

Transparent or Routed Firewall Mode

This chapter describes how to set the firewall mode to routed or transparent, as well as how the firewall works in each firewall mode.

Note The firewall mode only affects regular firewall interfaces, and not IPS-only interfaces such as inline sets or passive interfaces. IPS-only interfaces can be used in both firewall modes. See Inline Sets and Passive Interfaces for more information about IPS-only interfaces. Inline sets might be familiar to you as "transparent inline sets," but the inline interface type is unrelated to the transparent firewall mode described in this chapter or the firewall-type interfaces.

Caution

- Use FTD CLI commands to set "Firewall Mode."

- Firewall mode, on page 1
- Default settings, on page 11
- Guidelines for firewall mode, on page 11
- Set the firewall mode, on page 12

Firewall mode

A Firewall Threat Defense device supports two firewall modes for regular firewall interfaces:

- Routed Firewall mode
- Transparent Firewall mode

Routed firewall mode

In routed mode, the Firewall Threat Defense device is considered to be a router hop in the network. Each interface that you want to route between is on a different subnet.

Integrated routing and bridging features

With Integrated Routing and Bridging, you can use a "bridge group" where you group together multiple interfaces on a network, and the Firewall Threat Defense device uses bridging techniques to pass traffic between the interfaces. Each bridge group includes a Bridge Virtual Interface (BVI) to which you assign an IP address on the network. The Firewall Threat Defense device routes between BVIs and regular routed interfaces. If you do not need clustering or EtherChannel member interfaces, you might consider using routed mode instead of transparent mode. In routed mode, you can have one or more isolated bridge groups like in transparent mode, but also have normal routed interfaces as well for a mixed deployment.

Transparent firewall mode

Traditionally, a firewall is a routed hop and acts as a default gateway for hosts that connect to one of its screened subnets. A transparent firewall, on the other hand, is a Layer 2 firewall that acts like a “bump in the wire,” or a “stealth firewall,” and is not seen as a router hop to connected devices. However, like any other firewall, access control between interfaces is controlled, and all of the usual firewall checks are in place.

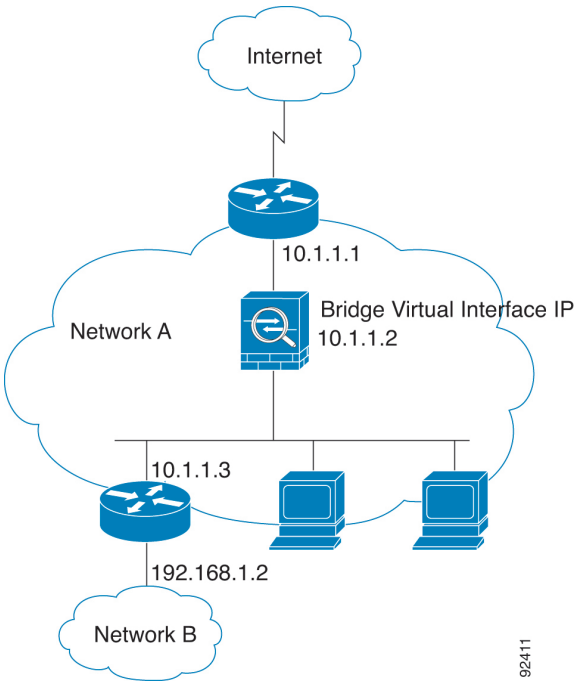
Layer 2 connectivity is achieved by using a "bridge group" where you group together the inside and outside interfaces for a network, and the Firewall Threat Defense device uses bridging techniques to pass traffic between the interfaces. Each bridge group includes a Bridge Virtual Interface (BVI) to which you assign an IP address on the network. You can have multiple bridge groups for multiple networks. In transparent mode, these bridge groups cannot communicate with each other.

Transparent firewall network usage

The Firewall Threat Defense device connects the same network between its interfaces. Because the firewall is not a routed hop, you can easily introduce a transparent firewall into an existing network.

The figure shows a typical transparent firewall network where the outside devices are on the same subnet as the inside devices. The inside router and hosts appear to be directly connected to the outside router.

Figure 1: Transparent firewall network



Passing traffic for routed-mode features

For features that are not directly supported on the transparent firewall, you can allow traffic to pass through so that upstream and downstream routers can support the functionality.

