gw.es.net)
--{ running }--[ ]--
A:cust1-edge1#

Current mode: running
admin (5) Tue 07:36PM
```



```
ssh clab-ipt-loc1-cr6 /Users/chrisccummings (ssh -W [netlab-rover1.es.net]:22 lbln-gw.es.net)
=====
Interface Table (Router: Base)
=====
Interface-Name      Adm    Opr(v4/v6)  Mode  Port/SapId
IP-Address          PfxState
-----
loc2-bb-a           Up     Up/Up       Network 1/1/c2/1:6
134.55.56.124/31    n/a
2001:400:0:63e::/127  PREFERRED
fe80::5054:ff:fe3b:cd02/64  PREFERRED
system              Up     Up/Up       Network system
134.55.200.10/32    n/a
2001:400:0:40::200:10/128  PREFERRED
-----
Interfaces : 2
=====
A:loc1-cr6# show router interface
```

```
=====
Interface Table (Router: Base)
=====
Interface-Name      Adm    Opr(v4/v6)  Mode  Port/SapId
IP-Address          PfxState
-----
loc2-bb-a           Up     Up/Up       Network 1/1/c2/1:6
134.55.56.124/31    n/a
2001:400:0:63e::/127  PREFERRED
fe80::5054:ff:fe3b:cd02/64  PREFERRED
system              Up     Up/Up       Network system
134.55.200.10/32    n/a
2001:400:0:40::200:10/128  PREFERRED
lo-cust1-primary   Up     Up/Up       IES    1/1/c20/1:2000
192.0.2.101/30     n/a
2001:db8::1:0/127  TENTATIVE
fe80::5054:ff:fe49:ea00/64  PREFERRED
-----
Interfaces : 3
=====
A:loc1-cr6#
```

```
ssh netlab-rover1.es.net *sudo ip netns exec clab-ipt-loc1-cr6 topdump -U -nri eth20 -w -* | wireshark -k -i - /Users/chrisccummings (ssh -W [netlab-rover1.es.net]:22 lbln-gw.es.net)
--{ running }--[ ]--
A:cust1-edge1# Session ended due to idle timeout
--{ running }--[ ]--
A:cust1-edge1#
Connection to clab-ipt-cust1-edge1 closed.
[I] [chrisccummings@chrisccummings-mbp:~] [14:46:05]
->$ ssh clab-ipt-cust1-edge1
Warning: Permanently added 'clab-ipt-cust1-edge1' (ED25519) to the list of known hosts.
admin@clab-ipt-cust1-edge1's password:
Last login: Tue Jun  7 19:29:42 2022 from 2001:400:0:40::1
Using configuration file(s): 
Welcome to the srlinux CLI.
Type 'help' (and press <ENTER>) if you need any help using this.
--{ running }--[ ]--
A:cust1-edge1#
```

```

ssh clab-ipt-loc1-cr6 /Users/chrisccummings (ssh -W [netlab-rover1.es.net]:22 lbln-gw.es.net)
2001:db8::1:0/127          TENTATIVE
fe80::5054:ff:fe49:ea00/64  PREFERRED
-----
Interfaces : 3
=====
A:loc1-cr6# show router interface
=====
Interface Table (Router: Base)
=====
Interface-Name      Adm      Opr(v4/v6)  Mode   Port/SapId
IP-Address          PfxState
-----
loc2-bb-a           Up       Up/Up       Network 1/1/c2/1:6
134.55.56.124/31    n/a
2001:400:0:63e::/127  PREFERRED
fe80::5054:ff:fe3b:cd02/64  PREFERRED
system             Up       Up/Up       Network system
134.55.200.10/32    n/a
2001:400:0:40::200:10/128  PREFERRED
to_cust1-primary   Up       Up/Up       IES      1/1/c20/1:2000
192.0.2.101/30     n/a
2001:db8::1:0/127  PREFERRED
fe80::5054:ff:fe49:ea00/64  PREFERRED
-----
Interfaces : 3
=====
A:loc1-cr6# ping 192.0.2.102
PING 192.0.2.102 56 data bytes
64 bytes from 192.0.2.102: icmp_seq=1 ttl=64 time=16.7ms.
64 bytes from 192.0.2.102: icmp_seq=2 ttl=64 time=8.44ms.
64 bytes from 192.0.2.102: icmp_seq=3 ttl=64 time=8.21ms.
64 bytes from 192.0.2.102: icmp_seq=4 ttl=64 time=8.94ms.
64 bytes from 192.0.2.102: icmp_seq=5 ttl=64 time=5.54ms.

