



Configuring Service Policy Rules on Firewall Devices

This section describes configuring service policy rules. Service policies provide a consistent and flexible way to configure certain security appliance features, including priority queuing, application inspection, and QoS (quality of service). For example, you can use a service policy to create a timeout configuration that is specific to a particular TCP application, as opposed to one that applies to all TCP applications.

- [About Service Policy Rules, on page 1](#)
- [About TCP State Bypass , on page 2](#)
- [Priority Queues Page , on page 4](#)
- [Service Policy Rules Page , on page 5](#)
- [Configuring Traffic Flow Objects , on page 19](#)
- [Configuring TCP Maps , on page 23](#)

About Service Policy Rules

Service policy rules encompass these features:

- TCP and general connection settings (including TCP State Bypass; see [About TCP State Bypass , on page 2](#))
- Content security control (CSC)
- Application inspection
- Intrusion Prevention Services
- QoS queuing and policing
- ASA CX redirection (see [About the ASA CX , on page 18](#))
- ASA FirePOWER redirection
- User statistics for identity-based firewall policies

The configuration options for these features are presented on two pages in Security Manager—**Priority Queues** and **Rules**—accessed by navigating to Platform > Service Policy.

Priority Queuing

Priority queuing establishes two queues on an interface, a Low Latency Queuing (LLQ) priority queue and a “best effort” queue. This lets you prioritize latency-sensitive traffic like voice and video, so it is transmitted ahead of other traffic. Packets in the priority queue are always transmitted before packets in the best effort queue.

Because queues are not of infinite size, they can fill and overflow. When a queue is full, additional packets cannot get into the queue and are dropped. This is called “tail drop.” To minimize tail drop, you can increase the queue buffer size. You can also fine-tune the maximum number of packets allowed into the transmit queue. These options let you control the latency and robustness of priority queuing.

Priority queuing is a Quality of Service (QoS) feature. In Security Manager, priority queue size and transmit queue size are managed on the [Priority Queues Page , on page 4](#), while establishment of priority queuing for a traffic class is an option on the QoS tab of the Service Policy (MPC) Rule Wizard, which is accessed from the [Service Policy Rules Page , on page 5](#).

Application Inspection and QoS

Some applications require special handling by the security appliance, and specific application inspection engines are provided for this purpose. Specifically, applications that embed IP addressing information in the user data packet, or open secondary channels on dynamically assigned ports require special inspection.

Application inspection is enabled by default for many protocols, while it is disabled for others. In many cases, you can change the port which the application inspection engine monitors for traffic.

Application inspection engines work with network address translation (NAT) to help identify the location of embedded addressing information. This allows NAT to translate these embedded addresses, and to update any checksum or other fields that are affected by the translation.

Service policy rules define how specific types of application inspection are applied to different types of traffic processed by the security appliance. You can apply rules to specific interfaces, or globally to every interface.

These rules provide a means to configure security appliance features in a manner similar to the Cisco IOS software quality-of-service (QoS) CLI. For example, with service policy rules you can include IP Precedence as one of the criteria to identify traffic for rate-limiting. You can also create a timeout configuration that is specific to a particular TCP application, as opposed to one that applies to all TCP applications.

Traffic match criteria are used to define the types of traffic to which you want to apply application inspection. For example, TCP traffic on port 23 might be classified as the Telnet traffic class. You then might use the traffic class to apply connection limits.

Multiple traffic match criteria can be assigned to a single interface, but a packet will only match the first criteria within a specific service policy rule.

About TCP State Bypass

By default, all traffic that enters an ASA or FWSM is inspected using the Adaptive Security Algorithm, and is either allowed through or dropped based on the security policy. The device maximizes its firewall performance by checking the state of each packet—to determine whether this a new connection, or an established connection—and assigning it to the session management path (if it is a new connection SYN packet), the fast path (if it is an established connection), or the control-plane path (for advanced inspection).



Note TCP State Bypass is available on FWSM 3.2+ and ASA 8.2+ devices only.

TCP packets that match existing connections in the fast path can pass through the appliance without every aspect of the security policy being rechecked. This feature maximizes performance. However, the method of establishing the session in the fast path using the SYN packet, and the checks that occur in the fast path (such as TCP sequence number), require that both outbound and inbound flows for a connection pass through the same device, which is not the case in asymmetric routing environments.

For example, assume a new connection is assigned to security device 1. The SYN packet goes through the session management path, and an entry for the connection is added to the fast path table. If subsequent packets of this connection go through device 1, then the packets match the entry in the fast path, and are passed through. But if subsequent packets go to device 2, where a SYN packet did not go through the session management path, there is no entry in the fast path for the connection, and the packets are dropped.

Thus, if you have asymmetric routing configured on upstream routers, and traffic alternates between two security devices, enable TCP state bypass for those specific traffic flows. TCP state bypass alters the way sessions are established in the fast path and disables the fast path checks. TCP traffic is then treated much as a UDP connection is treated: when a non-SYN packet matching the specified networks enters the security device, and there is not a fast path entry, then the packet goes through the session management path to establish a connection in the fast path. Once in the fast path, the traffic bypasses the fast path checks.

Unsupported Features

The following features are not supported when you enable TCP state bypass:

- Application inspection – Application inspection requires both inbound and outbound traffic to go through the same security device, so application inspection is not supported with TCP state bypass.
- AAA authenticated sessions – When a user authenticates with one security device, traffic returning via the other security device will be denied because the user did not authenticate with that device.
- TCP Intercept, Maximum Embryonic Connections limit, TCP sequence number randomization – If TCP state bypass is enabled, the device does not keep track of the state of the connection, so these features are not applicable.
- Cisco CSC SSM (Content Security and Control Security Services Module) – SSM and SSC functionality cannot be used with TCP state bypass.

Compatibility with NAT

Because the translation session is established separately for each security device, be sure to configure static NAT on both devices for TCP state bypass traffic; if you use dynamic NAT, the address chosen for the session on device 1 will differ from the address chosen for the session on device 2.

Related Topics

- [About Service Policy Rules, on page 1](#)

Priority Queues Page

Priority queues let you define how traffic is prioritized in the network. You can define a series of filters based on packet characteristics to cause traffic to be placed in a higher or lower priority queue. The queue with the highest priority is serviced first until it is empty, then the lower queues are serviced in sequence.

In Security Manager, priority queue size and transmit queue size are managed on this page, while establishment of priority queuing for a traffic class is an option on the QoS tab of the Service Policy (MPC) Rule Wizard, which is accessed from the [Service Policy Rules Page](#), on page 5.

The Priority Queue Configuration dialog box is used to add and edit these queues. Refer to [Priority Queue Configuration Dialog Box](#), on page 4 for descriptions of the fields displayed in the Priority Queues table on this page.



