Interface Management

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About Interfaces

The Firepower 4100/9300 chassis supports physical interfaces, VLAN subinterfaces for container instances, and EtherChannel (port-channel) interfaces. EtherChannel interfaces can include up to 16 member interfaces of the same type.

Chassis Management Interface

The chassis management interface is used for management of the FXOS Chassis by SSH or Firewall Chassis Manager. This interface is separate from the mgmt-type interface that you assign to the logical devices for application management.

To configure parameters for this interface, you must configure them from the CLI. See also Changing the Management IP Address. To view information about this interface in the FXOS CLI, connect to local management and show the management port:

Firepower # **connect local-mgmt**

Firepower(local-mgmt) # **show mgmt-port**

Note that the chassis management interface remains up even if the physical cable or SFP module are unplugged, or if the **mgmt-port shut** command is performed, or if the logical device is offline.

Note The chassis management interface does not support jumbo frames.

Interface Types

Physical interfaces, VLAN subinterfaces for container instances, and EtherChannel (port-channel) interfaces can be one of the following types:

- Data—Use for regular data. Data interfaces cannot be shared between logical devices, and logical devices cannot communicate over the backplane to other logical devices. For traffic on Data interfaces, all traffic must exit the chassis on one interface and return on another interface to reach another logical device.
- Data-sharing—Use for regular data. Only supported with container instances, these data interfaces can be shared by one or more logical devices/container instances (Firewall Threat Defense-using-Firewall Management Center only). Each container instance can communicate over the backplane with all other instances that share this interface. Shared interfaces can affect the number of container instances you can deploy. Shared interfaces are not supported for bridge group member interfaces (in transparent mode or routed mode), inline sets, passive interfaces, clusters, or failover links.
- Mgmt—Use to manage application instances. These interfaces can be shared by one or more logical devices to access external hosts; logical devices cannot communicate over this interface with other logical devices that share the interface. You can only assign one management interface per logical device. Depending on your application and manager, you can later enable management from a data interface; but you must assign a Management interface to the logical device even if you don't intend to use it after you enable data management.

Note Mgmt interface change will cause reboot of the logical device, for example one change mgmt from e1/1 to e1/2 will cause the logical device to reboot to apply the new management.

- Eventing—Use as a secondary management interface for Firewall Threat Defense-using-Firewall Management Center devices. To use this interface, you must configure its IP address and other parameters at the Firewall Threat Defense CLI. For example, you can separate management traffic from events (such as web events). See the management center configuration guide for more information. Eventing interfaces can be shared by one or more logical devices to access external hosts; logical devices cannot communicate over this interface with other logical devices that share the interface. If you later configure a data interface for management, you cannot use a separate eventing interface.

Note A virtual Ethernet interface is allocated when each application instance is installed. If the application does not use an eventing interface, then the virtual interface will be in an admin down state.

```
Firepower # show interface Vethernet775
Firepower # Vethernet775 is down (Administratively down)
Bound Interface is Ethernet1/10
Port description is server 1/1, VNIC ext-mgmt-nic5
```

- Cluster—Use as the cluster control link for a clustered logical device. By default, the cluster control link is automatically created on Port-channel 48. The Cluster type is only supported on EtherChannel interfaces. For multi-instance clustering, you cannot share a Cluster-type interface across devices. You can add VLAN subinterfaces to the Cluster EtherChannel to provide separate cluster control links per cluster. If

you add subinterfaces to a Cluster interface, you cannot use that interface for a native cluster. The Firewall Device Manager and Security Cloud Control does not support clustering.

Note This chapter discusses *FXOS* VLAN subinterfaces only. You can separately create subinterfaces within the Firewall Threat Defense application. See FXOS Interfaces vs. Application Interfaces, on page 4 for more information.

See the following table for interface type support for the Firewall Threat Defense and ASA applications in standalone and cluster deployments.

Table 1: Interface Type Support

Application		Data	Data: Subinterface	Data-Sharing	Data-Sharing: Subinterface	Mgmt	Eventing	Cluster (EtherChannel only)	Cluster: Subinterface
Firewall Threat Defense	Standalone Native Instance	**Yes**	—	—	—	**Yes**	**Yes**	—	—
	Standalone Container Instance	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	—	—
	Cluster Native Instance	**Yes** (EtherChannel only for inter-chassis cluster)	—	—	—	**Yes**	**Yes**	**Yes**	—
	Cluster Container Instance	**Yes** (EtherChannel only for inter-chassis cluster)	—	—	—	**Yes**	**Yes**	**Yes**	**Yes**
ASA	Standalone Native Instance	**Yes**	—	—	—	**Yes**	—	**Yes**	—
	Cluster Native Instance	**Yes** (EtherChannel only for inter-chassis cluster)	—	—	—	**Yes**	—	**Yes**	—

FXOS Interfaces vs. Application Interfaces

The Firepower 4100/9300 manages the basic Ethernet settings of physical interfaces, VLAN subinterfaces for container instances, and EtherChannel (port-channel) interfaces. Within the application, you configure higher level settings. For example, you can only create EtherChannels in FXOS; but you can assign an IP address to the EtherChannel within the application.

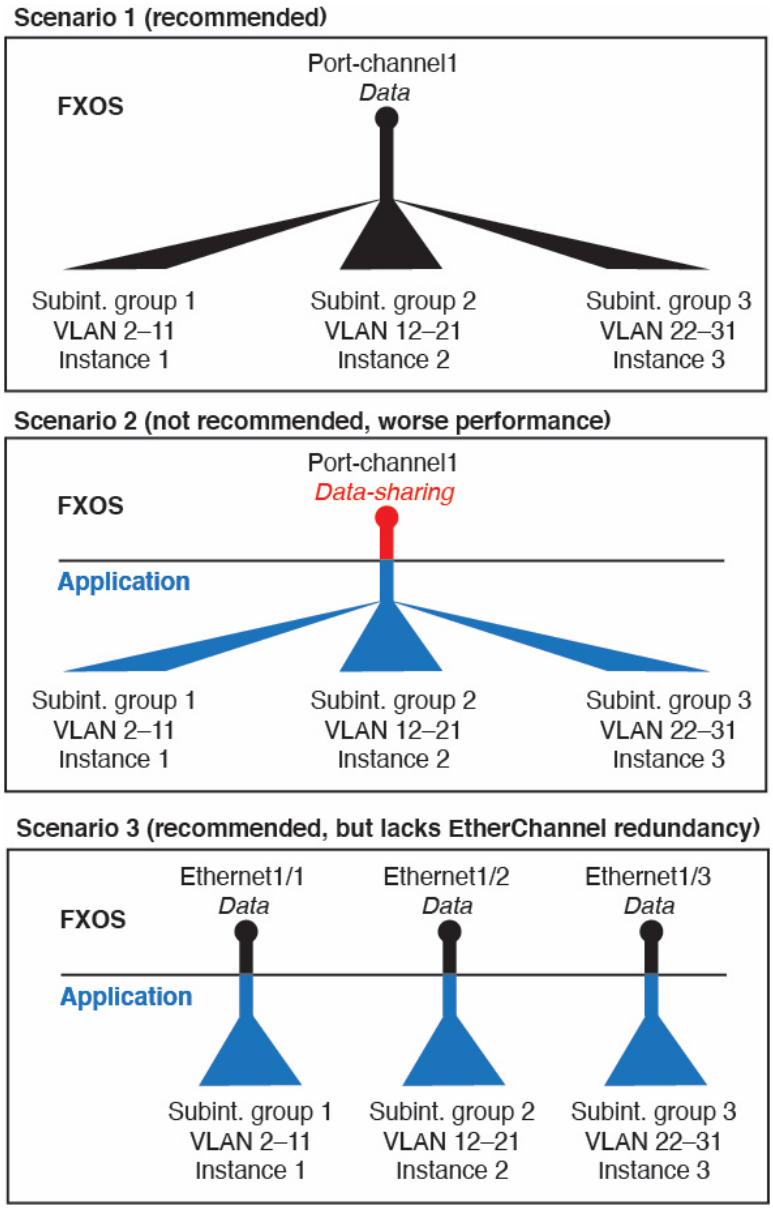
The following sections describe the interaction between FXOS and the application for interfaces.

VLAN Subinterfaces

For all logical devices, you can create VLAN subinterfaces within the application.

For container instances in standalone mode only, you can *also* create VLAN subinterfaces in FXOS. Multi-instance clusters do not support subinterfaces in FXOS except on the Cluster-type interface. Application-defined subinterfaces are not subject to the FXOS limit. Choosing in which operating system to create subinterfaces depends on your network deployment and personal preference. For example, to share a subinterface, you must create the subinterface in FXOS. Another scenario that favors FXOS subinterfaces comprises allocating separate subinterface groups on a single interface to multiple instances. For example, you want to use Port-channel1 with VLAN 2–11 on instance A, VLAN 12–21 on instance B, and VLAN 22–31 on instance C. If you create these subinterfaces within the application, then you would have to share the parent interface in FXOS, which may not be desirable. See the following illustration that shows the three ways you can accomplish this scenario:

Figure 1: VLANs in FXOS vs. the Application for Container Instances



Independent Interface States in the Chassis and in the Application

You can administratively enable and disable interfaces in both the chassis and in the application. For an interface to be operational, the interface must be enabled in both operating systems. Because the interface state is controlled independently, you may have a mismatch between the chassis and application.

The default state of an interface within the application depends on the type of interface. For example, the physical interface or EtherChannel is disabled by default within the application, but a subinterface is enabled by default.

