WAAS Support in Zone-Based Firewalls

Zone-based firewalls support Wide Area Application Services (WAAS). WAAS allows the firewall to automatically discover optimized traffic by enabling the sequence number to change without compromising the stateful Layer 4 inspection of TCP traffic flows that contain internal firewall TCP state variables.

This module provides more information about the WAAS Support in Zone-Based Firewalls feature.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Restrictions for WAAS Support in Zone-Based Firewalls

The following restrictions apply to this feature:

- In a Wide-Area Application Services (WAAS) and firewall configuration, all packets processed by a Wide Area Application Engine (WAE) must pass through the firewall in both directions to support the Web Cache Coordination Protocol (WCCP). This situation occurs because the Layer 2 redirect is not available in Cisco IOS Release 12.4T. If Layer 2 redirect is configured on the WAE, the system defaults to the generic routing encapsulation (GRE) redirect to continue to function.

- In a WAAS and firewall configuration, WCCP does not support traffic redirection using policy-based routing (PBR).

Information About WAAS Support in Zone-Based Firewalls

WAAS Support for the Cisco Firewall

Depending on your release, the Wide Area Application Services (WAAS) firewall software provides an integrated firewall that optimizes security-compliant WANs and application acceleration solutions with the following benefits:

- Integrates WAAS networks transparently.
- Protects transparent WAN accelerated traffic.
- Optimizes a WAN through full stateful inspection capabilities.
- Simplifies Payment Card Industry (PCI) compliance.
- Supports the Network Management Equipment (NME)-Wide Area Application Engine (WAE) modules or standalone WAAS device deployment.

WAAS has an automatic discovery mechanism that uses TCP options during the initial three-way handshake to identify WAE devices transparently. After automatic discovery, optimized traffic flows (paths) experience a change in the TCP sequence number to allow endpoints to distinguish between optimized and nonoptimized traffic flows.

Note Paths are synonymous with connections.

WAAS allows the Cisco firewall to automatically discover optimized traffic by enabling the sequence number to change without compromising the stateful Layer 4 inspection of TCP traffic flows that contain internal firewall TCP state variables. These variables are adjusted for the presence of WAE devices.

If the Cisco firewall notices that a traffic flow has successfully completed WAAS automatic discovery, it permits the initial sequence number shift for the traffic flow and maintains the Layer 4 state on the optimized traffic flow.

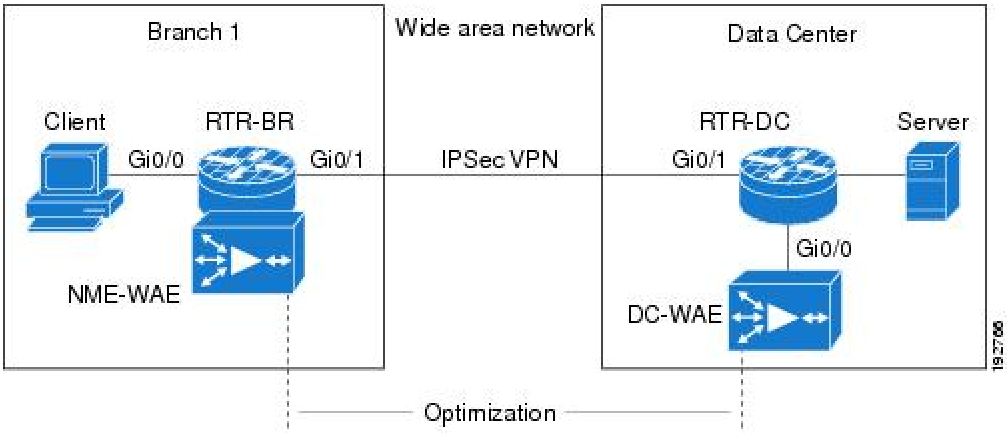
Note Stateful Layer 7 inspection on the client side can also be performed on nonoptimized traffic.

WAAS Traffic Flow Optimization Deployment Scenarios

The following sections describe two different WAAS traffic flow optimization scenarios for branch office deployments. WAAS traffic flow optimization works with the Cisco firewall feature on a Cisco Integrated Services Router (ISR).