Note Priority queuing is not available on Catalyst 6500 service modules (the Firewall Services Module and the Adaptive Security Appliance Service Module).

Navigation Path

- (Device view) Select **Platform** > **Service Policy** > **Priority Queues** from the Device Policy selector.
- (Policy view) Select **PIX/ASA/FWSM Platform** > **Service Policy** > **Priority Queues** from the Policy Type selector. Select an existing policy from the Shared Policy selector, or create a new one.

Related Topics

- [Insert/Edit Service Policy \(MPC\) Rule Wizard](#), on page 6
- [About Service Policy Rules](#), on page 1
- [Understanding Queuing Parameters](#)

Priority Queue Configuration Dialog Box

Use the Priority Queue Configuration dialog box to define and edit the priority queues on the Priority Queues page.



Note Priority queuing is not available on Catalyst 6500 service modules (the Firewall Services Module and the Adaptive Security Appliance Service Module).

Navigation Path

You open the Priority Queue Configuration dialog box by clicking the Add Row or Edit Row buttons on the [Priority Queues Page](#), on page 4.

Related Topics

- [Insert/Edit Service Policy \(MPC\) Rule Wizard](#) , on page 6
- [About Service Policy Rules](#) , on page 1
- [Understanding Queuing Parameters](#)

Field Reference

Table 1: Priority Queue Configuration Dialog Box

Element	Description
Interface Name	Specify the interface to which this rule applies; you can enter the interface name, or click Select to choose an available interface.
Queue Limit	Enter the maximum number of packets that can be queued in a priority queue before it drops data. This limit must be in the range of 0 through 2048 packets.
Transmission Ring Limit	Enter the maximum number of packets allowed into the transmit queue. This fine-tuning of the transmit queue can reduce latency and offer better performance through the transmit driver. On PIX devices, this value can range from 3 through 128 packets. On ASAs prior to version 7.2, this limit can be in the range 3 through 256 packets, while on ASAs running version 7.2 and later, the value can be in the range 3 through 512 packets.

Service Policy Rules Page

Use the Service Policy Rules page to define new service policy rules, and to edit or delete existing service policy rules.

Configuring Service Policy Rules consists of three tasks:

1. **Configure a service policy.** Create a service policy and determine the interfaces to which the service policy applies. For more information, see [Step 1. Configure a Service Policy](#) , on page 6.
2. **Configure the traffic class.** Specify the criteria you want to use to identify the traffic to which the service policy applies. For more information, see [Step 2. Configure the traffic class](#) , on page 7.
3. **Configure the actions.** Specify the actions that should be taken to protect information or resources, or to perform QoS functions for the traffic specified in this service policy. For more information, see [Step 3. Configure the MPC actions](#) , on page 8.

The three tasks are performed using the [Insert/Edit Service Policy \(MPC\) Rule Wizard](#) , on page 6. Refer to the individual task topics for descriptions of the fields displayed in the Service Policy Rules table on this page.

Navigation Path

- (Device view) Select **Platform** > **Service Policy** > **Rules** from the Device Policy selector.

- (Policy view) Select **PIX/ASA/FWSM Platform > Service Policy > Rules** from the Policy Type selector. Select an existing policy from the Shared Policy selector, or create a new one.

ASA CX Auth Proxy Configuration

The CXSC Auth Proxy button below the Service Policy Rules table opens the Add/Edit CXSC Auth Proxy Configuration dialog box, which is described in [ASA CX Auth Proxy Configuration , on page 18](#).

The CXSC Auth Proxy button is available below the Service Policy Rules table only in Device view; it is not visible in Policy view.



Note Security Manager uses “CXSC” in some places to refer to an ASA CX Security Services Processor (SSP).

Related Topics

- [About Service Policy Rules, on page 1](#)
- Standard rules table topics:
 - [Using Rules Tables](#)
 - [Filtering Tables](#)
 - [Table Columns and Column Heading Features](#)

Insert/Edit Service Policy (MPC) Rule Wizard

Use the Insert/Edit Service Policy (MPC) Rule wizard to add and edit service policy rules on the Service Policy Rules page. The Insert/Edit Service Policy (MPC) Rule wizard presents the following steps:

- [Step 1. Configure a Service Policy , on page 6](#)
- [Step 2. Configure the traffic class , on page 7](#)
- [Step 3. Configure the MPC actions , on page 8](#)



Note “MPC” refers to what is now called the Modular Policy Framework. Refer to [Using Modular Policy Framework](#) for additional information.

Navigation Path

Open the Insert/Edit Service Policy (MPC) Rule wizard by clicking the Add Row or Edit Row button on the [Service Policy Rules Page , on page 5](#).

Step 1. Configure a Service Policy

The first step in using the Insert/Edit Service Policy (MPC) Rule Wizard to configure a Service Policy Rule involves enabling the rule and specifying the interface(s) to which it is applied.

Navigation Path

Open the Insert/Edit Service Policy (MPC) Rule wizard by clicking the Add Row or Edit Row button on the [Service Policy Rules Page](#), on page 5.

Related Topics

- [Step 2. Configure the traffic class](#), on page 7
- [Step 3. Configure the MPC actions](#), on page 8

Table 2: Insert/Edit Service Policy (MPC) Rule Wizard—Step 1. Configure a Service Policy.

Element	Description
Enable The Current MPC Rule	Check this box to enable this service policy rule. You can deselect this option if you want to define the rule now, but not deploy it to the device until later.
Category	To assign the rule to a category, choose the category from the list. Categories can help you organize and identify rules and objects. For more information, see Using Category Objects .
Description	Optionally, enter a description for the service policy rule.
Global - Applies to All Interfaces	Select this option to apply the rule globally to all interfaces. This option is not compatible with matching traffic based on the source or destination IP address using an access list.
Interfaces	Select this option to apply the rule to a specific interface or group of interfaces (or interface roles), and then enter or Select the name of an interface or interface object. This selection is required if you want to match traffic based on the source or destination IP address using an access list. Note Interface-specific rules take precedence over the global service policy for a given feature. For example, if you have a global policy with FTP inspection, and an interface policy with TCP connection limits, then both FTP inspection and TCP connection limits are applied to the interface. However, if you have a global policy with FTP inspection, and an interface policy with FTP inspection, then only the interface policy FTP inspection is applied to that interface.

Step 2. Configure the traffic class

The second step in using the Insert/Edit Service Policy (MPC) Rule Wizard to configure a Service Policy Rule involves specifying the traffic class to which the rule is applied.

