FlexPod with Cisco AI POD: Infrastructure for AI Training and Fine-Tuning Deployment Guide

Manual Configuration for FlexPod with Cisco AI POD: Infrastructure for AI Training and Fine-Tuning

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About the Cisco Validated Design Program

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Executive Summary

Cisco AI PODs are modular, pre-validated infrastructure solutions designed to accelerate the entire AI lifecycle, including training, fine-tuning, and high-throughput inferencing. They leverage Cisco UCS compute, Cisco Nexus networking, advanced GPUs, and integrated software such as NVIDIA AI Enterprise and RedHat OpenShift to deliver scalable, secure, and efficient AI infrastructure suitable for both data center and edge deployments. These PODs simplify AI adoption by providing centralized management through Cisco Intersight and Nexus Dashboard, enabling rapid deployment, automation, and operational visibility. Supporting diverse AI workloads like large language models, generative AI, and real-time analytics, Cisco AI PODs offer flexible configurations tailored to various business needs and cost models. Backed by Cisco Validated Designs and partner storage options, they ensure reliability, performance, and seamless integration within existing IT environments, helping organizations innovate and scale AI with confidence and reduced complexity.

Combining Cisco AI PODs with FlexPod Datacenter creates a powerful, scalable, and validated infrastructure solution optimized for AI and machine learning workloads. FlexPod Datacenter provides a converged architecture integrating Cisco UCS servers, Cisco Nexus switches, and NetApp storage, designed for high availability and flexibility. When integrated with Cisco AI PODs, which include advanced GPU capabilities and AI-optimized compute resources, the combined solution supports accelerated AI lifecycle processes such as training, inferencing, and model deployment. This integration leverages Cisco UCS servers, NVIDIA GPUs, and software platforms like NVIDIA Base Command Manager and Red Hat OpenShift to deliver a unified environment that simplifies AI infrastructure management through Cisco Intersight. The solution offers high-speed networking, persistent storage, and automation playbooks to reduce deployment time and operational complexity, enabling enterprises to scale AI workloads efficiently while maintaining security and operational visibility. This combined approach supports diverse AI use cases, including generative AI and MLOps, with validated designs that minimize risk and maximize performance in enterprise data centers.

For information about the FlexPod design and deployment details, including the configuration of various elements of design and associated best practices, refer to Cisco Validated Designs for FlexPod, here: https://www.cisco.com/c/en/us/solutions/design-zone/data-center-design-guides/flexpod-design-guides.html.

Solution Overview

This chapter contains the following:

Introduction

Cisco AI PODs integrated with FlexPod Datacenter offer a comprehensive, scalable infrastructure designed to accelerate AI and machine learning workloads. This solution combines the converged architecture of FlexPod Datacenter—which includes Cisco UCS servers, Cisco Nexus switches, and NetApp storage—with the advanced GPU-accelerated compute capabilities of Cisco AI PODs. Together, they provide a validated, high-performance platform optimized for AI lifecycle tasks such as training, inferencing, and deployment. Leveraging technologies like Cisco UCS X-Series modular systems, NVIDIA GPUs, and software platforms including Red Hat OpenShift and NVIDIA Base Command Manager, this integrated environment simplifies AI infrastructure management through Cisco Intersight. The combined solution delivers high-speed networking, persistent storage, and automation to reduce complexity and enable enterprises to efficiently scale AI workloads with security and operational visibility.

Audience

The intended audience of this document includes but is not limited to IT architects, sales engineers, field consultants, professional services, IT managers, partner engineering, and customers who want to take advantage of an infrastructure built to deliver IT efficiency and enable IT innovation.

Purpose of this document

This document provides deployment guidance around setting up Cisco AI PODs with Cisco UCS C885A M8 servers along with FlexPod Datacenter for AI training and fine-tuning use cases. This configuration is built as a tenant on top of FlexPod Base and assumes FlexPod Base has already been configured. This document introduces various design elements and explains various considerations and best practices for successful deployment.

New in this release

The following design elements distinguish this version of FlexPod from previous models:

- Configuration of AI PODs with NetApp Storage first with NVIDIA Base Command Manager and running sample training workloads.
- Adding the Cisco UCS C885A M8 nodes to an existing OpenShift cluster and setting up the East-West or backend networking.

Deployment Hardware and Software

This chapter contains the following:

- Design Requirements
- NetApp ONTAP Design
- Physical Topology
- Software Revisions
- FlexPod Cabling

Design Requirements

The FlexPod Datacenter with Cisco UCS and Cisco Intersight meets the following general design requirements:

- Resilient design across all layers of the infrastructure with no single point of failure
- Scalable design with the flexibility to add compute capacity, storage, or network bandwidth as needed
- Modular design that can be replicated to expand and grow as the needs of the business grow
- Flexible design that can support different models of various components with ease
- Simplified design with the ability to integrate and automate with external automation tools
- Cloud-enabled design which can be configured, managed, and orchestrated from the cloud using GUI or APIs

To deliver a solution which meets all these design requirements, various solution components are connected and configured as explained in the following sections.

NetApp ONTAP Design

For the AI POD networking and server design, please refer to the Cisco AI POD for Enterprise Training and Fine-Tuning Design Guide - Cisco. Only the NetApp ONTAP Design is listed in this document.

The storage system and design is a critical component of the AI training and fine-tuning infrastructure. AI workloads require high-performance, scalability, and secure access to storage to read large training datasets and to write model checkpoints, logging, and other artifacts during the training process. A key storage requirement is for very high-throughput sequential reads, as massive datasets may need to be loaded into GPU memory at the beginning of each training epoch.

The NetApp AFF A90 storage system is a 4RU chassis containing 2 controllers that operate as high availability partners (HA Pair) for each other, with up to 48 2.5-inch form-factor solid state disks (SSD). Each controller is connected to a separate pair of Cisco Nexus 9332D-GX2B leaf switches (frontend fabric) using two 100GE connectivity providing general NFS v3 and v4 services, and as well as S3 access to shared filesystems if desired. To enable high performance and scalability, the storage controllers form a storage cluster that enables the entire performance and capacity of the cluster nodes to be combined into a single namespace called a FlexGroup with data distributed across the disks of each node in the cluster.

The storage cluster also supports NFS v4.1 with Parallel NFS (pNFS) that enables clients to establish connections directly to every controller in the cluster. Additionally, session trunking combines the performance from multiple physical interfaces into a single session, enabling even single-threaded workloads to access more network bandwidth than is possible with traditional ethernet bonding. Combining all these features with RDMA enables the AFF A90 storage system to deliver low latency and high throughput that scales linearly for workloads leveraging NVIDIA GPUDirect Storage. The NVIDIA Enterprise Reference Architecture (ERA) provides the guidance to do the scaling of AFF A90 storage nodes along with Cisco C series GPU nodes

Physical Topology

The AI PODs with FlexPod Datacenter with Red Hat OpenShift on Bare Metal infrastructure configuration is shown here. The AI PODs with FlexPod Datacenter with NVIDIA Base Command Manager

- Cisco UCS C885A M8 servers each with 8 NVIDIA H200 GPUs
- Cisco UCS X9508 Chassis with eight Cisco UCS X210c Compute Nodes for OpenShift cluster nodes and supporting services
- Cisco UCS X-Series Direct Fabric Interconnects 9108 to support 100GbE connectivity from various components
- High-speed Cisco NX-OS-based Nexus 9332D-GX2B and 9364D-GX2A switching design to support 100GE and 400GE connectivity
- NetApp AFF A90 storage controllers 100/200G Ethernet

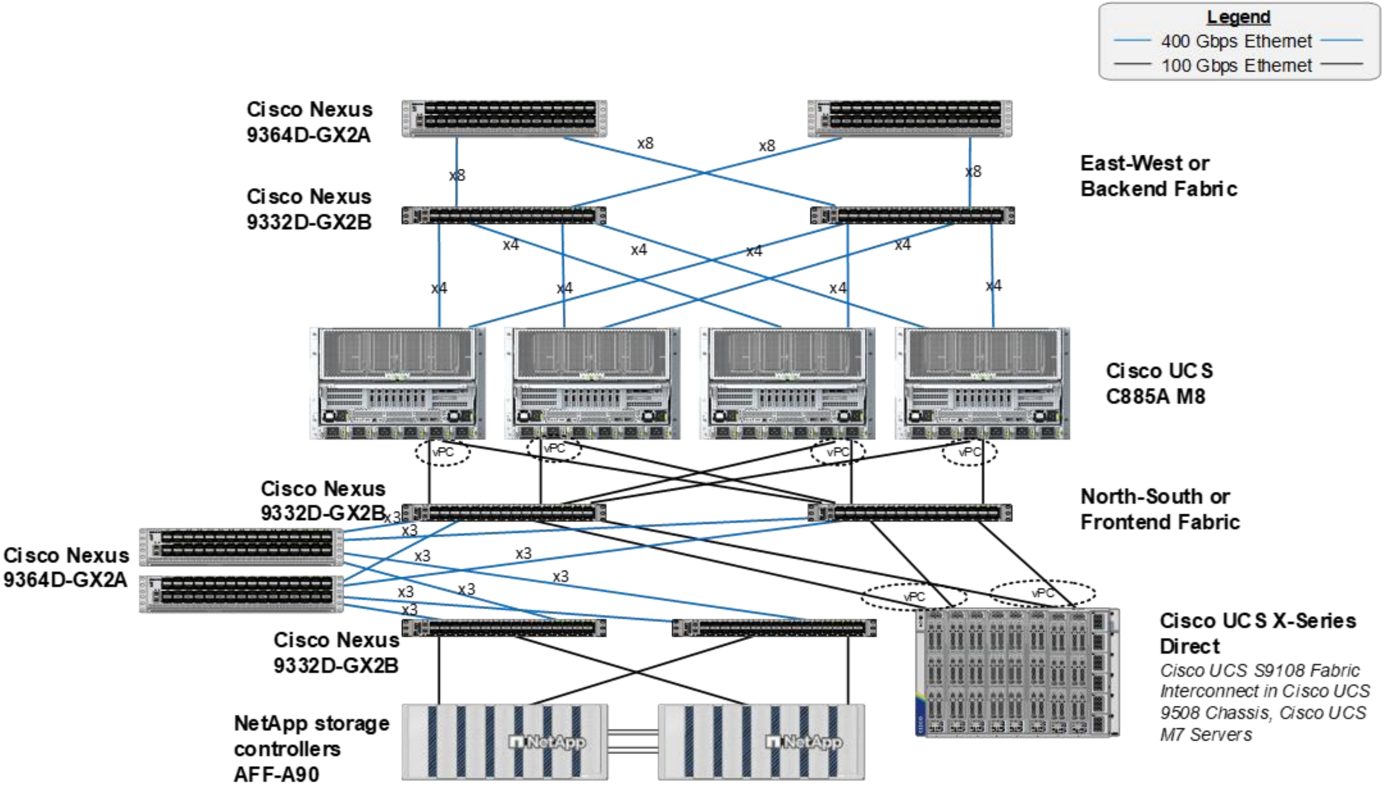
The software components of this solution consist of:

- Cisco Intersight to deploy, maintain, monitor and support the Cisco UCS server components
- Cisco Nexus Dashboard to deploy, maintain, and support the Cisco Nexus Switching Fabrics
- NVIDIA Base Command Manager to orchestrate training workloads on Ubuntu
- Red Hat OpenShift which provides a platform for both containers and VMs

FlexPod Datacenter with AI PODs Topology

Figure 1 shows various hardware components and the network connections for this IP-based FlexPod design.

Figure 1. FlexPod Datacenter with AI PODs Physical Topology


Legend
400 Gbps Ethernet
100 Gbps Ethernet
Cisco Nexus 9364D-GX2A
Cisco Nexus 9332D-GX2B
x8
x4
East-West or Backend Fabric
Cisco UCS C885A M8
vPC
Cisco Nexus 9332D-GX2B
North-South or Frontend Fabric
Cisco Nexus 9364D-GX2A
x3
Cisco Nexus 9332D-GX2B
Cisco UCS X-Series Direct
Cisco UCS S9108 Fabric Interconnect in Cisco UCS 9508 Chassis, Cisco UCS M7 Servers
NetApp storage controllers AFF-A90
NetApp

The reference hardware configuration includes:

- A scalable East-West or Backend fully non-blocking Spine Leaf fabric consisting of Cisco Nexus 9332D-GX2B leafs and Nexus 9364D-GX2A spines.
- 4 or more Cisco UCS C885A M8 servers, each with 8 NVIDIA H200 SXM GPUs.
- A scalable North-South or Frontend Spine Leaf fabric consisting of Cisco Nexus 9332D-GX2B leafs and Nexus 9364D-GX2A spines. This fabric has dedicated storage and compute leaf pairs.
- Two Cisco UCS Fabric Interconnects 9108 100G (FIs) in the chassis provide the chassis connectivity. At least two 100 Gigabit Ethernet ports from each FI, configured as a Port-Channel, are connected to each Nexus 9332D-GX2B switch in the North-South or Frontend Spine Leaf fabric. 25 Gigabit Ethernet connectivity is also supported as well as other versions of the Cisco UCS FI that would be used with Intelligent Fabric Modules (IFMs) in the chassis.
- One Cisco UCS X9508 Chassis contains up to 8 Cisco UCS X210c servers for OpenShift cluster nodes and supporting services nodes for services such as DNS/DHCP or configuration VMs.
- One NetApp AFF A90 HA pair connects to the Cisco Nexus 9332D-GX2B Switches using two 100 GE ports from each controller configured as individual links. 200GE connectivity is also supported when NVIDIA ConnectX-7 cards in the NetApp storage controllers are used.

Note: Only identically configured Cisco UCS C885A M8 servers should be added to an OpenShift cluster. Adding servers with different port configurations, such as Cisco UCS C-Series servers with only one ConnectX-7 will cause issues with Nic Cluster Policy in the NVIDIA Network Operator.

VLAN Configuration

Table 1 lists VLANs configured for setting up the FlexPod environment along with their usage.

Table 1. VLAN Usage

VLAN ID	Name	Usage	IP Subnet used in this deployment
2*	Native-VLAN	Use VLAN 2 as native VLAN instead of default VLAN (1)	
550*	OOB-MGMT-VLAN	Out-of-band management VLAN to connect management ports for various devices	10.115.90.0/26; GW: 10.115.90.1
703	OCP/Ubuntu-BareMetal-MGMT	Routable VLAN used for Ubuntu management and OpenShift cluster and node management	10.115.90.64/26; GW: 10.115.90.126
3051	NFS	Used for Ubuntu storage and OpenShift NFS RWX Persistent Storage	192.168.51.0/24

Note: *VLAN configured in FlexPod Base. In setting up FlexPod Base, the Nexus switch portion will not be set up.

Note: S3 object storage was also used in this environment. It was determined that OpenShift uses the management network to reach S3 storage. A separate VLAN, subnet and vNIC was not defined for S3.

Table 2 lists the VMs or bare metal servers necessary for deployment as outlined in this document.

Table 2. Virtual Machines

Virtual Machine Description	VLAN	IP Address	Comments
AD1	703	10.115.90.123	Hosted on pre-existing management infrastructure within the FlexPod
AD2	703	10.115.90.124	Hosted on pre-existing management infrastructure within the FlexPod
OCP Installer	703	10.115.90.65	Hosted on pre-existing management infrastructure within the FlexPod
NVIDIA Base Command Head Node	703	10.115.90.115	Hosted on pre-existing management infrastructure within the FlexPod

Software Revisions

Table 3 lists the software revisions for various components of the solution.

Table 3. Software Revisions

Layer	Device	Image Bundle	Comments
Compute	Cisco C885A M8 Firmware Package	1.1(0.250025)	Upgrades all server components

Layer	Device	Image Bundle	Comments
	Cisco UCS X210c M6	5.3(5.250021)	Used for OpenShift Control Plane / Worker Nodes
	Cisco UCS Fabric Interconnect 9108 100G	4.3(5.240162)	
Network	Cisco Nexus Dashboard	4.1.1g	
	Cisco Nexus 9332D-GX2B NX-OS	10.4(5)	
	Cisco Nexus 9364D-GX2A NX-OS	10.4(5)	
Storage	NetApp AFF A90	ONTAP 9.15.1P7	Although ONTAP 9.15.1 was used for this validation
Software	Red Hat OpenShift	4.16	
	NetApp Trident	25.6.2	
	NVIDIA H200 GPU Driver - Ubuntu	570.133.20	
	NVIDIA H200 GPU CUDA Version - Ubuntu	12.8	

FlexPod Cabling

Table 4. Cisco Nexus Backend Fabric Cable Connections

Device	Port	Speed	Device	Port	Comment
BE-LF1	mgmt0	1G	management switch		
BE-LF1	Eth1/1	400G	C885A-1	CX-7 1	
BE-LF1	Eth1/2	400G	C885A-1	CX-7 3	
BE-LF1	Eth1/3	400G	C885A-1	CX-7 5	
BE-LF1	Eth1/4	400G	C885A-1	CX-7 7	
BE-LF1	Eth1/5	400G	C885A-2	CX-7 1	
BE-LF1	Eth1/6	400G	C885A-2	CX-7 3	
BE-LF1	Eth1/7	400G	C885A-2	CX-7 5	
BE-LF1	Eth1/8	400G	C885A-2	CX-7 7	
BE-LF1	Eth1/9	400G	C885A-3	CX-7 1	
BE-LF1	Eth1/10	400G	C885A-3	CX-7 3	

Device	Port	Speed	Device	Port	Comment
BE-LF1	Eth1/11	400G	C885A-3	CX-7 5	
BE-LF1	Eth1/12	400G	C885A-3	CX-7 7	
BE-LF1	Eth1/13	400G	C885A-4	CX-7 1	
BE-LF1	Eth1/14	400G	C885A-4	CX-7 3	
BE-LF1	Eth1/15	400G	C885A-4	CX-7 5	
BE-LF1	Eth1/16	400G	C885A-4	CX-7 7	
BE-LF1	Eth1/17	400G	BE-SP1	Eth1/1	
BE-LF1	Eth1/18	400G	BE-SP1	Eth1/2	
BE-LF1	Eth1/19	400G	BE-SP1	Eth1/3	
BE-LF1	Eth1/20	400G	BE-SP1	Eth1/4	
BE-LF1	Eth1/21	400G	BE-SP1	Eth1/5	
BE-LF1	Eth1/22	400G	BE-SP1	Eth1/6	
BE-LF1	Eth1/23	400G	BE-SP1	Eth1/7	
BE-LF1	Eth1/24	400G	BE-SP1	Eth1/8	
BE-LF1	Eth1/25	400G	BE-SP2	Eth1/1	
BE-LF1	Eth1/26	400G	BE-SP2	Eth1/2	
BE-LF1	Eth1/27	400G	BE-SP2	Eth1/3	
BE-LF1	Eth1/28	400G	BE-SP2	Eth1/4	
BE-LF1	Eth1/29	400G	BE-SP2	Eth1/5	
BE-LF1	Eth1/30	400G	BE-SP2	Eth1/6	
BE-LF1	Eth1/31	400G	BE-SP2	Eth1/7	
BE-LF1	Eth1/32	400G	BE-SP2	Eth1/8	
BE-LF2	mgmt0	1G	management switch		
BE-LF2	Eth1/1	400G	C885A-1	CX-7 2	
BE-LF2	Eth1/2	400G	C885A-1	CX-7 2	
BE-LF2	Eth1/3	400G	C885A-1	CX-7 6	
BE-LF2	Eth1/4	400G	C885A-1	CX-7 8	
BE-LF2	Eth1/5	400G	C885A-2	CX-7 2	

Device	Port	Speed	Device	Port	Comment
BE-LF2	Eth1/6	400G	C885A-2	CX-7 2	
BE-LF2	Eth1/7	400G	C885A-2	CX-7 6	
BE-LF2	Eth1/8	400G	C885A-2	CX-7 8	
BE-LF2	Eth1/9	400G	C885A-3	CX-7 2	
BE-LF2	Eth1/10	400G	C885A-3	CX-7 2	
BE-LF2	Eth1/11	400G	C885A-3	CX-7 6	
BE-LF2	Eth1/12	400G	C885A-3	CX-7 8	
BE-LF2	Eth1/13	400G	C885A-4	CX-7 2	
BE-LF2	Eth1/14	400G	C885A-4	CX-7 2	
BE-LF2	Eth1/15	400G	C885A-4	CX-7 6	
BE-LF2	Eth1/16	400G	C885A-4	CX-7 8	
BE-LF2	Eth1/17	400G	BE-SP1	Eth1/9	
BE-LF2	Eth1/18	400G	BE-SP1	Eth1/10	
BE-LF2	Eth1/19	400G	BE-SP1	Eth1/11	
BE-LF2	Eth1/20	400G	BE-SP1	Eth1/12	
BE-LF2	Eth1/21	400G	BE-SP1	Eth1/13	
BE-LF2	Eth1/22	400G	BE-SP1	Eth1/14	
BE-LF2	Eth1/23	400G	BE-SP1	Eth1/15	
BE-LF2	Eth1/24	400G	BE-SP1	Eth1/16	
BE-LF2	Eth1/25	400G	BE-SP2	Eth1/9	
BE-LF2	Eth1/26	400G	BE-SP2	Eth1/10	
BE-LF2	Eth1/27	400G	BE-SP2	Eth1/11	
BE-LF2	Eth1/28	400G	BE-SP2	Eth1/12	
BE-LF2	Eth1/29	400G	BE-SP2	Eth1/13	
BE-LF2	Eth1/30	400G	BE-SP2	Eth1/14	
BE-LF2	Eth1/31	400G	BE-SP2	Eth1/15	
BE-LF2	Eth1/32	400G	BE-SP2	Eth1/16	
BE-SP1	mgmt0	1G	management switch		

Device	Port	Speed	Device	Port	Comment
BE-SP1	Eth1/1	400G	BE-LF1	Eth1/17	
BE-SP1	Eth1/2	400G	BE-LF1	Eth1/18	
BE-SP1	Eth1/3	400G	BE-LF1	Eth1/19	
BE-SP1	Eth1/4	400G	BE-LF1	Eth1/20	
BE-SP1	Eth1/5	400G	BE-LF1	Eth1/21	
BE-SP1	Eth1/6	400G	BE-LF1	Eth1/22	
BE-SP1	Eth1/7	400G	BE-LF1	Eth1/23	
BE-SP1	Eth1/8	400G	BE-LF1	Eth1/24	
BE-SP1	Eth1/9	400G	BE-LF2	Eth1/17	
BE-SP1	Eth1/10	400G	BE-LF2	Eth1/18	
BE-SP1	Eth1/11	400G	BE-LF2	Eth1/19	
BE-SP1	Eth1/12	400G	BE-LF2	Eth1/20	
BE-SP1	Eth1/13	400G	BE-LF2	Eth1/21	
BE-SP1	Eth1/14	400G	BE-LF2	Eth1/22	
BE-SP1	Eth1/15	400G	BE-LF2	Eth1/23	
BE-SP1	Eth1/16	400G	BE-LF2	Eth1/24	
BE-SP2	mgmt0	1G	management switch		
BE-SP2	Eth1/1	400G	BE-LF1	Eth1/25	
BE-SP2	Eth1/2	400G	BE-LF1	Eth1/26	
BE-SP2	Eth1/3	400G	BE-LF1	Eth1/27	
BE-SP2	Eth1/4	400G	BE-LF1	Eth1/28	
BE-SP2	Eth1/5	400G	BE-LF1	Eth1/29	
BE-SP2	Eth1/6	400G	BE-LF1	Eth1/30	
BE-SP2	Eth1/7	400G	BE-LF1	Eth1/31	
BE-SP2	Eth1/8	400G	BE-LF1	Eth1/32	
BE-SP2	Eth1/9	400G	BE-LF2	Eth1/25	
BE-SP2	Eth1/10	400G	BE-LF2	Eth1/26	
BE-SP2	Eth1/11	400G	BE-LF2	Eth1/27	

Device	Port	Speed	Device	Port	Comment
BE-SP2	Eth1/12	400G	BE-LF2	Eth1/28	
BE-SP2	Eth1/13	400G	BE-LF2	Eth1/29	
BE-SP2	Eth1/14	400G	BE-LF2	Eth1/30	
BE-SP2	Eth1/15	400G	BE-LF2	Eth1/31	
BE-SP2	Eth1/16	400G	BE-LF2	Eth1/32	

Table 5. Cisco Nexus Frontend Fabric Cable Connections

Device	Port	Speed	Device	Port	Comment
FE-LF1	mgmt0	1G	management switch		
FE-LF1	Eth1/1	200G	C885A-1	BF 1	
FE-LF1	Eth1/2	200G	C885A-2	BF 1	
FE-LF1	Eth1/3	200G	C885A-3	BF 1	
FE-LF1	Eth1/4	200G	C885A-4	BF 1	
FE-LF1	Eth1/5	100G	S9108-A	Eth1/5	UCS X-Series Direct
FE-LF1	Eth1/6	100G	S9108-B	Eth1/5	UCS X-Series Direct
FE-LF1	Eth1/7	100G	S9108-A	Eth1/6	UCS X-Series Direct
FE-LF1	Eth1/8	100G	S9108-B	Eth1/6	UCS X-Series Direct
FE-LF1	Eth1/20/1	100G	C225M6-1	VIC 1	
FE-LF1	Eth1/20/2	100G	C225M6-2	VIC 1	
FE-LF1	Eth1/20/3	100G	C225M6-3	VIC 1	
FE-LF1	Eth1/20/4	100G	C225M6-4	VIC 1	
FE-LF1	Eth1/21	100G	RTP5-BCM-MGMT	VIC 1	BCM Head Node
FE-LF1	Eth1/27	400G	FE-SP1	Eth1/7	
FE-LF1	Eth1/28	400G	FE-SP1	Eth1/8	
FE-LF1	Eth1/29	400G	FE-SP1	Eth1/9	
FE-LF1	Eth1/30	400G	FE-SP2	Eth1/7	

Device	Port	Speed	Device	Port	Comment
FE-LF1	Eth1/31	400G	FE-SP2	Eth1/8	
FE-LF1	Eth1/32	400G	FE-SP2	Eth1/9	
FE-LF2	mgmt0	1G	management switch		
FE-LF2	Eth1/1	200G	C885A-1	BF 2	
FE-LF2	Eth1/2	200G	C885A-2	BF 2	
FE-LF2	Eth1/3	200G	C885A-3	BF 2	
FE-LF2	Eth1/4	200G	C885A-4	BF 2	
FE-LF2	Eth1/5	100G	S9108-A	Eth1/7	UCS X-Series Direct
FE-LF2	Eth1/6	100G	S9108-B	Eth1/7	UCS X-Series Direct
FE-LF2	Eth1/7	100G	S9108-A	Eth1/8	UCS X-Series Direct
FE-LF2	Eth1/8	100G	S9108-B	Eth1/8	UCS X-Series Direct
FE-LF2	Eth1/20/1	100G	C225M6-1	VIC 2	
FE-LF2	Eth1/20/2	100G	C225M6-2	VIC 2	
FE-LF2	Eth1/20/3	100G	C225M6-3	VIC 2	
FE-LF2	Eth1/20/4	100G	C225M6-4	VIC 2	
FE-LF2	Eth1/21	100G	RTP5-BCM-MGMT	VIC 2	BCM Head Node
FE-LF2	Eth1/27	400G	FE-SP1	Eth1/10	
FE-LF2	Eth1/28	400G	FE-SP1	Eth1/11	
FE-LF2	Eth1/29	400G	FE-SP1	Eth1/12	
FE-LF2	Eth1/30	400G	FE-SP2	Eth1/10	
FE-LF2	Eth1/31	400G	FE-SP2	Eth1/11	
FE-LF2	Eth1/32	400G	FE-SP2	Eth1/12	
FE-SLF1	mgmt0	1G	management switch		
FE-SLF1	Eth1/24	100G	RTP5-BCM-MGMT	PCIe3 1	

Device	**Port**	**Speed**	**Device**	**Port**	**Comment**
FE-SLF1	Eth1/25	100G	NetApp-01	e2b	
FE-SLF1	Eth1/26	100G	NetApp-02	e2b	
FE-SLF1	Eth1/27	400G	FE-SP1	Eth1/1	
FE-SLF1	Eth1/28	400G	FE-SP1	Eth1/2	
FE-SLF1	Eth1/29	400G	FE-SP1	Eth1/3	
FE-SLF1	Eth1/30	400G	FE-SP2	Eth1/1	
FE-SLF1	Eth1/31	400G	FE-SP2	Eth1/2	
FE-SLF1	Eth1/32	400G	FE-SP2	Eth1/3	
FE-SLF1	mgmt0	1G	management switch		
FE-SLF1	Eth1/24	100G	RTP5-BCM-MGMT	PCIe3 2	
FE-SLF1	Eth1/25	100G	NetApp-01	e3a	
FE-SLF1	Eth1/26	100G	NetApp-02	e3a	
FE-SLF1	Eth1/27	400G	FE-SP1	Eth1/4	
FE-SLF1	Eth1/28	400G	FE-SP1	Eth1/5	
FE-SLF1	Eth1/29	400G	FE-SP1	Eth1/6	
FE-SLF1	Eth1/30	400G	FE-SP2	Eth1/4	
FE-SLF1	Eth1/31	400G	FE-SP2	Eth1/5	
FE-SLF1	Eth1/32	400G	FE-SP2	Eth1/6	
FE-SP1	mgmt0	1G	management		

Device	Port	Speed	Device	Port	Comment
			switch		
FE-SP1	Eth1/1	400G	FE-SLF1	Eth1/27	
FE-SP1	Eth1/2	400G	FE-SLF1	Eth1/28	
FE-SP1	Eth1/3	400G	FE-SLF1	Eth1/29	
FE-SP1	Eth1/4	400G	FE-SLF2	Eth1/27	
FE-SP1	Eth1/5	400G	FE-SLF2	Eth1/28	
FE-SP1	Eth1/6	400G	FE-SLF2	Eth1/29	
FE-SP1	Eth1/7	400G	FE-LF1	Eth1/27	
FE-SP1	Eth1/8	400G	FE-LF1	Eth1/28	
FE-SP1	Eth1/9	400G	FE-LF1	Eth1/29	
FE-SP1	Eth1/10	400G	FE-LF2	Eth1/27	
FE-SP1	Eth1/11	400G	FE-LF2	Eth1/28	
FE-SP1	Eth1/12	400G	FE-LF2	Eth1/29	
FE-SP1	Eth1/63.4	100G	Uplink Router		
FE-SP1	Eth1/64.4	100G	Uplink Router		
FE-SP2	mgmt0	1G	management switch		
FE-SP2	Eth1/1	400G	FE-SLF1	Eth1/30	
FE-SP2	Eth1/2	400G	FE-SLF1	Eth1/31	
FE-SP2	Eth1/3	400G	FE-SLF1	Eth1/32	
FE-SP2	Eth1/4	400G	FE-SLF2	Eth1/30	
FE-SP2	Eth1/5	400G	FE-SLF2	Eth1/31	
FE-SP2	Eth1/6	400G	FE-SLF2	Eth1/32	
FE-SP2	Eth1/7	400G	FE-LF1	Eth1/30	
FE-SP2	Eth1/8	400G	FE-LF1	Eth1/31	
FE-SP2	Eth1/9	400G	FE-LF1	Eth1/32	
FE-SP2	Eth1/10	400G	FE-LF2	Eth1/30	
FE-SP2	Eth1/11	400G	FE-LF2	Eth1/31	
FE-SP2	Eth1/12	400G	FE-LF2	Eth1/32	

Device	Port	Speed	Device	Port	Comment
FE-SP2	Eth1/63.4	100G	Uplink Router		
FE-SP2	Eth1/64.4	100G	Uplink Router		

Table 6. NVIDIA BCM Cabling

Device	Port	Speed	Device	Port	Comment
Head Node	Management	1G	management switch		CIMC
Head Node	VIC0	100G	FE-LF1	Eth1/21	
Head Node	VIC1	100G	FE-LF2	Eth1/21	
C885A-1	Management	1G	management switch		CIMC
C885A-1	BF 0	200G	FE-LF1	Eth1/1	N-S
C885A-1	BF 1	200G	FE-LF2	Eth1/1	N-S
C885A-1	CX-7 1	400G	BE-LF1	Eth1/1	E-W
C885A-1	CX-7 2	400G	BE-LF2	Eth1/1	E-W
C885A-1	CX-7 3	400G	BE-LF1	Eth1/2	E-W
C885A-1	CX-7 4	400G	BE-LF2	Eth1/2	E-W
C885A-1	CX-7 5	400G	BE-LF1	Eth1/3	E-W
C885A-1	CX-7 6	400G	BE-LF2	Eth1/3	E-W
C885A-1	CX-7 7	400G	BE-LF1	Eth1/4	E-W
C885A-1	CX-7 8	400G	BE-LF2	Eth1/4	E-W
C885A-2	Management	1G	management switch		CIMC
C885A-2	BF 0	200G	FE-LF1	Eth1/2	N-S
C885A-2	BF 1	200G	FE-LF2	Eth1/2	N-S
C885A-2	CX-7 1	400G	BE-LF1	Eth1/5	E-W
C885A-2	CX-7 2	400G	BE-LF2	Eth1/5	E-W
C885A-2	CX-7 3	400G	BE-LF1	Eth1/6	E-W
C885A-2	CX-7 4	400G	BE-LF2	Eth1/6	E-W
C885A-2	CX-7 5	400G	BE-LF1	Eth1/7	E-W

Device	Port	Speed	Device	Port	Comment
C885A-2	CX-7 6	400G	BE-LF2	Eth1/7	E-W
C885A-2	CX-7 7	400G	BE-LF1	Eth1/8	E-W
C885A-2	CX-7 8	400G	BE-LF2	Eth1/8	E-W
C885A-3	Management	1G	management switch		CIMC
C885A-3	BF 0	200G	FE-LF1	Eth1/3	N-S
C885A-3	BF 1	200G	FE-LF2	Eth1/3	N-S
C885A-3	CX-7 1	400G	BE-LF1	Eth1/9	E-W
C885A-3	CX-7 2	400G	BE-LF2	Eth1/9	E-W
C885A-3	CX-7 3	400G	BE-LF1	Eth1/10	E-W
C885A-3	CX-7 4	400G	BE-LF2	Eth1/10	E-W
C885A-3	CX-7 5	400G	BE-LF1	Eth1/11	E-W
C885A-3	CX-7 6	400G	BE-LF2	Eth1/11	E-W
C885A-3	CX-7 7	400G	BE-LF1	Eth1/12	E-W
C885A-3	CX-7 8	400G	BE-LF2	Eth1/12	E-W
C885A-4	Management	1G	management switch		CIMC
C885A-4	BF 0	200G	FE-LF1	Eth1/4	N-S
C885A-4	BF 1	200G	FE-LF2	Eth1/4	N-S
C885A-4	CX-7 1	400G	BE-LF1	Eth1/13	E-W
C885A-4	CX-7 2	400G	BE-LF2	Eth1/13	E-W
C885A-4	CX-7 3	400G	BE-LF1	Eth1/14	E-W
C885A-4	CX-7 4	400G	BE-LF2	Eth1/14	E-W
C885A-4	CX-7 5	400G	BE-LF1	Eth1/15	E-W
C885A-4	CX-7 6	400G	BE-LF2	Eth1/15	E-W
C885A-4	CX-7 7	400G	BE-LF1	Eth1/16	E-W
C885A-4	CX-7 8	400G	BE-LF2	Eth1/16	E-W

Network Switch Configuration

This chapter contains the following:

- Cisco Nexus Dashboard Setup
- Nexus Frontend Fabric Setup
- Nexus Backend Fabric Setup

Cisco Nexus Dashboard Setup

In this lab configuration, Cisco Nexus Dashboard is used to create and configure the Backend and Frontend Fabrics. Nexus Dashboard is available in both physical and virtual form factors. In this lab configuration, three Nexus Dashboard physical nodes were installed into a cluster. Please see Nexus Dashboard Capacity Planning and Cisco Nexus Dashboard Data Sheet to determine the form factor and cluster size for your deployment. Then install Nexus Dashboard

Nexus Frontend Fabric Setup

In this setup, the Nexus Frontend Fabric consisted of 2 spine and 4 leaf switches. This fabric was cabled according to Table 4. The fabric switch details are listed in Table 7.

Table 7. Frontend Fabric Switch Details

Switch	Role	OOB IP	Firmware	Model
FE-LF1	Leaf	10.115.90.52	10.4(5)	Cisco Nexus 9332D-GX2B
FE-LF2	Leaf	10.115.90.53	10.4(5)	Cisco Nexus 9332D-GX2B
FE-SLF1	Storage Leaf	10.115.90.54	10.4(5)	Cisco Nexus 9332D-GX2B
FE-SLF2	Storage Leaf	10.115.90.55	10.4(5)	Cisco Nexus 9332D-GX2B
FE-SP1	Spine	10.115.90.50	10.4(5)	Cisco Nexus 9364D-GX2A
FE-SP2	Spine	10.115.90.51	10.4(5)	Cisco Nexus 9364D-GX2A

Physical Connectivity

Follow the physical connectivity guidelines for FlexPod as explained in section FlexPod Cabling.

Initial Configuration of Switches

The following procedures describe this basic configuration of the Cisco Nexus frontend fabric switches for use in the FlexPod environment. This procedure assumes the use of Cisco Nexus 9000 10.4(5), the Cisco suggested Nexus switch release at the time of this validation.

Procedure 1. Set Up Initial Configuration from a serial console

Set up the initial configuration for each backend fabric switch from Table 7 above.

Step 1. Configure the switch.

Note: On initial boot, the NX-OS setup automatically starts and attempts to enter Power on Auto Provisioning.

```
Abort Power On Auto Provisioning [yes - continue with normal setup, skip - bypass password and basic
configuration, no - continue with Power On Auto Provisioning] (yes/skip/no)[no]: yes
Disabling POAP.......Disabling POAP
poap: Rolling back, please wait... (This may take 5-15 minutes)

         ---- System Admin Account Setup ----

Do you want to enforce secure password standard (yes/no) [y]: Enter
Enter the password for "admin": <password>
Confirm the password for "admin": <password>
Would you like to enter the basic configuration dialog (yes/no): yes
Create another login account (yes/no) [n]: Enter
Configure read-only SNMP community string (yes/no) [n]: Enter
Configure read-write SNMP community string (yes/no) [n]: Enter
Enter the switch name: <nexus-hostname>
Continue with Out-of-band (mgmt0) management configuration? (yes/no) [y]: Enter
Mgmt0 IPv4 address: <nexus-out_of_band_mgmt0-ip>
Mgmt0 IPv4 netmask: <nexus-mgmt0-netmask>
Configure the default gateway? (yes/no) [y]: Enter
IPv4 address of the default gateway: <nexus-mgmt0-gw>
Configure advanced IP options? (yes/no) [n]: Enter
Enable the telnet service? (yes/no) [n]: Enter
Enable the ssh service? (yes/no) [y]: Enter
Type of ssh key you would like to generate (dsa/rsa) [rsa]: Enter
Number of rsa key bits <1024-2048> [2048]: Enter
Configure the ntp server? (yes/no) [n]: Enter
Configure default interface layer (L3/L2) [L2]: Enter
Configure default switchport interface state (shut/noshut) [noshut]: Enter
Enter basic FC configurations (yes/no) [n]: n
Configure CoPP system profile (strict/moderate/lenient/dense) [strict]: Enter
Would you like to edit the configuration? (yes/no) [n]: Enter
```

Step 2. Review the configuration summary before enabling the configuration.

```
Use this configuration and save it? (yes/no) [y]: Enter
```

Step 3. Repeat this configuration for all switches in Table 7.

Deploy Frontend Fabric Using Nexus Dashboard

The procedures outlined in this section will use Cisco Nexus Dashboard (ND), specifically the fabric templates provided by ND, to deploy the frontend (FE) fabric in the AI POD solution. The frontend fabric is a 2-tier, 3-stage spine-leaf Clos topology, built using Cisco Nexus 9000 series data center switches. Once the fabric is deployed, ND will be used to provision connectivity between various infrastructure components connected to the frontend fabric. The Cisco UCS GPU servers in the AI POD training cluster will use the frontend (N-S) NIC to connect to the FE fabric.

The procedures in this section will:

- Deploy a VXLAN EVPN fabric on the frontend leaf and spine switches, connected in a 2-tier spine-leaf topology.
- Enable Virtual Port Channel (vPC) peering on compute/management leaf pairs and storage leaf pairs in the frontend fabric.
- Provision connectivity to UCS servers that will be used to host the control plane and workload management components for the AI workloads running on UCS GPU servers.

- Provisioning external connectivity from the frontend fabric to other enterprise internal and external networks. This includes connectivity to Cisco Intersight, Red Hat Hybrid Cloud Console and other SaaS services used in the AI POD solution.
- Provision any connectivity required to bring up the storage system.
- Enable connectivity between UCS management and storage, as well as from UCS GPU nodes to storage.

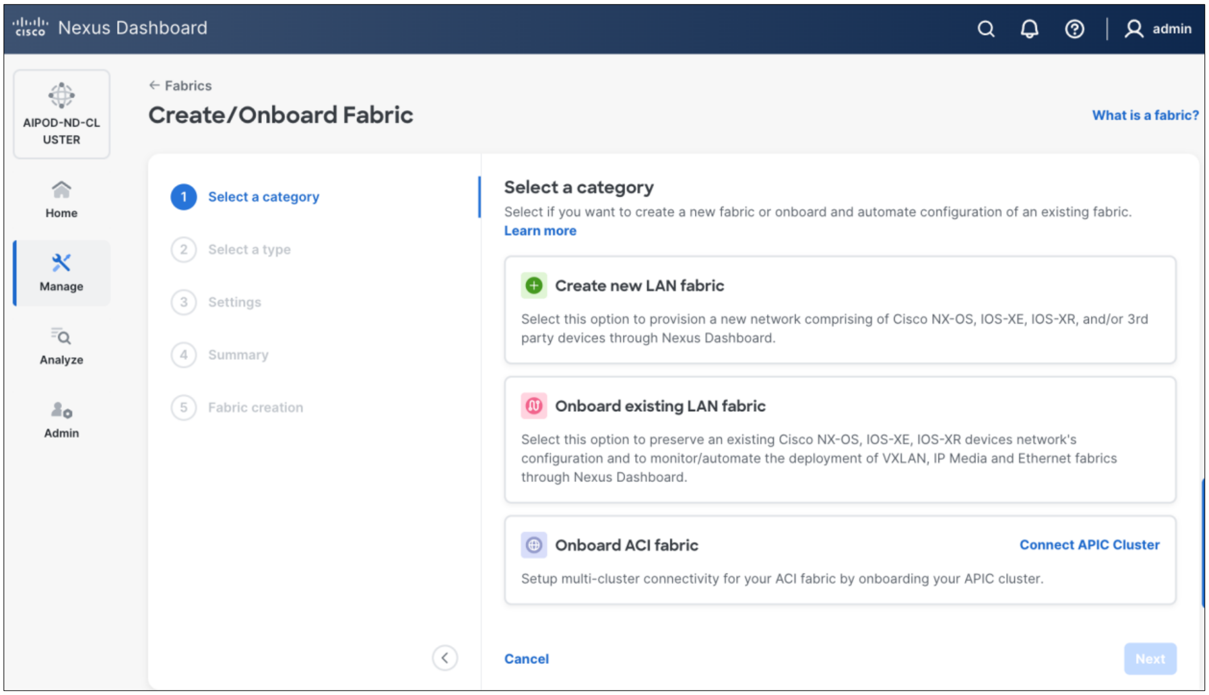
Procedure 1. Deploy VXLAN EVPN fabric on the two-tier spine and leaf switches

Step 1. Use a web browser to navigate to the management IP of any node in the Nexus Dashboard cluster. Log in using the **admin** account.

Step 2. From the left navigation menu, go to **Manage > Fabrics**.

Step 3. Click **Actions** and select **Create Fabric** from the drop-down list.

Step 4. Select **Create a new LAN** fabric box. Click **Next**.



Create/Onboard Fabric

Select a category

Select if you want to create a new fabric or onboard and automate configuration of an existing fabric. Learn more

Create new LAN fabric

Select this option to provision a new network comprising of Cisco NX-OS, IOS-XE, IOS-XR, and/or 3rd party devices through Nexus Dashboard.

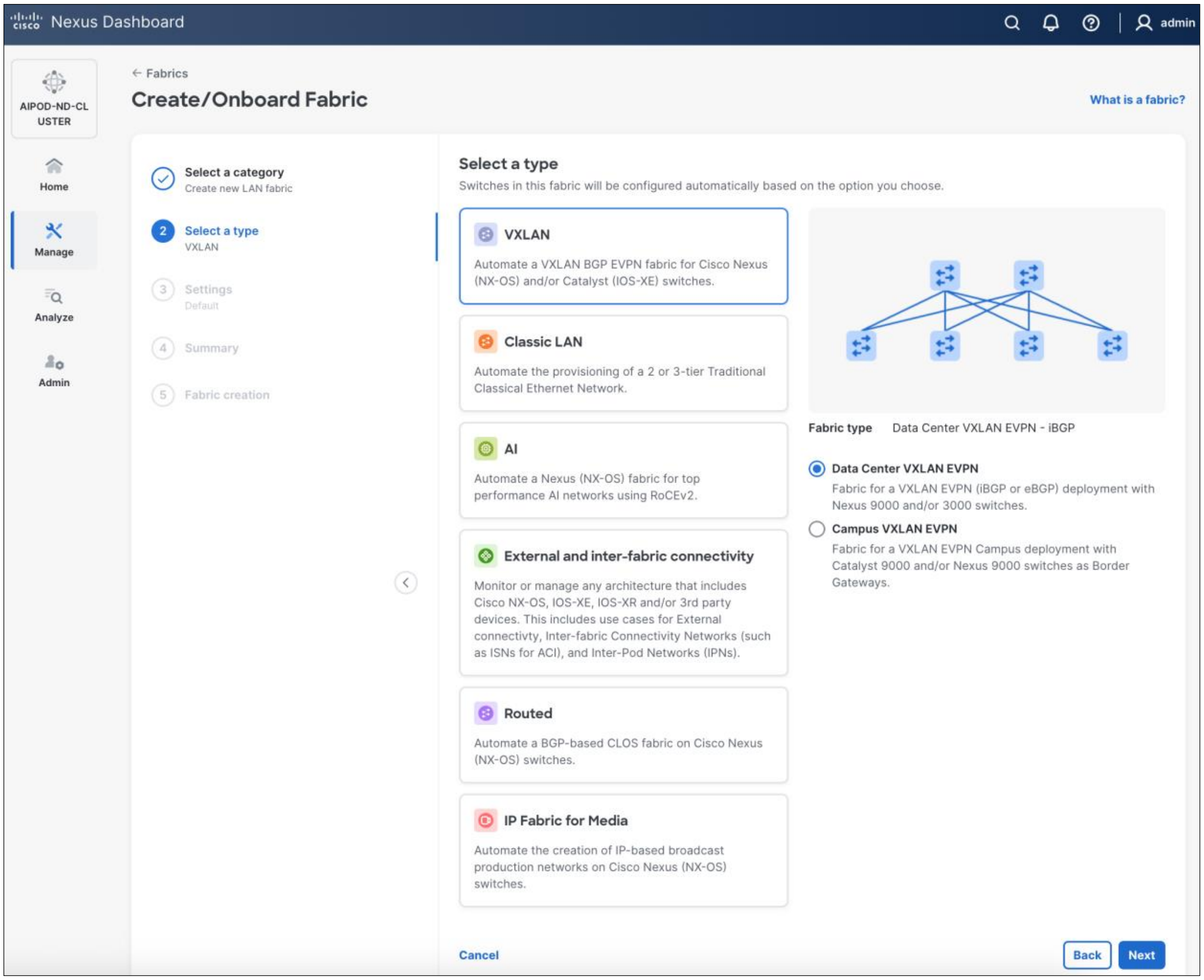
Onboard existing LAN fabric

Select this option to preserve an existing Cisco NX-OS, IOS-XE, IOS-XR devices network's configuration and to monitor/automate the deployment of VXLAN, IP Media and Ethernet fabrics through Nexus Dashboard.

Onboard ACI fabric

Setup multi-cluster connectivity for your ACI fabric by onboarding your APIC cluster.

Step 5. Select **VXLAN** and radio button for **Data Center VXLAN EVPN** for the fabric type. Click **Next.**



Create/Onboard Fabric

What is a fabric?

- Select a category — Create new LAN fabric
- 2 Select a type — VXLAN
- 3 Settings — Default
- 4 Summary
- 5 Fabric creation

Select a type

Switches in this fabric will be configured automatically based on the option you choose.

VXLAN — Automate a VXLAN BGP EVPN fabric for Cisco Nexus (NX-OS) and/or Catalyst (IOS-XE) switches.

Classic LAN — Automate the provisioning of a 2 or 3-tier Traditional Classical Ethernet Network.

AI — Automate a Nexus (NX-OS) fabric for top performance AI networks using RoCEv2.

External and inter-fabric connectivity — Monitor or manage any architecture that includes Cisco NX-OS, IOS-XE, IOS-XR and/or 3rd party devices. This includes use cases for External connectivty, Inter-fabric Connectivity Networks (such as ISNs for ACI), and Inter-Pod Networks (IPNs).

Routed — Automate a BGP-based CLOS fabric on Cisco Nexus (NX-OS) switches.

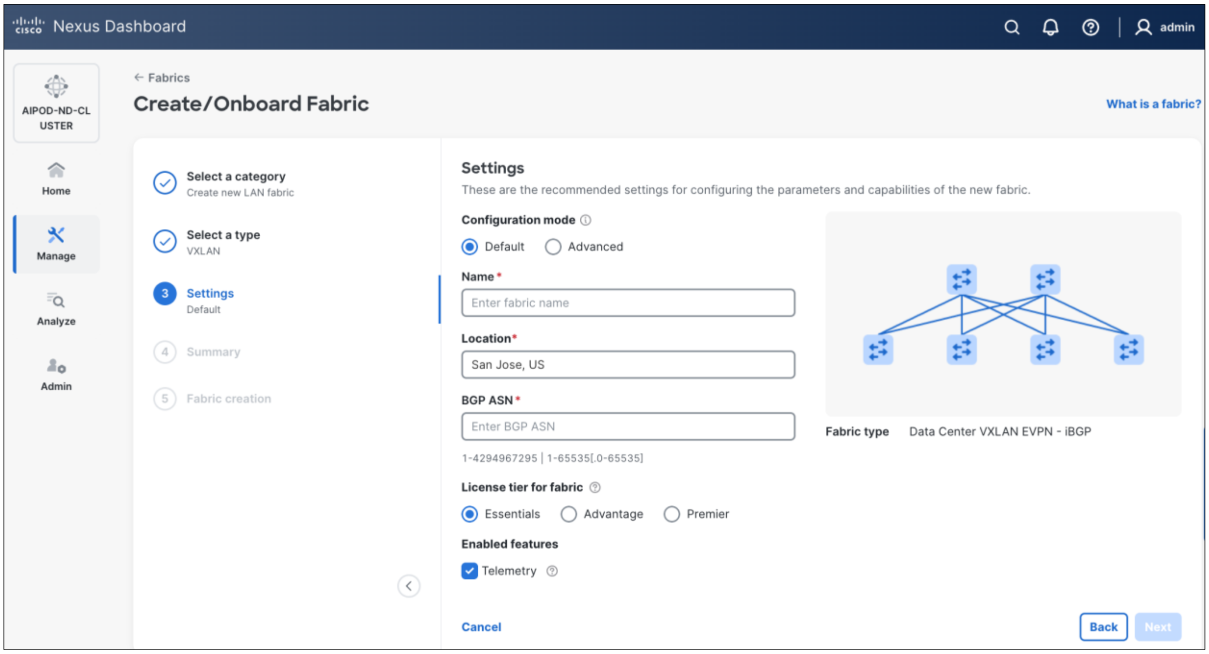
IP Fabric for Media — Automate the creation of IP-based broadcast production networks on Cisco Nexus (NX-OS) switches.

Fabric type: Data Center VXLAN EVPN - iBGP

● Data Center VXLAN EVPN — Fabric for a VXLAN EVPN (iBGP or eBGP) deployment with Nexus 9000 and/or 3000 switches.

○ Campus VXLAN EVPN — Fabric for a VXLAN EVPN Campus deployment with Catalyst 9000 and/or Nexus 9000 switches as Border Gateways.

Step 6. For **Configuration mode**, keep the **Default** option. Specify **Name**, **Location**, and **BGP ASN** for fabric. Also select the **Licensing tier for fabric** from the options available. **Premier** is required for **advanced** network analytics and **day 2** operations. Click the **?** icon to see the features available in each tier.



Create/Onboard Fabric

What is a fabric?

- Select a category — Create new LAN fabric
- Select a type — VXLAN
- 3 Settings — Default
- 4 Summary
- 5 Fabric creation

Settings

These are the recommended settings for configuring the parameters and capabilities of the new fabric.

Configuration mode: ● Default ○ Advanced

Name*: Enter fabric name

Location*: San Jose, US

BGP ASN*: Enter BGP ASN

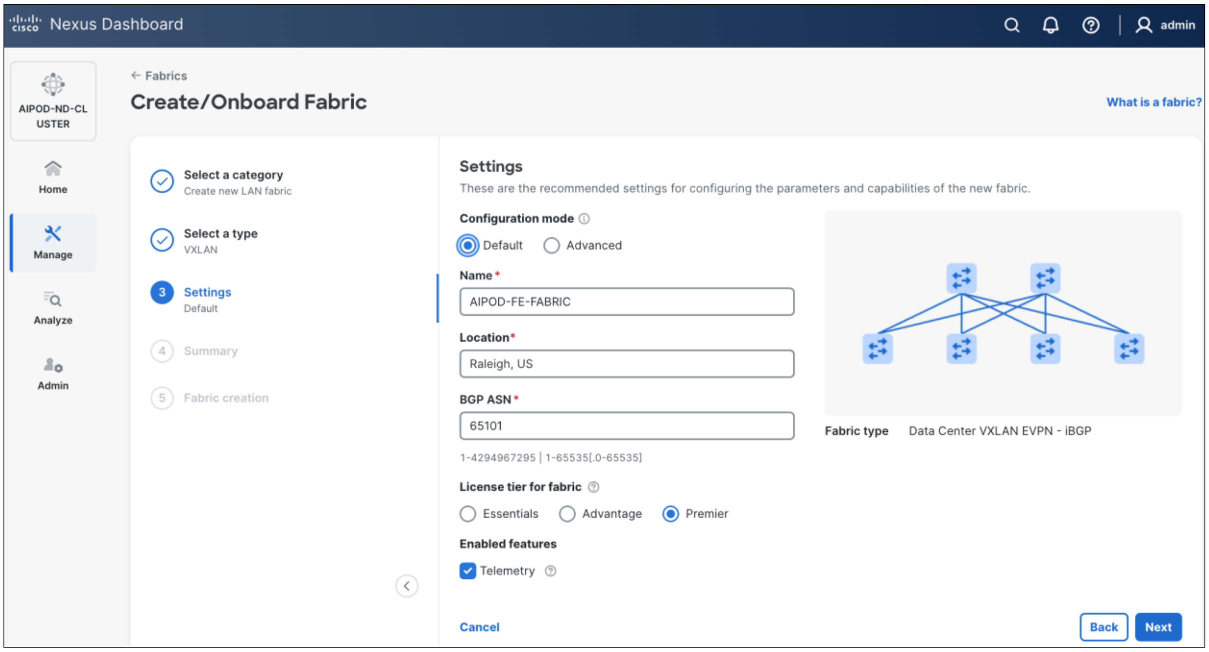
1-4294967295 | 1-65535[.0-65535]

License tier for fabric: ● Essentials ○ Advantage ○ Premier

Enabled features: ☑ Telemetry

Fabric type: Data Center VXLAN EVPN - iBGP

Step 7. Click **Next**.



Create/Onboard Fabric

Settings

These are the recommended settings for configuring the parameters and capabilities of the new fabric.

Configuration mode ● Default ○ Advanced

Name* AIPOD-FE-FABRIC

Location* Raleigh, US

BGP ASN* 65101

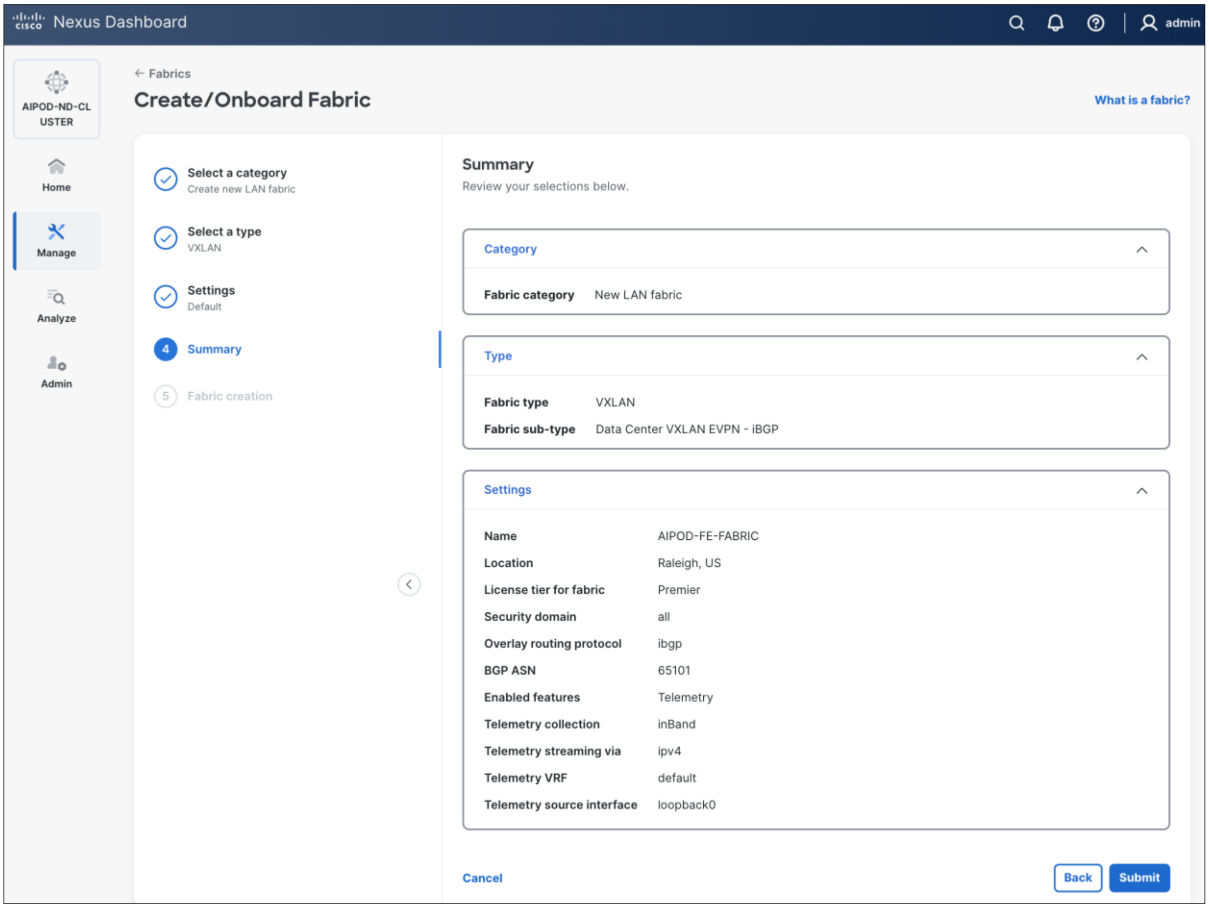
1-4294967295 | 1-65535[.0-65535]

License tier for fabric ○ Essentials ○ Advantage ● Premier

Enabled features ☑ Telemetry

Fabric type Data Center VXLAN EVPN - iBGP

Step 8. In the **Summary** view, verify the settings and click **Submit**.



Create/Onboard Fabric

Summary

Review your selections below.

Category

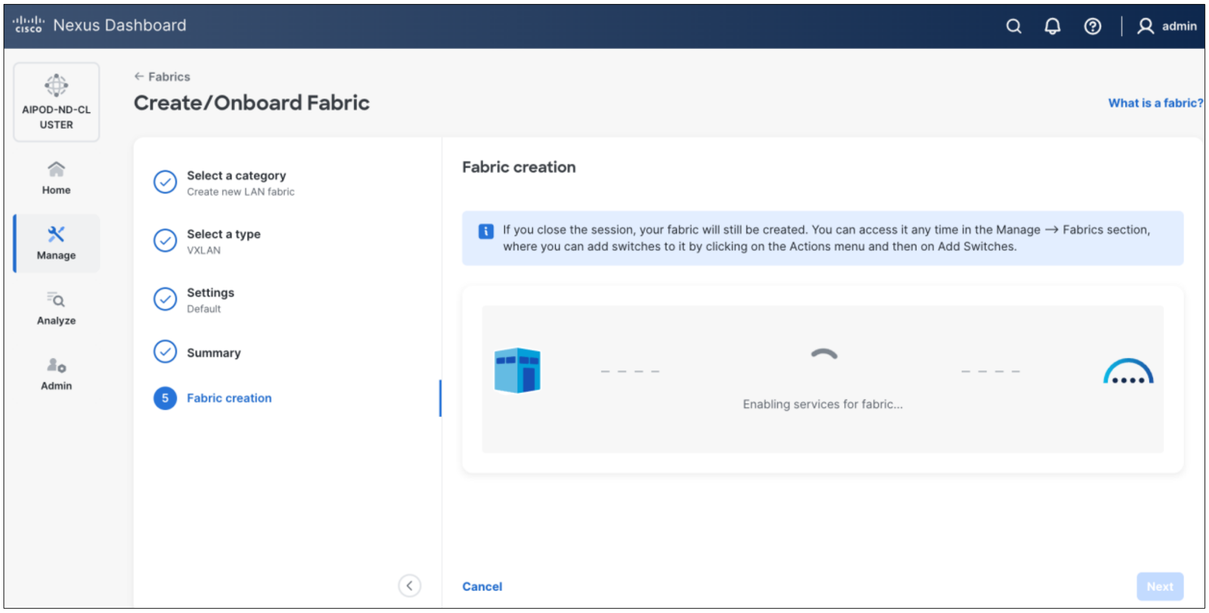
Fabric category	New LAN fabric

Type

Fabric type	VXLAN
Fabric sub-type	Data Center VXLAN EVPN - iBGP

Settings

Name	AIPOD-FE-FABRIC
Location	Raleigh, US
License tier for fabric	Premier
Security domain	all
Overlay routing protocol	ibgp
BGP ASN	65101
Enabled features	Telemetry
Telemetry collection	inBand
Telemetry streaming via	ipv4
Telemetry VRF	default
Telemetry source interface	loopback0



← Fabrics

Create/Onboard Fabric

What is a fabric?

- Select a category — Create new LAN fabric
- Select a type — VXLAN
- Settings — Default
- Summary
- 5 Fabric creation

Fabric creation

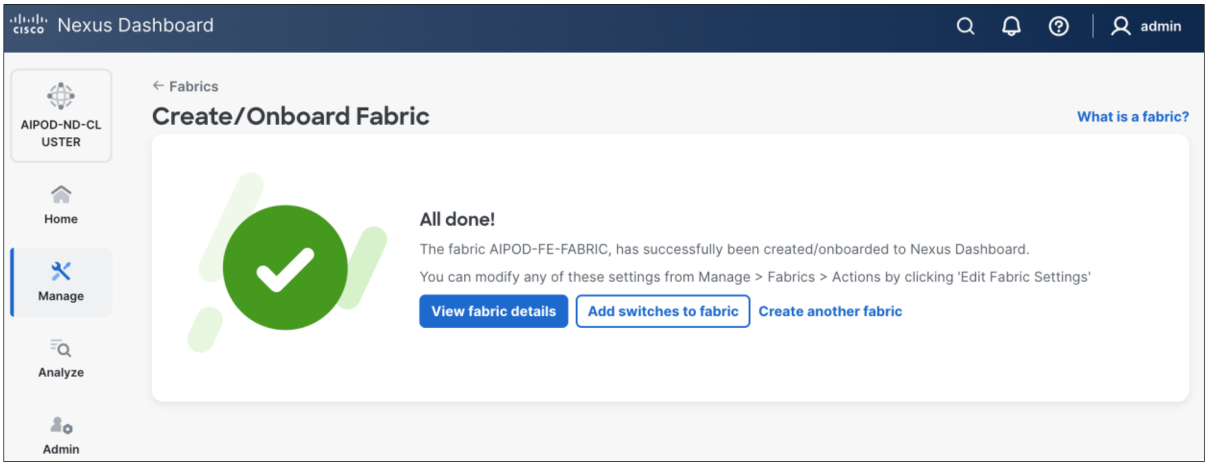
If you close the session, your fabric will still be created. You can access it any time in the Manage → Fabrics section, where you can add switches to it by clicking on the Actions menu and then on Add Switches.

Enabling services for fabric...

Cancel

Next

Step 9. When **Fabric Creation** completes, you should see the following:



← Fabrics

Create/Onboard Fabric

What is a fabric?

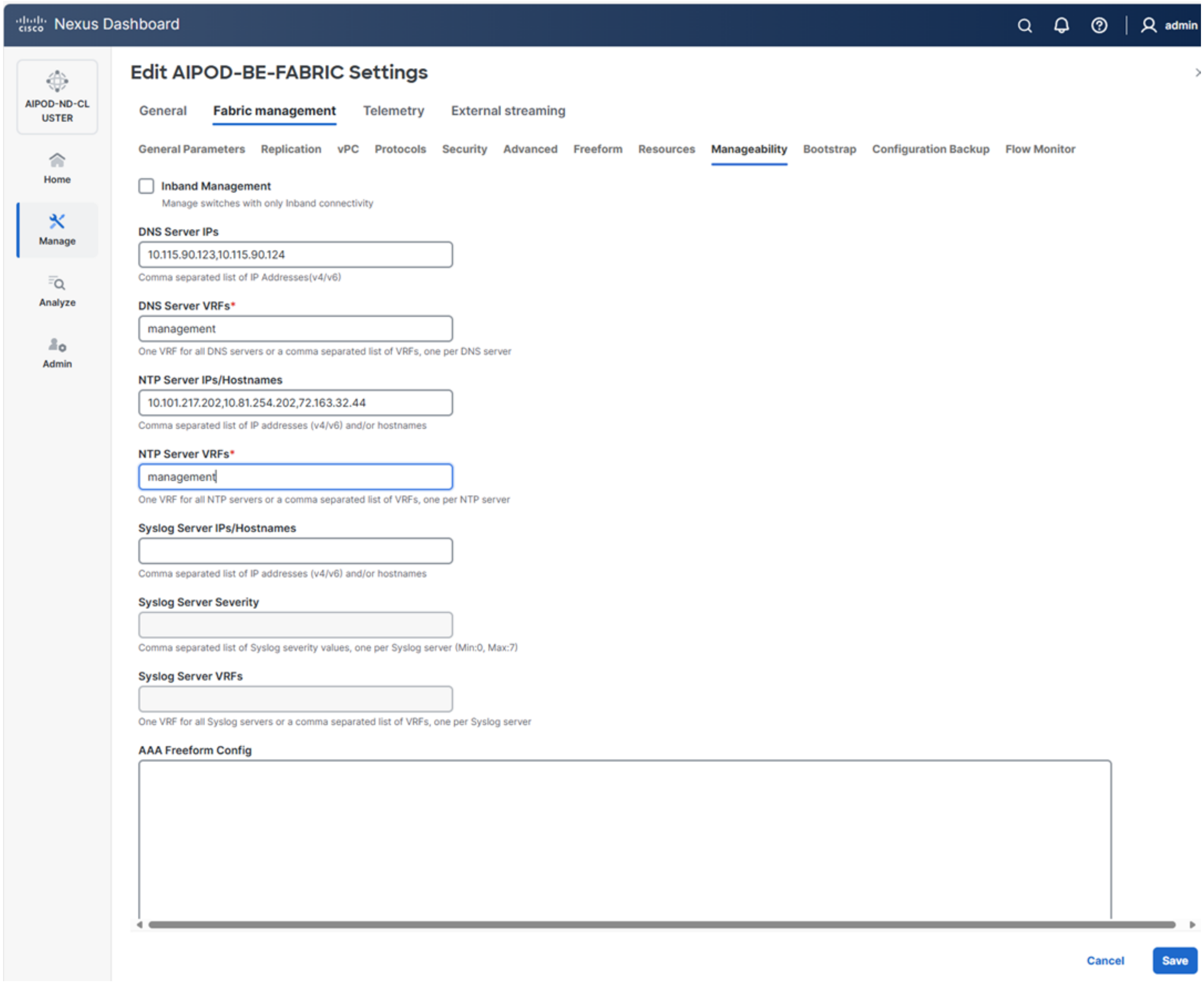
All done!

The fabric AIPOD-FE-FABRIC, has successfully been created/onboarded to Nexus Dashboard.

You can modify any of these settings from Manage > Fabrics > Actions by clicking 'Edit Fabric Settings'

View fabric details | Add switches to fabric | Create another fabric

Step 10. Select **Manage** > **Fabrics** on the left and then select the **FE fabric.** From the Actions drop-down list, select **Edit fabric** settings. Select the **Fabric management** tab and the **Manageability** tab underneath. Add the NTP Server IPs and the NTP Server VRF (management) and click **Save.**



Edit AIPOD-BE-FABRIC Settings

□ Inband Management
Manage switches with only Inband connectivity

DNS Server IPs: 10.115.90.123,10.115.90.124
Comma separated list of IP Addresses(v4/v6)

DNS Server VRFs*: management
One VRF for all DNS servers or a comma separated list of VRFs, one per DNS server

NTP Server IPs/Hostnames: 10.101.217.202,10.81.254.202,72.163.32.44
Comma separated list of IP addresses (v4/v6) and/or hostnames

NTP Server VRFs*: management
One VRF for all NTP servers or a comma separated list of VRFs, one per NTP server

Syslog Server IPs/Hostnames:
Comma separated list of IP addresses (v4/v6) and/or hostnames

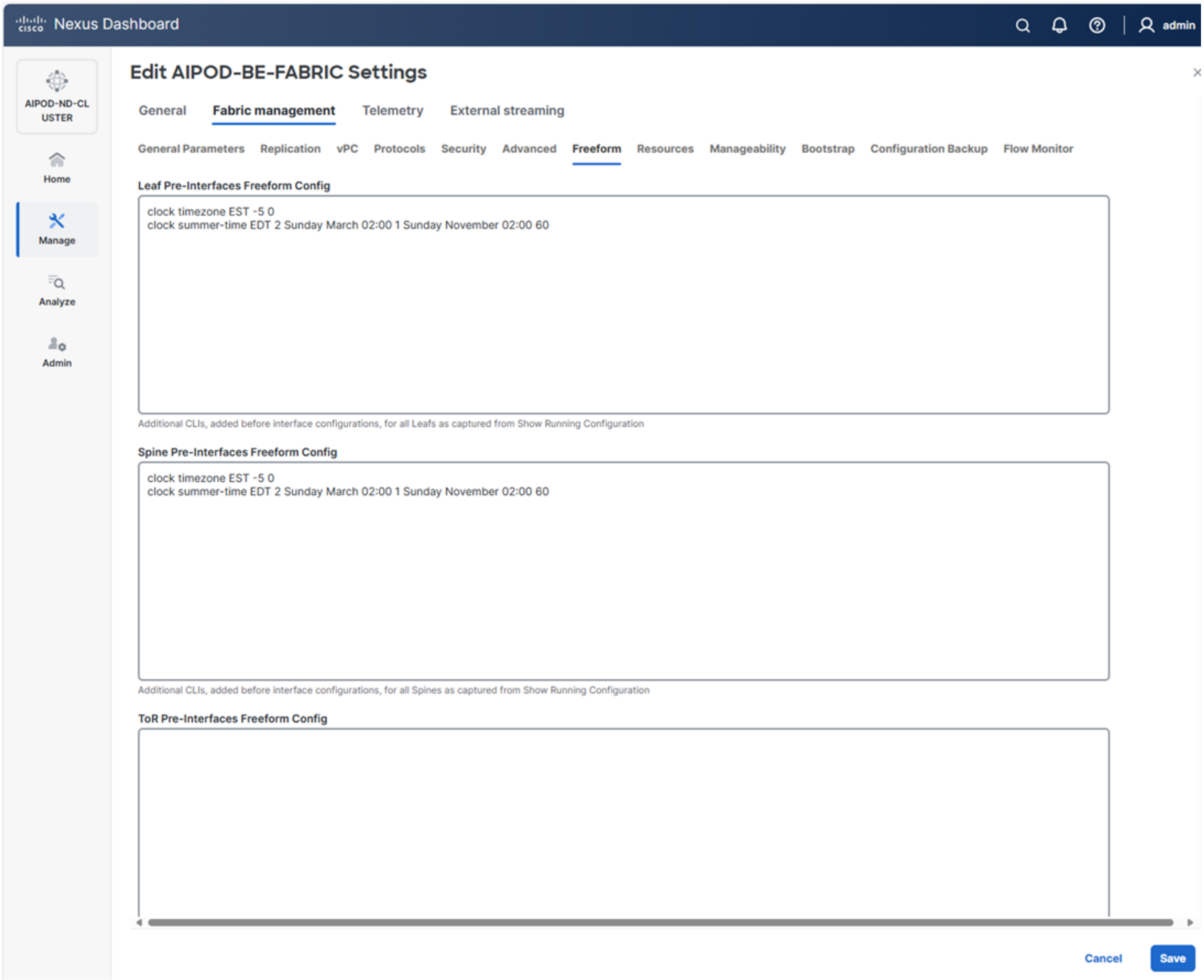
Syslog Server Severity:
Comma separated list of Syslog severity values, one per Syslog server (Min:0, Max:7)

Syslog Server VRFs:
One VRF for all Syslog servers or a comma separated list of VRFs, one per Syslog server

AAA Freeform Config:

Note: This screenshot and the following screenshot show BE fabric but are the same for the FE fabric.

Step 11. Select the **Freeform** tab and optionally enter the info shown in the screenshot modified for your timezone. Click **Save**.



Edit AIPOD-BE-FABRIC Settings

Leaf Pre-Interfaces Freeform Config

```
clock timezone EST -5 0
clock summer-time EDT 2 Sunday March 02:00 1 Sunday November 02:00 60
```

Additional CLIs, added before interface configurations, for all Leafs as captured from Show Running Configuration

Spine Pre-Interfaces Freeform Config

```
clock timezone EST -5 0
clock summer-time EDT 2 Sunday March 02:00 1 Sunday November 02:00 60
```

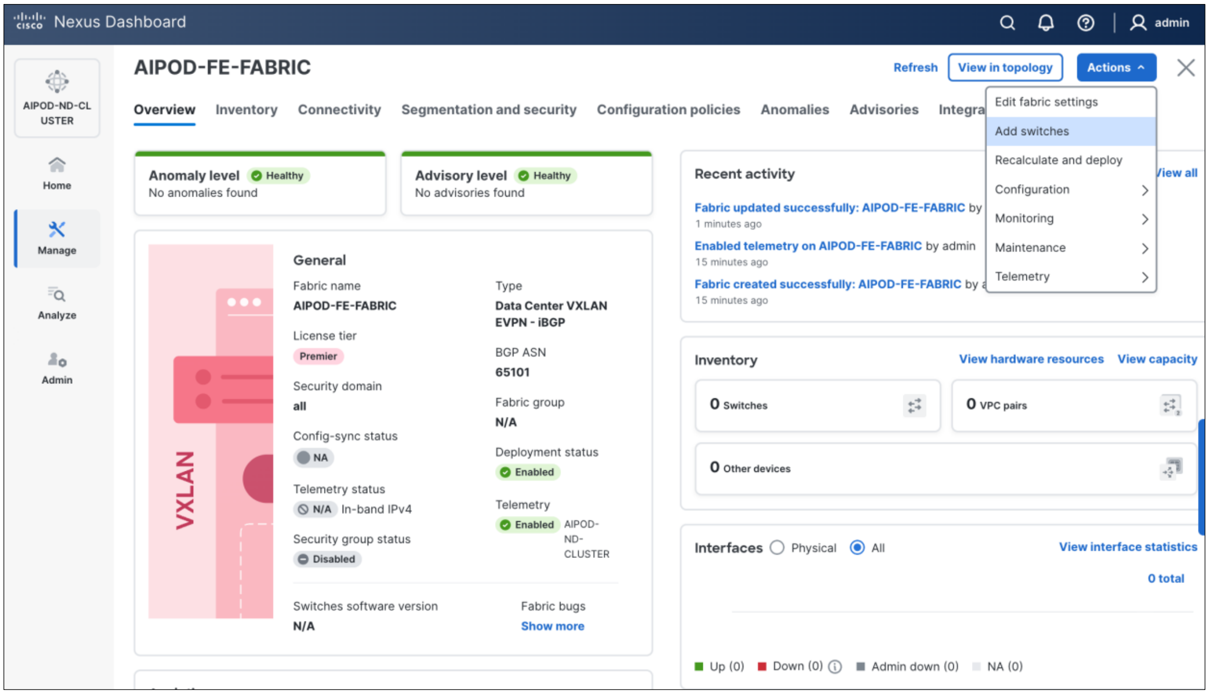
Additional CLIs, added before interface configurations, for all Spines as captured from Show Running Configuration

ToR Pre-Interfaces Freeform Config

Step 12. If you want to add switches without a reload, click **View fabric details**. Select **Fabric Management > Advanced** tabs and scroll down to find the field for **Add switches without Reload** and change setting to **enable.** Click **Save**, followed by **Got it** in the pop-up window.

Step 13. From the **Manage > Fabrics** view, click the fabric name to add switches to the fabric.

Step 14. Click **Actions** and select **Add Switches** from the drop-down list.



Anomaly level Healthy
No anomalies found

Advisory level Healthy
No advisories found

General

Fabric name AIPOD-FE-FABRIC	Type Data Center VXLAN EVPN - iBGP
License tier Premier	BGP ASN 65101
Security domain all	Fabric group N/A
Config-sync status NA	Deployment status Enabled
Telemetry status N/A In-band IPv4	Telemetry Enabled AIPOD-ND-CLUSTER
Security group status Disabled	
Switches software version N/A	Fabric bugs Show more

Recent activity

Fabric updated successfully: AIPOD-FE-FABRIC by
1 minutes ago

Enabled telemetry on AIPOD-FE-FABRIC by admin
15 minutes ago

Fabric created successfully: AIPOD-FE-FABRIC by a
15 minutes ago

Inventory — View hardware resources — View capacity

0 Switches

0 VPC pairs

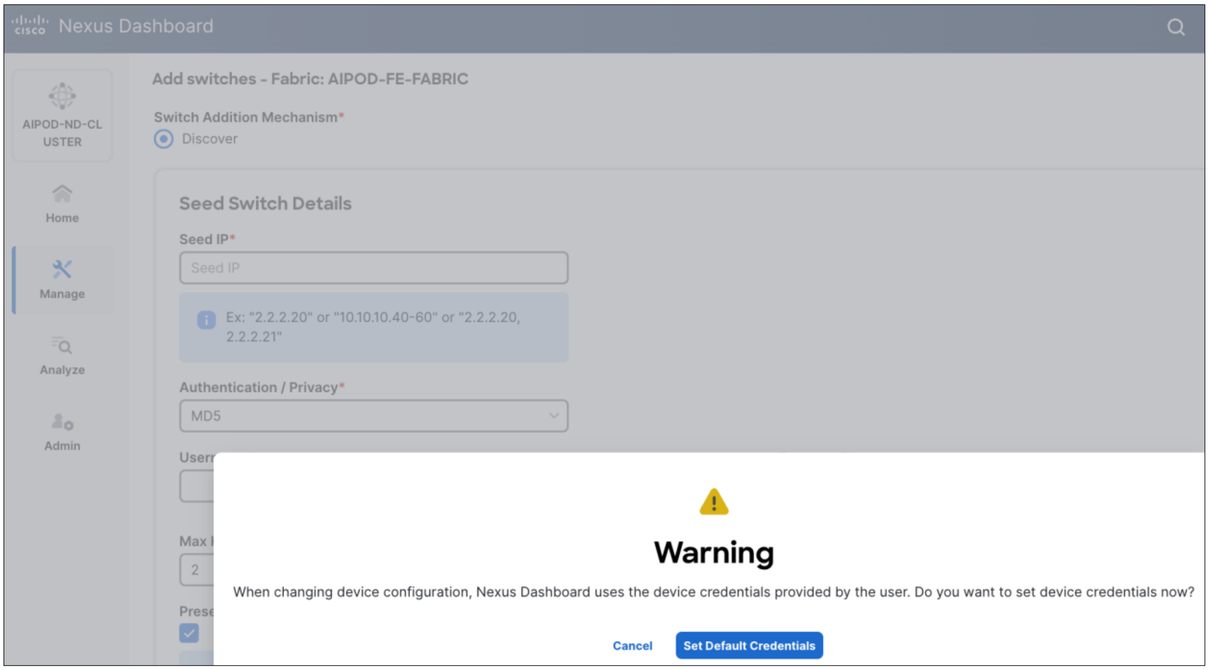
0 Other devices

Interfaces ○ Physical ● All — View interface statistics

0 total

🟩 Up (0) 🟥 Down (0) ■ Admin down (0) ■ NA (0)

Step 15. In the pop-up window, click **Set Default Credentials**.



Add switches - Fabric: AIPOD-FE-FABRIC

Switch Addition Mechanism*
● Discover

Seed Switch Details

Seed IP*
Seed IP

Ex: "2.2.2.20" or "10.10.10.40-60" or "2.2.2.20, 2.2.2.21"

Authentication / Privacy*
MD5

User

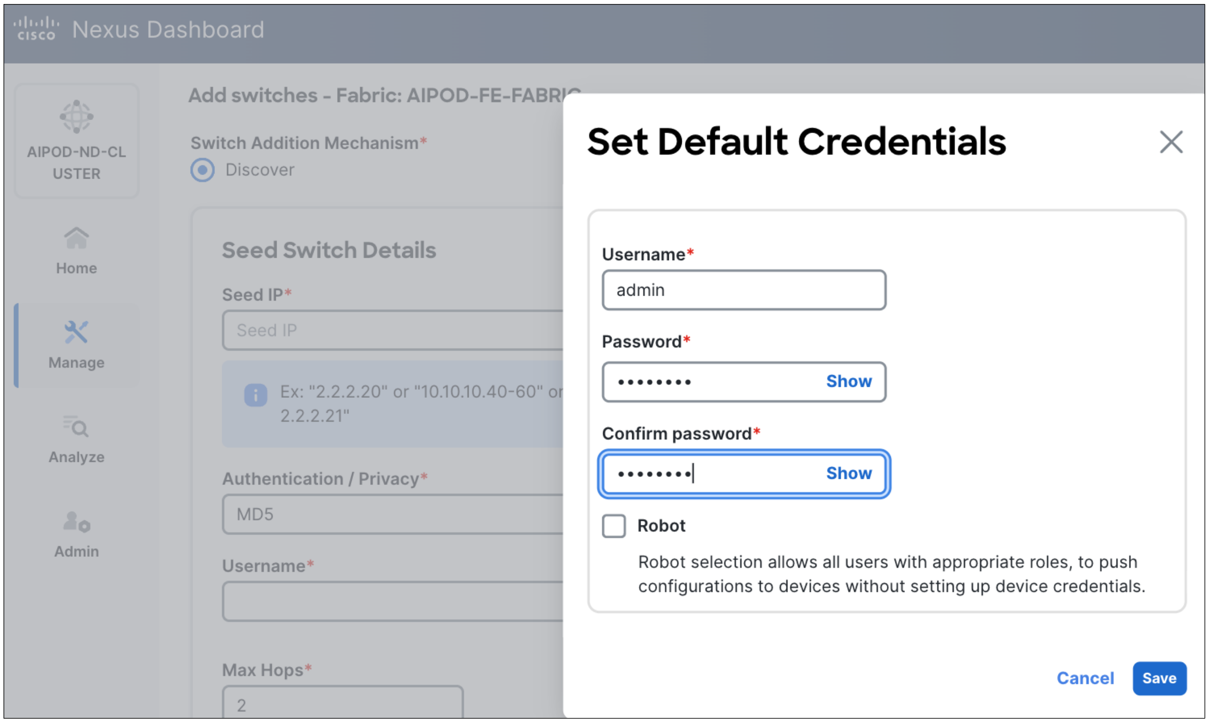
Max
2

Prese
☑

Warning

When changing device configuration, Nexus Dashboard uses the device credentials provided by the user. Do you want to set device credentials now?

Step 16. Specify **username** and **password**. Click **Save**.



Switch Addition Mechanism*
● Discover

Seed Switch Details

Seed IP*
Seed IP

Ex: "2.2.2.20" or "10.10.10.40-60" or 2.2.2.21"

Authentication / Privacy*
MD5

Username*

Max Hops*
2

Set Default Credentials

Username*
admin

Password*
•••••••• Show

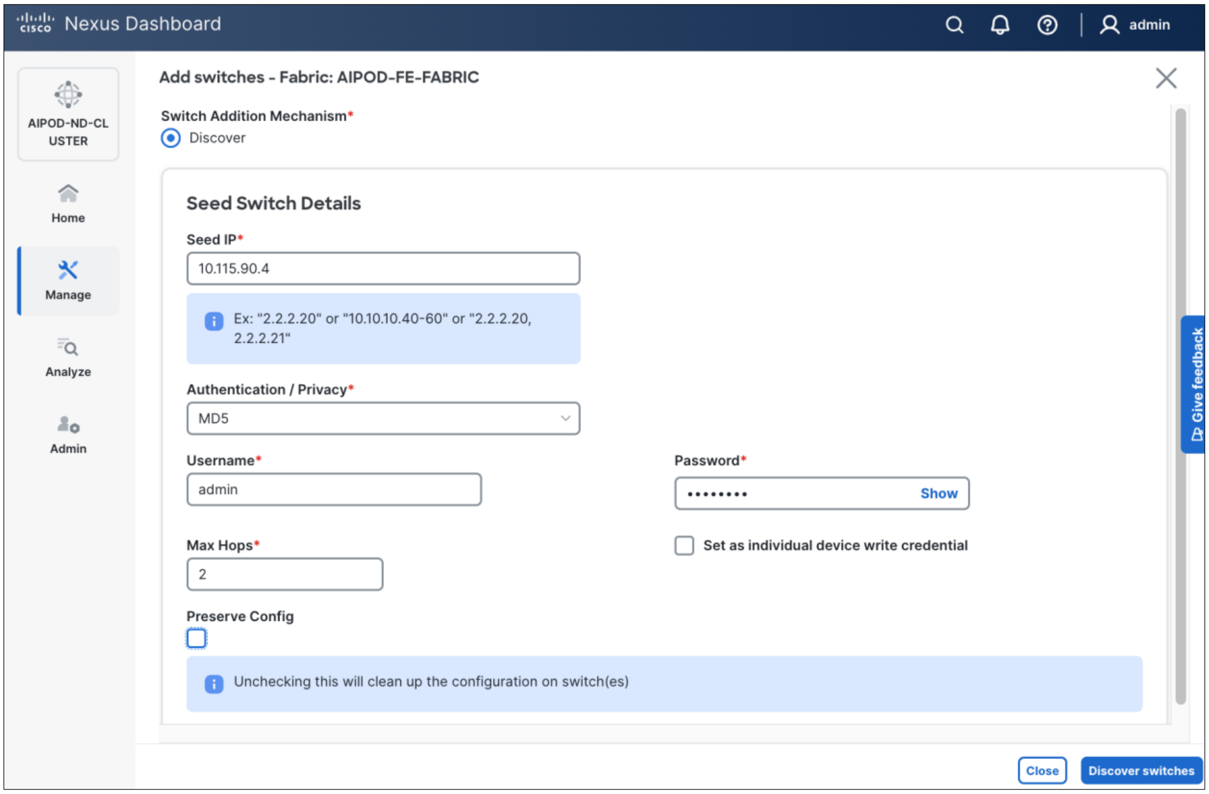
Confirm password*
•••••••• Show

□ Robot

Robot selection allows all users with appropriate roles, to push configurations to devices without setting up device credentials.

Step 17. Click **OK**.

Step 18. Specify **Seed IP**, **username** and **password**. Adjust **Max hops** as needed. Click **Discover Switches**.



Add switches - Fabric: AIPOD-FE-FABRIC

Switch Addition Mechanism*
● Discover

Seed Switch Details

Seed IP*
10.115.90.4

Ex: "2.2.2.20" or "10.10.10.40-60" or "2.2.2.20, 2.2.2.21"

Authentication / Privacy*
MD5

Username*
admin

Password*
•••••••• Show

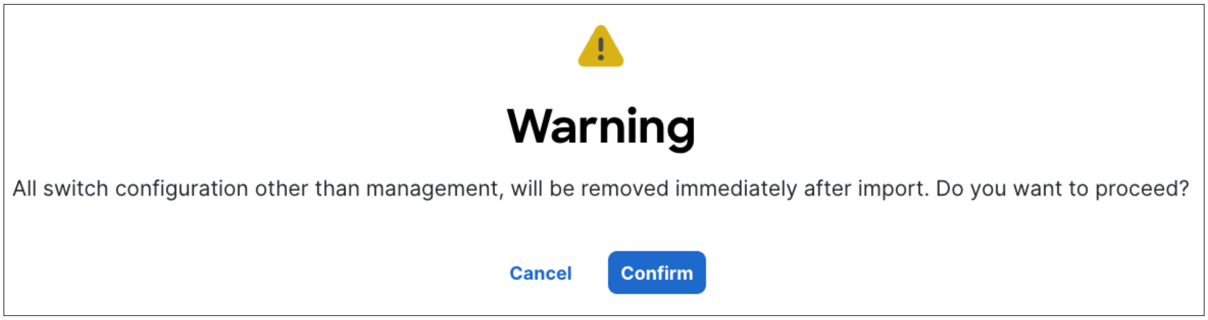
Max Hops*
2

□ Set as individual device write credential

Preserve Config
□

Unchecking this will clean up the configuration on switch(es)

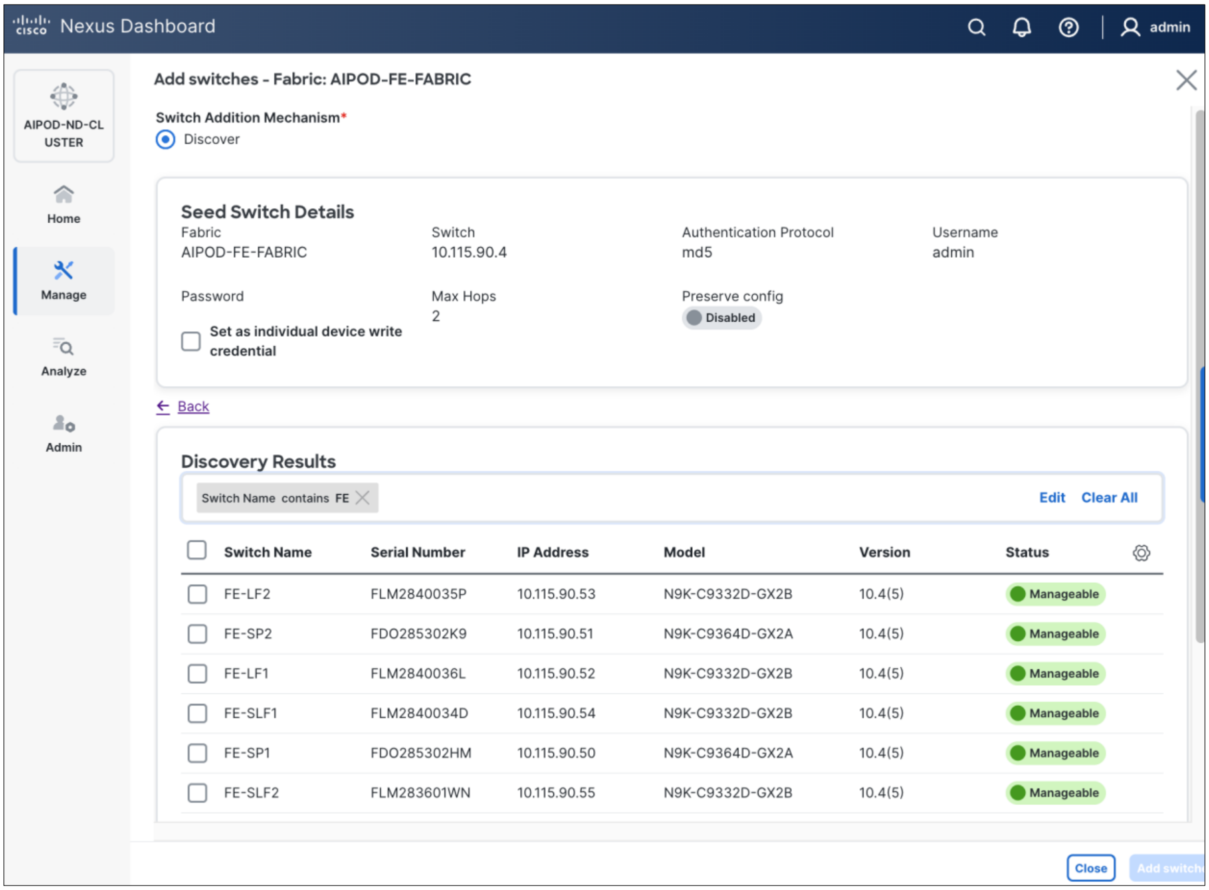
Step 19. Click **Confirm** in the pop-up **Warning**.



Warning

All switch configuration other than management, will be removed immediately after import. Do you want to proceed?

Step 20. Filter the discovered switch list as needed to view just the switches you want to add.



Add switches - Fabric: AIPOD-FE-FABRIC

Switch Addition Mechanism*
● Discover

Seed Switch Details

Fabric AIPOD-FE-FABRIC	Switch 10.115.90.4	Authentication Protocol md5	Username admin
Password	Max Hops 2	Preserve config Disabled	

□ Set as individual device write credential

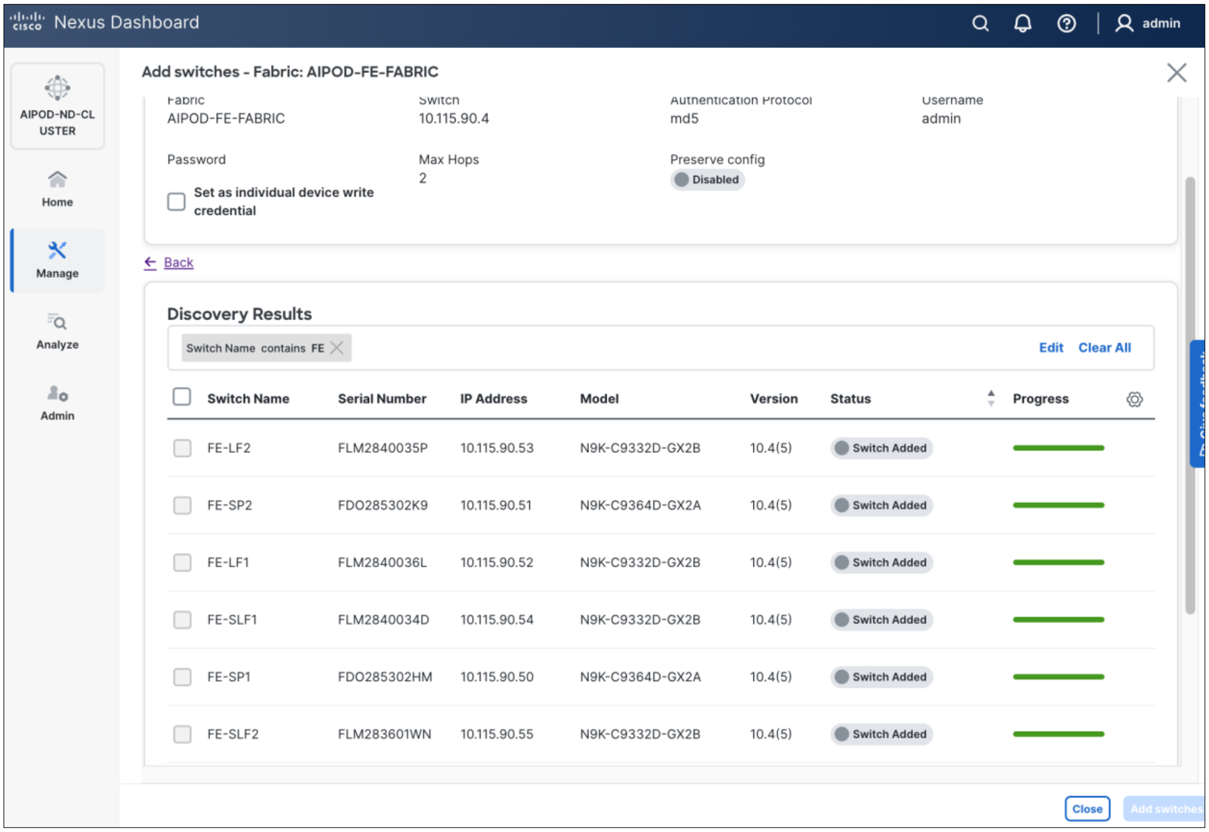
← Back

Discovery Results

Switch Name contains FE ✕ — Edit — Clear All

□	Switch Name	Serial Number	IP Address	Model	Version	Status
□	FE-LF2	FLM2840035P	10.115.90.53	N9K-C9332D-GX2B	10.4(5)	Manageable
□	FE-SP2	FDO285302K9	10.115.90.51	N9K-C9364D-GX2A	10.4(5)	Manageable
□	FE-LF1	FLM2840036L	10.115.90.52	N9K-C9332D-GX2B	10.4(5)	Manageable
□	FE-SLF1	FLM2840034D	10.115.90.54	N9K-C9332D-GX2B	10.4(5)	Manageable
□	FE-SP1	FDO285302HM	10.115.90.50	N9K-C9364D-GX2A	10.4(5)	Manageable
□	FE-SLF2	FLM283601WN	10.115.90.55	N9K-C9332D-GX2B	10.4(5)	Manageable

Step 21. Select all switches to be added. Click **Add switches**.



Add switches - Fabric: AIPOD-FE-FABRIC

Fabric	Switch	Authentication Protocol	Username
AIPOD-FE-FABRIC	10.115.90.4	md5	admin

Password	Max Hops	Preserve config
□ Set as individual device write credential	2	Disabled

Back

Discovery Results

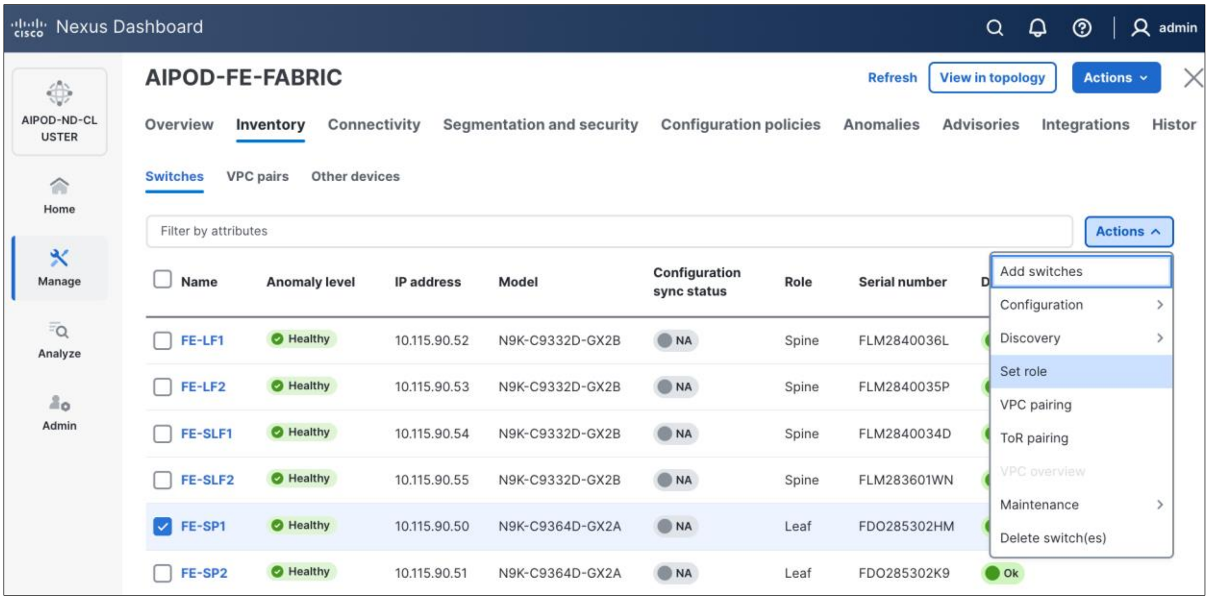
Switch Name contains FE ✕ Edit Clear All

□ Switch Name	Serial Number	IP Address	Model	Version	Status	Progress
□ FE-LF2	FLM2840035P	10.115.90.53	N9K-C9332D-GX2B	10.4(5)	Switch Added	
□ FE-SP2	FDO285302K9	10.115.90.51	N9K-C9364D-GX2A	10.4(5)	Switch Added	
□ FE-LF1	FLM2840036L	10.115.90.52	N9K-C9332D-GX2B	10.4(5)	Switch Added	
□ FE-SLF1	FLM2840034D	10.115.90.54	N9K-C9332D-GX2B	10.4(5)	Switch Added	
□ FE-SP1	FDO285302HM	10.115.90.50	N9K-C9364D-GX2A	10.4(5)	Switch Added	
□ FE-SLF2	FLM283601WN	10.115.90.55	N9K-C9332D-GX2B	10.4(5)	Switch Added	

Step 22. Click **Close** when all switches have been added.

Step 23. From the **Manage > Fabrics**, select the fabric and click **Inventory** tab.

Step 24. For each switch in the list, verify **Role** is correct. To change the role, select the switch and then click the lower of the two **Actions** buttons and select **Set role** from the drop-down list.



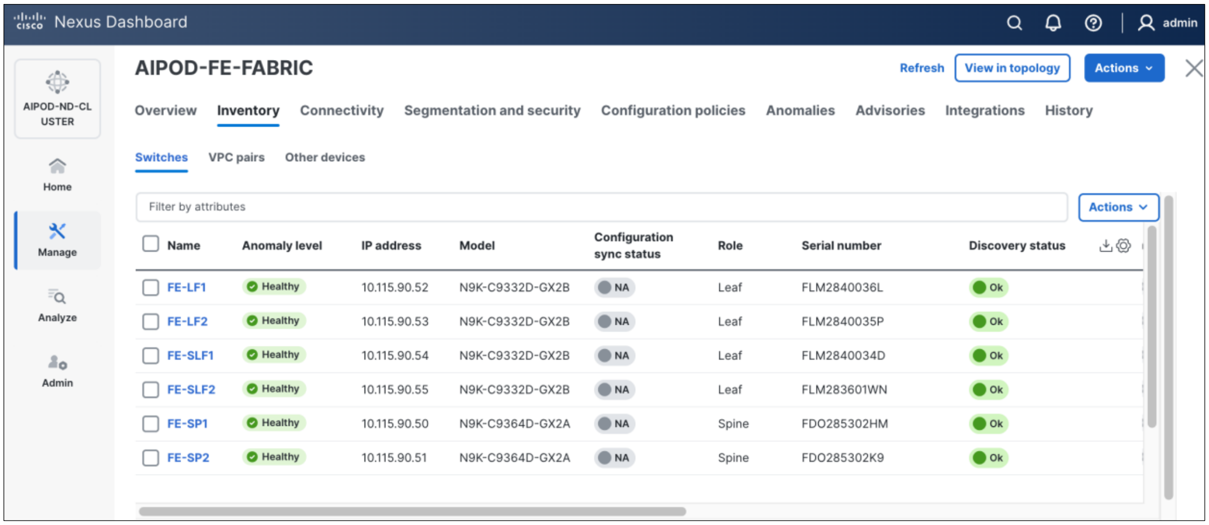
AIPOD-FE-FABRIC

□ Name	Anomaly level	IP address	Model	Configuration sync status	Role	Serial number	D
□ FE-LF1	Healthy	10.115.90.52	N9K-C9332D-GX2B	NA	Spine	FLM2840036L	
□ FE-LF2	Healthy	10.115.90.53	N9K-C9332D-GX2B	NA	Spine	FLM2840035P	
□ FE-SLF1	Healthy	10.115.90.54	N9K-C9332D-GX2B	NA	Spine	FLM2840034D	
□ FE-SLF2	Healthy	10.115.90.55	N9K-C9332D-GX2B	NA	Spine	FLM283601WN	
☑ FE-SP1	Healthy	10.115.90.50	N9K-C9364D-GX2A	NA	Leaf	FDO285302HM	
□ FE-SP2	Healthy	10.115.90.51	N9K-C9364D-GX2A	NA	Leaf	FDO285302K9	Ok

Step 25. In the **Select Role** pop-up window, select the correct role from the list and click **Select.**

Step 26. Click **OK** in the pop-up warning to perform **"Recalculate and deploy"** to complete the change.

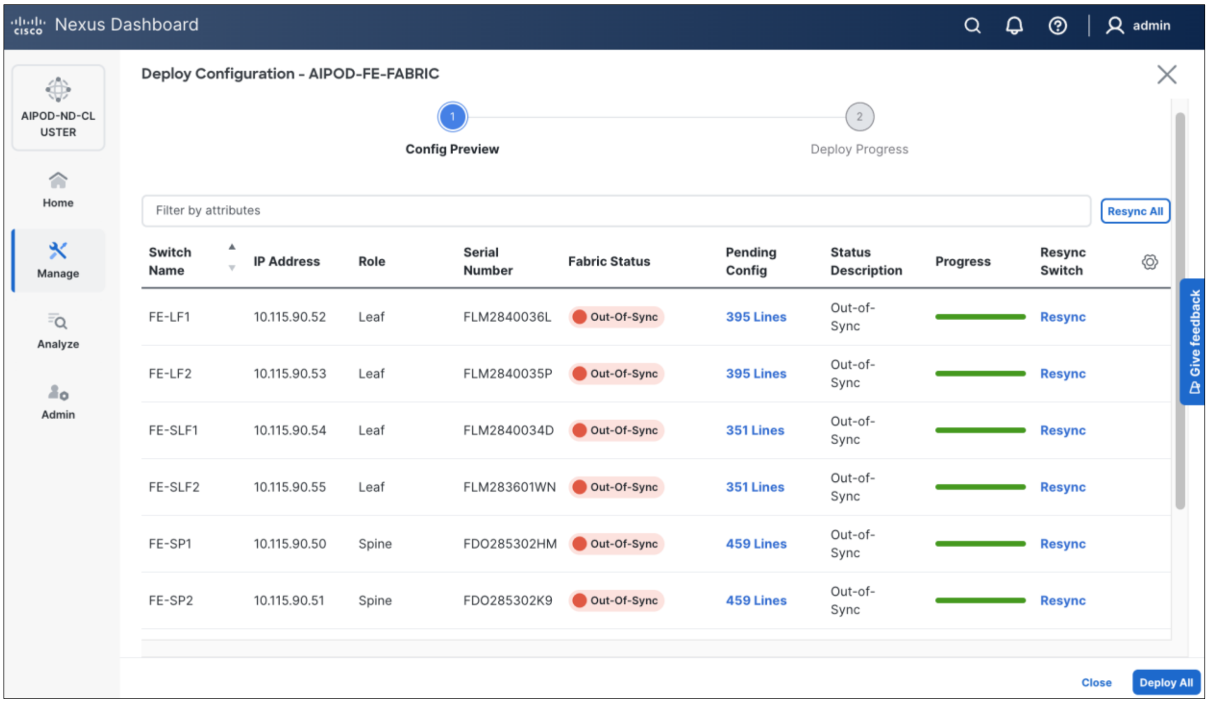
Step 27. Repeat these steps to select and confirm the role for all switches in the fabric.



☐	Name	Anomaly level	IP address	Model	Configuration sync status	Role	Serial number	Discovery status
☐	FE-LF1	Healthy	10.115.90.52	N9K-C9332D-GX2B	NA	Leaf	FLM2840036L	Ok
☐	FE-LF2	Healthy	10.115.90.53	N9K-C9332D-GX2B	NA	Leaf	FLM2840035P	Ok
☐	FE-SLF1	Healthy	10.115.90.54	N9K-C9332D-GX2B	NA	Leaf	FLM2840034D	Ok
☐	FE-SLF2	Healthy	10.115.90.55	N9K-C9332D-GX2B	NA	Leaf	FLM283601WN	Ok
☐	FE-SP1	Healthy	10.115.90.50	N9K-C9364D-GX2A	NA	Spine	FDO285302HM	Ok
☐	FE-SP2	Healthy	10.115.90.51	N9K-C9364D-GX2A	NA	Spine	FDO285302K9	Ok

Step 28. Click the higher of the two **Actions** buttons and select **Recalculate and deploy** from the drop-down list. If it says one is already in progress, wait a few minutes and repeat the steps. You should see the Fabric as **Out-of-sync** with some **Pending Config** (lines of config) change.

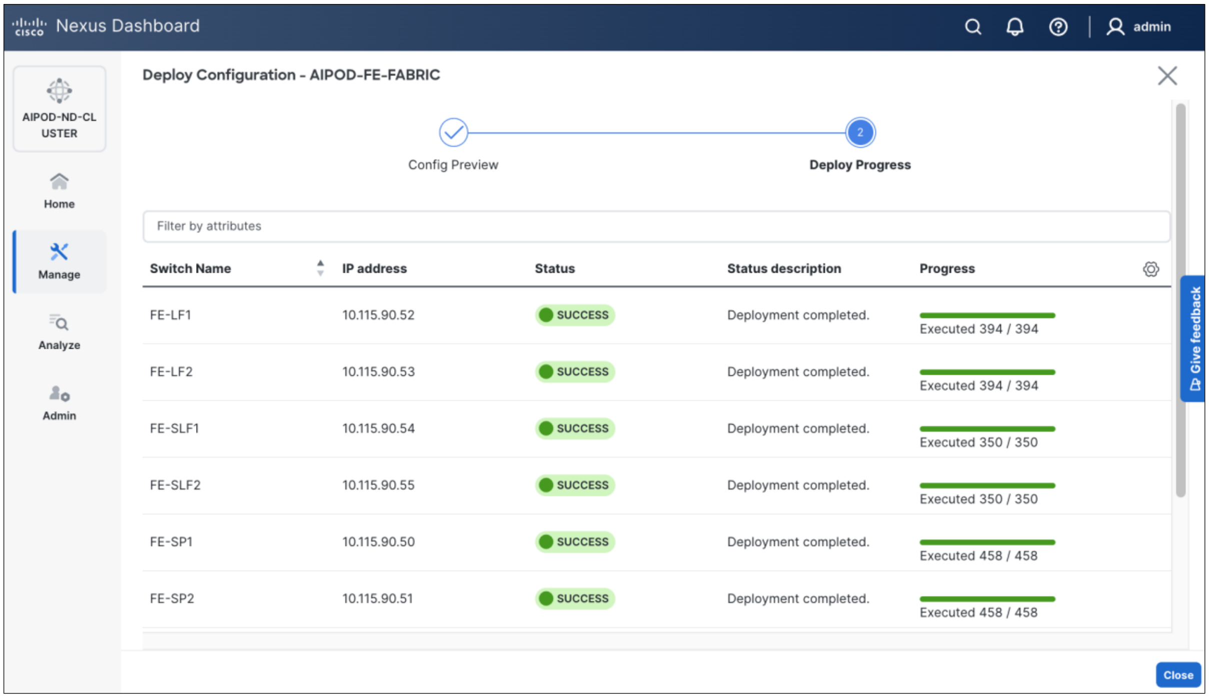
Step 29. Click **Deploy All**.



Deploy Configuration - AIPOD-FE-FABRIC

Switch Name	IP Address	Role	Serial Number	Fabric Status	Pending Config	Status Description	Progress	Resync Switch
FE-LF1	10.115.90.52	Leaf	FLM2840036L	Out-Of-Sync	395 Lines	Out-of-Sync		Resync
FE-LF2	10.115.90.53	Leaf	FLM2840035P	Out-Of-Sync	395 Lines	Out-of-Sync		Resync
FE-SLF1	10.115.90.54	Leaf	FLM2840034D	Out-Of-Sync	351 Lines	Out-of-Sync		Resync
FE-SLF2	10.115.90.55	Leaf	FLM283601WN	Out-Of-Sync	351 Lines	Out-of-Sync		Resync
FE-SP1	10.115.90.50	Spine	FDO285302HM	Out-Of-Sync	459 Lines	Out-of-Sync		Resync
FE-SP2	10.115.90.51	Spine	FDO285302K9	Out-Of-Sync	459 Lines	Out-of-Sync		Resync

Step 30. Click **Close**.

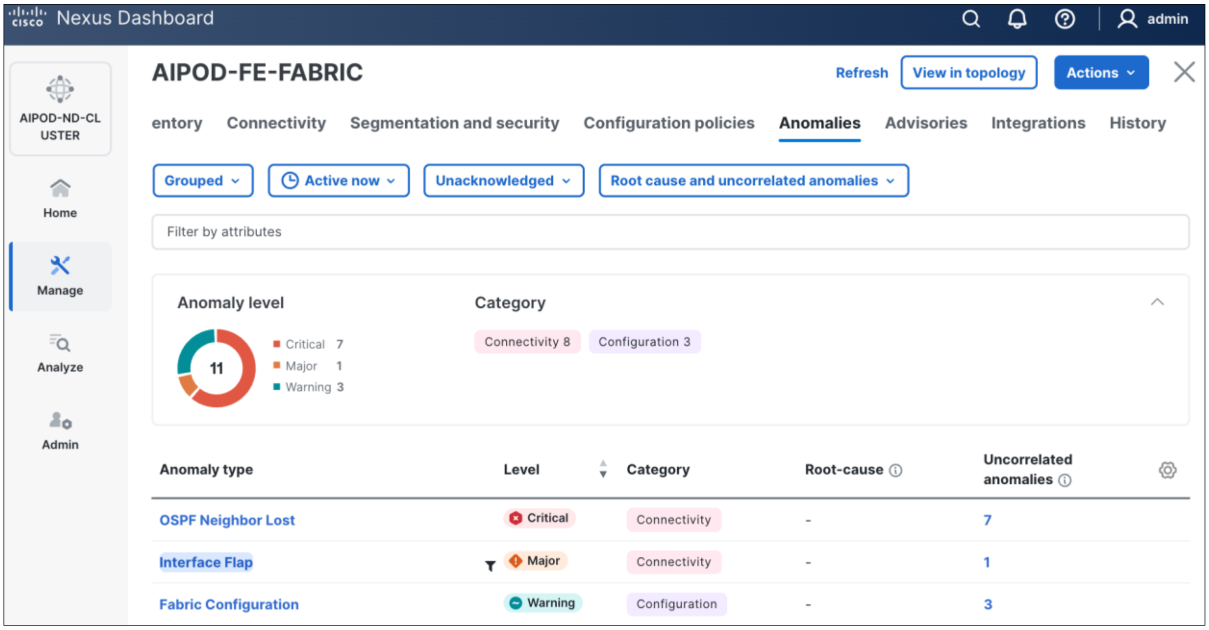


Deploy Configuration - AIPOD-FE-FABRIC

Filter by attributes

Switch Name	IP address	Status	Status description	Progress
FE-LF1	10.115.90.52	SUCCESS	Deployment completed.	Executed 394 / 394
FE-LF2	10.115.90.53	SUCCESS	Deployment completed.	Executed 394 / 394
FE-SLF1	10.115.90.54	SUCCESS	Deployment completed.	Executed 350 / 350
FE-SLF2	10.115.90.55	SUCCESS	Deployment completed.	Executed 350 / 350
FE-SP1	10.115.90.50	SUCCESS	Deployment completed.	Executed 458 / 458
FE-SP2	10.115.90.51	SUCCESS	Deployment completed.	Executed 458 / 458

Step 31. ND will identify issues in hardware, connectivity, software and so on, reflected by the Anomaly level. To view the flagged anomalies, navigate to **Anomalies** in the top menu bar. Address each anomaly to prevent issues later, either by resolving them or acknowledging them.



AIPOD-FE-FABRIC

Anomaly level

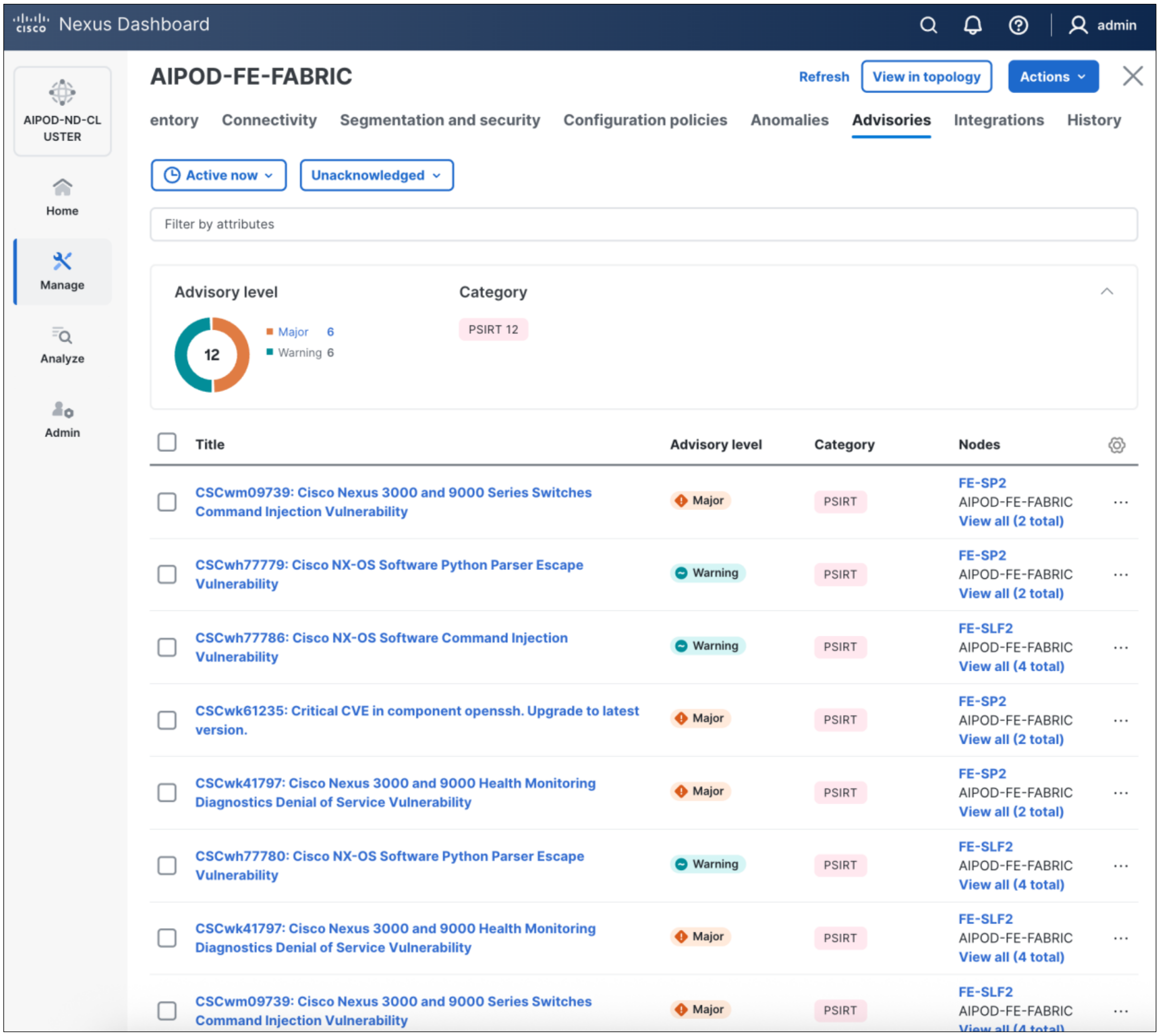
Critical	7
Major	1
Warning	3

Category

Connectivity 8 Configuration 3

Anomaly type	Level	Category	Root-cause	Uncorrelated anomalies
OSPF Neighbor Lost	Critical	Connectivity	-	7
Interface Flap	Major	Connectivity	-	1
Fabric Configuration	Warning	Configuration	-	3

Step 32. Review the Advisories and resolve or acknowledge them.



Title	Advisory level	Category	Nodes
CSCwm09739: Cisco Nexus 3000 and 9000 Series Switches Command Injection Vulnerability	Major	PSIRT	FE-SP2 AIPOD-FE-FABRIC View all (2 total)
CSCwh77779: Cisco NX-OS Software Python Parser Escape Vulnerability	Warning	PSIRT	FE-SP2 AIPOD-FE-FABRIC View all (2 total)
CSCwh77786: Cisco NX-OS Software Command Injection Vulnerability	Warning	PSIRT	FE-SLF2 AIPOD-FE-FABRIC View all (4 total)
CSCwk61235: Critical CVE in component openssh. Upgrade to latest version.	Major	PSIRT	FE-SP2 AIPOD-FE-FABRIC View all (2 total)
CSCwk41797: Cisco Nexus 3000 and 9000 Health Monitoring Diagnostics Denial of Service Vulnerability	Major	PSIRT	FE-SP2 AIPOD-FE-FABRIC View all (2 total)
CSCwh77780: Cisco NX-OS Software Python Parser Escape Vulnerability	Warning	PSIRT	FE-SLF2 AIPOD-FE-FABRIC View all (4 total)
CSCwk41797: Cisco Nexus 3000 and 9000 Health Monitoring Diagnostics Denial of Service Vulnerability	Major	PSIRT	FE-SLF2 AIPOD-FE-FABRIC View all (4 total)
CSCwm09739: Cisco Nexus 3000 and 9000 Series Switches Command Injection Vulnerability	Major	PSIRT	FE-SLF2 AIPOD-FE-FABRIC View all (4 total)

Step 33. Evaluate and upgrade to Cisco recommended Nexus OS release.

Step 34. Now start attaching compute, storage and other end devices to the cluster.

Enable vPC Pairing on Compute/Management Leaf Switches in the FE Fabric

To enable vPC pairing on the compute/management in the FE fabric, follow the procedures below.

Procedure 1. Enable vPC pairing for compute/management leaf switches in the FE fabric

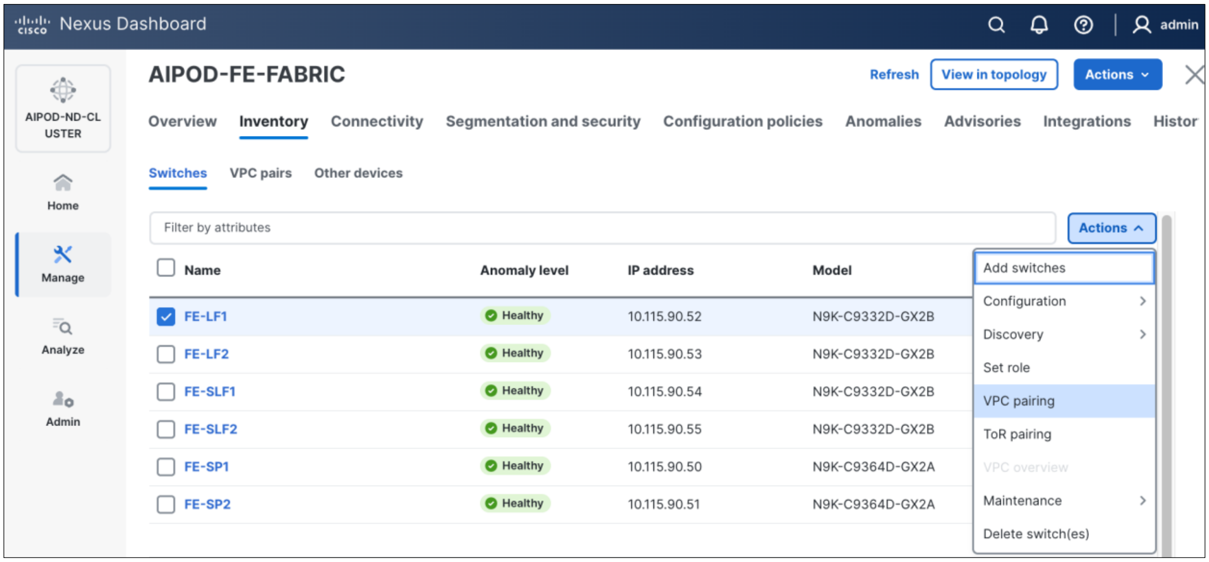
Step 1. Use a web browser to navigate to Nexus Dashboard. Use the management IP of any node in the ND cluster. Log in using **admin** account.

Step 2. From the left navigation menu, go to **Manage** > **Fabrics**.

Step 3. Select the FE fabric and click **Inventory** tab.

Step 4. To enable VPC **pairing** on the leaf switches that connect to UCS compute (GPU and management) nodes, select the **first** leaf switch in the leaf pair.

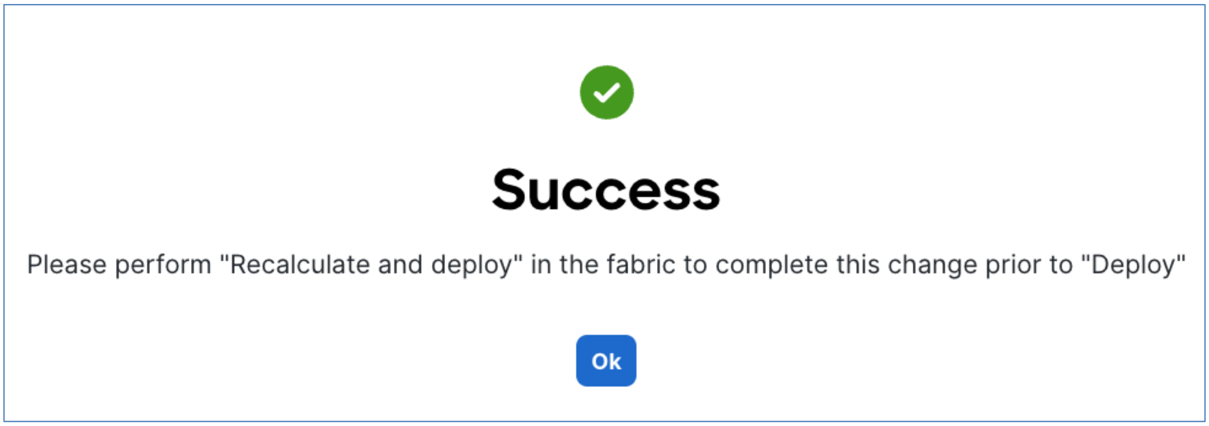
Step 5. Click the lower of the two **Actions** buttons and select **VPC pairing** from the drop-down list.



	Name	Anomaly level	IP address	Model
☑	FE-LF1	Healthy	10.115.90.52	N9K-C9332D-GX2B
□	FE-LF2	Healthy	10.115.90.53	N9K-C9332D-GX2B
□	FE-SLF1	Healthy	10.115.90.54	N9K-C9332D-GX2B
□	FE-SLF2	Healthy	10.115.90.55	N9K-C9332D-GX2B
□	FE-SP1	Healthy	10.115.90.50	N9K-C9364D-GX2A
□	FE-SP2	Healthy	10.115.90.51	N9K-C9364D-GX2A

Step 6. Select the **VPC peer switch** for the **first compute/management leaf.** Enable **Virtual Peerlink**.

Step 7. Click **Save**.

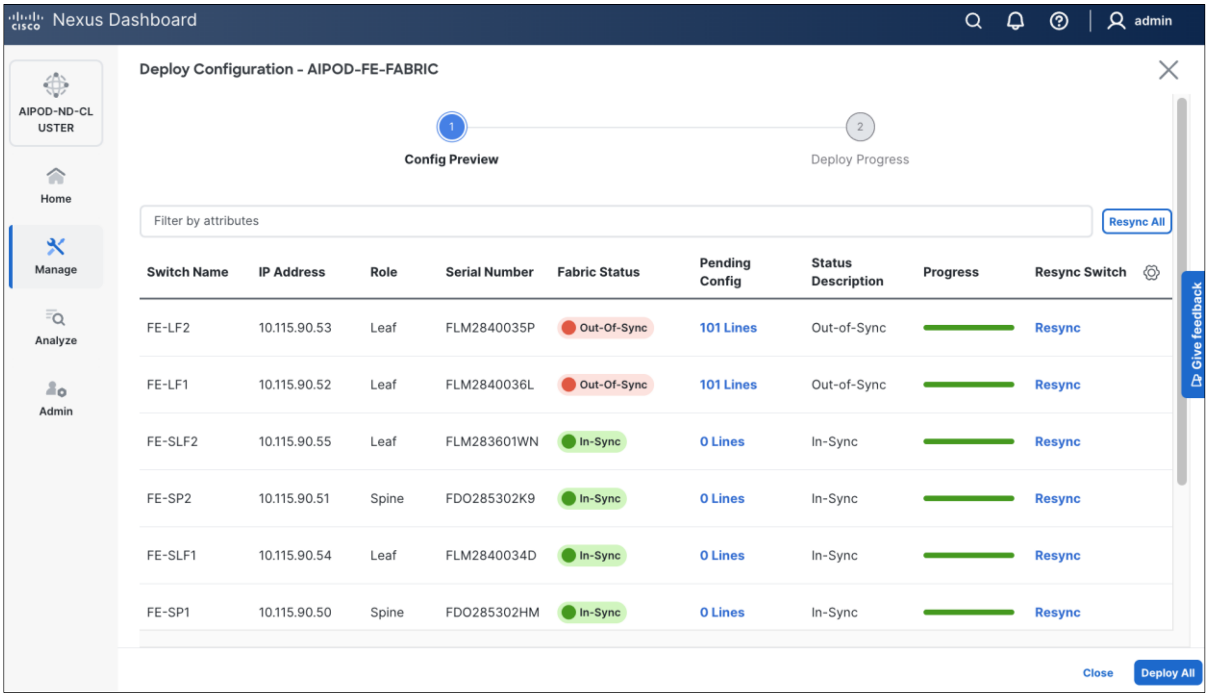


Success

Please perform "Recalculate and deploy" in the fabric to complete this change prior to "Deploy"

Step 8. Click **OK** in the **Success** pop-up window.

Step 9. Select the two leaf switches in the vPC pair that are now **Out-of-sync** from the configuration change. Click the higher of the two **Actions** buttons and select **Recalculate and deploy** from the drop-down list.



Deploy Configuration - AIPOD-FE-FABRIC

Switch Name	IP Address	Role	Serial Number	Fabric Status	Pending Config	Status Description	Progress	Resync Switch
FE-LF2	10.115.90.53	Leaf	FLM2840035P	Out-Of-Sync	101 Lines	Out-of-Sync		Resync
FE-LF1	10.115.90.52	Leaf	FLM2840036L	Out-Of-Sync	101 Lines	Out-of-Sync		Resync
FE-SLF2	10.115.90.55	Leaf	FLM283601WN	In-Sync	0 Lines	In-Sync		Resync
FE-SP2	10.115.90.51	Spine	FDO285302K9	In-Sync	0 Lines	In-Sync		Resync
FE-SLF1	10.115.90.54	Leaf	FLM2840034D	In-Sync	0 Lines	In-Sync		Resync
FE-SP1	10.115.90.50	Spine	FDO285302HM	In-Sync	0 Lines	In-Sync		Resync

Step 10. Click **Deploy All**.

Step 11. When the configuration deployment completes successfully, click **Close**.

Step 12. In the **Inventory** tab, navigate to **VPC pairs** tab to see the newly created vPC pair.

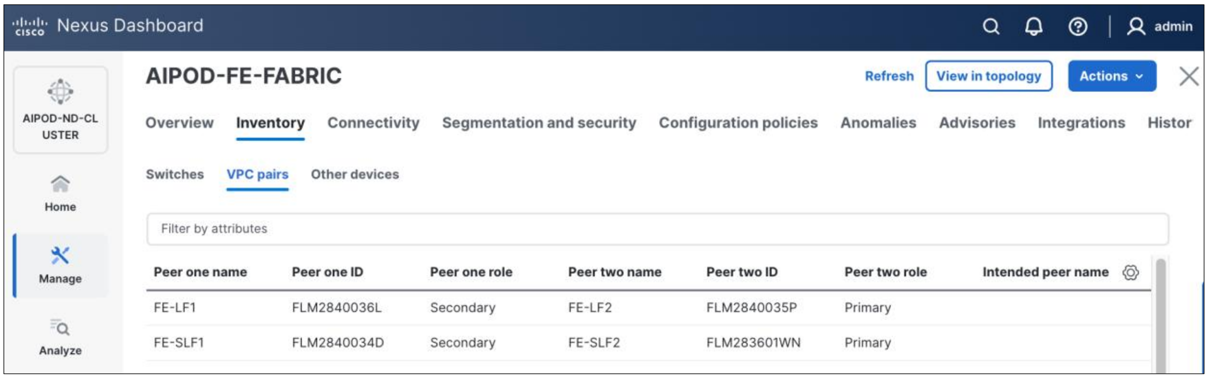
Enable vPC Pairing on Storage Leaf Switches in the Frontend Fabric

To enable vPC pairing for the storage leaf switches in the FE fabric, follow the procedures below.