The figure below shows an example of an end-to-end WAAS traffic flow optimization with the Cisco firewall. In this particular deployment, a Network Management Equipment (NME)-WAE device is on the same device as the Cisco firewall. Web Cache Communication Protocol (WCCP) is used to redirect traffic for interception.

Figure 1: End-to-End WAAS Optimization Path

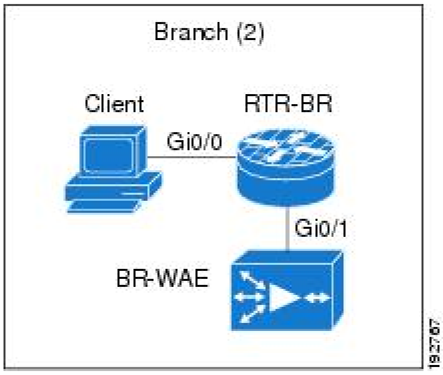


WAAS Branch Deployment with an Off-Path Device

A Wide Area Application Engine (WAE) device can be either a standalone WAE device or an NME-WAE that is installed on an Integrated Services Router (ISR) as an integrated service engine (as shown in the figure Wide Area Application Service [WAAS] Branch Deployment).

The figure below shows a WAAS branch deployment that uses Web Cache Communication Protocol (WCCP) to redirect traffic to an off-path, standalone WAE device for traffic interception. The configuration for this option is the same as the WAAS branch deployment with an NME-WAE.

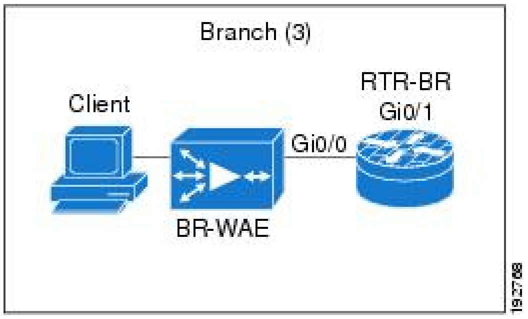
Figure 2: WAAS Off-Path Branch Deployment



WAAS Branch Deployment with an Inline Device

The figure below shows a Wide Area Application Service (WAAS) branch deployment that has an inline Wide Area Application Engine (WAE) device that is physically in front of the Integrated Services Router (ISR). Because the WAE device is in front of the device, the Cisco firewall receives WAAS optimized packets, and as a result, Layer 7 inspection on the client side is not supported.

Figure 3: WAAS Inline Path Branch Deployment



An edge WAAS device with the Cisco firewall is applied at branch office sites that must inspect the traffic moving to and from a WAN connection. The Cisco firewall monitors traffic for optimization indicators (TCP options and subsequent TCP sequence number changes) and allows optimized traffic to pass, while still applying Layer 4 stateful inspection and deep packet inspection to all traffic and maintaining security while accommodating WAAS optimization advantages.

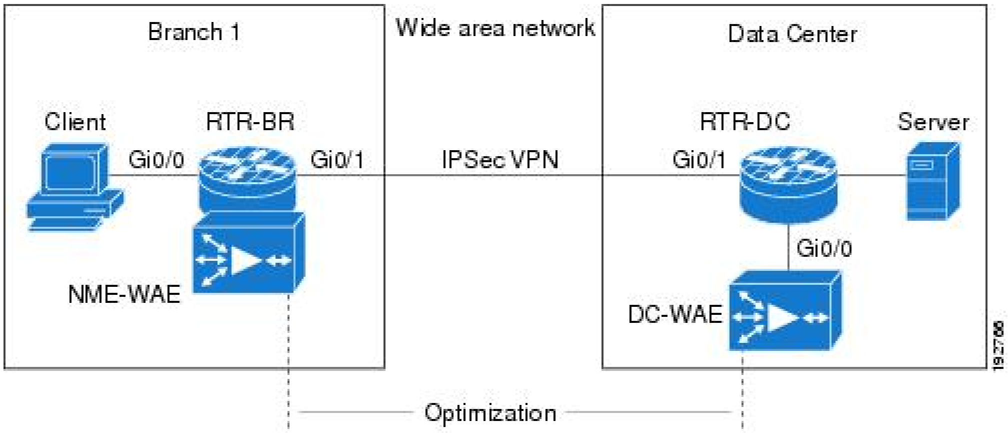
Note If the WAE device is in the inline location, the device enters its bypass mode after the automatic discovery process. Although the device is not directly involved in WAAS optimization, the device must be aware that WAAS optimization is applied to the traffic in order to apply the Cisco firewall inspection to network traffic and make allowances for optimization activity if optimization indicators are present.