Specify the class to use to match traffic for this rule:

- **Use class-default As The Traffic Class**—Select this option to use the traffic class class-default for this service policy. The class-default traffic class matches all traffic.
- **Traffic Class**—Select this option to apply this rule to a specific traffic class. Enter the name of the previously defined traffic class, or click **Select** to select it from the Traffic Flows Selector.

You also can define or edit a traffic flow “on the fly” by clicking the either Create or Edit buttons in the Traffic Flows Selector. (Traffic flows are also created and edited on the Traffic Flows page of the Policy Object Manager.) See [Configuring Traffic Flow Objects](#) , on page 19 for more information.

Related Topics

- [Step 1. Configure a Service Policy](#) , on page 6
- [Step 3. Configure the MPC actions](#) , on page 8

Step 3. Configure the MPC actions

The third step in the Insert/Edit Service Policy (MPC) Rule Wizard involves specifying IPS, CXSC, FirePOWER, Connection Setting, QoS, CSC, User Statistics, ScanSafe Web Security, and NetFlow parameters for the rule; each set of parameters is presented on a separate tabbed panel.

Related Topics

- [Step 1. Configure a Service Policy](#) , on page 6
- [Step 2. Configure the traffic class](#) , on page 7

Field Reference

Table 3: Insert/Edit Service Policy (MPC) Rule Wizard—Step 3. Configure the actions.

Element	Description
Intrusion Prevention tab	
Enable IPS for this Traffic	<p>Enables or disables intrusion prevention for this traffic flow. When this box is checked, the other parameters on this panel are available.</p> <p>Note These parameters are applicable only on ASA 7.0+ devices that have an IPS module installed. See About IPS Modules on ASA Devices , on page 16 for more information.</p>

Element	Description
IPS Mode	<p>Select the operating mode for intrusion prevention:</p> <ul style="list-style-type: none"> • Inline—This mode places the IPS module directly in the traffic flow. No traffic that you identified for IPS inspection can continue through the ASA without first passing through, and being inspected by, the IPS module. This mode is the most secure because every packet identified for inspection is analyzed before being allowed through. Also, the IPS module can implement a blocking policy on a packet-by-packet basis. However, this mode can affect throughput. • Promiscuous—This mode sends a duplicate stream of traffic to the IPS module. This is less secure than Inline mode, but has little impact on traffic throughput. Unlike Inline mode, in Promiscuous mode the IPS module cannot drop the original packets, it can only block traffic by instructing the ASA to shun the traffic, or by resetting the connection on the appliance. <p>Also, while the IPS module is analyzing the traffic, a small amount of traffic may pass through the ASA before the IPS module can shun it.</p>
On IPS Card Failure	<p>Specify the action to be taken if the IPS module becomes inoperable. Select either:</p> <ul style="list-style-type: none"> • Open—Permits traffic if the module or card fails. • Close—Blocks traffic if the module or card fails.
Virtual Sensor	<p>Text box in which you can view, edit, or remove the virtual sensor in the service policy that you are adding or editing</p>
<p>CXSC tab</p> <p>Note Security Manager uses “CXSC” in places to refer to an ASA CX Security Services Processor (SSP).</p>	
Enable CXSC For This Traffic	<p>Check this box to enable redirection of this traffic flow to an ASA CX installed in the ASA. When this box is checked, the other parameters on this panel are available.</p> <p>Note These parameters are applicable only on ASA 5585-X devices running version 8.4(4)+ and ASA 55xx-X devices running version 9.1(1)+ that have an ASA CX SSP installed.</p>
On Context Security Card Failure	<p>Specify the action to be taken if the ASA CX becomes inoperable. Select either:</p> <ul style="list-style-type: none"> • Open – If the ASA CX fails for any reason, the ASA will continue to pass traffic that would otherwise be redirected to the ASA CX. • Close – If the ASA CX fails, the ASA will drop any traffic that would otherwise be redirected to the ASA CX.

Element	Description
Enable Auth Proxy	<p>Check this box to enable the authentication proxy, which is required if you want to use active authentication in the identity policies on the ASA CX. If not checked, no authentication is performed.</p> <p>Note You can change the port used for authentication proxy; see ASA CX Auth Proxy Configuration, on page 18 for more information.</p>
FirePOWER tab	
Enable FirePOWER Card For This Traffic	<p>Check this box to enable redirection of this traffic flow to an ASA FirePOWER module installed in the ASA. When this box is checked, the other parameters on this panel are available.</p> <p>Note These parameters are applicable only on ASA 55xx-X devices running version 9.2(1)+.</p>
On FirePOWER Card Failure	<p>Specify the action to be taken if the ASA FirePOWER module becomes inoperable. Select either:</p> <ul style="list-style-type: none"> • Open – If the ASA FirePOWER module fails for any reason, the ASA will continue to pass traffic that would otherwise be redirected to the ASA FirePOWER module. • Close – If the ASA FirePOWER module fails, the ASA will drop any traffic that would otherwise be redirected to the ASA FirePOWER module.
Enable Monitor Only	<p>Sets the module to monitor-only mode. In monitor-only mode, the module can process traffic for demonstration purposes, but then drops the traffic. You cannot use the traffic-forwarding interface or the device for production purposes.</p>
Connection Settings tab	
Enable Connection Settings For This Traffic	<p>Enables or disables connection settings for this traffic flow. When this box is checked, the other parameters on this panel become active. From the Connection Settings tab you can configure maximum connections, embryonic connections, timeouts, and TCP parameters.</p>

Element	Description
Maximum Connections	<p>You can specify the maximum number of TCP and UDP connections, and the maximum number of embryonic connections for this traffic flow:</p> <ul style="list-style-type: none"> • Maximum TCP & UDP Connections – Specify the maximum number of simultaneous TCP and UDP connections for the entire subnet, up to 65,535, for ASA versions earlier than 8.4(5); for ASA 8.4(5) and later, the maximum number is 2,000,000. The default is zero for both protocols, which means the maximum possible connections are allowed. • Maximum TCP & UDP Connections Per Client – For ASA/PIX 7.1+ only; specify the maximum number of simultaneous TCP and UDP connections on a per client basis. For ASA 8.4(5) and later, the maximum number is 2,000,000. • Maximum Embryonic Connections – For ASA/PIX 7.0+ only; specify the maximum number of embryonic connections per host, up to 65,535, for ASA versions earlier than 8.4(5); for ASA 8.4(5) and later, the maximum number is 2,000,000. An embryonic connection is a connection request that has not finished the necessary handshake between source and destination. This limit enables the TCP Intercept feature. The default is zero, which means the maximum embryonic connections. TCP Intercept protects inside systems from a DoS attack perpetrated by flooding an interface with TCP SYN packets. When the embryonic limit has been surpassed, the TCP intercept feature intercepts TCP SYN packets from clients to servers on a higher security level. SYN cookies are used during the validation process and help minimize the amount of valid traffic being dropped. Thus, connection attempts from unreachable hosts will never reach the server. This feature is not applicable if TCP State Bypass is enabled. • Maximum Embryonic Connections Per Client – For ASA/PIX 7.1+ only; specify the maximum number of embryonic connections on a per client basis. For ASA 8.4(5) and later, the maximum number is 2,000,000. This feature is not applicable if TCP State Bypass is enabled.

