Web Cache Communication Protocol Version 2

This appendix describes the Web Cache Communication Protocol (WCCP) Version 2 feature. It includes information on the benefits of this feature and other information you may need to work with WCCP Version 2. This appendix includes the following sections:

Feature Overview

Cisco developed the Web Cache Communication Protocol (WCCP) within Cisco IOS software to enable routers or switches to transparently redirect packets to network appliances. WCCP does not interfere with normal router or switch operations. Using WCCP, the router redirects requests on configured TCP and UDP ports to network appliances rather than to intended host sites. It also balances traffic load across a group of appliances (a cluster) and ensures fault-tolerant and fail-safe operation. As Content Routers are added to or deleted from an appliance cluster, the WCCP-aware router or switch dynamically adjusts its redirection map to reflect the currently available appliances, resulting in maximized performance and content availability.

WCCP Version 2 contains the following features:

- Multiple router support
- Improved security
- Faster throughput
- Redirection of multiple TCP and UDP port-destined traffic
- Load-distributing applications capability

Multirouter Support

WCCP Version 2 enables a series of Content Routers, called a *Content Router cluster*, to connect to multiple routers. This feature provides redundancy and a more distributed architecture for instances when a Content Router needs to connect to a large number of interfaces. This strategy also has the benefit of keeping all the Content Routers in a single cluster.

How WCCP Version 2 Works

With WCCP Version 2, multiple routers can service a cluster. This allows any of the available routers in a service group to redirect packets to each of the Content Routers in the cluster. Figure A-1 illustrates how this configuration appears.

Figure A-1   Content Router Network Configuration Using WCCP Version 2
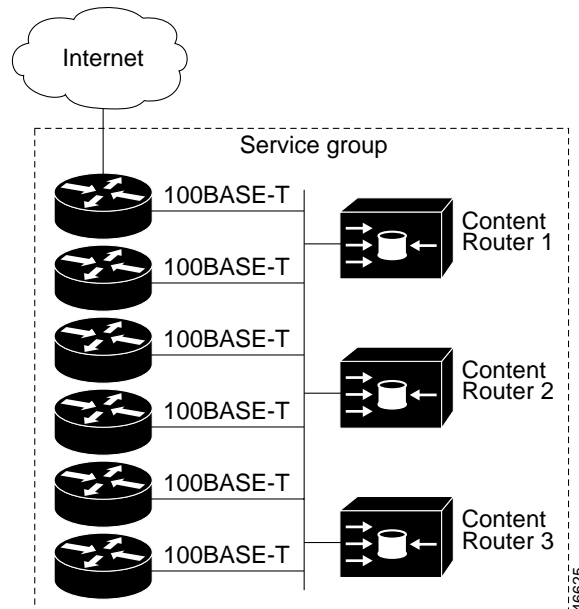
You can configure the router to run DNS boomerang (service number 50), a service that sends DNS Address (DNS A) record requests to a Content Router.

The subset of Content Routers within a cluster and routers connected to the cluster that are running the same service is known as a *service group*.

WCCP Version 2 addresses the issue of multiple routers being available to the cluster by allowing either a list of routers or an IP multicast address to be created on the Content Router. The difference in these two strategies is as follows:

- In the multiple router strategy, the Content Router sends a notification of its presence to an explicit router address.

- In the multicast address strategy, the Content Router sends a notification to one address, which provides coverage for all routers in the service group, for example, 192.168.1.2, which will indicate packets be sent to a multicast address of 192.168.1.2, which would send a multicast packet to all routers in the service group.

If you are adding and removing routers dynamically, the multicast address strategy provides for easier configuration because you do not need to change the configuration for each device in the WCCP network.

The following sequence of events details how the multicast address strategy process works:

1. Instead of having one central "home router," each Content Router defines a list of routers and stores the list in its memory.

2. Each Content Router announces its presence and view of the service group to the list of router IP addresses with which it has been configured. The routers reply with their view, which is a list of Content Router addresses in the group.

3. Once the view is consistent across all Content Routers in the cluster, one Content Router is designated the lead and sets the policy that the routers need to deploy in redirecting packets.

Also, you must perform these tasks to configure the routers that will become members of the service group:

- Configure an IP multicast address for use by the cluster.

- Enable the **ip wccp** command.

For network configurations in which the Content Router sends to a target router a packet that needs to traverse an intervening router, the router being traversed must be configured to perform IP multicast routing:

- Enable IP multicast routing using the **ip multicast routing** command.

