CHAPTER 9

Using Modular Policy Framework

This chapter describes how to use Modular Policy Framework to create security policies for multiple features, including TCP and general connection settings, inspections, IPS, CSC, and QoS. This chapter includes the following sections:

Information About Modular Policy Framework

Modular Policy Framework provides a consistent and flexible way to configure ASA features. For example, you can use Modular Policy Framework to create a timeout configuration that is specific to a particular TCP application, as opposed to one that applies to all TCP applications. This section includes the following topics:

Modular Policy Framework Supported Features

Table 9-1 lists the features supported by Modular Policy Framework.

Table 9-1 Modular Policy Framework

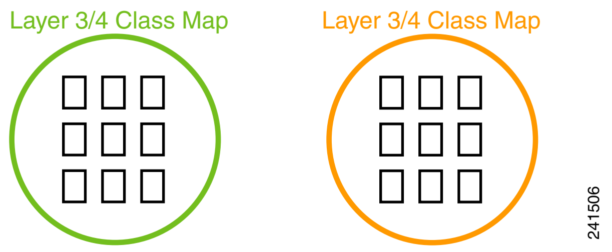
Feature	For Through Traffic?	For Management Traffic?	See:
Application inspection (multiple types)	**All** except RADIUS accounting	**RADIUS accounting** only	• Chapter 40, "Getting Started With Application Layer Protocol Inspection." • Chapter 41, "Configuring Inspection of Basic Internet Protocols." • Chapter 43, "Configuring Inspection of Database and Directory Protocols." • Chapter 44, "Configuring Inspection for Management Application Protocols." • Chapter 42, "Configuring Inspection for Voice and Video Protocols."
ASA CSC	**Yes**	No	Chapter 60, "Configuring the Content Security and Control Application on the CSC SSM."
ASA IPS	**Yes**	No	Chapter 59, "Configuring the IPS Module."
NetFlow Secure Event Logging filtering	**Yes**	**Yes**	Chapter 75, "Configuring NetFlow Secure Event Logging (NSEL)."
QoS input and output policing	**Yes**	No	Chapter 55, "Configuring QoS."
QoS standard priority queue	**Yes**	No	Chapter 55, "Configuring QoS."
QoS traffic shaping, hierarchical priority queue	**Yes**	**Yes**	Chapter 55, "Configuring QoS."
TCP and UDP connection limits and timeouts, and TCP sequence number randomization	**Yes**	**Yes**	Chapter 53, "Configuring Connection Limits and Timeouts."
TCP normalization	**Yes**	No	Chapter 52, "Configuring TCP Normalization."
TCP state bypass	**Yes**	No	Chapter 51, "Configuring TCP State Bypass."

Information About Configuring Modular Policy Framework

Configuring Modular Policy Framework consists of the following tasks:

1. **Identify the traffic** on which you want to perform Modular Policy Framework actions by creating Layer 3/4 class maps.

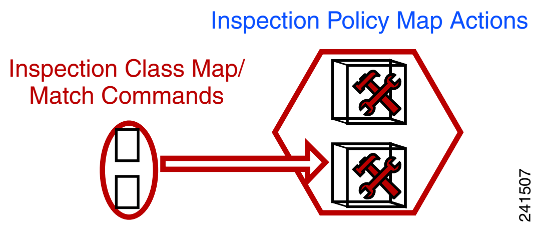
   For example, you might want to perform actions on all traffic that passes through the ASA; or you might only want to perform certain actions on traffic from 10.1.1.0/24 to any destination address.



See the "Identifying Traffic (Layer 3/4 Class Map)" section on page 9-13.

2. If one of the actions you want to perform is application inspection, and you want to **perform additional actions on some inspection traffic**, then create an inspection policy map. The inspection policy map identifies the traffic and specifies what to do with it.

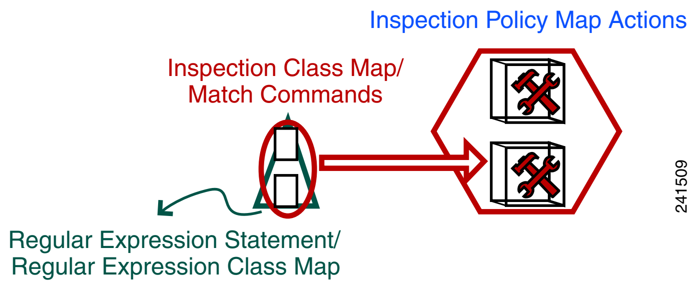
   For example, you might want to drop all HTTP requests with a body length greater than 1000 bytes.



   You can create a self-contained inspection policy map that identifies the traffic directly with **match** commands, or you can create an inspection class map for reuse or for more complicated matching. See the "Defining Actions in an Inspection Policy Map" section on page 9-17 and the "Identifying Traffic in an Inspection Class Map" section on page 9-20.

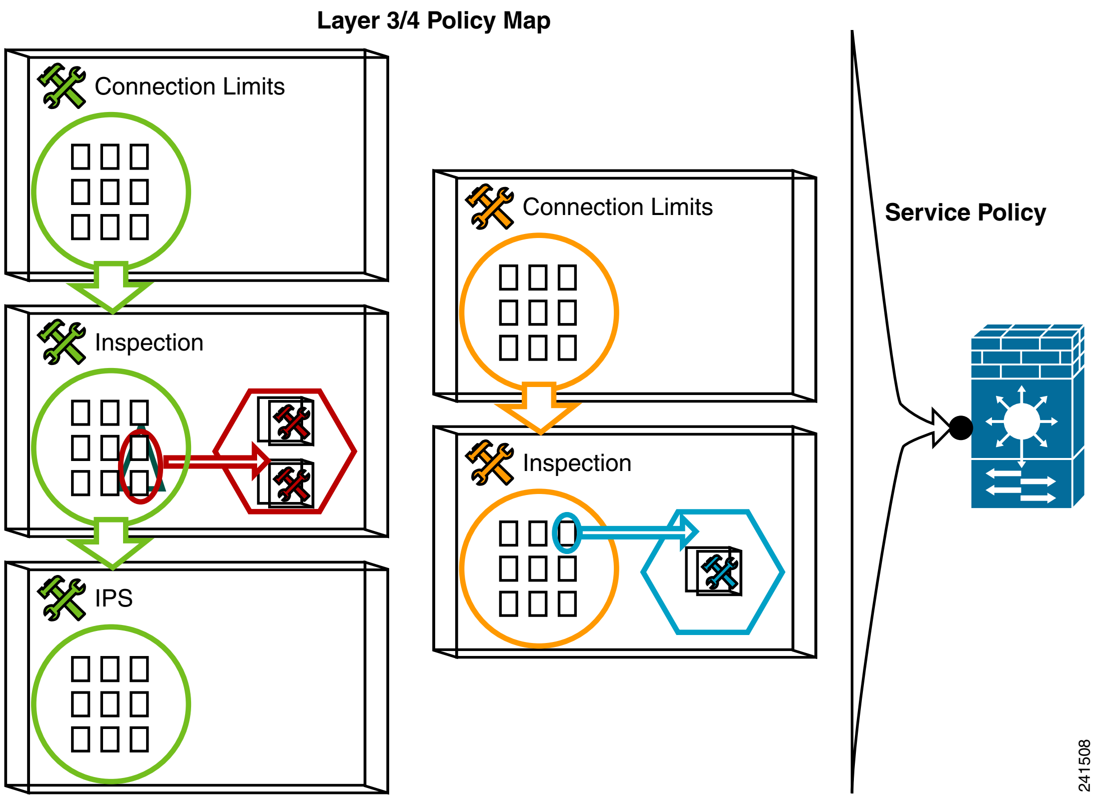
3. If you want to match text with a regular expression within inspected packets, you can **create a regular expression** or a group of regular expressions (a regular expression class map). Then, when you define the traffic to match for the inspection policy map, you can call on an existing regular expression.

   For example, you might want to drop all HTTP requests with a URL including the text "example.com."