WAAS and Firewall Integration Support

The following sections describe three different WAAS traffic flow optimization scenarios for branch office deployments. WAAS traffic flow optimization works with the Cisco IOS XE firewall feature on Cisco Aggregation Services Routers (ASRs).

The figure below shows an example of an end-to-end WAAS traffic flow optimization with the Cisco IOS XE firewall. In this particular deployment, an NME-WAE device is on the Cisco IOS Integrated Services Router (ISR).

Figure 4: End-to-End WAAS Optimization Path



WCCP is used to redirect traffic for interception. NME-WAE is not supported on ASR. Therefore, to support NME-WAE in the branch office must be an ISR.

How to Configure WAAS Support in Zone-Based Firewalls

Configuring a Parameter Map for WAAS Support

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip wccp** *service-id*
4. **ip wccp** *service-id*
5. **parameter-map type inspect global**
6. **waas enable**
7. **log dropped-packets enable**
8. **max-incomplete low**
9. **max-incomplete high**
10. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**ip wccp** *service-id* **Example:** `Device(config)# ip wccp 61`	Enters the Web Cache Communication Protocol (WCCP) dynamically defined service identifier number.
Step 4	**ip wccp** *service-id* **Example:** `Device(config)# ip wccp 62`	Enters the WCCP dynamically defined service identifier number.
Step 5	**parameter-map type inspect global** **Example:** `Device(config)# parameter-map type inspect global`	Defines a global inspect parameter map and enters parameter-map type inspect configuration mode.
Step 6	**waas enable** **Example:** `Device(config-profile)# waas enable`	Enables Wide-Area Application Services (WAAS) Express on a WAN interface.
Step 7	**log dropped-packets enable** **Example:** `Device(config-profile)# log dropped-packets enable`	Logs the packets dropped by the firewall.
Step 8	**max-incomplete low** **Example:** `Device(config)# max-incomplete low 18000`	Defines the maximum number of half-open sessions; after which the firewall stops deleting half-open sessions.
Step 9	**max-incomplete high** **Example:** `Device(config)# max-incomplete high 20000`	Defines the maximum number of half-open sessions that can enter a network; after which the firewall starts deleting half-open sessions.

	Command or Action	Purpose

Step 10	**end**
	Example:
	`Device(config-profile)# end`
		Exits parameter-map type inspect configuration mode and returns to privileged EXEC mode.

Configuring Class Maps and Policy Maps for WAAS Support

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **class-map type inspect match-any** *class-name*
4. **match protocol** *protocol-name* [**signature**]
5. **match protocol** *protocol-name* [**signature**]
6. **match protocol** *protocol-name* [**signature**]
7. **match protocol** *protocol-name* [**signature**]
8. **exit**
9. **policy-map type inspect** *policy-map-name*
10. **class-map type inspect** *class-name*
11. **inspect**
12. **exit**
13. **class class-default**
14. **drop**
15. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**class-map type inspect match-any** *class-name* **Example:** `Device(config)# class-map type inspect match-any most-traffic`	Creates an inspect type class map for the traffic class and enters class-map configuration mode.
Step 4	**match protocol** *protocol-name* [**signature**] **Example:** `Device(config-cmap)# match protocol icmp`	Configures match criteria for a class map on the basis of the specified protocol. • Only Cisco stateful packet inspection-supported protocols can be used as match criteria in inspect type class maps.
Step 5	**match protocol** *protocol-name* [**signature**] **Example:** `Device(config-cmap)# match protocol ftp`	Configures match criteria for a class map on the basis of a specified protocol.
Step 6	**match protocol** *protocol-name* [**signature**] **Example:** `Device(config-cmap)# match protocol tcp`	Configures match criteria for a class map on the basis of a specified protocol.
Step 7	**match protocol** *protocol-name* [**signature**] **Example:** `Device(config-cmap)# match protocol udp`	Configures match criteria for a class map on the basis of a specified protocol.
Step 8	**exit** **Example:** `Device(config-cmap)# exit`	Exits class-map configuration mode and returns to global configuration mode.
Step 9	**policy-map type inspect** *policy-map-name* **Example:** `Device(config)# policy-map type inspect p1`	Creates a Layer 3 and Layer 4 inspect type policy map and enters policy-map configuration mode.

