



Web Cache Communication Protocol v2

This feature module describes the Web Cache Communication Protocol v2 (WCCP Version 2) feature. It includes information on the benefits of this new feature, supported platforms, related documents, and other information you may need to work with WCCP v2.

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Feature Overview

The Web Cache Communication Protocol (WCCP) feature allows you to use a Cisco Cache Engine to handle web traffic, reducing transmission costs and downloading time. This traffic includes user requests to view pages and graphics on World Wide Web servers, whether internal or external to your network, and the replies to those requests. When a user requests a page from a web server (located in the Internet), the router sends the request to a cache engine. If the cache engine has a copy of the requested page in storage, the cache engine sends the user that page. Otherwise, the cache engine retrieves the requested page and the objects on that page from the web server, stores a copy of the page and its objects, and forwards the page and objects to the user.

WCCP transparently redirects Hypertext Transfer Protocol (HTTP) requests from the intended server to a cache engine. End users do not know that the page came from the cache engine rather than the originally requested web server.



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WCCP v2 now contains the following new features:

- Multiple router support
- Improved security
- Faster throughput
- Redirection of multiple TCP port-destined traffic
- Load distributing applications capability
- Client IP addressing transparency

Multirouter Support

WCCP v2 enables a series of cache engines, called a *cache engine cluster*, to connect to multiple routers. This feature provides redundancy and a more distributed architecture for instances when a cache engine needs to connect to a large number of interfaces. This strategy also has the benefit of keeping all the cache engines in a single cluster, avoiding unnecessary duplication of web pages across several clusters.

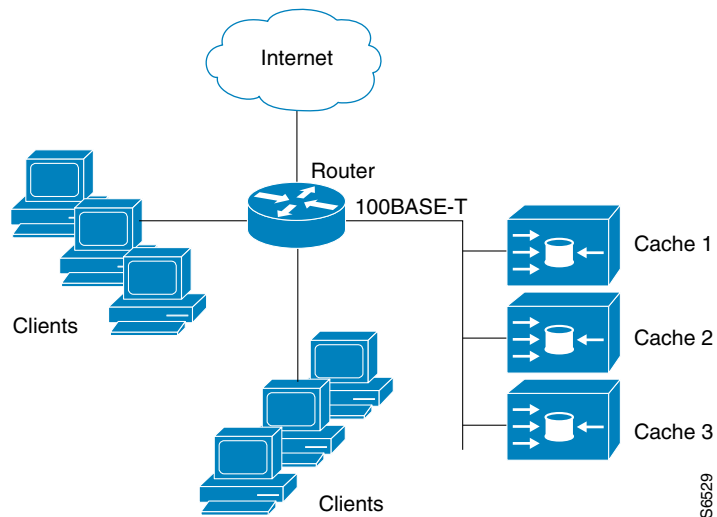
How Version 1 Works

1. With WCCP-Version 1, only a single router services a cluster, becoming the default home router for the cluster. In this scenario, this router is the device that performs all the IP packet redirection. Figure 1 illustrates how this configuration appears.

The following sequence of events details how this process works:

2. Each cache engine records the IP address of the router servicing the cluster.
3. The cache engines then transmit their IP addresses to the router, indicating their presence to one another in the cluster.
4. The router then replies to the cache engines, establishing that each can connect to the other in the cluster, providing a *view* or a list of cache engine addresses in the cluster, indicating that each can recognize each other.
5. Once the view has been established, one cache engine is designated as the lead and indicates to the router how IP packet redirection should be performed. The lead cache engine is defined as one seen by all the routers in the service group and that has the lowest IP address. Figure 1 illustrates how this configuration appears.

Figure 1 Cisco Cache Engine Network Configuration Using WCCP-Version 1



How Version 2 Works

With WCCP v2, multiple routers can service a cluster, creating contention between available routers to obtain status as the device that redirects packets for data coming from each of the cache engines in the cluster. Figure 2 illustrates how this configuration appears. You can configure the router to run one of two services:

- Web cache which is a global service that sends content to a large collection of destination World Wide Web servers.
- Reverse proxy which is a local service that sends content to a small number of destination World Wide Web servers.