Inspection Policy Map Actions
Inspection Class Map/
Match Commands
Regular Expression Statement/
Regular Expression Class Map
241509

   See the "Creating a Regular Expression" section on page 9-21 and the "Creating a Regular Expression Class Map" section on page 9-24.

4. **Define the actions you want to perform** on each Layer 3/4 class map by creating a Layer 3/4 policy map. Then, **determine on which interfaces you want to apply the policy map** using a service policy.



See the "Defining Actions (Layer 3/4 Policy Map)" section on page 9-25 and the "Applying Actions to an Interface (Service Policy)" section on page 9-26.

Information About Inspection Policy Maps

See the "Configuring Application Layer Protocol Inspection" section on page 40-6 for a list of applications that support inspection policy maps.

An inspection policy map consists of one or more of the following elements. The exact options available for an inspection policy map depends on the application.

- Traffic matching command—You can define a traffic matching command directly in the inspection policy map to match application traffic to criteria specific to the application, such as a URL string, for which you then enable actions.
  - Some traffic matching commands can specify regular expressions to match text inside a packet. Be sure to create and test the regular expressions before you configure the policy map, either singly or grouped together in a regular expression class map.
- Inspection class map—(Not available for all applications. See the CLI help for a list of supported applications.) An inspection class map includes traffic matching commands that match application traffic with criteria specific to the application, such as a URL string. You then identify the class map in the policy map and enable actions. The difference between creating a class map and defining the traffic match directly in the inspection policy map is that you can create more complex match criteria and you can reuse class maps.

  - Some traffic matching commands can specify regular expressions to match text inside a packet. Be sure to create and test the regular expressions before you configure the policy map, either singly or grouped together in a regular expression class map.
- Parameters—Parameters affect the behavior of the inspection engine.

Information About Layer 3/4 Policy Maps

This section describes how Layer 3/4 policy maps work, and includes the following topics:

- Feature Directionality, page 9-5
- Feature Matching Within a Policy Map, page 9-6
- Order in Which Multiple Feature Actions are Applied, page 9-6
- Incompatibility of Certain Feature Actions, page 9-8
- Feature Matching for Multiple Policy Maps, page 9-8

Feature Directionality

Actions are applied to traffic bidirectionally or unidirectionally depending on the feature. For features that are applied bidirectionally, all traffic that enters or exits the interface to which you apply the policy map is affected if the traffic matches the class map for both directions.

Note When you use a global policy, all features are unidirectional; features that are normally bidirectional when applied to a single interface only apply to the ingress of each interface when applied globally. Because the policy is applied to all interfaces, the policy will be applied in both directions so bidirectionality in this case is redundant.

For features that are applied unidirectionally, for example QoS priority queue, only traffic that enters (or exits, depending on the feature) the interface to which you apply the policy map is affected. See Table 9-2 for the directionality of each feature.

Table 9-2 Feature Directionality

Feature	Single Interface Direction	Global Direction
Application inspection (multiple types)	Bidirectional	Ingress
CSC	Bidirectional	Ingress
IPS	Bidirectional	Ingress
NetFlow Secure Event Logging filtering	N/A	Ingress
QoS input policing	Ingress	Ingress
QoS output policing	Egress	Egress
QoS standard priority queue	Egress	Egress
QoS traffic shaping, hierarchical priority queue	Egress	Egress
TCP and UDP connection limits and timeouts, and TCP sequence number randomization	Bidirectional	Ingress

Table 9-2 Feature Directionality

Feature	Single Interface Direction	Global Direction
TCP normalization	Bidirectional	Ingress
TCP state bypass	Bidirectional	Ingress

Feature Matching Within a Policy Map

See the following information for how a packet matches class maps in a policy map:

1. A packet can match only one class map in the policy map for each feature type.
2. When the packet matches a class map for a feature type, the ASA does not attempt to match it to any subsequent class maps for that feature type.
3. If the packet matches a subsequent class map for a different feature type, however, then the ASA also applies the actions for the subsequent class map, if supported. See the "Incompatibility of Certain Feature Actions" section on page 9-8 for more information about unsupported combinations.

For example, if a packet matches a class map for connection limits, and also matches a class map for application inspection, then both class map actions are applied.

If a packet matches a class map for HTTP inspection, but also matches another class map that includes HTTP inspection, then the second class map actions are not applied.

Note Application inspection includes multiple inspection types, and each inspection type is a separate feature when you consider the matching guidelines above.

Order in Which Multiple Feature Actions are Applied

The order in which different types of actions in a policy map are performed is independent of the order in which the actions appear in the policy map.

Note NetFlow Secure Event Logging filtering is order-independent.

Actions are performed in the following order:

1. QoS input policing
2. TCP normalization, TCP and UDP connection limits and timeouts, TCP sequence number randomization, and TCP state bypass.

   Note When a the ASA performs a proxy service (such as AAA or CSC) or it modifies the TCP payload (such as FTP inspection), the TCP normalizer acts in dual mode, where it is applied before and after the proxy or payload modifying service.

3. CSC
4. Application inspection (multiple types)

The order of application inspections applied when a class of traffic is classified for multiple inspections is as follows. Only one inspection type can be applied to the same traffic. WAAS inspection is an exception, because it can be applied along with other inspections for the same traffic. See the "Incompatibility of Certain Feature Actions" section on page 9-8 for more information.

a. CTIQBE
b. DNS
c. FTP
d. GTP
e. H323
f. HTTP
g. ICMP
h. ICMP error
i. ILS
j. MGCP
k. NetBIOS
l. PPTP
m. Sun RPC
n. RSH
o. RTSP
p. SIP
q. Skinny
r. SMTP
s. SNMP
t. SQL*Net
u. TFTP
v. XDMCP
w. DCERPC
x. Instant Messaging

Note RADIUS accounting is not listed because it is the only inspection allowed on management traffic. WAAS is not listed because it can be configured along with other inspections for the same traffic.

5. IPS
6. QoS output policing
7. QoS standard priority queue
8. QoS traffic shaping, hierarchical priority queue

Incompatibility of Certain Feature Actions

Some features are not compatible with each other for the same traffic. For example, you cannot configure QoS priority queueing and QoS policing for the same set of traffic. Also, most inspections should not be combined with another inspection, so the ASA only applies one inspection if you configure multiple inspections for the same traffic. In this case, the feature that is applied is the higher priority feature in the list in the "Order in Which Multiple Feature Actions are Applied" section on page 9-6.

For information about compatibility of each feature, see the chapter or section for your feature.

Note The **match default-inspection-traffic** command, which is used in the default global policy, is a special CLI shortcut to match the default ports for all inspections. When used in a policy map, this class map ensures that the correct inspection is applied to each packet, based on the destination port of the traffic. For example, when UDP traffic for port 69 reaches the ASA, then the ASA applies the TFTP inspection; when TCP traffic for port 21 arrives, then the ASA applies the FTP inspection. So in this case only, you can configure multiple inspections for the same class map. Normally, the ASA does not use the port number to determine which inspection to apply, thus giving you the flexibility to apply inspections to non-standard ports, for example.

An example of a misconfiguration is if you configure multiple inspections in the same policy map and do not use the default-inspection-traffic shortcut. In Example 9-1, traffic destined to port 21 is mistakenly configured for both FTP and HTTP inspection. In Example 9-2, traffic destined to port 80 is mistakenly configured for both FTP and HTTP inspection. In both cases of misconfiguration examples, only the FTP inspection is applied, because FTP comes before HTTP in the order of inspections applied.

Example 9-1 Misconfiguration for FTP packets: HTTP Inspection Also Configured

```
class-map ftp
   match port tcp eq 21
class-map http
   match port tcp eq 21 [it should be 80]
policy-map test
   class ftp
     inspect ftp
   class http
     inspect http
```

Example 9-2 Misconfiguration for HTTP packets: FTP Inspection Also Configured

```
class-map ftp
   match port tcp eq 80 [it should be 21]
class-map http
   match port tcp eq 80
policy-map test
   class http
     inspect http
   class ftp
     inspect ftp
```

Feature Matching for Multiple Policy Maps

For TCP and UDP traffic (and ICMP when you enable stateful ICMP inspection), Modular Policy Framework operates on traffic flows, and not just individual packets. If traffic is part of an existing connection that matches a feature in a policy on one interface, that traffic flow cannot also match the same feature in a policy on another interface; only the first policy is used.