- Enable the interfaces to which the Content Routers will connect to receive multicast transmissions using the **ip pim** command.

How Routers and Content Routers Communicate

Routers and Content Routers become aware of one another and form a service group using a management protocol. Once the service group has been established, one of the Content Routers is designated to determine load assignments among the Content Routers.

If there is a group of Content Routers, the one seen by all routers and the one that has the lowest IP address becomes the lead Content Router. The role of this Content Router is to determine how traffic should be allocated across Content Routers. The assignment information is passed to the entire service group from the designated Content Router so that the routers of the group can redirect the packets properly and the Content Routers of the group can manage their load better.

Improved Security

WCCP Version 2 provides authentication that enables you to control which routers and Content Routers become part of the service group. You use passwords and the HMAC MD5 standard set by the **ip wccp** [**password** [*0-7*] *password*] command to control service group membership.

Faster Throughput

Cisco Express Forwarding (CEF) has been integrated into WCCP Version 2 and provides fast packet redirection.

Redirection for Multiple TCP and UDP Port-Destined Traffic

WCCP Version 2 enables more TCP and UDP ports to have traffic redirected to the Content Router. Previously, web-cached information could be redirected only if it was destined for TCP port 80. Many applications require packets intended for other ports to be redirected, for example, proxy-web cache handling, FTP caching, FTP proxy handling, web caching for ports other than 80, and RealAudio, video, and telephony applications. A UDP port is used for the interception of DNS packets for content routing.

Packets that the Content Routers do not service are tunneled back to the same router from which they were received. When a router receives a formerly redirected packet, it knows not to redirect it again.

The criteria for determining whether to redirect the traffic are:

- IP protocol
- Ports
- Priority
- Distribution scheme
- Default handling

Note that service information has been added to the protocol to indicate which service the WCCP messages refer to. This information is used to help verify that service group members are all using or providing the same service.

Web Cache Packet Return

WCCP Version 2 filters packets to determine which redirected packets have been returned from the Content Router and which ones have not. It does not redirect the ones that have been returned because the Content Router has determined that the packets should not be routed. WCCP Version 2 returns packets that the Content Router does not service to the same router from which they were transmitted. Typical reasons why a Content Router would reject packets and initiate packet return are:

- The Content Router is overloaded and cannot service the packets.
- The DNS packet was not a DNS Address request.
- The requested DNS domain is not supported by the Content Router.

Load-Distributing Applications

WCCP Version 2 has the capability to adjust the load being offered to individual Content Routers to provide more effective use of the resources available and at the same time help to ensure high quality of service to the clients. It uses three techniques to perform this task:

- Hot spot handling allows an individual hash bucket, or a pool of IP addresses to which routers are mapped, to be distributed across all the Content Routers.
- Load balancing allows the set of hash buckets assigned to a Content Router to be adjusted so that the load can be shifted from an overwhelmed Content Router to other Content Routers that have available capacity.
- Load shedding enables the router to selectively redirect the load to avoid exceeding the capacity of the Content Routers.

Restrictions

The following limitations apply to WCCP Version 2:

- The Time To Live (TTL) value in packets sent by routers servicing a cluster must be 15 seconds or less.
- The protocol needs to include the list of routers in the service group as part of its messages to properly depict the view.
- Because the messages may now be IP multicasted, members may receive messages that are not relevant or are duplicates. Appropriate filtering needs to be performed.

- Service groups can comprise up to 32 Content Routers and 32 routers.

- All Content Routers in a cluster must include all routers servicing the cluster in its configuration. If a cache within a cluster does not include one or more of the routers in its configuration, the service group detects the inconsistency and the Content Router is not allowed to operate within the service group.

- Multicast addresses must be between 224.0.0.0 and 239.255.255.255.

- WCCP works only with IP networks.

Related Documents

- *Cisco IOS Configuration Fundamentals Configuration Guide*
- *Cisco IOS Configuration Fundamentals Command Reference*

Supported Platforms

In IOS Release 12.0(3)T , WCCP Version 2 is supported on these platforms:

- Cisco 2500 series routers
- Cisco 4000 series routers
- Cisco 4500 series routers
- Cisco 4700 series routers
- Cisco 7200 series routers

In IOS Release 12.0(5)T, WCCP Version 2 is supported on these platforms:

- Cisco 1600/1700 routers
- Cisco 2500 series routers
- Cisco 4000 series routers
- Cisco 4500 series routers
- Cisco 4700 series routers
- Cisco 7500 series routers

Supported Standards, MIBs, and RFCs

Standards

For descriptions of supported MIBs and how to use MIBs, see Cisco's MIB website on Cisco.com at http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml.

