



## Advanced FabricPath Features

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This chapter describes how to configure advanced FabricPath features, such as using the Intermediate System-to-Intermediate System (IS-IS) protocol on Cisco NX-OS devices.

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### Finding Feature Information

Your software release might not support all the features documented in this module. For the latest caveats and feature information, see the Bug Search Tool at <https://tools.cisco.com/bugsearch/> and the release notes for your software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the "New and Changed Information" chapter or the Feature History table in this chapter.

### Information About FabricPath Advanced Features



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**Note** You must have an F Series module in your chassis to run FabricPath.

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### Information About Advanced FabricPath Layer 2 IS-IS Configurations



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**Note** See “Configuring FabricPath Switching,” for information on the default Layer 2 IS-IS behavior with FabricPath.

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We recommend that you run the FabricPath network using the default Layer 2 IS-IS configurations.

Optionally, you can also change many of the IS-IS settings. You change these settings as follows:

- Globally on the entire device and on each device in the FabricPath network
- On specified FabricPath interfaces within the FabricPath network

If you do change any of the FabricPath Layer 2 IS-IS settings, ensure that you make the same changes for those global parameters on every device in the FabricPath network and for those interface parameters on every applicable FabricPath interface in the network.

Layer 2 IS-IS is based on Layer 3 IS-IS with enhancements to run on Layer 2. The commands for Layer 2 IS-IS and Layer 3 IS-IS are not the same. Layer 2 IS-IS is the control plane in FabricPath and a single protocol controls all unicast and multicast traffic. From a forwarding standpoint, FabricPath Layer 2 IS-IS forwards traffic for unicast, unknown unicast, broadcast, and multicast frames. Using Layer 2 IS-IS, the system maintains loop-free paths throughout the FabricPath network (see “Configuring FabricPath Switching,” for information on default FabricPath Layer 2 IS-IS behavior and “Configuring FabricPath Forwarding,” for information on FabricPath forwarding.)

You can use these advanced FabricPath Layer 2 IS-IS configurations to fine-tune the operation of the FabricPath network.

Beginning with Cisco Nexus Release 6.2(2), the following features for advanced FabricPath Layer 2 IS-IS are available:

- Overload bit—You can configure the overload bit for FabricPath IS-IS. You achieve consistent routing behavior in conditions where a node reboots or gets overloaded.
- VLAN pruning—The switch will only attract data traffic for the VLANs that have active Classic Ethernet (CE) ports on an F1 Series module, F2 Series module, or switch virtual interfaces (SVIs) for those VLANs.
- Route-map and mesh group—You can use a route-map to control the routes that are redistributed into the FabricPath IS-IS topology. The mesh group reduces flooding for parallel links and mesh topologies. For the parallel links, the blocked mode stops flooding after an initial exchange. For the mesh topologies, the group mode groups the links to stop the link-state packet (LSP) flooding back to the same link in the group where the LSP is received.




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**Note**

Prior to Cisco NX-OS Release 6.2(8), FabricPath Layer 2 IS-IS advertises the anycast switch ID even with the overload bit set, which may incur longer convergence times for selected nodes. Beginning with Cisco NX-OS Release 6.2(8), the system does not advertise the configured anycast switch ID while the overload bit is set, which improves convergence times.

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## High Availability

The FabricPath topologies retain their configuration through ISSU.

See the *Cisco Nexus 7000 Series NX-OS High Availability and Redundancy Guide* for more information on high availability.

## Virtual Device Contexts

You must install the FabricPath feature set before you enable FabricPath on the switch. See the *Configuring Feature Set for FabricPath* guide for information on installing the FabricPath feature set.

Because of the multiple FEs on the F Series modules, the following port pairs must be in the same VDC:

- Ports 1 and 2
- Ports 3 and 4
- Ports 5 and 6
- Ports 7 and 8
- Ports 9 and 10
- Ports 11 and 12
- Ports 13 and 14
- Ports 15 and 16
- Ports 17 and 18
- Ports 19 and 20
- Ports 21 and 22
- Ports 23 and 24
- Ports 25 and 26
- Ports 27 and 28
- Ports 29 and 30
- Ports 31 and 32

See the *Virtual Device Context Configuration Guide, Cisco DCNM for LAN*, for more information about VDCs.