For example, if HTTP traffic matches a policy on the inside interface to inspect HTTP traffic, and you have a separate policy on the outside interface for HTTP inspection, then that traffic is not also inspected on the egress of the outside interface. Similarly, the return traffic for that connection will not be inspected by the ingress policy of the outside interface, nor by the egress policy of the inside interface.

For traffic that is not treated as a flow, for example ICMP when you do not enable stateful ICMP inspection, returning traffic can match a different policy map on the returning interface. For example, if you configure IPS on the inside and outside interfaces, but the inside policy uses virtual sensor 1 while the outside policy uses virtual sensor 2, then a non-stateful Ping will match virtual sensor 1 outbound, but will match virtual sensor 2 inbound.

Licensing Requirements for Modular Policy Framework

Model	License Requirement
All models	Base License.

Guidelines and Limitations

This section includes the guidelines and limitations for this feature.

Context Mode Guidelines

Supported in single and multiple context mode.

Firewall Mode Guidelines

Supported in routed and transparent firewall mode.

IPv6 Guidelines

Supports IPv6 for the following features:

- Application inspection for FTP, HTTP, ICMP, SIP, SMTP and IPSec-pass-thru
- IPS
- NetFlow Secure Event Logging filtering
- TCP and UDP connection limits and timeouts, TCP sequence number randomization
- TCP normalization
- TCP state bypass

Class Map Guidelines

The maximum number of class maps of all types is 255 in single mode or per context in multiple mode. Class maps include the following types:

- Layer 3/4 class maps (for through traffic and management traffic)
- Inspection class maps
- Regular expression class maps
- **match** commands used directly underneath an inspection policy map

This limit also includes default class maps of all types, limiting user-configured class maps to approximately 235. . See the "Default Class Maps" section on page 9-11.

Policy Map Guidelines

See the following guidelines for using policy maps:

- You can only assign one policy map per interface. (However you can create up to 64 policy maps in the configuration.)
- You can apply the same policy map to multiple interfaces.
- You can identify up to 63 Layer 3/4 class maps in a Layer 3/4 policy map.
- For each class map, you can assign multiple actions from one or more feature types, if supported. See the "Incompatibility of Certain Feature Actions" section on page 9-8.

Service Policy Guidelines

- Interface service policies 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 normalization, then both FTP inspection and TCP normalization 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.
- You can only apply one global policy. For example, you cannot create a global policy that includes feature set 1, and a separate global policy that includes feature set 2. All features must be included in a single policy.
- When you make service policy changes to the configuration, all *new* connections use the new service policy. Existing connections continue to use the policy that was configured at the time of the connection establishment. **show** command output will not include data about the old connections.

  For example, if you remove a QoS service policy from an interface, then re-add a modified version, then the **show service-policy** command only displays QoS counters associated with new connections that match the new service policy; existing connections on the old policy no longer show in the command output.

  To ensure that all connections use the new policy, you need to disconnect the current connections so they can reconnect using the new policy. See the **clear conn** or **clear local-host** commands.

Default Settings

The following topics describe the default settings for Modular Policy Framework:

- Default Configuration, page 9-10
- Default Class Maps, page 9-11
- Default Inspection Policy Maps, page 9-12

Default Configuration

By default, the configuration includes a policy that matches all default application inspection traffic and applies certain inspections to the traffic on all interfaces (a global policy). Not all inspections are enabled by default. You can only apply one global policy, so if you want to alter the global policy, you need to either edit the default policy or disable it and apply a new one. (An interface policy overrides the global policy for a particular feature.)

The default policy configuration includes the following commands:

```
class-map inspection_default
 match default-inspection-traffic
policy-map type inspect dns preset_dns_map
 parameters
  message-length maximum 512
policy-map global_policy
 class inspection_default
  inspect dns preset_dns_map
  inspect ftp
  inspect h323 h225
  inspect h323 ras
  inspect rsh
  inspect rtsp
  inspect esmtp
  inspect sqlnet
  inspect skinny
  inspect sunrpc
  inspect xdmcp
  inspect sip
  inspect netbios
  inspect tftp
service-policy global_policy global
```

Note See the "Incompatibility of Certain Feature Actions" section on page 9-8 for more information about the special **match default-inspection-traffic** command used in the default class map.

Default Class Maps

The configuration includes a default Layer 3/4 class map that the ASA uses in the default global policy. It is called **inspection_default** and matches the default inspection traffic:

```
class-map inspection_default
 match default-inspection-traffic
```

The **match default-inspection-traffic** command, which is used in the default global policy, is a special CLI shortcut to match the default ports for all inspections. When used in a policy map, this class map ensures that the correct inspection is applied to each packet, based on the destination port of the traffic. For example, when UDP traffic for port 69 reaches the ASA, then the ASA applies the TFTP inspection; when TCP traffic for port 21 arrives, then the ASA applies the FTP inspection. So in this case only, you can configure multiple inspections for the same class map. Normally, the ASA does not use the port number to determine which inspection to apply, thus giving you the flexibility to apply inspections to non-standard ports, for example.

Another class map that exists in the default configuration is called class-default, and it matches all traffic:

```
class-map class-default
 match any
```

This class map appears at the end of all Layer 3/4 policy maps and essentially tells the ASA to not perform any actions on all other traffic. You can use the class-default class map if desired, rather than making your own **match any** class map. In fact, some features are only available for class-default, such as QoS traffic shaping.

Default Inspection Policy Maps

The default inspection policy map configuration includes the following commands, which sets the maximum message length for DNS packets to be 512 bytes:

```
policy-map type inspect dns preset_dns_map
 parameters
  message-length maximum 512
```

Note There are other default inspection policy maps such as **policy-map type inspect esmtp _default_esmtp_map**. These default policy maps are created implicitly by the command **inspect** *protocol*. For example, **inspect esmtp** implicitly uses the policy map "_default_esmtp_map." All the default policy maps can be shown by using the **show running-config all policy-map** command.

Configuring Modular Policy Framework

This section describes how to configure your security polcy using Modular Policy Framework, and includes the following topics:

- Task Flow for Configuring Hierarchical Policy Maps, page 9-12
- Identifying Traffic (Layer 3/4 Class Map), page 9-13
- Configuring Special Actions for Application Inspections (Inspection Policy Map), page 9-17
- Defining Actions (Layer 3/4 Policy Map), page 9-25
- Applying Actions to an Interface (Service Policy), page 9-26

Task Flow for Configuring Hierarchical Policy Maps

If you enable QoS traffic shaping for a class map, then you can optionally enable priority queueing for a subset of shaped traffic. To do so, you need to create a policy map for the priority queueing, and then within the traffic shaping policy map, you can call the priority class map. Only the traffic shaping class map is applied to an interface.

See Chapter 55, "Information About QoS," for more information about this feature.

Hierarchical policy maps are only supported for traffic shaping and priority queueing.

To implement a hierarchical policy map, perform the following steps:

Step 1 Identify the prioritized traffic according to the "Identifying Traffic (Layer 3/4 Class Map)" section on page 9-13.

You can create multiple class maps to be used in the hierarchical policy map.

Step 2 Create a policy map according to the "Defining Actions (Layer 3/4 Policy Map)" section on page 9-25, and identify the sole action for each class map as **priority**.

Step 3 Create a separate policy map according to the "Defining Actions (Layer 3/4 Policy Map)" section on page 9-25, and identify the **shape** action for the **class-default** class map.

Traffic shaping can only be applied the to **class-default** class map.

Step 4 For the same class map, identify the priority policy map that you created in Step 2 using the **service-policy** *priority_policy_map* command.

