



HTTP Inspection Engine

The HTTP Inspection Engine feature allows users to configure their Cisco IOS Firewall to detect and prohibit HTTP connections—such as tunneling over port 80, unauthorized request methods, and non-HTTP compliant file transfers—that are not authorized within the scope of the security policy configuration. Tunneling unauthorized protocols through port 80 and over HTTP exposes a network to significant security risks.

The Cisco IOS Firewall can now be configured with a security policy that adheres to the following tasks:

- Allowing specific traffic targeted for port 80 to traverse the firewall. The traffic is inspected for protocol conformance and for the types of HTTP commands that are allowed or disallowed.
- Denying specific traffic targeted for port 80 that does not comply to HTTP traffic standards. The firewall is enabled to drop the packet, reset the connection, and send a syslog message, as appropriate.

Feature History for HTTP Inspection Engine

Release	Modification
12.3(14)T	This feature was introduced.

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

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- [Command Reference, page 12](#)

Restrictions for HTTP Inspection Engine

The Cisco 831 router with 48M RAM does not have enough memory to support this feature.

Information About HTTP Inspection Engine

Before configuring an application firewall to detect and police specific traffic targeted for port 80, you should understand the following concepts:

- [What Is a Security Policy?, page 2](#)
- [Cisco IOS HTTP Application Policy Overview, page 2](#)

What Is a Security Policy?

The application firewall uses a security policy, which consists of a collection of static signatures, to detect security violations. A static signature is a collection of parameters that specify protocol conditions that must be met before an action is taken. (For example, a signature may specify that an HTTP data stream containing the POST method must reset the connection.) These protocol conditions and reactions are defined by the end user via the command-line interface (CLI) to form a security policy.

Cisco IOS HTTP Application Policy Overview

HTTP uses port 80 to transport Internet web services, which are commonly used on the network and rarely challenged with regards to their legitimacy and conformance to standards. Because port 80 traffic is typically allowed through the network without being challenged, many application developers are leveraging HTTP traffic as an alternative transport protocol in which to enable their application to travel through or even bypass the firewall.

Most firewalls provide only packet filtering capabilities that simply permit or deny port 80 traffic without inspecting the data stream; the Cisco IOS application firewall for HTTP performs packet inspection as follows:

- Detects HTTP connections that are not authorized within the scope of the security policy configuration.
- Detects users who are tunneling applications through port 80.

If the packet is not in compliance with the HTTP protocol, it will be dropped, the connection will be reset, and a syslog message will be generated, as appropriate.

How to Define and Apply an HTTP Application Policy to a Firewall for Inspection

This section contains the following procedures:

- [Defining an HTTP Application Policy, page 3](#)

- [Applying an HTTP Application Policy to a Firewall for Inspection, page 7](#)

Defining an HTTP Application Policy

Use this task to create an HTTP application firewall policy.

Restrictions

Although application firewall policies are defined in global configuration mode, only one global policy for a given protocol is allowed per interface.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **appfw policy-name** *policy-name*
4. **application** *protocol*
5. **strict-http action** {reset | allow} [alarm]
6. **content-length** {min *bytes* max *bytes* | min *bytes* | max *bytes*} action {reset | allow} [alarm]
7. **content-type-verification** [match-req-resp] action {reset | allow} [alarm]
8. **max-header-length** {request *bytes* response *bytes*} action {reset | allow} [alarm]
9. **max-uri-length** *bytes* action {reset | allow} [alarm]
10. **request-method** {rfc *rfc-method* | extension *extension-method*} action {reset | allow} [alarm]
11. **port-misuse** {p2p | tunneling | im | default} action {reset | allow} [alarm]
12. **transfer-encoding type** {chunked | compress | deflate | gzip | identity | default} action {reset | allow} [alarm]
13. **timeout** *seconds*
14. **audit-trail** {on | off}
15. **exit**
16. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none">Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	appfw policy-name policy-name Example: Router(config)# appfw policy-name mypolicy	Defines an application firewall policy and puts the router in application firewall policy configuration mode.
Step 4	application protocol Example: Router(cfg-appfw-policy)# application http	Allows you to configure inspection parameters for a given protocol. Currently, only HTTP traffic can be inspected. <ul style="list-style-type: none"><i>protocol</i>—Specify the http keyword. This command puts you in <i>appfw-policy-protocol</i> configuration mode, where “ <i>protocol</i> ” is dependent upon the specified protocol. Because only HTTP can be specified, the configuration mode is <i>appfw-policy-http</i> .
Step 5	strict-http action {reset allow} [alarm] Example: Router(cfg-appfw-policy-http)# strict-http action allow alarm	(Optional) Allows HTTP messages to pass through the firewall or resets the TCP connection when HTTP noncompliant traffic is detected.
Step 6	content-length {min bytes max bytes min bytes max bytes} action {reset allow} [alarm] Example: Router(cfg-appfw-policy-http)# content-length max 1 action allow alarm	(Optional) Permits or denies HTTP traffic through the firewall on the basis of message size. <ul style="list-style-type: none">min max bytes—Minimum or maximum content length, in bytes, allowed per message. Number of bytes range: 0 to 65535.
Step 7	content-type-verification [match-req-resp] action {reset allow} [alarm] Example: Router(cfg-appfw-policy-http)# content-type-verification match-req-resp action allow alarm	(Optional) Permits or denies HTTP traffic through the firewall on the basis of content message type.
Step 8	max-header-length {request bytes response bytes} action {reset allow} [alarm] Example: Router(cfg-appfw-policy-http)# max-header-length request 1 response 1 action allow alarm	(Optional) Permits or denies HTTP traffic on the basis of the message header length. <ul style="list-style-type: none"><i>bytes</i>—Number of bytes ranging from 0 to 65535.