## Multiple Topologies

In the FabricPath paradigm, a network can be divided into multiple topologies. Within each topology, one or more trees can be computed for forwarding of broadcast and multicast traffic. A tree is a subset of links of an acyclic graph, and a graph is a collection of Layer 2 multipath (L2MP) nodes and links that forms an acyclic topology. The L2MP IS-IS component supports multiple topologies that run in the same process, which reduces CPU usage when compared with using one process per VLAN.

You can have multiple pods (small Layer 2 blocks) in the same Layer 2 domain, but all the pods must have the same set of VLANs configured. Without FabricPath, each pod could have some VLANs used as local VLANs and the traffic on those VLANs are localized to the switches in the pod. To restrict local VLAN traffic to the pod, different FabricPath topologies are configured for the local VLANs. Each pod must be configured with a unique set of local VLANs. The broadcast and multicast traffic on the local VLANs might go through the spine switches and other pods based on the multicast tree.

The L2MP network might have multiple topologies. Each topology has multiple graphs that are associated with them. However, not all graphs can be used until a trigger is received from the Dynamic Resource Allocation Protocol (DRAP). On receipt of the trigger, the graphs are activated. When the topology changes, to maintain loop-free properties of these graphs, triggers are sent to set the hardware states of the ports. The L2MP IS-IS component requests redistribution of the multicast routes from other protocols. All routes that are populated to the multicast Layer 2 routing information base (M2RIB) are redistributed by L2MP IS-IS in its group membership (GM) link state protocols (LSP).

## Licensing Requirements for FabricPath

FabricPath requires an Enhanced Layer 2 Package license. For a complete explanation of the Cisco NX-OS licensing scheme and how to obtain and apply licenses, see the *Cisco NX-OS Licensing Guide*.

## Prerequisites for FabricPath

FabricPath forwarding has the following prerequisites:

- You should have a working knowledge of Classical Ethernet Layer 2 functionality.
- You must install the FabricPath feature set in the default and nondefault VDC before you enable FabricPath on the switch. See the Configuring Feature Set for FabricPath for complete information on installing and enabling the FabricPath feature set.
- The FabricPath feature set operation might cause the standby supervisor to reload if it is in an unstable state, such as following a service failure or powering up.
- You are logged onto the device.
- Ensure that you have installed the Enhanced Layer 2 license.
- You are in the correct virtual device context (VDC). A VDC is a logical representation of a set of system resources. You can use the **switchto vdc** command with a VDC number.
- You are working on the F Series module.

## Guidelines and Limitations for FabricPath Advanced Features

FabricPath has the following configuration guidelines and limitations:

- FabricPath interfaces carry only FabricPath-encapsulated traffic.
- You enable FabricPath on each device before you can view or access the commands. Enter the **feature-set fabricpath** command to enable FabricPath on each device. See *Configuring Feature-Set for FabricPath* for complete information on installing and enabling the FabricPath feature set.
- The FabricPath feature set operation might cause the standby supervisor to reload if it is in an unstable state, such as following a service failure or powering up.
- STP does not run inside a FabricPath network.

- The F Series modules do not support multiple SPAN destination ports or virtual SPAN. If a port on an F Series module is in a VDC and that VDC has multiple SPAN destination ports, that SPAN session is not brought up.
- The following guidelines apply to private VLAN configuration when you are running FabricPath:
  - All VLANs in a private VLAN must be in the same VLAN mode; either CE or FabricPath. If you attempt to put different types of VLANs into a private VLAN, these VLANs will not be active in the private VLAN. The system remembers the configurations, and if you change the VLAN mode later, that VLAN becomes active in the specified private VLAN.
  - FabricPath ports cannot be put into a private VLAN.
- The system does not support hierarchical static MAC addresses. That is, you cannot configure static FabricPath ODAs or OSAs; you can only configure Classical Ethernet static MAC addresses.
- On the F Series modules, user-configured static MAC addresses are programmed on all forwarding engines (FEs) that have ports in that VLAN.