---- 192.0.2.102 PING Statistics ----
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min = 5.54ms, avg = 9.57ms, max = 16.7ms, stddev = 3.76ms
A:loc1-cr6#

```

```

ssh netlab-rover1.es.net *sudo ip netns exec clab-ipt-loc1-cr6 topdump -U -nni eth20 -w -* | wireshark -k -i - /Users/chrisccummings (ssh -W [netlab-rover1.es.net]:22 lbln-gw.es.net)
Net instance      : default
Interface         : ethernet-1/1.2000
Type              : routed
Oper state        : up
Ip mtu            : 9000
Prefix            Origin      Status
-----
192.0.2.102/30    static      preferred, primary
2001:db8::1:1/127  static      preferred, primary
fe80::18b0:ff:feff:0/64  link-layer  preferred
=====
Net instance      : default
Interface         : ethernet-1/2.1000
Type              : routed
Oper state        : up
Ip mtu            : 9000
Prefix            Origin      Status
-----
172.16.0.0/31     static      preferred, primary
2001:db8::/127    static      preferred, primary
fe80::18b0:ff:feff:1/64  link-layer  preferred
=====
Net instance      : default
Interface         : lo1.0
Oper state        : up
Prefix            Origin      Status
-----
131.225.0.1/16    static      preferred, primary
192.190.216.1/22   static      preferred
198.49.208.1/24    static      preferred
198.124.68.1/22    static      preferred
198.124.212.1/23   static      preferred
198.151.133.1/24   static      preferred
2001:400:2410::1/48  static      preferred, primary
2620:6a::1/48      static      preferred
=====
--[ running ]--[ ]--
A:cust1-edge1#
Current mode: running
admin (6) Tue 07:46PM

```

HOME > SERVICES >

# CUST1-Main-v6

## General Information

LABEL	Main
SERVICE TYPE	IPv6 Internet Transi
ROUTING INSTANCE	Base
CUSTOMER	CUST1 - CUST1
PEER	AS3152 - CUST1
DESCRIPTION	
STATIC ROUTING	<input type="checkbox"/> CHECK THIS BOX IF THE SERVICE IS STATIC ROUTED

## Orchestration Subscriptions for this Service

ORCHESTRATOR IDS

## Service Edges

SERVICE EDGES	<a href="#">loc2-cr6:to_cust1-secondary v4,v6</a>
	<a href="#">loc1-cr6:to_cust1-primary v4,v6</a>

## Prefixes

PREFIXES	<a href="#">2001:400:2410::/48</a>
	<a href="#">2620:6a::/48</a>

-  [SAVE CHANGES](#)
-  [RESET PAGE](#)
-  [DELETE](#)

CREATED  
4 hours ago by Unknown  
Jun 07 2022 11:12 AM

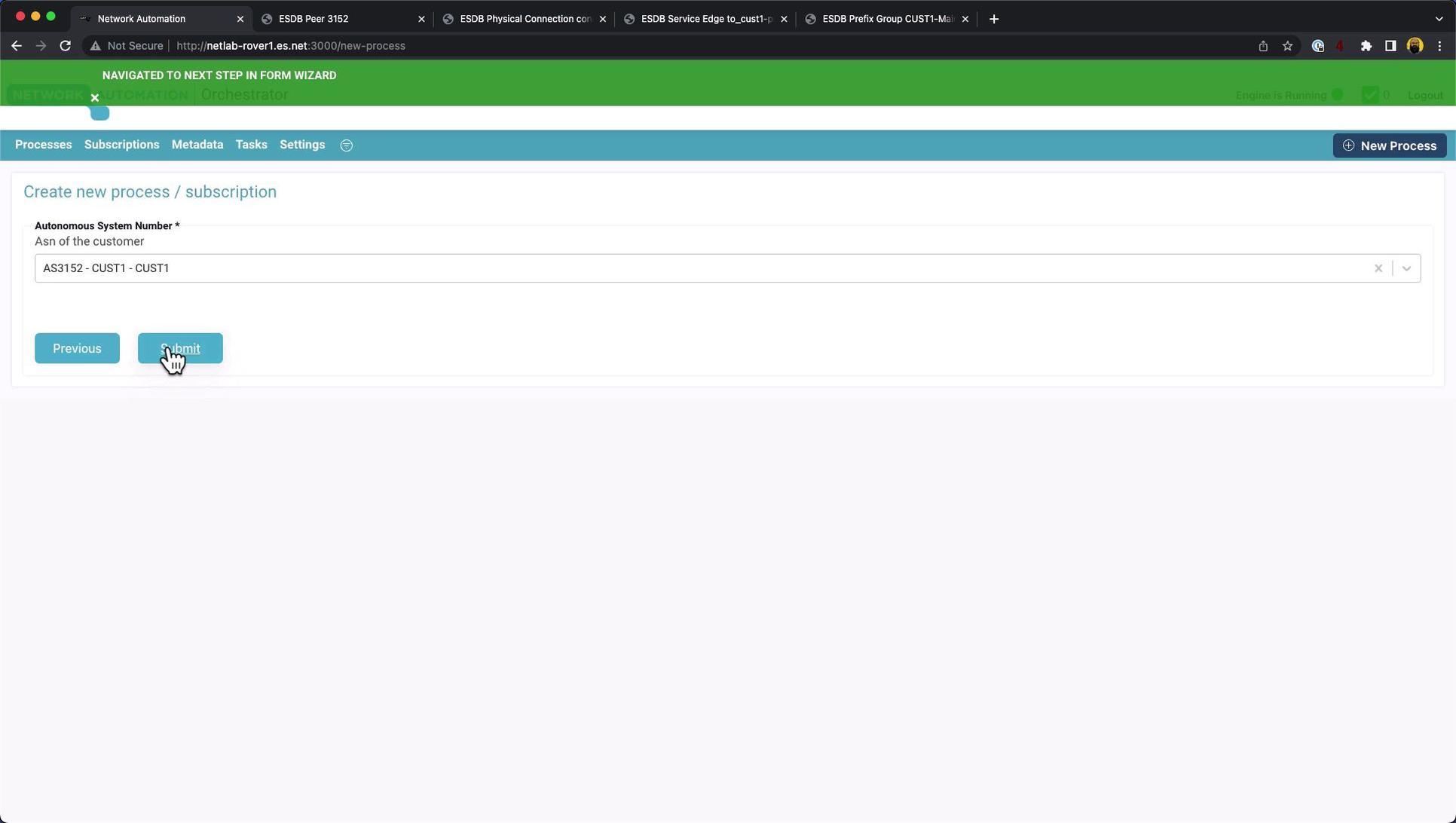
### Create new process / subscription

#### Choose Product

**Product**  
Search and select the product

Cancel Next





NAVIGATED TO NEXT STEP IN FORM WIZARD

Network Automation | Orchestrator

Engine is Running ● 0. Logout

Processes Subscriptions Metadata Tasks Settings

+ New Process

## Create new process / subscription

**Autonomous System Number \***

Asn of the customer

AS3152 - CUST1 - CUST1

Previous

Submit

### Create new process / subscription

Select the route table \*

Select nodes automatically

[Previous](#)

[Submit](#)