Hardware Bypass Pairs

For the Firepower Threat Defense, certain interface modules on the Firepower 9300 and 4100 series let you use the Hardware Bypass feature for Firepower Threat Defense inline set interfaces. Hardware Bypass ensures that traffic continues to flow between an inline interface pair during a power outage. This feature can be used to maintain network connectivity in the case of software or hardware failures. The Hardware Bypass feature is configured within the Firepower Threat Defense application; no configuration is available in FXOS.

You do not need to use these interfaces as Hardware Bypass pairs; they can be used as regular interfaces for both the ASA and the Firepower Threat Defense applications. Note that Hardware Bypass-capable interfaces cannot be configured for breakout ports. If you want to use the Hardware Bypass feature, do not configure the ports as EtherChannels; otherwise, you can include these interfaces as EtherChannel members in regular interface mode.

When Hardware Bypass is enabled on an inline pair, switch bypass is attempted first. If the bypass configuration fails due a switch error, physical bypass is enabled.

Note Hardware Bypass (FTW) is not supported on the Firepower Threat Defense installed in service-chaining with third-party applications, such as VDP/Radware.

Note Do not enable Hardware Bypass and link state propagation for the same inline set.

The Firepower Threat Defense supports Hardware Bypass for interface pairs on specific network modules on the following models:

- Firepower 9300
- Firepower 4100 series

The supported Hardware Bypass network modules for these models include:

- Firepower 6-port 1G SX FTW Network Module single-wide (FPR-NM-6X1SX-F)
- Firepower 6-port 10G SR FTW Network Module single-wide (FPR-NM-6X10SR-F)
- Firepower 6-port 10G LR FTW Network Module single-wide (FPR-NM-6X10LR-F)
- Firepower 2-port 40G SR FTW Network Module single-wide (FPR-NM-2X40G-F)
- Firepower 8-port 1G Copper FTW Network Module single-wide (FPR-NM-8X1G-F)

Hardware Bypass can only use the following port pairs:

- 1 & 2
- 3 & 4
- 5 & 6
- 7 & 8

Jumbo Frame Support

The Firepower 4100/9300 chassis has support for jumbo frames enabled by default. To enable jumbo frame support on a specific logical device installed on the Firepower 4100/9300 chassis, you will need to configure the appropriate MTU settings for the interfaces on the logical device.

The maximum MTU that is supported for the application on the Firepower 4100/9300 chassis is 9184.

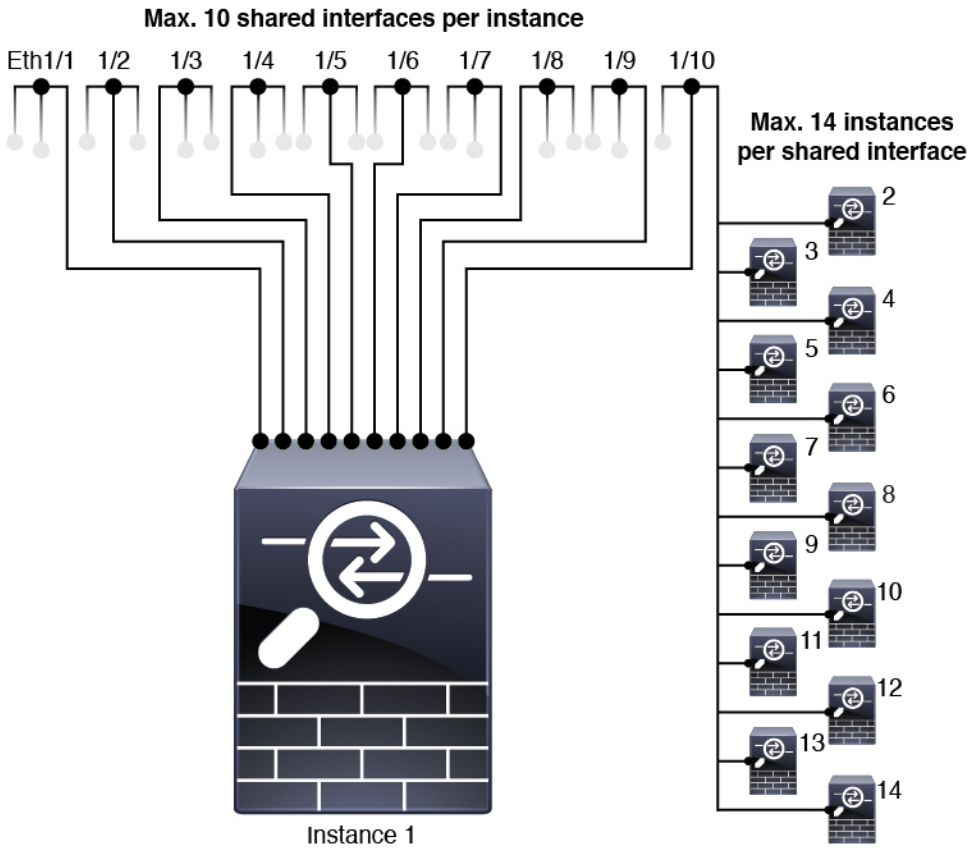
Note The chassis management interface does not support jumbo frames.

Shared Interface Scalability

Instances can share data-sharing type interfaces. This capability lets you conserve physical interface usage as well as support flexible networking deployments. When you share an interface, the chassis uses unique MAC addresses to forward traffic to the correct instance. However, shared interfaces can cause the forwarding table to grow large due to the need for a full mesh topology within the chassis (every instance must be able to communicate with every other instance that is sharing the same interface). Therefore, there are limits to how many interfaces you can share.

In addition to the forwarding table, the chassis maintains a VLAN group table for VLAN subinterface forwarding. You can create up to 500 VLAN subinterfaces.

See the following limits for shared interface allocation:



Shared Interface Best Practices

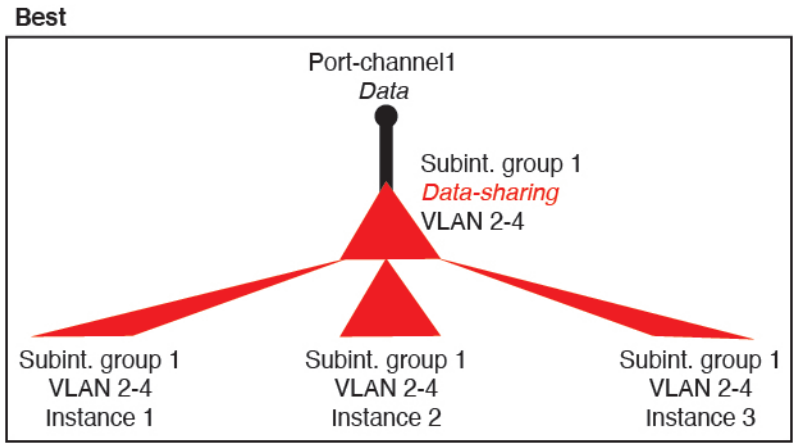
For optimal scalability of the forwarding table, share as few interfaces as possible. Instead, you can create up to 500 VLAN subinterfaces on one or more physical interfaces and then divide the VLANs among the container instances.

When sharing interfaces, follow these practices in the order of most scalable to least scalable:

1. Best—Share subinterfaces under a single parent, and use the same set of subinterfaces with the same group of instances.

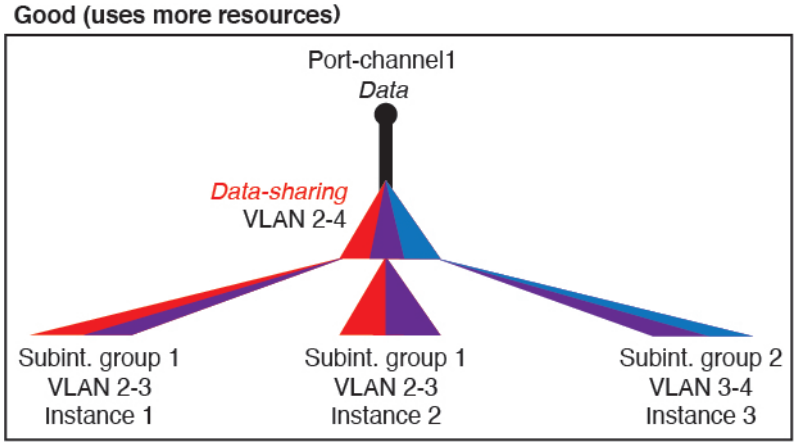
   For example, create a large EtherChannel to bundle all of your like-kind interfaces together, and then share subinterfaces of that EtherChannel: Port-Channel1.2, 3, and 4 instead of Port-Channel2, Port-Channel3, and Port-Channel4. When you share subinterfaces from a single parent, the VLAN group table provides better scaling of the forwarding table than when sharing physical/EtherChannel interfaces or subinterfaces across parents.

Figure 2: Best: Shared Subinterface Group on One Parent



If you do not share the same set of subinterfaces with a group of instances, your configuration can cause more resource usage (more VLAN groups). For example, share Port-Channel1.2, 3, and 4 with instances 1, 2, and 3 (one VLAN group) instead of sharing Port-Channel1.2 and 3 with instances 1 and 2, while sharing Port-Channel1.3 and 4 with instance 3 (two VLAN groups).

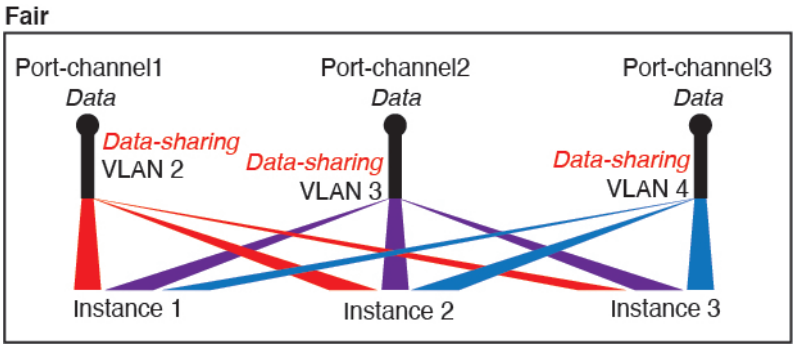
Figure 3: Good: Sharing Multiple Subinterface Groups on One Parent



2. Fair—Share subinterfaces across parents.

   For example, share Port-Channel1.2, Port-Channel2.3, and Port-Channel3.4 instead of Port-Channel2, Port-Channel4, and Port-Channel4. Although this usage is not as efficient as only sharing subinterfaces on the same parent, it still takes advantage of VLAN groups.