## Setting Advanced FabricPath Layer 2 IS-IS Parameters



**Note** You must have FabricPath enabled on the F Series module before you can see any of these commands.

Although the Layer 2 IS-IS protocol works automatically once you enable FabricPath, you can optionally configure parameters. Some FabricPath Layer 2 IS-IS parameters you configure globally and some you configure per interface.

### Setting Advanced FabricPath Layer 2 IS-IS Parameters Globally (Optional)

Although the FabricPath Layer 2 IS-IS protocol works automatically once you enable FabricPath, you can optionally configure the global parameters.

#### Before you begin

Ensure that you are working on an F Series module.

Ensure that you have installed the Enhanced Layer 2 license.

Ensure that you have enabled the FabricPath feature.

#### Procedure

	Command or Action	Purpose
<b>Step 1</b>	switch# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 2</b>	switch(config)# <b>fabricpath domain default</b>	Enters global FabricPath Layer 2 IS-IS configuration mode.

	Command or Action	Purpose
<b>Step 3</b>	(Optional) switch(config-fabricpath-isis)# <b>authentication-check</b>	Configures an authentication check on a PDU reception. To turn the authentication check off, enter the <b>no</b> form of this command.  The default is ON.
<b>Step 4</b>	(Optional) switch(config-fabricpath-isis)# <b>authentication key-chain</b> <i>auth-key-chain-name</i>	Configures the authentication key chain. To clear this parameter, enter the <b>no</b> form of this command.  An example of key chain creation is as follows:  <pre>key chain trees   key 0     key-string cisco01     accept-lifetime 07:00:00 Sep 20 2011 infinite     send-lifetime 07:00:00 Sep 20 2011 infinite</pre> See the <i>Cisco Nexus 7000 Series NX-OS Security Configuration Guide</i> , for information about key chains.
<b>Step 5</b>	(Optional) switch(config-fabricpath-isis)# <b>authentication type {cleartext   md5}</b>	Configures the authentication type. To clear this parameter, enter the <b>no</b> form of this command.
<b>Step 6</b>	(Optional) switch(config-fabricpath-isis)# <b>log-adjacency-changes</b>	Sets the device to send a log message when the state of a FabricPath Layer 2 IS-IS neighbor changes. To stop the log messages, enter the <b>no</b> form of this command. The default is off.
<b>Step 7</b>	(Optional) switch(config-fabricpath-isis)# <b>lsp-gen-interval</b> <i>lsp-max-wait</i> [ <i>lsp-initial-wait</i> <i>lsp-second-wait</i> ]	Configures the LSP generation interval. To return to the default values, enter the <b>no</b> form of this command. The optional arguments are as follows: <ul style="list-style-type: none"> <li>• <i>lsp-max-wait</i>—The initial wait between the trigger and LSP generation. The range is from 50 to 12000 milliseconds, and the default value is 8000 milliseconds.</li> <li>• <i>lsp-initial-wait</i>—The initial wait between the trigger and LSP generation. The range is from 50 to 12000 milliseconds, and the default value is 50 milliseconds.</li> <li>• <i>lsp-second-wait</i>—The second wait used for LSP throttle during backoff. The range is from 50 to 12000 milliseconds, and the default value is 50 milliseconds.</li> </ul>