```
ssh netlab-rover1.es.net *sudo ip netns exec clab-ipt-loc1-cr6 topdump -U -nni eth20 -w -* | wireshark -k -i - /Users/chrisccummings (ssh -W [netlab-rover1.es.net]:22 lbln-gw.es.net)
ssh clab-ipt-loc1-cr6 /Users/chrisccummings (ssh -W [netlab-rover1.es.net]:22 lbln-gw.es.net)
A:loc1-cr6# admin display-config | match l3p-base-v6-3152 context all
A:loc1-cr6#
```

```
ssh netlab-rover1.es.net *sudo ip netns exec clab-ipt-loc1-cr6 topdump -U -nni eth20 -w -* | wireshark -k -i - /Users/chrisccummings (ssh -W [netlab-rover1.es.net]:22 lbln-gw.es.net)
ssh clab-ipt-cust1-edge1 /Users/chrisccummings (ssh -W [netlab-rover1.es.net]:22 lbln-gw.es.net)
Net instance      : default
Interface         : ethernet-1/1.2000
Type              : routed
Oper state        : up
Ip mtu            : 9000
Prefix            Origin                               Status
=====
192.0.2.102/30    static                                                  preferred, primary
2001:db8::1:1/127 static                                                  preferred, primary
fe80::18b0:ff:feff:0/64 link-layer                                             preferred
=====
Net instance      : default
Interface         : ethernet-1/2.1000
Type              : routed
Oper state        : up
Ip mtu            : 9000
Prefix            Origin                               Status
=====
172.16.0.0/31     static                                                  preferred, primary
2001:db8::/127   static                                                  preferred, primary
fe80::18b0:ff:feff:1/64 link-layer                                             preferred
=====
Net instance      : default
Interface         : lo1.0
Oper state        : up
Prefix            Origin                               Status
=====
131.225.0.1/16   static                                                  preferred, primary
192.190.216.1/22 static                                                  preferred
198.49.208.1/24  static                                                  preferred
198.124.68.1/22 static                                                  preferred
198.124.212.1/23 static                                                  preferred
198.151.133.1/24 static                                                  preferred
2001:400:2410::1/48 static                                                  preferred, primary
2620:6a::1/48   static                                                  preferred
=====
--{ running }--[ ]--
A:cust1-edge1#
Current mode: running                               admin (6) Tue 07:46PM
```

```

A:loc1-cr6# admin display-config | match l3p-base-v6-3152 context all
A:loc1-cr6# admin display-config | match l3p-base-v6-3152 context all
#-----
router Base
  policy-options
    prefix-list "l3p-base-v6-3152"
      prefix 2001:400:2410::/48 through 60
      prefix 2620:6a::/48 through 60
#-----
  policy-options
    policy-statement "l3p-base-in-v6-cust1-3152"
      entry 10
        from
          prefix-list "l3p-base-v6-3152"
A:loc1-cr6#

```