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

WCCP v2 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 cache engine. The difference in these two strategies is as follows:

- In the multiple router strategy, the cache engine sends a notification of its presence to an explicit router address.
- In the multicast address strategy, the cache engine sends a notification to one address, which provides coverage for all routers in the service group, for example, 224.0.0.0, which will indicate packets be sent to a multicast address of 224.0.0.0 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 specifically enter the addresses of all devices in the WCCP network.

The following sequence of events details how this process works:

1. Instead of having one central “home router,” each cache engine obtains a list of routers and stores the list in its memory.
2. Each cache engine announces its presence and view of the service group to the list of router IP addresses with which they have been configured. The routers reply with their view or a list of cache engine addresses in the group.

- Once the view is consistent across all cache engines in the cluster, one cache engine is designated as the lead and sets the policy that the routers need to deploy in redirecting packets.

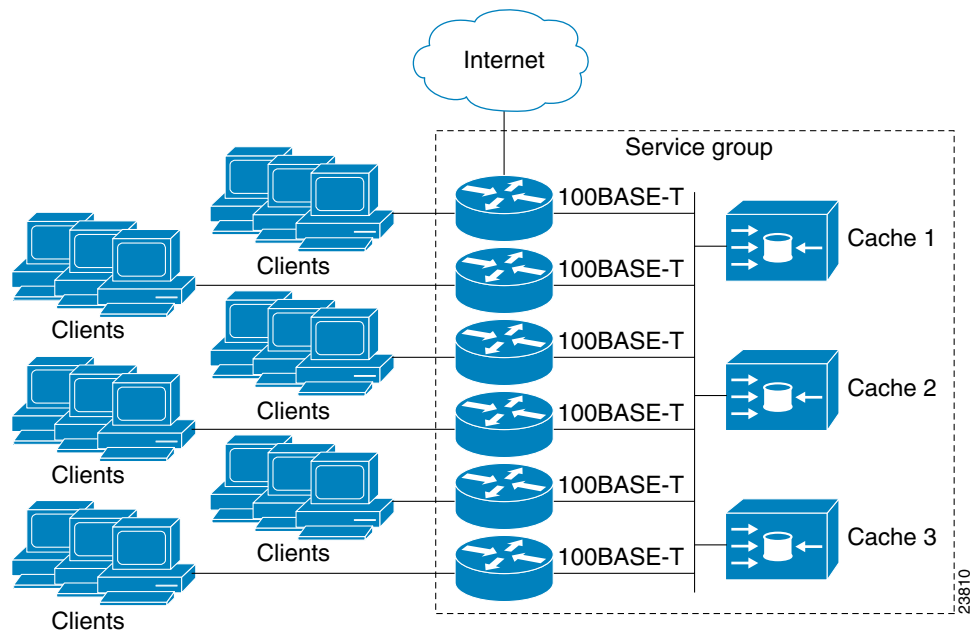
Also, you need to configure routers that will become members of the service group:

- Configure an IP multicast address for use by the cluster.
- Enable the **ip wccp** command.

For network configurations where the cache engine 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. You must configure two components to enable traversal over an intervening router:

- Enable IP multicast routing using the **ip multicast routing** command.
- Enable the interfaces to which the cache engines will connect to receive multicast transmissions using the **ip pim** command.

Figure 2 Cisco Cache Engine Network Configuration Using WCCP v2



How Routers and Cache Engines Communicate

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

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

Improved Security

Security between a cache engine and a router is now stronger because the cache engine's location in a cluster is more strongly circumscribed. WCCP v2 provides authentication that enables you to control which routers and cache engines become part of the service group using passwords and the HMAC MD5 standard set by the `ip wccp [password [0-7] password]` command.

