



IPFM and Classic IPFM, Release 12.2.2

Table of Contents

New and Changed Information	1
IPFM Fabrics	2
Creating IPFM Fabrics	2
Creating a Classic IPFM Fabric	4
General Parameters	4
Advanced	5
Bootstrap	6
Supported Templates for Configuring Interfaces	9
Supported Interface Types for Creating Interfaces	9
Creating an IPFM Fabric	11
General Parameters	11
Multicast	13
Protocols	14
Advanced	16
Manageability	17
Bootstrap	18
Retrieving the Authentication Key	21
Retrieving the 3DES Encrypted OSPF Authentication Key	21
Retrieving the Encrypted IS-IS Authentication Key	21
Retrieving the 3DES Encrypted BGP Authentication Key	22
Retrieving the Encrypted BFD Authentication Key	22
Editing an IPFM Fabric	24
Deleting an IPFM Fabric	25
Interface Configuration for IPFM Fabrics	26
Creating an Interface for IPFM Fabrics	26
Creating a Sub-Interface for IPFM Fabrics	29
PTP Configuration for IPFM Fabrics	31
Editing an Interface for IPFM Fabrics	31
Creating an IPFM Fabric Group	34
Benefits of Creating an IPFM Fabric Group	34
Guidelines and Limitations for Creating an IPFM Fabric Group	34
Create an IPFM Multi-Fabric Group	34
Adding IPFM Fabrics to the IPFM Fabric Group	35
Associating Hosts from Two Fabrics in a Host Group	35
Associating Flows to a Host Group	36
Viewing Side-by-Side Associations of IPFM Member Fabrics	36
Adding a Policy for Configuring an IPFM Fabric	38
Editing a Policy for an IPFM Fabric	39
Copyright	40

New and Changed Information

The following table provides an overview of the significant changes up to this current release. The table does not provide an exhaustive list of all changes or of the new features up to this release.

Release Version	Feature	Description
NDFC 12.2.2 release	2022-7 redundant media fabrics (red/blue) visualization	<p>With this feature, you can group 2022-7 redundant fabrics into a fabric group. This feature allows you to associate endpoints and multicast groups from both fabrics for a side-by-side topology view for individual flows.</p> <p>For more information, see Creating an IPFM Fabric Group.</p>
NDFC 12.2.2 release	Support for Cisco Catalyst 9000 series switches in IPFM Classic fabrics	<p>This feature lets you add Cisco Catalyst 9000 series switches to an IPFM Classic fabric. For more information, see Creating a Classic IPFM Fabric and the "Add Switches for LAN Operational Mode" section in Add Switches for LAN Operational Mode.</p>
NDFC 12.2.2 release	Support for IPFM fabrics in One Manage Dashboard	<p>With this release, NDFC supports IPFM fabrics for One Manage Dashboard. For more information, see the section "Viewing the Details" in Managing and Monitoring Multi-Cluster Fabrics Using One Manage.</p>

IPFM Fabrics

This section describes how to configure fabrics related to IP Fabric for Media (IPFM). The IPFM fabric feature is a part of LAN fabric. To enable the IPFM fabrics feature, you must have enabled the following features on the LAN Fabric in **Admin > System Settings > Feature Management**:

- IP Fabric for Media - Starts microservices corresponding to media controller.
- PTP Monitoring - Enable if required. However, PTP monitoring is used for IPFM though it is independent of IPFM.
- Performance Monitoring - Provides for base interface monitoring.

Beginning from Nexus Dashboard Fabric Controller version 12.0.1a, the IPFM fabric templates are of the following types:

- Classic IPFM - Use the Classic IPFM fabric template to bring in switches from an existing IPFM fabric. This template works like an external or Classic LAN Fabric where only basic switch configuration such as management VRF/interface, and hostname can be imported. You can set the attribute of the fabric to Read/Write or Read-only. For the Read-only fabric, enable the monitor mode. This template supports Classic IPFM and Generic_Multicast technologies.
- IPFM - Use the IPFM template to create a new IPFM fabric with Easy Fabric management and build an underlay network for the IPFM fabric.



IPFM Easy Fabric supports only Greenfield deployments.

We recommend that you deploy a 3-node cluster if you've more than 35 switches in your NDFC deployment. If you are using a Virtual Nexus Dashboard Cluster before you begin, ensure that the Persistent IP address and required settings are enabled for telemetry. Refer to [Cisco Nexus Dashboard Fabric Controller Deployment Guide](#).

For a fresh installation, you can choose either an IPFM Easy Fabric or an IPFM Classic Fabric, based on your requirement.

Creating IPFM Fabrics

Perform the following procedures to create IPFM fabrics:

1. Create the required IPFM Fabric using the appropriate templates and set the parameters. For more information about Classic IPFM template, see [Creating a Classic IPFM Fabric](#). For more information about IPFM template, see [Creating an IPFM Fabric](#).
2. Add switches to the fabric and set the switch roles (only spine and leaf are supported for IPFM Fabric). For more information about adding switches, discovering existing and new switches, assigning roles, and deploying switches, see [Add Switches for LAN Operational Mode](#).



- IPFM Easy Fabric supports only Greenfield deployments.
- If you add a switch to an IPFM fabric that is configured in a non-monitor mode (Active NBM), the ongoing flows on that switch will be interrupted because NDFC deletes the existing switch DME configuration and then adds the intended DME configuration as part of the process of adding a switch. This is expected behavior.

3. In the **Fabric Overview** window of your fabric, choose **Recalculate Config** from the **Actions** drop-down list. Then, in the **Deploy Configuration** window, click the **Deploy** button to deploy the configuration. For more information, see the section "Fabric Overview" in [About Fabric Overview for LAN Operational Mode Setups](#).

IPFM Easy Fabric: The underlay config of each switch is calculated based on the fabric settings, switch role, and switch platform.

IPFM Classic Fabric: If you choose to have Nexus Dashboard Fabric Controller manage the interfaces for your fabric, perform `host_port_resync/Interface Config Resync` to complete the migration process for the switch. For more information about host port resync, see the section "Out-of-Band Switch Interface Configurations" in [About Fabric Overview for LAN Operational Mode Setups](#).

If you want to edit or delete an IPFM fabric, see [Editing an IPFM Fabric](#) or [Deleting an IPFM Fabric](#) respectively.

4. Edit the existing interfaces as required. For more information, see [Editing an Interface for IPFM Fabrics](#). For more information about any new logical interfaces, see [Creating an Interface for IPFM Fabrics](#).

Creating a Classic IPFM Fabric

This document describes how to create a Classic IPFM fabric using the **Classic IPFM** fabric template.

1. Navigate to the **Manage > Fabrics** page.
2. Click **Actions > Create Fabric**.

The **Create Fabric** page appears.



When you log in for the first time, the **Manage > Fabrics** page displays no entries for IPFM fabrics. After you create a fabric, the IPFM fabric displays on the **Manage > Fabrics** page.

3. Enter a unique name for the fabric in the **Fabric Name** field, then click **Choose Fabric**.

A list of all available fabric templates are listed.

4. From the available list of fabric templates, choose the **Classic IPFM** template, then click **Select**.
5. Enter the necessary field values to create a fabric.

The tabs and their fields in the screen are explained in the following sections. The fabric-level parameters are included in these tabs.


- o [General Parameters](#)
- o [Advanced](#)
- o [Bootstrap](#)

6. When you have completed the necessary configurations, click **Save**.
 - o Click on the fabric to display a summary in the slide-in pane.
 - o Click on the Launch icon to display the Fabric Overview.

General Parameters

The **General Parameters** tab is displayed by default. The fields in this tab are described in the following table.

Field	Description
Fabric Technology	Specifies IPFM fabric types. Options are: <ul style="list-style-type: none">• Classic IPFM• Generic _Multicast
Fabric Monitor Mode	Check this check box to monitor the fabric only. No configuration is deployed. From Cisco NDFC release 12.1.2e, you can configure and monitor both Non-Blocking Multicast (NBM) active and passive VRFs. In NBM passive mode, NDFC monitors the IPFM fabric without configuring it, except if you configure VRF mode as NBM passive.