```

Net instance : default
Interface    : ethernet-1/1.2000
Type         : routed
Oper state   : up
Ip mtu       : 9000

Prefix      Origin      Status
=====
192.0.2.102/30    static    preferred, primary
2001:db8::1:1/127  static    preferred, primary
fe80::18b0:ff:feff:0/64 link-layer preferred

Net instance : default
Interface    : ethernet-1/2.1000
Type         : routed
Oper state   : up
Ip mtu       : 9000

Prefix      Origin      Status
=====
172.16.0.0/31     static    preferred, primary
2001:db8::/127    static    preferred, primary
fe80::18b0:ff:feff:1/64 link-layer preferred

Net instance : default
Interface    : lo1.0
Oper state   : up

Prefix      Origin      Status
=====
131.225.0.1/16    static    preferred, primary
192.190.216.1/22  static    preferred
198.49.208.1/24   static    preferred
198.124.68.1/22   static    preferred
198.124.212.1/23  static    preferred
198.151.133.1/24  static    preferred
2001:400:2410::1/48 static    preferred, primary
2620:6a::1/48     static    preferred

--[ running ]--
A:cust1-edge1#
Current mode: running

```



ASN	3152
ORGANIZATION	CUST1 - CUST1
DIFFERENTIATOR	
ACL UID	1
PEER CONTACT	
NOC CONTACT	
JUSTIFICATION	Because of reasons
AS SET	
START DATE	
TERM DATE	
PEER STATUS	<b>Active</b>

CREATED  
4 hours ago by Unknown  
Jun 07 2022 11:11 AM

### Orchestration Subscriptions for this AS

ORCHESTRATOR IDS	16c655e-abf2-4dcc-9ac7-ef5fa5eb7342 Prefix List	AS3152 - CUST1 - CUST1 -- base
------------------	--	--------------------------------

### Services using this AS

SERVICES	CUST1-Main-LHCONEv6 IPv6 LHCONE L3VPN	Service Edges - <i>Orchestrator IDs</i> : <ul style="list-style-type: none"> <li>loc1-cr6:to_cust1-lhcone-primary</li> <li>loc2-cr6:to_cust1-lhcone-secondary</li> </ul> Static Routing: <i>No</i>
	CUST1-Main-LHCONEv4 IPv4 LHCONE L3VPN	Service Edges - <i>Orchestrator IDs</i> : <ul style="list-style-type: none"> <li>loc1-cr6:to_cust1-lhcone-primary</li> <li>loc2-cr6:to_cust1-lhcone-secondary</li> </ul> Static Routing: <i>No</i>
	CUST1-Main-v6 IPv6 Internet Transit	Service Edges - <i>Orchestrator IDs</i> : <ul style="list-style-type: none"> <li>loc2-cr6:to_cust1-secondary</li> <li>loc1-cr6:to_cust1-primary - b32b190f-3805-41d9-a278-77b841847208</li> </ul> Static Routing: <i>No</i>
	CUST1-Main-v4 IPv4 Internet Transit	Service Edges - <i>Orchestrator IDs</i> : <ul style="list-style-type: none"> <li>loc2-cr6:to_cust1-secondary</li> <li>loc1-cr6:to_cust1-primary - b32b190f-3805-41d9-a278-77b841847208</li> </ul> Static Routing: <i>No</i>

### Create new process / subscription

#### Choose Product

**Product**  
Search and select the product

[Cancel](#) [Next](#)

Network Automation | Orchestrator

Home is Running 0 Logout

Processes Subscriptions Metadata Tasks Settings ⊖ ⊕ New Process

### Create new process / subscription

#### Layer 3 Service

Select an existing service edge subscription in the Orchestrator \*

Search and select a value... ⌵

Service Edge CUST1 - Base - loc1-cr6:1/1/c20/1\_to\_cust1-primary

Select an existing prefix list subscription to be applied to this service edge \*

Search and select a value... ⌵

**Skip NSO Dry Run Approval? (Auto-approve)**

skip\_dry\_run\_approval

Previous Submit

### Create new process / subscription

#### Layer 3 Service

Select an existing service edge subscription in the Orchestrator \*

Select an existing prefix list subscription to be applied to this service edge \*

Skip NSO Dry Run Approval? (Auto-approve)

 skip\_dry\_run\_approval