Faster Throughput

Cisco Express Forwarding (CEF) has been integrated into WCCP v2 and provides fast packet redirection.

Redirection for Multiple TCP Port Destined Traffic

WCCP v2 enables more TCP ports to have traffic redirected to the cache engine. 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 Real Audio, video, and telephony applications.

Packets that the cache engines do not service are tunneled back to the same router from where they were received. Once a router has received a formerly redirected packet, it knows not to redirect it again.

The criteria set for determining whether to redirect the traffic is as follows:

- 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 validate that service group members are all using or providing the same service.

Web Cache Packet Return

WCCP v2 filters packets to determine which redirected packets have been returned from the cache engine and which ones have not. It does not redirect the ones that have been returned because the cache engine has determined that the packets should not be cached. WCCP v2 returns packets that the cache engine does not service to the same router from which they were transmitted. Typical reasons why a cache engine would reject packets and initiate the packet return feature are:

- Instances when the cache engine is overloaded and has no room to service the packets.
- Instances when the cache engine is filtering for certain conditions that make caching packets counterproductive, for example, when IP authentication has been turned on.

Load Distributing Applications

WCCP v2 has the capability to adjust the load being offered to individual cache engines 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 cache engines.
- Load Balancing allows the set of hash buckets assigned to a cache engine to be adjusted so that the load can be shifted from an overwhelmed cache engine to other members that have available capacity.
- Load Shedding enables the router to selectively redirect the load to avoid exceeding the capacity of the cache engines.

Client IP Address Transparency

The cache engine accepts traffic and establishes the connection with the client, acting as if it were the original destination server. Once the connection is established, if the object being requested is not available on the cache engine, the engine then establishes its own connection out to the original destination server.

Benefits

Redundancy

Access to multiple routers provides backup support for a failed connection between a cache engine and the lead router.

Better Response to a High Interface Count

Access to multiple routers also provides a more distributed or evenly shared load. When many devices are being serviced, multiple routers can better handle the increased traffic.

Improved Security

Security between a cache engine and a router is now stronger as the cache engine's place in a cluster is more strongly circumscribed. Also authentication is now available, using the HMAC MD5 security feature.

Faster Redirection

CEF provides fast redirection by using more efficient levels of switching, specifically, the process switch.

Increased Control over Traffic Selected for Redirection

The ability to redirect traffic destined to multiple TCP ports provides more flexibility for more applications, for example, proxy-web cache handling, FTP caching, FTP proxy handling, and Real Audio, video, and telephony applications, all targeted to various TCP ports. Previously, only applications with traffic destined to TCP port 80 could have traffic redirected.

Reduced Bottlenecks

Traffic between hash buckets, or collections of packets that contain filtered information can now be evenly distributed across multiple cache engines in three ways, preventing one cache from being overloaded and reducing the potential for bottlenecks associated with overloading:

- Hot Spot Handling allows an individual hash bucket to be distributed across all the cache engines.
- Load Balancing allows the set of hash buckets assigned to a cache engine to be adjusted so that the load can be shifted from an overwhelmed cache engine to other members that have available capacity.
- Load Shedding enables the cache engine to selectively redirect the load to avoid exceeding the capacity of the cache engines.

Client IP Address Transparency

The cache engine accepts traffic and establishes the connection with the client acting as if it were the original destination server. Once the connection is established, if the object being requested is not available on the cache engine, the engine then establishes its own connection out to the original destination server.

Prior to WCCP v2	Using WCCP v2
Only one router could access a cache engine server cluster.	Multiple routers can access a cache engine server cluster.
Web-cached information can be redirected only if destined for TCP port 80.	Web-cached information can be redirected if destined for any TCP port.
Information from one hash bucket could only go to one cache engine.	Information from one hash bucket can go to multiple cache engines.