Field	Description
Enable NBM Passive Mode	<p>Check this check box to enable NBM mode in IPFM passive mode for the default VRF.</p> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;">  <p>You cannot edit the existing fabric to change the NBM mode. You must delete and recreate the IPFM fabric to change the NBM mode from active to passive or vice versa.</p> </div>
Enable Performance Monitoring	<p>Check this check box to enable performance monitoring.</p> <p>Ensure that you do not clear interface counters from the command-line interface of the switches. Clearing interface counters can cause the Performance Monitor to display incorrect data for traffic utilization. If you must clear the counters and the switch has both clear counters and clear counters snmp commands (not all switches have the clear counters snmp command), ensure that you run both the main and the Simple Network Management Protocol (SNMP) commands simultaneously. For example, you must run the clear counters interface ethernet slot/port command followed by the clear counters interface ethernet slot/port snmp command. This can lead to a one time spike.</p>

What's next: Complete the configurations in another tab if necessary, or click **Save** when you have completed the necessary configurations for this fabric.

Advanced


The fields in the **Advanced** tab are described in the following table. All of the fields are automatically populated based on Cisco-recommended best practice configurations, but you can update the fields if needed.

Field	Description
Power Supply Mode	<p>Choose the appropriate power supply mode. Options are:</p> <ul style="list-style-type: none"> • ps-redundant • combined • insync-redundant
Enable AAA IP Authorization	<p>Enables authentication, authorization, and accounting (AAA) IP authorization, when IP Authorization is enabled in the remote authentication server. This is required to support Nexus Dashboard Fabric Controller in scenarios where customers have strict control of which IP addresses can have access to the switches.</p>
Enable NDFC as Trap Host	<p>Select this check box to enable Nexus Dashboard Fabric Controller as a Simple Network Management Protocol (SNMP) trap destination. Typically, for a native high-availability Nexus Dashboard Fabric Controller deployment, the eth1 VIP IP address is configured as an SNMP trap destination on the switches. By default, this check box is enabled.</p>

Field	Description
Enable CDP for Bootstrapped Switch	Enables Cisco Discovery Protocol on the management (mgmt0) interface for a bootstrapped switch. By default, for bootstrapped switches, Cisco Discovery Protocol is disabled on the mgmt0 interface.
Inbound Mgmt	<p>For external and Classic LAN fabrics, this knob enables Nexus Dashboard Fabric Controller to import and manage switches with inband connectivity (reachable over switch loopback, routed, or switch virtual interface (SVI) interfaces), in addition to management of switches with out-of-band connectivity (that is, reachable over the switch mgmt0 interface).</p> <p>The only requirement is that for inband-managed switches, there should be IP reachability from Nexus Dashboard Fabric Controller to the switches through the Nexus Dashboard data interface. After enabling inband management, during discovery, provide the IPs of all the switches to be imported using inband management and set the maximum hops to 0.</p> <p>Nexus Dashboard Fabric Controller has a precheck that validates that the inband-managed switch IPs are reachable over the Nexus Dashboard data interface. Once the precheck has passed, Nexus Dashboard Fabric Controller then discovers and learns about the interface on that switch that has the specified discovery IP in addition to the VRF that the interface belongs to.</p> <p>As part of the process of switch import/discovery, this information is captured in the baseline intent that is populated on the Nexus Dashboard Fabric Controller. For more information, see the section "Inband Management in External Fabrics and LAN Classic Fabrics" in Configuring Inband Management, Inband POAP Management, and Secure POAP.</p> <div style="border-left: 1px solid #ccc; padding-left: 10px; margin-top: 10px;">  <p>Bootstrap or PowerOn Auto Provisioning (POAP) is only supported for switches that are reachable over out-of-band connectivity, that is, over the switch mgmt0. The various POAP services on the Nexus Dashboard Fabric Controller are typically bound to the eth1 or out-of-band interface. In scenarios, where the Nexus Dashboard Fabric Controller eth0/eth1 interfaces reside in the same IP subnet, the POAP services are bound to both interfaces.</p> </div>
Fabric Freeform	You can apply configurations globally across all the devices discovered in the external fabric using this freeform field.
AAA Freeform Config	Specifies the AAA freeform configurations.

Bootstrap

The fields in the **Bootstrap** tab are described in the following table. Most of the fields are automatically populated based on Cisco-recommended best practice configurations, but you can update the fields if needed.

Field	Description
Enable Bootstrap (For NX-OX Switches Only)	<p>Select this check box to enable the bootstrap feature. Bootstrap allows easy day-0 import and bring-up of new devices into an existing fabric. Bootstrap leverages the NX-OS POAP functionality.</p> <p>To add more switches and for POAP capability, chose the check box for Enable Bootstrap and Enable Local DHCP Server.</p> <p>After you enable bootstrap, you can enable the DHCP server for automatic IP address assignment using one of the following methods:</p> <ul style="list-style-type: none"> • External DHCP Server: Enter information about the external DHCP server in the Switch Mgmt Default Gateway and Switch Mgmt IP Subnet Prefix fields. • Local DHCP Server: Enable the Local DHCP Server check box and enter details for the remaining mandatory fields.
Enable Local DHCP Server	<p>Select this check box to initiate enabling of automatic IP address assignment through the local DHCP server. When you select this check box, the DHCP Scope Start Address and DHCP Scope End Address fields become editable.</p> <p>If you do not select this check box, Nexus Dashboard Fabric Controller uses the remote or external DHCP server for automatic IP address assignment.</p>
DHCP Version	<p>Select DHCPv4 or DHCPv6 from this drop-down list. When you select DHCPv4, the Switch Mgmt IPv6 Subnet Prefix field is disabled. If you select DHCPv6, the Switch Mgmt IP Subnet Prefix is disabled.</p> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;">  <p>Cisco Nexus Dashboard Fabric Controller IPv6 POAP is not supported with Cisco Nexus 7000 Series Switches. Cisco Nexus 9000 and 3000 Series Switches support IPv6-POAP only when switches are either Layer-2 adjacent (eth1 or out-of-band subnet must be a /64) or they are Layer 3 adjacent residing in some IPv6 /64 subnet. Subnet prefixes except /64 are not supported.</p> </div>
DHCP Scope Start Address and DHCP Scope End Address	<p>Specifies the first and last IP addresses of the IP address range to be used for the switch out of band POAP.</p>
Switch Mgmt Default Gateway	<p>Specifies the default gateway for the management VRF on the switch.</p>

Field	Description
Switch Mgmt IP Subnet Prefix	<p>Specifies the prefix for the mgmt0 interface on the switch. The prefix should be between 8 and 30.</p> <p><i>DHCP scope and management default gateway IP address specification:</i> If you specify the management default gateway IP address 10.0.1.1 and subnet mask 24, ensure that the DHCP scope is within the specified subnet, between 10.0.1.2 and 10.0.1.254.</p> <p>Cisco Nexus Dashboard Fabric Controller IPv6 POAP is not supported with Cisco Nexus 7000 Series Switches. Cisco Nexus 9000 and 3000 Series Switches support IPv6 POAP only when switches are either L2 adjacent (eth1 or out-of-band subnet must be a /64) or they are L3 adjacent residing in some IPv6 /64 subnet. Subnet prefixes except /64 are not supported.</p>
DHCP scope and management default gateway IP address specification	<p>If you specify the management default gateway IP address 10.0.1.1 and subnet mask 24, ensure that the DHCP scope is within the specified subnet, between 10.0.1.2 and 10.0.1.254.</p>
Switch Mgmt IPv6 Subnet Prefix	<p>Specifies the IPv6 prefix for the mgmt0 interface on the switch. The prefix should be between 64 and 126. This field is editable if you enable IPv6 for DHCP.</p>
Enable AAA Config	<p>Check this check box to include AAA configurations from the Manageability tab as part of the device startup configuration post bootstrap.</p>
Bootstrap Freeform Config	<p>(Optional) Enter additional commands as needed. For example, if you require some additional configurations to be pushed to the device and be available post device bootstrap, they can be captured in this field, to save the desired intent. After the devices boot up, they will contain the configuration defined in the Bootstrap Freeform Config field.</p> <p>Copy and paste the running configuration to a freeform config field with the correct indentation, as seen in the running configuration on the NX-OS switches. The freeform configuration must match the running configuration. For more information, see Enabling Freeform Configurations on Fabric Switches.</p>
DHCPv4/DHCPv6 Multi Subnet Scope	<p>Specifies the field to enter one subnet scope per line. This field is editable after you check the Enable Local DHCP Server check box. The format of the scope should be defined as:</p> <p>DHCP Scope Start Address, DHCP Scope End Address, Switch Management Default Gateway, Switch Management Subnet Prefix</p> <p>For example: 10.6.0.2, 10.6.0.9, 10.6.0.1, 24</p>