Supported traffic types

For example, by using an access rule, you can allow DHCP traffic (instead of the unsupported DHCP relay feature) or multicast traffic such as that created by IP/TV. You can also establish routing protocol adjacencies through a transparent firewall; you can allow OSPF, RIP, EIGRP, or BGP traffic through based on an access rule. Likewise, protocols like HSRP or VRRP can pass through the Firewall Threat Defense device.

Bridge groups

A bridge group is a group of interfaces that the Firewall Threat Defense device bridges instead of routes. Bridge groups are supported in both transparent and routed firewall mode. Like any other firewall interfaces, access control between interfaces is controlled, and all of the usual firewall checks are in place.

Bridge virtual interfaces

Each bridge group includes a Bridge Virtual Interface (BVI). The Firewall Threat Defense device uses the BVI IP address as the source address for packets originating from the bridge group. The BVI IP address must be on the same subnet as the bridge group member interfaces. The BVI does not support traffic on secondary networks; only traffic on the same network as the BVI IP address is supported.

BVI functionality by mode

In transparent mode: Only bridge group member interfaces are named and can be used with interface-based features.

In routed mode: The BVI acts as the gateway between the bridge group and other routed interfaces. To route between bridge groups/routed interfaces, you must name the BVI. For some interface-based features, you can use the BVI itself:

- DHCPv4 server—Only the BVI supports the DHCPv4 server configuration.
- Static routes—You can configure static routes for the BVI; you cannot configure static routes for the member interfaces.
- Syslog server and other traffic sourced from the Firewall Threat Defense device—When specifying a syslog server (or SNMP server, or other service where the traffic is sourced from the Firewall Threat Defense device), you can specify either the BVI or a member interface.

If you do not name the BVI in routed mode, then the Firewall Threat Defense device does not route bridge group traffic. This configuration replicates transparent firewall mode for the bridge group. If you do not need clustering or EtherChannel member interfaces, you might consider using routed mode instead. In routed mode, you can have one or more isolated bridge groups like in transparent mode, but also have normal routed interfaces as well for a mixed deployment.

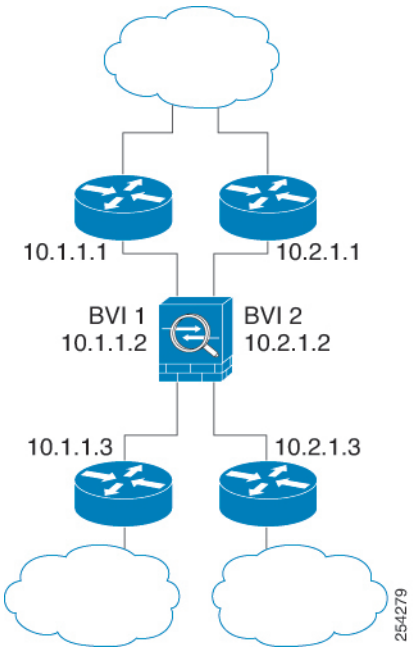
Bridge groups in transparent firewall mode

Bridge group traffic is isolated from other bridge groups; traffic is not routed to another bridge group within the Firewall Threat Defense device , and traffic must exit the Firewall Threat Defense device before it is routed by an external router back to another bridge group in the Firewall Threat Defense device. Although the bridging functions are separate for each bridge group, many other functions are shared between all bridge groups. For example, all bridge groups share a syslog server or AAA server configuration.

You can include multiple interfaces per bridge group. See Guidelines for firewall mode, on page 11 for the exact number of bridge groups and interfaces supported. If you use more than 2 interfaces per bridge group, you can control communication between multiple segments on the same network, and not just between inside and outside. For example, if you have three inside segments that you do not want to communicate with each other, you can put each segment on a separate interface, and only allow them to communicate with the outside interface. Or you can customize the access rules between interfaces to allow only as much access as desired.

This figure shows two networks connected to the Firewall Threat Defense device, which has two bridge groups.