	Command or Action	Purpose
<b>Step 8</b>	(Optional) switch(config-fabricpath-isis)# <b>lsp-mtu</b> <i>mtu</i>	Sets the LSP MTU. To return to the default values, enter the <b>no</b> form of this command. The range is from 128 to 4352, and the default value is 1492.
<b>Step 9</b>	(Optional) switch(config-fabricpath-isis)# <b>max-lsp-lifetime</b> <i>secs</i>	Sets the maximum LSP lifetime in seconds. To return to the default values, enter the <b>no</b> form of this command. The range is from 128 to 4352, and the default value is 1492.
<b>Step 10</b>	(Optional) switch(config-fabricpath-isis)# <b>maximum-paths</b> <i>max-paths</i>	Sets the maximum number of paths per destination. To return to the default values, enter the <b>no</b> form of this command. The range is from 1 to 16, and the default value is 16.
<b>Step 11</b>	(Optional) switch(config-fabricpath-isis)# <b>reference-bandwidth</b> { <i>ref-mbps</i> [Mbps]   <i>ref-gbps</i> [Gbps]}	Configures the reference bandwidth, which is used to assign the FabricPath Layer 2 IS-IS cost. The default value is 400000 Mbps. To return to the default values, enter the <b>no</b> form of this command. The optional arguments are as follows: <ul style="list-style-type: none"> <li>• <i>ref-mbps</i>—The range is from 1 to 400000, and the default value is 400000.</li> <li>• <i>ref-gbps</i>—The range is from 1 to 4000, and the default value is 400.</li> </ul>
<b>Step 12</b>	(Optional) switch(config-fabricpath-isis)# <b>spf-interval</b> <i>spf-max-wait</i> [ <i>spf-initial-wait</i> <i>spf-second-wait</i> ]	Configures the interval between LSA arrivals. To return to the default values, enter the <b>no</b> form of this command. The optional keywords are as follows: <ul style="list-style-type: none"> <li>• <i>spf-max-wait</i>—The maximum wait between the trigger and SPF computation. The range is from 50 to 120000 milliseconds, and the default value is 8000 milliseconds.</li> <li>• <i>spf-initial-wait</i>—The initial wait between the trigger and SPF computation. The range is from 50 to 120000 milliseconds, and the default value is 50 milliseconds.</li> <li>• <i>spf-second-wait</i>—The second wait used for SPF computation during backoff. The range is from 50 to 120000 milliseconds, and the default value is 50 milliseconds.</li> </ul>
<b>Step 13</b>	(Optional) switch(config-fabricpath-isis)# <b>graceful-restart</b> [ <b>t3 manual</b> <i>secs</i> ]	Enables graceful restart for the FabricPath Layer 2 IS-IS protocol. To disable graceful restart, enter the <b>no</b> form of this command. Use

	Command or Action	Purpose
		the <b>t3 manual</b> keyword to set the graceful-restart timer; the range is from 30 to 65535, and the default value is 60.  This feature is on by default.
<b>Step 14</b>	(Optional) switch(config-fabricpath-isis)# <b>redistribute filter route-map</b> <i>map-name</i>	Configures the route map to control the routes that are redistributed into the FabricPath IS-IS topology.  <b>Note</b> See <i>Cisco Nexus 7000 Series NX-OS Unicast Routing Configuration Guide</i> for more information on configuring route maps.
<b>Step 15</b>	(Optional) switch(config-fabricpath-isis)# <b>hostname dynamic</b>	Enables dynamic hostname for the FabricPath Layer 2 IS-IS protocol. To disable the dynamic hostname, enter the no form of this command.
<b>Step 16</b>	(Optional) switch(config-fabricpath-isis)# <b>root-priority</b> <i>value</i>	Configures the priority for which node becomes the Layer 2 IS-IS protocol root in the FabricPath network. The highest numerical value for the priority is likely to become the root. To return to the default values, enter the <b>no</b> form of this command. The range is from 1 to 255, and the default value is 64.
<b>Step 17</b>	(Optional) switch(config-fabricpath-isis)# [ <b>no</b> ] <b>set-overload-bit</b> { <b>always</b>   <b>on-startup</b> <i>seconds</i> }	Configures the overload bit for the system. To disable the overload bit enter the no form of this command. The optional keywords are as follows:  <ul style="list-style-type: none"> <li>• <b>always</b>—The overload bit is always on.</li> <li>• <b>on-startup</b>—The overload bit is set upon system startup and remains set for the specified number of seconds.</li> </ul>
<b>Step 18</b>	(Optional) switch(config-fabricpath-isis)# [ <b>no</b> ] <b>vlan-pruning enable</b>	Configures the VLAN pruning for the system. To disable VLAN pruning, enter the <b>no</b> form of this command.
<b>Step 19</b>	switch(config-fabricpath-isis)# <b>exit</b>	Exits global FabricPath Layer 2 IS-IS configuration mode.
<b>Step 20</b>	switch(config)# <b>exit</b>	Exits global configuration mode.
<b>Step 21</b>	(Optional) switch# <b>show running-config</b>	Displays the running configuration.
<b>Step 22</b>	(Optional) switch# <b>copy running-config startup-config</b>	Copies the running configuration to the startup configuration.