Step 5 Apply the shaping policy map to the interface accrding to "Applying Actions to an Interface (Service Policy)" section on page 9-26.

Identifying Traffic (Layer 3/4 Class Map)

A Layer 3/4 class map identifies Layer 3 and 4 traffic to which you want to apply actions. You can create multiple Layer 3/4 class maps for each Layer 3/4 policy map.

This section includes the following topics:

- Creating a Layer 3/4 Class Map for Through Traffic, page 9-13
- Creating a Layer 3/4 Class Map for Management Traffic, page 9-16

Creating a Layer 3/4 Class Map for Through Traffic

A Layer 3/4 class map matches traffic based on protocols, ports, IP addresses and other Layer 3 or 4 attributes.

Detailed Steps

Step 1 Create a Layer 3/4 class map by entering the following command:

```
hostname(config)# class-map class_map_name
hostname(config-cmap)#
```

Where *class_map_name* is a string up to 40 characters in length. The name "class-default" is reserved. All types of class maps use the same name space, so you cannot reuse a name already used by another type of class map. The CLI enters class-map configuration mode.

Step 2 (Optional) Add a description to the class map by entering the following command:

```
hostname(config-cmap)# description string
```

Step 3 Define the traffic to include in the class by matching one of the following characteristics. Unless otherwise specified, you can include only one **match** command in the class map.

- Any traffic—The class map matches all traffic.

```
hostname(config-cmap)# match any
```

Note For features that support IPv6 (see the "Guidelines and Limitations" section on page 9-9), then the **match any** and **match default-inspection-traffic** commands are the only commands that match IPv6 traffic. For example, you cannot match an IPv6 access list.

- Access list—The class map matches traffic specified by an extended access list. If the ASA is operating in transparent firewall mode, you can use an EtherType access list.

```
hostname(config-cmap)# match access-list access_list_name
```

For more information about creating access lists, see Chapter 11, "Adding an Extended Access List," or Chapter 12, "Adding an EtherType Access List.".

For information about creating access lists with NAT, see the "IP Addresses Used for Access Lists When You Use NAT" section on page 10-3.

- TCP or UDP destination ports—The class map matches a single port or a contiguous range of ports.

```
hostname(config-cmap)# match port {tcp | udp} {eq port_num | range port_num port_num}
```

Tip For applications that use multiple, non-contiguous ports, use the **match access-list** command and define an ACE to match each port.

For a list of ports you can specify, see the "TCP and UDP Ports" section on page C-11.

For example, enter the following command to match TCP packets on port 80 (HTTP):

```
hostname(config-cmap)# match tcp eq 80
```

- Default traffic for inspection—The class map matches the default TCP and UDP ports used by all applications that the ASA can inspect.

```
hostname(config-cmap)# match default-inspection-traffic
```

This command, which is used in the default global policy, is a special CLI shortcut that when used in a policy map, ensures that the correct inspection is applied to each packet, based on the destination port of the traffic. For example, when UDP traffic for port 69 reaches the ASA, then the ASA applies the TFTP inspection; when TCP traffic for port 21 arrives, then the ASA applies the FTP inspection. So in this case only, you can configure multiple inspections for the same class map (with the exception of WAAS inspection, which can be configured with other inspections. See the "Incompatibility of Certain Feature Actions" section on page 9-8 for more information about combining actions). Normally, the ASA does not use the port number to determine the inspection applied, thus giving you the flexibility to apply inspections to non-standard ports, for example.

See the "Default Settings" section on page 40-4 for a list of default ports. Not all applications whose ports are included in the **match default-inspection-traffic** command are enabled by default in the policy map.

You can specify a **match access-list** command along with the **match default-inspection-traffic** command to narrow the matched traffic. Because the **match default-inspection-traffic** command specifies the ports and protocols to match, any ports and protocols in the access list are ignored.

Tip We suggest that you only inspect traffic on ports on which you expect application traffic; if you inspect all traffic, for example using **match any**, the ASA performance can be impacted.

Note For features that support IPv6 (see the "Guidelines and Limitations" section on page 9-9), then the **match any** and **match default-inspection-traffic** commands are the only commands that match IPv6 traffic. For example, you cannot match an IPv6 access list.

- DSCP value in an IP header—The class map matches up to eight DSCP values.

```
hostname(config-cmap)# match dscp value1 [value2] [...] [value8]
```

For example, enter the following:

```
hostname(config-cmap)# match dscp af43 cs1 ef
```

- Precedence—The class map matches up to four precedence values, represented by the TOS byte in the IP header.

  ```
  hostname(config-cmap)# match precedence value1 [value2] [value3] [value4]
  ```

  where *value1* through *value4* can be 0 to 7, corresponding to the possible precedences.
- RTP traffic—The class map matches RTP traffic.

  ```
  hostname(config-cmap)# match rtp starting_port range
  ```

  The *starting_port* specifies an even-numbered UDP destination port between 2000 and 65534. The *range* specifies the number of additional UDP ports to match above the *starting_port*, between 0 and 16383.
- Tunnel group traffic—The class map matches traffic for a tunnel group to which you want to apply QoS.

  ```
  hostname(config-cmap)# match tunnel-group name
  ```

  You can also specify one other **match** command to refine the traffic match. You can specify any of the preceding commands, except for the **match any**, **match access-list**, or **match default-inspection-traffic** commands. Or you can enter the following command to police each flow:

  ```
  hostname(config-cmap)# match flow ip destination address
  ```

  All traffic going to a unique IP destination address is considered a flow.

Examples

The following is an example for the **class-map** command:

```
hostname(config)# access-list udp permit udp any any
hostname(config)# access-list tcp permit tcp any any
hostname(config)# access-list host_foo permit ip any 10.1.1.1 255.255.255.255

hostname(config)# class-map all_udp
hostname(config-cmap)# description "This class-map matches all UDP traffic"
hostname(config-cmap)# match access-list udp

hostname(config-cmap)# class-map all_tcp
hostname(config-cmap)# description "This class-map matches all TCP traffic"
hostname(config-cmap)# match access-list tcp

hostname(config-cmap)# class-map all_http
hostname(config-cmap)# description "This class-map matches all HTTP traffic"
hostname(config-cmap)# match port tcp eq http

hostname(config-cmap)# class-map to_server
hostname(config-cmap)# description "This class-map matches all traffic to server 10.1.1.1"
hostname(config-cmap)# match access-list host_foo
```

Creating a Layer 3/4 Class Map for Management Traffic

For management traffic to the ASA, you might want to perform actions specific to this kind of traffic. You can specify a management class map that can match an access list or TCP or UDP ports. The types of actions available for a management class map in the policy map are specialized for management traffic. See the "Modular Policy Framework Supported Features" section on page 9-1.

Detailed Steps

Step 1 Create a class map by entering the following command:

```
hostname(config)# class-map type management class_map_name
hostname(config-cmap)#
```

Where *class_map_name* is a string up to 40 characters in length. The name "class-default" is reserved. All types of class maps use the same name space, so you cannot reuse a name already used by another type of class map. The CLI enters class-map configuration mode.

Step 2 (Optional) Add a description to the class map by entering the following command:

```
hostname(config-cmap)# description string
```

Step 3 Define the traffic to include in the class by matching one of the following characteristics. You can include only one **match** command in the class map.

- Access list—The class map matches traffic specified by an extended access list. If the ASA is operating in transparent firewall mode, you can use an EtherType access list.

  ```
  hostname(config-cmap)# match access-list access_list_name
  ```

  For more information about creating access lists, see Chapter 11, "Adding an Extended Access List," or Chapter 12, "Adding an EtherType Access List."

  For information about creating access lists with NAT, see the "IP Addresses Used for Access Lists When You Use NAT" section on page 10-3.

- TCP or UDP destination ports—The class map matches a single port or a contiguous range of ports.

  ```
  hostname(config-cmap)# match port {tcp | udp} {eq port_num | range port_num port_num}
  ```

Tip For applications that use multiple, non-contiguous ports, use the **match access-list** command and define an ACE to match each port.