Figure 2: Transparent firewall network with two bridge groups



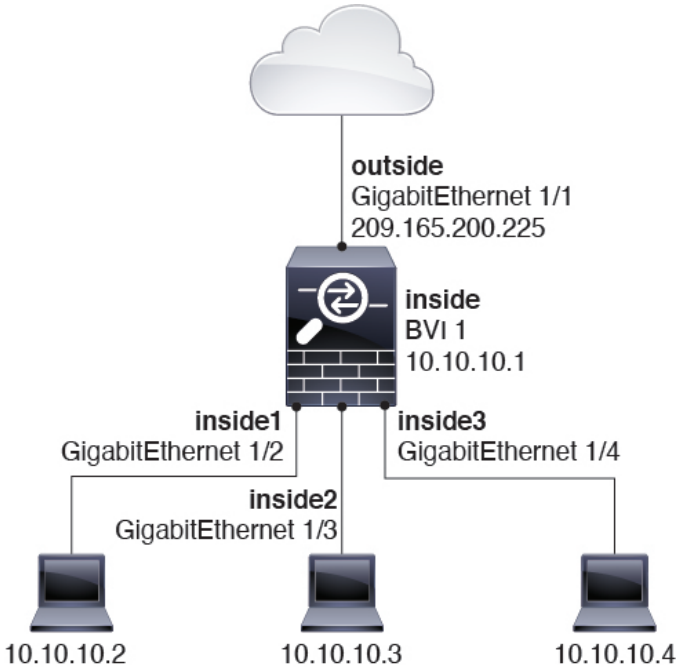
Bridge groups in routed firewall mode

Bridge group traffic can be routed to other bridge groups or routed interfaces. You can choose to isolate bridge group traffic by not assigning a name to the BVI interface for the bridge group. If you name the BVI, then the BVI participates in routing like any other regular interface.

Bridge group usage and configuration

One use for a bridge group in routed mode is to use extra interfaces on the Firewall Threat Defense instead of an external switch. For example, the default configuration for some devices include an outside interface as a regular interface, and then all other interfaces assigned to the inside bridge group. Because the purpose of this bridge group is to replace an external switch, you need to configure an access policy so all bridge group interfaces can freely communicate.

Figure 3: Routed firewall network with an inside bridge group and an outside routed interface



Allow layer 3 traffic

This topic describes how different types of Layer 3 traffic are handled through bridge groups and the access rule requirements for each traffic type.

- Unicast IPv4 and IPv6 traffic requires an access rule to be allowed through the bridge group.
- ARPs are allowed through the bridge group in both directions without an access rule. ARP traffic can be controlled by ARP inspection.
- IPv6 neighbor discovery and router solicitation packets can be passed using access rules.
- Broadcast and multicast traffic can be passed using access rules.

Allowed MAC addresses

These destination MAC addresses are allowed through the bridge group if allowed by your access policy (For more information, refer to Allow layer 3 traffic, on page 6). Any MAC address not on this list is dropped.

- TRUE broadcast destination MAC address equal to FFFF.FFFF.FFFF
- IPv4 multicast MAC addresses from 0100.5E00.0000 to 0100.5EFE.FFFF
- IPv6 multicast MAC addresses from 3333.0000.0000 to 3333.FFFF.FFFF
- BPDU multicast address equal to 0100.0CCC.CCCD

BPDUs handling

To prevent loops using the Spanning Tree Protocol, BPDUs are passed by default.

By default BPDUs are also forwarded for advanced inspection, which is unnecessary for this type of packet, and which can cause problems if they are blocked due to an inspection restart, for example. We recommend that you always exempt BPDUs from advanced inspection. To do so, use FlexConfig to configure an EtherType ACL that trusts BPDUs and exempts them from advanced inspection on each member interface.

The FlexConfig object should deploy the following commands, where you replace <if-name> with an interface name. Add as many access-group commands as needed to cover each bridge group member interface on the device. You can also choose a different name for the ACL.

```
access-list permit-bpdu ethertype trust bpdu
access-group permit-bpdu in interface <if-name>
```

MAC address and route lookups

For traffic within a bridge group, the outgoing interface of a packet is determined by performing a destination MAC address lookup instead of a route lookup.