**What to do next**

See the *Cisco Nexus 7000 Series NX-OS Unicast Routing Configuration Guide* for more information about IS-IS commands.

**Setting Advanced FabricPath Layer 2 IS-IS Parameters per Interface (Optional)**

Although the FabricPath Layer 2 IS-IS protocol works automatically once you enable FabricPath, you can optionally configure the interface parameters.

**Before you begin**

Ensure that you are working on an F Series module.

Ensure that you have installed the Enhanced Layer 2 license.

Ensure that you have enabled the FabricPath feature.

**Procedure**

	Command or Action	Purpose
<b>Step 1</b>	switch# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 2</b>	<b>interface</b> { <b>ethernet</b> <i>mod/slot</i>   <b>port-channel</b> <i>channel-number</i> }	Enters interface configuration mode.
<b>Step 3</b>	(Optional) switch(config-if)# <b>fabricpath isis authentication-check</b>	Enables authentication checking on incoming FabricPath Layer 2 IS-IS hello PDUs. The default is ON. To disable authentication, enter the <b>no</b> form of the command.
<b>Step 4</b>	(Optional) switch(config-if)# <b>fabricpath isis authentication key-chain</b> <i>auth-key-chain-name</i>	<p>Assigns a password to authentication hello PDUs. To remove this password, enter the <b>no</b> form of the command.</p> <p><b>Note</b> A level specification is not required.</p> <p>An example of key chain creation is as follows:</p> <pre>key chain trees   key 0     key-string cisco01     accept-lifetime 07:00:00 Sep 20 2011 infinite     send-lifetime 07:00:00 Sep 20 2011 infinite</pre> <p>See the <i>Cisco Nexus 7000 Series NX-OS Security Configuration Guide</i>, for information about key chains.</p>
<b>Step 5</b>	(Optional) switch(config-if)# <b>fabricpath isis authentication-type</b> { <b>cleartext</b>   <b>md5</b> }	Specifies the authentication type for an interface for FabricPath Layer 2 IS-IS hello PDUs. To remove this type, enter the <b>no</b> form of the command.

	Command or Action	Purpose
		<b>Note</b> A level specification is not required.
<b>Step 6</b>	(Optional) switch(config-if)# <b>fabricpath isis csnp-interval</b> <i>seconds</i>	Specifies the interval between CSNP PDUs sent on the interface. To return to the default value, enter the <b>no</b> form of this command. The range is from 1 to 65535, and the default value is 10.
<b>Step 7</b>	(Optional) switch(config-if)# <b>fabricpath isis hello-interval</b> <i>seconds</i>	Sets the hello interval between PDUs sent on the interface. To return to the default value, enter the <b>no</b> form of this command. The range is from 1 to 65535, and the default value is 10.  <b>Note</b> A level specification is not required.
<b>Step 8</b>	(Optional) switch(config-if)# <b>fabricpath isis hello-multiplier</b> <i>multiplier</i>	Specifies the multiplier used to calculate the interval within which hello PDUs must be received or adjacency goes down. To return to the default value, enter the <b>no</b> form of this command. The range is from 3 to 1000. The default is 3.  <b>Note</b> A level specification is not required.
<b>Step 9</b>	(Optional) switch(config-if)# <b>fabricpath isis hello-padding</b>	Enables padding on the hello PDUs. The default is on. To disable authentication, enter the <b>no</b> form of the command.  If you enter the <b>always</b> keyword with the <b>no</b> form of this command, the padding is always on.
<b>Step 10</b>	(Optional) switch(config-if)# <b>fabricpath isis lsp-interval</b> <i>milliseconds</i>	Sets the interval in milliseconds between LSPs sent on this interface during flooding. To return to the default value, enter the <b>no</b> form of this command. The range is from 10 to 65535. The default is 33.
<b>Step 11</b>	(Optional) switch(config-if)# <b>fabricpath isis mesh-group</b> <i>group-number</i>	Specifies the mesh-group state and sets the mesh-group attribute on the interface.
<b>Step 12</b>	(Optional) switch(config-if)# <b>fabricpath isis metric</b> <i>metric</i>	Configures the FabricPath Layer 2 IS-IS metric for this interface. The range is from 0 to 16777215. To return to the default value, enter the <b>no</b> form of this command. The default values are as follows (the default interface for the F Series module is 10 GB):  <ul style="list-style-type: none"> <li>• 1 GB—400</li> <li>• 10 GB—40</li> </ul>