Step 10	**class-map type inspect** *class-name*
	Example:
	`Device(config-pmap)# class-map type inspect most-traffic`
		Specifies the firewall traffic (class) map on which an action is to be performed and enters policy-map class configuration mode.

Step 11	**inspect** **Example:** `Device(config-pmap-c)# inspect`	Enables Cisco stateful packet inspection.

	Command or Action	Purpose
Step 12	**exit** **Example:** `Device(config-pmap-c)# exit`	Exits policy-map class configuration mode and returns to policy-map configuration mode.

Step 13	**class class-default**
	Example:
	`Device(config-pmap)# class class-default`
		Specifies the matching of the system default class.
		• If the system default class is not specified, unclassified packets are matched.

Step 14	**drop** **Example:** `Device(config-pmap-c)# drop`	Drops packets that are sent to a device.
Step 15	**exit** **Example:** `Device(config-pmap-c)# exit`	Exits policy-map class configuration mode and returns to global configuration mode.

Configuring Zones and Zone-Pairs for WAAS Support

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **zone security** *zone-name*
4. **exit**
5. **zone security** *zone-name*
6. **exit**
7. **zone security** *zone-name*
8. **exit**
9. **zone-pair security** *zone-pair name* [**source** *source-zone-name* | **self**] **destination** [**self** | *destination-zone-name*]
10. **service-policy type inspect** *policy-map-name*
11. **exit**
12. **zone-pair security** *zone-pair name* [**source** *source-zone-name* | **self**] **destination** [**self** | *destination-zone-name*]
13. **service-policy type inspect** *policy-map-name*
14. **exit**
15. **zone-pair security** *zone-pair name* [**source** *source-zone-name* | **self**] **destination** [**self** | *destination-zone-name*]
16. **service-policy type inspect** *policy-map-name*
17. **exit**
18. **zone-pair security** *zone-pair name* [**source** *source-zone-name* | **self**] **destination** [**self** | *destination-zone-name*]
19. **service-policy type inspect** *p-----*
20. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**zone security** *zone-name* **Example:** `Device(config)# zone security in`	Creates a security zone to which interfaces can be assigned and enters security zone configuration mode.
Step 4	**exit** **Example:** `Device(config-sec-zone)# exit`	Exits security zone configuration mode and returns to global configuration mode.
Step 5	**zone security** *zone-name* **Example:** `Device(config)# zone security out`	Creates a security zone to which interfaces can be assigned and enters security zone configuration mode.
Step 6	**exit** **Example:** `Device(config-sec-zone)# exit`	Exits security zone configuration mode and returns to global configuration mode.
Step 7	**zone security** *zone-name* **Example:** `Device(config)# zone security waas`	Creates a security zone to which interfaces can be assigned and enters security zone configuration mode.
Step 8	**exit** **Example:** `Device(config-sec-zone)# exit`	Exits security zone configuration mode and returns to global configuration mode.
Step 9	**zone-pair security** *zone-pair name* [**source** *source-zone-name* | **self**] **destination** [**self** | *destination-zone-name*] **Example:** `Device(config)# zone-pair security in-out source in destination out`	Creates a zone pair and enters security zone-pair configuration mode. **Note** To apply a policy, you must configure a zone pair.
Step 10	**service-policy type inspect** *policy-map-name* **Example:** `Device(config-sec-zone-pair)# service-policy type inspect p1`	Attaches a firewall policy map to a zone-pair.
Step 11	**exit** **Example:** `Device(config-sec-zone-pair)# exit`	Exits security zone-pair configuration mode and returns to global configuration mode.