Procedure 1. Enable vPC pairing for storage leaf switches in the FE fabric

Step 1. Repeat the previous procedure to configure storage leaf switches in the FE fabric as vPC peers.

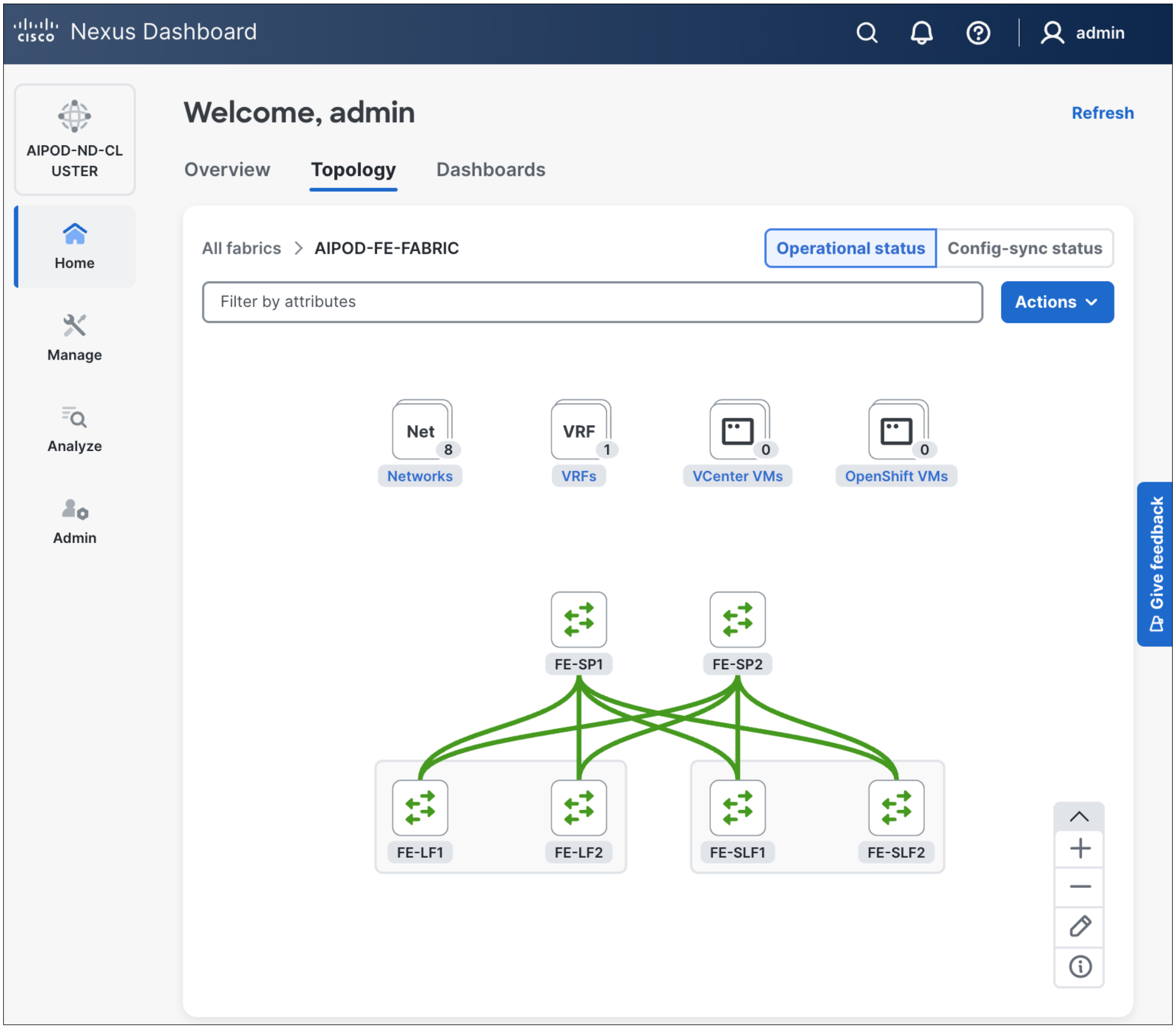
Step 2. In the **Inventory** tab, navigate to **VPC pairs** tab to see the newly created vPC pairs.



AIPOD-FE-FABRIC

Peer one name	Peer one ID	Peer one role	Peer two name	Peer two ID	Peer two role	Intended peer name
FE-LF1	FLM2840036L	Secondary	FE-LF2	FLM2840035P	Primary	
FE-SLF1	FLM2840034D	Secondary	FE-SLF2	FLM283601WN	Primary	

Step 3. From the left navigation menu, if you now go to **Manage** > **Fabric** and select the FE fabric and then the **Topology** tab, you should now see the 2 Leaf switch pairs grouped in a box, indicating they are vPC peers.



Enable Layer 2 Connectivity to Management UCS X-Direct from FE fabric

Table 8. Setup Parameters for FE Fabric: Layer 2 Connectivity to Management UCS X-Direct

Parameter Type	Parameter Name | Value	Parameter Type
Leaf Switches	FE-LF1, FE-LF2	
Management UCS	UCS X-Direct with (-A, -B) uplinks; Both uplinks are dual-homed to FE-LF1 & FE-LF2	With multiple servers
Virtual Port Channel (vPC)	To UCS X-Direct	Management UCS-X Direct Chassis
vPC/PC1 - ID	15	To UCS X-Direct: Side-A
vPC Pair	FE-LF1, FE-LF2	
Ports	1/5, 1/7	FI-A: Ports 1/1-4 (PC-11)

Parameter Type	Parameter Name | Value	Parameter Type
vPC/PC2 - ID	16	To UCS X-Direct: Side-B
Ports	1/6, 1/8	FI-B: Ports 1/1-4 (PC-12)

To enable Layer 2 connectivity to management Cisco UCS X-Series Direct chassis from the FE fabric, follow the procedures below. You will be configuring **two** vPCs to the management Cisco UCS X-Series Direct, one for -A side and another for -B side. Each vPC will use multiple ports on each compute leaf switch pair to connect to -A and -B uplinks on Cisco UCS X-Series Direct chassis.

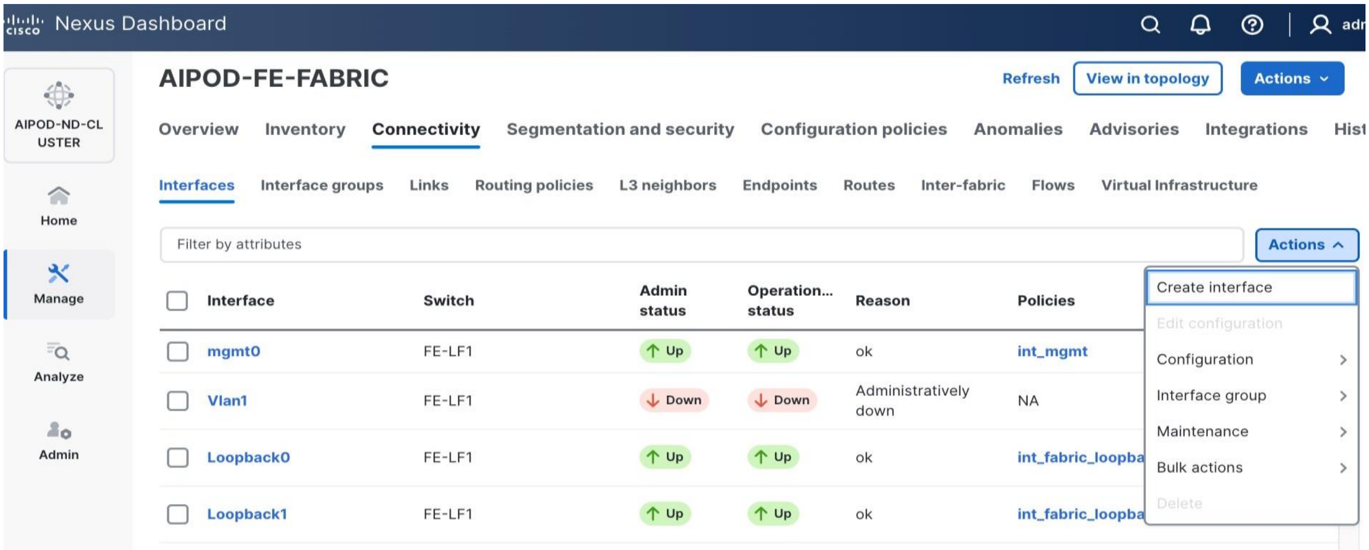
Procedure 1. Deploy first vPC to Management UCS X-Series Direct

Step 1. Use a web browser to navigate to Nexus Dashboard. Use the management IP of any node in the ND cluster. Log in using **admin** account.

Step 2. From the left navigation menu, go to **Manage** > **Fabrics**.

Step 3. Select the FE fabric and navigate to **Connectivity** > **Interfaces** tab.

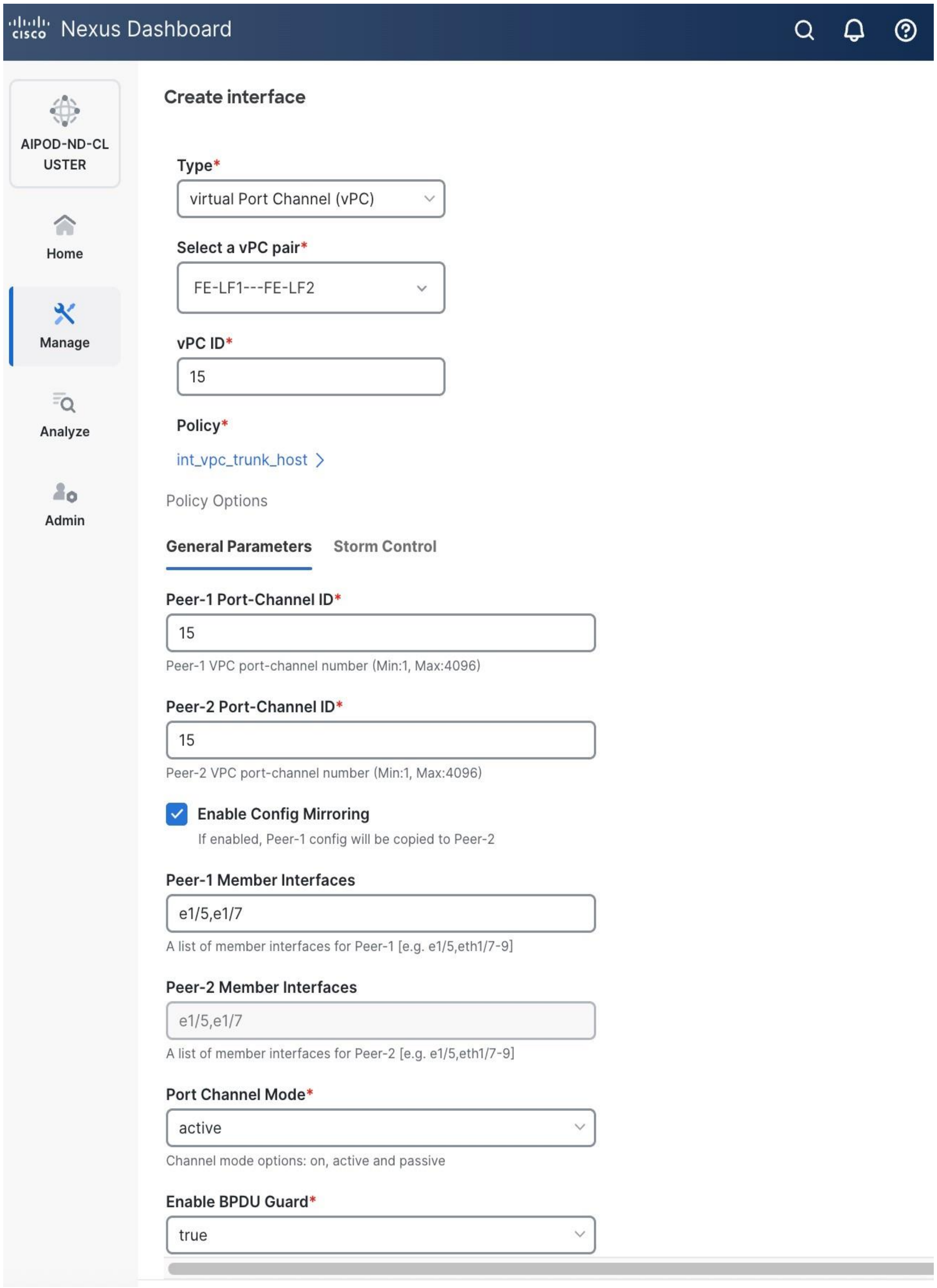
Step 4. Click the lower of the two **Actions** buttons and select **Create interface**.



Interface	Switch	Admin status	Operation... status	Reason	Policies
mgmt0	FE-LF1	Up	Up	ok	int_mgmt
Vlan1	FE-LF1	Down	Down	Administratively down	NA
Loopback0	FE-LF1	Up	Up	ok	int_fabric_loopba
Loopback1	FE-LF1	Up	Up	ok	int_fabric_loopba

Step 5. In the Create interface window:

- Specify the **Type** of interface as **virtual Port Channel (vPC)** from the drop-down list.
- For the **Select a vPC pair**, select the compute leaf switch vPC pair from the drop-down list.
- Specify a **vPC ID** for the **first** vPC to the UCS X-Direct (**-A side**). Port Channel IDs from each switch to the first UCS node should match the vPC ID (see screenshot below).
- Leave the Policy as int_vpc_trunk_host.
- **Enable** checkbox for **Config Mirroring** to configure both vPC peer switches identically.
- Specify **Peer-1 Member Interfaces** that connects to first UCS node.
- Leave other fields as is.



Create interface

Type* virtual Port Channel (vPC)

Select a vPC pair* FE-LF1---FE-LF2

vPC ID* 15

Policy* int_vpc_trunk_host >

Policy Options

General Parameters | Storm Control

Peer-1 Port-Channel ID* 15
Peer-1 VPC port-channel number (Min:1, Max:4096)

Peer-2 Port-Channel ID* 15
Peer-2 VPC port-channel number (Min:1, Max:4096)

☑ Enable Config Mirroring
If enabled, Peer-1 config will be copied to Peer-2

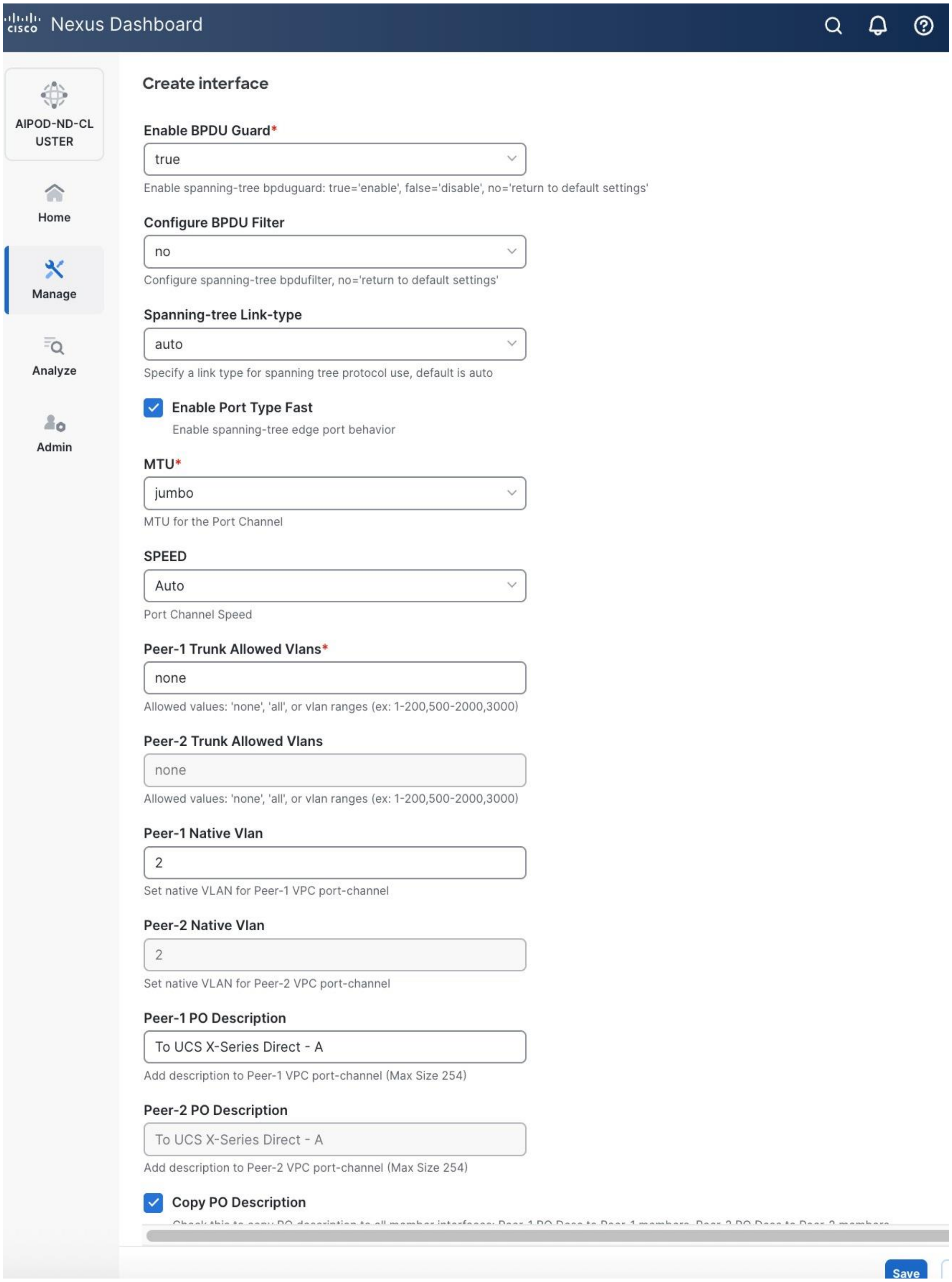
Peer-1 Member Interfaces e1/5,e1/7
A list of member interfaces for Peer-1 [e.g. e1/5,eth1/7-9]

Peer-2 Member Interfaces e1/5,e1/7
A list of member interfaces for Peer-2 [e.g. e1/5,eth1/7-9]

Port Channel Mode* active
Channel mode options: on, active and passive

Enable BPDU Guard* true

- Scroll down and fill remaining fields: **Native VLAN**, **Peer-1 PO Description,** and select the checkbox for **Copy PO Description** to copy the description to second vPC peer’s Port Channel.



Create interface

Enable BPDU Guard*
true
Enable spanning-tree bpduguard: true='enable', false='disable', no='return to default settings'

Configure BPDU Filter
no
Configure spanning-tree bpdufilter, no='return to default settings'

Spanning-tree Link-type
auto
Specify a link type for spanning tree protocol use, default is auto

☑ Enable Port Type Fast
Enable spanning-tree edge port behavior

MTU*
jumbo
MTU for the Port Channel

SPEED
Auto
Port Channel Speed

Peer-1 Trunk Allowed Vlans*
none
Allowed values: 'none', 'all', or vlan ranges (ex: 1-200,500-2000,3000)

Peer-2 Trunk Allowed Vlans
none
Allowed values: 'none', 'all', or vlan ranges (ex: 1-200,500-2000,3000)

Peer-1 Native Vlan
2
Set native VLAN for Peer-1 VPC port-channel

Peer-2 Native Vlan
2
Set native VLAN for Peer-2 VPC port-channel

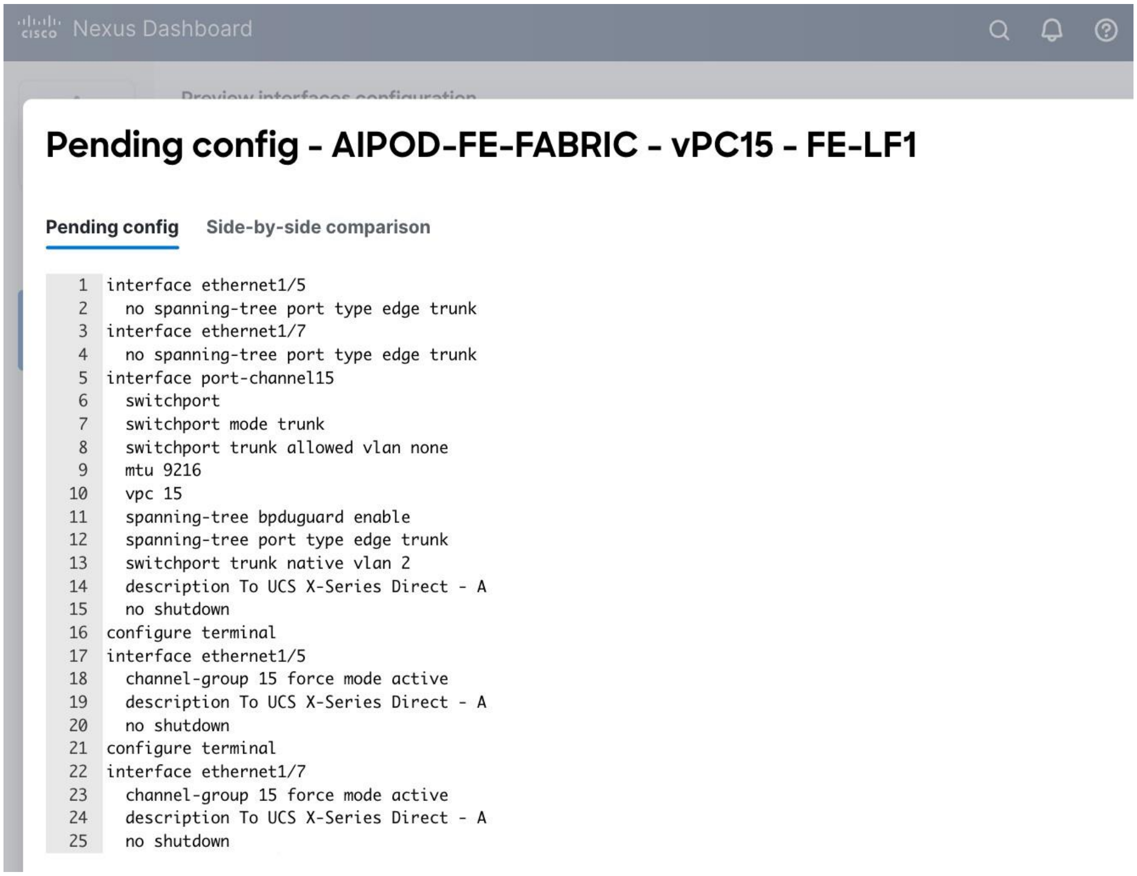
Peer-1 PO Description
To UCS X-Series Direct - A
Add description to Peer-1 VPC port-channel (Max Size 254)

Peer-2 PO Description
To UCS X-Series Direct - A
Add description to Peer-2 VPC port-channel (Max Size 254)

☑ Copy PO Description
Check this to copy PO description to all member interfaces; Peer-1 PO Desc to Peer-1 members, Peer-2 PO Desc to Peer-2 members

Step 6. Click **Save**.

Step 7. Click **Preview**.

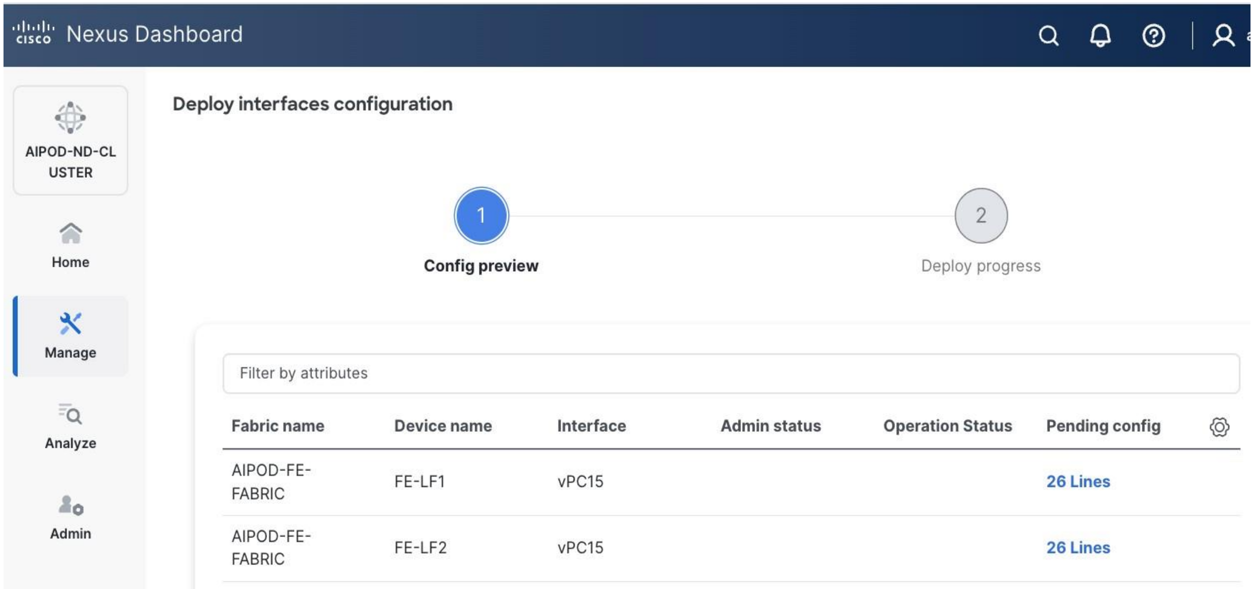


Pending config - AIPOD-FE-FABRIC - vPC15 - FE-LF1

```
interface ethernet1/5
  no spanning-tree port type edge trunk
interface ethernet1/7
  no spanning-tree port type edge trunk
interface port-channel15
  switchport
  switchport mode trunk
  switchport trunk allowed vlan none
  mtu 9216
  vpc 15
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  switchport trunk native vlan 2
  description To UCS X-Series Direct - A
  no shutdown
configure terminal
interface ethernet1/5
  channel-group 15 force mode active
  description To UCS X-Series Direct - A
  no shutdown
configure terminal
interface ethernet1/7
  channel-group 15 force mode active
  description To UCS X-Series Direct - A
  no shutdown
```

Step 8. Click **Close**, then click **Cancel**.

Step 9. Click **Deploy**. The **Pending Config** is the configuration shown in a previous step.



Deploy interfaces configuration

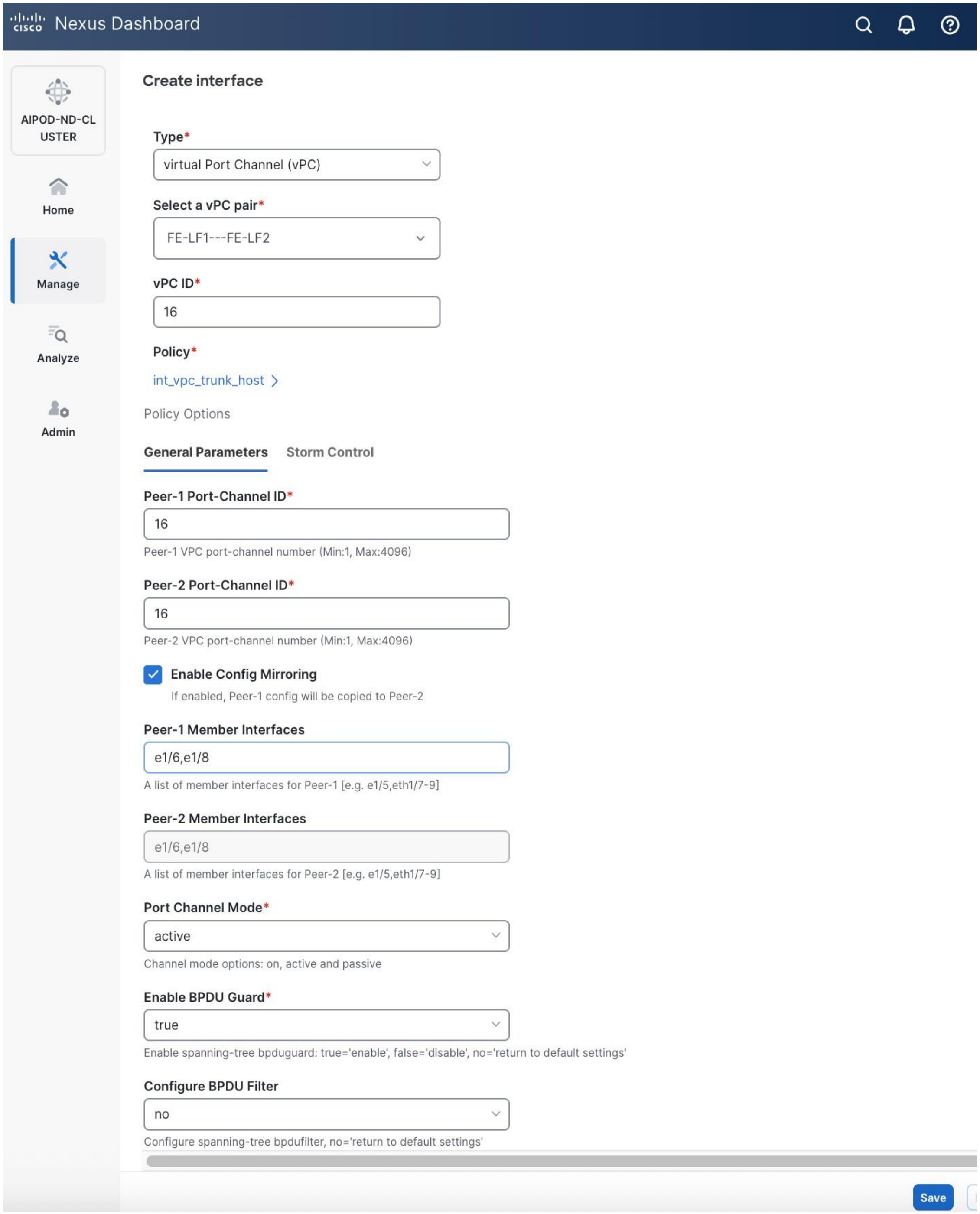
Fabric name	Device name	Interface	Admin status	Operation Status	Pending config
AIPOD-FE-FABRIC	FE-LF1	vPC15			26 Lines
AIPOD-FE-FABRIC	FE-LF2	vPC15			26 Lines

Step 10. Click Deploy Config.

Step 11. Verify that all the interfaces and port-channels are up on each switch in the vPC leaf pair that connects to the UCS X-Series Direct (-A side). It may take a few minutes for the vPC to go from Not discovered to consistent state.

Procedure 2. Deploy second vPC to Management UCS X-Direct

Step 1. Repeat the previous procedure for the **second** vPC to UCS X-Series Direct (**-B side**).



Create interface

Type*: virtual Port Channel (vPC)

Select a vPC pair*: FE-LF1---FE-LF2

vPC ID*: 16

Policy*: int_vpc_trunk_host

Policy Options

General Parameters | Storm Control

Peer-1 Port-Channel ID*: 16
Peer-1 VPC port-channel number (Min:1, Max:4096)

Peer-2 Port-Channel ID*: 16
Peer-2 VPC port-channel number (Min:1, Max:4096)

☑ Enable Config Mirroring
If enabled, Peer-1 config will be copied to Peer-2

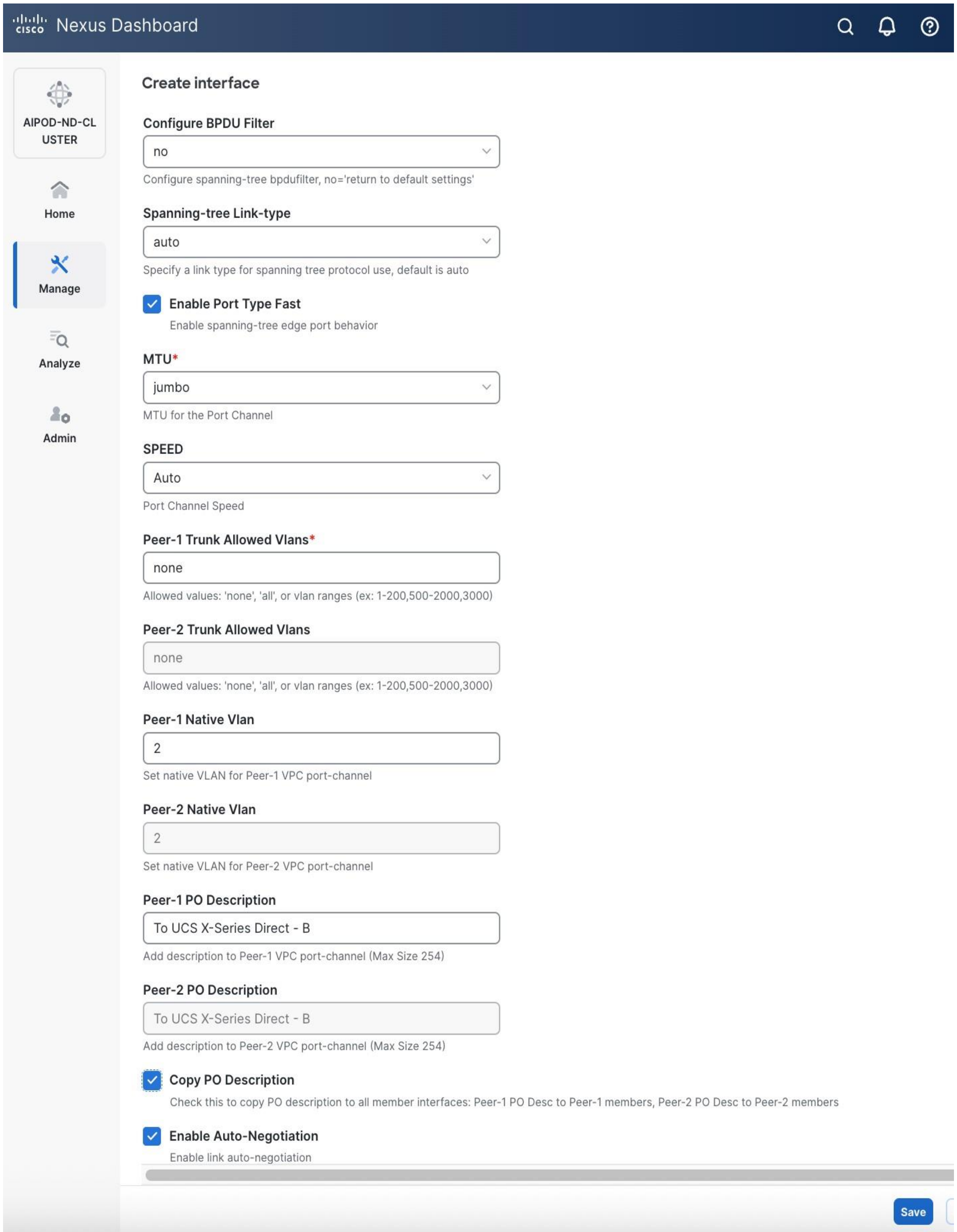
Peer-1 Member Interfaces: e1/6,e1/8
A list of member interfaces for Peer-1 [e.g. e1/5,eth1/7-9]

Peer-2 Member Interfaces: e1/6,e1/8
A list of member interfaces for Peer-2 [e.g. e1/5,eth1/7-9]

Port Channel Mode*: active
Channel mode options: on, active and passive

Enable BPDU Guard*: true
Enable spanning-tree bpduguard: true='enable', false='disable', no='return to default settings'

Configure BPDU Filter: no
Configure spanning-tree bpdufilter, no='return to default settings'



Create interface

Configure BPDU Filter

no

Configure spanning-tree bpdufilter, no='return to default settings'

Spanning-tree Link-type

auto

Specify a link type for spanning tree protocol use, default is auto

☑ Enable Port Type Fast

Enable spanning-tree edge port behavior

MTU*

jumbo

MTU for the Port Channel

SPEED

Auto

Port Channel Speed

Peer-1 Trunk Allowed Vlans*

none

Allowed values: 'none', 'all', or vlan ranges (ex: 1-200,500-2000,3000)

Peer-2 Trunk Allowed Vlans

none

Allowed values: 'none', 'all', or vlan ranges (ex: 1-200,500-2000,3000)

Peer-1 Native Vlan

2

Set native VLAN for Peer-1 VPC port-channel

Peer-2 Native Vlan

2

Set native VLAN for Peer-2 VPC port-channel

Peer-1 PO Description

To UCS X-Series Direct - B

Add description to Peer-1 VPC port-channel (Max Size 254)

Peer-2 PO Description

To UCS X-Series Direct - B

Add description to Peer-2 VPC port-channel (Max Size 254)

☑ Copy PO Description

Check this to copy PO description to all member interfaces: Peer-1 PO Desc to Peer-1 members, Peer-2 PO Desc to Peer-2 members

☑ Enable Auto-Negotiation

Enable link auto-negotiation

Step 2. Click **Save**.

Step 3. Click **Deploy**, followed by **Deploy Config**.

Step 4. Verify that all the interfaces and port-channels are up on each switch in the vPC leaf pair that connects to the UCS X-Series Direct (-B side). It may take a few minutes for the vPC to go from Not discovered to consistent state.

Enable Layer 2 Connectivity to UCS GPU Nodes from FE Fabric

To enable layer 2 connectivity to UCS GPU nodes, you will be configuring four vPCs, one per UCS C885A node. Each vPC will use one port on each switch in the compute leaf pair to connect to the UCS node.

Table 9. Setup Parameters for FE Fabric: Layer 2 Connectivity to UCS GPU Nodes

Parameter Type	Parameter Name | Value	Parameter Type
Leaf Switches	FE-LF1, FE-LF2	
UCS Nodes	4 x UCS C885A GPU Nodes, each dual-homed to FE-LF1 & FE-LF2	
Virtual Port Channel (vPC)	To UCS C885As	UCS GPU Nodes
vPC/PC1 - ID	111	
vPC Pair	FE-LF1, FE-LF2	
Ports	1/1	On each Leaf switch
vPC/PC2 - ID	112	
vPC Pair	FE-LF1, FE-LF2	
Ports	1/2	On each Leaf switch
vPC/PC3 - ID	113	
vPC Pair	FE-LF1, FE-LF2	
Ports	1/3	On each Leaf switch
vPC/PC4 - ID	114	
vPC Pair	FE-LF1, FE-LF2	
Ports	1/4	On each Leaf switch

To enable Layer 2 connectivity to UCS C885A GPU nodes from the FE fabric, follow the procedures below.

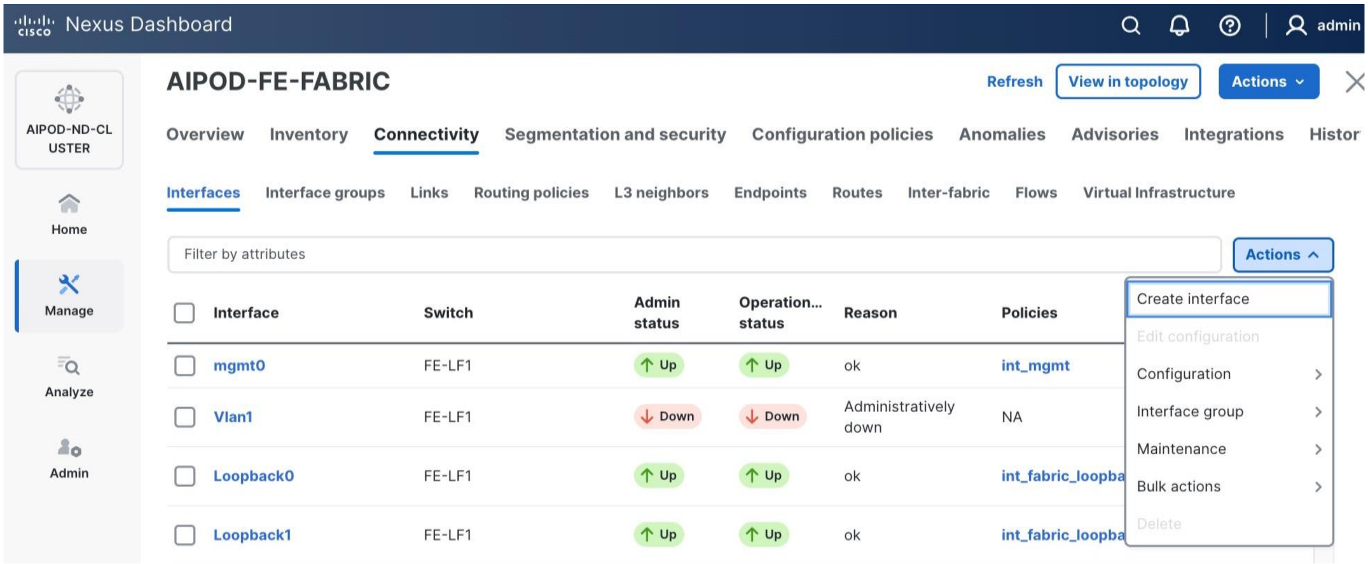
Procedure 1. Deploy first vPC to first UCS C885A GPU node

Step 1. Use a web browser to navigate to Nexus Dashboard. Use the management IP of any node in the ND cluster. Log in using **admin** account.

Step 2. From the left navigation menu, go to **Manage > Fabrics**.

Step 3. Select the FE fabric and navigate to **Connectivity > Interfaces** tab.

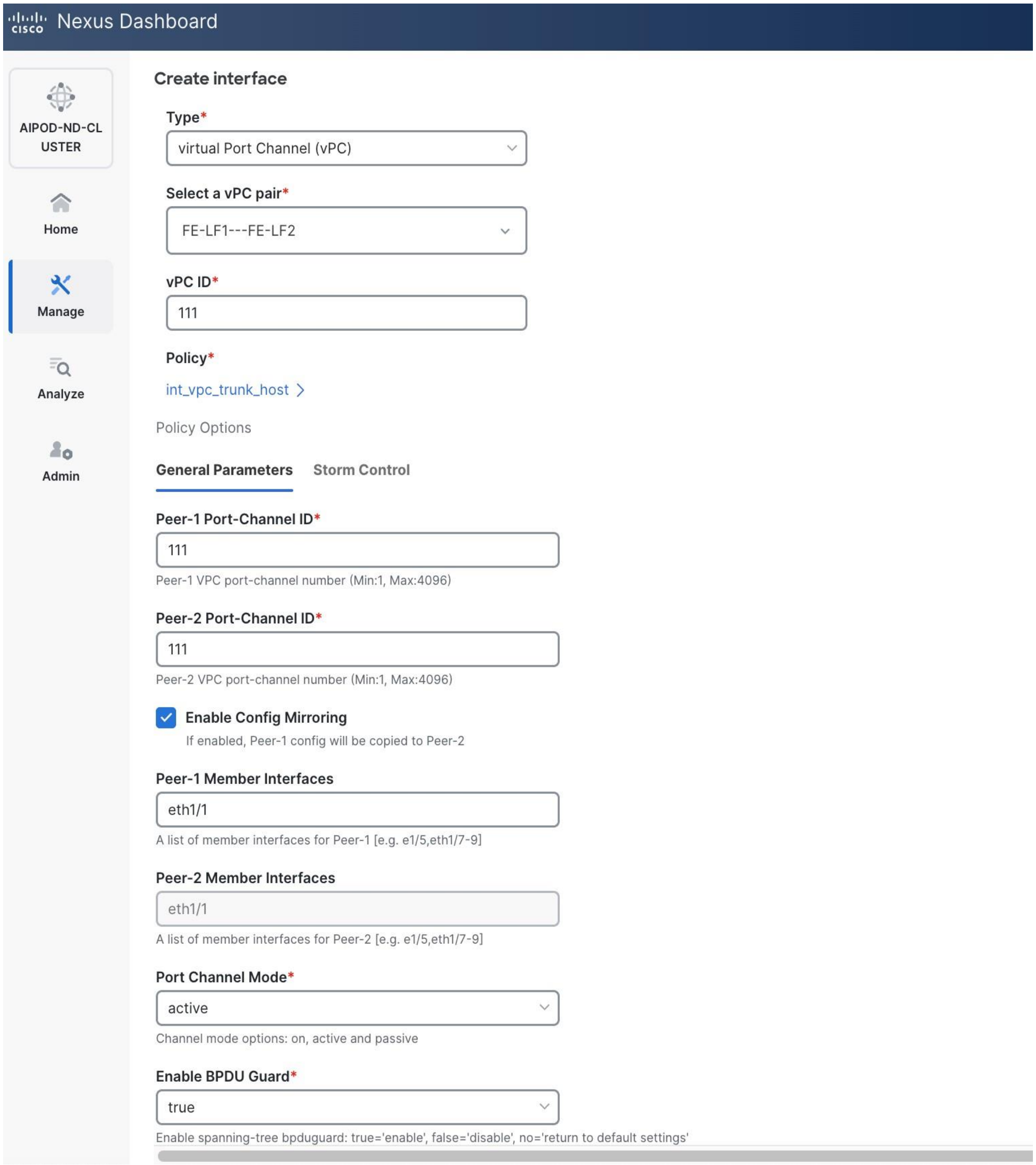
Step 4. Click the lower of the two **Actions** buttons and select **Create interface**.



	Interface	Switch	Admin status	Operation... status	Reason	Policies
□	mgmt0	FE-LF1	↑ Up	↑ Up	ok	int_mgmt
□	Vlan1	FE-LF1	↓ Down	↓ Down	Administratively down	NA
□	Loopback0	FE-LF1	↑ Up	↑ Up	ok	int_fabric_loopba
□	Loopback1	FE-LF1	↑ Up	↑ Up	ok	int_fabric_loopba

Step 5. In the Create interface window:

- Specify the **Type** of interface as **virtual Port Channel (vPC)** from the drop-down list.
- For the **Select a vPC pair**, select the compute leaf switch VPC pair from the drop-down list.
- Specify a **vPC ID** for the vPC to the **first** UCS GPU node. Peer-1 and Peer-2 Port-Channel ID should match that of the vPC ID.
- Leave the Policy as int_vpc_trunk_host.
- Enable checkbox for Config Mirroring.
- Specify **Peer-1 Member Interfaces** that connects to first UCS node.



Create interface

Type*
virtual Port Channel (vPC)

Select a vPC pair*
FE-LF1---FE-LF2

vPC ID*
111

Policy*
int_vpc_trunk_host >

Policy Options

General Parameters | Storm Control

Peer-1 Port-Channel ID*
111
Peer-1 VPC port-channel number (Min:1, Max:4096)

Peer-2 Port-Channel ID*
111
Peer-2 VPC port-channel number (Min:1, Max:4096)

☑ Enable Config Mirroring
If enabled, Peer-1 config will be copied to Peer-2

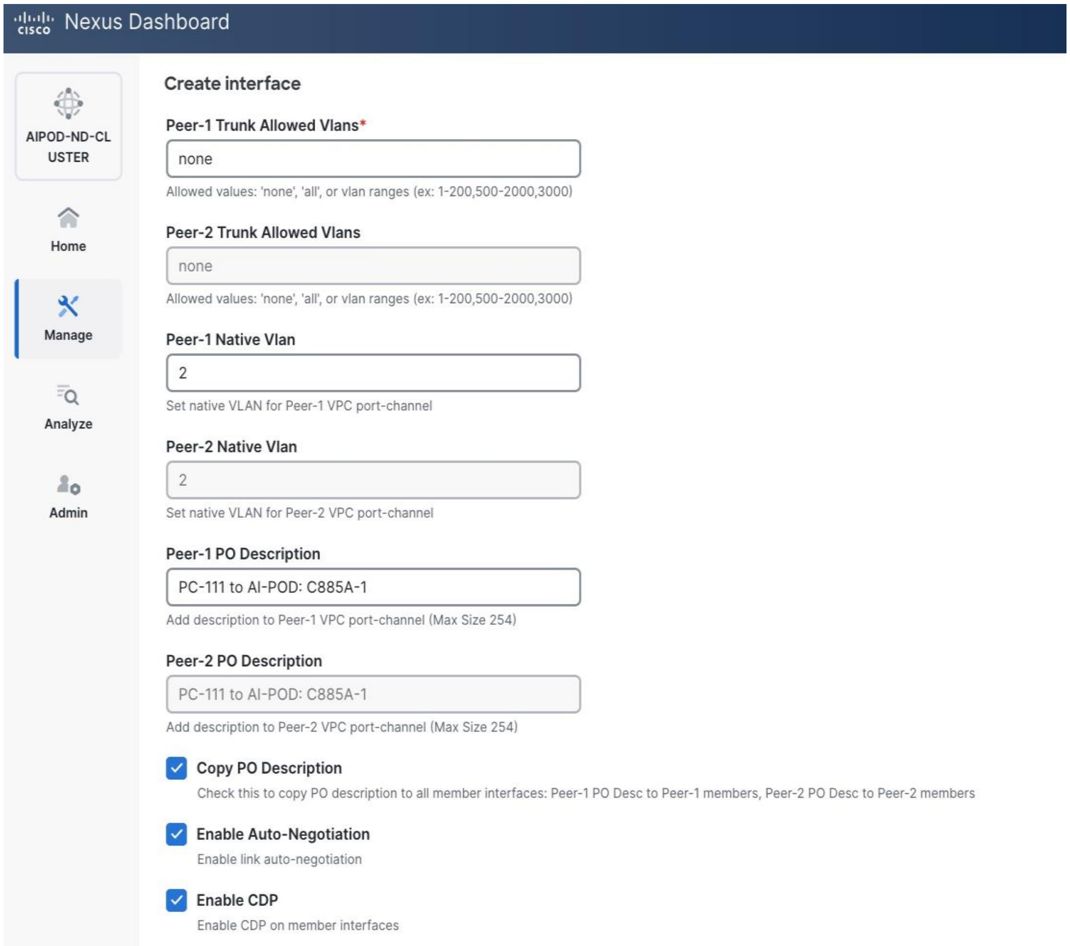
Peer-1 Member Interfaces
eth1/1
A list of member interfaces for Peer-1 [e.g. e1/5,eth1/7-9]

Peer-2 Member Interfaces
eth1/1
A list of member interfaces for Peer-2 [e.g. e1/5,eth1/7-9]

Port Channel Mode*
active
Channel mode options: on, active and passive

Enable BPDU Guard*
true
Enable spanning-tree bpduguard: true='enable', false='disable', no='return to default settings'

- Specify Peer-1 Native Vlan.
- Specify Peer-1 PO Description.
- **Enable** the checkbox for **Copy PO Description** to copy PO description to all member interfaces.



Create interface

Peer-1 Trunk Allowed Vlans*: none

Allowed values: 'none', 'all', or vlan ranges (ex: 1-200,500-2000,3000)

Peer-2 Trunk Allowed Vlans: none

Allowed values: 'none', 'all', or vlan ranges (ex: 1-200,500-2000,3000)

Peer-1 Native Vlan: 2

Set native VLAN for Peer-1 VPC port-channel

Peer-2 Native Vlan: 2

Set native VLAN for Peer-2 VPC port-channel

Peer-1 PO Description: PC-111 to AI-POD: C885A-1

Add description to Peer-1 VPC port-channel (Max Size 254)

Peer-2 PO Description: PC-111 to AI-POD: C885A-1

Add description to Peer-2 VPC port-channel (Max Size 254)

☑ Copy PO Description

Check this to copy PO description to all member interfaces: Peer-1 PO Desc to Peer-1 members, Peer-2 PO Desc to Peer-2 members

☑ Enable Auto-Negotiation

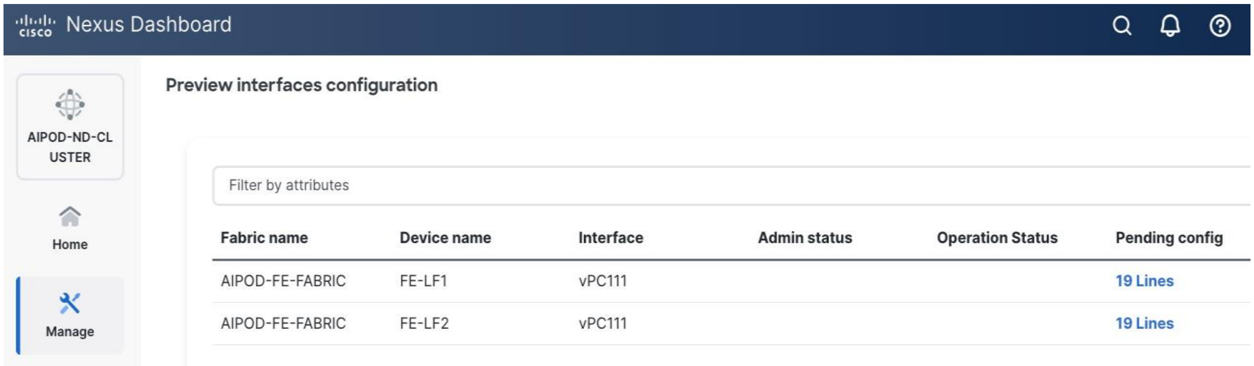
Enable link auto-negotiation

☑ Enable CDP

Enable CDP on member interfaces

Step 6. Additional configuration changes can be made later as needed. Click **Save**.

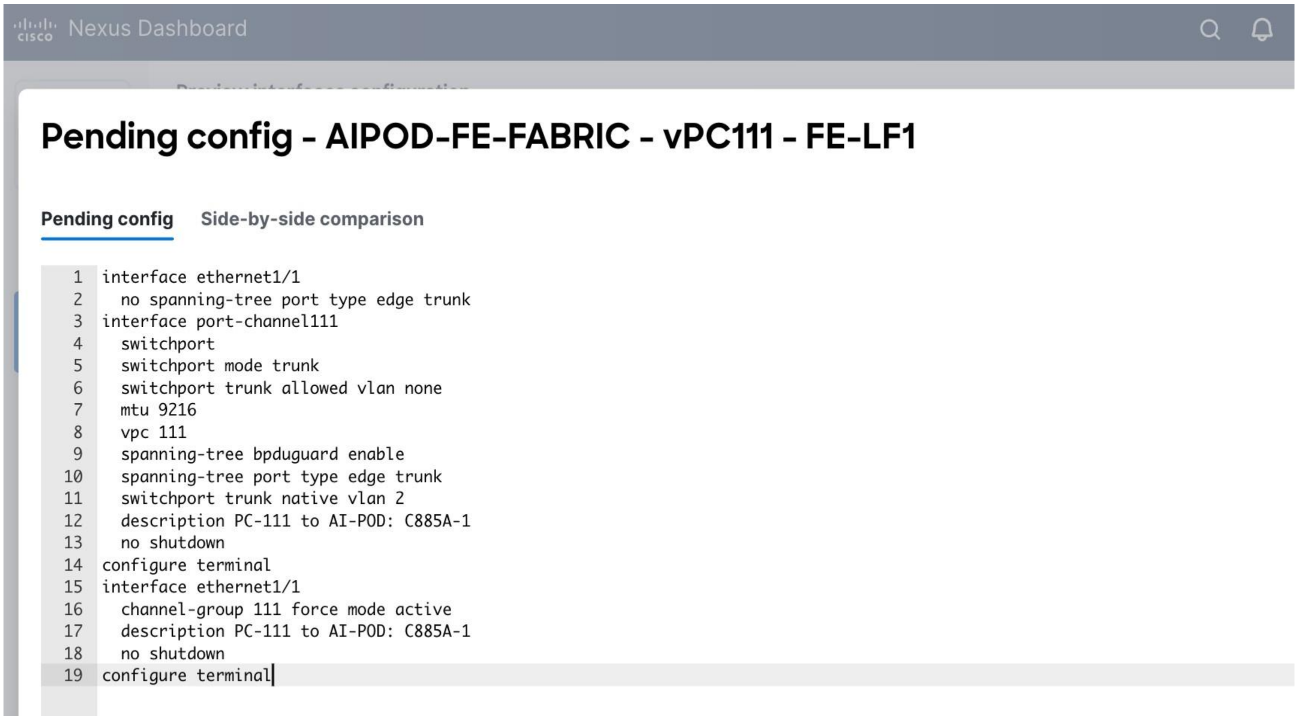
Step 7. Click **Preview** to view the **Pending config** changes.



Preview interfaces configuration

Fabric name	Device name	Interface	Admin status	Operation Status	Pending config
AIPOD-FE-FABRIC	FE-LF1	vPC111			19 Lines
AIPOD-FE-FABRIC	FE-LF2	vPC111			19 Lines

Step 8. Click the **Pending Config** for each switch to see the configuration.



Pending config - AIPOD-FE-FABRIC - vPC111 - FE-LF1

```
interface ethernet1/1
  no spanning-tree port type edge trunk
interface port-channel111
  switchport
  switchport mode trunk
  switchport trunk allowed vlan none
  mtu 9216
  vpc 111
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  switchport trunk native vlan 2
  description PC-111 to AI-POD: C885A-1
  no shutdown
configure terminal
interface ethernet1/1
  channel-group 111 force mode active
  description PC-111 to AI-POD: C885A-1
  no shutdown
configure terminal
```

Step 9. Click the **X** in the top right corner and select **Deploy** and **Deploy config** to deploy the **Pending config** changes.

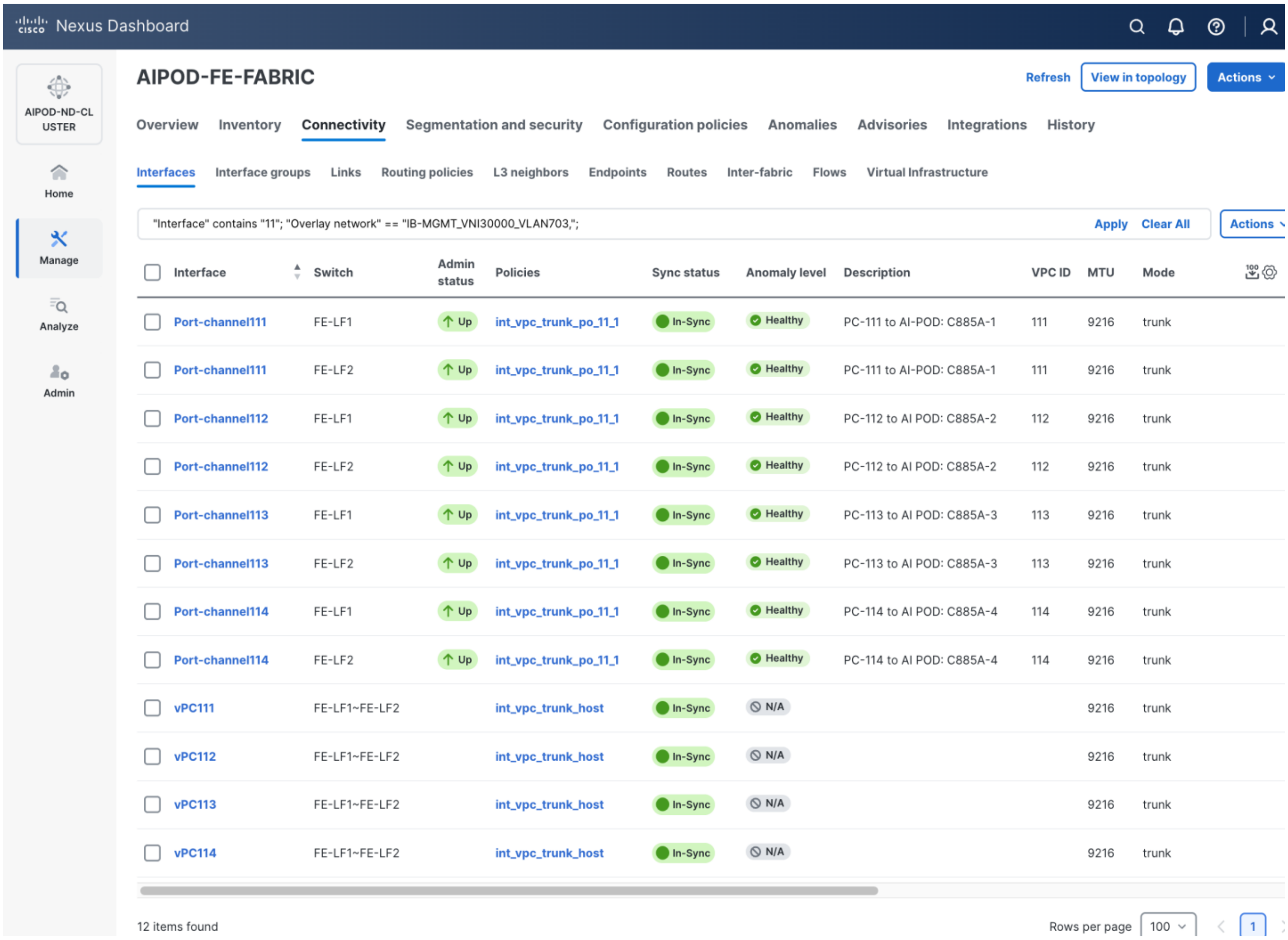
Step 10. Click **Close** when deployment completes successfully.

Step 11. Verify that all the interfaces and port-channel is up on each switch in the leaf switch pair that connects to the UCS node. It may take a few minutes for the vPC to go from **Not discovered** to **consistent** state.

Procedure 2. Deploy vPCs to remaining UCS C885A GPU nodes

Step 1. Repeat the previous procedure to provision layer 2 connectivity from the compute/management leaf switches to the remaining 3 UCS nodes in the cluster.

Step 2. Verify that all the interfaces and port-channel is up on each switch in the leaf switch pair that connects to the UCS nodes. It may take a few minutes for the vPC to go from **Not discovered** to **consistent** state.



"Interface" contains "11"; "Overlay network" == "IB-MGMT_VNI30000_VLAN703,";

Interface	Switch	Admin status	Policies	Sync status	Anomaly level	Description	VPC ID	MTU	Mode
Port-channel111	FE-LF1	Up	int_vpc_trunk_po_11_1	In-Sync	Healthy	PC-111 to AI-POD: C885A-1	111	9216	trunk
Port-channel111	FE-LF2	Up	int_vpc_trunk_po_11_1	In-Sync	Healthy	PC-111 to AI-POD: C885A-1	111	9216	trunk
Port-channel112	FE-LF1	Up	int_vpc_trunk_po_11_1	In-Sync	Healthy	PC-112 to AI POD: C885A-2	112	9216	trunk
Port-channel112	FE-LF2	Up	int_vpc_trunk_po_11_1	In-Sync	Healthy	PC-112 to AI POD: C885A-2	112	9216	trunk
Port-channel113	FE-LF1	Up	int_vpc_trunk_po_11_1	In-Sync	Healthy	PC-113 to AI POD: C885A-3	113	9216	trunk
Port-channel113	FE-LF2	Up	int_vpc_trunk_po_11_1	In-Sync	Healthy	PC-113 to AI POD: C885A-3	113	9216	trunk
Port-channel114	FE-LF1	Up	int_vpc_trunk_po_11_1	In-Sync	Healthy	PC-114 to AI POD: C885A-4	114	9216	trunk
Port-channel114	FE-LF2	Up	int_vpc_trunk_po_11_1	In-Sync	Healthy	PC-114 to AI POD: C885A-4	114	9216	trunk
vPC111	FE-LF1~FE-LF2		int_vpc_trunk_host	In-Sync	N/A			9216	trunk
vPC112	FE-LF1~FE-LF2		int_vpc_trunk_host	In-Sync	N/A			9216	trunk
vPC113	FE-LF1~FE-LF2		int_vpc_trunk_host	In-Sync	N/A			9216	trunk
vPC114	FE-LF1~FE-LF2		int_vpc_trunk_host	In-Sync	N/A			9216	trunk

12 items found

(Ubuntu) Enable Layer 2 Connectivity to NVIDIA BCM Nodes

If running Ubuntu on the Cisco UCS C885A M8 nodes under NVIDIA BCM, to enable Layer 2 connectivity to the BCM (UCS) node(s) from the FE fabric, you will be configuring two vPCs from the same BCM node: one to compute/management leaf pair and another storage leaf pair.

Table 10. Setup Parameters for FE Fabric: Layer 2 Connectivity to NVIDIA BCME Nodes

Parameter Type	Parameter Name | Value	Parameter Type
Virtual Port Channel (vPC)	To BCME Node	Management/Control/Workload Management Node
vPC/PC1 - ID	17	
vPC Pair	FE-LF1, FE-LF2	
Ports	1/21	
vPC/PC1 - ID	18	
vPC Pair	FE-SLF1, FE-SLF2	
Ports	1/24	

To enable Layer 2 connectivity to the BCM (UCS) node(s) from the FE fabric, follow the procedures below.

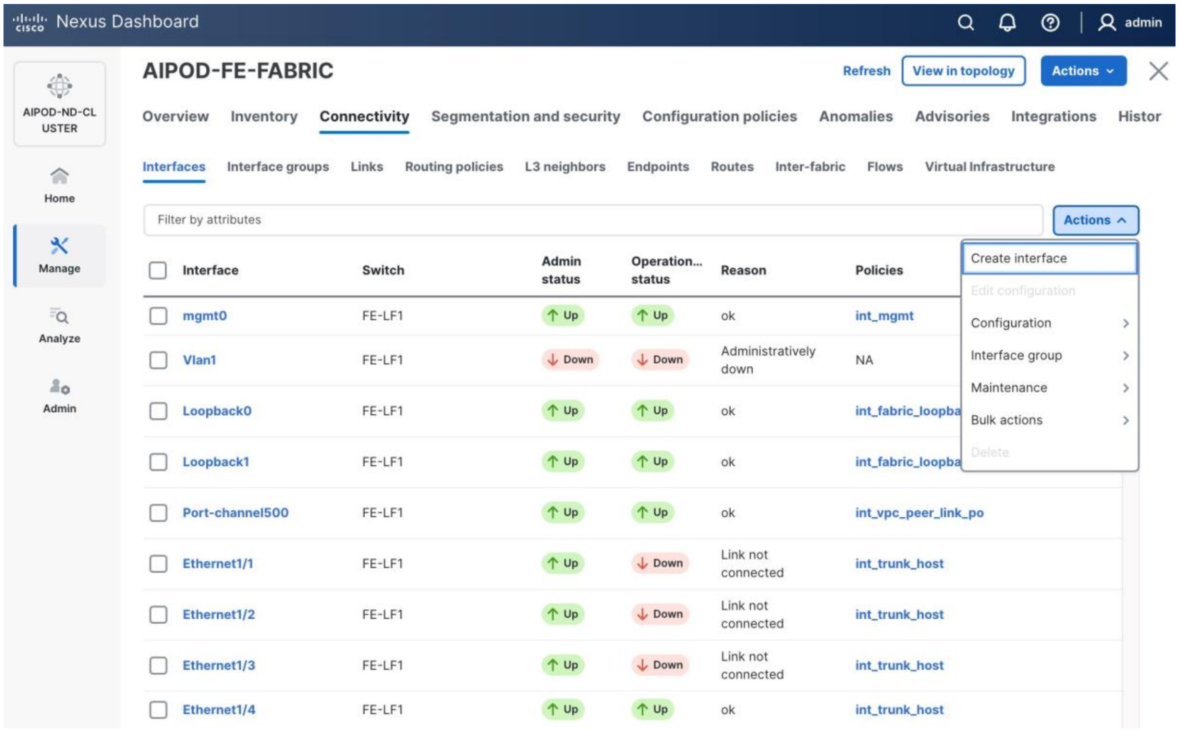
Procedure 1. Deploy first vPC to BCM node from compute leaf switch pair

Step 1. Use a web browser to navigate to Nexus Dashboard. Use the management IP of any node in the ND cluster. Log in using admin account.

Step 2. From the left navigation menu, go to **Manage** > **Fabrics**.

Step 3. Select the FE fabric and navigate to **Connectivity** > **Interfaces** tab.

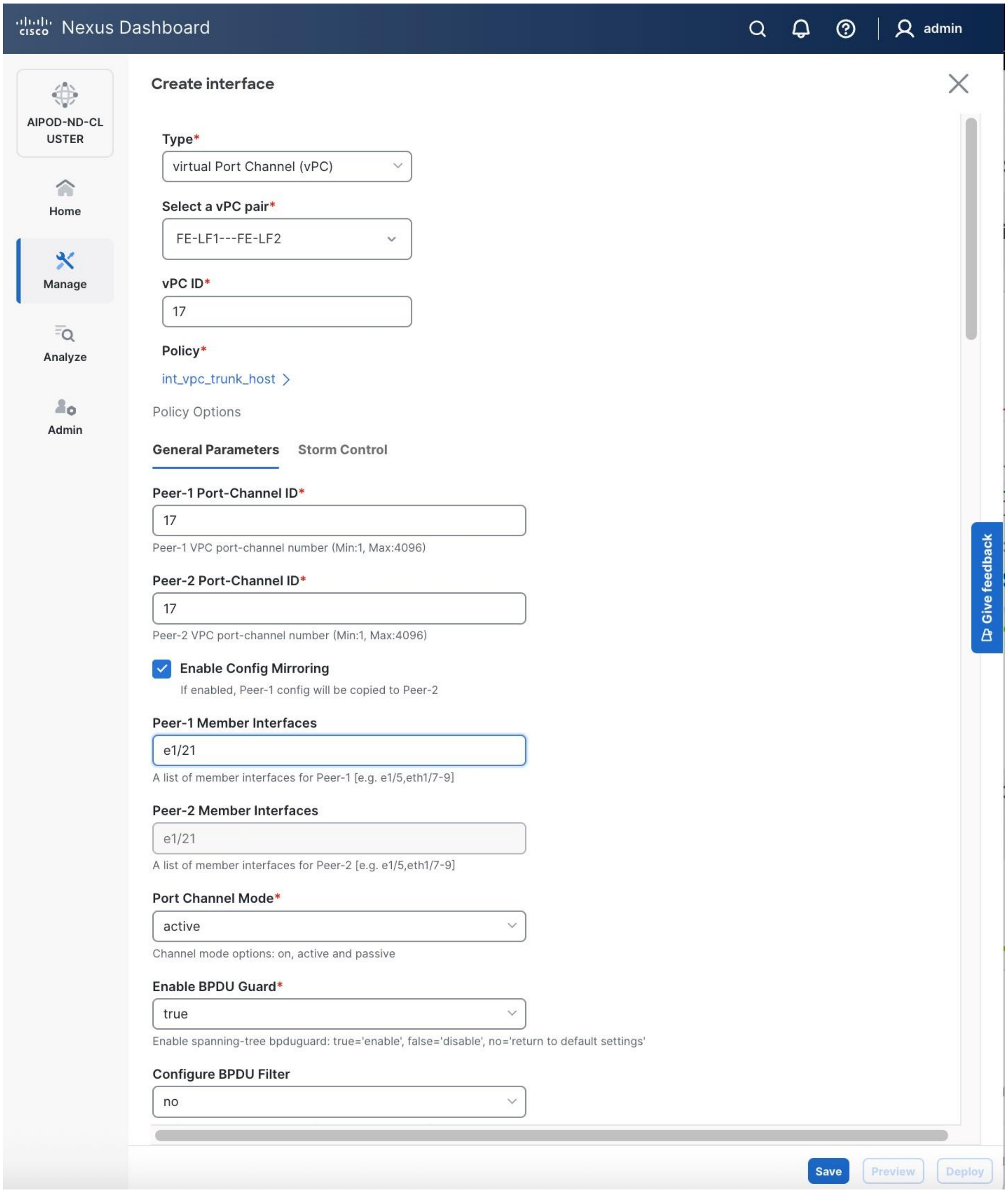
Step 4. Click the lower of the two **Actions** buttons and select **Create interface**.



□	Interface	Switch	Admin status	Operation... status	Reason	Policies
□	mgmt0	FE-LF1	↑ Up	↑ Up	ok	int_mgmt
□	Vlan1	FE-LF1	↓ Down	↓ Down	Administratively down	NA
□	Loopback0	FE-LF1	↑ Up	↑ Up	ok	int_fabric_loopba
□	Loopback1	FE-LF1	↑ Up	↑ Up	ok	int_fabric_loopba
□	Port-channel500	FE-LF1	↑ Up	↑ Up	ok	int_vpc_peer_link_po
□	Ethernet1/1	FE-LF1	↑ Up	↓ Down	Link not connected	int_trunk_host
□	Ethernet1/2	FE-LF1	↑ Up	↓ Down	Link not connected	int_trunk_host
□	Ethernet1/3	FE-LF1	↑ Up	↓ Down	Link not connected	int_trunk_host
□	Ethernet1/4	FE-LF1	↑ Up	↑ Up	ok	int_trunk_host

Step 5. In the Create interface window:

- Specify the **Type** of interface as **virtual Port Channel (vPC)** from the drop-down list.
- For the **Select a vPC pair**, select the leaf switch pair from the drop-down list.
- Specify a **vPC ID** for the **first** vPC to the **BCME node**. Port Channel IDs from each switch to the first UCS node should match the vPC ID (see screenshot below).
- Leave the Policy as int_vpc_trunk_host.
- **Enable** checkbox for **Config Mirroring** to configure both vPC peer switches identically.
- Specify **Peer-1 Member Interfaces** that connects to the BCME node.



Create interface

Type*
virtual Port Channel (vPC)

Select a vPC pair*
FE-LF1---FE-LF2

vPC ID*
17

Policy*
int_vpc_trunk_host >

Policy Options

General Parameters | Storm Control

Peer-1 Port-Channel ID*
17
Peer-1 VPC port-channel number (Min:1, Max:4096)

Peer-2 Port-Channel ID*
17
Peer-2 VPC port-channel number (Min:1, Max:4096)

☑ Enable Config Mirroring
If enabled, Peer-1 config will be copied to Peer-2

Peer-1 Member Interfaces
e1/21
A list of member interfaces for Peer-1 [e.g. e1/5,eth1/7-9]

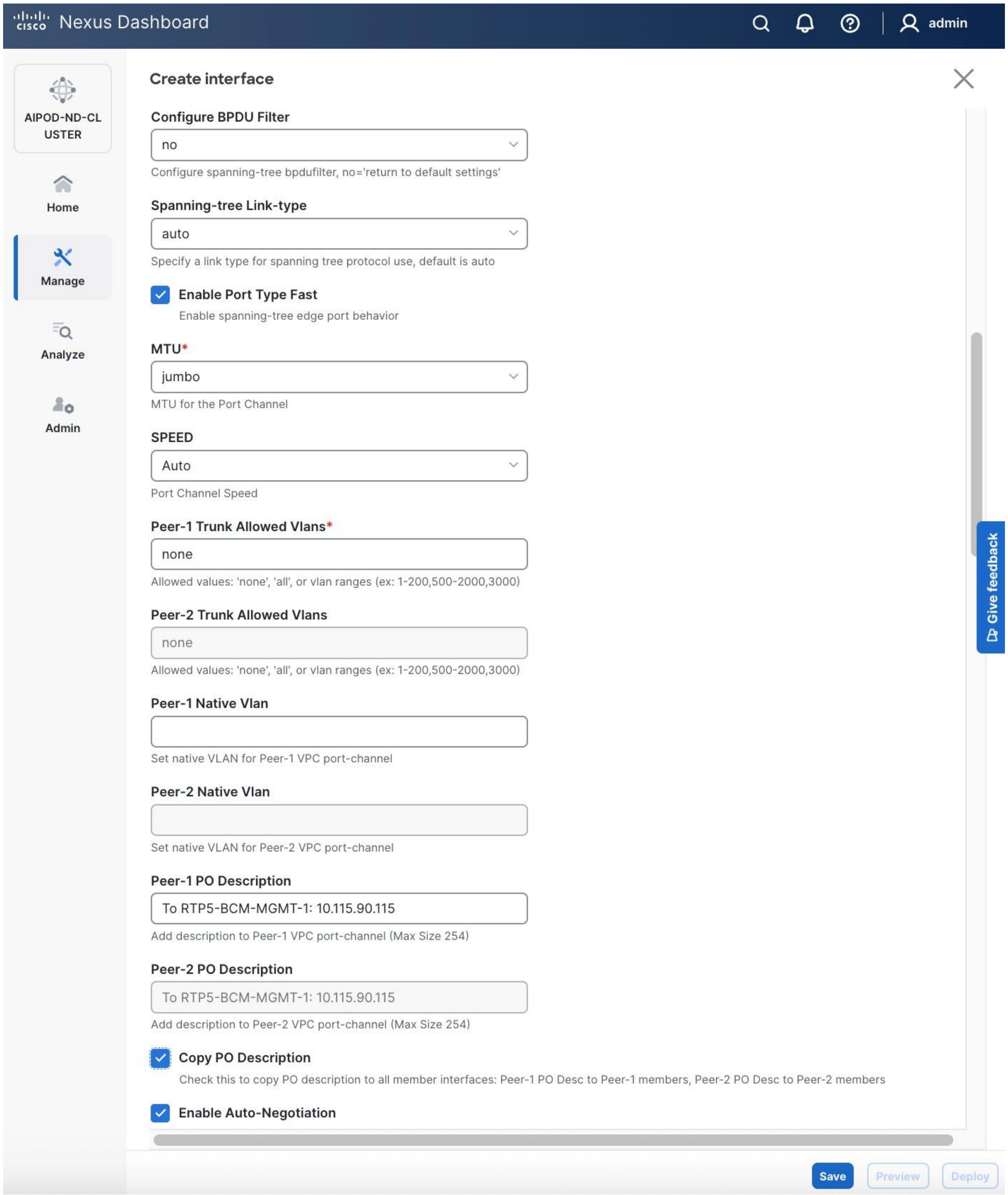
Peer-2 Member Interfaces
e1/21
A list of member interfaces for Peer-2 [e.g. e1/5,eth1/7-9]

Port Channel Mode*
active
Channel mode options: on, active and passive

Enable BPDU Guard*
true
Enable spanning-tree bpduguard: true='enable', false='disable', no='return to default settings'

Configure BPDU Filter
no

- Scroll down and fill remaining fields: Native VLAN (optional), Peer-1 PO Description, Copy PO Description.



Create interface

Configure BPDU Filter: no
Configure spanning-tree bpdufilter, no='return to default settings'

Spanning-tree Link-type: auto
Specify a link type for spanning tree protocol use, default is auto

☑ Enable Port Type Fast
Enable spanning-tree edge port behavior

MTU*: jumbo
MTU for the Port Channel

SPEED: Auto
Port Channel Speed

Peer-1 Trunk Allowed Vlans*: none
Allowed values: 'none', 'all', or vlan ranges (ex: 1-200,500-2000,3000)

Peer-2 Trunk Allowed Vlans: none
Allowed values: 'none', 'all', or vlan ranges (ex: 1-200,500-2000,3000)

Peer-1 Native Vlan:
Set native VLAN for Peer-1 VPC port-channel

Peer-2 Native Vlan:
Set native VLAN for Peer-2 VPC port-channel

Peer-1 PO Description: To RTP5-BCM-MGMT-1: 10.115.90.115
Add description to Peer-1 VPC port-channel (Max Size 254)

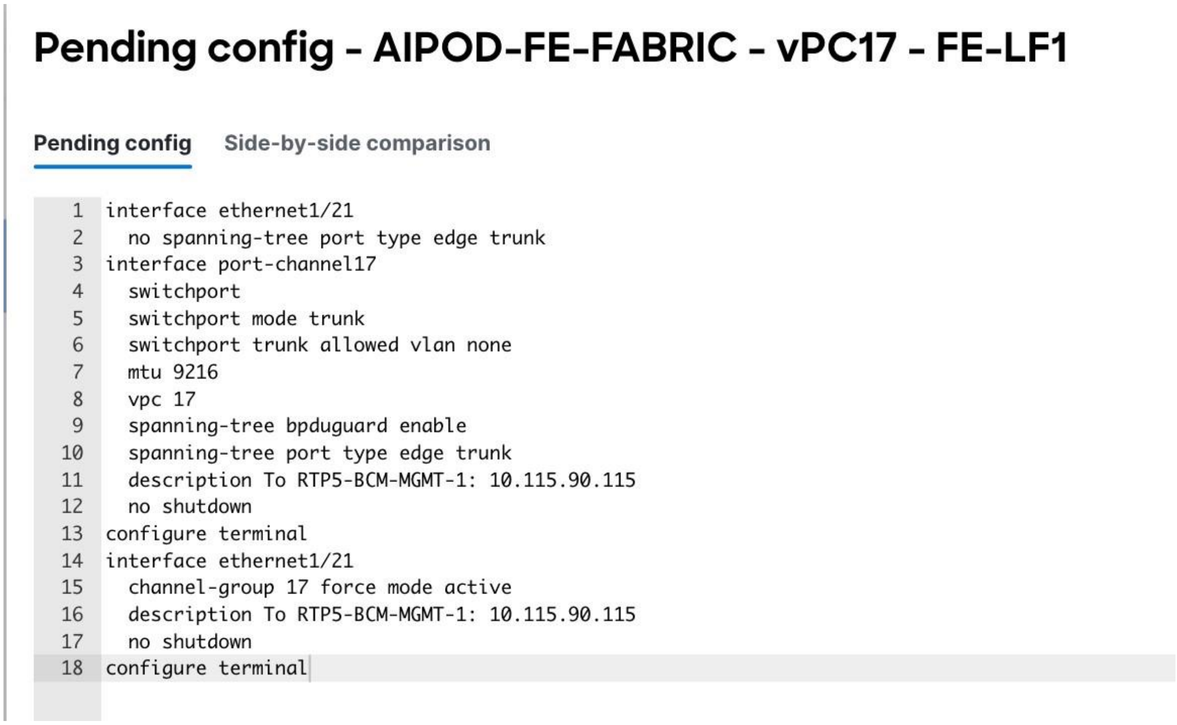
Peer-2 PO Description: To RTP5-BCM-MGMT-1: 10.115.90.115
Add description to Peer-2 VPC port-channel (Max Size 254)

☑ Copy PO Description
Check this to copy PO description to all member interfaces: Peer-1 PO Desc to Peer-1 members, Peer-2 PO Desc to Peer-2 members

☑ Enable Auto-Negotiation

Step 6. Click **Save**.

Step 7. Click **Preview**.

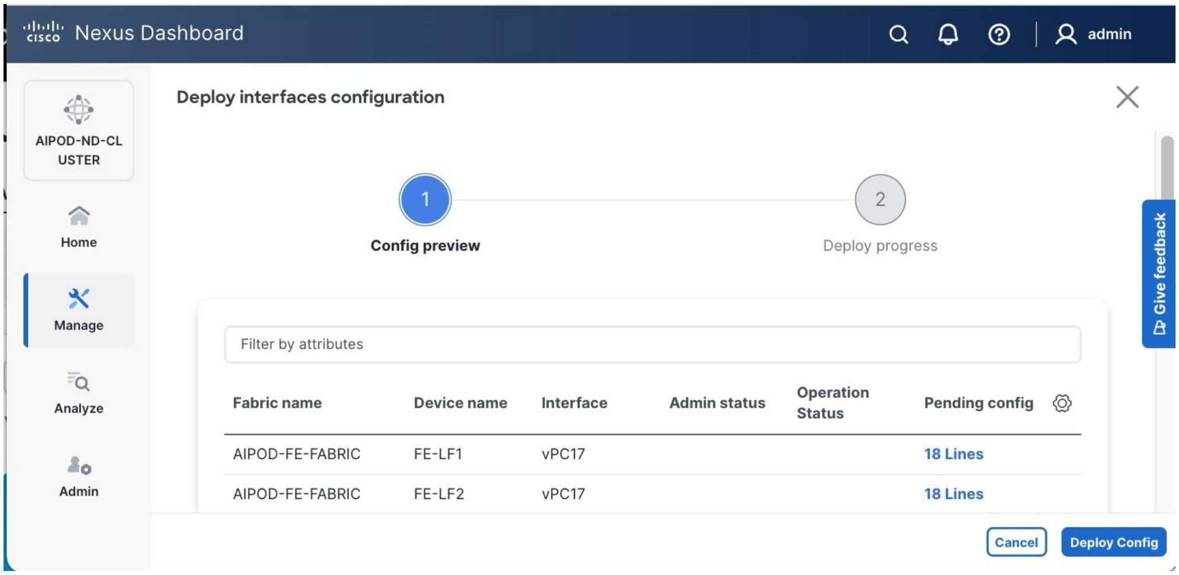


Pending config - AIPOD-FE-FABRIC - vPC17 - FE-LF1

```
interface ethernet1/21
  no spanning-tree port type edge trunk
interface port-channel17
  switchport
  switchport mode trunk
  switchport trunk allowed vlan none
  mtu 9216
  vpc 17
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  description To RTP5-BCM-MGMT-1: 10.115.90.115
  no shutdown
configure terminal
interface ethernet1/21
  channel-group 17 force mode active
  description To RTP5-BCM-MGMT-1: 10.115.90.115
  no shutdown
configure terminal
```

Step 8. Click **Close**, then click **Cancel**.

Step 9. Click **Deploy**. The **Pending Config** is the configuration shown in a previous step.



Deploy interfaces configuration

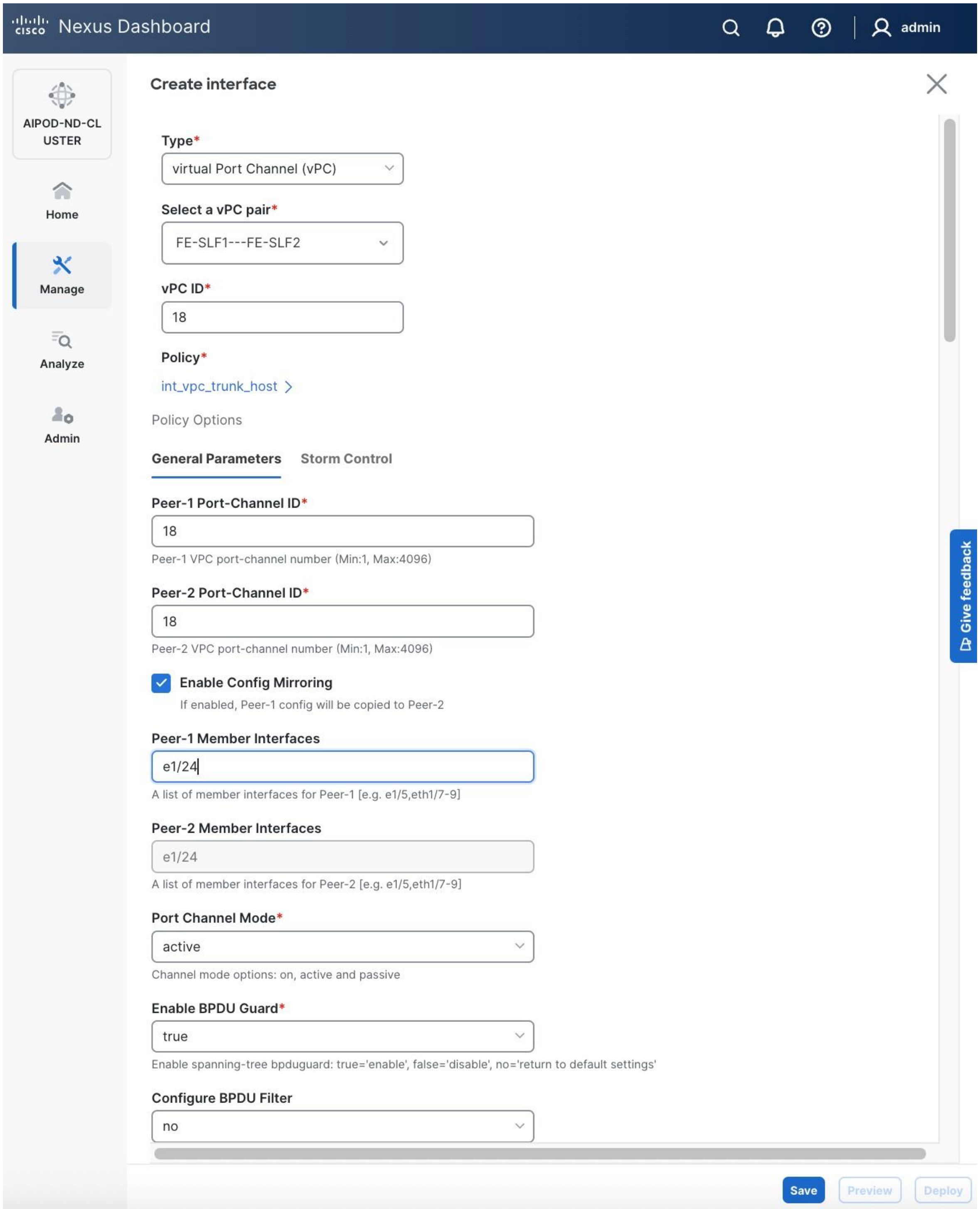
Fabric name	Device name	Interface	Admin status	Operation Status	Pending config
AIPOD-FE-FABRIC	FE-LF1	vPC17			18 Lines
AIPOD-FE-FABRIC	FE-LF2	vPC17			18 Lines

Step 10. Click **Deploy Config**.

Step 11. Verify that all the interfaces and port-channels are up on each switch in the vPC leaf pair that connects to the BCME node. It may take a few minutes for the vPC to go from Not discovered to consistent state.

Procedure 2. Deploy second vPC to BCM node from storage leaf switch pair

Step 1. Repeat the previous procedure for the **second** vPC from storage leaf pair to BCME node.



Create interface

Type*
virtual Port Channel (vPC)

Select a vPC pair*
FE-SLF1---FE-SLF2

vPC ID*
18

Policy*
int_vpc_trunk_host

Policy Options

General Parameters | Storm Control

Peer-1 Port-Channel ID*
18
Peer-1 VPC port-channel number (Min:1, Max:4096)

Peer-2 Port-Channel ID*
18
Peer-2 VPC port-channel number (Min:1, Max:4096)

☑ Enable Config Mirroring
If enabled, Peer-1 config will be copied to Peer-2

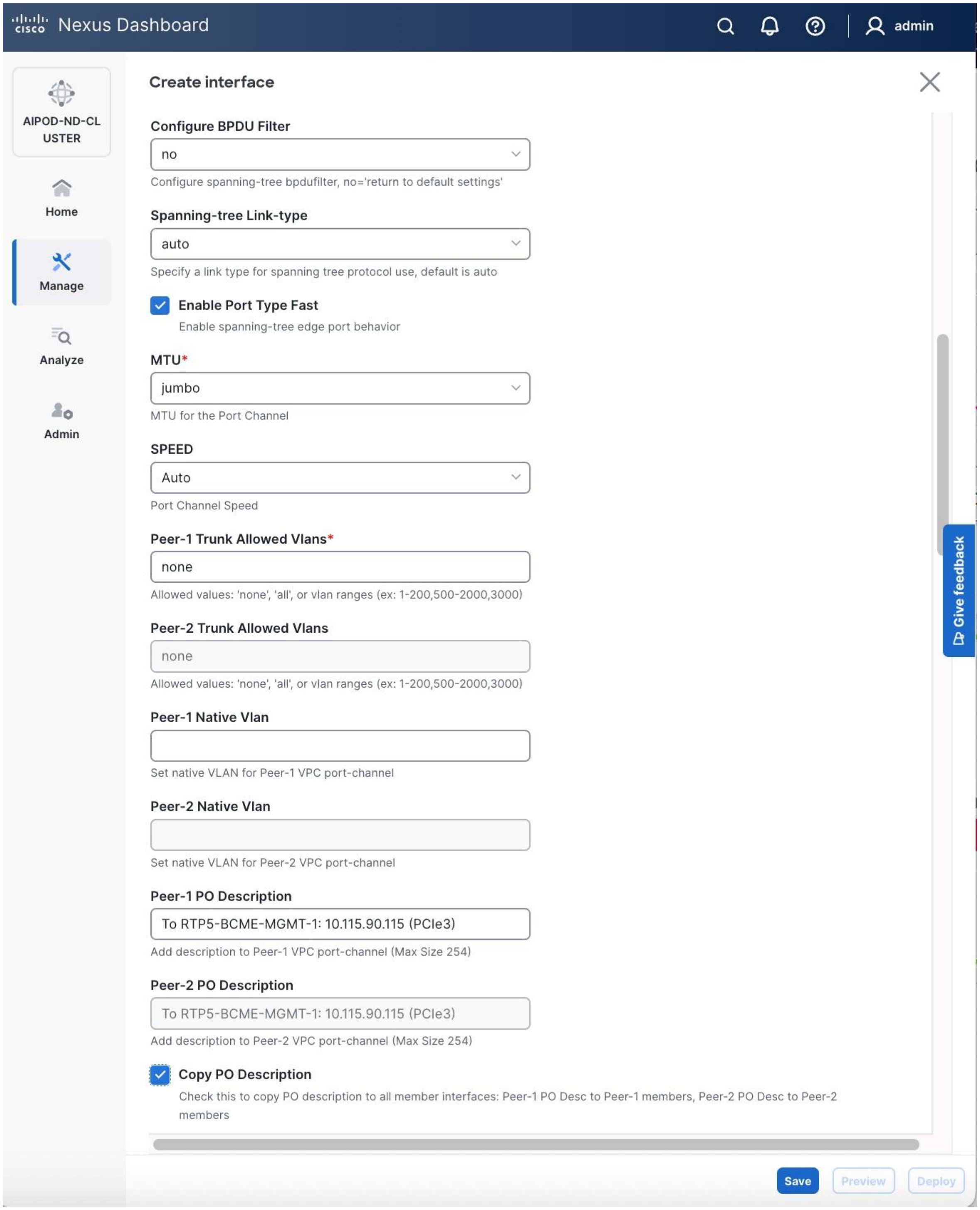
Peer-1 Member Interfaces
e1/24
A list of member interfaces for Peer-1 [e.g. e1/5,eth1/7-9]

Peer-2 Member Interfaces
e1/24
A list of member interfaces for Peer-2 [e.g. e1/5,eth1/7-9]

Port Channel Mode*
active
Channel mode options: on, active and passive

Enable BPDU Guard*
true
Enable spanning-tree bpduguard: true='enable', false='disable', no='return to default settings'

Configure BPDU Filter
no



Create interface

Configure BPDU Filter: no
Configure spanning-tree bpdufilter, no='return to default settings'

Spanning-tree Link-type: auto
Specify a link type for spanning tree protocol use, default is auto

☑ Enable Port Type Fast
Enable spanning-tree edge port behavior

MTU*: jumbo
MTU for the Port Channel

SPEED: Auto
Port Channel Speed

Peer-1 Trunk Allowed Vlans*: none
Allowed values: 'none', 'all', or vlan ranges (ex: 1-200,500-2000,3000)

Peer-2 Trunk Allowed Vlans: none
Allowed values: 'none', 'all', or vlan ranges (ex: 1-200,500-2000,3000)

Peer-1 Native Vlan:
Set native VLAN for Peer-1 VPC port-channel

Peer-2 Native Vlan:
Set native VLAN for Peer-2 VPC port-channel

Peer-1 PO Description: To RTP5-BCME-MGMT-1: 10.115.90.115 (PCIe3)
Add description to Peer-1 VPC port-channel (Max Size 254)

Peer-2 PO Description: To RTP5-BCME-MGMT-1: 10.115.90.115 (PCIe3)
Add description to Peer-2 VPC port-channel (Max Size 254)

☑ Copy PO Description
Check this to copy PO description to all member interfaces: Peer-1 PO Desc to Peer-1 members, Peer-2 PO Desc to Peer-2 members

Step 2. Click **Save**.

Step 3. Click **Deploy**, then click **Deploy Config**.

Step 4. Verify that all the interfaces and port-channels are up on each switch in the vPC leaf pair that connects to the BCM node. It may take a few minutes for the vPC to go from **Not discovered** to **consistent** state.

(Ubuntu) Enable Layer 2 Connectivity to UCS GPU Nodes from FE Fabric

If running Ubuntu on the Cisco UCS C885A M8 nodes under NVIDIA BCM, to enable Layer 2 connectivity to UCS C885A GPU nodes from the FE fabric, you will be configuring four vPCs, one per UCS C885A node. Each vPC will use one port on each switch in the compute leaf pair to connect to the UCS node.

If running OpenShift on the Cisco UCS C885A M8 nodes, follow this procedure but set the native VLAN to 2 below instead of 703.

Table 11. Setup Parameters for FE Fabric: Layer 2 Connectivity to UCS GPU Nodes

Parameter Type	Parameter Name | Value	Parameter Type
Leaf Switches	FE-LF1, FE-LF2	
UCS Nodes	4 x UCS C885A GPU Nodes	Each node is dual-homed to FE-LF1 & FE-LF2
Virtual Port Channel (vPC)	To UCS C885As	UCS GPU Nodes
vPC/PC1 - ID	111	To UCS C885A-1
vPC Pair	FE-LF1, FE-LF2	
Ports	1/1	On each Leaf switch
vPC/PC2 - ID	112	To UCS C885A-2
vPC Pair	FE-LF1, FE-LF2	
Ports	1/2	On each Leaf switch
vPC/PC3 - ID	113	To UCS C885A-3
vPC Pair	FE-LF1, FE-LF2	
Ports	1/3	On each Leaf switch
vPC/PC4 - ID	114	To UCS C885A-4
vPC Pair	FE-LF1, FE-LF2	
Ports	1/4	On each Leaf switch

To enable Layer 2 connectivity to UCS C885A GPU nodes from the FE fabric, follow the procedures below. You will be configuring four vPCs, one per UCS C885A node. Each vPC will use one port on each switch in the compute leaf pair to connect to the UCS node.

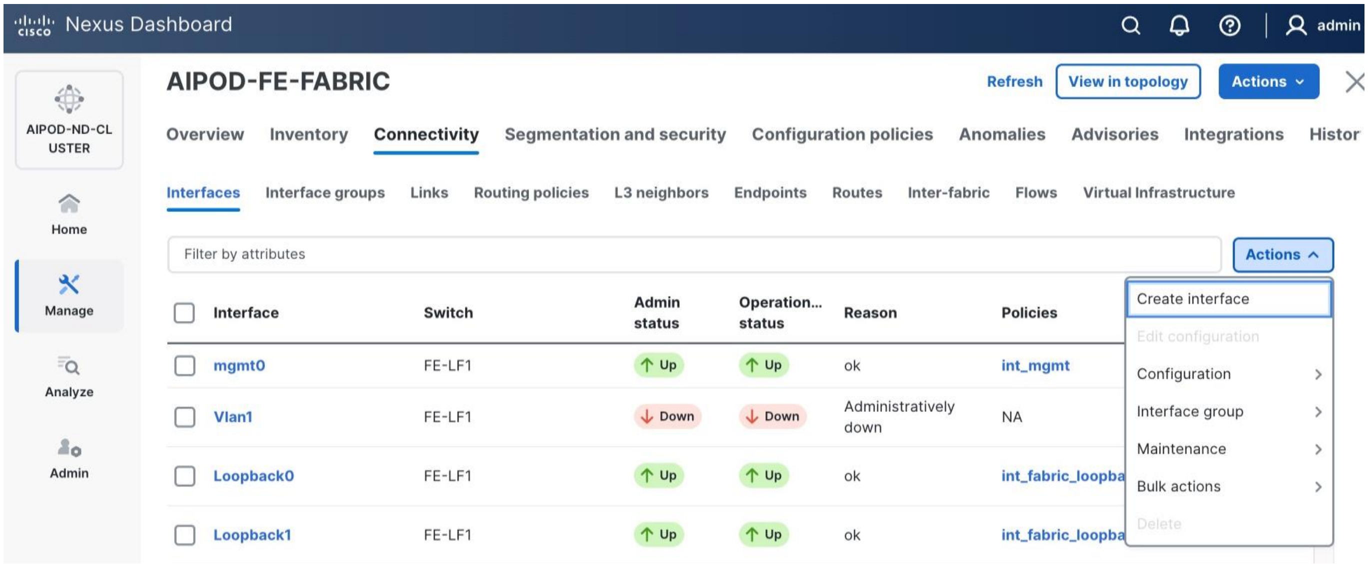
Procedure 1. Deploy first vPC to first UCS C885A GPU node

Step 1. Use a web browser to navigate to Nexus Dashboard. Use the management IP of any node in the ND cluster. Log in using **admin** account.

Step 2. From the left navigation menu, go to **Manage > Fabrics**.

Step 3. Select the FE fabric and navigate to **Connectivity > Interfaces** tab.

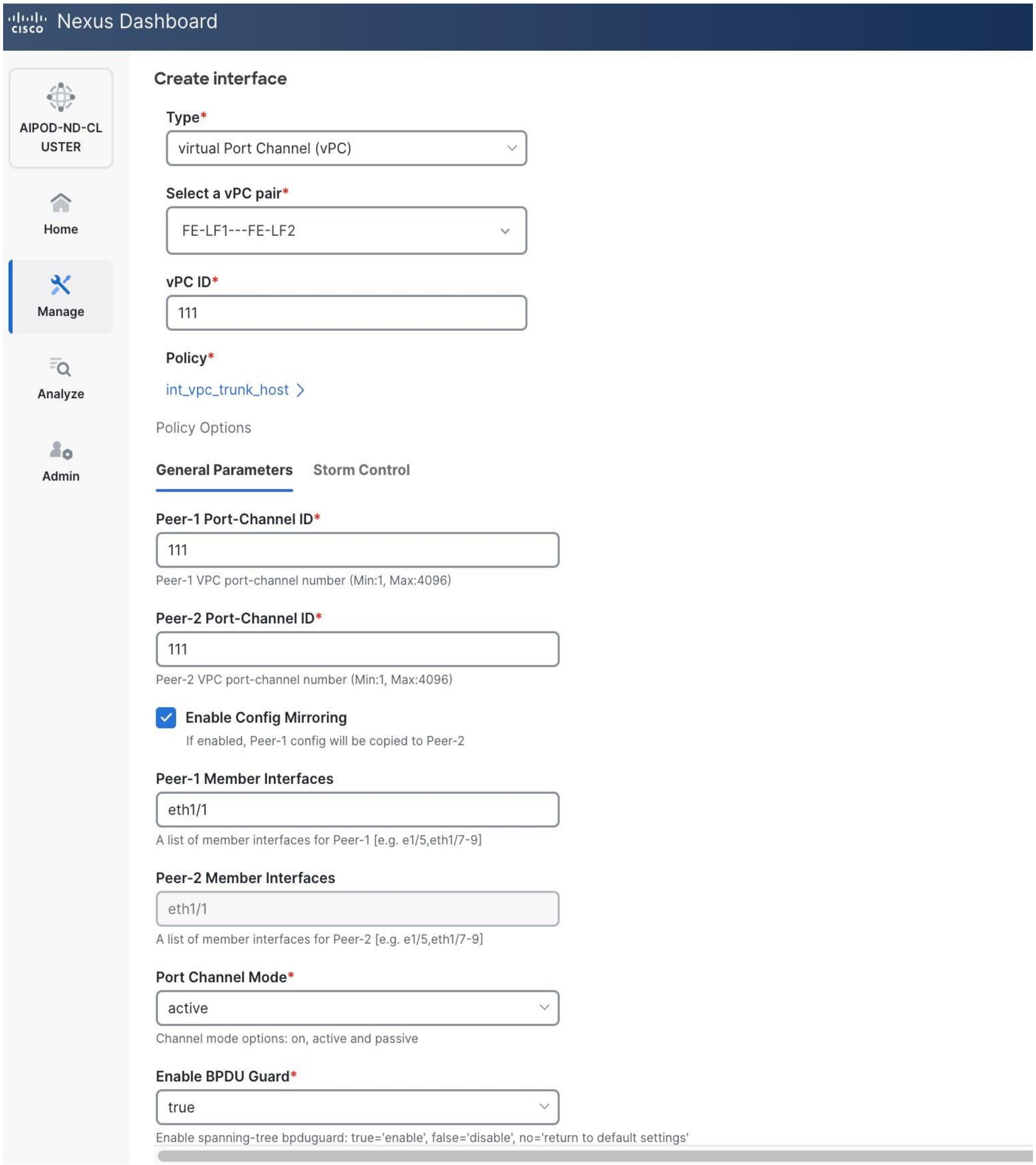
Step 4. Click the lower of the two **Actions** buttons and select **Create interface**.



□	Interface	Switch	Admin status	Operation... status	Reason	Policies
□	mgmt0	FE-LF1	↑ Up	↑ Up	ok	int_mgmt
□	Vlan1	FE-LF1	↓ Down	↓ Down	Administratively down	NA
□	Loopback0	FE-LF1	↑ Up	↑ Up	ok	int_fabric_loopba
□	Loopback1	FE-LF1	↑ Up	↑ Up	ok	int_fabric_loopba

Step 5. In the Create interface window:

- Specify the **Type** of interface as **virtual Port Channel (vPC)** from the drop-down list.
- For the **Select a vPC pair**, select the compute leaf switch VPC pair from the dropdown list.
- Specify a **vPC ID** for the vPC to the **first** UCS GPU node. Peer-1 and Peer-2 Port-Channel ID should match that of the vPC ID.
- Leave the Policy as int_vpc_trunk_host.
- Enable checkbox for Config Mirroring.
- Specify **Peer-1 Member Interfaces** that connects to first UCS node.



Create interface

Type*
virtual Port Channel (vPC)

Select a vPC pair*
FE-LF1---FE-LF2

vPC ID*
111

Policy*
int_vpc_trunk_host

Policy Options

General Parameters | Storm Control

Peer-1 Port-Channel ID*
111
Peer-1 VPC port-channel number (Min:1, Max:4096)

Peer-2 Port-Channel ID*
111
Peer-2 VPC port-channel number (Min:1, Max:4096)

☑ Enable Config Mirroring
If enabled, Peer-1 config will be copied to Peer-2

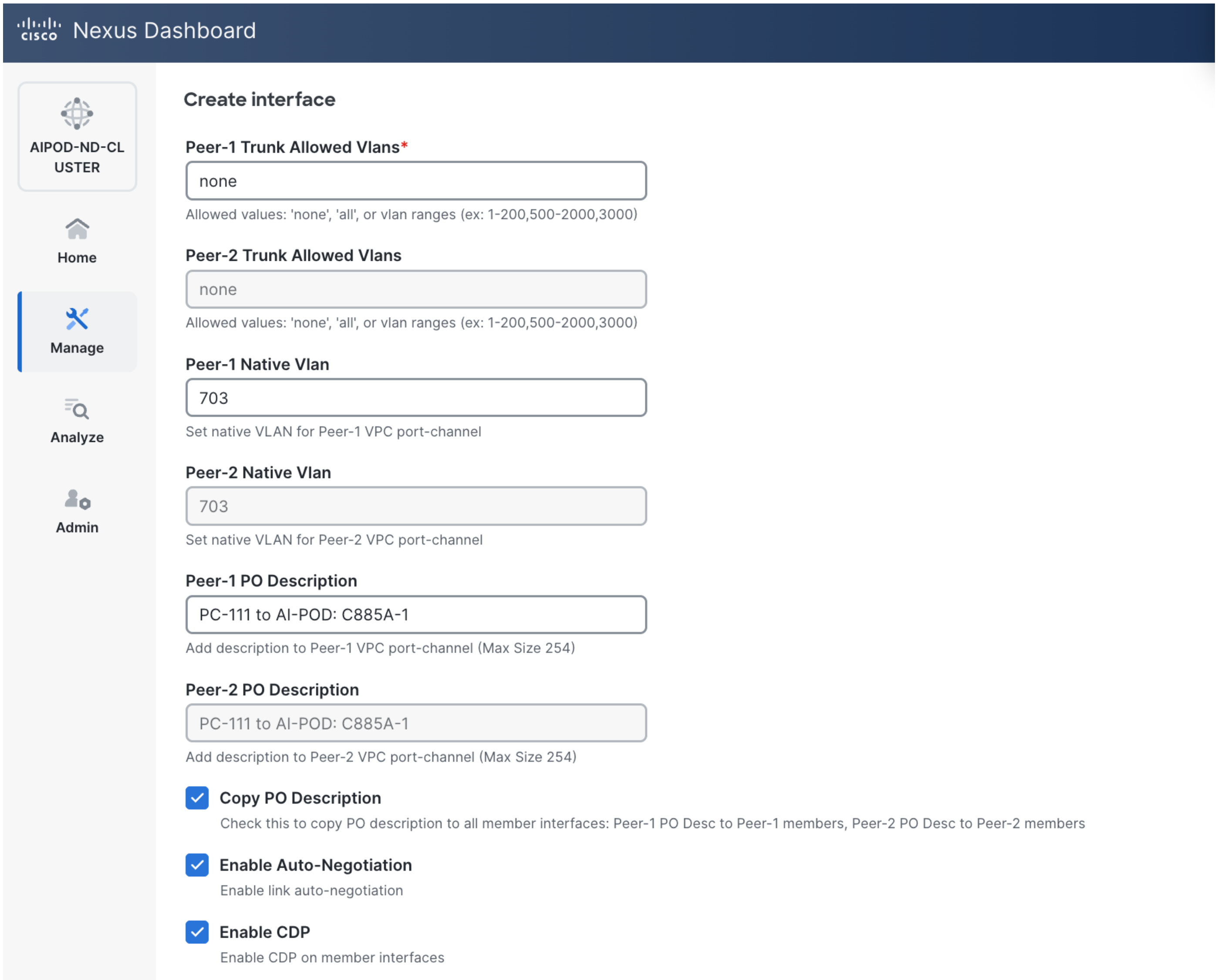
Peer-1 Member Interfaces
eth1/1
A list of member interfaces for Peer-1 [e.g. e1/5,eth1/7-9]

Peer-2 Member Interfaces
eth1/1
A list of member interfaces for Peer-2 [e.g. e1/5,eth1/7-9]

Port Channel Mode*
active
Channel mode options: on, active and passive

Enable BPDU Guard*
true
Enable spanning-tree bpduguard: true='enable', false='disable', no='return to default settings'

- Specify **Peer-1 Native Vlan.** – If running OpenShift on the C885A nodes, set the Peer-1 Native VLAN to 2
- Specify Peer-1 PO Description.
- **Enable** checkbox for **Copy PO Description** to copy PO description to all member interfaces.



Create interface

Peer-1 Trunk Allowed Vlans*

none

Allowed values: 'none', 'all', or vlan ranges (ex: 1-200,500-2000,3000)

Peer-2 Trunk Allowed Vlans

none

Allowed values: 'none', 'all', or vlan ranges (ex: 1-200,500-2000,3000)

Peer-1 Native Vlan

703

Set native VLAN for Peer-1 VPC port-channel

Peer-2 Native Vlan

703

Set native VLAN for Peer-2 VPC port-channel

Peer-1 PO Description

PC-111 to AI-POD: C885A-1

Add description to Peer-1 VPC port-channel (Max Size 254)

Peer-2 PO Description

PC-111 to AI-POD: C885A-1

Add description to Peer-2 VPC port-channel (Max Size 254)

☑ Copy PO Description

Check this to copy PO description to all member interfaces: Peer-1 PO Desc to Peer-1 members, Peer-2 PO Desc to Peer-2 members

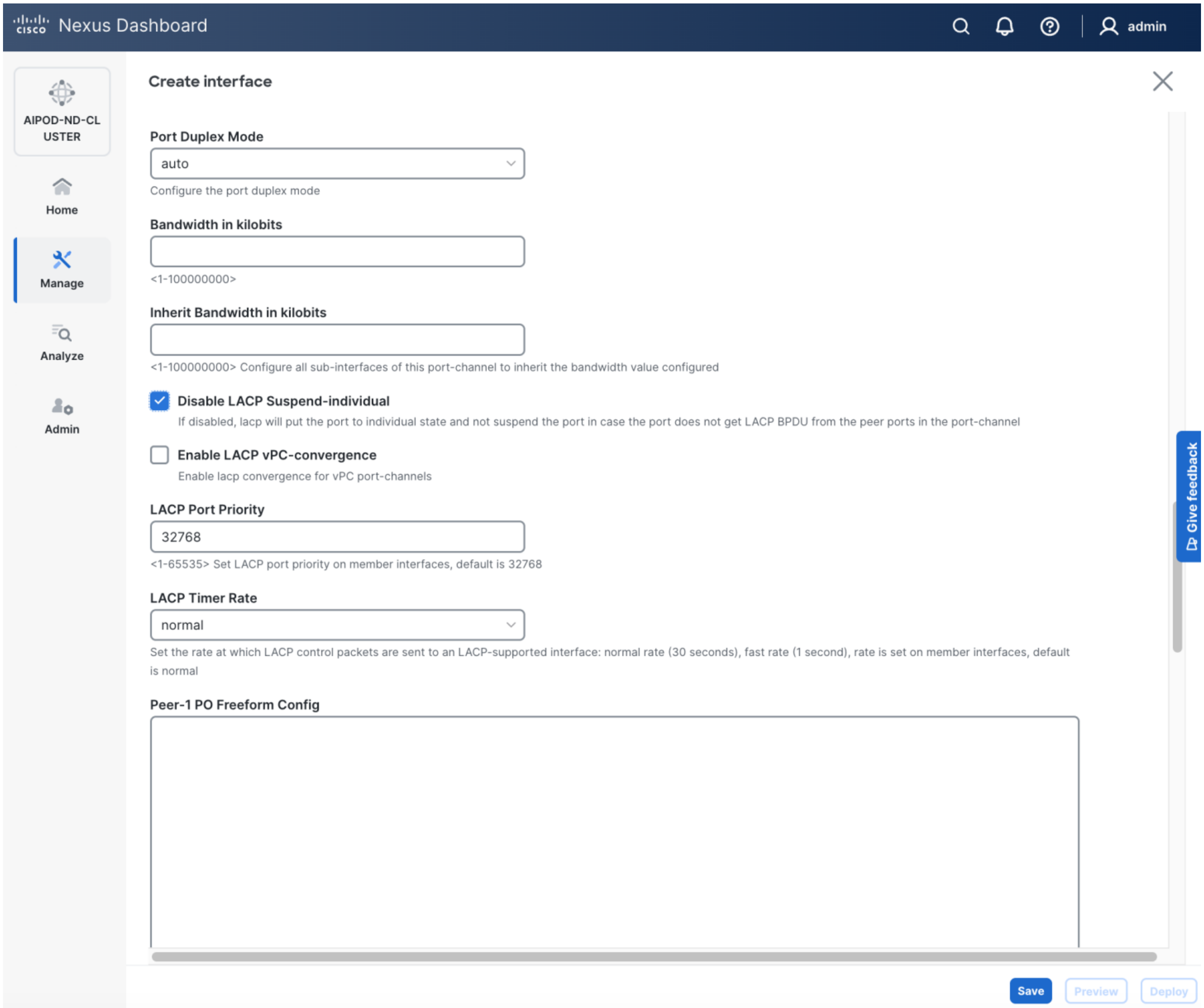
☑ Enable Auto-Negotiation

Enable link auto-negotiation

☑ Enable CDP

Enable CDP on member interfaces

- Enable checkbox for **Disable LACP Suspend-individual** – If running OpenShift on the C885A nodes, do not select this checkbox.
- Leave everything else as is. Additional configuration changes can be made later as needed.



Nexus Dashboard

Create interface

Port Duplex Mode: auto
Configure the port duplex mode

Bandwidth in kilobits:
<1-100000000>

Inherit Bandwidth in kilobits:
<1-100000000> Configure all sub-interfaces of this port-channel to inherit the bandwidth value configured

☑ Disable LACP Suspend-individual
If disabled, lacp will put the port to individual state and not suspend the port in case the port does not get LACP BPDU from the peer ports in the port-channel

☐ Enable LACP vPC-convergence
Enable lacp convergence for vPC port-channels

LACP Port Priority: 32768
<1-65535> Set LACP port priority on member interfaces, default is 32768

LACP Timer Rate: normal
Set the rate at which LACP control packets are sent to an LACP-supported interface: normal rate (30 seconds), fast rate (1 second), rate is set on member interfaces, default is normal

Peer-1 PO Freeform Config:

Step 6. Click **Save**.

Step 7. Click **Preview**.

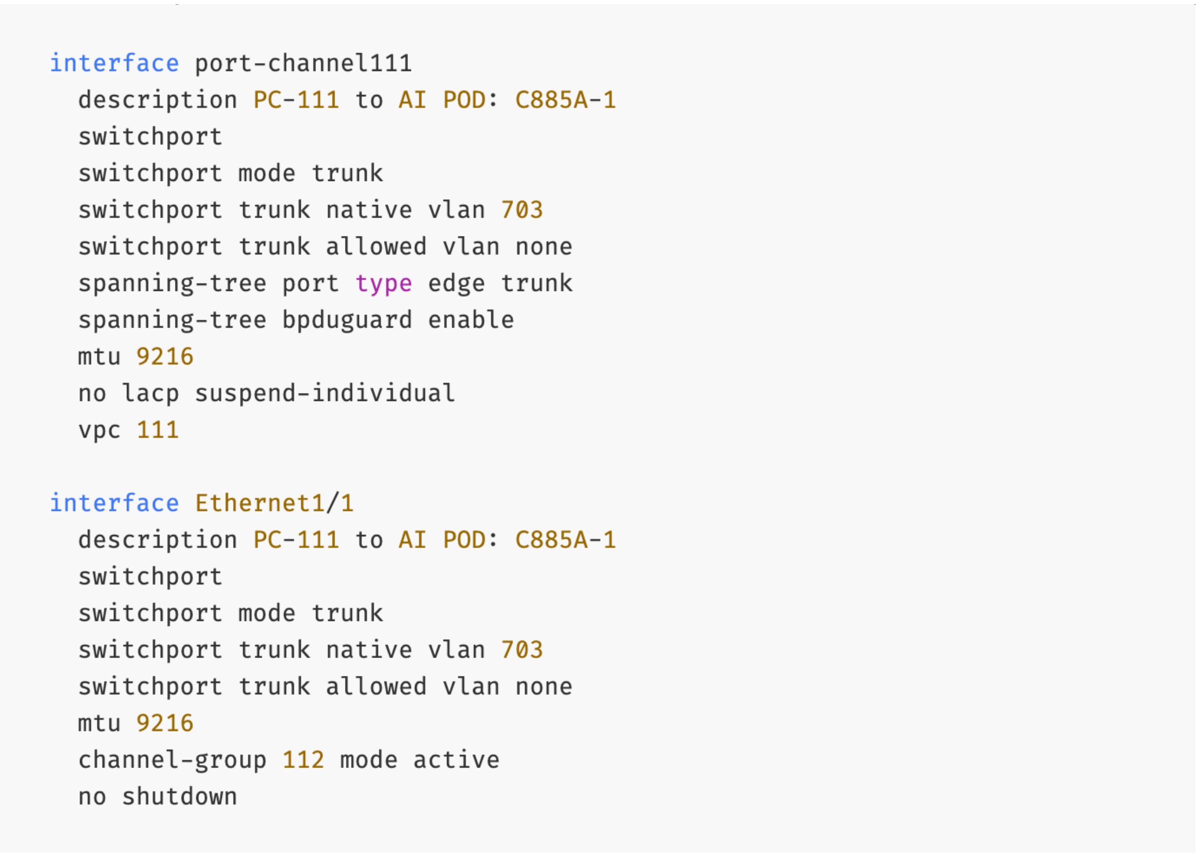
Step 8. To view the **Pending config** changes, click the **Pending Config** column for each switch (**X lines**) to see the configuration. The configuration is provided as a reference from one leaf switch.

Step 9. Click the **X** in the top right corner and select **Deploy** and **Deploy config** to deploy the **Pending config** changes.

Step 10. Click **Close** when deployment completes successfully.

Step 11. Verify that all the interfaces and port-channel is up on each switch in the leaf switch pair that connects to the UCS node. It may take a few minutes for the vPC to go from **Not discovered** to **consistent** state.

The deployed configuration on one leaf switch is provided as a reference below:



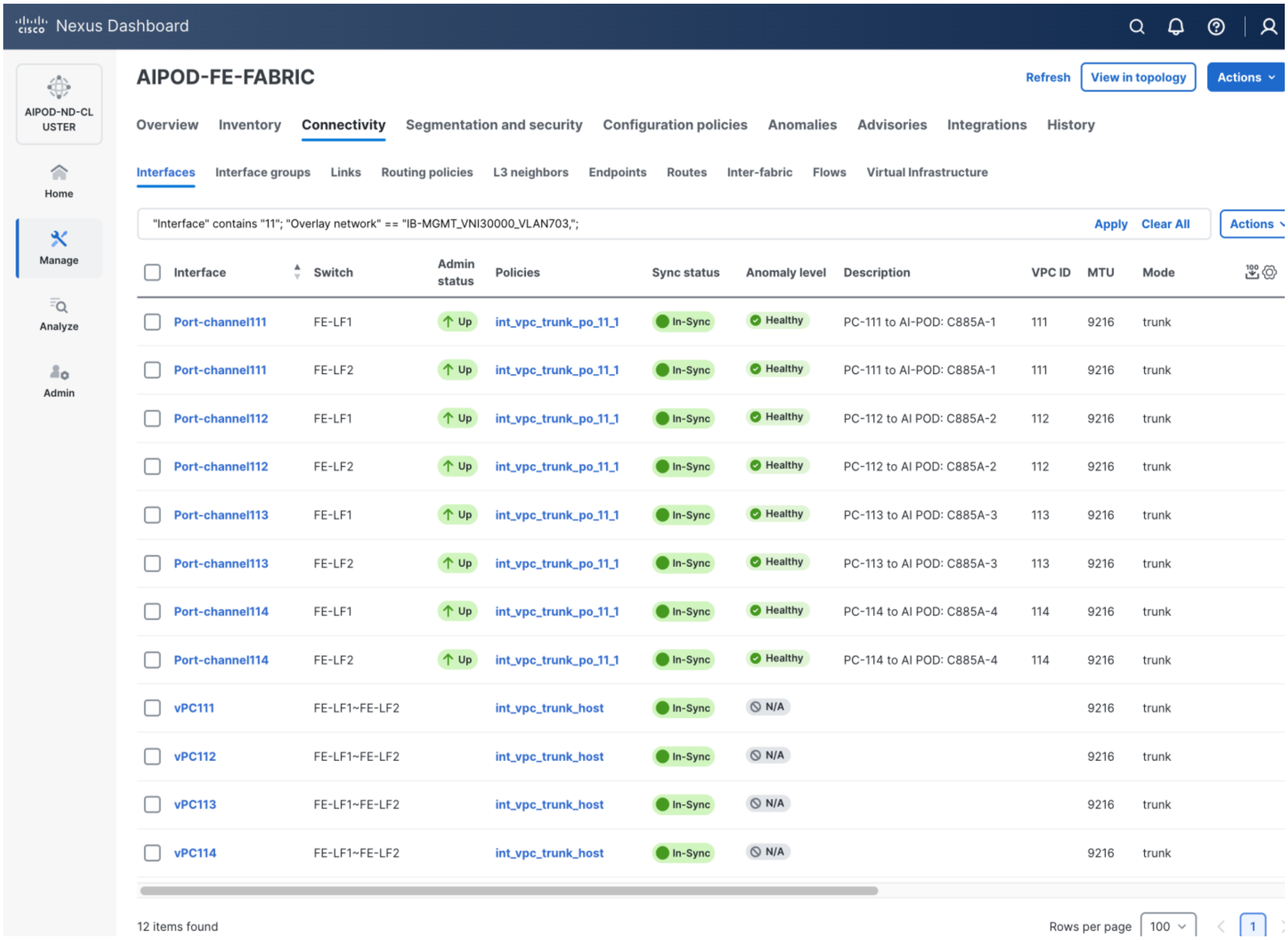
```
interface port-channel111
  description PC-111 to AI POD: C885A-1
  switchport
  switchport mode trunk
  switchport trunk native vlan 703
  switchport trunk allowed vlan none
  spanning-tree port type edge trunk
  spanning-tree bpduguard enable
  mtu 9216
  no lacp suspend-individual
  vpc 111

interface Ethernet1/1
  description PC-111 to AI POD: C885A-1
  switchport
  switchport mode trunk
  switchport trunk native vlan 703
  switchport trunk allowed vlan none
  mtu 9216
  channel-group 112 mode active
  no shutdown
```

Procedure 2. Deploy vPCs to remaining UCS C885A GPU nodes

Step 1. Repeat the previous procedure to provision layer 2 connectivity from the compute/management leaf switches to the remaining 3 UCS nodes in the cluster.

Step 2. Verify that all the interfaces and port-channel is up on each switch in the leaf switch pair that connects to the UCS nodes. It may take a few minutes for the vPC to go from **Not discovered** to **consistent** state.



"Interface" contains "11"; "Overlay network" == "IB-MGMT_VNI30000_VLAN703,";

	Interface	Switch	Admin status	Policies	Sync status	Anomaly level	Description	VPC ID	MTU	Mode
□	Port-channel111	FE-LF1	Up	int_vpc_trunk_po_11_1	In-Sync	Healthy	PC-111 to AI-POD: C885A-1	111	9216	trunk
□	Port-channel111	FE-LF2	Up	int_vpc_trunk_po_11_1	In-Sync	Healthy	PC-111 to AI-POD: C885A-1	111	9216	trunk
□	Port-channel112	FE-LF1	Up	int_vpc_trunk_po_11_1	In-Sync	Healthy	PC-112 to AI POD: C885A-2	112	9216	trunk
□	Port-channel112	FE-LF2	Up	int_vpc_trunk_po_11_1	In-Sync	Healthy	PC-112 to AI POD: C885A-2	112	9216	trunk
□	Port-channel113	FE-LF1	Up	int_vpc_trunk_po_11_1	In-Sync	Healthy	PC-113 to AI POD: C885A-3	113	9216	trunk
□	Port-channel113	FE-LF2	Up	int_vpc_trunk_po_11_1	In-Sync	Healthy	PC-113 to AI POD: C885A-3	113	9216	trunk
□	Port-channel114	FE-LF1	Up	int_vpc_trunk_po_11_1	In-Sync	Healthy	PC-114 to AI POD: C885A-4	114	9216	trunk
□	Port-channel114	FE-LF2	Up	int_vpc_trunk_po_11_1	In-Sync	Healthy	PC-114 to AI POD: C885A-4	114	9216	trunk
□	vPC111	FE-LF1~FE-LF2		int_vpc_trunk_host	In-Sync	N/A			9216	trunk
□	vPC112	FE-LF1~FE-LF2		int_vpc_trunk_host	In-Sync	N/A			9216	trunk
□	vPC113	FE-LF1~FE-LF2		int_vpc_trunk_host	In-Sync	N/A			9216	trunk
□	vPC114	FE-LF1~FE-LF2		int_vpc_trunk_host	In-Sync	N/A			9216	trunk

12 items found

Rows per page 100

1

Enable In-Band Management Connectivity to UCS GPU and Management Nodes

The **In-band management** (**IB-MGMT**) network in the FE fabric will provide the following connectivity:

- Connectivity from control, management and services nodes to the UCS GPU nodes where the AI workload is running
- Connectivity to other networks (networks outside this FE fabric to other networks within the enterprise or external to the enterprise)

In a Red Hat OpenShift environment, this network will also serve as the **Cluster IP** pod network for the OpenShift cluster running on UCS management (Kubernetes Control) nodes and UCS GPU (Kubernetes Worker) nodes.

Table 12. Setup Parameters for FE Fabric: In-Band Management Connectivity to UCS Management and GPU Nodes

Parameter Type	Parameter Name | Value	Parameter Type
IB-MGMT Network		
Name	IB-MGMT_VN30000_VLAN703	
Layer 2 Only	No	
IB-MGMT VRF		

Parameter Type	Parameter Name | Value	Parameter Type
VRF Name	FE-MGMT_VN50000	
VRF ID	50000	(System Proposed)
VLAN ID	2000	(System Proposed)
VRF Interface Description	FE-MGMT VRF	
VRF Description	Frontend Fabric – Management VRF	
IB-MGMT Network Contd.		
Network ID	30000	
VLAN ID	703	
IPv4 Gateway/Netmask	10.115.90.126/26	
VLAN Name	IB-MGMT_VLAN	
Interface Description	IB-MGMT	
UCS C885A GPU Nodes		
vPC Leaf Switch Pair	FE-LF1, FE-LF2	vPC Leaf Switch Pair
UCS C885-A Node-1 Interface	Port-Channel 111	
UCS C885-A Node-2 Interface	Port-Channel 112	
UCS C885-A Node-3 Interface	Port-Channel 113	
UCS C885-A Node-4 Interface	Port-Channel 114	
Management UCS X-Direct Chassis		
vPC Leaf Switch Pair	FE-LF1, FE-LF2	
UCS X-Direct (-A Uplinks)	Port-Channel 15	
UCS X-Direct (-B Uplinks)	Port-Channel 16	

To deploy the in-band management network and enable connectivity to the UCS GPU nodes, follow the procedures below.

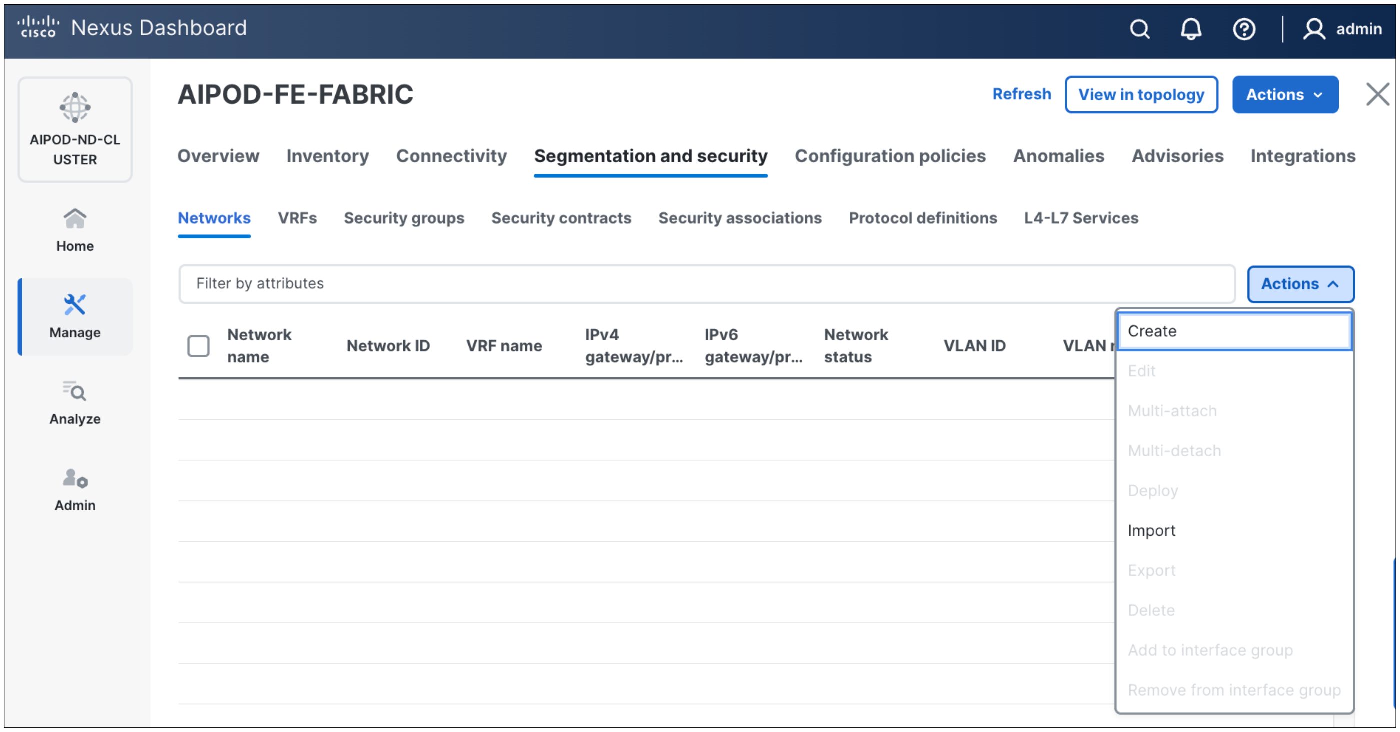
Procedure 1. Deploy In-Band Management Connectivity for UCS GPU Nodes

Step 1. Use a web browser to navigate to Nexus Dashboard. Use the management IP of any node in the ND cluster. Log in using **admin** account.

Step 2. From the left navigation menu, go to **Manage** > **Fabrics**.

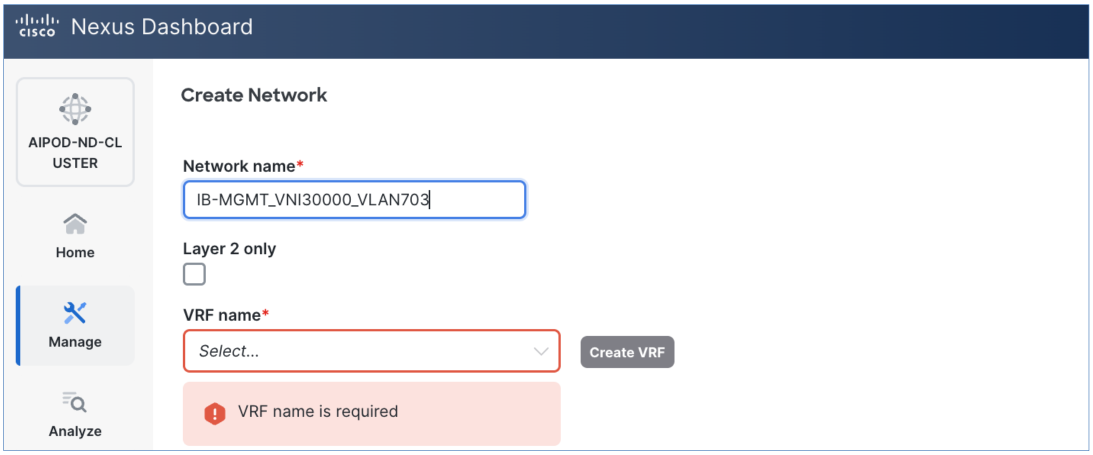
Step 3. Select the FE fabric and navigate to **Segmentation and Security** > **Networks** tab.