Element	Description
Connection Timeouts	<p>You can specify the following connection timeout settings for this traffic flow:</p> <ul style="list-style-type: none"> • Embryonic Connection Timeout – Specify the idle time until an embryonic connection slot is freed. Enter 0:00:00 to disable timeout for the connection. The default is 20 seconds for FWSMs, and 30 seconds for ASA/PIX devices. • Half Closed Connection Timeout – Specify the idle time until a half-closed connection slot is freed. Enter 0:00:00 to disable timeout for the connection. <p>For FWSMs, the default value is 20 seconds; the maximum value is 255 seconds (four minutes, 15 seconds).</p> <p>For ASA 9.1.2 and later devices, the minimum is 30 seconds. For all other ASA/PIX devices, the minimum is 5 minutes. The default is 10 minutes for all ASA/PIX devices.</p> <ul style="list-style-type: none"> • Idle Connection Timeout – Specify the idle time until a connection slot is freed. Enter 0:00:00 to disable timeout for the connection. This duration must be at least 5 minutes. The default is 1 hour.
Reset Connection Upon Timeout	If selected, connections are reset after a timeout occurs. Available for ASA/PIX 7.0(4)+ only.
Detect Dead Connections	<p>Enables the Dead Connection Detection feature; available for ASA/PIX 7.2+ devices. Selecting this option enables these two fields:</p> <ul style="list-style-type: none"> • Dead Connection Detection Timeout – Specify the period of time between retries when a dead connection is detected. The default is 15 seconds. • Dead Connection Detection Retries – Specify the number of retries to be performed after a dead connection is detected. The default is five.
Traffic Flow Idle Timeout	Specify the period of time between a traffic flow becoming idle and the flow's disconnection. Applicable to FWSM 3.2+ only. The default is 1 hour.
Enable TCP Normalization	Enables TCP normalization, and activates the TCP Map selection option. Applies to ASA/PIX 7.0+ only; not applicable if TCP State Bypass is enabled.
TCP map	Specify the TCP map to use for TCP normalization: enter or Select the name of a TCP map. For more information, see Configuring TCP Maps , on page 23.
Randomize TCP Sequence Number	Enables the Randomize Sequence Number feature. Disable this feature only if another inline security appliance is also randomizing sequence numbers and the result is scrambling the data. Each TCP connection has two Initial Sequence Numbers: one generated by the client and one generated by the server. The security appliance randomizes the ISN that is generated by the host/server on the higher security interface. At least one ISN must be randomly generated so that attackers cannot predict the next ISN and potentially hijack the session. Not applicable if TCP State Bypass is enabled.

Element	Description
Enable TCP State Bypass	Enables TCP state bypass for this traffic flow. This allows specific traffic flows in asymmetric routing environments when both the outbound and inbound flow for a connection do not pass through the same device. Applicable to FWSM 3.2+ and ASA 8.2+ only. See About TCP State Bypass , on page 2 for more information.
Enable SCTP State Bypass (ASA 9.5.2 + only)	You can bypass Stream Control Transmission Protocol (SCTP) stateful inspection if you do not want SCTP protocol validation.
Enable Decrement TTL	Select this option to turn on decrementing of the time-to-live (TTL) value in packets passed by the security appliance. Applicable to PIX/ASA 7.2.2+ only.
Configure Flow Offload (For Firepower 9000/4000 series ASA 9.6(1) and above)	<p>Note You must enable flow offload manually on the ASA and restart the device, before configuring flow offload in the Service Policy Wizard in Cisco Security Manager. Flow offload and flow offload statistics are supported on the ASA only in the single context and system context modes. It is not supported in the admin or user context. ASA supports flow offload starting from version 9.5.2(1); however Cisco Security Manager supports flow offload from ASA 9.6(1).</p> <p>Select this option to offload specific traffic to a super-fast path; traffic is switched and processed in the NIC instead of the ASA. Offloading can help you improve performance for data-intensive applications such as large file transfers.</p> <p>Tip You can configure flow offload only when TCP State Bypass and SCTP State bypass are not enabled on your device.</p>
QoS tab	
Enable QoS For This Traffic	Enables Quality of Service (QoS) options for this traffic flow. When selected, the Enable Priority For This Flow and the Traffic Policing options become active. <p>Note The options on this tab are applicable to PIX/ASA 7.0+ devices only.</p>
Enable Priority For This Flow	Enables strict scheduling priority for this flow. The priority queues must be defined on the Priority Queues Page , on page 4.
Traffic Policing	Enables output and input traffic policing. Traffic policing lets you control the maximum rate of traffic transmitted or received on an interface.

Element	Description
Output (Traffic Policing)	<p>Enables policing of traffic flowing out of the device. If you enable policing, you can specify the following values:</p> <ul style="list-style-type: none"> • Committed Rate – The rate limit for this traffic flow; this is a value in the range 8,000 to 2,000,000,000, specifying the maximum speed (bits per second) allowed. • Burst Rate – A value in the range 1,000 to 512,000,000 that specifies the maximum number of instantaneous bytes allowed in a sustained burst before throttling to the conforming rate value. • Conform Action – The action to take when the rate is less than the conform-burst value. Choices are Transmit or Drop. • Exceed Action – Take this action when the rate is between the conform-rate value and the conform-burst value. Choices are Transmit or Drop.
Input (Traffic Policing)	<p>Enables policing of traffic flowing into the device; these options apply to ASA/PIX 7.2+ devices only. If you enable policing, you can specify the following values:</p> <ul style="list-style-type: none"> • Committed Rate – The rate limit for this traffic flow; this is a value in the range 8,000 to 2,000,000,000, specifying the maximum speed (bits per second) allowed. • Burst Rate – A value in the range 1,000 to 512,000,000 that specifies the maximum number of instantaneous bytes allowed in a sustained burst before throttling to the conforming rate value. • Conform Action – The action to take when the rate is less than the conform-burst value. Choices are Transmit or Drop. • Exceed Action – Take this action when the rate is between the conform-rate value and the conform-burst value. Choices are Transmit or Drop.
CSC tab	
Enable Content Security Control For This Traffic	<p>Enables or disables the use of the Cisco CSC SSM (Content Security and Control Security Services Module) for this traffic flow. When this box is checked, the On CSC SSM Failure options become available. These options are applicable on ASA 7.1+ devices only; they are not applicable if TCP State Bypass is enabled.</p> <p>The CSC SSM provides protection against viruses, spyware, spam, and other unwanted traffic by scanning the FTP, HTTP, POP3, and SMTP packets.</p>
On CSC SSM Failure	<p>Specifies the action to take if the CSC SSM becomes inoperable:</p> <ul style="list-style-type: none"> • Open – Permits traffic if the CSC SSM fails. • Close – Blocks traffic if the CSC SSM fails.
User Statistics tab	