```

Total FlowIPv6 Rem Rts : 0      Total FlowIPv6 Rem Act Rts : 0
Total Link State Rem Rts: 0     Total Link State Rem Act Rts: 0
Total SrPlcyIpv4 Rem Rts: 0     Total SrPlcyIpv4 Rem Act Rts: 0
Total SrPlcyIpv6 Rem Rts: 0     Total SrPlcyIpv6 Rem Act Rts: 0

```

BGP Summary

Legend : D - Dynamic Neighbor

Neighbor

Description

	AS	PktRcvd	InQ	Up/Down	State	Rcv/Act/Sent (Addr Family)
		PktSent	OutQ			
<b>134.55.200.20</b>						
<b>LOC2-CR6</b>						
	293	325	0	02h39m57s	0/0/0	(IPv4)
		333	0		0/0/0	(IPv6)
					0/0/0	(VpnIPv4)
					1/0/1	(MCastIPv4)
					0/0/0	(VpnIPv6)
<b>134.55.200.30</b>						
<b>LOC3-CR6</b>						
	293	0	0	03h34m40s	Connect	
		0	0			
<b>134.55.200.40</b>						
<b>LOC4-CR6</b>						
	293	0	0	03h34m40s	Connect	
		0	0			
<b>134.55.200.50</b>						
<b>LOC5-CR6</b>						
	293	0	0	03h34m40s	Active	
		0	0			
<b>134.55.210.194</b>						
	293	0	0	03h34m40s	Active	
		0	0			

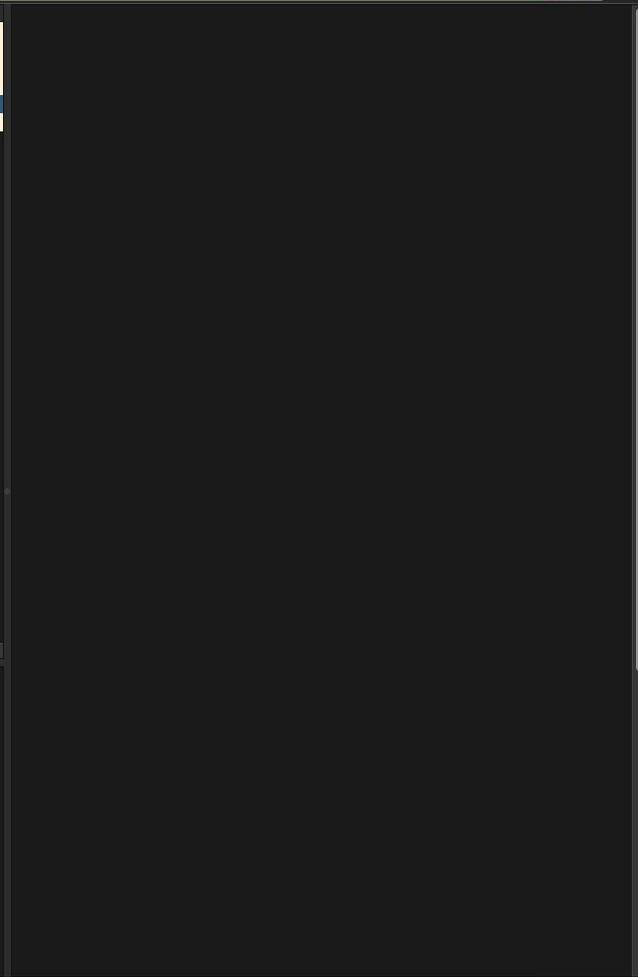
```

--{ running }--[ ]--
A:cust1-edge1#

```



No.	Time	Source	Destination	Protocol	Length	Info
289	629.259315	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
318	659.283424	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
337	689.315440	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
356	719.335331	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
375	749.363111	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
393	779.391006	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message



```

ssh clab-ipt-cust1-edge1 /Users/chrisummings (ssh -W [netlab-rover1.es.net]:22 lbln-gw.es.net)
Total FlowIPv6 Rem Rts : 0      Total FlowIPv6 Rem Act Rts : 0
Total Link State Rem Rts: 0     Total Link State Rem Act Rts: 0
Total SrPlcyIpv4 Rem Rts: 0     Total SrPlcyIpv4 Rem Act Rts: 0
Total SrPlcyIpv6 Rem Rts: 0     Total SrPlcyIpv6 Rem Act Rts: 0

=====
BGP Summary
=====
Legend : D - Dynamic Neighbor
=====
Neighbor
Description
      AS PktRcvd InQ  Up/Down  State|Rcv/Act/Sent (Addr Family)
      PktSent OutQ
-----
134.55.200.20
LOC2-CR6
      293      325    0 02h39m57s  0/0/0 (IPv4)
      333      0      0/0/0 (IPv6)
      0/0/0 (VpnIPv4)
      1/0/1 (MCastIPv4)
      0/0/0 (VpnIPv6)

134.55.200.30
LOC3-CR6
      293      0      0 03h34m40s Connect
      0      0

134.55.200.40
LOC4-CR6
      293      0      0 03h34m40s Connect
      0      0

134.55.200.50
LOC5-CR6
      293      0      0 03h34m40s Active
      0      0

134.55.210.194
      293      0      0 03h34m40s Active
      0      0
-----
A:loc1-cr6#

```