	Command or Action	Purpose
Step 12	**zone-pair security** *zone-pair name* [**source** *source-zone-name* | **self**] **destination** [**self** | *destination-zone-name*] **Example:** `Device(config)# zone-pair security out-in source out destination in`	Creates a zone pair and enters security zone-pair configuration mode.
Step 13	**service-policy type inspect** *policy-map-name* **Example:** `Device(config-sec-zone-pair)# service-policy type inspect p1`	Attaches a firewall policy map to a zone-pair.
Step 14	**exit** **Example:** `Device(config-sec-zone-pair)# exit`	Exits security zone-pair configuration mode and returns to global configuration mode.
Step 15	**zone-pair security** *zone-pair name* [**source** *source-zone-name* | **self**] **destination** [**self** | *destination-zone-name*] **Example:** `Device(config)# zone-pair security waas-out source waas destination out`	Creates a zone pair and enters security zone-pair configuration mode.
Step 16	**service-policy type inspect** *policy-map-name* **Example:** `Device(config-sec-zone-pair)# service-policy type inspect p1`	Attaches a firewall policy map to a zone-pair.
Step 17	**exit** **Example:** `Device(config-sec-zone-pair)# exit`	Exits security zone-pair configuration mode and returns to global configuration mode.
Step 18	**zone-pair security** *zone-pair name* [**source** *source-zone-name* | **self**] **destination** [**self** | *destination-zone-name*] **Example:** `Device(config)# zone-pair security in-waas source in destination waas`	Creates a zone pair and enters security zone-pair configuration mode.
Step 19	**service-policy type inspect** *p-----* **Example:** `Device(config-sec-zone-pair)# service-policy type inspect p1`	Attaches a firewall policy map to a zone-pair.

	Command or Action	Purpose

Step 20	**end**
	Example:
	`Device(config-sec-zone-pair)# end`
		Exits security zone-pair configuration mode and returns to privileged EXEC mode.

Configuring Interfaces for WAAS Support

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **description** *line-of-description*
5. **no ip dhcp client request tftp-server-address**
6. **no ip dhcp client request router**
7. **ip address dhcp**
8. **ip wccp** *service-identifier* **redirect in**
9. **ip wccp** *service-identifier* **redirect in**
10. **ip flow ingress**
11. **ip nat outside**
12. **ip virtual-reassembly in**
13. **ip virtual-reassembly out**
14. **zone-member security** *zone-name*
15. **load-interval** *seconds*
16. **delay** *throughput-delay*
17. **duplex auto**
18. **speed auto**
19. **exit**
20. **interface** *type number*
21. **description** *line-of-description*
22. **ip address** *ip-address mask*
23. **ip pim spare-mode**
24. **ip nat inside**
25. **ip virtual-reassembly in**
26. **zone-member security** *zone-name*
27. **ip igmp version**{**1** | **2** | **3**}
28. **delay** *tens-of-microseconds*
29. **duplex auto**
30. **speed auto**
31. **exit**
32. **interface** *type number*
33. **description** *line-of-description*
34. **ip address** *ip-address mask*
35. **ip wccp redirect exclude in**
36. **ip nat inside**
37. **ip virtual-reassembly in**
38. **zone-member security** *zone-name*
39. **load-interval** *seconds*

40. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**interface** *type number* **Example:** `Device(config)# interface gigabitethernet 0/0`	Specifies an interface and enters interface configuration mode.
Step 4	**description** *line-of-description* **Example:** `Device(config-if)# description WAN connection`	(Optional) Describes an interface.
Step 5	**no ip dhcp client request tftp-server-address** **Example:** `Device(config-if)# no ip dhcp client request tftp-server-address`	Removes an option from the Dynamic Host Control Protocol (DHCP) server.
Step 6	**no ip dhcp client request router** **Example:** `Device(config-if)# no ip dhcp client request router`	Removes the default router option from the DHCP server.
Step 7	**ip address dhcp** **Example:** `Device(config-if)# ip address dhcp`	Acquires an IP address on an interface from DHCP.
Step 8	**ip wccp** *service-identifier* **redirect in** **Example:** `Device(config-if)# ip wccp 62 redirect in`	Redirects inbound packets that have the specified dynamic service identifier to the Web Cache Communication Protocol (WCCP) engine.
Step 9	**ip wccp** *service-identifier* **redirect in** **Example:** `Device(config-if)# ip wccp 61 redirect out`	Redirects outbound packets that have the specified dynamic service identifier to the Web Cache Communication Protocol (WCCP) engine.