What's next: Add switches to the fabric and set the switch roles (only spine and leaf roles are supported for IPFM fabrics).

Beginning with NDFC 12.2.2, you can add Cisco Catalyst 9000 series switches to an IPFM Classic

fabric only. Though Cisco Catalyst 9000 series switches are shown as part of an IPFM fabric, Cisco Catalyst 9000 series switches do not include any IPFM functionality. For more information on adding switches, discovering existing and new switches, assigning roles, and deploying switches, see the section "Adding Switches to a Fabric" in [Add Switches for LAN Operational Mode](#).

Then, edit or create an interface as appropriate. For more information, see [Interface Configuration for IPFM Fabrics](#).

Supported Templates for Configuring Interfaces

Template	Description
GigabitEthernet	Interface template for creating a GigabitEthernet interface on an IOS XE switch.
GigabitEthernet_freeform	Interface template for a GigabitEthernet interface using a freeform config on a Cisco Catalyst 9000 series switch.
GigabitEthernet_mgmt	Interface template for a GigabitEthernet interface using a freeform config on a Cisco Catalyst 9000 series switch.
ios_xe_int_access_host	Interface template for creating an access switch port on a Cisco Catalyst 9000 series switch.
ios_xe_int_monitor_ethernet	Interface template for putting an ethernet interface into monitor mode.
ios_xe_int_routed_host	Interface template for creating a Layer 3 routed port on a Cisco Catalyst 9000 series switch.
ios_xe_int_stackwise_dual_active	Interface template for a stackwise virtual dual-active detection.
ios_xe_int_stackwise_link	Interface template for a stackwise virtual link.
ios_xe_int_trunk_host	Interface template for creating a trunk switchport on a Cisco Catalyst 9000 series switch.

Supported Interface Types for Creating Interfaces

You can create the following types of interfaces on a Cisco Catalyst 9000 series switch in a Classic IPFM fabric:

- **Port Channel**
- **Virtual Port Channel (VPC)**
- **Straight-through (ST) FEX**
- **Active-Active (AA) FEX**
- **Loopback**
- **Tunnel**
- **Ethernet**
- **Switch Virtual Interface (SVI)**

For more information on creating interfaces, see [Add Interfaces for LAN Operational Mode](#).

Creating an IPFM Fabric

This document describes the procedure to create an IPFM fabric from the IPFM fabric template.

1. Choose **Fabric Controller**.
2. Click **Manage > Fabrics**.

The **Manage > Fabrics** page appears.



When you log in for the first time, the **Manage > Fabrics** table has no entries. After you create a fabric, the fabric appears on the **Manage > Fabrics** page.

3. Click **Actions > Create Fabric**.

The **Create Fabric** page appears.

4. Enter a unique name for the fabric in the **Fabric Name** field, and click **Choose Fabric**.
5. Click **Close**.

The **Select Type of Fabric** dialog box appears.

6. From the available list of fabric templates, choose **IPFM**, then click **Select**.
7. In the **Pick Fabric** field, click on the fabric type if you want to select a different fabric type.

The **Select Fabric Template** window appears.

8. Enter the necessary field values to create a fabric.

The tabs and their fields in the screen are explained in the following sections. The fabric level parameters are included in these tabs.

- o [General Parameters](#)
- o [Multicast](#)
- o [Protocols](#)
- o [Advanced](#)
- o [Manageability](#)
- o [Bootstrap](#)

General Parameters

The **General Parameters** tab is displayed by default. The fields in this tab are described in the following table.

Field	Description
Fabric Interface Numbering	Supports only numbered, point-to-point, networks.
Fabric Subnet IP Mast	Specifies the subnet mask for the fabric interface IP addresses.

Field	Description
Fabric Protocol Routing	<p>Specifies the Cisco Interior Gateway Routing Protocol (IGP) used in the fabric. Options are:</p> <ul style="list-style-type: none"> • OSPF - Open Shortest Path First (OSPF) is an IGP designed for IP networks that supports IP subnetting and tagging of externally derived routing information. OSPF also allows packet authentication and uses IP multicast when sending and receiving packets. • IS-IS - Integrated Intermediate System-to-Intermediate Systems (IS-IS) is a link-state IGP for propagating information required to build a complete network connectivity map on each participating device. The map is then used to calculate the shortest path to destinations.
Fabric Loopback Id Routing	<p>Specifies that the loopback interface ID is populated as 0 since loopback0 is usually used for fabric-underlay IGP peering purposes. The valid value ranges are from 0 to 1023.</p>
Manual Fabric IP Address Allocation	<p>Check this check box to disable dynamic allocation of the fabric IP address.</p> <p>By default, Nexus Dashboard Fabric Controller allocates the underlay IP address resources (for loopbacks, fabric interfaces, and so on) dynamically from the defined pools. If you check the check box, the allocation scheme switches to static, and some of the dynamic IP address range fields are disabled. For static allocation, the underlay IP address resources must be populated into the Resource Manager (RM) using REST APIs.</p> <p>For more information, see the <i>Cisco REST API Reference Guide, Release 12.0.1a</i>. The REST APIs must be invoked after the switches are added to the fabric and before you use the Save & Deploy option.</p> <p>Changing from static to dynamic allocation keeps the current IP resource usage intact. Only future IP address allocation requests are taken from dynamic pools.</p>
Fabric Loopback IP Range Routing	<p>Specifies the range of loopback IP addresses for protocol peering.</p>
Fabric Subnet IP Range	<p>Specifies the IP addresses for the underlay point-to-point routing traffic between the interfaces.</p>
Enable Performance Monitoring	<p>Check this check box to monitor the performance of the fabric.</p> <p>Ensure that you do not clear interface counters from the command-line interface of the switches. Clearing interface counters can cause the Performance Monitor to display incorrect data for traffic utilization. If you must clear the counters and the switch has both clear counters and clear counters snmp commands (not all switches have the clear counters snmp command), ensure that you run both the main and the SNMP commands simultaneously. For example, you must run the clear counters interface ethernet slot/port command followed by the clear counters interface ethernet slot/port snmp command. This can lead to a one time spike.</p>

What's next: Complete the configurations in another tab if necessary, or click **Save** when you have

completed the necessary configurations for this fabric.

Multicast

From Cisco NDFC Release 12.1.2e, you can configure and monitor both Non-Blocking Multicast (NBM) active and passive VRFs. In NBM passive mode, NDFC is involved only in the monitoring of the IPFM fabric and not configuration except in setting up VRF mode as NBM passive.



You cannot deploy a VRF on a switch in read-only memory (ROM).

The fields in this tab are described in the following table.