	Command or Action	Purpose
<b>Step 13</b>	(Optional) switch(config-if)# <b>fabricpath isis retransmit-interval</b> <i>seconds</i>	Sets the interval between initial LSP retransmissions. To return to the default value, enter the <b>no</b> form of this command. The range is from 1 to 65535. The default is 5.
<b>Step 14</b>	(Optional) switch(config-if)# <b>fabricpath isis retransmit-throttle-interval</b> <i>milliseconds</i>	Sets the interval between subsequent LSP retransmissions. To return to the default value, enter the <b>no</b> form of this command. The range is from 20 to 65535. The default is 66.
<b>Step 15</b>	switch(config-if)# <b>exit</b>	Exits interface configuration mode.
<b>Step 16</b>	switch(config)# <b>exit</b>	Exits global configuration mode.
<b>Step 17</b>	(Optional) switch# <b>show running-config</b>	Displays the running configuration.
<b>Step 18</b>	(Optional) switch# <b>copy running-config startup-config</b>	Copies the running configuration to the startup configuration.

**What to do next**

See the *Cisco Nexus 7000 Series NX-OS Unicast Routing Configuration Guide* for more information about IS-IS commands.

## Clearing Advanced FabricPath Layer 2 IS-IS Counters

You can clear the FabricPath Layer 2 IS-IS counters.

**Before you begin**

Ensure that you are working on an F Series module.

Ensure that you have installed the Enhanced Layer 2 license.

Ensure that you have enabled the FabricPath feature.

**Procedure**

	Command or Action	Purpose
<b>Step 1</b>	(Optional) switch# <b>clear fabricpath isis adjacency</b> [*   <b>system-id</b>   <b>interface</b> { <i>ethernet mod/slot</i>   <i>port-channel channel-number</i> }]	Clears the FabricPath Layer 2 IS-IS adjacency state.  <b>Note</b> If you enter the * variable, you affect forwarding which might interrupt traffic; this command tears down all adjacencies.
<b>Step 2</b>	(Optional) switch# <b>clear fabricpath isis statistics</b> *	Clears all FabricPath Layer 2 IS-IS protocol statistics.

	Command or Action	Purpose
<b>Step 3</b>	(Optional) switch# <b>clear fabricpath isis traffic</b> [*   <b>interface</b> { <i>ethernet mod/slot</i>   <b>port-channel</b> <i>channel-number</i> }]	Clears FabricPath Layer 2 IS-IS traffic information.

## Configuring Multiple Topologies

You can create a topology, map VLANs to the topology, and add an interface to the topology.

### Before you begin

Ensure that you are working on an F Series module.

Ensure that you have installed the Enhanced Layer 2 license.

Ensure that you have enabled the FabricPath feature.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	switch# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 2</b>	switch(config)# <b>fabricpath topology id</b>	Creates a new fabricpath topology and enters the FabricPath topology configuration mode.
<b>Step 3</b>	switch(config-fp-topology)# <b>member vlan range</b>	Configures the VLANs for the topology. The range of the VLAN ID is from 1 to 4094.
<b>Step 4</b>	switch(config-fp-topology)# <b>exit</b>	Exits FabricPath topology configuration mode.
<b>Step 5</b>	switch(config)# <b>interface port-channel number</b>	Configures a port-channel interface and enters interface configuration mode. You can configure any of the available interfaces.
<b>Step 6</b>	switch(config-if)# <b>fabricpath topology-member id</b>	Adds the interface to the topology.
<b>Step 7</b>	switch(config-if)# <b>exit</b>	Exits interface configuration mode.
<b>Step 8</b>	switch(config)# <b>exit</b>	Exits global configuration mode.
<b>Step 9</b>	(Optional) switch# <b>show fabricpath topology vlan</b>	Displays information about the VLANs in the Layer 2 topology.
<b>Step 10</b>	(Optional) switch# <b>show fabricpath isis topology summary</b>	Displays information about the IS-IS summary topology.
<b>Step 11</b>	(Optional) switch# <b>copy running-config startup-config</b>	Copies the running configuration to the startup configuration.