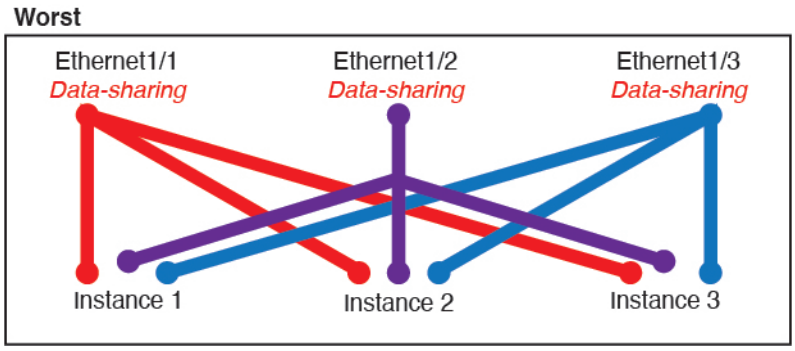
Figure 4: Fair: Shared Subinterfaces on Separate Parents



3. Worst—Share individual parent interfaces (physical or EtherChannel).

   This method uses the most forwarding table entries.

Figure 5: Worst: Shared Parent Interfaces



Shared Interface Usage Examples

See the following tables for examples of interface sharing and scalability. The below scenarios assume use of one physical/EtherChannel interface for management shared across all instances, and another physical or EtherChannel interface with dedicated subinterfaces for use with High Availability.

- Table 2: Physical/EtherChannel Interfaces and Instances on a Firepower 9300 with Three SM-44s, on page 11
- Table 3: Subinterfaces on One Parent and Instances on a Firepower 9300 with Three SM-44s, on page 12
- Table 4: Physical/EtherChannel Interfaces and Instances on a Firepower 9300 with One SM-44, on page 14
- Table 5: Subinterfaces on One Parent and Instances on a Firepower 9300 with One SM-44, on page 15

Firepower 9300 with Three SM-44s

The following table applies to three SM-44 security modules on a 9300 using only physical interfaces or EtherChannels. Without subinterfaces, the maximum number of interfaces are limited. Moreover, sharing multiple physical interfaces uses more forwarding table resources than sharing multiple subinterfaces.

Each SM-44 module can support up to 14 instances. Instances are split between modules as necessary to stay within limits.

Table 2: Physical/EtherChannel Interfaces and Instances on a Firepower 9300 with Three SM-44s

Dedicated Interfaces	Shared Interfaces	Number of Instances	% Forwarding Table Used
32: • 8 • 8 • 8 • 8	**0**	**4:** • Instance 1 • Instance 2 • Instance 3 • Instance 4	16%
30: • 15 • 15	**0**	**2:** • Instance 1 • Instance 2	14%
14: • 14 (1 ea.)	**1**	**14:** • Instance 1-Instance 14	46%
33: • 11 (1 ea.) • 11 (1 ea.) • 11 (1 ea.)	**3:** • 1 • 1 • 1	**33:** • Instance 1-Instance 11 • Instance 12-Instance 22 • Instance 23-Instance 33	98%
33: • *11 (1 ea.)* • *11 (1 ea.)* • *12 (1 ea.)*	***3:*** • *1* • *1* • *1*	***34:*** • *Instance 1-Instance 11* • *Instance 12-Instance 22* • *Instance 23-Instance 34*	*102%* DISALLOWED
30: • 30 (1 ea.)	**1**	**6:** • Instance 1-Instance 6	25%
30: • 10 (5 ea.) • 10 (5 ea.) • 10 (5 ea.)	**3:** • 1 • 1 • 1	**6:** • Instance 1-Instance2 • Instance 2-Instance 4 • Instance 5-Instance 6	23%

Dedicated Interfaces	Shared Interfaces	Number of Instances	% Forwarding Table Used
30: • 30 (6 ea.)	**2**	**5:** • Instance 1-Instance 5	28%
30: • 12 (6 ea.) • 18 (6 ea.)	**4:** • 2 • 2	**5:** • Instance 1-Instance2 • Instance 2-Instance 5	26%
24: • 6 • 6 • 6 • 6	**7**	**4:** • Instance 1 • Instance 2 • Instance 3 • Instance 4	44%
24: • 12 (6 ea.) • 12 (6 ea.)	**14:** • 7 • 7	**4:** • Instance 1-Instance2 • Instance 2-Instance 4	41%

The following table applies to three SM-44 security modules on a 9300 using subinterfaces on a single parent physical interface. For example, create a large EtherChannel to bundle all of your like-kind interfaces together, and then share subinterfaces of that EtherChannel. Sharing multiple physical interfaces uses more forwarding table resources than sharing multiple subinterfaces.

Each SM-44 module can support up to 14 instances. Instances are split between modules as necessary to stay within limits.

Table 3: Subinterfaces on One Parent and Instances on a Firepower 9300 with Three SM-44s

Dedicated Subinterfaces	Shared Subinterfaces	Number of Instances	% Forwarding Table Used
168: • 168 (4 ea.)	**0**	**42:** • Instance 1-Instance 42	33%
224: • 224 (16 ea.)	**0**	**14:** • Instance 1-Instance 14	27%
14: • 14 (1 ea.)	**1**	**14:** • Instance 1-Instance 14	46%

Dedicated Subinterfaces	Shared Subinterfaces	Number of Instances	% Forwarding Table Used
33: • 11 (1 ea.) • 11 (1 ea.) • 11 (1 ea.)	**3:** • 1 • 1 • 1	**33:** • Instance 1-Instance 11 • Instance 12-Instance 22 • Instance 23-Instance 33	98%
70: • 70 (5 ea.)	**1**	**14:** • Instance 1-Instance 14	46%
165: • 55 (5 ea.) • 55 (5 ea.) • 55 (5 ea.)	**3:** • 1 • 1 • 1	**33:** • Instance 1-Instance 11 • Instance 12-Instance 22 • Instance 23-Instance 33	98%
70: • 70 (5 ea.)	**2**	**14:** • Instance 1-Instance 14	46%
165: • 55 (5 ea.) • 55 (5 ea.) • 55 (5 ea.)	**6:** • 2 • 2 • 2	**33:** • Instance 1-Instance 11 • Instance 12-Instance 22 • Instance 23-Instance 33	98%
70: • 70 (5 ea.)	**10**	**14:** • Instance 1-Instance 14	46%
165: • *55 (5 ea.)* • *55 (5 ea.)* • *55 (5 ea.)*	***30:*** • *10* • *10* • *10*	***33:*** • *Instance 1-Instance 11* • *Instance 12-Instance 22* • *Instance 23-Instance 33*	*102%* DISALLOWED

Firepower 9300 with One SM-44

The following table applies to the Firepower 9300 with one SM-44 using only physical interfaces or EtherChannels. Without subinterfaces, the maximum number of interfaces are limited. Moreover, sharing multiple physical interfaces uses more forwarding table resources than sharing multiple subinterfaces.

The Firepower 9300 with one SM-44 can support up to 14 instances.

Table 4: Physical/EtherChannel Interfaces and Instances on a Firepower 9300 with One SM-44

Dedicated Interfaces	Shared Interfaces	Number of Instances	% Forwarding Table Used
32: • 8 • 8 • 8 • 8	**0**	**4:** • Instance 1 • Instance 2 • Instance 3 • Instance 4	16%
30: • 15 • 15	**0**	**2:** • Instance 1 • Instance 2	14%
14: • 14 (1 ea.)	**1**	**14:** • Instance 1-Instance 14	46%
14: • 7 (1 ea.) • 7 (1 ea.)	**2:** • **1** • **1**	**14:** • Instance 1-Instance 7 • Instance 8-Instance 14	37%
32: • 8 • 8 • 8 • 8	**1**	**4:** • Instance 1 • Instance 2 • Instance 3 • Instance 4	21%
32: • 16 (8 ea.) • 16 (8 ea.)	**2**	**4:** • Instance 1-Instance 2 • Instance 3-Instance 4	20%
32: • 8 • 8 • 8 • 8	**2**	**4:** • Instance 1 • Instance 2 • Instance 3 • Instance 4	25%

Dedicated Interfaces	Shared Interfaces	Number of Instances	% Forwarding Table Used
32: • 16 (8 ea.) • 16 (8 ea.)	**4:** • 2 • 2	**4:** • Instance 1-Instance 2 • Instance 3-Instance 4	24%
24: • 8 • 8 • 8	**8**	**3:** • Instance 1 • Instance 2 • Instance 3	37%
10: • 10 (2 ea.)	**10**	**5:** • Instance 1-Instance 5	69%
10: • 6 (2 ea.) • 4 (2 ea.)	**20:** • 10 • 10	**5:** • Instance 1-Instance 3 • Instance 4-Instance 5	59%
14: • *12 (2 ea.)*	***10***	***7:*** • *Instance 1-Instance 7*	*109%* DISALLOWED

The following table applies to the Firepower 9300 with one SM-44 using subinterfaces on a single parent physical interface. For example, create a large EtherChannel to bundle all of your like-kind interfaces together, and then share subinterfaces of that EtherChannel. Sharing multiple physical interfaces uses more forwarding table resources than sharing multiple subinterfaces.