MIBs

None

RFCs

None

Prerequisites

Before you use WCCP Version 2, you must complete the following tasks:

- Properly install and configure a cluster connected to one or more routers.
- Configure IP on the interface connected to the Internet and the interface connected to the Content Router. The interface connected to the Content Router must be an Ethernet or Fast Ethernet interface.

Router Configuration Tasks

You can configure a router to run the DNS boomerang, custom web cache, and reverse proxy services associated with WCCP Version 2. The services can be configured simultaneously. Perform the following tasks to configure a cluster with multiple routers.

Configuring a Service Group Using WCCP Version 2

	Command	Purpose
Step 1	Router(config)# `ip wccp {web-cache | service-number} [group-address groupaddress] [redirect-list access-list] [group-list access-list] [password [0-7] password]`	Turns the WCCP feature on or off for the specified service.
Step 2	Router(config-if)# `ip wccp {web-cache | service-number} redirect out`	Specifies "out" because in the future, WCCP may have the ability to redirect incoming packets as well as outgoing packets.
Step 3	Router(config-if)# `ip wccp redirect exclude in`	Allows inbound packets on this interface to be excluded from redirection.

Running the DNS Boomerang Service

	Command	Purpose
Step 1	Router(config)# `ip wccp 50`	Turns on the protocol for DNS packet redirection.
Step 2	Router(config)# `interface type-number`	Specifies an interface for packet redirection.
Step 3	Router(config-if)# `ip wccp 50 redirect out`	Enables the check on packets to determine whether they need to be redirected to a Content Router.

Registering a Router to a Multicast Address

	Command	Purpose
Step 1	Router(config)# `ip wccp 50 group-address groupaddress`	Configures the group address for the service group.
Step 2	Router(config)# `interface type-number`	Specifies an interface that will listen for the multicast address (for example, Eth 0, Eth0, Ser 0, Ser0, Eth 0/0).
Step 3	Router(config-if)# `ip wccp 50 group-listen`	Configures an interface on a router to enable or disable the reception of IP multicast packets for WCCP.

Informing a Router of Valid IP Addresses

	Command	Purpose
Step 1	Router(config)# `ip wccp 50 group-list access-list`	Indicates to the router which Content Router IP addresses to allow packets from.
Step 2	Router(config)# `access-list access-list number permit host host-address`	Creates an access list that enables or disables traffic redirection to the Content Router.

Setting a Password for a Router and Content Routers

	Command	Purpose
Step 1	Router(config)# **ip wccp 50 password** [*0-7*] *password*	Sets a password for the Content Router that the router is trying to access.

Disabling Caching for Certain Clients

	Command	Purpose
Step 1	Router(config)# **ip wccp 50 redirect-list** *access-list number*	Sets the access list used to enable redirection.
Step 2	Router(config)# **access-list** *access-list number* **deny host** *host-address*	Creates an access list that enables or disables traffic redirection to the Content Router.

Verifying WCCP Configuration Settings

Step 1   To view the existing configuration, enter the **show running-config** command. A sample configuration follows:

```
Console# show running-config

Building configuration...
Current configuration:
!
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
service udp-small-servers
service tcp-small-servers
!
hostname router4
!
enable secret 5 $1$nSVy$faliJsVQXVPW.KuCxZNTh1
enable password alabama1
!
ip wccp subnet zero
ip wccp 50
ip domain-name cisco.com
ip name-server 10.1.1.1
ip name-server 10.1.1.2
ip name-server 10.1.1.3
!
!
!
interface Ethernet0
ip address 10.3.1.2 255.255.255.0
no ip directed-broadcast
ip wccp 50 redirect out
no ip route-cache
no ip mroute-cache
!
```

```
interface Ethernet1
ip address 10.4.1.1 255.255.255.0
no ip directed-broadcast
no ip route-cache
no ip mroute-cache
!
interface Serial0
no ip address
no ip directed-broadcast
no ip route-cache
no ip mroute-cache
shutdown
!
interface Serial1
no ip address
no ip directed-broadcast
no ip route-cache
no ip mroute-cache
shutdown
!
ip default-gateway 10.3.1.1
ip classless
ip route 0.0.0.0 0.0.0.0 10.3.1.1
no ip http server
!
!
!
line con 0
transport input none
line aux 0
transport input all
line vty 0 4
password alaska1
login
!
end
```