### Example

This example shows how to create a topology, map VLANs to the topology, and add an interface to the topology.

```
switch# configure terminal
switch(config)# fabricpath topology 1
switch(config-fp-topology)# member vlan 7-19
switch(config-fp-topology)# exit
switch(config)# interface port-channel 1
switch(config-if)# fabricpath topology-member 1
switch(config-if)# exit
switch(config)# show fabricpath topology vlan
switch(config)# show fabricpath isis topology summary
```

## Configuring FabricPath IS-IS Multiple Topologies

You can configure FabricPath IS-IS multiple topologies.

### Before you begin

Ensure that you are working on an F Series module.

Ensure that you have installed the Enhanced Layer 2 license.

Ensure that you have enabled the FabricPath feature.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	switch# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 2</b>	switch(config)# <b>fabricpath domain default</b>	Enters global FabricPath Layer 2 IS-IS configuration mode.
<b>Step 3</b>	switch(config-fabricpath-isis)# <b>topology id</b>	Enters the Layer 2 topology for IS-IS configuration mode.
<b>Step 4</b>	(Optional) switch(config-fabricpath-isis-topo)# <b>maximum-paths max-paths</b>	Configures the maximum paths per destination on the switch for the Layer 2 topology.
<b>Step 5</b>	(Optional) switch(config-fabricpath-isis-topo)# <b>reference-bandwidth {ref-mbps mbps   ref-gbps gbps}</b>	Configures the reference bandwidth for setting the interface metrics on the switch for the Layer 2 topology.
<b>Step 6</b>	(Optional) switch(config-fabricpath-isis-topo)# <b>root-priority priority</b>	Configures the priority with which nodes become root on the switch for the Layer 2 topology.
<b>Step 7</b>	switch(config-fabricpath-isis-topo)# <b>exit</b>	Exits FabricPath IS-IS topology configuration mode.

	Command or Action	Purpose
<b>Step 8</b>	(Optional) switch# <b>show fabricpath topology vlan</b>	Displays information about the VLANs in the Layer 2 topology.
<b>Step 9</b>	(Optional) switch# <b>show fabricpath isis topology summary</b>	Displays information about the IS-IS summary topology.
<b>Step 10</b>	(Optional) switch# <b>copy running-config startup-config</b>	Copies the running configuration to the startup configuration.

### Example

This example shows how to configure FabricPath IS-IS multiple topologies:

```
switch# configure terminal
switch(config)# fabricpath domain default
switch(config-fabricpath-isis)# topology 5
switch(config-fabricpath-isis-topo)# maximum-paths 5
switch(config-fabricpath-isis-topo)# reference-bandwidth ref-mbps 100
switch(config-fabricpath-isis-topo)# root-priority 1
switch(config-fabricpath-isis-topo)# exit
switch(config-fabricpath-isis)# show fabricpath topology vlan
switch(config-fabricpath-isis)# show fabricpath isis topology summary
```

## Verifying the FabricPath Advanced Configurations

To display FabricPath information for advanced configurations perform one of the following tasks:

Command	Purpose
<b>show fabricpath isis adjacency</b> [ <b>interface</b> { <b>ethernet</b> <i>mod/slot</i>   <b>port-channel</b> <i>channel-number</i> }   <b>system-id</b>   <b>detail</b>   <b>summary</b> ]	Displays the FabricPath Layer 2 IS-IS adjacency database.
<b>show fabricpath isis database</b> [ <i>level</i> ] [ <b>mgroup</b> ] [ <b>detail</b>   <b>summary</b> ] [ <i>lid</i> ] { <b>zero-seq</b>   <b>router-id</b>   <b>adjacency</b> } [ <i>SID.XX-XX</i> ]	Displays the FabricPath Layer 2 IS-IS database.
<b>show fabricpath isis hostname</b> [ <b>detail</b> ]	Displays the FabricPath Layer 2 IS-IS dynamic hostname exchange information.
<b>show fabricpath isis interface</b> [ <b>ethernet</b> <i>mod/slot</i>   <b>port-channel</b> <i>channel-number</i> ] [ <b>brief</b> ]	Displays the FabricPath Layer 2 IS-IS related interface information.
<b>show fabricpath isis route</b> [ <b>summary</b>   <b>detail</b> ]	Displays the FabricPath Layer 2 IS-IS routing table for unicast routes.
<b>show fabricpath isis spf-log</b> [ <b>detail</b> ]	Displays the FabricPath Layer 2 IS-IS SPF calculation statistics.
<b>show fabricpath isis</b> [ <b>statistics</b> ]	Displays the FabricPath Layer 2 IS-IS event counters.

Command	Purpose
<b>show fabricpath isis ftag</b> [ <b>multidestination</b> <i>tree_id</i> ]	Displays the FTag values associated with the trees in the topology.
<b>show fabricpath isis vlan-range</b>	Displays the congruent VLAN-set to topology mapping.
<b>show fabricpath isis trees</b> [ <b>multidestination</b> <i>tree_id</i> ]	Displays the nodes in the trees.
<b>show fabricpath isis switch-id</b>	Displays the switch IDs and reachability information for the topology.
<b>show fabricpath isis ip redistribute mroute</b> [ <b>vlan</b> [ <b>group</b> [ <b>source</b> ]]]	Displays the locally learned multicast routes.
<b>show fabricpath isis ip mroute</b> [ <b>vlan</b> <i>vlan-id</i> [ <b>group</b> <i>group-id</i> [ <b>source</b> <i>source-id</i> ]]]	Displays the multicast routes learned from neighbors.
<b>show fabricpath isis</b> [ <b>protocol</b> ]	Displays the FabricPath Layer 2 IS-IS process level information.
<b>show fabricpath isis rrm</b> [ <b>gm</b> ] <b>interface</b> { <b>ethernet</b> <i>mod/slot</i>   <b>port-channel</b> <i>channel-number</i> }	Displays the FabricPath Layer 2 IS-IS retransmit-routing-message information.
<b>show fabricpath isis srm</b> [ <b>gm</b> ] <b>interface</b> { <b>ethernet</b> <i>mod/slot</i>   <b>port-channel</b> <i>channel-number</i> }	Displays the FabricPath Layer 2 IS-IS send-routing-message information.
<b>show fabricpath isis topology summary</b>	Displays the FabricPath Layer 2 IS-IS topology database.
<b>show fabricpath isis traffic</b> [ <b>interface</b> { <b>ethernet</b> <i>mod/slot</i>   <b>port-channel</b> <i>channel-number</i> }]	Displays the FabricPath Layer 2 IS-IS traffic information.
<b>show fabricpath isis ssn</b> [ <b>gm</b> ] <b>interface</b> { <b>ethernet</b> <i>mod/slot</i>   <b>port-channel</b> <i>channel-number</i> }	Displays the FabricPath Layer 2 IS-IS send-sequence-number information.
<b>show fabricpath isis mesh-group</b>	Displays the FabricPath IS-IS mesh-group information.

## Feature History for Configuring FabricPath Advanced Features

This table includes only the updates for those releases that have resulted in additions or changes to the feature.

**Table 1: Feature History for Advanced FabricPath Features**

Feature Name	Release	Feature Information
Multiple topologies	6.2(2)	This feature was introduced.
Advanced FabricPath Layer 2 IS-IS Parameters per Interface	6.2(2)	Route-map and mesh group were introduced.

<b>Feature Name</b>	<b>Release</b>	<b>Feature Information</b>
Advanced FabricPath Layer 2 IS-IS Parameters Globally	6.2(2)	Overload bit and VLAN pruning for FabricPath IS-IS were introduced.
Advanced FabricPath features	5.1(1)	These features were introduced.