The Firepower 9300 with one SM-44 can support up to 14 instances.

Table 5: Subinterfaces on One Parent and Instances on a Firepower 9300 with One SM-44

Dedicated Subinterfaces	Shared Subinterfaces	Number of Instances	% Forwarding Table Used
112: • 112 (8 ea.)	**0**	**14:** • Instance 1-Instance 14	17%
224: • 224 (16 ea.)	**0**	**14:** • Instance 1-Instance 14	17%
14: • 14 (1 ea.)	**1**	**14:** • Instance 1-Instance 14	46%

Dedicated Subinterfaces	Shared Subinterfaces	Number of Instances	% Forwarding Table Used
14: • 7 (1 ea.) • 7 (1 ea.)	**2:** • 1 • 1	**14:** • Instance 1-Instance 7 • Instance 8-Instance 14	37%
112: • 112 (8 ea.)	**1**	**14:** • Instance 1-Instance 14	46%
112: • 56 (8 ea.) • 56 (8 ea.)	**2:** • 1 • 1	**14:** • Instance 1-Instance 7 • Instance 8-Instance 14	37%
112: • 112 (8 ea.)	**2**	**14:** • Instance 1-Instance 14	46%
112: • 56 (8 ea.) • 56 (8 ea.)	**4:** • 2 • 2	**14:** • Instance 1-Instance 7 • Instance 8-Instance 14	37%
140: • 140 (10 ea.)	**10**	**14:** • Instance 1-Instance 14	46%
140: • 70 (10 ea.) • 70 (10 ea.)	**20:** • 10 • 10	**14:** • Instance 1-Instance 7 • Instance 8-Instance 14	37%

Viewing Shared Interface Resources

To view forwarding table and VLAN group usage, enter the **show detail** command under **scope fabric-interconnect**. For example:

```
Firepower# scope fabric-interconnect
Firepower /fabric-interconnect # show detail

Fabric Interconnect:
    ID: A
    Product Name: Cisco FPR9K-SUP
    PID: FPR9K-SUP
    VID: V02
    Vendor: Cisco Systems, Inc.
    Serial (SN): JAD104807YN
    HW Revision: 0
    Total Memory (MB): 16185
```

```
OOB IP Addr: 10.10.5.14
OOB Gateway: 10.10.5.1
OOB Netmask: 255.255.255.0
OOB IPv6 Address: ::
OOB IPv6 Gateway: ::
Prefix: 64
Operability: Operable
Thermal Status: Ok
Ingress VLAN Group Entry Count (Current/Max): 0/500
Switch Forwarding Path Entry Count (Current/Max): 16/1021
Current Task 1:
Current Task 2:
Current Task 3:
```

Inline Set Link State Propagation for the FTD

An inline set acts like a bump on the wire, and binds two interfaces together to slot into an existing network. This function allows the system to be installed in any network environment without the configuration of adjacent network devices. Inline interfaces receive all traffic unconditionally, but all traffic received on these interfaces is retransmitted out of an inline set unless explicitly dropped.

When you configure an inline set in the Firepower Threat Defense application and enable link state propagation, the Firepower Threat Defense sends inline set membership to the FXOS chassis. Link state propagation means that the chassis automatically brings down the second interface in the inline interface pair when one of the interfaces in an inline set goes down. When the downed interface comes back up, the second interface automatically comes back up, also. In other words, if the link state of one interface changes, the chassis senses the change and updates the link state of the other interface to match it. Note that the chassis requires up to 4 seconds to propagate link state changes. Link state propagation is especially useful in resilient network environments where routers are configured to reroute traffic automatically around network devices that are in a failure state.

Note Do not enable Hardware Bypass and link state propagation for the same inline set.

Guidelines and Limitations for Interfaces

VLAN Subinterfaces

- This document discusses *FXOS* VLAN subinterfaces only. You can separately create subinterfaces within the Firewall Threat Defense application. See FXOS Interfaces vs. Application Interfaces, on page 4 for more information.
- Subinterfaces (and the parent interfaces) can only be assigned to container instances.

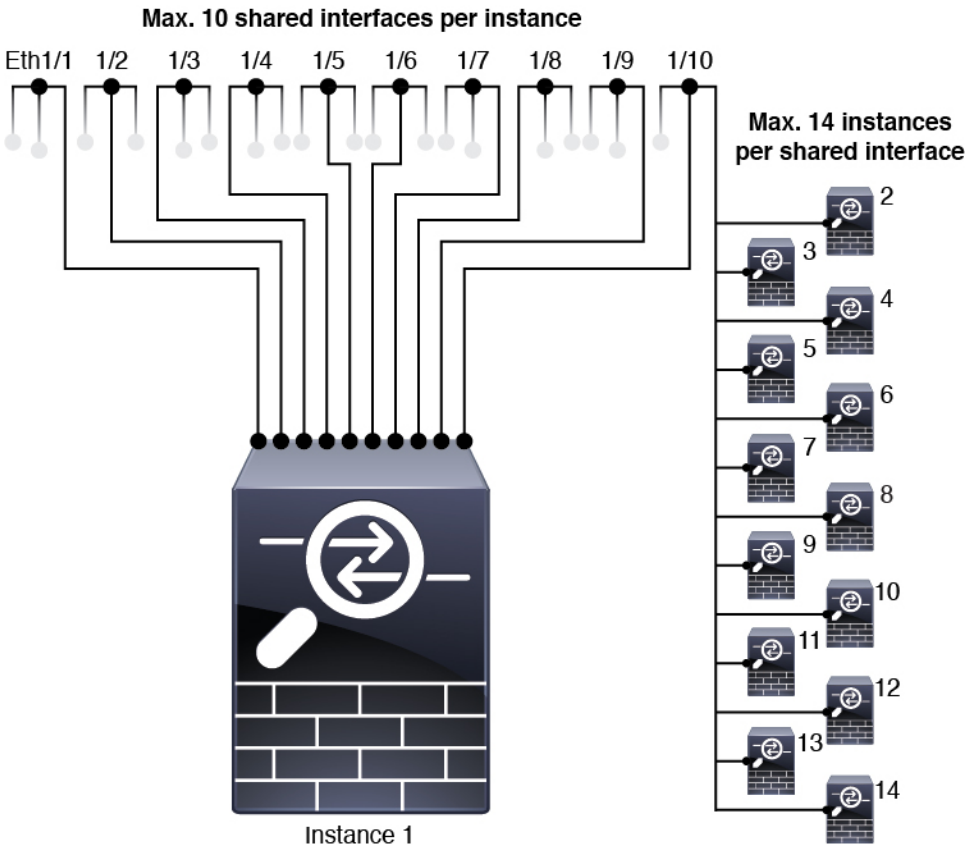
Note If you assign a parent interface to a container instance, it only passes untagged (non-VLAN) traffic. Do not assign the parent interface unless you intend to pass untagged traffic. For Cluster type interfaces, the parent interface cannot be used.

- Subinterfaces are supported on Data or Data-sharing type interfaces, as well as Cluster type interfaces. If you add subinterfaces to a Cluster interface, you cannot use that interface for a native cluster.
- For multi-instance clustering, FXOS subinterfaces are not supported on Data interfaces. However, subinterfaces are supported for the cluster control link, so you can use either a dedicated EtherChannel or a subinterface of an EtherChannel for the cluster control link. Note that *application*-defined subinterfaces are supported for Data interfaces.
- You can create up to 500 VLAN IDs.
- See the following limitations within the logical device application; keep these limitations in mind when planning your interface allocation.
  - You cannot use subinterfaces for an Firewall Threat Defense inline set or as a passive interface.
  - If you use a subinterface for the failover link, then all subinterfaces on that parent, and the parent itself, are restricted for use as failover links. You cannot use some subinterfaces as failover links, and some as regular data interfaces.

Data-sharing Interfaces

- You cannot use a data-sharing interface with a native instance.
- Maximum 14 instances per shared interface. For example, you can allocate Ethernet1/1 to Instance1 through Instance14.

  Maximum 10 shared interfaces per instance. For example, you can allocate Ethernet1/1.1 through Ethernet1/1.10 to Instance1.



- You cannot use a data-sharing interface in a cluster.
- See the following limitations within the logical device application; keep these limitations in mind when planning your interface allocation.
  - You cannot use a data-sharing interface with a transparent firewall mode device.
  - You cannot use a data-sharing interface with Firewall Threat Defense inline sets or passive interfaces.
  - You cannot use a data-sharing interface for the failover link.

Inline Sets for Firewall Threat Defense

- Supported for physical interfaces (both regular and breakout ports) and EtherChannels. Subinterfaces are not supported.
- Link state propagation is supported.
- Do not enable Hardware Bypass and link state propagation for the same inline set.

Hardware Bypass

- Supported for the Firewall Threat Defense; you can use them as regular interfaces for the ASA.
- The Firewall Threat Defense only supports Hardware Bypass with inline sets.

- Hardware Bypass-capable interfaces cannot be configured for breakout ports.
- You cannot include Hardware Bypass interfaces in an EtherChannel and use them for Hardware Bypass; you can use them as regular interfaces in an EtherChannel.
- Hardware Bypass is not supported with High Availability.
- Do not enable Hardware Bypass and link state propagation for the same inline set.

Default MAC Addresses

For native instances:

Default MAC address assignments depend on the type of interface.

- Physical interfaces—The physical interface uses the burned-in MAC address.
- EtherChannels—For an EtherChannel, all interfaces that are part of the channel group share the same MAC address. This feature makes the EtherChannel transparent to network applications and users, because they only see the one logical connection; they have no knowledge of the individual links. The port-channel interface uses a unique MAC address from a pool; interface membership does not affect the MAC address.