```

ssh netlab-rover1.es.net *sudo ip netns exec clab-ipt-loc1-cr6 topdump -U -nni eth20 -w -* | wireshark -k -i - /Users/chrisummings (ssh -W [netlab-rover1.es.net]:22 lbln-gw.es.net)
--{ running }--[ ]--
A:cust1-edge1# show network-instance default protocols bgp neighbor
-----
BGP neighbor summary for network-instance "default"
Flags: S static, D dynamic, L discovered by LLDP, B BFD enabled, - disabled, * slow
-----
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Net-  | Peer  | Group | Flags | Peer- | State | Uptime | AFI/SA | [Rx/Ac |
| Inst  |       |       |       | AS    |       |        | FI     | tive/T |
|       |       |       |       |       |       |        |        | x]     |
+-----+-----+-----+-----+-----+-----+-----+-----+
| defaul| 192.0.| ebgp-v| S     | 293   | connec| -      |        |         |
| t     | 2.101 | 4     |      |       | t     |        |        |         |
| defaul| 2001:d| ebgp-v| S     | 293   | active| -      |        |         |
| t     | b8::1:| 6     |      |       |       |        |        |         |
|       | 0     |       |      |       |       |        |        |         |
+-----+-----+-----+-----+-----+-----+-----+
Summary:
2 configured neighbors, 0 configured sessions are established, 0 disabled peers
0 dynamic peers
--{ running }--[ ]--
A:cust1-edge1#
-----
Current mode: running
admin (6) Tue 07:49PM

```



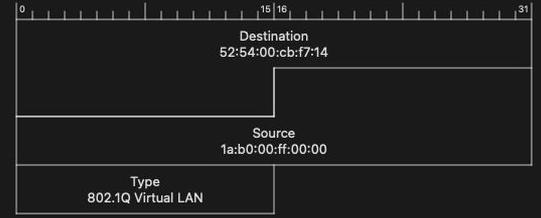
No.	Time	Source	Destination	Protocol	Length	Info
289	629.259315	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
318	659.283424	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
337	689.315440	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
356	719.335331	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
375	749.363111	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
393	779.391006	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
409	809.415415	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
433	836.871681	192.0.2.102	192.0.2.101	BGP	125	OPEN Message
434	836.874204	192.0.2.101	192.0.2.102	BGP	119	OPEN Message
436	836.876782	192.0.2.101	192.0.2.102	BGP	89	KEEPALIVE Message
438	836.879794	192.0.2.102	192.0.2.101	BGP	89	KEEPALIVE Message
440	836.881435	192.0.2.101	192.0.2.102	BGP	89	KEEPALIVE Message
450	837.605478	2001:db8::1:0	2001:db8::1:1	BGP	139	OPEN Message
452	837.611927	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
454	837.613529	2001:db8::1:0	2001:db8::1:1	BGP	109	KEEPALIVE Message
456	837.621843	2001:db8::1:1	2001:db8::1:0	BGP	109	KEEPALIVE Message
458	837.623362	2001:db8::1:0	2001:db8::1:1	BGP	109	KEEPALIVE Message