Restrictions

The following limitations apply to WCCP v2:

- The Time To Live (TTL) value of 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 will not be relevant or are duplicates. Appropriate filtering needs to be performed.
- Service groups can comprise up to 32 cache engines and 32 routers.
- All cache engines in a cluster must be mapped to all routers servicing the cluster. If a cache within a cluster is not mapped to one or more of the routers, a router attempting to service the cache engine will not distinguish the cache engine's IP address from other signals and will not 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 Features and Technologies

To understand how WCCP v2 works, you must understand concepts associated with the Cisco Cache Engine.

Related Documents

- The “Web Cache Control Protocol” Feature Guide
WCCP was introduced in Cisco IOS Release 11.2(10)P and 11.1(14) CA. The “Web Cache Control Protocol” feature guide (available on CCO) describes the WCCP functionality available for the 11.2. P and 11.1 CA releases. Note that WCCP has since been modified to stand for Web Cache Communication Protocol.
- The *Configuration Fundamentals Configuration Guide* & the *Cisco IOS Configuration Fundamentals Command Reference* for Cisco IOS Release 12.0
These documents contain information on the WCCP Cisco IOS software commands available in Cisco IOS Release 12.0.

Supported Platforms

- Cisco 1000 series
- Cisco 1600 series
- Cisco 1700 series
- Cisco 2500 series
- Cisco 2500 series access servers
- Cisco 3600 series
- Cisco 3800 series
- MC3810
- Cisco 4000 series
- Cisco 4500 series
- Router Switch Module (RSM) for Catalyst 5000 Series
- Cisco AS5100 access server
- Cisco AS5200 universal access server
- Cisco AS5300 access server
- Cisco AS5800 series
- Cisco 7000 series
- Cisco 7200 series
- Cisco 7500 series

Supported Standards, MIBs, and RFCs

No standards, MIBs, or RFCs are directly associated with WCCP.

Prerequisites

Before you use WCCP v2, 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 cache engine. The interface connected to the cache engine must be an Ethernet or Fast Ethernet interface.

Configuration Tasks

You can configure a router to run the web cache and reverse proxy services associated with WCCP v2. Each service may be configured simultaneously. Perform the following tasks to configure a cluster with multiple routers.

- [Configuring a Service Group Using WCCP v2](#)
- [Running a Web Cache Service](#)
- [Running a Reverse Proxy Service](#)
- [Registering a Router to a Multicast Address](#)
- [Informing a Router of Valid IP Addresses](#)
- [Setting a Password for a Router and Cache Engines](#)
- [Disabling Caching for Certain Clients](#)

Configuring a Service Group Using WCCP v2

	Command	Purpose
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 feature on or off for the specified service.
2.	Router(config-if)# ip wccp {web-cache service-number} redirect out	Redirects WCCP traffic for the specified service.
3.	Router(config-if)# ip wccp redirect exclude in	Allows inbound packets on this interface to be excluded from redirection.

Running a Web Cache Service

	Command	Purpose
1.	Router(config)# ip wccp web-cache	Turns on the protocol for web caching.
2.	Router(config)# interface interface-number	Targets an interface number for which a web cache service will run.
3.	Router(config-if)# ip wccp web-cache redirect out	Enables the check on packets to determine if they qualify to be redirected to a web cache.

Running a Reverse Proxy Service

	Command	Purpose
1.	Router(config)# ip wccp 99	Turns the feature on or off for the reverse proxy service. The value for reverse proxy is 99.
2.	Router(config)# interface <i>interface-number</i>	Targets an interface on which the reverse proxy service will run.
3.	Router(config-if)# ip wccp 99 redirect out	Specifies “out” for the reverse proxy service.

Registering a Router to a Multicast Address

	Command	Purpose
1.	Router(config)# ip wccp web-cache group-address <i>groupaddress</i>	Configures the address of the group address for the service group.
2.	Router(config)# interface <i>interface-number</i>	Targets an interface to listen for the multicast address.
3.	Router(config-if)# ip wccp web-cache 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

Step	Command	Purpose
1.	Router(config)# ip wccp web-cache group-list access-list	Indicates to the router which IP addresses of cache engines to accept packets from.
2.	Router(config)# access-list <i>access-list</i> permit ip host <i>host-address</i>	Creates an access list that enables or disables traffic redirection to the cache engine.