For container instances:

- MAC addresses for all interfaces are taken from a MAC address pool. For subinterfaces, if you decide to manually configure MAC addresses, make sure you use unique MAC addresses for all subinterfaces on the same parent interface to ensure proper classification. See Automatic MAC Addresses for Container Instance Interfaces.

Configure Interfaces

By default, physical interfaces are disabled. You can enable interfaces, add EtherChannels, add VLAN subinterfaces, edit interface properties, and configure breakout ports.

Note

Configure a Physical Interface

You can physically enable and disable interfaces, as well as set the interface speed and duplex. To use an interface, it must be physically enabled in FXOS and logically enabled in the application.

Note

- For QSFPH40G-CUxM, auto-negotiation is always enabled by default and you cannot disable it.
- If you replace an SFP on a port with a different SFP module, the speed, duplex, and auto-negotiation of the interface is not updated automatically. You must manually re-configure the interface.

Before you begin

- Interfaces that are already a member of an EtherChannel cannot be modified individually. Be sure to configure settings before you add it to the EtherChannel.

Procedure

Step 1 Enter interface mode.

scope eth-uplink

scope fabric a

Step 2 Enable the interface.

enter interface *interface_id*

enable

Example:

```
Firepower /eth-uplink/fabric # enter interface Ethernet1/8
Firepower /eth-uplink/fabric/interface # enable
```

Note
Interfaces that are already a member of a port-channel cannot be modified individually. If you use the **enter interface** or **scope interface** command on an interface that is a member of a port channel, you will receive an error stating that the object does not exist. You should edit interfaces using the **enter interface** command before you add them to a port-channel.

Step 3 (Optional) Set Debounce Time.

set debounce-time 5000 {Enter a value between 0-15000 milli-seconds}

Example:

```
Firepower /eth-uplink/fabric/interface # set debounce-time 5000
```

Example:

Note
Configuring Debounce Time is not supported on 1G interfaces.

Step 4 (Optional) Set the interface type.

set port-type {**data** | **data-sharing** | **mgmt** | **firepower-eventing** | **cluster**}

Example:

```
Firepower /eth-uplink/fabric/interface # set port-type mgmt
```

The **data** keyword is the default type. The **data-sharing** type is only supported with container instances. Do not choose the **cluster** keyword; by default, the cluster control link is automatically created on Port-channel 48.

Step 5 Enable or disable autonegotiation, if supported for your interface.

set auto-negotiation {**on** | **off**}

Example:

```
Firepower /eth-uplink/fabric/interface* # set auto-negotiation off
```

If a peer switch connecting to the port over a 50G cable does not support auto-negotiation, ensure to disable auto-negotiation on the switch and the platform interface as well. For example, N9K-C93400LD-H1 does not support auto-negotiation on a 50G cable. Hence, for the port to be connected you must disable the default auto-negotiation on the platform and the switch:

Example:

```
N5-50G-SW(config-if)# speed 50000
N5-50G-SW(config-if)# no negotiate auto
```

Step 6 Set the interface speed.

set admin-speed {**1gbps** | **10gbps** | **40gbps** | **100gbps**}

Example:

```
Firepower /eth-uplink/fabric/interface* # set admin-speed 1gbps
```

Step 7 Set the interface duplex mode.

set admin-duplex {**fullduplex** | **halfduplex**}

Example:

```
Firepower /eth-uplink/fabric/interface* # set admin-duplex halfduplex
```

Step 8 If you edited the default flow control policy, it is already applied to interfaces. If you created a new policy, apply it to the interface. See Configure a Flow Control Policy, on page 28.

set flow-control-policy *name*

Example:

```
Firepower /eth-uplink/fabric/interface* # set flow-control-policy flow1
```

Step 9 Save the configuration.

commit-buffer

Example:

```
Firepower /eth-uplink/fabric/interface* # commit-buffer
Firepower /eth-uplink/fabric/interface #
```

Add an EtherChannel (Port Channel)

An EtherChannel (also known as a port channel) can include up to 16 member interfaces of the same media type and capacity, and must be set to the same speed and duplex. The media type can be either RJ-45 or SFP; SFPs of different types (copper and fiber) can be mixed. You cannot mix interface capacities (for example 1GB and 10GB interfaces) by setting the speed to be lower on the larger-capacity interface. The Link Aggregation Control Protocol (LACP) aggregates interfaces by exchanging the Link Aggregation Control Protocol Data Units (LACPDUs) between two network devices.

You can configure each physical Data or Data-sharing interface in an EtherChannel to be:

- Active—Sends and receives LACP updates. An active EtherChannel can establish connectivity with either an active or a passive EtherChannel. You should use the active mode unless you need to minimize the amount of LACP traffic.
- On—The EtherChannel is always on, and LACP is not used. An "on" EtherChannel can only establish a connection with another "on" EtherChannel.

Note It may take up to three minutes for an EtherChannel to come up to an operational state if you change its mode from On to Active or from Active to On.

Non-data interfaces only support active mode.

LACP coordinates the automatic addition and deletion of links to the EtherChannel without user intervention. It also handles misconfigurations and checks that both ends of member interfaces are connected to the correct channel group. "On" mode cannot use standby interfaces in the channel group when an interface goes down, and the connectivity and configurations are not checked.

When the Firepower 4100/9300 creates an EtherChannel, the EtherChannel stays in a **Suspended** state for Active LACP mode or a **Down** state for On LACP mode until you assign it to a logical device, even if the physical link is up. The EtherChannel will be brought out of this **Suspended** state in the following situations:

- The EtherChannel is added as a data or management interface for a standalone logical device
- The EtherChannel is added as a management interface or cluster control link for a logical device that is part of a cluster
- The EtherChannel is added as a data interface for a logical device that is part of a cluster and at least one unit has joined the cluster

Note that the EtherChannel does not come up until you assign it to a logical device. If the EtherChannel is removed from the logical device or the logical device is deleted, the EtherChannel will revert to a **Suspended** or **Down** state.

Procedure

Step 1 Enter interface mode:

scope eth-uplink

scope fabric a

Step 2 Create the port-channel:

create port-channel *id*

enable

Step 3 Assign member interfaces:

create member-port *interface_id*

You can add up to 16 member interfaces of the same media type and capacity. The member interfaces must be set to the same speed and duplex, and must match the speed and duplex that you configured for this port channel. The media type can be either RJ-45 or SFP; SFPs of different types (copper and fiber) can be mixed. You cannot mix interface capacities (for example 1GB and 10GB interfaces) by setting the speed to be lower on the larger-capacity interface.

Example:

```
Firepower /eth-uplink/fabric/port-channel* # create member-port Ethernet1/1
Firepower /eth-uplink/fabric/port-channel/member-port* # exit
Firepower /eth-uplink/fabric/port-channel* # create member-port Ethernet1/2
Firepower /eth-uplink/fabric/port-channel/member-port* # exit
Firepower /eth-uplink/fabric/port-channel* # create member-port Ethernet1/3
Firepower /eth-uplink/fabric/port-channel/member-port* # exit
Firepower /eth-uplink/fabric/port-channel* # create member-port Ethernet1/4
Firepower /eth-uplink/fabric/port-channel/member-port* # exit
```

Step 4 (Optional) Set the interface type.

set port-type {**data** | **data-sharing** | **mgmt** | **firepower-eventing** | **cluster**}

Example:

```
Firepower /eth-uplink/fabric/port-channel # set port-type data
```

The **data** keyword is the default type. The **data-sharing** type is only supported with container instances. Do not choose the **cluster** keyword unless you want to use this port-channel as the cluster control link instead of the default.

Step 5 Set the required interface speed for members of the port-channel.

set speed {**10mbps** | **100mbps** | **1gbps** | **10gbps** | **40gbps** | **100gbps**}

If you add a member interface that is not at the specified speed, it will not successfully join the port channel. The default is **10gbps**.

Example:

```
Firepower /eth-uplink/fabric/port-channel* # set speed 1gbps
```

Step 6 (Optional) Set the required duplex for members of the port-channel.

set duplex {**fullduplex** | **halfduplex**}

If you add a member interface that is configured with the specified duplex, it will not successfully join the port channel. The default is **fullduplex**.

Example:

```
Firepower /eth-uplink/fabric/port-channel* # set duplex fullduplex
```

Step 7 Enable or disable autonegotiation, if supported for your interface.

set auto-negotiation {**on** | **off**}

Example:

```
Firepower /eth-uplink/fabric/interface* # set auto-negotiation off
```

Step 8 Set the LACP port-channel mode for data and data-sharing interfaces.

For non-Data and non-data-sharing interfaces, the mode is always active.

set port-channel-mode {**active** | **on**}

Example:

```
Firepower /eth-uplink/fabric/port-channel* # set port-channel-mode on
```

Step 9 If you edited the default flow control policy, it is already applied to interfaces. If you created a new policy, apply it to the interface. See Configure a Flow Control Policy, on page 28.

set flow-control-policy *name*

Example:

```
Firepower /eth-uplink/fabric/interface* # set flow-control-policy flow1
```

Step 10 Commit the configuration:

commit-buffer

Add a VLAN Subinterface for Container Instances

You can add up to 500 subinterfaces to your chassis.

For multi-instance clustering, you can only add subinterfaces to the Cluster-type interface; subinterfaces on data interfaces are not supported.

VLAN IDs per interface must be unique, and within a container instance, VLAN IDs must be unique across all assigned interfaces. You can reuse VLAN IDs on *separate* interfaces as long as they are assigned to different container instances. However, each subinterface still counts towards the limit even though it uses the same ID.

This document discusses *FXOS* VLAN subinterfaces only. You can separately create subinterfaces within the Firewall Threat Defense application.