Element	Description
Enable user statistics accounting (ASA 8.4(2)+ only)	Whether to collect user statistics accounting information for identity-based firewall policies. These statistics are kept for users to which a firewall policy is applied based on user name or user group membership. Select the type of information you want to collect: <ul style="list-style-type: none"> • Account for sent drop count • Account for sent packet, sent drop and received packet count
Protocol Inspection tab	
Enable Scansafe Web Security for this traffic (ASA 9.0+ only)	Enables or disables the use of ScanSafe Web Security for this traffic flow. When this box is checked, two options become available: These options are applicable on ASA 9.0+ devices only. <ul style="list-style-type: none"> • ScanSafe Policy Map– enables policy map selection. • On ScanSafe Tower Communication Failure– specifies action the system should take if ScanSafe Tower communication fails.
Enable SCTP for this traffic (ASA 9.5.2 + only)	Enables or disables the use of SCTP for this traffic flow. <ul style="list-style-type: none"> • SCTP Policy Map– enables policy map selection
Enable Diameter Inspection for this traffic (ASA 9.5.2 + only)	Enables or disables the use of Diameter inspection for this traffic flow. <ul style="list-style-type: none"> • Diameter Policy Map– enables policy map selection When Diameter Inspection is enabled, you can further enable inspection of encrypted traffic by selecting the Enable encrypted traffic inspection check box. You must select the TLS Proxy to be used for this inspection.
Enable LISP for this traffic (ASA 9.5.2 + only)	Enables or disables the use of LISP Inspection for this traffic flow. <ul style="list-style-type: none"> • LISP Policy Map– enables policy map selection
Enable Flow LISP mobility for devices (ASA 9.5.2 + only)	Enables flow mobility in clustering.
Enable STUN Inspection support for devices (ASA 9.6.2 + only)	Enables or disables the use of STUN inspection for this traffic flow. It is supported on ASA 9.6.2 and above in the single and multi-context mode. <p>Note When you enable STUN inspection on the default inspection class, TCP/UDP port 3478 is watched for STUN traffic. The inspection supports IPv4 addresses and TCP/UDP only. STUN inspection is supported in failover and cluster modes, as pinholes are replicated. However, as the transaction ID is not replicated among units, when a unit fails after receiving a STUN Request and another unit received the STUN Response, the STUN Response will be dropped.</p>

Element	Description
Enable M3UA for this traffic (ASA 9.6.2 + only)	Enables or disables the use of M3UA for this traffic flow. <ul style="list-style-type: none"> • M3UA Policy Map— enables policy map selection
NetFlow tab	
Enable NetFlow for this traffic	Enables or disables the use of NetFlow for this traffic flow. When this box is checked, the NetFlow options become available.
Collectors	Specify the collectors that should be used when sending NetFlow events of a specific event type: <p>Note Only use collectors that have been configured on the NetFlow page at Platform > Logging > NetFlow.</p> <ul style="list-style-type: none"> • Flow Create Event • Flow Deny Event • Flow Tear Event • All Event Types <p>Note Cisco Security Manager does not allow duplicate netflow collectors for ASA 9.6(4) to 9.7.0, and 9.8(2) and above devices. Ensure that you remove the duplicate collectors.</p>

About IPS Modules on ASA Devices



Note From version 4.17, though Cisco Security Manager continues to support IPS features/functionality, it does not support any bug fixes or enhancements.

You can install a variety of IPS modules, such as the Advanced Inspection and Prevention Security Services Module (AIP-SSM), in some ASA device models. The IPS modules supported by each ASA model differ. The IPS modules run advanced IPS software that provides proactive, full-featured intrusion prevention services to stop malicious traffic, including worms and network viruses, before they can affect your network.

The ASA IPS module runs separately from the adaptive security appliance, and you need to add it to the device inventory as a separate device. It is, however, integrated into the ASA traffic flow.

When you configure the ASA IPS module, you need to configure the service policy rules on the host ASA as well as the IPS policies on the IPS module. The service policy rules determine which traffic is inspected by the IPS module. For an overview of IPS policy configuration, see [Overview of IPS Configuration](#).

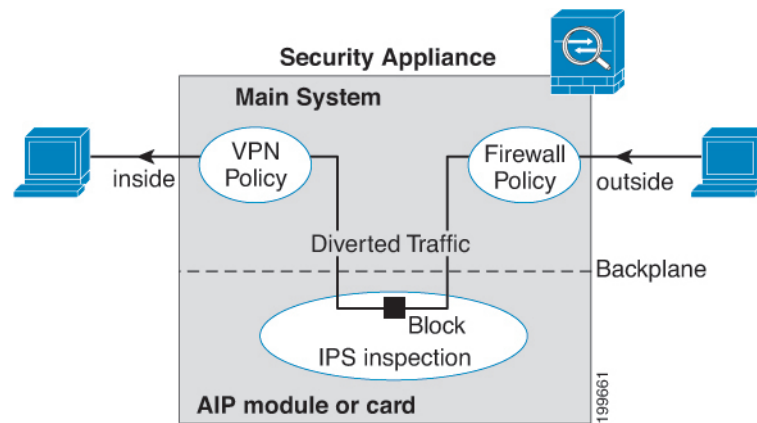
When you identify traffic for IPS inspection, the traffic flows through the ASA and the IPS module as follows:

1. Traffic enters the ASA.
2. Firewall policies, such as interface access rules, are applied.
3. Traffic is sent to the IPS module over the backplane when you operate in inline mode. If you configure the system to use promiscuous mode, a copy of the traffic is sent to the IPS module.