Setting a Password for a Router and Cache Engines

Step	Command	Purpose
1.	Router(config)# ip wccp web-cache password <i>password</i>	Sets a password for the cache engine the router is trying to access.

Disabling Caching for Certain Clients

Step	Command	Purpose
1.	Router(config)# ip wccp web-cache redirect-list <i>access-list</i>	Sets the access list used to enable redirection
2.	Router(config)# access-list <i>access-list</i> deny ip host <i>host-address</i>	Creates an access list that enables or disables traffic redirection to the cache engine.

Verifying WCCP Configuration Settings

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

```
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.KuCxZNTht1
enable password alabama1
!
ip subnet-zero
ip wccp web-cache
ip wccp 99
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 web-cache redirect out
ip wccp 99 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
ip wccp 99 redirect out
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. The following output is displayed:

```
show ip wccp
```

```
Global WCCP Information:
```

```
Service Name: web-cache:  
Number of Cache Engines:1  
Number of Routers:1  
Total Packets Redirected:213  
Redirect access-list:no_linux  
Total Packets Denied Redirect:88  
Total Packets Unassigned:-none-  
Group access-list:0  
Total Messages Denied to Group:0  
Total Authentication failures:0
```

```
Service Name:99  
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
```

Monitoring and Maintaining Using WCCP v2

Command	Purpose
Router# <code>show ip wccp</code> or Router# <code>show ip wccp {web-cache service-number}</code>	Displays global statistics related to WCCP.
Router# <code>show ip wccp {web-cache service-number} detail</code>	Queries the router for information on which cache engines of a specific service group the router has detected. The information can be displayed for either a web cache or the reverse proxy service, which is indicated by a value of 99.
Router# <code>show ip interface</code>	Displays status about whether any <code>ip wccp direct</code> commands are configured on an interface.
Router# <code>show ip wccp {web-cache service-number} view</code>	Displays which devices in a particular service group have been detected and which cache engines are having trouble becoming visible to all other routers to which the current router is connected. The information can be displayed for either a web cache or the reverse proxy service, which is indicated by a value of 99.

Configuration Examples

This section provides the following configuration examples:

- [Performing a General WCCP v2 Configuration](#)
- [Running a Web Cache Service](#)
- [Running a Reverse Proxy Service](#)
- [Registering a Router to a Multicast Address](#)
- [Informing a Router of Valid IP Addresses](#)
- [Setting a Password for a Router and Cache Engines](#)
- [Disabling Caching for Certain Clients](#)

Performing a General WCCP v2 Configuration

The following example shows a general WCCP v2 configuration session:

```
ip wccp web-cache group-address 224.1.1.100 password alabama1
interface ethernet0
ip wccp web-cache redirect out
```

Running a Web Cache Service

The following example shows a web cache service configuration session:

```
configure terminal
ip wccp web-cache
interface ethernet 0
ip wccp web-cache redirect out
```

Running a Reverse Proxy Service

The following example shows a configuration session for a reverse proxy service (where the reverse proxy service is assigned the value 99):

```
configure terminal
ip wccp 99
interface ethernet 0
ip wccp 99 redirect out
```

Registering a Router to a Multicast Address

The following example shows how to register a router to a multicast address of 224.1.1.100:

```
configure terminal
ip wccp web-cache group-address 224.1.1.100
interface ethernet 0
ip wccp web-cache group-listen
```

Informing a Router of Valid IP Addresses

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

```
access-list 10 permit host 11.1.1.1
access-list 10 permit host 11.1.1.2
access-list 10 permit host 11.1.1.3
ip wccp web-cache group-list 10
```

Setting a Password for a Router and Cache Engines

The following example shows a WCCP v2 password configuration session where the password is alabama2:

```
configure terminal
ip wccp web-cache 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 to 12.1.1.1 will bypass the cache. while all other requests will be serviced normally:

```
configure terminal
ip wccp web-cache redirect-list 120
access-list 120 deny tcp host 10.1.1.1
access-list 120 deny tcp any host 12.1.1.1
access-list 120 permit ip any any
```

Displaying WCCP Settings

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

```
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 web-cache
ip wccp 99
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 web-cache redirect out
ip wccp 99 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
ip wccp 99 redirect out
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 v2 feature. All other commands used with this feature are documented in the Cisco IOS Release 12.0 command references.

- [clear ip wccp](#)
- [ip wccp](#)
- [ip wccp group-listen](#)
- [ip wccp redirect exclude in](#)
- [ip wccp redirect out](#)
- [show ip interface](#)
- [show ip wccp](#)
- [show ip wccp detail](#)
- [show ip wccp view](#)

In Cisco IOS Release 12.0(1)T or later, you can search 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.
<i>service-number</i>	Directs the router to remove statistics for a specified web cache service. The number can be from 0 to 99. The reverse proxy service is indicated by a value of 99.

Defaults

No default behavior or values.

Command Modes

EXEC

Command History

Release	Modification
11.1 CA	This command was introduced.
11.2 P	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

The following command removes all statistics associated with the web cache service.

```
clear ip wccp web cache
```

Related Commands

Command	Description
ip wccp	Directs a router to enable or disable the support for a service group.
show ip wccp	Displays global statistics related to the WCCP feature.

ip wccp

To direct a router to enable or disable the support for a cache engine 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-listen access-list] [password [0-7] text]
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.
<i>service-number</i>	The identification number of the Web Cache Communication Protocol (WCCP) service being controlled by a router. The number can be from 0 to 99. The reverse proxy service is indicated by a value of 99.
group-address	(Optional) Directs the router to use a specified multicast IP address for communication with the WCCP service group.
<i>groupaddress</i>	(Optional) A multicast address used by the router to determine which cache engine should receive redirected message.
redirect-list	(Optional) Directs the router to use an access list to control traffic redirected to this service group.
<i>access-list</i>	(Optional) A string (not to exceed 64 characters) that is the name of the access list that determines which traffic is redirected to a cache engine.
group-listen	(Optional) Directs the router to use an access list to determine which cache engines are allowed to participate in the service group.
<i>access-list</i>	(Optional) A string (not to exceed 64 characters) that is the name of the access list that determines which cache engines are allowed to participate in the service group.
password	(Optional) A 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) A value that indicates the HMAC MD5 algorithm that will be used to encrypt the password. This value is generated when an encrypted password is created for a cache engine.
<i>text</i>	(Optional) The password name that will be combined with the HMAC MD5 value to create security for the connection between the router and the cache engine.

Defaults

No default behavior or values.

Command Modes

Global configuration

Command History

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

Usage Guidelines

The command is disabled by default.

Examples

The following example shows a router configured to run WCCP reverse proxy service, using (listening to) the multicast address of 224.1.1.1:

```
ip wccp 99 group-address 224.1.1.1
```

Related Commands

Command	Description
ip wccp group-listen	Configures an interface on a router to enable or disable the reception of IP multicast packets for the WCCP feature.

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.
<i>service-number</i>	The identification number of the cache engine service group being controlled by a router. The number can be from 0 to 99. The reverse proxy service is indicated by a value of 99.

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 a web cache with an address of 224.1.1.100.