Step 4. Click the lower of the two **Actions** buttons and select **Create** from the list.



Step 5. In the **Create Network** window, specify the following:

- **Network name** for the IB-MGMT network.
- Leave unchecked the **Layer 2 only** checkbox as IB-MGMT is a layer 3 overlay network.
- **VRF name.** If a VRF hasn't been created already, you have an option from this window to also create a VRF.



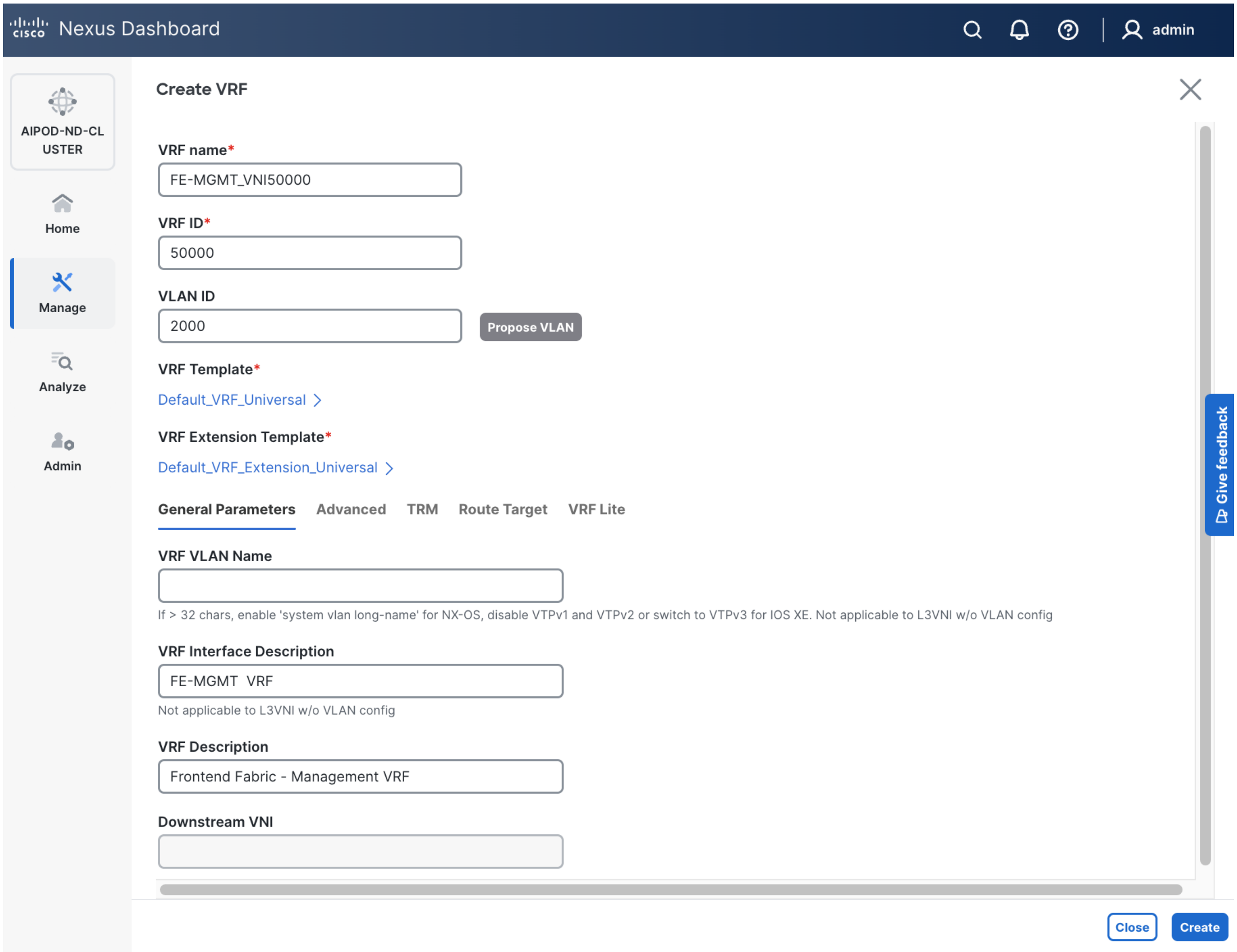
Network name*: IB-MGMT_VNI30000_VLAN703

Layer 2 only ☐

VRF name*: Select...

VRF name is required

- To create a new VRF, click **Create** VRF. In the **Create VRF** window, specify **VRF ID** (or use default), **VLAN ID** (or click **Propose VLAN** to let system define a VLAN), and optionally other parameters as shown in the screenshot.



Create VRF

VRF name* FE-MGMT_VNI50000

VRF ID* 50000

VLAN ID 2000 Propose VLAN

VRF Template* Default_VRF_Universal

VRF Extension Template* Default_VRF_Extension_Universal

General Parameters | Advanced | TRM | Route Target | VRF Lite

VRF VLAN Name

If > 32 chars, enable 'system vlan long-name' for NX-OS, disable VTPv1 and VTPv2 or switch to VTPv3 for IOS XE. Not applicable to L3VNI w/o VLAN config

VRF Interface Description FE-MGMT VRF

Not applicable to L3VNI w/o VLAN config

VRF Description Frontend Fabric - Management VRF

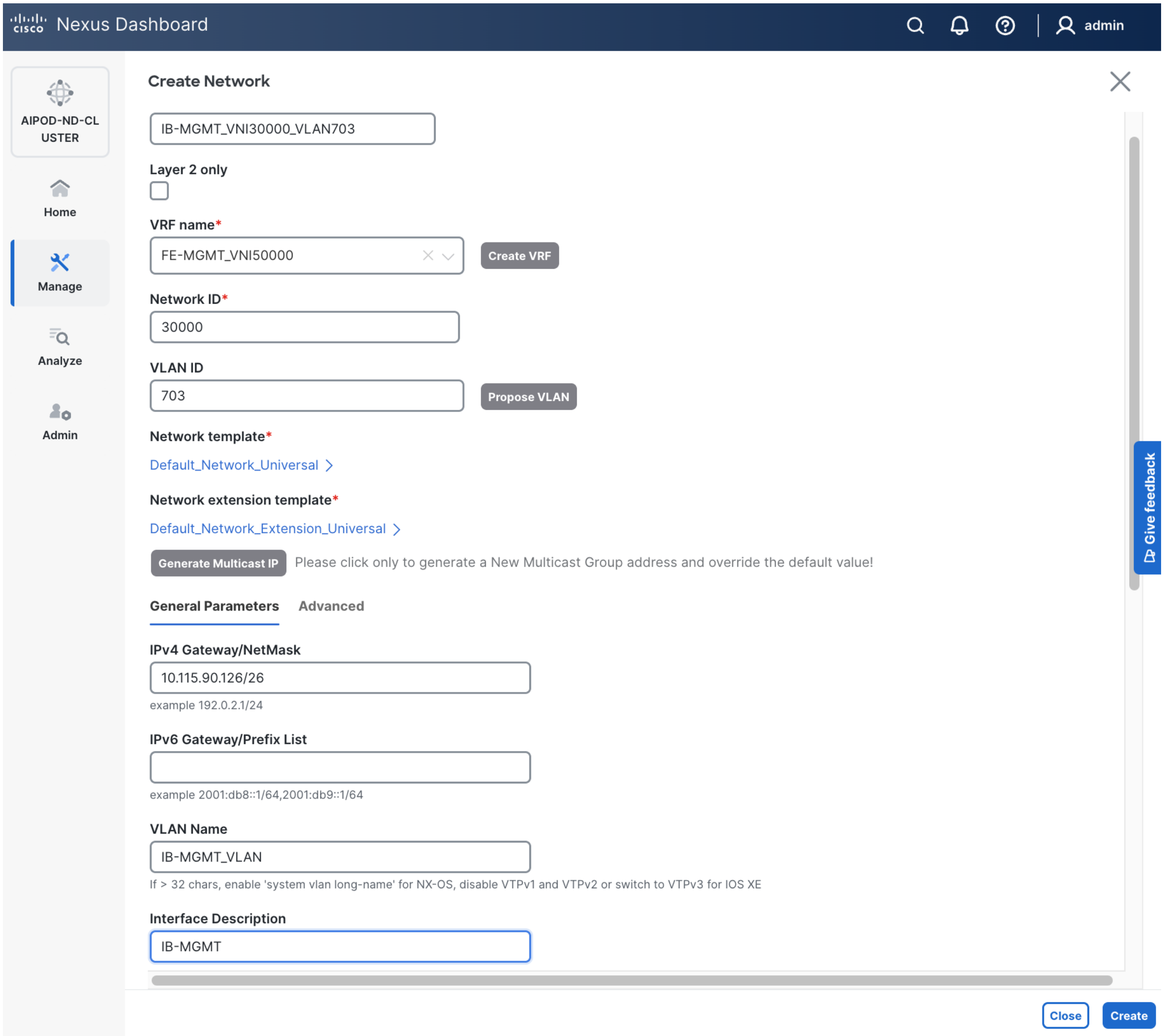
Downstream VNI

Close | Create

Step 6. Click **Create** to create the VRF and return to the **Create Network** window.

Step 7. In the **Create Network** window, specify the following:

- **Network ID** or use default.
- **VLAN ID** or click **Propose VLAN** button to let system define a VLAN.
- In the General Parameters tab, specify IP Gateway/Netmask, VLAN Name and Interface Description.



Create Network

IB-MGMT_VNI30000_VLAN703

Layer 2 only

□

VRF name*

FE-MGMT_VNI50000

Create VRF

Network ID*

30000

VLAN ID

703

Propose VLAN

Network template*

Default_Network_Universal >

Network extension template*

Default_Network_Extension_Universal >

Generate Multicast IP Please click only to generate a New Multicast Group address and override the default value!

General Parameters Advanced

IPv4 Gateway/NetMask

10.115.90.126/26

example 192.0.2.1/24

IPv6 Gateway/Prefix List

example 2001:db8::1/64,2001:db9::1/64

VLAN Name

IB-MGMT_VLAN

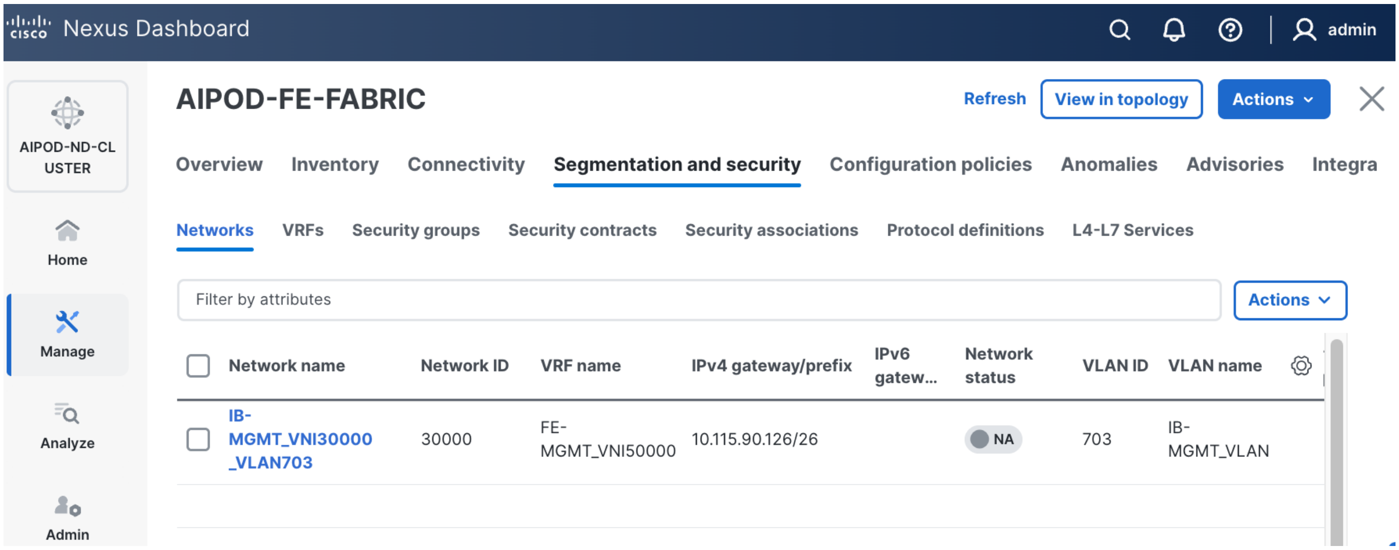
If > 32 chars, enable 'system vlan long-name' for NX-OS, disable VTPv1 and VTPv2 or switch to VTPv3 for IOS XE

Interface Description

IB-MGMT

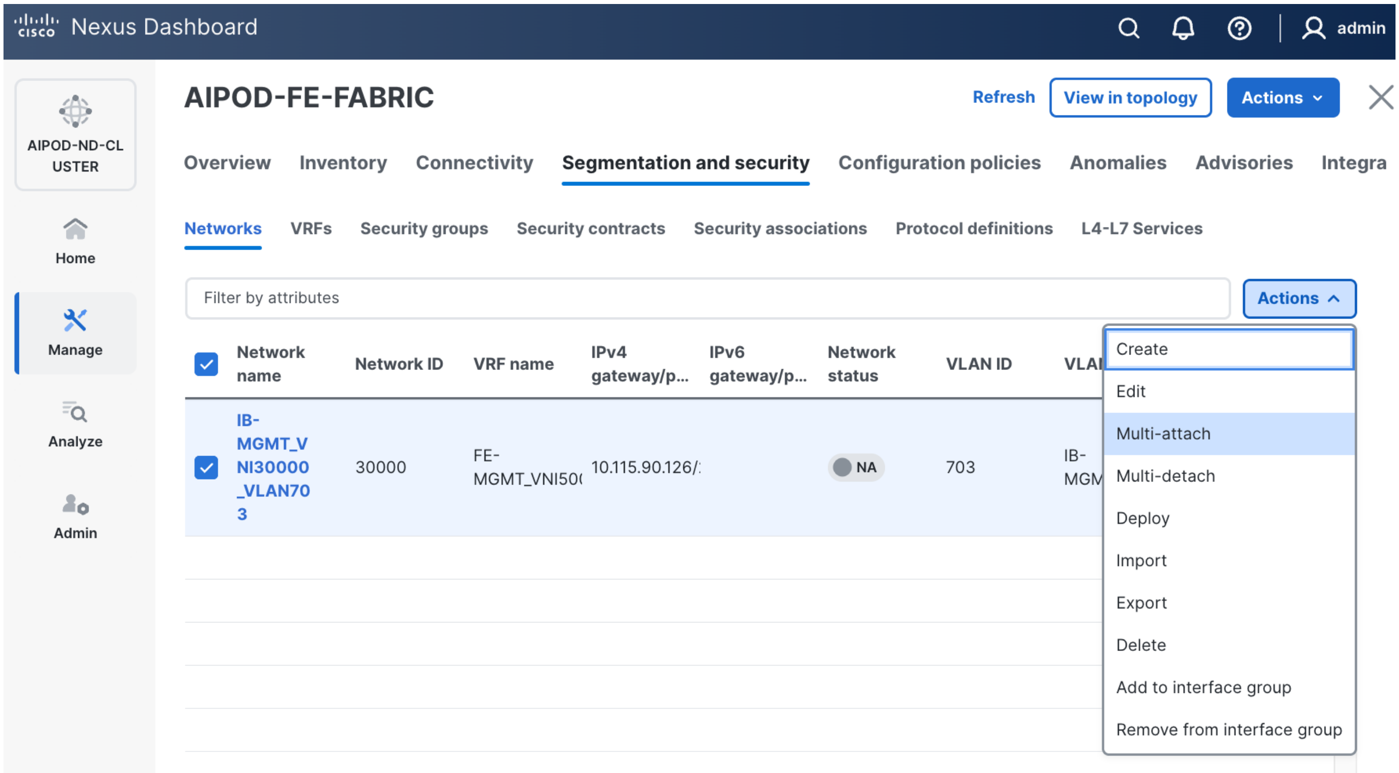
Close Create

Step 8. Click **Create** to create the **Network.**



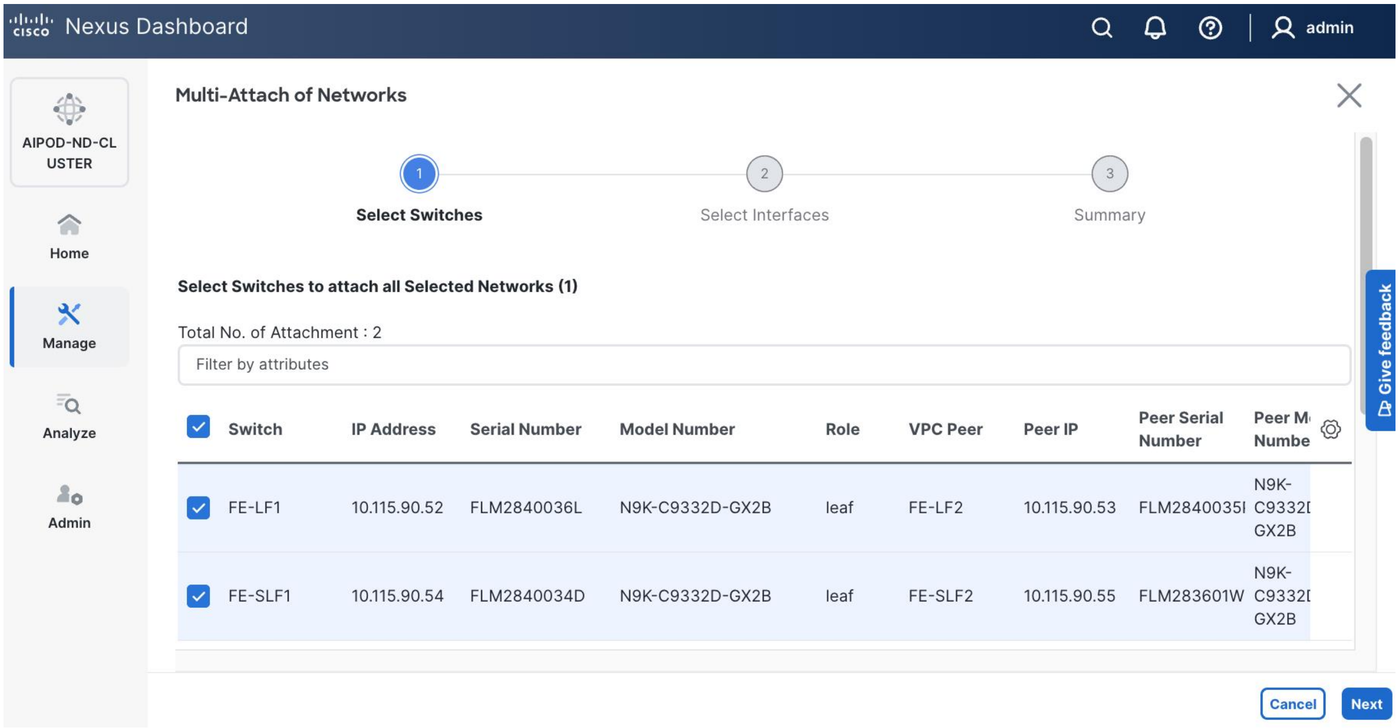
	Network name	Network ID	VRF name	IPv4 gateway/prefix	IPv6 gatew...	Network status	VLAN ID	VLAN name
□	IB-MGMT_VNI30000_VLAN703	30000	FE-MGMT_VNI50000	10.115.90.126/26		NA	703	IB-MGMT_VLAN

Step 9. Select newly created network and deploy it on both leaf pairs. Click the lower of the two **Actions** button and select **Multi-attach** from the list.



☑	Network name	Network ID	VRF name	IPv4 gateway/p...	IPv6 gateway/p...	Network status	VLAN ID	VLAI
☑	IB-MGMT_VNI30000_VLAN703	30000	FE-MGMT_VNI50(	10.115.90.126/:		NA	703	IB-MGM

Step 10. Select the Leaf switch pairs. Enabling this network on storage leaf pairs, as shown below, may not be necessary in all deployments.



Multi-Attach of Networks

1 Select Switches — 2 Select Interfaces — 3 Summary

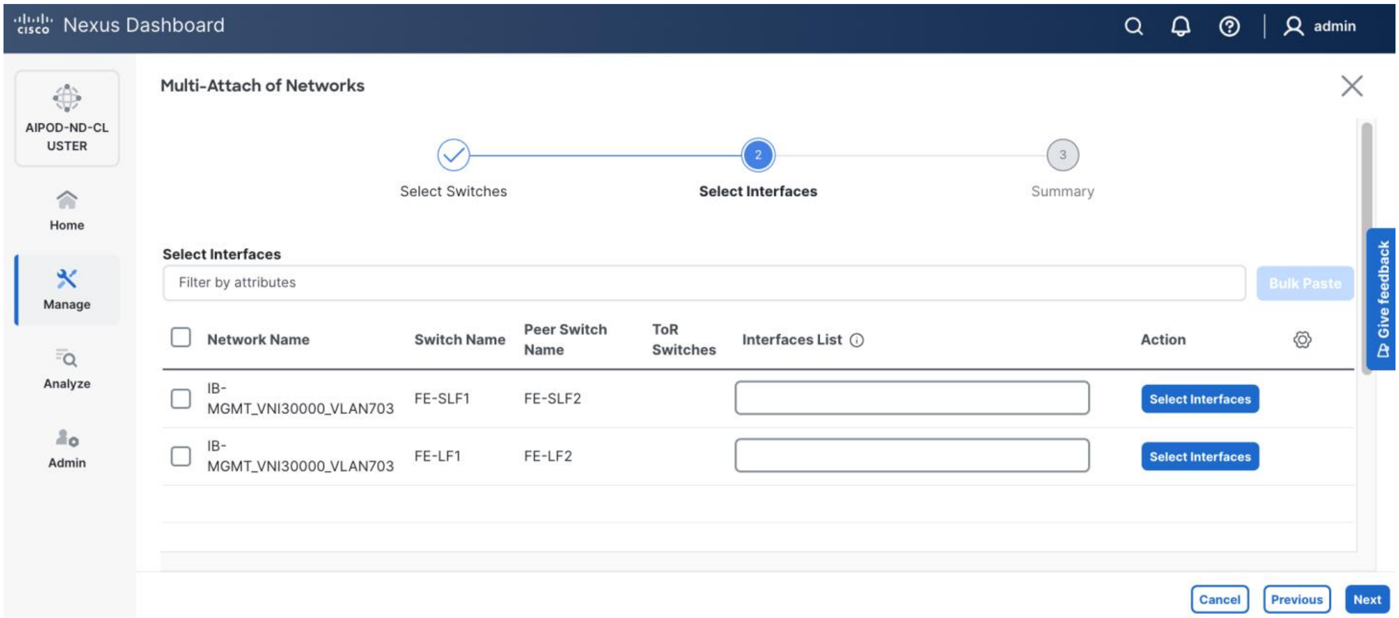
Select Switches to attach all Selected Networks (1)

Total No. of Attachment : 2

Filter by attributes

☑	Switch	IP Address	Serial Number	Model Number	Role	VPC Peer	Peer IP	Peer Serial Number	Peer M Numbe
☑	FE-LF1	10.115.90.52	FLM2840036L	N9K-C9332D-GX2B	leaf	FE-LF2	10.115.90.53	FLM2840035I	N9K-C9332I GX2B
☑	FE-SLF1	10.115.90.54	FLM2840034D	N9K-C9332D-GX2B	leaf	FE-SLF2	10.115.90.55	FLM283601W	N9K-C9332I GX2B

Step 11. Click **Next.**



Multi-Attach of Networks

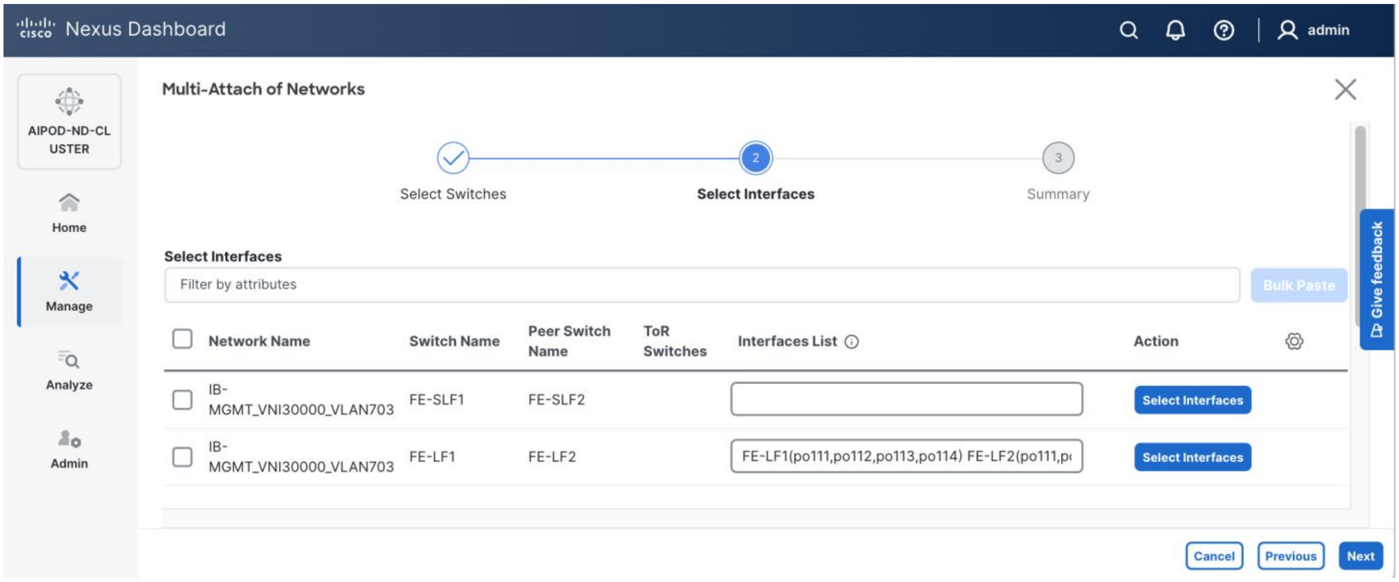
Select Switches — 2 Select Interfaces — 3 Summary

Select Interfaces

Filter by attributes

□	Network Name	Switch Name	Peer Switch Name	ToR Switches	Interfaces List	Action
□	IB-MGMT_VNI30000_VLAN703	FE-SLF1	FE-SLF2			Select Interfaces
□	IB-MGMT_VNI30000_VLAN703	FE-LF1	FE-LF2			Select Interfaces

Step 12. Select each switch pair in the list and click **Select interfaces** on the right to deploy this network as a trunked VLAN (VLAN 703) on the selected interfaces. Select the interfaces on the compute leaf switches that connect to the UCS GPU nodes. Additional interfaces can be added later as needed.



Multi-Attach of Networks

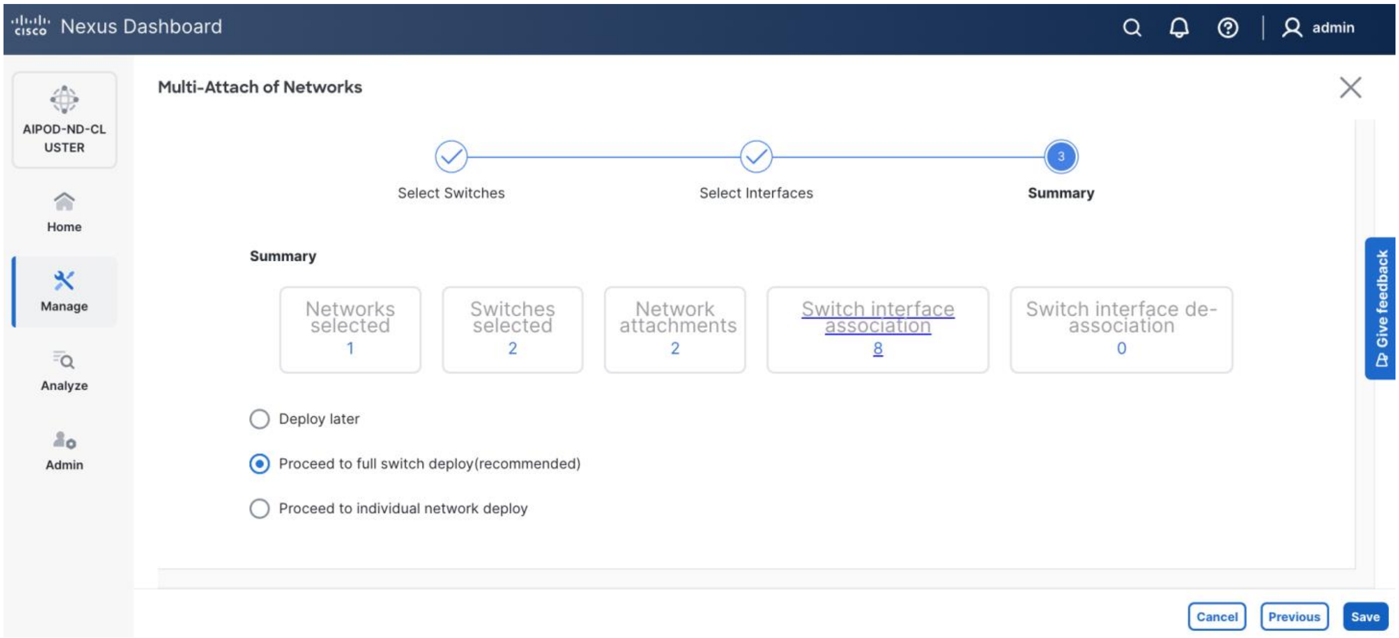
Select Switches — Select Interfaces — Summary

Select Interfaces

Filter by attributes

	Network Name	Switch Name	Peer Switch Name	ToR Switches	Interfaces List	Action
□	IB-MGMT_VNI30000_VLAN703	FE-SLF1	FE-SLF2			Select Interfaces
□	IB-MGMT_VNI30000_VLAN703	FE-LF1	FE-LF2		FE-LF1(po111,po112,po113,po114) FE-LF2(po111,p	Select Interfaces

Step 13. Click **Next.**



Multi-Attach of Networks

Select Switches — Select Interfaces — Summary

Summary

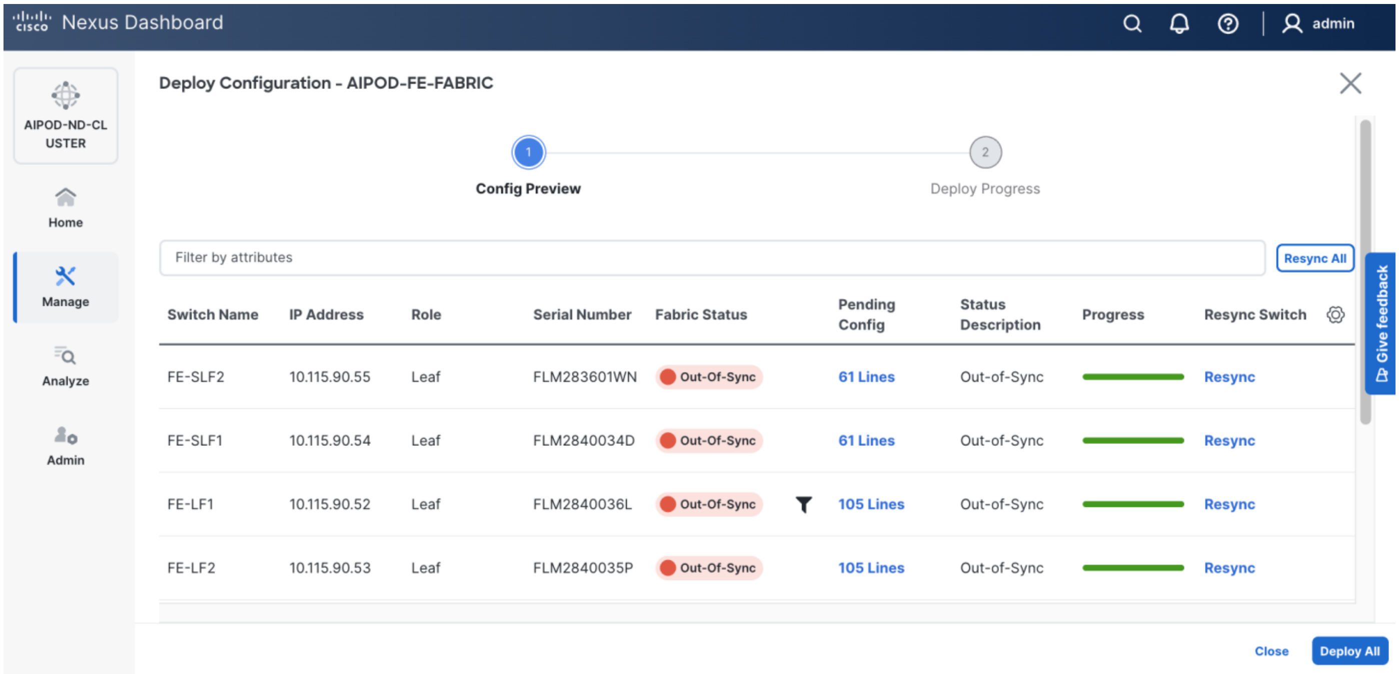
Networks selected	Switches selected	Network attachments	Switch interface association	Switch interface de-association
1	2	2	8	0

○ Deploy later

● Proceed to full switch deploy(recommended)

○ Proceed to individual network deploy

Step 14. Click **Save.**

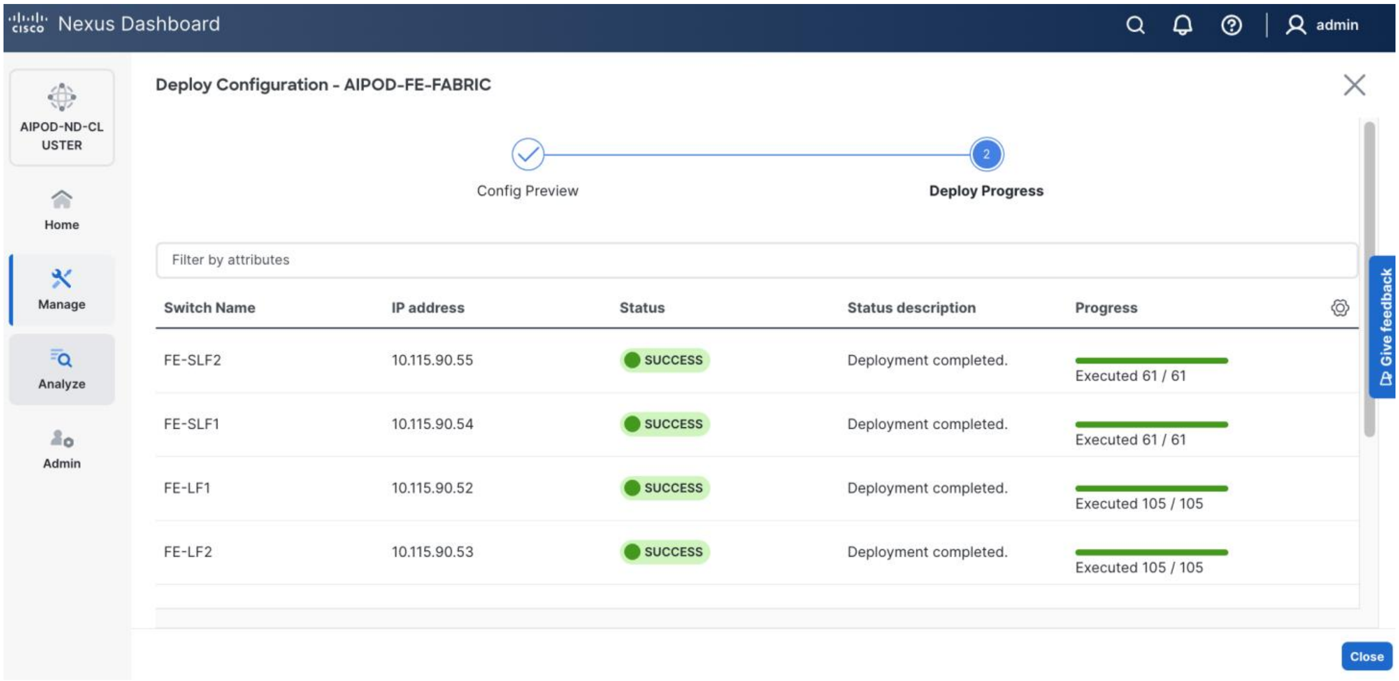


Deploy Configuration - AIPOD-FE-FABRIC

Switch Name	IP Address	Role	Serial Number	Fabric Status	Pending Config	Status Description	Progress	Resync Switch
FE-SLF2	10.115.90.55	Leaf	FLM283601WN	Out-Of-Sync	61 Lines	Out-of-Sync		Resync
FE-SLF1	10.115.90.54	Leaf	FLM2840034D	Out-Of-Sync	61 Lines	Out-of-Sync		Resync
FE-LF1	10.115.90.52	Leaf	FLM2840036L	Out-Of-Sync	105 Lines	Out-of-Sync		Resync
FE-LF2	10.115.90.53	Leaf	FLM2840035P	Out-Of-Sync	105 Lines	Out-of-Sync		Resync

Step 15. Click **Pending Config** to see the configuration being deployed. The **pending** configuration on one leaf switch is provided as a reference at the end.

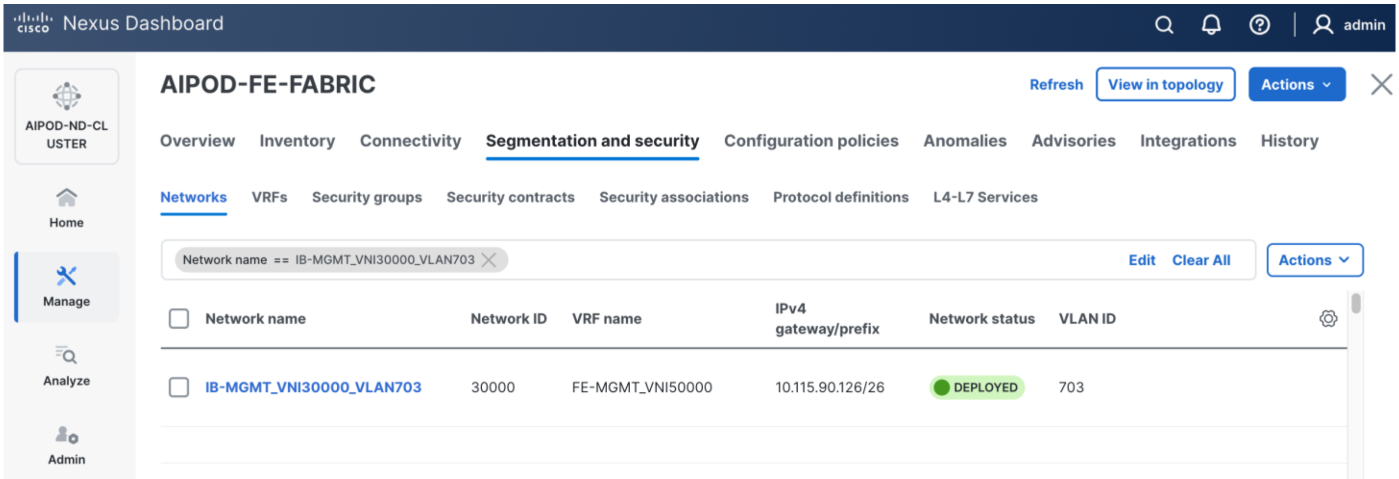
Step 16. Click **Deploy All**.



Deploy Configuration - AIPOD-FE-FABRIC

Switch Name	IP address	Status	Status description	Progress
FE-SLF2	10.115.90.55	SUCCESS	Deployment completed.	Executed 61 / 61
FE-SLF1	10.115.90.54	SUCCESS	Deployment completed.	Executed 61 / 61
FE-LF1	10.115.90.52	SUCCESS	Deployment completed.	Executed 105 / 105
FE-LF2	10.115.90.53	SUCCESS	Deployment completed.	Executed 105 / 105

Step 17. Click **Close**.

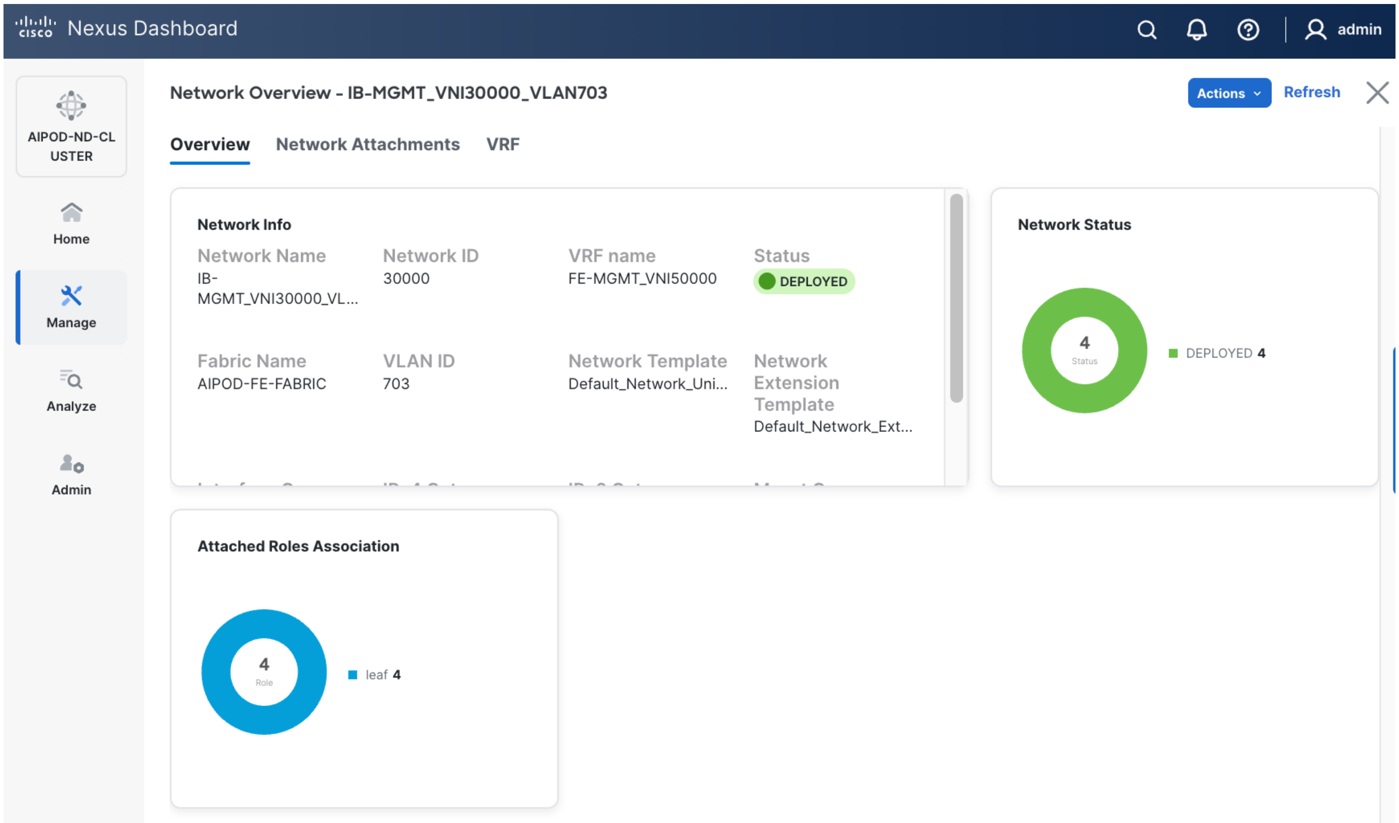


AIPOD-FE-FABRIC

Network name == IB-MGMT_VNI30000_VLAN703

Network name	Network ID	VRF name	IPv4 gateway/prefix	Network status	VLAN ID
IB-MGMT_VNI30000_VLAN703	30000	FE-MGMT_VNI50000	10.115.90.126/26	DEPLOYED	703

Step 18. Click the **Network name** to verify that the network was successfully **deployed** on the relevant switches and interfaces.



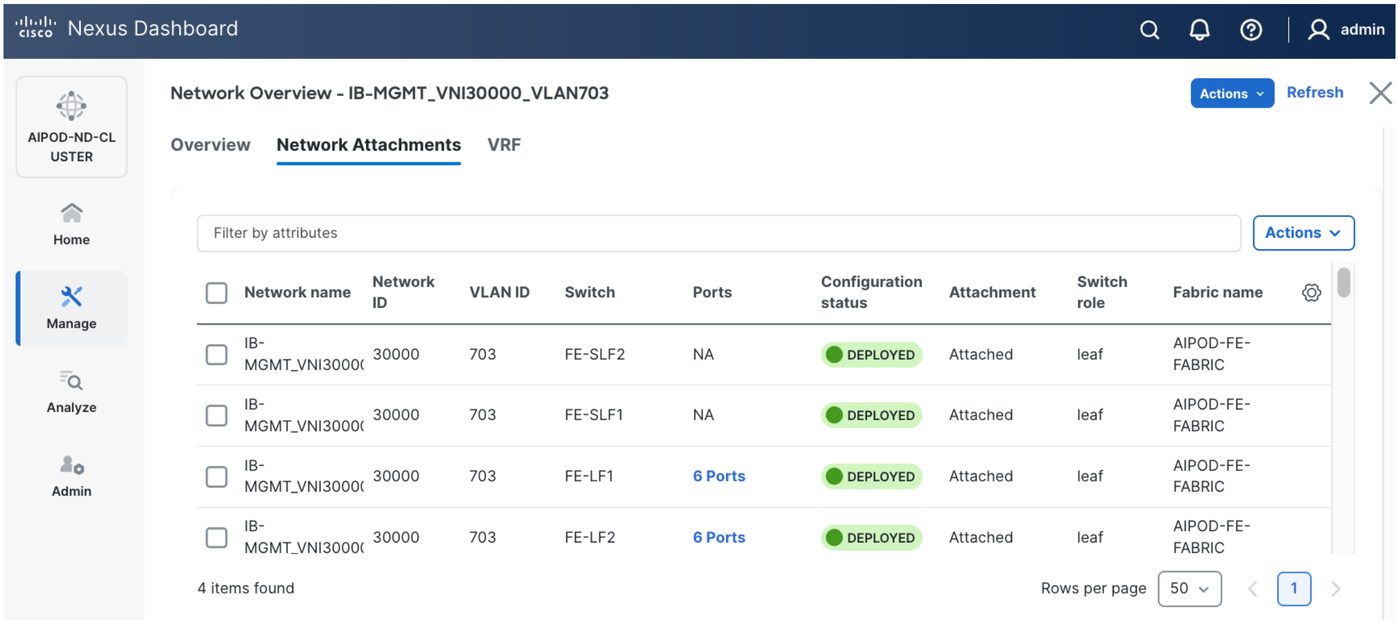
Network Overview - IB-MGMT_VNI30000_VLAN703

Network Info

Network Name: IB-MGMT_VNI30000_VL...
Network ID: 30000
VRF name: FE-MGMT_VNI50000
Status: DEPLOYED
Fabric Name: AIPOD-FE-FABRIC
VLAN ID: 703
Network Template: Default_Network_Uni...
Network Extension Template: Default_Network_Ext...

Network Status

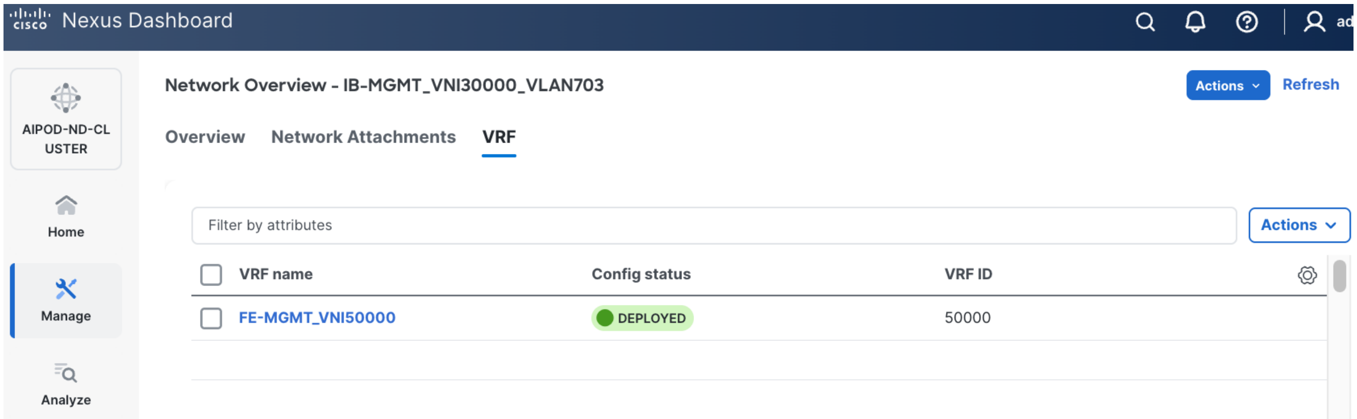
Attached Roles Association



Network Overview - IB-MGMT_VNI30000_VLAN703

Network name	Network ID	VLAN ID	Switch	Ports	Configuration status	Attachment	Switch role	Fabric name
IB-MGMT_VNI3000(	30000	703	FE-SLF2	NA	DEPLOYED	Attached	leaf	AIPOD-FE-FABRIC
IB-MGMT_VNI3000(	30000	703	FE-SLF1	NA	DEPLOYED	Attached	leaf	AIPOD-FE-FABRIC
IB-MGMT_VNI3000(	30000	703	FE-LF1	6 Ports	DEPLOYED	Attached	leaf	AIPOD-FE-FABRIC
IB-MGMT_VNI3000(	30000	703	FE-LF2	6 Ports	DEPLOYED	Attached	leaf	AIPOD-FE-FABRIC

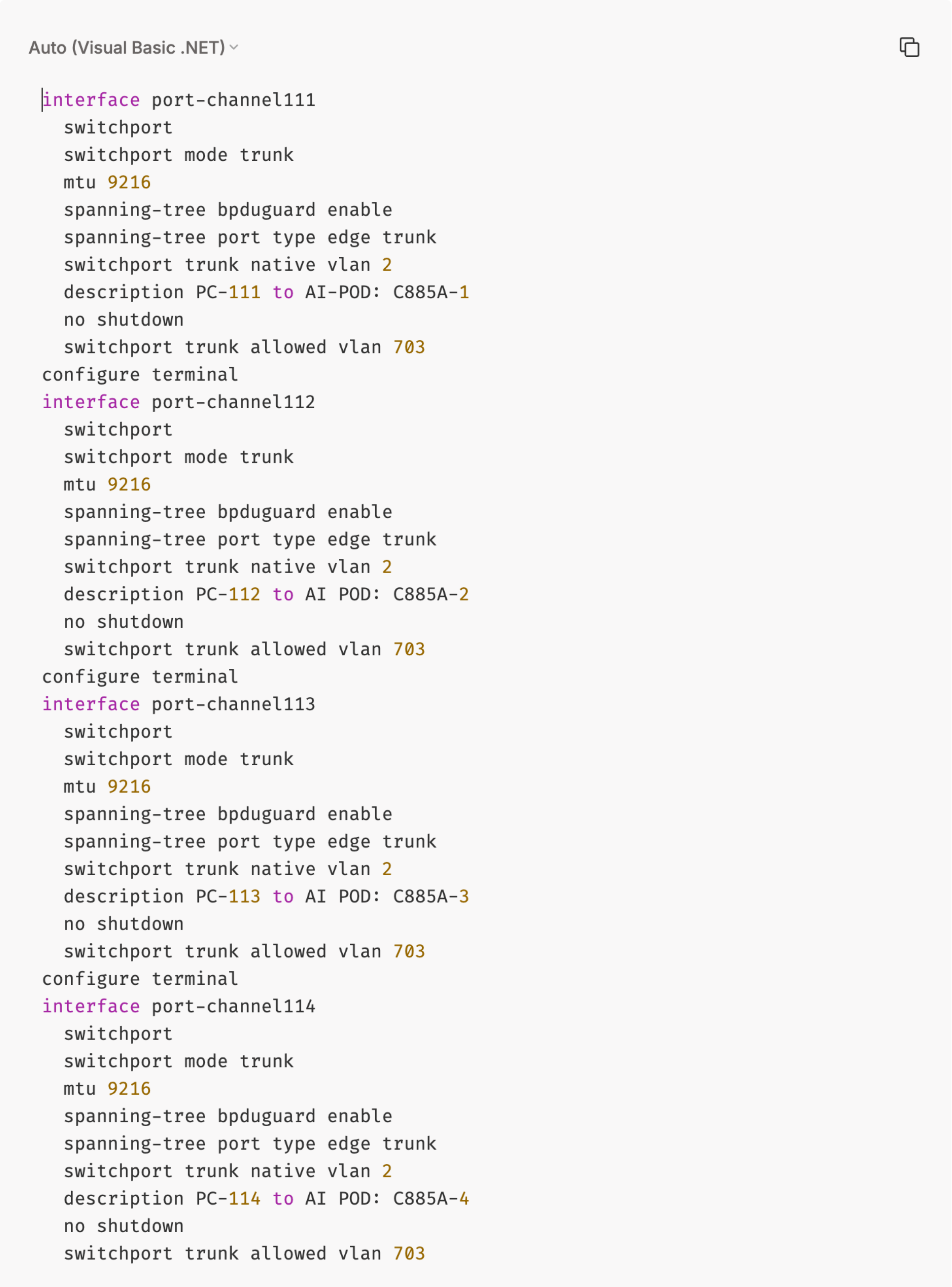
4 items found Rows per page 50 1



Network Overview - IB-MGMT_VNI30000_VLAN703

VRF name	Config status	VRF ID
FE-MGMT_VNI50000	DEPLOYED	50000

The configuration deployed on one compute leaf switch is provided below as a reference:



```
interface port-channel111
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  switchport trunk native vlan 2
  description PC-111 to AI-POD: C885A-1
  no shutdown
  switchport trunk allowed vlan 703
configure terminal
interface port-channel112
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  switchport trunk native vlan 2
  description PC-112 to AI POD: C885A-2
  no shutdown
  switchport trunk allowed vlan 703
configure terminal
interface port-channel113
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  switchport trunk native vlan 2
  description PC-113 to AI POD: C885A-3
  no shutdown
  switchport trunk allowed vlan 703
configure terminal
interface port-channel114
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  switchport trunk native vlan 2
  description PC-114 to AI POD: C885A-4
  no shutdown
  switchport trunk allowed vlan 703
```

```
configure terminal
vlan 2000
  vn-segment 50000
configure terminal
vrf context fe-mgmt_vni50000
  description Frontend Fabric - Management VRF
  vni 50000
  rd auto
  address-family ipv4 unicast
    route-target both auto
    route-target both auto evpn
  address-family ipv6 unicast
    route-target both auto
    route-target both auto evpn
exit
interface Vlan2000
  description FE-MGMT  VRF
  vrf member fe-mgmt_vni50000
  ip forward
  ipv6 address use-link-local-only
  no ip redirects
  no ipv6 redirects
  mtu 9216
  no shutdown
configure terminal
router bgp 65101
  vrf fe-mgmt_vni50000
    address-family ipv4 unicast
      advertise l2vpn evpn
      redistribute direct route-map fabric-rmap-redist-subnet
      maximum-paths ibgp 2
      exit
    address-family ipv6 unicast
      advertise l2vpn evpn
      redistribute direct route-map fabric-rmap-redist-subnet
      maximum-paths ibgp 2
```

```
configure terminal
interface nve1
  member vni 50000 associate-vrf
  member vni 30000
    mcast-group 239.1.1.0
configure terminal
vlan 703
  vn-segment 30000
  name IB-MGMT_VLAN
configure terminal
interface Vlan703
  description IB-MGMT
  vrf member fe-mgmt_vni50000
  no ip redirects
  no ipv6 redirects
  ip address 10.115.90.126/26 tag 12345
  fabric forwarding mode anycast-gateway
  no shutdown
configure terminal
configure terminal
evpn
  vni 30000 l2
    rd auto
    route-target import auto
    route-target export auto
configure terminal
```

To deploy in-band management connectivity to Management UCS X-Series Direct on the compute leaf switches in the FE fabric, follow the procedures below.

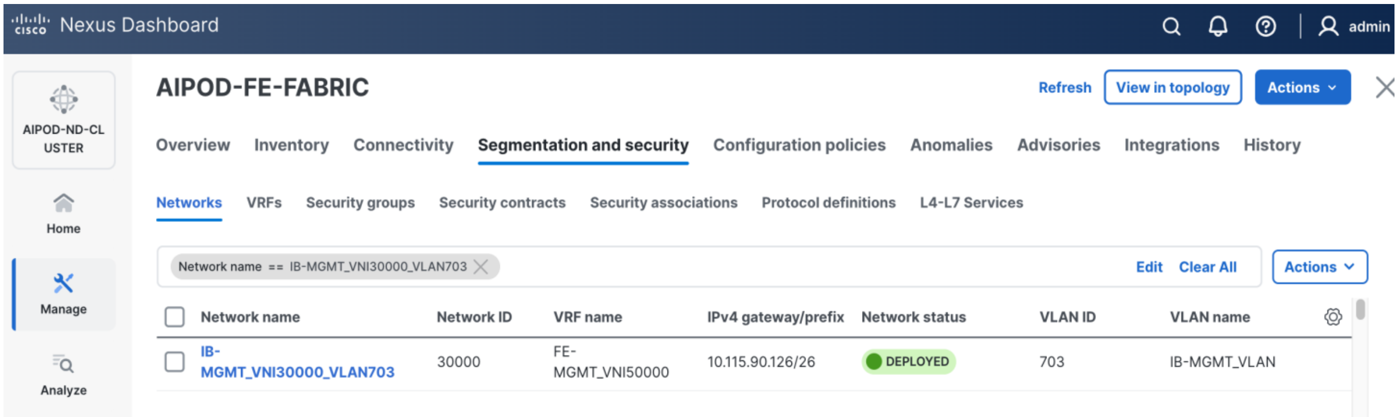
Procedure 2. Deploy in-band management connectivity for management UCS X-Direct chassis

Step 1. Use a web browser to navigate to Nexus Dashboard. Use the management IP of any node in the ND cluster. Log in using **admin** account.

Step 2. From the left navigation menu, go to **Manage > Fabrics**.

Step 3. Select the FE fabric and navigate to **Segmentation and Security > Networks** tab.

Step 4. Select the previously deployed in-band management network from the list.

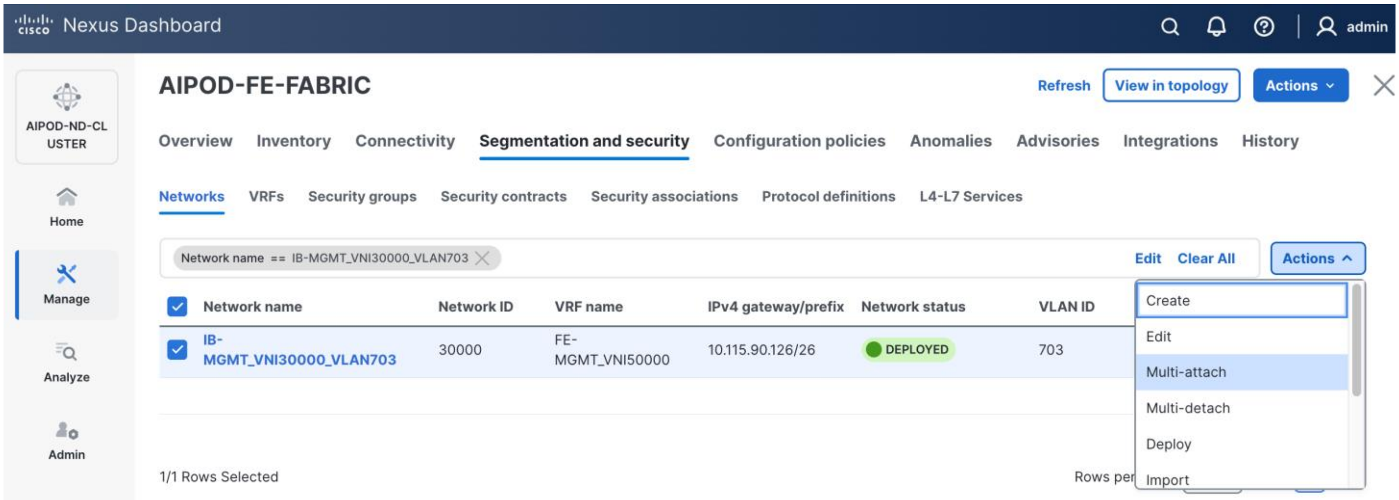


AIPOD-FE-FABRIC

Network name == IB-MGMT_VNI30000_VLAN703

	Network name	Network ID	VRF name	IPv4 gateway/prefix	Network status	VLAN ID	VLAN name
□	IB-MGMT_VNI30000_VLAN703	30000	FE-MGMT_VNI50000	10.115.90.126/26	DEPLOYED	703	IB-MGMT_VLAN

Step 5. Click the lower of the two **Actions** buttons and select **Multi-attach** from the list.



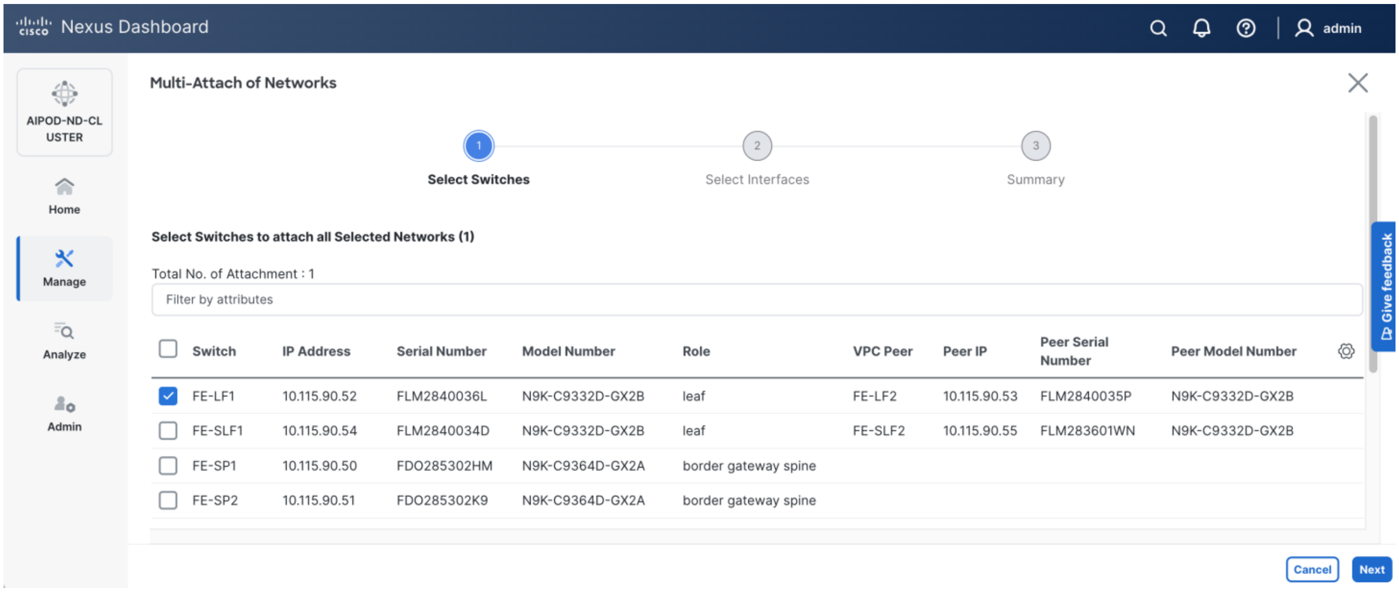
AIPOD-FE-FABRIC

Network name == IB-MGMT_VNI30000_VLAN703

☑	Network name	Network ID	VRF name	IPv4 gateway/prefix	Network status	VLAN ID
☑	IB-MGMT_VNI30000_VLAN703	30000	FE-MGMT_VNI50000	10.115.90.126/26	DEPLOYED	703

1/1 Rows Selected

Step 6. Select the leaf switch pair from the list that the UCS X-Series Direct system connects to.



Multi-Attach of Networks

Select Switches to attach all Selected Networks (1)

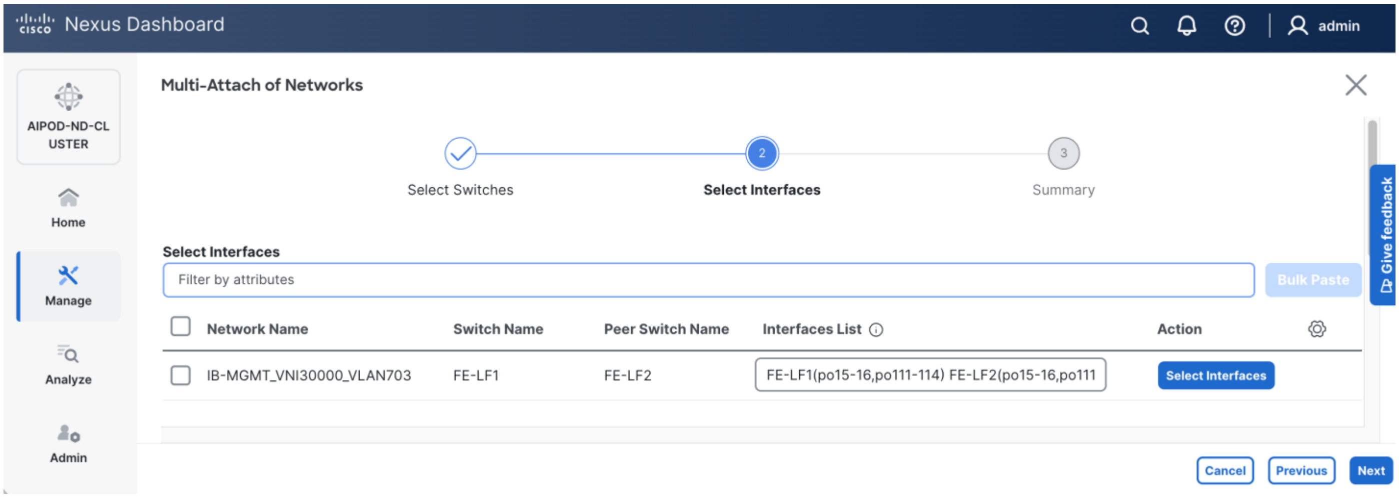
Total No. of Attachment : 1

Filter by attributes

□	Switch	IP Address	Serial Number	Model Number	Role	VPC Peer	Peer IP	Peer Serial Number	Peer Model Number
☑	FE-LF1	10.115.90.52	FLM2840036L	N9K-C9332D-GX2B	leaf	FE-LF2	10.115.90.53	FLM2840035P	N9K-C9332D-GX2B
□	FE-SLF1	10.115.90.54	FLM2840034D	N9K-C9332D-GX2B	leaf	FE-SLF2	10.115.90.55	FLM283601WN	N9K-C9332D-GX2B
□	FE-SP1	10.115.90.50	FDO285302HM	N9K-C9364D-GX2A	border gateway spine				
□	FE-SP2	10.115.90.51	FDO285302K9	N9K-C9364D-GX2A	border gateway spine				

Step 7. Click **Next.**

Step 8. Click **Select Interfaces** to the right of the leaf switch pair to **add** the interfaces that connect to management UCS X-Series Direct.



Multi-Attach of Networks

Select Switches — Select Interfaces — Summary

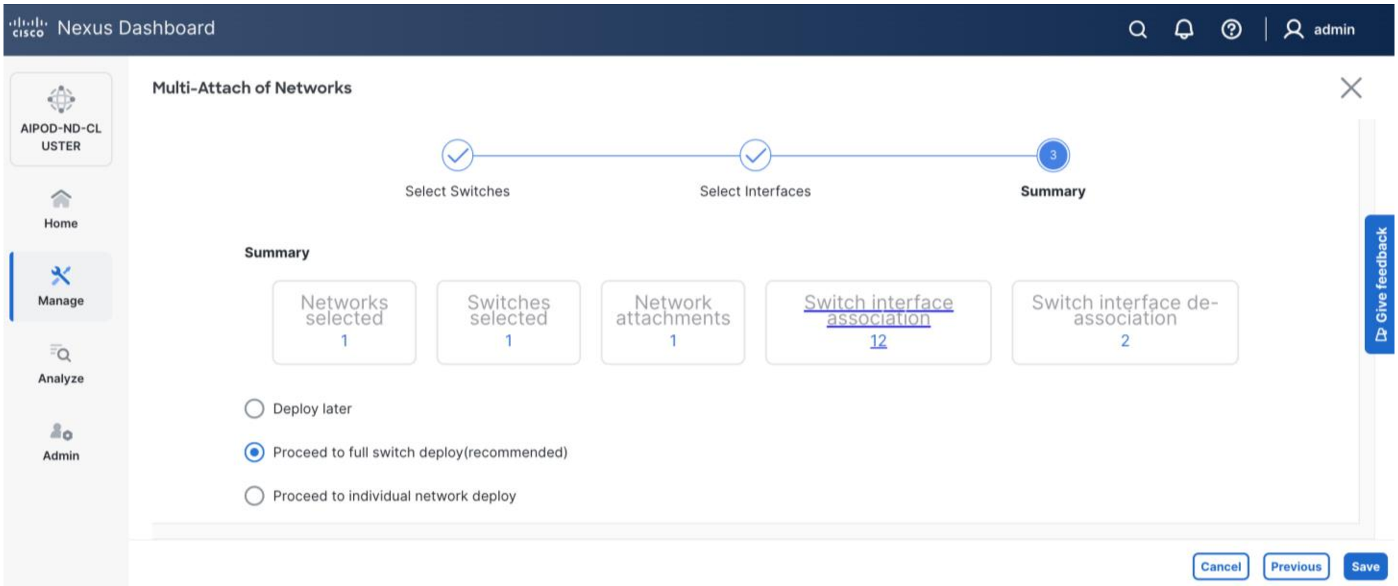
Select Interfaces

Filter by attributes | Bulk Paste

□	Network Name	Switch Name	Peer Switch Name	Interfaces List	Action
□	IB-MGMT_VNI30000_VLAN703	FE-LF1	FE-LF2	FE-LF1(po15-16,po111-114) FE-LF2(po15-16,po111	Select Interfaces

Cancel | Previous | Next

Step 9. Click **Next**.



Multi-Attach of Networks

Select Switches — Select Interfaces — Summary

Summary

Networks selected	Switches selected	Network attachments	Switch interface association	Switch interface de-association
1	1	1	12	2

○ Deploy later

● Proceed to full switch deploy(recommended)

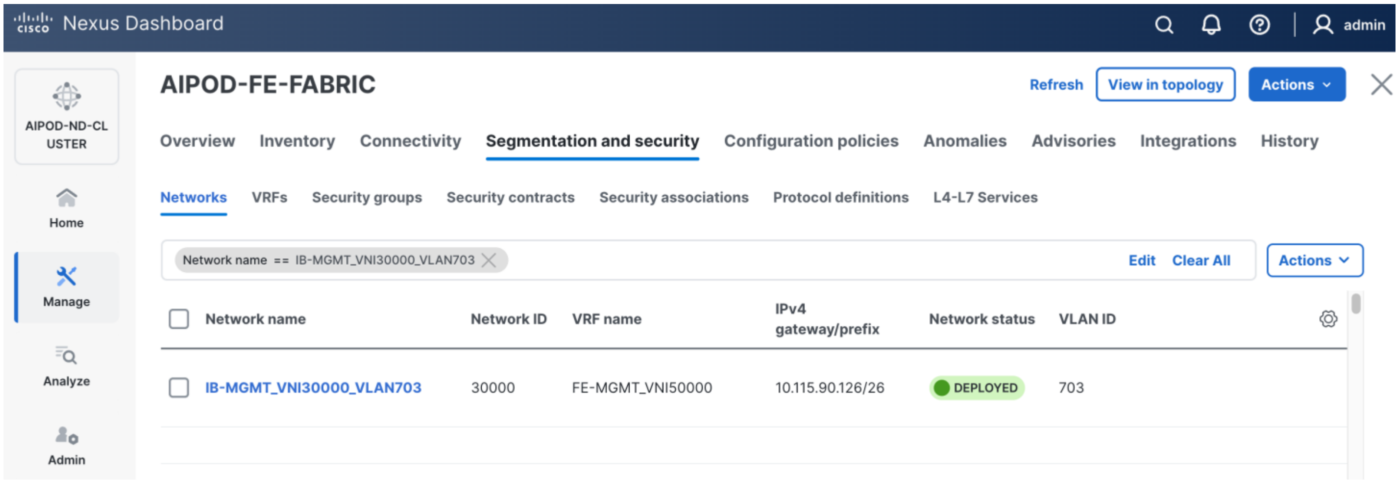
○ Proceed to individual network deploy

Cancel | Previous | Save

Step 10. Click **Save**.

Step 11. Click **Deploy All**.

Step 12. Click **Close**.



AIPOD-FE-FABRIC

Network name == IB-MGMT_VNI30000_VLAN703

□	Network name	Network ID	VRF name	IPv4 gateway/prefix	Network status	VLAN ID
□	IB-MGMT_VNI30000_VLAN703	30000	FE-MGMT_VNI50000	10.115.90.126/26	DEPLOYED	703

Step 13. Click the **Network name** to verify that the network was successfully **deployed** on the relevant switches and interfaces.

The configuration deployed on one compute leaf switch is provided below as a reference:

```
interface port-channel15
  description To UCS X-Series Direct - A
  switchport
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 703
  spanning-tree port type edge trunk
  spanning-tree bpduguard enable
  mtu 9216
  vpc 15
interface Ethernet1/5
  description To UCS X-Series Direct - A
  switchport
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 703
  mtu 9216
  channel-group 15 mode active
  no shutdown
interface Ethernet1/7
  description To UCS X-Series Direct - A
  switchport
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 703
  mtu 9216
  channel-group 15 mode active
  no shutdown
```

(Ubuntu) Enable In-Band Management Connectivity to BCM Node(s)

To deploy in-band management connectivity to BCM node connected to compute leaf switches in the FE fabric, you will be deploying this network on the compute Leaf switch pair that connects to the BCM node.

Table 13. Setup Parameters for FE Fabric: In-Band Management Connectivity to BCME Nodes

Parameter Type	Parameter Name | Value	Parameter Type
IB-MGMT Network		
Name	IB-MGMT_VN30000_VLAN703	
IB-MGMT VRF		
VRF Name	FE-MGMT_VN50000	
Management BCME Node		

Parameter Type	Parameter Name | Value	Parameter Type
vPC Leaf Switch Pair	FE-LF1, FE-LF2	
BCM Interface	Port-Channel 17	

To deploy in-band management connectivity to BCM node connected to compute leaf switches in the FE fabric, complete the procedures below.

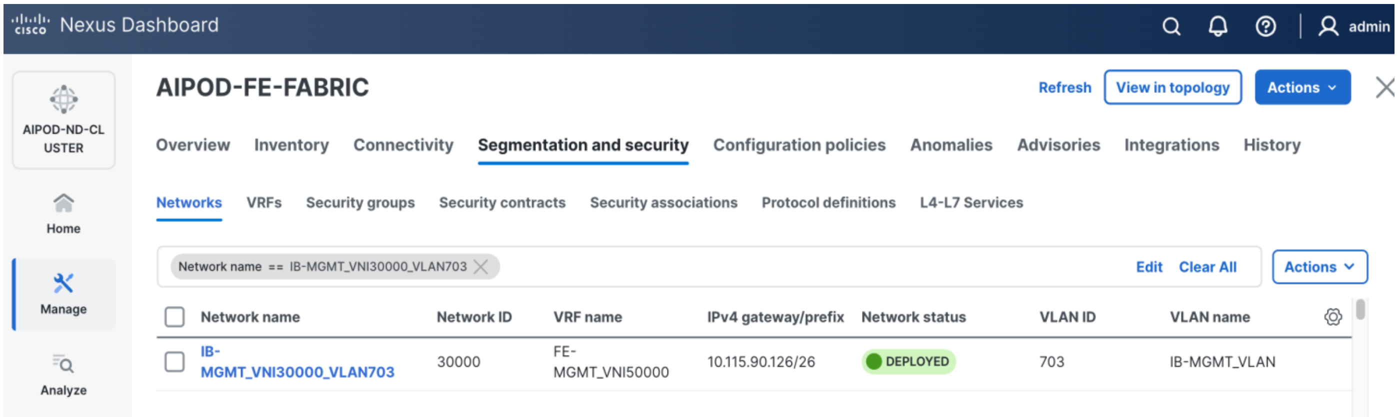
Procedure 1. Enable in-band management connectivity to BCM node

Step 1. Use a web browser to navigate to Nexus Dashboard. Use the management IP of any node in the ND cluster. Log in using admin account.

Step 2. From the left navigation menu, go to **Manage** > **Fabrics**.

Step 3. Select the FE fabric and go to **Segmentation and Security** > **Networks** tab.

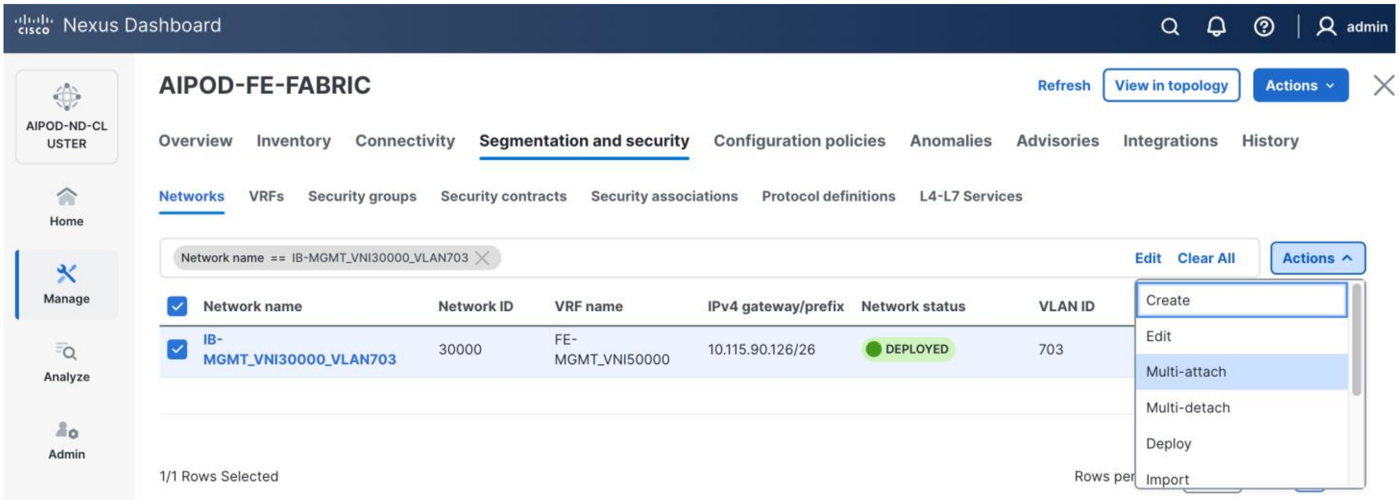
Step 4. Select the **previously** deployed in-band management network from the list.



Network name == IB-MGMT_VNI30000_VLAN703

Network name	Network ID	VRF name	IPv4 gateway/prefix	Network status	VLAN ID	VLAN name
IB-MGMT_VNI30000_VLAN703	30000	FE-MGMT_VNI50000	10.115.90.126/26	DEPLOYED	703	IB-MGMT_VLAN

Step 5. Click the lower of the two **Actions** buttons and select **Multi-attach** from the list.

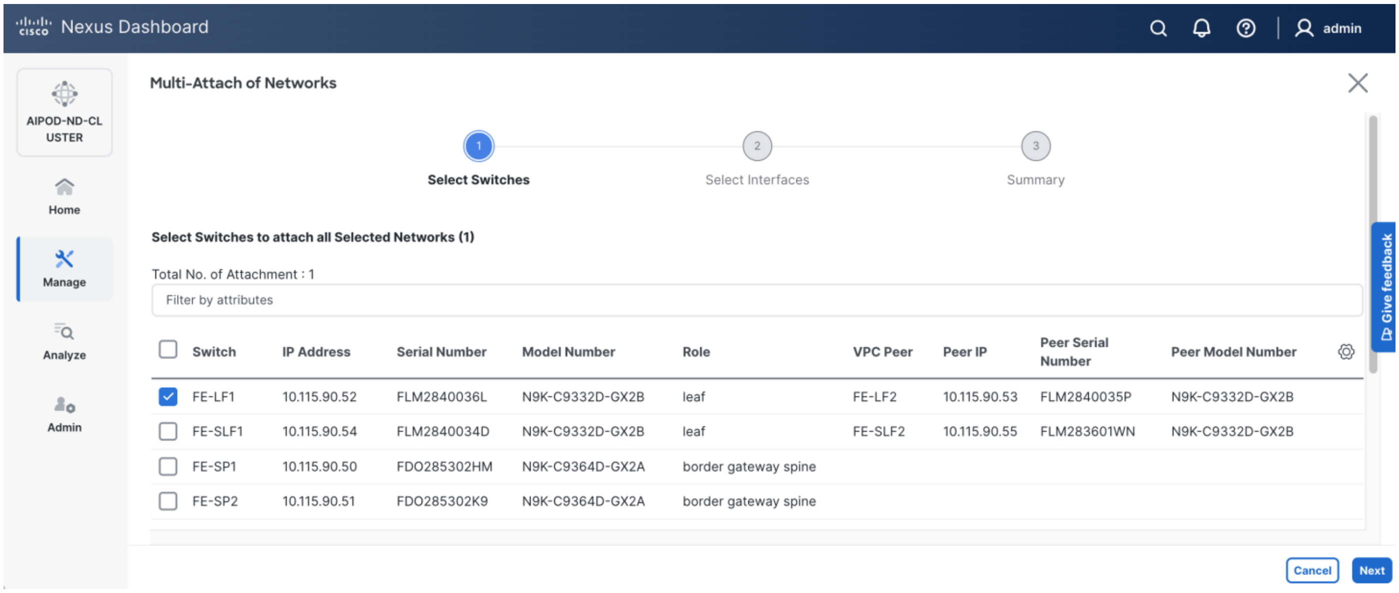


Network name == IB-MGMT_VNI30000_VLAN703

Network name	Network ID	VRF name	IPv4 gateway/prefix	Network status	VLAN ID
☑ IB-MGMT_VNI30000_VLAN703	30000	FE-MGMT_VNI50000	10.115.90.126/26	DEPLOYED	703

1/1 Rows Selected

Step 6. Select the leaf switch pair from the list that the BCME node connects.



Multi-Attach of Networks

1 Select Switches — 2 Select Interfaces — 3 Summary

Select Switches to attach all Selected Networks (1)

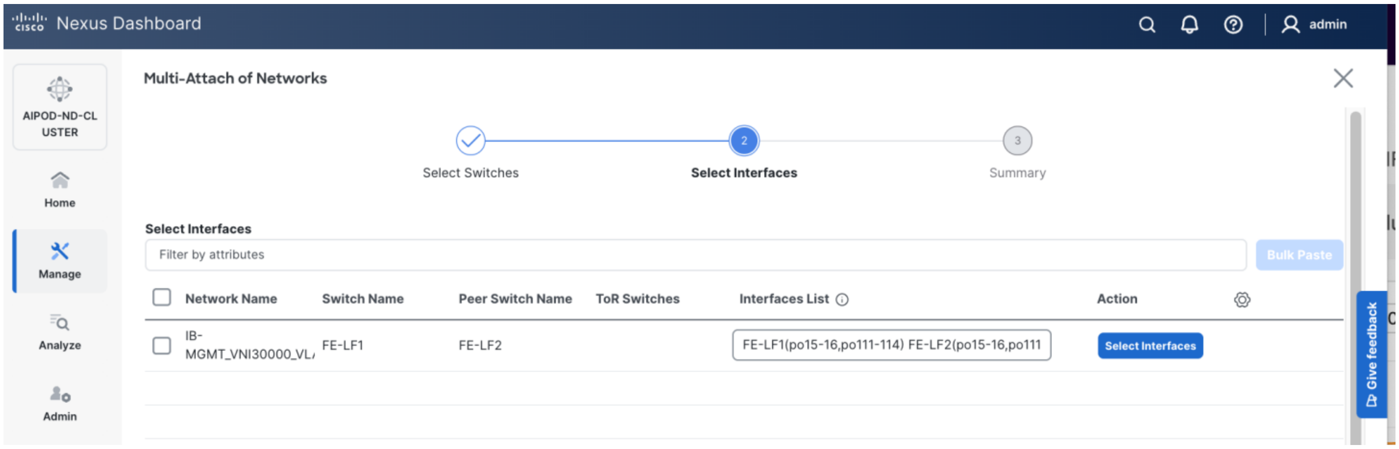
Total No. of Attachment : 1

Filter by attributes

	Switch	IP Address	Serial Number	Model Number	Role	VPC Peer	Peer IP	Peer Serial Number	Peer Model Number
☑	FE-LF1	10.115.90.52	FLM2840036L	N9K-C9332D-GX2B	leaf	FE-LF2	10.115.90.53	FLM2840035P	N9K-C9332D-GX2B
□	FE-SLF1	10.115.90.54	FLM2840034D	N9K-C9332D-GX2B	leaf	FE-SLF2	10.115.90.55	FLM283601WN	N9K-C9332D-GX2B
□	FE-SP1	10.115.90.50	FDO285302HM	N9K-C9364D-GX2A	border gateway spine				
□	FE-SP2	10.115.90.51	FDO285302K9	N9K-C9364D-GX2A	border gateway spine				

Cancel Next

Step 7. Click **Next**.



Multi-Attach of Networks

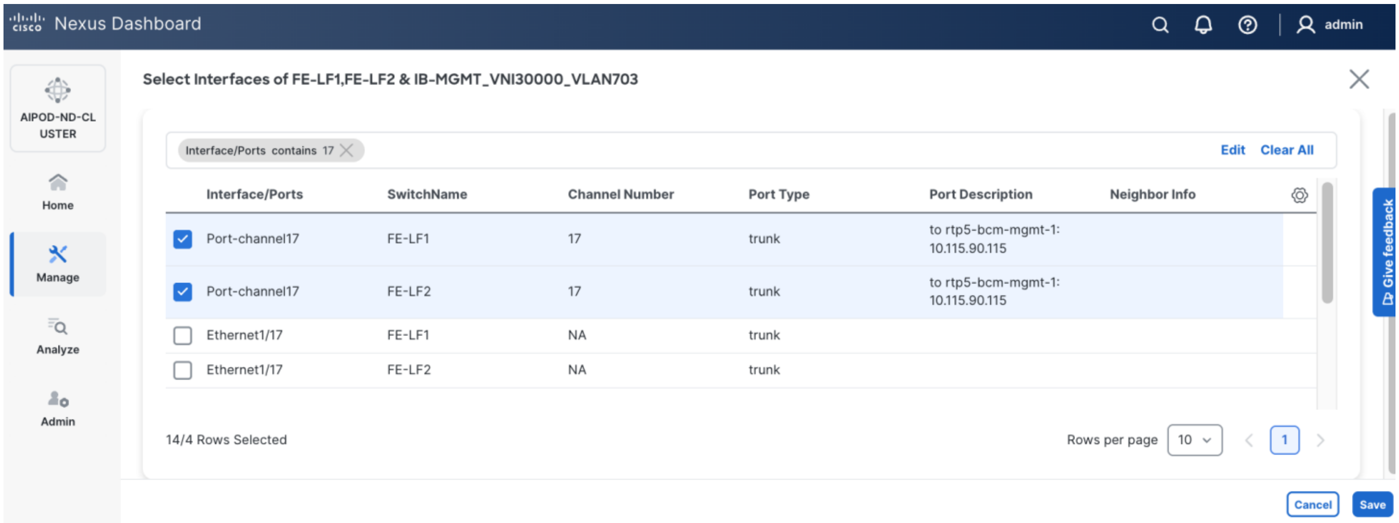
Select Switches — 2 Select Interfaces — 3 Summary

Select Interfaces

Filter by attributes Bulk Paste

	Network Name	Switch Name	Peer Switch Name	ToR Switches	Interfaces List	Action
□	IB-MGMT_VNI30000_VL/	FE-LF1	FE-LF2		FE-LF1(po15-16,po111-114) FE-LF2(po15-16,po111	Select Interfaces

Step 8. Click **Select Interfaces** to the right of the network name to add the interfaces that connect to the BCM node.



Select Interfaces of FE-LF1,FE-LF2 & IB-MGMT_VNI30000_VLAN703

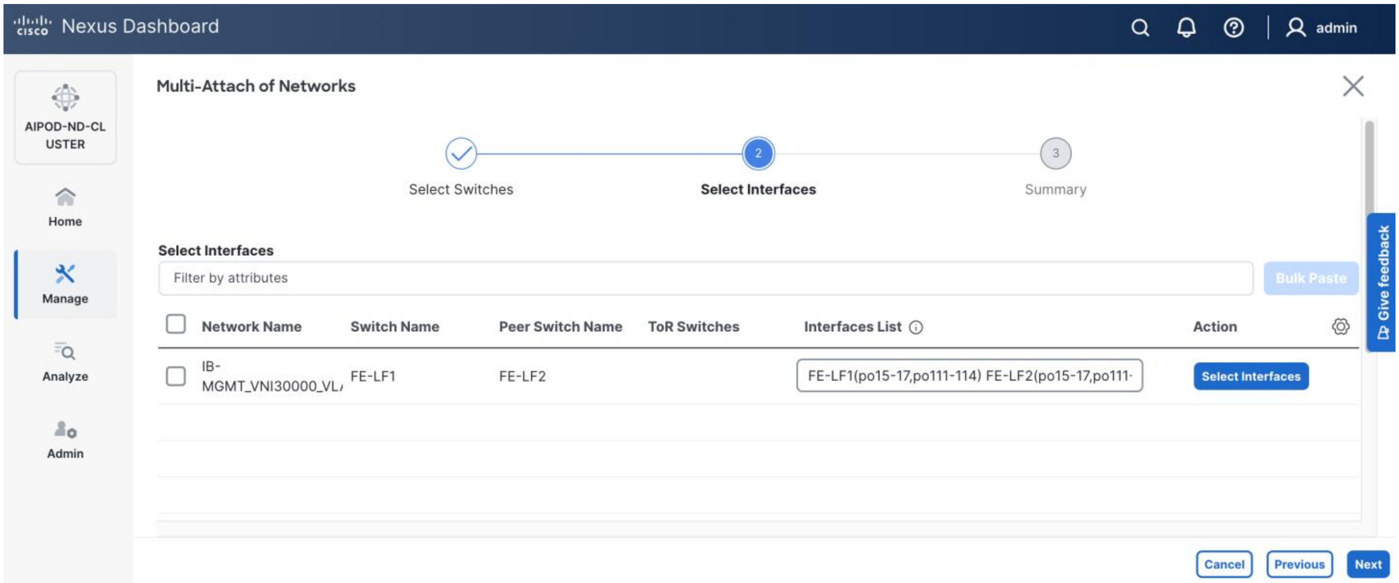
Interface/Ports contains 17 Edit Clear All

	Interface/Ports	SwitchName	Channel Number	Port Type	Port Description	Neighbor Info
☑	Port-channel17	FE-LF1	17	trunk	to rtp5-bcm-mgmt-1: 10.115.90.115	
☑	Port-channel17	FE-LF2	17	trunk	to rtp5-bcm-mgmt-1: 10.115.90.115	
□	Ethernet1/17	FE-LF1	NA	trunk		
□	Ethernet1/17	FE-LF2	NA	trunk		

14/4 Rows Selected Rows per page 10 1

Cancel Save

Step 9. Click **Save**.



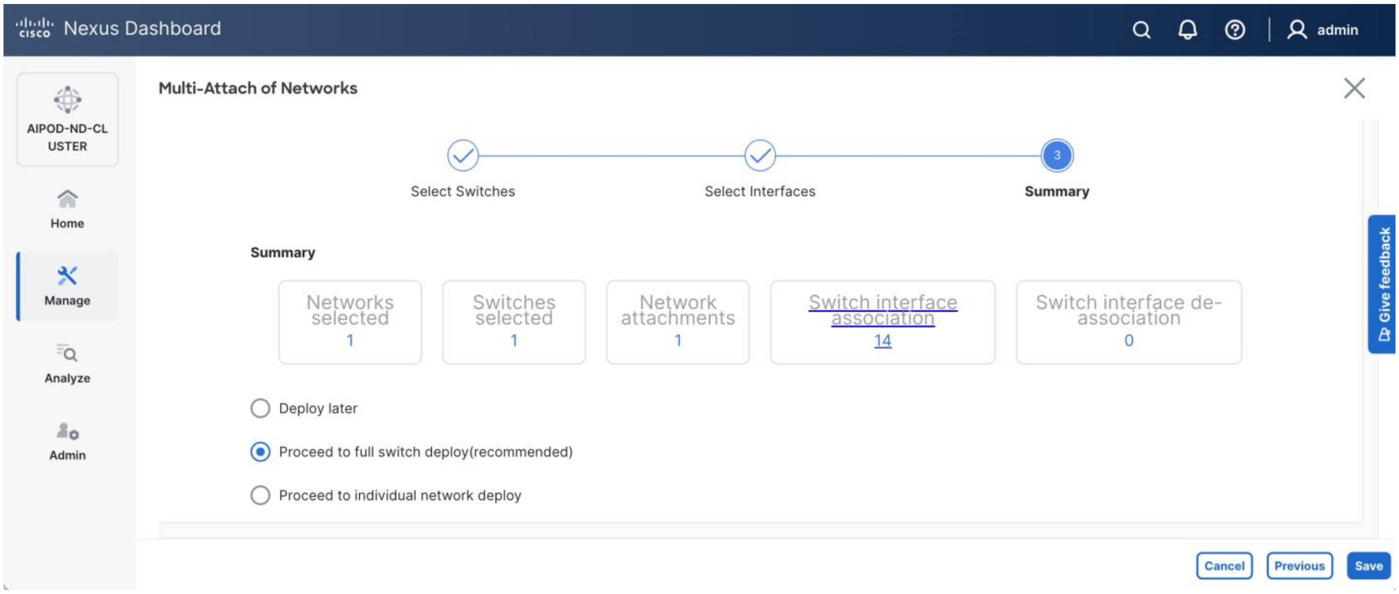
Multi-Attach of Networks

Select Interfaces

Filter by attributes

□	Network Name	Switch Name	Peer Switch Name	ToR Switches	Interfaces List	Action
□	IB-MGMT_VNI30000_VL/	FE-LF1	FE-LF2		FE-LF1(po15-17,po111-114) FE-LF2(po15-17,po111-	Select Interfaces

Step 10. Click **Next**.



Multi-Attach of Networks

Summary

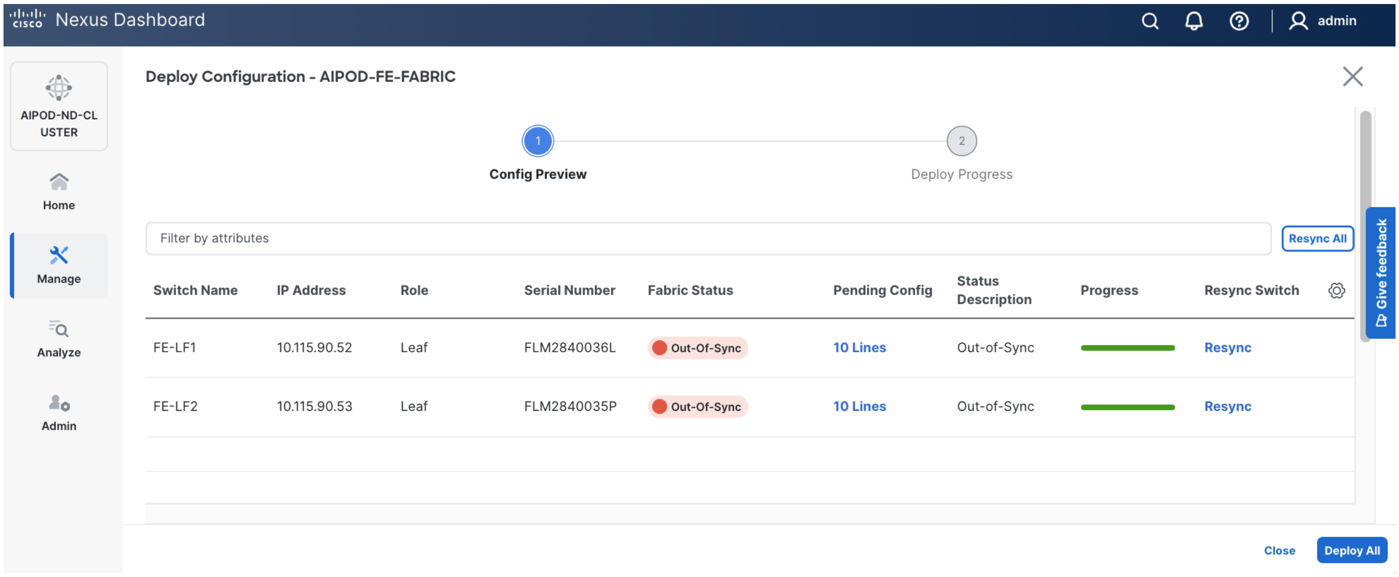
Networks selected	Switches selected	Network attachments	Switch interface association	Switch interface de-association
1	1	1	14	0

○ Deploy later

● Proceed to full switch deploy(recommended)

○ Proceed to individual network deploy

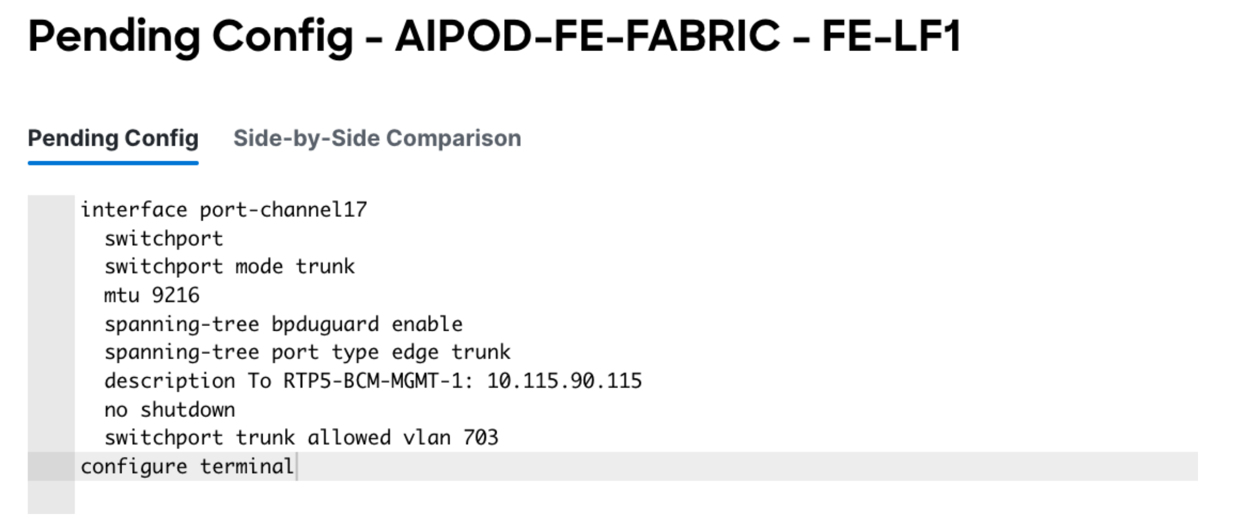
Step 11. Click **Save**.



Deploy Configuration - AIPOD-FE-FABRIC

Switch Name	IP Address	Role	Serial Number	Fabric Status	Pending Config	Status Description	Progress	Resync Switch
FE-LF1	10.115.90.52	Leaf	FLM2840036L	Out-Of-Sync	10 Lines	Out-of-Sync		Resync
FE-LF2	10.115.90.53	Leaf	FLM2840035P	Out-Of-Sync	10 Lines	Out-of-Sync		Resync

The configuration deployed on one compute leaf switch is provided below as a reference:

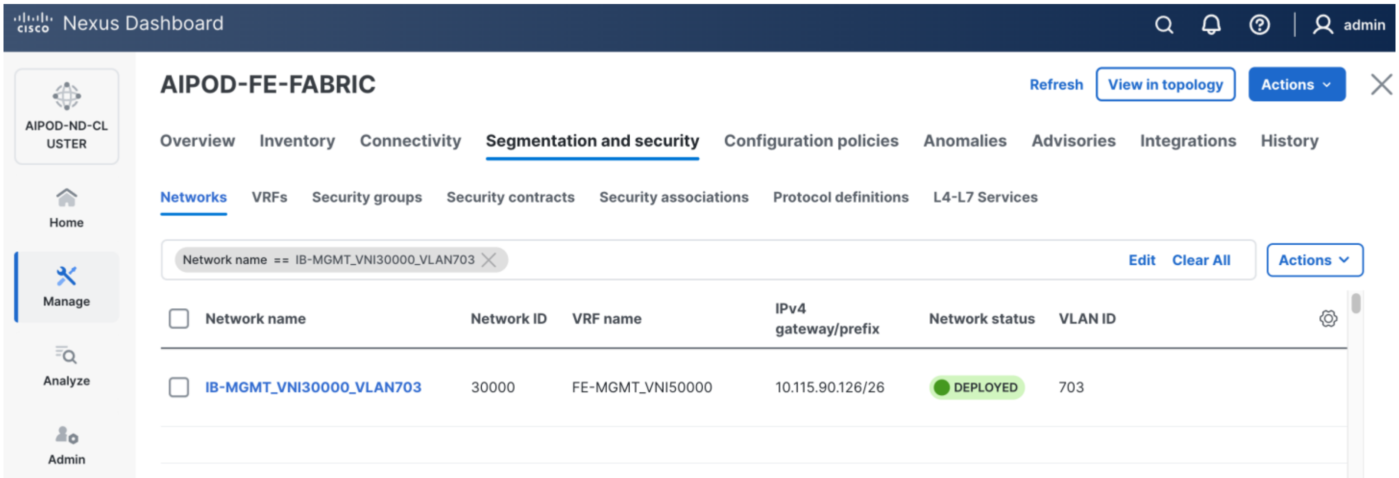


Pending Config - AIPOD-FE-FABRIC - FE-LF1

```
interface port-channel17
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  description To RTP5-BCM-MGMT-1: 10.115.90.115
  no shutdown
  switchport trunk allowed vlan 703
configure terminal
```

Step 12. Click **Deploy All**.

Step 13. Click **Close**.



AIPOD-FE-FABRIC

Network name == IB-MGMT_VNI30000_VLAN703

Network name	Network ID	VRF name	IPv4 gateway/prefix	Network status	VLAN ID
IB-MGMT_VNI30000_VLAN703	30000	FE-MGMT_VNI50000	10.115.90.126/26	DEPLOYED	703

Step 14. Click the **Network name** to verify that the network was successfully **deployed** on the relevant switches and interfaces.

Enable Layer 2 Connectivity to NetApp Storage

To enable Layer 2 connectivity from the FE fabric to NetApp storage, you will be configuring four ports, two on each Leaf switch. Each port is configured as a trunk port using the default native VLAN.

Table 14. Setup Parameters for FE Fabric: Layer 2 Connectivity to NetApp Storage

Parameter Type	Parameter Name | Value	Parameter Type
Leaf Switches	FE-SLF1, FE-SLF2	
NetApp Storage		To Storage Leaf Switches
FE-SLF1		
Ports	1/25	
Ports	1/26	
FE-SLF2		
Ports	1/25	
Ports	1/26	

To enable Layer 2 connectivity from the FE fabric to NetApp storage, follow the procedures below.

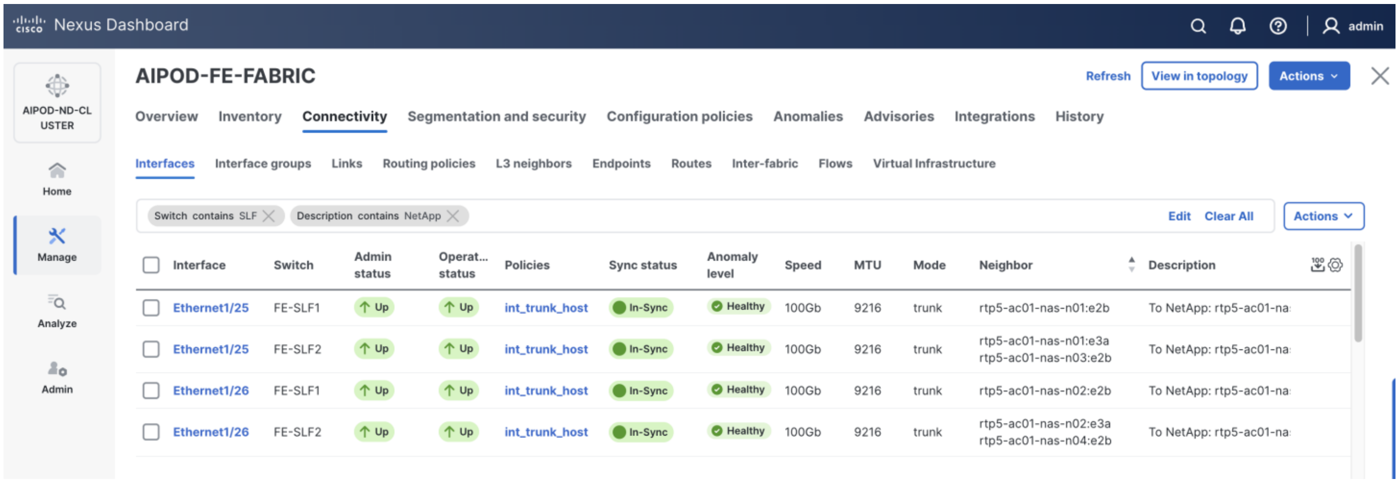
Procedure 2. Enable Layer 2 connectivity on the first port to NetApp storage

Step 1. Use a web browser to navigate to Nexus Dashboard. Use the management IP of any node in the ND cluster. Log in using admin account.

Step 2. From the left navigation menu, go to **Manage** > **Fabrics**.

Step 3. Select the FE fabric and go to **Connectivity** > **Interfaces** tab.

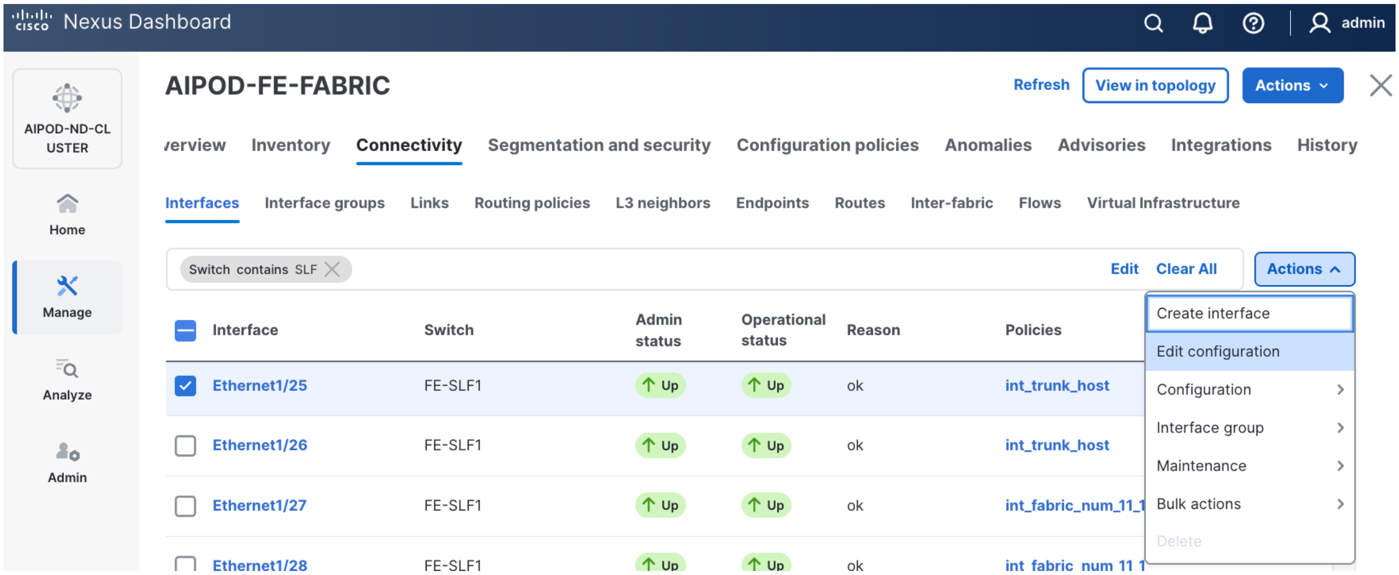
Step 4. Filter on the storage leaf switches and the ports that connect to NetApp storage.



Interface	Switch	Admin status	Operat... status	Policies	Sync status	Anomaly level	Speed	MTU	Mode	Neighbor	Description
Ethernet1/25	FE-SLF1	Up	Up	int_trunk_host	In-Sync	Healthy	100Gb	9216	trunk	rtp5-ac01-nas-n01:e2b	To NetApp: rtp5-ac01-na
Ethernet1/25	FE-SLF2	Up	Up	int_trunk_host	In-Sync	Healthy	100Gb	9216	trunk	rtp5-ac01-nas-n01:e3a rtp5-ac01-nas-n03:e2b	To NetApp: rtp5-ac01-na
Ethernet1/26	FE-SLF1	Up	Up	int_trunk_host	In-Sync	Healthy	100Gb	9216	trunk	rtp5-ac01-nas-n02:e2b	To NetApp: rtp5-ac01-na
Ethernet1/26	FE-SLF2	Up	Up	int_trunk_host	In-Sync	Healthy	100Gb	9216	trunk	rtp5-ac01-nas-n02:e3a rtp5-ac01-nas-n04:e2b	To NetApp: rtp5-ac01-na

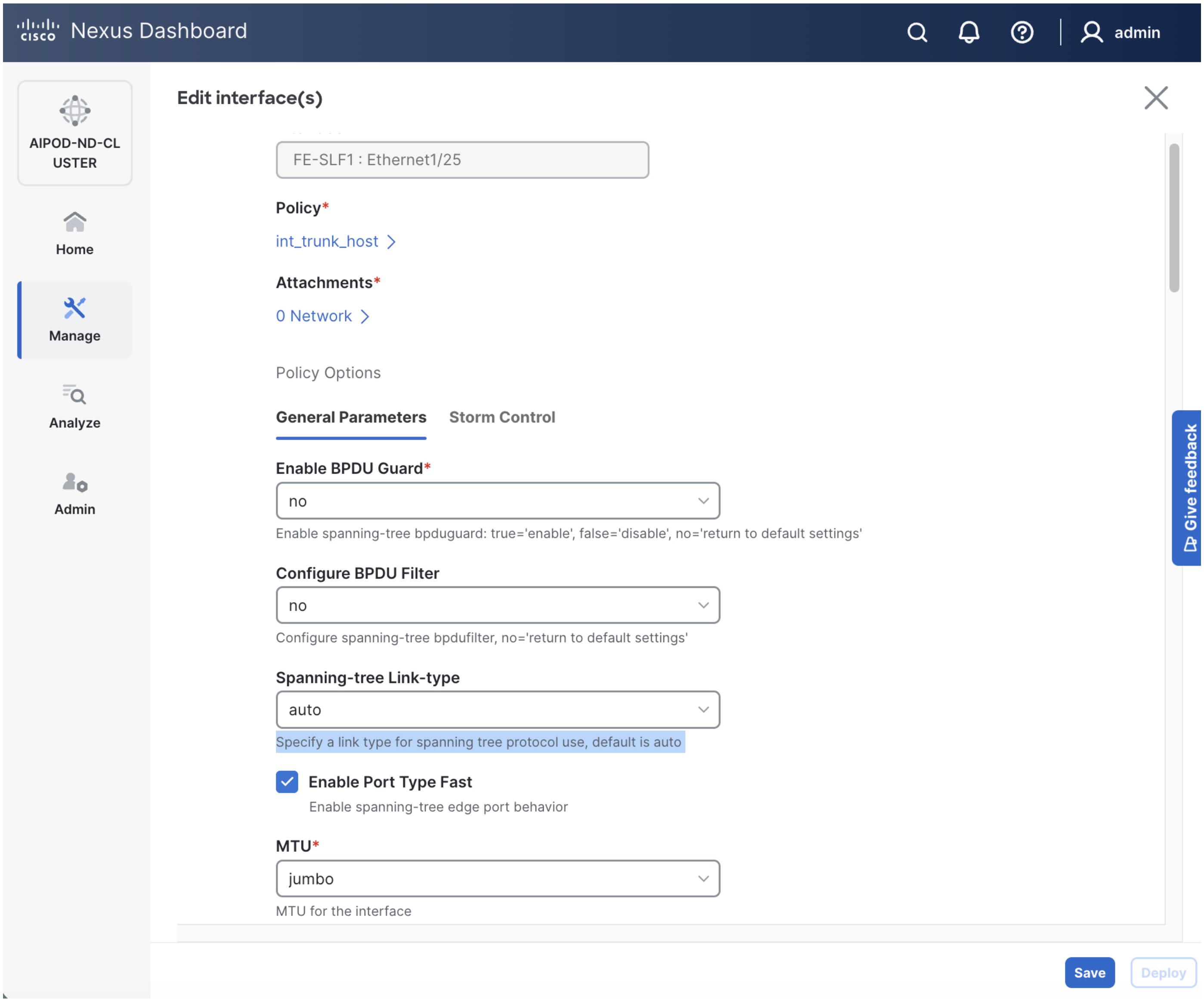
Step 5. Select the **first** interface to configure from the list.

Step 6. Click the lower of the two **Actions** buttons and select the **Edit configuration** from the drop-down list.



	Interface	Switch	Admin status	Operational status	Reason	Policies
☑	Ethernet1/25	FE-SLF1	Up	Up	ok	int_trunk_host
□	Ethernet1/26	FE-SLF1	Up	Up	ok	int_trunk_host
□	Ethernet1/27	FE-SLF1	Up	Up	ok	int_fabric_num_11_1
□	Ethernet1/28	FE-SLF1	Up	Up	ok	int_fabric_num_11_1

Step 7. In the **Edit interface** window, configure **Interface Description** and leave everything else as is.



Edit interface(s)

FE-SLF1 : Ethernet1/25

Policy*

int_trunk_host

Attachments*

0 Network

Policy Options

General Parameters | Storm Control

Enable BPDU Guard*

no

Enable spanning-tree bpduguard: true='enable', false='disable', no='return to default settings'

Configure BPDU Filter

no

Configure spanning-tree bpdufilter, no='return to default settings'

Spanning-tree Link-type

auto

Specify a link type for spanning tree protocol use, default is auto

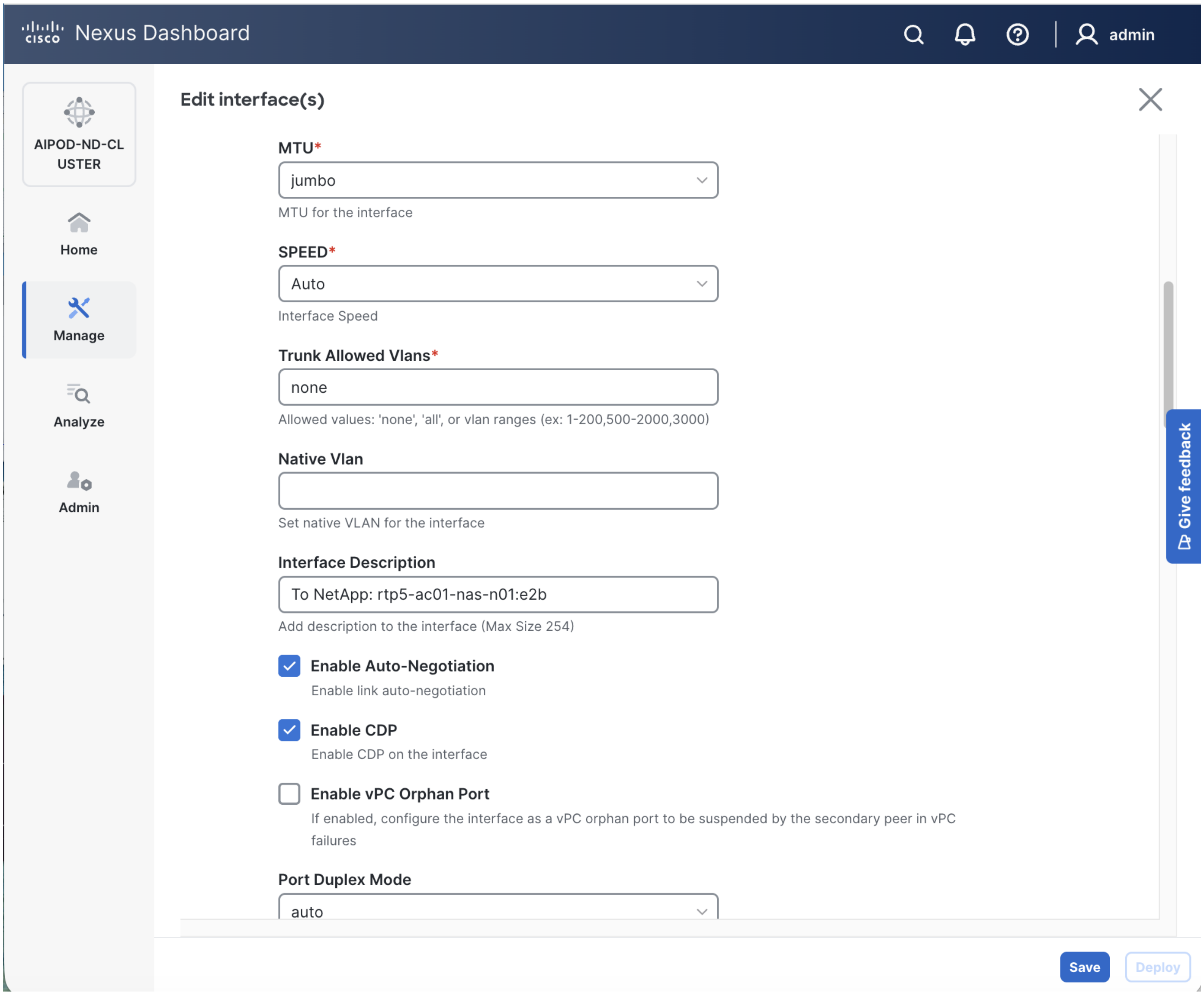
☑ Enable Port Type Fast

Enable spanning-tree edge port behavior

MTU*

jumbo

MTU for the interface



Edit interface(s)

MTU*: jumbo
MTU for the interface

SPEED*: Auto
Interface Speed

Trunk Allowed Vlans*: none
Allowed values: 'none', 'all', or vlan ranges (ex: 1-200,500-2000,3000)

Native Vlan:
Set native VLAN for the interface

Interface Description: To NetApp: rtp5-ac01-nas-n01:e2b
Add description to the interface (Max Size 254)

☑ Enable Auto-Negotiation
Enable link auto-negotiation

☑ Enable CDP
Enable CDP on the interface

□ Enable vPC Orphan Port
If enabled, configure the interface as a vPC orphan port to be suspended by the secondary peer in vPC failures

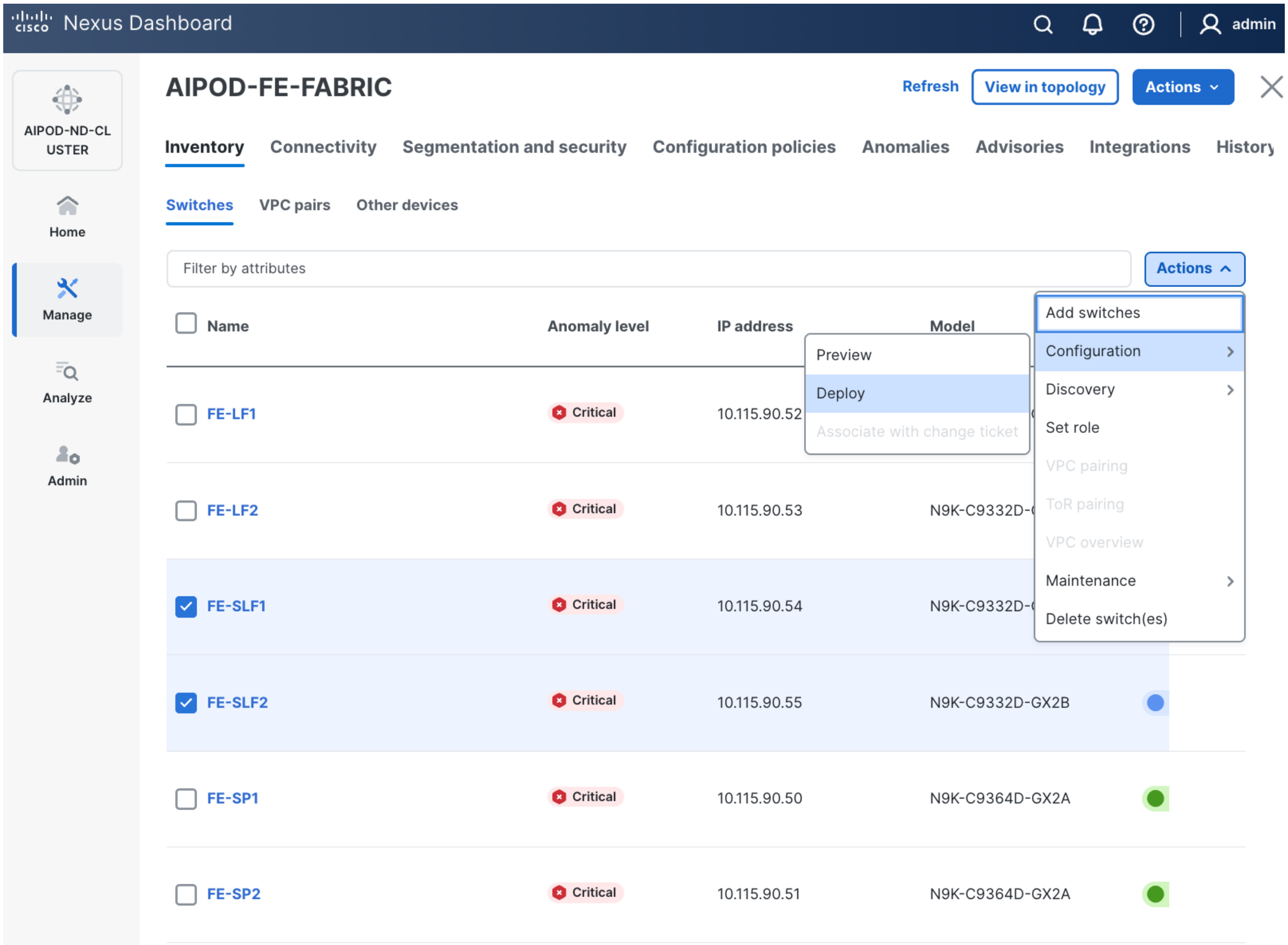
Port Duplex Mode: auto

Step 8. Click **Save**.

Step 9. Click **X** to exit the window (changes will be deployed later).

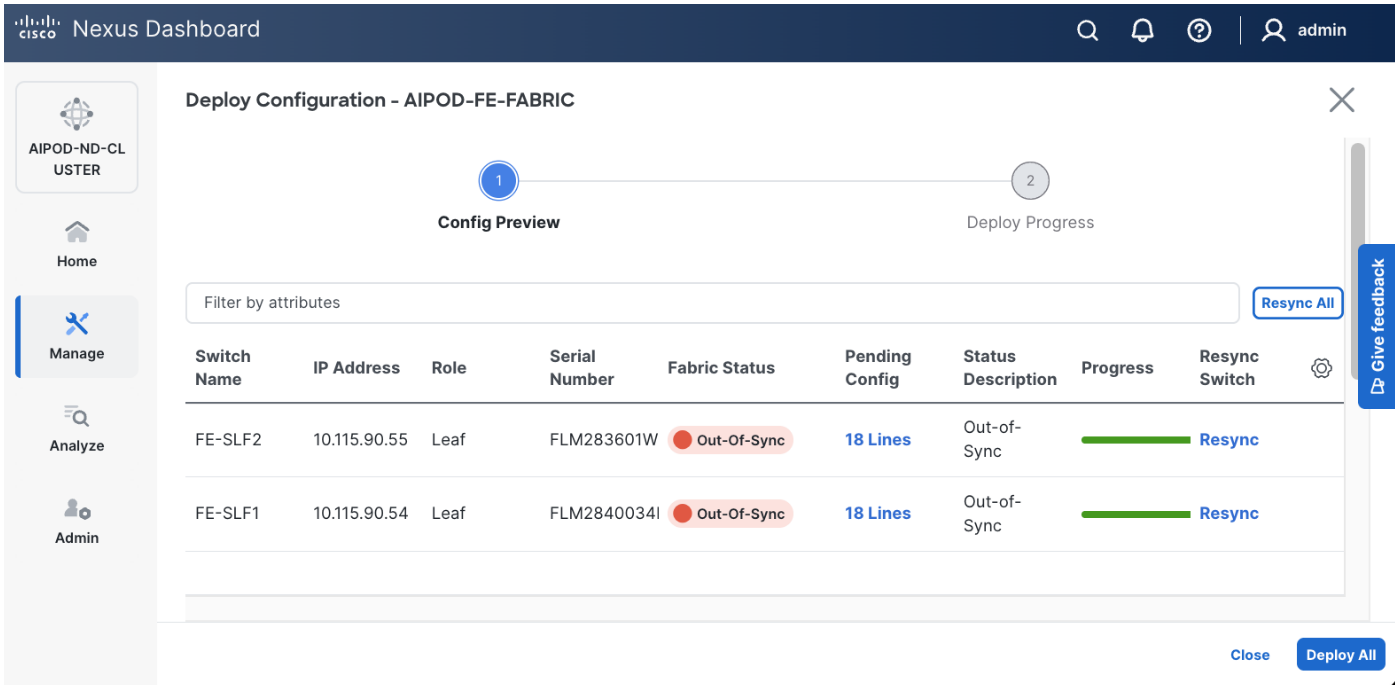
Step 10. Repeat for remaining ports on both storage leaf switches that connect to NetApp storage.

Step 11. Navigate to **Manage** > **Inventory**. Select the **two** storage Leaf switches and click the lower of the two **Actions** button.



	Name	Anomaly level	IP address	Model
□	FE-LF1	Critical	10.115.90.52	
□	FE-LF2	Critical	10.115.90.53	N9K-C9332D-(
☑	FE-SLF1	Critical	10.115.90.54	N9K-C9332D-(
☑	FE-SLF2	Critical	10.115.90.55	N9K-C9332D-GX2B
□	FE-SP1	Critical	10.115.90.50	N9K-C9364D-GX2A
□	FE-SP2	Critical	10.115.90.51	N9K-C9364D-GX2A

Step 12. Select **Configuration** > **Deploy** from the drop-down list.



Switch Name	IP Address	Role	Serial Number	Fabric Status	Pending Config	Status Description	Progress	Resync Switch
FE-SLF2	10.115.90.55	Leaf	FLM283601W	Out-Of-Sync	18 Lines	Out-of-Sync		Resync
FE-SLF1	10.115.90.54	Leaf	FLM2840034I	Out-Of-Sync	18 Lines	Out-of-Sync		Resync

Step 13. Click **Pending Config** for each switch to see the configuration that will be deployed on each switch. The deployed configuration from one leaf switch is provided as reference below.

```
interface Ethernet1/25
  description To NetApp: rtp5-ac01-nas-n01:e2b
  switchport
  switchport mode trunk
  switchport trunk allowed vlan none
  spanning-tree port type edge trunk
  mtu 9216
  no shutdown

interface Ethernet1/26
  description To NetApp: rtp5-ac01-nas-n02:e2b
  switchport
  switchport mode trunk
  switchport trunk allowed vlan none
  spanning-tree port type edge trunk
  mtu 9216
  no shutdown
```

Step 14. Click Deploy All.

Step 15. Click Close.

Enable In-Band Management Connectivity to NetApp Storage

Table 15. Setup Parameters for FE Fabric: In-Band Management Connectivity to NetApp Storage

Parameter Type	Parameter Name | Value	Parameter Type
IB-MGMT Network		
Name	IB-MGMT_VN30000_VLAN703	
NetApp Storage		On Storage Leaf Switches
Storage Leaf Switch	FE-SLF1	
Port	e1/25	
Port	e1/26	
Storage Leaf Switch	FE-SLF2	
Port	e1/25	
Port	e1/26	

Procedure 1. Deploy In-Band Management Connectivity for NetApp storage

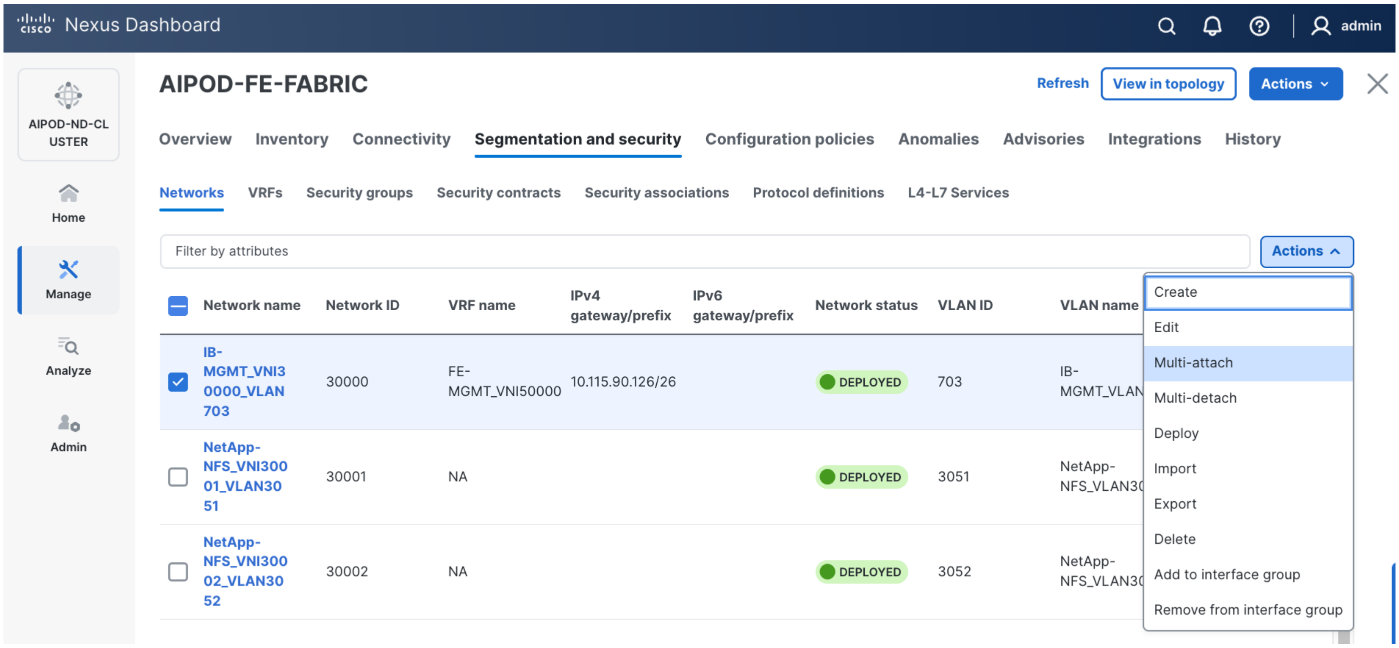
Step 1. Use a web browser to navigate to Nexus Dashboard. Use the management IP of any node in the ND cluster. Log in using admin account.

Step 2. From the left navigation menu, go to **Manage** > **Fabrics**.

Step 3. Select the FE fabric and go to **Segmentation and Security** > **Networks** tab.