Step 2   To view values associated with WCCP variables, enter the **show ip wccp** command. Output similar to the following is displayed:

```
Console# show ip wccp

Global WCCP Information:
Service Name: 50
Number of Content Routers:1
Number of Routers:2
Total Packets Redirected:198
Redirect access-list:-none-
Total Packets Denied Redirect:0
Total Packets Unassigned:0
Group access-list:11
Total Messages Denied to Group:0
Total Authentication failures:0
```

Monitoring and Maintaining WCCP Version 2 Usage

Command	Purpose
Router# **show ip wccp** or Router# **show ip wccp** {**web-cache** | *0-99*}	Displays global statistics related to WCCP.
Router# **show ip wccp** {**web-cache** | *0-99*} **detail**	Queries the router for information about which Content Routers the router has detected in a specific service group. The information can be displayed for either a web cache or another service, which is indicated by a value of 99.
Router# **show ip interface**	Shows whether any **ip wccp direct** commands are configured on an interface.
Router# **show ip wccp** {**web-cache** | **99**} **view**	Displays which devices in a particular service group have been detected and which Content Routers are not visible to all other routers to which the current router is connected. The information can be displayed for either a web cache or another service.

Router Configuration Examples

This section provides the following configuration examples:

- Running the DNS Boomerang Service
- Registering a Router to a Multicast Address
- Informing a Router of Valid IP Addresses
- Setting a Password for a Router and Content Routers
- Disabling Caching for Certain Clients
- Displaying WCCP Settings

Running the DNS Boomerang Service

The following example shows a web cache service configuration session:

```
configure terminal
ip wccp service 50
interface ethernet 0
ip wccp 50 redirect out
```

Registering a Router to a Multicast Address

The following example shows how to register a router to a multicast address of 192.168.1.1:

```
configure terminal
ip wccp 50 group-address 192.168.1.1
interface ethernet 0
ip wccp 50 group-listen
```

Informing a Router of Valid IP Addresses

To achieve better security, you can use a standard access list to notify the router which IP addresses are valid addresses for a Content Router attempting to register with the current router. The following example shows a standard access list configuration session where the access list number is 10 for some sample hosts:

```
configure terminal
access-list 10 permit host 10.1.1.1
access-list 10 permit host 10.1.1.2
access-list 10 permit host 10.1.1.3
ip wccp 50 group-list 10
```

Setting a Password for a Router and Content Routers

The following example shows a WCCP Version 2 password configuration session in which the password is alabama2:

```
configure terminal
ip wccp 50 password alabama2
```

Disabling Caching for Certain Clients

To disable caching for certain clients, servers, or client/server pairs, you can use WCCP access lists. The following example shows any requests coming from 10.1.1.1 or going to 10.2.2.2 will bypass the cache, whereas all other requests will be serviced normally:

```
configure terminal
ip wccp 50 redirect-list 120
access-list 120 deny host 10.1.1.1
access-list 120 deny host 10.2.2.2
access-list 120 permit host 10.1.1.3
```

Displaying WCCP Settings

The following example displays WCCP settings, using the **show running-config** command:

```
Console# show running-config

Building configuration...
Current configuration:
!
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
service udp-small-servers
service tcp-small-servers
!
hostname router4
!
enable secret 5 $1$nSVy$faliJsVQXVPW.KuCxZNTh1
enable password alabama1
!
ip subnet-zero
ip wccp 50
```

```
ip domain-name cisco.com
ip name-server 10.1.1.1
ip name-server 10.1.1.2
ip name-server 10.1.1.3
!
!
!

interface Ethernet0
ip address 10.3.1.2 255.255.255.0
no ip directed broadcast
ip wccp 50 redirect out
no ip route-cache
no ip mroute-cache
!
interface Ethernet1
ip address 10.4.1.1 255.255.255.0
no ip directed-broadcast
no ip route-cache
no ip mroute-cache

!
interface Serial0
no ip address
no ip directed-broadcast
no ip route-cache
no ip mroute-cache
shutdown
!
interface Serial1
no ip address
no ip directed-broadcast
no ip route-cache
no ip mroute-cache
shutdown
!
ip default-gateway 10.3.1.1
ip classless
ip route 0.0.0.0 0.0.0.0 10.3.1.1
no ip http server
!
!
!
line con 0
transport input none
line aux 0
transport input all
line vty 0 4
password alaska1
login
!
end
```

Command Reference

This section documents new or modified commands that configure the WCCP Version 2 feature.