	Command or Action	Purpose
Step 10	**ip flow ingress** **Example:** `Device(config-if)# ip flow ingress`	Enables NetFlow accounting for traffic that is received on an interface.
Step 11	**ip nat outside** **Example:** `Device(config-if)# ip nat outside`	Specifies that an interface is connected to the outside network.
Step 12	**ip virtual-reassembly in** **Example:** `Device(config-if)# ip virtual-reassembly in`	
Step 13	**ip virtual-reassembly out** **Example:** `Device(config-if)# ip virtual-reassembly out`	Enables virtual fragment reassembly (VFR) on outbound interface traffic.
Step 14	**zone-member security** *zone-name* **Example:** `Device(config-if)# zone-member security out`	Assigns an interface to a specified security zone. **Note** When you make an interface a member of a security zone, all traffic in and out of that interface (except the traffic bound for the device or initiated by the device) is dropped by default. To let traffic through the interface, you must make the zone part of a zone pair to which you apply a policy. If the policy permits traffic, traffic can flow through that interface.
Step 15	**load-interval** *seconds* **Example:** `Device(config-if)# load-interval 30`	Changes the length of time for which data is used to compute load statistics.
Step 16	**delay** *throughput-delay* **Example:** `Device(config-if)# delay 30`	Sets a throughput delay value for an interface.
Step 17	**duplex auto** **Example:** `Device(config-if)# duplex auto`	Enables autonegotiation on an interface. • The interface automatically operates at half-duplex or full-duplex mode depending on environmental factors, such as the type of media and the transmission speeds for the peer routers, hubs, and switches used in the network configuration.

	Command or Action	Purpose
Step 18	**speed auto** **Example:** `Device(config-if)# speed auto`	Enables autonegotiation on an interface.
Step 19	**exit** **Example:** `Device(config-if)# exit`	Exits interface configuration mode and returns to global configuration mode.
Step 20	**interface** *type number* **Example:** `Device(config)# interface gigabitethernet 0/1`	Specifies an interface and enters interface configuration mode.
Step 21	**description** *line-of-description* **Example:** `Device(config-if)# description clients`	(Optional) Describes an interface.
Step 22	**ip address** *ip-address mask* **Example:** `Device(config-if)# ip address 172.25.50.1 255.255.255.0`	Specifies an IP address for the interface.
Step 23	**ip pim spare-mode** **Example:** `Device(config-if)# ip pim sparse-mode`	Enables Protocol Independent Multicast (PIM) sparse mode of operation on an interface.
Step 24	**ip nat inside** **Example:** `Device(config-if)# ip nat inside`	Specifies that an interface is connected to the inside network.
Step 25	**ip virtual-reassembly in** **Example:** `Device(config-if)# ip virtual-reassembly in`	Enables VFR on inbound interface traffic.
Step 26	**zone-member security** *zone-name* **Example:** `Device(config-if)# zone-member security out`	Assigns an interface to a specified security zone.

Step 27	**ip igmp version**{**1** | **2** | **3**}
	Example:
	`Device(config-if)# ip igmp version 3`
		Configure Version 3 of Internet Group Management Protocol (IGMP) on the router.