```

> Frame 289: 145 bytes on wire (1160 bits), 145 bytes captured (1160 bits) on interface -, id 0
> Ethernet II, Src: 1a:b0:00:ff:00:00 (1a:b0:00:ff:00:00), Dst: RealtekU_cb:f7:14 (52:54:00:cb:f7:14)
> 802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 2000
> Internet Protocol Version 6, Src: 2001:db8::1:1, Dst: 2001:db8::1:0
> Transmission Control Protocol, Src Port: 34009, Dst Port: 179, Seq: 1, Ack: 1, Len: 55
> Border Gateway Protocol - OPEN Message

```

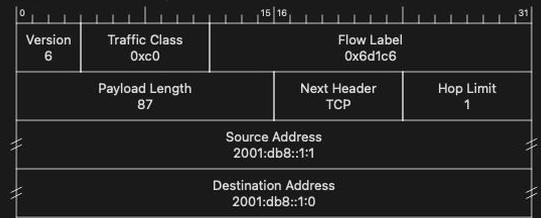
### Ethernet



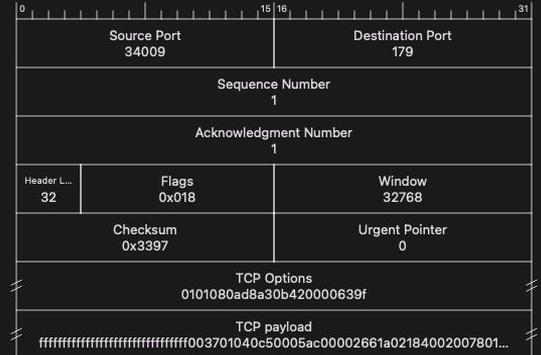
### 802.1Q Virtual LAN



### Internet Protocol Version 6



### Transmission Control Protocol



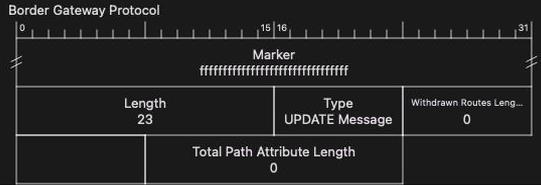
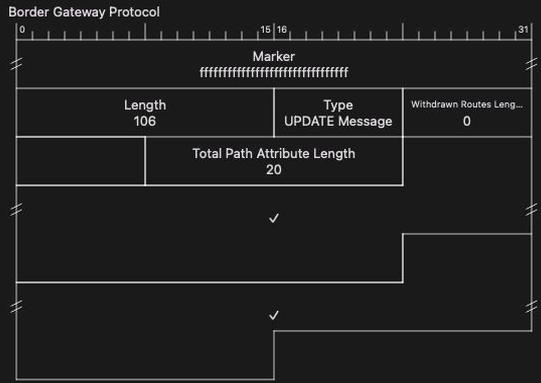


No.	Time	Source	Destination	Protocol	Length	Info
289	629.259315	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
318	659.283424	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
337	689.315440	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
356	719.335331	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
375	749.363111	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
393	779.391006	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
409	809.415415	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
433	836.871681	192.0.2.102	192.0.2.101	BGP	125	OPEN Message
434	836.874204	192.0.2.101	192.0.2.102	BGP	119	OPEN Message
436	836.876782	192.0.2.101	192.0.2.102	BGP	89	KEEPALIVE Message
438	836.879794	192.0.2.102	192.0.2.101	BGP	89	KEEPALIVE Message
440	836.881435	192.0.2.101	192.0.2.102	BGP	89	KEEPALIVE Message
450	837.605478	2001:db8::1:0	2001:db8::1:1	BGP	139	OPEN Message
452	837.611927	2001:db8::1:1	2001:db8::1:0	BGP	145	OPEN Message
454	837.613529	2001:db8::1:1	2001:db8::1:1	BGP	109	KEEPALIVE Message
456	837.621843	2001:db8::1:1	2001:db8::1:0	BGP	109	KEEPALIVE Message
458	837.623362	2001:db8::1:1	2001:db8::1:1	BGP	109	KEEPALIVE Message
462	841.426799	192.0.2.102	192.0.2.101	BGP	199	UPDATE Message, UPDATE Message
465	842.423607	2001:db8::1:1	2001:db8::1:0	BGP	263	UPDATE Message, UPDATE Message
477	864.240312	192.0.2.101	192.0.2.102	BGP	162	UPDATE Message, UPDATE Message
479	865.237053	2001:db8::1:0	2001:db8::1:1	BGP	276	UPDATE Message, UPDATE Message, UPDAT
481	865.243128	192.0.2.102	192.0.2.101	BGP	89	KEEPALIVE Message

Source Port 37079		Destination Port 179	
Sequence Number 75			
Acknowledgment Number 88			
Header Len 32	Flags 0x018	Window 32681	
Checksum 0x7699		Urgent Pointer 0	
TCP Options 0101080affb2f63b0000653e			
TCP payload ffffffffffffffffffffffff006a0200000144001010040020602010000c50...			

```

Marker: ffffffffffffffffffffffffffffffff
Length: 106
Type: UPDATE Message (2)
Withdrawn Routes Length: 0
Total Path Attribute Length: 20
Path attributes
  Path Attribute - ORIGIN: IGP
  Path Attribute - AS_PATH: 3152
  Path Attribute - NEXT_HOP: 192.0.2.102
    Flags: 0x40, Transitive, Well-known, Complete
    Type Code: NEXT_HOP (3)
    Length: 4
    Next hop: 192.0.2.102
  Network Layer Reachability Information (NLRI)
Border Gateway Protocol - UPDATE Message
Marker: ffffffffffffffffffffffffffffffff
Length: 23
  
```



```

ssh clab-ipt-loc1-cr6 /Users/chrisummings (ssh -W [netlab-rover1.es.net]:22 lbln-gw.es.net)
Legend : D - Dynamic Neighbor
=====
Neighbor
Description
AS PktRcvd InQ Up/Down StaterRcv/Act/Sent (Addr Family)
PktSent OutQ
-----
134.55.200.20
LOC2-CR6
293 329 0 02h41m41s 0/0/7 (IPv4)
343 0 0/0/3 (IPv6)
0/0/0 (VpnIPv4)
1/0/2 (MCastIPv4)
0/0/0 (VpnIPv6)
134.55.200.30
LOC3-CR6
293 0 0 03h36m24s Connect
0 0
134.55.200.40
LOC4-CR6
293 0 0 03h36m24s Connect
0 0
134.55.200.50
LOC5-CR6
293 0 0 03h36m24s Connect
0 0
134.55.210.194
293 0 0 03h36m24s Active
0 0
192.0.2.102
cust1 : to_cust1-primary
3152 5 0 00h00m36s 14/6/4 (IPv4)
7 0
2001:db8::1:1
cust1 : to_cust1-primary
3152 5 0 00h00m35s 6/2/2 (IPv6)
7 0
-----
A:loc1-cr6#

```