Field	Description
Enable NBM Passive Mode	<p>Check this check box to enable NBM mode to Protocol Independent Multicast (PIM) passive mode. If you enable NBM passive mode, the switch ignores all rendezvous point (RP) and Multicast Source Discovery Protocol (MSDP) configurations. This is a mandatory check box.</p> <p>If you check this check box, the remaining fields and check boxes are disabled. For more information, see the Configuring an NBM VRF for Static Flow Provisioning section of the Cisco Nexus 9000 Series NX-OS IP Fabric for Media Solution Guide, Release 10.2(x).</p> <p>You must add the IP PIM Passive command when you add the VRF that is in passive mode to the interface.</p> <p>Perform the steps below to add the IP PIM Passive command:</p> <ol style="list-style-type: none">1. On the Fabric Overview page, choose Links > Links.2. Select the appropriate fabric with the policy int_ipfm_intra_fabric_num_link and choose Actions > Edit. <p>The Link Management - Edit Link page appears.</p> <ol style="list-style-type: none">3. On the General Parameters tab, enter the default VRF for the Interface VRF name.4. Click the Advanced tab, enter IP PIM Passive on the Source Interface Freeform Config and Destination Interface Freeform Config fields.5. Click Save. <div data-bbox="564 1765 632 1827"></div> <p>You cannot edit the existing fabric to change the NBM mode. You must delete and recreate the fabric to change the NBM mode from active to passive mode or vice versa.</p>
Enable ASM	<p>Check this check box to enable groups with receiver sending (*,G) joins.</p> <p>If you check this check box, the Advanced Services Module (ASM)-related section is enabled.</p>


Field	Description
NBM Flow ASM Groups for default VRF (w/wo SPT-Threshold Infinity)	<p>Specifies ASM-related information.</p> <ol style="list-style-type: none"> 1. Click the expander arrow next to the title of this section to collapse or expand the section. 2. Use the Actions drop-down list to add, edit, or delete the ASM groups in the table. <ul style="list-style-type: none"> Add - Choose this option to open the Add Item dialog box. 3. In the Add Item dialog box, perform the following steps: <ol style="list-style-type: none"> a. Enter the appropriate values in the fields and check or clear the check box as follows: <ul style="list-style-type: none"> ▪ Group_Address - Specifies the IP address for the NBM flow ASM group subnet. ▪ Prefix - Specifies the subnet mask length for the ASM group subnet. <p>The valid value for the subnet mask length ranges from 4 to 32. For example, 239.1.1.0/25 is the group address with the prefix.</p> b. Enable_SPT_Threshold- Check this check box to enable the shortest path tree (SPT) threshold infinity. 4. Click Save to add the configured NBM flow ASM groups to the table or click Cancel to discard the values. 5. Edit - Check the check box next to the group address and then choose this option to open the Edit Item window. 6. Open the edit item and edit the ASM group parameters. 7. Click Save to update the values in the table or click Cancel to discard the values. 8. Check the Delete check box next to the group address and then choose this option to delete the ASM group from the table. <p>The table displays the values for the group address, prefix, and the enabled-SPT threshold.</p>

What's next: Complete the configurations in another tab if necessary, or click **Save** when you have completed the necessary configurations for this fabric.

Protocols

The fields in this tab are.

Field	Description
Fabric Routing Protocol Tag	Specifies the routing process tag for the fabric.

Field	Description
OSPF Area Id	<p>Specifies the OSPF area ID, if OSPF is used as the IGP within the fabric.</p> <div style="border-left: 1px solid #ccc; padding-left: 10px; margin-top: 10px;">  <p>The OSPF or IS-IS authentication fields are enabled based on your selection in the Fabric Routing Protocol field in the General Parameters tab.</p> </div>
Enable OSPF Authentication	<p>Check the check box to enable OSPF authentication. Clear the check box to disable it.</p> <p>If you enable this field, the OSPF Authentication Key ID and the OSPF Authentication Key fields get enabled.</p>
OSPF Authentication Key ID	<p>Indicates that the key ID is populated.</p>
OSPF Authentication Key	<p>Ensure that the OSPF authentication key is the Triple Data Encryption Standard (3DES) key from the switch.</p> <div style="border-left: 1px solid #ccc; padding-left: 10px; margin-top: 10px;">  <p>Plain-text passwords are not supported.</p> </div> <p>Log in to the switch, retrieve the encrypted key, and enter it in this field.</p> <p>For more information, see the Retrieving the Authentication Key section for details.</p>
IS-IS Level	<p>Choose the IS-IS level.</p> <p>Available options are:</p> <ul style="list-style-type: none"> • level-1 • level-2
Enable IS-IS Network Point-to-Point	<p>Enables network point-to-point on numbered fabric interfaces.</p>
Enable IS-IS Authentication	<p>Check the check box to enable IS-IS authentication. Clear the check box to disable it.</p> <p>If you enable this field, the IS-IS Key ID field is auto populated.</p>
IS-IS Authentication Keychain Name	<p>Specifies the name of the IS-IS key chain.</p>
IS-IS Authentication Key ID	<p>Specifies the IS-IS authentication key ID.</p>
IS-IS Authentication Key	<p>Specifies the encrypted IS-IS authentication key.</p> <p>Log in to the switch, retrieve the encrypted key, and enter it in this field.</p> <p>A plain-text password gets converted to a Cisco type 7 password.</p> <p>For more information, see the Retrieving the Encrypted IS-IS Authentication Key section for details.</p>


Field	Description
Enable PIM Hello Authentication	Enables the PIM hello authentication.
PIM Hello Authentication Key	Specifies the PIM hello authentication key.

What's next: Complete the configurations in another tab if necessary, or click **Save** when you have completed the necessary configurations for this fabric.

Advanced

The fields in this tab are.

Field	Description
Intra Fabric Interface MTU	<p>Specifies the maximum transmission unit (MTU) for the intra fabric interface.</p> <p>This value must be an even number.</p> <p>The valid values range from 576 to 9216. This is a mandatory field.</p>
Layer 2 Host Interface MTU	<p>Specifies the MTU for the Layer 2 host interface.</p> <p>This value must be an even number.</p> <p>The valid values range from 1500 to 9216.</p>
Power Supply Mode	<p>Choose the appropriate power supply mode that will be the default mode for the fabric from the drop-down list.</p> <p>This is a mandatory field.</p>
Enable CDP for Bootstrapped Switch	<p>Check this check box to enable the Cisco Discovery Protocol on the management (mgmt0) interface for a bootstrapped switch. By default, for bootstrapped switches, Cisco Discovery Protocol is disabled on the mgmt0 interface.</p>
Enable AAA IP Authorization	<p>Enables AAA IP authorization, when IP Authorization is enabled in the remote authentication server.</p> <p>This is required to support Nexus Dashboard Fabric Controller in scenarios where customers have strict control of which IP addresses can have access to the switches.</p>
Enable NDFC as Trap Host	<p>Check this check box to enable Nexus Dashboard Fabric Controller as an SNMP trap destination. Typically, for a native HA Nexus Dashboard Fabric Controller deployment, the eth1 VIP IP address will be configured as SNMP trap destination on the switches. By default, this check box is enabled.</p>

Field	Description
Enable Precision Time Protocol (PTP)	<p>Enables PTP across a fabric.</p> <p>When you select this check box, PTP is enabled globally and on intra fabric interfaces. Additionally, the PTP Source Loopback Id and PTP Domain Id fields are editable. For more information, see PTP Configuration for IPFM Fabrics.</p>
PTP Source Loopback Id	<p>Specifies the loopback interface ID loopback that is used as the source IP address for all PTP packets.</p> <p>The valid values range from 0 to 1023.</p> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;">  <p>The PTP loopback ID cannot be the same as the RP loopback ID. Otherwise, an error appears. The PTP loopback ID can be the same as the Border Gateway Protocol (BGP) loopback or user-defined loopback that is created from the Nexus Dashboard Fabric Controller. The PTP loopback will be created automatically if it is not created.</p> </div>
PTP Domain Id	Specifies the PTP domain ID on a single network. The valid values range from 0 to 127.
PTP Profile	<p>Select a PTP profile from the list.</p> <p>The PTP profile is enabled only on Inter-Switch Links (ISL) links. The supported PTP profiles are IEEE-1588v2, SMPTE-2059-2, and AES67-2015.</p>
Leaf Freeform Config	Adds CLIs that should be added to switches that have the Leaf , Border , and Border Gateway roles.
Spine Freeform Config	Adds CLIs that should be added to switches with a Spine , Border Spine , Border Gateway Spine , and Super Spine roles.
Intra-fabric Links Additional Config	Adds CLIs that should be added to the intra fabric links.