Procedure

Step 1 Enter fabric a mode.

scope eth-uplink

scope fabric a

Example:

```
Firepower# scope eth-uplink
Firepower /eth-uplink # scope fabric a
Firepower /eth-uplink/fabric #
```

Step 2 Enter the interface to which you want to add the subinterface.

enter {**interface** | **port-channel**} *interface_id*

You cannot add a subinterface to a physical interface that is currently allocated to a logical device. If other subinterfaces of the parent are allocated, you can add a new subinterface as long as the parent interface itself is not allocated.

Subinterfaces are supported on data or data-sharing type interfaces, as well as cluster type interfaces.

Example:

```
Firepower /eth-uplink/fabric # enter interface Ethernet1/8
Firepower /eth-uplink/fabric/interface #
```

Step 3 Create the subinterface.

enter subinterface *id*

- *id*—Set the ID between 1 and 4294967295. This ID will be appended to the parent interface ID as *interface_id***.***subinterface_id*. For example, if you add a subinterface to Ethernet1/1 with the ID of 100, then the subinterface ID will be: Ethernet1/1.100. This ID is not the same as the VLAN ID, although you can set them to match for convenience.

Example:

```
Firepower /eth-uplink/fabric/interface # enter subinterface 100
Firepower /eth-uplink/fabric/interface/subinterface* #
```

Step 4 Set the VLAN.

set vlan *id*

- *id*—Set the VLAN ID between 1 and 4095.

Example:

```
Firepower /eth-uplink/fabric/interface/subinterface* # set vlan 100
```

Step 5 Set the interface type.

set port-type {**data** | **data-sharing** | **cluster**}

Example:

```
Firepower /eth-uplink/fabric/interface/subinterface* # set port-type data
```

For data and data-sharing interfaces: The type is independent of the parent interface type; you can have a data-sharing parent and a data subinterface, for example. The default type is data.

Step 6 Save the configuration.

commit-buffer

Example:

```
Firepower /eth-uplink/fabric/interface/subinterface* # commit-buffer
Firepower /eth-uplink/fabric/interface/subinterface #
```

Example

The following example creates 3 subinterfaces on Ethernet 1/1, and sets them to be data-sharing interfaces.

```
Firepower# scope eth-uplink
Firepower /eth-uplink # scope fabric a
Firepower /eth-uplink/fabric # enter interface Ethernet1/1
Firepower /eth-uplink/fabric/interface # enter subinterface 10
Firepower /eth-uplink/fabric/interface/subinterface* # set vlan 10
Firepower /eth-uplink/fabric/interface/subinterface* # set port-type data-sharing
Firepower /eth-uplink/fabric/interface/subinterface* # exit
Firepower /eth-uplink/fabric/interface # enter subinterface 11
Firepower /eth-uplink/fabric/interface/subinterface* # set vlan 11
Firepower /eth-uplink/fabric/interface/subinterface* # set port-type data-sharing
Firepower /eth-uplink/fabric/interface/subinterface* # exit
Firepower /eth-uplink/fabric/interface # enter subinterface 12
Firepower /eth-uplink/fabric/interface/subinterface* # set vlan 12
Firepower /eth-uplink/fabric/interface/subinterface* # set port-type data-sharing
Firepower /eth-uplink/fabric/interface/subinterface* # commit-buffer
Firepower /eth-uplink/fabric/interface/subinterface #
```

Configure Breakout Cables

The following procedure shows how to configure breakout cables for use with the Firepower 4100/9300 chassis. You can use a breakout cable to provide four 10 Gbps ports in place of a single 40 Gbps port.

Before you begin

Hardware Bypass-capable interfaces cannot be configured for breakout ports.

Procedure

Step 1 To create a new breakout, use the following commands:

a) Enter cabling mode:

scope cabling

scope fabric a

b) Create the breakout:

create breakout *network_module_slot port*

Example:

```
Firepower /cabling/fabric/ # create breakout 2 1
```

c) Commit the configuration:

commit-buffer

This will cause an automatic reboot. If you are configuring more than one breakout, you should create all of them before you issue the commit-buffer command.

Step 2 To enable/configure the breakout ports, use the following commands:

a) Enter interface mode:

scope eth-uplink

scope fabric a

scope aggr-interface *network_module_slot port*

Note
Interfaces that are already a member of a port-channel cannot be modified individually. If you use the **enter interface** or **scope interface** command on an interface that is a member of a port channel, you will receive an error stating that the object does not exist. You should edit interfaces using the **enter interface** command before you add them to a port-channel.

b) Use the **set** command to configure the interface speed and port type.

Use the **enable** or **disable** command to set the administrative state of the interface.

c) Commit the configuration:

commit-buffer

Configure a Flow Control Policy

Flow control policies determine whether the Ethernet ports send and receive IEEE 802.3x pause frames when the receive buffer for a port fills. These pause frames request that the transmitting port stop sending data for

a few milliseconds until the buffer clears. For flow control to work between devices, you must enable the corresponding receive and send flow control parameters for both devices.

The default policy disables send and receive control, and sets the priority to autonegotiate.

Procedure

Step 1 Enter eth-uplink and then flow-control mode.

scope eth-uplink

scope flow-control

Example:

```
firepower-4110# scope eth-uplink
firepower-4110 /eth-uplink # scope flow-control
firepower-4110 /eth-uplink/flow-control #
```

Step 2 Edit or create a flow control policy.

enter policy *name*

If you want to edit the default policy, enter **default** for the name.

Example:

```
firepower-4110 /eth-uplink/flow-control # enter policy default
firepower-4110 /eth-uplink/flow-control/policy* #
```

Step 3 Set the priority.

set prio {**auto** | **on**}

The priority sets whether to negotiate or enable PPP for this link.

Example:

```
firepower-4110 /eth-uplink/flow-control/policy* # set prio on
```

Step 4 Enable or disable flow control receive pauses.

set receive {**on** | **off**}

- **on**—Pause requests are honored and all traffic is halted on that uplink port until the network cancels the pause request.
- **off**—Pause requests from the network are ignored and traffic flow continues as normal.

Example:

```
firepower-4110 /eth-uplink/flow-control/policy* # set receive on
```

Step 5 Enable or disable flow control send pauses.

set send {**on** | **off**}

- **on**—The Firepower 4100/9300 sends a pause request to the network if the incoming packet rate becomes too high. The pause remains in effect for a few milliseconds before traffic is reset to normal levels.
- **off**—Traffic on the port flows normally regardless of the packet load.

Example:

```
firepower-4110 /eth-uplink/flow-control/policy* # set send on
```

Step 6 Save the configuration.

commit-buffer

Example:

```
firepower-4110 /eth-uplink/flow-control/policy* # commit-buffer
firepower-4110 /eth-uplink/flow-control/policy #
```

Example

The following example configures a flow control policy.

```
firepower-4110# scope eth-uplink
firepower-4110 /eth-uplink # scope flow-control
firepower-4110 /eth-uplink/flow-control # enter policy FlowControlPolicy23
firepower-4110 /eth-uplink/flow-control/policy* # set prio auto
firepower-4110 /eth-uplink/flow-control/policy* # set receive on
firepower-4110 /eth-uplink/flow-control/policy* # set send on
firepower-4110 /eth-uplink/flow-control/policy* # commit-buffer
firepower-4110 /eth-uplink/flow-control/policy #
```

Monitoring Interfaces

Note There can be a difference between the FXOS and Firepower Threat Defense/ASA interface utilization due to fragmentation drops in the Firepower Threat Defense/ASA. To view fragmentation drops, see the Firepower Threat Defense/ASA **show asp drop** and **show fragment** commands.

- **show interface**

  Shows interface status.

Note Interfaces that act as ports in port channels do not appear in this list.

```
Firepower# scope eth-uplink
Firepower /eth-uplink # scope fabric a
Firepower /eth-uplink/fabric # show interface

Interface:
    Port Name       Port Type          Admin State Oper State
  Allowed Vlan State Reason
    --------------- ------------------ ----------- ----------------
 ------------ ------------
    Ethernet1/2     Data               Enabled     Up
  All
    Ethernet1/4     Mgmt               Enabled     Up
  All
    Ethernet1/5     Data               Enabled     Up
  Untagged
    Ethernet1/7     Firepower Eventing Enabled     Up
  All
    Ethernet1/8     Data               Disabled    Sfp Not Present
  All          Unknown
    Ethernet2/1     Data               Disabled    Sfp Not Present
  All          Unknown
    Ethernet2/2     Data               Disabled    Sfp Not Present
  All          Unknown
    Ethernet2/3     Data               Disabled    Sfp Not Present
  All          Unknown
    Ethernet2/4     Data               Disabled    Sfp Not Present
  All          Unknown
    Ethernet2/5     Data               Disabled    Sfp Not Present
  All          Unknown
    Ethernet2/6     Data               Disabled    Sfp Not Present
  All          Unknown
    Ethernet2/7     Data               Disabled    Sfp Not Present
  All          Unknown
    Ethernet2/8     Data               Disabled    Sfp Not Present
  All          Unknown
```

- **show port-channel**

  Shows port-channel status.

```
Firepower# scope eth-uplink
Firepower /eth-uplink # scope fabric a
Firepower /eth-uplink/fabric # show port-channel

Port Channel:
    Port Channel Id Name             Port Type          Admin State Oper State
Port Channel Mode Allowed Vlan State Reason
    --------------- ---------------- ------------------ ----------- ----------------
---------------- ------------ ------------
    1               Port-channel1    Data               Enabled     Up
Active           Untagged
    2               Port-channel2    Data               Enabled     Failed
Active           All          No operational members
    48              Port-channel48   Cluster            Enabled     Up
Active           All
```