  For a list of ports you can specify, see the "TCP and UDP Ports" section on page C-11.

  For example, enter the following command to match TCP packets on port 80 (HTTP):

  ```
  hostname(config-cmap)# match tcp eq 80
  ```

Configuring Special Actions for Application Inspections (Inspection Policy Map)

Modular Policy Framework lets you configure special actions for many application inspections. When you enable an inspection engine in the Layer 3/4 policy map, you can also optionally enable actions as defined in an *inspection policy map*. When the inspection policy map matches traffic within the Layer 3/4 class map for which you have defined an inspection action, then that subset of traffic will be acted upon as specified (for example, dropped or rate-limited).

This section includes the following topics:

- Defining Actions in an Inspection Policy Map, page 9-17
- Identifying Traffic in an Inspection Class Map, page 9-20
- Creating a Regular Expression, page 9-21
- Creating a Regular Expression Class Map, page 9-24

Defining Actions in an Inspection Policy Map

When you enable an inspection engine in the Layer 3/4 policy map, you can also optionally enable actions as defined in an inspection policy map.

Restrictions

- HTTP inspection policy maps—If you modify an in-use HTTP inspection policy map (**policy-map type inspect http**), you must remove and reapply the **inspect http** *map* action for the changes to take effect. For example, if you modify the “http-map” inspection policy map, you must remove and readd the **inspect http http-map** command from the layer 3/4 policy:

```
hostname(config)# policy-map test
hostname(config-pmap)# class http0
hostname(config-pmap-c)# no inspect http http-map
hostname(config-pmap-c)# inspect http http-map
```

- All inspection policy maps—If you want to exchange an in-use inspection policy map for a different map name, you must remove the **inspect** *protocol map* command, and readd it with the new map. For example:

```
hostname(config)# policy-map test
hostname(config-pmap)# class sip
hostname(config-pmap-c)# no inspect sip sip-map1
hostname(config-pmap-c)# inspect sip sip-map2
```

- You can specify multiple **class** or **match** commands in the policy map.

  If a packet matches multiple different **match** or **class** commands, then the order in which the ASA applies the actions is determined by internal ASA rules, and not by the order they are added to the policy map. The internal rules are determined by the application type and the logical progression of parsing a packet, and are not user-configurable. For example for HTTP traffic, parsing a Request Method field precedes parsing the Header Host Length field; an action for the Request Method field occurs before the action for the Header Host Length field. For example, the following match commands can be entered in any order, but the **match request method get** command is matched first.

```
match request header host length gt 100
  reset
match request method get
```

```
  log
```

If an action drops a packet, then no further actions are performed in the inspection policy map. For example, if the first action is to reset the connection, then it will never match any further **match** or **class** commands. If the first action is to log the packet, then a second action, such as resetting the connection, can occur. (You can configure both the **reset** (or **drop-connection**, and so on.) and the **log** action for the same **match** or **class** command, in which case the packet is logged before it is reset for a given match.)

If a packet matches multiple **match** or **class** commands that are the same, then they are matched in the order they appear in the policy map. For example, for a packet with the header length of 1001, it will match the first command below, and be logged, and then will match the second command and be reset. If you reverse the order of the two **match** commands, then the packet will be dropped and the connection reset before it can match the second **match** command; it will never be logged.

```
match request header length gt 100
  log
match request header length gt 1000
  reset
```

A class map is determined to be the same type as another class map or **match** command based on the lowest priority **match** command in the class map (the priority is based on the internal rules). If a class map has the same type of lowest priority **match** command as another class map, then the class maps are matched according to the order they are added to the policy map. If the lowest priority command for each class map is different, then the class map with the higher priority **match** command is matched first. For example, the following three class maps contain two types of **match** commands: **match request-cmd** (higher priority) and **match filename** (lower priority). The ftp3 class map includes both commands, but it is ranked according to the lowest priority command, **match filename**. The ftp1 class map includes the highest priority command, so it is matched first, regardless of the order in the policy map. The ftp3 class map is ranked as being of the same priority as the ftp2 class map, which also contains the **match filename** command. They are matched according to the order in the policy map: ftp3 and then ftp2.

```
class-map type inspect ftp match-all ftp1
  match request-cmd get
class-map type inspect ftp match-all ftp2
  match filename regex abc
class-map type inspect ftp match-all ftp3
  match request-cmd get
  match filename regex abc

policy-map type inspect ftp ftp
  class ftp3
    log
  class ftp2
    log
  class ftp1
    log
```

Detailed Steps

Step 1 (Optional) Create an inspection class map according to the "Identifying Traffic in an Inspection Class Map" section on page 9-20. Alternatively, you can identify the traffic directly within the policy map.

Step 2 To create the inspection policy map, enter the following command:

```
hostname(config)# policy-map type inspect application policy_map_name
hostname(config-pmap)#
```

See the "Configuring Application Layer Protocol Inspection" section on page 40-6 for a list of applications that support inspection policy maps.

The *policy_map_name* argument is the name of the policy map up to 40 characters in length. All types of policy maps use the same name space, so you cannot reuse a name already used by another type of policy map. The CLI enters policy-map configuration mode.

Step 3 To apply actions to matching traffic, perform the following steps.

Note For information about including multiple **class** or **match** commands, see the "Restrictions" section on page 9-17.

a. Specify the traffic on which you want to perform actions using one of the following methods:

- Specify the inspection class map that you created in the "Identifying Traffic in an Inspection Class Map" section on page 9-20 by entering the following command:

```
hostname(config-pmap)# class class_map_name
hostname(config-pmap-c)#
```

  Not all applications support inspection class maps.

- Specify traffic directly in the policy map using one of the **match** commands described for each application in the applicable inspection chapter. If you use a **match not** command, then any traffic that matches the criterion in the **match not** command does not have the action applied.

b. Specify the action you want to perform on the matching traffic by entering the following command:

```
hostname(config-pmap-c)# {[drop [send-protocol-error] |
drop-connection [send-protocol-error]| mask | reset] [log] | rate-limit message_rate}
```

Not all options are available for each application. Other actions specific to the application might also be available. See the appropriate inspection chapter for the exact options available.

The **drop** keyword drops all packets that match.

The **send-protocol-error** keyword sends a protocol error message.

The **drop-connection** keyword drops the packet and closes the connection.

The **mask** keyword masks out the matching portion of the packet.

The **reset** keyword drops the packet, closes the connection, and sends a TCP reset to the server and/or client.

The **log** keyword, which you can use alone or with one of the other keywords, sends a system log message.

The **rate-limit** *message_rate* argument limits the rate of messages.

Step 4 To configure parameters that affect the inspection engine, enter the following command:

```
hostname(config-pmap)# parameters
hostname(config-pmap-p)#
```

The CLI enters parameters configuration mode. For the parameters available for each application, see the appropriate inspection chapter.

Examples

The following is an example of an HTTP inspection policy map and the related class maps. This policy map is activated by the Layer 3/4 policy map, which is enabled by the service policy.

```
hostname(config)# regex url_example example\.com
hostname(config)# regex url_example2 example2\.com
hostname(config)# class-map type regex match-any URLs
hostname(config-cmap)# match regex url_example
hostname(config-cmap)# match regex url_example2

hostname(config-cmap)# class-map type inspect http match-all http-traffic
hostname(config-cmap)# match req-resp content-type mismatch
hostname(config-cmap)# match request body length gt 1000
hostname(config-cmap)# match not request uri regex class URLs

hostname(config-cmap)# policy-map type inspect http http-map1
hostname(config-pmap)# class http-traffic
hostname(config-pmap-c)# drop-connection log
hostname(config-pmap-c)# match req-resp content-type mismatch
hostname(config-pmap-c)# reset log
hostname(config-pmap-c)# parameters
hostname(config-pmap-p)# protocol-violation action log

hostname(config-pmap-p)# policy-map test
hostname(config-pmap)# class test (a Layer 3/4 class map not shown)
hostname(config-pmap-c)# inspect http http-map1

hostname(config-pmap-c)# service-policy test interface outside
```

Identifying Traffic in an Inspection Class Map

This type of class map allows you to match criteria that is specific to an application. For example, for DNS traffic, you can match the domain name in a DNS query.