What's next: Complete the configurations in another tab if necessary, or click **Save** when you have completed the necessary configurations for this fabric.

Manageability

The fields in this tab are.


Field	Description
DNS Server IPs	Specifies the comma-separated list of IP addresses (IPv4 or IPv6) of the Domain Name System (DNS) servers.
DNS Server VRFs	Specifies one VRF for all DNS servers or a comma-separated list of VRFs, one per DNS server.

Field	Description
NTP Server IPs	Specifies a comma-separated list of IP addresses (IPv4 or IPv6) of the NTP server.
NTP Server VRFs	Specifies one VRF for all NTP servers or a comma-separated list of VRFs, one per NTP server.
Syslog Server IPs	Specifies a comma-separated list of IP addresses (IPv4 or IPv6) IP address of the syslog servers, if used.
Syslog Server Severity	<p>Specifies a comma-separated list of syslog severity values, one per syslog server.</p> <p>The minimum value is 0 and the maximum value is 7.</p> <p>To specify a higher severity, enter a higher number.</p>
Syslog Server VRFs	Specifies one VRF for all syslog servers or a comma-separated list of VRFs, one per syslog server.
AAA Freeform Config	<p>Specifies the AAA freeform Configurations.</p> <p>If AAA configurations are specified in the fabric settings, a switch_freeform Policy Template Instance (PTI) with a source as UNDERLAY_AAA and description as AAAConfigurations is created.</p>

What's next: Complete the configurations in another tab if necessary, or click **Save** when you have completed the necessary configurations for this fabric.

Bootstrap

The fields in this tab are.

Field	Description
Enable Bootstrap	<p>Check this check box to enable the bootstrap feature.</p> <p>Bootstrap functionality allows easy day-0 import and bring-up of new devices into an existing fabric.</p> <p>Bootstrap functionality leverages the NX-OS PowerOn Auto Provisioning (POAP) functionality.</p> <p>After you enable bootstrap functionality, you can enable the DHCP server for automatic IP address assignment for POAP using one of the following methods:</p> <ul style="list-style-type: none"> • External DHCP Server <p>Enter information about the external DHCP server in the Switch Mgmt Default Gateway and Switch Mgmt IP Subnet Prefix fields.</p> • Local DHCP Server <p>Enable the Local DHCP Server check box and enter details for the remaining mandatory fields.</p>
Enable Local DHCP Server	<p>Check this check box to initiate enabling of automatic IP address assignment through the local DHCP server.</p> <p>When you check this check box, the DHCP Scope Start Address and DHCP Scope End Address fields become editable.</p> <p>If you do not check this check box, Nexus Dashboard Fabric Controller uses the remote or external DHCP server for automatic IP address assignment.</p>
DHCP Version	<p>Select DHCPv4 or DHCPv6 from this drop-down list.</p> <p>When you select DHCPv4, the Switch Mgmt IPv6 Subnet Prefix field is disabled.</p> <p>If you select DHCPv6, the Switch Mgmt IP Subnet Prefix field is disabled.</p> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;">  <p>Cisco Nexus 9000 and 3000 Series Switches support IPv6 POAP only when switches are either Layer 2 adjacent (eth1 or out-of-band subnet must be a /64) or they are Layer 3 adjacent residing in some IPv6 /64 subnet. Subnet prefixes except /64 are not supported.</p> </div>
DHCP Scope Start Address	Specifies the first IP address in the IP address range to be used for the switch out-of-band POAP.
DHCP Scope End Address-	Specifies the last IP address in the IP address range to be used for the switch out-of-band POAP.
Switch Mgmt Default Gateway	Specifies the default gateway for the management VRF on the switch.

Field	Description
Switch Mgmt IP Subnet Prefix	<p>Specifies the prefix for the mgmt0 interface on the switch. The prefix should be between 8 and 30.</p> <p><i>DHCP scope and management default gateway IP address specification</i></p> <p>If you specify the management default gateway IP address 10.0.1.1 and subnet mask 24, ensure that the DHCP scope is within the specified subnet, between 10.0.1.2 and 10.0.1.254.</p>
Switch Mgmt IPv6 Subnet Prefix	<p>Specifies the IPv6 prefix for the mgmt0 interface on the switch. The prefix should be between 64 and 126. This field is editable if you enable IPv6 for DHCP.</p>
Enable AAA Config	<p>Check this check box to include an AAA configurations from the Manageability tab as part of the device startup configuration post bootstrap.</p>
Bootstrap Freeform Config	<p>(Optional) Enter additional commands as needed. For example, if you require some additional configurations to be pushed to the device and be available post device bootstrap, they can be captured in this field, to save the desired intent. After the devices boot up, they will contain the configuration defined in the Bootstrap Freeform Config field.</p> <p>Copy-paste the running configuration to a freeform config field with the correct indentation, as seen in the running configuration on the NX-OS switches. The freeform config must match the running configuration.</p> <p>For more information on resolving freeform configuration errors in switches, see the Enabling Freeform Configurations on Fabric Switches.</p>
DHCPv4/DHCPv6 Multi Subnet Scope	<p>Specifies the field to enter one subnet scope per line. This field is editable after you check the Enable Local DHCP Server check box.</p> <p>The format of the scope should be defined as:</p>
DHCP Scope Start Address, DHCP Scope End Address, DHCP Management Gateway, DHCP Management Prefix	<p>For example, 10.6.0.2,10.6.0.9,10.6.0.1,24</p>

What's next: Complete the configurations in another tab if necessary, or click **Save** when you have completed the necessary configurations for this fabric.

The IPFM fabric is created and displayed in the table in the **Lan Fabrics** window.

Click on the fabric to display a summary in the slide-in pane.

After creating the IPFM fabric, perform **Recalculate Config** and deploy the configuration to the switches.

For more information, see the section "Fabric Overview" in the [About Fabric Overview for LAN](#)

Edit or create an interface as appropriate. For more information, see [Interface Configuration for IPFM Fabrics](#).

Retrieving the Authentication Key

Retrieving the 3DES Encrypted OSPF Authentication Key

1. SSH into the switch.
2. On an unused switch interface, enable the following:

```
config terminal
feature ospf
interface Ethernet1/1
no switchport
ip ospf message-digest-key 127 md5 ospfAuth
```

In the example, **ospfAuth** is the unencrypted password.



This Step 2 is needed when you want to configure a new key.

3. Enter the **show run interface Ethernet1/1** command to retrieve the password.

```
Switch # show run interface Ethernet1/1
interface Ethernet1/1
no switchport
ip ospf message-digest key 127 md5 3 sd8478f4fsw4f4w34sd8478fsdfw
no shutdown
```

The sequence of characters after **md5 3** is the encrypted password.

4. Update the encrypted password into the **OSPF Authentication Key** field.

Retrieving the Encrypted IS-IS Authentication Key

To get the key, you must have access to the switch.

1. SSH into the switch.
2. Create a temporary keychain.

```
config terminal
key chain isis
key 127
key-string isisAuth
```

In the example, **isisAuth** is the plaintext password. This will get converted to a Cisco type 7 password after the CLI is accepted.

3. Enter the **show run | section "key chain"** command to retrieve the password.

```
key chain isis
  key 127
    key-string 7 071b245f5a
```

The sequence of characters after key-string 7 is the encrypted password. Save it.