- **show detail**

  View forwarding table and VLAN group usage for shared interfaces.

```
Firepower# scope fabric-interconnect
DFirepower /fabric-interconnect # show detail

Fabric Interconnect:
    ID: A
    Product Name: Cisco FPR9K-SUP
    PID: FPR9K-SUP
    VID: V02
    Vendor: Cisco Systems, Inc.
    Serial (SN): JAD104807YN
    HW Revision: 0
    Total Memory (MB): 16185
    OOB IP Addr: 10.10.5.14
    OOB Gateway: 10.10.5.1
    OOB Netmask: 255.255.255.0
    OOB IPv6 Address: ::
    OOB IPv6 Gateway: ::
    Prefix: 64
    Operability: Operable
    Thermal Status: Ok
    Ingress VLAN Group Entry Count (Current/Max): 0/500
    Switch Forwarding Path Entry Count (Current/Max): 16/1021
    Current Task 1:
    Current Task 2:
    Current Task 3:
```

- **show subinterface**

  Shows subinterfaces for a given interface.

```
Firepower# scope eth-uplink
Firepower /eth-uplink # scope fabric a
Firepower /eth-uplink/fabric # enter interface ethernet1/8
Firepower /eth-uplink/fabric/interface # show subinterface
Sub Interface:
    Sub-If Id  Sub-Interface Name VLAN        Port Type
    ---------- ------------------ ----------- ---------
            10 Ethernet1/8.10     11          Data
            11 Ethernet1/8.11     12          Data
```

- **show mac-address**

  Shows MAC address assignments for container instance interfaces.

```
Firepower# scope ssa
Firepower /ssa # scope auto-macpool
Firepower /ssa/auto-macpool # show mac-address
Mac Address Item:
    Mac Address          Owner Profile            Owner Name
    -------------------- ------------------------ ----------
    A2:46:C4:00:00:1E    ftd13                    Port-channel14
    A2:46:C4:00:00:20    ftd14                    Port-channel15
    A2:46:C4:00:01:7B    ftd1                     Ethernet1/3
    A2:46:C4:00:01:7C    ftd12                    Port-channel11
    A2:46:C4:00:01:7D    ftd13                    Port-channel14
    A2:46:C4:00:01:7E    ftd14                    Port-channel15
```

```
A2:46:C4:00:01:7F    ftd1                 Ethernet1/2
A2:46:C4:00:01:80    ftd12                Ethernet1/2
A2:46:C4:00:01:81    ftd13                Ethernet1/2
A2:46:C4:00:01:82    ftd14                Ethernet1/2
A2:46:C4:00:01:83    ftd2                 Ethernet3/1/4
A2:46:C4:00:01:84    ftd2                 Ethernet3/1/1
A2:46:C4:00:01:85    ftd2                 Ethernet3/1/3
A2:46:C4:00:01:86    ftd2                 Ethernet3/1/2
A2:46:C4:00:01:87    ftd2                 Ethernet1/2
A2:46:C4:00:01:88    ftd1                 Port-channel21
A2:46:C4:00:01:89    ftd1                 Ethernet1/8
```

Troubleshooting Interfaces

Error: The Switch Forwarding Path has 1076 entries and exceeds the limit of 1024. If you are adding an interface, reduce the number of shared interfaces assigned to logical devices, reduce the number of logical devices sharing interfaces, or use non-shared subinterfaces instead. If you are deleting a subinterface, you are seeing this message because the remaining configuration is no longer optimized to fit within the Switch Forwarding Path table. See the FXOS configuration guide for troubleshooting information about the deletion use case. Use 'show detail' under scope 'fabric-interconnect' to view the current Switch Forwarding Path Entry Count.

If you see this error when trying to delete a shared subinterface from a logical device, it is because your new configuration is not following this guideline for shared subinterfaces: use the same set of subinterfaces with the same group of logical devices. If you delete a shared subinterface from one logical device, you can end up with more VLAN groups and therefore less efficient usage of the forwarding table. To work around this situation, you need to add and delete shared subinterfaces simultaneously using the CLI so that you maintain the same set of subinterfaces for the same group of logical devices.

See the following scenarios for more information. These scenarios start with the following interfaces and logical devices:

- Shared subinterface set on the same parent: Port-Channel1.100 (VLAN 100), Port-Channel1.200 (VLAN 200), Port-Channel1.300 (VLAN 300)
- Logical device group: LD1, LD2, LD3, and LD4

Scenario 1: Remove a subinterface from one logical device, but leave it assigned to other logical devices

Do not remove the subinterface. Instead, just disable it in the application configuration. If you have to remove the subinterface, you will need to reduce the number of shared interfaces in general to continue to fit in the forwarding table.

Scenario 2: Remove all subinterfaces in the set from one logical device

Remove all subinterfaces in the set from the logical device at the CLI, and then save the configuration so that the removal is simultaneous.

1. View the VLAN groups for reference. In the following output, group 1 includes VLAN 100, 200, and 300, representing the 3 shared subinterfaces.

```
firepower# connect fxos
[...]
firepower(fxos)# show ingress-vlan-groups
```

```
ID   Class ID  Status         INTF         Vlan Status
1    1         configured
                                          100  present
                                          200  present
                                          300  present
2048 512       configured
                                          0    present
2049 511       configured
                                          0    present
firepower(fxos)# exit
firepower#
```

2. View the shared subinterfaces assigned to the logical device you want to change.

```
firepower# scope ssa
firepower /ssa # scope logical-device LD1
firepower /ssa/logical-device # show external-port-link

External-Port Link:
    Name                          Port or Port Channel Name Port Type          App Name
   Description
    ------------------------------ ------------------------ ------------------ ----------
 -----------
    Ethernet14_ftd                 Ethernet1/4              Mgmt               ftd
    PC1.100_ftd                    Port-channel1.100        Data Sharing       ftd
    PC1.200_ftd                    Port-channel1.200        Data Sharing       ftd
    PC1.300_ftd                    Port-channel1.300        Data Sharing       ftd
```

3. Remove the subinterfaces from the logical device, and then save the configuration.

```
firepower /ssa/logical-device # delete external-port-link PC1.100_ftd
firepower /ssa/logical-device* # delete external-port-link PC1.200_ftd
firepower /ssa/logical-device* # delete external-port-link PC1.300_ftd
firepower /ssa/logical-device* # commit-buffer
firepower /ssa/logical-device #
```

If you had committed the configuration in the middle, you would have ended up with 2 VLAN groups, which could have generated the switch forwarding path error and prevented you from saving the configuration.

Scenario 3: Remove a subinterface from all logical devices in the group

Remove the subinterface from all logical devices in the group at the CLI, and then save the configuration so that the removal is simultaneous. For example:

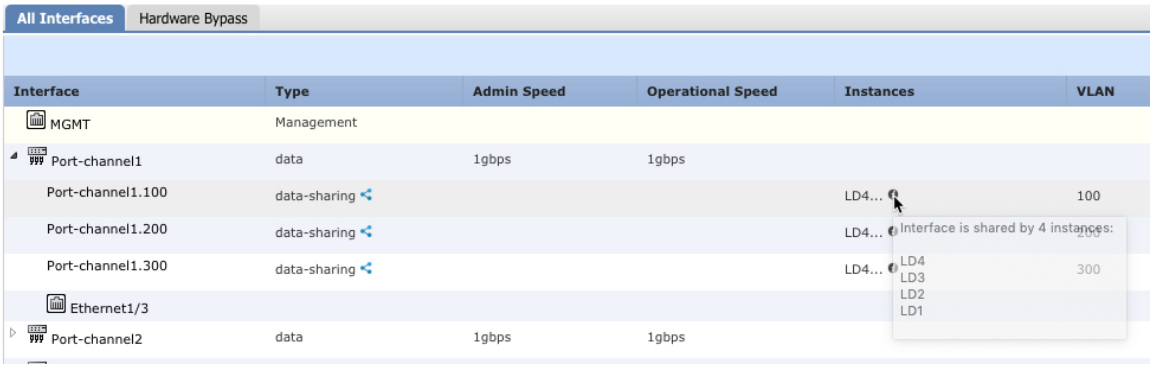
1. View the VLAN groups for reference. In the following output, group 1 includes VLAN 100, 200, and 300, representing the 3 shared subinterfaces.

```
firepower# connect fxos
[...]
firepower(fxos)# show ingress-vlan-groups
ID   Class ID  Status         INTF         Vlan Status
1    1         configured
                                          100  present
                                          200  present
                                          300  present
2048 512       configured
                                          0    present
```

```
2049 511       configured
                                          0     present
```

2. View the interfaces assigned to each logical device, and note the shared subinterfaces in common. If they are on the same parent interface, they will belong to one VLAN group, and should match the **show ingress-vlan-groups** list. In Firepower Chassis Manager, you can hover over each shared subinterface to see which instances it is allocated to.