	Command or Action	Purpose
Step 28	**delay** *tens-of-microseconds* **Example:** `Device(config-if)# delay 30`	Sets a delay value for an interface.
Step 29	**duplex auto** **Example:** `Device(config-if)# duplex auto`	Enables autonegotiation on an interface. • The interface automatically operates at half-duplex or full-duplex mode depending on environmental factors, such as the type of media and the transmission speeds for the peer routers, hubs, and switches used in the network configuration.
Step 30	**speed auto** **Example:** `Device(config-if)# speed auto`	Enables autonegotiation on an interface.
Step 31	**exit** **Example:** `Device(config-if)# exit`	Exits interface configuration mode and returns to global configuration mode.
Step 32	**interface** *type number* **Example:** `Device(config)# interface vlan 1`	Specifies an interface and enters interface configuration mode.
Step 33	**description** *line-of-description* **Example:** `Device(config-if)# description WAAS interface`	(Optional) Describes an interface.
Step 34	**ip address** *ip-address mask* **Example:** `Device(config-if)# ip address 172.25.60.1 255.255.255.0`	Specifies an IP address for an interface.
Step 35	**ip wccp redirect exclude in** **Example:** `Device(config-if)# ip wccp redirect exclude in`	Excludes inbound packets from outbound redirection.
Step 36	**ip nat inside** **Example:** `Device(config-if)# ip nat inside`	Specifies that an interface is connected to the inside network.

	Command or Action	Purpose
Step 37	**ip virtual-reassembly in** **Example:** `Device(config-if)# ip virtual-reassembly in`	Enables VFR on inbound interface traffic.
Step 38	**zone-member security** *zone-name* **Example:** `Device(config-if)# zone-member security waas`	Assigns an interface to a specified security zone.
Step 39	**load-interval** *seconds* **Example:** `Device(config-if)# load-interval 30`	Changes the length of time for which data is used to compute load statistics.

Step 40	**end**
	Example:
	`Device(config-if)# end`
		Exits interface configuration mode and returns to global configuration mode.

Configuring WAAS for Zone-Based Firewalls

Note Perform this task on the Wide Area Application Engine (WAE) and not on the router on which zone-based firewall is configured.

SUMMARY STEPS

1. **enable**
2. **configure**
3. **primary-interface** *type number*
4. **interface** *type number*
5. **ip address** *ip-address ip-subnet*
6. **exit**
7. **ip default-gateway** *ip-address*
8. **wccp router-list** *number ip-address*
9. **wccp tcp-promiscuousservice-pair** *serviceID serviceID+1*
10. **router-list-num** *number*
11. **redirect-method** {**gre** | **L2**}
12. **egress-method** {**ip-forwarding** | **generic-gre** | **L2** | **wccp-gre**}
13. **enable**
14. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure** **Example:** `Device# configure`	Enters global configuration mode.
Step 3	**primary-interface** *type number* **Example:** `Device(config)# primary-interface Virtual 1/0`	Configures the primary interface for a Wide Area Application Services (WAAS) device.
Step 4	**interface** *type number* **Example:** `Device(config)# interface Virtual 1/0`	Configures an interface and enters interface configuration mode.
Step 5	**ip address** *ip-address ip-subnet* **Example:** `Device(config-if)# ip address 172.25.60.12 255.255.255.0`	Configures the IP address for the interface.

	Command or Action	Purpose
Step 6	**exit** **Example:** `Device(config-if)# exit`	Exits interface configuration mode and returns to global configuration mode.
Step 7	**ip default-gateway** *ip-address* **Example:** `Device(config)# ip default-gateway 172.25.60.1`	Specifies the default gateway.
Step 8	**wccp router-list** *number ip-address* **Example:** `Device(config)# wccp router-list 1 172.25.60.1`	Configures the IP address and router list number for Web Cache Control Protocol (WCCP) Version 2.
Step 9	**wccp tcp-promiscuousservice-pair** *serviceID serviceID+1* **Example:** `Device(config)# wccp tcp-promiscuous service-pair 61 62`	Configures the Web Cache Coordination Protocol (WCCP) Version 2 TCP promiscuous mode service and enters WCCP configuration mode.
Step 10	**router-list-num** *number* **Example:** `Device(config-wccp-service)# router-list-num 1`	Associates a configured router list with the WCCP service on a WAE.

Step 11	**redirect-method** {**gre** | **L2**}
	Example:
	`Device(config-wccp-service)# redirect-method gre`
		Configures the WAE to use Layer 3 GRE packet redirection.

Step 12	**egress-method** {**ip-forwarding** | **generic-gre** | **L2** | **wccp-gre**}
	Example:
	`Device(config-wccp-service)# egress-method ip-forwarding`
		Configures the IP forwarding egress method.

Step 13	**enable** **Example:** `Device(config-wccp-service)# enable`	Enables the WCCP service.