A class map groups multiple traffic matches (in a match-all class map), or lets you match any of a list of matches (in a match-any class map). The difference between creating a class map and defining the traffic match directly in the inspection policy map is that the class map lets you group multiple match commands, and you can reuse class maps. For the traffic that you identify in this class map, you can specify actions such as dropping, resetting, and/or logging the connection in the inspection policy map. If you want to perform different actions on different types of traffic, you should identify the traffic directly in the policy map.

Restrictions

Not all applications support inspection class maps. See the CLI help for **class-map type inspect** for a list of supported applications.

Detailed Steps

Step 1 (Optional) If you want to match based on a regular expression, see the "Creating a Regular Expression" section on page 9-21 and the "Creating a Regular Expression Class Map" section on page 9-24.

Step 2 Create a class map by entering the following command:

```
hostname(config)# class-map type inspect application [match-all | match-any]
class_map_name
hostname(config-cmap)#
```

Where the *application* is the application you want to inspect. For supported applications, see the CLI help for a list of supported applications or see Chapter 40, “Getting Started With Application Layer Protocol Inspection.”

The *class_map_name* argument is the name of the class map up to 40 characters in length.

The **match-all** keyword is the default, and specifies that traffic must match all criteria to match the class map.

The **match-any** keyword specifies that the traffic matches the class map if it matches at least one of the criteria.

The CLI enters class-map configuration mode, where you can enter one or more **match** commands.

Step 3 (Optional) To add a description to the class map, enter the following command:

```
hostname(config-cmap)# description string
```

Step 4 Define the traffic to include in the class by entering one or more **match** commands available for your application.

To specify traffic that should not match the class map, use the **match not** command. For example, if the **match not** command specifies the string “example.com,” then any traffic that includes “example.com” does not match the class map.

To see the **match** commands available for each application, see the appropriate inspection chapter.

Examples

The following example creates an HTTP class map that must match all criteria:

```
hostname(config-cmap)# class-map type inspect http match-all http-traffic
hostname(config-cmap)# match req-resp content-type mismatch
hostname(config-cmap)# match request body length gt 1000
hostname(config-cmap)# match not request uri regex class URLs
```

The following example creates an HTTP class map that can match any of the criteria:

```
hostname(config-cmap)# class-map type inspect http match-any monitor-http
hostname(config-cmap)# match request method get
hostname(config-cmap)# match request method put
hostname(config-cmap)# match request method post
```

Creating a Regular Expression

A regular expression matches text strings either literally as an exact string, or by using *metacharacters* so you can match multiple variants of a text string. You can use a regular expression to match the content of certain application traffic; for example, you can match a URL string inside an HTTP packet.

Guidelines

Use **Ctrl+V** to escape all of the special characters in the CLI, such as question mark (?) or a tab. For example, type **d[Ctrl+V]?g** to enter **d?g** in the configuration.

See the **regex** command in the *Cisco ASA 5500 Series Command Reference* for performance impact information when matching a regular expression to packets.

Note As an optimization, the ASA searches on the deobfuscated URL. Deobfuscation compresses multiple forward slashes (/) into a single slash. For strings that commonly use double slashes, like "http://", be sure to search for "http:/" instead.

Table 9-3 lists the metacharacters that have special meanings.

Table 9-3 regex Metacharacters

Character	Description	Notes
.	Dot	Matches any single character. For example, **d.g** matches dog, dag, dtg, and any word that contains those characters, such as doggonnit.
(*exp*)	Subexpression	A subexpression segregates characters from surrounding characters, so that you can use other metacharacters on the subexpression. For example, **d(o|a)g** matches dog and dag, but **do|ag** matches do and ag. A subexpression can also be used with repeat quantifiers to differentiate the characters meant for repetition. For example, **ab(xy){3}z** matches abxyxyxyz.
|	Alternation	Matches either expression it separates. For example, **dog|cat** matches dog or cat.
?	Question mark	A quantifier that indicates that there are 0 or 1 of the previous expression. For example, **lo?se** matches lse or lose. **Note** You must enter **Ctrl+V** and then the question mark or else the help function is invoked.
*	Asterisk	A quantifier that indicates that there are 0, 1 or any number of the previous expression. For example, **lo*se** matches lse, lose, loose, and so on.
+	Plus	A quantifier that indicates that there is at least 1 of the previous expression. For example, **lo+se** matches lose and loose, but not lse.
{*x*} or {*x*,}	Minimum repeat quantifier	Repeat at least *x* times. For example, **ab(xy){2,}z** matches abxyxyz, abxyxyxyz, and so on.
[*abc*]	Character class	Matches any character in the brackets. For example, **[abc]** matches a, b, or c.
[^*abc*]	Negated character class	Matches a single character that is not contained within the brackets. For example, **[^abc]** matches any character other than a, b, or c. **[^A-Z]** matches any single character that is not an uppercase letter.
[*a*-*c*]	Character range class	Matches any character in the range. **[a-z]** matches any lowercase letter. You can mix characters and ranges: **[abcq-z]** matches a, b, c, q, r, s, t, u, v, w, x, y, z, and so does **[a-cq-z]**. The dash (-) character is literal only if it is the last or the first character within the brackets: **[abc-]** or **[-abc]**.

Table 9-3 regex Metacharacters (continued)

Character	Description	Notes
""	Quotation marks	Preserves trailing or leading spaces in the string. For example, **" test"** preserves the leading space when it looks for a match.
^	Caret	Specifies the beginning of a line.
\	Escape character	When used with a metacharacter, matches a literal character. For example, **\[** matches the left square bracket.
char	Character	When character is not a metacharacter, matches the literal character.
\r	Carriage return	Matches a carriage return 0x0d.
\n	Newline	Matches a new line 0x0a.
\t	Tab	Matches a tab 0x09.
\f	Formfeed	Matches a form feed 0x0c.
\x*NN*	Escaped hexadecimal number	Matches an ASCII character using hexadecimal (exactly two digits).
\NNN	Escaped octal number	Matches an ASCII character as octal (exactly three digits). For example, the character 040 represents a space.

Detailed Steps

Step 1 To test a regular expression to make sure it matches what you think it will match, enter the following command:

```
hostname(config)# test regex input_text regular_expression
```

Where the *input_text* argument is a string you want to match using the regular expression, up to 201 characters in length.

The *regular_expression* argument can be up to 100 characters in length.

Use **Ctrl+V** to escape all of the special characters in the CLI. For example, to enter a tab in the input text in the **test regex** command, you must enter **test regex "test[Ctrl+V Tab]" "test\t"**.

If the regular expression matches the input text, you see the following message:

```
INFO: Regular expression match succeeded.
```

If the regular expression does not match the input text, you see the following message:

```
INFO: Regular expression match failed.
```

Step 2 To add a regular expression after you tested it, enter the following command:

```
hostname(config)# regex name regular_expression
```

Where the *name* argument can be up to 40 characters in length.

The *regular_expression* argument can be up to 100 characters in length.

Examples

The following example creates two regular expressions for use in an inspection policy map:

```
hostname(config)# regex url_example example\.com
hostname(config)# regex url_example2 example2\.com
```

Creating a Regular Expression Class Map

A regular expression class map identifies one or more regular expressions. You can use a regular expression class map to match the content of certain traffic; for example, you can match URL strings inside HTTP packets.

Detailed Steps

Step 1 Create one or more regular expressions according to the "Creating a Regular Expression" section.

Step 2 Create a class map by entering the following command:

```
hostname(config)# class-map type regex match-any class_map_name
hostname(config-cmap)#
```

Where *class_map_name* is a string up to 40 characters in length. The name "class-default" is reserved. All types of class maps use the same name space, so you cannot reuse a name already used by another type of class map.

The **match-any** keyword specifies that the traffic matches the class map if it matches at least one of the regular expressions.

The CLI enters class-map configuration mode.