Route lookups, however, are necessary for these situations:

- Traffic originating on the Firewall Threat Defense device—Add a default/static route on the Firewall Threat Defense device for traffic destined for a remote network where a syslog server, for example, is located.
- SSL policy enabled in transparent firewall mode—
  - TLS 1.3 traffic passes through the Firewall Threat Defense device device.
  - Firewall Threat Defense device acts as a TCP proxy. It terminates the client-side TCP connection and initiates a separate server-side connection. The Firewall Threat Defense device TCP stack owns the session state.
  - For idle proxied sessions, Firewall Threat Defense device generates TCP ACK keepalive probes to preserve the connection state. These are not passthrough packets—the firewall originates them and sends them toward the client or server depending on the state of the TLS transit connection.
  - Because the Firewall Threat Defense device originates these keepalives, it must perform an adjacency table lookup (next-hop or egress MAC resolution) even in transparent mode.
  - If the adjacency lookup fails for one of these proxy-generated packets, the Firewall Threat Defense device logs syslog 110003.

    To prevent these syslog messages, configure routes on the Firewall Threat Defense device for the transit connection endpoints (client and server IP addresses). Proper routing enables successful adjacency lookups for keepalive packets.

    If the Firewall Threat Defense device successfully sends a TCP keepalive and receives a reply, it keeps the transit connection active. If the device cannot send the keepalives, or receives no reply, it removes the transit connection after approximately 240 seconds.
- Voice over IP (VoIP) and TFTP traffic, and the endpoint is at least one hop away—Add a static route on the Firewall Threat Defense device for traffic destined for the remote endpoint so that secondary connections are successful. The Firewall Threat Defense device creates a temporary "pinhole" in the access control policy to allow the secondary connection; and because the connection might use a different set of IP addresses than the primary connection, the Firewall Threat Defense device needs to perform a route lookup to install the pinhole on the correct interface.

Affected applications include:

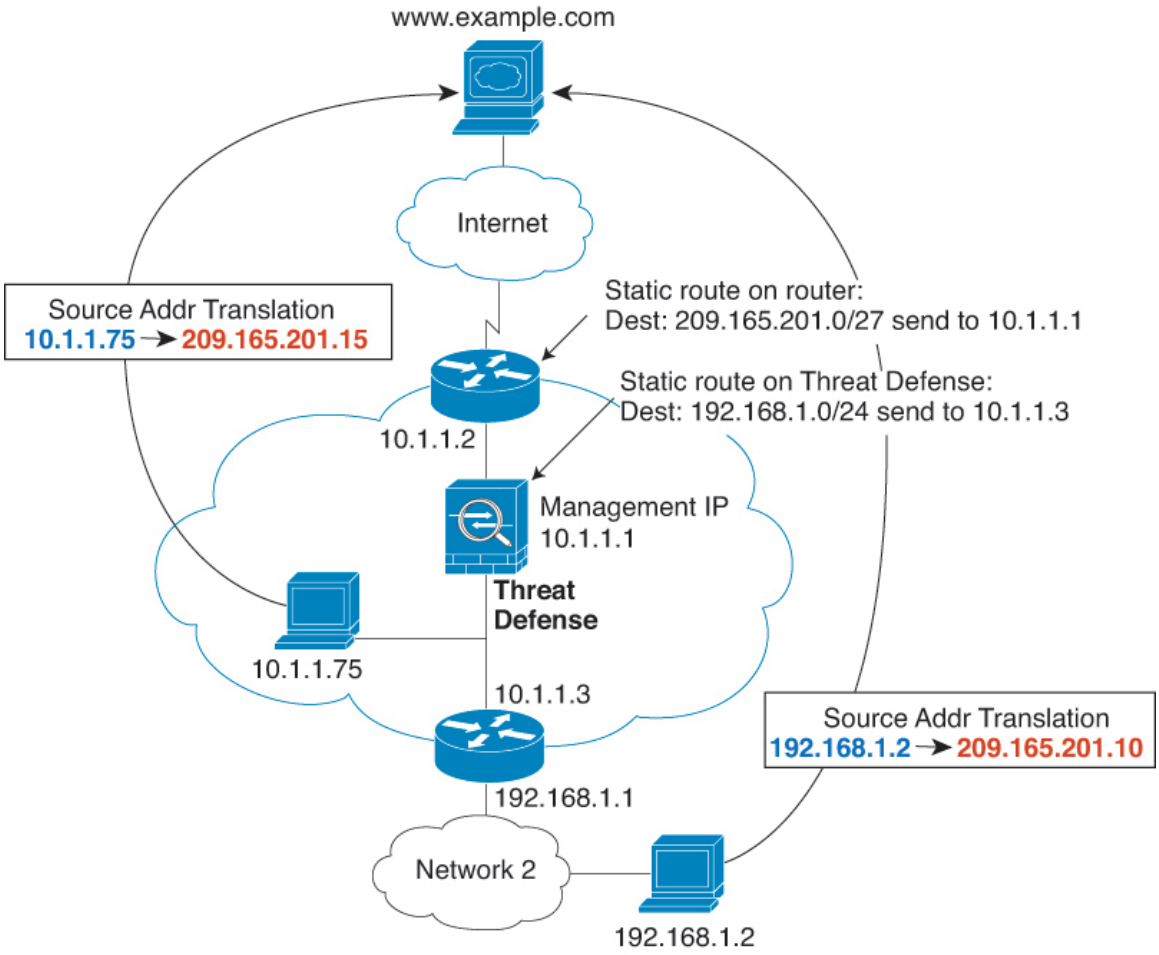
- H.323
- RTSP
- SIP and Skinny (SCCP)
- SQL*Net
- SunRPC
- TFTP