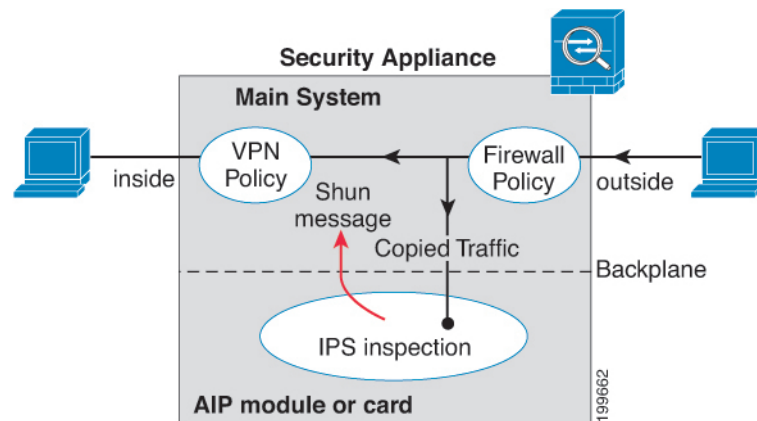
See **IPS Mode** in the Intrusion Prevention section of the Insert/Edit Service Policy (MPC) Rule wizard ([Step 3. Configure the MPC actions , on page 8](#)) for more information about Inline and Promiscuous modes.

4. The IPS module applies its security policy to the traffic and takes appropriate actions.
5. Allowed traffic is sent back to the adaptive security appliance over the backplane. In Inline mode, the IPS module may block some traffic according to its security policy; in other words, that traffic is not passed back.
6. VPN policies are applied (if configured).
7. Traffic exits the ASA.

The following illustration depicts traffic flow when running the IPS module in Inline mode. In this example, the IPS module automatically blocks traffic that it identifies as an attack. All other traffic is returned to the ASA.



The next illustration depicts traffic flow when the IPS module is running in Promiscuous mode. In this example, the IPS module sends a shun message to the ASA for traffic it has identified as a threat.



Related Topics

- [Adding Devices to the Device Inventory](#)

About the ASA CX

The ASA CX is a Security Services Processor (SSP) that can be installed in the Cisco ASA-5585-X series Adaptive Security Appliance. You configure the parent ASA to redirect traffic to the ASA CX, which then applies its security policies and either drops the traffic, or returns it to the ASA for further processing and routing to the next destination.

There are two basic policies that may need adjustment in the ASA when you add a ASA CX: access rules and inspection rules:

- Access rules, whether global rules or those applied to specific interfaces, are always applied before traffic is redirected to the ASA CX. Thus, the security card sees only the traffic already permitted, and does not process traffic that was dropped at entry to the ASA. Consider adjusting the rules to ensure that all traffic that you want the ASA CX to process is permitted.
- Inspection rules determine which traffic is inspected. The ASA CX does not inspect traffic that has already been inspected by the ASA. Therefore, you must ensure that you do not inspect traffic that you intend the ASA CX to inspect. Specifically, do not inspect HTTP traffic, because HTTP inspection is one of the core functions of the ASA CX. The default inspection rules on the ASA do not include HTTP inspection, so you must alter your inspection rules only if you added HTTP rules.

Determine if you need to create access rules for an interface, or global access rules that apply to all interfaces. Use the ASA access rules to filter traffic before it is redirected to the ASA CX. If you know there are classes of traffic that you never want to pass, it is more efficient to drop them immediately upon entry to the ASA.

If you have already established access rules, there is no requirement to change them. However, you should evaluate whether they need to be relaxed in order to have the ASA CX process certain types of traffic that you are now dropping by means of access rules.

Enabling traffic redirection to an installed ASA CX is described in [Step 3. Configure the MPC actions](#), on page 8 of the [Insert/Edit Service Policy \(MPC\) Rule Wizard](#), on page 6.

Related Topics

- [About Service Policy Rules, on page 1](#)

ASA CX Auth Proxy Configuration

If you enabled ASA CX authentication proxy—on the **CXSC** tab during Step 3 of the Insert/Edit Service Policy (MPC) Rule Wizard; see [Step 3. Configure the MPC actions](#), on page 8—and you want to use a non-default port for active authentication, use the Add/Edit CXSC Auth Proxy Configuration dialog box to change the ASA CX Auth Proxy Port number.

If users must be prompted for authentication credentials, the prompting is done through this port.



Note Security Manager uses “CXSC” in some places to refer to an ASA CX Security Services Processor (SSP).

Navigation Path

Open the Add/Edit CXSC Auth Proxy Configuration dialog box by clicking the **CXSC Auth Proxy** button below the rules table on the [Service Policy Rules Page](#), on page 5.



Note The CXSC Auth Proxy button is available below the IPS, QoS, and Connection Rules table only in Device view; it is not visible in Policy view.

Related Topics

- [Service Policy Rules Page](#) , on page 5

Field Reference

Table 4: Add/Edit CXSC Auth Proxy Configuration Dialog Box

Element	Description
CXSC Auth Proxy Port	The default authentication proxy TCP port is 885; however, if you change it, you must enter a port number between 1024 and 65535.

Configuring Traffic Flow Objects

Use the Add and Edit Traffic Flow dialog boxes to configure traffic-match definitions. These traffic-flow definitions correspond to class maps (the **class map** command) in the IPS, QoS and Connection Rules service policy for devices running the PIX 7.0+, ASA 7.0+, and FWSM 3.2+ operating systems. For more information on configuring these rules, see [About Service Policy Rules, on page 1](#).

Navigation Path

Select **Manage > Policy Objects**, then select **Traffic Flows** from the Object Type selector. Right-click inside the work area and choose New Object, or right-click a row and choose Edit Object.

These dialog boxes also can be opened by clicking the Create or Edit buttons in the Traffic Flows Selector while defining a Service Policy rule. See for [Step 2. Configure the traffic class](#) , on page 7 more information about selecting a Traffic Flow class.

Related Topics

- [Creating Access Control List Objects](#)

Field Reference

Table 5: Add and Edit Traffic Flow Dialog Boxes

Element	Description
Name	The name of the Traffic Flow object. A maximum of 40 characters is allowed. The name space for class maps is local to a security context. Therefore, the same name may be used in multiple security contexts. The maximum number of class maps per security context is 255.