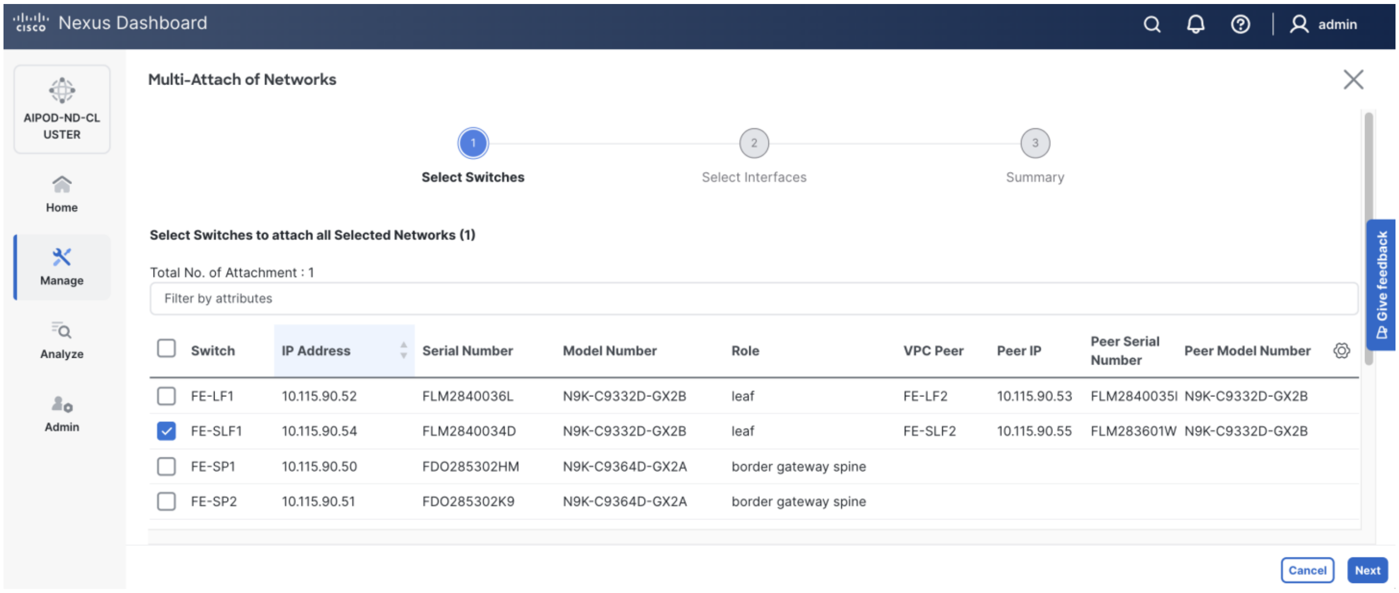
Step 4. Select the previously deployed **in-band management network** from the list.

Step 5. Click the lower of the two **Actions** buttons and select **Multi-attach** from the drop-down list.



	Network name	Network ID	VRF name	IPv4 gateway/prefix	IPv6 gateway/prefix	Network status	VLAN ID	VLAN name
☑	IB-MGMT_VNI30000_VLAN703	30000	FE-MGMT_VNI50000	10.115.90.126/26		DEPLOYED	703	IB-MGMT_VLAN
☐	NetApp-NFS_VNI30001_VLAN3051	30001	NA			DEPLOYED	3051	NetApp-NFS_VLAN3(
☐	NetApp-NFS_VNI30002_VLAN3052	30002	NA			DEPLOYED	3052	NetApp-NFS_VLAN3(

Step 6. Deploy the network on the storage leaf switch pair.

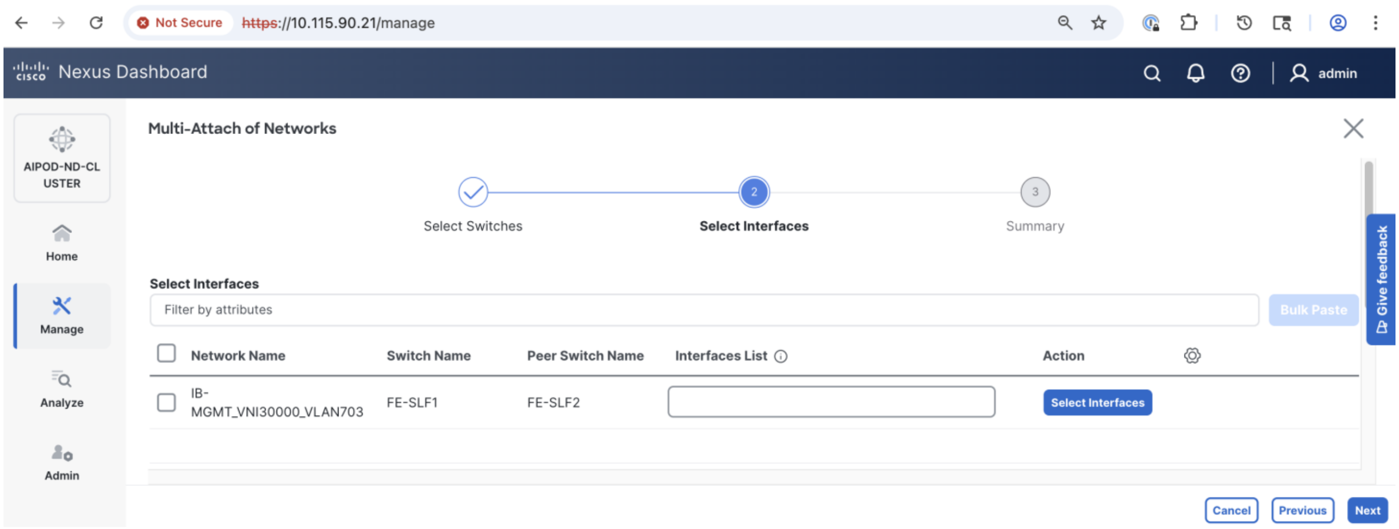


Select Switches to attach all Selected Networks (1)

Total No. of Attachment : 1

☐	Switch	IP Address	Serial Number	Model Number	Role	VPC Peer	Peer IP	Peer Serial Number	Peer Model Number
☐	FE-LF1	10.115.90.52	FLM2840036L	N9K-C9332D-GX2B	leaf	FE-LF2	10.115.90.53	FLM2840035I	N9K-C9332D-GX2B
☑	FE-SLF1	10.115.90.54	FLM2840034D	N9K-C9332D-GX2B	leaf	FE-SLF2	10.115.90.55	FLM283601W	N9K-C9332D-GX2B
☐	FE-SP1	10.115.90.50	FDO285302HM	N9K-C9364D-GX2A	border gateway spine				
☐	FE-SP2	10.115.90.51	FDO285302K9	N9K-C9364D-GX2A	border gateway spine				

Step 7. Click **Next.**



Multi-Attach of Networks

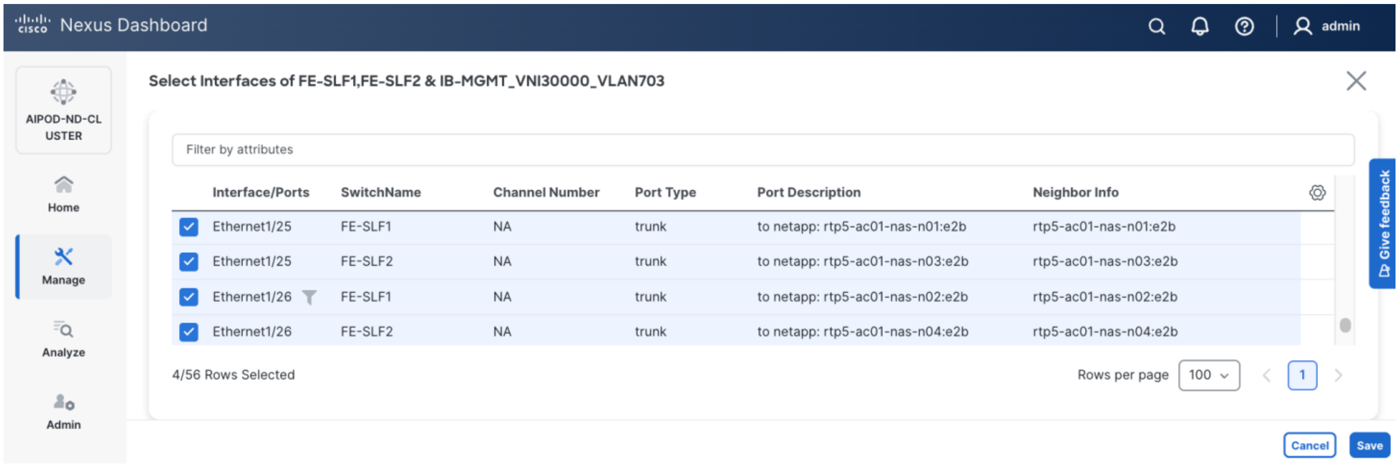
Select Interfaces

Filter by attributes

□	Network Name	Switch Name	Peer Switch Name	Interfaces List	Action
□	IB-MGMT_VNI30000_VLAN703	FE-SLF1	FE-SLF2		Select Interfaces

Step 8. Select the network and click **Select interfaces** on the right.

Step 9. Select the interfaces from the list.



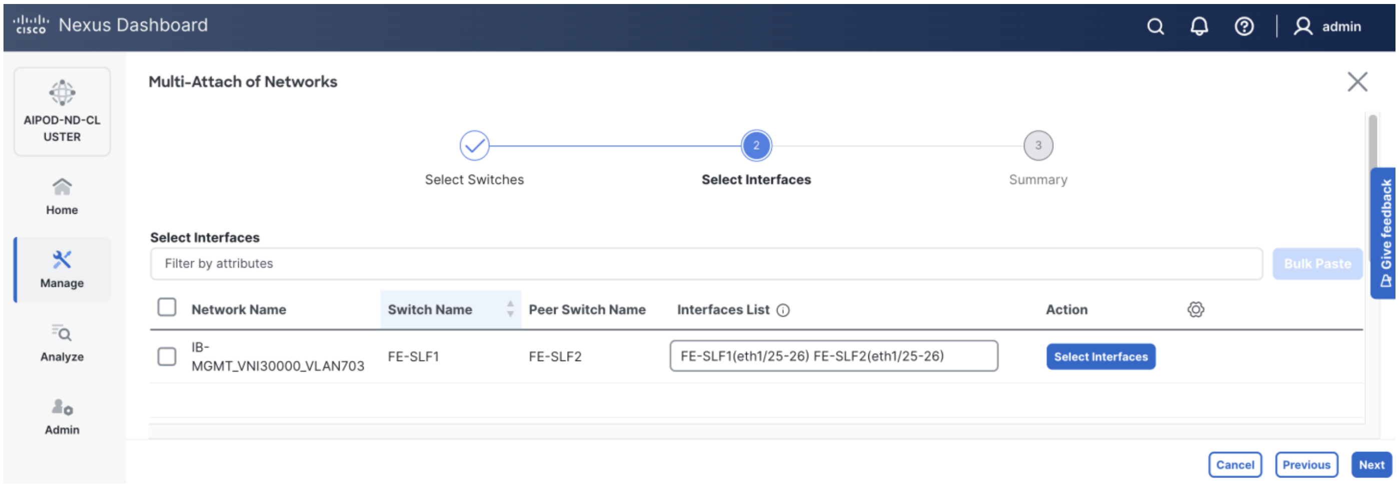
Select Interfaces of FE-SLF1,FE-SLF2 & IB-MGMT_VNI30000_VLAN703

Filter by attributes

	Interface/Ports	SwitchName	Channel Number	Port Type	Port Description	Neighbor Info
☑	Ethernet1/25	FE-SLF1	NA	trunk	to netapp: rtp5-ac01-nas-n01:e2b	rtp5-ac01-nas-n01:e2b
☑	Ethernet1/25	FE-SLF2	NA	trunk	to netapp: rtp5-ac01-nas-n03:e2b	rtp5-ac01-nas-n03:e2b
☑	Ethernet1/26	FE-SLF1	NA	trunk	to netapp: rtp5-ac01-nas-n02:e2b	rtp5-ac01-nas-n02:e2b
☑	Ethernet1/26	FE-SLF2	NA	trunk	to netapp: rtp5-ac01-nas-n04:e2b	rtp5-ac01-nas-n04:e2b

4/56 Rows Selected

Step 10. Click **Save**.



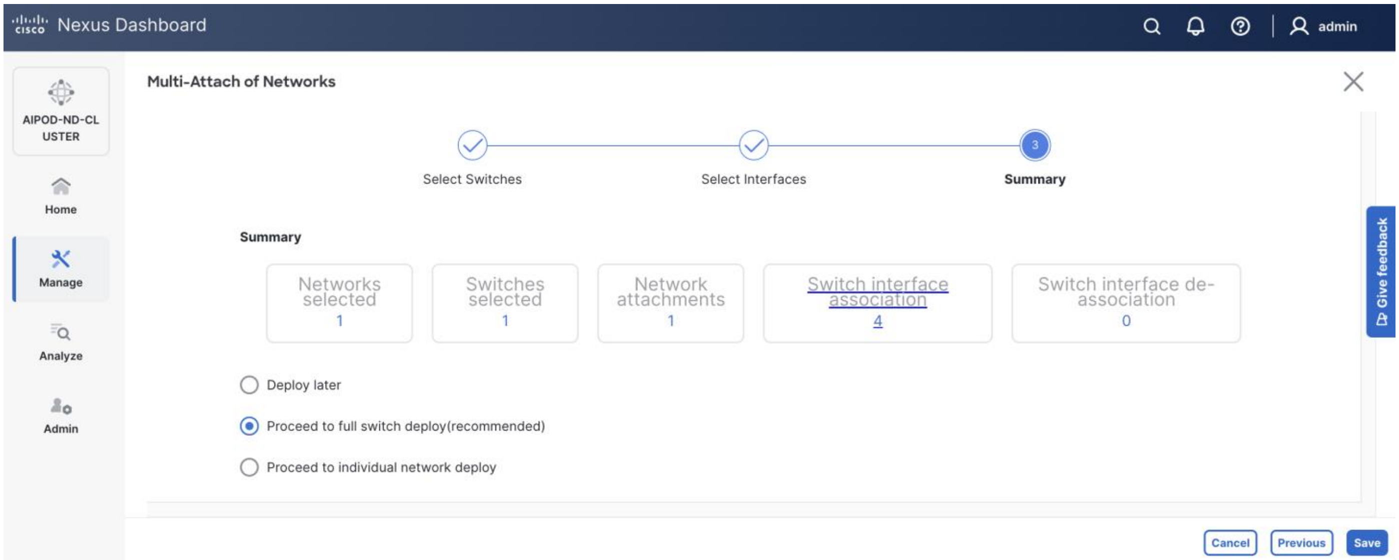
Multi-Attach of Networks

Select Interfaces

Filter by attributes

□	Network Name	Switch Name	Peer Switch Name	Interfaces List	Action
□	IB-MGMT_VNI30000_VLAN703	FE-SLF1	FE-SLF2	FE-SLF1(eth1/25-26) FE-SLF2(eth1/25-26)	Select Interfaces

Step 11. Click **Next**.



Multi-Attach of Networks

Select Switches — Select Interfaces — Summary

Summary

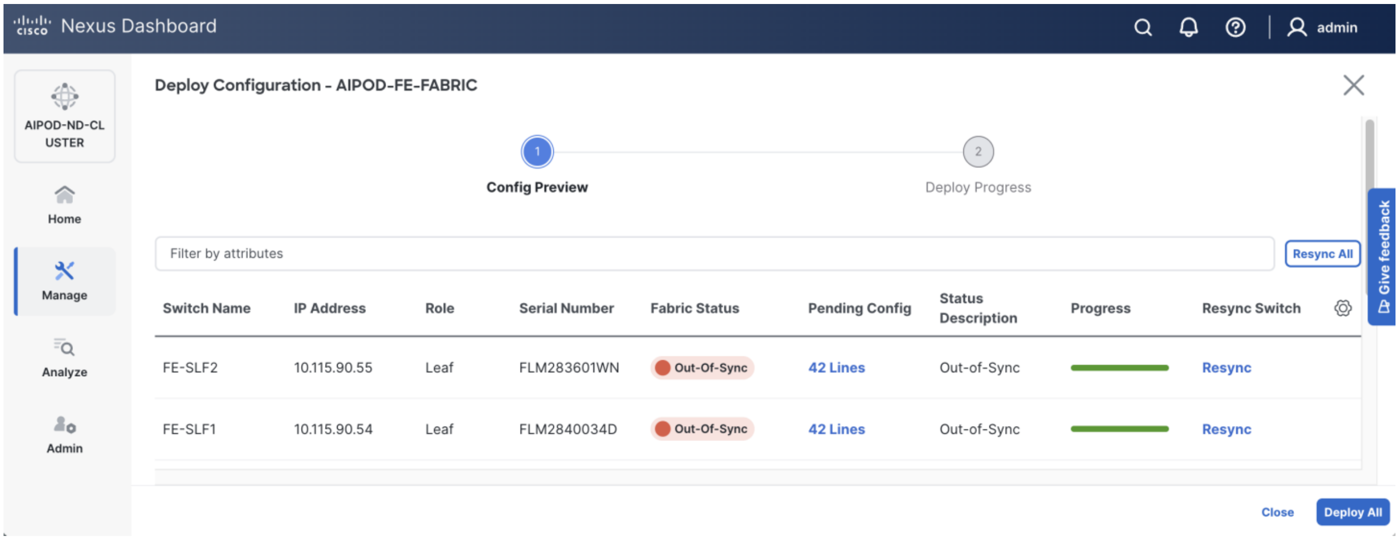
Networks selected	Switches selected	Network attachments	Switch interface association	Switch interface de-association
1	1	1	4	0

○ Deploy later

● Proceed to full switch deploy(recommended)

○ Proceed to individual network deploy

Step 12. Click **Save**.



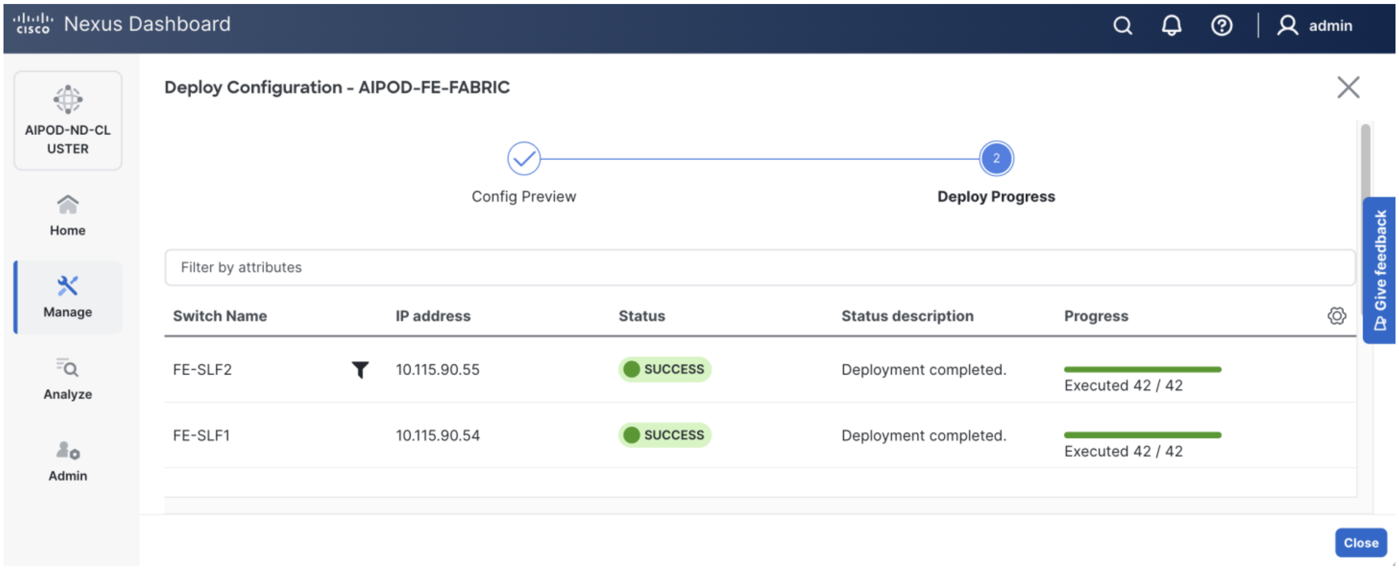
Deploy Configuration - AIPOD-FE-FABRIC

1 Config Preview — 2 Deploy Progress

Switch Name	IP Address	Role	Serial Number	Fabric Status	Pending Config	Status Description	Progress	Resync Switch
FE-SLF2	10.115.90.55	Leaf	FLM283601WN	Out-Of-Sync	42 Lines	Out-of-Sync		Resync
FE-SLF1	10.115.90.54	Leaf	FLM2840034D	Out-Of-Sync	42 Lines	Out-of-Sync		Resync

Step 13. Click **Pending Config** to see the configuration being deployed. The **pending** configuration on one leaf switch is provided as a reference at the end.

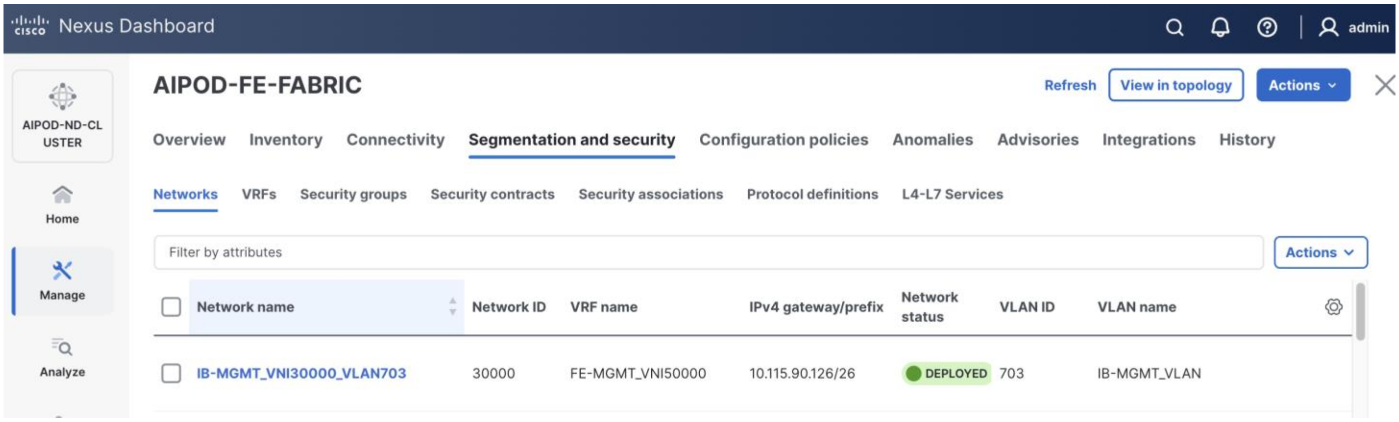
Step 14. Click **Deploy All**.



Deploy Configuration - AIPOD-FE-FABRIC

Switch Name	IP address	Status	Status description	Progress
FE-SLF2	10.115.90.55	SUCCESS	Deployment completed.	Executed 42 / 42
FE-SLF1	10.115.90.54	SUCCESS	Deployment completed.	Executed 42 / 42

Step 15. Click **Close**.

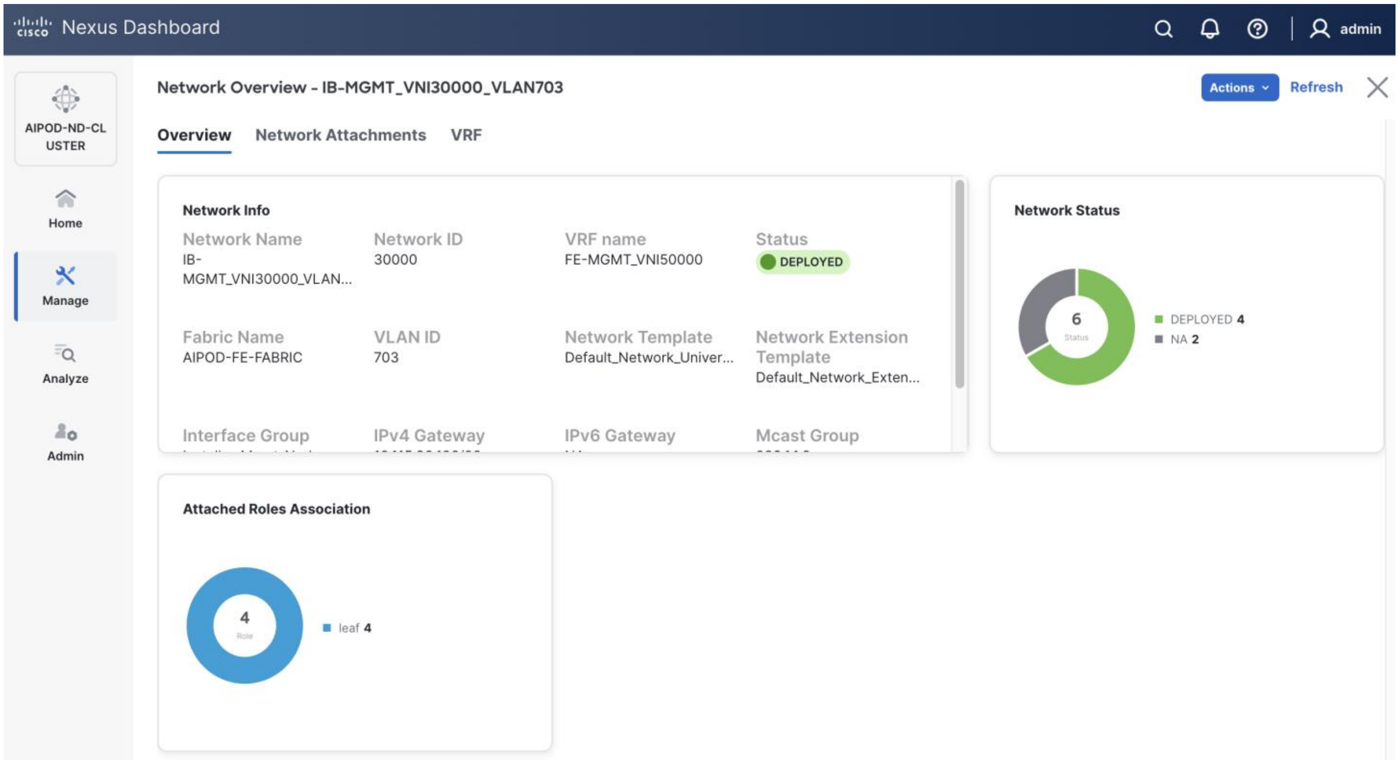


AIPOD-FE-FABRIC

□	Network name	Network ID	VRF name	IPv4 gateway/prefix	Network status	VLAN ID	VLAN name
□	IB-MGMT_VNI30000_VLAN703	30000	FE-MGMT_VNI50000	10.115.90.126/26	DEPLOYED	703	IB-MGMT_VLAN

Step 16. Click the **Network name** to verify that the network was successfully **deployed** on the relevant switches and interfaces.

Step 17. Verify the status and that the network is **deployed**.



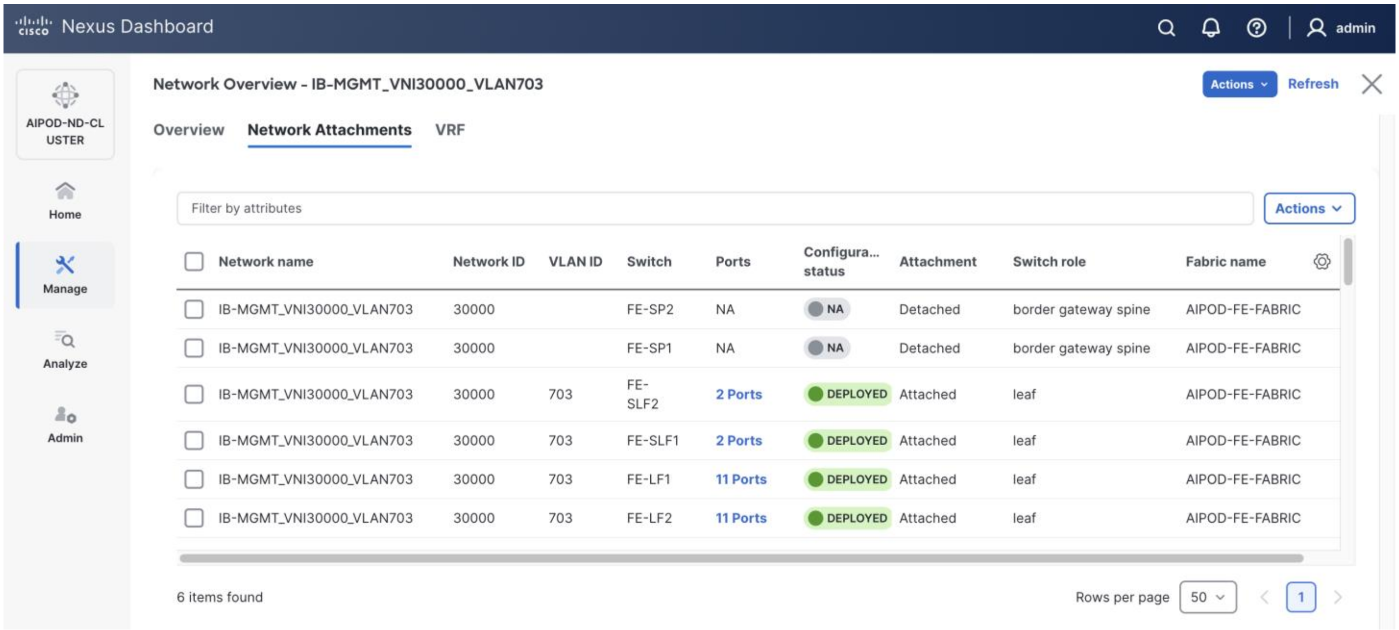
Network Overview - IB-MGMT_VNI30000_VLAN703

Network Info

Network Name	Network ID	VRF name	Status
IB-MGMT_VNI30000_VLAN...	30000	FE-MGMT_VNI50000	DEPLOYED

Fabric Name	VLAN ID	Network Template	Network Extension Template
AIPOD-FE-FABRIC	703	Default_Network_Univer...	Default_Network_Exten...

Interface Group	IPv4 Gateway	IPv6 Gateway	Mcast Group



Network Overview - IB-MGMT_VNI30000_VLAN703

☐	Network name	Network ID	VLAN ID	Switch	Ports	Configura... status	Attachment	Switch role	Fabric name
☐	IB-MGMT_VNI30000_VLAN703	30000		FE-SP2	NA	NA	Detached	border gateway spine	AIPOD-FE-FABRIC
☐	IB-MGMT_VNI30000_VLAN703	30000		FE-SP1	NA	NA	Detached	border gateway spine	AIPOD-FE-FABRIC
☐	IB-MGMT_VNI30000_VLAN703	30000	703	FE-SLF2	2 Ports	DEPLOYED	Attached	leaf	AIPOD-FE-FABRIC
☐	IB-MGMT_VNI30000_VLAN703	30000	703	FE-SLF1	2 Ports	DEPLOYED	Attached	leaf	AIPOD-FE-FABRIC
☐	IB-MGMT_VNI30000_VLAN703	30000	703	FE-LF1	11 Ports	DEPLOYED	Attached	leaf	AIPOD-FE-FABRIC
☐	IB-MGMT_VNI30000_VLAN703	30000	703	FE-LF2	11 Ports	DEPLOYED	Attached	leaf	AIPOD-FE-FABRIC

6 items found

Rows per page 50

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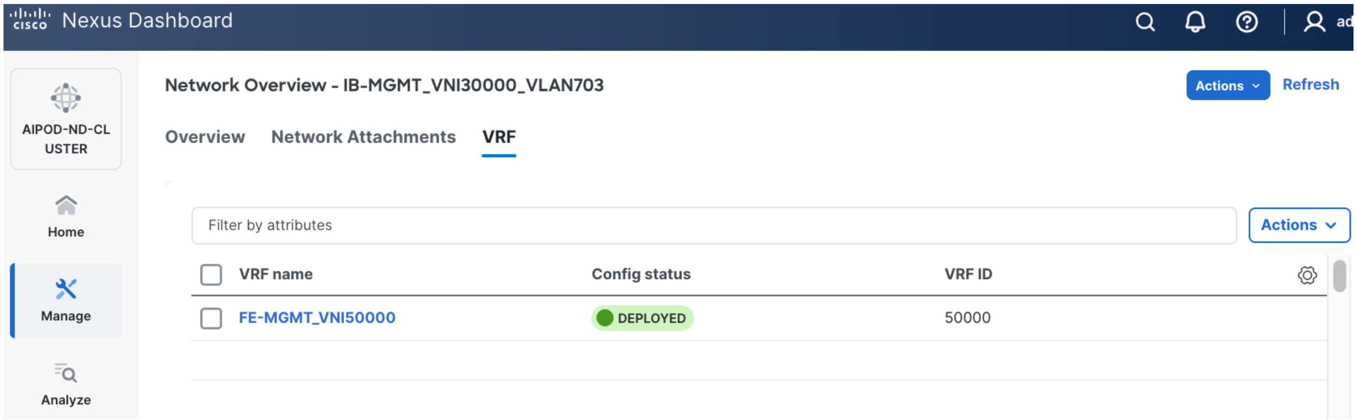


Network Overview - IB-MGMT_VNI30000_VLAN703

□	VRF name	Config status	VRF ID
□	FE-MGMT_VNI50000	● DEPLOYED	50000

The configuration deployed on one storage leaf switch is provided below as a reference:

```
interface ethernet1/25
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree port type edge trunk
  description To NetApp: rtp5-ac01-nas-n01:e3a
  no shutdown
  switchport trunk allowed vlan 703
configure terminal
interface ethernet1/26
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree port type edge trunk
  description To NetApp: rtp5-ac01-nas-n02:e3a
  no shutdown
  switchport trunk allowed vlan 703
configure terminal
```

```
vlan 703
  vn-segment 30000
  name IB-MGMT_VLAN
configure terminal
interface Vlan703
  description IB-MGMT
  vrf member fe-mgmt_vni50000
  no ip redirects
  no ipv6 redirects
  ip address 10.115.90.126/26 tag 12345
  fabric forwarding mode anycast-gateway
  no shutdown
configure terminal
interface nve1
  member vni 30000
    mcast-group 239.1.1.0
configure terminal
configure terminal
evpn
  vni 30000 l2
    rd auto
    route-target import auto
    route-target export auto
configure terminal
```

Enable NFS Storage Data Access to NetApp Storage

Table 16. Setup Parameters for FE Fabric: NFS Storage Data Access to NetApp Storage

Parameter Type	Parameter Name | Value	Parameter Type
NFS Storage Data Network(s)		
Name	NetApp-NFS_VN30001_VLAN3051	
Layer 2 Only	Enable checkbox	
Network ID	30001	
VLAN ID	3051	
VLAN Name	NetApp-NFS_VLAN3051	
Interface Description	NetApp-NFS	
Name	NetApp-NFS_VN30002_VLAN3052	
Layer 2 Only	Enable checkbox	

Parameter Type	Parameter Name | Value	Parameter Type
Network ID	30002	
VLAN ID	3052	
VLAN Name	NetApp-NFS_VLAN3052	
Interface Description	NetApp-NFS	
NetApp Storage		
vPC Leaf Switch Pair	FE-SLF1, FE-SLF2	
Port	e1/25 - 26	
Leaf Switch Pair	FE-LF1, FE-LF2	
vPC	15,16, 111-114	To Management UCS-X Direct, UCS C885A GPU Nodes
Port Channel	15,16, 111-114	Members: e1/1-4

To enable NFS storage data access to NetApp storage, follow the procedures below.

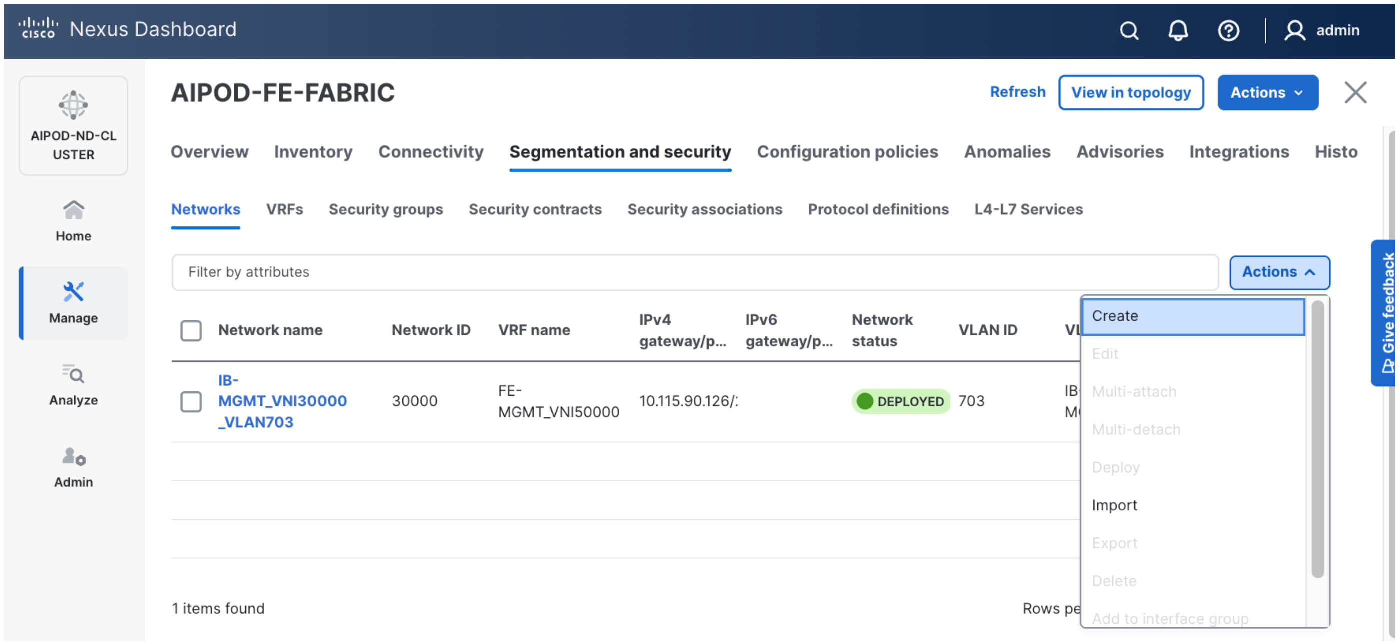
Procedure 1. Enable NFS Storage Data Access to NetApp Storage using the first NFS VLAN

Step 1. Use a web browser to navigate to Nexus Dashboard. Use the management IP of any node in the ND cluster. Log in using admin account.

Step 2. From the left navigation menu, go to **Manage** > **Fabrics**.

Step 3. Select the FE fabric and go to **Segmentation and Security** > **Networks** tab.

Step 4. Click the lower of the two **Actions** buttons and select **Create** from the menu.

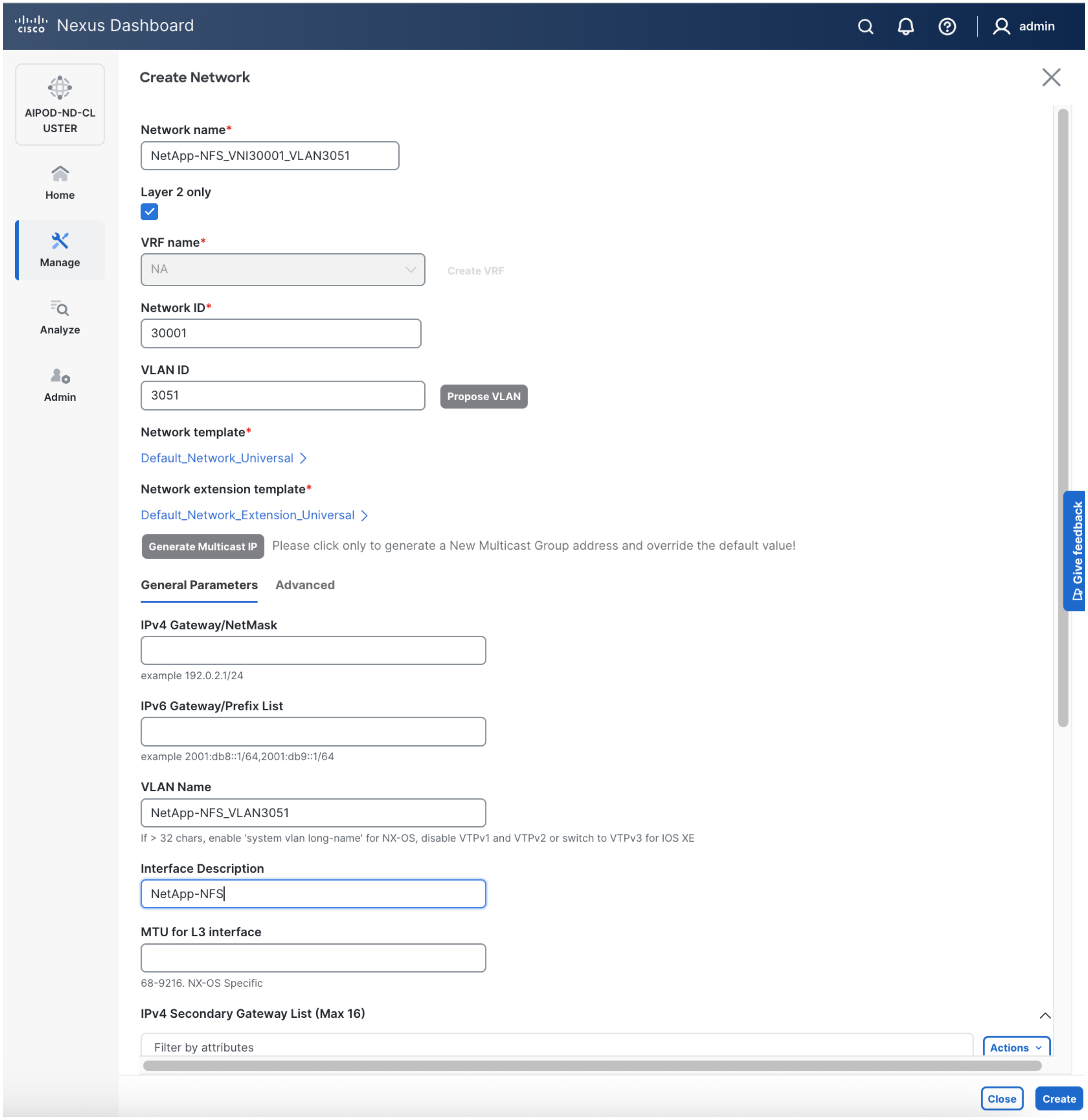


Network name	Network ID	VRF name	IPv4 gateway/p...	IPv6 gateway/p...	Network status	VLAN ID	VI
IB-MGMT_VNI30000_VLAN703	30000	FE-MGMT_VNI50000	10.115.90.126/:		DEPLOYED	703	IB M

Step 5. In the **Create Network** window, specify the following:

- Network name

- Enable checkbox for **Layer 2 only**.
- **Network ID** or use default.
- **VLAN ID** or click **Propose VLAN** to let system define a VLAN.
- In the General Parameters tab, specify VLAN Name and Interface Description.



Create Network

Network name*: NetApp-NFS_VNI30001_VLAN3051

Layer 2 only: ☑

VRF name*: NA (Create VRF)

Network ID*: 30001

VLAN ID: 3051 (Propose VLAN)

Network template*: Default_Network_Universal

Network extension template*: Default_Network_Extension_Universal

Generate Multicast IP — Please click only to generate a New Multicast Group address and override the default value!

General Parameters | Advanced

IPv4 Gateway/NetMask: (example 192.0.2.1/24)

IPv6 Gateway/Prefix List: (example 2001:db8::1/64,2001:db9::1/64)

VLAN Name: NetApp-NFS_VLAN3051

If > 32 chars, enable 'system vlan long-name' for NX-OS, disable VTPv1 and VTPv2 or switch to VTPv3 for IOS XE

Interface Description: NetApp-NFS

MTU for L3 interface: (68-9216. NX-OS Specific)

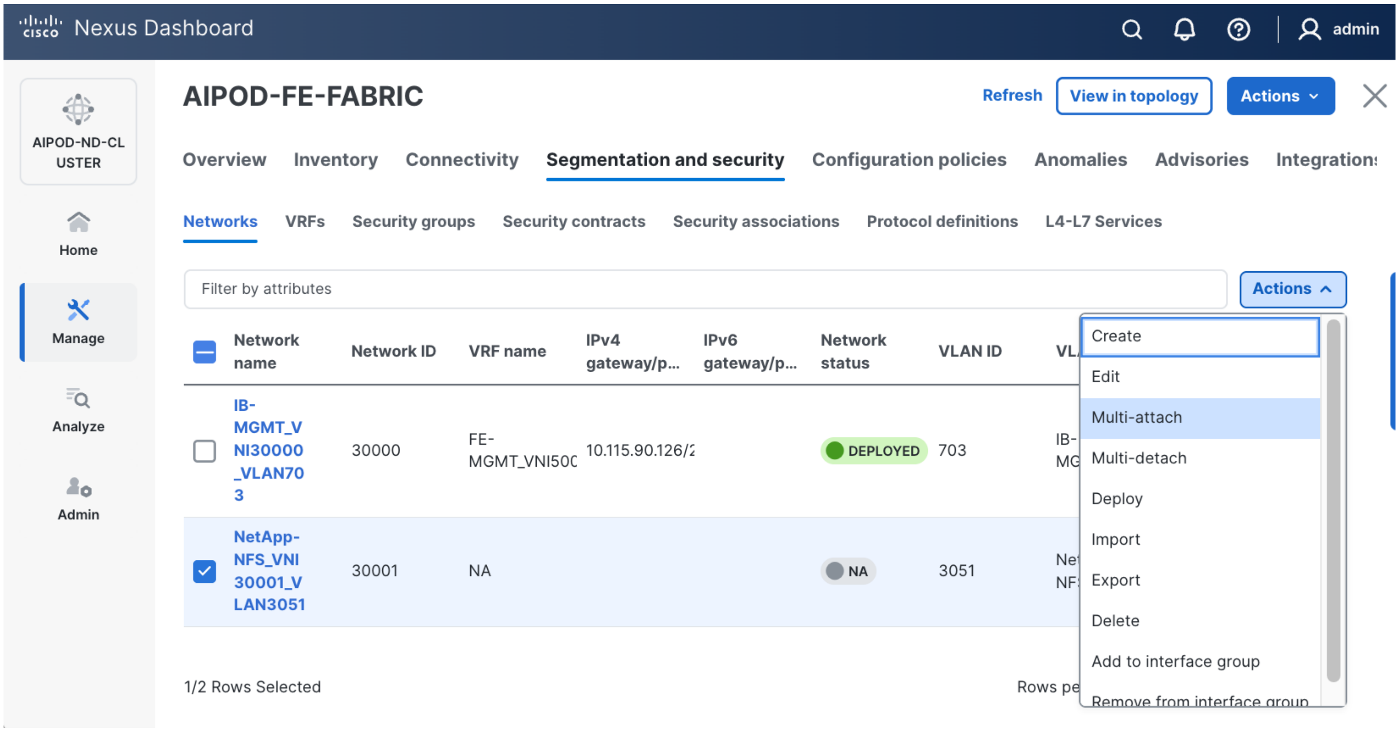
IPv4 Secondary Gateway List (Max 16)

Filter by attributes | Actions

Close | Create

Step 6. Click **Create** to create the NFS Storage Data Network.

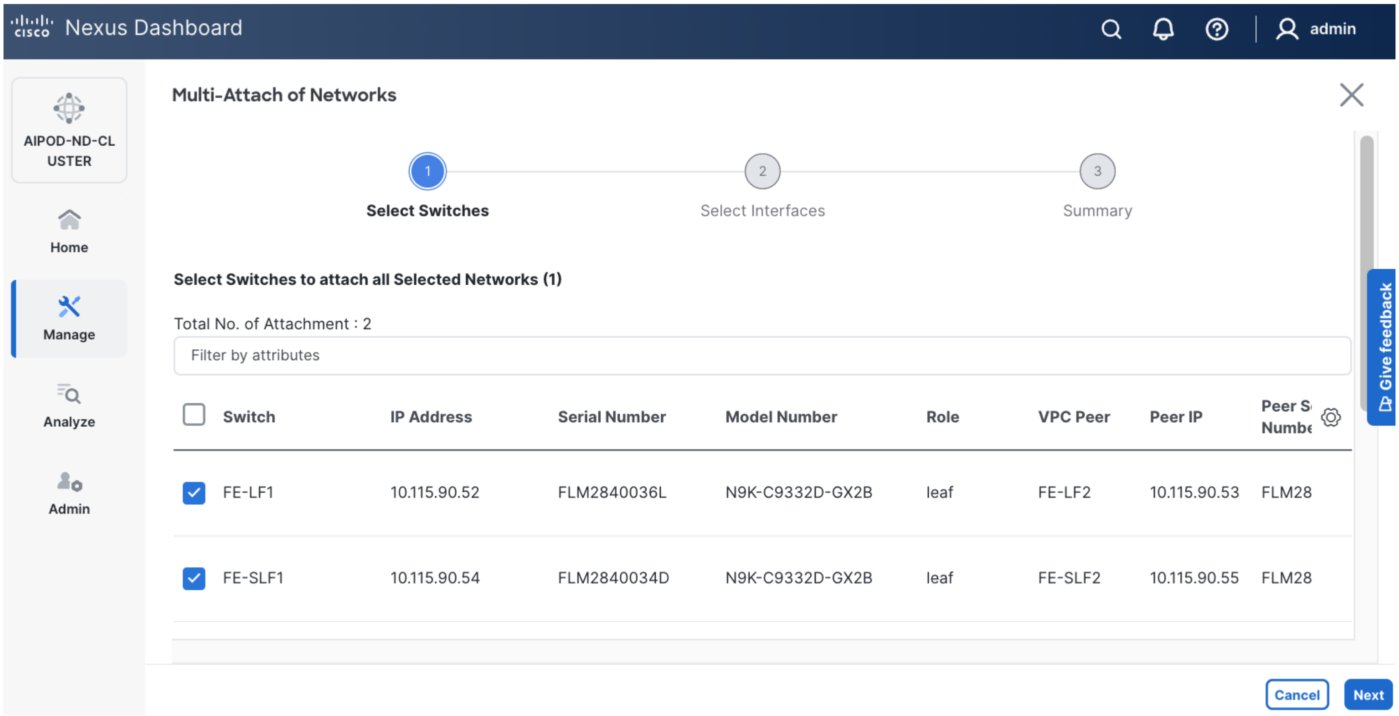
Step 7. Select newly created network. Click the lower of the two **Actions** button and select **Multi-attach** from the list.



	Network name	Network ID	VRF name	IPv4 gateway/p...	IPv6 gateway/p...	Network status	VLAN ID	VL
☐	IB-MGMT_VNI30000_VLAN703	30000	FE-MGMT_VNI50C	10.115.90.126/2		DEPLOYED	703	IB-MG
☑	NetApp-NFS_VNI30001_VLAN3051	30001	NA			NA	3051	Ne NF

1/2 Rows Selected

Step 8. Select the compute and storage Leaf switch pairs.

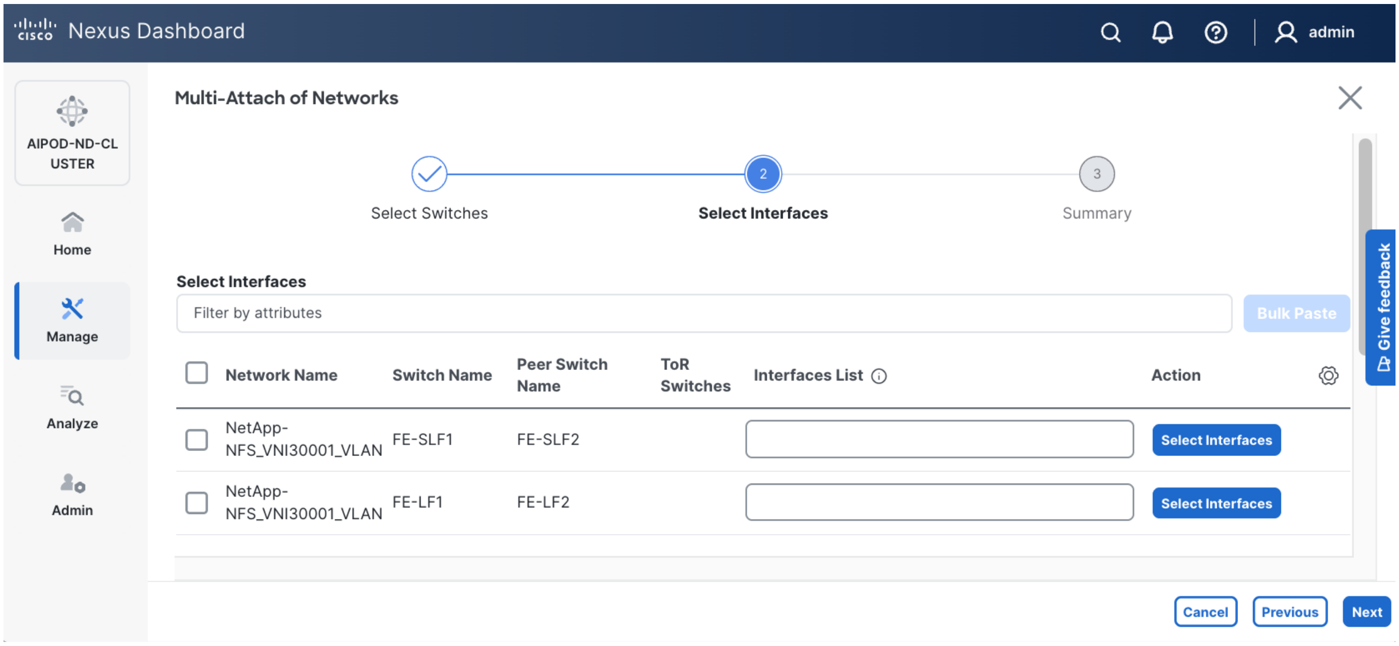


Select Switches to attach all Selected Networks (1)

Total No. of Attachment : 2

☐	Switch	IP Address	Serial Number	Model Number	Role	VPC Peer	Peer IP	Peer S Numbe
☑	FE-LF1	10.115.90.52	FLM2840036L	N9K-C9332D-GX2B	leaf	FE-LF2	10.115.90.53	FLM28
☑	FE-SLF1	10.115.90.54	FLM2840034D	N9K-C9332D-GX2B	leaf	FE-SLF2	10.115.90.55	FLM28

Step 9. Click **Next**.



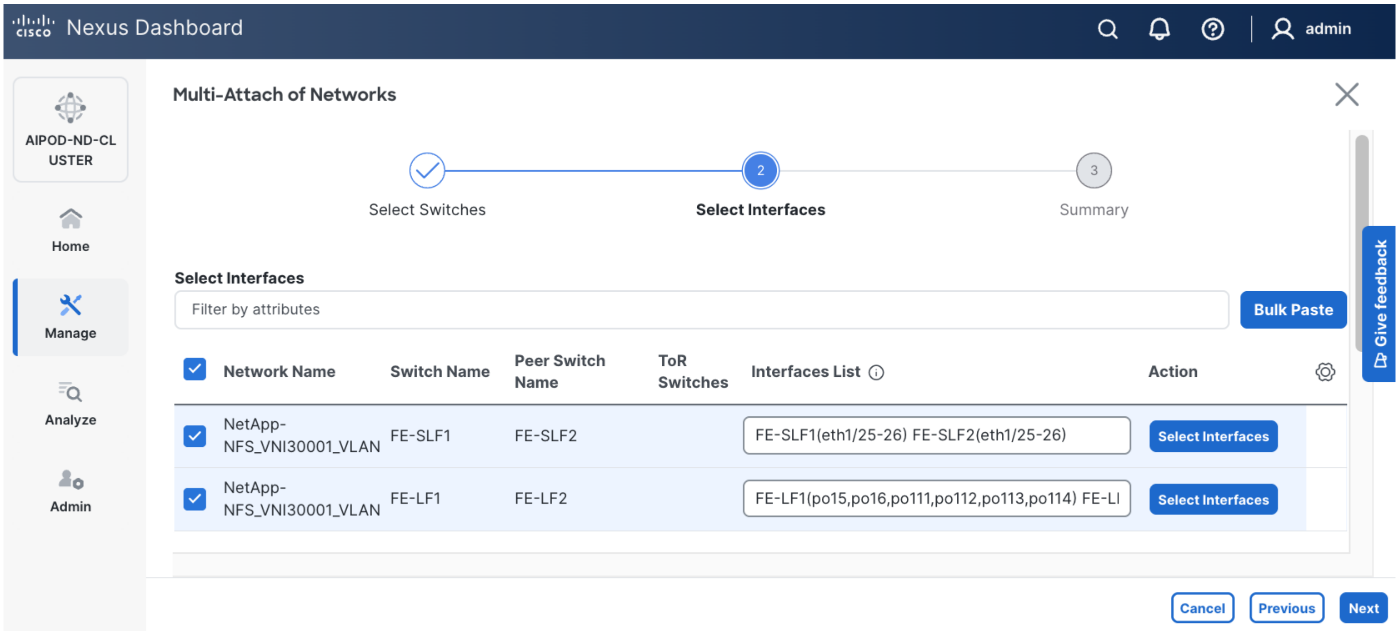
Multi-Attach of Networks

Select Interfaces

Filter by attributes

□	Network Name	Switch Name	Peer Switch Name	ToR Switches	Interfaces List	Action
□	NetApp-NFS_VNI30001_VLAN	FE-SLF1	FE-SLF2			Select Interfaces
□	NetApp-NFS_VNI30001_VLAN	FE-LF1	FE-LF2			Select Interfaces

Step 10. Select each **Network Name** in the list and click **Select interfaces** on the right to deploy this network as a trunked VLAN on the selected interfaces. This should include the ports on the compute and storage leaf pair that connect to UCS nodes and NetApp storage, respectively. Additional interfaces can be added later as needed.



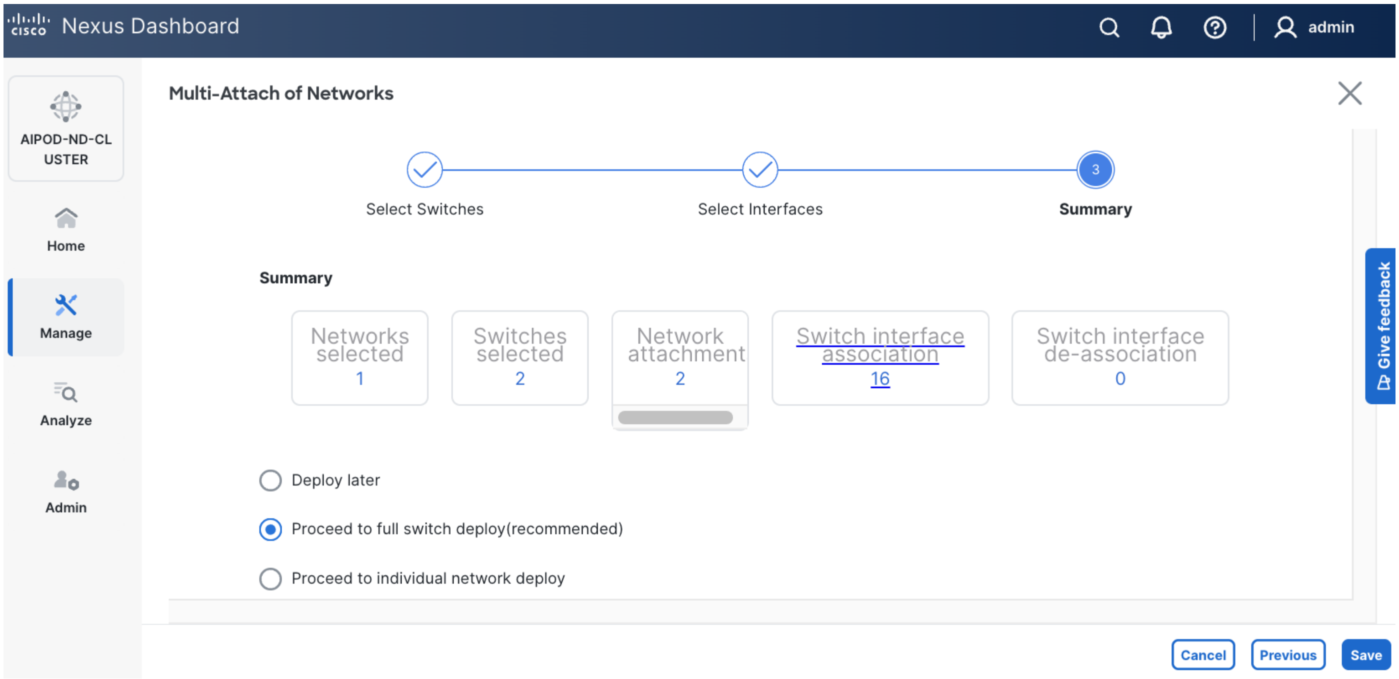
Multi-Attach of Networks

Select Interfaces

Filter by attributes

☑	Network Name	Switch Name	Peer Switch Name	ToR Switches	Interfaces List	Action
☑	NetApp-NFS_VNI30001_VLAN	FE-SLF1	FE-SLF2		FE-SLF1(eth1/25-26) FE-SLF2(eth1/25-26)	Select Interfaces
☑	NetApp-NFS_VNI30001_VLAN	FE-LF1	FE-LF2		FE-LF1(po15,po16,po111,po112,po113,po114) FE-LI	Select Interfaces

Step 11. Click **Next.**



Multi-Attach of Networks

Summary

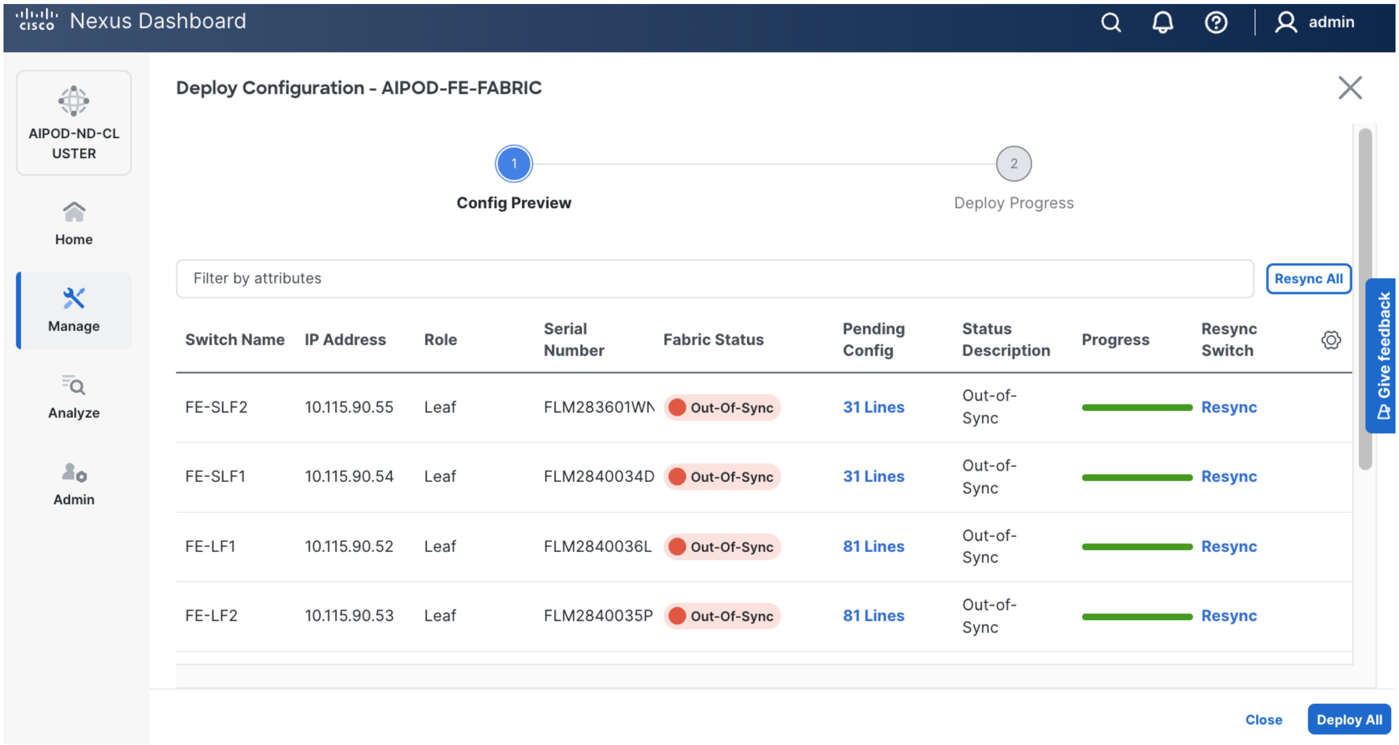
Networks selected	Switches selected	Network attachment	Switch interface association	Switch interface de-association
1	2	2	16	0

○ Deploy later

● Proceed to full switch deploy(recommended)

○ Proceed to individual network deploy

Step 12. Click **Save.**

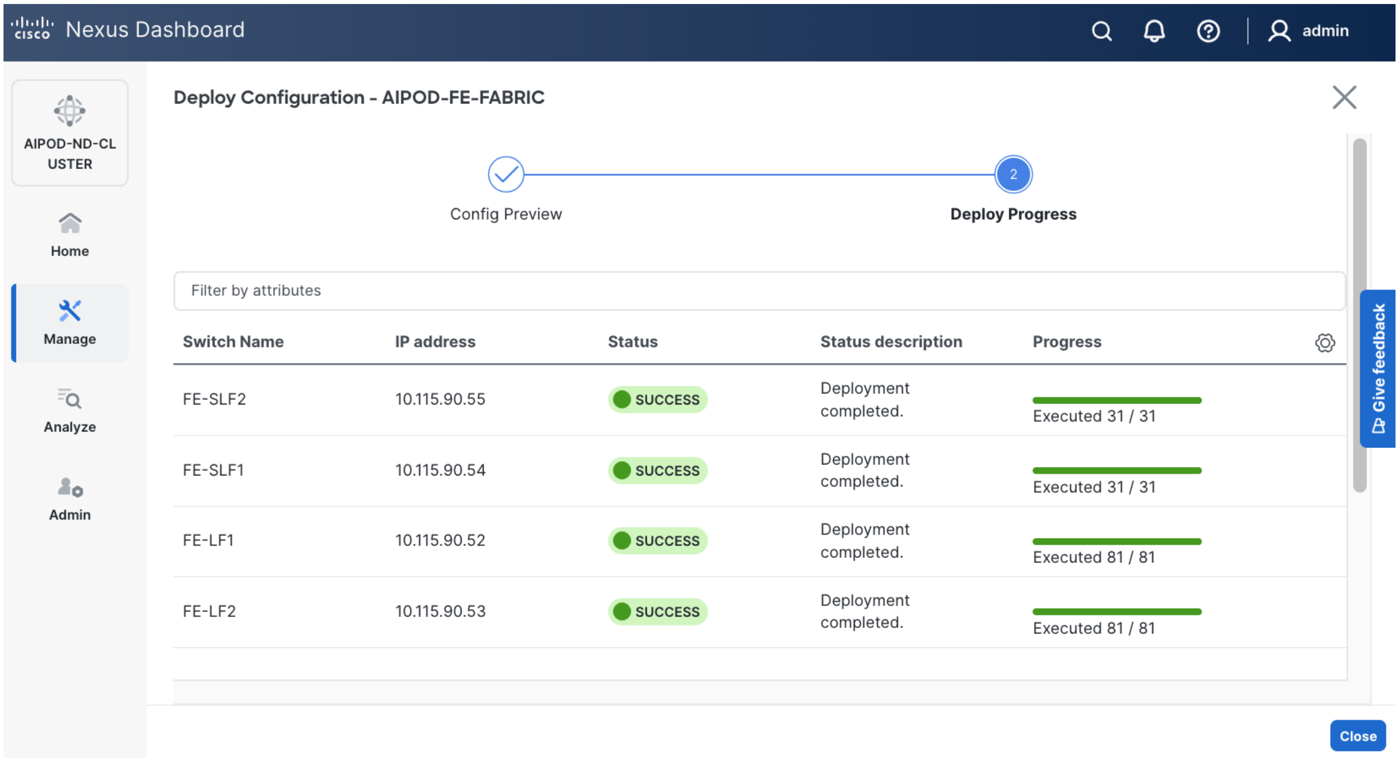


Deploy Configuration - AIPOD-FE-FABRIC

Switch Name	IP Address	Role	Serial Number	Fabric Status	Pending Config	Status Description	Progress	Resync Switch
FE-SLF2	10.115.90.55	Leaf	FLM283601WN	● Out-Of-Sync	31 Lines	Out-of-Sync		Resync
FE-SLF1	10.115.90.54	Leaf	FLM2840034D	● Out-Of-Sync	31 Lines	Out-of-Sync		Resync
FE-LF1	10.115.90.52	Leaf	FLM2840036L	● Out-Of-Sync	81 Lines	Out-of-Sync		Resync
FE-LF2	10.115.90.53	Leaf	FLM2840035P	● Out-Of-Sync	81 Lines	Out-of-Sync		Resync

Step 13. Click **Pending Config** to see the configuration being deployed. The **pending** configuration on one leaf switch is provided as a reference at the end.

Step 14. Click **Deploy All.**



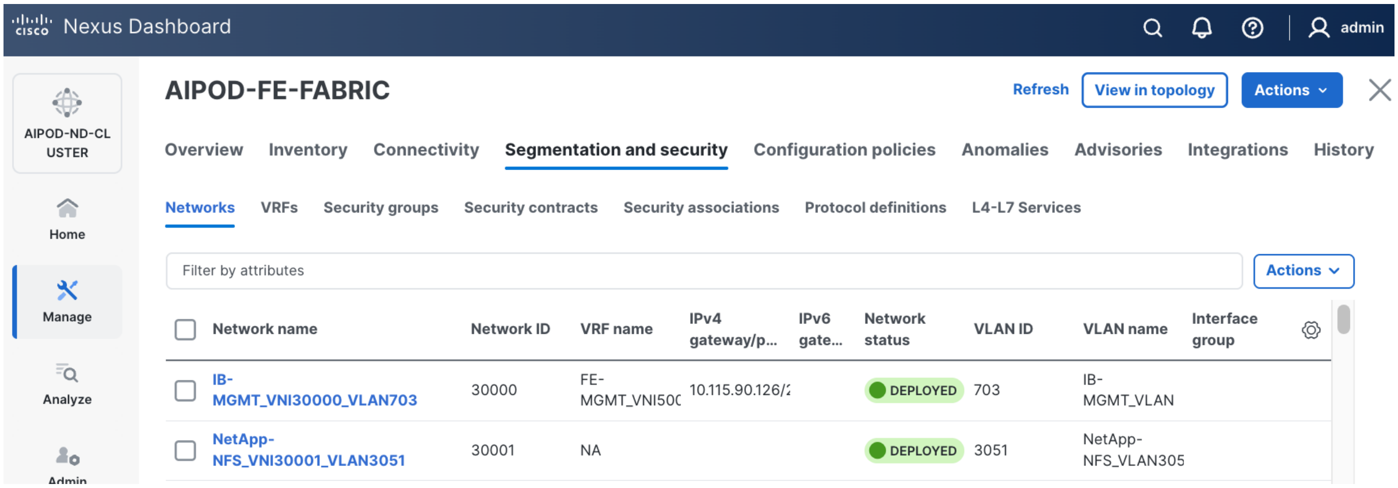
Deploy Configuration - AIPOD-FE-FABRIC

Config Preview — Deploy Progress

Filter by attributes

Switch Name	IP address	Status	Status description	Progress
FE-SLF2	10.115.90.55	SUCCESS	Deployment completed.	Executed 31 / 31
FE-SLF1	10.115.90.54	SUCCESS	Deployment completed.	Executed 31 / 31
FE-LF1	10.115.90.52	SUCCESS	Deployment completed.	Executed 81 / 81
FE-LF2	10.115.90.53	SUCCESS	Deployment completed.	Executed 81 / 81

Step 15. Click **Close**.

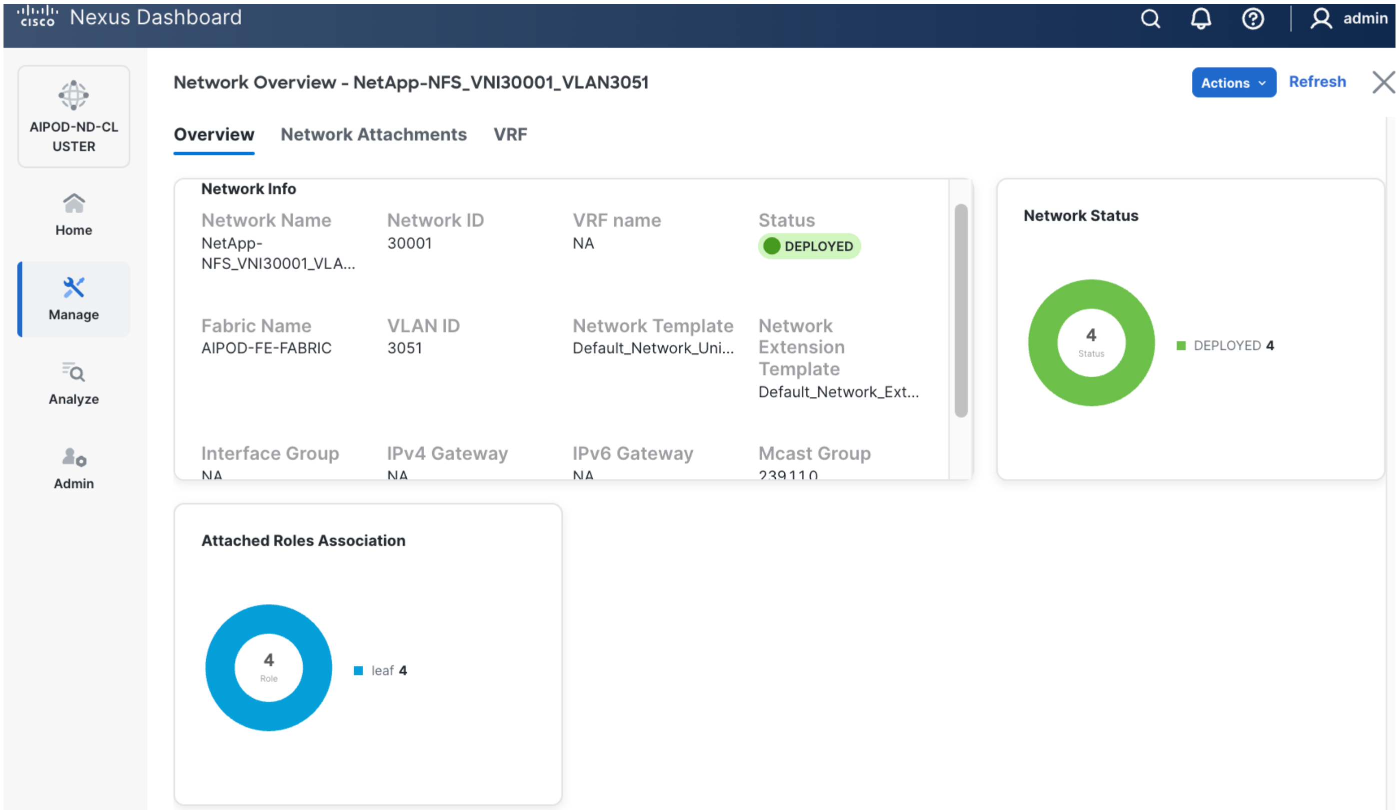


AIPOD-FE-FABRIC

Filter by attributes

	Network name	Network ID	VRF name	IPv4 gateway/p...	IPv6 gate...	Network status	VLAN ID	VLAN name	Interface group
□	IB-MGMT_VNI30000_VLAN703	30000	FE-MGMT_VNI50(	10.115.90.126/2		DEPLOYED	703	IB-MGMT_VLAN	
□	NetApp-NFS_VNI30001_VLAN3051	30001	NA			DEPLOYED	3051	NetApp-NFS_VLAN305	

Step 16. Click the **Network name** to verify that the network was successfully **deployed** on the relevant switches and interfaces.



Network Overview - NetApp-NFS_VNI30001_VLAN3051

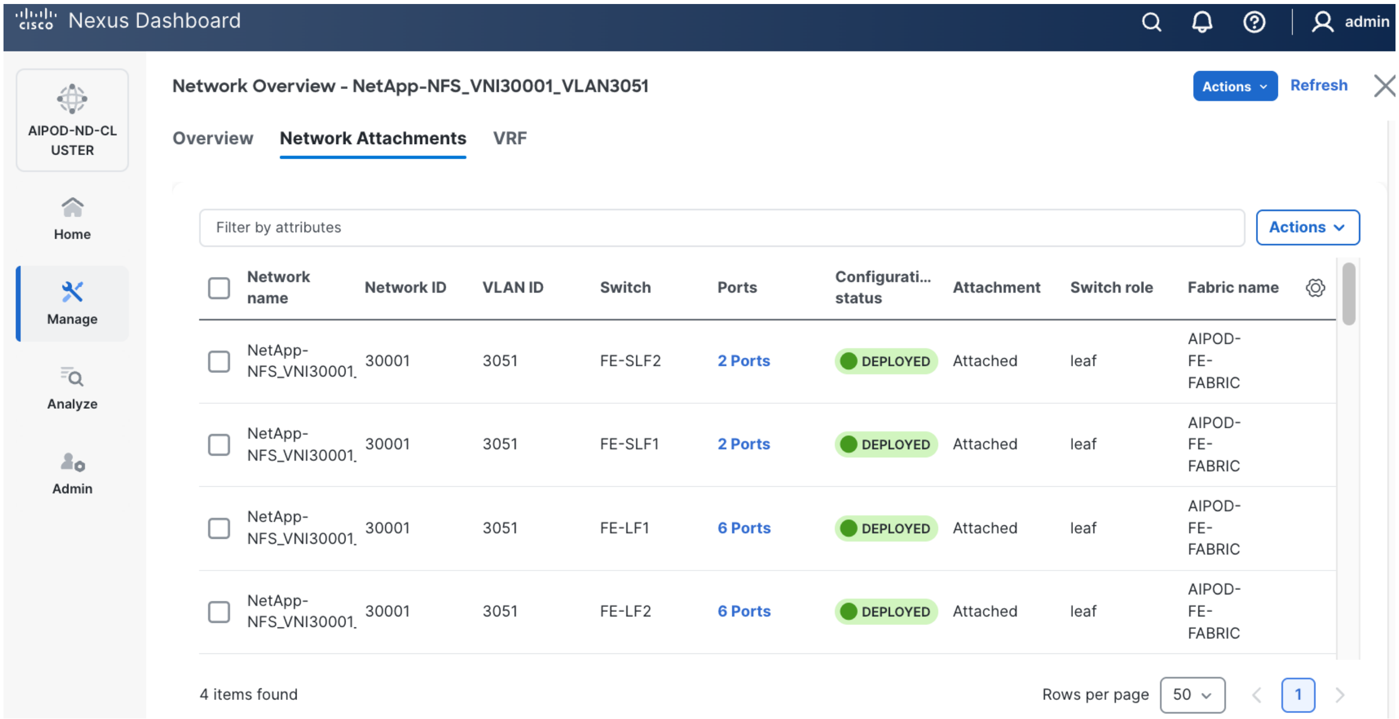
Overview | Network Attachments | VRF

Network Info

Network Name NetApp-NFS_VNI30001_VLA...	Network ID 30001	VRF name NA	Status DEPLOYED
Fabric Name AIPOD-FE-FABRIC	VLAN ID 3051	Network Template Default_Network_Uni...	Network Extension Template Default_Network_Ext...
Interface Group NA	IPv4 Gateway NA	IPv6 Gateway NA	Mcast Group 239.1.1.0

Network Status

Attached Roles Association



Network Overview - NetApp-NFS_VNI30001_VLAN3051

Overview | Network Attachments | VRF

Network name	Network ID	VLAN ID	Switch	Ports	Configurati... status	Attachment	Switch role	Fabric name
NetApp-NFS_VNI30001_	30001	3051	FE-SLF2	2 Ports	DEPLOYED	Attached	leaf	AIPOD-FE-FABRIC
NetApp-NFS_VNI30001_	30001	3051	FE-SLF1	2 Ports	DEPLOYED	Attached	leaf	AIPOD-FE-FABRIC
NetApp-NFS_VNI30001_	30001	3051	FE-LF1	6 Ports	DEPLOYED	Attached	leaf	AIPOD-FE-FABRIC
NetApp-NFS_VNI30001_	30001	3051	FE-LF2	6 Ports	DEPLOYED	Attached	leaf	AIPOD-FE-FABRIC

4 items found

Rows per page 50 | 1

Step 17. The configuration deployed on one storage and compute leaf switch is provided below as a reference:

- **Storage** Leaf

```
interface ethernet1/25
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree port type edge trunk
  no shutdown
  switchport trunk allowed vlan 3051
configure terminal
interface ethernet1/26
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree port type edge trunk
  no shutdown
  switchport trunk allowed vlan 3051
configure terminal
vlan 3051
  vn-segment 30001
  name NetApp-NFS_VLAN3051
configure terminal
interface nve1
  member vni 30001
    mcast-group 239.1.1.0
configure terminal
configure terminal
evpn
  vni 30001 l2
    rd auto
    route-target import auto
    route-target export auto
configure terminal
```

- **Compute** Leaf

```
 interface port-channel111
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  switchport trunk native vlan 2
  description PC-111 to AI-POD: C885A-1
  no shutdown
  switchport trunk allowed vlan 703,3051
configure terminal
interface port-channel112
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  switchport trunk native vlan 2
  description PC-112 to AI POD: C885A-2
  no shutdown
  switchport trunk allowed vlan 703,3051
configure terminal
interface port-channel113
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  switchport trunk native vlan 2
  description PC-113 to AI POD: C885A-3
  no shutdown
  switchport trunk allowed vlan 703,3051
configure terminal
interface port-channel114
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  switchport trunk native vlan 2
  description PC-114 to AI POD: C885A-4
  no shutdown
  switchport trunk allowed vlan 703,3051
configure terminal
```

```
interface port-channel15
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  switchport trunk native vlan 2
  description To UCS X-Series Direct - A
  no shutdown
  switchport trunk allowed vlan 703,3051
configure terminal
interface port-channel16
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  switchport trunk native vlan 2
  description To UCS X-Series Direct - B
  no shutdown
  switchport trunk allowed vlan 703,3051
configure terminal
vlan 3051
  vn-segment 30001
  name NetApp-NFS_VLAN3051
configure terminal
interface nve1
  member vni 30001
    mcast-group 239.1.1.0
configure terminal
configure terminal
evpn
  vni 30001 l2
    rd auto
    route-target import auto
    route-target export auto
configure terminal
```

Step 18. Repeat this procedure to deploy the **second** NFS storage data VLAN.

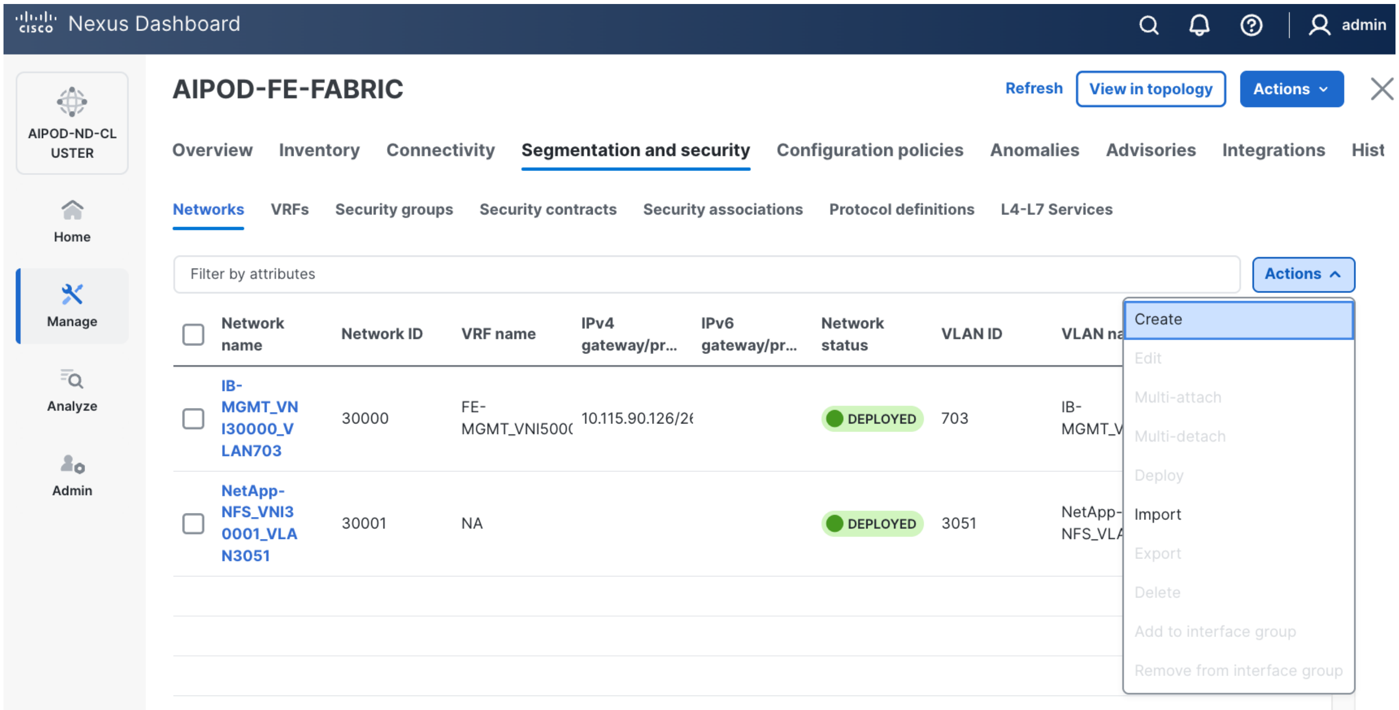
Procedure 2. Enable NFS Storage Data Access to NetApp Storage using the second NFS VLAN (Optional)

Step 1. Use a web browser to navigate to Nexus Dashboard. Use the management IP of any node in the ND cluster. Log in using **admin** account.

Step 2. From the left navigation menu, go to **Manage** > **Fabrics**.

Step 3. Select the FE fabric and go to **Segmentation and Security** > **Networks** tab.

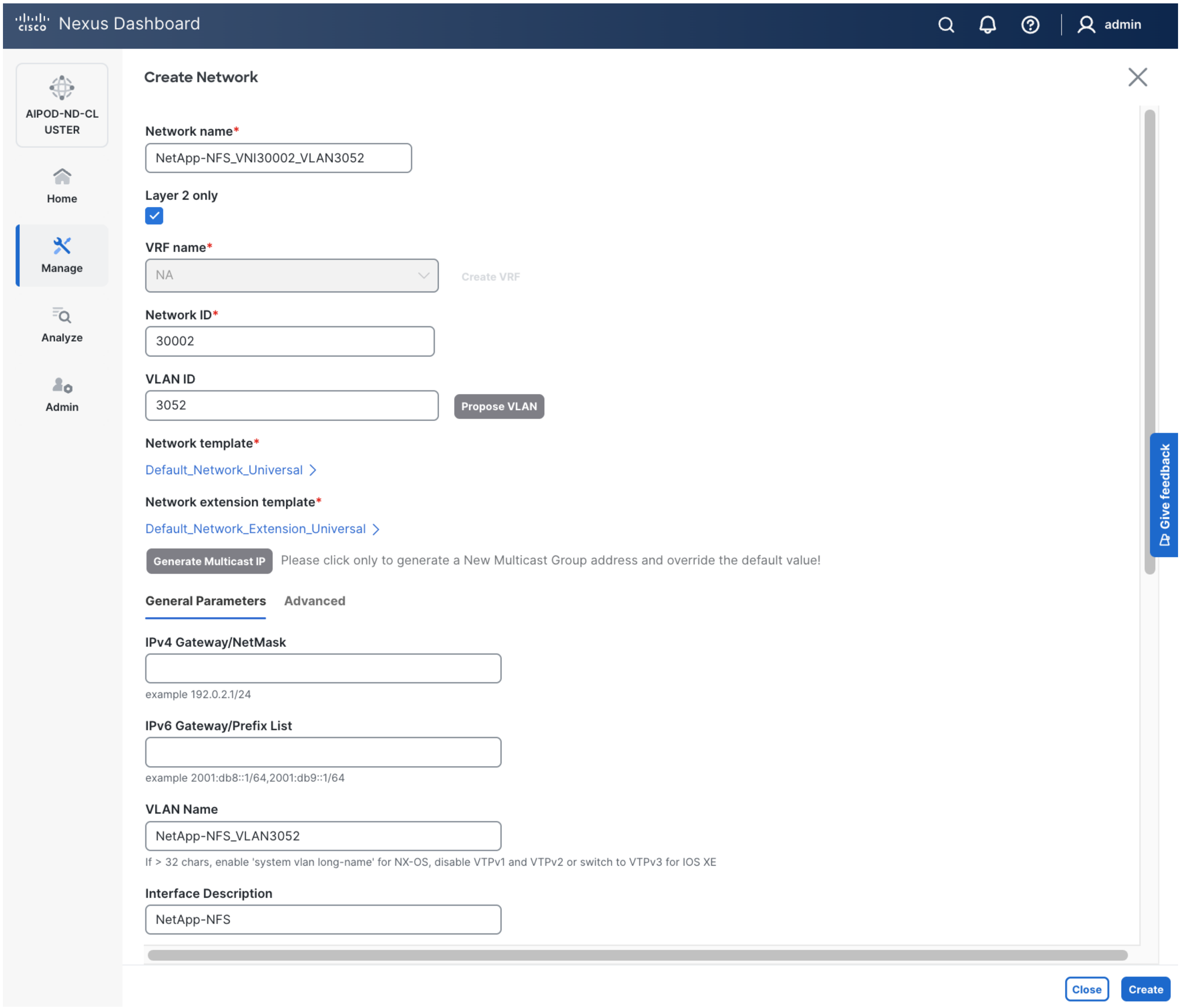
Step 4. Click the lower of the two **Actions** buttons and select **Create** from the menu.



☐	Network name	Network ID	VRF name	IPv4 gateway/pr...	IPv6 gateway/pr...	Network status	VLAN ID	VLAN na
☐	IB-MGMT_VNI30000_VLAN703	30000	FE-MGMT_VNI500(	10.115.90.126/2(		DEPLOYED	703	IB-MGMT_V
☐	NetApp-NFS_VNI30001_VLAN3051	30001	NA			DEPLOYED	3051	NetApp-NFS_VLA

Step 5. In the **Create Network** window, specify the following:

- Network name
- Enable checkbox for **Layer 2 only**.
- **Network ID** or use default.
- **VLAN ID** or click **Propose VLAN** to let system define a VLAN.
- In the General Parameters tab, specify VLAN Name and Interface Description.



Network name* NetApp-NFS_VNI30002_VLAN3052

Layer 2 only ☑

VRF name* NA

Network ID* 30002

VLAN ID 3052

Network template* Default_Network_Universal

Network extension template* Default_Network_Extension_Universal

Please click only to generate a New Multicast Group address and override the default value!

IPv4 Gateway/NetMask

example 192.0.2.1/24

IPv6 Gateway/Prefix List

example 2001:db8::1/64,2001:db9::1/64

VLAN Name NetApp-NFS_VLAN3052

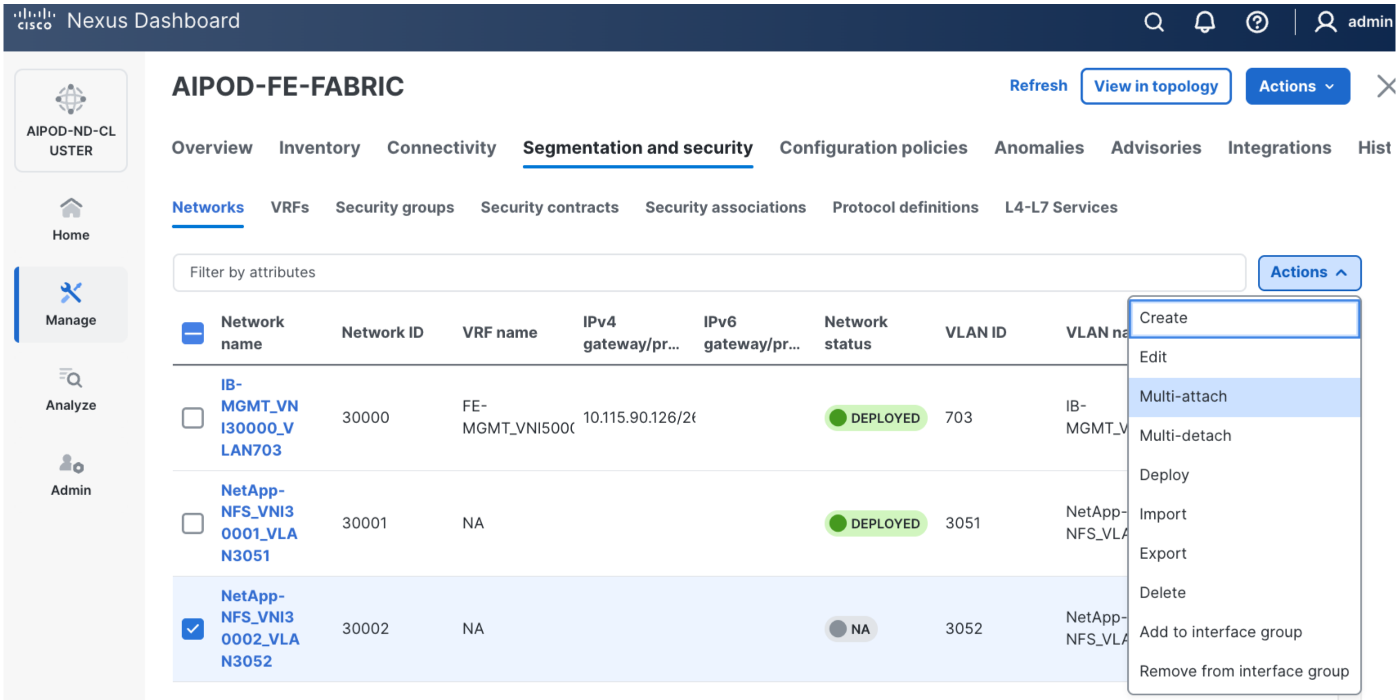
If > 32 chars, enable 'system vlan long-name' for NX-OS, disable VTPv1 and VTPv2 or switch to VTPv3 for IOS XE

Interface Description NetApp-NFS

Step 6. Click **Create** to create the second NFS Storage Data Network.

Step 7. Select the newly created network.

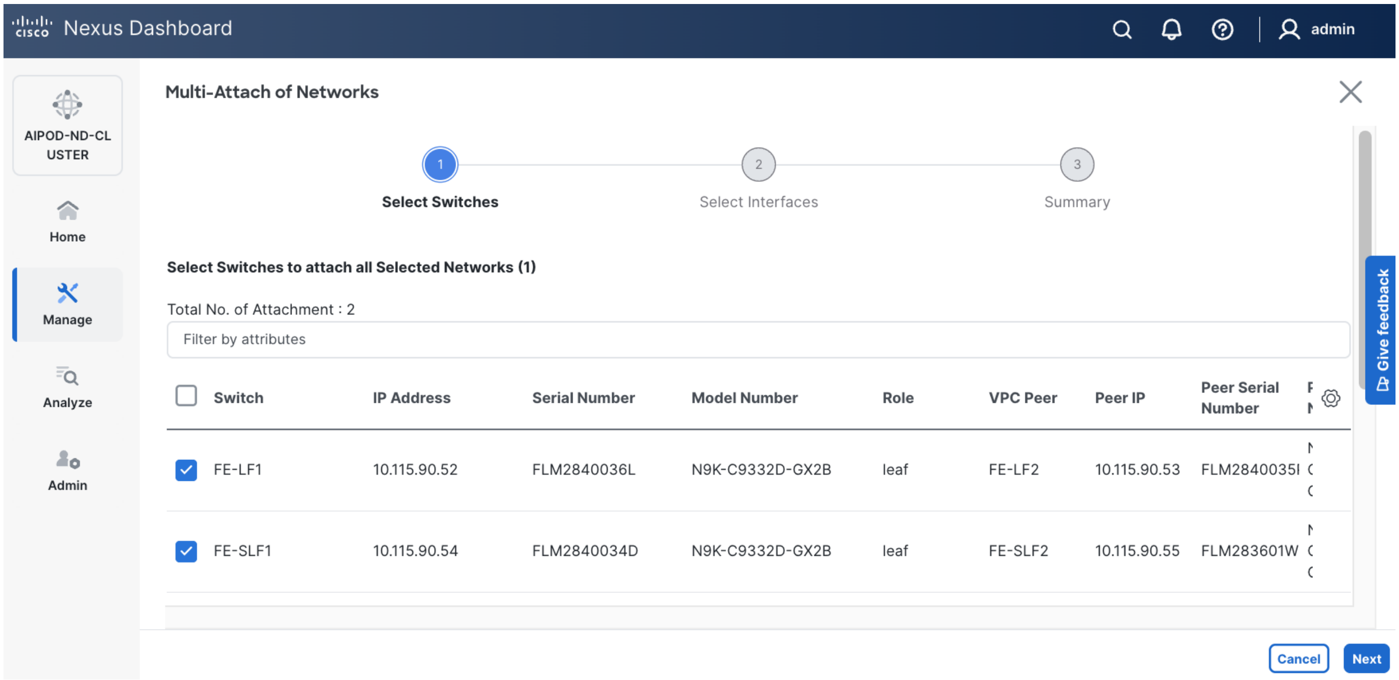
Step 8. Click the lower of the two **Actions** button and select **Multi-attach** from the list.



AIPOD-FE-FABRIC

	Network name	Network ID	VRF name	IPv4 gateway/pr...	IPv6 gateway/pr...	Network status	VLAN ID	VLAN na
□	IB-MGMT_VNI30000_VLAN703	30000	FE-MGMT_VNI500(	10.115.90.126/2(		DEPLOYED	703	IB-MGMT_V
□	NetApp-NFS_VNI30001_VLAN3051	30001	NA			DEPLOYED	3051	NetApp-NFS_VLA
☑	NetApp-NFS_VNI30002_VLAN3052	30002	NA			NA	3052	NetApp-NFS_VLA

Step 9. Select the compute and storage Leaf switch pairs.



Multi-Attach of Networks

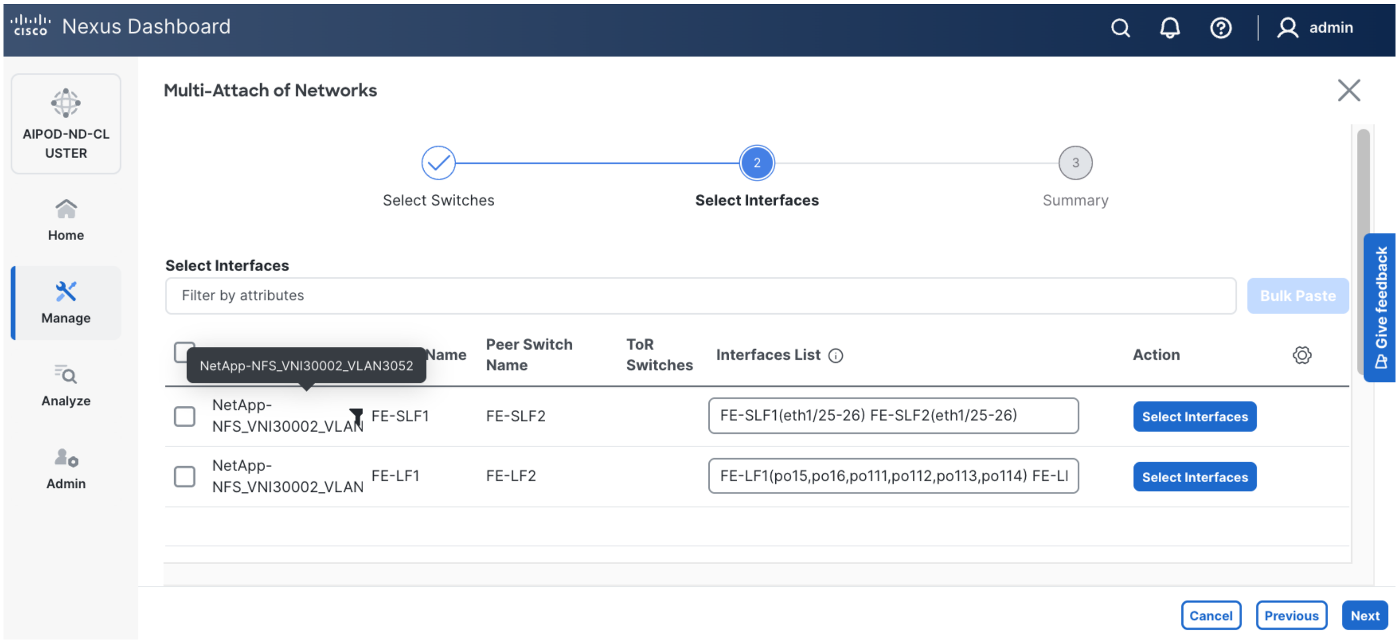
Select Switches to attach all Selected Networks (1)

Total No. of Attachment : 2

□	Switch	IP Address	Serial Number	Model Number	Role	VPC Peer	Peer IP	Peer Serial Number
☑	FE-LF1	10.115.90.52	FLM2840036L	N9K-C9332D-GX2B	leaf	FE-LF2	10.115.90.53	FLM2840035I
☑	FE-SLF1	10.115.90.54	FLM2840034D	N9K-C9332D-GX2B	leaf	FE-SLF2	10.115.90.55	FLM283601W

Step 10. Click **Next.**

Step 11. Select each switch pair in the list and click **Select interfaces** on the right to deploy this network as a trunked VLAN on the selected interfaces. This should include the ports on the compute and storage leaf pair that connect to UCS nodes and NetApp storage, respectively. Additional interfaces can be added later as needed.



Multi-Attach of Networks

Select Switches — Select Interfaces — Summary

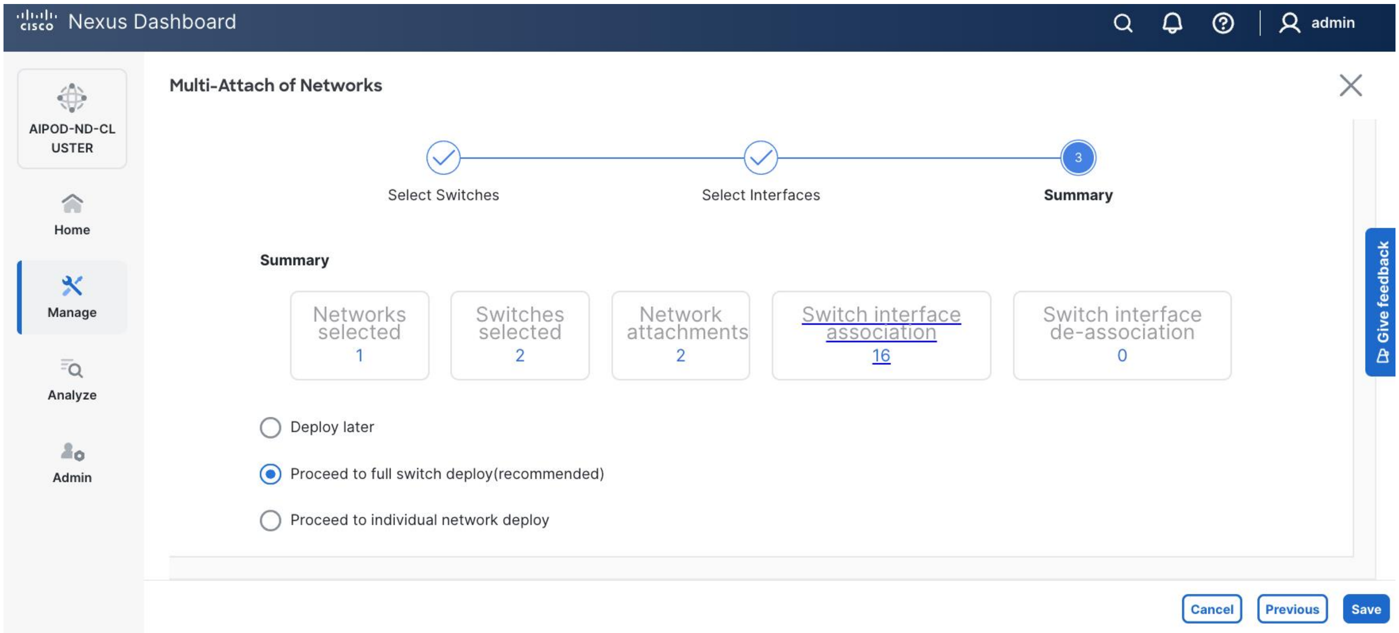
Select Interfaces

Filter by attributes | Bulk Paste

□		Name	Peer Switch Name	ToR Switches	Interfaces List	Action
□	NetApp-NFS_VNI30002_VLAN	FE-SLF1	FE-SLF2		FE-SLF1(eth1/25-26) FE-SLF2(eth1/25-26)	Select Interfaces
□	NetApp-NFS_VNI30002_VLAN	FE-LF1	FE-LF2		FE-LF1(po15,po16,po111,po112,po113,po114) FE-LI	Select Interfaces

Cancel | Previous | Next

Step 12. Click **Next.**



Multi-Attach of Networks

Select Switches — Select Interfaces — Summary

Summary

Networks selected	Switches selected	Network attachments	Switch interface association	Switch interface de-association
1	2	2	16	0

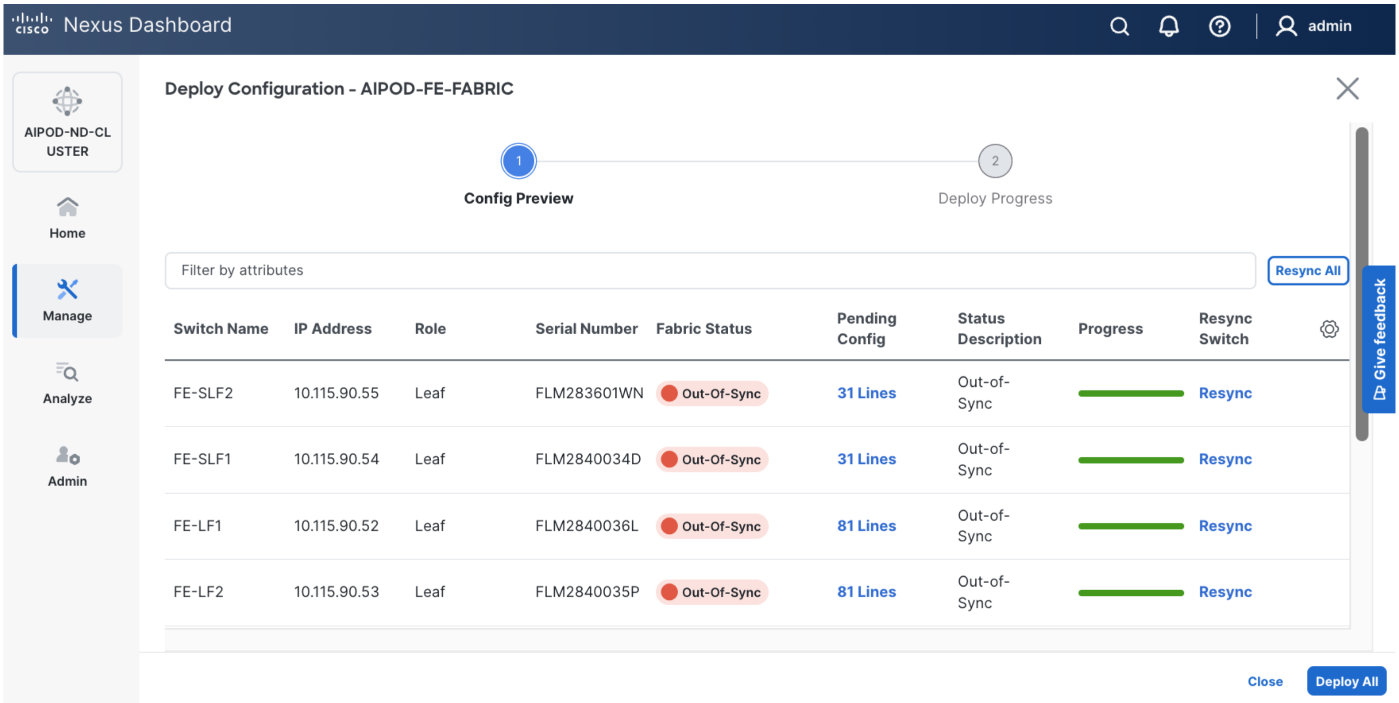
○ Deploy later

● Proceed to full switch deploy(recommended)

○ Proceed to individual network deploy

Cancel | Previous | Save

Step 13. Click **Save.**

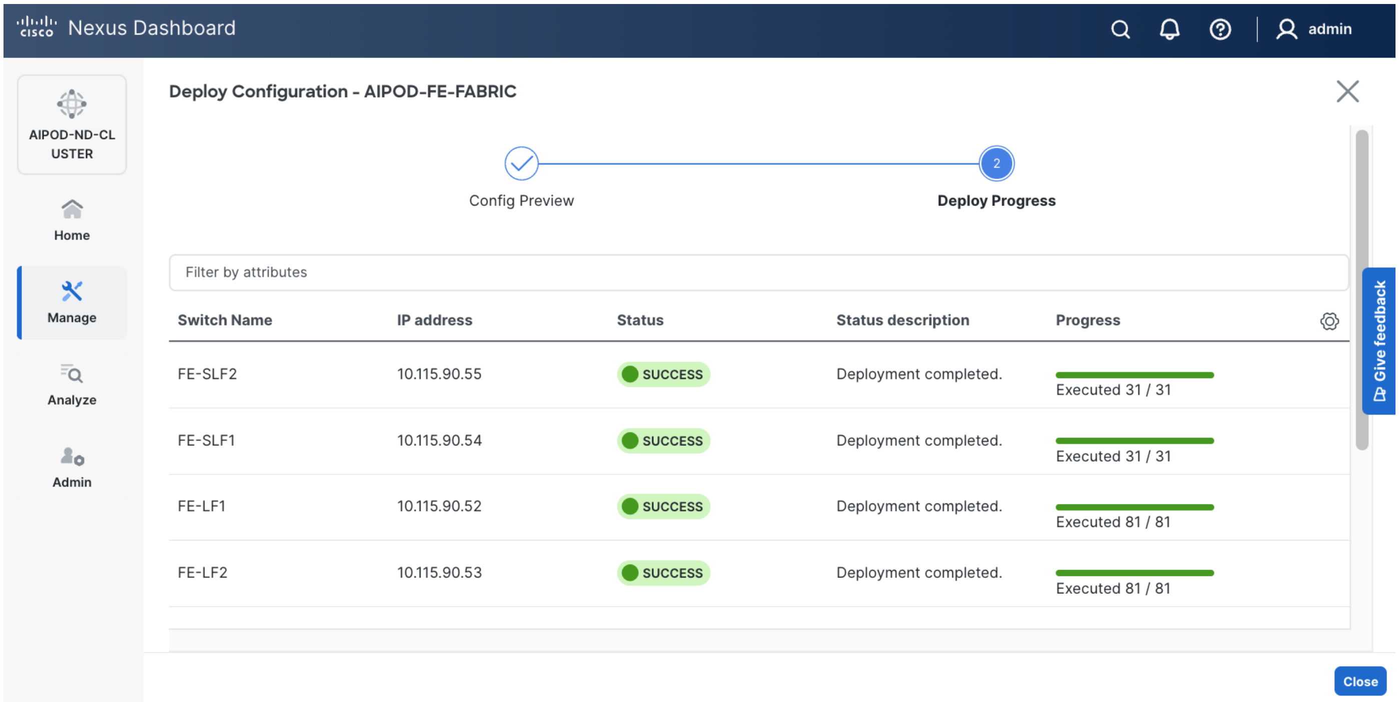


Deploy Configuration - AIPOD-FE-FABRIC

Switch Name	IP Address	Role	Serial Number	Fabric Status	Pending Config	Status Description	Progress	Resync Switch
FE-SLF2	10.115.90.55	Leaf	FLM283601WN	● Out-Of-Sync	31 Lines	Out-of-Sync	🟩	Resync
FE-SLF1	10.115.90.54	Leaf	FLM2840034D	● Out-Of-Sync	31 Lines	Out-of-Sync	🟩	Resync
FE-LF1	10.115.90.52	Leaf	FLM2840036L	● Out-Of-Sync	81 Lines	Out-of-Sync	🟩	Resync
FE-LF2	10.115.90.53	Leaf	FLM2840035P	● Out-Of-Sync	81 Lines	Out-of-Sync	🟩	Resync

Step 14. Click **Pending Config** to see the configuration being deployed. The **pending** configuration on one leaf switch is provided as a reference at the end.

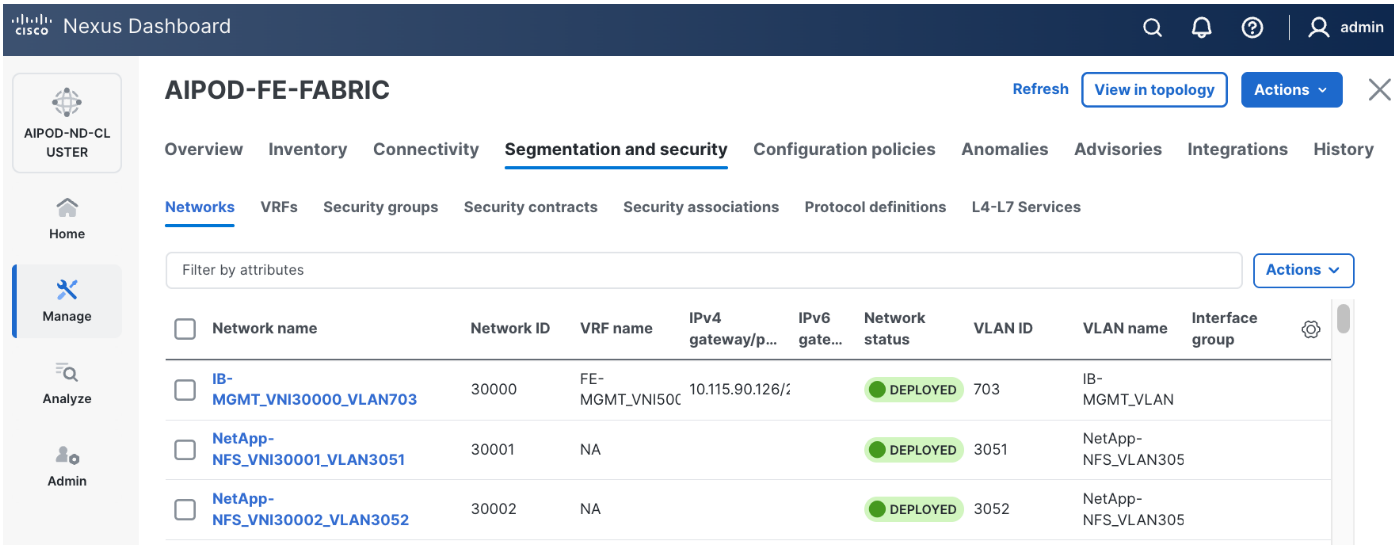
Step 15. Click **Deploy All**.



Deploy Configuration - AIPOD-FE-FABRIC

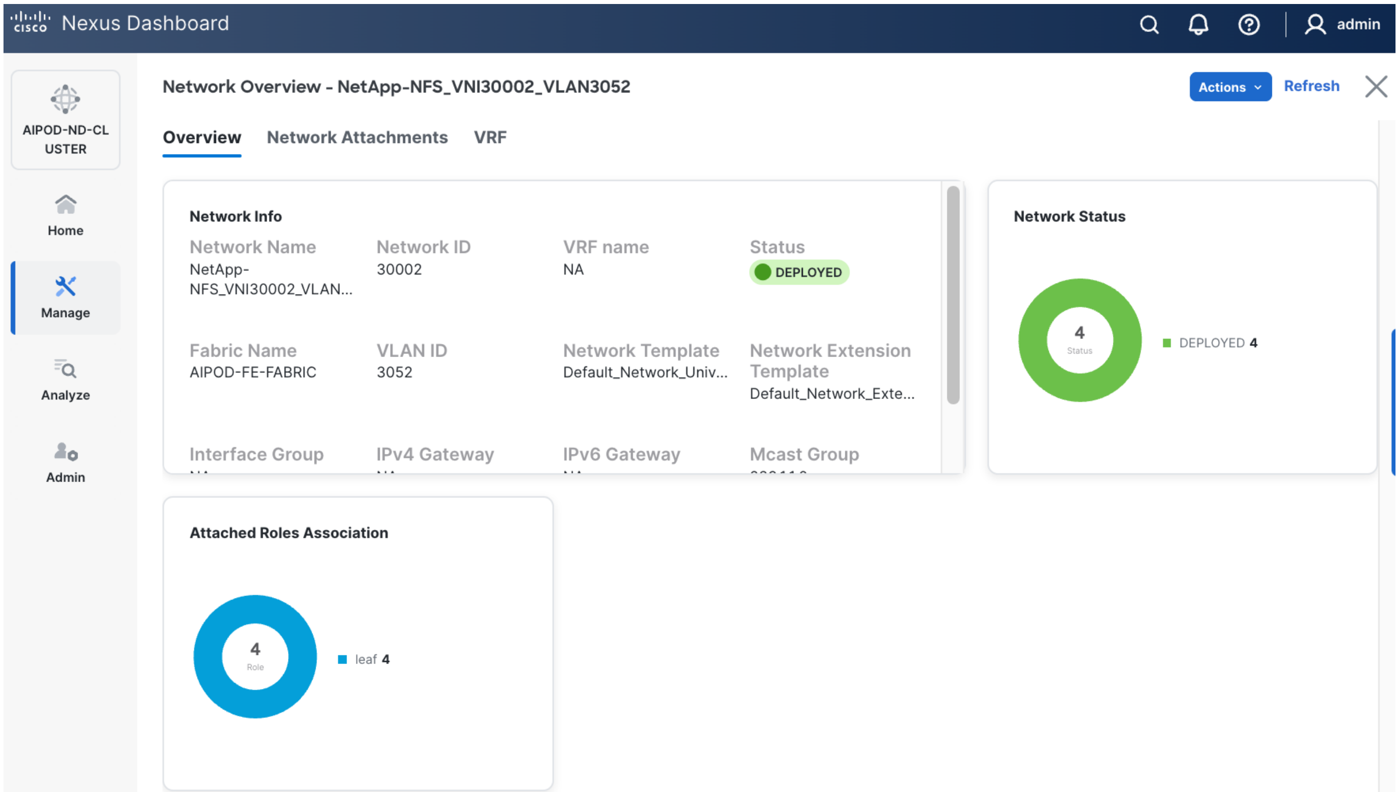
Switch Name	IP address	Status	Status description	Progress
FE-SLF2	10.115.90.55	● SUCCESS	Deployment completed.	Executed 31 / 31
FE-SLF1	10.115.90.54	● SUCCESS	Deployment completed.	Executed 31 / 31
FE-LF1	10.115.90.52	● SUCCESS	Deployment completed.	Executed 81 / 81
FE-LF2	10.115.90.53	● SUCCESS	Deployment completed.	Executed 81 / 81

Step 16. Click **Close**.



□	Network name	Network ID	VRF name	IPv4 gateway/p...	IPv6 gate...	Network status	VLAN ID	VLAN name	Interface group
□	IB-MGMT_VNI30000_VLAN703	30000	FE-MGMT_VNI50C	10.115.90.126/2		● DEPLOYED	703	IB-MGMT_VLAN	
□	NetApp-NFS_VNI30001_VLAN3051	30001	NA			● DEPLOYED	3051	NetApp-NFS_VLAN305	
□	NetApp-NFS_VNI30002_VLAN3052	30002	NA			● DEPLOYED	3052	NetApp-NFS_VLAN305	

Step 17. Click the **Network name** to verify that the network was successfully **deployed** on the relevant switches and interfaces.



Network Overview - NetApp-NFS_VNI30002_VLAN3052

Network Info

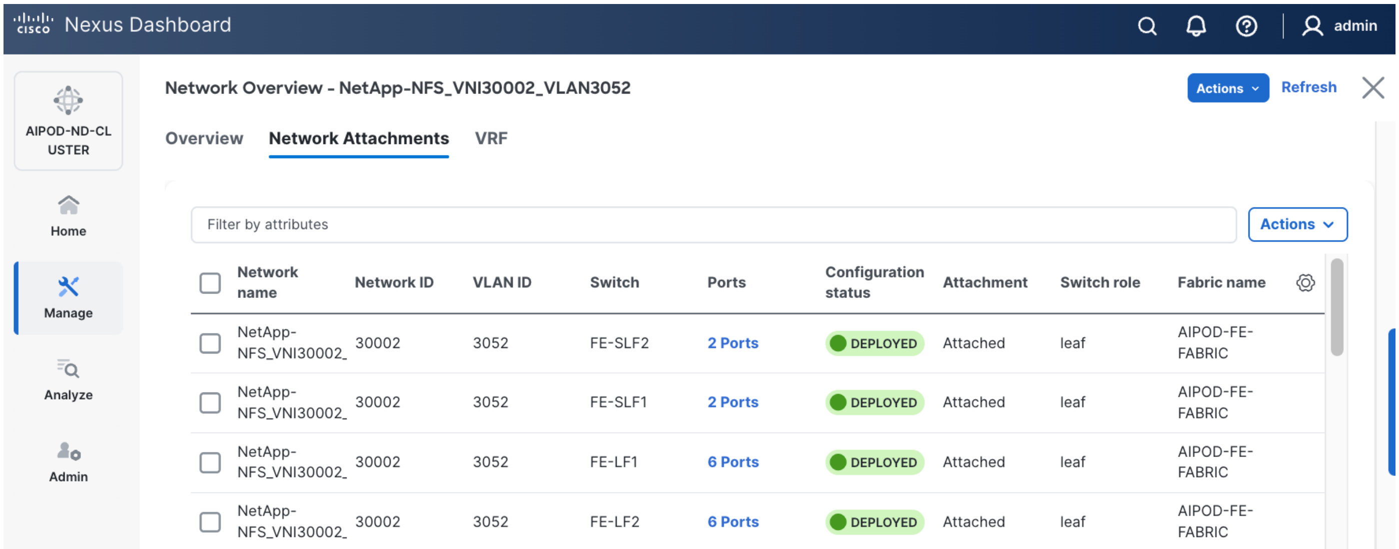
Network Name	Network ID	VRF name	Status
NetApp-NFS_VNI30002_VLAN...	30002	NA	● DEPLOYED

Fabric Name	VLAN ID	Network Template	Network Extension Template
AIPOD-FE-FABRIC	3052	Default_Network_Univ...	Default_Network_Exte...

Interface Group	IPv4 Gateway	IPv6 Gateway	Mcast Group

Network Status

Attached Roles Association



Network Overview - NetApp-NFS_VNI30002_VLAN3052

☐	Network name	Network ID	VLAN ID	Switch	Ports	Configuration status	Attachment	Switch role	Fabric name
☐	NetApp-NFS_VNI30002_	30002	3052	FE-SLF2	2 Ports	DEPLOYED	Attached	leaf	AIPOD-FE-FABRIC
☐	NetApp-NFS_VNI30002_	30002	3052	FE-SLF1	2 Ports	DEPLOYED	Attached	leaf	AIPOD-FE-FABRIC
☐	NetApp-NFS_VNI30002_	30002	3052	FE-LF1	6 Ports	DEPLOYED	Attached	leaf	AIPOD-FE-FABRIC
☐	NetApp-NFS_VNI30002_	30002	3052	FE-LF2	6 Ports	DEPLOYED	Attached	leaf	AIPOD-FE-FABRIC

Step 18. The configuration deployed on one compute leaf switch is provided below as a reference:

- **Storage** Leaf

```
interface ethernet1/25
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree port type edge trunk
  no shutdown
  switchport trunk allowed vlan 703,3051-3052
configure terminal
interface ethernet1/26
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree port type edge trunk
  no shutdown
  switchport trunk allowed vlan 703,3051-3052
configure terminal
vlan 3052
  vn-segment 30002
  name NetApp-NFS_VLAN3052
configure terminal
interface nve1
  member vni 30002
    mcast-group 239.1.1.0
configure terminal
configure terminal
evpn
  vni 30002 l2
    rd auto
    route-target import auto
    route-target export auto
configure terminal
```

- **Compute** Leaf

```
 interface port-channel111
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  switchport trunk native vlan 2
  description PC-111 to AI-POD: C885A-1
  no shutdown
  switchport trunk allowed vlan 703,3051-3052
configure terminal
interface port-channel112
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  switchport trunk native vlan 2
  description PC-112 to AI POD: C885A-2
  no shutdown
  switchport trunk allowed vlan 703,3051-3052
configure terminal
interface port-channel113
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  switchport trunk native vlan 2
  description PC-113 to AI POD: C885A-3
  no shutdown
  switchport trunk allowed vlan 703,3051-3052
configure terminal
interface port-channel114
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  switchport trunk native vlan 2
  description PC-114 to AI POD: C885A-4
  no shutdown
  switchport trunk allowed vlan 703,3051-3052
configure terminal
```

```
interface port-channel15
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  switchport trunk native vlan 2
  description To UCS X-Series Direct - A
  no shutdown
  switchport trunk allowed vlan 703,3051-3052
configure terminal
interface port-channel16
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  switchport trunk native vlan 2
  description To UCS X-Series Direct - B
  no shutdown
  switchport trunk allowed vlan 703,3051-3052
configure terminal
vlan 3052
  vn-segment 30002
  name NetApp-NFS_VLAN3052
configure terminal
interface nve1
  member vni 30002
    mcast-group 239.1.1.0
configure terminal
configure terminal
evpn
  vni 30002 l2
    rd auto
    route-target import auto
    route-target export auto
configure terminal
```

(Ubuntu) Enable NFS Storage Data Access to BCM Node(s)

To enable NFS storage data access to BCM nodes, you will be deploying this network on the storage Leaf switch pair that connects to the BCM node.

Table 17. Setup Parameters for FE Fabric: NFS Storage Data Access Connectivity to BCM Node(s)

Parameter Type	Parameter Name | Value	Parameter Type
IB-MGMT Network		
Name	NetApp-NFS_VN30001_VLAN3051	
BCM Node		
vPC Leaf Switch Pair	FE-SLF1, FE-SLF2	

Parameter Type	Parameter Name | Value	Parameter Type
BCM Interface	Port-Channel 18	

To enable NFS storage data access to BCM node(s), follow the procedures below.

Procedure 1. Enable NFS storage data access to BCME Node

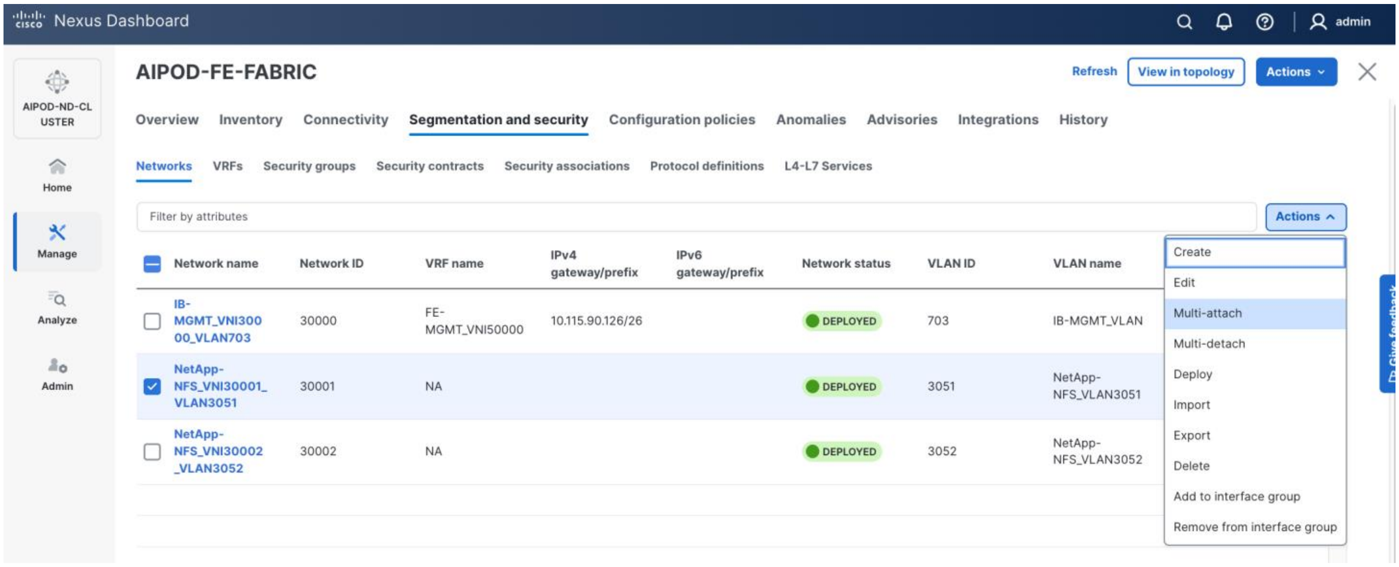
Step 1. Use a web browser to navigate to Nexus Dashboard. Use the management IP of any node in the ND cluster. Log in using **admin** account.

Step 2. From the left navigation menu, go to **Manage** > **Fabrics**.

Step 3. Select the FE fabric and go to **Segmentation and Security** > **Networks** tab.

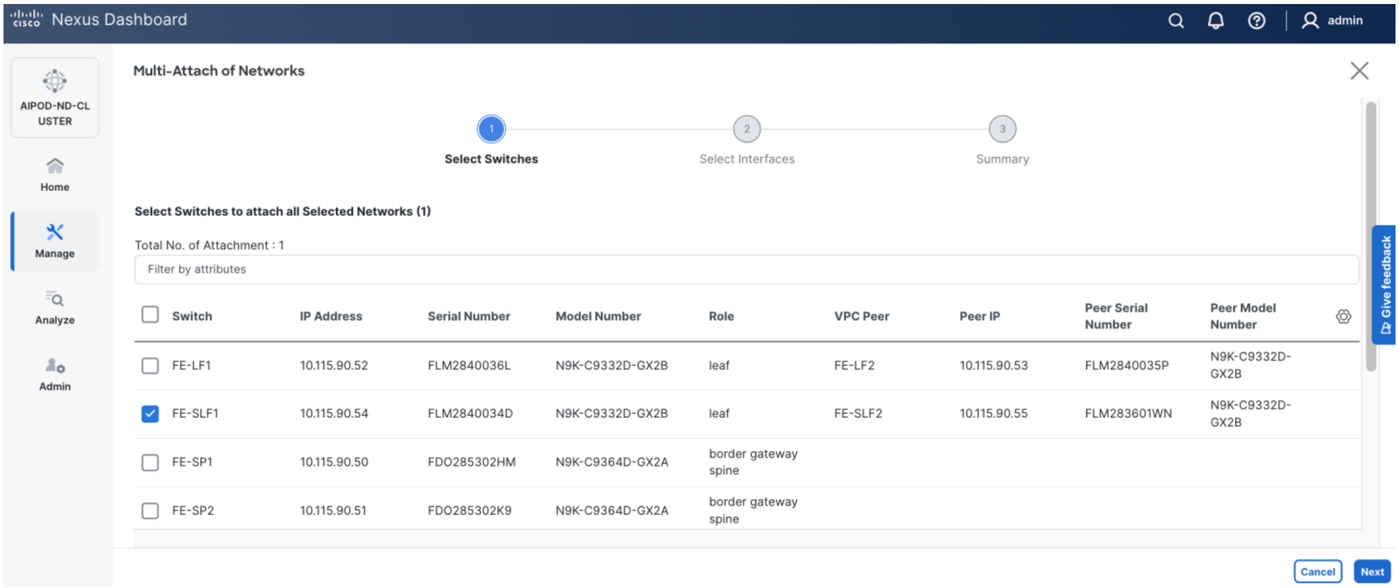
Step 4. Select the **previously** deployed NFS storage data access network from the list.

Step 5. Click the lower of the two **Actions** buttons and select **Multi-attach** from the menu.



	Network name	Network ID	VRF name	IPv4 gateway/prefix	IPv6 gateway/prefix	Network status	VLAN ID	VLAN name
□	IB-MGMT_VNI30000_VLAN703	30000	FE-MGMT_VNI50000	10.115.90.126/26		DEPLOYED	703	IB-MGMT_VLAN
☑	NetApp-NFS_VNI30001_VLAN3051	30001	NA			DEPLOYED	3051	NetApp-NFS_VLAN3051
□	NetApp-NFS_VNI30002_VLAN3052	30002	NA			DEPLOYED	3052	NetApp-NFS_VLAN3052

Step 6. Select the leaf switch pair from the list that the BCM node connects.