	Command or Action	Purpose
Step 9	<p>max-uri-length <i>bytes</i> action {reset allow} [alarm]</p> <p>Example: Router(cfg-appfw-policy-http)# max-uri-length 1 action allow alarm</p>	(Optional) Permits or denies HTTP traffic on the basis of the URI length in the request message.
Step 10	<p>request method {rfc <i>rfc-method</i> extension <i>extension-method</i>} action {reset allow} [alarm]</p> <p>Example: Router(cfg-appfw-policy-http)# request-method rfc default action allow alarm</p>	<p>(Optional) Permits or denies HTTP traffic according to either the request methods or the extension methods.</p> <ul style="list-style-type: none"> • rfc—Specifies that the supported methods of RFC 2616, <i>Hypertext Transfer Protocol—HTTP/1.1</i>, are to be used for traffic inspection. • <i>rfc-method</i>—Any one of the following RFC 2616 methods can be specified: connect, default, delete, get, head, options, post, put, trace. • extension—Specifies that the extension methods are to be used for traffic inspection. • <i>extension-method</i>—Any one of the following extension methods can be specified: copy, default, edit, getattribute, getproperties, index, lock, mkdir, move, revadd, revlabel, revlog, save, setattribute, startrev, stoprev, unedit, unlock.
Step 11	<p>port-misuse {p2p tunneling im default} action {reset allow} [alarm]</p> <p>Example: Router(cfg-appfw-policy-http)# port-misuse default action allow alarm</p>	<p>(Optional) Permits or denies HTTP traffic through the firewall on the basis of specified applications in the HTTP message.</p> <ul style="list-style-type: none"> • p2p—Peer-to-peer protocol applications subject to inspection: Kazaa and Gnutella. • tunneling—Tunneling applications subject to inspection: HTTPPort/HTTPHost, GNU Httptunnel, GotoMyPC, Firethru, Http-tunnel.com Client • im—Instant messaging protocol applications subject to inspection: Yahoo Messenger. • default—All applications are subject to inspection.

Command or Action	Purpose
<p>Step 12 <code>transfer-encoding type {chunked compress deflate gzip identity default} action {reset allow} [alarm]</code></p> <p>Example: Router(cfg-appfw-policy-http)# transfer-encoding type default action allow alarm</p>	<p>(Optional) Permits or denies HTTP traffic according to the specified transfer-encoding of the message.</p> <ul style="list-style-type: none"> • chunked—Encoding format (specified in RFC 2616, <i>Hypertext Transfer Protocol—HTTP/1</i>) in which the body of the message is transferred in a series of chunks; each chunk contains its own size indicator. • compress—Encoding format produced by the UNIX “compress” utility. • deflate—“ZLIB” format defined in RFC 1950, <i>ZLIB Compressed Data Format Specification version 3.3</i>, combined with the “deflate” compression mechanism described in RFC 1951, <i>DEFLATE Compressed Data Format Specification version 1.3</i>. • gzip—Encoding format produced by the “gzip” (GNU zip) program. • identity—Default encoding, which indicates that no encoding has been performed. • default—All of the transfer encoding types.
<p>Step 13 <code>timeout seconds</code></p> <p>Example: Router(cfg-appfw-policy-http)# timeout 60</p>	<p>(Optional) Overrides the global TCP idle timeout value for HTTP traffic.</p> <p>Note If this command is not issued, the default value specified via the ip inspect tcp idle-time command will be used.</p>
<p>Step 14 <code>audit-trail {on off}</code></p> <p>Example: Router(cfg-appfw-policy-http)# audit-trail on</p>	<p>(Optional) Turns audit trail messages on or off.</p> <p>Note If this command is not issued, the default value specified via the ip inspect audit-trail command will be used.</p>
<p>Step 15 <code>exit</code></p> <p>Example: Router(cfg-appfw-policy-http)# exit</p>	<p>Exits cfg-appfw-policy-http configuration mode.</p>
<p>Step 16 <code>exit</code></p> <p>Example: Router(cfg-appfw-policy)# exit</p>	<p>Exits cfg-appfw-policy configuration mode.</p>