- **clear ip wccp**
- **ip wccp**
- **ip wccp group-listen**
- **ip wccp redirect exclude in**
- **ip wccp redirect out**
- **ip wccp version**
- **show ip interface**
- **show ip wccp**

In Cisco IOS Release 12.0(1)T or a later release of 12.0 T, you can search and filter the output for **show** and **more** commands. This functionality is useful when you need to sort through large amounts of output, or if you want to exclude output that you do not need to see.

To use this functionality, enter a **show** or **more** command followed by the "pipe" character (|), one of the keywords **begin**, **include**, or **exclude**, and an expression that you want to search or filter on:

command | {**begin** | **include** | **exclude**} *regular-expression*

Following is an example of the **show atm vc** command in which you want the command output to begin with the first line where the expression "PeakRate" appears:

show atm vc | **begin PeakRate**

For more information on the search and filter functionality, refer to the Cisco IOS Release 12.0(1)T feature module titled *CLI String Search*.

clear ip wccp

To remove Web Cache Communication Protocol (WCCP) statistics maintained on the router either for a particular service or for all the services, use the **clear ip wccp** EXEC command.

clear ip wccp {**web-cache** | *service-number*}

Syntax Description

web-cache	Directs the router to remove statistics for the web cache service.
service-number	Directs the router to remove statistics for a specified web cache service. The number can be from 0 to 99. The DNS boomerang service is indicated by a value of 50.

Defaults   No default behavior or values.

Command Modes   EXEC

Command History

Release	Modification
11.1 CA	This command was introduced.
12.0(3)T	This command has been expanded to be explicit about service.

Usage Guidelines   Use the **show ip wccp** and **show ip wccp detail** commands to display WCCP statistics.

Examples

```
clear ip wccp 50
```

Related Commands   **ip wccp**

show ip wccp

ip wccp

To direct a router to enable or disable the support for a Content Router service group, use the **ip wccp** global configuration command. To remove the ability of a router to control support for a service group, use the **no** form of this command.

ip wccp {**web-cache** | *service-number*} [**group-address** *groupaddress*] [**redirect-list** *access-list*] [**group-list** *access-list*] [**password** [*0-7*] *password*]

no ip wccp {**web-cache** | *service-number*} [**group-address** *groupaddress*] [**redirect-list** *access-list*] [**group-list** *access-list*] [**password** [*0-7*] *password*]

Syntax Description

web-cache	Enables the web cache service.
service-number	Identification number of the Web Cache Communication Protocol (WCCP) service being controlled by a router. The number can be from 0 to 99. The DNS boomerang service is indicated by a value of 50.
group-address	(Optional.) Directs the router to use a specified multicast IP address for communication with the WCCP service group.
groupaddress	(Optional.) Multicast address used by the router to determine which Content Router should receive redirected messages.
redirect-list	(Optional.) Directs the router to use an access list to control traffic redirected to this service group.
access-list	(Optional.) String (not to exceed 64 characters) that is the name of the access list that determines which traffic is redirected to a Content Router.
group-list	(Optional.) Directs the router to use an access list to determine which Content Routers are allowed to participate in the service group.
access-list	(Optional.) String (not to exceed 64 characters) that is the name of the access list that determines which Content Routers are allowed to participate in the service group.
password	(Optional.) String that directs the router to apply MD5 authentication to messages received from the service group specified by the service name given. Messages that are not accepted by the authentication are discarded.
0-7	(Optional.) Value that indicates the HMAC MD5 algorithm used to encrypt the password. This value is generated when an encrypted password is created for the Content Router.
password	(Optional.) Password name that is combined with the HMAC MD5 value to create security for the connection between the router and the Content Router.

Defaults

This command is disabled by default.

Command Modes

Global configuration

Command History	Release	Modification
	12.0(3)T	This command was introduced.

Examples   The following example shows a router configured to run WCCP DNS boomerang service, using (listening to) the multicast address of 192.168.1.2:

```
ip wccp 50 group-address 192.168.1.2
```

Related Commands   **ip wccp group-listen**

ip wccp group-listen

To configure an interface on a router to enable or disable the reception of IP multicast packets for the Web Cache Communication Protocol (WCCP) feature, use the **ip wccp group-listen** interface configuration command. To remove control of the reception of IP multicast packets for the WCCP feature, use the **no** form of this command.