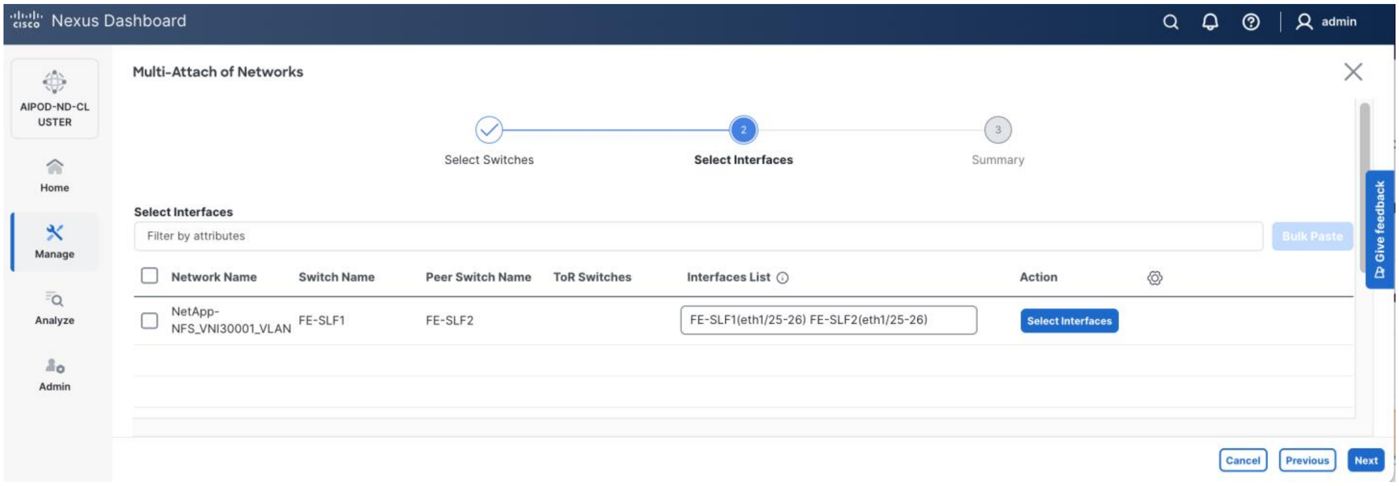


Select Switches to attach all Selected Networks (1)

Total No. of Attachment : 1

	Switch	IP Address	Serial Number	Model Number	Role	VPC Peer	Peer IP	Peer Serial Number	Peer Model Number
□	FE-LF1	10.115.90.52	FLM2840036L	N9K-C9332D-GX2B	leaf	FE-LF2	10.115.90.53	FLM2840035P	N9K-C9332D-GX2B
☑	FE-SLF1	10.115.90.54	FLM2840034D	N9K-C9332D-GX2B	leaf	FE-SLF2	10.115.90.55	FLM283601WN	N9K-C9332D-GX2B
□	FE-SP1	10.115.90.50	FDO285302HM	N9K-C9364D-GX2A	border gateway spine				
□	FE-SP2	10.115.90.51	FDO285302K9	N9K-C9364D-GX2A	border gateway spine				

Step 7. Click **Next**.



Multi-Attach of Networks

Select Switches — Select Interfaces — Summary

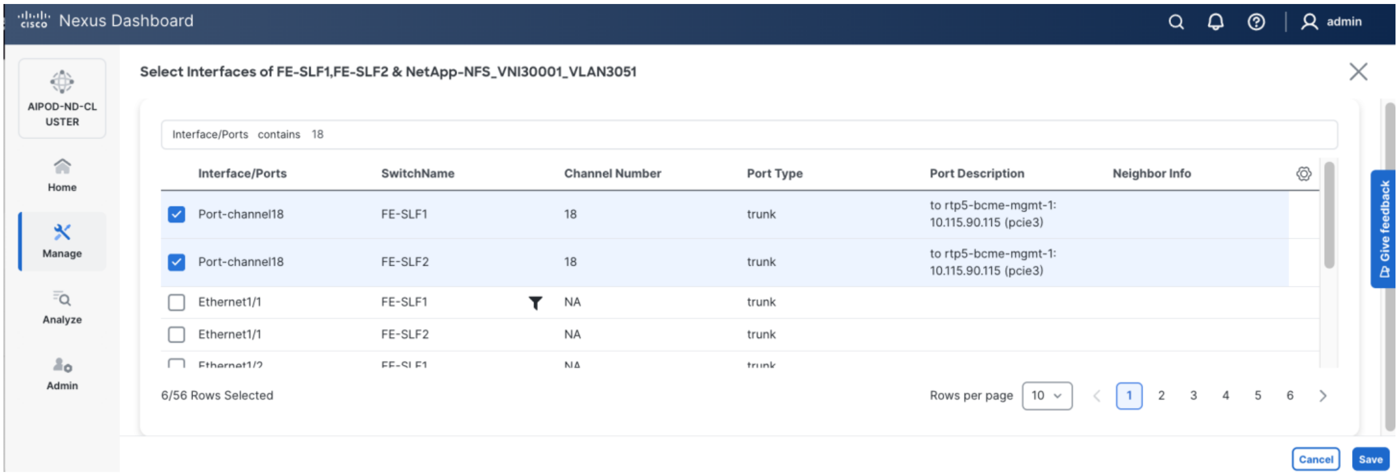
Select Interfaces

Filter by attributes

□	Network Name	Switch Name	Peer Switch Name	ToR Switches	Interfaces List	Action
□	NetApp-NFS_VNI30001_VLAN	FE-SLF1	FE-SLF2		FE-SLF1(eth1/25-26) FE-SLF2(eth1/25-26)	Select Interfaces

Cancel Previous Next

Step 8. Click **Select Interfaces** to the right of the network to **add** the interfaces that connect to the BCME node. Select the port channel on both leaf switches in the leaf pair.



Select Interfaces of FE-SLF1,FE-SLF2 & NetApp-NFS_VNI30001_VLAN3051

Interface/Ports contains 18

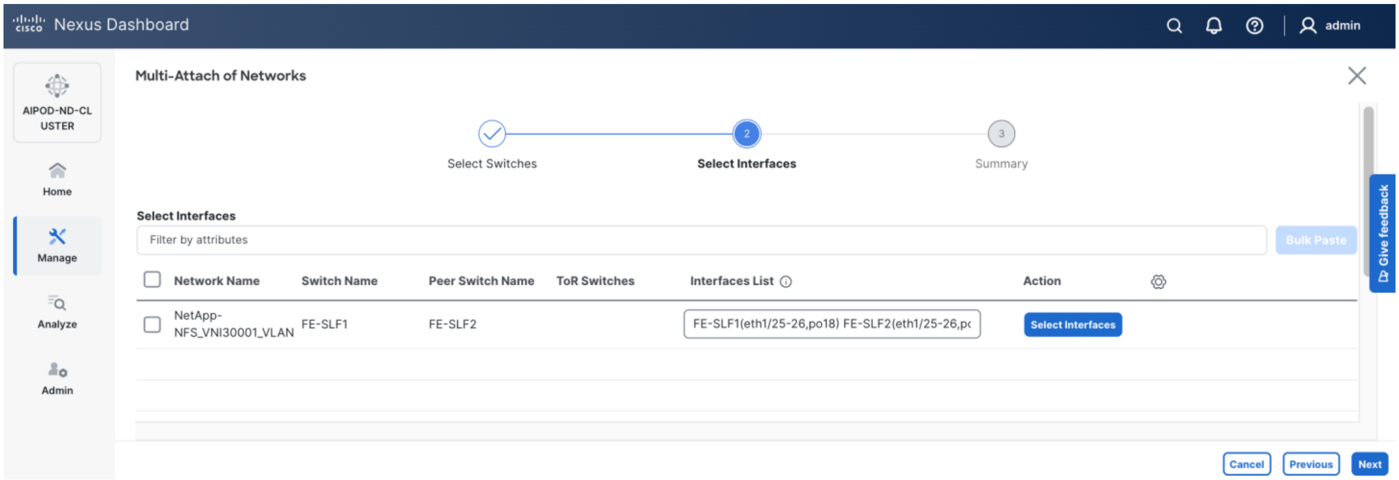
	Interface/Ports	SwitchName	Channel Number	Port Type	Port Description	Neighbor Info
☑	Port-channel18	FE-SLF1	18	trunk	to rtp5-bcme-mgmt-1: 10.115.90.115 (pcie3)	
☑	Port-channel18	FE-SLF2	18	trunk	to rtp5-bcme-mgmt-1: 10.115.90.115 (pcie3)	
□	Ethernet1/1	FE-SLF1	NA	trunk		
□	Ethernet1/1	FE-SLF2	NA	trunk		
□	Ethernet1/2	FE-SLF1	NA	trunk		

6/56 Rows Selected

Rows per page 10 &lt; 1 2 3 4 5 6 &gt;

Cancel Save

Step 9. Click **Save**.



Multi-Attach of Networks

Select Switches — Select Interfaces — Summary

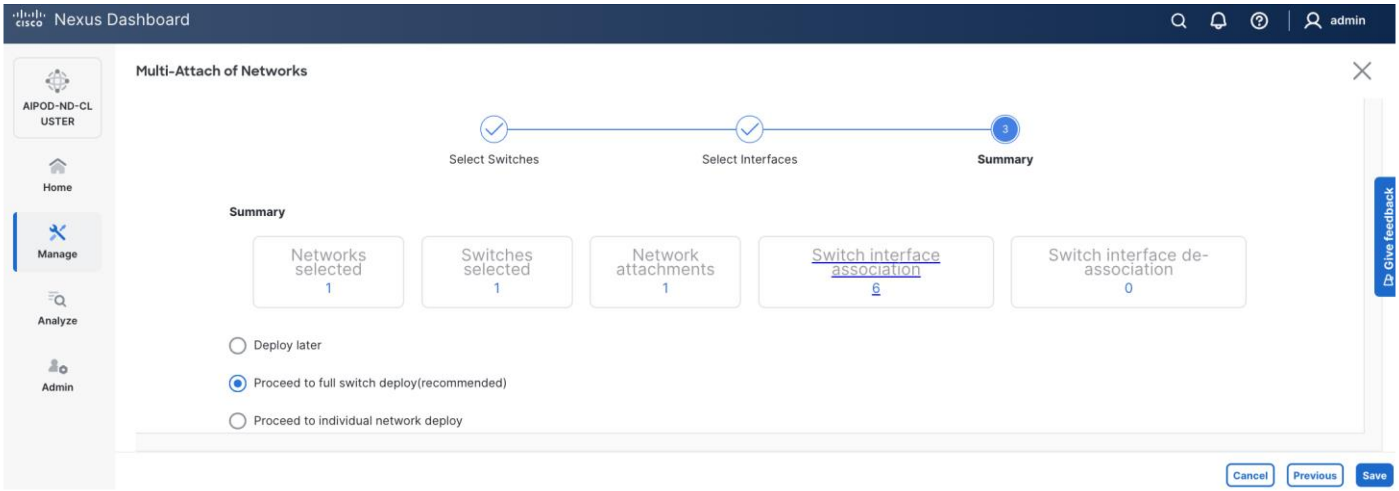
Select Interfaces

Filter by attributes

□	Network Name	Switch Name	Peer Switch Name	ToR Switches	Interfaces List	Action
□	NetApp-NFS_VNI30001_VLAN	FE-SLF1	FE-SLF2		FE-SLF1(eth1/25-26,po18) FE-SLF2(eth1/25-26,pc	Select Interfaces

Cancel Previous Next

Step 10. Click **Next**.



Multi-Attach of Networks

Summary

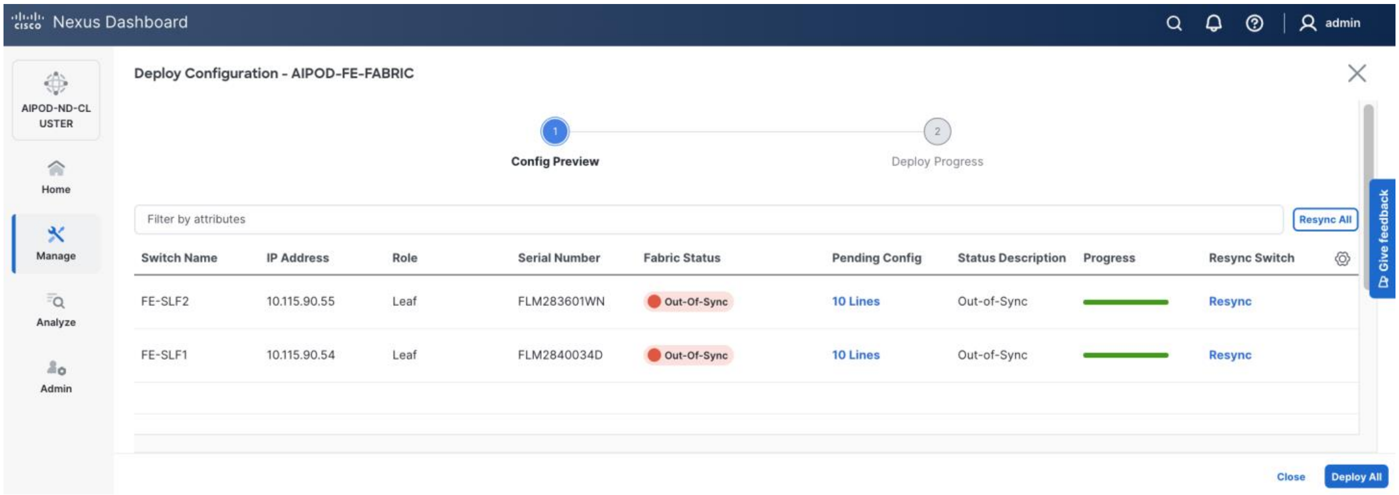
Networks selected	Switches selected	Network attachments	Switch interface association	Switch interface de-association
1	1	1	6	0

○ Deploy later

● Proceed to full switch deploy(recommended)

○ Proceed to individual network deploy

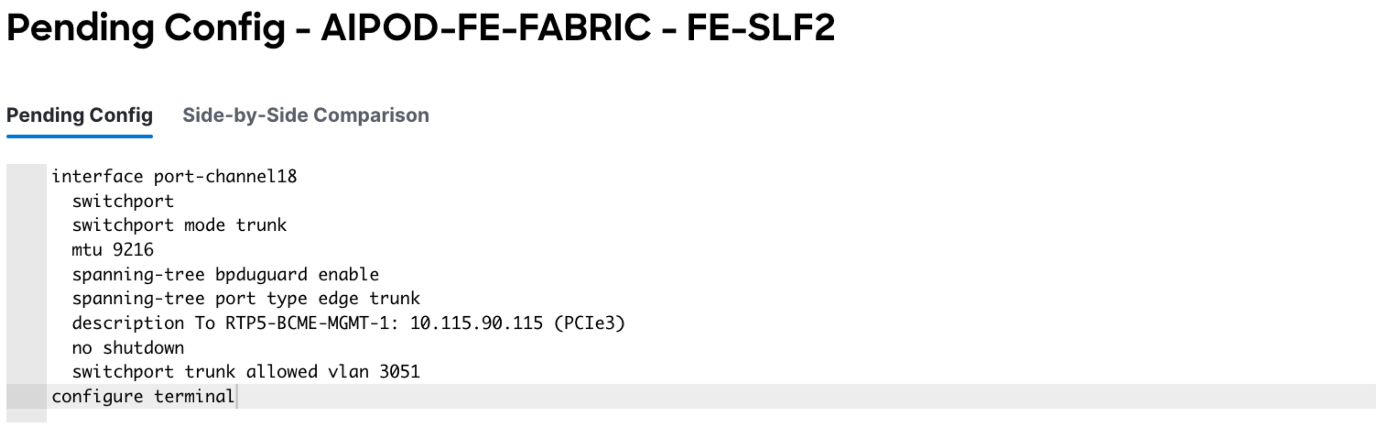
Step 11. Click **Save**.



Deploy Configuration - AIPOD-FE-FABRIC

Switch Name	IP Address	Role	Serial Number	Fabric Status	Pending Config	Status Description	Progress	Resync Switch
FE-SLF2	10.115.90.55	Leaf	FLM283601WN	🟥 Out-Of-Sync	10 Lines	Out-of-Sync	🟩	Resync
FE-SLF1	10.115.90.54	Leaf	FLM2840034D	🟥 Out-Of-Sync	10 Lines	Out-of-Sync	🟩	Resync

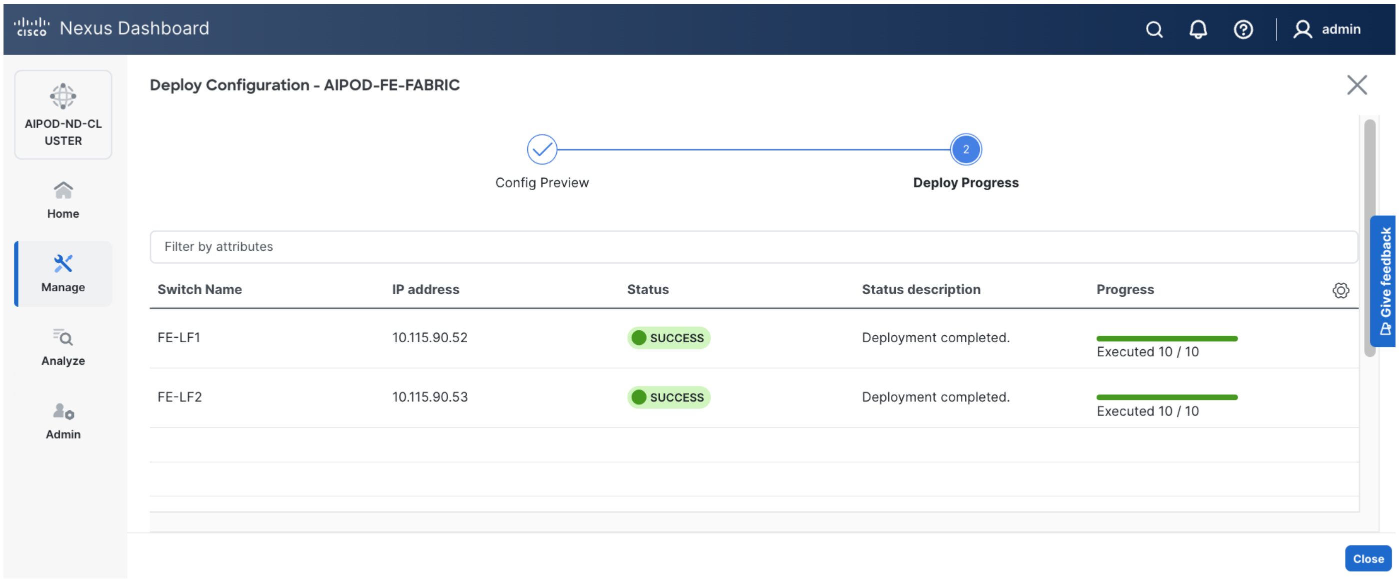
The configuration deployed on one storage leaf switch is provided below as a reference:



Pending Config - AIPOD-FE-FABRIC - FE-SLF2

```
interface port-channel18
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  description To RTP5-BCME-MGMT-1: 10.115.90.115 (PCIe3)
  no shutdown
  switchport trunk allowed vlan 3051
configure terminal
```

Step 12. Click **Deploy All**.



Deploy Configuration - AIPOD-FE-FABRIC

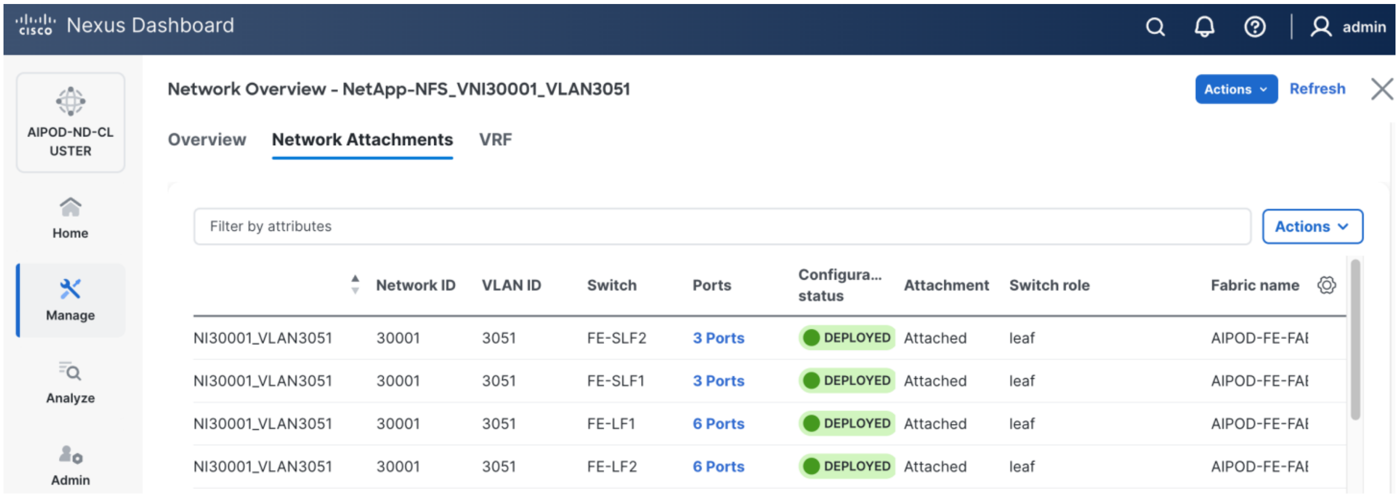
Config Preview → Deploy Progress

Filter by attributes

Switch Name	IP address	Status	Status description	Progress
FE-LF1	10.115.90.52	SUCCESS	Deployment completed.	Executed 10 / 10
FE-LF2	10.115.90.53	SUCCESS	Deployment completed.	Executed 10 / 10

Step 13. Click **Close**.

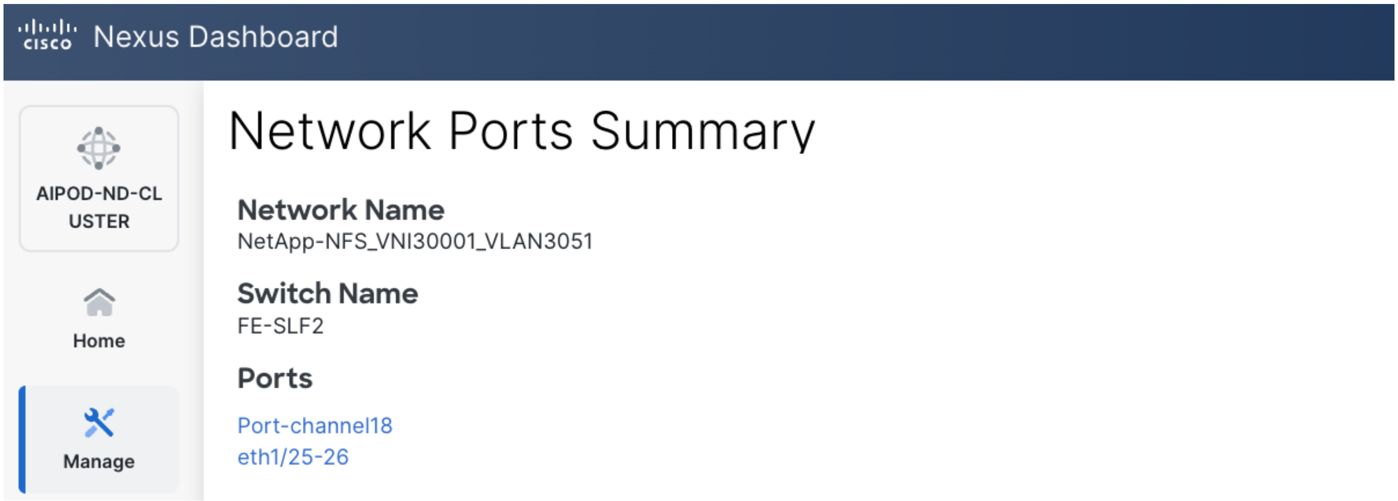
Step 14. Click the **Network name** to verify that the network was successfully **deployed** on the relevant switches and interfaces.



Network Overview - NetApp-NFS_VNI30001_VLAN3051

Filter by attributes

	Network ID	VLAN ID	Switch	Ports	Configura... status	Attachment	Switch role	Fabric name
NI30001_VLAN3051	30001	3051	FE-SLF2	3 Ports	DEPLOYED	Attached	leaf	AIPOD-FE-FAI
NI30001_VLAN3051	30001	3051	FE-SLF1	3 Ports	DEPLOYED	Attached	leaf	AIPOD-FE-FAI
NI30001_VLAN3051	30001	3051	FE-LF1	6 Ports	DEPLOYED	Attached	leaf	AIPOD-FE-FAI
NI30001_VLAN3051	30001	3051	FE-LF2	6 Ports	DEPLOYED	Attached	leaf	AIPOD-FE-FAI



Network Ports Summary

Network Name
NetApp-NFS_VNI30001_VLAN3051

Switch Name
FE-SLF2

Ports
Port-channel18
eth1/25-26

Enable QoS for FE Fabric

Table 18. Setup Parameters for FE Fabric: QoS

Parameter Type	Parameter Name | Value	Parameter Type
Modified QoS Policy		
Name	AIPOD-FE-QOS-200G	
Priority Flow Control (PFC) MTU	9216	Default = 4200
Fabric Settings		
AI QoS and Queueing Policies	Enable	Checkbox
AI QoS and Queueing Policy	AIPOD-FE-QOS-200G	Select modified policy from drop-down list
Interface Settings		
Priority Flow Control	Enable	Checkbox
QoS	Enable	Checkbox

To deploy QoS on the frontend fabric, follow the procedure below.

Procedure 1. Modify default QoS policy for FE fabric

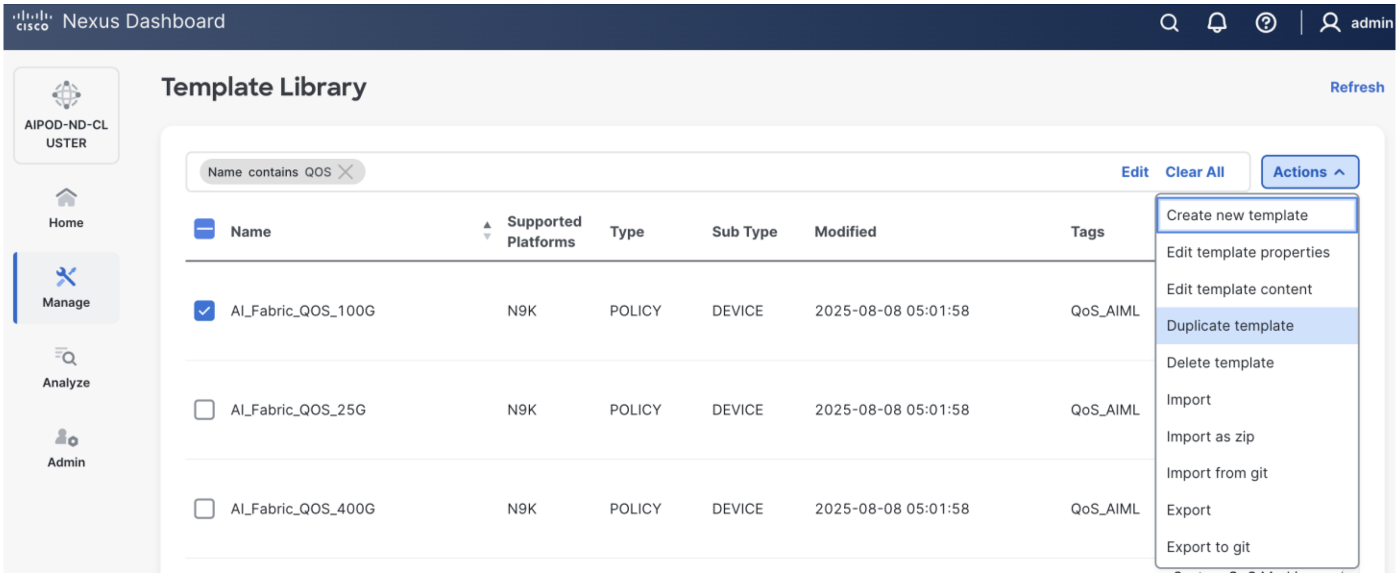
Step 1. Use a web browser to navigate to Nexus Dashboard. Use the management IP of any node in the ND cluster. Log in using admin account.

Step 2. From the left navigation menu, go to **Manage** > **Template Library**.

Step 3. Use **Filter** to view all templates that contain QOS in the name.

Step 4. Select the AI_Fabric_QoS_100G policy.

Step 5. Click the lower of the two **Actions** buttons and select **Duplicate template** from the menu.

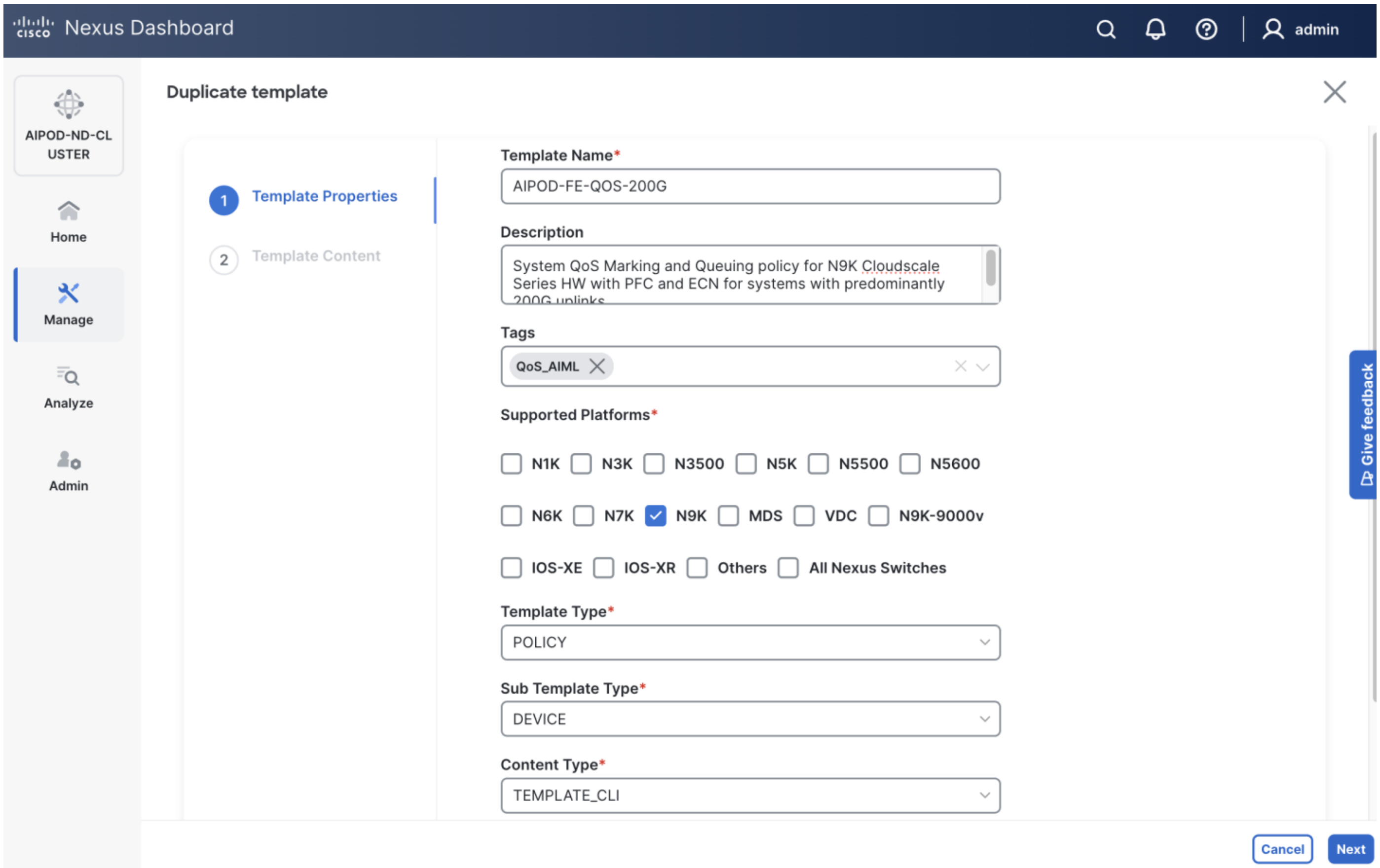


Template Library

Name contains QOS

	Name	Supported Platforms	Type	Sub Type	Modified	Tags
☑	AI_Fabric_QOS_100G	N9K	POLICY	DEVICE	2025-08-08 05:01:58	QoS_AIML
□	AI_Fabric_QOS_25G	N9K	POLICY	DEVICE	2025-08-08 05:01:58	QoS_AIML
□	AI_Fabric_QOS_400G	N9K	POLICY	DEVICE	2025-08-08 05:01:58	QoS_AIML

Step 6. For **Template Properties**, specify a **Template Name** for the new template. Adjust the **Description** as needed.



Template Name* AIPOD-FE-QOS-200G

Description: System QoS Marking and Queuing policy for N9K Cloudscale Series HW with PFC and ECN for systems with predominantly 200G uplinks

Tags: QoS_AIML

Supported Platforms*

□ N1K □ N3K □ N3500 □ N5K □ N5500 □ N5600

□ N6K □ N7K ☑ N9K □ MDS □ VDC □ N9K-9000v

□ IOS-XE □ IOS-XR □ Others □ All Nexus Switches

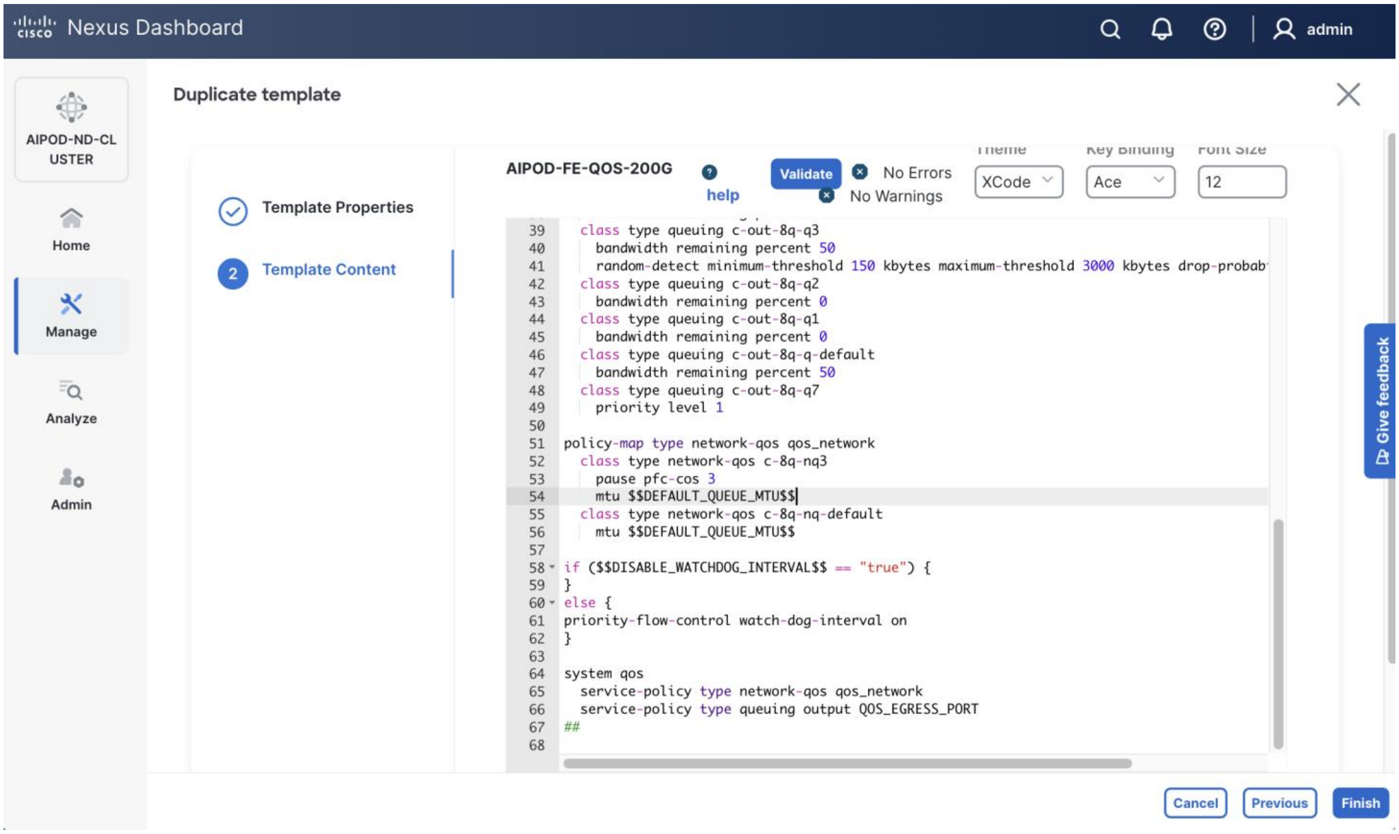
Template Type* POLICY

Sub Template Type* DEVICE

Content Type* TEMPLATE_CLI

Step 7. Click **Next**.

Step 8. For **Template Content**, scroll down to **policy-map type network-qos qos_network**, and change the MTU for PFC from **4200** to default of 9216 as shown.



AIPOD-FE-QOS-200G

No Errors

No Warnings

Theme: XCode

Key Binding: Ace

Font Size: 12

```
  class type queuing c-out-8q-q3
    bandwidth remaining percent 50
    random-detect minimum-threshold 150 kbytes maximum-threshold 3000 kbytes drop-probab
  class type queuing c-out-8q-q2
    bandwidth remaining percent 0
  class type queuing c-out-8q-q1
    bandwidth remaining percent 0
  class type queuing c-out-8q-q-default
    bandwidth remaining percent 50
  class type queuing c-out-8q-q7
    priority level 1

policy-map type network-qos qos_network
  class type network-qos c-8q-nq3
    pause pfc-cos 3
    mtu $$DEFAULT_QUEUE_MTU$$
  class type network-qos c-8q-nq-default
    mtu $$DEFAULT_QUEUE_MTU$$

if ($$DISABLE_WATCHDOG_INTERVAL$$ == "true") {
}
else {
priority-flow-control watch-dog-interval on
}

system qos
  service-policy type network-qos qos_network
  service-policy type queuing output QOS_EGRESS_PORT
##

```

Step 9. Click **Finish**.

Procedure 2. Deploy modified QoS policy in Frontend Fabric

Step 1. Use a web browser to navigate to Nexus Dashboard. Use the management IP of any node in the ND cluster. Log in using admin account.

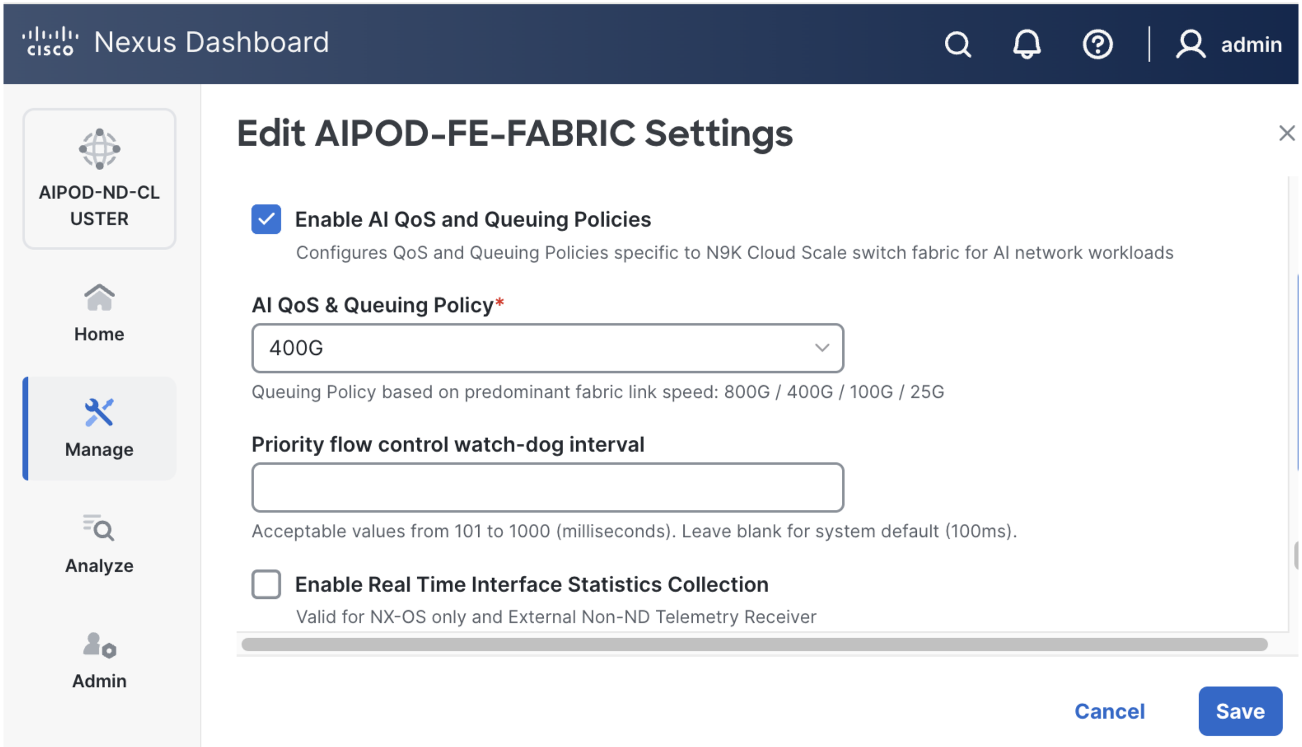
Step 2. From the left navigation menu, go to **Manage** > **Fabrics**.

Step 3. Select the **FE fabric**.

Step 4. Click the higher of the two **Actions** buttons and select **Edit fabric settings**.

Step 5. Go to **Fabric management** > **Advanced**.

Step 6. Scroll down and enable the checkbox for **Enable AI QoS and Queuing Policies**.



Edit AIPOD-FE-FABRIC Settings

☑ **Enable AI QoS and Queuing Policies**

Configures QoS and Queuing Policies specific to N9K Cloud Scale switch fabric for AI network workloads

AI QoS & Queuing Policy*

400G

Queuing Policy based on predominant fabric link speed: 800G / 400G / 100G / 25G

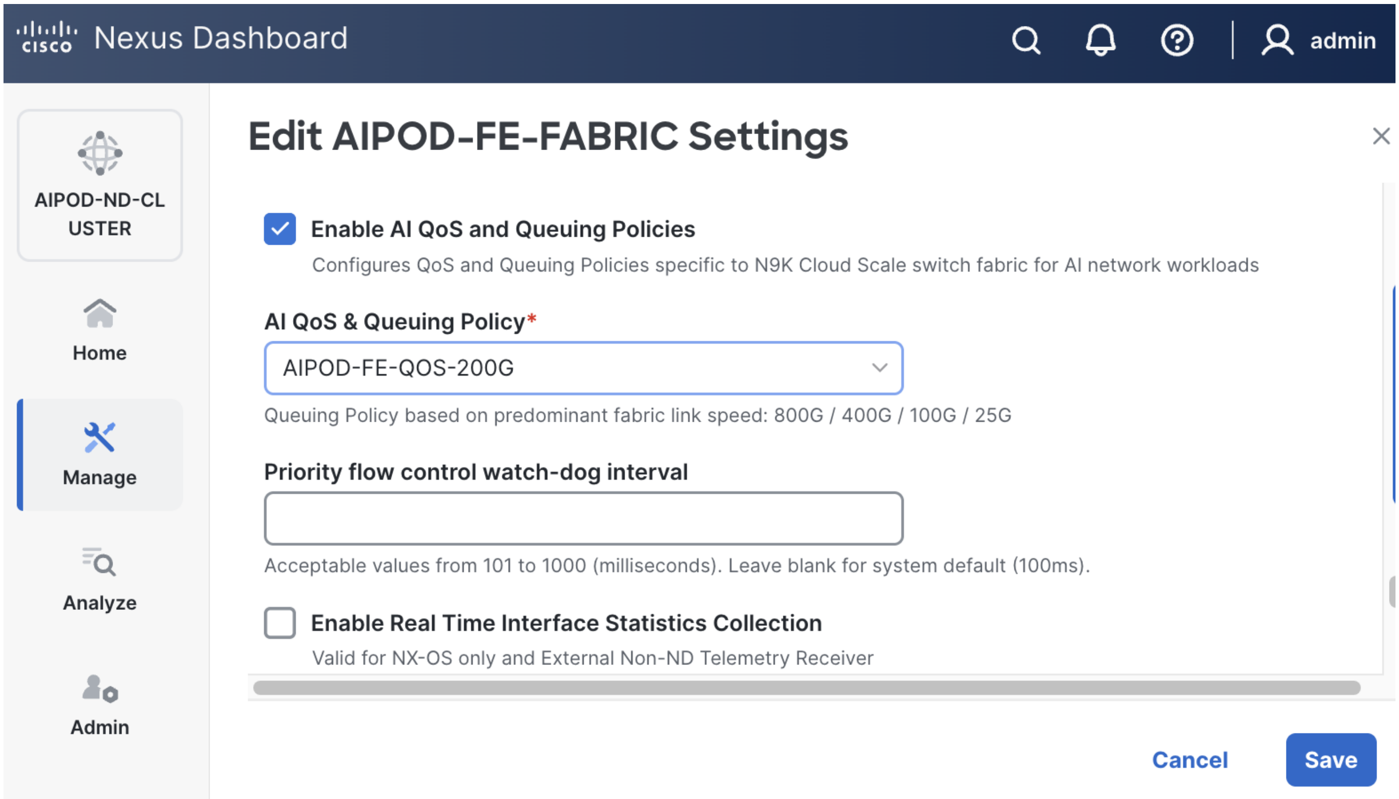
Priority flow control watch-dog interval

Acceptable values from 101 to 1000 (milliseconds). Leave blank for system default (100ms).

☐ **Enable Real Time Interface Statistics Collection**

Valid for NX-OS only and External Non-ND Telemetry Receiver

Step 7. For AI QoS & Queuing Policy, select the modified QoS policy from the drop-down list.



Edit AIPOD-FE-FABRIC Settings

☑ **Enable AI QoS and Queuing Policies**

Configures QoS and Queuing Policies specific to N9K Cloud Scale switch fabric for AI network workloads

AI QoS & Queuing Policy*

AIPOD-FE-QOS-200G

Queuing Policy based on predominant fabric link speed: 800G / 400G / 100G / 25G

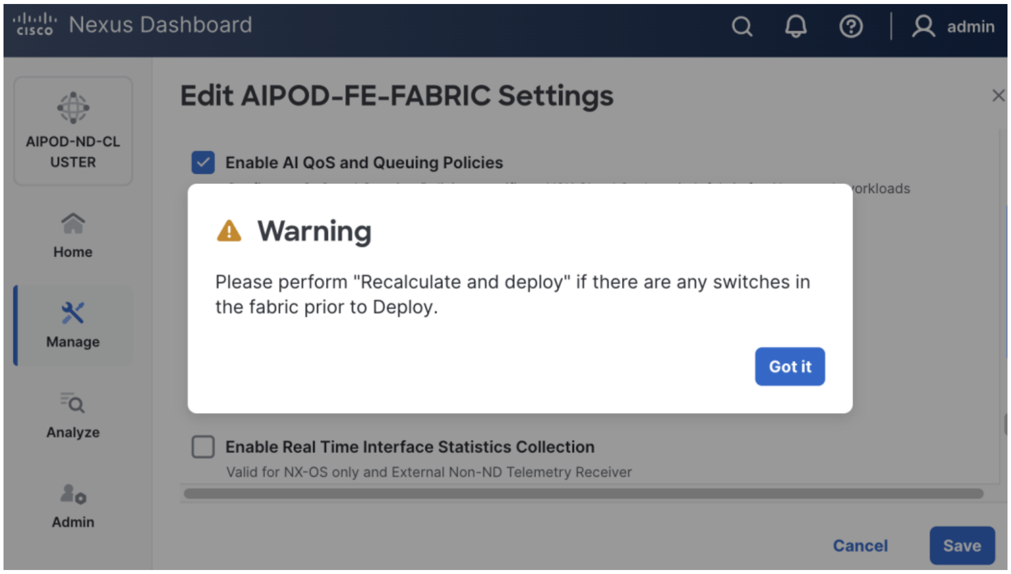
Priority flow control watch-dog interval

Acceptable values from 101 to 1000 (milliseconds). Leave blank for system default (100ms).

☐ **Enable Real Time Interface Statistics Collection**

Valid for NX-OS only and External Non-ND Telemetry Receiver

Step 8. Click **Save**.



Edit AIPOD-FE-FABRIC Settings

☑ Enable AI QoS and Queuing Policies

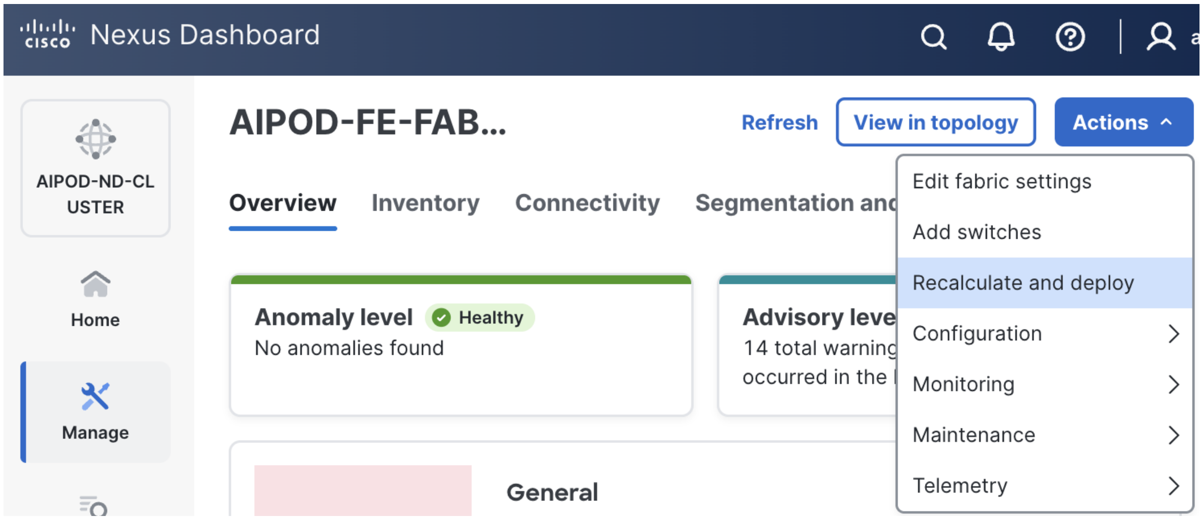
Warning

Please perform "Recalculate and deploy" if there are any switches in the fabric prior to Deploy.

□ Enable Real Time Interface Statistics Collection

Valid for NX-OS only and External Non-ND Telemetry Receiver

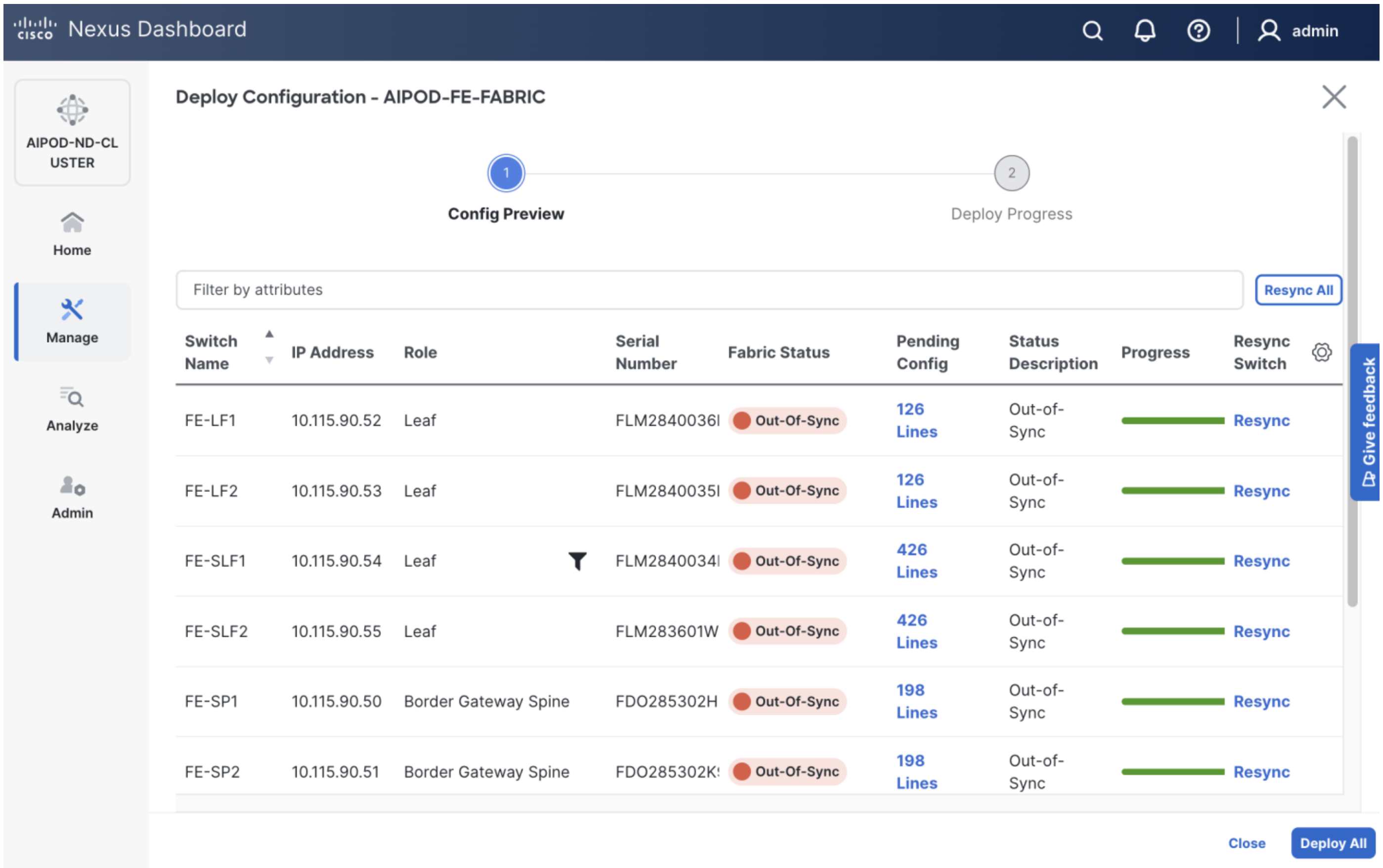
Step 9. In the pop-up window, review warning and click **Got It**.



Anomaly level Healthy
No anomalies found

Advisory leve
14 total warning
occurred in the l

Step 10. Click the higher of the two **Actions** buttons and select **Recalculate and deploy** from the menu.



Deploy Configuration - AIPOD-FE-FABRIC

Filter by attributes

Resync All

Switch Name	IP Address	Role	Serial Number	Fabric Status	Pending Config	Status Description	Progress	Resync Switch
FE-LF1	10.115.90.52	Leaf	FLM2840036I	Out-Of-Sync	126 Lines	Out-of-Sync		Resync
FE-LF2	10.115.90.53	Leaf	FLM2840035I	Out-Of-Sync	126 Lines	Out-of-Sync		Resync
FE-SLF1	10.115.90.54	Leaf	FLM2840034I	Out-Of-Sync	426 Lines	Out-of-Sync		Resync
FE-SLF2	10.115.90.55	Leaf	FLM283601W	Out-Of-Sync	426 Lines	Out-of-Sync		Resync
FE-SP1	10.115.90.50	Border Gateway Spine	FDO285302H	Out-Of-Sync	198 Lines	Out-of-Sync		Resync
FE-SP2	10.115.90.51	Border Gateway Spine	FDO285302K!	Out-Of-Sync	198 Lines	Out-of-Sync		Resync

Close Deploy All

Step 11. Click **Deploy All**.

Step 12. Click **Close**.

Procedure 3. Enable Priority Flow Control on interfaces

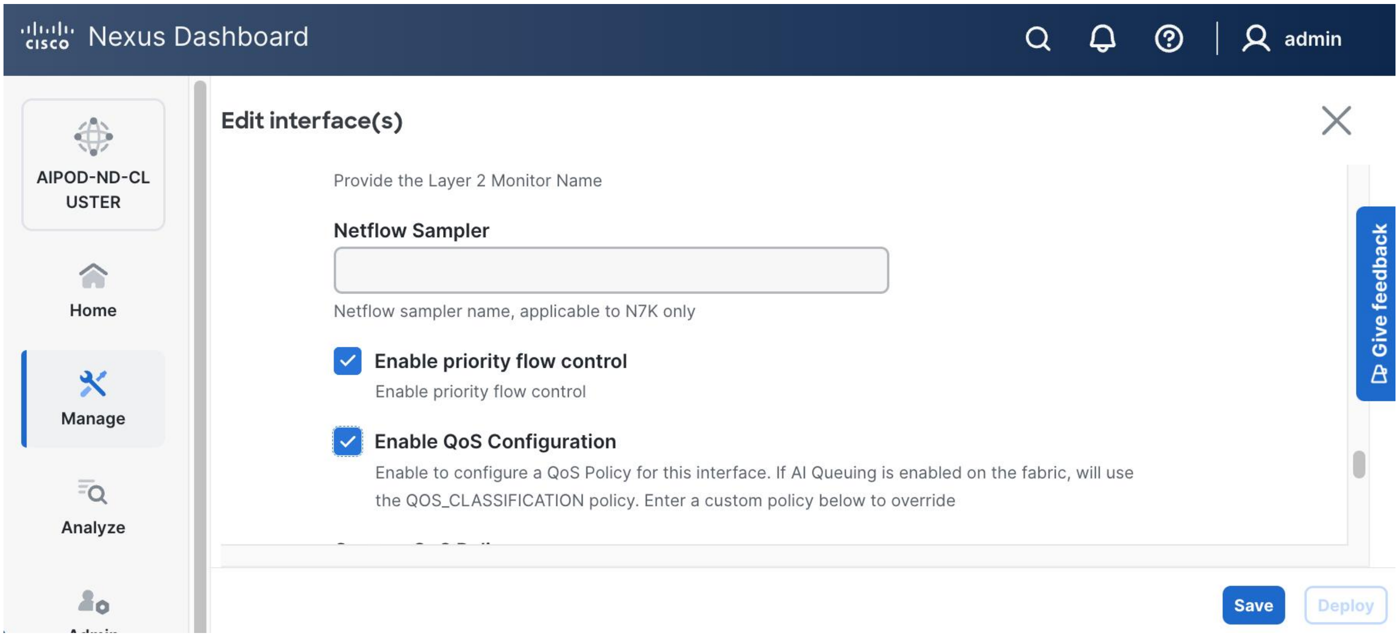
Step 1. Use a web browser to navigate to Nexus Dashboard. Use the management IP of any node in the ND cluster. Log in using admin account.

Step 2. From the left navigation menu, go to **Manage** > **Fabrics**.

Step 3. Select the FE fabric and go to **Connectivity > Interfaces**.

Step 4. Select the **first** interface and click the lower of the two **Actions** buttons and select **Edit interface**.

Step 5. Scroll down to the bottom and enable the following two QoS related settings.



Edit interface(s)

Provide the Layer 2 Monitor Name

Netflow Sampler

Netflow sampler name, applicable to N7K only

☑ Enable priority flow control

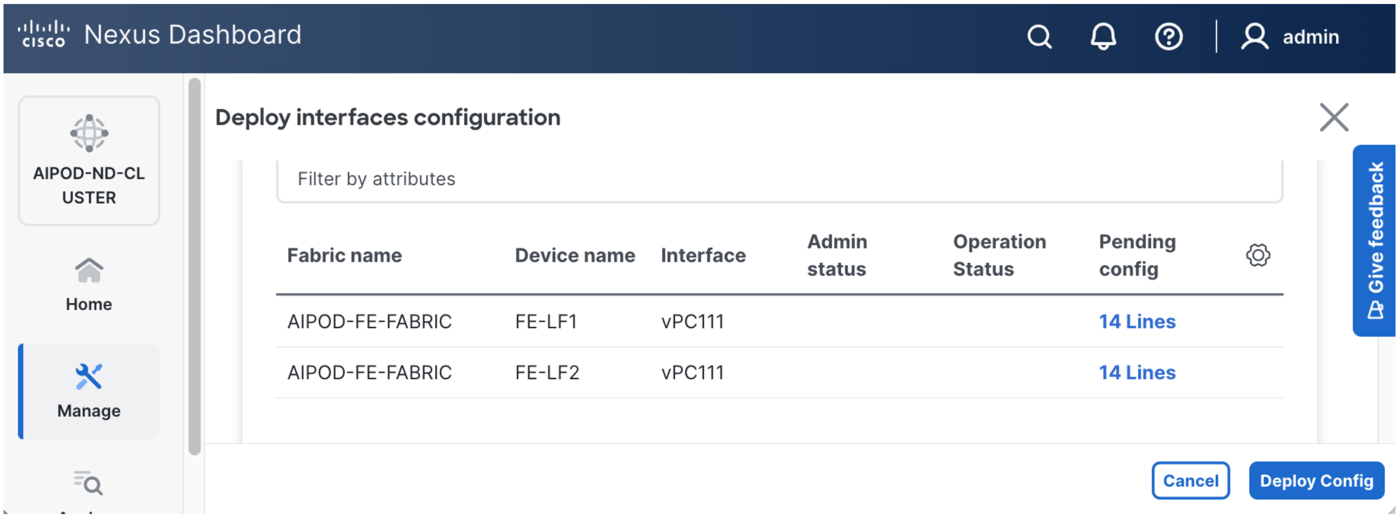
Enable priority flow control

☑ Enable QoS Configuration

Enable to configure a QoS Policy for this interface. If AI Queuing is enabled on the fabric, will use the QOS_CLASSIFICATION policy. Enter a custom policy below to override

Step 6. Click **Save**.

Step 7. Click **Deploy**.

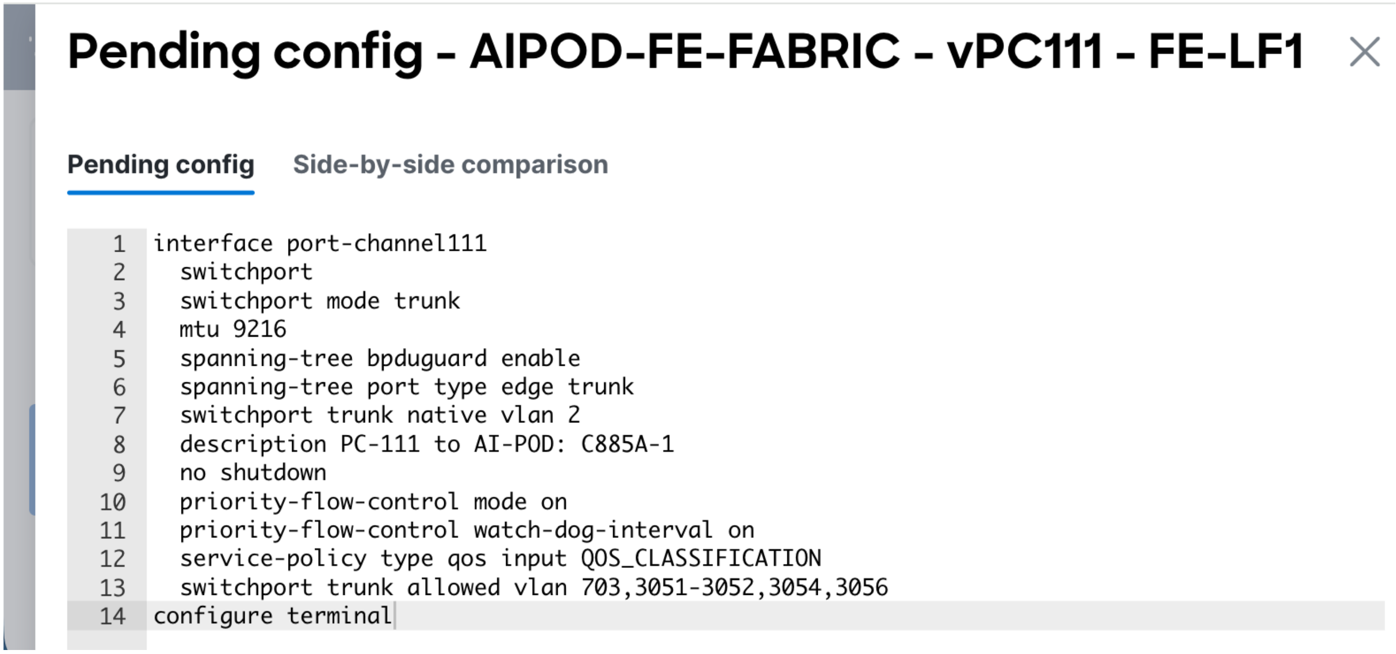


Deploy interfaces configuration

Filter by attributes

Fabric name	Device name	Interface	Admin status	Operation Status	Pending config
AIPOD-FE-FABRIC	FE-LF1	vPC111			14 Lines
AIPOD-FE-FABRIC	FE-LF2	vPC111			14 Lines

Step 8. Click **Pending config** to see configuration that will be deployed on the interface on each switch.



```
interface port-channel111
  switchport
  switchport mode trunk
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge trunk
  switchport trunk native vlan 2
  description PC-111 to AI-POD: C885A-1
  no shutdown
  priority-flow-control mode on
  priority-flow-control watch-dog-interval on
  service-policy type qos input QOS_CLASSIFICATION
  switchport trunk allowed vlan 703,3051-3052,3054,3056
configure terminal
```

Step 9. Click **Deploy Config**.

Step 10. Repeat this procedure for all remaining interfaces on both leaf switches that access the storage system.

Nexus Backend Fabric Setup

In this setup, the Nexus Backend Fabric consisted of 2 spine and 2 leaf switches. This fabric was cabled according to Table 4. The fabric switch details are listed in Table 19.

Table 19. Backend Fabric Switch Details

Switch	Role	OOB IP	Firmware	Model
BE-LF1	Leaf	10.115.90.58	10.4(5)	Cisco Nexus 9332D-GX2B
BE-LF2	Leaf	10.115.90.59	10.4(5)	Cisco Nexus 9332D-GX2B
BE-SP1	Spine	10.115.90.60	10.4(5)	Cisco Nexus 9364D-GX2A
BE-SP2	Spine	10.115.90.61	10.4(5)	Cisco Nexus 9364D-GX2A

Physical Connectivity

Follow the physical connectivity guidelines for FlexPod as explained in section FlexPod Cabling.

Initial Configuration of Switches

The following procedures describe this basic configuration of the Cisco Nexus backend fabric switches for use in the FlexPod environment. This procedure assumes the use of Cisco Nexus 9000 10.4(5), the Cisco suggested Nexus switch release at the time of this validation.

Procedure 4. Set Up Initial Configuration from a serial console

Step 1. Set up the initial configuration for each backend fabric switch as listed in Table 7.

Step 2. Configure the switch.

Note: On initial boot, the NX-OS setup automatically starts and attempts to enter Power on Auto Provisioning.

```
Abort Power On Auto Provisioning [yes - continue with normal setup, skip - bypass password and basic
configuration, no - continue with Power On Auto Provisioning] (yes/skip/no)[no]: yes
Disabling POAP.......Disabling POAP
poap: Rolling back, please wait... (This may take 5-15 minutes)

         ---- System Admin Account Setup ----

Do you want to enforce secure password standard (yes/no) [y]: Enter
Enter the password for "admin": <password>
Confirm the password for "admin": <password>
Would you like to enter the basic configuration dialog (yes/no): yes
Create another login account (yes/no) [n]: Enter
Configure read-only SNMP community string (yes/no) [n]: Enter
Configure read-write SNMP community string (yes/no) [n]: Enter
Enter the switch name: <nexus-hostname>
Continue with Out-of-band (mgmt0) management configuration? (yes/no) [y]: Enter
Mgmt0 IPv4 address: <nexus-out_of_band_mgmt0-ip>
Mgmt0 IPv4 netmask: <nexus-mgmt0-netmask>
Configure the default gateway? (yes/no) [y]: Enter
IPv4 address of the default gateway: <nexus-mgmt0-gw>
Configure advanced IP options? (yes/no) [n]: Enter
Enable the telnet service? (yes/no) [n]: Enter
Enable the ssh service? (yes/no) [y]: Enter
Type of ssh key you would like to generate (dsa/rsa) [rsa]: Enter
Number of rsa key bits <1024-2048> [2048]: Enter
Configure the ntp server? (yes/no) [n]: Enter
Configure default interface layer (L3/L2) [L2]: Enter
Configure default switchport interface state (shut/noshut) [noshut]: Enter
Enter basic FC configurations (yes/no) [n]: n
Configure CoPP system profile (strict/moderate/lenient/dense) [strict]: Enter
Would you like to edit the configuration? (yes/no) [n]: Enter
```

Step 3. Review the configuration summary before enabling the configuration.

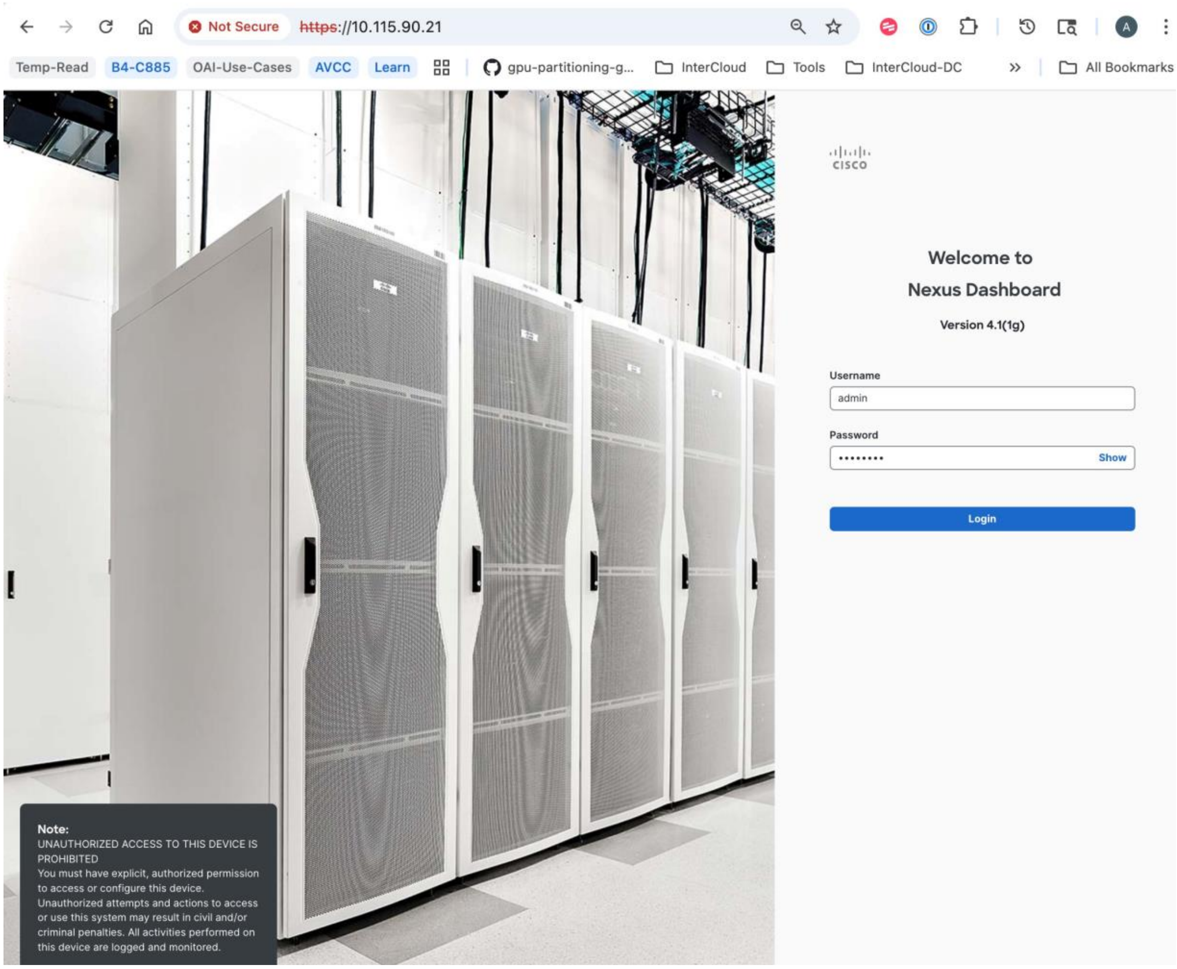
```
Use this configuration and save it? (yes/no) [y]: Enter
```

Step 4. Repeat this configuration for all switches in Table 7.

Deploy Backend Fabric Using Nexus Dashboard

Procedure 1. Deploy BE Cluster

Step 1. Use a web browser to navigate to **Nexus Dashboard**. Use the management IP of any node in the ND cluster. Log in using **admin** account.



Welcome to
Nexus Dashboard

Version 4.1(1g)

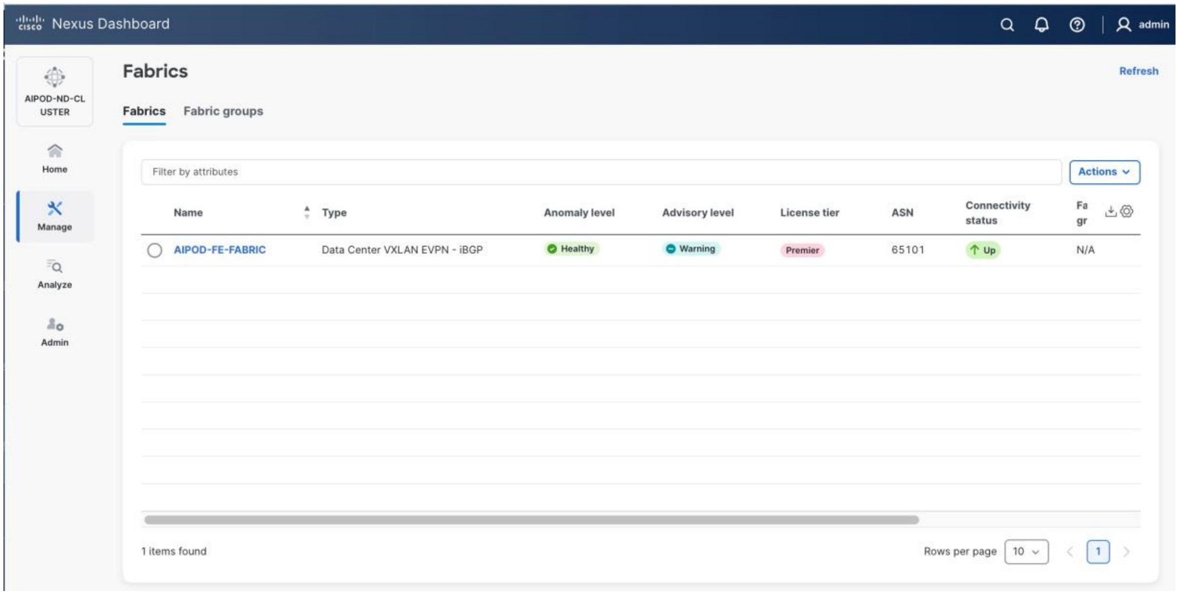
Username: admin

Password: ••••••••• Show

Login

Note:
UNAUTHORIZED ACCESS TO THIS DEVICE IS PROHIBITED
You must have explicit, authorized permission to access or configure this device. Unauthorized attempts and actions to access or use this system may result in civil and/or criminal penalties. All activities performed on this device are logged and monitored.

Step 2. Go to **Manage** > **Fabrics**.



Fabrics

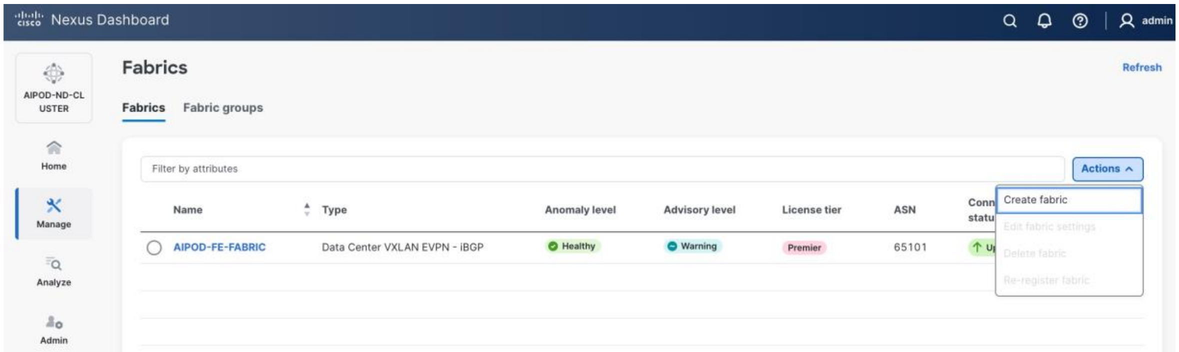
Fabrics | Fabric groups

	Name	Type	Anomaly level	Advisory level	License tier	ASN	Connectivity status	Fa gr
○	AIPOD-FE-FABRIC	Data Center VXLAN EVPN - iBGP	Healthy	Warning	Premier	65101	Up	N/A

1 items found

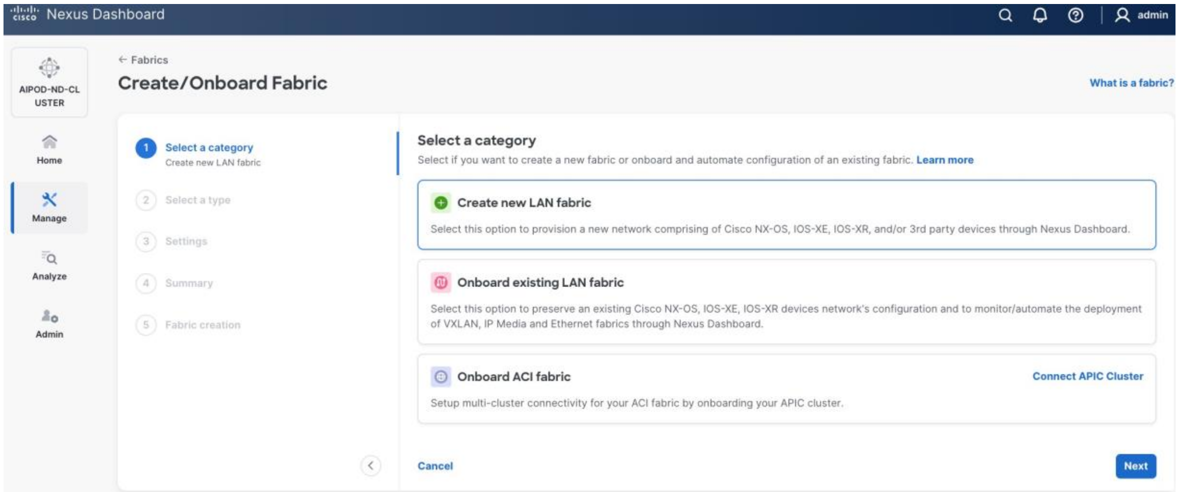
Rows per page 10 | 1

Step 3. Click **Actions.**



Name	Type	Anomaly level	Advisory level	License tier	ASN	Conn statu
○ AIPOD-FE-FABRIC	Data Center VXLAN EVPN - iBGP	Healthy	Warning	Premier	65101	↑ U

Step 4. Select **Create Fabric** from the drop-down list.



Create/Onboard Fabric

Select a category

Select if you want to create a new fabric or onboard and automate configuration of an existing fabric. Learn more

Create new LAN fabric

Select this option to provision a new network comprising of Cisco NX-OS, IOS-XE, IOS-XR, and/or 3rd party devices through Nexus Dashboard.

Onboard existing LAN fabric

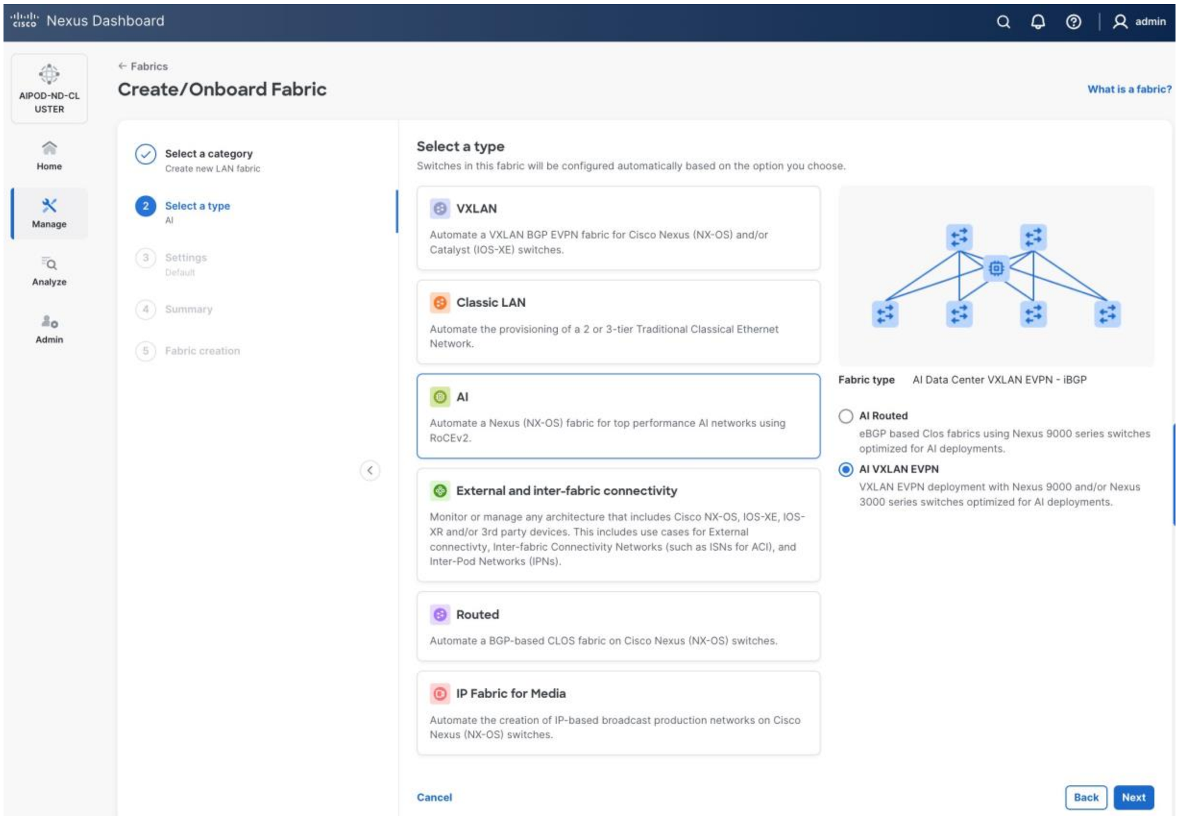
Select this option to preserve an existing Cisco NX-OS, IOS-XE, IOS-XR devices network's configuration and to monitor/automate the deployment of VXLAN, IP Media and Ethernet fabrics through Nexus Dashboard.

Onboard ACI fabric — Connect APIC Cluster

Setup multi-cluster connectivity for your ACI fabric by onboarding your APIC cluster.

Step 5. Select **Create a new LAN fabric.**

Step 6. Click **Next.**



Create/Onboard Fabric

- Select a category — Create new LAN fabric
- 2 Select a type — AI
- 3 Settings — Default
- 4 Summary
- 5 Fabric creation

Select a type

Switches in this fabric will be configured automatically based on the option you choose.

VXLAN
Automate a VXLAN BGP EVPN fabric for Cisco Nexus (NX-OS) and/or Catalyst (IOS-XE) switches.

Classic LAN
Automate the provisioning of a 2 or 3-tier Traditional Classical Ethernet Network.

AI
Automate a Nexus (NX-OS) fabric for top performance AI networks using RoCEv2.

External and inter-fabric connectivity
Monitor or manage any architecture that includes Cisco NX-OS, IOS-XE, IOS-XR and/or 3rd party devices. This includes use cases for External connectivty, Inter-fabric Connectivity Networks (such as ISNs for ACI), and Inter-Pod Networks (IPNs).

Routed
Automate a BGP-based CLOS fabric on Cisco Nexus (NX-OS) switches.

IP Fabric for Media
Automate the creation of IP-based broadcast production networks on Cisco Nexus (NX-OS) switches.

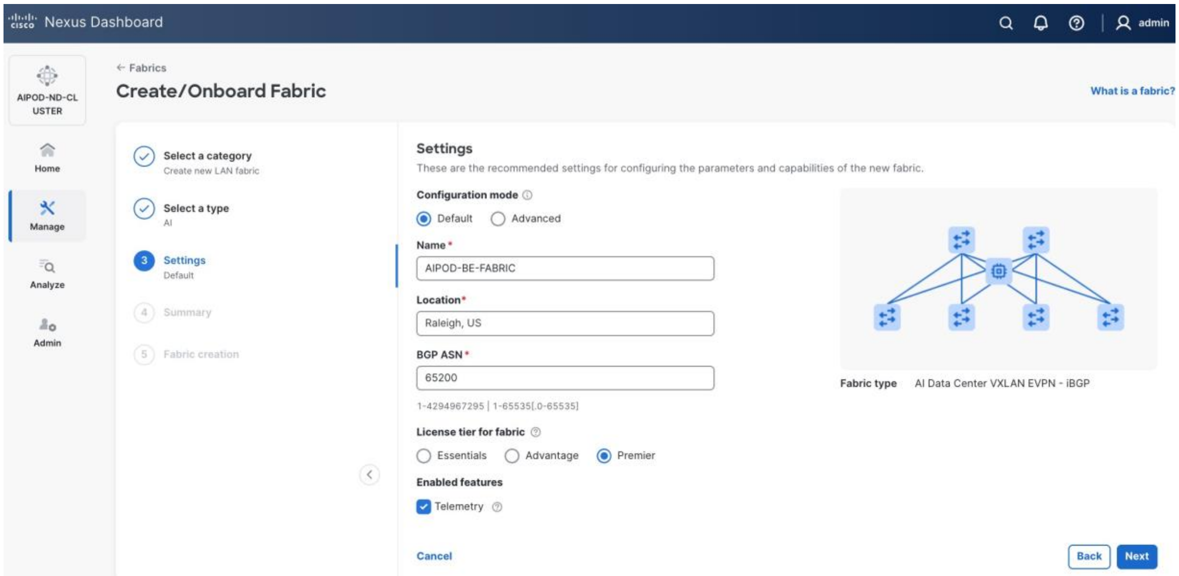
Fabric type AI Data Center VXLAN EVPN - iBGP

○ AI Routed
eBGP based Clos fabrics using Nexus 9000 series switches optimized for AI deployments.

● AI VXLAN EVPN
VXLAN EVPN deployment with Nexus 9000 and/or Nexus 3000 series switches optimized for AI deployments.

Step 7. For the Backend (E-W) AI/ML fabric, select **AI** > **AI VXLAN EVPN** to manage and setup a high-speed 400GbE/800GbE fabric for GPU-to-GPU connectivity.

Step 8. Click **Next.**



Create/Onboard Fabric

- Select a category — Create new LAN fabric
- Select a type — AI
- 3 Settings — Default
- 4 Summary
- 5 Fabric creation

Settings

These are the recommended settings for configuring the parameters and capabilities of the new fabric.

Configuration mode
● Default ○ Advanced

Name *
AIPOD-BE-FABRIC

Location*
Raleigh, US

BGP ASN *
65200
1-4294967295 | 1-65535[.0-65535]

License tier for fabric
○ Essentials ○ Advantage ● Premier

Enabled features
☑ Telemetry

Fabric type AI Data Center VXLAN EVPN - iBGP

Step 9. To configure the Backend (BE) fabric, under **Configuration Mode**, specify the following:

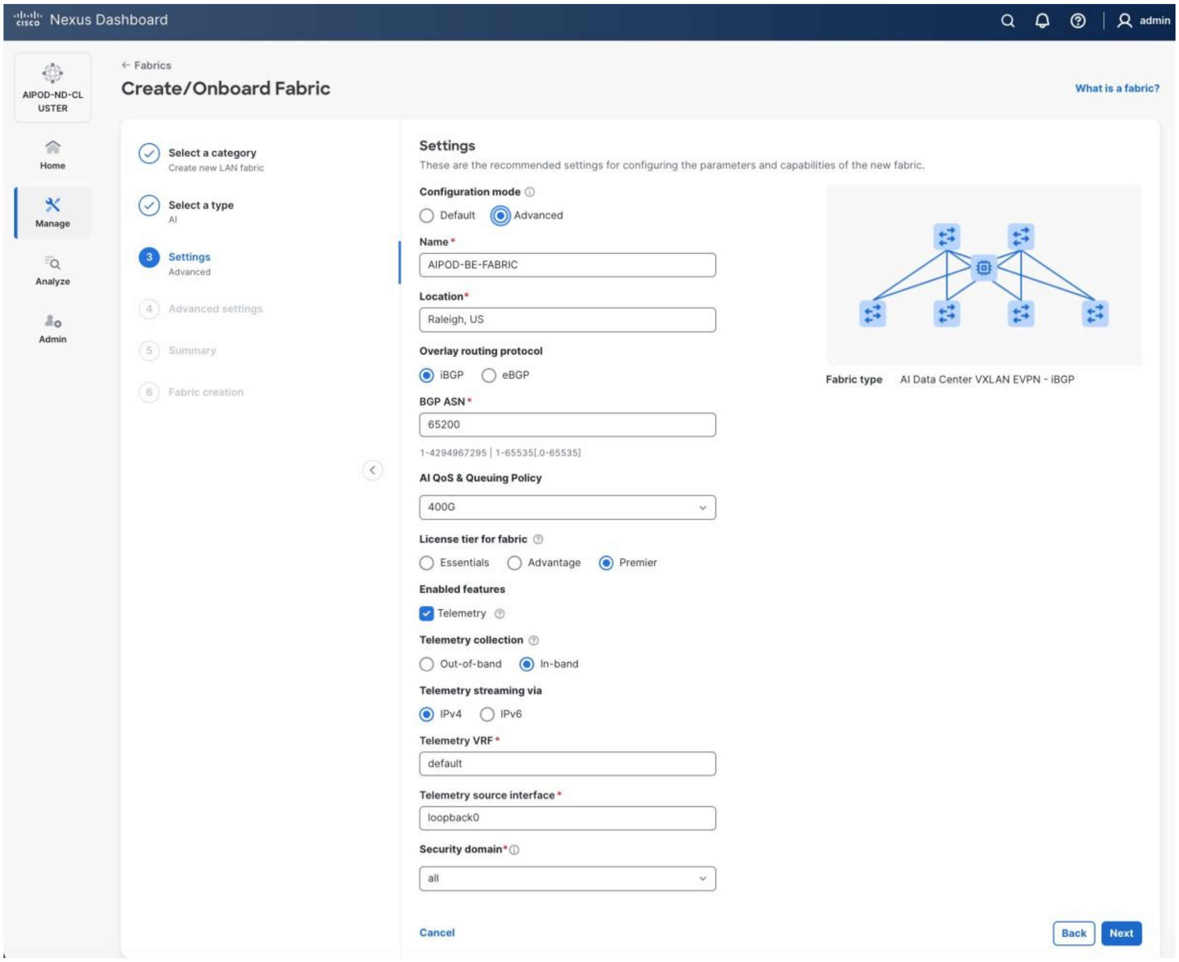
a. Leave the radio button enabled for **Default.**

b. Specify Name, Location, and BGP ASN#.

c. Select one of the **Licensing** options for the fabric - see " ? " icon to get more details on the options.

d. (Optional) Enable **Telemetry** feature.

Step 10. Enable the radio button for **Advanced** in the **Configuration Mode** section to see additional configuration options for the fabric.



Create/Onboard Fabric

Settings

These are the recommended settings for configuring the parameters and capabilities of the new fabric.

Configuration mode

○ Default ● Advanced

Name*

AIPOD-BE-FABRIC

Location*

Raleigh, US

Overlay routing protocol

● iBGP ○ eBGP

BGP ASN*

65200

1-4294967295 | 1-65535[.0-65535]

AI QoS & Queuing Policy

400G

License tier for fabric

○ Essentials ○ Advantage ● Premier

Enabled features

☑ Telemetry

Telemetry collection

○ Out-of-band ● In-band

Telemetry streaming via

● IPv4 ○ IPv6

Telemetry VRF*

default

Telemetry source interface*

loopback0

Security domain*

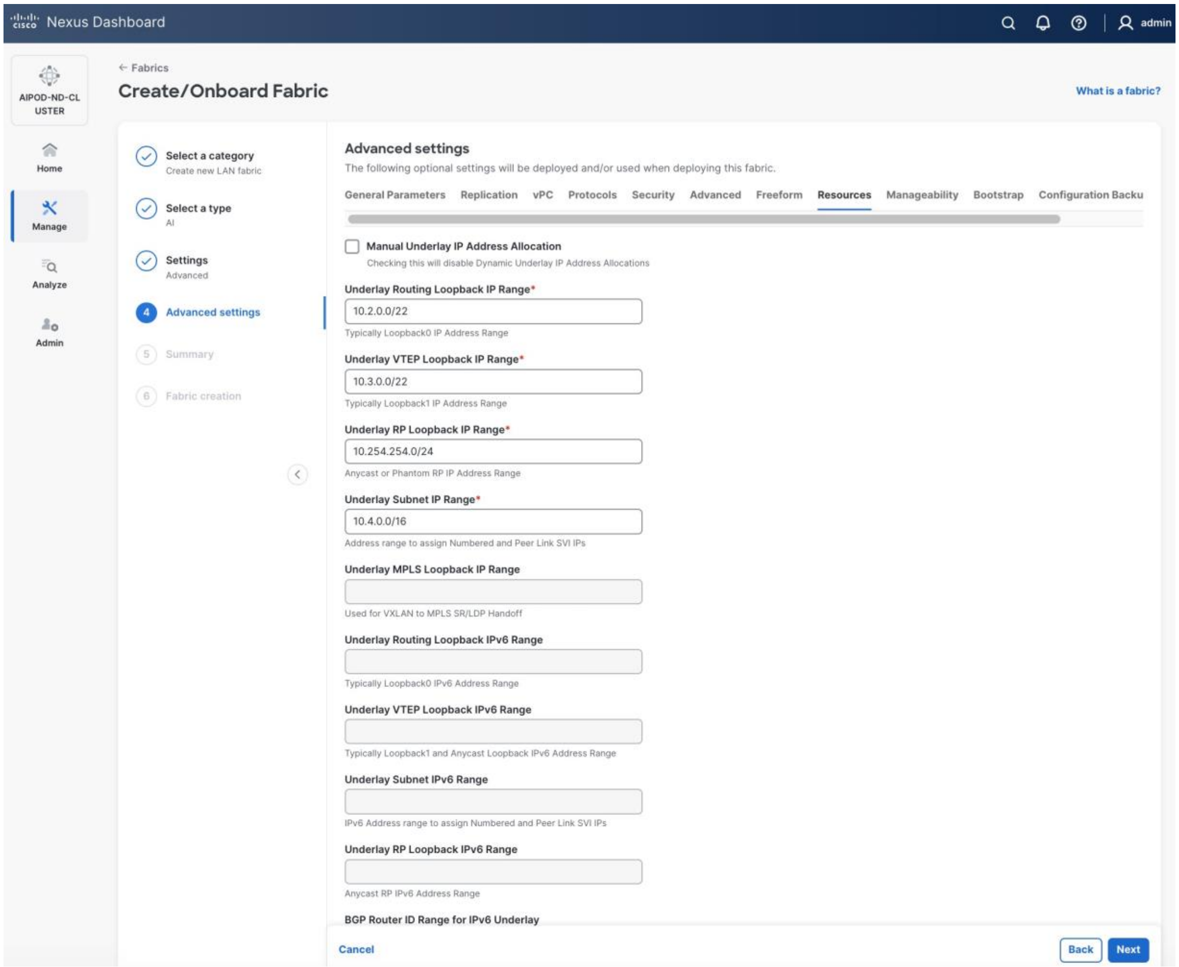
all

Fabric type AI Data Center VXLAN EVPN - iBGP

Step 11. Verify **QoS** and **Telemetry** settings reflect your setup.

Step 12. In the Advanced Settings menu, select the **Resource** tab.

Step 13. Click **Next.**



Create/Onboard Fabric

- Select a category: Create new LAN fabric
- Select a type: AI
- Settings: Advanced
- 4 Advanced settings
- 5 Summary
- 6 Fabric creation

Advanced settings

The following optional settings will be deployed and/or used when deploying this fabric.

□ Manual Underlay IP Address Allocation
Checking this will disable Dynamic Underlay IP Address Allocations

Underlay Routing Loopback IP Range*: 10.2.0.0/22
Typically Loopback0 IP Address Range

Underlay VTEP Loopback IP Range*: 10.3.0.0/22
Typically Loopback1 IP Address Range

Underlay RP Loopback IP Range*: 10.254.254.0/24
Anycast or Phantom RP IP Address Range

Underlay Subnet IP Range*: 10.4.0.0/16
Address range to assign Numbered and Peer Link SVI IPs

Underlay MPLS Loopback IP Range:
Used for VXLAN to MPLS SR/LDP Handoff

Underlay Routing Loopback IPv6 Range:
Typically Loopback0 IPv6 Address Range

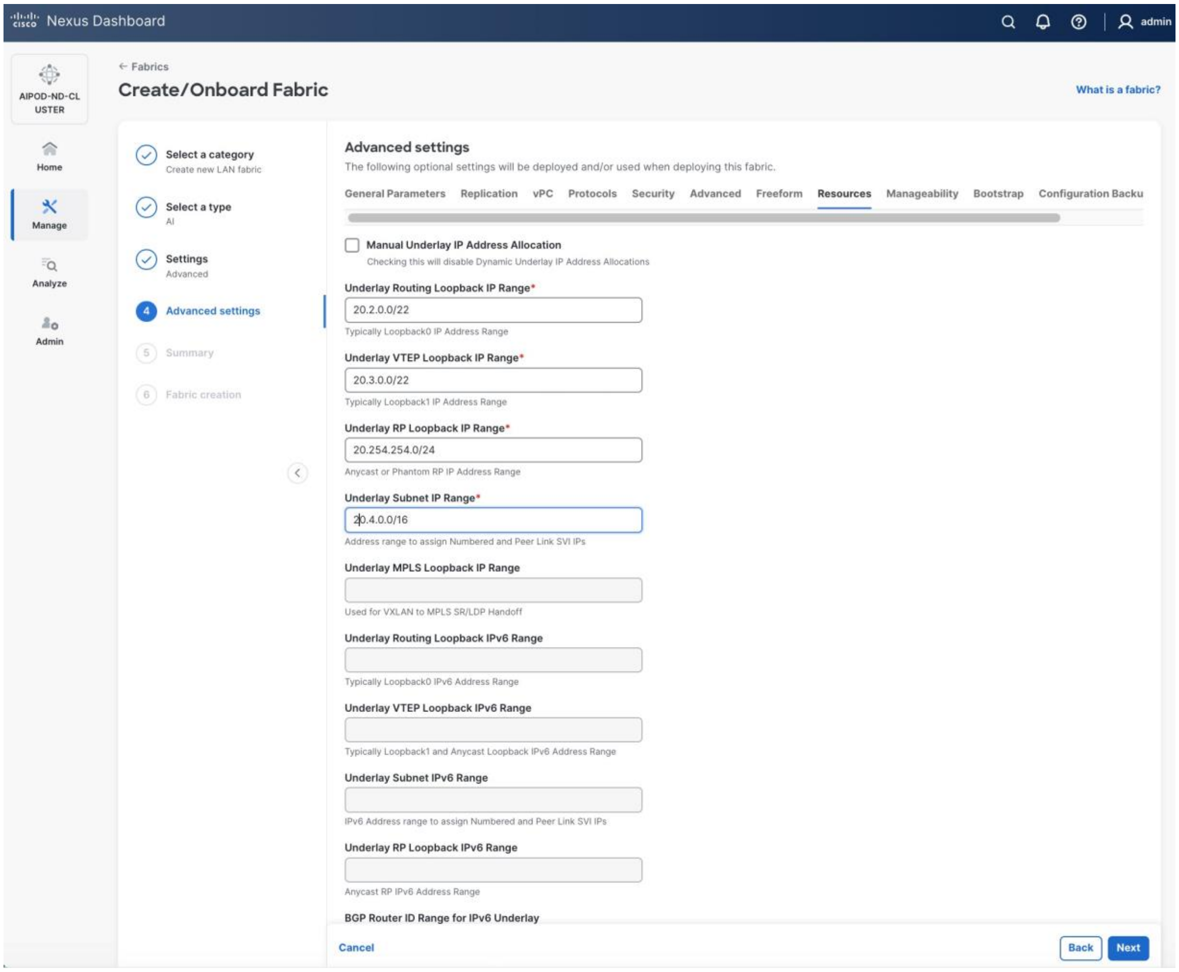
Underlay VTEP Loopback IPv6 Range:
Typically Loopback1 and Anycast Loopback IPv6 Address Range

Underlay Subnet IPv6 Range:
IPv6 Address range to assign Numbered and Peer Link SVI IPs

Underlay RP Loopback IPv6 Range:
Anycast RP IPv6 Address Range

BGP Router ID Range for IPv6 Underlay

Step 14. Change the **IP address** for this fabric from the default values to prevent overlap with frontend fabric, also managed by the same Nexus Dashboard. For this CVD validation, the first octet was changed from 10 to 20. The Backend fabric is isolated from other networks with no external connectivity so it could be kept as frontend but there will be alerts and warnings on Nexus dashboard, so the change is primarily done for this reason.



Create/Onboard Fabric

Advanced settings

The following optional settings will be deployed and/or used when deploying this fabric.

□ Manual Underlay IP Address Allocation
Checking this will disable Dynamic Underlay IP Address Allocations

Underlay Routing Loopback IP Range*: 20.2.0.0/22
Typically Loopback0 IP Address Range

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Typically Loopback1 IP Address Range

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Anycast or Phantom RP IP Address Range

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Address range to assign Numbered and Peer Link SVI IPs

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Used for VXLAN to MPLS SR/LDP Handoff

Underlay Routing Loopback IPv6 Range:
Typically Loopback0 IPv6 Address Range

Underlay VTEP Loopback IPv6 Range:
Typically Loopback1 and Anycast Loopback IPv6 Address Range

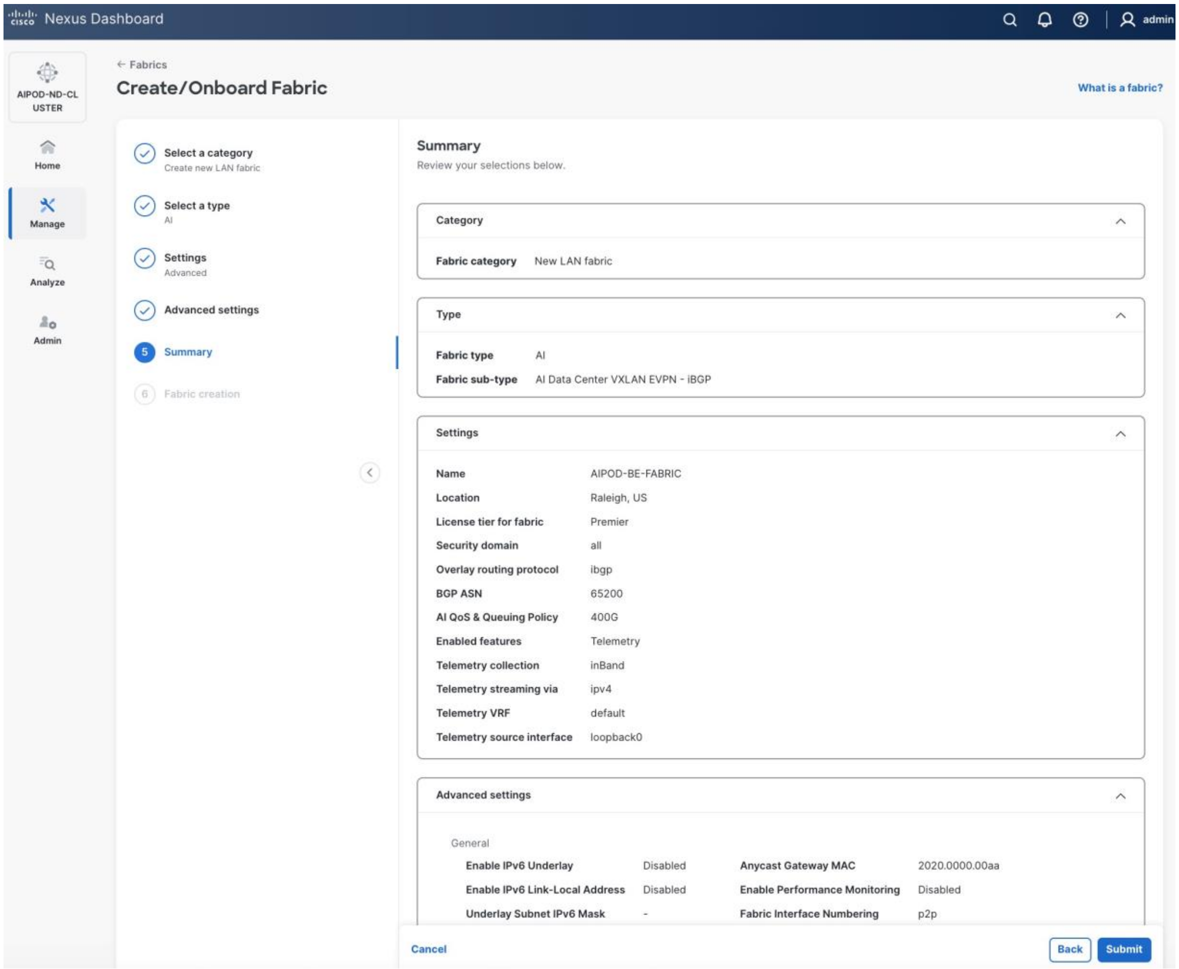
Underlay Subnet IPv6 Range:
IPv6 Address range to assign Numbered and Peer Link SVI IPs

Underlay RP Loopback IPv6 Range:
Anycast RP IPv6 Address Range

BGP Router ID Range for IPv6 Underlay

Step 15. Scroll down and change the **VRF Lite Subnet IP Range**.

Step 16. Click **Next**.



Create/Onboard Fabric

Summary

Review your selections below.

Category

Fabric category	New LAN fabric

Type

Fabric type	AI
Fabric sub-type	AI Data Center VXLAN EVPN - iBGP

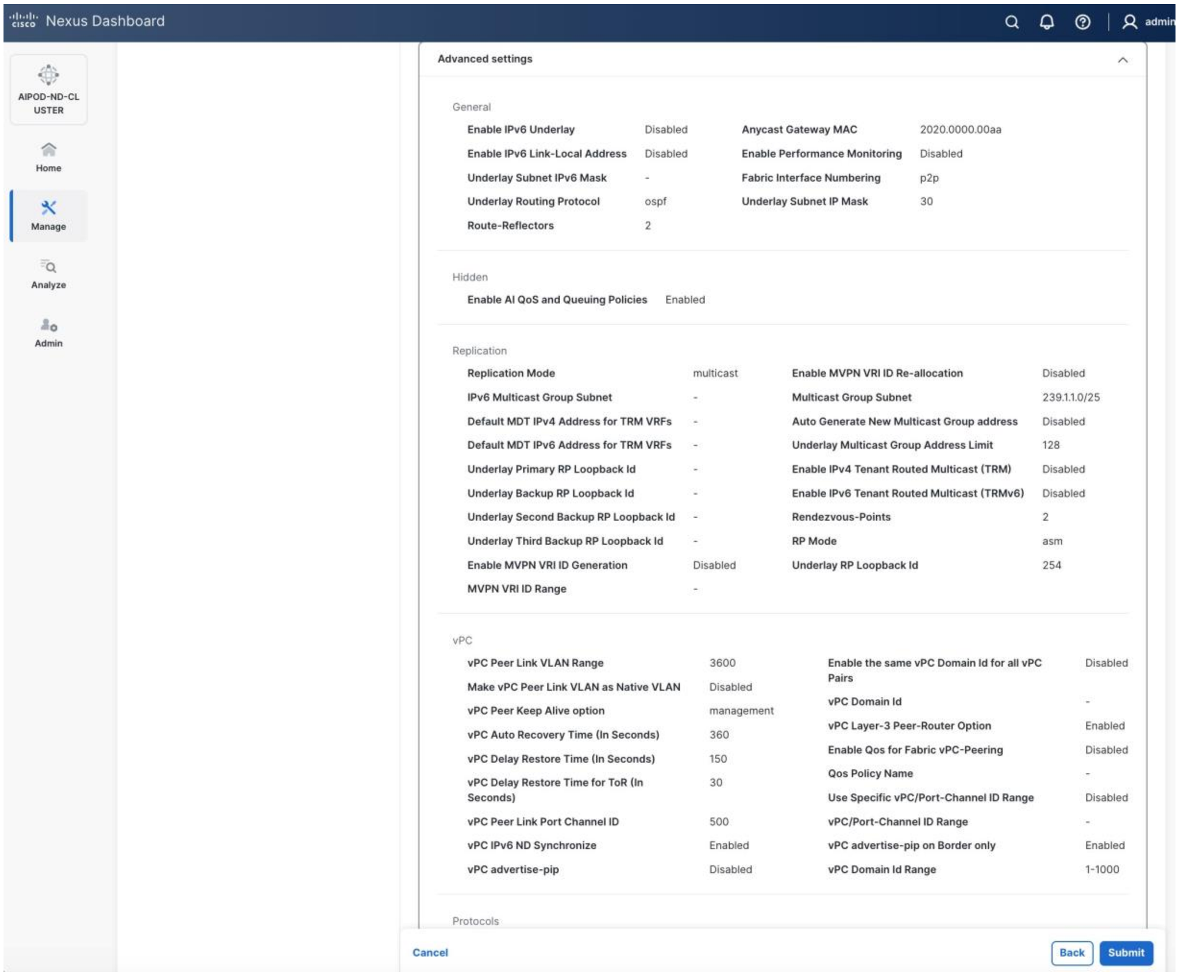
Settings

Name	AIPOD-BE-FABRIC
Location	Raleigh, US
License tier for fabric	Premier
Security domain	all
Overlay routing protocol	ibgp
BGP ASN	65200
AI QoS & Queuing Policy	400G
Enabled features	Telemetry
Telemetry collection	inBand
Telemetry streaming via	ipv4
Telemetry VRF	default
Telemetry source interface	loopback0

Advanced settings

General

Enable IPv6 Underlay	Disabled	Anycast Gateway MAC	2020.0000.00aa
Enable IPv6 Link-Local Address	Disabled	Enable Performance Monitoring	Disabled
Underlay Subnet IPv6 Mask	-	Fabric Interface Numbering	p2p



Advanced settings

General

Enable IPv6 Underlay	Disabled	Anycast Gateway MAC	2020.0000.00aa
Enable IPv6 Link-Local Address	Disabled	Enable Performance Monitoring	Disabled
Underlay Subnet IPv6 Mask	-	Fabric Interface Numbering	p2p
Underlay Routing Protocol	ospf	Underlay Subnet IP Mask	30
Route-Reflectors	2		

Hidden

Enable AI QoS and Queuing Policies	Enabled

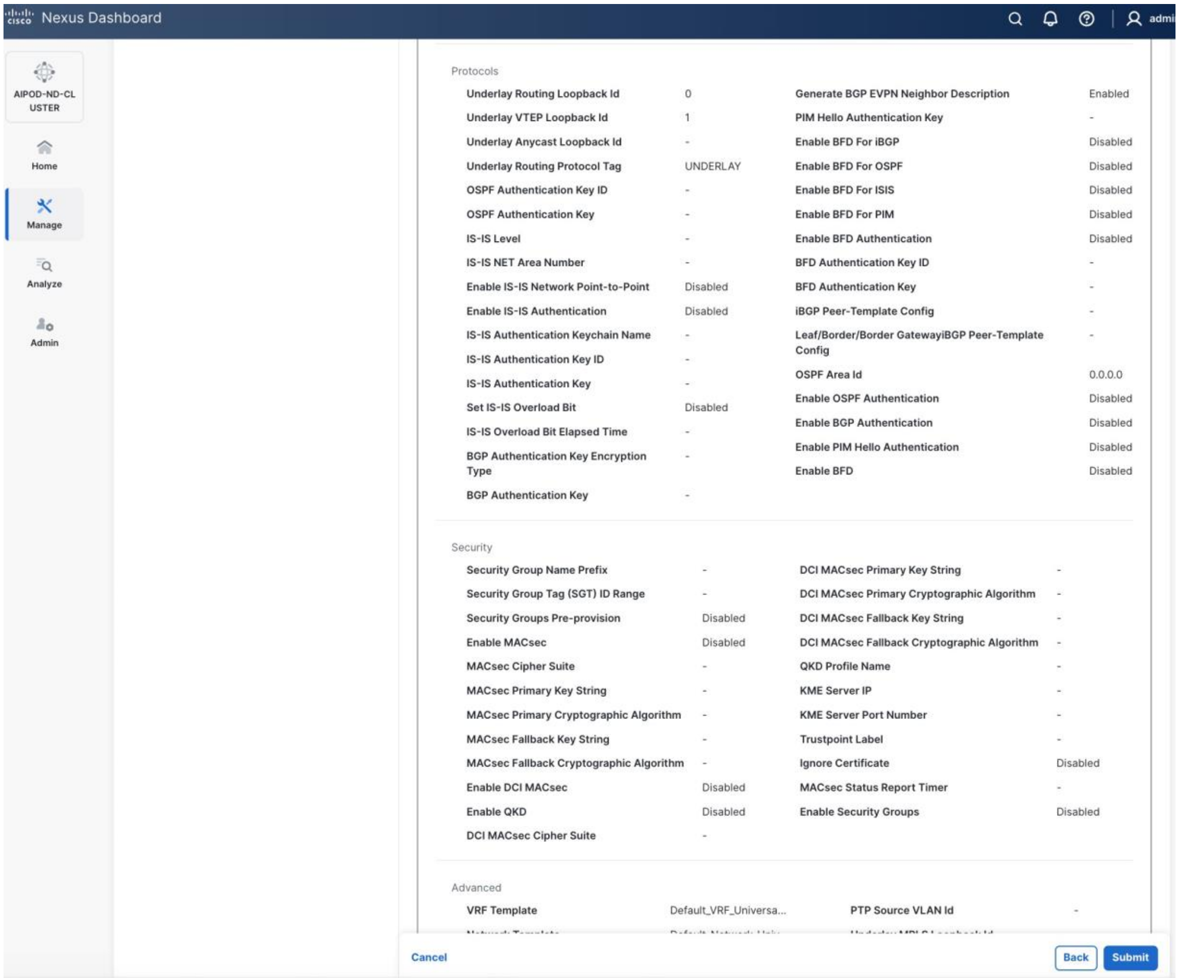
Replication

Replication Mode	multicast	Enable MVPN VRI ID Re-allocation	Disabled
IPv6 Multicast Group Subnet	-	Multicast Group Subnet	239.1.1.0/25
Default MDT IPv4 Address for TRM VRFs	-	Auto Generate New Multicast Group address	Disabled
Default MDT IPv6 Address for TRM VRFs	-	Underlay Multicast Group Address Limit	128
Underlay Primary RP Loopback Id	-	Enable IPv4 Tenant Routed Multicast (TRM)	Disabled
Underlay Backup RP Loopback Id	-	Enable IPv6 Tenant Routed Multicast (TRMv6)	Disabled
Underlay Second Backup RP Loopback Id	-	Rendezvous-Points	2
Underlay Third Backup RP Loopback Id	-	RP Mode	asm
Enable MVPN VRI ID Generation	Disabled	Underlay RP Loopback Id	254
MVPN VRI ID Range	-		

vPC

vPC Peer Link VLAN Range	3600	Enable the same vPC Domain Id for all vPC Pairs	Disabled
Make vPC Peer Link VLAN as Native VLAN	Disabled	vPC Domain Id	-
vPC Peer Keep Alive option	management	vPC Layer-3 Peer-Router Option	Enabled
vPC Auto Recovery Time (In Seconds)	360	Enable Qos for Fabric vPC-Peering	Disabled
vPC Delay Restore Time (In Seconds)	150	Qos Policy Name	-
vPC Delay Restore Time for ToR (In Seconds)	30	Use Specific vPC/Port-Channel ID Range	Disabled
vPC Peer Link Port Channel ID	500	vPC/Port-Channel ID Range	-
vPC IPv6 ND Synchronize	Enabled	vPC advertise-pip on Border only	Enabled
vPC advertise-pip	Disabled	vPC Domain Id Range	1-1000

Protocols



Protocols

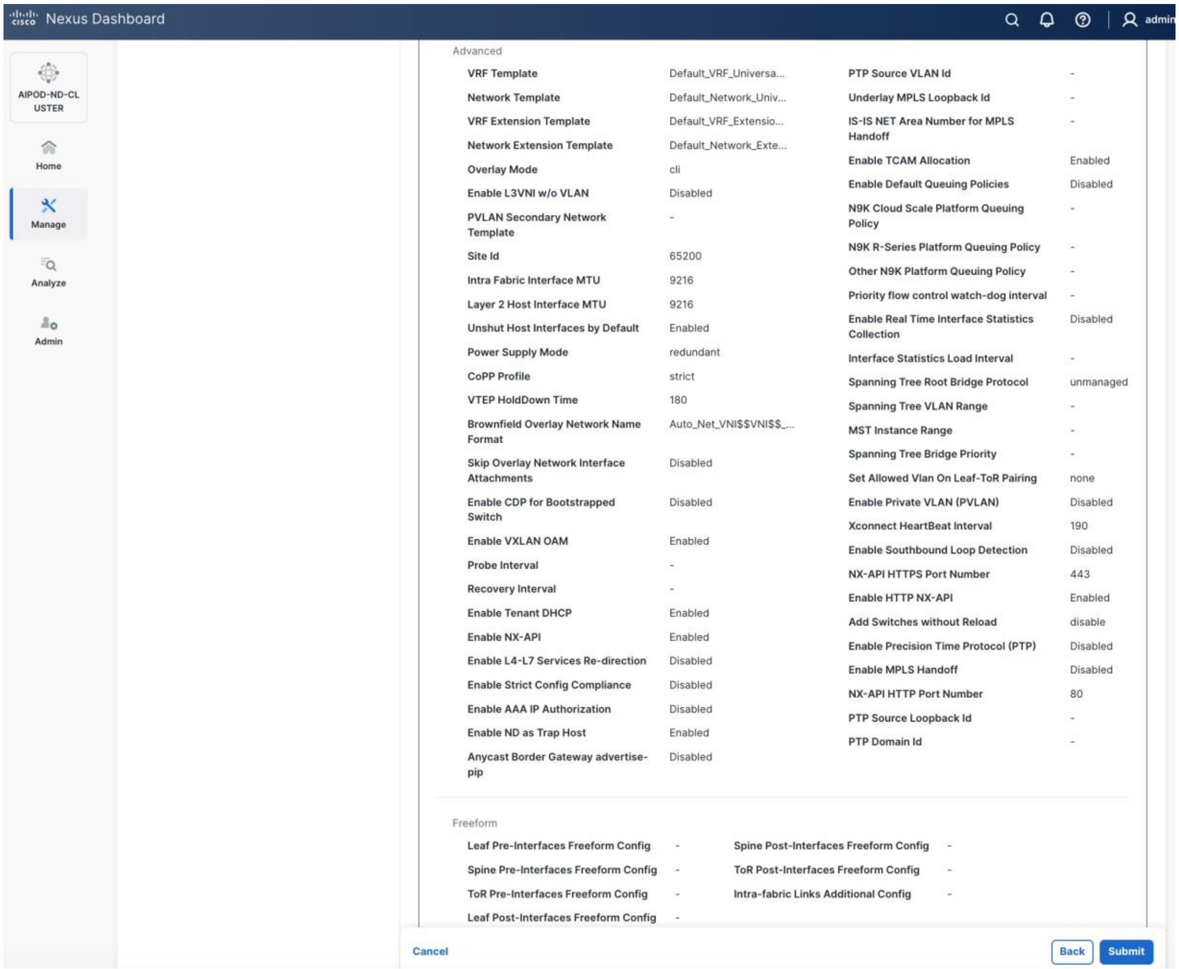
Underlay Routing Loopback Id	0	Generate BGP EVPN Neighbor Description	Enabled
Underlay VTEP Loopback Id	1	PIM Hello Authentication Key	-
Underlay Anycast Loopback Id	-	Enable BFD For iBGP	Disabled
Underlay Routing Protocol Tag	UNDERLAY	Enable BFD For OSPF	Disabled
OSPF Authentication Key ID	-	Enable BFD For ISIS	Disabled
OSPF Authentication Key	-	Enable BFD For PIM	Disabled
IS-IS Level	-	Enable BFD Authentication	Disabled
IS-IS NET Area Number	-	BFD Authentication Key ID	-
Enable IS-IS Network Point-to-Point	Disabled	BFD Authentication Key	-
Enable IS-IS Authentication	Disabled	iBGP Peer-Template Config	-
IS-IS Authentication Keychain Name	-	Leaf/Border/Border GatewayiBGP Peer-Template Config	-
IS-IS Authentication Key ID	-	OSPF Area Id	0.0.0.0
IS-IS Authentication Key	-	Enable OSPF Authentication	Disabled
Set IS-IS Overload Bit	Disabled	Enable BGP Authentication	Disabled
IS-IS Overload Bit Elapsed Time	-	Enable PIM Hello Authentication	Disabled
BGP Authentication Key Encryption Type	-	Enable BFD	Disabled
BGP Authentication Key	-		

Security

Security Group Name Prefix	-	DCI MACsec Primary Key String	-
Security Group Tag (SGT) ID Range	-	DCI MACsec Primary Cryptographic Algorithm	-
Security Groups Pre-provision	Disabled	DCI MACsec Fallback Key String	-
Enable MACsec	Disabled	DCI MACsec Fallback Cryptographic Algorithm	-
MACsec Cipher Suite	-	QKD Profile Name	-
MACsec Primary Key String	-	KME Server IP	-
MACsec Primary Cryptographic Algorithm	-	KME Server Port Number	-
MACsec Fallback Key String	-	Trustpoint Label	-
MACsec Fallback Cryptographic Algorithm	-	Ignore Certificate	Disabled
Enable DCI MACsec	Disabled	MACsec Status Report Timer	-
Enable QKD	Disabled	Enable Security Groups	Disabled
DCI MACsec Cipher Suite	-		

Advanced

VRF Template	Default_VRF_Universa...	PTP Source VLAN Id	-



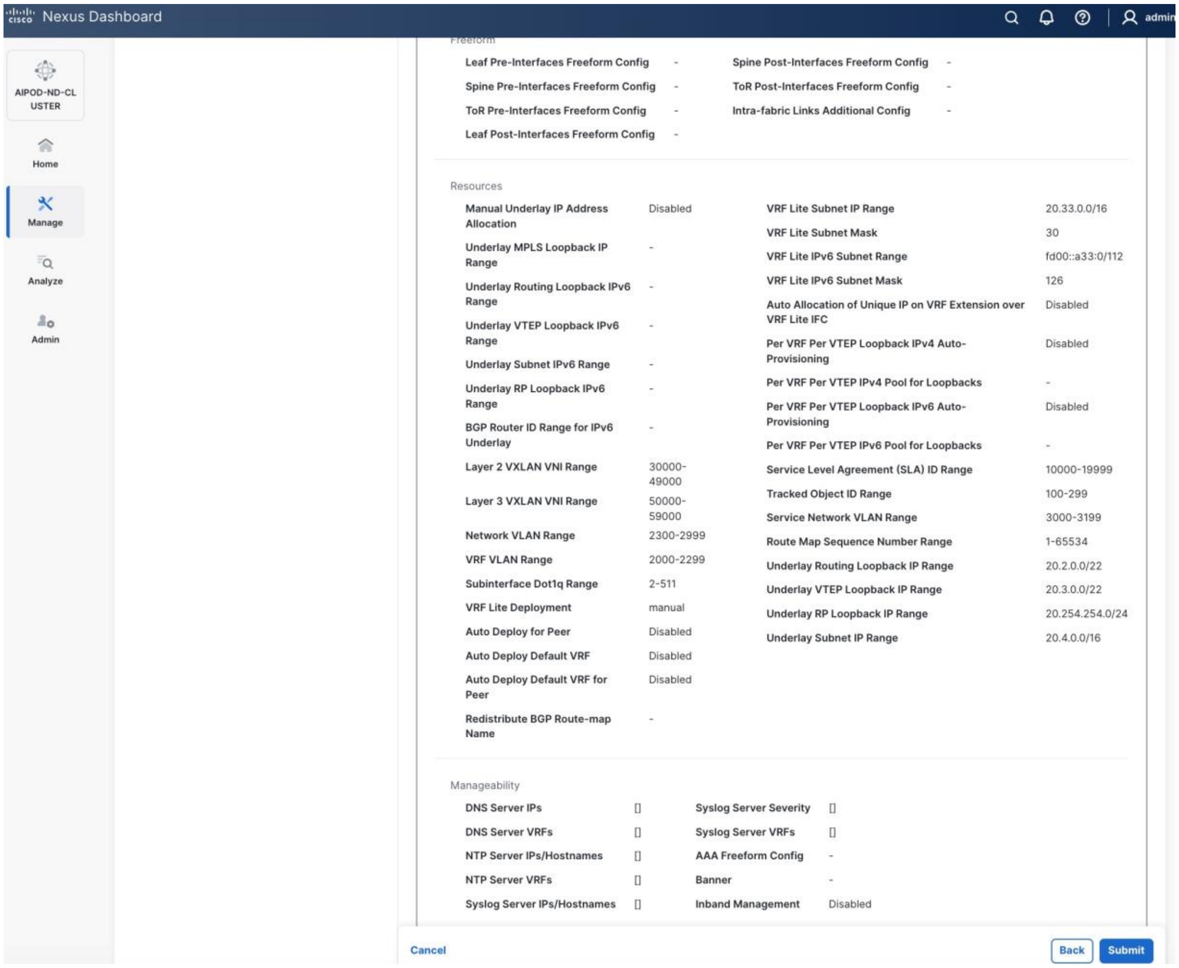
Advanced

VRF Template	Default_VRF_Universa...
Network Template	Default_Network_Univ...
VRF Extension Template	Default_VRF_Extensio...
Network Extension Template	Default_Network_Exte...
Overlay Mode	cli
Enable L3VNI w/o VLAN	Disabled
PVLAN Secondary Network Template	-
Site Id	65200
Intra Fabric Interface MTU	9216
Layer 2 Host Interface MTU	9216
Unshut Host Interfaces by Default	Enabled
Power Supply Mode	redundant
CoPP Profile	strict
VTEP HoldDown Time	180
Brownfield Overlay Network Name Format	Auto_Net_VNI$$VNI$$_...
Skip Overlay Network Interface Attachments	Disabled
Enable CDP for Bootstrapped Switch	Disabled
Enable VXLAN OAM	Enabled
Probe Interval	-
Recovery Interval	-
Enable Tenant DHCP	Enabled
Enable NX-API	Enabled
Enable L4-L7 Services Re-direction	Disabled
Enable Strict Config Compliance	Disabled
Enable AAA IP Authorization	Disabled
Enable ND as Trap Host	Enabled
Anycast Border Gateway advertise-pip	Disabled

PTP Source VLAN Id	-
Underlay MPLS Loopback Id	-
IS-IS NET Area Number for MPLS Handoff	-
Enable TCAM Allocation	Enabled
Enable Default Queuing Policies	Disabled
N9K Cloud Scale Platform Queuing Policy	-
N9K R-Series Platform Queuing Policy	-
Other N9K Platform Queuing Policy	-
Priority flow control watch-dog interval	-
Enable Real Time Interface Statistics Collection	Disabled
Interface Statistics Load Interval	-
Spanning Tree Root Bridge Protocol	unmanaged
Spanning Tree VLAN Range	-
MST Instance Range	-
Spanning Tree Bridge Priority	-
Set Allowed Vlan On Leaf-ToR Pairing	none
Enable Private VLAN (PVLAN)	Disabled
Xconnect HeartBeat Interval	190
Enable Southbound Loop Detection	Disabled
NX-API HTTPS Port Number	443
Enable HTTP NX-API	Enabled
Add Switches without Reload	disable
Enable Precision Time Protocol (PTP)	Disabled
Enable MPLS Handoff	Disabled
NX-API HTTP Port Number	80
PTP Source Loopback Id	-
PTP Domain Id	-

Freeform

Leaf Pre-Interfaces Freeform Config	-	Spine Post-Interfaces Freeform Config	-
Spine Pre-Interfaces Freeform Config	-	ToR Post-Interfaces Freeform Config	-
ToR Pre-Interfaces Freeform Config	-	Intra-fabric Links Additional Config	-
Leaf Post-Interfaces Freeform Config	-		



Freeform

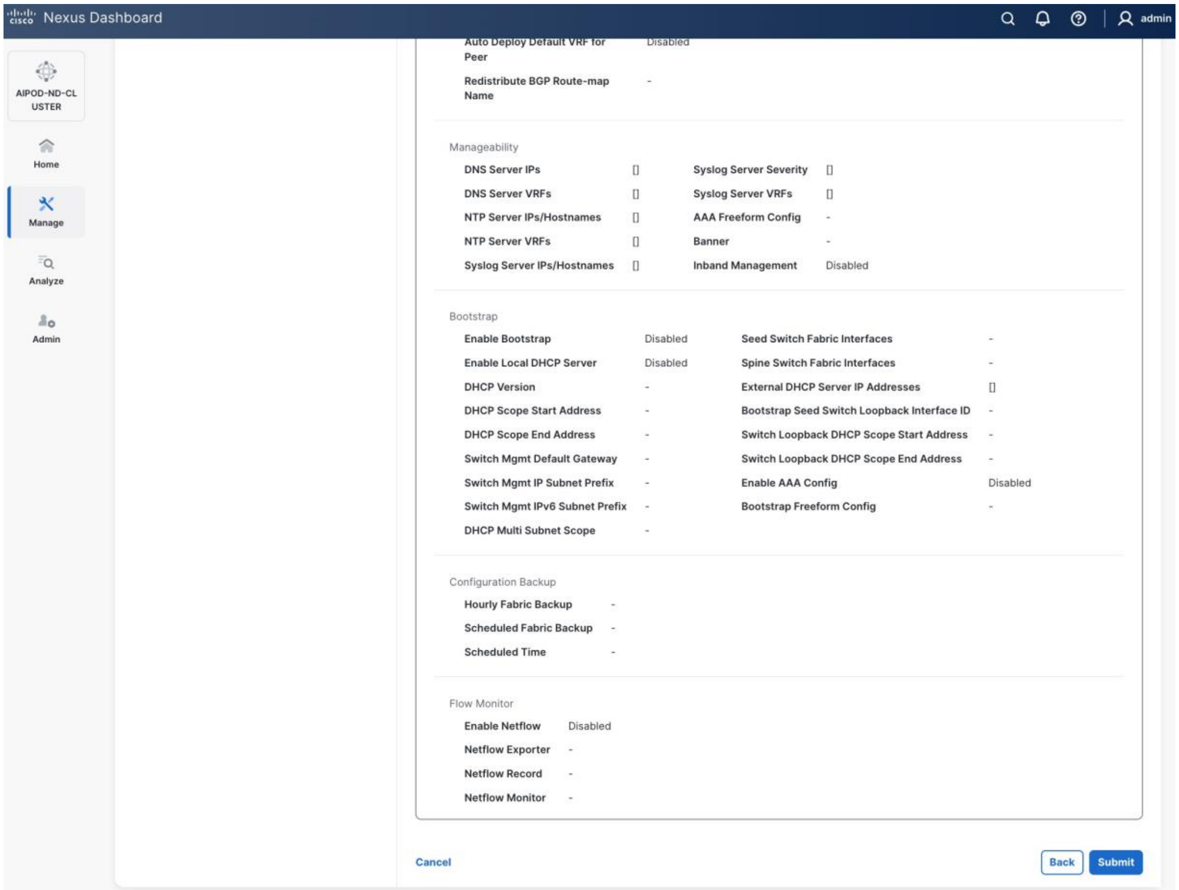
Leaf Pre-Interfaces Freeform Config	-	Spine Post-Interfaces Freeform Config	-
Spine Pre-Interfaces Freeform Config	-	ToR Post-Interfaces Freeform Config	-
ToR Pre-Interfaces Freeform Config	-	Intra-fabric Links Additional Config	-
Leaf Post-Interfaces Freeform Config	-		

Resources

Manual Underlay IP Address Allocation	Disabled	VRF Lite Subnet IP Range	20.33.0.0/16
		VRF Lite Subnet Mask	30
Underlay MPLS Loopback IP Range	-	VRF Lite IPv6 Subnet Range	fd00::a33:0/112
		VRF Lite IPv6 Subnet Mask	126
Underlay Routing Loopback IPv6 Range	-	Auto Allocation of Unique IP on VRF Extension over VRF Lite IFC	Disabled
Underlay VTEP Loopback IPv6 Range	-	Per VRF Per VTEP Loopback IPv4 Auto-Provisioning	Disabled
Underlay Subnet IPv6 Range	-	Per VRF Per VTEP IPv4 Pool for Loopbacks	-
Underlay RP Loopback IPv6 Range	-	Per VRF Per VTEP Loopback IPv6 Auto-Provisioning	Disabled
BGP Router ID Range for IPv6 Underlay	-	Per VRF Per VTEP IPv6 Pool for Loopbacks	-
Layer 2 VXLAN VNI Range	30000-49000	Service Level Agreement (SLA) ID Range	10000-19999
		Tracked Object ID Range	100-299
Layer 3 VXLAN VNI Range	50000-59000	Service Network VLAN Range	3000-3199
Network VLAN Range	2300-2999	Route Map Sequence Number Range	1-65534
VRF VLAN Range	2000-2299	Underlay Routing Loopback IP Range	20.2.0.0/22
Subinterface Dot1q Range	2-511	Underlay VTEP Loopback IP Range	20.3.0.0/22
VRF Lite Deployment	manual	Underlay RP Loopback IP Range	20.254.254.0/24
Auto Deploy for Peer	Disabled	Underlay Subnet IP Range	20.4.0.0/16
Auto Deploy Default VRF	Disabled		
Auto Deploy Default VRF for Peer	Disabled		
Redistribute BGP Route-map Name	-		

Manageability

DNS Server IPs	[]	Syslog Server Severity	[]
DNS Server VRFs	[]	Syslog Server VRFs	[]
NTP Server IPs/Hostnames	[]	AAA Freeform Config	-
NTP Server VRFs	[]	Banner	-
Syslog Server IPs/Hostnames	[]	Inband Management	Disabled



Auto Deploy Default VRF for Peer	Disabled
Redistribute BGP Route-map Name	-

Manageability

DNS Server IPs	[]	Syslog Server Severity	[]
DNS Server VRFs	[]	Syslog Server VRFs	[]
NTP Server IPs/Hostnames	[]	AAA Freeform Config	-
NTP Server VRFs	[]	Banner	-
Syslog Server IPs/Hostnames	[]	Inband Management	Disabled

Bootstrap

Enable Bootstrap	Disabled	Seed Switch Fabric Interfaces	-
Enable Local DHCP Server	Disabled	Spine Switch Fabric Interfaces	-
DHCP Version	-	External DHCP Server IP Addresses	[]
DHCP Scope Start Address	-	Bootstrap Seed Switch Loopback Interface ID	-
DHCP Scope End Address	-	Switch Loopback DHCP Scope Start Address	-
Switch Mgmt Default Gateway	-	Switch Loopback DHCP Scope End Address	-
Switch Mgmt IP Subnet Prefix	-	Enable AAA Config	Disabled
Switch Mgmt IPv6 Subnet Prefix	-	Bootstrap Freeform Config	-
DHCP Multi Subnet Scope	-		

Configuration Backup

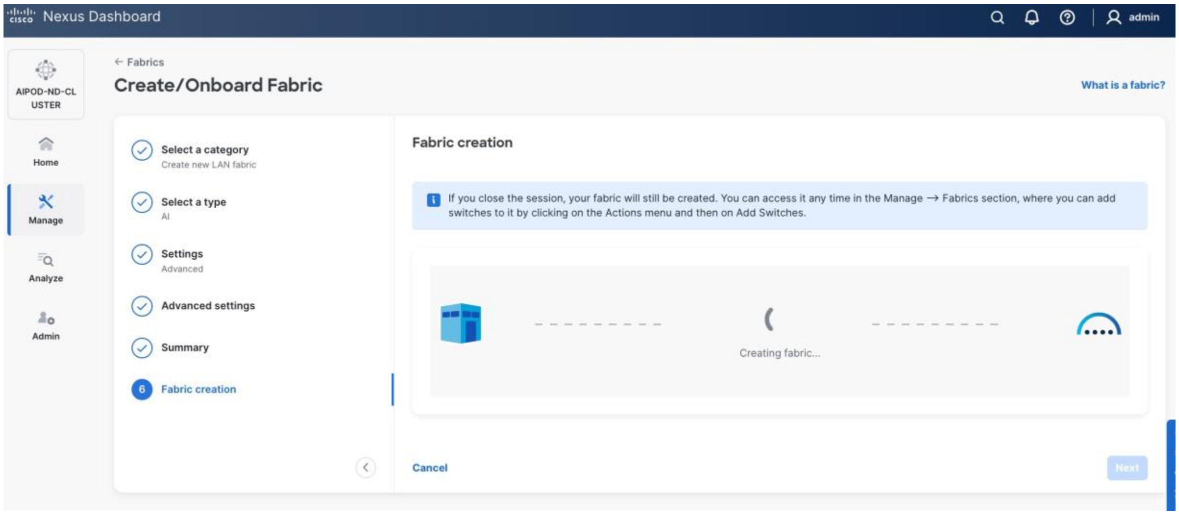
Hourly Fabric Backup	-
Scheduled Fabric Backup	-
Scheduled Time	-

Flow Monitor

Enable Netflow	Disabled
Netflow Exporter	-
Netflow Record	-
Netflow Monitor	-

Step 17. Review the **Fabric Summary** settings.