```

ssh netlab-rover1.es.net *sudo ip netns exec clab-ipt-loc1-cr6 topdump -U -nri eth20 -w -* | wireshark -k -i - /Users/chrisummings (ssh -W [netlab-rover1.es.net]:22 lbln-gw.es.net)
--{ running }--[ ]--
A:cust1-edge1# show network-instance default protocols bgp neighbor
-----
BGP neighbor summary for network-instance "default"
Flags: S static, D dynamic, L discovered by LLDP, B BFD enabled, - disabled, * slow
-----
+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Net- | Peer | Group | Flags | Peer- | State | Uptime | AFI/SA | [Rx/Ac |
| Inst | AS | | | AS | | | FI | tive/T |
| | | | | | | | | x] |
+-----+-----+-----+-----+-----+-----+-----+-----+
| defaul | 192.0. | ebgp-v | S | 293 | connec | - | | |
| t | 2.101 | 4 | | | t | | | |
| defaul | 2001:d | ebgp-v | S | 293 | active | - | | |
| t | b8::1: | 6 | | | | | | |
| | 0 | | | | | | | |
+-----+-----+-----+-----+-----+-----+-----+-----+
Summary:
2 configured neighbors, 0 configured sessions are established,0 disabled peers
0 dynamic peers
--{ running }--[ ]--
A:cust1-edge1#

```

```

ssh clab-ipt-cust1-edge1 /Users/chrisccummings (ssh -W [netlab-rover1.es.net]:22 lbln-gw.es.net)
Legend : D - Dynamic Neighbor
=====
Neighbor
Description
AS PktRcvd InQ Up/Down StaterRcv/Act/Sent (Addr Family)
PktSent OutQ
-----
134.55.200.20
LOC2-CR6
293 329 0 02h41m41s 0/0/7 (IPv4)
343 0 0/0/3 (IPv6)
0/0/0 (VpnIPv4)
1/0/2 (MCastIPv4)
0/0/0 (VpnIPv6)
134.55.200.30
LOC3-CR6
293 0 0 03h36m24s Connect
0 0
134.55.200.40
LOC4-CR6
293 0 0 03h36m24s Connect
0 0
134.55.200.50
LOC5-CR6
293 0 0 03h36m24s Connect
0 0
134.55.210.194
293 0 0 03h36m24s Active
0 0
192.0.2.102
cust1 : to_cust1-primary
3152 5 0 00h00m36s 14/6/4 (IPv4)
7 0
2001:db8::1:1
cust1 : to_cust1-primary
3152 5 0 00h00m35s 6/2/2 (IPv6)
7 0
-----
A:loc1-cr6#

```

```

ssh netlab-rover1.es.net *sudo ip netns exec clab-ipt-cr6 topdump -U -nri eth20 -w -* | wireshark -k -i - /Users/chrisccummings (ssh -W [netlab-rover1.es.net]:22 lbln-gw.es.net)
--{ running }--[ ]--
A:cust1-edge1# show network-instance default protocols bgp neighbor
-----
BGP neighbor summary for network-instance "default"
Flags: S static, D dynamic, L discovered by LLDP, B BFD enabled, - disabled, * slow
-----
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Net- | Peer | Group | Flags | Peer- | State | Uptime | AFI/SA | [Rx/Ac |
| Inst | AS   |       |       | AS    |       |         | FI     | tive/T |
|      |     |     |     |      |     |       |       | x]     |
+-----+-----+-----+-----+-----+-----+-----+-----+
| defaul | 192.0. | ebgp-v | S     | 293   | establ | 0d:0h: | ipv4-u | [4/0/1 |
| t      | 2.101 | 4      |      |      | ished  | 0m:43s | nicast | 4]     |
| defaul | 2001:d | ebgp-v | S     | 293   | establ | 0d:0h: | ipv6-u | [2/0/6 |
| t      | b8::1: | 6      |      |      | ished  | 0m:42s | nicast | ]     |
|      | 0     |       |     |      |       |       |       |       |
+-----+-----+-----+-----+-----+-----+-----+-----+
Summary:
2 configured neighbors, 2 configured sessions are established,0 disabled peers
0 dynamic peers
--{ running }--[ ]--
A:cust1-edge1#
Current mode: running
admin (6) Tue 07:51PM

```

# Questions?