```
configure terminal
ip wccp web-cache group-address 224.1.1.100
interface ethernet 0
ip wccp web cache group-listen
```

Related Commands

Command	Description
ip wccp	Directs a router to enable or disable the support for a service group.
ip wccp redirect out	Configures an interface to enable or disable the exclusion of a redirection check for packets that were received on the interface.

ip wccp redirect exclude in

To configure an interface to enable or disable excluding packets received on an interface from being cached, use the **ip wccp redirect exclude in** global configuration command. To disable a router's ability to verify appropriate packets being redirected to a cache engine, 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

Global 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

Related Commands

Command	Description
ip wccp	Directs a router to enable or disable the support for a service group.
ip wccp redirect out	Configures an interface to enable or disable the exclusion of a redirection check for packets that were received on the interface.

ip wccp redirect out

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

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

Syntax Description

<code>web-cache</code>	Enables the web cache service.
<code>service-number</code>	The identification number of the cache engine service group being controlled by a router. The number can be from 0 to 99. For Cisco Cache Engines, the reverse proxy service is indicated by a value of 99.

Defaults

No default behavior or values.

Command Modes

Interface configuration

Command History

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

Usage Guidelines

The “out” keyword is used because in later Cisco IOS software releases, WCCP has the ability to redirect incoming packets as well as outgoing packets.

Examples

The following example shows that reverse proxy packets on Ethernet interface 0 are being redirected to a cache engine.

```
configure terminal
ip wccp 99
interface ethernet 0
ip wccp 99 redirect out
```

Related Commands

Command	Description
ip wccp redirect exclude in	Configures an interface to enable or disable excluding packets received on an interface from being cached.

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 first introduced.
12.0	This command was enhanced.
12.0(3)T	This command was enhanced to include status of 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 running. If the interface hardware is usable, the interface is indicated to be running.

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

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 17.1.1.38/24
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 unreachable 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 1 describes the fields shown in the example.

Table 1 *show ip interface Field Descriptions*

Field	Description
<i>Ethernet3/0 is up</i>	If the interface hardware is usable, the interface is marked “uup.” For an interface to be usable, both the interface hardware and line protocol must be up.
Internet address is	The IP address of the interface.
Broadcast address is	Shows the broadcast address.
Address determined by non-volatile memory	Indicates how the IP address of the interface was determined.
MTU is 1500 bytes	Maximum Transmission Unit (MTU) or the maximum size of packets allowed to be transmitted from the router to a cache engine.
Helper address is not set	Shows a helper address, if one has been set.
Directed broadcast forwarding is enabled	Shows a secondary address, if one has been set.
Outgoing access list is not set	Indicates whether the interface has an outgoing access list set.
Inbound access list is not set	Indicates whether the interface has an incoming access list set.
Proxy ARP is enabled	Specifies the IPSO security level set for this interface.
Security level is default	Specifies the default IPSO security level for this interface.
Split horizon is enabled	Specifies that routing updates sent to a particular neighbor router should not contain information about routes that were learned from that neighbor.
ICMP redirects are always sent	Specifies whether redirects will be sent on this interface.
ICMP unreachable are always sent	Specifies whether pings to determine unreachable nodes will be sent on this interface.
ICMP mask replies are never sent	Specifies Internet Control Message Protocol mask messages that tests node reachability across the network are suppressed.
IP fast switching is enabled	Specifies 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 is disabled	Specifies whether fast switching has been disabled for this interface. It is generally enabled on serial interfaces, such as this one.

Field	Description
IP Optimum switching is enabled	The IP Optimum switching feature has been turned on.
IP multicast fast switching is enabled	The IP multicast fast switching feature has been turned on.
Router Discovery is disabled	Cisco Discovery Protocol has been turned off.
IP output packet accounting is disabled	The output packet counter has been turned off.
IP access violation accounting is disabled	The feature that counts unauthorized access events on the router has been turned off.
TCP/IP header compression is disabled	Indicates whether compression is enabled or disabled.
Probe proxy name replies are disabled	Indicates whether HP Probe proxy name replies are generated.
Gateway Discovery is disabled	The gateway discovery option has been turned off.
Policy routing is disabled	The policy routing option has been turned off.
Network address translation is disabled	The status of the network address translation feature. This field can be enabled or disabled.
WCCP Redirect outbound is enabled	Indicates the status of whether packets received on an interface are redirected to a cache engine. This field can be enabled or disabled.
WCCP Redirect exclude is disabled	Indicates the status of whether packets targeted for an interface will be excluded from being redirected to a cache engine. This field can be enabled or disabled.

Related Commands

Command	Description
show ip wccp detail	Queries the router for information on which other members of a specific service group the router has detected.
show ip wccp	Displays global statistics related to the Web Cache Communication Protocol feature.

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.
<i>service-number</i>	The identification number of the cache engine service group being controlled by a router. The number can be from 0 to 99. For Cisco Cache Engines, the reverse proxy service is indicated by a value of 99.
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
11.2 P	This command was introduced in Cisco IOS Release 11.2 P and Release 11.1 CA.
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 “Packets Redirected” information.

Examples

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