Element	Description
Description	A description of the Traffic Flow (optional). A maximum of 1024 characters is allowed.
Traffic Match Type	<p>The type of traffic to match. The option you choose may change the fields in the dialog box; all possible fields are explained later in this table. The Traffic Match Type options are:</p> <ul style="list-style-type: none"> • Any Traffic – Matches all traffic. • Source and Destination IP Address (access-list) – Matches the source and destination IP addresses in a packet based on the access control list that you specify. <p>For ASA 8.4(2+) devices, the ACL can include FQDN objects and user specifications to perform identity-based traffic matching.</p> <ul style="list-style-type: none"> • Default Inspection Traffic – Matches default inspection traffic. For a list of default settings, see Default Inspection Traffic, on page 21. • Default Inspection Traffic with access list – Matches default inspection traffic limited by the access control list that you specify. • TCP or UDP or SCTP Destination Port – Matches traffic to the TCP or UDP or SCTP destination port or port range that you specify. Valid port numbers here are 0 to 65535. • RTP Range – Matches traffic to the range of UDP destination ports that you specify. Valid port numbers here are 2000 to 65535. • Tunnel Group – Matches the destination address based on flows in VPN tunnels belonging to a specified tunnel group. • IP Precedence Bits – Matches precedence values assigned to the traffic packets. You can select a maximum of four values. • IP DiffServe Code Points (DSCP) Values – Matches DSCP values associated with the traffic packets. You can select a maximum of eight values.
<p>Variable Fields</p> <p>The following fields may appear in the Add and Edit Traffic Flow dialog boxes, depending on your choice in the Traffic Match Type field. This list is the complete set of possible fields.</p>	
Available ACLs	<p>A list of the access control list (ACL) objects that you can select for the map. Select the ACL that defines the target traffic, or click the Create button to add a new object. You can also select an object and click Edit to change its definition. If the list of objects is large, use the Filter field to limit the display (see Filtering Items in Selectors).</p>

Element	Description
TCP or UDP or SCTP TCP/UDP/SCTP Port or Port Range	Radio buttons used to specify a protocol (either TCP, UDP, or SCTP), and a text field used to specify a destination port number or range of numbers to use when matching traffic based on the specified protocol/ports. You can specify a single port value, or a range of port numbers (for example, 0-2000). Valid port numbers are 0 to 65535.
RTP Port Range	The range of RTP destination ports associated with the traffic flow. You must enter a port range within the valid range of 2000 to 65535. Note When you close the dialog box, the port range you entered is converted to port-span values by subtracting the start value from the end value. For example, if you enter the range 2001-3000 in the dialog box, “RTP port 2001 range 999” appears in the Match Value column of the Traffic Flows policy object table. Port-span values are expected by the device.
Tunnel group name Match Flow IP Destination Address	Lists available VPN tunnel groups. Choose one or enter the name of a group. You can also select Match Flow IP Destination Address to recognize the destination address as the match type. Tip You can use FlexConfig objects and policies to define a VPN tunnel group on a PIX 7.0+ device. For more information, see Understanding FlexConfig Policies and Policy Objects .
Available IP Precedence Match on IP Precedence	The IP precedence numbers. Select the values you want to match and click >> to add them to the Match table. Ctrl-click to select multiple values. You can select a maximum of four values. To remove a value from the Match table, select it and click <<.
Available DSCP Values Match on DSCP	The IP DiffServe Code Points (DSCP) numbers. Select the values you want to match and click >> to add them to the Match table. Ctrl-click to select multiple values. You can select a maximum of eight values. To remove a value from the Match table, select it and click <<.
Category	The category assigned to the traffic-flow object. Categories help you organize and identify rules and objects. See Using Category Objects .

Default Inspection Traffic

When you create a Traffic Flow policy object, you can choose to match the default inspection traffic. For more information, see [Configuring Traffic Flow Objects](#), on page 19. The following table lists the types of traffic included in the Default Inspection Traffic category.

Table 6: Default Inspection Traffic

Value	Port	NAT Limitations	Comments
CTIQBE	TCP/2748		
CuSeeMe	UDP/7648		

Value	Port	NAT Limitations	Comments
DNS over UDP	UDP/53	No NAT support for name resolution through WINS.	No PTR records are changed.
FTP	TCP/21		
GTP	UDP/2123, 3386		
H.323, H.225	TCP/1720, 1718	No NAT on same security interfaces. No static PAT.	
RAS	UDP/1718, 1719	No NAT on same security interfaces. No static PAT.	
HTTP	TCP/80		
ICMP	—		All ICMP traffic is matched in the default class map.
ILS (LDAP)	TCP/389	No PAT.	
IP Options	—		All IP Options traffic is matched in the default class map.
MGCP	UDP/2427, 2727		
NETBIOS Name Server	UDP/137, 138 (Source ports)		NetBIOS is supported by performing NAT of the packets for NBNS UDP port 137 and NBDS UDP port 138.
RSH	TCP/514	No PAT.	
RTSP	TCP/554	No PAT. No outside NAT.	No handling for HTTP cloaking.
SIP	TCP/5060; UDP/5060	No outside NAT. No NAT on same security interfaces.	
Skinny Client Control Protocol (SCCP)	TCP/2000	No outside NAT. No NAT on same security interfaces.	
SMTP and ESMTP	TCP/25		
SQL*Net	TCP/1521		Versions 1 and 2.
Sun RPC over UDP	UDP/111	No NAT or PAT.	The default rule includes UDP port 111; if you want to enable Sun RPC inspection for TCP port 111, you need to create a new rule that matches TCP port 111 and performs Sun RPC inspection.

Value	Port	NAT Limitations	Comments
TFTP	UDP/69		Payload IP addresses are not translated.
XDMCP	UDP/177	No NAT or PAT.	

Configuring TCP Maps

Use the Add and Edit TCP Map dialog boxes to define TCP normalization maps for use with IPS, QoS, and Connection Rules service policies. The TCP normalization feature lets you specify criteria that identify abnormal packets, which the security appliance drops when they are detected. The map is used for TCP traffic that passes through the device or that is going to the device.

These TCP maps can be applied to TCP flows on PIX 7.x+ and ASA devices. For more information on configuring IPS, QoS, and Connection Rules, see [About Service Policy Rules, on page 1](#).

Navigation Path

Select **Manage > Policy Objects**, then select **Maps > TCP Maps** from the Object Type selector. Right-click inside the work area and choose New Object, or right-click a row and choose Edit Object.

These dialog boxes also can be opened by clicking the Create or Edit buttons in the TCP Maps Selector while defining a Service Policy rule. See the “Connection Settings” section of [Step 3. Configure the MPC actions, on page 8](#) for more information about enabling TCP normalization and selecting a TCP map.

Related Topics

- [Understanding Map Objects](#)

Field Reference

Table 7: Add and Edit TCP Map Dialog Boxes

Element	Description
Name	The name of the TCP normalization map. A maximum of 128 characters is allowed.
Description	A description of the map object. A maximum of 1024 characters is allowed.