Step 3 (Optional) Add a description to the class map by entering the following command:

```
hostname(config-cmap)# description string
```

Step 4 Identify the regular expressions you want to include by entering the following command for each regular expression:

```
hostname(config-cmap)# match regex regex_name
```

Examples

The following example creates two regular expressions, and adds them to a regular expression class map. Traffic matches the class map if it includes the string "example.com" or "example2.com."

```
hostname(config)# regex url_example example\.com
hostname(config)# regex url_example2 example2\.com
hostname(config)# class-map type regex match-any URLs
hostname(config-cmap)# match regex url_example
hostname(config-cmap)# match regex url_example2
```

Defining Actions (Layer 3/4 Policy Map)

This section describes how to associate actions with Layer 3/4 class maps by creating a Layer 3/4 policy map.

Restrictions

- The maximum number of policy maps is 64, but you can only apply one policy map per interface.
- If you modify a policy map while it is in use by the service policy, your changes do not take effect unless you delete and readd the policy map.

Detailed Steps

Step 1 Add the policy map by entering the following command:

```
hostname(config)# policy-map policy_map_name
```

The *policy_map_name* argument is the name of the policy map up to 40 characters in length. All types of policy maps use the same name space, so you cannot reuse a name already used by another type of policy map. The CLI enters policy-map configuration mode.

Step 2 (Optional) Specify a description for the policy map:

```
hostname(config-pmap)# description text
```

Step 3 Specify a previously configured Layer 3/4 class map using the following command:

```
hostname(config-pmap)# class class_map_name
```

where the *class_map_name* is the name of the class map you created earlier. See the "Identifying Traffic (Layer 3/4 Class Map)" section on page 9-13 to add a class map.

Step 4 Specify one or more actions for this class map. See the "Modular Policy Framework Supported Features" section on page 9-1.

Note If there is no **match default_inspection_traffic** command in a class map, then at most one **inspect** command is allowed to be configured under the class.

For QoS, you can configure a hierarchical policy map for the traffic shaping and priority queue features. See the "Task Flow for Configuring Hierarchical Policy Maps" section on page 9-12 for more information.

Step 5 Repeat Step 3 and Step 4 for each class map you want to include in this policy map.

Examples

The following is an example of a **policy-map** command for connection policy. It limits the number of connections allowed to the web server 10.1.1.1:

```
hostname(config)# access-list http-server permit tcp any host 10.1.1.1
hostname(config)# class-map http-server
hostname(config-cmap)# match access-list http-server

hostname(config)# policy-map global-policy
hostname(config-pmap)# description This policy map defines a policy concerning connection
to http server.
hostname(config-pmap)# class http-server
hostname(config-pmap-c)# set connection conn-max 256
```

The following example shows how multi-match works in a policy map:

```
hostname(config)# class-map inspection_default
hostname(config-cmap)# match default-inspection-traffic
hostname(config)# class-map http_traffic
hostname(config-cmap)# match port tcp eq 80

hostname(config)# policy-map outside_policy
hostname(config-pmap)# class inspection_default
hostname(config-pmap-c)# inspect http http_map
hostname(config-pmap-c)# inspect sip
hostname(config-pmap)# class http_traffic
hostname(config-pmap-c)# set connection timeout tcp 0:10:0
```

The following example shows how traffic matches the first available class map, and will not match any subsequent class maps that specify actions in the same feature domain:

```
hostname(config)# class-map telnet_traffic
hostname(config-cmap)# match port tcp eq 23
hostname(config)# class-map ftp_traffic
hostname(config-cmap)# match port tcp eq 21
hostname(config)# class-map tcp_traffic
hostname(config-cmap)# match port tcp range 1 65535
hostname(config)# class-map udp_traffic
hostname(config-cmap)# match port udp range 0 65535
hostname(config)# policy-map global_policy
hostname(config-pmap)# class telnet_traffic
hostname(config-pmap-c)# set connection timeout tcp 0:0:0
hostname(config-pmap-c)# set connection conn-max 100
hostname(config-pmap)# class ftp_traffic
hostname(config-pmap-c)# set connection timeout tcp 0:5:0
hostname(config-pmap-c)# set connection conn-max 50
hostname(config-pmap)# class tcp_traffic
hostname(config-pmap-c)# set connection timeout tcp 2:0:0
hostname(config-pmap-c)# set connection conn-max 2000
```

When a Telnet connection is initiated, it matches **class telnet_traffic**. Similarly, if an FTP connection is initiated, it matches **class ftp_traffic**. For any TCP connection other than Telnet and FTP, it will match **class tcp_traffic**. Even though a Telnet or FTP connection can match **class tcp_traffic**, the ASA does not make this match because they previously matched other classes.

Applying Actions to an Interface (Service Policy)

To activate the Layer 3/4 policy map, create a service policy that applies it to one or more interfaces or that applies it globally to all interfaces.

Restrictions

You can only apply one global policy.

Detailed Steps

- To create a service policy by associating a policy map with an interface, enter the following command:

```
hostname(config)# service-policy policy_map_name interface interface_name
```

- To create a service policy that applies to all interfaces that do not have a specific policy, enter the following command:

  ```
  hostname(config)# service-policy policy_map_name global
  ```

  By default, the configuration includes a global policy that matches all default application inspection traffic and applies inspection to the traffic globally. You can only apply one global policy, so if you want to alter the global policy, you need to either edit the default policy or disable it and apply a new one.

  The default service policy includes the following command:

  ```
  service-policy global_policy global
  ```

Examples

For example, the following command enables the inbound_policy policy map on the outside interface:

```
hostname(config)# service-policy inbound_policy interface outside
```

The following commands disable the default global policy, and enables a new one called new_global_policy on all other ASA interfaces:

```
hostname(config)# no service-policy global_policy global
hostname(config)# service-policy new_global_policy global
```

Monitoring Modular Policy Framework

To monitor Modular Policy Framework, enter the following command:

Command	Purpose
show service-policy	Displays the service policy statistics.

Configuration Examples for Modular Policy Framework

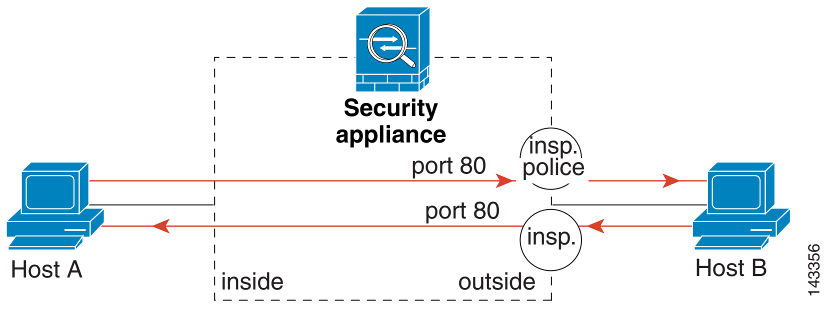
This section includes several Modular Policy Framework examples, and includes the following topics:

- Applying Inspection and QoS Policing to HTTP Traffic, page 9-28
- Applying Inspection to HTTP Traffic Globally, page 9-28
- Applying Inspection and Connection Limits to HTTP Traffic to Specific Servers, page 9-29
- Applying Inspection to HTTP Traffic with NAT, page 9-30

Applying Inspection and QoS Policing to HTTP Traffic

In this example (see Figure 9-1), any HTTP connection (TCP traffic on port 80) that enters or exits the ASA through the outside interface is classified for HTTP inspection. Any HTTP traffic that exits the outside interface is classified for policing.