> **ip wccp** {**web-cache** | *service-number*} **group-listen**

> **no ip wccp** {**web-cache** | *service-number*} **group-listen**

Syntax Description

web-cache	Directs the router to transmit packets to the web cache service.
service-number	Identification number of the Content Router service group being controlled by a router. The number can be from 0 to 99. The DNS boomerang service is indicated by a value of 50.

Defaults

This command is disabled by default.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(3)T	This command was introduced.

Examples

The following example shows that multicast packets have been enabled for DNS boomerang with an address of 192.168.1.2.

```
configure terminal
ip wccp 50 group-address 192.168.1.2
interface ethernet 0
ip wccp 50 group-listen
```

Related Commands

ip wccp

ip wccp redirect out

ip wccp redirect exclude in

To configure an interface to enable or disable excluding packets received on an interface from being redirected to a Content Router, use the **ip wccp redirect exclude in** interface configuration command. To disable a router's ability to verify that only appropriate packets are being redirected to a Content Router, use the **no** form of this command.

ip wccp redirect exclude in

no ip wccp redirect exclude in

Syntax Description   This command has no arguments or keywords.

Defaults   No default behavior or values.

Command Modes   Interface configuration

Command History

Release	Modification
12.0(3)T	This command was introduced.

Usage Guidelines   Note that the command is global to all the services and should be applied to any inbound interface that has been configured to be excluded from redirection on an outbound interface that the traffic will traverse.

Examples
```
configure terminal
ip wccp 50
interface ethernet0
ip wccp redirect exclude in
```

Related Commands   **ip wccp**

ip wccp redirect out

■ ip wccp redirect out

ip wccp redirect out

To configure an interface to enable a router's ability to verify that appropriate packets are being redirected to a Content Router, use the **ip wccp redirect out** interface configuration command. To disable a router's ability to verify that only appropriate packets being redirected to a Content Router, use the **no** form of this command.

ip wccp {**web-cache** | *service-number*} **redirect out**

no ip wccp {**web-cache** | *service-number*} **redirect out**

Syntax Description

web-cache	Enables the web cache service.
service-number	Identification number of the Content Router service group being controlled by a router. The number can be from 0 to 99. The DNS boomerang service is indicated by a value of 50.

Defaults

No default behavior or values.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(3)T	This command was introduced.

Examples

```
configure terminal
ip wccp 50
interface ethernet0
ip wccp 50 redirect out
```

Related Commands

ip wccp redirect exclude in

ip wccp version

To change the WCCP version number, use the **ip wccp version** global configuration command.

ip wccp version {**1** | **2**}

Syntax Description

1	Enables WCCP Version 1.
2	Enables WCCP Version 2.

Defaults   Version 2 is the default.

Command Modes   Global configuration

Command History

Release	Modification
12.0(5)T	This command was introduced.

Usage Guidelines   To use boomerang features, you must use WCCP Version 2. The default WCCP version is Version 2.

Examples   `ip wccp version 2`

show ip interface

To display status about any **ip wccp direct** commands configured on an interface, use the **show ip interface** EXEC command.

show ip interface [*type-number*]

Syntax Description

type-number	(Optional.) The interface number whose status is being displayed.

Defaults No default behavior or values.

Command Modes EXEC

Command History

Release	Modification
10.0	This command was introduced.
12.0	This command was enhanced.
12.0(3)T	This command was enhanced to include status of the **ip wccp redirect out** and **ip wccp redirect exclude add in** commands.

Usage Guidelines The Cisco IOS software automatically enters a directly connected route in the routing table if the interface is usable. A usable interface is one through which the software can send and receive packets. If the software determines that an interface is not usable, it removes the directly connected routing entry from the routing table. Removing the entry allows the software to use dynamic routing protocols to determine backup routes to the network (if any).

If the interface can provide two-way communication, the line protocol is indicated to be up. If the interface hardware is usable, the interface is indicated to be up.

If you specify an optional interface type, you will see information on that specific interface only.

If you specify no optional arguments, you will see information on all the interfaces.