- Traffic at least one hop away for which the Firewall Threat Defense device performs NAT—Configure a static route on the Firewall Threat Defense device for traffic destined for the remote network. You also need a static route on the upstream router for traffic destined for the mapped addresses to be sent to the Firewall Threat Defense device.

  This routing requirement is also true for embedded IP addresses for VoIP and DNS with NAT enabled, and the embedded IP addresses are at least one hop away. The Firewall Threat Defense device needs to identify the correct egress interface so it can perform the translation.

NAT within a bridge group

Figure 4: NAT example: NAT within a bridge group



Unsupported features for bridge groups in transparent mode

This table lists the features that are not supported in bridge groups in transparent mode.

Table 1: Unsupported features in transparent mode

Feature	Description
Dynamic DNS	—
DHCP relay	The transparent firewall can act as a DHCPv4 server, but it does not support DHCP relay. DHCP relay is not required because you can allow DHCP traffic to pass through using two access rules: one that allows DCHP requests from the inside interface to the outside, and one that allows the replies from the server in the other direction.

Feature	Description
Dynamic routing protocols	You can, however, add static routes for traffic originating on the Firewall Threat Defense device for bridge group member interfaces. You can also allow dynamic routing protocols through the Firewall Threat Defense device using an access rule.
Multicast IP routing	You can allow multicast traffic through the Firewall Threat Defense device by allowing it in an access rule.
QoS	—
VPN termination for through traffic	The transparent firewall supports site-to-site VPN tunnels for management connections only on bridge group member interfaces. It does not terminate VPN connections for traffic through the Firewall Threat Defense device. You can pass VPN traffic through the Firewall Threat Defense device using an access rule, but it does not terminate non-management connections.

Unsupported features for bridge groups in routed mode

This table lists the features are not supported in bridge groups in routed mode.

Table 2: Unsupported features in routed mode

Feature	Description
EtherChannel member interfaces	Only physical interfaces, redundant interfaces, and subinterfaces are supported as bridge group member interfaces. Diagnostic interfaces are also not supported.
Clustering	Bridge groups are not supported in clustering.
Dynamic DNS	—
DHCP relay	The routed firewall can act as a DHCPv4 server, but it does not support DHCP relay on BVIs or bridge group member interfaces.
Dynamic routing protocols	You can, however, add static routes for BVIs. You can also allow dynamic routing protocols through the Firewall Threat Defense device using an access rule. Non-bridge group interfaces support dynamic routing.
Multicast IP routing	You can allow multicast traffic through the Firewall Threat Defense device by allowing it in an access rule. Non-bridge group interfaces support multicast routing.
QoS	Non-bridge group interfaces support QoS.

Feature	Description
VPN termination for through traffic	You cannot terminate a VPN connection on the BVI. Non-bridge group interfaces support VPN. Bridge group member interfaces support site-to-site VPN tunnels for management connections only. It does not terminate VPN connections for traffic through the Firewall Threat Defense device. You can pass VPN traffic through the bridge group using an access rule, but it does not terminate non-management connections.

Default settings

Lists the default settings for firewall mode.

Bridge group defaults

By default, all ARP packets are passed within the bridge group.