Step 18. Click **Submit**.

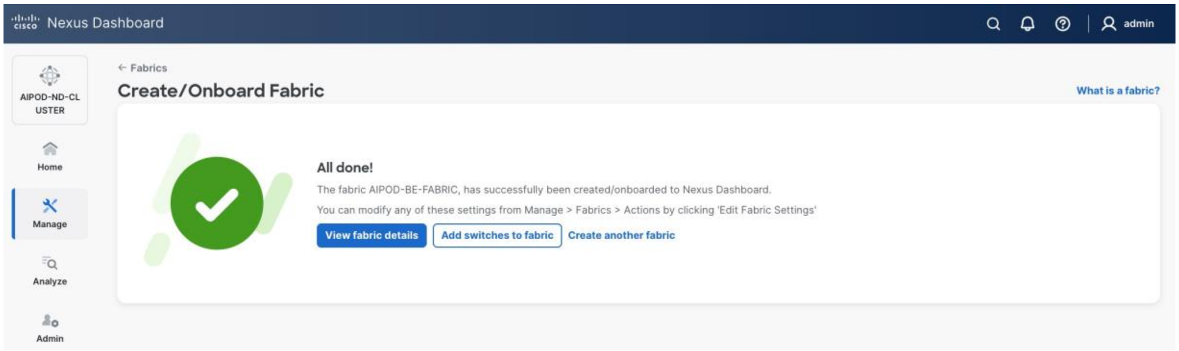


Create/Onboard Fabric

Fabric creation

If you close the session, your fabric will still be created. You can access it any time in the Manage → Fabrics section, where you can add switches to it by clicking on the Actions menu and then on Add Switches.

Step 19. Wait for the Fabric creation to complete.



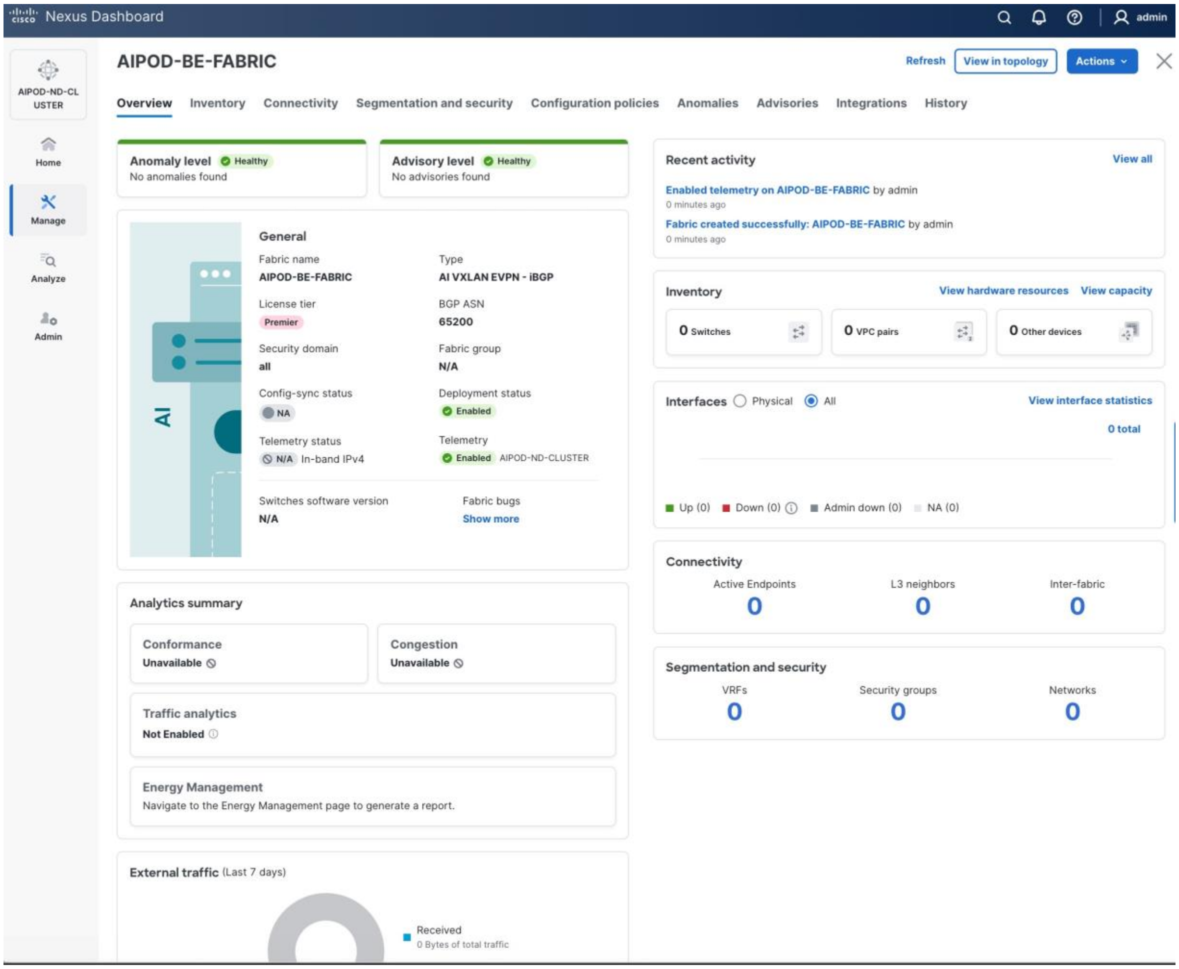
Create/Onboard Fabric

All done!

The fabric AIPOD-BE-FABRIC, has successfully been created/onboarded to Nexus Dashboard.

You can modify any of these settings from Manage > Fabrics > Actions by clicking 'Edit Fabric Settings'

Step 20. Click **View Fabric Details** to see the dashboard for the newly created BE Fabric.



AIPOD-BE-FABRIC

Anomaly level Healthy
No anomalies found

Advisory level Healthy
No advisories found

General

Fabric name: AIPOD-BE-FABRIC

Type: AI VXLAN EVPN - iBGP

License tier: Premier

BGP ASN: 65200

Security domain: all

Fabric group: N/A

Config-sync status: NA

Deployment status: Enabled

Telemetry status: N/A In-band IPv4

Telemetry: Enabled AIPOD-ND-CLUSTER

Switches software version: N/A

Fabric bugs: Show more

Analytics summary

Conformance: Unavailable

Congestion: Unavailable

Traffic analytics: Not Enabled

Energy Management: Navigate to the Energy Management page to generate a report.

External traffic (Last 7 days)

Received
0 Bytes of total traffic

Recent activity

Enabled telemetry on AIPOD-BE-FABRIC by admin
0 minutes ago

Fabric created successfully: AIPOD-BE-FABRIC by admin
0 minutes ago

Inventory

0 Switches | 0 VPC pairs | 0 Other devices

Interfaces ○ Physical ● All

0 total

🟩 Up (0) 🟥 Down (0) ■ Admin down (0) □ NA (0)

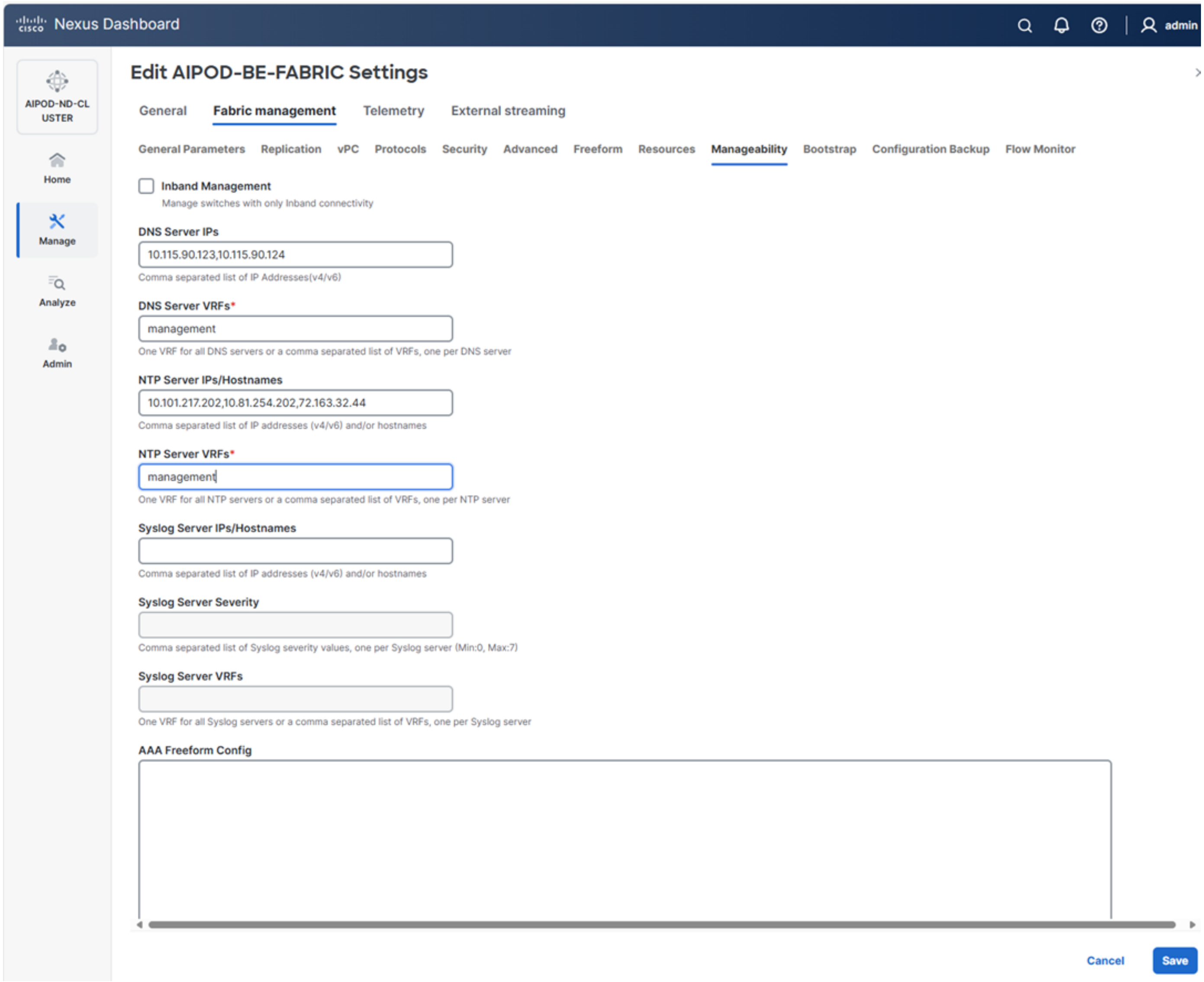
Connectivity

Active Endpoints	L3 neighbors	Inter-fabric
0	0	0

Segmentation and security

VRFs	Security groups	Networks
0	0	0

Step 21. Select **Manage** > **Fabrics** on the left and then select the BE fabric. From the Actions drop-down list, select **Edit fabric** settings. Select the **Fabric management** tab and the **Manageability** tab underneath. Add the NTP Server IPs and the NTP Server VRF (management) and click **Save**.



Edit AIPOD-BE-FABRIC Settings

□ Inband Management
Manage switches with only Inband connectivity

DNS Server IPs: 10.115.90.123,10.115.90.124
Comma separated list of IP Addresses(v4/v6)

DNS Server VRFs*: management
One VRF for all DNS servers or a comma separated list of VRFs, one per DNS server

NTP Server IPs/Hostnames: 10.101.217.202,10.81.254.202,72.163.32.44
Comma separated list of IP addresses (v4/v6) and/or hostnames

NTP Server VRFs*: management
One VRF for all NTP servers or a comma separated list of VRFs, one per NTP server

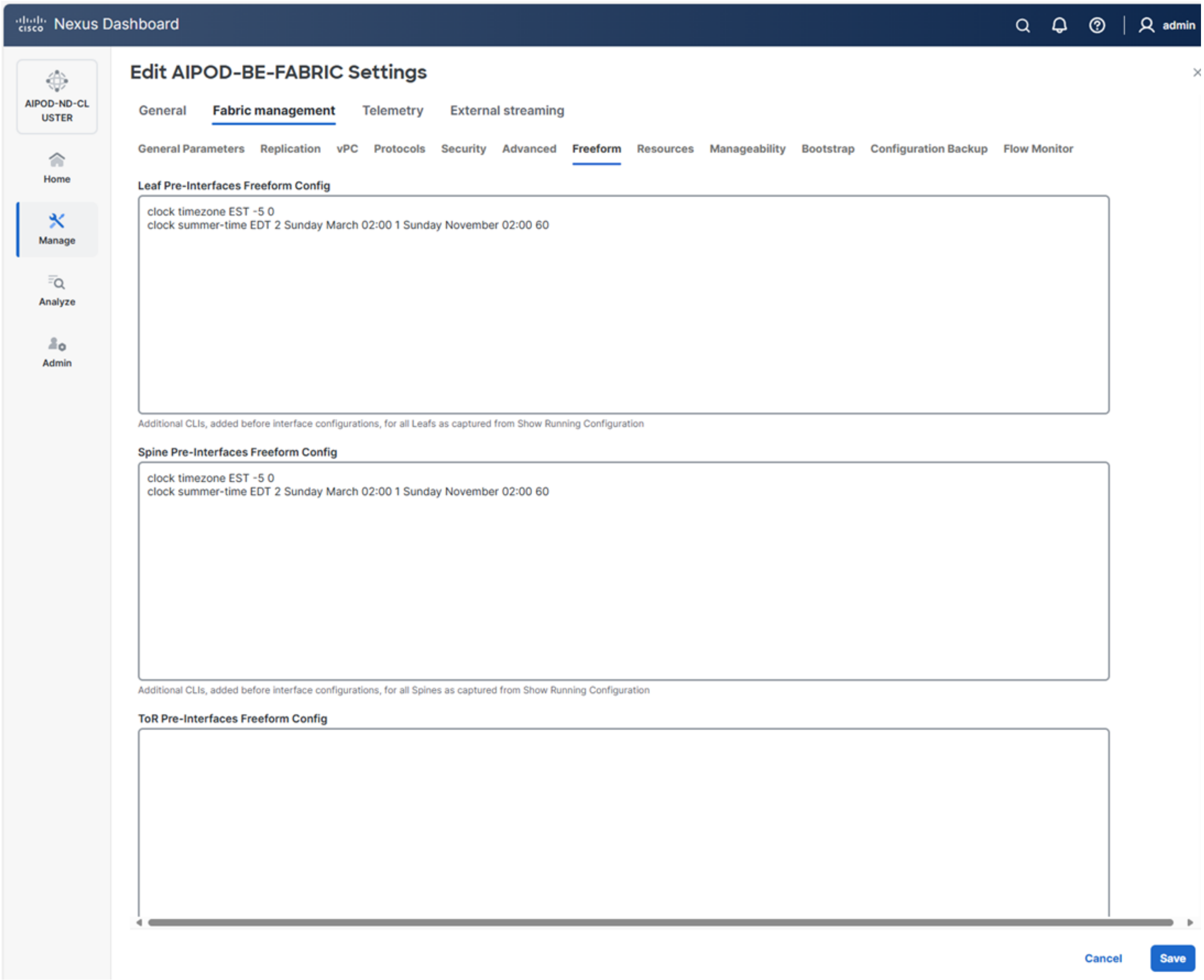
Syslog Server IPs/Hostnames:
Comma separated list of IP addresses (v4/v6) and/or hostnames

Syslog Server Severity:
Comma separated list of Syslog severity values, one per Syslog server (Min:0, Max:7)

Syslog Server VRFs:
One VRF for all Syslog servers or a comma separated list of VRFs, one per Syslog server

AAA Freeform Config

Step 22. Select the **Freeform** tab and optionally enter the info shown in the screenshot modified for your timezone. Click **Save**.



Leaf Pre-Interfaces Freeform Config

```
clock timezone EST -5 0
clock summer-time EDT 2 Sunday March 02:00 1 Sunday November 02:00 60
```

Additional CLIs, added before interface configurations, for all Leafs as captured from Show Running Configuration

Spine Pre-Interfaces Freeform Config

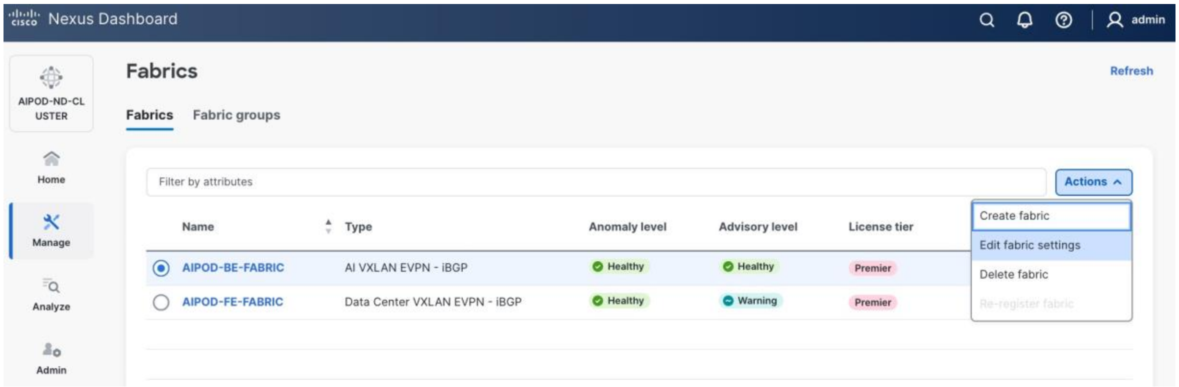
```
clock timezone EST -5 0
clock summer-time EDT 2 Sunday March 02:00 1 Sunday November 02:00 60
```

Additional CLIs, added before interface configurations, for all Spines as captured from Show Running Configuration

ToR Pre-Interfaces Freeform Config

Procedure 2. Add Spine and Leaf switches to the BE Fabric

Step 1. If you want to add switches without a reload, go to **Manage** > **Fabrics**.

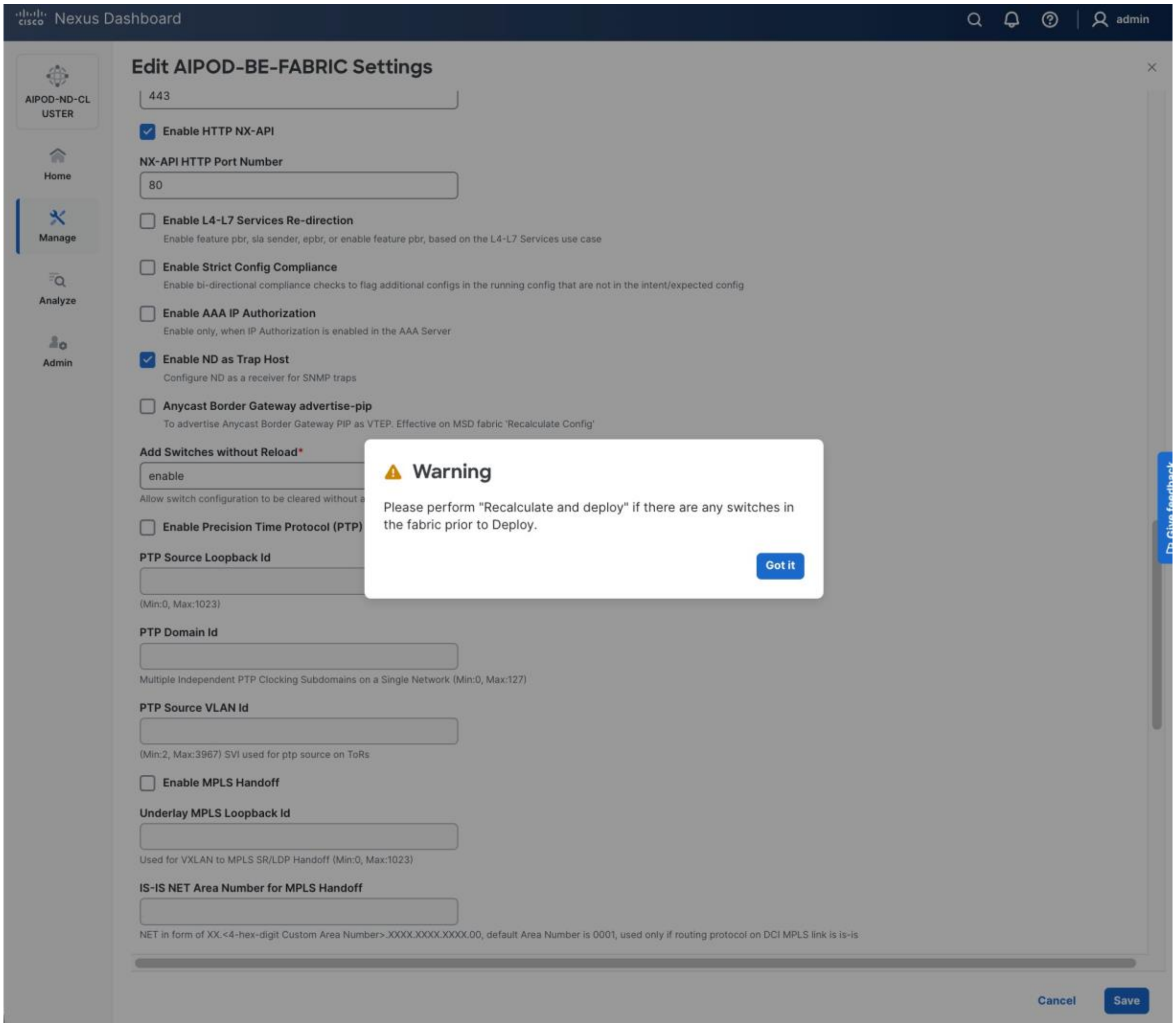


	Name	Type	Anomaly level	Advisory level	License tier
●	AIPOD-BE-FABRIC	AI VXLAN EVPN - iBGP	Healthy	Healthy	Premier
○	AIPOD-FE-FABRIC	Data Center VXLAN EVPN - iBGP	Healthy	Warning	Premier

Step 2. From the Actions menu, select **Edit Fabric Settings.**

Step 3. Click **Fabric Management** > **Advanced** tabs and scroll down to find the field for Add switches without Reload and change setting to **Enable.** Click **Save.**

Step 4. In the Warning message, click **Got it**.



Edit AIPOD-BE-FABRIC Settings

443

☑ Enable HTTP NX-API

NX-API HTTP Port Number: 80

□ Enable L4-L7 Services Re-direction
Enable feature pbr, sla sender, epbr, or enable feature pbr, based on the L4-L7 Services use case

□ Enable Strict Config Compliance
Enable bi-directional compliance checks to flag additional configs in the running config that are not in the intent/expected config

□ Enable AAA IP Authorization
Enable only, when IP Authorization is enabled in the AAA Server

☑ Enable ND as Trap Host
Configure ND as a receiver for SNMP traps

□ Anycast Border Gateway advertise-pip
To advertise Anycast Border Gateway PIP as VTEP. Effective on MSD fabric 'Recalculate Config'

Add Switches without Reload*: enable
Allow switch configuration to be cleared without a

□ Enable Precision Time Protocol (PTP)

PTP Source Loopback Id
(Min:0, Max:1023)

PTP Domain Id
Multiple Independent PTP Clocking Subdomains on a Single Network (Min:0, Max:127)

PTP Source VLAN Id
(Min:2, Max:3967) SVI used for ptp source on ToRs

□ Enable MPLS Handoff

Underlay MPLS Loopback Id
Used for VXLAN to MPLS SR/LDP Handoff (Min:0, Max:1023)

IS-IS NET Area Number for MPLS Handoff
NET in form of XX.<4-hex-digit Custom Area Number>.XXXX.XXXX.XXXX.00, default Area Number is 0001, used only if routing protocol on DCI MPLS link is is-is

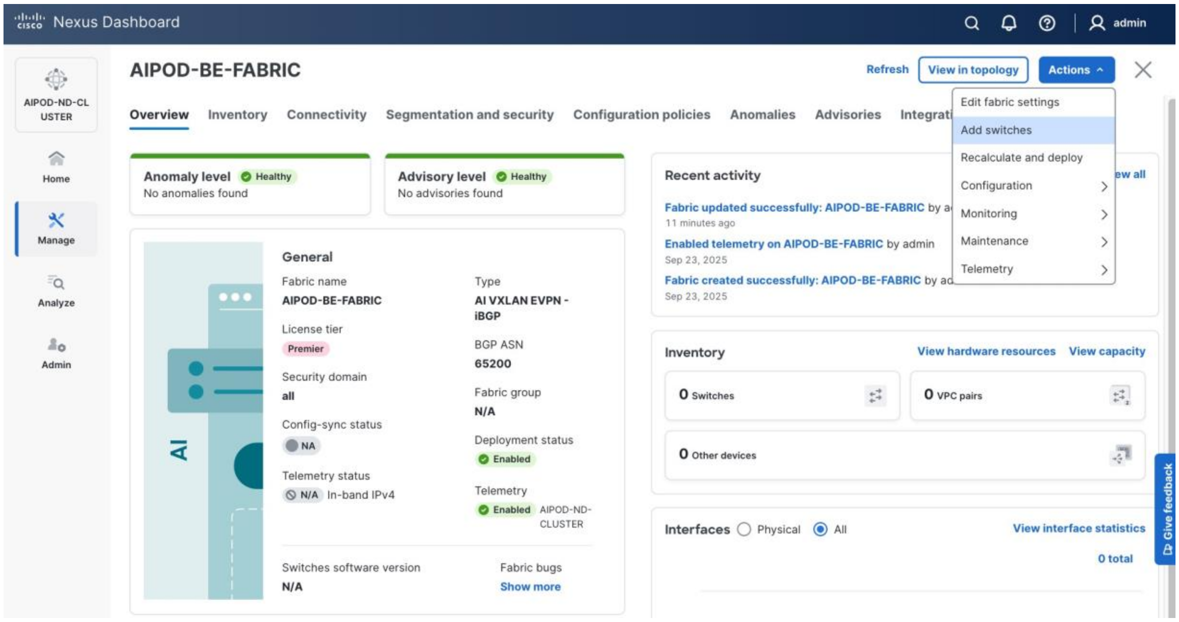
Cancel | Save

⚠ Warning

Please perform "Recalculate and deploy" if there are any switches in the fabric prior to Deploy.

Got it

Step 5. From the **Manage** > **Fabrics** view, click the **BE fabric name** to add switches to the fabric.



AIPOD-BE-FABRIC

Anomaly level: Healthy
No anomalies found

Advisory level: Healthy
No advisories found

General

Fabric name	Type
AIPOD-BE-FABRIC	AI VXLAN EVPN - iBGP

License tier: Premier
BGP ASN: 65200
Security domain: all
Fabric group: N/A
Config-sync status: NA
Deployment status: Enabled
Telemetry status: N/A In-band IPv4
Telemetry: Enabled AIPOD-ND-CLUSTER
Switches software version: N/A
Fabric bugs: Show more

Recent activity — ...ew all

Fabric updated successfully: AIPOD-BE-FABRIC by a
11 minutes ago

Enabled telemetry on AIPOD-BE-FABRIC by admin
Sep 23, 2025

Fabric created successfully: AIPOD-BE-FABRIC by ad
Sep 23, 2025

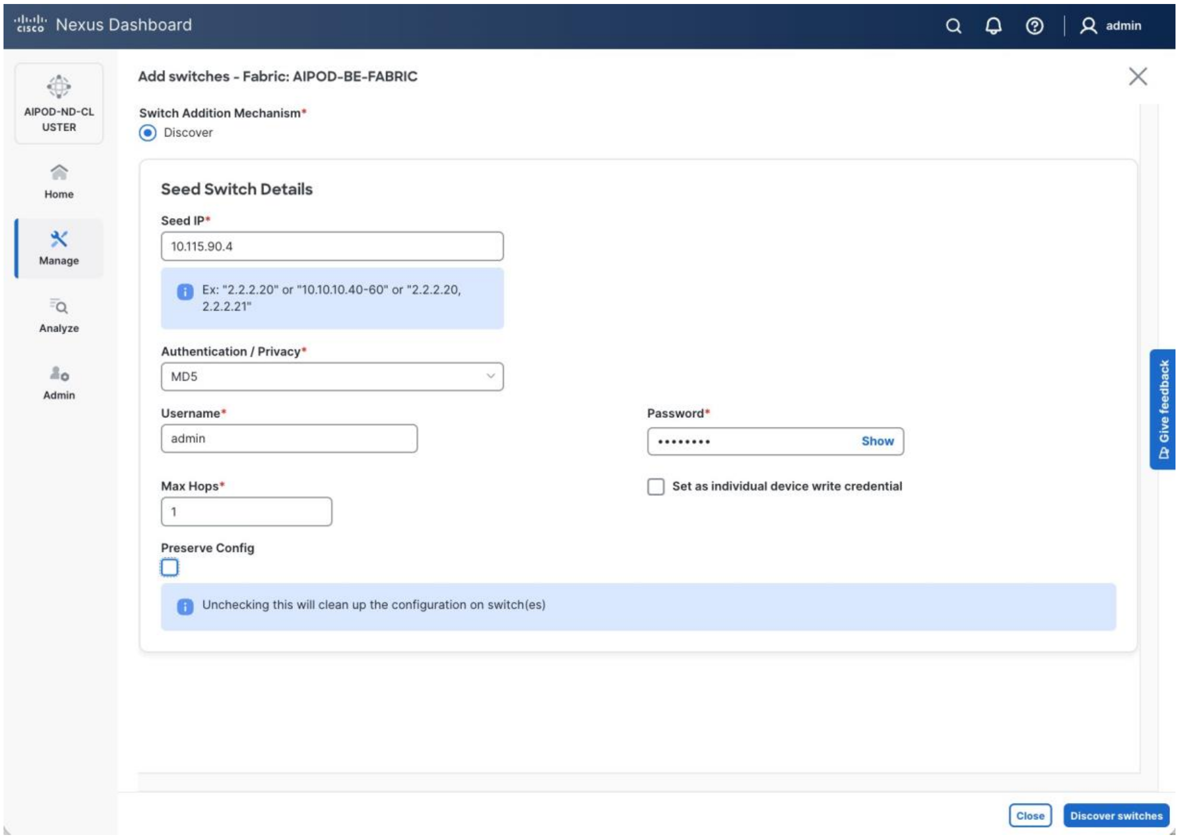
Inventory — View hardware resources | View capacity

0 Switches
0 VPC pairs
0 Other devices

Interfaces ○ Physical ● All — View interface statistics
0 total

Step 6. Click **Actions** > **Add** switches. Specify the following:

- Seed IP
- Username and Password
- Number of hops
- Uncheck Preserver Config



Add switches - Fabric: AIPOD-BE-FABRIC

Switch Addition Mechanism*
● Discover

Seed Switch Details

Seed IP*: 10.115.90.4

Ex: "2.2.2.20" or "10.10.10.40-60" or "2.2.2.20, 2.2.2.21"

Authentication / Privacy*: MD5

Username*: admin

Password*: •••••••• Show

Max Hops*: 1

□ Set as individual device write credential

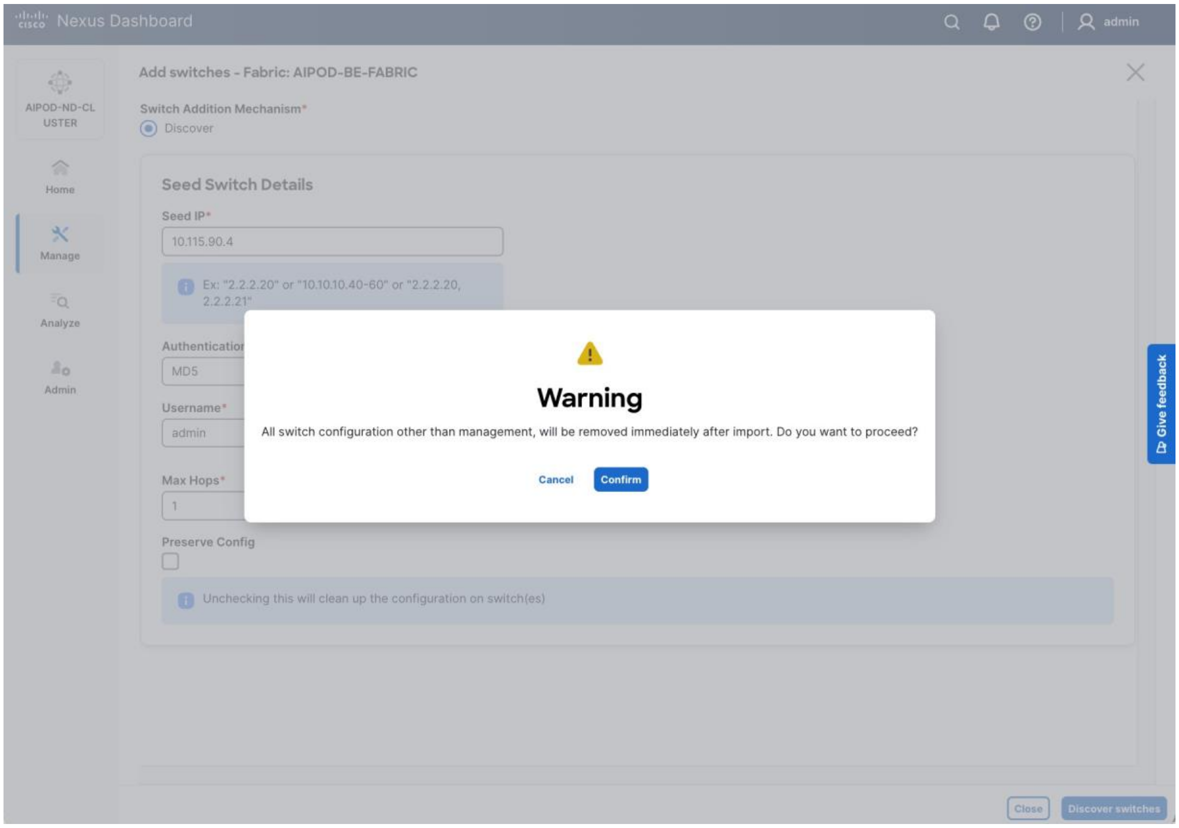
Preserve Config
□

Unchecking this will clean up the configuration on switch(es)

Close | Discover switches

Step 7. Click **Discover Switches**.

Step 8. Click **Confirm**. Filter the discovered switch list as needed to view just the switches you want to add.



Add switches - Fabric: AIPOD-BE-FABRIC

Switch Addition Mechanism*

● Discover

Seed Switch Details

Seed IP*: 10.115.90.4

Ex: "2.2.2.20" or "10.10.10.40-60" or "2.2.2.20, 2.2.2.21"

Authentication: MD5

Username*: admin

Max Hops*: 1

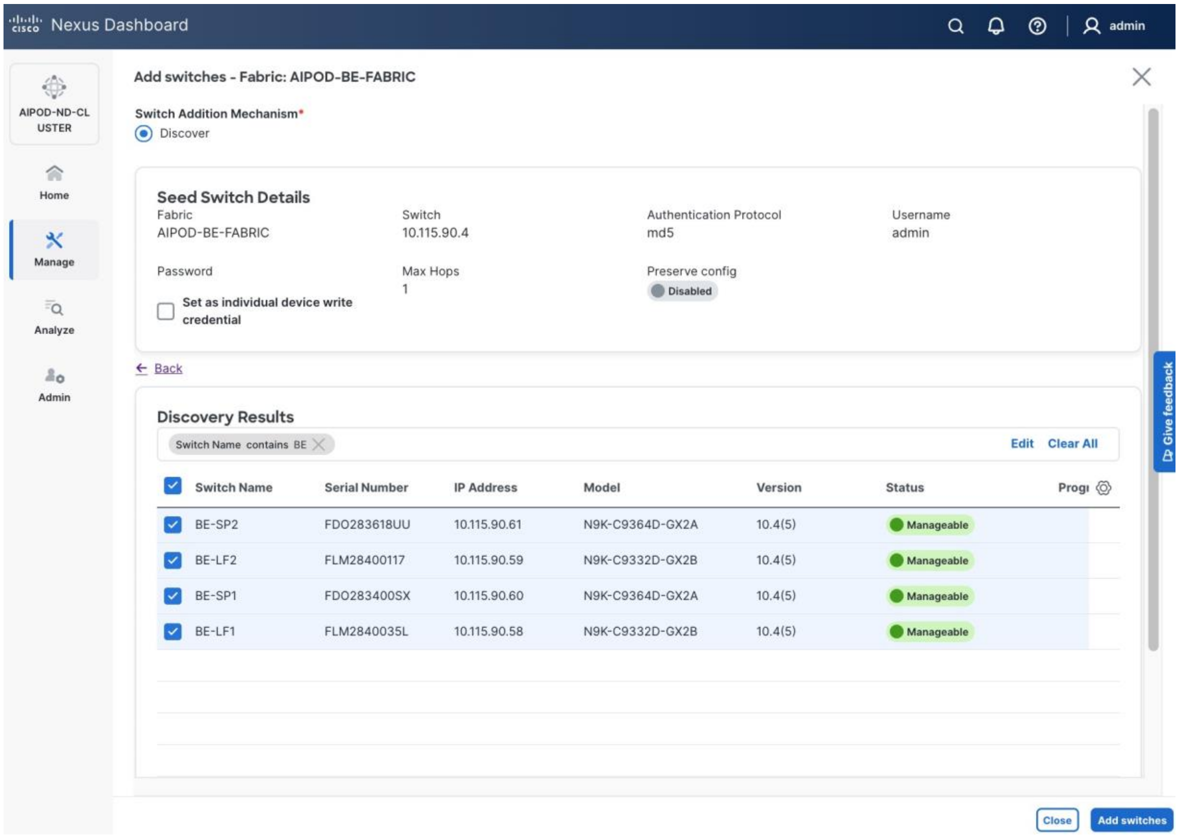
Preserve Config: □

Unchecking this will clean up the configuration on switch(es)

Warning

All switch configuration other than management, will be removed immediately after import. Do you want to proceed?

Step 9. Select the switches to add to the BE Cluster.



Add switches - Fabric: AIPOD-BE-FABRIC

Switch Addition Mechanism*

● Discover

Seed Switch Details

Fabric	Switch	Authentication Protocol	Username
AIPOD-BE-FABRIC	10.115.90.4	md5	admin
Password	Max Hops	Preserve config	
□ Set as individual device write credential	1	Disabled	

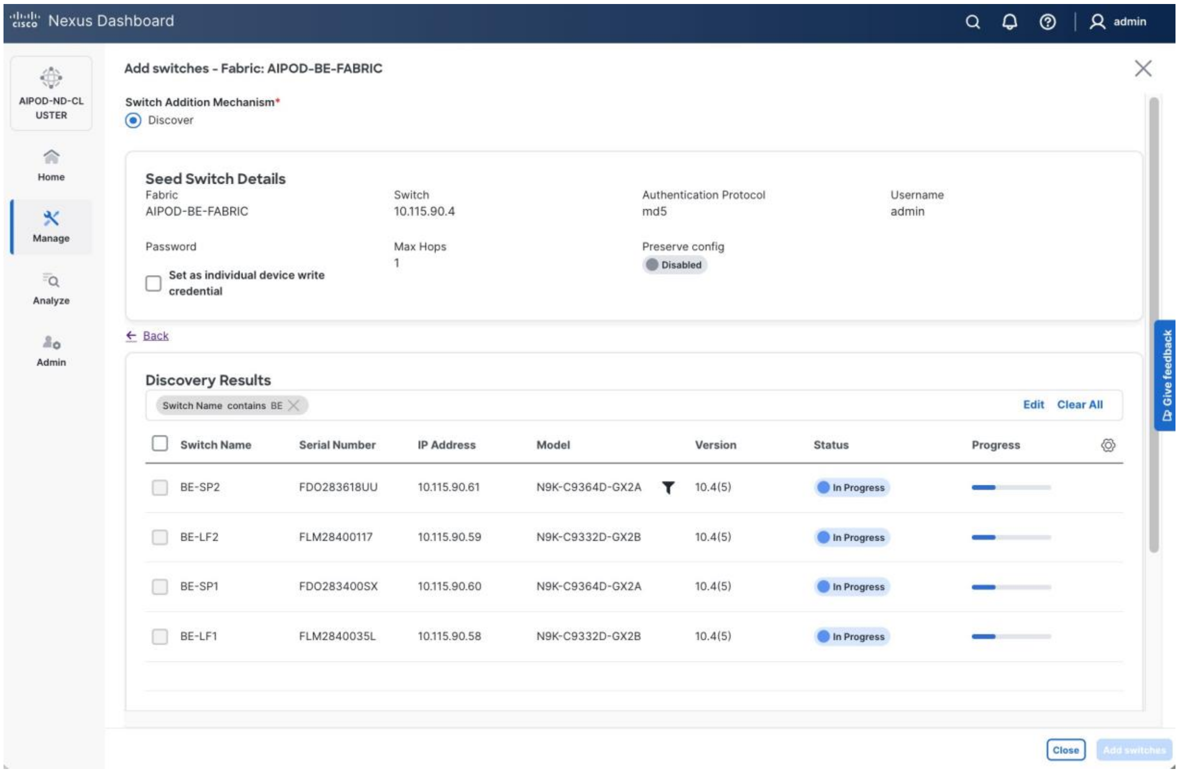
← Back

Discovery Results

Switch Name contains BE

☑	Switch Name	Serial Number	IP Address	Model	Version	Status	Progı
☑	BE-SP2	FDO283618UU	10.115.90.61	N9K-C9364D-GX2A	10.4(5)	Manageable	
☑	BE-LF2	FLM28400117	10.115.90.59	N9K-C9332D-GX2B	10.4(5)	Manageable	
☑	BE-SP1	FDO283400SX	10.115.90.60	N9K-C9364D-GX2A	10.4(5)	Manageable	
☑	BE-LF1	FLM2840035L	10.115.90.58	N9K-C9332D-GX2B	10.4(5)	Manageable	

Step 10. Click **Add Switches.**



Add switches - Fabric: AIPOD-BE-FABRIC

Switch Addition Mechanism*

● Discover

Seed Switch Details

Fabric AIPOD-BE-FABRIC	Switch 10.115.90.4	Authentication Protocol md5	Username admin
Password	Max Hops 1	Preserve config Disabled	

□ Set as individual device write credential

Discovery Results

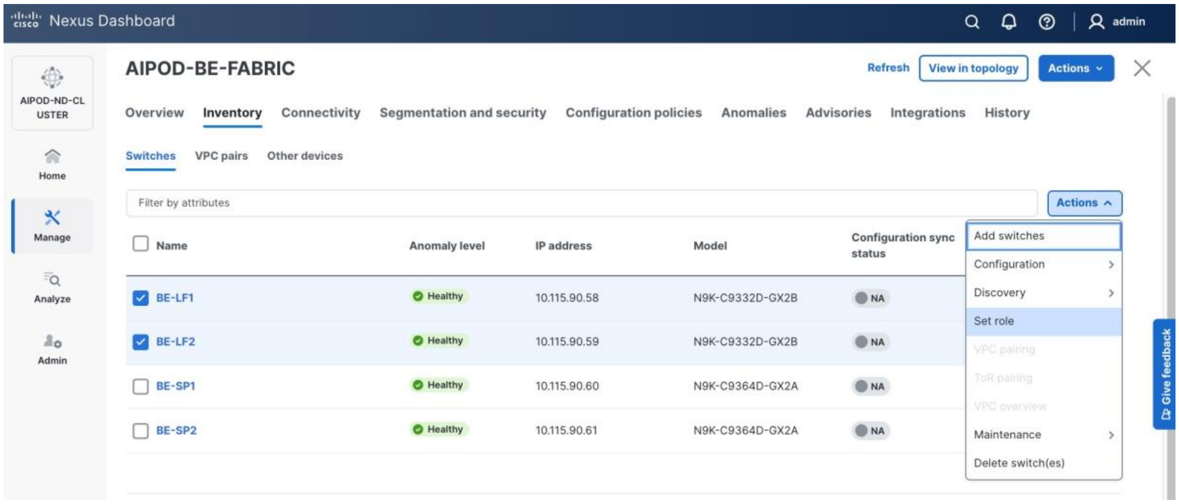
Switch Name contains BE

□	Switch Name	Serial Number	IP Address	Model	Version	Status	Progress
□	BE-SP2	FDO283618UU	10.115.90.61	N9K-C9364D-GX2A	10.4(5)	In Progress	
□	BE-LF2	FLM28400117	10.115.90.59	N9K-C9332D-GX2B	10.4(5)	In Progress	
□	BE-SP1	FDO283400SX	10.115.90.60	N9K-C9364D-GX2A	10.4(5)	In Progress	
□	BE-LF1	FLM2840035L	10.115.90.58	N9K-C9332D-GX2B	10.4(5)	In Progress	

Step 11. When the Status changes from Status to Switch Added, click **Close**.

Step 12. From the **Manage** > **Fabrics**, select the **fabric** and click **Inventory** tab.

Step 13. For each switch in the list, verify **Role** is correct.



AIPOD-BE-FABRIC

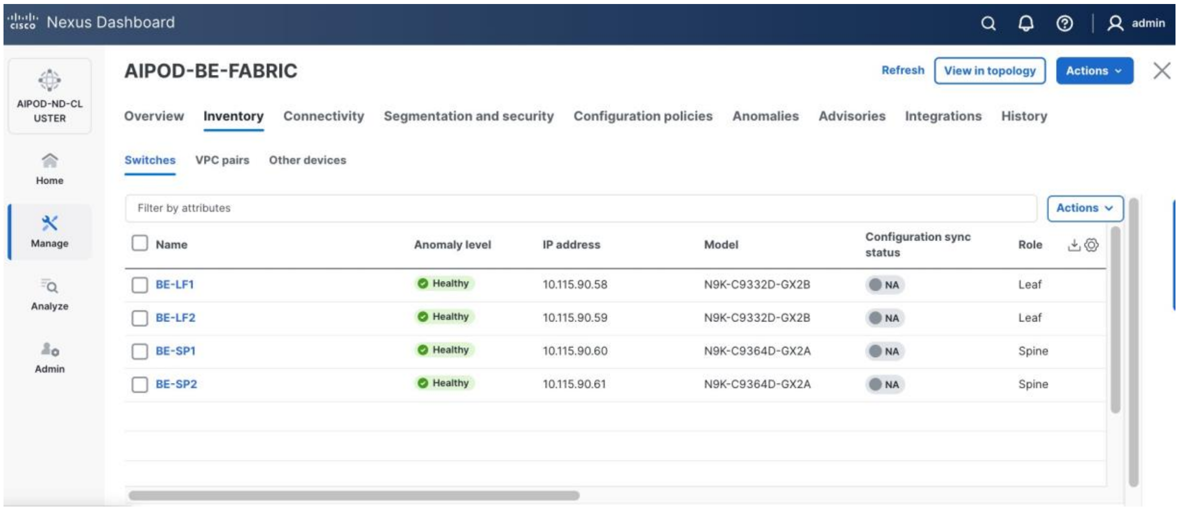
□	Name	Anomaly level	IP address	Model	Configuration sync status
☑	BE-LF1	Healthy	10.115.90.58	N9K-C9332D-GX2B	NA
☑	BE-LF2	Healthy	10.115.90.59	N9K-C9332D-GX2B	NA
□	BE-SP1	Healthy	10.115.90.60	N9K-C9364D-GX2A	NA
□	BE-SP2	Healthy	10.115.90.61	N9K-C9364D-GX2A	NA

Step 14. To change the role, select the **switch** and then click **Actions** and select **Set role** from the drop-down list.

Step 15. In the Select Role pop-up window, select the correct **role** from the list and click **Select**.

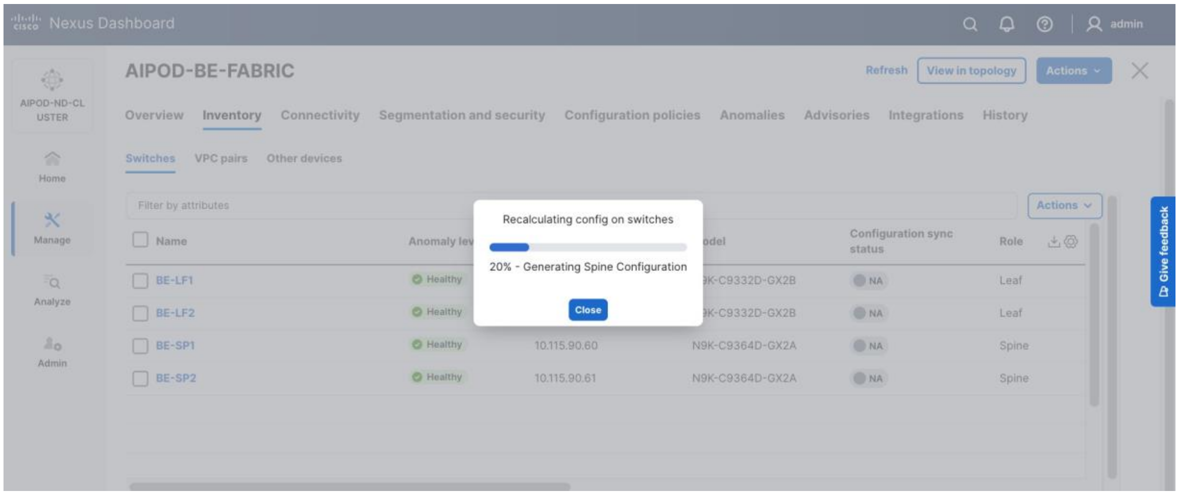
Step 16. Click **OK** in the pop-up warning to perform **Recalculate and deploy** to complete the change.

Step 17. Repeat steps 14 - 16 to select role for all switches in the fabric.



Name	Anomaly level	IP address	Model	Configuration sync status	Role
BE-LF1	Healthy	10.115.90.58	N9K-C9332D-GX2B	NA	Leaf
BE-LF2	Healthy	10.115.90.59	N9K-C9332D-GX2B	NA	Leaf
BE-SP1	Healthy	10.115.90.60	N9K-C9364D-GX2A	NA	Spine
BE-SP2	Healthy	10.115.90.61	N9K-C9364D-GX2A	NA	Spine

Step 18. Click the main **Actions** button and select Recalculate and deploy from the drop-down list. If it says one is already in progress, wait a few minutes and repeat the steps.

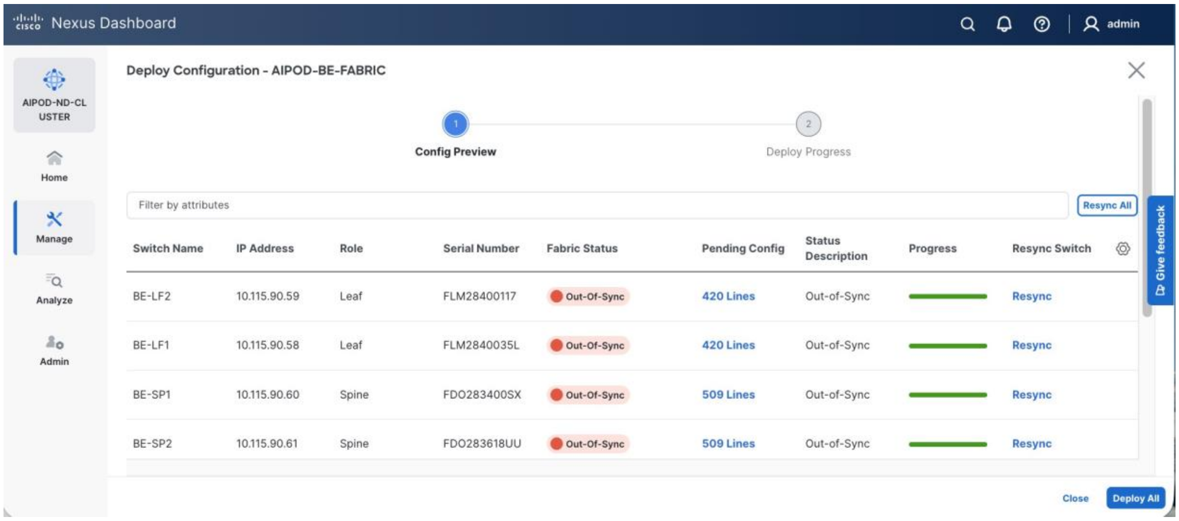


Recalculating config on switches

20% - Generating Spine Configuration

Close

You should see the Fabric as Out-of-sync with some Pending Config (lines of config) changes from the recalculation as shown below:

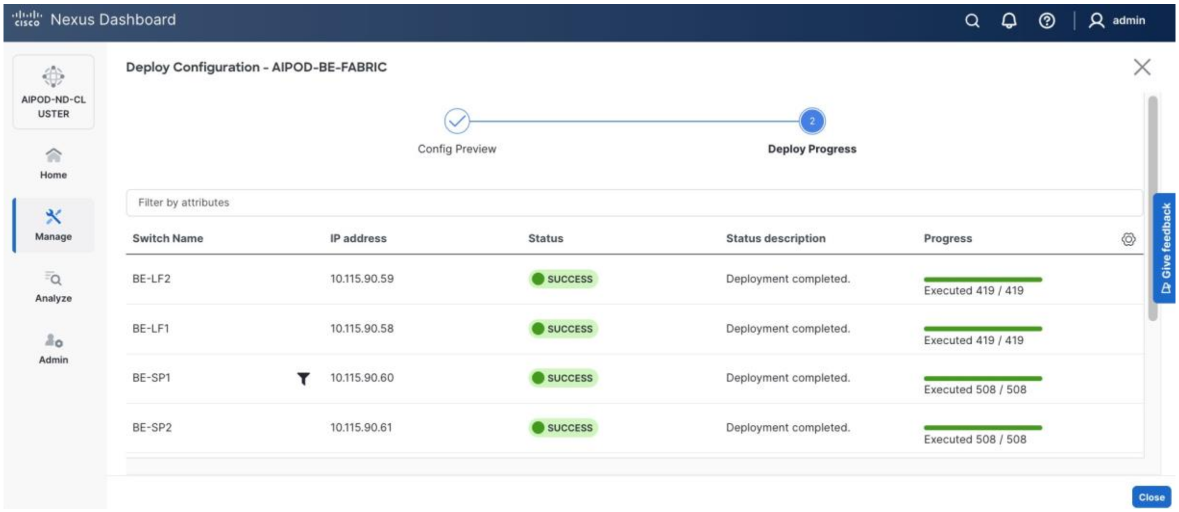


Deploy Configuration - AIPOD-BE-FABRIC

Switch Name	IP Address	Role	Serial Number	Fabric Status	Pending Config	Status Description	Progress	Resync Switch
BE-LF2	10.115.90.59	Leaf	FLM28400117	Out-Of-Sync	420 Lines	Out-of-Sync		Resync
BE-LF1	10.115.90.58	Leaf	FLM2840035L	Out-Of-Sync	420 Lines	Out-of-Sync		Resync
BE-SP1	10.115.90.60	Spine	FDO283400SX	Out-Of-Sync	509 Lines	Out-of-Sync		Resync
BE-SP2	10.115.90.61	Spine	FDO283618UU	Out-Of-Sync	509 Lines	Out-of-Sync		Resync

Step 19. Click the **Pending Config** lines for any of the switches to view the exact changes that will be deployed. Click **Close.**

Step 20. Click **Deploy All**.



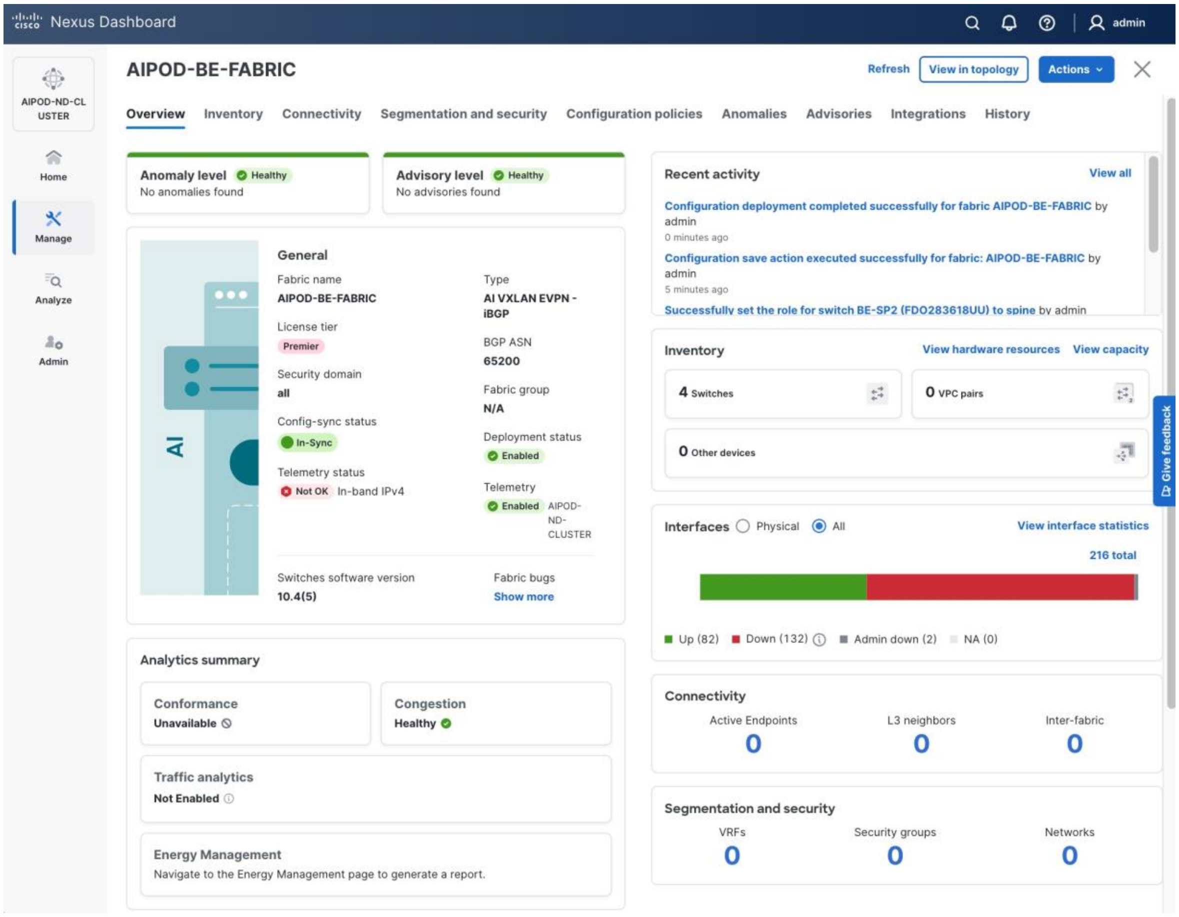
Deploy Configuration - AIPOD-BE-FABRIC

Config Preview → Deploy Progress

Filter by attributes

Switch Name	IP address	Status	Status description	Progress
BE-LF2	10.115.90.59	SUCCESS	Deployment completed.	Executed 419 / 419
BE-LF1	10.115.90.58	SUCCESS	Deployment completed.	Executed 419 / 419
BE-SP1	10.115.90.60	SUCCESS	Deployment completed.	Executed 508 / 508
BE-SP2	10.115.90.61	SUCCESS	Deployment completed.	Executed 508 / 508

Step 21. When the configuration deployment completes successfully, click **Close**.



AIPOD-BE-FABRIC

Anomaly level Healthy
No anomalies found

Advisory level Healthy
No advisories found

General

Fabric name: AIPOD-BE-FABRIC
Type: AI VXLAN EVPN - iBGP
License tier: Premier
BGP ASN: 65200
Security domain: all
Fabric group: N/A
Config-sync status: In-Sync
Deployment status: Enabled
Telemetry status: Not OK In-band IPv4
Telemetry: Enabled AIPOD-ND-CLUSTER
Switches software version: 10.4(5)
Fabric bugs: Show more

Recent activity — View all

Configuration deployment completed successfully for fabric AIPOD-BE-FABRIC by admin
0 minutes ago

Configuration save action executed successfully for fabric: AIPOD-BE-FABRIC by admin
5 minutes ago

Successfully set the role for switch BE-SP2 (FDO283618UU) to spine by admin

Inventory — View hardware resources — View capacity

4 Switches
0 VPC pairs
0 Other devices

Interfaces ○ Physical ● All — View interface statistics

216 total

🟩 Up (82) 🟥 Down (132) ■ Admin down (2) ■ NA (0)

Analytics summary

Conformance: Unavailable
Congestion: Healthy
Traffic analytics: Not Enabled
Energy Management: Navigate to the Energy Management page to generate a report.

Connectivity

Active Endpoints: 0
L3 neighbors: 0
Inter-fabric: 0

Segmentation and security

VRFs: 0
Security groups: 0
Networks: 0

Procedure 3. Review fabric state and upgrade software as needed

Step 1. ND may identify issues in hardware, connectivity, software and so on, reflected by the Anomaly level. To view the flagged anomalies, go to **Anomalies in the top menu bar**. Address each anomaly to prevent issues later, either by resolving them or acknowledging them.

Step 2. Review the **Advisories** and resolve or acknowledge them.

Step 3. Evaluate and upgrade to the most current Cisco recommended Nexus OS release.

Step 4. The BE fabric is now ready for connecting to UCS GPU nodes to enable GPU-to-GPU communication across the BE fabric.

Modify QoS Policy on BE Fabric

Assumptions/Prerequisites

Assumes that you have selected the AI Fabric template with default QoS policy enabled. This section will modify this default policy for the software version used in this CVD.

Setup Information

Table 20. Setup Information for BE Fabric QoS

Parameter Type	Parameter Name | Value	Parameter Type / Other Info
QoS Policy Template		
Default/Original Policy Template Name	400G | AI_Fabric_QOS_400G	
New Policy Template Name	AIPOD-BE-QOS-400G	
PFC MTU	9216	Default for this release: 4200
Bandwidth Percent for 'c-out-8q-q3'	90	Default = 50
Bandwidth Percent for 'c-out-8q-q-default'	90	Default = 50

Deployment Steps

To change the QoS policy deployed in the backend fabric, follow the procedures below using the setup information provided above.

Procedure 1. Create new template from default QoS policy template

Step 1. Use a web browser to navigate to **Cisco Nexus Dashboard**. Use the management IP of any node in the ND cluster. Log in using **admin** account.

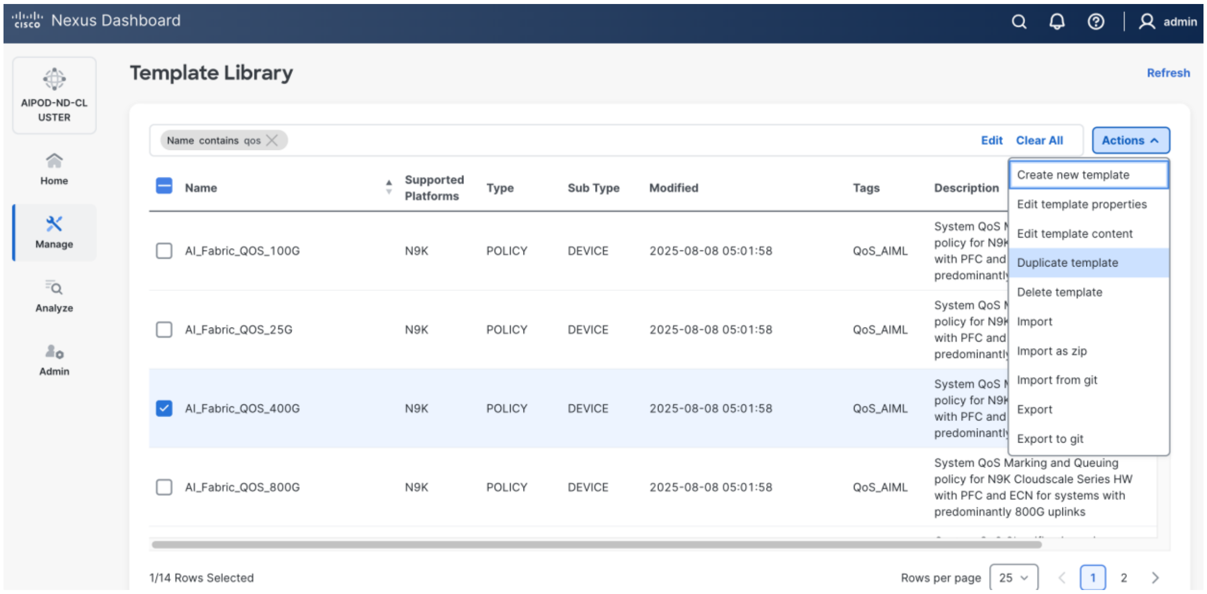
Step 2. Navigate to **Manage > Template** Library.

Step 3. Filter on **'QOS'** in top search bar.

Step 4. Select the default QoS policy that was applied when the BE fabric was deployed using the default AI fabric template.

Step 5. Click **Actions**.

Step 6. Select **Duplicate template** from the drop-down list.



Template Library

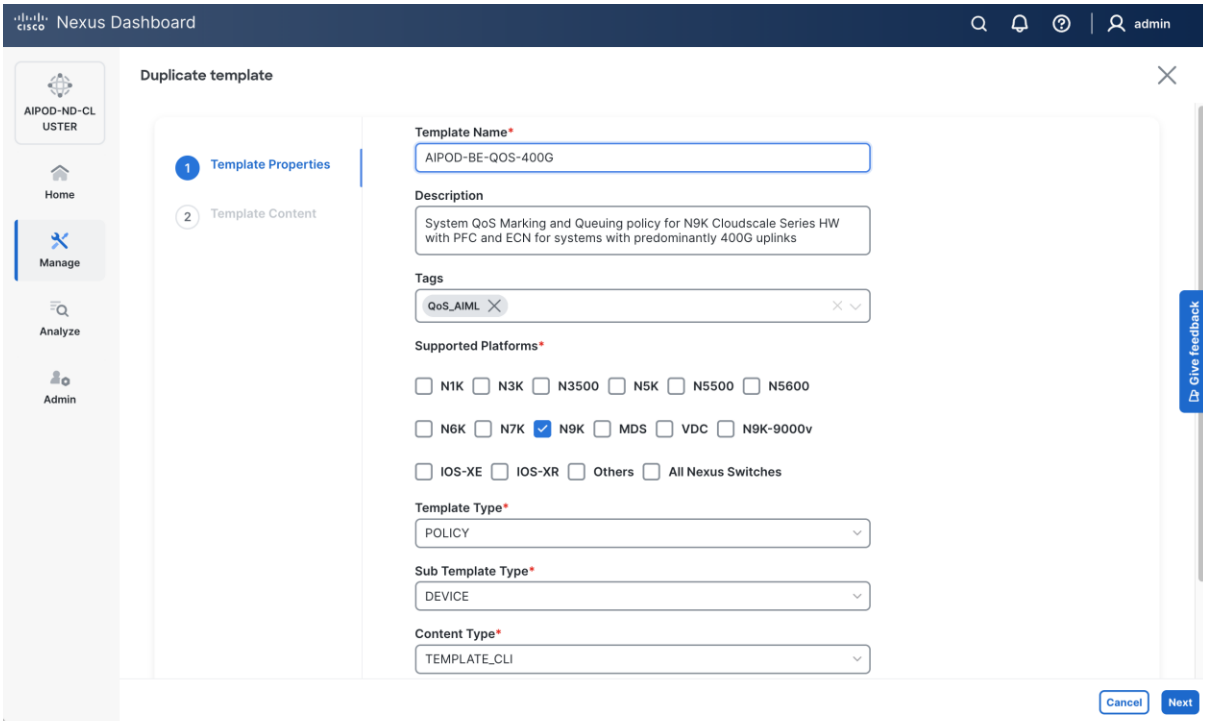
Name contains qos

☐	Name	Supported Platforms	Type	Sub Type	Modified	Tags	Description
☐	AI_Fabric_QOS_100G	N9K	POLICY	DEVICE	2025-08-08 05:01:58	QoS_AIML	System QoS M policy for N9K with PFC and predominantly
☐	AI_Fabric_QOS_25G	N9K	POLICY	DEVICE	2025-08-08 05:01:58	QoS_AIML	System QoS M policy for N9K with PFC and predominantly
☑	AI_Fabric_QOS_400G	N9K	POLICY	DEVICE	2025-08-08 05:01:58	QoS_AIML	System QoS M policy for N9K with PFC and predominantly
☐	AI_Fabric_QOS_800G	N9K	POLICY	DEVICE	2025-08-08 05:01:58	QoS_AIML	System QoS Marking and Queuing policy for N9K Cloudscale Series HW with PFC and ECN for systems with predominantly 800G uplinks

1/14 Rows Selected

Rows per page 25 | 1 2

Step 7. In the **Template Properties** section, specify a **new** name for the QoS policy template.



Duplicate template

1 Template Properties

2 Template Content

Template Name*: AIPOD-BE-QOS-400G

Description: System QoS Marking and Queuing policy for N9K Cloudscale Series HW with PFC and ECN for systems with predominantly 400G uplinks

Tags: QoS_AIML

Supported Platforms*

☐ N1K ☐ N3K ☐ N3500 ☐ N5K ☐ N5500 ☐ N5600

☐ N6K ☐ N7K ☑ N9K ☐ MDS ☐ VDC ☐ N9K-9000v

☐ IOS-XE ☐ IOS-XR ☐ Others ☐ All Nexus Switches

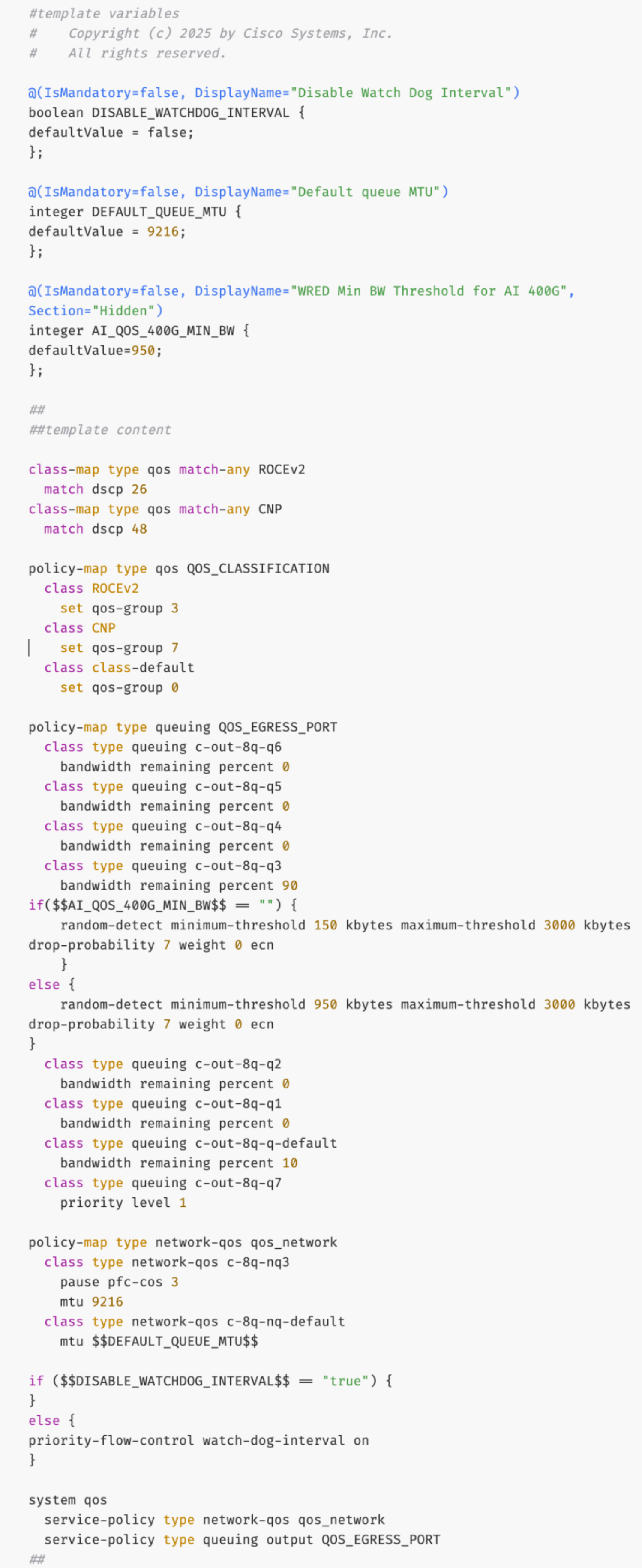
Template Type*: POLICY

Sub Template Type*: DEVICE

Content Type*: TEMPLATE_CLI

Step 8. In the **Template Content** section, modify the bandwidth percent for two queues: **c-out-8q-q3** to **90** and **c-out-8q-q** to **10.** Also, scroll down and change **PFC MTU** to **9216.**

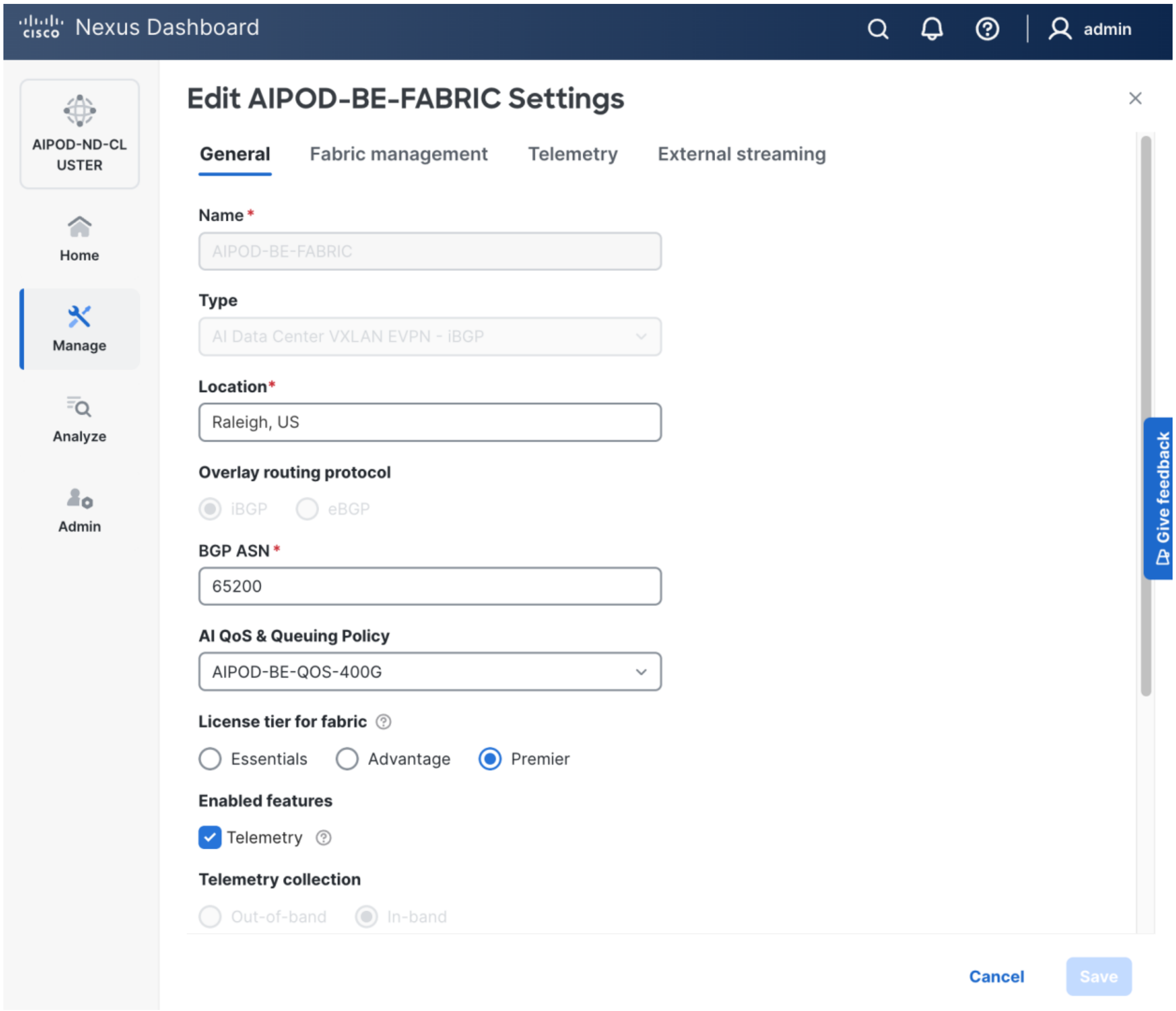
Note: Bandwidth Percent for the above queues can be adjusted as needed for your environment.



```
#template variables
#    Copyright (c) 2025 by Cisco Systems, Inc.
#    All rights reserved.

@(IsMandatory=false, DisplayName="Disable Watch Dog Interval")
boolean DISABLE_WATCHDOG_INTERVAL {
defaultValue = false;
};

@(IsMandatory=false, DisplayName="Default queue MTU")
integer DEFAULT_QUEUE_MTU {
defaultValue = 9216;
};

@(IsMandatory=false, DisplayName="WRED Min BW Threshold for AI 400G",
Section="Hidden")
integer AI_QOS_400G_MIN_BW {
defaultValue=950;
};

##
##template content

class-map type qos match-any ROCEv2
  match dscp 26
class-map type qos match-any CNP
  match dscp 48

policy-map type qos QOS_CLASSIFICATION
  class ROCEv2
    set qos-group 3
  class CNP
    set qos-group 7
  class class-default
    set qos-group 0

policy-map type queuing QOS_EGRESS_PORT
  class type queuing c-out-8q-q6
    bandwidth remaining percent 0
  class type queuing c-out-8q-q5
    bandwidth remaining percent 0
  class type queuing c-out-8q-q4
    bandwidth remaining percent 0
  class type queuing c-out-8q-q3
    bandwidth remaining percent 90
if($$AI_QOS_400G_MIN_BW$$ == "") {
    random-detect minimum-threshold 150 kbytes maximum-threshold 3000 kbytes
drop-probability 7 weight 0 ecn
    }
else {
    random-detect minimum-threshold 950 kbytes maximum-threshold 3000 kbytes
drop-probability 7 weight 0 ecn
}
  class type queuing c-out-8q-q2
    bandwidth remaining percent 0
  class type queuing c-out-8q-q1
    bandwidth remaining percent 0
  class type queuing c-out-8q-q-default
    bandwidth remaining percent 10
  class type queuing c-out-8q-q7
    priority level 1

policy-map type network-qos qos_network
  class type network-qos c-8q-nq3
    pause pfc-cos 3
    mtu 9216
  class type network-qos c-8q-nq-default
    mtu $$DEFAULT_QUEUE_MTU$$

if ($$DISABLE_WATCHDOG_INTERVAL$$ == "true") {
}
else {
priority-flow-control watch-dog-interval on
}

system qos
  service-policy type network-qos qos_network
  service-policy type queuing output QOS_EGRESS_PORT
##
```

Step 9. Go to **Manage > Fabrics**. Select the BE fabric from the list and click the **BE fabric name.**

Step 10. Go to **Actions** and **Edit Fabric Settings** from the drop-down list. In the **General** tab, select the **new** QoS policy template from the drop-down list for **AI QoS & Queueing Policy**.



Edit AIPOD-BE-FABRIC Settings

General | Fabric management | Telemetry | External streaming

Name *: AIPOD-BE-FABRIC

Type: AI Data Center VXLAN EVPN - iBGP

Location*: Raleigh, US

Overlay routing protocol: ● iBGP ○ eBGP

BGP ASN *: 65200

AI QoS & Queuing Policy: AIPOD-BE-QOS-400G

License tier for fabric: ○ Essentials ○ Advantage ● Premier

Enabled features: ☑ Telemetry

Telemetry collection: ○ Out-of-band ● In-band

Cancel | Save

Enable GPU-to-GPU Networking between UCS GPU Nodes across BE Fabric

Assumptions/Prerequisites

Setup Information

Table 21. Setup Information for GPU-to-GPU networking across BE Fabric

Parameter Type	Parameter Name | Value	Parameter Type / Other Info
BE Network		
Network Name	BE-MLPerf_VNI_33590	
Layer 2 Only	Enable checkbox	
Network ID	33590	
VLAN ID	3590	

Parameter Type	Parameter Name | Value	Parameter Type / Other Info
VLAN Name	BE-MLPerf_VLAN_3590	
Interface Description	BE-MLPerf_VLAN	
Ports Connecting to UCS Servers	Assumed to be same on all leaf switches	
Interface List	Ethernet 1/1-8	
Port type	Access port (int_access_host)	Default = trunk port (int_trunk_host)
Enable port type fast	Enable checkbox	

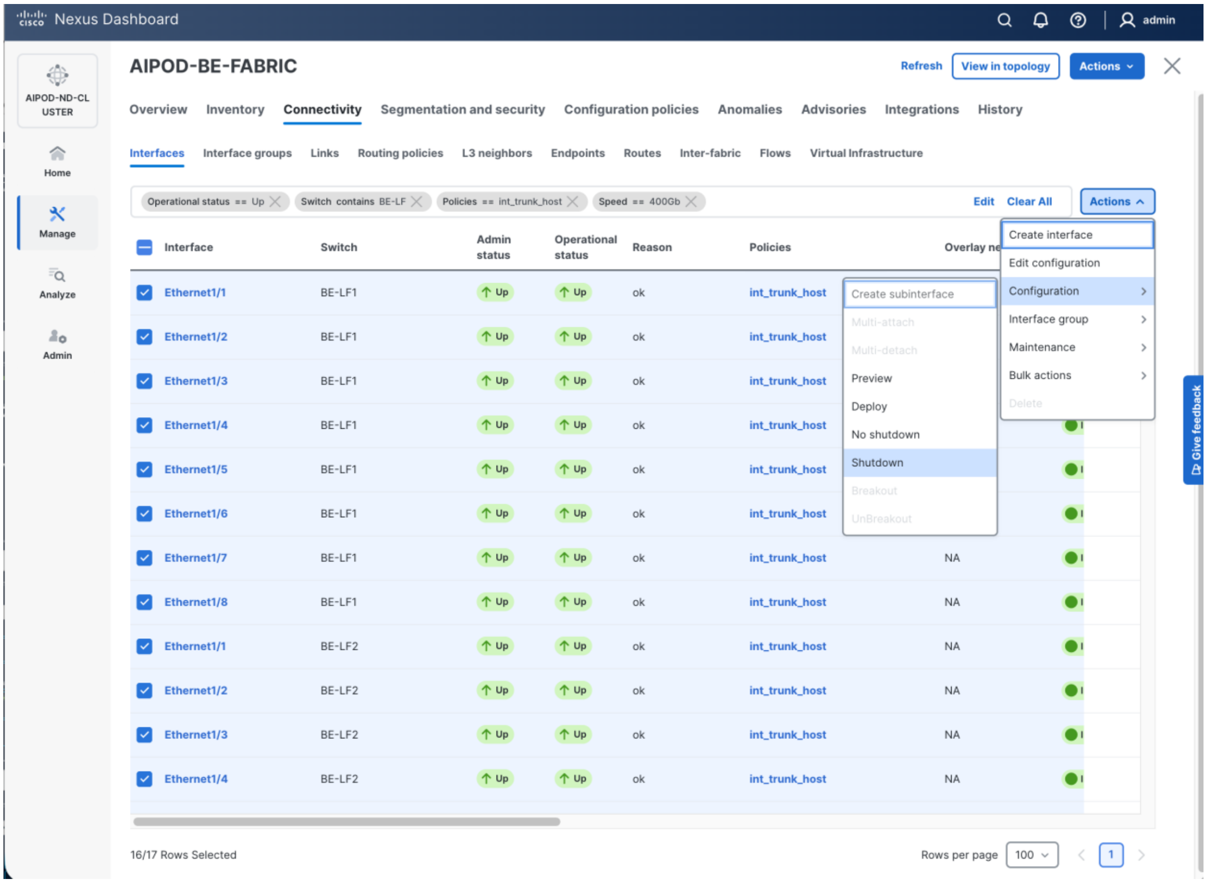
Deployment Steps

To enable GPU-to-GPU network between UCS GPU nodes across the backend fabric, follow the procedures below using the setup information previously provided.

Procedure 1. Configure ports going to UCS GPU nodes

Step 1. Filter the relevant interfaces going to UCS GPU nodes.

Step 2. Select the ports. Click the second of two **Actions** and select **Configuration** > **Shutdown** from the drop-down list to administratively shut the ports going to UCS GPU nodes.



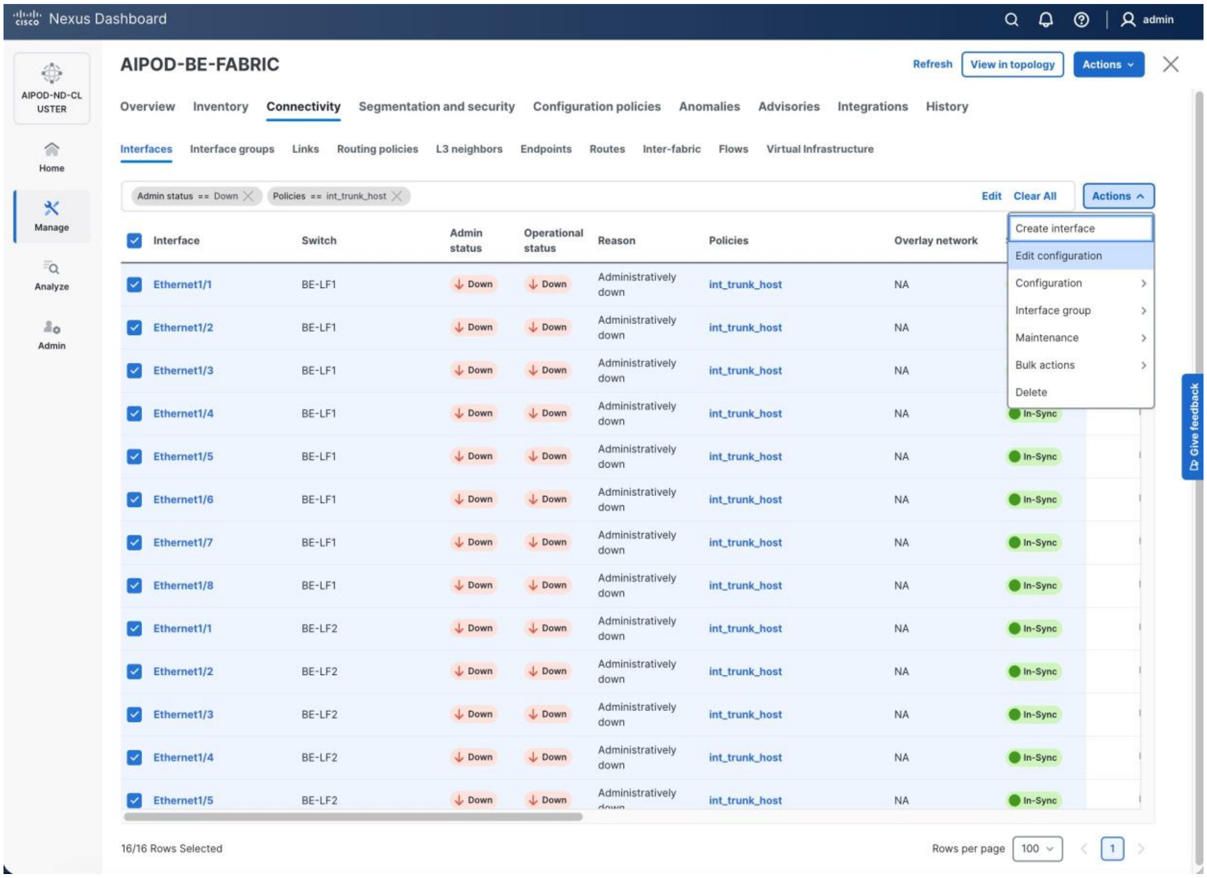
Operational status == Up | Switch contains BE-LF | Policies == int_trunk_host | Speed == 400Gb

Interface	Switch	Admin status	Operational status	Reason	Policies	Overlay ne
☑ Ethernet1/1	BE-LF1	↑ Up	↑ Up	ok	int_trunk_host	
☑ Ethernet1/2	BE-LF1	↑ Up	↑ Up	ok	int_trunk_host	
☑ Ethernet1/3	BE-LF1	↑ Up	↑ Up	ok	int_trunk_host	
☑ Ethernet1/4	BE-LF1	↑ Up	↑ Up	ok	int_trunk_host	
☑ Ethernet1/5	BE-LF1	↑ Up	↑ Up	ok	int_trunk_host	
☑ Ethernet1/6	BE-LF1	↑ Up	↑ Up	ok	int_trunk_host	
☑ Ethernet1/7	BE-LF1	↑ Up	↑ Up	ok	int_trunk_host	NA
☑ Ethernet1/8	BE-LF1	↑ Up	↑ Up	ok	int_trunk_host	NA
☑ Ethernet1/1	BE-LF2	↑ Up	↑ Up	ok	int_trunk_host	NA
☑ Ethernet1/2	BE-LF2	↑ Up	↑ Up	ok	int_trunk_host	NA
☑ Ethernet1/3	BE-LF2	↑ Up	↑ Up	ok	int_trunk_host	NA
☑ Ethernet1/4	BE-LF2	↑ Up	↑ Up	ok	int_trunk_host	NA

16/17 Rows Selected

Rows per page 100

Step 3. Select the shutdown ports. Click the second of two **Actions** and select **Edit Configuration** to configure all ports going to UCS GPU nodes.



Admin status == Down | Policies == int_trunk_host

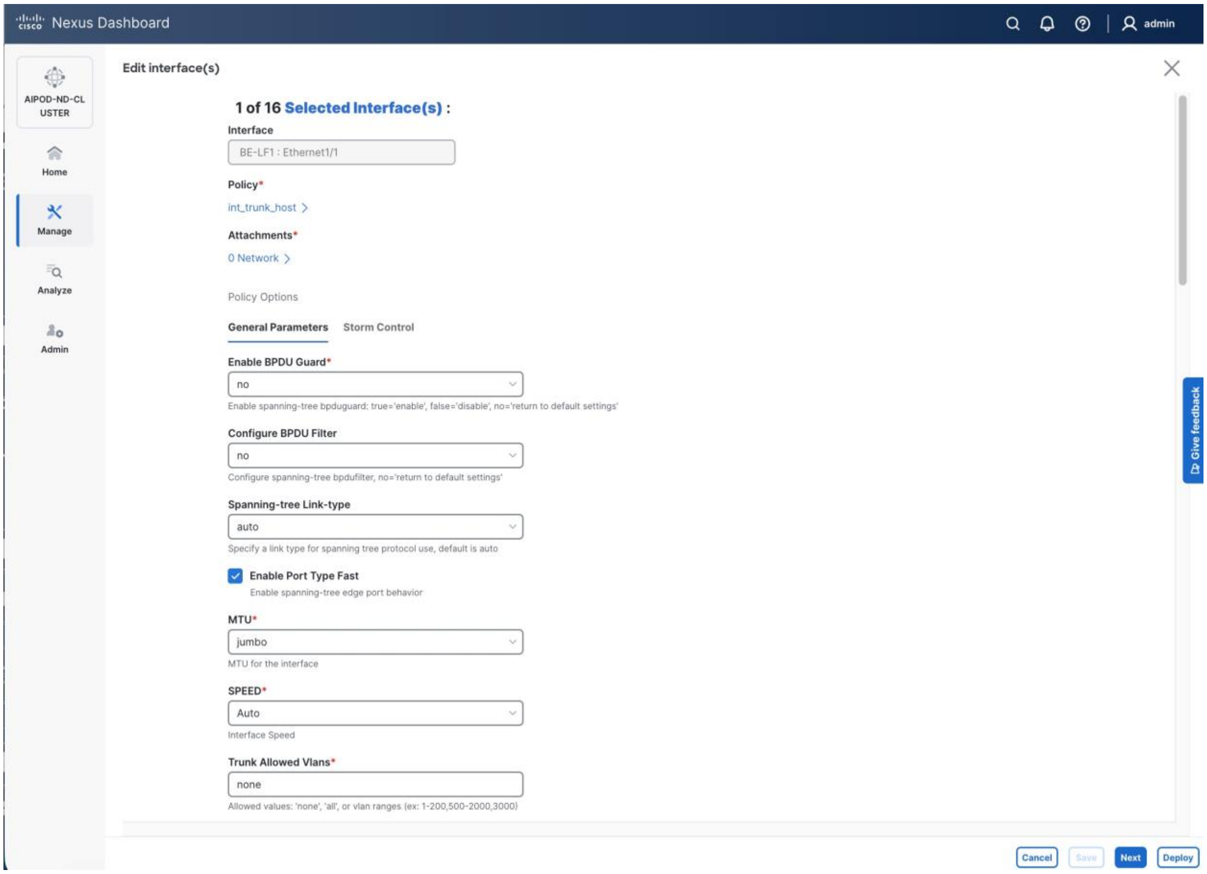
☑	Interface	Switch	Admin status	Operational status	Reason	Policies	Overlay network	
☑	Ethernet1/1	BE-LF1	↓ Down	↓ Down	Administratively down	int_trunk_host	NA	
☑	Ethernet1/2	BE-LF1	↓ Down	↓ Down	Administratively down	int_trunk_host	NA	
☑	Ethernet1/3	BE-LF1	↓ Down	↓ Down	Administratively down	int_trunk_host	NA	
☑	Ethernet1/4	BE-LF1	↓ Down	↓ Down	Administratively down	int_trunk_host	NA	● In-Sync
☑	Ethernet1/5	BE-LF1	↓ Down	↓ Down	Administratively down	int_trunk_host	NA	● In-Sync
☑	Ethernet1/6	BE-LF1	↓ Down	↓ Down	Administratively down	int_trunk_host	NA	● In-Sync
☑	Ethernet1/7	BE-LF1	↓ Down	↓ Down	Administratively down	int_trunk_host	NA	● In-Sync
☑	Ethernet1/8	BE-LF1	↓ Down	↓ Down	Administratively down	int_trunk_host	NA	● In-Sync
☑	Ethernet1/1	BE-LF2	↓ Down	↓ Down	Administratively down	int_trunk_host	NA	● In-Sync
☑	Ethernet1/2	BE-LF2	↓ Down	↓ Down	Administratively down	int_trunk_host	NA	● In-Sync
☑	Ethernet1/3	BE-LF2	↓ Down	↓ Down	Administratively down	int_trunk_host	NA	● In-Sync
☑	Ethernet1/4	BE-LF2	↓ Down	↓ Down	Administratively down	int_trunk_host	NA	● In-Sync
☑	Ethernet1/5	BE-LF2	↓ Down	↓ Down	Administratively down	int_trunk_host	NA	● In-Sync

16/16 Rows Selected

Rows per page 100

1

Step 4. Configure the first port going in the above list.



Edit interface(s)

1 of 16 Selected Interface(s) :

Interface: BE-LF1 : Ethernet1/1

Policy*: int_trunk_host

Attachments*: 0 Network

Policy Options

General Parameters | Storm Control

Enable BPDU Guard*: no
Enable spanning-tree bpduguard: true='enable', false='disable', no='return to default settings'

Configure BPDU Filter: no
Configure spanning-tree bpdufilter, no='return to default settings'

Spanning-tree Link-type: auto
Specify a link type for spanning tree protocol use, default is auto

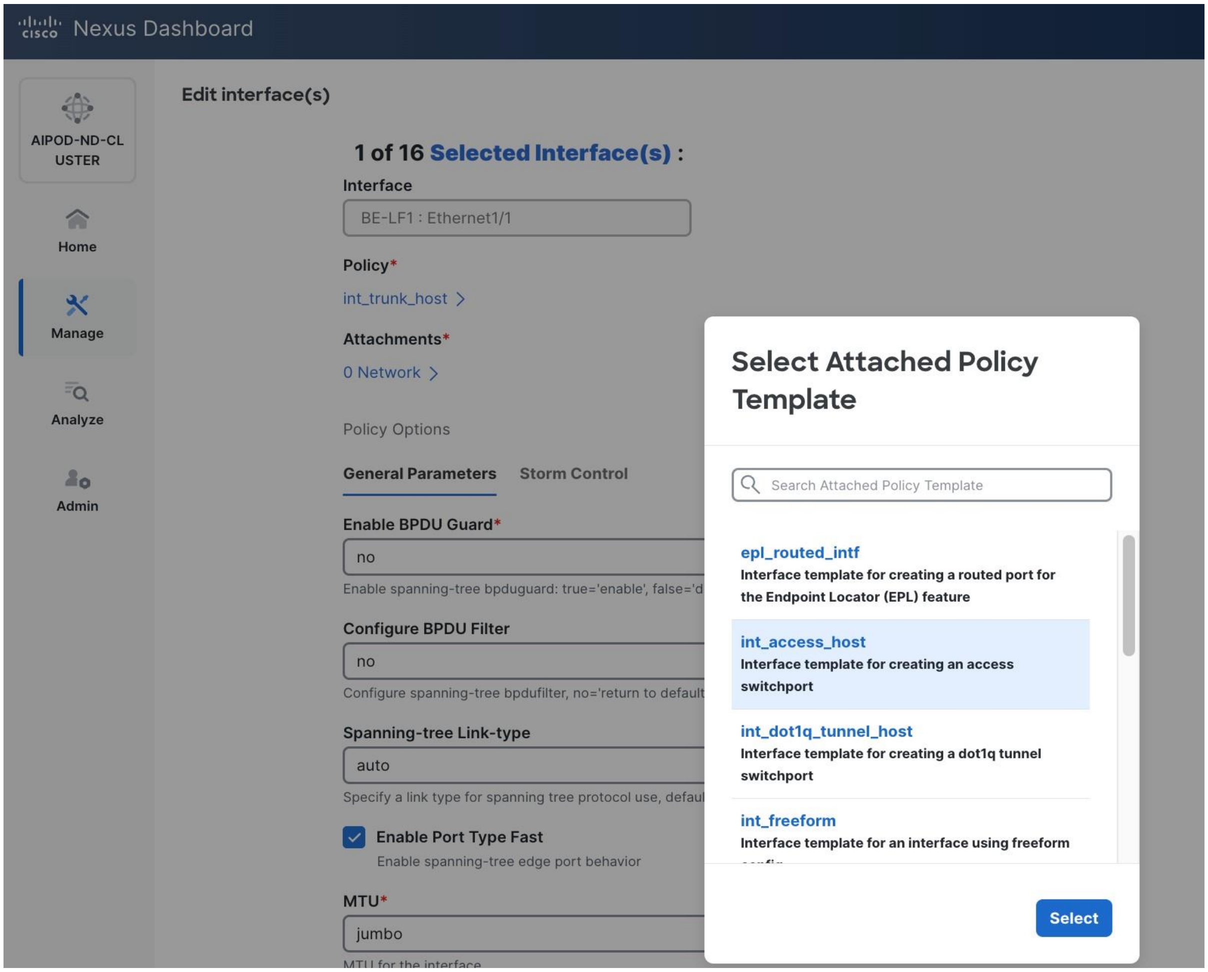
☑ Enable Port Type Fast
Enable spanning-tree edge port behavior

MTU*: jumbo
MTU for the interface

SPEED*: Auto
Interface Speed

Trunk Allowed Vlans*: none
Allowed values: 'none', 'all', or vlan ranges (ex: 1-200,500-2000,3000)

Step 5. Click **int_trunk_host** under **Policy**. In the **Select Attached Policy Template** pop-up window, select **int_access_host** from the drop-down list.



Edit interface(s)

1 of 16 Selected Interface(s) :

Interface: BE-LF1 : Ethernet1/1

Policy*: int_trunk_host

Attachments*: 0 Network

Policy Options

General Parameters | Storm Control

Enable BPDU Guard*: no

Enable spanning-tree bpduguard: true='enable', false='d

Configure BPDU Filter: no

Configure spanning-tree bpdufilter, no='return to default

Spanning-tree Link-type: auto

Specify a link type for spanning tree protocol use, defaul

☑ Enable Port Type Fast

Enable spanning-tree edge port behavior

MTU*: jumbo

MTU for the interface

Select Attached Policy Template

Search Attached Policy Template

epl_routed_intf
Interface template for creating a routed port for the Endpoint Locator (EPL) feature

int_access_host
Interface template for creating an access switchport

int_dot1q_tunnel_host
Interface template for creating a dot1q tunnel switchport

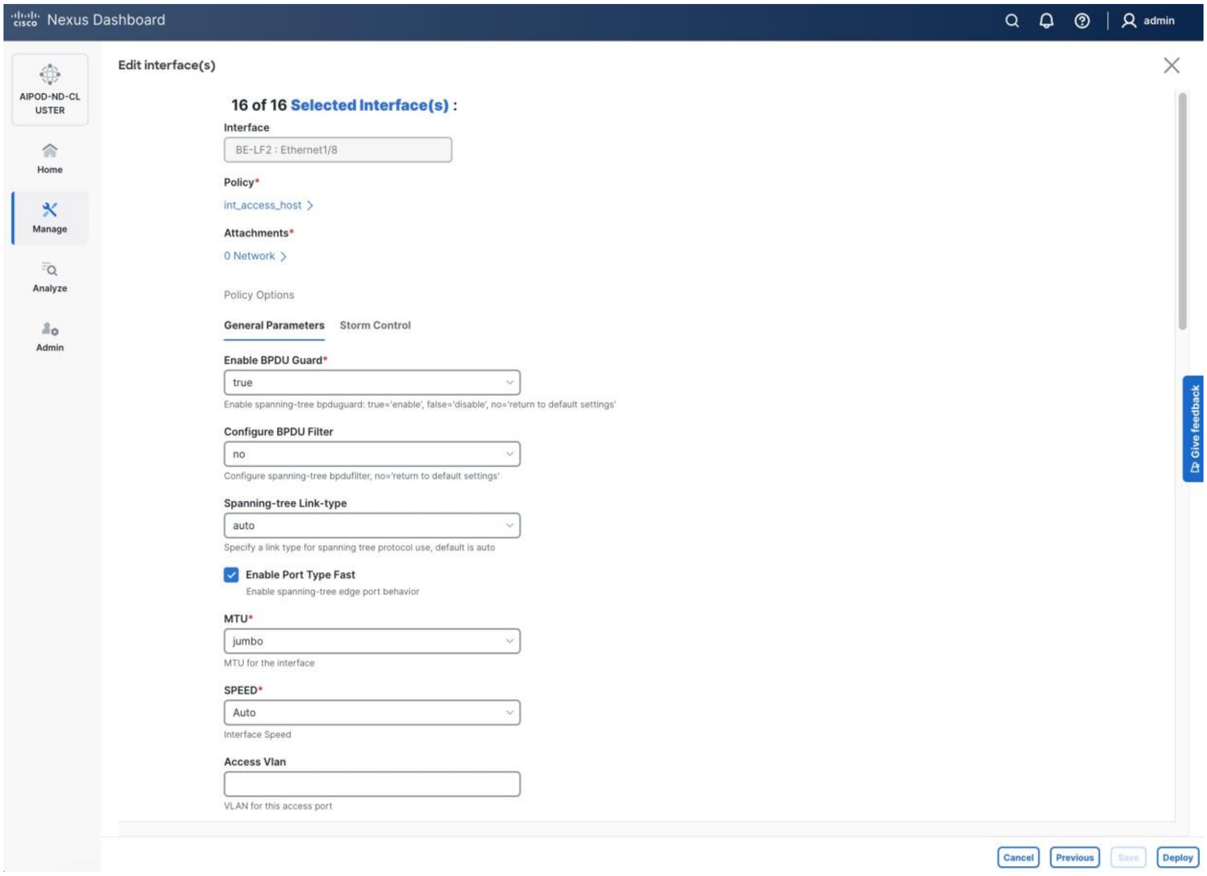
int_freeform
Interface template for an interface using freeform config

Select

Step 6. Click **Select**.

Step 7. Make any other changes as needed. Click **Save** and click **Next** until all ports have been configured.

Step 8. Click **Save**.



Edit interface(s)

16 of 16 Selected Interface(s) :

Interface: BE-LF2 : Ethernet1/8

Policy*: int_access_host

Attachments*: 0 Network

Policy Options

General Parameters | Storm Control

Enable BPDU Guard*: true
Enable spanning-tree bpduguard: true='enable', false='disable', no='return to default settings'

Configure BPDU Filter: no
Configure spanning-tree bpdufilter, no='return to default settings'

Spanning-tree Link-type: auto
Specify a link type for spanning tree protocol use, default is auto

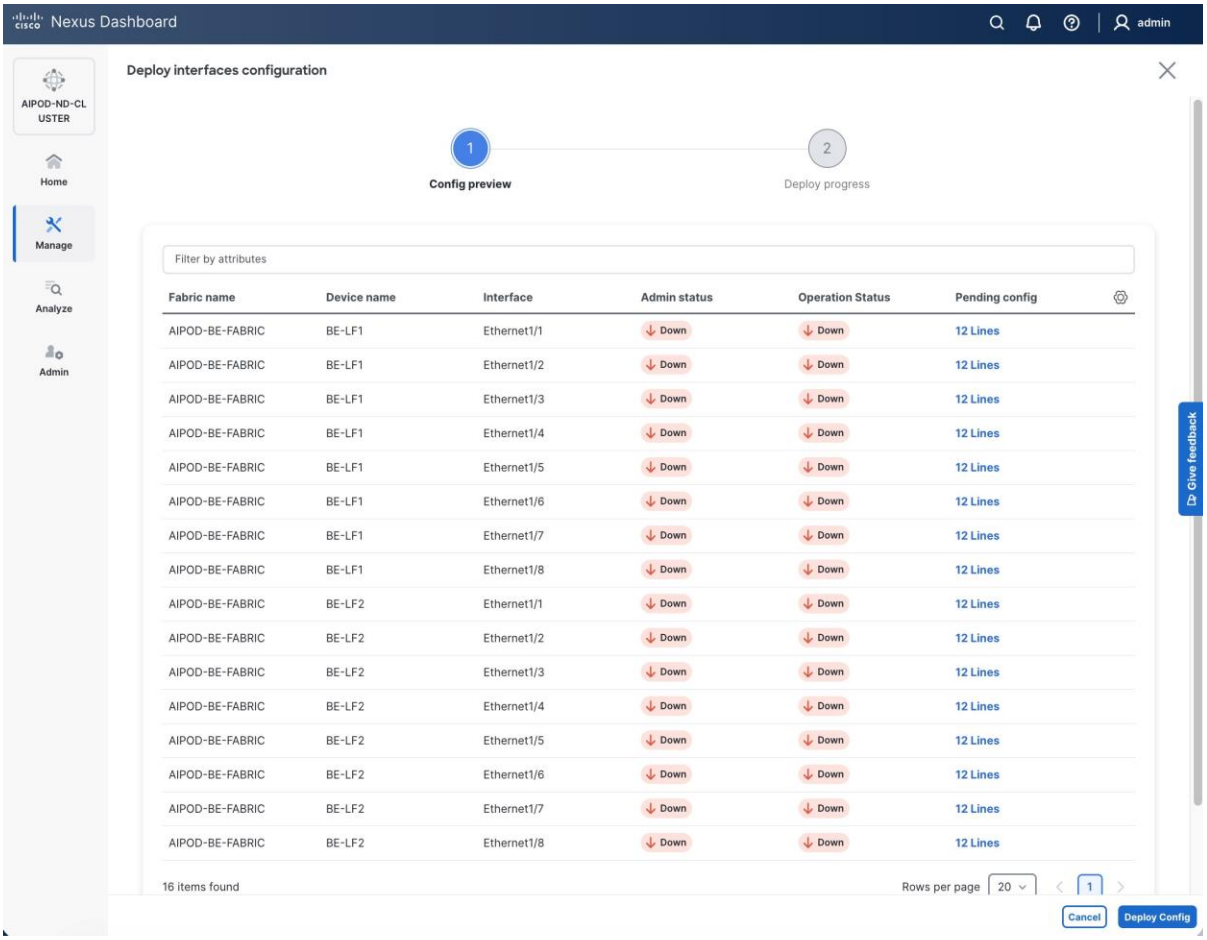
☑ Enable Port Type Fast
Enable spanning-tree edge port behavior

MTU*: jumbo
MTU for the interface

SPEED*: Auto
Interface Speed

Access Vlan:
VLAN for this access port

Step 9. Click **Deploy**.



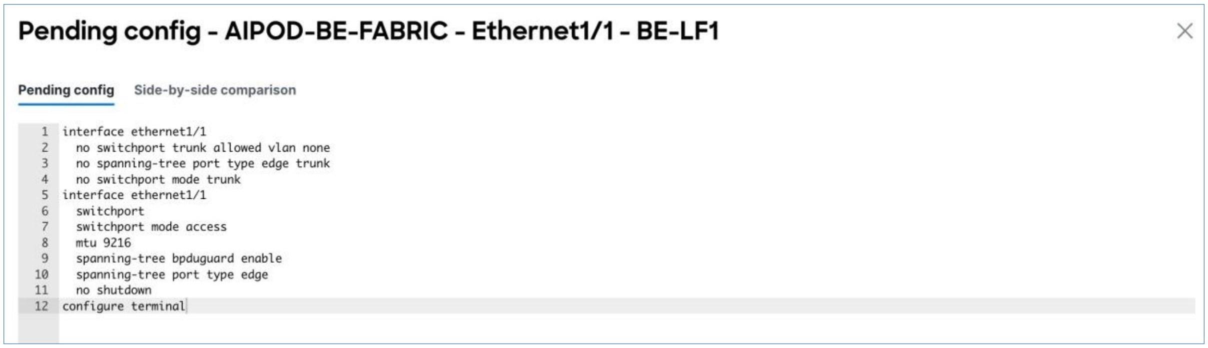
Deploy interfaces configuration

Fabric name	Device name	Interface	Admin status	Operation Status	Pending config
AIPOD-BE-FABRIC	BE-LF1	Ethernet1/1	Down	Down	12 Lines
AIPOD-BE-FABRIC	BE-LF1	Ethernet1/2	Down	Down	12 Lines
AIPOD-BE-FABRIC	BE-LF1	Ethernet1/3	Down	Down	12 Lines
AIPOD-BE-FABRIC	BE-LF1	Ethernet1/4	Down	Down	12 Lines
AIPOD-BE-FABRIC	BE-LF1	Ethernet1/5	Down	Down	12 Lines
AIPOD-BE-FABRIC	BE-LF1	Ethernet1/6	Down	Down	12 Lines
AIPOD-BE-FABRIC	BE-LF1	Ethernet1/7	Down	Down	12 Lines
AIPOD-BE-FABRIC	BE-LF1	Ethernet1/8	Down	Down	12 Lines
AIPOD-BE-FABRIC	BE-LF2	Ethernet1/1	Down	Down	12 Lines
AIPOD-BE-FABRIC	BE-LF2	Ethernet1/2	Down	Down	12 Lines
AIPOD-BE-FABRIC	BE-LF2	Ethernet1/3	Down	Down	12 Lines
AIPOD-BE-FABRIC	BE-LF2	Ethernet1/4	Down	Down	12 Lines
AIPOD-BE-FABRIC	BE-LF2	Ethernet1/5	Down	Down	12 Lines
AIPOD-BE-FABRIC	BE-LF2	Ethernet1/6	Down	Down	12 Lines
AIPOD-BE-FABRIC	BE-LF2	Ethernet1/7	Down	Down	12 Lines
AIPOD-BE-FABRIC	BE-LF2	Ethernet1/8	Down	Down	12 Lines

16 items found

Rows per page 20

Step 10. Click the line count for each port in the **Pending Config** column to see the configuration being deployed.

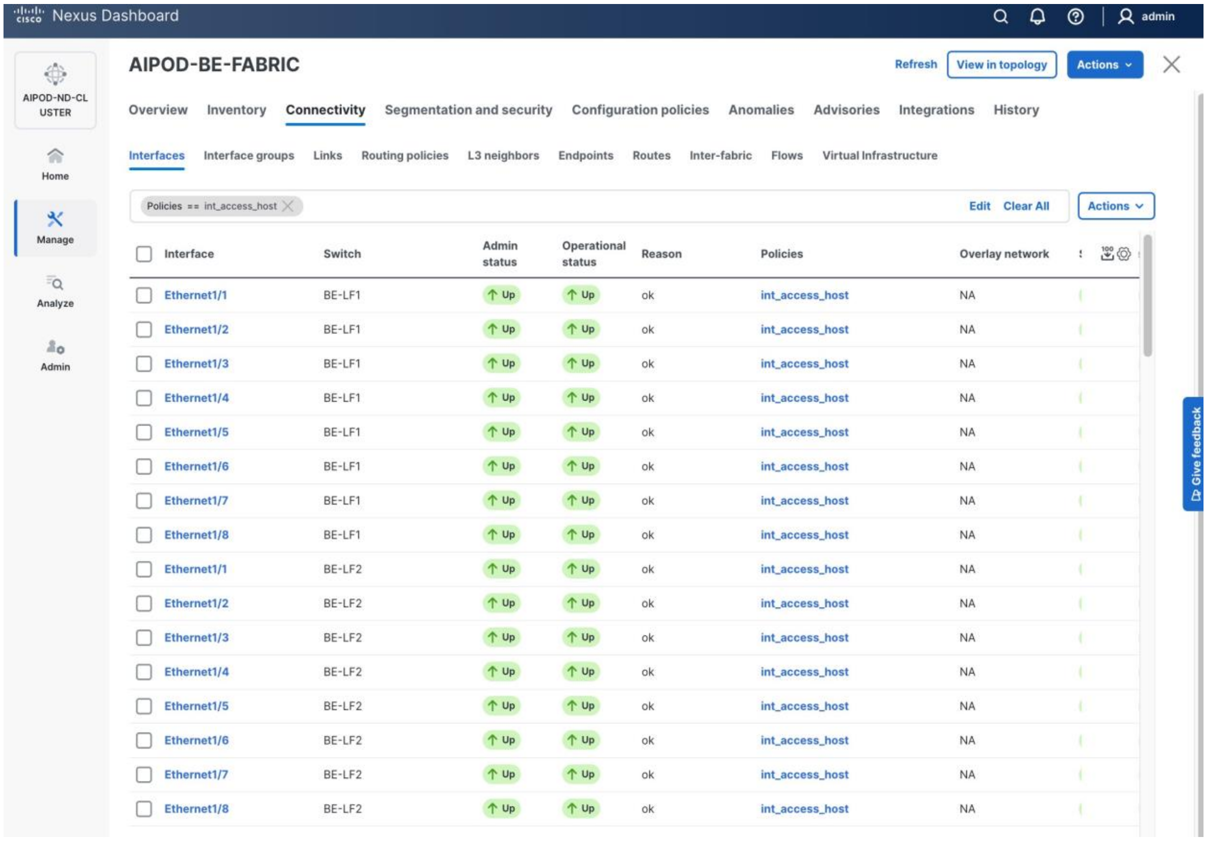


Pending config - AIPOD-BE-FABRIC - Ethernet1/1 - BE-LF1

```
interface ethernet1/1
  no switchport trunk allowed vlan none
  no spanning-tree port type edge trunk
  no switchport mode trunk
interface ethernet1/1
  switchport
  switchport mode access
  mtu 9216
  spanning-tree bpduguard enable
  spanning-tree port type edge
  no shutdown
configure terminal
```

Step 11. Click **Close**.

Step 12. Click **Deploy Config**.



AIPOD-BE-FABRIC

Policies == int_access_host

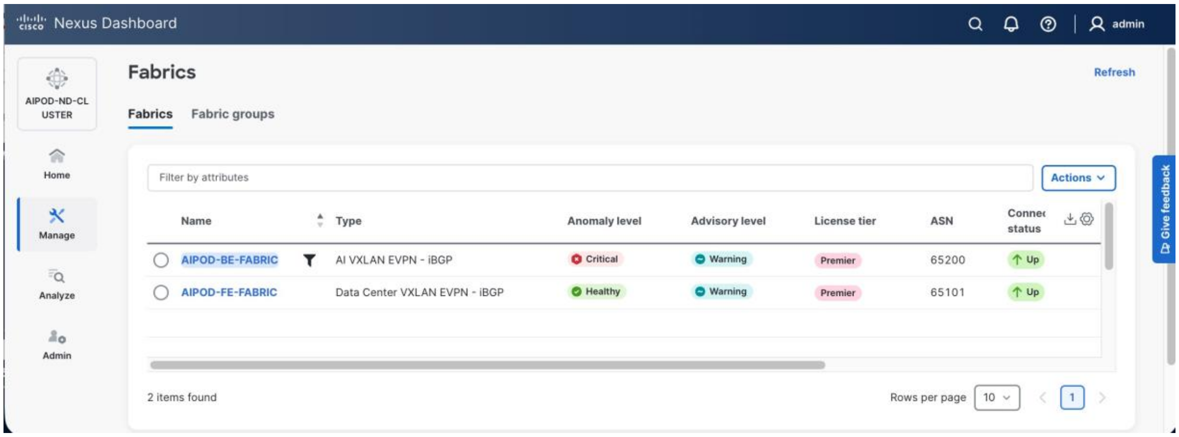
Interface	Switch	Admin status	Operational status	Reason	Policies	Overlay network
Ethernet1/1	BE-LF1	Up	Up	ok	int_access_host	NA
Ethernet1/2	BE-LF1	Up	Up	ok	int_access_host	NA
Ethernet1/3	BE-LF1	Up	Up	ok	int_access_host	NA
Ethernet1/4	BE-LF1	Up	Up	ok	int_access_host	NA
Ethernet1/5	BE-LF1	Up	Up	ok	int_access_host	NA
Ethernet1/6	BE-LF1	Up	Up	ok	int_access_host	NA
Ethernet1/7	BE-LF1	Up	Up	ok	int_access_host	NA
Ethernet1/8	BE-LF1	Up	Up	ok	int_access_host	NA
Ethernet1/1	BE-LF2	Up	Up	ok	int_access_host	NA
Ethernet1/2	BE-LF2	Up	Up	ok	int_access_host	NA
Ethernet1/3	BE-LF2	Up	Up	ok	int_access_host	NA
Ethernet1/4	BE-LF2	Up	Up	ok	int_access_host	NA
Ethernet1/5	BE-LF2	Up	Up	ok	int_access_host	NA
Ethernet1/6	BE-LF2	Up	Up	ok	int_access_host	NA
Ethernet1/7	BE-LF2	Up	Up	ok	int_access_host	NA
Ethernet1/8	BE-LF2	Up	Up	ok	int_access_host	NA

Procedure 2. Deploy L2 overlay network in the BE fabric for inter-node UCS connectivity

Step 1. Use a web browser to navigate to the **Nexus Dashboard**. Use the management IP of any node in the ND cluster. Log in using **admin** account.

Step 2. From the left navigation menu, go to **Manage** > **Fabrics**.

Step 3. Select the BE Fabric from the list and click the BE fabric name.



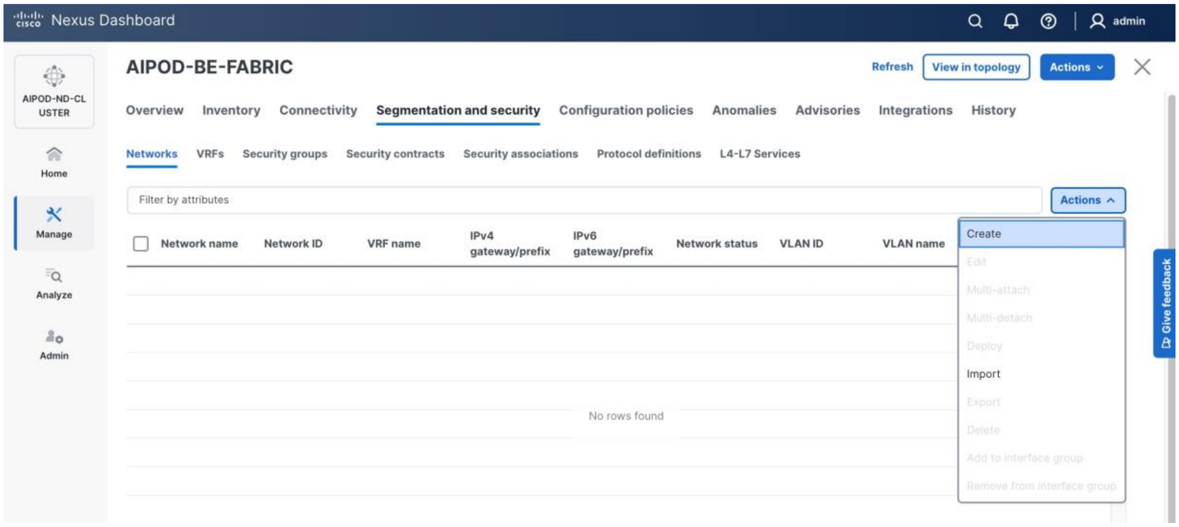
Fabrics

Name	Type	Anomaly level	Advisory level	License tier	ASN	Connec status
○ AIPOD-BE-FABRIC	AI VXLAN EVPN - iBGP	Critical	Warning	Premier	65200	Up
○ AIPOD-FE-FABRIC	Data Center VXLAN EVPN - iBGP	Healthy	Warning	Premier	65101	Up

2 items found

Rows per page 10 1

Step 4. Go to the **Segmentation and Security** > **Networks** tab. To deploy the BE network on UCS nodes, click the lower of the two **Actions** button and select **Create** from the drop-down list.



Step 5. In the **Create Network** window, specify the following:

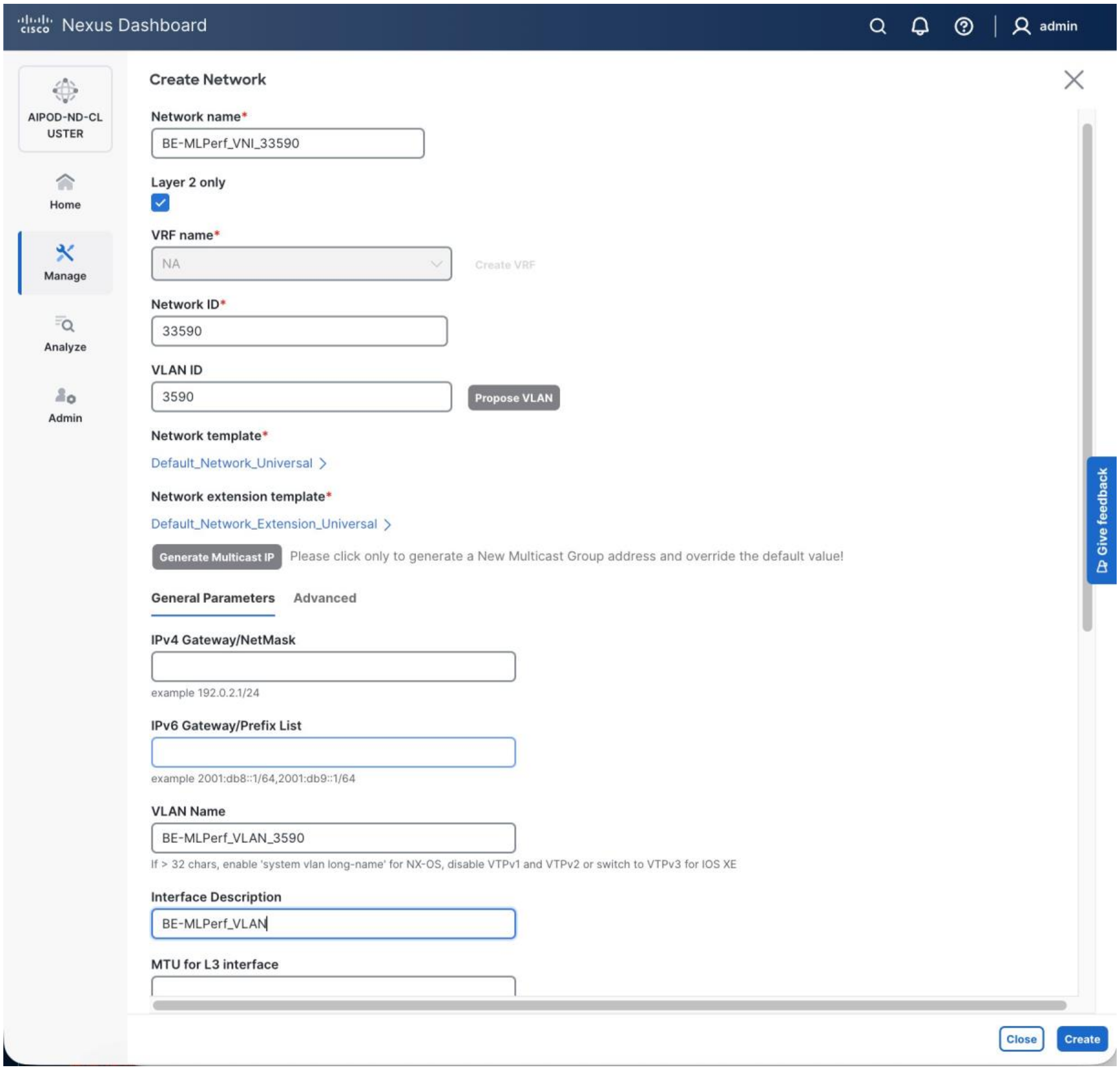
a. Network name

b. Enable checkbox for Layer 2 only or VRF name if it is a Layer 3 network

c. Network ID (or use default)

d. VLAN ID (or use Propose VLAN for system to allocate).

e. For a Layer 3 network, if VRF hasn't been created already, you have an option from this window to also create a VRF (click Create VRF).



Create Network

Network name*: BE-MLPerf_VNI_33590

Layer 2 only: ☑

VRF name*: NA

Create VRF

Network ID*: 33590

VLAN ID: 3590

Propose VLAN

Network template*: Default_Network_Universal >

Network extension template*: Default_Network_Extension_Universal >

Generate Multicast IP — Please click only to generate a New Multicast Group address and override the default value!

General Parameters | Advanced

IPv4 Gateway/NetMask:

example 192.0.2.1/24

IPv6 Gateway/Prefix List:

example 2001:db8::1/64,2001:db9::1/64

VLAN Name: BE-MLPerf_VLAN_3590

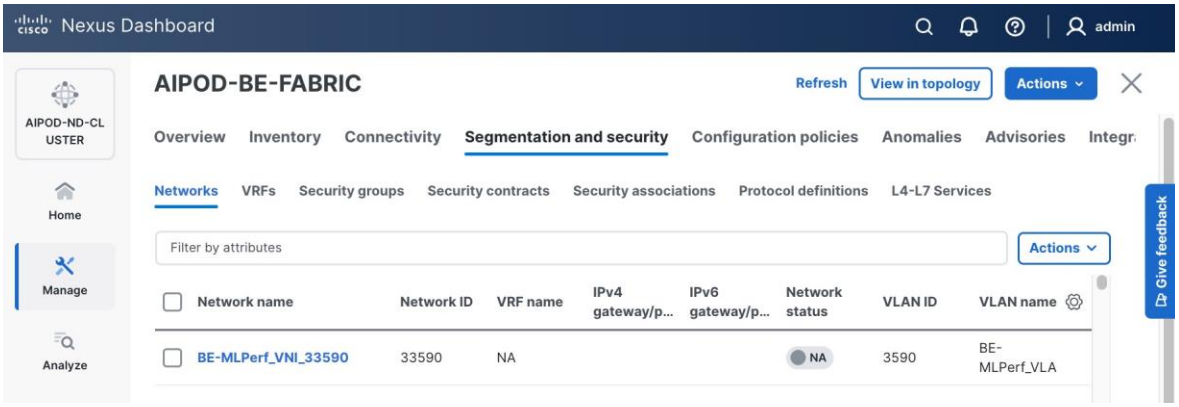
If > 32 chars, enable 'system vlan long-name' for NX-OS, disable VTPv1 and VTPv2 or switch to VTPv3 for IOS XE

Interface Description: BE-MLPerf_VLAN

MTU for L3 interface:

Close | Create

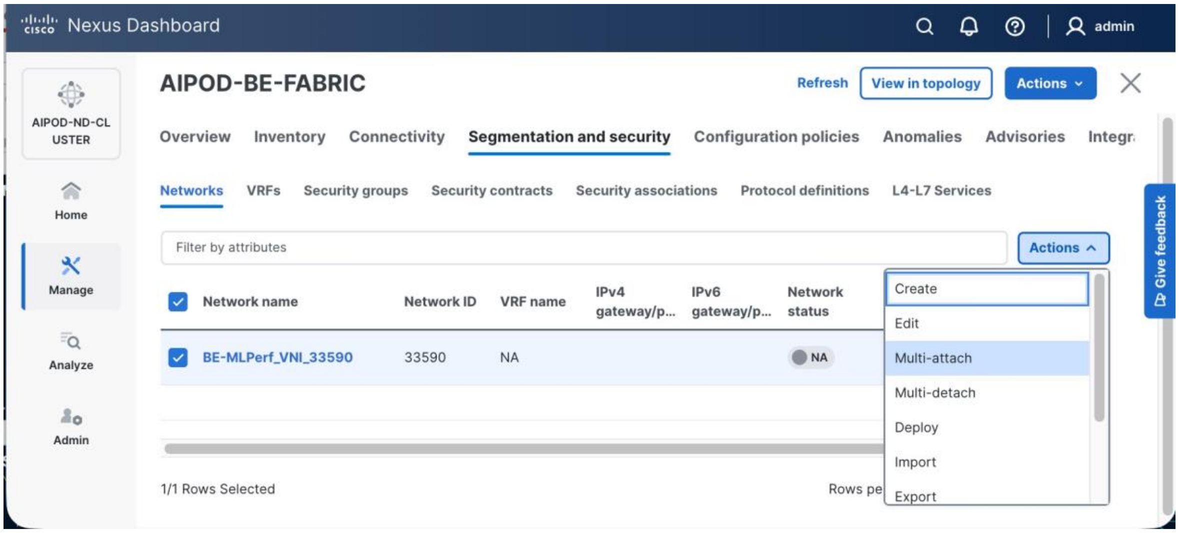
Step 6. Click **Create** to create the Layer 2 overlay network.