When an asynchronous interface is encapsulated with Point-to-Point Protocol (PPP) or Serial Line Internet Protocol (SLIP), IP fast switching is enabled. A **show ip interface** command on an asynchronous interface encapsulated with PPP or SLIP displays a message indicating that IP fast switching is enabled.

Examples The following example displays output from the **show ip interface** command, using the interface e3/0:

```
show ip interface e3/0

Ethernet3/0 is up
Internet address is 10.1.1.38/24
Broadcast address is 255.255.255.255
Address determined by non-volatile memory
MTU is 1500 bytes
Helper address is not set
```

```
Directed broadcast forwarding is enabled
Outgoing access list is not set
Inbound access list is not set
Proxy ARP is enabled
Security level is default
Split horizon is enabled
ICMP redirects are always sent
ICMP unreachables are always sent
ICMP mask replies are never sent
IP fast switching is enabled
IP fast switching on the same interface is disabled
IP Optimum switching is enabled
IP multicast fast switching is enabled
Router Discovery is disabled
IP output packet accounting is disabled
IP access violation accounting is disabled
TCP/IP header compression is disabled
Probe proxy name replies are disabled
Gateway Discovery is disabled
Policy routing is disabled
Network address translation is disabled
WCCP Redirect outbound is enabled
WCCP Redirect exclude is disabled
```

Table A-1 describes the fields shown in the example.

Table A-1   show ip interface Field Descriptions

Field	Description
Ethernet 3/0 is up	If the interface hardware is usable, the interface is marked "up." For an interface to be usable, both the interface hardware and line protocol must be up.
Internet address	Shows the IP address of the interface.
Broadcast address	Shows the broadcast address.
Address determined by	Indicates how the IP address of the interface was determined.
MTU	Shows the Maximum Transmission Unit (MTU), or the maximum size of packets allowed to be transmitted from the router to a Content Router.
Helper address	Shows a helper address, if one has been set.
Directed broadcast forwarding	Shows a secondary address, if one has been set.
Outgoing access list	Indicates whether the interface has an outgoing access list set.
Inbound access list	Indicates whether the interface has an incoming access list set.
Proxy ARP	Specifies the IP Security Option (IPSO) security level set for this interface.
Security level	Specifies the default IPSO security level for this interface.
Split horizon	Specifies that routing updates sent to a particular neighbor router should not contain information about routes that were learned from that neighbor.
ICMP redirects	Indicates whether Internet Control Message Protocol (ICMP) redirects will be sent on this interface.
ICMP unreachables	Indicates whether unreachable messages will be sent on this interface.

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Table A-1   show ip interface Field Descriptions (continued)

Field	Description
ICMP mask replies	Indicates whether ICMP mask messages that test node reachability across the network will be suppressed.
IP fast switching	Indicates whether fast switching has been enabled for this interface. It is generally enabled on serial interfaces, such as this one.
IP fast switching on the same interface	Indicates whether fast switching has been disabled for this interface. It is generally enabled on serial interfaces, such as this one.
IP Optimum switching	Indicates whether the IP optimum switching feature has been turned on.
IP multicast fast switching	Indicates whether the IP multicast fast switching feature has been turned on.
Router Discovery	Indicates whether the Cisco Discovery Protocol has been turned off.
IP output packet accounting	Indicates whether the output packet counter has been turned off.
IP access violation accounting	Indicates whether the feature that counts unauthorized access events on the router has been turned off.
TCP/IP header compression	Indicates whether compression is enabled or disabled.
Probe proxy name replies	Indicates whether HP Probe proxy name replies are generated.
Gateway Discovery	Indicates whether the gateway discovery option has been turned off.
Policy routing	Indicates whether the policy routing option has been turned off.
Network address translation	Indicates whether the status of the network address translation feature has been enabled or disabled.
WCCP Redirect outbound	Indicates whether packets received on an interface are redirected to a Content Router. This field can be enabled or disabled.
WCCP Redirect exclude	Indicates whether packets targeted for an interface will be excluded from being redirected to a Content Router. This field can be enabled or disabled.

Related Commands   **show ip wccp**

show ip wccp

To display global statistics related to the Web Cache Communication Protocol (WCCP) feature, use the **show ip wccp** EXEC command.

> **show ip wccp** {**web-cache** | *service-number*} [**view** | **detail**]

Syntax Description

web-cache	Directs the router to display statistics for the web cache service.
service-number	Identification number of the Content Router service group being controlled by a router. The number can be from 0 to 99. The DNS boomerang service is indicated by a value of 50.
view	(Optional.) Directs the router to display statistics for the WCCP view configuration.
detail	(Optional.) Directs the router to display statistics for the WCCP detail configuration.