4. Update the encrypted password into the ISIS Authentication Key field.
5. Remove any unwanted configuration made in Step 2.

Retrieving the 3DES Encrypted BGP Authentication Key

1. SSH into the switch and enable BGP configuration for a non-existent neighbor.



Non-existent neighbor configuration is a temporary BGP neighbor configuration for retrieving the password.

```
router bgp
  neighbor 10.2.0.2 remote-as 65000
  password bgpAuth
```

In the example, **bgpAuth** is the unencrypted password.

2. Enter the show run bgp command to retrieve the password. A sample output:

```
neighbor 10.2.0.2
  remote-as 65000
  password 3 sd8478fswerdfw3434fsw4f4w34sdsd8478fswerdfw3434fsw4f4w3
```

The sequence of characters after password 3 is the encrypted password.

3. Update the encrypted password into the **BGP Authentication Key** field.
4. Remove the BGP neighbor configuration.

Retrieving the Encrypted BFD Authentication Key

1. SSH into the switch.
2. On an unused switch interface, enable the following:

```
switch# config terminal
switch(config)# int e1/1
```



```
switch(config-if)# bfd authentication keyed-SHA1 key-id 100 key cisco123
```

In the example, **cisco123** is the unencrypted password and the key ID is **100**.



This Step 2 is needed when you want to configure a new key.

3. Enter the **show running-config interface** command to retrieve the key.

```
switch# show running-config interface Ethernet1/1

interface Ethernet1/1
description connected-to- switch-Ethernet1/1
no switchport
mtu 9216
bfd authentication Keyed-SHA1 key-id 100 hex-key 636973636F313233
no ip redirects
ip address 10.4.0.6/30
no ipv6 redirects
ip ospf network point-to-point
ip router ospf 100 area 0.0.0.0
no shutdown
```

The BFD key ID is **100** and the encrypted key is **636973636F313233**.

4. Update the key ID and key in the **BFD Authentication Key ID** and **BFD Authentication Key** fields.

Editing an IPFM Fabric

1. On the **LAN Fabrics** page, choose the IPFM fabric that you want to edit.
2. From the **Actions** drop-down list, choose **Edit Fabric**.
3. Click **Save**.



After the fabric settings are changed, perform a **Recalculate and Deploy** operation to deploy the configuration to the switches.

Deleting an IPFM Fabric

In the **LAN Fabrics** window, select the fabric that you want to delete. From the **Actions** drop-down list, choose **Delete Fabric**. When a message appears asking whether you want to delete the fabric, click **Confirm**.

Interface Configuration for IPFM Fabrics

The Cisco Nexus Dashboard Fabric Controller Web UI allows you to configure IPFM external links for each switch in your fabric. The external device can connect to the network through this interface by marking it an IPFM external link.



A user with the network operator role in Nexus Dashboard Fabric Controller cannot save, deploy, undeploy, or edit interface configurations.

Beginning with NDFC Release 12.0.1a, interfaces in IPFM fabrics are managed by the Nexus Dashboard Fabric Controller Interface Manager. The default interface policy for IPFM is **int_ipfm_l3_port**.

The following issues are seen when an NBM VRF is deleted from NDFC after an interface is enabled with an NBM external link and unicast BW setting. When this occurs, the affected interfaces continue to show the external link and ucast BW as set.

Perform the following steps to cleanup:

1. Select all the switches that have these interface issues under the **Policies** tab using **Add Policy**.
2. Choose the **host_port_resync** template and click **Save**.
3. Select **Recalculate & Deploy**.

This syncs switch configuration with NDFC.

4. Select **Resync All**.

The following are non-fabric ethernet interface policy templates for IPFM fabrics:

- **int_ipfm_l3_port**
- **int_ipfm_access_host**
- **int_ipfm_trunk_host**

The following are the port-channel interface policy templates for IPFM fabrics:

- **int_ipfm_port_channel_access_host**
- **int_ipfm_port_channel_trunk_host**
- **int_ipfm_port_channel_access_member**
- **int_ipfm_port_channel_trunk_member**

The Switch Virtual Interface (SVI) template for IPFM fabrics is **int_ipfm_vlan**.

Creating an Interface for IPFM Fabrics

This section describes the procedure to create a new interface for an IPFM fabric based on the template that you have selected from the available IPFM fabric interface templates.



IPFM fabrics do not support V6 underlay.

1. Navigate to the **Fabric Overview** window for your fabric and click the **Interfaces** tab.
2. Choose **Create new interface** from the **Actions** drop-down list.

The **Create new interface** window appears.

3. Select either Port Channel, Loopback, or SVI as the interface type for IPFM.
4. Select a device from the drop-down list. The switches (spine and leaf) that are a part of the fabric are displayed in the drop-down list.
5. Enter the Port Channel ID, Loopback ID, or VLAN ID, based on your choice of the interface type.
6. Click the **No Policy Selected** link to select a policy that is specific to IPFM. In the **Select Attached Policy Template** dialog box, choose the required interface policy template and click **Save**.
7. Enter the appropriate values in the **Policy Options** area. Note that the appropriate Policy Options fields are displayed based on the policy.

- o **Type - Port Channel**

Port Channel Member Interfaces- Specify a list of member interfaces, for example, e1/5,eth1/7-9.

Port Channel Mode- Select one of the following channel mode options: on, active, or passive.

Enable BPDU Guard- Select one of the following options for spanning-tree Bridge Protocol Data Unit (BPDU) guard:

- true - enables bdpuguard
- false - disables bdpuguard
- no - returns to default settings

Enable Port Type Fast- Select this check box to enable spanning-tree edge port behavior.

MTU- Specify the maximum transmission unit (MTU) for the Port Channel or the MTU for the interface. The valid value range for MTU for the interface is from 576 to 9216.

SPEED - Specify the port channel speed or the interface speed.

Access Vlan- Specify the VLAN for the access port.

Trunk Allowed Vlans- Enter one of the following values:

- none
- all
- vlan ranges, for example, 1-200, 500-2000, 3000)

Enable PTP- Select this check box to enable Precision Time Protocol (PTP) for the host interface for the IPFM fabric. For more information about PTP, see [PTP Configuration for IPFM Fabrics](#).

PTP Profile- Select a PTP profile from the drop-down list: **IEEE-1588v2**, **SMPTE-2059-2**, or **AES67-2015**.

PTP Vlan- Specifies the PTP vlan for member interface when PTP is enabled.

Port Channel Description- Enter description for the port channel.

Freeform Config- Enter additional CLI for the port channel if required.

Enable Port Channel- Select this check box to enable the port channel.

- **Type - Loopback**

Interface VRF- Enter the name of the interface VRF. Enter **default** for default VRF.

Loopback IP- Enter an IPv4 address for the loopback interface.

Loopback IPv6 address- Enter an IPv6 address for the loopback interface if the VRF is non-default. For default VRF add the IPv6 address in the freeform.

Route-Map TAG- Enter the Route-Map tag associated with the interface IP.

Interface Description- Enter description for the interface. The maximum size limit is 254 characters.

Freeform Config- Enter additional CLI for the loopback interface if required.

Enable Interface- Select this check box to enable the interface.

- **Type - SVI**

Interface VRF- Enter the name of the interface VRF. Enter **default** for default VRF.

VLAN Interface IP- Enter IP address of the VLAN interface.

IP Netmask Length- Specify the IP netmask length used with the IP address. The valid value range is from 1 to 31.

Routing TAG- Enter the routing tag associated with the interface IP.

MTU- Specify the maximum transmission unit (MTU) for the Port Channel or the MTU for the interface. The valid value range for MTU for the interface is from 576 to 9216.

Disable IP redirects- Select this check box to disable both IPv4 and IPv6 redirects on the interface.

IPFM External-Link- Select this check box to specify that the interface is connected to an external router.

Interface Description- Enter description for the interface. The maximum size limit is 254 characters.