AIPOD-BE-FABRIC

	Network name	Network ID	VRF name	IPv4 gateway/p...	IPv6 gateway/p...	Network status	VLAN ID	VLAN name
□	BE-MLPerf_VNI_33590	33590	NA			NA	3590	BE-MLPerf_VLA

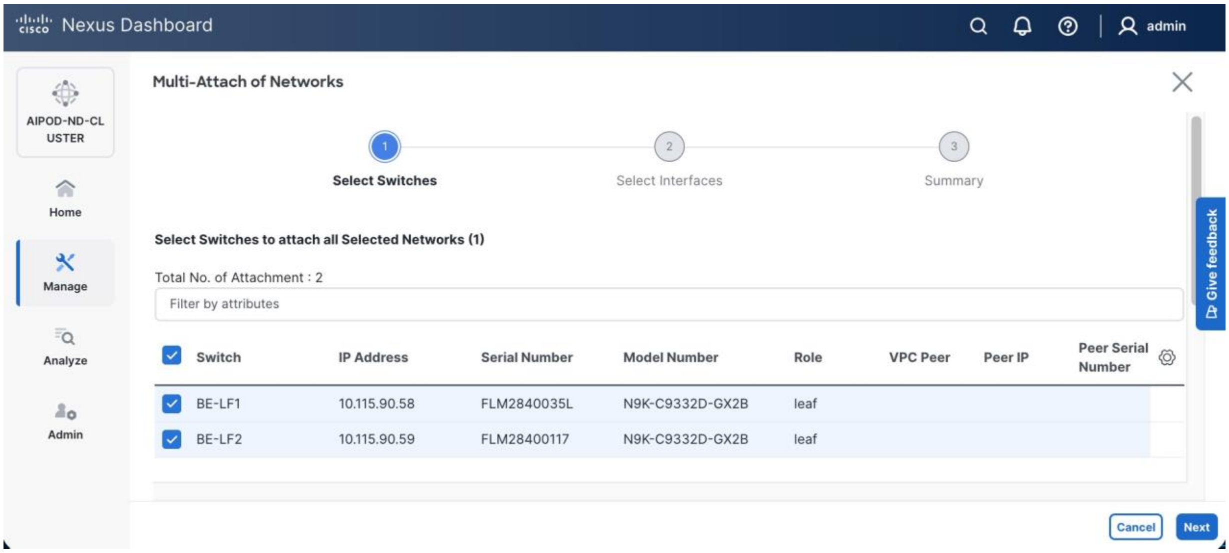
Step 7. Select newly created **network** and deploy it on both leaf pairs. Click the lower of the two **Actions** buttons and select **Multi-attach** from the list.



☑	Network name	Network ID	VRF name	IPv4 gateway/p...	IPv6 gateway/p...	Network status
☑	BE-MLPerf_VNI_33590	33590	NA			NA

1/1 Rows Selected

Step 8. Select **both** BE Leaf Switches.

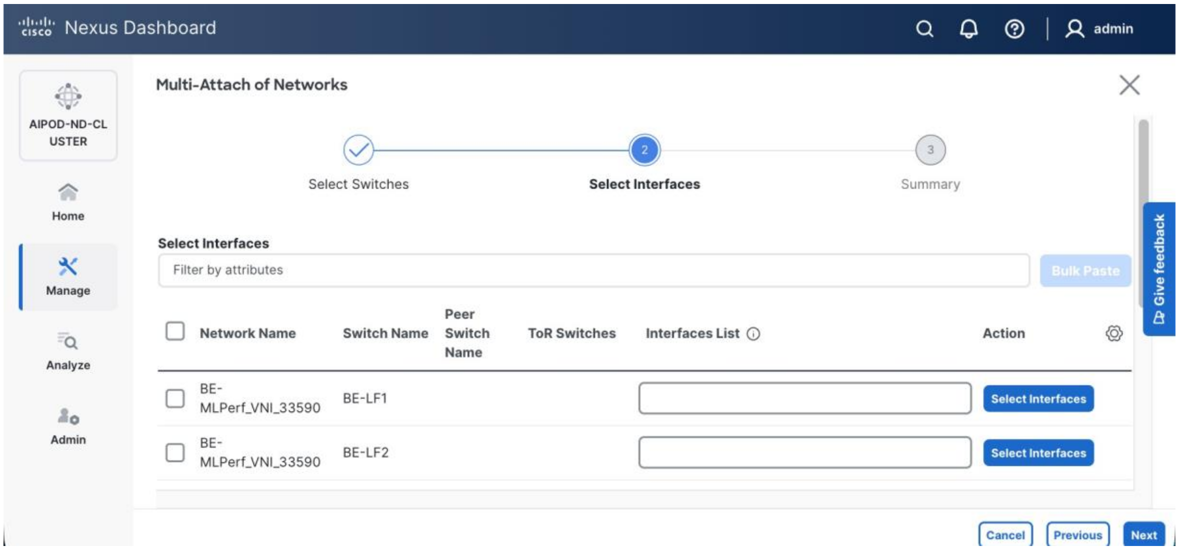


Select Switches to attach all Selected Networks (1)

Total No. of Attachment : 2

☑	Switch	IP Address	Serial Number	Model Number	Role	VPC Peer	Peer IP	Peer Serial Number
☑	BE-LF1	10.115.90.58	FLM2840035L	N9K-C9332D-GX2B	leaf			
☑	BE-LF2	10.115.90.59	FLM28400117	N9K-C9332D-GX2B	leaf			

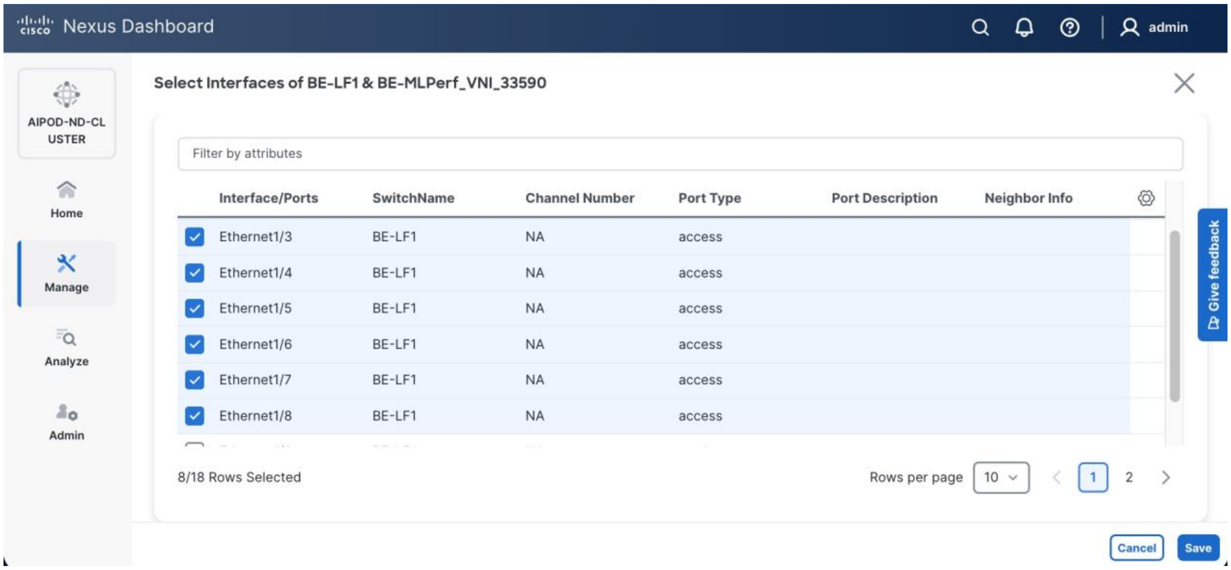
Step 9. Click **Next**. Select **the row for the first switch** and click **Select Interfaces** on the far right to select the interfaces going to the UCS C885A nodes on that switch.



Select Interfaces

□	Network Name	Switch Name	Peer Switch Name	ToR Switches	Interfaces List	Action
□	BE-MLPerf_VNI_33590	BE-LF1				Select Interfaces
□	BE-MLPerf_VNI_33590	BE-LF2				Select Interfaces

Step 10. Select **all ports on the first switch** that connect to UCS GPU nodes.



Select Interfaces of BE-LF1 & BE-MLPerf_VNI_33590

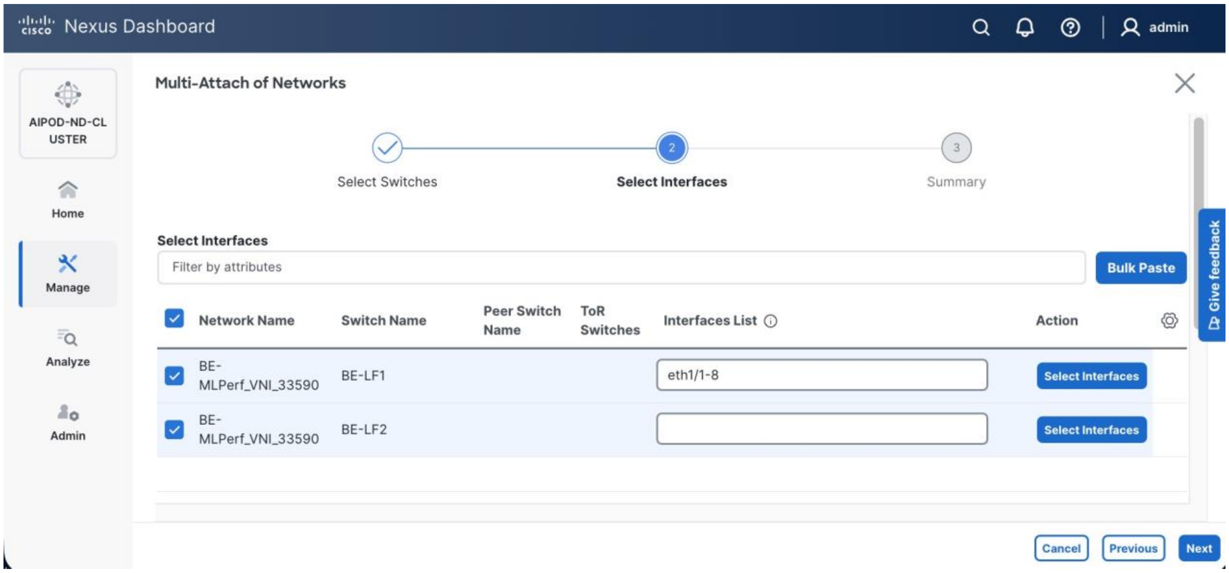
Filter by attributes

	Interface/Ports	SwitchName	Channel Number	Port Type	Port Description	Neighbor Info
☑	Ethernet1/3	BE-LF1	NA	access		
☑	Ethernet1/4	BE-LF1	NA	access		
☑	Ethernet1/5	BE-LF1	NA	access		
☑	Ethernet1/6	BE-LF1	NA	access		
☑	Ethernet1/7	BE-LF1	NA	access		
☑	Ethernet1/8	BE-LF1	NA	access		

8/18 Rows Selected

Rows per page 10 | 1 2

Step 11. Click **Save**.



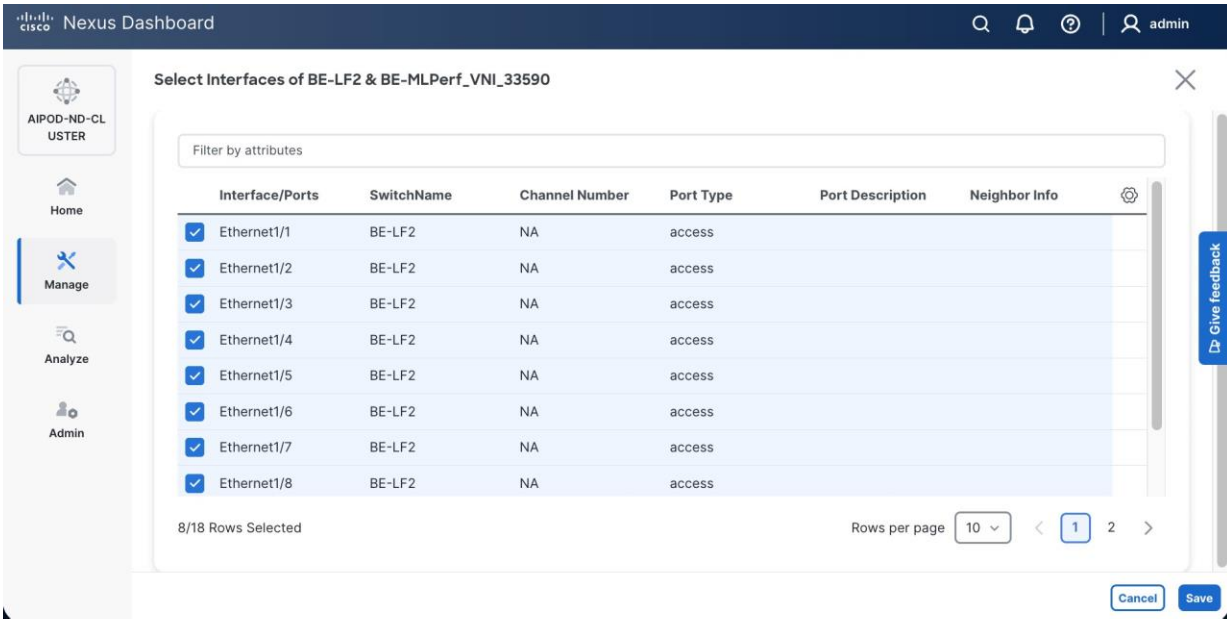
Multi-Attach of Networks

Select Interfaces

Filter by attributes

☑	Network Name	Switch Name	Peer Switch Name	ToR Switches	Interfaces List	Action
☑	BE-MLPerf_VNI_33590	BE-LF1			eth1/1-8	Select Interfaces
☑	BE-MLPerf_VNI_33590	BE-LF2				Select Interfaces

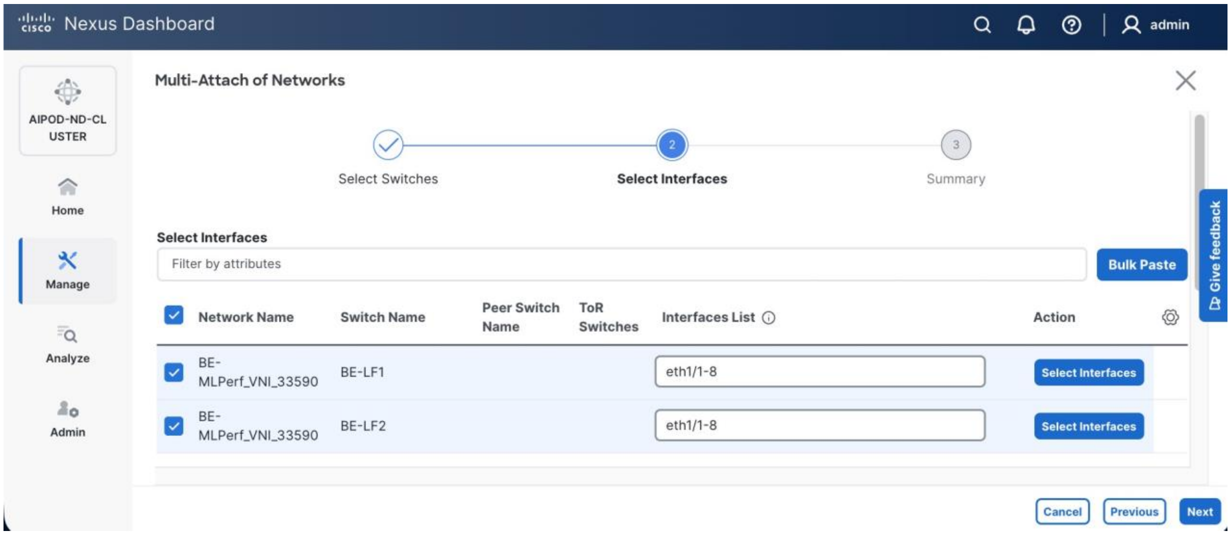
Step 12. Repeat this procedure for the **second** leaf switch to select the ports going to the UCS GPU nodes on that switch. (Repeat for any **remaining** leaf switches if you have more than two).



Select Interfaces of BE-LF2 & BE-MLPerf_VNI_33590

	Interface/Ports	SwitchName	Channel Number	Port Type	Port Description	Neighbor Info
☑	Ethernet1/1	BE-LF2	NA	access		
☑	Ethernet1/2	BE-LF2	NA	access		
☑	Ethernet1/3	BE-LF2	NA	access		
☑	Ethernet1/4	BE-LF2	NA	access		
☑	Ethernet1/5	BE-LF2	NA	access		
☑	Ethernet1/6	BE-LF2	NA	access		
☑	Ethernet1/7	BE-LF2	NA	access		
☑	Ethernet1/8	BE-LF2	NA	access		

8/18 Rows Selected

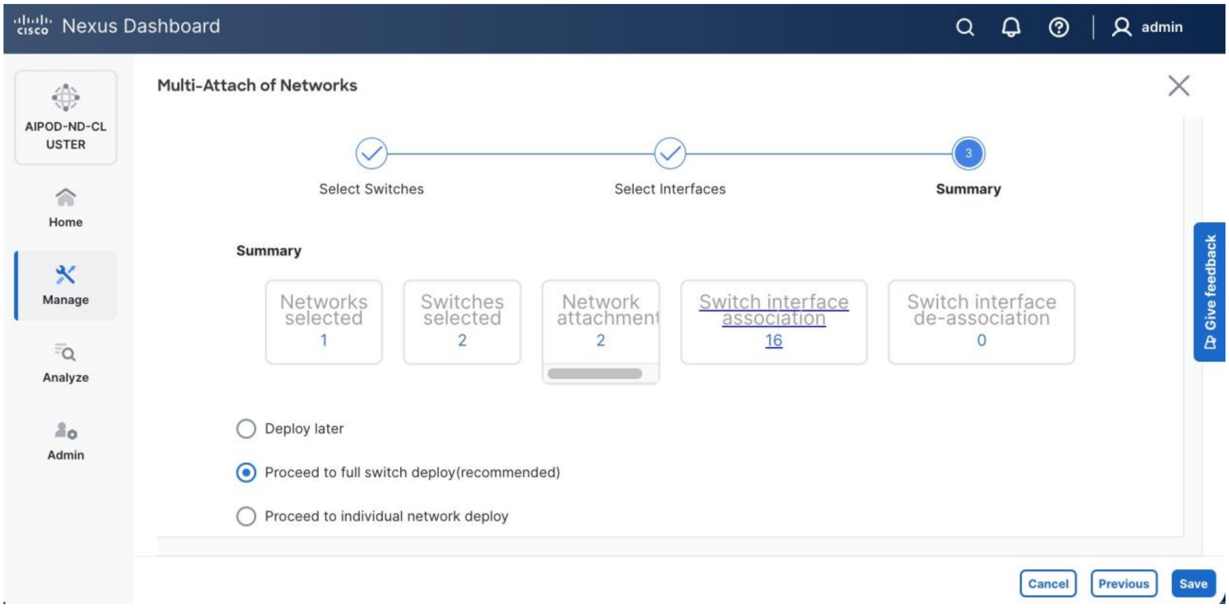


Multi-Attach of Networks

Select Interfaces

☑	Network Name	Switch Name	Peer Switch Name	ToR Switches	Interfaces List	Action
☑	BE-MLPerf_VNI_33590	BE-LF1			eth1/1-8	Select Interfaces
☑	BE-MLPerf_VNI_33590	BE-LF2			eth1/1-8	Select Interfaces

Step 13. Click **Next.**



Multi-Attach of Networks

1 Select Switches — 2 Select Interfaces — 3 **Summary**

Summary

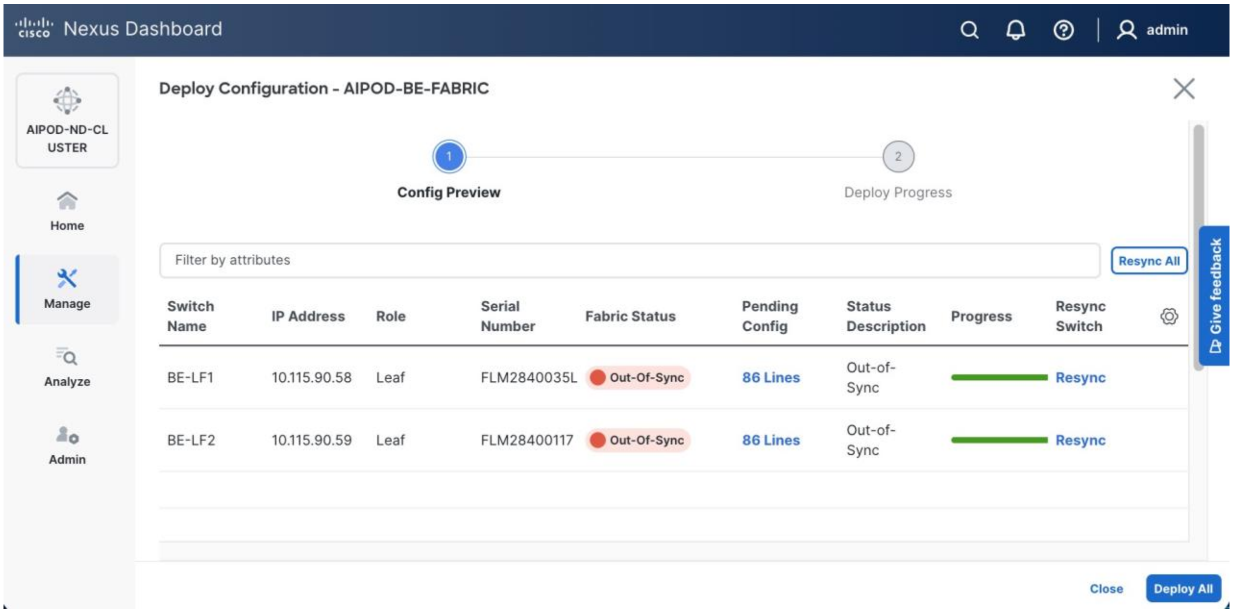
Networks selected	Switches selected	Network attachment	Switch interface association	Switch interface de-association
1	2	2	16	0

○ Deploy later

● Proceed to full switch deploy(recommended)

○ Proceed to individual network deploy

Step 14. Click **Save**.



Deploy Configuration - AIPOD-BE-FABRIC

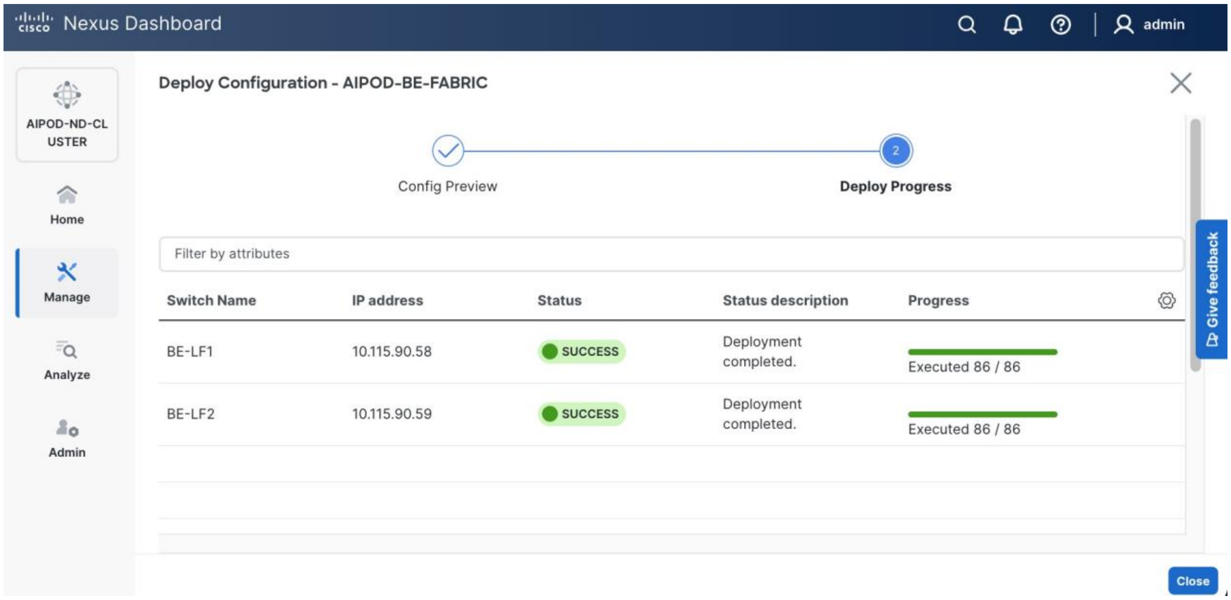
1 **Config Preview** — 2 Deploy Progress

Filter by attributes

Switch Name	IP Address	Role	Serial Number	Fabric Status	Pending Config	Status Description	Progress	Resync Switch
BE-LF1	10.115.90.58	Leaf	FLM2840035L	● Out-Of-Sync	86 Lines	Out-of-Sync		Resync
BE-LF2	10.115.90.59	Leaf	FLM28400117	● Out-Of-Sync	86 Lines	Out-of-Sync		Resync

Note: Pending configuration being deployed on leaf switches is included at the end as a reference.

Step 15. Click **Deploy All**.

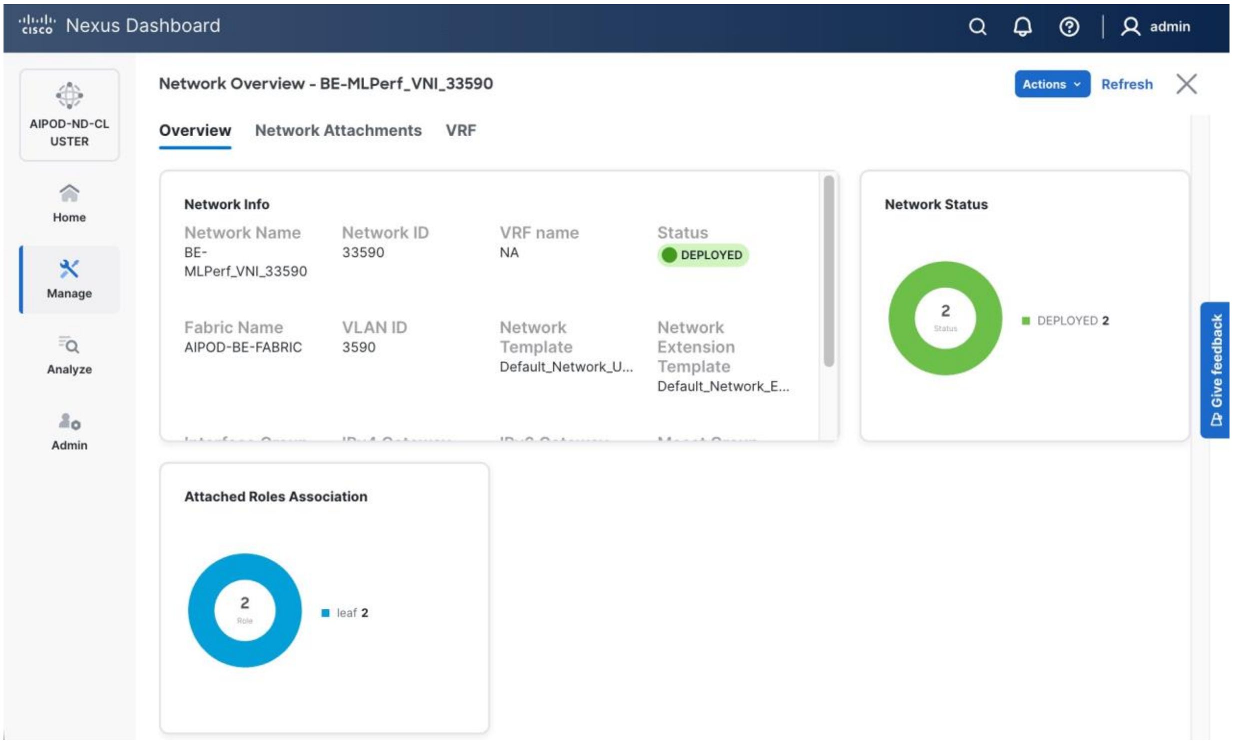


Deploy Configuration - AIPOD-BE-FABRIC

Switch Name	IP address	Status	Status description	Progress
BE-LF1	10.115.90.58	SUCCESS	Deployment completed.	Executed 86 / 86
BE-LF2	10.115.90.59	SUCCESS	Deployment completed.	Executed 86 / 86

Step 16. Click **Close**.

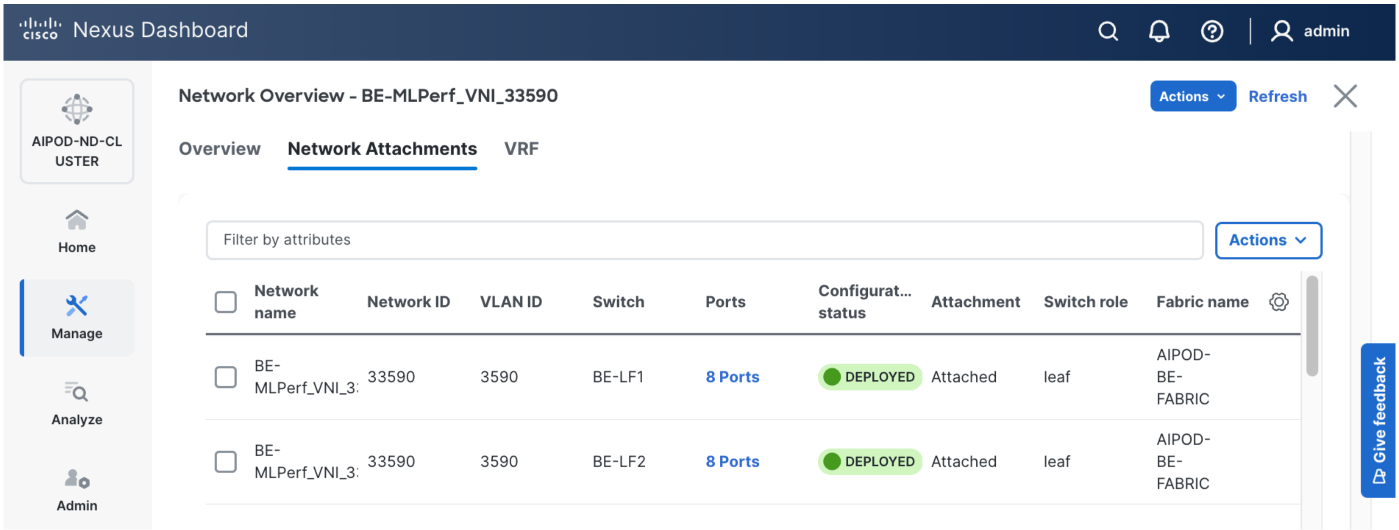
Step 17. Click the **network name** and verify status is **deployed**.



Network Overview - BE-MLPerf_VNI_33590

Network Info

Network Name	Network ID	VRF name	Status
BE-MLPerf_VNI_33590	33590	NA	DEPLOYED
Fabric Name	**VLAN ID**	**Network Template**	**Network Extension Template**
AIPOD-BE-FABRIC	3590	Default_Network_U...	Default_Network_E...



Network Overview - BE-MLPerf_VNI_33590

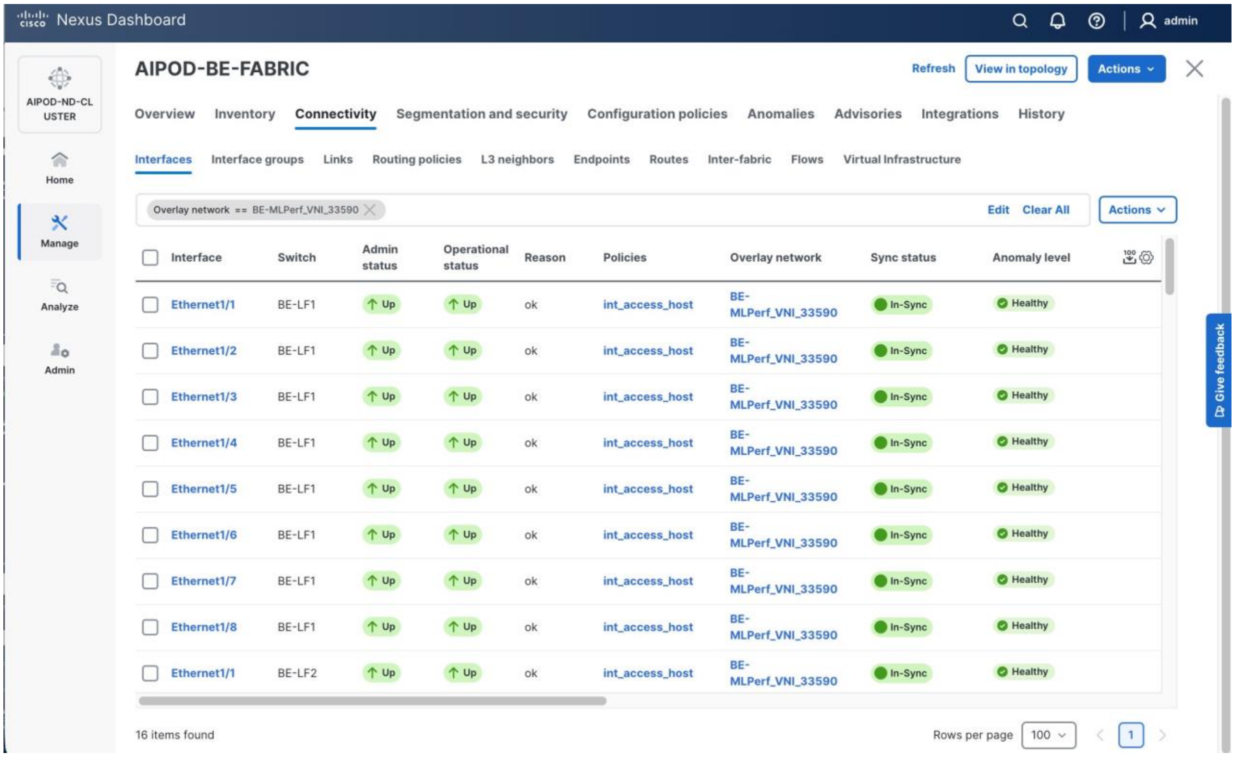
Overview | Network Attachments | VRF

Filter by attributes

	Network name	Network ID	VLAN ID	Switch	Ports	Configurat... status	Attachment	Switch role	Fabric name
□	BE-MLPerf_VNI_3:	33590	3590	BE-LF1	8 Ports	DEPLOYED	Attached	leaf	AIPOD-BE-FABRIC
□	BE-MLPerf_VNI_3:	33590	3590	BE-LF2	8 Ports	DEPLOYED	Attached	leaf	AIPOD-BE-FABRIC

Step 18. Click **X** in the top right corner to close this window.

Step 19. Filter the newly deployed network 16 ports. Verify the status of all ports.



AIPOD-BE-FABRIC

Overview | Inventory | Connectivity | Segmentation and security | Configuration policies | Anomalies | Advisories | Integrations | History

Interfaces | Interface groups | Links | Routing policies | L3 neighbors | Endpoints | Routes | Inter-fabric | Flows | Virtual Infrastructure

Overlay network == BE-MLPerf_VNI_33590

	Interface	Switch	Admin status	Operational status	Reason	Policies	Overlay network	Sync status	Anomaly level
□	Ethernet1/1	BE-LF1	Up	Up	ok	int_access_host	BE-MLPerf_VNI_33590	In-Sync	Healthy
□	Ethernet1/2	BE-LF1	Up	Up	ok	int_access_host	BE-MLPerf_VNI_33590	In-Sync	Healthy
□	Ethernet1/3	BE-LF1	Up	Up	ok	int_access_host	BE-MLPerf_VNI_33590	In-Sync	Healthy
□	Ethernet1/4	BE-LF1	Up	Up	ok	int_access_host	BE-MLPerf_VNI_33590	In-Sync	Healthy
□	Ethernet1/5	BE-LF1	Up	Up	ok	int_access_host	BE-MLPerf_VNI_33590	In-Sync	Healthy
□	Ethernet1/6	BE-LF1	Up	Up	ok	int_access_host	BE-MLPerf_VNI_33590	In-Sync	Healthy
□	Ethernet1/7	BE-LF1	Up	Up	ok	int_access_host	BE-MLPerf_VNI_33590	In-Sync	Healthy
□	Ethernet1/8	BE-LF1	Up	Up	ok	int_access_host	BE-MLPerf_VNI_33590	In-Sync	Healthy
□	Ethernet1/1	BE-LF2	Up	Up	ok	int_access_host	BE-MLPerf_VNI_33590	In-Sync	Healthy

16 items found

Step 20. Verify that ports on both switches are **Up** with an **In-Sync** status.

NetApp ONTAP Storage Configuration

This chapter contains the following:

- Configure NetApp ONTAP Storage
- Configure S3 access to the OpenShift Tenant

Configure NetApp ONTAP Storage

This section describes how to configure the NetApp ONTAP Storage for the OpenShift Tenant.

Procedure 1. Log into the Cluster

Step 1. Open an SSH connection to either the cluster IP or the host name.

Step 2. Log into the admin user with the password you provided earlier.

Procedure 2. Configure NetApp ONTAP Storage for the OpenShift Tenant

Note: By default, all network ports are included in a separate default broadcast domain. Network ports used for data services (for example, e3a, e2b, and so on) should be removed from their default broadcast domain and that broadcast domain should be deleted.

Step 1. Delete any Default-N automatically created broadcast domains:

```
network port broadcast-domain delete -broadcast-domain <Default-N> -ipspace Default
network port broadcast-domain show
```

Note: Delete the Default broadcast domains with Network ports (Default-1, Default-2, and so on). This does not include Cluster ports and management ports.

Step 2. Create an IPspace for the OpenShift tenant:

```
network ipspace create -ipspace AC01-OCP
```

Step 3. Create the OCP-MGMT and OCP-NFS broadcast domains with appropriate maximum transmission unit (MTU):

```
network port broadcast-domain create -broadcast-domain OCP-MGMT -mtu 1500 -ipspace AC01-OCP
network port broadcast-domain create -broadcast-domain OCP-NFS -mtu 9000 -ipspace AC01-OCP
```

Step 4. Create the OpenShift management VLAN ports and add them to the OpenShift management broadcast domain:

```
network port vlan create -node rtp5-ac01-nas-n01 -vlan-name e3a-703
network port vlan create -node rtp5-ac01-nas-n01 -vlan-name e2b-703
network port vlan create -node rtp5-ac01-nas-n02 -vlan-name e3a-703
network port vlan create -node rtp5-ac01-nas-n02 -vlan-name e2b-703
network port broadcast-domain add-ports -ipspace AC01-OCP -broadcast-domain OCP-MGMT -ports rtp5-ac01-nas-n01:e3a-703,rtp5-ac01-nas-n01:e2b-703,rtp5-ac01-nas-n02:e3a-703, rtp5-ac01-nas-n02:e2b-703
```

Step 5. Create the OpenShift NFS VLAN ports and add them to the NFS broadcast domain:

```
network port vlan create -node rtp5-ac01-nas-n01 -vlan-name e3a-3051
network port vlan create -node rtp5-ac01-nas-n02 -vlan-name e3a-3051
network port broadcast-domain add-ports -ipspace AC01-OCP -broadcast-domain OCP-NFS -ports rtp5-ac01-nas-n01:e3a-3051,rtp5-ac01-nas-n01:e2b-3051,rtp5-ac01-nas-n02:e3a-3051,rtp5-ac01-nas-n02:e2b-3051
```

Step 6. Create the SVM (Storage Virtual Machine) in IPspace. Run the `vserver create` command:

```
vserver create -vserver rtp5-ac01-nas-tme-ucs885 -ipspace AC01-OCP
```

Note: The SVM must be created in the IPspace. An SVM cannot be moved into an IPspace later.

Step 7. Add the required data protocols to the SVM and remove the unused data protocols from the SVM:

```
vserver add-protocols -vserver rtp5-ac01-nas-tme-ucs885 -protocols nfs
vserver remove-protocols -vserver rtp5-ac01-nas-tme-ucs885 -protocols cifs,fcp, iscsi, nvme
```

Note: Make sure licenses are installed for all storage protocols used before creating the services.

Step 8. Add the two data aggregates to the OCP-SVM aggregate list and enable and run the NFS protocol in the SVM:

```
vserver modify -vserver rtp5-ac01-nas-tme-ucs885 -aggr-list AC01_NAS_01_SSD_1, AC01_NAS_02_SSD_1
set -privilege advanced
vserver nfs create -vserver rtp5-ac01-nas-tme-ucs885 -udp disabled -v3 enabled -v4.1 enabled -tcp-max-xfer-size 262144
set -privilege admin
```

Step 9. Create a Load-Sharing Mirror of the SVM Root Volume. Create a volume to be the load-sharing mirror of the infrastructure SVM root volume only on the node that does not have the Root Volume:

```
volume show -vserver rtp5-ac01-nas-tme-ucs885 # Identify the aggregate and node where the vserver root volume is located.

volume create -vserver rtp5-ac01-nas-tme-ucs885 -volume rtp5_ac01_nas_tme_ucs885_root_lsm01 -aggregate AC01_NAS_0<x>_SSD_1 -size 1GB -type DP # Create the mirror volume on the other node
```

Step 10. Create the 15min interval job schedule:

```
job schedule interval create -name 15min -minutes 15
```

Step 11. Create the mirroring relationship:

```
snapmirror create -source-path rtp5-ac01-nas-tme-ucs885: rtp5_ac01_nas_tme_ucs885_rootvol -destination-path rtp5_ac01_nas_tme_ucs885_rootvol_lsm01 -type LS -schedule 15min
```

Step 12. Initialize and verify the mirroring relationship:

```
snapmirror initialize-ls-set -source-path rtp5-ac01-nas-tme-ucs885:rtp5_ac01_nas_tme_ucs885_rootvol

snapmirror show -vserver rtp5-ac01-nas-tme-ucs885

                                                                       Progress
Source            Destination Mirror  Relationship   Total             Last
Path        Type  Path        State   Status         Progress  Healthy Updated
----------- ---- ------------ ------- -------------- --------- ------- --------
rtp5-ac01-nas://rtp5-ac01-nas-tme-ucs885/rtp5_ac01_nas_tme_ucs885_rootvol
             LS  rtp5-ac01-nas://rtp5-ac01-nas-tme-ucs885/rtp5_ac01_nas_tme_ucs885_rootvol_lsm01
                              Snapmirrored
                                       Idle           -        true    -
```

Step 13. To create the login banner for the SVM, run the following command:

```
security login banner modify -vserver rtp5-ac01-nas-tme-ucs885 -message "This AI POD SVM is reserved for
authorized users only!"
```

Step 14. Create a new rule for the SVM NFS subnet in the default export policy and assign the policy to the SVM's root volume:

```
vserver export-policy rule create -vserver rtp5-ac01-nas-tme-ucs885 -policyname default -ruleindex 1 -
protocol nfs -clientmatch 192.168.51.0/24 -rorule sys -rwrule sys -superuser sys -allow-suid true

volume modify –vserver rtp5-ac01-nas-tme-ucs885 –volume rtp5_ac01_nas_tme_ucs885_root –policy default
```

Step 15. Create a service policy for the S3 object store:

Note: You need to switch to privileged mode.

```
set -privilege advanced

network interface service-policy create -vserver rtp5-ac01-nas-tme-ucs885 -policy aipod-data-s3 -services
data-s3-server,data-core -allowed-addresses 0.0.0.0/0

set -privilege admin   #Switch back to admin mode
```

Step 16. Create and enable the audit log in the SVM:

```
volume create -vserver rtp5-ac01-nas-tme-ucs885 -volume audit_log -aggregate AC01_NAS_01_SSD_1 -size 50GB -
state online -policy default -junction-path /audit_log -space-guarantee none -percent-snapshot-space 0

snapmirror update-ls-set -source-path rtp5-ac01-nas-tme-ucs885:rtp5_ac01_nas_tme_ucs885_rootvol
vserver audit create -vserver rtp5-ac01-nas-tme-ucs885 -destination /audit_log
vserver audit enable -vserver rtp5-ac01-nas-tme-ucs885
```

Step 17. Run the following commands to create general NFS Logical Interfaces (LIFs):

```
network interface create -vserver rtp5-ac01-nas-tme-ucs885 -lif rtp5-ac01-nas-tme-ucs885-lif1 -service-policy
default-data-files -home-node rtp5-ac01-nas-n01 -home-port e2b-3051 -address 192.168.51.121 -netmask
255.255.255.0 -status-admin up -failover-policy broadcast-domain-wide -auto-revert true

network interface create -vserver rtp5-ac01-nas-tme-ucs885 -lif rtp5-ac01-nas-tme-ucs885-lif2 -service-policy
default-data-files -home-node rtp5-ac01-nas-n02 -home-port e2b-3051 -address 192.168.51.122 -netmask
255.255.255.0 -status-admin up -failover-policy broadcast-domain-wide -auto-revert true
```

Step 18. Run the following commands to create ONTAP S3 LIFs:

```
network interface create -vserver rtp5-ac01-nas-tme-ucs885 -lif rtp5-ac01-nas-tme-ucs885-s3-1 -service-policy
aipod-data-s3 -home-node rtp5-ac01-nas-n01 -home-port e2b-703 -address 10.115.90.117 -netmask 255.255.255.192
-status-admin up -failover-policy broadcast-domain-wide -auto-revert true

network interface create -vserver rtp5-ac01-nas-tme-ucs885 -lif rtp5-ac01-nas-tme-ucs885-s3-2 -service-policy
aipod-data-s3 -home-node rtp5-ac01-nas-n02 -home-port e2b-703 -address 10.115.90.118 -netmask 255.255.255.192
-status-admin up -failover-policy broadcast-domain-wide -auto-revert true

network interface create -vserver rtp5-ac01-nas-tme-ucs885 -lif rtp5-ac01-nas-tme-ucs885-s3-3 -service-policy
aipod-data-s3 -home-node rtp5-ac01-nas-n01 -home-port e3a-703 -address 10.115.90.119 -netmask 255.255.255.192
-status-admin up -failover-policy broadcast-domain-wide -auto-revert true

network interface create -vserver rtp5-ac01-nas-tme-ucs885 -lif rtp5-ac01-nas-tme-ucs885-s3-4 -service-policy
aipod-data-s3 -home-node rtp5-ac01-nas-n02 -home-port e3a-703 -address 10.115.90.120 -netmask 255.255.255.192
-status-admin up -failover-policy broadcast-domain-wide -auto-revert true
```

Step 19. Run the following command to create the SVM-MGMT LIF:

```
network interface create -vserver rtp5-ac01-nas-tme-ucs885 -lif rtp5-ac01-nas-tme-ucs885-mgmt -service-policy
default-management -home-node rtp5-ac01-nas-n01 -home-port e2b-703 -address 10.115.90.121 -netmask
255.255.255.192 -status-admin up -failover-policy broadcast-domain-wide -auto-revert true
```

Step 20. Run the following command to verify LIFs:

```
network interface show -vserver rtp5-ac01-nas-tme-ucs885
            Logical    Status     Network            Current       Current Is
Vserver     Interface  Admin/Oper Address/Mask       Node          Port    Home
----------- ---------- ---------- ------------------ ------------- ------- ----
rtp5-ac01-nas-tme-ucs885

            rtp5-ac01-nas-tme-ucs885-lif1    up/up    192.168.51.121/24   rtp5-ac01-nas-n01 e2b-3051
                                                                           true
            rtp5-ac01-nas-tme-ucs885-lif2    up/up    192.168.51.122/24   rtp5-ac01-nas-n02 e2b-3051
                                                                           true
            rtp5-ac01-nas-tme-ucs885-lif3    up/up    192.168.51.123/24   rtp5-ac01-nas-n01 e3a-3051
                                                                           true
            rtp5-ac01-nas-tme-ucs885-lif4    up/up    192.168.51.124/24   rtp5-ac01-nas-n02 e3a-3051
                                                                           true
            rtp5-ac01-nas-tme-ucs885-mgmt    up/up    10.115.90.121/26    rtp5-ac01-nas-n01 e2b-703
                                                                           true
            rtp5-ac01-nas-tme-ucs885-s3-1    up/up    192.168.90.117/24   rtp5-ac01-nas-n01 e2b-703

            rtp5-ac01-nas-tme-ucs885-s3-2    up/up    192.168.90.118/24   rtp5-ac01-nas-n02 e2b-703
                                                                           true
            rtp5-ac01-nas-tme-ucs885-s3-3    up/up    192.168.90.119/24   rtp5-ac01-nas-n01 e3a-703
                                                                           true
            rtp5-ac01-nas-tme-ucs885-s3-4    up/up    192.168.90.120/24   rtp5-ac01-nas-n02 e3a-703
                                                                           true

9 entries were displayed.
```

Step 21. Create a default route that enables the SVM management interface to reach the outside world:

```
network route create -vserver rtp5-ac01-nas-tme-ucs885 -destination 0.0.0.0/0 -gateway 10.115.90.126
```

Step 22. Set a password for the SVM vsadmin user and unlock the user:

```
security login password -username vsadmin -vserver rtp5-ac01-nas-tme-ucs885
Enter a new password:
Enter it again:

security login unlock -username vsadmin -vserver rtp5-ac01-nas-tme-ucs885
```

Step 23. Add the OpenShift DNS servers to the SVM:

```
dns create -vserver rtp5-ac01-nas-tme-ucs885 -domains ocp-c885.aipod.local -name-servers
10.115.90.123,10.115.90.124
```

Configure S3 access to the OpenShift Tenant

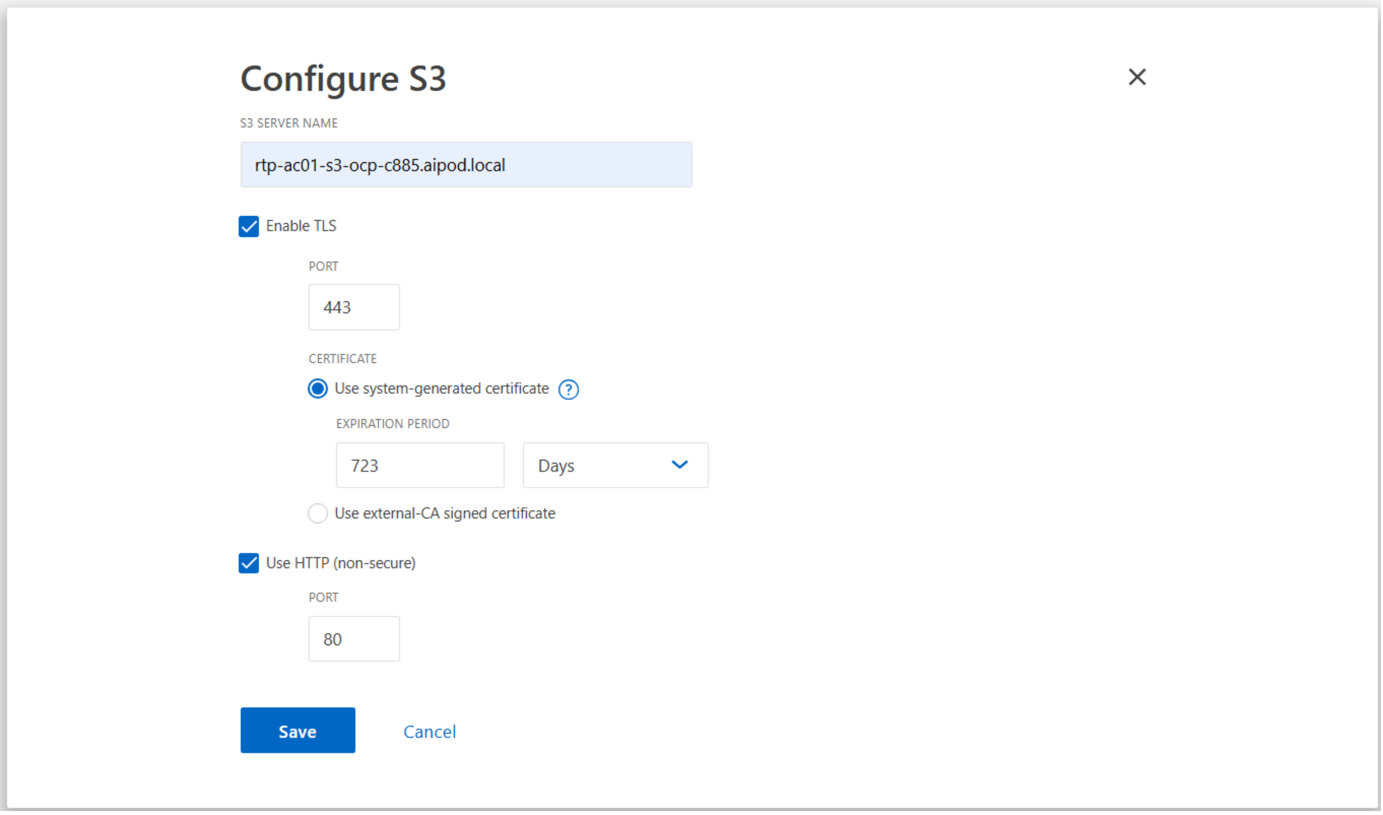
Procedure 1. Enable S3 on the storage VM

Step 1. In NetApp System Manager, click **Storage > Storage VMs**, select the storage VM, click **Settings**, and then click the pencil icon under **S3**.

Step 2. Enter the S3 server name. Make sure to enter the S3 server name as a Fully Qualified Domain Name (FQDN).

Step 3. TLS is enabled by default (port 443). You can enable HTTP if required.

Step 4. Select the certificate type. Whether you select system-generated certificate or external-CA signed certificate, it will be required for client access.



Configure S3

S3 SERVER NAME

rtp-ac01-s3-ocp-c885.aipod.local

☑ Enable TLS

PORT

443

CERTIFICATE

● Use system-generated certificate

EXPIRATION PERIOD

723 Days

○ Use external-CA signed certificate

☑ Use HTTP (non-secure)

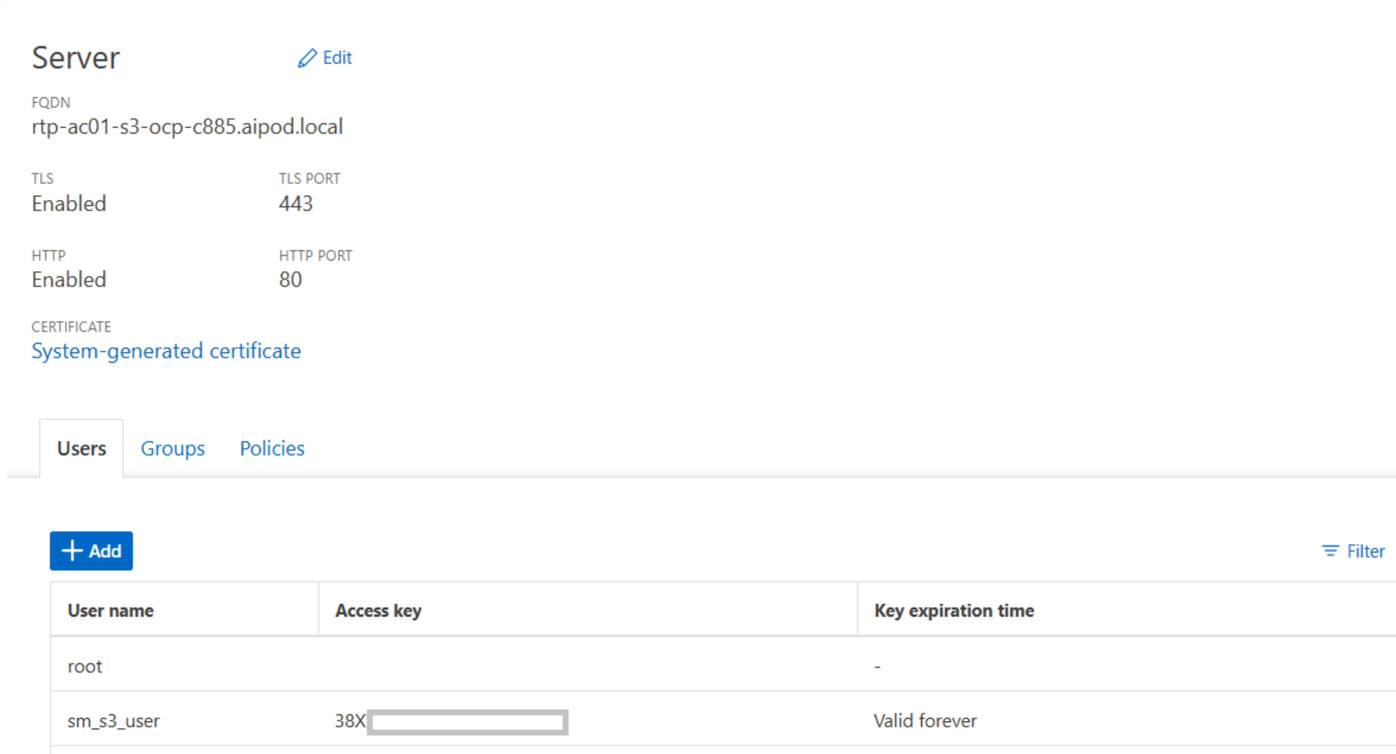
PORT

80

Step 5. Click **Save**.

The ONTAP S3 object store server is now configured as shown in the following figure. There are two users created by default:

1. root user with UID 0 – no access key or secret key is generated for this user
2. sm_s3_user – both access and secret keys are generated for this user. Save access keys and secret keys for future use.



Server

FQDN
rtp-ac01-s3-ocp-c885.aipod.local

TLS
Enabled

TLS PORT
443

HTTP
Enabled

HTTP PORT
80

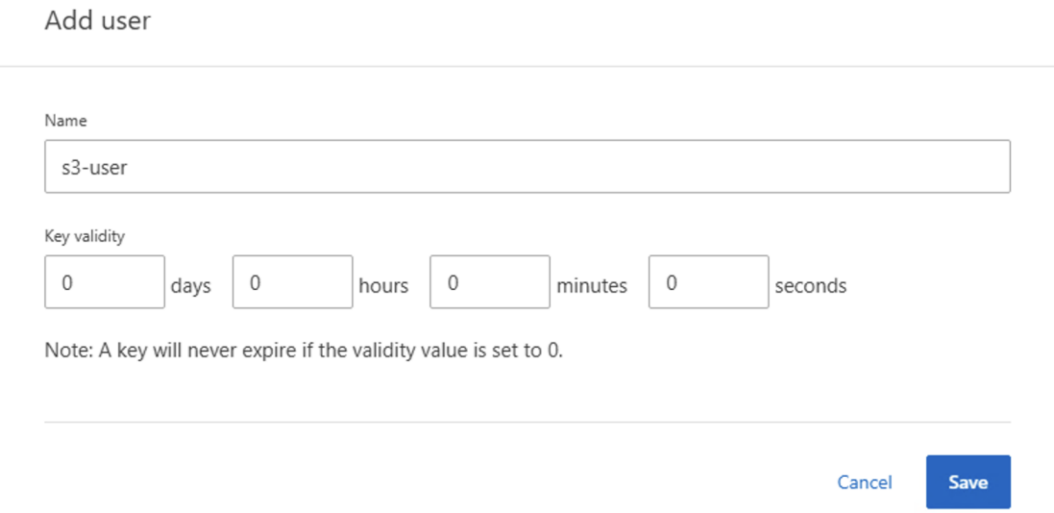
CERTIFICATE
System-generated certificate

User name	Access key	Key expiration time
root		-
sm_s3_user	38X[redacted]	Valid forever

Note: The ONTAP administrator must run the `object-store-server users regenerate-keys` command to set the access key and secret key for the root user. As a NetApp best practice, do not use this root user. Any client application that uses the access key or secret key of the root user has full access to all buckets and objects in the object store.

Step 6. You can choose to utilize the default user (sm_s3_user) or create a custom ONTAP S3 user:

- Click **Storage** > **Storage VMs**. Select the storage VM to which you need to add a user, select **Settings** and then click the **pencil icon** under S3.
- To add a user, click **Users** > **Add**.
- Enter a name for the user. Click **Save**.



Add user

Name
s3-user

Key validity
0 days 0 hours 0 minutes 0 seconds

Note: A key will never expire if the validity value is set to 0.

The user is created, and an access key and a secret key are generated for the user.

- Download or save the access key and secret key. These will be required for access from S3 clients.

Note: Beginning with ONTAP 9.14.1, you can specify the retention period of the access keys that get created for the user. You can specify the retention period in days, hours, minutes, or seconds, after which the keys automatically expire. By default, the value is set to 0 that indicates that the key is indefinitely valid.

Procedure 2. Create ONTAP S3 user group to control access to buckets

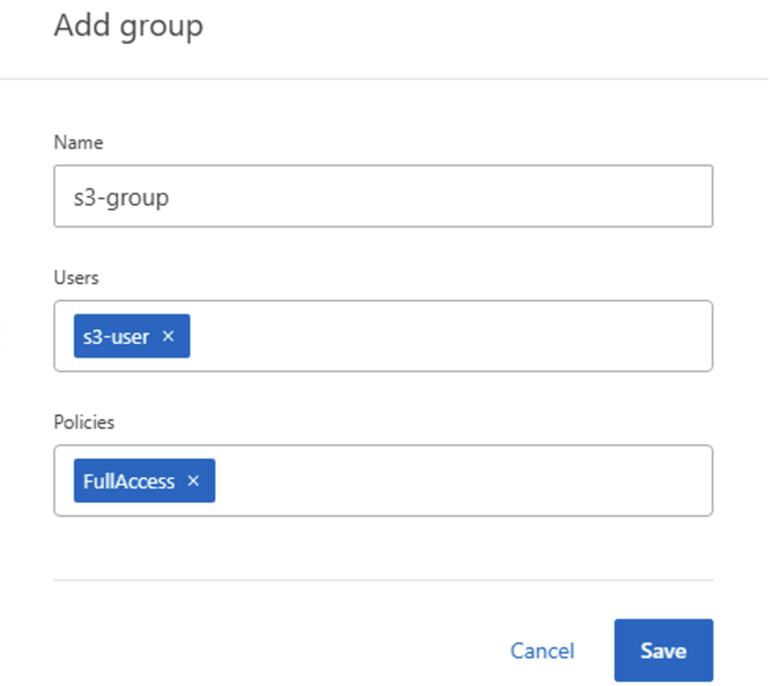
Step 1. Click **Storage > Storage VMs**. Select the storage VM to which you need to add a group, select **Settings** and then click the pencil icon under **S3**.

Step 2. To add a group, select **Groups**, then click **Add**.

Step 3. Enter a group name and select from a list of users.

Step 4. You can select an existing group policy or add one now, or you can add a policy later. In this configuration, we have used an existing policy (FullAccess).

Step 5. Click **Save**.



Add group

Name: s3-group

Users: s3-user ×

Policies: FullAccess ×

Procedure 3. Create an ONTAP S3 bucket

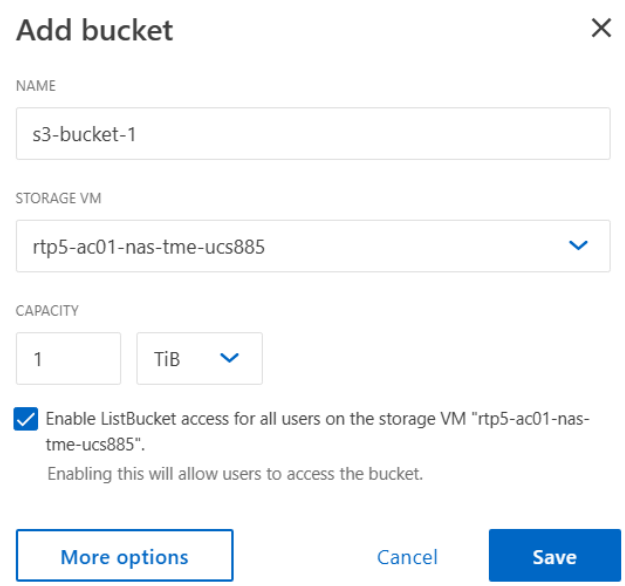
Step 1. Click **Storage > Buckets**, then click **Add**.

Step 2. Enter a name for the bucket, select the storage VM, and enter the size.

a. If you click Save at this point, a bucket is created with these default settings:

   i. No users are granted access to the bucket unless any group policies are already in effect.
   ii. A Quality of Service (performance) level that is the highest available for your system.

b. Click **Save** to create a bucket.



Add bucket

NAME

s3-bucket-1

STORAGE VM

rtp5-ac01-nas-tme-ucs885

CAPACITY

1 TiB

☑ Enable ListBucket access for all users on the storage VM "rtp5-ac01-nas-tme-ucs885".

Enabling this will allow users to access the bucket.

Step 3. On the bucket, click the three dots and select **Edit**. Under **Permissions** section, click **Add** to add relevant permissions for accessing the bucket. Specify the following parameters:

a. **Principal:** the user or group to whom access is granted. Here, we selected “s3-group”.

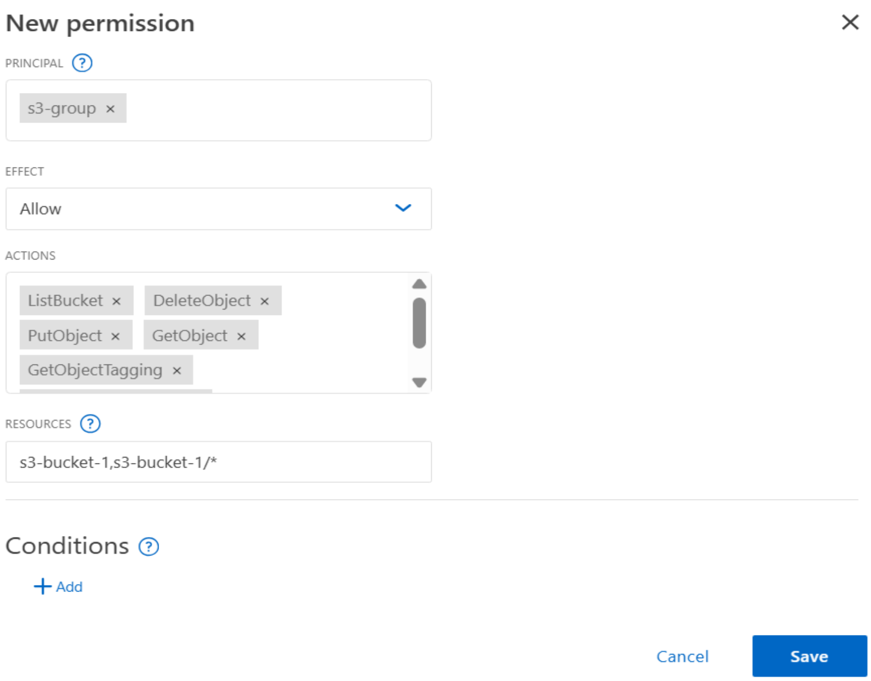
b. **Effect:** allows or denies access to a user or group. Allow is selected here for “s3-group”.

c. **Actions:** permissible actions in the bucket for a given user or group. Select as required for validation.

d. **Resources:** paths and names of objects within the bucket for which access is granted or denied. The defaults *bucketname* and *bucketname/** grant access to all objects in the bucket. In this solution, we used default values for resources (s3-bucket1,s3-bucket1/*)

e. **Conditions (optional):** expressions that are evaluated when access is attempted. For example, you can specify a list of IP addresses for which access will be allowed or denied. In this case, the field value was empty as no conditions were specified.

Step 4. Click **Save**.



New permission

PRINCIPAL: s3-group

EFFECT: Allow

ACTIONS: ListBucket, DeleteObject, PutObject, GetObject, GetObjectTagging

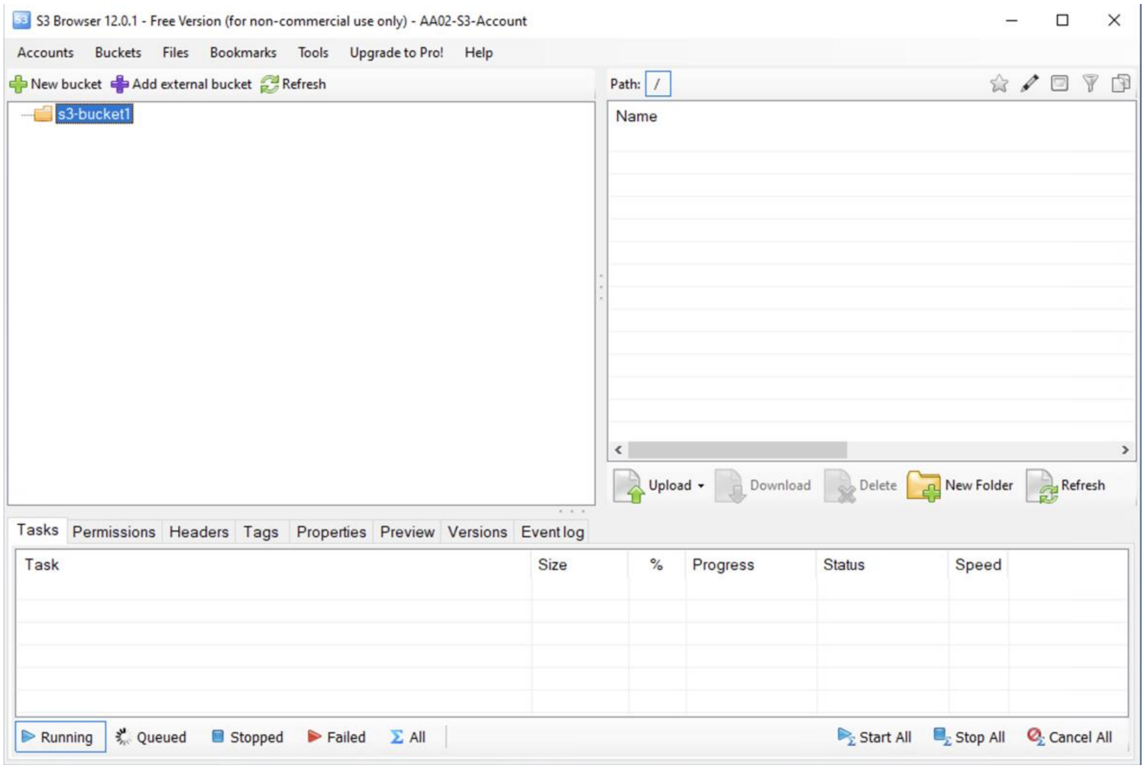
RESOURCES: s3-bucket-1,s3-bucket-1/*

Conditions

Step 5. Click **Save** to create the ONTAP S3 bucket.

Step 6. ONTAP S3 is successfully created as shown in the following figure. Navigate to **Storage > Buckets**, select the bucket (s3-bucket1) and click **Overview** tab to see detailed information about the bucket.

Step 7. On S3 client applications (whether ONTAP S3 or an external third-party application), you can verify access to the newly created S3 bucket. In this solution, we used the S3 Browser application to access the bucket as shown below:



S3 Browser 12.0.1 - Free Version (for non-commercial use only) - AA02-S3-Account

Note: In S3 Browser application, new account needs to be created first by providing S3 user access key and secret key, and REST endpoint (http://<s3-lif-ip>:80). Once the account is successfully added, the S3 buckets are fetched automatically as shown above.

Cisco UCS C885A Configuration

This chapter contains the following:

- Set up Cisco Intersight Resource Group

This section details the configuration of the Cisco UCS C885A 8-GPU servers. These servers can currently be monitored by Cisco Intersight, but policy-based configuration will come in the future. The following sections go through updating server firmware and configuring the servers for an AI training environment. This procedure will need to be followed for each C885A server. The server should be installed according to Cisco UCS C885A M8 Server Installation and Service Guide and cabled according to Table 4. Set up the Cisco BMC with either a static or DHCP IP address.

Set up Cisco Intersight Resource Group

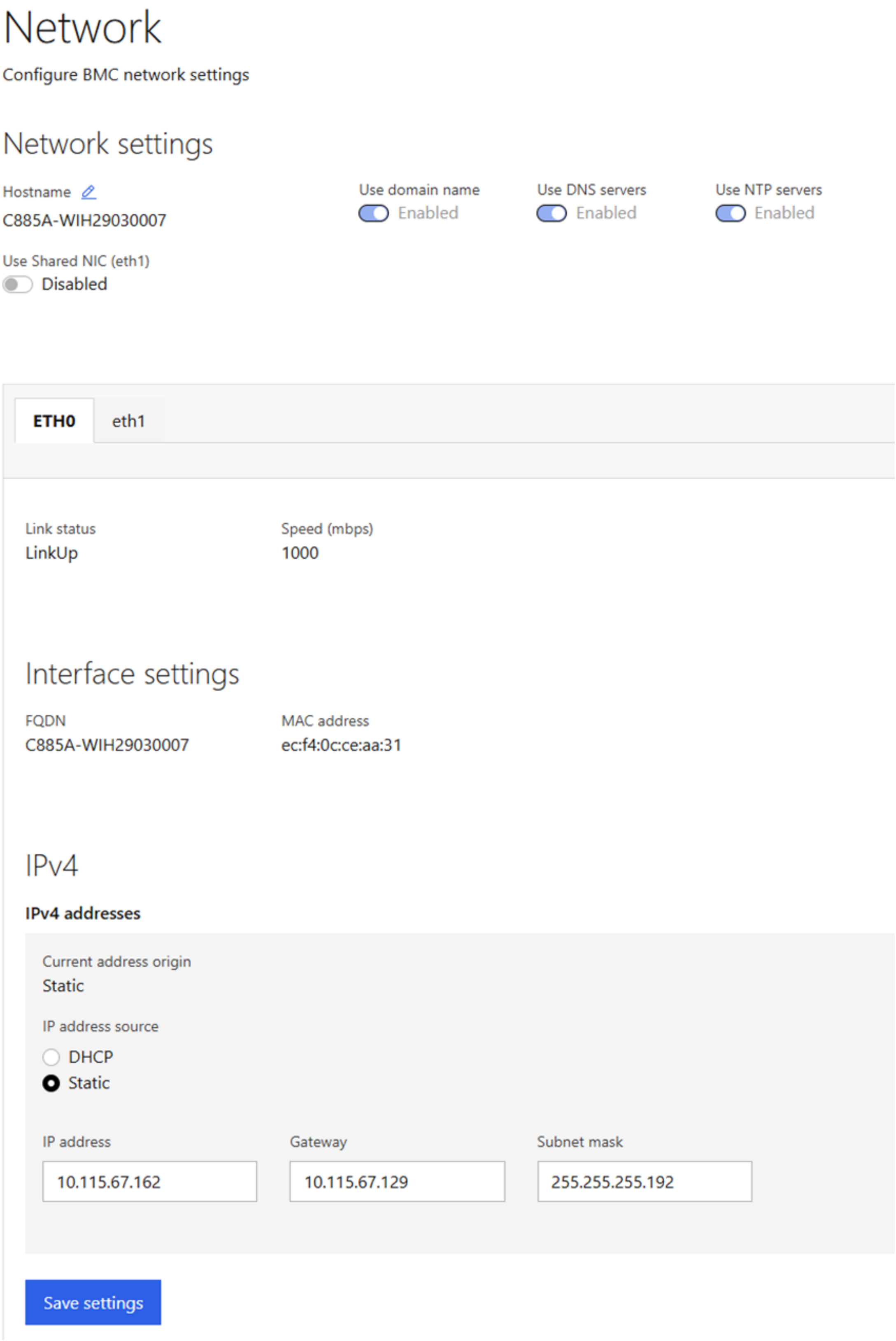
Procedure 1. Initial C885A Setup

In this procedure, the Cisco UCS C885A is initially setup.

Step 1. Using a web browser, connect to https://<BMC IP>. The default user id is root, and the default password is “password.” The first time you connect, you will be asked to set a strong password.

Step 2. Once connected, click **Select Timezone**. Use the drop-down list to select the current Timezone. Click **Confirm**.

Step 3. Go to **Settings > Network**. Ensure that all necessary network information is in place, including DNS servers and DNS Search domain.



Network

Configure BMC network settings

Network settings

Hostname
C885A-WIH29030007

Use domain name
Enabled

Use DNS servers
Enabled

Use NTP servers
Enabled

Use Shared NIC (eth1)
Disabled

Link status
LinkUp

Speed (mbps)
1000

Interface settings

FQDN
C885A-WIH29030007

MAC address
ec:f4:0c:ce:aa:31

IPv4

IPv4 addresses

Current address origin
Static

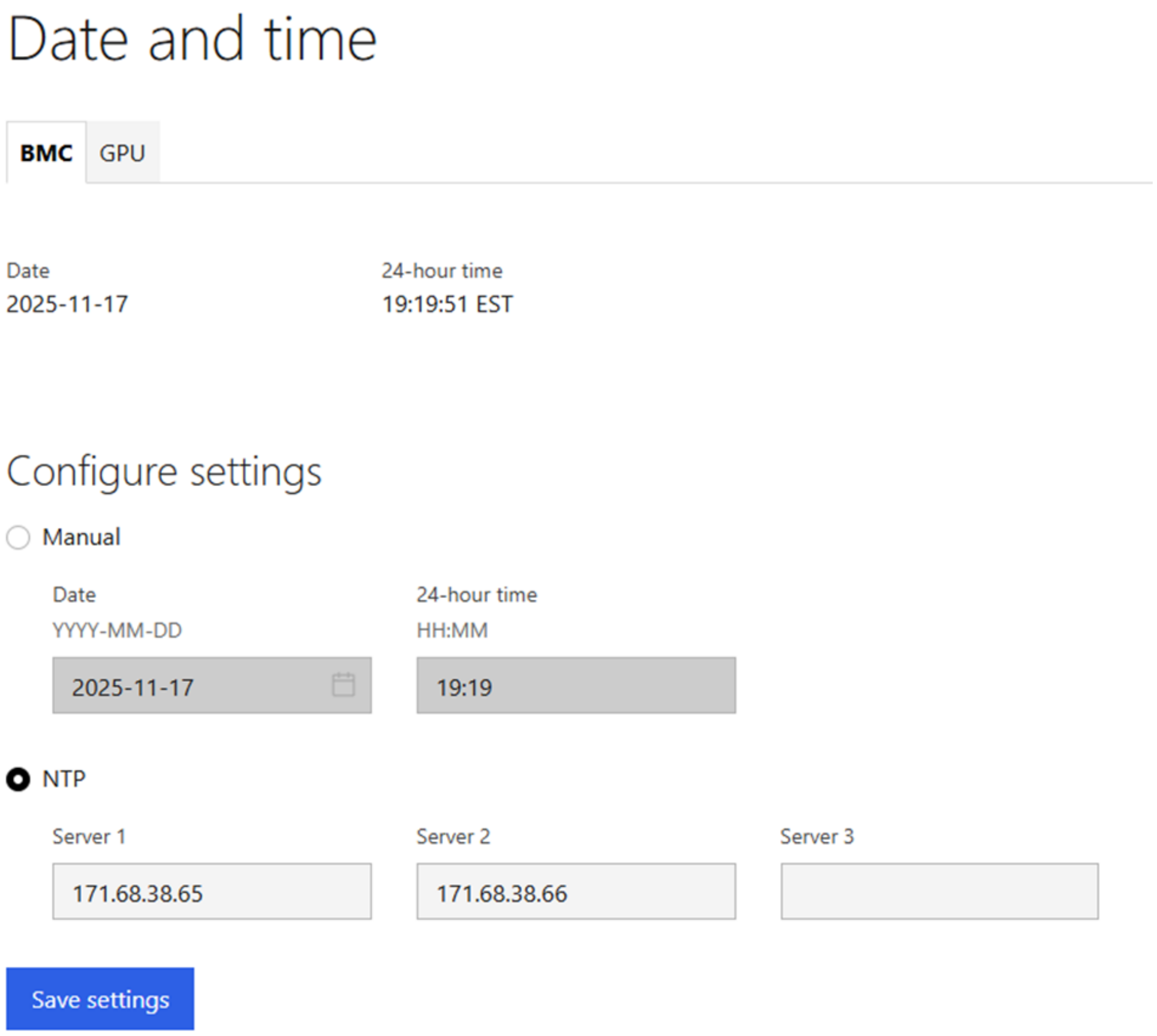
IP address source
○ DHCP
● Static

IP address
10.115.67.162

Gateway
10.115.67.129

Subnet mask
255.255.255.192

Step 4. Go to **Settings > Date and time.** Enter up to three NTP servers and click **Save settings.** After these settings have been saved return to this screen and verify the correct time.



Date and time

Date
2025-11-17

24-hour time
19:19:51 EST

Configure settings

○ Manual

Date YYYY-MM-DD: 2025-11-17

24-hour time HH:MM: 19:19

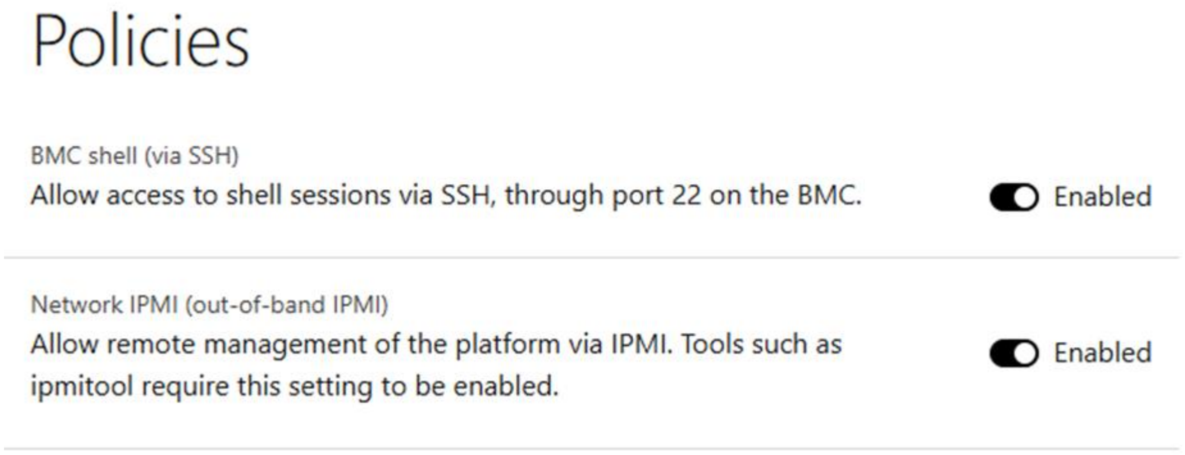
● NTP

Server 1: 171.68.38.65

Server 2: 171.68.38.66

Server 3:

Step 5. Go to **Security and access > Policies**. Enable both BMC shell (via SSH) and Network IPMI (out-of-band IPMI).



Policies

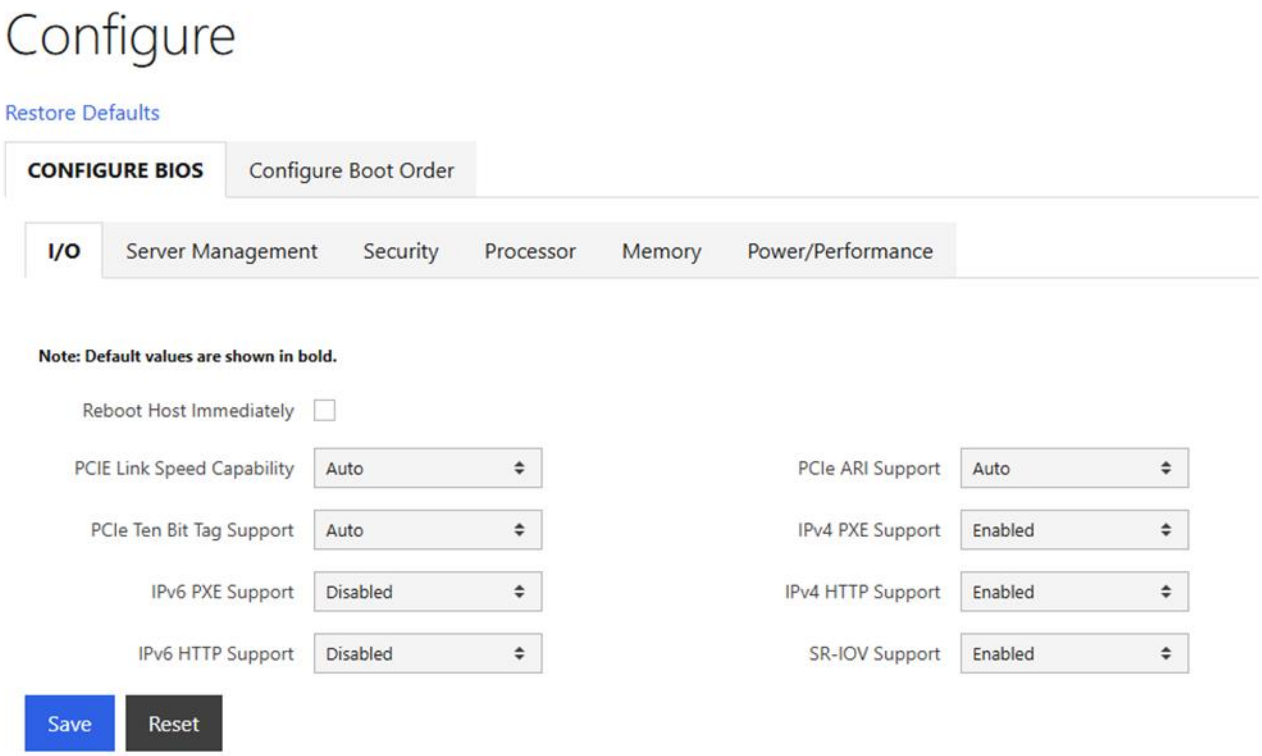
BMC shell (via SSH)
Allow access to shell sessions via SSH, through port 22 on the BMC. Enabled

Network IPMI (out-of-band IPMI)
Allow remote management of the platform via IPMI. Tools such as ipmitool require this setting to be enabled. Enabled

Procedure 2. Configure C885A BIOS Settings

Configure the C885A BIOS Settings to work with AI applications.

Step 1. Go to **Configure > Configure BIOS > I/O**. Configure settings as shown without selecting Reboot Host Immediately. If any changes are made, click **Save**.

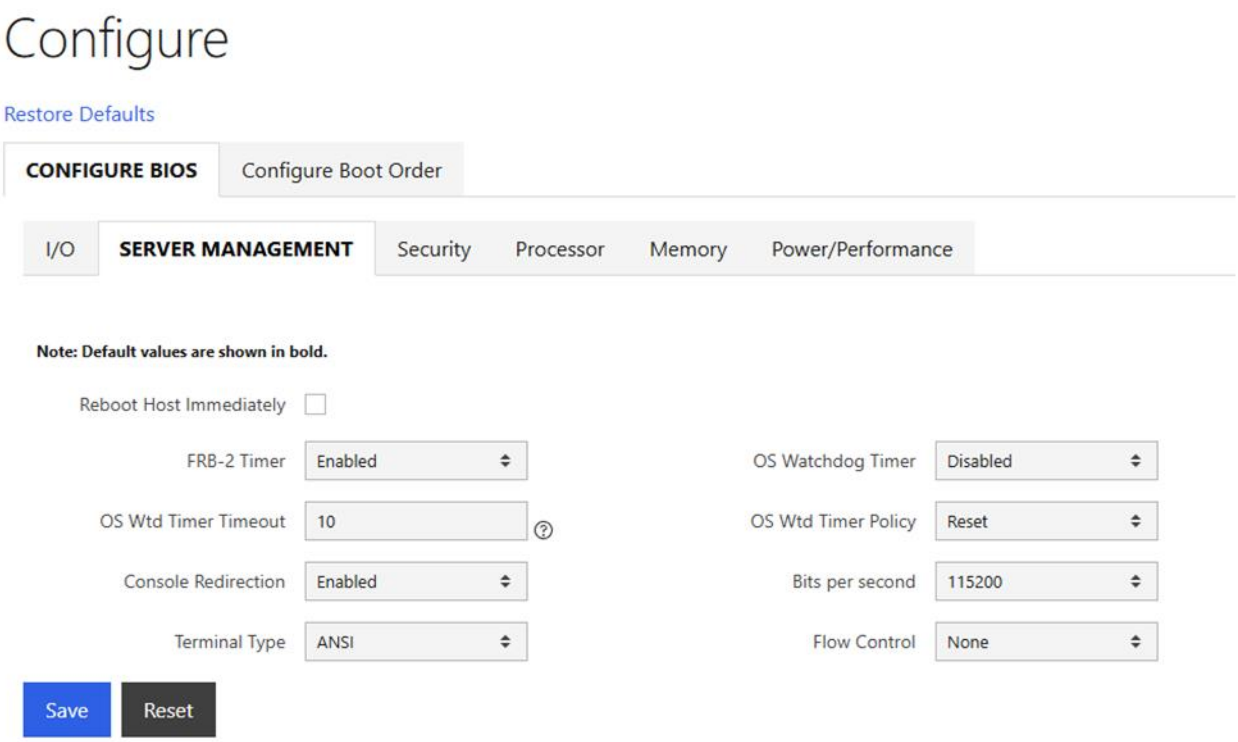


Note: Default values are shown in bold.

Reboot Host Immediately □

PCIE Link Speed Capability	Auto	PCIe ARI Support	Auto
PCIe Ten Bit Tag Support	Auto	IPv4 PXE Support	Enabled
IPv6 PXE Support	Disabled	IPv4 HTTP Support	Enabled
IPv6 HTTP Support	Disabled	SR-IOV Support	Enabled

Step 2. Go to **Configure > Configure BIOS > Server Management**. Configure settings as shown without selecting Reboot Host Immediately. If any changes are made, click **Save**.



Note: Default values are shown in bold.

Reboot Host Immediately □

FRB-2 Timer: Enabled

OS Watchdog Timer: Disabled

OS Wtd Timer Timeout: 10

OS Wtd Timer Policy: Reset

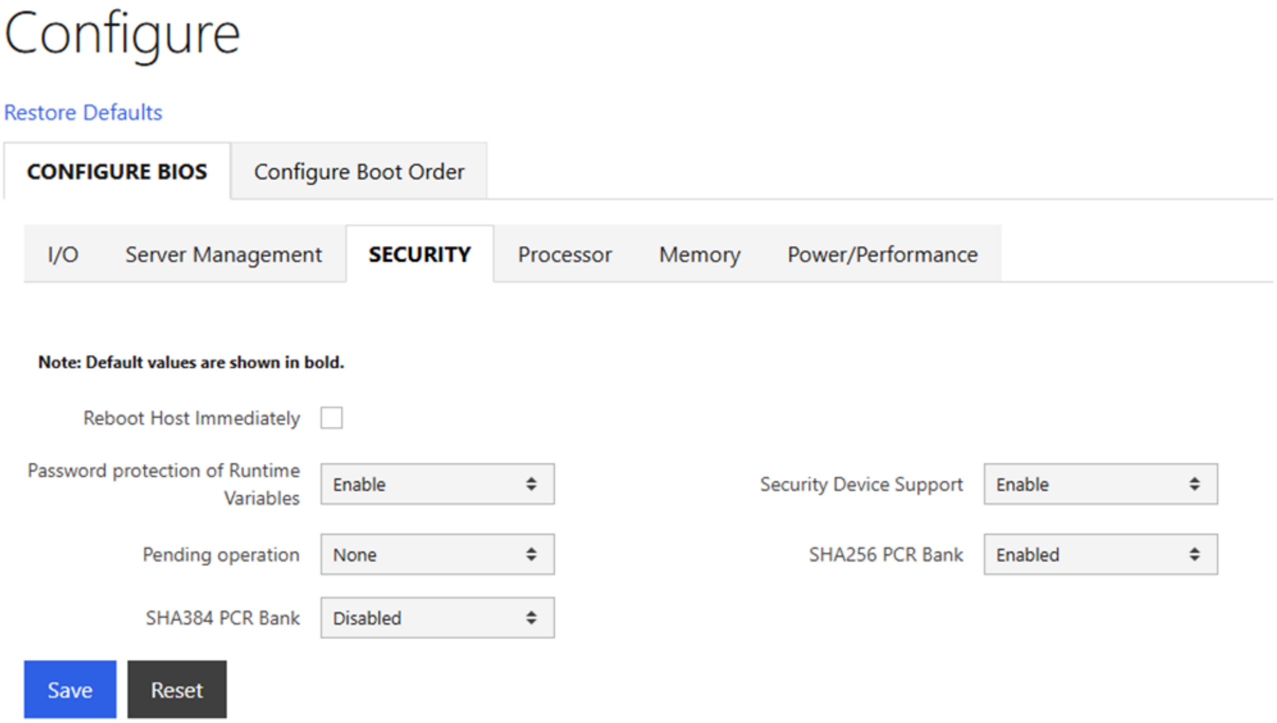
Console Redirection: Enabled

Bits per second: 115200

Terminal Type: ANSI

Flow Control: None

Step 3. Go to **Configure > Configure BIOS > Security**. Configure settings as shown without selecting Reboot Host Immediately. If any changes are made, click **Save**.



Note: Default values are shown in bold.

Reboot Host Immediately □

Password protection of Runtime Variables: Enable

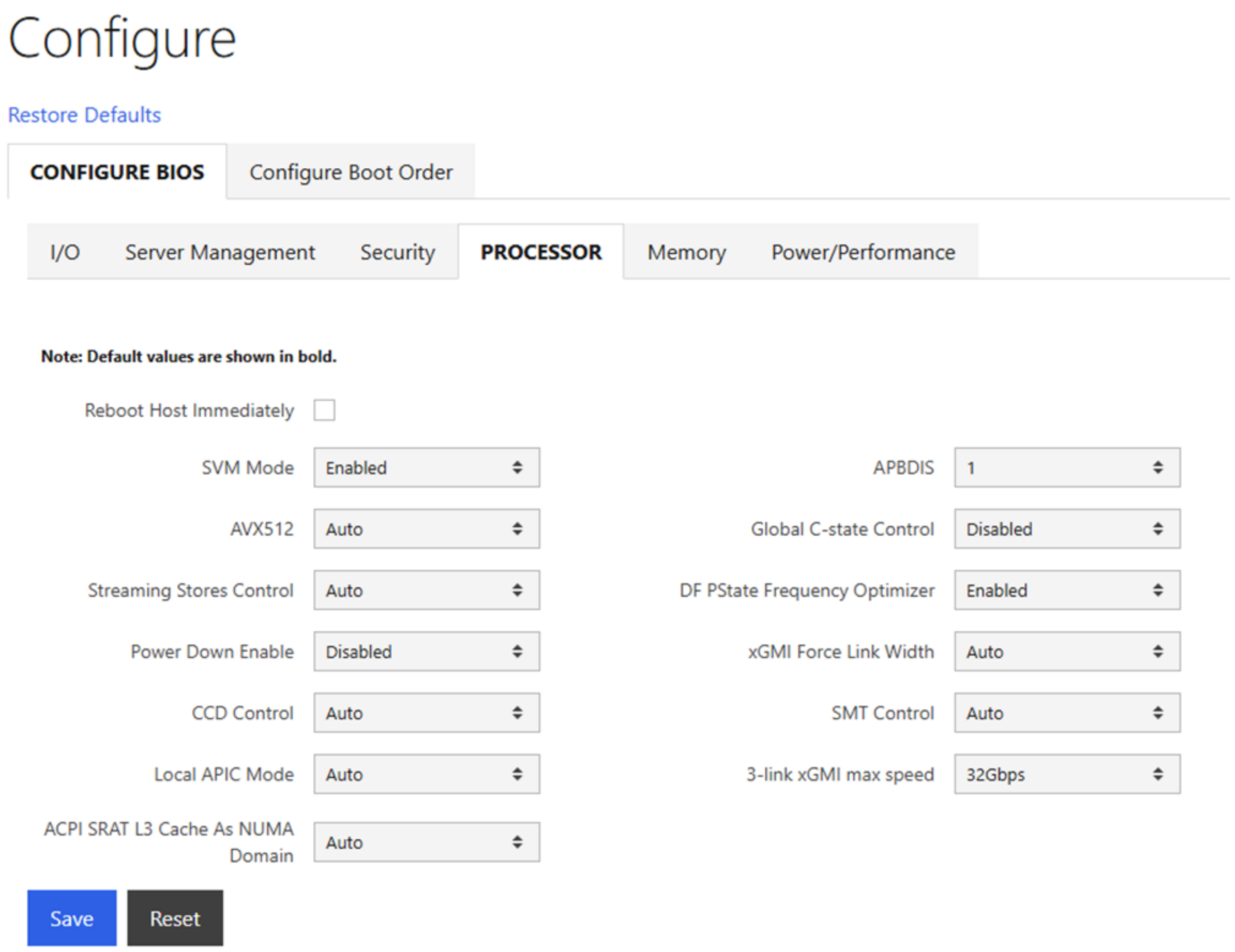
Security Device Support: Enable

Pending operation: None

SHA256 PCR Bank: Enabled

SHA384 PCR Bank: Disabled

Step 4. Go to **Configure > Configure BIOS > Processor**. Configure settings as shown without selecting Reboot Host Immediately. If any changes are made, click **Save**.



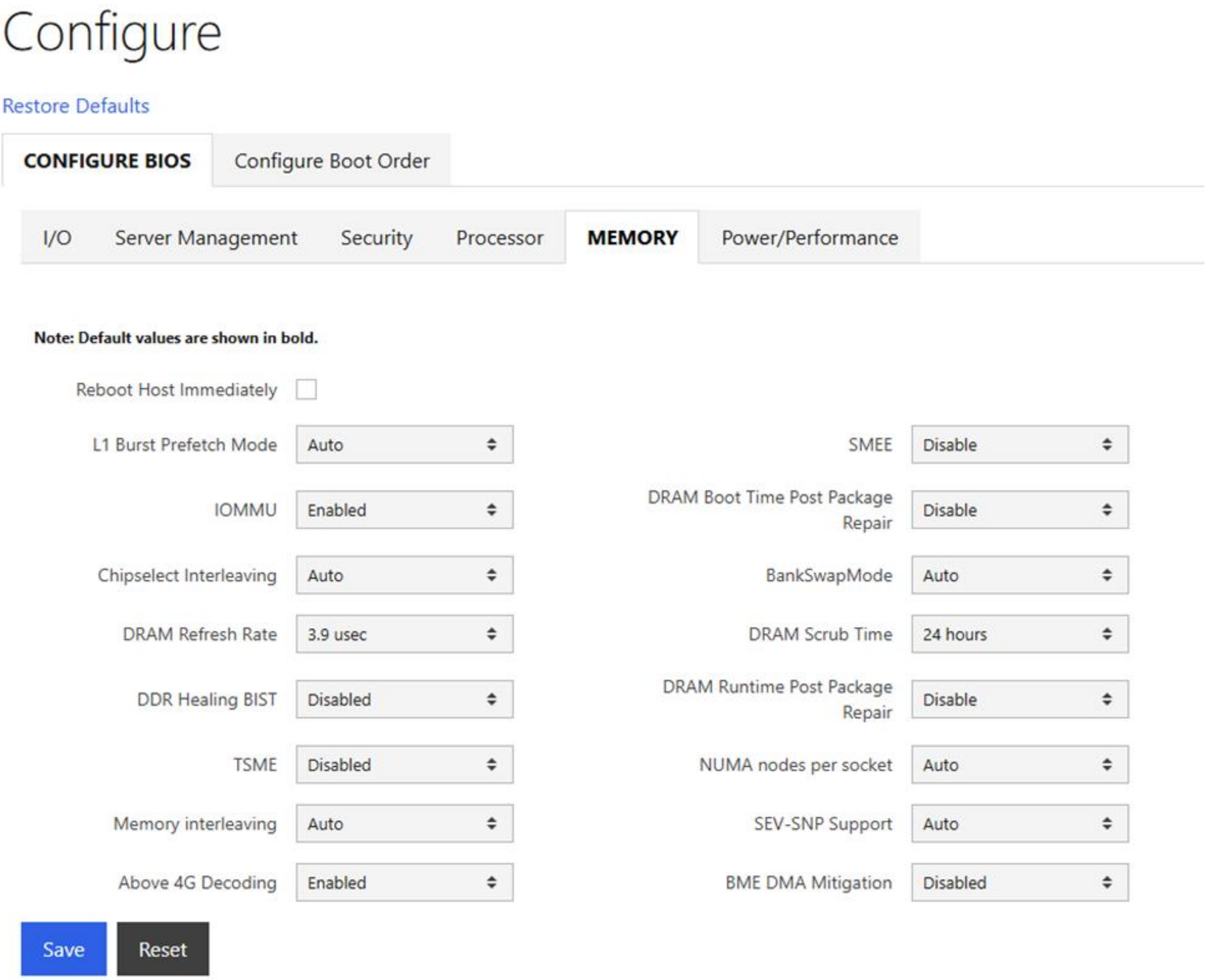
Configure

Note: Default values are shown in bold.

Reboot Host Immediately □

SVM Mode	Enabled	APBDIS	1
AVX512	Auto	Global C-state Control	Disabled
Streaming Stores Control	Auto	DF PState Frequency Optimizer	Enabled
Power Down Enable	Disabled	xGMI Force Link Width	Auto
CCD Control	Auto	SMT Control	Auto
Local APIC Mode	Auto	3-link xGMI max speed	32Gbps
ACPI SRAT L3 Cache As NUMA Domain	Auto		

Step 5. Go to **Configure > Configure BIOS > Memory**. Configure settings as shown without selecting Reboot Host Immediately. If any changes are made, click **Save**. Note that IOMMU should be Enabled.



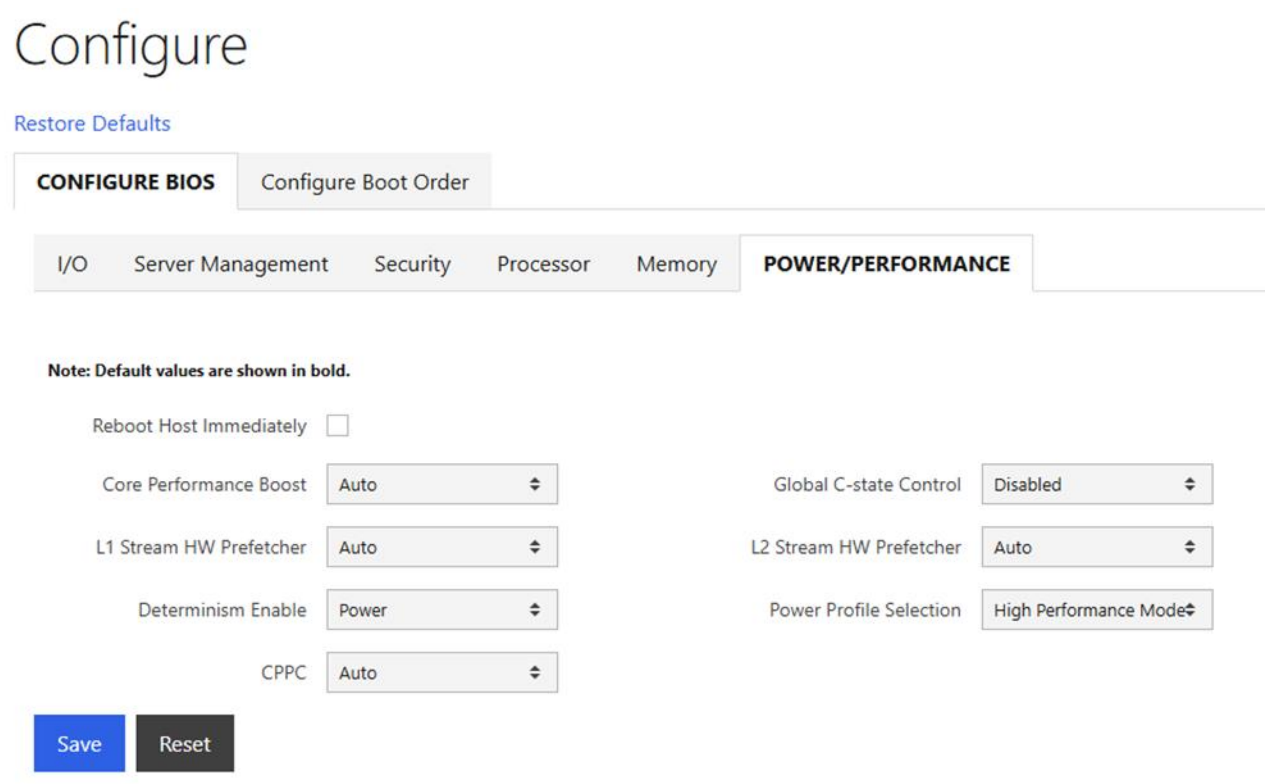
Configure

Note: Default values are shown in bold.

Reboot Host Immediately □

L1 Burst Prefetch Mode	Auto	SMEE	Disable
IOMMU	Enabled	DRAM Boot Time Post Package Repair	Disable
Chipselect Interleaving	Auto	BankSwapMode	Auto
DRAM Refresh Rate	3.9 usec	DRAM Scrub Time	24 hours
DDR Healing BIST	Disabled	DRAM Runtime Post Package Repair	Disable
TSME	Disabled	NUMA nodes per socket	Auto
Memory interleaving	Auto	SEV-SNP Support	Auto
Above 4G Decoding	Enabled	BME DMA Mitigation	Disabled

Step 6. Go to **Configure > Configure BIOS > Power/Performance**. Configure settings as shown and select Reboot Host Immediately. Click **Save**.



Note: Default values are shown in bold.

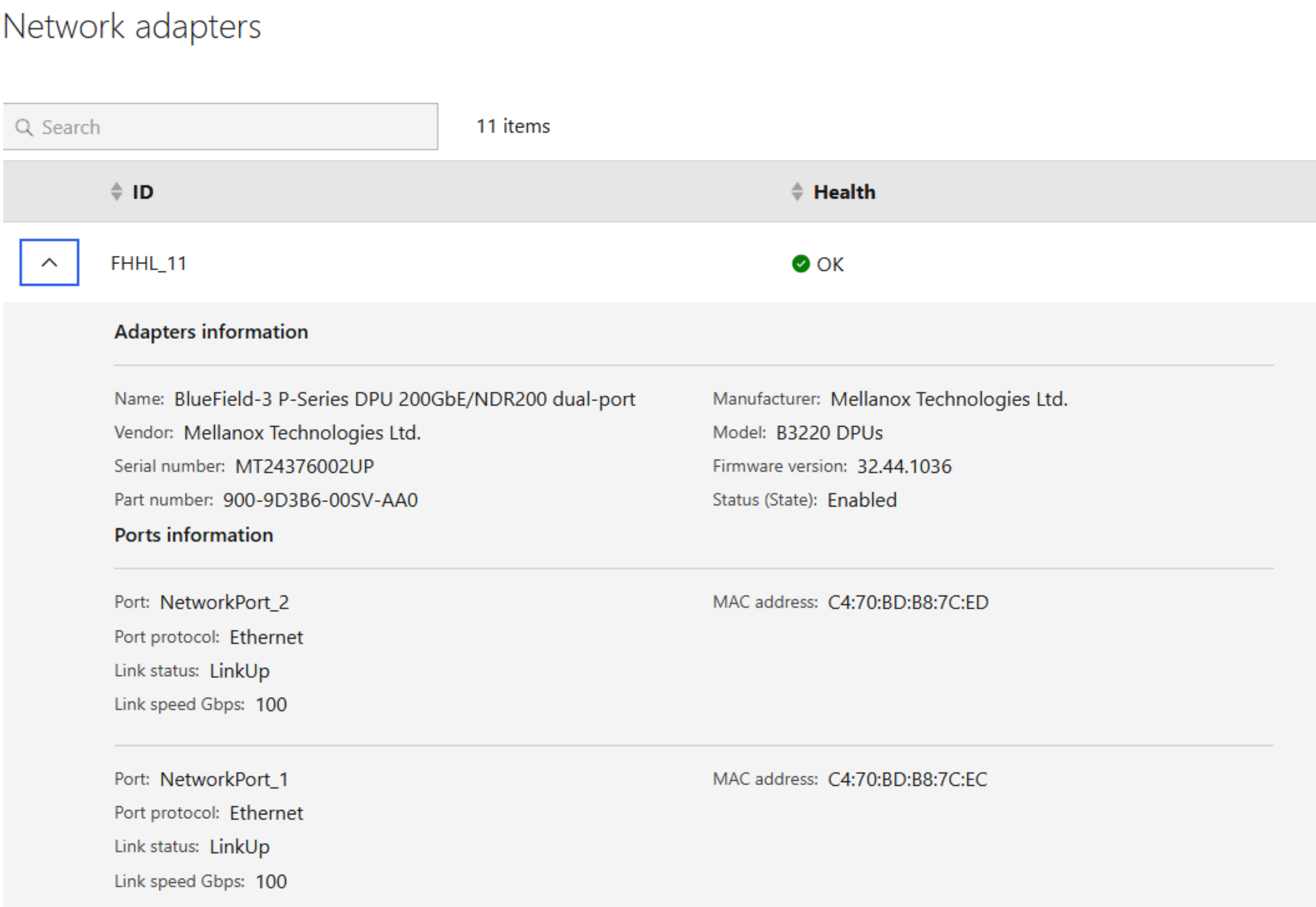
Reboot Host Immediately □

Core Performance Boost	Auto	Global C-state Control	Disabled
L1 Stream HW Prefetcher	Auto	L2 Stream HW Prefetcher	Auto
Determinism Enable	Power	Power Profile Selection	High Performance Mode
CPPC	Auto		

Procedure 3. Disable BlueField Internal CPU (DPU)

If you have BlueField-3 (BF-3) NIC Cards in your frontend or N-S network, it is often desirable to configure the two 200G or 100G ports in an LACP bond. It has been determined that if the DPUs in the BF-3 NICs are enabled, the LACP PDUs to the switches are blocked. It is necessary to disable the DPUs for the LACP vPC port-channels on the Cisco Nexus switches to function properly. This will need to be done on all N-S BF-3 NICs on all the Cisco UCS C885As.

Step 1. In the Cisco UCS C885A BMC interface, select **Hardware status > Inventory and LEDs > Network adapters**. Identify the adapter(s) being used for the frontend network, expand them, and note the MAC addresses.


Network adapters

Search

11 items

ID	Health
FHHL_11	✓ OK

Adapters information

Name: BlueField-3 P-Series DPU 200GbE/NDR200 dual-port
Vendor: Mellanox Technologies Ltd.
Serial number: MT24376002UP
Part number: 900-9D3B6-00SV-AA0
Manufacturer: Mellanox Technologies Ltd.
Model: B3220 DPUs
Firmware version: 32.44.1036
Status (State): Enabled

Ports information

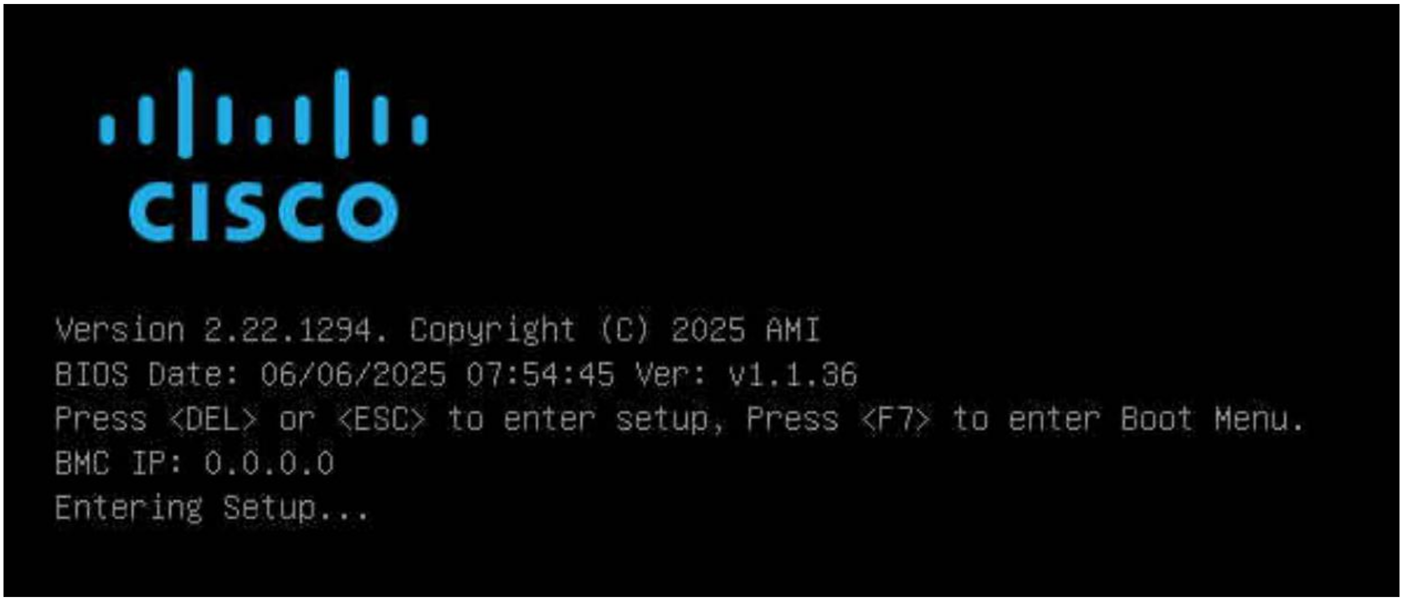
Port: NetworkPort_2
Port protocol: Ethernet
Link status: LinkUp
Link speed Gbps: 100
MAC address: C4:70:BD:B8:7C:ED

Port: NetworkPort_1
Port protocol: Ethernet
Link status: LinkUp
Link speed Gbps: 100
MAC address: C4:70:BD:B8:7C:EC

Step 2. Select **Operations > KVM** and click **Launch KVM**. The KVM will open in a separate window. On Windows, the KVM will open in full screen but can be sized down.

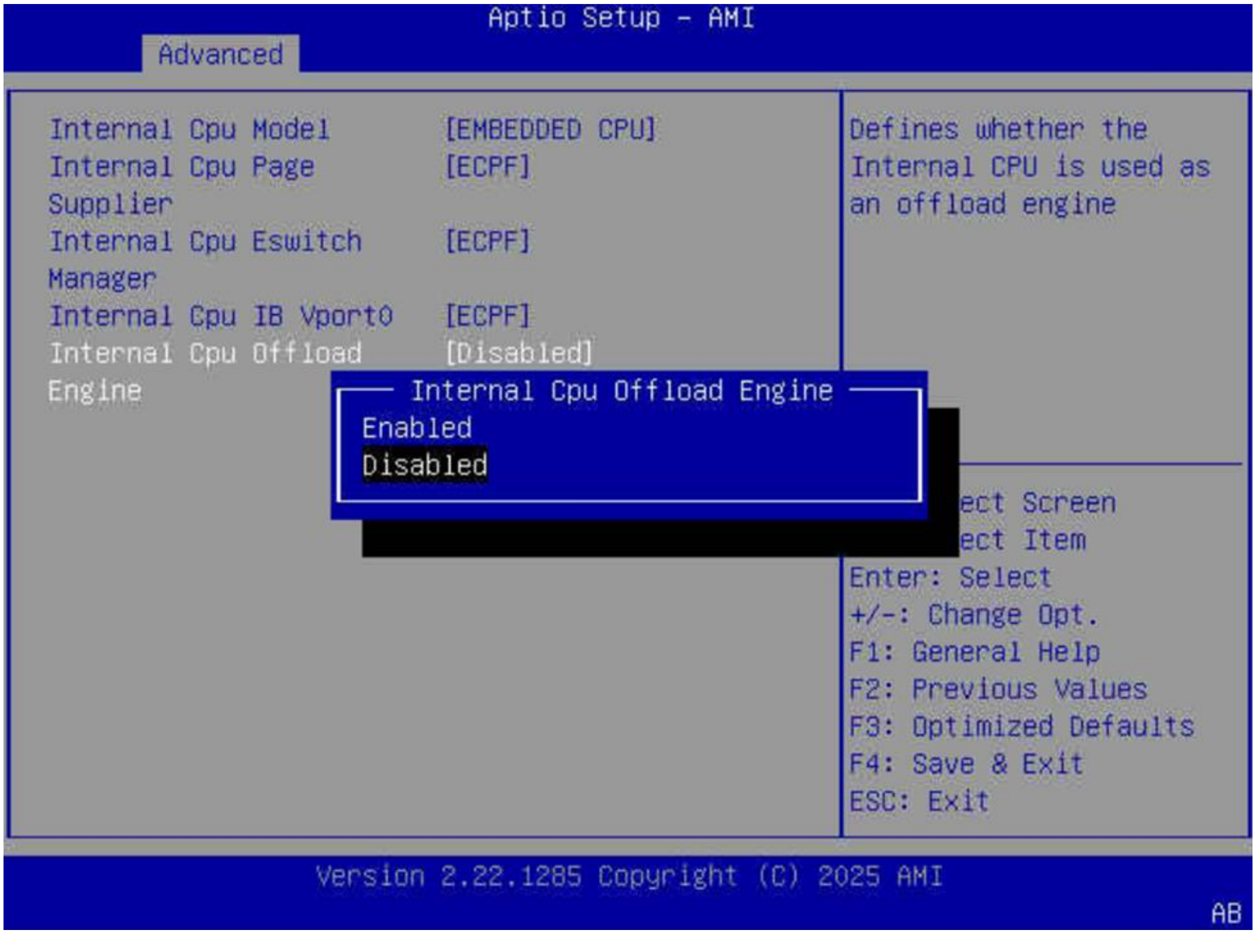
Step 3. From the **Host Power** drop-down list, select **Power Cycle** and click **Confirm**.

Step 4. When the server comes back up and you see Press <DEL> or <ESC> to enter setup, press either of those keys. You should then see an Entering Setup message.



```
Version 2.22.1294. Copyright (C) 2025 AMI
BIOS Date: 06/06/2025 07:54:45 Ver: v1.1.36
Press <DEL> or <ESC> to enter setup, Press <F7> to enter Boot Menu.
BMC IP: 0.0.0.0
Entering Setup...
```

Step 5. Use the right arrow key to move to the Advanced tab and then Arrow down until you find an Nvidia Network Adapter with a MAC address that matches what was queried in Step 1. When the adapter is highlighted, press Enter to open it. Arrow down to **BlueField Internal Cpu Configuration** and press Enter to open it. Arrow down to the field to the right of **Internal Cpu Offload Engine** and use the arrow keys and Enter key to set the field to **Disabled**. Hit the ESC key twice to back out to the device selection page. Repeat this process for all BF-3 ports connected to the frontend network. Press F4 to Save and Exit and click Yes to verify. The server will reboot with the DPUs

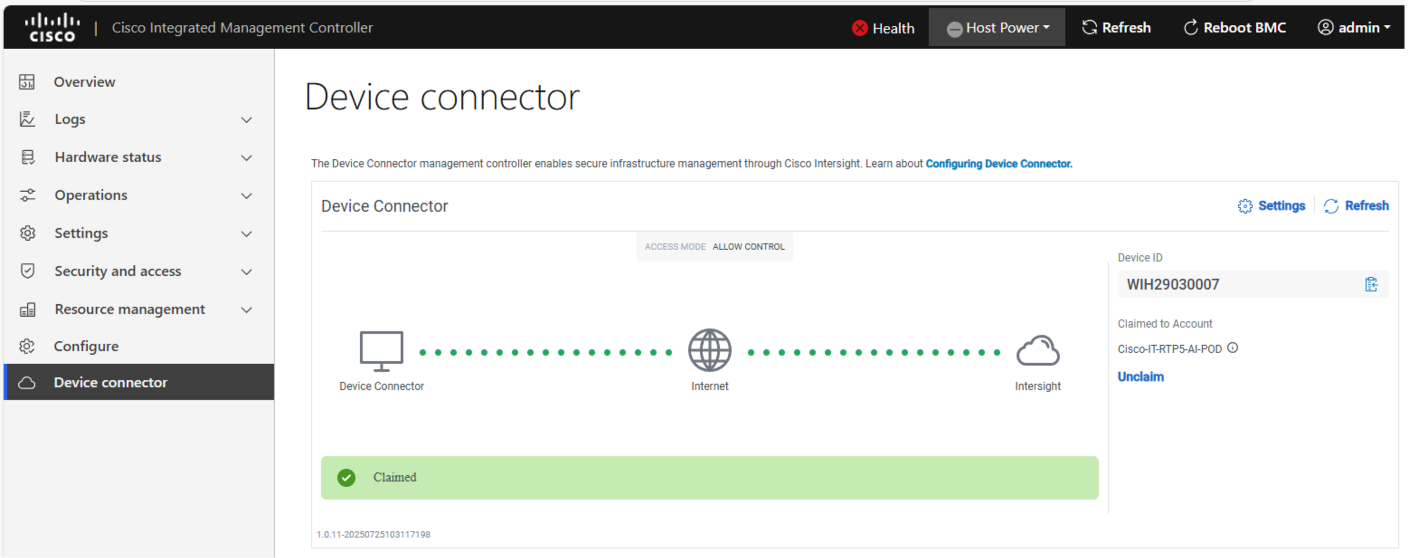


```
                         Aptio Setup - AMI
        Advanced

  Internal Cpu Model        [EMBEDDED CPU]     Defines whether the
  Internal Cpu Page         [ECPF]             Internal CPU is used as
  Supplier                                     an offload engine
  Internal Cpu Eswitch      [ECPF]
  Manager
  Internal Cpu IB Vport0    [ECPF]
  Internal Cpu Offload      [Disabled]
  Engine        ┌ Internal Cpu Offload Engine ┐
                │ Enabled                     │
                │ Disabled                    │
                └─────────────────────────────┘
                                                   ect Screen
                                                   ect Item
                                               Enter: Select
                                               +/-: Change Opt.
                                               F1: General Help
                                               F2: Previous Values
                                               F3: Optimized Defaults
                                               F4: Save & Exit
                                               ESC: Exit

              Version 2.22.1285 Copyright (C) 2025 AMI
                                                                 AB
```

Procedure 4. Claiming Cisco UCS C885A to Intersight

Cisco UCS C885A servers can be claimed into Cisco Intersight to provide detailed hardware and monitoring information. You can also access the BMC interface and the KVM interface from Intersight. To claim a C885A server into Intersight, complete the following steps.

Step 1. In the Cisco UCS C885A BMC interface, select **Device connector** on the left. At the same time, in Cisco Intersight in the account where you want to claim the C885A servers, select **System > Targets**. Click **Claim a New Target** and then select **Cisco UCS Server (Standalone)**. Click **Start**. Select all resource groups you would like to place the server in. Copy and paste the Device ID and Claim Code from the C885A Device connector page and click **Claim**. After the target is claimed to Intersight, the status will update on the C885A Device connector page.



The Device Connector management controller enables secure infrastructure management through Cisco Intersight. Learn about Configuring Device Connector.

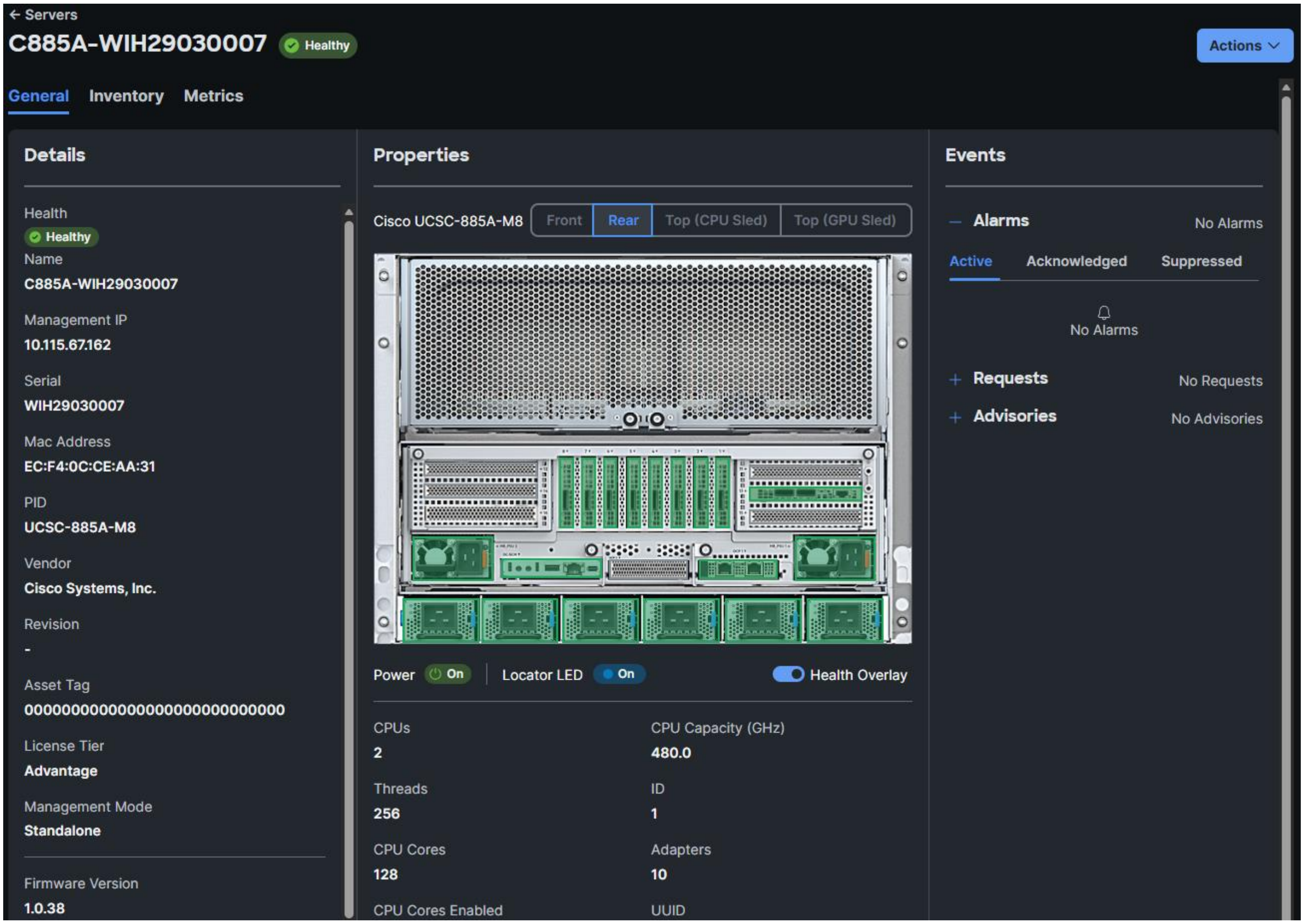
Device ID: WIH29030007

Claimed to Account: Cisco-IT-RTP5-AI-POD

Claimed

1.0.11-20250725103117198

Step 2. Once the server is claimed into Intersight, it will appear under **Operate** > **Servers.** Server Inventory and Metrics can be viewed and the server’s BMC and KVM interfaces can be brought up from Intersight. In order for either of these interfaces to be reached, the machine that is logged into Intersight must have routable access to the C885As’ BMC IP addresses.



C885A-WIH29030007 Healthy

Details

Health
Healthy

Name
C885A-WIH29030007

Management IP
10.115.67.162

Serial
WIH29030007

Mac Address
EC:F4:0C:CE:AA:31

PID
UCSC-885A-M8

Vendor
Cisco Systems, Inc.

Revision
-

Asset Tag
0000000000000000000000000000

License Tier
Advantage

Management Mode
Standalone

Firmware Version
1.0.38

Properties

Cisco UCSC-885A-M8

Power On | Locator LED On | Health Overlay

CPUs 2	CPU Capacity (GHz) 480.0
Threads 256	ID 1
CPU Cores 128	Adapters 10
CPU Cores Enabled	UUID

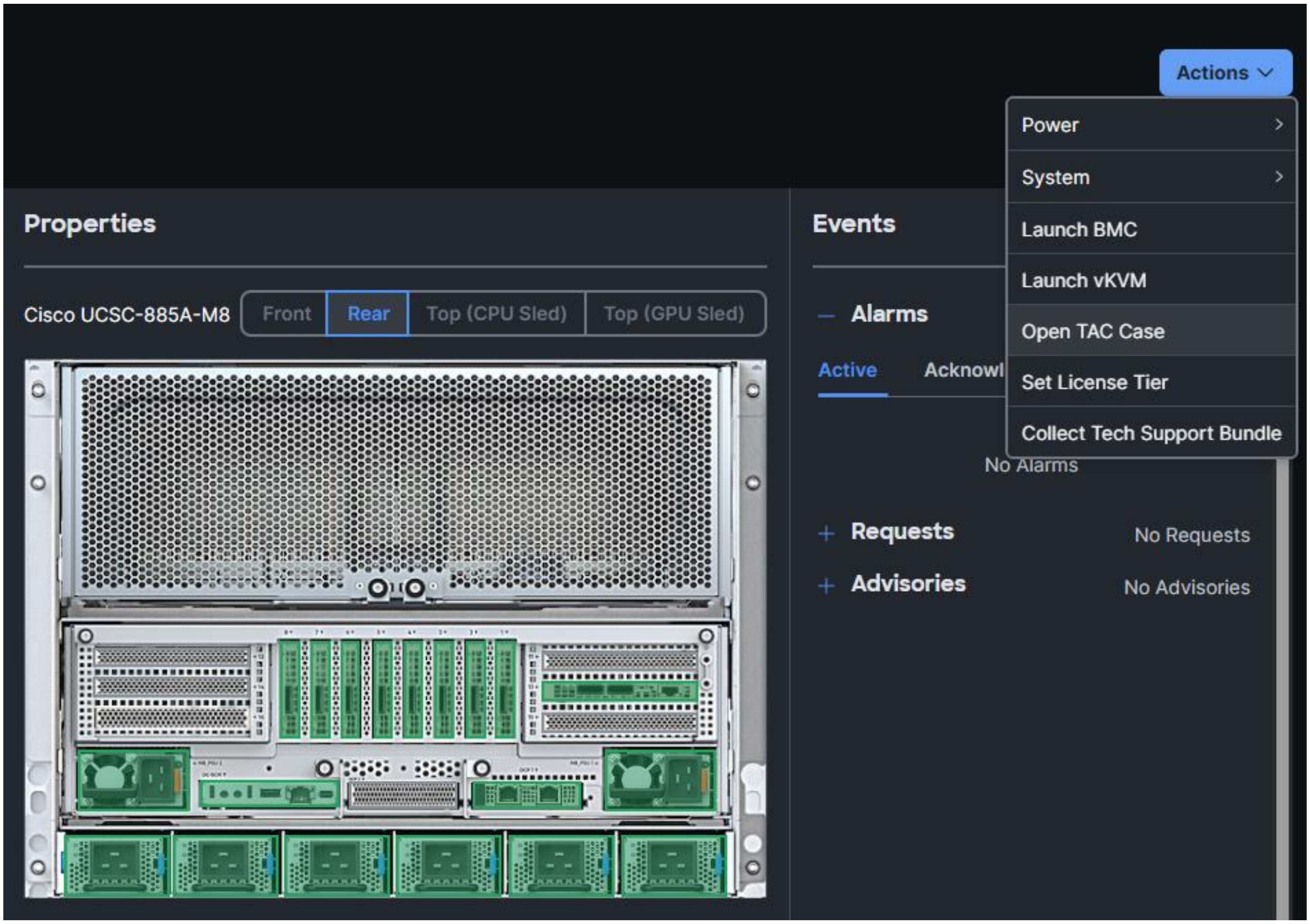
Events

— Alarms No Alarms

No Alarms

+ Requests No Requests

+ Advisories No Advisories



Procedure 5. Update Cisco UCS C885A Firmware

Note: It is important to update Cisco UCS C885A firmware to at least the Suggested Release from https://software.cisco.com/download/home/286337202/type/283850974/release/1.1(0.250025). This procedure will show an update to what is currently the latest release – version 1.2(0.250011). The firmware will need to be updated individually on each server. The firmware downloads include a PCIe Switch Update Tool to update the PCIe switches between the GPUs and backend NIC cards, a server firmware upgrade script to update mainly BIOS and BMC firmware, a firmware tar.gz file containing the updated firmware, and a firmware hardware update utility ISO to update firmware in all hardware NICs in the server. Note that at the time of publication, only the version 1.2 firmware includes the PCIE Switch Update Tool.