Figure 9-1 HTTP Inspection and QoS Policing



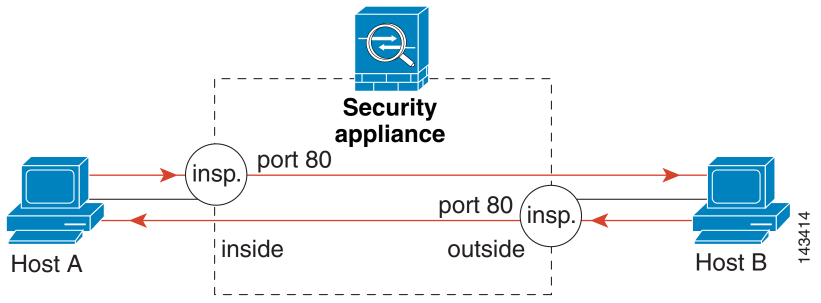
See the following commands for this example:

```
hostname(config)# class-map http_traffic
hostname(config-cmap)# match port tcp eq 80

hostname(config)# policy-map http_traffic_policy
hostname(config-pmap)# class http_traffic
hostname(config-pmap-c)# inspect http
hostname(config-pmap-c)# police output 250000
hostname(config)# service-policy http_traffic_policy interface outside
```

Applying Inspection to HTTP Traffic Globally

In this example (see Figure 9-2), any HTTP connection (TCP traffic on port 80) that enters the ASA through any interface is classified for HTTP inspection. Because the policy is a global policy, inspection occurs only as the traffic enters each interface.

Figure 9-2 Global HTTP Inspection



See the following commands for this example:

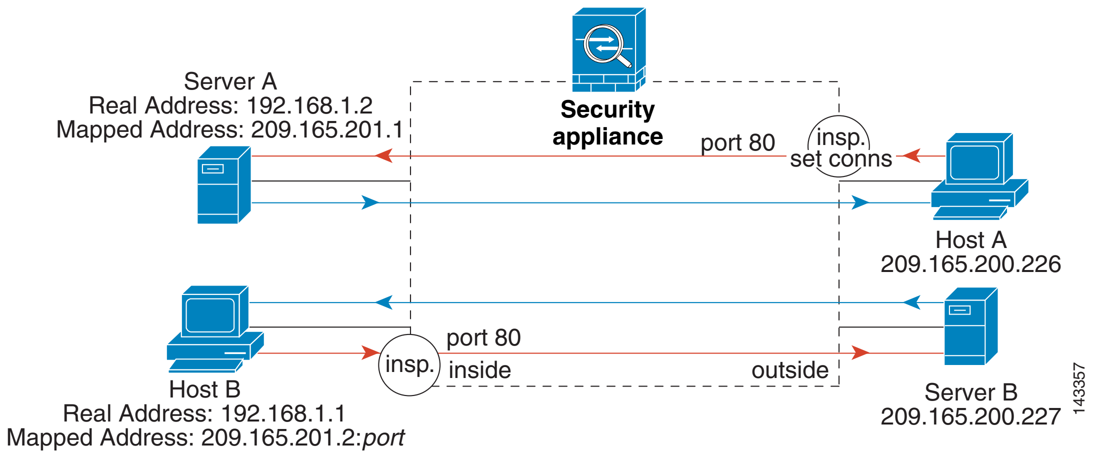
```
hostname(config)# class-map http_traffic
hostname(config-cmap)# match port tcp eq 80
hostname(config)# policy-map http_traffic_policy
hostname(config-pmap)# class http_traffic
hostname(config-pmap-c)# inspect http
hostname(config)# service-policy http_traffic_policy global
```

Applying Inspection and Connection Limits to HTTP Traffic to Specific Servers

In this example (see Figure 9-3), any HTTP connection destined for Server A (TCP traffic on port 80) that enters the ASA through the outside interface is classified for HTTP inspection and maximum connection limits. Connections initiated from server A to Host A does not match the access list in the class map, so it is not affected.

Any HTTP connection destined for Server B that enters the ASA through the inside interface is classified for HTTP inspection. Connections initiated from server B to Host B does not match the access list in the class map, so it is not affected.

Figure 9-3 HTTP Inspection and Connection Limits to Specific Servers



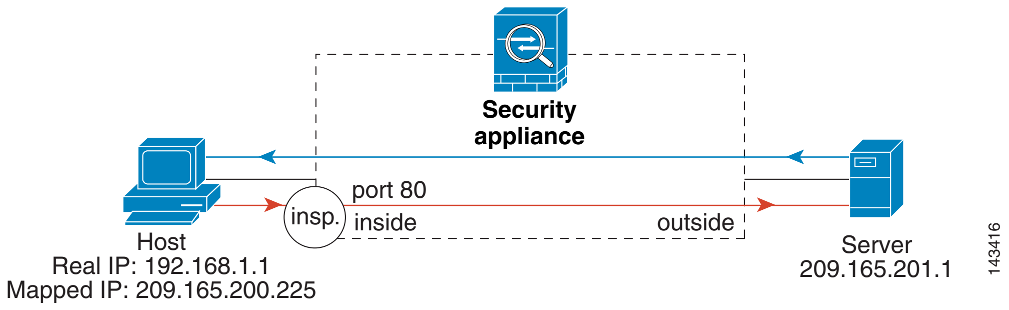
See the following commands for this example:

```
hostname(config)# static (inside,outside) 209.165.201.1 192.168.1.2
hostname(config)# nat (inside) 1 192.168.1.0 255.255.255.0
hostname(config)# global (outside) 1 209.165.201.2
hostname(config)# access-list serverA extended permit tcp any host 209.165.201.1 eq 80
hostname(config)# access-list ServerB extended permit tcp any host 209.165.200.227 eq 80

hostname(config)# class-map http_serverA
hostname(config-cmap)# match access-list serverA
hostname(config)# class-map http_serverB
hostname(config-cmap)# match access-list serverB

hostname(config)# policy-map policy_serverA
hostname(config-pmap)# class http_serverA
hostname(config-pmap-c)# inspect http
hostname(config-pmap-c)# set connection conn-max 100
hostname(config)# policy-map policy_serverB
hostname(config-pmap)# class http_serverB
hostname(config-pmap-c)# inspect http

hostname(config)# service-policy policy_serverB interface inside
hostname(config)# service-policy policy_serverA interface outside
```

Applying Inspection to HTTP Traffic with NAT

In this example, the Host on the inside network has two addresses: one is the real IP address 192.168.1.1, and the other is a mapped IP address used on the outside network, 209.165.200.225. Because the policy is applied to the inside interface, where the real address is used, then you must use the real IP address in the access list in the class map. If you applied it to the outside interface, you would use the mapped address.

Figure 9-4 HTTP Inspection with NAT



See the following commands for this example:

```
hostname(config)# static (inside,outside) 209.165.200.225 192.168.1.1
hostname(config)# access-list http_client extended permit tcp host 192.168.1.1 any eq 80

hostname(config)# class-map http_client
hostname(config-cmap)# match access-list http_client

hostname(config)# policy-map http_client
hostname(config-pmap)# class http_client
hostname(config-pmap-c)# inspect http

hostname(config)# service-policy http_client interface inside
```

Feature History for Modular Policy Framework

Table 9-4 lists the release history for this feature.

Table 9-4 Feature History for Feature-1

Feature Name	Releases	Feature Information
Modular Policy Framework	7.0(1)	Modular Policy Framework was introduced.
Management class map for use with RADIUS accounting traffic	7.2(1)	The management class map was introduced for use with RADIUS accounting traffic. The following commands were introduced: **class-map type management**, and **inspect radius-accounting**.
Inspection policy maps	7.2(1)	The inspection policy map was introduced. The following command was introduced: **class-map type inspect**.

Table 9-4 Feature History for Feature-1 (continued)

Feature Name	Releases	Feature Information
Regular expressions and policy maps	7.2(1)	Regular expressions and policy maps were introduced to be used under inspection policy maps. The following commands were introduced: **class-map type regex**, **regex**, **match regex**.
Match any for inspection policy maps	8.0(2)	The **match any** keyword was introduced for use with inspection policy maps: traffic can match one or more criteria to match the class map. Formerly, only **match all** was available.
Maximum connections and embryonic connections for management traffic	8.0(2)	The **set connection** command is now available for a Layer 3/4 management class map, for to-the-security appliance management traffic. Only the **conn-max** and **embryonic-conn-max** keywords are available.