What to Do Next

After you have successfully defined an application policy for HTTP traffic inspection, you must apply the policy to an inspection rule. Thereafter, the inspection rule must be applied to an interface. For information on completing this task, see the section “[Applying an HTTP Application Policy to a Firewall for Inspection.](#)”

Applying an HTTP Application Policy to a Firewall for Inspection

Use this task to apply an HTTP application policy to an inspection rule, followed by applying the inspection rule to an interface.

**Note**

An application policy can coexist with other inspection protocols (for example, an HTTP policy and an FTP policy can coexist).

Prerequisites

You must have already defined an application policy (as shown in the section “[Defining an HTTP Application Policy](#)”).

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip inspect name** *inspection-name* **appfw** *policy-name*
4. **ip inspect name** *inspection-name* **http** [**alert** {**on** | **off**}] [**audit-trail** {**on** | **off**}] [**timeout** *seconds*]
5. **interface** *type number*
6. **ip inspect** *inspection-name* {**in** | **out**}
7. **exit**
8. **exit**
9. **show appfw configuration** [*name*]
or
show ip inspect {**name** *inspection-name* | **config** | **interfaces** | **session** [**detail**] | **statistics** | **all**}

DETAILED STEPS

	Command or Action	Purpose
Step 1	<p>enable</p> <p>Example: Router> enable</p>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> Enter your password if prompted.
Step 2	<p>configure terminal</p> <p>Example: Router# configure terminal</p>	<p>Enters global configuration mode.</p>
Step 3	<p>ip inspect name inspection-name appfw policy-name</p> <p>Example: Router(config)# ip inspect name firewall appfw mypolicy</p>	<p>Defines a set of inspection rules for the application policy.</p> <ul style="list-style-type: none"> <i>policy-name</i>—Must match the policy name specified via the appfw policy-name command.
Step 4	<p>ip inspect name inspection-name http [alert {on off}] [audit-trail {on off}] [timeout seconds]</p> <p>Example: Router(config)# ip inspect name firewall http</p>	<p>Defines a set of inspection rules that is to be applied to all HTTP traffic.</p> <ul style="list-style-type: none"> The <i>inspection-name</i> argument must match the <i>inspection-name</i> argument specified in Step 3.
Step 5	<p>interface type number</p> <p>Example: Router#(config)# interface FastEthernet0/0</p>	<p>Configures an interface type and enters interface configuration mode.</p>
Step 6	<p>ip inspect inspection-name {in out}</p> <p>Example: Router#(config-if)# ip inspect firewall in</p>	<p>Applies the inspection rules (defined in Step 3 and Step 4) to all traffic entering the specified interface.</p> <ul style="list-style-type: none"> The <i>inspection-name</i> argument must match the inspection name defined via the ip inspect name command.
Step 7	<p>exit</p> <p>Example: Router#(config-if)# exit</p>	<p>Exits interface configuration mode.</p>

	Command or Action	Purpose
Step 8	<p>exit</p> <p>Example: Router(config)# exit</p>	Exits global configuration mode.
Step 9	<p>show appfw configuration [name]</p> <p>Example: Router# show appfw configuration</p> <p>Or</p> <p>show ip inspect {name inspection-name config interfaces session [detail] statistics all}</p> <p>Example: Router# show ip inspect config</p>	<p>(Optional) Displays application firewall policy configuration information.</p> <p>(Optional) Displays firewall-related configuration information.</p>

Troubleshooting Tips

To help troubleshoot the application firewall configuration, issue the following application-firewall specific debug command: **debug appfw {application protocol | function-trace | object-creation | object-deletion | events | timers | detailed}**.