Step 1. Download all the desired UCS C885A M8 firmware release files from https://software.cisco.com.

Step 2. If your download included The PCIE Switch Update Tool, it can be run on Ubuntu 22.04.5 LTS or on RHEL 9.4, since Red Hat CoreOS 4.16-4.18 is based off RHEL 9.4, the PCIe switch update can be done from CoreOS. To upgrade the PCIe switch software with Red Hat CoreOS 4.18, from the OpenShift Installer VM where the pcie-switch-update-tool-04.18.00.00.zip file was downloaded to, run the following:

```
unzip pcie-switch-update-tool-04.18.00.00.zip
chmod +x pcie-switch-update-tool-04.18.00.00.run
scp pcie-switch-update-tool-04.18.00.00.run core@<c885a-hostname-or-IP>:/var/home/core/
ssh core@<c885a-hostname-or-IP>
sudo ./pcie-switch-update-tool-04.18.00.00.run
```

```
Enter option 1. If the Firmware Version is less than 04.18.00.00, then rerun the tool and select option 2.
If option 2, was entered, answer yes to the question.
```

When the update is completed, drain the node and reboot the node. Ssh back into the node and rerun the tool to verify the firmware update.

Step 3. The C885A BIOS and BMC update can be done from a Linux machine. In this example, it was done from the OpenShift Installer VM running RHEL 9.6. For this update, power off the C885A.

```
sudo dnf install python3.11
pip3.11 install prettytable
tar -xzvf ucs-c885a-m8-upgrade-script-v1.5.tar.gz
python3.11 ucs-c885a-m8-upgrade-v1.5.py -B ucs-c885a-m8-1.2.0.250011.tar.gz -U <user> -P <password> -I <BMC-
IP> -D
```

Step 4. If any of the firmware components require update:

```
python3.11 ucs-c885a-m8-upgrade-v1.5.py -B ucs-c885a-m8-1.2.0.250011.tar.gz -U <user> -P <password> -I <BMC-
IP> -F
```

The update will take at least 15 minutes to complete.

Step 5. To upgrade the remaining firmware on the server, launch the server's KVM interface. To launch the KVM from Intersight, select **Operate > Servers**. Click the three dots to the right of the UCSC-885A-M8 server and select **Launch vKVM**. To launch the KVM from the BMC interface, select **Operations > KVM** and click **Launch KVM**. Once in the KVM window, from the **Virtual Media** drop-down list and **Map image** to map the HUU ISO file to the KVM. From the **Boot Device** drop-down list to select a one-time boot from **CD.** From the Host Power drop-down list to power cycle the C885A and reboot from the HUU ISO CD. Follow the prompts to update the remaining firmware.

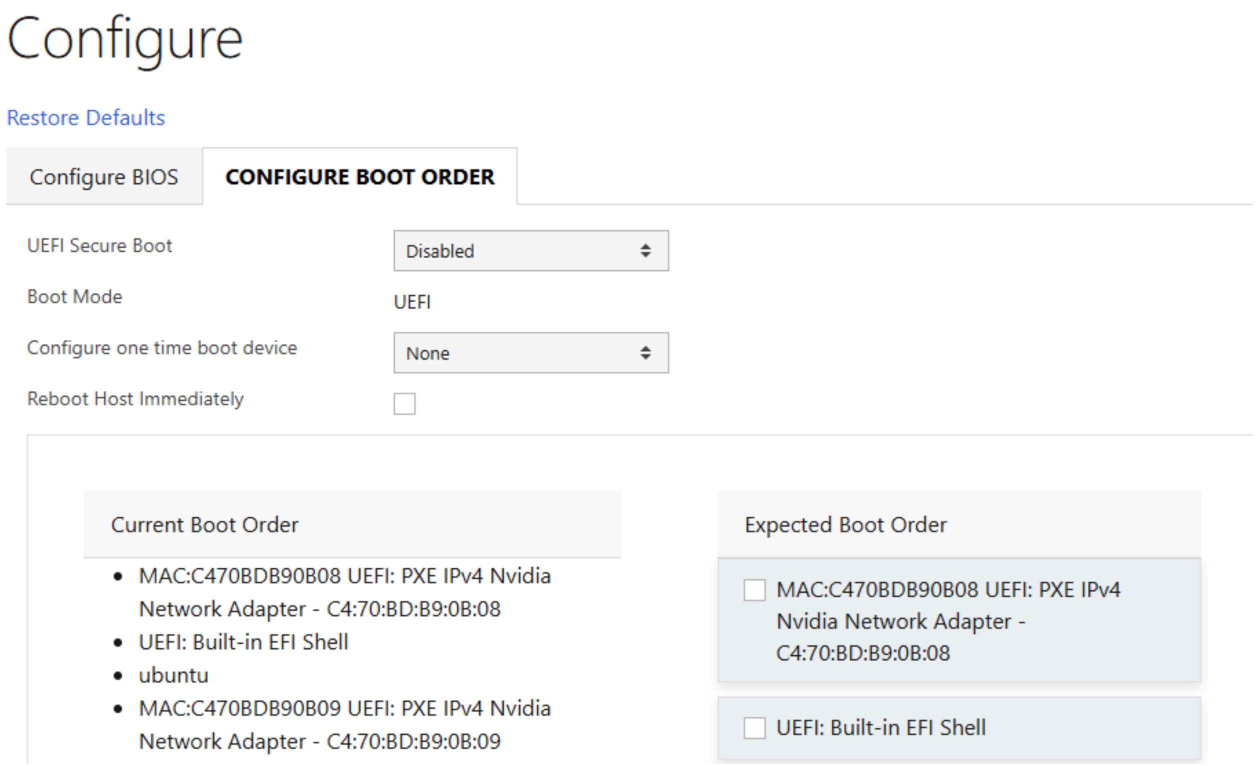
Procedure 6. Set Boot Order if Using NVIDIA Base Command Manager (BCM)

If you use NVIDIA BCM to run training and fine-tuning jobs on the C885A servers, the server boot order needs to be set to PXE boot from the first front-end or N-S NIC. Complete the following steps to set this boot order on all Cisco UCS C885A servers.

Note: Since the front-end NICs are mainly used in a bond, the "no lacp suspend individual command" should be present on all switch ports connected to the C885A front-end NICs.

Step 1. In the Cisco UCS C885A BMC interface, select **Hardware status > Inventory and LEDs > Network adapters**. Identify the adapter(s) being used for the frontend network, expand them, and note the MAC addresses.

Step 2. From the server's BMC interface, select **Configure > Configure Boot Order.** Scroll down to find the first N-S NIC by MAC address with PXE. Use the up arrow on the right to move this NIC to the top of the list. Select **Reboot Host Immediately** and click **Save**.



Configure

UEFI Secure Boot: Disabled

Boot Mode: UEFI

Configure one time boot device: None

Reboot Host Immediately: □

Current Boot Order

- MAC:C470BDB90B08 UEFI: PXE IPv4 Nvidia Network Adapter - C4:70:BD:B9:0B:08
- UEFI: Built-in EFI Shell
- ubuntu
- MAC:C470BDB90B09 UEFI: PXE IPv4 Nvidia Network Adapter - C4:70:BD:B9:0B:09

Expected Boot Order

□ MAC:C470BDB90B08 UEFI: PXE IPv4 Nvidia Network Adapter - C4:70:BD:B9:0B:08

□ UEFI: Built-in EFI Shell

NVIDIA Base Command Manager (BCM)

This chapter contains the following:

- NVIDIA BCM Installation
- MLPerf Training
- Deploy GPUDirect RDMA on Backend Fabric

NVIDIA BCM 10 was used in this lab validation to run ML Commons and other tests under the Simple Linux Utility for Resource Management (SLURM). BCM was used as a PXE boot target for the Cisco UCS C885A HGX Worker nodes to load an Ubuntu 22.04.4 LTS-based image with NVIDIA GPU utilities and software. NVIDIA BCM was installed on Ubuntu22.04.4 LTS in this validation on a single Cisco UCS C220 head node. BCM can also be installed on a pair of head nodes in an HA configuration. The BCM head node was connected to the front-end fabric compute leafs (where the C885As were also connected) with an LACP bonded connection that consisted of 2-100G connections from the Cisco VIC. On the bond, an IP in the management subnet was assigned and connected to a vPC in the fabric where the native VLAN for the vPC corresponded to the VLAN for the management subnet. Tagged VLAN interfaces on the bond allowed NFS and NFS over RDMA connections to storage. The NVIDIA BCM nodes were cabled according to Table 5 and mounted NFS storage from the NetApp Storage controllers.

Table 22. NVIDIA BCM Node Assignment

Node Type	Server Type	Hostname	IP	CIMC IP
Head Node	Cisco UCS C220	rtp5-hgx-mgt-06	10.115.90.115/26	10.115.90.7/26
Worker	Cisco UCS C885A M8	rtp5-hgx-hgpu-009	10.115.90.105	10.115.67.161
Worker	Cisco UCS C885A M8	rtp5-hgx-hgpu-010	10.115.90.106	10.115.67.162
Worker	Cisco UCS C885A M8	rtp5-hgx-hgpu-011	10.115.90.107	10.115.67.163
Worker	Cisco UCS C885A M8	rtp5-hgx-hgpu-012	10.115.90.108	10.115.67.164

Table 23. NVIDIA BCM Network Info

Name	Netmask Bits	Base Address	Domain Name
internalnet	26	10.115.90.64	eth.cluster
ipminet	26	10.115.67.128	ipmi.cluster
storagenet	24	192.168.51.0	storage.cluster

NVIDIA BCM Installation

Procedure 1. Install NVIDIA BCM

NVIDIA BCM was installed on a Cisco UCS C-Series server using the NVIDIA Base Command Manager 10 Installation Manual. In the installation, Ubuntu 22.04.4 LTS was used as the underlying OS, and the SLURM Workload Manager and a type 2 network was installed.

Procedure 2. Configure BCM and Worker Nodes

Step 1. Using NVIDIA Base Command Manager 10 Administrator Manual, section 2, bring up the BCM View GUI.

Step 2. Using NVIDIA Base Command Manager 10 Administrator Manual, section 3, configure BCM.

Step 3. Using NVIDIA Base Command Manager 10 Administrator Manual, section 5, set up PXE boot and provision nodes with the base Ubuntu image.

Step 4. On one node, install all necessary drivers and tools, grab this image, and apply it to the other nodes.

Step 5. You can now run workloads such as SLURM on the nodes. For more information, see NVIDIA Base Command Manager 10 Administrator Manual, section 7.
Training Applications Run under NVIDIA BCM

MLPerf Training

Setup

The MLPerf Training benchmark suite comprises full system tests that stress models, software, and hardware for a range of machine learning (ML) applications. The open-source and peer-reviewed benchmark suite provides a level playing field for competition that drives innovation, performance, and energy efficiency for the entire industry.

The MLPerf Training v5.1 benchmark suite highlighting the rapid evolution and increasing richness of the AI ecosystem as well as significant performance improvements from new generations of systems.

Llama 2 70B-LoRA: Efficient LLM Fine-Tuning

The Llama 2 70B-LoRA utilizes the massive Llama 2 70B general LLM, fine-tuning it with Parameter-Efficient Fine-Tuning (PEFT) on the SCROLLS GovReport dataset. The primary task is high-quality document summarization, with results measured against the industry-standard ROUGE algorithm. Reflecting the trend toward complex, detailed analysis, the model is configured with a long context window of 8,192 tokens.

Feature	Detail
Model	Llama 2 70B (70 billion parameters)
Method	LoRA (Low-Rank Adaptation): This Parameter-Efficient Fine-Tuning (PEFT) technique drastically reduces training time and cost by only updating a small subset of the total parameters.
Task	Document Summarization on the SCROLLS GovReport dataset, designed for instruction following and general productivity tasks.
Accuracy	Performance is measured until the model reaches a target quality, evaluated using the ROUGE algorithm for summary accuracy.
Context	The model utilizes a long context length of 8,192 tokens, reflecting the growing need for LLMs to process and understand lengthy documents.

Setup instructions:
https://github.com/mlcommons/training_results_v5.1/tree/main/Cisco/benchmarks/llama2_70b_lora/implementations/nemo

Results

For published MLPerf Results, please refer to MLCommons MLPerf Training Benchmark. Results for the Cisco UCS C885A with NVIDIA H200-SXM GPUs are shown.

OpenShift Installation and Configuration

This chapter contains the following:

- OpenShift Installation
- Add a Cisco UCS C885A M8 Worker Node to an OpenShift Cluster
- Deploy GPUDirect RDMA on Backend Fabric
- Deploy NetApp NFS over RDMA with NVIDIA GPU Direct Storage (GDS)

For running OpenShift and OpenShift AI applications in this validation, a three-node OpenShift combo cluster (combined control plane and worker nodes) was built in the Cisco UCS X-Series chassis with Cisco UCS 9108 X-Series Direct Fabric Interconnects installed directly in the chassis. Supporting systems such as the OpenShift Installer Machine and DNS/DHCP servers should be run in another virtualization cluster (hypervisor of choice) or on bare metal servers. The Cisco UCS C885A servers were then added to the cluster as worker nodes. At the time of publication, virtual machines (VMs) could only be run on the combo nodes. Only containerized applications were run on the Cisco UCS C885As.

OpenShift Installation

OpenShift 4.18 was installed using two of the four following two documents, depending on if you use Ansible:

- FlexPod Datacenter Base Manual Configuration with Cisco IMM and NetApp ONTAP
- FlexPod Datacenter with Red Hat OCP Bare Metal Manual Configuration with Cisco UCS X-Series Direct
- FlexPod Datacenter Base Configuration using IaC with Cisco IMM and NetApp ONTAP
- FlexPod Datacenter with Red Hat OpenShift Bare Metal IaC Configuration with Cisco UCS X-Series Direct

In using both of these documents, you will not be setting up Cisco Nexus NXOS networking but instead will be setting up VXLAN EVPN networks using Nexus Dashboard. Also, it is only necessary to setup the NFS storage protocol. Setting up iSCSI and NVMe-TCP is not necessary in this environment.

For the AI portion of the OpenShift configuration, it is only necessary to install the NFS storage protocol and NFS and NFS FlexGroup Storage Classes. It is not necessary to install iSCSI or NVMe-TCP, but these can be installed if desired.

If you want to run OpenShift VMs, add OpenShift Virtualization with FlexPod Datacenter with Red Hat OpenShift Virtualization.

Add a Cisco UCS C885A M8 Worker Node to an OpenShift Cluster

To add one or more Cisco UCS C885A M8 servers to an existing OpenShift Cluster, complete the following.

Procedure 1. Setup the Cisco UCS C885A Server and CIMC

Deploy a Cisco UCS Server Profile in Cisco Intersight.

Step 1. Depending on the type of server added (Cisco UCS X-Series or Cisco UCS C-Series), clone the existing OCP-Worker template and create and adjust the template according to the server type.

Step 2. From the **Configure** > **Templates** page, to the right of the OCP-Worker template setup above, click the **...** and select **Derive Profiles**.

Step 3. Under the Server Assignment, select **Assign Now** and select the Cisco UCS server that will be added to the cluster as a Worker Node. Click **Next**.

Step 4. Assign the Server Profile an appropriate Name (for example, ocp-worker3) and select the appropriate Organization. Click **Next**.

Step 5. Click **Derive**.

Step 6. From the Infrastructure Service > Profiles page, to the right of the just-created profile, click the **…** and select **Deploy**. Select **Reboot Immediately to Activate** and click **Deploy**.

Step 7. Wait until the profile deploys and activates.

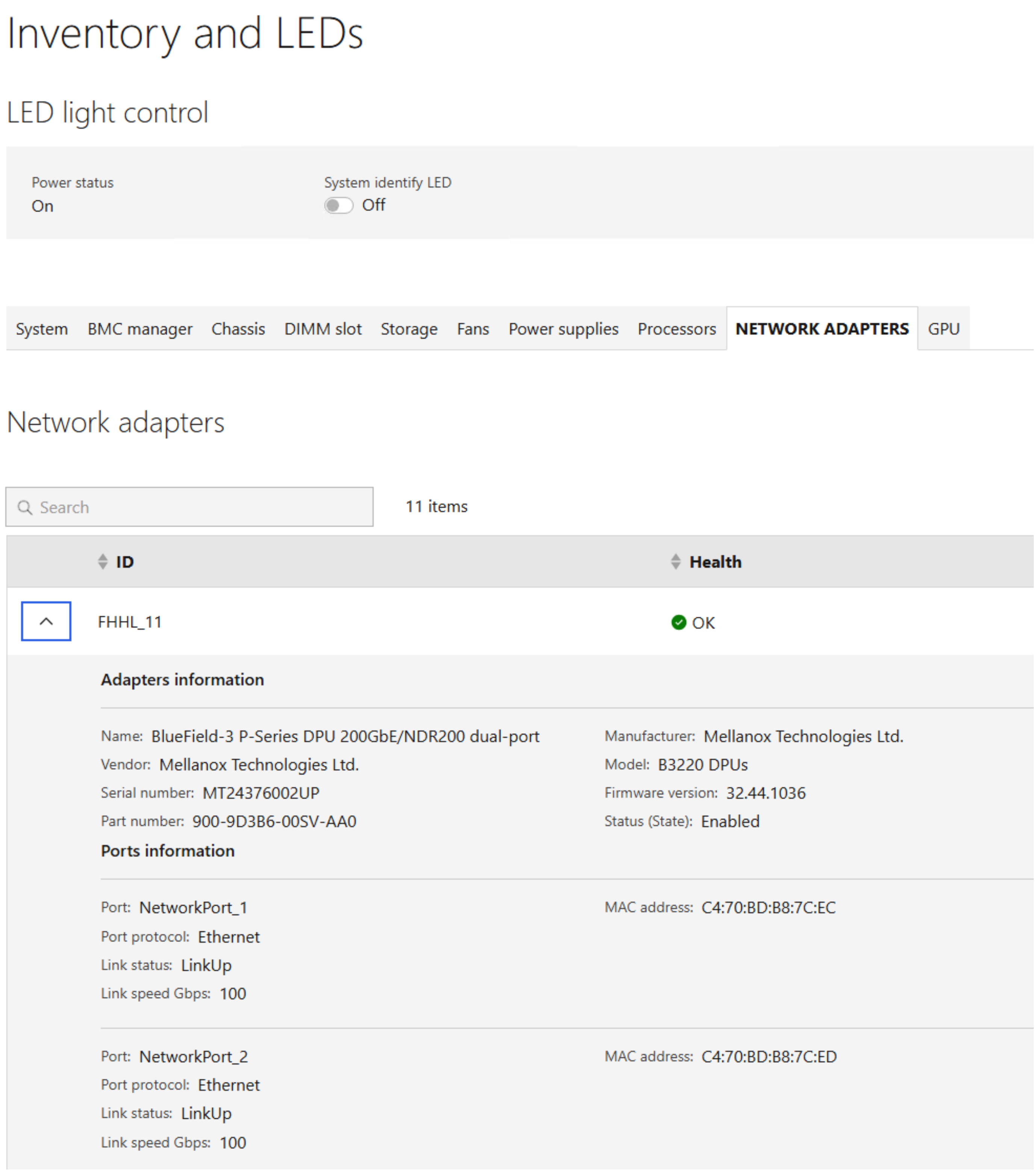
Step 8. Click the server profile and go to **Configuration > Identifiers and Inventory** tabs note the server's management IP, serial number, and the MAC of address of network interface eno5.

Procedure 2. Create the Bare Metal Host (BMH)

Step 1. On the OCP-Installer VM, create the following yaml file (the example shown is for worker node worker4:

```
cat bmh.yaml
apiVersion: metal3.io/v1alpha1
kind: BareMetalHost
metadata:
  name: worker-4
  namespace: openshift-machine-api
spec:
  online: True
  bootMACAddress: C4:70:BD:B8:7C:EC
  customDeploy:
    method: install_coreos
  externallyProvisioned: true
```

Note: The bootMACAddress can be obtained from the Cisco UCS C885A M8 CIMC interface under Inventory and LEDs > NETWORK ADAPTERS. It is the MAC Address of the first port for the adapter used for the N-S Network.



Inventory and LEDs

LED light control

Power status: On

System identify LED: Off

Network adapters

11 items

ID	Health
FHHL_11	OK

Adapters information

Name: BlueField-3 P-Series DPU 200GbE/NDR200 dual-port

Manufacturer: Mellanox Technologies Ltd.

Vendor: Mellanox Technologies Ltd.

Model: B3220 DPUs

Serial number: MT24376002UP

Firmware version: 32.44.1036

Part number: 900-9D3B6-00SV-AA0

Status (State): Enabled

Ports information

Port: NetworkPort_1

MAC address: C4:70:BD:B8:7C:EC

Port protocol: Ethernet

Link status: LinkUp

Link speed Gbps: 100

Port: NetworkPort_2

MAC address: C4:70:BD:B8:7C:ED

Port protocol: Ethernet

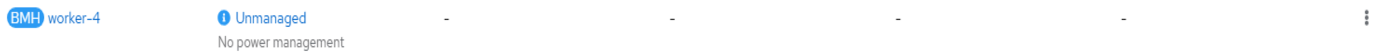
Link status: LinkUp

Link speed Gbps: 100

Step 2. Create the Bare Metal Host by typing the following:

```
oc project openshift-machine-api
oc create -f bmh.yaml
```

Step 3. Verify that the BMH is created by selecting **Compute > Bare Metal Hosts** in the OpenShift Console.

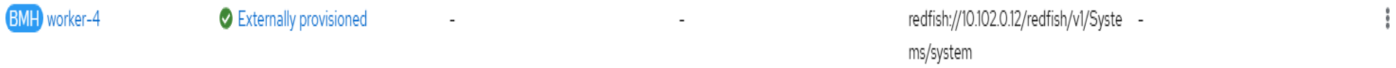


BMH worker-4	Unmanaged No power management	-	-	-	-	⋮

Note: With this method of creating the BMH, the server is not inspected, and some details such as Serial Number, Network Interfaces, and Disks are not retrieved from the server0.

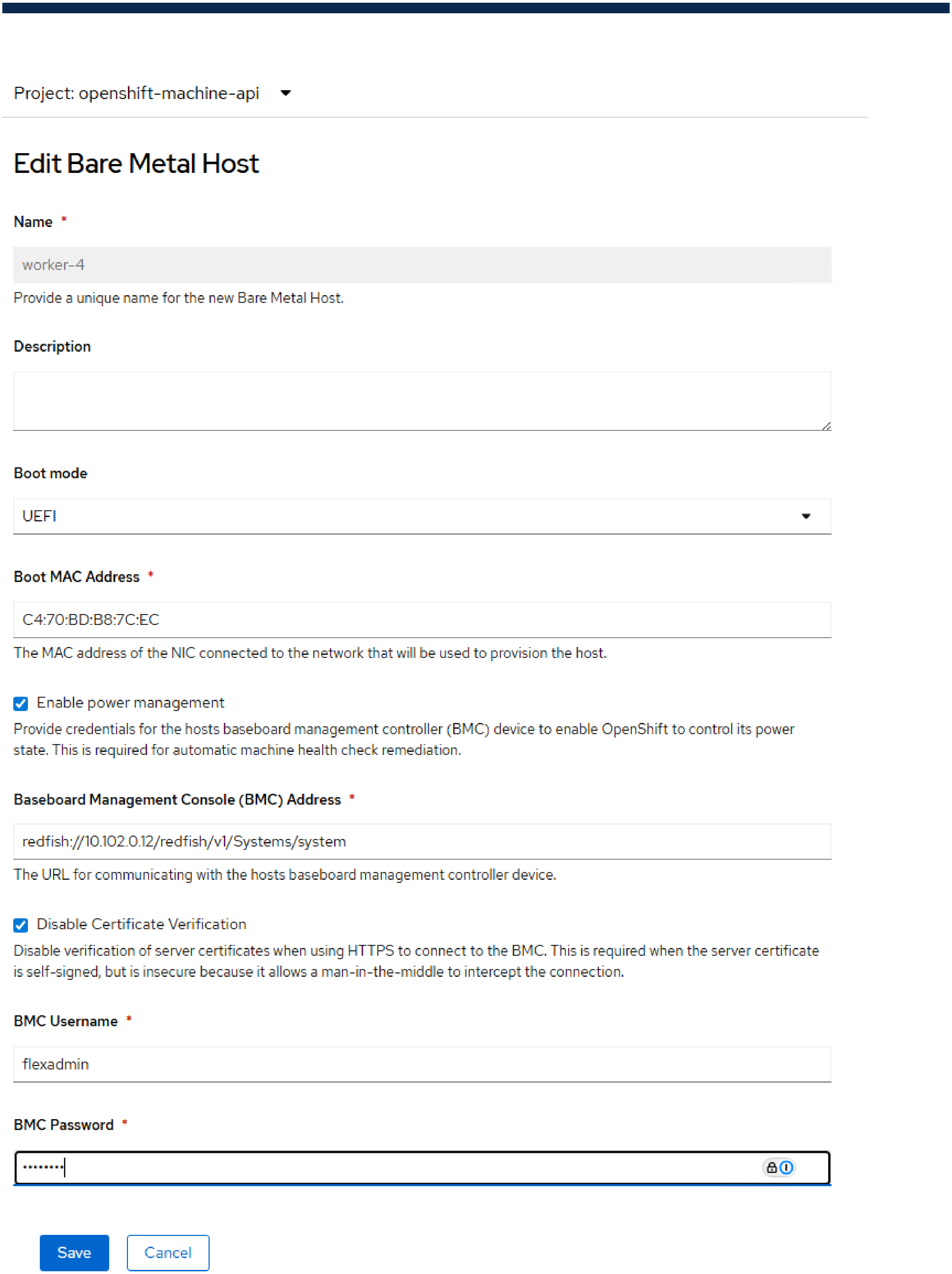
Step 4. Click the three dots to the right of the newly added BMH and select **Edit Bare Metal Host**.

Step 5. Select **Enable power management.** Using the screenshot below, fill in the remaining parameters and click **Save**. Upon successful registration, the BMH should show Externally provisioned.



BMH worker-4	Externally provisioned	-	-	redfish://10.102.0.12/redfish/v1/Systems/system	-	⋮

Note: It is critical to select **Disable Certificate Verification**.



Project: openshift-machine-api ▾

Edit Bare Metal Host

Name *

worker-4

Provide a unique name for the new Bare Metal Host.

Description

Boot mode

UEFI ▾

Boot MAC Address *

C4:70:BD:B8:7C:EC

The MAC address of the NIC connected to the network that will be used to provision the host.

☑ Enable power management

Provide credentials for the hosts baseboard management controller (BMC) device to enable OpenShift to control its power state. This is required for automatic machine health check remediation.

Baseboard Management Console (BMC) Address *

redfish://10.102.0.12/redfish/v1/Systems/system

The URL for communicating with the hosts baseboard management controller device.

☑ Disable Certificate Verification

Disable verification of server certificates when using HTTPS to connect to the BMC. This is required when the server certificate is self-signed, but is insecure because it allows a man-in-the-middle to intercept the connection.

BMC Username *

flexadmin

BMC Password *

••••••••

Step 6. In the OpenShift Console, select **Compute > MachineSets**. Click the **...** to the right of the worker MachineSet and choose Edit Machine count. Use the plus sign to increase the count by one. Click **Save**.

Step 7. Click **Compute > Machines**. A new machine in the Provisioning phase should now appear in the list.

M aa02-ocp-6xmtm-worker-0-lsfvj	-	Provisioning	-	-	-

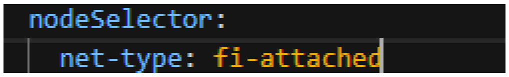
Procedure 3. Adjust Networking for the Existing Workers

If adding a Cisco UCS C885A M8 Worker to an existing OpenShift cluster with servers attached behind fabric interconnects, the C885A M8 will use different networking than the FI-attached servers. We will add some node labels indicating how the server is attached and apply these labels to the existing NMState policies.

Step 1. For each existing Worker node that is FI-attached, apply a node label.

```
oc label node <node-name> net-type=fi-attached
```

Step 2. In the OpenShift console, select **Networking** > **NodeNetworkConfigurationPolicy**. For each policy being used with fabric interconnect attached worker nodes, starting with the interface policies then progressing to the bridge policies, select the policy, then select the YAML tab. Under nodeSelector:, replace "node-role.kubernetes.io/worker: ''" with "net-type: fi-attached."

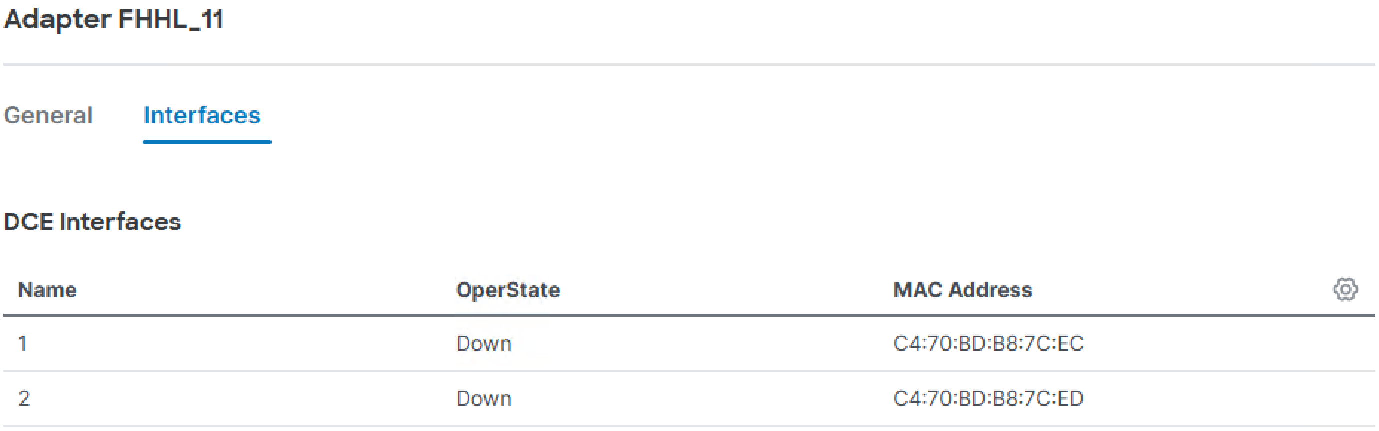


```
nodeSelector:
  net-type: fi-attached
```

Step 3. Repeat this for all FI-attached worker policies.

Procedure 4. Install Red Hat CoreOS on the New Cisco UCS C885A M8 Worker(s)

Step 1. For each of the Cisco UCS C885A M8 server(s), in Cisco Intersight, select the server. Then select **Inventory > Network Adapters**. In the list of Network Adapters, select the adapter being used for the N-S or front end network (normally the first adapter in the list). Select **Interfaces**. The LACP bond interface will use the MAC Address for DCE Interface 1 for its MAC address. Use this MAC to build a DHCP reservation in your DHCP server. If the network card being used for the front end network is a Bluefield adapter, the network interface names for the two NICs will be ens2<slot-number>f0np0 and ens2<slot-number>f1np1. In this example, the two NICs are ens211f0np0 and ens211f1np1.



Adapter FHHL_11

DCE Interfaces

Name	OperState	MAC Address
1	Down	C4:70:BD:B8:7C:EC
2	Down	C4:70:BD:B8:7C:ED

Step 2. Connect to the Red Hat Hybrid Cloud Console here: https://console.redhat.com/openshift/overview and log in with your Red Hat credentials. On the left, select **Cluster List**. Under Cluster List, click your cluster to open it.

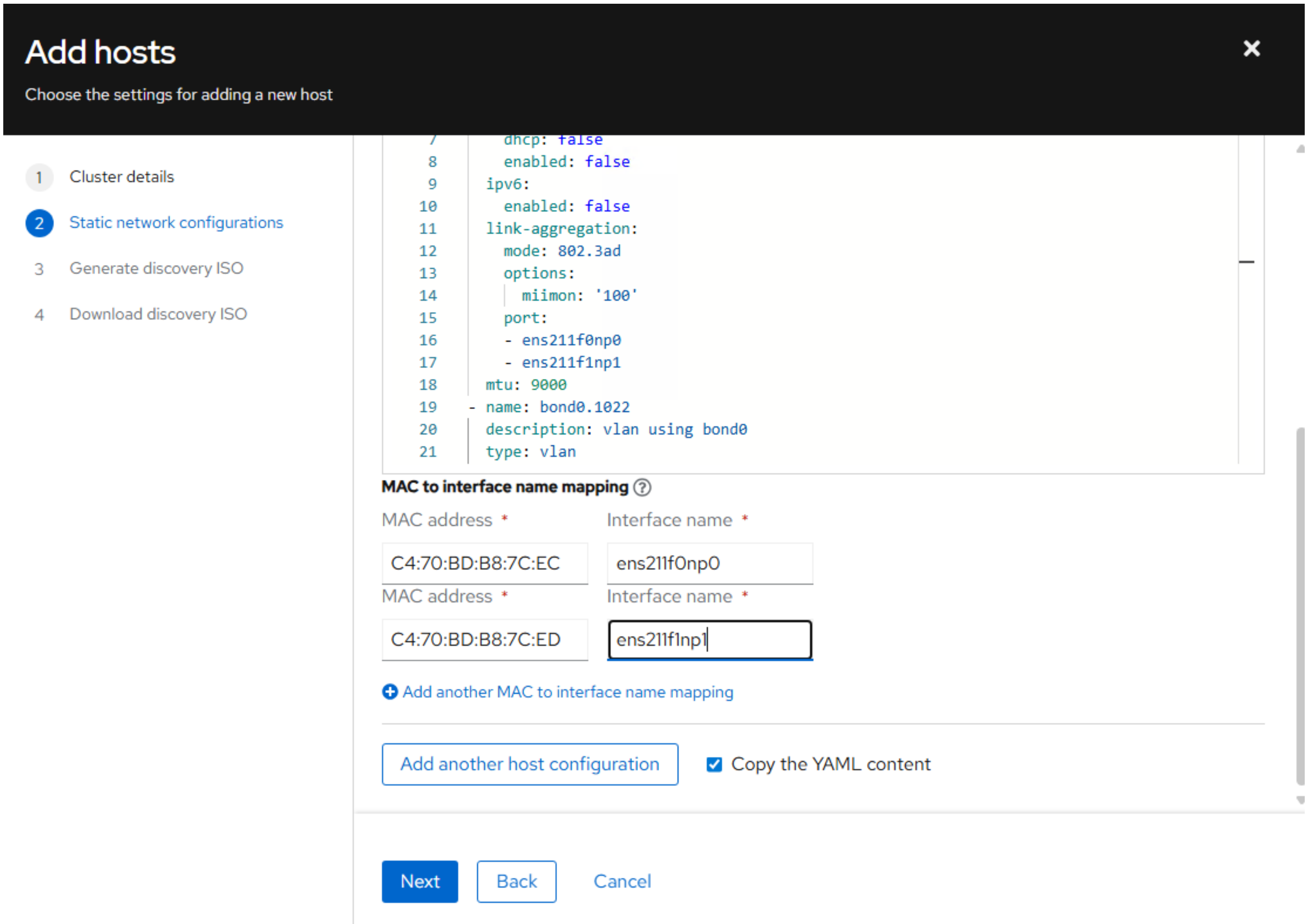
Step 3. Select the **Add Hosts** tab. Click **Add hosts**.

Step 4. The Cisco UCS C885A M8 will use a VLAN tagged interface on top of an LACP bond interface to connect to the front end network fabric. Select **Static IP, bridges, and bonds** and click **Next**.

Step 5. Next to **Configure via:** select **YAML view**. In the YAML text box, click **Start from scratch**. Build and copy a YAML file specifying the LACP bond interface and then the VLAN-tagged interface on top of the bond into the text box. For this example, the following NMState YAML file was used:

```
interfaces:
- name: bond0
  description: C885A LACP Bond with ports ens211f0np0 and ens211f1np1
  type: bond
  state: up
  ipv4:
    dhcp: false
    enabled: false
  ipv6:
    enabled: false
  link-aggregation:
    mode: 802.3ad
    options:
      miimon: '100'
      xmit_hash_policy: layer3+4
    port:
    - ens211f0np0
    - ens211f1np1
  mtu: 9000
- name: bond0.1022
  description: vlan using bond0
  type: vlan
  state: up
  vlan:
    base-iface: bond0
    id: 1022
  ipv4:
    dhcp: true
    enabled: true
  mtu: 1500
```

Step 6. Scroll down below the YAML box and enter the MAC address and Interface name of the two NICs specified in the YAML file, using **Add another MAC to interface name mapping** to add the second MAC and Interface name. If additional Cisco UCS C885A M8 hosts need to be added, select **Add another host configuration** and add them one at a time. Once all hosts are added, click **Next**.



Add hosts

Choose the settings for adding a new host

1 Cluster details
2 Static network configurations
3 Generate discovery ISO
4 Download discovery ISO

```
        dhcp: false
        enabled: false
      ipv6:
        enabled: false
      link-aggregation:
        mode: 802.3ad
        options:
          miimon: '100'
        port:
        - ens211f0np0
        - ens211f1np1
      mtu: 9000
    - name: bond0.1022
      description: vlan using bond0
      type: vlan
```

MAC to interface name mapping

MAC address *	Interface name *
C4:70:BD:B8:7C:EC	ens211f0np0
C4:70:BD:B8:7C:ED	ens211f1np1

Add another MAC to interface name mapping
Add another host configuration

☑ Copy the YAML content

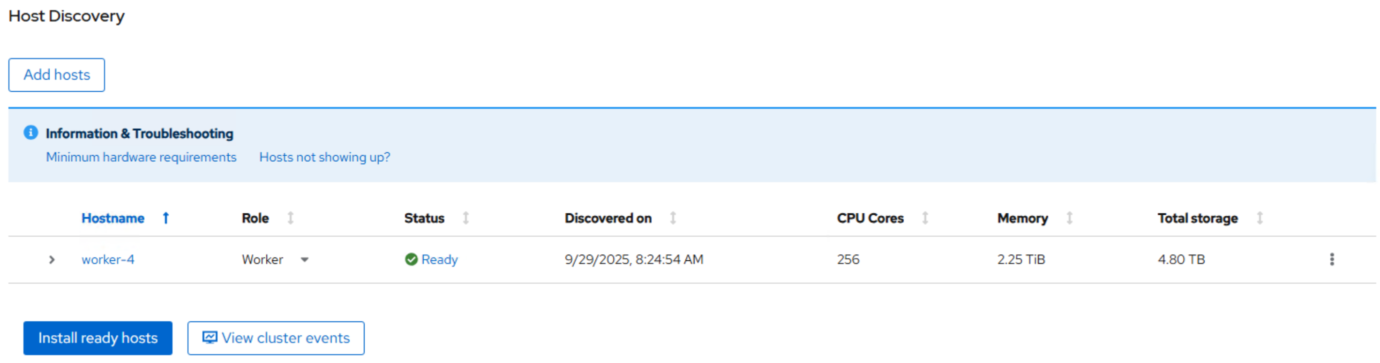
Step 7. For Provisioning type, select Minimal image file. Browse to and select the SSH public key file used in the original cluster installation. Click **Generate Discovery ISO**.

Step 8. Click **Download Discovery ISO**. The file will download to your machine. Click **Close**.

Step 9. For each Cisco UCS C885A M8, in Cisco Intersight, launch the server's vKVM. In the vKVM, from the Virtual Media drop-down list to select **Map image**. Click **Drop file here or click to upload**. Navigate to and select the Discovery ISO in your Downloads folder and click **Open**. Click **Upload**.

Step 10. From the Boot Device drop-down list to select **CD**. From the Host Power drop-down list to select **Power cycle**. Click **Confirm**. The server will reboot and boot from the Discovery ISO.

Step 11. Once the server has booted from the Discovery ISO, return to the Red Hat Hybrid Cloud Console. The newly added worker should appear in a few minutes. Wait for the Status to become Ready.



Host Discovery

Information & Troubleshooting

Minimum hardware requirements   Hosts not showing up?

Hostname	Role	Status	Discovered on	CPU Cores	Memory	Total storage
worker-4	Worker	Ready	9/29/2025, 8:24:54 AM	256	2.25 TiB	4.80 TB

Step 12. Click the arrow to the left of the server(s) Hostname. Make sure the correct M.2 boot disk is selected.

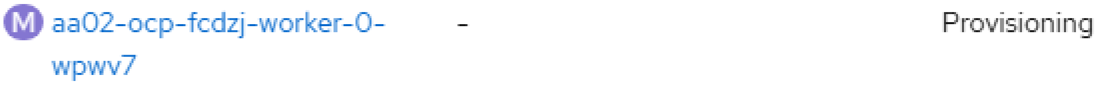
Step 13. Click **Install ready hosts.** The installation of CoreOS will take several minutes.

Note: Once the CoreOS installation completes (Status of Installed), the server will reboot, boot CoreOS, and reboot a second time.

Step 14. Once the server has booted into CoreOS, in the vKVM from the Virtual Media drop-down list to select **Eject image**.

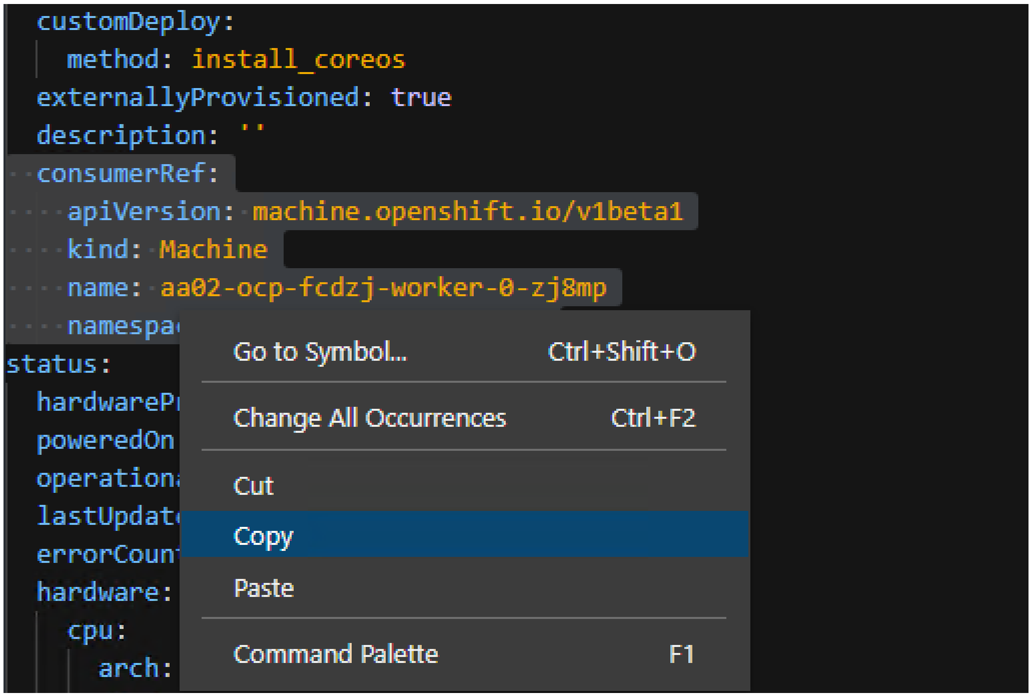
Step 15. In the OpenShift Console, select **Compute > Nodes.** Once the server reboots have completed, the newly added worker(s) will appear in the list as Discovered. Click **Discovered** and then select **Approve.** Click **Not Ready** and select **Approve.**

Step 16. To link the Bare Metal Host to the Machine, select **Compute > Machines.** For the newly-added machine in the Provisioning Phase, note the last five characters in the machine name (for example, bqz2k).



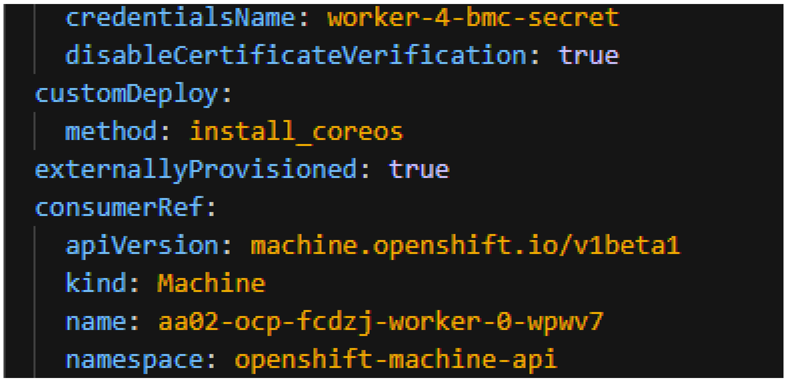
M aa02-ocp-fcdzj-worker-0-wpwv7 - Provisioning

Step 17. Select **Compute > Bare Metal Hosts.** Select the BMH above the newly added BMH (for example, worker2). Select the **YAML** tab. Select and copy the entire **consumerRef** field right underneath the externallyProvisioned field.



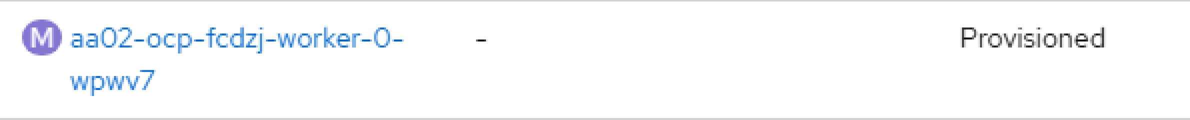
```
  customDeploy:
    method: install_coreos
  externallyProvisioned: true
  description: ''
  consumerRef:
    apiVersion: machine.openshift.io/v1beta1
    kind: Machine
    name: aa02-ocp-fcdzj-worker-0-zj8mp
    namespa
status:
  hardwareP
  poweredOn
  operation
  lastUpdat
  errorCoun
  hardware:
    cpu:
      arch:
```

Step 18. Select **Compute > Bare Metal Hosts.** Select the BMH for the newly added BMH (for example, worker3). Select the **YAML** tab. Place the cursor at the end of the externallyProvisioned: true line and press **Enter** to insert a new line. Backspace to the beginning of the line and then paste in the consumerRef field from the previous step. Replace the last five characters in the name field with the five characters noted above (for example, bqz2k).



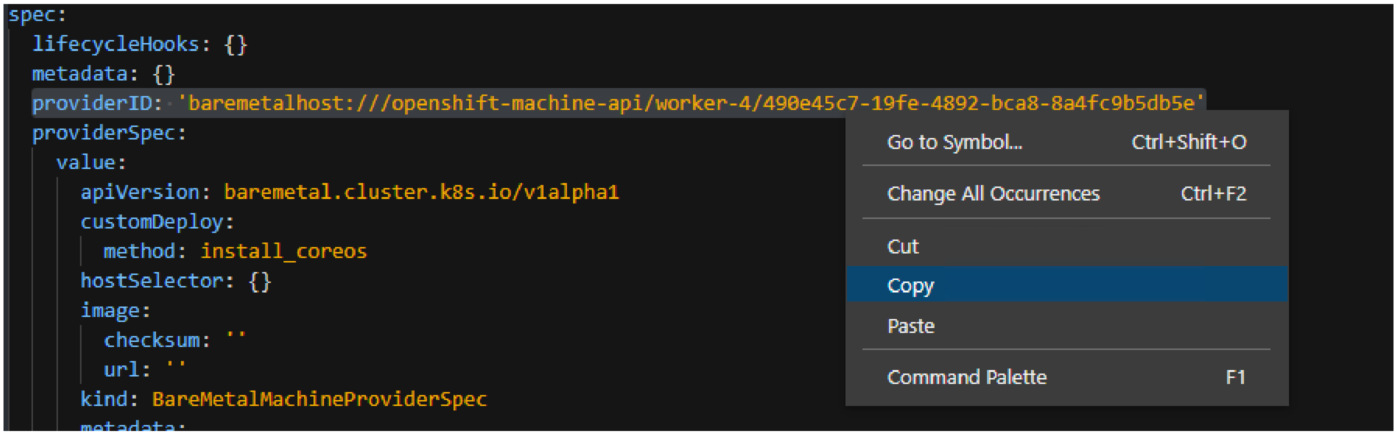
```
    credentialsName: worker-4-bmc-secret
    disableCertificateVerification: true
  customDeploy:
    method: install_coreos
  externallyProvisioned: true
  consumerRef:
    apiVersion: machine.openshift.io/v1beta1
    kind: Machine
    name: aa02-ocp-fcdzj-worker-0-wpwv7
    namespace: openshift-machine-api
```

Step 19. Click **Save**. Click **Compute > Machines.** The newly added machine should now be in the Provisioned Phase.



M aa02-ocp-fcdzj-worker-0-wpwv7	-	Provisioned

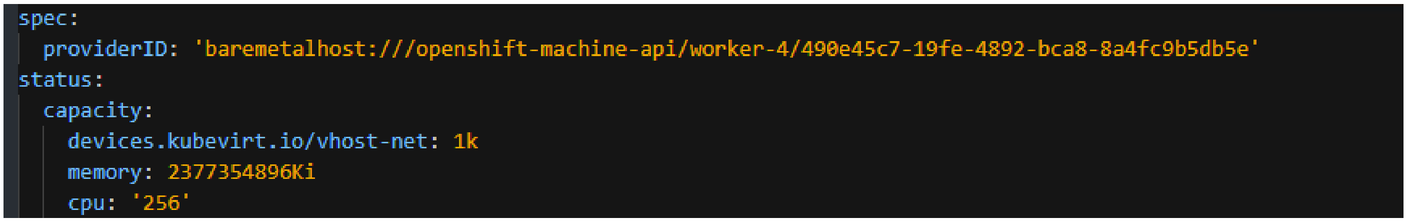
Step 20. To link this machine to the node, click this newly added machine and select the YAML tab. Under spec, select and copy the entire providerID line.



```
spec:
  lifecycleHooks: {}
  metadata: {}
  providerID: 'baremetalhost:///openshift-machine-api/worker-4/490e45c7-19fe-4892-bca8-8a4fc9b5db5e'
  providerSpec:
    value:
      apiVersion: baremetal.cluster.k8s.io/v1alpha1
      customDeploy:
        method: install_coreos
      hostSelector: {}
      image:
        checksum: ''
        url: ''
      kind: BareMetalMachineProviderSpec
      metadata:
```

Step 21. Select **Compute > Nodes.** Select the newly-added node and select the **YAML** tab. Scroll down to find the spec field. Select and delete the **{}** to the right of spec: and press **Enter** to add a line. Paste in the providerID field with a two space indention and click **Save.**

Note: The OpenShift nodes update frequently, and it will be necessary if an update has occurred to reload the YAML tab. After reloading, you may need to make the changes again.

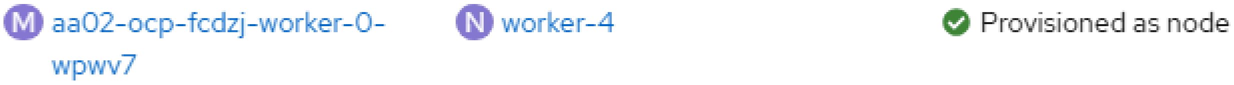


```
spec:
  providerID: 'baremetalhost:///openshift-machine-api/worker-4/490e45c7-19fe-4892-bca8-8a4fc9b5db5e'
status:
  capacity:
    devices.kubevirt.io/vhost-net: 1k
    memory: 2377354896Ki
    cpu: '256'
```

Step 22. Select **Compute > Bare Metal Hosts.** The newly-added BMH should now be linked to a node.

BMH worker-4	✓ Externally provisioned	N worker-4	worker	redfish://10.102.0.12/redfish/v1/Systems/system	-

Step 23. Select **Compute > Machines**. The newly-added machine should now be in the Provisioned as node Phase and should be linked to the node.



M aa02-ocp-fcdzj-worker-0-wpwv7 N worker-4 ✓ Provisioned as node

Procedure 5. Setup NFS Networking for the Newly Added Host(s)

Step 1. Label each newly added node(s) with net-type=switch-attached

```
oc label node worker-4 net-type=c885a
```

Step 2. Add the NFS VLAN to the bond with a Node Network Configuration Policy (NNCP) file.

```
cat c885-bond0.3051.yaml

apiVersion: nmstate.io/v1
kind: NodeNetworkConfigurationPolicy
metadata:
  name: c885-ocp-nfs-policy
spec:
  nodeSelector:
   net-type: c885a
  desiredState:
    interfaces:
    - name: bond0.3051
      description: VLAN 3051 using bond0
      type: vlan
      state: up
      ipv4:
        dhcp: true
        enabled: true
      ipv6:
        enabled: false
      vlan:
        base-iface: bond0
        id: 3051
```

Step 3. Add the NNCP to OpenShift.

```
oc create -f c885-bond0.3051.yaml
```

Step 4. Verify the addition in the OpenShift web console by checking **Networking > NodeNetworkConfigurationPolicy**.

Step 5. SSH to the C885A(s) and using the “ifconfig -a” command to verify the addition.

Procedure 6. Create a new node label for Cisco UCS C885A M8 GPU worker nodes

This is done so that machine configs (requires reboot) and other policies can be applied without impacting all nodes in the cluster. GPU-dense nodes may require different policies so creating roles allow you to apply, especially machine configurations that require a reboot.

Step 1. Log into the OpenShift Installer machine and label the UCS C885A nodes.

```
oc get nodes
oc label node <node_name> node-role.kubernetes.io/worker-ucs-c885a=
oc get nodes
```

Step 2. Repeat for all UCS C885A nodes in the cluster.

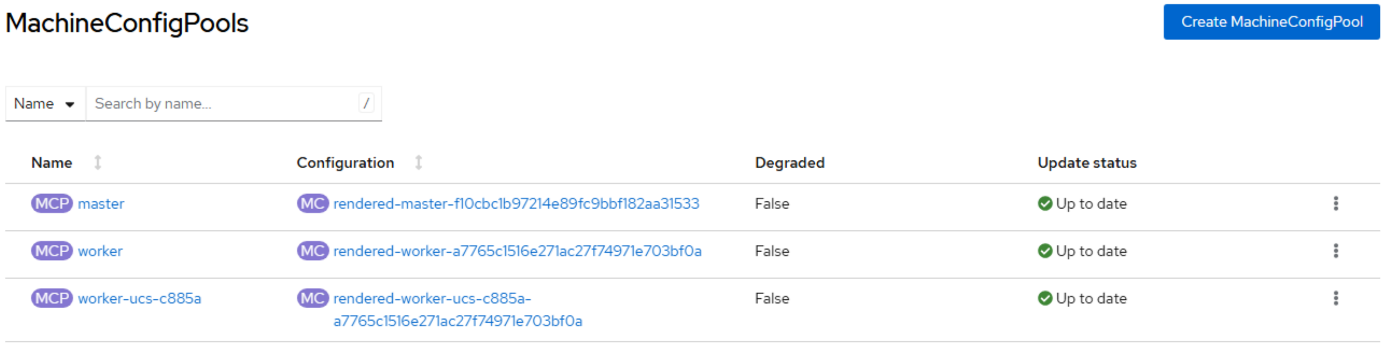
Procedure 7. Create a UCS C885A Machine Config Pool

Step 1. Create the following YAML file on the OpenShift Installer VM:

```
cat worker-ucs-c885a-mcp.yaml
apiVersion: machineconfiguration.openshift.io/v1
kind: MachineConfigPool
metadata:
  name: worker-ucs-c885a
spec:
  machineConfigSelector:
    matchExpressions:
      - {key: machineconfiguration.openshift.io/role, operator: In, values: [worker,worker-ucs-c885a]}
  nodeSelector:
    matchLabels:
      node-role.kubernetes.io/worker-ucs-c885a: ""
```

Step 2. Add this Machine Config Pool to the OpenShift cluster.

```
oc create -f worker-ucs-c885a-mcp.yaml
```



MachineConfigPools

Name	Configuration	Degraded	Update status
MCP master	MC rendered-master-f10cbc1b97214e89fc9bbf182aa31533	False	✓ Up to date
MCP worker	MC rendered-worker-a7765c1516e271ac27f74971e703bf0a	False	✓ Up to date
MCP worker-ucs-c885a	MC rendered-worker-ucs-c885a-a7765c1516e271ac27f74971e703bf0a	False	✓ Up to date

Step 3. Click the **worker-ucs-c885a Machine Config Pool** and verify the correct number of machines in the pool.

Procedure 8. Set UCS C885A Kernel Arguments

Step 1. Create the following YAML file on the OpenShift Installer VM:

```
cat 99-worker-ucs-c885a-kernel-args.yaml
apiVersion: machineconfiguration.openshift.io/v1
kind: MachineConfig
metadata:
  labels:
    machineconfiguration.openshift.io/role: worker-ucs-c885a
  name: 99-worker-ucs-c885a-kernel-args
spec:
  kernelArguments:
    - "module_blacklist=irdma"
    - intel_iommu=off
    - amd_iommu=off
    - iommu=pt
```

Step 2. Add this Machine Config to the Openshift cluster.

```
oc create -f 99-worker-ucs-c885a-kernel-args.yaml
```

Step 3. Wait until the worker-ucs-c885a Machine Config Pool has moved from “Updating” to “Up to date”.

Step 4. Log into each UCS C885A node and check kernel parameters.

```
ssh core@<node_name>


cat /proc/cmdline
BOOT_IMAGE=(hd0,gpt3)/boot/ostree/rhcos-
f9a3486fdae1cf8a2d934693030c00eb1a10f0ae8b16605640186dbb75fc9e0f/vmlinuz-5.14.0-427.107.1.el9_4.x86_64
ignition.platform.id=metal systemd.unified_cgroup_hierarchy=1 cgroup_no_v1=all psi=0 module_blacklist=irdma
```

```
intel_iommu=off amd_iommu=off iommu=pt
ostree=/ostree/boot.1/rhcos/f9a3486fdae1cf8a2d934693030c00eb1a10f0ae8b16605640186dbb75fc9e0f/0
root=UUID=e3b53ab5-a973-402c-a25a-2facc91c9e9a rw rootflags=prjquota boot=UUID=11182f97-0a8c-4d85-9751-
92f549f49d03

lsmod | grep irdma
<no output expected>
```

Procedure 9. Remove the NVIDIA GPU Operator

If the NVIDIA GPU Operator has already been installed it should be removed at this point.

Step 1. In the OpenShift cluster web interface, select **Operators > Installed Operators**. At the top, select the **nvidia-gpu-operator** project. Select **NVIDIA GPU Operator**. Select the **ClusterPolicy** tab. To the right of the gpu-cluster-policy, click the three dots and select **Delete Cluster Policy** followed by **Delete.**

Step 2. From the Actions drop-down list, select **Uninstall Operator** followed by **Uninstall.**

Step 3. Select **Home > Projects.** To the right of the **nvidia-gpu-operator** project, click the three dots and select **Delete Project.** In the popup, enter **nvidia-gpu-operator** and select **Delete.**

Procedure 10. Modify the Node Feature Discovery Operator

Step 1. If the **Node Feature Discovery Operator** has not been installed, in the OpenShift console, select **Operators > OperatorHub.** In the search box, type **Node Feature.** Select **Node Feature Discovery Operator**. Click **Install.** Click **Install** again to deploy the operator. When the operator is installed, click **View Operator.**

Step 2. If the **Node Feature Discovery Operator** was not installed in the previous step, in the **OpenShift console**, select **Operators > Installed Operators**. At the top, select **All Projects** then select **Node Feature Discovery Operator.**

Step 3. Select the **NodeFeatureDiscovery** tab. If a nfd-instance is present, click the **ellipses** to the right and select **Delete NodeFeatureDiscovery** followed then click **Delete** to delete the policy.

Step 4. On the **installer VM**, create the following YAML file:

```
cat nodefeaturediscovery.yaml
apiVersion: nfd.openshift.io/v1
kind: NodeFeatureDiscovery
metadata:
 name: nfd-instance
 namespace: openshift-nfd
spec:
 instance: ''
 operand:
  servicePort: 12000
 prunerOnDelete: false
 topologyUpdater: false
 workerConfig:
  configData: |
   core:
    sleepInterval: 60s
   sources:
    pci:
     deviceClassWhitelist:
      - "02"
      - "03"
      - "0200"
      - "0207"
      - "12"
     deviceLabelFields:
      - "vendor"
```

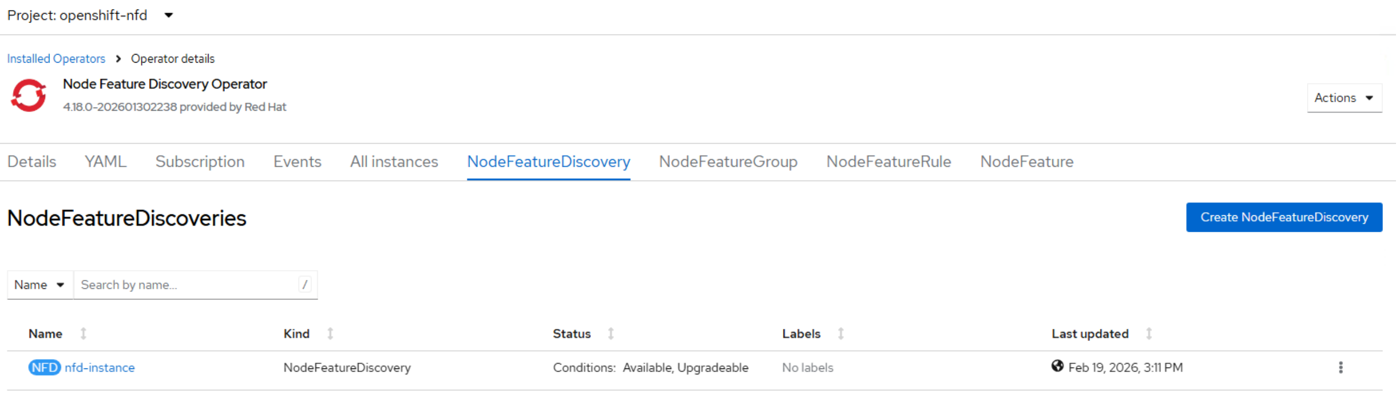
Step 5. Create the nfd-instance:

```
oc create -f nodefeaturediscovery.yaml
```

Step 6. Wait for the **nfd-instance** to reach a **Status of Available, Upgradable**.

Step 7. If after a few minutes the nfd-instance has not progressed from the Status of Condition: Degraded, select **Workloads > Pods**. If the nfd-gc pod has a Status of CreateContainerConfigError, select **Workloads > Deployments**. Click **nfd-gc** and select the **YAML** tab. Under spec:, change the **runasNonRoot:** property from true to **false**. Click **Save**. Acknowledge the warning and click **Save** again. Click **Workloads > Pods**. A new nfd-gc pod should now be Running. From **Operators > Installed Operators** and the **NodeFeatureDiscovery** tab, the nfd-instance should now have a Status of Available, Upgradeable.

Note: The old nfd-gc pod is also still present, but this is not an issue.



Node Feature Discovery Operator
4.18.0-202601302238 provided by Red Hat

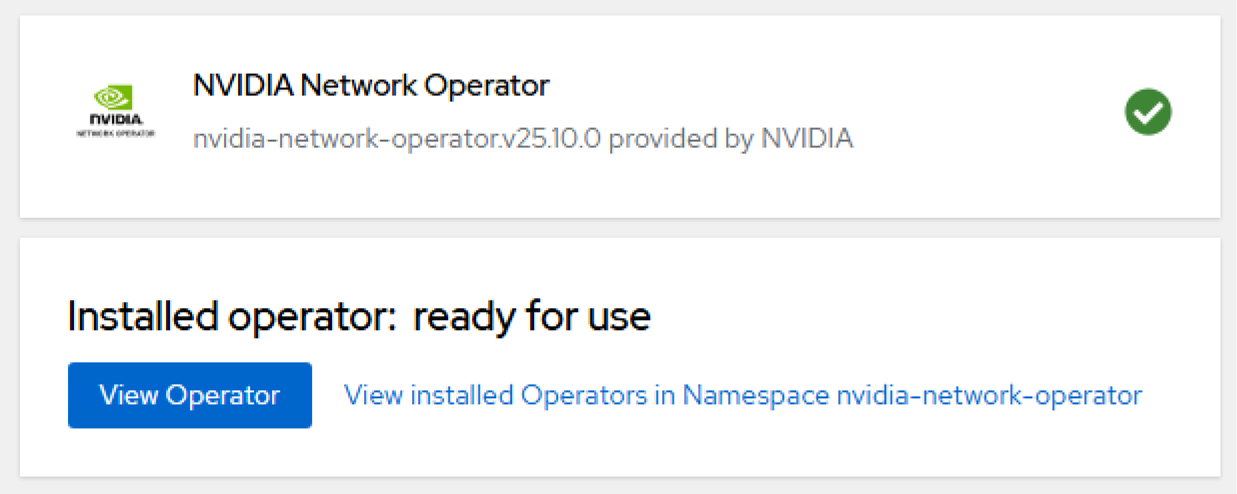
NodeFeatureDiscoveries

Name	Kind	Status	Labels	Last updated
NFD nfd-instance	NodeFeatureDiscovery	Conditions: Available, Upgradeable	No labels	Feb 19, 2026, 3:11 PM

Procedure 11. Deploy the NVIDIA Network Operator

Step 1. In the OpenShift console, select **Operators > OperatorHub**. In the search box, type **NVIDIA**. Select **NVIDIA Network Operator**.

Step 2. Click **Install**. Click **Install** again to deploy the operator.


NVIDIA
NETWORK OPERATOR
View Operator
View installed Operators in Namespace nvidia-network-operator

NVIDIA Network Operator
nvidia-network-operator.v25.10.0 provided by NVIDIA

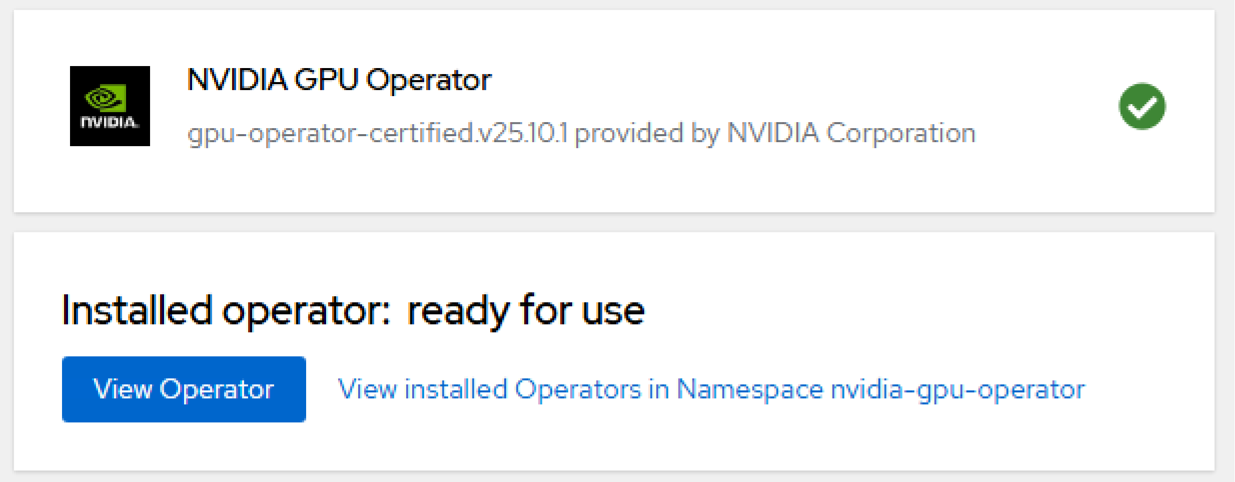
Installed operator: ready for use

Step 3. When the operator is installed, click **View Operator**.

Procedure 12. Deploy the NVIDIA GPU Operator

Step 1. In the OpenShift console, select **Operators > OperatorHub**. In the search box, type **NVIDIA**. Select **NVIDIA GPU Operator**.

Step 2. Click **Install**. Click **Install** again to deploy the operator.



NVIDIA GPU Operator

gpu-operator-certified.v25.10.1 provided by NVIDIA Corporation

Installed operator: ready for use

Step 3. When the operator is installed, click **View Operator**.

Deploy GPUDirect RDMA on Backend Fabric

The NVIDIA network Operator manages NVIDIA networking resources and networking related components such as drivers and device plugins to enable NVIDIA GPUDirect RDMA workloads. NVIDA Network Operator was deployed earlier. Verify that the previously deployed Network Operator is installed and running.

Procedure 1. Install NVIDIA Network Operator Nic Cluster Policy

Step 1. Verify that the previously deployed Network Operator is installed and running:

```
oc get pods -n nvidia-network-operator
NAME                                                   READY   STATUS    RESTARTS   AGE
nvidia-network-operator-controller-manager-54fc877bf5-mm5sp   1/1     Running   0          19m
```

Step 2. Create the NicClusterPolicy custom resource file:

```
cat nic-cluster-policy.yaml
apiVersion: mellanox.com/v1alpha1
kind: NicClusterPolicy
metadata:
  name: nic-cluster-policy
spec:
  rdmaSharedDevicePlugin:
    config: |
      {
        "configList": [
          {
            "resourceName": "rdma_shared_device_a",
            "rdmaHcaMax": 63,
            "selectors": {
              "ifNames": [
                "ens201np0",
                "ens202np0",
                "ens203np0",
                "ens204np0",
                "ens205np0",
                "ens206np0",
                "ens207np0",
                "ens208np0"
              ]
            }
          },
          {
            "resourceName": "rdma_shared_device_b",
            "rdmaHcaMax": 63,
            "selectors": {
              "ifNames": ["bond0"]
            }
          }
        ]
      }
    image: k8s-rdma-shared-dev-plugin
    repository: nvcr.io/nvidia/mellanox
    version: sha256:78f01edc4cc6f5f1282b5e4bf0a0d0291ee97c1bdb372616daa5367e1070269e
  ofedDriver:
    readinessProbe:
      initialDelaySeconds: 10
      periodSeconds: 30
    forcePrecompiled: false
    terminationGracePeriodSeconds: 300
    livenessProbe:
      initialDelaySeconds: 30
      periodSeconds: 30
    upgradePolicy:
      autoUpgrade: true
      drain:
        deleteEmptyDir: true
        enable: true
        force: true
        timeoutSeconds: 300
        podSelector: ''
      maxParallelUpgrades: 1
      safeLoad: false
      waitForCompletion:
        timeoutSeconds: 0
    startupProbe:
      initialDelaySeconds: 10
      periodSeconds: 20
    image: doca-driver
    repository: nvcr.io/nvidia/mellanox
    version: doca3.2.0-25.10-1.2.8.0-2
    env:
    - name: ENABLE_NFSRDMA
      value: "true"
    - name: UNLOAD_STORAGE_MODULES
      value: "true"
    - name: RESTORE_DRIVER_ON_POD_TERMINATION
      value: "true"
    - name: CREATE_IFNAMES_UDEV
      value: "true"
```

Step 3. Add the NicClusterPolicy to the OpenShift cluster:

```
oc create -f nic-cluster-policy.yaml
```

Step 4. Verify that all nvidia-network-operator pods are running:

```
oc get pods -n nvidia-network-operator
NAME                                                          READY   STATUS    RESTARTS   AGE
mofed-rhcos4.18-6468b8fcdb-ds-vd5vf                           2/2     Running   0          4h51m
nvidia-network-operator-controller-manager-7f7ff45c45-nltnx   1/1     Running   0          4d2h
rdma-shared-dp-ds-rb4nm                                       1/1     Running   0          4h47m
```

Note: One mofed- pod should be listed for each Cisco UCS C885A M8 server.

Step 5. To verify drivers loaded, execute the following commands using the mofed- pod on each UCS C885A:

```
oc project nvidia-network-operator
oc exec -it mofed-rhcos4.18-6468b8fcdb-ds-vd5vf -- bash

Defaulted container "mofed-container" out of: mofed-container, openshift-driver-toolkit-ctr, network-
operator-init-container (init)

ofed_info -s
```

```
OFED-internal-25.10-1.2.8:

ibdev2netdev -v

0000:69:00.0 mlx5_0 (MT4129 - 30-100363-01) MCX715105AS-WEAT CX-7 1x400GbE QSFP112 PCIe Gen5 x16 VPI NIC
fw 28.43.2026 port 1 (ACTIVE) ==> ens202np0 (Up)
0000:09:00.0 mlx5_1 (MT4129 - 30-100363-01) MCX715105AS-WEAT CX-7 1x400GbE QSFP112 PCIe Gen5 x16 VPI NIC
fw 28.43.2026 port 1 (ACTIVE) ==> ens204np0 (Up)
0000:53:00.0 mlx5_2 (MT4129 - 30-100363-01) MCX715105AS-WEAT CX-7 1x400GbE QSFP112 PCIe Gen5 x16 VPI NIC
fw 28.43.2026 port 1 (ACTIVE) ==> ens201np0 (Up)
0000:23:00.0 mlx5_3 (MT4129 - 30-100363-01) MCX715105AS-WEAT CX-7 1x400GbE QSFP112 PCIe Gen5 x16 VPI NIC
fw 28.43.2026 port 1 (ACTIVE) ==> ens203np0 (Up)
0000:f1:00.0 mlx5_4 (MT4129 - 30-100363-01) MCX715105AS-WEAT CX-7 1x400GbE QSFP112 PCIe Gen5 x16 VPI NIC
fw 28.43.2026 port 1 (ACTIVE) ==> ens205np0 (Up)
0000:89:00.0 mlx5_5 (MT41692 - 900-9D3B6-00SV-AA0) BlueField-3 P-Series DPU 200GbE/NDR200 dual-port QSFP-
DD112, PCIe Gen5.0 x16 FHHL, Crypto Disabled, 32GB DDR5, BMC, Tall Bracket
fw 32.45.1020 port 1 (ACTIVE) ==> ens214f0np0 (Up)
0000:89:00.1 mlx5_6 (MT41692 - 900-9D3B6-00SV-AA0) BlueField-3 P-Series DPU 200GbE/NDR200 dual-port QSFP-
DD112, PCIe Gen5.0 x16 FHHL, Crypto Disabled, 32GB DDR5, BMC, Tall Bracket
fw 32.45.1020 port 1 (ACTIVE) ==> ens214f1np1 (Up)
0000:8f:00.0 mlx5_7 (MT4129 - 30-100363-01) MCX715105AS-WEAT CX-7 1x400GbE QSFP112 PCIe Gen5 x16 VPI NIC
fw 28.43.2026 port 1 (ACTIVE) ==> ens207np0 (Up)
0000:cd:00.0 mlx5_8 (MT4129 - 30-100363-01) MCX715105AS-WEAT CX-7 1x400GbE QSFP112 PCIe Gen5 x16 VPI NIC
fw 28.43.2026 port 1 (ACTIVE) ==> ens206np0 (Up)
0000:9c:00.0 mlx5_9 (MT4129 - 30-100363-01) MCX715105AS-WEAT CX-7 1x400GbE QSFP112 PCIe Gen5 x16 VPI NIC
fw 28.43.2026 port 1 (ACTIVE) ==> ens208np0 (Up)
0000:4d:00.0 mlx5_bond_0 (MT41692 - 900-9D3B6-00SV-AA0) BlueField-3 P-Series DPU 200GbE/NDR200 dual-port
QSFP-DD112, PCIe Gen5.0 x16 FHHL, Crypto Disabled, 32GB DDR5, BMC, Tall Bracket
fw 32.45.1020 port 1 (ACTIVE) ==> bond0 (Up)
```

Procedure 2. Install Virtual Machine (VM) Network Bridge on UCS C885A Node(s)

Now that updated mlx5 drivers are in place, if you have installed OpenShift Virtualization and would like to run VMs on the C885A node(s), install the VM network bridge on these node(s).

Step 1. Add the VM network bridge to the bond with a Node Network Configuration Policy (NNCP) file.

```
cat c885-vm-network-bridge.yaml

apiVersion: nmstate.io/v1
kind: NodeNetworkConfigurationPolicy
metadata:
  name: c885-br-vm-network-policy
spec:
  nodeSelector:
    net-type: c885
  desiredState:
    interfaces:
      - name: br-vm-network
        description: Linux bridge with bond0 as a port
        type: linux-bridge
        state: up
        ipv4:
          dhcp: false
          enabled: false
        ipv6:
          enabled: false
        bridge:
          options:
            stp:
              enabled: false
          port:
            - name: bond0
```

Step 2. Add the NNCP to OpenShift.

```
oc create -f c885-vm-network-bridge.yaml
```

Step 3. Verify the addition in the OpenShift web console by checking **Networking > NodeNetworkConfigurationPolicy**.

Step 4. SSH to the C885A(s) and use the **ifconfig -a** command to verify the addition.

Procedure 3. Install NVIDIA GPU Operator Cluster Policy

Step 1. In the OpenShift cluster web interface select **Operators > Installed Operators**. Select Project **nvidia-gpu-operator**, then select **NVIDIA GPU Operator.** Click the **ClusterPolicy** tab.

Step 2. On the installer VM, create the following YAML file:

```
cat clusterpolicy.yaml

apiVersion: nvidia.com/v1
kind: ClusterPolicy
metadata:
  name: gpu-cluster-policy
spec:
  vgpuDeviceManager:
    config:
      default: default
    enabled: true
  migManager:
    config:
      default: all-disabled
      name: default-mig-parted-config
    enabled: true
  operator:
    defaultRuntime: crio
    initContainer: {}
    runtimeClass: nvidia
    use_ocp_driver_toolkit: true
  dcgm:
    enabled: true
  gfd:
    enabled: true
  dcgmExporter:
    config:
      name: ''
    serviceMonitor:
      enabled: true
    enabled: true
  cdi:
    default: false
    enabled: true
  driver:
    licensingConfig:
      nlsEnabled: true
      secretName: ''
    kernelModuleType: auto
    certConfig:
      name: ''
    kernelModuleConfig:
      name: ''
    upgradePolicy:
      autoUpgrade: true
      drain:
        deleteEmptyDir: false
        enable: false
        force: false
        timeoutSeconds: 300
      maxParallelUpgrades: 1
      maxUnavailable: 25%
      podDeletion:
        deleteEmptyDir: false
        force: false
        timeoutSeconds: 300
      waitForCompletion:
        timeoutSeconds: 0
    repoConfig:
      configMapName: ''
    virtualTopology:
      config: ''
    enabled: true
    useNvidiaDriverCRD: false
  devicePlugin:
    config:
      name: ''
      default: ''
    mps:
      root: /run/nvidia/mps
    enabled: true
  gdrcopy:
    enabled: false
  kataManager:
    config:
      artifactsDir: /opt/nvidia-gpu-operator/artifacts/runtimeclasses
  mig:
    strategy: single
  sandboxDevicePlugin:
    enabled: true
  validator:
    plugin:
      env: []
  nodeStatusExporter:
    enabled: true
  daemonsets:
    rollingUpdate:
      maxUnavailable: '1'
    updateStrategy: RollingUpdate
  sandboxWorkloads:
    defaultWorkload: container
    enabled: false
  gds:
    enabled: true
    image: nvidia-fs
    repository: nvcr.io/nvidia/cloud-native
    version: 2.26.6
  vgpuManager:
    enabled: false
  vfioManager:
    enabled: true
  toolkit:
    installDir: /usr/local/nvidia
    enabled: true
```

Note: The ClusterPolicy shown above enables NVIDIA GPU Direct Storage (GDS) which works with NetApp NFS over RDMA on the FE fabric. If you do not want to enable this feature, change gds: enabled: to false. Changing this setting will not affect GPU Direct on the BE fabric.

Step 3. Create the ClusterPolicy:

```
oc create -f clusterpolicy.yaml
```

Step 4. From the OpenShift Installer VM, check the pod status waiting for all pods to get to the Running status.

```
oc project nvidia-gpu-operator
oc get pods

NAME                                                  READY   STATUS             RESTARTS      AGE
gpu-feature-discovery-4bmwr                           1/1     Running            0             2m14s
gpu-operator-7ccfc5879b-6k2m7                         1/1     Running            0             23h
nvidia-container-toolkit-daemonset-qpl4p              1/1     Running            0             2m14s
nvidia-cuda-validator-2mfbz                           0/1     Completed          0             17s
nvidia-dcgm-exporter-fvxvh                            1/1     Running            0             2m14s
nvidia-dcgm-l6bjw                                     1/1     Running            0             2m14s
nvidia-device-plugin-daemonset-7kfxm                  1/1     Running            0             2m14s
nvidia-driver-daemonset-418.94.202601202224-0-9mjjn   2/3     CrashLoopBackOff   3 (12s ago)   2m23s
nvidia-mig-manager-r4t25                              1/1     Running            0             2m14s
nvidia-node-status-exporter-47zz7                     1/1     Running            0             2m20s
nvidia-operator-validator-dfzwh                       1/1     Running            0             2m14s
```

Note: What is shown here reflects a setup with one Cisco UCS C885A server. For multiple servers, corresponding multiple copies of each pod will be present.

Step 5. In your environment, if the nvidia-driver-daemonset pod(s) show the CrashLoopBackOff Status as shown above, repeat the following steps for each nvidia-driver-daemonset pod:

a. In the **OpenShift console**, select **Workloads > Pods** and select the **nvidia-gpu-operator** Project.

b. Click the first **nvidia-driver-daemonset** pod in the **CrashLoopBackOff Status**. Select the **Terminal** tab.

c. Verify that the **nvidia_fs kernel** module is loaded.

```
lsmod | grep nvidia
```

d. If **nvidia_fs** is present, remove it.

```
rmmod nvidia_fs
```

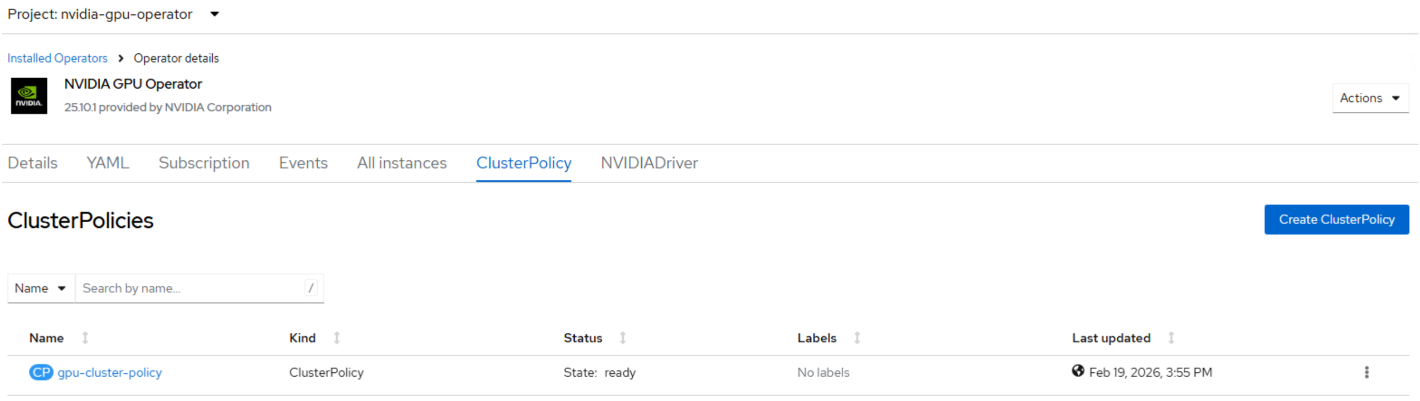
e. Repeat these steps for each nvidia-driver-daemonset pod in the CrashLoopBackOff Status.

Note: This is a temporary workaround until this issue is fixed by NVIDIA. This workaround will need to be repeated any time the nvidia-driver daemonset pod is restarted, including server reboots.

Step 6. From the OpenShift Installer VM, check the pod status waiting for all pods to get to the Running status.

```
oc get pods

NAME                                                 READY   STATUS      RESTARTS         AGE
gpu-feature-discovery-4bmwr                          1/1     Running     0                23m
gpu-operator-7ccfc5879b-6k2m7                        1/1     Running     0                24h
nvidia-container-toolkit-daemonset-qpl4p             1/1     Running     0                23m
nvidia-cuda-validator-2mfbz                          0/1     Completed   0                21m
nvidia-dcgm-exporter-fvxvh                           1/1     Running     0                23m
nvidia-dcgm-l6bjw                                    1/1     Running     0                23m
nvidia-device-plugin-daemonset-7kfxm                 1/1     Running     0                23m
nvidia-driver-daemonset-418.94.202601202224-0-9mjjn  3/3     Running     11 (5m36s ago)   23m
nvidia-mig-manager-r4t25                             1/1     Running     0                23m
nvidia-node-status-exporter-47zz7                    1/1     Running     0                23m
nvidia-operator-validator-dfzwh                      1/1     Running     0                23m
```

Step 7. In the OpenShift cluster web interface, the gpu-cluster-policy will also show a Status of “State: ready.”



Name	Kind	Status	Labels	Last updated
CP gpu-cluster-policy	ClusterPolicy	State: ready	No labels	Feb 19, 2026, 3:55 PM

Procedure 4. Set the MTU of BE Interfaces to 9000 and Assigning IPs

The BE network interfaces by default have MTU 1500 and no IP address assigned.

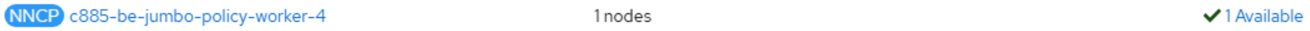
Step 1. To set MTU 9000 and assign an access port style IP address to each BE interface of a Cisco UCS C885A server, create a YAML file as follows:

```
cat c885-be-jumbo-w4.yaml
apiVersion: nmstate.io/v1
kind: NodeNetworkConfigurationPolicy
metadata:
  name: c885-be-jumbo-policy-worker-4
spec:
  nodeSelector:
    kubernetes.io/hostname: worker-4
  desiredState:
    interfaces:
      - name: ens201np0
        type: ethernet
        state: up
        mtu: 9000
        ipv4:
          enabled: true
          address:
            - ip: 192.168.100.1
              prefix-length: 24
        ipv6:
          enabled: false
      - name: ens202np0
        type: ethernet
        state: up
        mtu: 9000
        ipv4:
          enabled: true
          address:
            - ip: 192.168.100.2
              prefix-length: 24
        ipv6:
          enabled: false
      - name: ens203np0
        type: ethernet
        state: up
        mtu: 9000
        ipv4:
          enabled: true
          address:
            - ip: 192.168.100.3
              prefix-length: 24
        ipv6:
          enabled: false
      - name: ens204np0
        type: ethernet
        state: up
        mtu: 9000
        ipv4:
          enabled: true
          address:
            - ip: 192.168.100.4
              prefix-length: 24
        ipv6:
          enabled: false
      - name: ens205np0
        type: ethernet
        state: up
        mtu: 9000
        ipv4:
          enabled: true
          address:
            - ip: 192.168.100.5
              prefix-length: 24
        ipv6:
          enabled: false
      - name: ens206np0
        type: ethernet
        state: up
        mtu: 9000
        ipv4:
          enabled: true
          address:
            - ip: 192.168.100.6
              prefix-length: 24
        ipv6:
          enabled: false
      - name: ens207np0
        type: ethernet
        state: up
        mtu: 9000
        ipv4:
          enabled: true
          address:
            - ip: 192.168.100.7
              prefix-length: 24
        ipv6:
          enabled: false
      - name: ens208np0
        type: ethernet
        state: up
        mtu: 9000
        ipv4:
          enabled: true
          address:
            - ip: 192.168.100.8
              prefix-length: 24
        ipv6:
          enabled: false
```

Step 2. Add the NodeNetworkConfigurationPolicy to OpenShift:

```
oc create -f c885-be-jumbo-w4.yaml
```

Step 3. Verify the NodeNetworkConfigurationPolicy has been applied; go to **Networking > NodeNetworkConfigurationPolicy** in the OpenShift console.



NNCP c885-be-jumbo-policy-worker-4 1 nodes ✓ 1 Available

Step 4. Repeat this process using different IPs in the same subnet for all Cisco UCS C885A nodes.

Procedure 5. Testing the BE Fabric and GPU Direct RDMA

Both the BE Network and the GPU Direct RDMA functionality can be tested with a NCCL test on two or more Cisco UCS C885A servers connected to a BE Fabric. For examples of running these tests, check https://github.com/schmaustech/nvidia-tools-image.

Deploy NetApp NFS over RDMA with NVIDIA GPU Direct Storage (GDS)

For the NetApp NFS over RDMA with NVIDIA GPU Direct Storage setup, a different validation lab was used. In this lab, the main NetApp controller interfaces were setup as port channels connected to vPCs on the Nexus switches. NFS over RDMA was setup on 4 (2 per controller) ConnectX-7 interfaces that were setup as individual links. A separate NFS VLAN and Storage Virtual Machine (SVM) were used for NFS over RDMA. The separate NFS VLAN ensured separate VLAN interfaces in a separate broadcast domain on storage and logical interfaces (LIFs) in a different subnet. The separate SVM was used to provide a separate NFS server where NFS Session Trunking and parallel NFS (pNFS) could be turned on without affecting existing NFS mounts and connections already on the OpenShift cluster. For NetApp NFS over RDMA, LIFs on port channels or NetApp interface groups are not supported. It is also recommended to run NFS over RDMA on ConnectX-7 interfaces. In this validation lab, the existing NFS and management LIFs were setup on ConnectX-6 interfaces and NFS over RDMA was added on ConnectX-7 interfaces.

Procedure 1. Setup Networking to Support NFS over RDMA

Since the additional 4 NFS over RDMA ports were not setup as part of the original FE fabric setup, these ports will need to be added as individual ports in Nexus Dashboard on the storage leafs. We used the second NFS VLAN (3052). Configure the ConnectX-7 ports with VLAN 3052 and make sure the PFC and the QoS Marking policy are enabled on the ports along with MTU 9216. Also, ensure VLAN 3052 has been added to the UCS C885A port channels.

Procedure 2. Setup NetApp Storage to Support NFS over RDMA

For the NetApp storage VLAN interface ports and broadcast domains need to be added and the SVM needs to be setup to support NFS over RDMA.

Step 1. Open an SSH connection to either the cluster IP or the host name. Log in with the admin user and the password you provided earlier.

```
Create the OCP-NFSoRDMA broadcast domain with appropriate maximum transmission unit (MTU):
network port broadcast-domain create -broadcast-domain OCP-NFSoRDMA -mtu 9000 -ipspace AC01-OCP
```

Step 2. Create the OpenShift NFS over RDMA VLAN ports and add them to the NFSoRDMA broadcast domain:

```
network port vlan create -node rtp5-ac01-nas-n01 -vlan-name e6a-3052
network port vlan create -node rtp5-ac01-nas-n01 -vlan-name e6b-3052
network port vlan create -node rtp5-ac01-nas-n02 -vlan-name e6a-3052
network port vlan create -node rtp5-ac01-nas-n02 -vlan-name e6b-3052

network port broadcast-domain add-ports -ipspace AC01-OCP -broadcast-domain OCP-NFSoRDMA -ports rtp5-ac01-nas-n01:e6a-3052,rtp5-ac01-nas-n01:e6b-3052,rtp5-ac01-nas-n02:e6a-3052,rtp5-ac01-nas-n02:e6b-3052
```

Step 3. Create the SVM (Storage Virtual Machine) in IPspace. Run the `vserver create` command:

```
vserver create -vserver rtp5-ac01-nas-tme-nfsordma -ipspace AC01-OCP
```

Note: The SVM must be created in the IPspace. An SVM cannot be moved into an IPspace later.

Step 4. Add the required data protocols to the SVM and remove the unused data protocols from the SVM:

```
vserver add-protocols -vserver rtp5-ac01-nas-tme-nfsordma -protocols nfs
vserver remove-protocols -vserver rtp5-ac01-nas-tme-nfsordma -protocols cifs,fcp,iscsi,nvme,s3
```

Note: Make sure licenses are installed for all storage protocols used before creating the services.

Step 5. Add the two data aggregates to the OCP-SVM aggregate list and enable and configure the NFS protocol in the SVM:

```
vserver modify -vserver rtp5-ac01-nas-tme-nfsordma -aggr-list AC01_NAS_01_SSD_1, AC01_NAS_02_SSD_1
set -privilege advanced
vserver nfs create -vserver rtp5-ac01-nas-tme-nfsordma -udp disabled -v3 enabled -v4.1-pnfs enabled -v4.1
enabled -v4.1-trunking enabled -tcp-max-xfer-size 262144 -rdma enabled
set -privilege admin
```

Step 6. Create a Load-Sharing Mirror of the SVM Root Volume. Create a volume to be the load-sharing mirror of the infrastructure SVM root volume only on the node that does not have the Root Volume:

```
volume show -vserver rtp5-ac01-nas-tme-nfsordma # Identify the aggregate and node where the vserver root volume is located.
volume create -vserver rtp5-ac01-nas-tme-nfsordma -volume rtp5_ac01_nas_tme_nfsordma_root_lsm01 -aggregate
AC01_NAS_0<x>_SSD_1 -size 1GB -type DP # Create the mirror volume on the other node
```

Step 7. Create the mirroring relationship:

```
snapmirror create -source-path rtp5-ac01-nas-tme-nfsordma:rtp5_ac01_nas_tme_nfsordma_rootvol -destination-
path rtp5_ac01_nas_tme_nfsordma_rootvol_lsm01 -type LS -schedule 15min
```

Step 8. Initialize and verify the mirroring relationship:

```
snapmirror initialize-ls-set -source-path rtp5-ac01-nas-tme-nfsordma:rtp5_ac01_nas_tme_nfsordma_rootvol

snapmirror show -vserver rtp5-ac01-nas-tme-nfsordma

                                                                       Progress
Source            Destination Mirror  Relationship   Total             Last
Path        Type  Path        State   Status         Progress  Healthy Updated
----------- ---- ------------ ------- -------------- --------- ------- --------
rtp5-ac01-nas://rtp5-ac01-nas-tme-nfsordma/rtp5_ac01_nas_tme_nfsordma_rootvol
             LS  rtp5-ac01-nas://rtp5-ac01-nas-tme-nfsordma/rtp5_ac01_nas_tme_nfsordma_rootvol_lsm01
                              Snapmirrored
                                       Idle           -         true    -
```

Step 9. To create the login banner for the SVM, run the following command:

```
security login banner modify -vserver rtp5-ac01-nas-tme-nfsordma -message "This AI POD NFS over RDMA SVM is
reserved for authorized users only!"
```

Step 10. Create a new rule for the SVM NFS subnet in the default export policy and assign the policy to the SVM's root volume:

```
vserver export-policy rule create -vserver rtp5-ac01-nas-tme-nfsordma -policyname default -ruleindex 1 -
protocol nfs -clientmatch 192.168.52.0/24 -rorule sys -rwrule sys -superuser sys -allow-suid true

volume modify -vserver rtp5-ac01-nas-tme-nfsordma -volume rtp5_ac01_nas_tme_nfsordma_root -policy default
```

Step 11. Create and enable the audit log in the SVM:

```
volume create -vserver rtp5-ac01-nas-tme-nfsordma -volume audit_log -aggregate AC01_NAS_01_SSD_1 -size 50GB -
state online -policy default -junction-path /audit_log -space-guarantee none -percent-snapshot-space 0

snapmirror update-ls-set -source-path rtp5-ac01-nas-tme-nfsordma:rtp5_ac01_nas_tme_nfsordma_rootvol
vserver audit create -vserver rtp5-ac01-nas-tme-nfsordma -destination /audit_log
vserver audit enable -vserver rtp5-ac01-nas-tme-nfsordma
```

Step 12. Run the following commands to create NFS over RDMA LIFs:

```
network interface create -vserver rtp5-ac01-nas-tme-nfsordma -lif rtp5-ac01-nas-tme-nfsordma-lif01a -service-
policy default-data-files -home-node rtp5-ac01-nas-n01 -home-port e6a-3052 -address 192.168.52.123 -netmask
255.255.255.0 -status-admin up -failover-policy broadcast-domain-wide -auto-revert true -rdma-protocols roce

network interface create -vserver rtp5-ac01-nas-tme-nfsordma -lif rtp5-ac01-nas-tme-nfsordma-lif01b -service-
policy default-data-files -home-node rtp5-ac01-nas-n01 -home-port e6b-3052 -address 192.168.52.125 -netmask
255.255.255.0 -status-admin up -failover-policy broadcast-domain-wide -auto-revert true -rdma-protocols roce

network interface create -vserver rtp5-ac01-nas-tme-nfsordma -lif rtp5-ac01-nas-tme-nfsordma-lif02a -service-
policy default-data-files -home-node rtp5-ac01-nas-n02 -home-port e6a-3052 -address 192.168.52.124 -netmask
255.255.255.0 -status-admin up -failover-policy broadcast-domain-wide -auto-revert true -rdma-protocols roce

network interface create -vserver rtp5-ac01-nas-tme-nfsordma -lif rtp5-ac01-nas-tme-nfsordma-lif02b -service-
policy default-data-files -home-node rtp5-ac01-nas-n02 -home-port e6a-3052 -address 192.168.52.126 -netmask
255.255.255.0 -status-admin up -failover-policy broadcast-domain-wide -auto-revert true -rdma-protocols roce
```

Step 13. Run the following command to create the SVM-MGMT LIF:

```
network interface create -vserver rtp5-ac01-nas-tme-nfsordma -lif rtp5-ac01-nas-tme-nfsordma-mgmt -service-policy default-management -home-node rtp5-ac01-nas-n01 -home-port e2b-703 -address 10.115.90.122 -netmask 255.255.255.192 -status-admin up -failover-policy broadcast-domain-wide -auto-revert true
```

Step 14. Run the following command to verify LIFs:

```
network interface show -vserver rtp5-ac01-nas-tme-nfsordma
            Logical    Status     Network            Current       Current Is
Vserver     Interface  Admin/Oper Address/Mask       Node          Port    Home
----------- ---------- ---------- ------------------ ------------- ------- ----
rtp5-ac01-nas-tme-nfsordma

            rtp5-ac01-nas-tme-nfsordma-lif01a    up/up    192.168.52.123/24   rtp5-ac01-nas-n01 e6a-3052
                                                                                true
            rtp5-ac01-nas-tme-nfsordma-lif01b    up/up    192.168.52.125/24   rtp5-ac01-nas-n01 e6b-3052
                                                                                 true
            rtp5-ac01-nas-tme-nfsordma-lif02a    up/up    192.168.52.124/24   rtp5-ac01-nas-n02 e6a-3052
                                                                                 true
            rtp5-ac01-nas-tme-nfsordma-lif02b    up/up    192.168.52.126/24   rtp5-ac01-nas-n02 e6b-3052
                                                                                 true
            rtp5-ac01-nas-tme-nfsordma-mgmt      up/up    10.115.90.122/24    rtp5-ac01-nas-n01 e2b-703
                                                                                 true

5 entries were displayed.
```

Step 15. Create a default route that enables the SVM management interface to reach the outside world:

```
network route create -vserver rtp5-ac01-nas-tme-nfsordma -destination 0.0.0.0/0 -gateway 10.115.90.126
```

Step 16. Set a password for the SVM vsadmin user and unlock the user:

```
security login password -username vsadmin -vserver rtp5-ac01-nas-tme-nfsordma
Enter a new password:
Enter it again:

security login unlock -username vsadmin -vserver rtp5-ac01-nas-tme-nfsordma
```

Step 17. Add the OpenShift DNS servers to the SVM:

```
dns create -vserver rtp5-ac01-nas-tme-nfsordma -domains ocp-c885.aipod.local -name-servers
10.115.90.123,10.115.90.124
```

Procedure 3. Setup Red Hat OpenShift to Support NFS over RDMA and GDS

Step 1. Ensure that GDS is enabled in the NVIDIA GPU Cluster Policy with the driver specified.

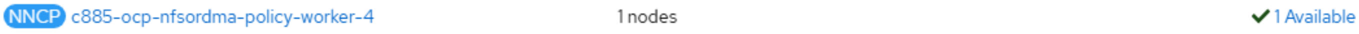
Step 2. Add an NFS over RDMA network interface to each UCS C885A by creating a .yaml file for each server:

```
cat c885-bond0.3052.w4.yaml
apiVersion: nmstate.io/v1
kind: NodeNetworkConfigurationPolicy
metadata:
  name: c885-ocp-nfsordma-policy-worker-4
spec:
  nodeSelector:
    kubernetes.io/hostname: worker-4
  desiredState:
    interfaces:
    - name: bond0.3052
      description: VLAN 3052 using bond0
      type: vlan
      state: up
      ipv4:
        enabled: true
        address:
          - ip: 192.168.52.107
            prefix-length: 24
      ipv6:
        enabled: false
      vlan:
        base-iface: bond0
        id: 3052
```

Step 3. Add the interface to each C885A server:

```
oc create -f c885-bond0.3052.w4.yaml
```

Step 4. Check **Networking > NodeNetworkConfigurationPolicy** to ensure the policy is in place for each C885A server.



NNCP c885-ocp-nfsordma-policy-worker-4 1 nodes ✓ 1 Available

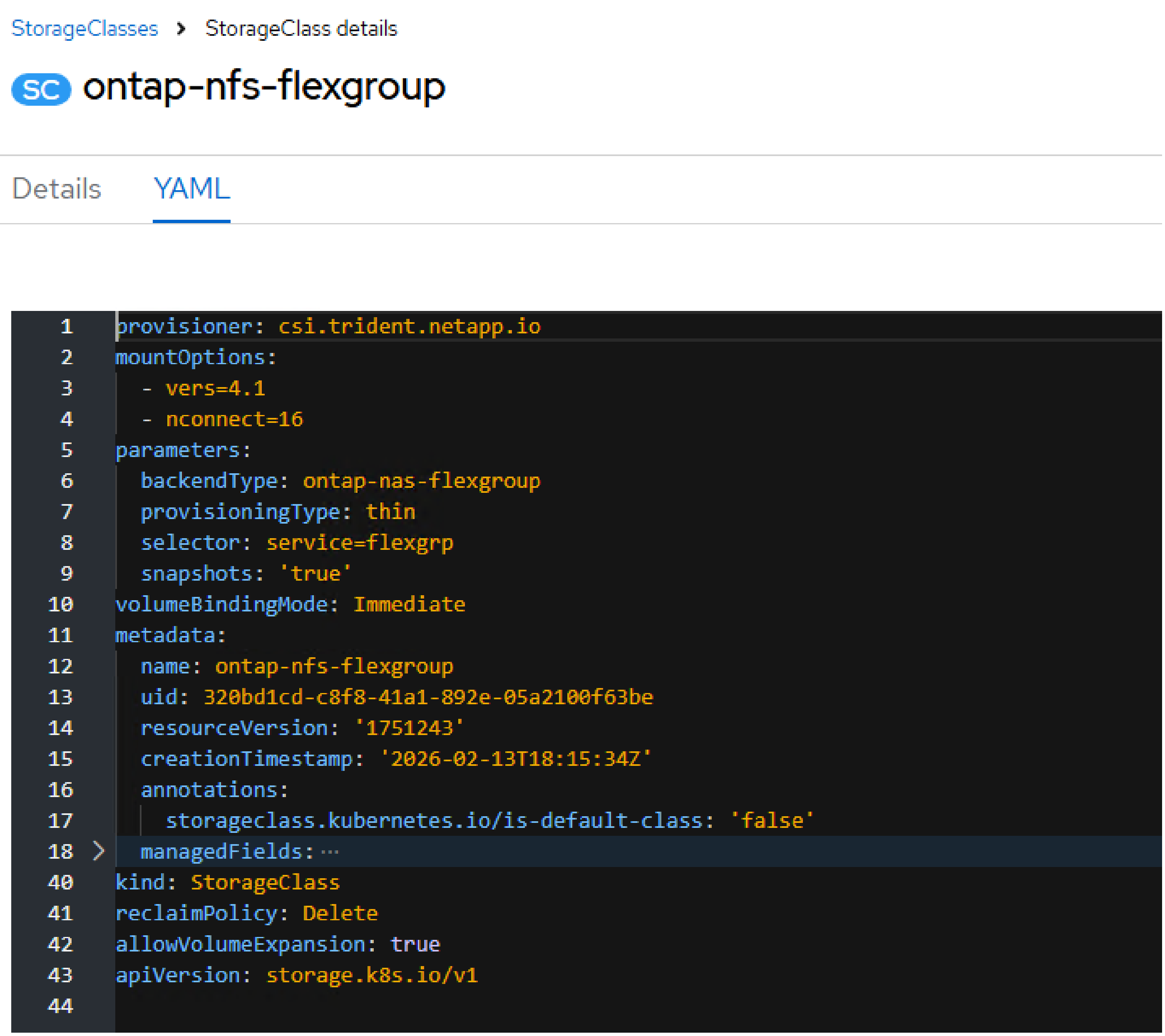
Step 5. For GDS storage NetApp NFS FlexGroup volumes are used. For comparison purposes, adjust the ocp-nfs-flexgroup backend by updating or creating the following .yaml file:

```
cat backend_NFS_flexgroup.yaml
---
version: 1
storageDriverName: ontap-nas-flexgroup
backendName: ocp-nfs-flexgroup
managementLIF: 10.115.90.121
dataLIF: 192.168.51.121
svm: rtp5-ac01-nas-tme-ucs885
username: vsadmin
password: <password>
useREST: true
defaults:
  spaceReserve: none
  exportPolicy: default
  snapshotPolicy: default
  snapshotReserve: '0'
  nameTemplate:
"{{.config.StoragePrefix}}_{{.config.BackendName}}_{{.volume.Namespace}}_{{.volume.RequestName}}"
labels:
  service: "flexgrp"
  perf: "standard"
```

Step 6. Update the backend:

```
tridentctl -n trident get backend
tridentctl -n trident delete backend ocp-nfs-flexgroup
tridentctl -n trident create backend -f backend_NFS_flexgroup.yaml
tridentctl -n trident get backend
```

Step 7. Adjust the ontap-nfs-flexgroup StorageClass by selecting **Storage > StorageClasses** in the OpenShift Console. Select **ontap-nfs-flexgroup** and then click the **YAML** tab. Add mountOptions and the selector as shown below and click **Save**.



ontap-nfs-flexgroup

```
provisioner: csi.trident.netapp.io
mountOptions:
  - vers=4.1
  - nconnect=16
parameters:
  backendType: ontap-nas-flexgroup
  provisioningType: thin
  selector: service=flexgrp
  snapshots: 'true'
volumeBindingMode: Immediate
metadata:
  name: ontap-nfs-flexgroup
  uid: 320bd1cd-c8f8-41a1-892e-05a2100f63be
  resourceVersion: '1751243'
  creationTimestamp: '2026-02-13T18:15:34Z'
  annotations:
    storageclass.kubernetes.io/is-default-class: 'false'
  managedFields: ···
kind: StorageClass
reclaimPolicy: Delete
allowVolumeExpansion: true
apiVersion: storage.k8s.io/v1
```

Note: The nconnect number sets the number of NFS sessions on the single mount point. 16 is the maximum value. Adjust this number downward if a large amount of regular NFS FlexGroup connections, which do not support NFS over RDMA and GDS, will be made.

Step 8. Create an ocp-nfs-rdma-flexgroup Trident backend by first creating the following .yaml file:

```
cat backend_NFS_rdma_flexgroup.yaml
---
version: 1
storageDriverName: ontap-nas-flexgroup
backendName: ocp-nfs-rdma-flexgroup
managementLIF: 10.102.2.52
dataLIF: 192.168.52.51
svm: AA02-OCP-RDMA-SVM
username: vsadmin
password: H1ghV0lt
useREST: true
defaults:
  spaceReserve: none
  exportPolicy: default
  snapshotPolicy: default
  snapshotReserve: '0'
  nameTemplate:
"{{.config.StoragePrefix}}_{{.config.BackendName}}_{{.volume.Namespace}}_{{.volume.RequestName}}"
labels:
  service: "rdma"
  perf: "standard"
```

Step 9. Add the backend to OpenShift.

```
tridentctl -n trident create backend -f backend_NFS_rdma_flexgroup.yaml
tridentctl -n trident get backend
```

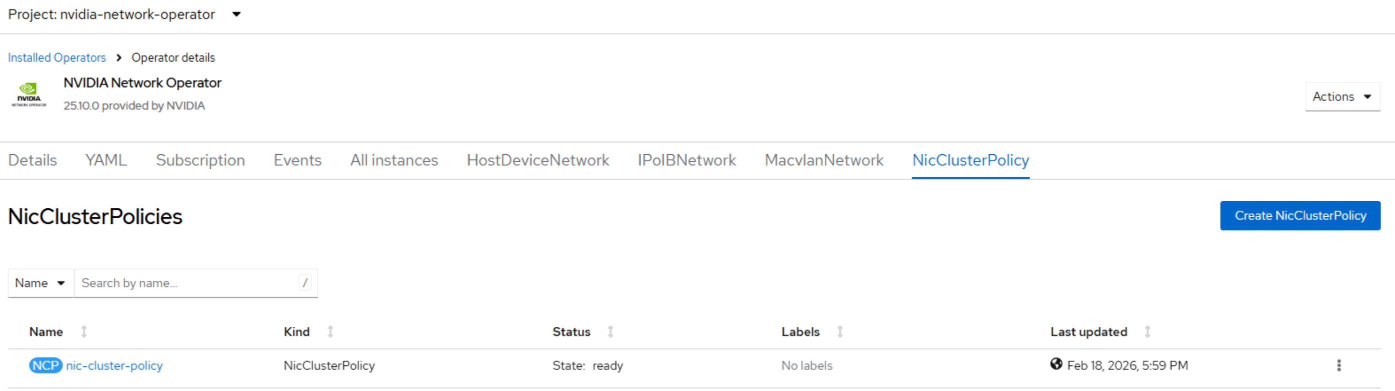
Step 10. Create an ocp-nfs-rdma-flexgroup storage class by first creating the following .yaml file:

```
cat storage-class-ontap-nfs-rdma-flexgroup.yaml
---
apiVersion: storage.k8s.io/v1
kind: StorageClass
metadata:
  name: ontap-nfs-rdma-flexgroup
  annotations:
    storageclass.kubernetes.io/is-default-class: "false"
provisioner: csi.trident.netapp.io
parameters:
  backendType: "ontap-nas-flexgroup"
  selector: "service=rdma"
  provisioningType: "thin"
  snapshots: "true"
mountOptions:
["vers=4.1","proto=rdma","max_connect=16","rsize=262144","wsize=262144","write=eager","hard","noatime","nodir
atime"]
allowVolumeExpansion: true
```

Step 11. Create the storage class in OpenShift.

```
oc create -f storage-class-ontap-nfs-rdma-flexgroup.yaml
```

Step 12. Ensure that the NVIDIA Network Operator NicClusterPolicy has a status of State: ready. Select **Operators > Installed Operators**, the **nvidia-network-operator** project, **NVIDIA Network Operator**, and the **NicClusterPolicy** tab.



Project: nvidia-network-operator

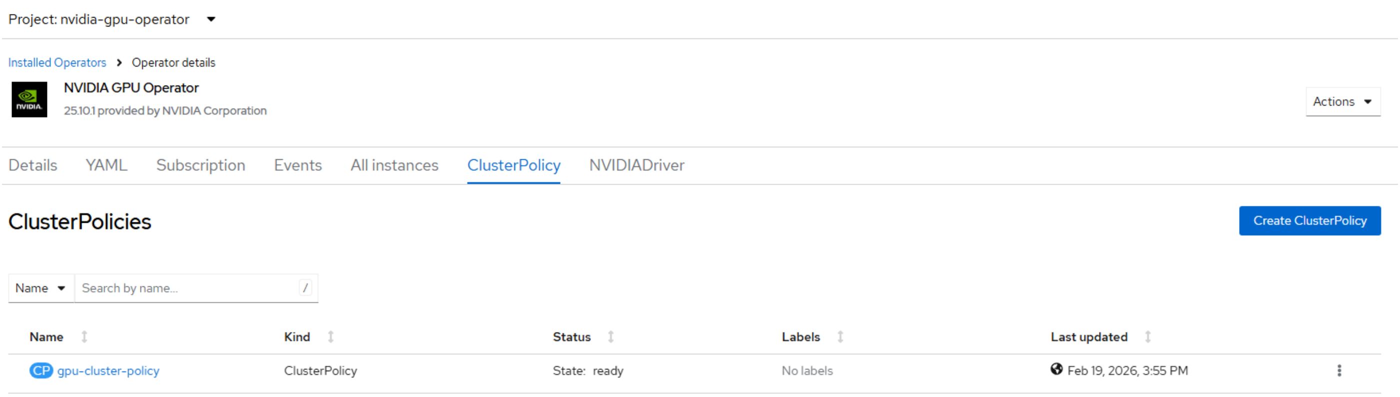
Installed Operators > Operator details

NVIDIA Network Operator
25.10.0 provided by NVIDIA

NicClusterPolicies

Name	Kind	Status	Labels	Last updated
NCP nic-cluster-policy	NicClusterPolicy	State: ready	No labels	Feb 18, 2026, 5:59 PM

Step 13. Ensure that the NVIDIA GPU Operator ClusterPolicy has a status of State: ready. Select **Operators > Installed Operators**, the **nvidia-gpu-operator** project, **NVIDIA GPU Operator**, and the **ClusterPolicy** tab.

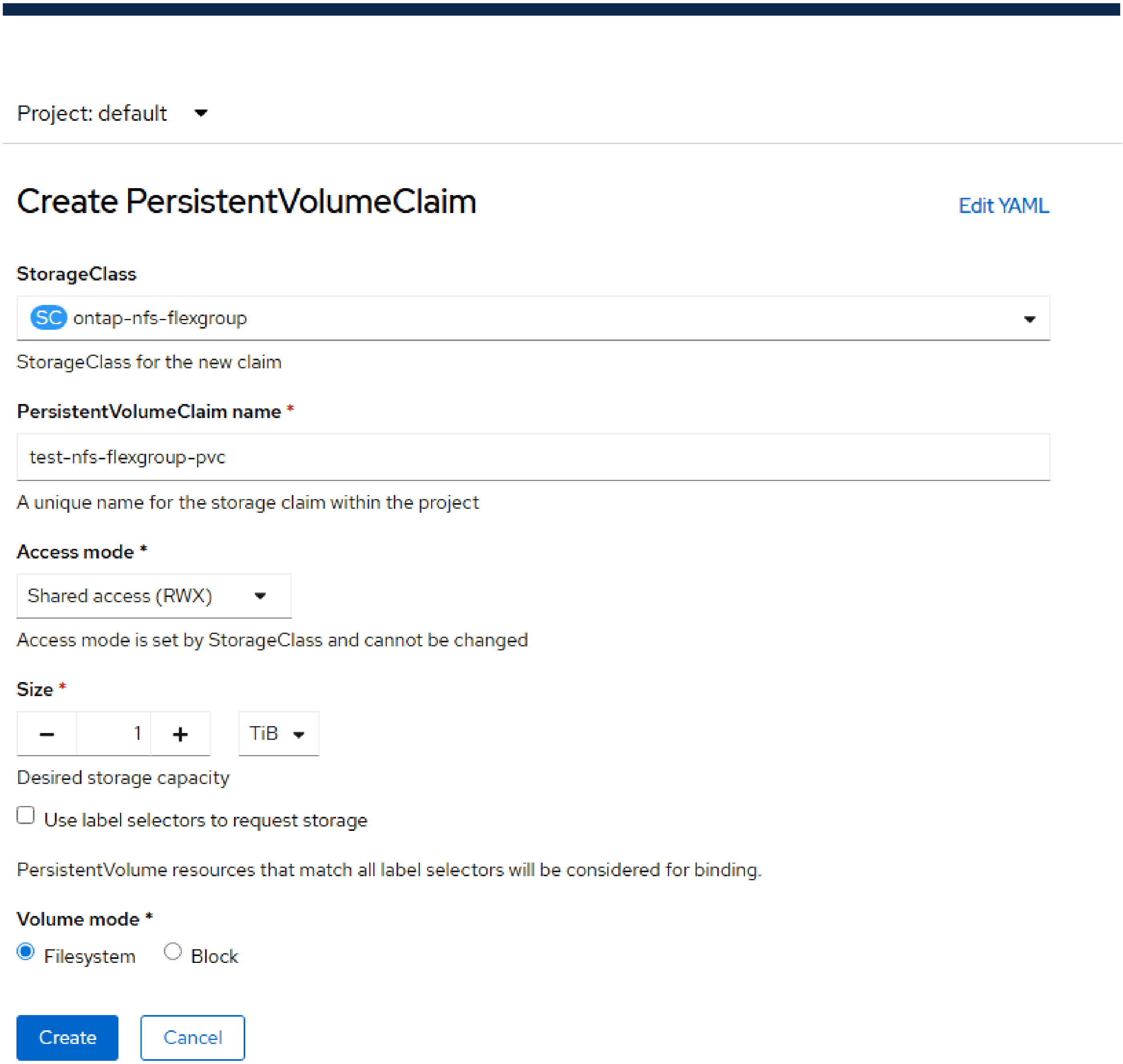


Name	Kind	Status	Labels	Last updated
CP gpu-cluster-policy	ClusterPolicy	State: ready	No labels	Feb 19, 2026, 3:55 PM

Procedure 4. Test NFS over RDMA and GDS

NFS over RDMA and GDS can be tested using a rdma-tools container publicly available on quay.io.

Step 1. Create two Persistent Volume Claims (PVCs) in the default namespace. In the OpenShift console, select **Storage > PersistentVolumeClaims**. Select the **default** Project. Click **Create PersistentVolumeClaim > With Form** and create the two PVCs as shown below.



Project: default

Create PersistentVolumeClaim

StorageClass

SC ontap-nfs-flexgroup

StorageClass for the new claim

PersistentVolumeClaim name *

test-nfs-flexgroup-pvc

A unique name for the storage claim within the project

Access mode *

Shared access (RWX)

Access mode is set by StorageClass and cannot be changed

Size *

− 1 + TiB

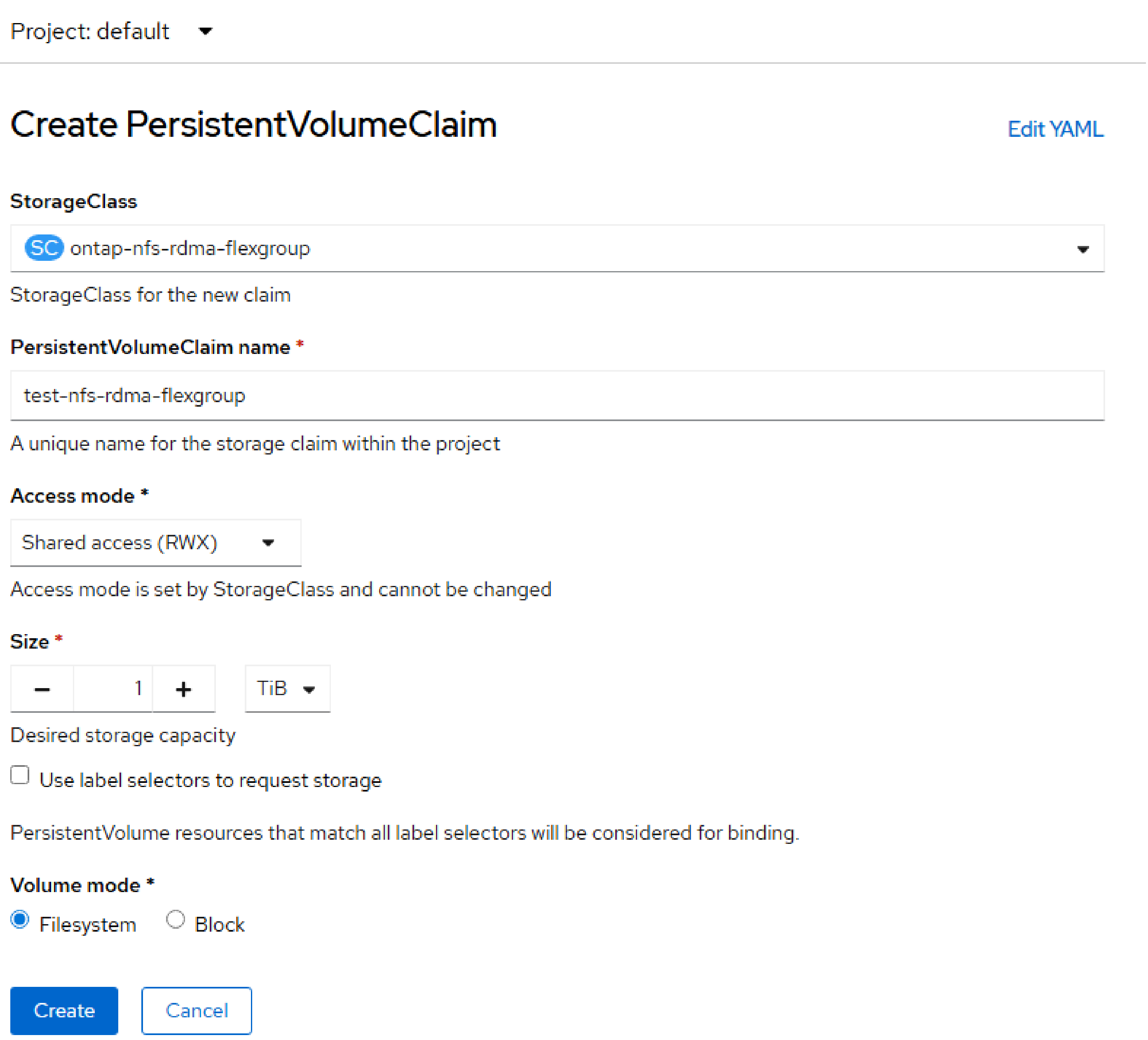
Desired storage capacity

□ Use label selectors to request storage

PersistentVolume resources that match all label selectors will be considered for binding.

Volume mode *

● Filesystem ○ Block



Project: default

Create PersistentVolumeClaim

StorageClass

SC ontap-nfs-rdma-flexgroup

StorageClass for the new claim

PersistentVolumeClaim name *

test-nfs-rdma-flexgroup

A unique name for the storage claim within the project

Access mode *

Shared access (RWX)

Access mode is set by StorageClass and cannot be changed

Size *

− 1 + TiB

Desired storage capacity

□ Use label selectors to request storage

PersistentVolume resources that match all label selectors will be considered for binding.

Volume mode *

● Filesystem ○ Block

Step 2. In an nvidia-tools directory, create the following .yaml files:

```
cat nvidiatools-serviceaccount.yaml

apiVersion: v1
kind: ServiceAccount
metadata:
  name: nvidiatools
  namespace: default

cat nvidiatools-30-workload.yaml

apiVersion: v1
kind: Pod
metadata:
  name: nvidiatools-30-workload
  namespace: default
spec:
  serviceAccountName: nvidiatools
  nodeSelector:
    kubernetes.io/hostname: worker-4
  volumes:
    - name: rdma-pv-storage
      persistentVolumeClaim:
        claimName: test-nfs-rdma-flexgroup
    - name: nordma-pv-storage
      persistentVolumeClaim:
        claimName: test-nfs-flexgroup-pvc
  containers:
    - name: nvidiatools-30-workload
      image: quay.io/wabouham/ecosys-nvidia/rdma-tools:0.0.3
      imagePullPolicy: IfNotPresent
      securityContext:
        privileged: true
        capabilities:
          add: ["IPC_LOCK"]
      resources:
        limits:
          nvidia.com/gpu: 1
        requests:
          nvidia.com/gpu: 1
      volumeMounts:
        - name: rdma-pv-storage
          mountPath: /nfsfast
        - name: nordma-pv-storage
          mountPath: /nfsslow
```

Step 3. Bring the pod up with the following:

```
oc project default
oc create -f nvidiatools-serviceaccount.yaml
oc -n default adm policy add-scc-to-user privileged -z nvidiatools
oc create -f nvidiatools-30-workload.yaml
oc get pods #Until the pod is running. Then wait at least 5 minutes.
```

Step 4. Open a session in the pod.

```
oc exec -it nvidiatools-30-workload – bash
```

Step 5. Check the GDS configuration:

```
/usr/local/cuda-12.8/gds/tools/gdscheck -p

 GDS release version: 1.13.1.3
 nvidia_fs version:  2.26 libcufile version: 2.12
 Platform: x86_64
 ============
 ENVIRONMENT:
 ============
 =====================
 DRIVER CONFIGURATION:
 =====================
 NVMe P2PDMA        : Unsupported
 NVMe               : Unsupported
 NVMeOF             : Unsupported
 SCSI               : Unsupported
 ScaleFlux CSD      : Unsupported
 NVMesh             : Unsupported
 DDN EXAScaler      : Unsupported
 IBM Spectrum Scale : Unsupported
 NFS                : Supported
 BeeGFS             : Unsupported
 WekaFS             : Unsupported
 Userspace RDMA     : Unsupported
 --Mellanox PeerDirect : Disabled
 --rdma library        : Not Loaded (libcufile_rdma.so)
 --rdma devices        : Not configured
 --rdma_device_status  : Up: 0 Down: 0
 =====================
 CUFILE CONFIGURATION:
 =====================
 properties.use_pci_p2pdma : false
 properties.use_compat_mode : true
 properties.force_compat_mode : false
 properties.gds_rdma_write_support : true
 properties.use_poll_mode : false
 properties.poll_mode_max_size_kb : 4
 properties.max_batch_io_size : 128
 properties.max_batch_io_timeout_msecs : 5
 properties.max_direct_io_size_kb : 16384
 properties.max_device_cache_size_kb : 131072
 properties.max_device_pinned_mem_size_kb : 33554432
 properties.posix_pool_slab_size_kb : 4 1024 16384
 properties.posix_pool_slab_count : 128 64 64
 properties.rdma_peer_affinity_policy : RoundRobin
 properties.rdma_dynamic_routing : 0
 fs.generic.posix_unaligned_writes : false
 fs.lustre.posix_gds_min_kb: 0
 fs.beegfs.posix_gds_min_kb: 0
 fs.weka.rdma_write_support: false
 fs.gpfs.gds_write_support: false
 fs.gpfs.gds_async_support: true
 profile.nvtx : false
 profile.cufile_stats : 0
 miscellaneous.api_check_aggressive : false
 execution.max_io_threads : 4
 execution.max_io_queue_depth : 128
 execution.parallel_io : true
 execution.min_io_threshold_size_kb : 8192
 execution.max_request_parallelism : 4
 properties.force_odirect_mode : false
 properties.prefer_iouring : false
 =========
 GPU INFO:
 =========
 GPU index 0 NVIDIA H200 bar:1 bar size (MiB):262144 supports GDS, IOMMU State: Disabled
 ==============
 PLATFORM INFO:
 ==============
 IOMMU: disabled
 Nvidia Driver Info Status: Supported(Nvidia Open Driver Installed)
 Cuda Driver Version Installed:  13000
 Platform: UCSC-885A-M8-H26, Arch: x86_64(Linux 5.14.0-427.107.1.el9_4.x86_64)
 Platform verification succeeded
```

Step 6. Verify the NFS over RDMA mount and the NFS over TCP mount:

```
mount | grep nfs

192.168.52.51:/trident_ocp_nfs_rdma_flexgroup_default_nfs_rdma_9c4f0 on /nfsfast type nfs4
(rw,noatime,nodiratime,vers=4.1,rsize=262144,wsize=262144,namlen=255,hard,proto=rdma,max_connect=16,port=2004
9,timeo=600,retrans=2,sec=sys,clientaddr=192.168.52.107,local_lock=none,write=eager,addr=192.168.52.51)
aa02-ocp-nfs-lif.aa02-ocp.flexpodb4.cisco.com:/trident_ocp_nfs_flexgroup_default_nfs_normal_77c94 on /nfsslow
type nfs4
(rw,relatime,vers=4.1,rsize=262144,wsize=262144,namlen=255,hard,proto=tcp,nconnect=16,timeo=600,retrans=2,sec
=sys,clientaddr=10.102.8.153,local_lock=none,addr=10.102.8.52)
```

Note: The IPs shown here are different because this was validated in a different lab.

Step 7. Run a sample write workload on each mount. The NFS over RDMA mount with use GDS (-x 0) and the NFS over TCP mount will use Storage to CPU to GPU (-x 2).

```
/usr/local/cuda-12.8/gds/tools/gdsio -D /nfsfast -d 0 -w 32 -s 50G -i 256K -x 0 -I 1 -T 120
IoType: WRITE XferType: GPUD Threads: 32 DataSetSize: 275860992/1677721600(KiB) IOSize: 256(KiB) Throughput:
2.184754 GiB/sec, Avg_Latency: 3540.411614 usecs ops: 1077582 total_time 120.417034 secs

/usr/local/cuda-12.8/gds/tools/gdsio -D /nfsslow -d 0 -w 32 -s 50G -i 256K -x 2 -I 1 -T 120
IoType: WRITE XferType: CPU_GPU Threads: 32 DataSetSize: 207761664/1677721600(KiB) IOSize: 256(KiB)
Throughput: 1.651616 GiB/sec, Avg_Latency: 4742.871292 usecs ops: 811569 total_time 119.965479 secs
```

Step 8. Run sample read workloads on each mount.

```
/usr/local/cuda-12.8/gds/tools/gdsio -D /nfsfast -d 0 -w 32 -s 50G -i 256K -x 0 -I 0 -T 120
```

```
IoType: READ XferType: GPUD Threads: 32 DataSetSize: 2750820352/1677721600(KiB) IOSize: 256(KiB) Throughput:
21.922869 GiB/sec, Avg_Latency: 356.615790 usecs ops: 10745392 total_time 119.664387 secs

/usr/local/cuda-12.8/gds/tools/gdsio -D /nfsslow -d 0 -w 32 -s 50G -i 256K -x 2 -I 0 -T 120
IoType: READ XferType: CPU_GPU Threads: 32 DataSetSize: 2101642496/1677721600(KiB) IOSize: 256(KiB)
Throughput: 16.797159 GiB/sec, Avg_Latency: 475.806746 usecs ops: 8209541 total_time 119.322703 secs
```

Note: For a full explanation of the gdsio command, see https://github.com/schmaustech/nvidia-tools-image. In both cases, transfers using GDS had higher throughput and lower latency.

Conclusion

FlexPod with Cisco AI POD is a comprehensive infrastructure solution for enterprises, designed to support their AI/ML journey and a range of AI workloads from training to fine-tuning to inferencing. The FlexPod with AI POD solution detailed in this document is a complete, integrated, and full-stack infrastructure specifically tailored for AI training and fine-tuning workloads. This architecture directly addresses unique AI requirements of enterprises, such as support for multiple smaller workloads with multi-tenancy, incremental scale with operational simplicity and consistency, and ease of integration into existing data center environments.

The FlexPod with Cisco AI POD solution for AI training and fine-tuning includes GPU-dense compute (UCS AI platforms), high-performance networking (Cisco Nexus), NetApp storage, and a robust AI software stack running on Linux or Kubernetes. Each AI POD is built, integrated, and validated in Cisco labs, backed by Cisco Validated Designs, and provides solution-level support through Cisco TAC. While focused on core infrastructure today, FlexPod with Cisco AI POD solutions are designed to evolve, supporting advanced security solutions (Cisco AI Defense, Hypershield) and new technology trends, thereby providing a future-ready platform.

The architectural approach of FlexPod with AI PODs ensures infrastructure is right-sized and can grow with enterprise adoption. This avoids upfront investments in large, potentially underutilized clusters—an important consideration given the rapid pace of technology innovation in the AI space. By leveraging the modularity and flexibility of Scale Units (for example, 32, 64, or 128 GPU clusters), combined with operational ease, design simplicity, and incremental scalability, Cisco AI PODs ensure consistency across all deployment vectors, even at scale.

By adopting FlexPod with Cisco AI PODs, enterprise organizations have a complete, pre-validated solution to meet their full spectrum of AI infra requirements and accelerate AI adoption in a secure manner. This approach reduces time-to-value, lowers total cost of ownership, and empowers enterprises to confidently operationalize AI initiatives that bring value to the business.

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John has been involved in designing, developing, validating, and supporting the FlexPod Converged Infrastructure since it was developed more than 15 years ago. Before his role with FlexPod, he supported and administered a large worldwide training network and VPN infrastructure. John holds a master's degree in Computer Engineering from Clemson University.

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