Freeform Config- Enter additional CLI for the VLAN interface if required.

Interface Admin State- Select this check box to enable admin state for the interface.

Based on your requirements, click one of the following buttons:

- Save - Click **Save** to save the configuration changes.
- Preview - Click **Preview** to open the **Preview interfaces configuration** window and view the details.

- Deploy - Click **Deploy** to configure the interfaces.

What to do next:

If you want to edit the interface, see [Editing an Interface for IPFM Fabrics](#).

If your interface is ready, add a policy for configuring the IPFM fabric. For more information, see [Adding a Policy for Configuring an IPFM Fabric](#)

Creating a Sub-Interface for IPFM Fabrics

This section describes the procedure to create a new sub-interface for an IPFM fabric.

1. Navigate to the **Fabric Overview** window for your fabric and click the **Interfaces** tab.
2. Select a leaf or a spine switch from the list of devices and choose **Actions > Create Subinterface**.

The **Create Subinterface** window appears.

3. Click the **No Policy Selected** link to select a policy that is specific to IPFM.
4. In the **Select Attached Policy Template** dialog box, choose the **int_ipfm_subif** policy template and click **Select**.
5. Enter the appropriate values in the **Policy Options** area. Note that the appropriate Policy Options fields are displayed based on the policy.

- **Type - Port Channel**

Port Channel Member Interfaces- Specify a list of member interfaces, for example, e1/5,eth1/7-9.

Port Channel Mode- Select one of the following channel mode options: on, active, or passive.

Enable BPDU Guard- Select one of the following options for spanning-tree Bridge Protocol Data Unit (BPDU) guard:

- true - enables bdpuguard
- false - disables bdpuguard
- no - returns to default settings

Enable Port Type Fast- Select this check box to enable spanning-tree edge port behavior.

MTU- Specify the maximum transmission unit (MTU) for the Port Channel or the MTU for the interface. The valid value range for MTU for the interface is from 576 to 9216.

SPEED - Specify the port channel speed or the interface speed.

Access Vlan- Specify the VLAN for the access port.

Trunk Allowed Vlans- Enter one of the following values:

- none
- all

- vlan ranges, for example, 1-200, 500-2000, 3000)

Enable PTP- Select this check box to enable Precision Time Protocol (PTP) for the host interface for the IPFM fabric. For more information about PTP, see [PTP Configuration for IPFM Fabrics](#).

PTP Profile- Select a PTP profile from the drop-down list: **IEEE-1588v2**, **SMPTE-2059-2**, or **AES67-2015**.

PTP Vlan- Specifies the PTP vlan for member interface when PTP is enabled.

Port Channel Description- Enter description for the port channel.

Freeform Config- Enter additional CLI for the port channel if required.

Enable Port Channel- Select this check box to enable the port channel.

- **Type - Loopback**

Interface VRF- Enter the name of the interface VRF. Enter **default** for default VRF.

Loopback IP- Enter an IPv4 address for the loopback interface.

Loopback IPv6 address- Enter an IPv6 address for the loopback interface if the VRF is non-default. For default VRF add the IPv6 address in the freeform.

Route-Map TAG- Enter the Route-Map tag associated with the interface IP.

Interface Description- Enter description for the interface. The maximum size limit is 254 characters.

Freeform Config- Enter additional CLI for the loopback interface if required.

Enable Interface- Select this check box to enable the interface.

- **Type - SVI**

Interface VRF- Enter the name of the interface VRF. Enter **default** for default VRF.

VLAN Interface IP- Enter IP address of the VLAN interface.

IP Netmask Length- Specify the IP netmask length used with the IP address. The valid value range is from 1 to 31.

Routing TAG- Enter the routing tag associated with the interface IP.

MTU- Specify the maximum transmission unit (MTU) for the Port Channel or the MTU for the interface. The valid value range for MTU for the interface is from 576 to 9216.

Disable IP redirects- Select this check box to disable both IPv4 and IPv6 redirects on the interface.

IPFM External-Link- Select this check box to specify that the interface is connected to an external router.

Interface Description- Enter description for the interface. The maximum size limit is 254 characters.

Freeform Config- Enter additional CLI for the VLAN interface if required.

Interface Admin State- Select this check box to enable admin state for the interface.

Based on your requirements, click one of the following buttons:

- Save - Click **Save** to save the configuration changes.
- Preview - Click **Preview** to open the **Preview interfaces configuration** window and view the details.
- Deploy - Click **Deploy** to configure the interfaces.

What to do next:

If you want to edit the interface, see [Editing an Interface for IPFM Fabrics](#).

If your interface is ready, add a policy for configuring the IPFM fabric. For more information, see [Adding a Policy for Configuring an IPFM Fabric](#)

PTP Configuration for IPFM Fabrics

The Precision Time Protocol (PTP) is a protocol used to synchronize clocks throughout a computer network. When creating an interface, if you enable the **Enable PTP** check box, PTP is enabled across the fabric and on all the intrafabric interfaces. The supported PTP profiles for IPFM fabrics are **IEEE-1588v2**, **SMPTE-2059-2**, and **AES67-2015**.

A few things to note about the per-interface PTP profile for nonfabric ethernet interfaces are as follows:

- You must enable PTP and select PTP profile on each nonfabric ethernet interface.
- PTP profile can be different from the fabric level one.
- PTP must be enabled in the fabric settings before PTP can be configured on a nonfabric ethernet interface.

If PTP is disabled from the fabric settings, the PTP config will be removed from all the interfaces, that is, both the fabric and nonfabric interfaces.

For more information about PTP monitoring for IPFM fabrics, see the section "PTP (Monitoring)" in [About Switch Overview for LAN Operational Mode Setups](#).

Editing an Interface for IPFM Fabrics

This section describes the procedure to edit an existing IPFM fabric interface template. You can either change a template or edit the values for any of the editable parameters in the **Policy Options** area.

1. Navigate to the **Manage > Fabrics** page.
2. Double-click on a fabric to open **Fabric Overview**.
3. Click on the **Interfaces** tab.
4. Choose an **easyFabric_IPFM** fabric with an **int_ipfm_13_port** policy and an **Up** operational status.
5. Choose **Edit** from the **Actions** drop-down list.


The **Edit interface(s)** page appears.

6. To change a policy in the **Policy** field, click the policy link and select a policy that is specific to an IPFM fabric.
7. In the **Select Attached Policy Template** dialog box, choose the required interface policy template and click **Save**.
8. Edit the required values in the **Policy Options** area.

Note that the appropriate **Policy Options** fields are displayed based on the policy. For more information about the parameters, see [Creating an Interface for IPFM Fabrics](#).

The following fields are specific to the **int_ipfm_l3_port** policy and the subinterface **int_ipfm_subif** policy:

Field	Description
IPFM Unicast Bandwidth Percentage	Specifies the dedicated percentage of bandwidth for unicast traffic. The remaining percentage is automatically reserved for multicast traffic. If you leave this field blank, NDFC IPMF uses a global unicast bandwidth reservation.
IPFM Bandwidth Capacity Percentage	Specifies the dedicated percentage of bandwidth for this interface. If you leave this field blank, NDFC IPMF uses a global unicast bandwidth reservation.
IPFM External-Link	Check this check box to specify that the interface is connected to an external router.
Border Router	Check this check box to enable the border router configuration on the interface. The interface is a boundary of a Protocol Independent Multicast (PIM) domain.
Interface Description	Enter a description for the interface. The maximum size limit is 254 characters.
Enable Host Source Group Proxy	Check this check box to enable an IGMP host proxy on the interface. The IGMP host proxy connects a PIM-enabled multicast network to a domain different from the PIM domain. For more information on configuring an IGMP source group proxy, see the Cisco Nexus 9000 Series NX-OX Multicast Routing Configuration Guide .