The following sample configuration shows how to configure an HTTP policy with application firewall debugging enabled:

```
Router(config)# appfw policy-name myPolicyAPPFW FUNC:appfw_policy_find
APPFW FUNC:appfw_policy_find -- Policy myPolicy is not found
APPFW FUNC:appfw_policy_alloc
APPFW FUNC:appfw_policy_alloc -- policy_alloc 0x65727278
APPFW FUNC:appfw_policy_alloc -- Policy 0x65727278 is set to valid
APPFW FUNC:appfw_policy_alloc -- Policy myPolicy has been created
APPFW FUNC:appfw_policy_command -- memlock policy 0x65727278

! Debugging sample for application (HTTP) creation

Router(cfg-appfw-policy)# application httpAPPFW FUNC:appfw_http_command
APPFW FUNC:appfw_http_appl_find
APPFW FUNC:appfw_http_appl_find -- Application not found
APPFW FUNC:appfw_http_appl_alloc
APPFW FUNC:appfw_http_appl_alloc -- appl_http 0x64D7A25C
APPFW FUNC:appfw_http_appl_alloc -- Application HTTP parser structure 64D7A25C created

! Debugging sample for HTTP-specific application inspection
Router(cfg-appfw-policy-http)#
Router(cfg-appfw-policy-http)# strict-http action reset alarm
APPFW FUNC:appfw_http_subcommand
APPFW FUNC:appfw_http_subcommand -- strict-http cmd turned on

Router# debug appfw detailed

APPFW Detailed Debug debugging is on
fw7-7206a#debug appfw object-creation
APPFW Object Creations debugging is on
fw7-7206a#debug appfw object-deletion
APPFW Object Deletions debugging is on
```

Configuration Examples for Setting Up an HTTP Inspection Engine

This section contains the following configuration example:

- [Setting Up and Verifying an HTTP Inspection Engine: Example, page 10](#)

Setting Up and Verifying an HTTP Inspection Engine: Example

The following example show how to define the HTTP application firewall policy “mypolicy.” This policy includes all supported HTTP policy rules. This example also includes sample output from the **show appfw configuration** and **show ip inspect config** commands, which allow you to verify the configured setting for the application policy.

```
! Define the HTTP policy.
appfw policy-name mypolicy
  application http
    strict-http action allow alarm
    content-length maximum 1 action allow alarm
    content-type-verification match-req-rsp action allow alarm
    max-header-length request 1 response 1 action allow alarm
    max-uri-length 1 action allow alarm
    port-misuse default action allow alarm
    request-method rfc put action allow alarm
    transfer-encoding type default action allow alarm
!
!
! Apply the policy to an inspection rule.
ip inspect name firewall appfw mypolicy
ip inspect name firewall http
!
!
! Apply the inspection rule to all HTTP traffic entering the FastEthernet0/0 interface.
interface FastEthernet0/0
  ip inspect firewall in
!
!
! Issue the show appfw configuration command and the show ip inspect config command after
the inspection rule “mypolicy” is applied to all incoming HTTP traffic on the
FastEthernet0/0 interface.
!
Router# show appfw configuration

Application Firewall Rule configuration
Application Policy name mypolicy
Application http
  strict-http action allow alarm
  content-length minimum 0 maximum 1 action allow alarm
  content-type-verification match-req-rsp action allow alarm
  max-header-length request length 1 response length 1 action allow alarm
  max-uri-length 1 action allow alarm
  port-misuse default action allow alarm
  request-method rfc put action allow alarm
  transfer-encoding default action allow alarm

Router# show ip inspect config

Session audit trail is disabled
Session alert is enabled
```

```
one-minute (sampling period) thresholds are [400:500] connections
max-incomplete sessions thresholds are [400:500]
max-incomplete tcp connections per host is 50. Block-time 0 minute.
tcp synwait-time is 30 sec -- tcp finwait-time is 5 sec
tcp idle-time is 3600 sec -- udp idle-time is 30 sec
dns-timeout is 5 sec
Inspection Rule Configuration
Inspection name firewall
http alert is on audit-trail is off timeout 3600
```

Additional References

The following sections provide references related to the HTTP Inspection Engine feature.

Related Documents

Related Topic	Document Title
Firewall commands: complete command syntax, command mode, defaults, usage guidelines, and examples	Cisco IOS Security Command Reference , Release 12.3T

Standards

Standards	Title
No new or modified standards are supported by this feature.	—

MIBs

MIBs	MIBs Link
No new or modified MIBs are supported by this feature.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFCs	Title
RFC 2616	<i>Hypertext Transfer Protocol -- HTTP/1.1</i>

Technical Assistance

Description	Link
Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/public/support/tac/home.shtml

Command Reference

The following commands are introduced or modified in the feature or features documented in this module. For information about these commands, see the *Cisco IOS Security Command Reference* at http://www.cisco.com/en/US/docs/ios/security/command/reference/sec_book.html. For information about all Cisco IOS commands, go to the Command Lookup Tool at

<http://tools.cisco.com/Support/CLILookup> or to the *Cisco IOS Master Commands List*.

New Commands

- **appfw policy-name**
- **application**
- **audit-trail**
- **content-length**
- **content-type-verification**
- **debug appfw**
- **max-header-length**
- **max-uri-length**
- **port-misuse**
- **request-method**
- **show appfw**
- **strict-http**
- **timeout**
- **transfer-encoding type**

Modified Command

- **ip inspect name**

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