Guidelines for firewall mode

Review these guidelines for firewall mode.

Bridge group limits and network requirements

- You can create up to 250 bridge groups, with 64 interfaces per bridge group.
- Each directly-connected network must be on the same subnet.
- The Firewall Threat Defense device does not support traffic on secondary networks; only traffic on the same network as the BVI IP address is supported.

BVI IP address requirements

- An IP address for the BVI is required for each bridge group for to-the-device and from-the-device management traffic, as well as for data traffic to pass through the Firewall Threat Defense device. For IPv4 traffic, specify an IPv4 address. For IPv6 traffic, specify an IPv6 address.
- You can only configure IPv6 addresses manually.
- The BVI IP address must be on the same subnet as the connected network. You cannot set the subnet to a host subnet (255.255.255.255).

Unsupported bridge group members

- Management interfaces are not supported as bridge group members.
- For multi-instance mode, shared interfaces are not supported for bridge group member interfaces (in transparent mode or routed mode).

- For the Firewall Threat Defense Virtual on VMware with bridged ixgbevf interfaces, transparent mode is not supported, and bridge groups are not supported in routed mode.
- For the Firepower 2100 series, bridge groups are not supported in routed mode.
- For the / 1010/ , you cannot mix logical VLAN interfaces and physical firewall interfaces in the same bridge group.
- For the Firepower 4100/9300, data-sharing interfaces are not supported as bridge group members.

Transparent mode requirements and limitations

- In transparent mode, you must use at least 1 bridge group; data interfaces must belong to a bridge group.
- In transparent mode, do not specify the BVI IP address as the default gateway for connected devices; devices need to specify the router on the other side of the Firewall Threat Defense as the default gateway.
- In transparent mode, the default route, which is required to provide a return path for management traffic, is only applied to management traffic from one bridge group network. This is because the default route specifies an interface in the bridge group as well as the router IP address on the bridge group network, and you can only define one default route. If you have management traffic from more than one bridge group network, you need to specify a regular static route that identifies the network from which you expect management traffic.
- In transparent mode, PPPoE is not supported for the Diagnostic interface.
- Transparent mode is not supported on threat defense virtual instances deployed on Amazon Web Services, Microsoft Azure, Google Cloud Platform, and Oracle Cloud Infrastructure.

Routed mode requirements and limitations

- In routed mode, to route between bridge groups and other routed interfaces, you must name the BVI.
- In routed mode, Firewall Threat Defense-defined EtherChannel interfaces are not supported as bridge group members. EtherChannels on the Firepower 4100/9300 can be bridge group members.

Traffic handling limitation

- Bidirectional Forwarding Detection (BFD) echo packets are not allowed through the Firewall Threat Defense when using bridge group members. If there are two neighbors on either side of the Firewall Threat Defense running BFD, then the Firewall Threat Defense will drop BFD echo packets because they have the same source and destination IP address and appear to be part of a LAND attack.

Set the firewall mode

You can set the firewall mode when you perform the initial system setup at the CLI. We recommend setting the firewall mode during setup because changing the firewall mode erases your configuration to ensure you do not have incompatible settings. If you need to change the firewall mode later, you must do so from the CLI.

Procedure

Step 1 Unregister the Firewall Threat Defense device from the Firewall Management Center.

You cannot change the mode until you unregister the device.

a) Performance profiles are retained across firewall mode changes and can't be changed after you re-register. You must set the performance profile to Default. See the **Performance Profile** page in your platform settings policy (choose **Devices** > **Platform Settings**, and then click **Edit** (✎) for your policy).

Deploy the configuration to make these changes.

b) Choose **Devices** > **Device Management**.

c) Next to the device you want to unregister, click **More** (⋮), and then click **Delete**.

Step 2 Access the Firewall Threat Defense device CLI, preferably from the console port.

If you use SSH to the diagnostic interface, then changing the mode erases your interface configuration and you will be disconnected. You should instead connect to the management interface.

Step 3 Change the firewall mode:

configure firewall [**routed** | **transparent**]

Example:

```
> configure firewall transparent
This will destroy the current interface configurations, are you sure that you want to
proceed? [y/N] y
The firewall mode was changed successfully.
```

Step 4 Re-register with the Firewall Management Center.