Element	Description
Queue Limit (ASA devices only)	<p>The maximum number of out-of-order packets that can be buffered and put in order for a TCP connection; enter a value between 1 and 250. Enter 0 to disable this setting and use the default system queue limit, which depends on the type of traffic:</p> <ul style="list-style-type: none"> • Connections for application inspection, IPS, and TCP check-retransmission have a queue limit of 3 packets. If the security appliance receives a TCP packet with a different window size, then the queue limit is dynamically changed to match the advertised setting. • For other TCP connections, out-of-order packets are passed through untouched. <p>However, if you set the Queue Limit to 1 or higher, the number of out-of-order packets allowed for all TCP traffic matches the specified value. For application inspection, IPS, and TCP check-retransmission traffic, any advertised settings are ignored. For other TCP traffic, out-of-order packets are now buffered and put in order instead of passed through untouched.</p>
Time Out (ASA 7.2(4)+ devices only)	<p>The maximum amount of time that out-of-order packets can remain in the buffer before they are dropped; enter a value between 1 and 20 seconds. The default is 4 seconds.</p> <p>This setting is ignored if you entered 0 for the Queue Limit.</p>
Verify TCP Checksum	If checked, checksum verification is enabled.
Drop SYN Packets with Data	If checked, TCP SYN packets that include data are dropped.
Drop Connection on Window Variation	If checked, connections that change window size unexpectedly are dropped.
Drop Packets that Exceed Maximum Segment Size	If checked, packets that exceed the maximum segment size (MSS) set by a peer are dropped.
Check if Transmitted Data is the Same as Original	If checked, retransmit data checking is enabled.
Clear Urgent Flag	If checked, the URG (urgent) flag is cleared through the security appliance. The URG flag is used to indicate that the packet contains information that is of higher priority than other data within the stream. The TCP RFC is vague about the exact interpretation of the URG flag; therefore end systems handle urgent offsets in different ways, which may make the end system vulnerable.

Element	Description
Enable TTL Evasion Protection	<p>Enables the TTL evasion protection offered by the security appliance. Do not enable this option if you want to prevent attacks that attempt to evade security policy.</p> <p>For example, an attacker can send a packet that passes policy with a very short TTL. When the TTL goes to zero, a router between the security appliance and the endpoint drops the packet. It is at this point that the attacker can send a malicious packet with a long TTL that appears to the security appliance to be a retransmission and is passed. To the endpoint host, however, it is the first packet that has been received. In this case, an attacker is able to succeed without security preventing the attack.</p>
Selective Acknowledgment	
Clear Selective Ack	When checked, clears window selective acknowledgment mechanism option and allows packet. When unchecked, allows packets with single selective acknowledgment option.
Selective Ack Allow Multiple	Whether or not packets with multiple selective acknowledgment mechanism (SACK) are allowed.
Note	If the selective acknowledgment options are not configured, by default, packets with a single selective acknowledgment option are allowed and packets with multiple selective acknowledgment options are dropped.
TCP Timestamp	
Clear TCP Timestamp	<p>When checked, clears TCP timestamp option and allows packet. When unchecked, allows packets with single TCP timestamp option.</p> <p>Note When the Clear TCP timestamp option is enabled, PAWS and RTT are disabled.</p>
TCP Timestamp Allow multiple	Whether or not packets with multiple TCP timestamp option are allowed.
Note	If the TCP timestamp options are not configured, by default, packets with a single TCP timestamp option are allowed and packets with multiple TCP timestamp options are dropped.
Window Scale	
Clear Window Scale	When checked, clears window scale timestamp option and allows packet. When unchecked, allows packet with single window scale option.
Window Scale Allow Multiple	Whether or not the packets with multiple window scale timestamp option are allowed.
Note	If the window scale options are not configured, by default, packets with a single window scale option are allowed and packets with multiple window scale options are dropped.
Maximum Segment Size (MSS)	
Clear MSS	When checked, clears MSS option and allows packet. When unchecked, allows packet with a single MSS option.

Element	Description
MSS Allow Multiple	Whether or not the packets with multiple MSS options are allowed.
Max. MSS	Enter a value for the TCP MSS limit in bytes. Valid values are between 68- 65535.
Note	If the MSS options are not configured, by default, packets with a single MSS option are allowed and packets with multiple MSS options are dropped.
Allow packets with MD5 option	<p>Whether or not to allow packets with the MD5 option.</p> <p>The Allow, Allow Multiple and Clear checkboxes are available when packets with MD5 option are allowed.</p> <p>Allow: This allows a packet with a single MD5 option.</p> <p>Allow Multiple: This allows a packet with multiple MD5 options.</p> <p>Clear: This clears the MD5 option and allows a packet.</p>
Note	If the MD5 options are not configured, by default, packets with a single MD5 option are allowed and packets with multiple MD5 options are dropped.
Reserved Bits	<p>Specify how to handle TCP packets with the reserved bits set in the TCP header. The six reserved bits in the TCP header are for future use and usually have a value of 0.</p> <ul style="list-style-type: none"> • Clear and Allow—Clears the reserved bits in the TCP header and allows the packet. • Allow only—Permits packets with the reserved bits set in the TCP header. • Drop—Drops packets with the reserved bits set in the TCP header.
TCP Range Options table	<p>The TCP Range Options table lists TCP options ranges defined for the TCP map, and the action to take for those options. The typical range numbers are 6-7, 9-18 and 20-255; the lower bound must be less than or equal to the upper bound.</p> <ul style="list-style-type: none"> • To add a range, click the Add button to open the Add TCP Option Range dialog box (see Add and Edit TCP Option Range Dialog Boxes, on page 27). • To edit a range, select it and click the Edit button. • To delete a range, select it and click the Delete button. <p>Note Prior to ASA 9.6(2), the TCP values are in the range of 6-7 and 9-255.</p>
Category	The category assigned to the map object. Categories help you organize and identify rules and objects. See Using Category Objects .

Add and Edit TCP Option Range Dialog Boxes

Use the Add and Edit TCP Option Range dialog boxes to define or edit a range of TCP options for use with a TCP normalization map; these are TCP options not explicitly supported on the device. This feature lets you allow or discard packets with the specified TCP options set. The typical range numbers are 6-7, 9-18 and 20-255.

Navigation Path

In the Add and Edit TCP Map dialog boxes, right-click inside the TCP Range Options table and choose Add Row, or right-click an existing row and choose Edit Row. See [Configuring TCP Maps](#), on page 23.

Field Reference

Table 8: Add and Edit TCP Option Range Dialog Boxes

Element	Description
Note	Prior to ASA 9.6(2), specify either 6 or 7 or an integer from 9-255 for the lower and upper bounds of the range, respectively. For all devices, the Lower bound must be less than or equal to the Upper bound.
Lower	The lower bound of the range; enter either 6 or 7, or an integer from 9 to 18 or an integer from 20-255.
Upper	The upper bound of the range; enter either 6 or 7, or an integer from 9 to 18 or an integer from 20-255.
Action	Choose the action to take for packets with the specified options set: <ul style="list-style-type: none"> • Allow – Allows any packet with a specified option set. • Clear – Clears the specified option from any packet that has it set and allows the packet. • Drop – Discards any packet with a specified option set.