Figure 6: Instances per shared interface



At the CLI, you can view characteristics of all logical devices, including the allocated interfaces.

```
firepower# scope ssa
firepower /ssa # show logical-device expand

Logical Device:
    Name: LD1
    Description:
    Slot ID: 1
    Mode: Standalone
    Oper State: Ok
    Template Name: ftd

    External-Port Link:
        Name: Ethernet14_ftd
        Port or Port Channel Name: Ethernet1/4
        Port Type: Mgmt
        App Name: ftd
        Description:

        Name: PC1.100_ftd
        Port or Port Channel Name: Port-channel1.100
        Port Type: Data Sharing
        App Name: ftd
        Description:

        Name: PC1.200_ftd
        Port or Port Channel Name: Port-channel1.200
        Port Type: Data Sharing
        App Name: ftd
        Description:

        System MAC address:
            Mac Address
            -----------
            A2:F0:B0:00:00:25

        Name: PC1.300_ftd
```

```
        Port or Port Channel Name: Port-channel1.300
        Port Type: Data Sharing
        App Name: ftd
        Description:

[...]

    Name: LD2
    Description:
    Slot ID: 1
    Mode: Standalone
    Oper State: Ok
    Template Name: ftd

    External-Port Link:
        Name: Ethernet14_ftd
        Port or Port Channel Name: Ethernet1/4
        Port Type: Mgmt
        App Name: ftd
        Description:

        Name: PC1.100_ftd
        Port or Port Channel Name: Port-channel1.100
        Port Type: Data Sharing
        App Name: ftd
        Description:

        Name: PC1.200_ftd
        Port or Port Channel Name: Port-channel1.200
        Port Type: Data Sharing
        App Name: ftd
        Description:

        System MAC address:
            Mac Address
            -----------
            A2:F0:B0:00:00:28

        Name: PC1.300_ftd
        Port or Port Channel Name: Port-channel1.300
        Port Type: Data Sharing
        App Name: ftd
        Description:

[...]

    Name: LD3
    Description:
    Slot ID: 1
    Mode: Standalone
    Oper State: Ok
    Template Name: ftd

    External-Port Link:
        Name: Ethernet14_ftd
        Port or Port Channel Name: Ethernet1/4
        Port Type: Mgmt
        App Name: ftd
        Description:

        Name: PC1.100_ftd
        Port or Port Channel Name: Port-channel1.100
        Port Type: Data Sharing
        App Name: ftd
```

```
        Description:

        Name: PC1.200_ftd
        Port or Port Channel Name: Port-channel1.200
        Port Type: Data Sharing
        App Name: ftd
        Description:

        System MAC address:
            Mac Address
            -----------
            A2:F0:B0:00:00:2B

        Name: PC1.300_ftd
        Port or Port Channel Name: Port-channel1.300
        Port Type: Data Sharing
        App Name: ftd
        Description:

[...]

    Name: LD4
    Description:
    Slot ID: 1
    Mode: Standalone
    Oper State: Ok
    Template Name: ftd

    External-Port Link:
        Name: Ethernet14_ftd
        Port or Port Channel Name: Ethernet1/4
        Port Type: Mgmt
        App Name: ftd
        Description:

        Name: PC1.100_ftd
        Port or Port Channel Name: Port-channel1.100
        Port Type: Data Sharing
        App Name: ftd
        Description:

        Name: PC1.200_ftd
        Port or Port Channel Name: Port-channel1.200
        Port Type: Data Sharing
        App Name: ftd
        Description:

        System MAC address:
            Mac Address
            -----------
            A2:F0:B0:00:00:2E

        Name: PC1.300_ftd
        Port or Port Channel Name: Port-channel1.300
        Port Type: Data Sharing
        App Name: ftd
        Description:

[...]
```

3. Remove the subinterface from each logical device, and then save the configuration.

```
firepower /ssa # scope logical device LD1
```

```
firepower /ssa/logical-device # delete external-port-link PC1.300_ftd
firepower /ssa/logical-device* # exit
firepower /ssa* # scope logical-device LD2
firepower /ssa/logical-device* # delete external-port-link PC1.300_ftd
firepower /ssa/logical-device* # exit
firepower /ssa* # scope logical-device LD3
firepower /ssa/logical-device* # delete external-port-link PC1.300_ftd
firepower /ssa/logical-device* # exit
firepower /ssa* # scope logical-device LD4
firepower /ssa/logical-device* # delete external-port-link PC1.300_ftd
firepower /ssa/logical-device* # commit-buffer
firepower /ssa/logical-device #
```

If you had committed the configuration in the middle, you would have ended up with 2 VLAN groups, which could have generated the switch forwarding path error and prevented you from saving the configuration.

Scenario 4: Add a subinterface to one or more logical devices

Add the subinterface to *all* logical devices in the group at the CLI, and then save the configuration so that the addition is simultaneous.

1. Add the subinterface to each logical device, and then save the configuration.

```
firepower# scope ssa
firepower /ssa # scope logical-device LD1
firepower /ssa/logical-device # create external-port-link PC1.400_ftd Port-channel1.400
 ftd
firepower /ssa/logical-device/external-port-link* # exit
firepower /ssa/logical-device* # exit
firepower /ssa # scope logical-device LD2
firepower /ssa/logical-device # create external-port-link PC1.400_ftd Port-channel1.400
 ftd
firepower /ssa/logical-device/external-port-link* # exit
firepower /ssa/logical-device* # exit
firepower /ssa # scope logical-device LD3
firepower /ssa/logical-device # create external-port-link PC1.400_ftd Port-channel1.400
 ftd
firepower /ssa/logical-device/external-port-link* # exit
firepower /ssa/logical-device* # exit
firepower /ssa # scope logical-device LD4
firepower /ssa/logical-device # create external-port-link PC1.400_ftd Port-channel1.400
 ftd
firepower /ssa/logical-device/external-port-link* # commit-buffer
firepower /ssa/logical-device/external-port-link #
```

   If you had committed the configuration in the middle, you would have ended up with 2 VLAN groups, which could have generated the switch forwarding path error and prevented you from saving the configuration.

2. You can check that the Port-channel1.400 VLAN ID was added to VLAN group 1.

```
firepower /ssa/logical-device/external-port-link # connect fxos
[...]
firepower(fxos)# show ingress-vlan-groups
ID   Class ID  Status         INTF         Vlan Status
1    1         configured
                                          200  present
                                          100  present
                                          300  present
                                          400  present
```

```
2048 512       configured
                                                0    present
2049 511       configured
                                                0    present
firepower(fxos)# exit
firepower /ssa/logical-device/external-port-link #
```

History for Interfaces

Feature Name	Platform Releases	Feature Information
Synchronization between the Firepower Threat Defense operational link state and the physical link state	2.9.1	The chassis can now synchronize the Firepower Threat Defense operational link state with the physical link state for data interfaces. Currently, interfaces will be in an Up state as long as the FXOS admin state is up and the physical link state is up. The Firepower Threat Defense application interface admin state is not considered. Without synchronization from Firepower Threat Defense, data interfaces can be in an Up state physically before the Firepower Threat Defense application has completely come online, for example, or can stay Up for a period of time after you initiate an Firepower Threat Defense shutdown. For inline sets, this state mismatch can result in dropped packets because external routers may start sending traffic to the Firepower Threat Defense before the Firepower Threat Defense can handle it. This feature is disabled by default, and can be enabled per logical device in FXOS. **Note** This feature is not supported for clustering, container instances, or an Firepower Threat Defense with a Radware vDP decorator. It is also not supported for the ASA. New/Modified Firepower Chassis Manager screens: **Logical Devices > Enable Link State** New/Modified FXOS commands: **set link-state-sync enabled**, **show interface expand detail**
Support for VLAN subinterfaces on a Cluster type interface (multi-instance use only)	2.8.1	For use with multi-instance clusters, you can now create VLAN subinterfaces on cluster type interfaces. Because each cluster requires a unique cluster control link, VLAN subinterfaces provide a simple method to fulfill this requirement. You can alternatively assign a dedicated EtherChannel per cluster. Multiple Cluster type interfaces are now allowed. New/Modified commands: **set port-type cluster**
Support for 500 VLANs, without contingencies	2.7.1	Previously, the device supported between 250 and 500 VLANs, depending on the number of parent interfaces and other deployment decisions. You can now use 500 VLANs in all cases.

Feature Name	Platform Releases	Feature Information
VLAN subinterfaces for use with container instances	2.4.1	To provide flexible physical interface use, you can create VLAN subinterfaces in FXOS and also share interfaces between multiple instances. **Note** Requires Firepower Threat Defense Version 6.3 or later. New/Modified commands: **create subinterface, set vlan, show interface,show subinterface** New/Modified FMC screens: **Devices** > **Device Management** > **Edit** icon **> Interfaces** tab
Data-sharing interfaces for container instances	2.4.1	To provide flexible physical interface use, you can share interfaces between multiple instances. **Note** Requires Firepower Threat Defense Version 6.3 or later. New/Modified commands: **set port-type data-sharing, show interface**
Support for data EtherChannels in On mode	2.4.1	You can now set data and data-sharing EtherChannels to either Active LACP mode or to On mode. Other types of EtherChannels only support Active mode. New/Modified commands: **set port-channel-mode**
Support for EtherChannels in Firepower Threat Defense inline sets	2.1.1	You can now use EtherChannels in a Firepower Threat Defense inline set.
Inline set link state propagation support for the Firepower Threat Defense	2.0.1	When you configure an inline set in the Firepower Threat Defense application and enable link state propagation, the Firepower Threat Defense sends inline set membership to the FXOS chassis. Link state propagation means that the chassis automatically brings down the second interface in the inline interface pair when one of the interfaces in an inline set goes down. New/Modified commands: **show fault |grep link-down**, **show interface detail**
Support for Hardware bypass network modules for the Firepower Threat Defense	2.0.1	Hardware Bypass ensures that traffic continues to flow between an inline interface pair during a power outage. This feature can be used to maintain network connectivity in the case of software or hardware failures. New/Modified FMC screens: **Devices** > **Device Management** > **Interfaces** > **Edit Physical Interface**
Firepower-eventing type interface for Firepower Threat Defense	1.1.4	You can specify an interface as firepower-eventing for use with the Firepower Threat Defense. This interface is a secondary management interface for Firepower Threat Defense devices. To use this interface, you must configure its IP address and other parameters at the Firepower Threat Defense CLI. For example, you can separate management traffic from events (such as web events). See the "Management Interfaces" section in the FMC configuration guide *System Configuration* chapter. New/Modified FXOS commands: **set port-type firepower-eventing, show interface**