Defaults

No default behavior or values.

Command Modes

EXEC

Command History

Release	Modification
11.1 CA and 11.2 P	This command was introduced.
12.0(3)T	The user was allowed to query the router for the current global configuration information in use by either a single service or all services.

Usage Guidelines

Use the **clear ip wccp** command to reset the counter for the "Total Packets Redirected" information.

Examples

The following example displays output from the **show ip wccp** command:

```
show ip wccp

Global WCCP Information:

Service Name: 50
Number of Cache Engines:1
Number of Routers:2
Total Packets Redirected:198
Redirect access-list:-none-
Total Packets Denied Redirect:0
Total Packets Unassigned:0
Group access-list:11
Total Messages Denied to Group:0
Total Authentication failures:0
```

Table A-2 describes the fields shown in the example.

Table A-2   show ip wccp Field Descriptions

Field	Description
Service Name	Service that is detailed in the display output.
Number of Content Routers	Number of Content Routers using the router as their home router.
Number of Routers	Number of routers in the service group.
Total Packets Redirected	Total number of packets redirected by the router.
Redirect access-list	Name or number of the access list that determines which packets will be redirected.
Total Packets Denied Redirect	Total number of packets that were not redirected because they did not match the access list.
Total Packets Unassigned	Number of packets that were not redirected because they were not assigned to any Content Router. Packets may not be assigned during initial discovery of Content Routers or when a Content Router is dropped from a cluster.
Group access-list	Content Router that is allowed to connect to the router.
Total Messages Denied to Group	Number of messages disallowed by the router because they did not meet all the requirements of the service group.
Total Authentication failures	Number of password authentication failures.

The following example displays output from the **show ip wccp 50 detail** EXEC command. This command displays Content Router and WCCP router statistics for a particular service group:

```
show ip wccp 50 detail

WCCP Router information:
IP Address:192.168.88.10
Protocol Version:2.0

WCCP Cache-Router Information
IP Address:192.168.88.11
Protocol Version:2.0
State:Usable
Initial Hash Info:AAAAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAAAAAA
Assigned Hash Info:FFFFFFFFFFFFFFFFFFFFFFFFFF
FFFFFFFFFFFFFFFFFFFFFFFFFF
Hash Allotment:256 (100.00%)
Packets Redirected:21345
Connect Time:00:13:46
```

Table A-3 describes the fields shown in the example.

Table A-3   show ip wccp detail Field Descriptions

Field	Description
WCCP Router information	Header for the area that contains fields for the IP address and version of WCCP associated with the router connected to the Content Router in the service group.
IP Address	IP address of the router connected to the Content Router in the service group.
Protocol Version	Version of WCCP being used by the router in the service group.
WCCP Cache-Router information	Fields for information on Content Routers.
IP Address	IP address of the Content Router in the service group.
Protocol Version	Version of WCCP being used by the Content Router in the service group.
State	Indicates whether the Content Router is operating properly and can be contacted by a router and other Content Routers in the service group.
Initial Hash Info	Initial state of the hash bucket assignment.
Assigned Hash Info	Current state of the hash bucket assignment.
Hash Allotment	Percentage of buckets assigned to the current Content Router. Both a value and a percentage figure are displayed.
Packets Redirected	Number of packets that have been redirected to the Content Router.
Connect Time	Length of time the Content Router has been connected.

The following is sample output from the **show ip wccp view** EXEC command. In this case, the service number 50 has been specified.

```
show ip wccp service 50 view

WCCP Router Informed of:
192.168.88.10
192.168.88.20

WCCP Content Routers Visible
192.168.88.11
192.168.88.12

WCCP Content Routers Not Visible:
-none-
```

If any Content Router is displayed under the WCCP Content Routers Not Visible field, the Content Router needs to be reconfigured to add this router to it. Table A-4 describes the fields shown in the example.

■   show ip wccp

Table A-4   show ip wccp view Field Descriptions

Field	Description
WCCP Routers Informed of	List of routers detected by the current router.
WCCP Content Routers Visible	List of Content Routers that are visible to the router and other Content Routers in the service group.
WCCP Content Routers Not Visible	List of Content Routers in the service group that are not visible to the router and other Content Routers in the service group.

Related Commands   **ip wccp detail**