Step 14	**end**
	Example:
	`Device(config-wccp-service)# end`
		Exits WCCP configuration mode and returns to privileged EXEC mode.

Configuration Examples for WAAS Support in Zone-Based Firewalls

Example: Configuring the Cisco Firewall with WAAS

The following is a sample of an end-to-end Wide Area Application Services (WAAS) traffic flow optimization configuration for the firewall that uses Web Cache Communication Protocol (WCCP) to redirect traffic to a Wide Area Application Engine (WAE) device for traffic interception.

The following configuration example prevents traffic from being dropped between security zone members because the integrated-service-engine interface is configured on a different zone and each security zone member is assigned an interface.

```
! Zone-based firewall configuration on your router.
ip wccp 61
ip wccp 62
parameter-map type inspect global
 WAAS enable
 log dropped-packets enable
 max-incomplete low 18000
 max-incomplete high 20000
!
class-map type inspect match-any most-traffic
 match protocol icmp
 match protocol ftp
 match protocol tcp
 match protocol udp
!
policy-map type inspect p1
 class type inspect most-traffic
  inspect
!
 class class-default
  drop
!
zone security in
!
zone security out
!
zone security waas
!
zone-pair security in-out source in destination out
 service-policy type inspect p1
!
zone-pair security out-in source out destination in
 service-policy type inspect p1
!
zone-pair security waas-out source waas destination out
 service-policy type inspect p1
!
zone-pair security in-waas source in destination waas
 service-policy type inspect p1
!
interface GigabitEthernet0/0
 description WAN Connection
 no ip dhcp client request tftp-server-address
 no ip dhcp client request router
 ip address dhcp
 ip wccp 62 redirect in
 ip wccp 61 redirect out
 ip flow ingress
 ip nat outside
 ip virtual-reassembly in
 ip virtual-reassembly out
 zone-member security out
 load-interval 30
 delay 30
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 description Clients
 ip address 172.25.50.1 255.255.255.0
 ip pim sparse-mode
 ip nat inside
 ip virtual-reassembly in
 zone-member security in
 ip igmp version 3
 delay 30
 duplex auto
 speed auto
!
interface Vlan1
 description WAAS Interface
 ip address 172.25.60.1 255.255.255.0
 ip wccp redirect exclude in
 ip nat inside
 ip virtual-reassembly in
 zone-member security waas
 load-interval 30
!
```

The following example shows the configuration on the WAE for zone-based firewall support:

Note This configuration cannot be done on the router; but only on the WAE.

```
!Configuration on the WAE.
primary-interface Virtual 1/0
interface Virtual 1/0
 ip address 172.25.60.12 255.255.255.0
!
ip default-gateway 172.25.60.1
wccp router-list 1 172.25.60.1
wccp tcp-promiscuous service-pair 61 62
 router-list-num 1
 redirect-method gre
 egress-method ip-forwarding
 enable
!
```

Note The new configuration, depending on your release, places an integrated service engine in its own zone and need not be part of any zone pair. The zone pairs are configured between zone-hr (zone-out) and zone-eng (zone-output).

```
interface Integrated-Service-Engine 1/0
 ip address 10.70.100.1 255.255.255.252
 ip wccp redirect exclude in
 zone-member security z-waas
```

Additional References for WAAS Support in Zone-Based Firewalls

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Releases
Security commands	• Cisco IOS Security Command Reference: Commands A to C • Cisco IOS Security Command Reference: Commands D to L • Cisco IOS Security Command Reference: Commands M to R • Cisco IOS Security Command Reference: Commands S to Z
WAAS commands	http://www.cisco.com/c/en/us/support/routers/wide-area-application-services-waas-software/products-command-reference-list.html

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/support

Feature Information for WAAS Support in Zone-Based Firewalls

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1: Feature Information for WAAS Support in Zone-Based Firewalls

Feature Name	Releases	Feature Information
WAAS Support in Zone-Based Firewalls	12.4(15)T	Zone-based firewalls support Wide Area Application Services (WAAS) to automatically discover optimized traffic by enabling the sequence number to change without compromising the stateful Layer 4 inspection of TCP traffic flows that contain internal firewall TCP state variables.