Field	Description
IGMP Host Source Group Proxy	<p>You can filter by proxy groups, or you can add a new proxy group.</p> <p>From the Actions drop-down list, choose Add, Edit, Delete, or Insert Above for adding IGMP proxy groups.</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;">  <p>When policy groups are associated with an IGMP source group proxy, NDFC creates a route map for the corresponding interface. Use the switch-level Deploy option to provision the route map on a switch.</p> </div> <p>Choose a group from the drop-down list to filter by IGMP proxy groups.</p>

9. Ensure that you check the **Enable Interface** check box.

10. Choose from one of the following options depending on your configuration:

- o Click **Save** to save the configuration changes.
- o Click **Preview** to open the **Preview interfaces configuration** window and view the details.
- o Click **Deploy** to configure the interfaces.

What to do next:

Add a policy for configuring the IPFM fabric. For more information, see [Adding a Policy for Configuring an IPFM Fabric](#).

Creating an IPFM Fabric Group

A Society of Motion Picture and Television Engineers (SMPTE 2022-7)-enabled transmitter duplicates an input stream and sends the input stream using two different paths to a destination receiver, which is also SMPTE 2022-7 enabled. The receiver combines the streams from both paths and reconstructs the original stream. If a packet is lost on path 1, the packet is taken from path 2. This involves two active IPFM fabrics named as red and blue fabrics. You can choose to name the IPFM fabrics other than red and blue fabrics.

You can group 2022-7 redundant fabrics into a fabric group. This feature allows you to associate endpoints and multicast groups from both fabrics for a side-by-side topology view for individual flows.



There is no change to the topology view compared to prior releases if there is no associated redundant flow or the IPFM fabrics are not grouped.

Beginning with NDFC release 12.2.2, NDFC extended the Fabric Group fabric to include IPFM fabrics. The Fabric Group fabric is a container for a multi-fabric group. In prior releases, NDFC supported multiple fabrics, but the fabrics were not considered as one entity.

Benefits of Creating an IPFM Fabric Group

- Provides high availability with two switches in an IPFM fabric group
- Provides a single entity for managing IPFM fabrics
- Supports a side-by-side view of the red and blue fabrics for managing and monitoring both fabrics
- Supports the SMPTE 2022-7 standard for sending digital video over an IP network
- Provides endpoint group and multicast group associations

Guidelines and Limitations for Creating an IPFM Fabric Group

- You cannot have more than two IPFM fabrics in a single fabric group. If you try to add a third IPFM fabric to a fabric group, you receive an error message.
- IPFM fabrics must be of the same type.
- If you create one IPFM Classic fabric, you must create a second IPFM Classic fabric for the same fabric group. The same restriction applies for an IPFM Easy fabric.

Create an IPFM Multi-Fabric Group

1. Choose **Fabric Controller**.
2. Click **Manage > Fabrics**.

The **Manage > Fabrics** page appears with a list of the current fabrics and fabric groups.

3. Click **Actions > Create Fabric**.

The **Create Fabric** page appears.

4. Enter a unique name for the fabric in the **Fabric Name** field and click **Choose Fabric**.
5. Click **Close**.

The **Select Type of Fabric** dialog box appears.

6. From the available list of fabric templates, choose **Fabric Group** and then click **Select**.

The **Create Fabric** page displays.

7. Click **Save**.

Adding IPFM Fabrics to the IPFM Fabric Group

1. Choose another IPFM fabric group into which to add the IPFM fabrics on the **Manage > Fabrics** page.

The **Fabric Overview** page displays.

2. Click on the **Child Fabrics** tab to add the child fabric to the fabric group.
3. Click **Actions > Move Fabric into Fabric Group**.

The **Select Child Fabrics** page displays.

4. Choose the child fabric that you want added to the IPFM fabric group and click **Select**.

Associating Hosts from Two Fabrics in a Host Group

By adding two hosts to the host group, the hosts are associated together and are linked, so you can view the hosts in a side-by-side visual representation.

To associate hosts to a host group, perform the following steps:

1. Click the **Hosts** tab and click **Actions > Add Host Group**.

The **Add Host Group** page displays.

To link hosts from two IPFM fabrics, you need to specify the VRF associated with the fabric where the host resides, as well as enter the IP address of the host for each fabric. Optionally, you can add an alias to each host for better recognition.

Field	Description
VRF	Specify the VRF associated with the fabric for where each host resides.
IP Address	Enter the IP address for the red fabric.
Host Alias	(Optional) Enter the host alias for the red fabric.
IP Address	Enter the IP address for the blue fabric.
Host Alias	(Optional) Enter the host alias for the ble fabric.

2. Click **Save**.

NDFC adds the hosts to the host group view where you can view the hosts in a side-by-side visual representation.

Associating Flows to a Host Group

To associate flows to a host group, perform the following steps:

1. Click the **Flows** tab on the **Fabric Overview** page.
2. On the **Flows > Flow Groups** page, click **Actions > Add Flow Group**.

To link flows from two IPFM fabrics in a flow group, you need to specify the VRF associated with the fabric where the flow resides, as well as enter the multicast destination IP address of the flows in each fabric. Optionally, you can add a flow alias and a description for better recognition. NDFC adds the flows to the host group view in a side-by-side representation.

Field	Description
VRF	Specify the VRF associated with the fabric for where the flow resides.
IP Address	Enter the IP address for the red fabric.
Flow Alias	(Optional) Enter the flow alias for the red fabric.
Description	(Optional) Enter the description for the red fabric.
IP Address	Enter the IP address for the blue fabric.
Flow Alias	(Optional) Enter the flow alias for the ble fabric.
Description	(Optional) Enter the description for the blue fabric.

3. Click **Save** and close the **Fabric Overview** page.

NDFC adds the flows to the flow group view where you can view a side-by-side representation of both flows.

Viewing Side-by-Side Associations of IPFM Member Fabrics

You can view side-by-side associations of IPFM member fabrics on the **Flows > Flow Status** page.

1. Navigate to the **Manage > Fabrics** page, and click on a child member of an IPFM fabric group.

The **Fabric Overview** page displays.

2. Click on the **Flows > Flow Status** tab, and under the **Flow Link State** column, click on the **active** link.

NDFC displays a side-by-side representation of the two fabrics and the grouped flows.

3. To access the same page from the topology view, click the **Overview > Topology** page.
4. Right-click on the fabric group and click **Detailed View**.

The **Fabric Overview** page displays.

5. Right-click on a member of the fabric group.

The **Fabric Overview** page displays.

Adding a Policy for Configuring an IPFM Fabric

For configuration that is not uniform for all leafs or spines, additional templates are provided to help you complete the configuration of an IPFM fabric.

For example, if you enable NAT on a 9300 switch, you can create an **ipfm_tcam_nat_9300** policy to configure the required NAT TCAM for the switch.

Use the **ipfm_telemetry** policy for telemetry and **ipfm_vrf** policy for VRF config (routing, pim, asm).

1. Navigate to the **Fabric Overview** window for your fabric and click the **Policies** tab.
2. Choose **Add Policy** from the **Actions** drop-down list.

The **Create Policy** window appears.

3. Click the right arrow in the **Select Switches** field.

The **Select Switches** dialog box appears.

4. Select one or more switches and click **Select**.
5. In the **Create Policy** window, click **Choose Template**.
6. In the **Select a Policy Template** dialog box, select the required template for IPFM fabric, for example, **ipfm_tcam_nat_9300**. Click **Select**.
7. Enter a priority for the template. The valid value ranges from 1 to 1000.
8. Enter the values in the TCAM-related fields. Make sure that you enter the TCAM size in increments of 256 and click **Save**.

Editing a Policy for an IPFM Fabric

You can edit a policy for any switch in the IPFM fabric.

1. Navigate to the **Fabric Overview** window for your fabric and click the **Policies** tab.
2. Search for the policy template.
3. Select the policy and choose **Edit Policy** from the **Actions** drop-down list.

The **Edit Policy** window appears.

4. Make the required changes and click **Save**.

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