```
show ip wccp

Global WCCP Information:
  Service Name: web-cache:
  Number of Cache Engines:1
  Number of Routers:1
  Total Packets Redirected:213
  Redirect access-list:no_linux
  Total Packets Denied Redirect:88
  Total Packets Unassigned:-none-
  Group access-list:0
  Total Messages Denied to Group:0
```

```

Total Authentication failures:0

Service Name: 1
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 2 describes the fields shown in the example.

Table 2 *show ip wccp Field Descriptions*

Field	Description
<i>Service Name</i>	Indicates which service is detailed.
Number of Cache Engines	Number of Cisco cache engines using the router as their home router.
Number of Routers	The number of routers in the service group.
Total Packets Redirected	Total number of packets redirected by the router.
Redirect access-list	The 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 cache engine. Packets may not be assigned during initial discovery of cache engines or when a cache is dropped from a cluster.
Group access-list	Indicates which cache engine is allowed to connect to the router.
Total Messages Denied to Group	Indicates the number of messages disallowed by the router because they did not meet all the requirements of the service group.
Total Authentication failures	The number of instances where a password did not match

Related Commands

Command	Description
ip wccp	Directs a router to enable or disable the support for a service group.
show ip wccp detail	Queries the router for information on which other members of a specific service group the router has detected.

show ip wccp detail

To query the router for information on which cache engines of a WCCP network the router has detected, use the **show ip wccp detail EXEC** command.

```
show ip wccp {web-cache | service-number} detail
```

Syntax Description

web-cache	Directs the router to display statistics for the web cache service.
<i>service-number</i>	The identification number of the cache engine service group being controlled by a router. The number can be from 0 to 99. For Cisco Cache Engines, the reverse proxy service is indicated by a value of 99.

Defaults

No default behavior or values.

Command Modes

EXEC

Command History

Release	Modification
11.1 CA	This command was introduced.
11.2 P	This command was introduced.
12.0(3)T	This command was expanded to indicate that a router has not had a cache engine mapped to it.

Examples

The following example displays cache engine and Web Cache Communication Protocol (WCCP) router statistics for a particular service group:

```
show ip wccp web-cache detail
```

```

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

WCCP Cache-Engine Information
  IP Address:192.168.88.11
  Protocol Version:2.0
  State:Usable
  Initial Hash Info:AAAAAAAAAAAAAAAAAAAAAAAAAAAA
    AAAAAAAAAAAAAAAAAAAAAAAAAAAAA
  Assigned Hash Info:FFFFFFFFFFFFFFFFFFFFFFFF
    FFFFFFFFFFFFFFFFFFFFFFFFF
  Hash Allotment:256 (100.00%)
  Packets Redirected:21345
  Connect Time:00:13:46

```

Table 3 describes the fields shown in the example.

Table 3 *show ip wccp detail Field Descriptions*

Field	Description
<i>WCCP Router information</i>	The header for the area that contains fields for the IP address and version of WCCP associated with the router connected to the cache engine in the service group.
IP Address	The IP address of the router connected to the cache engine in the service group.
Protocol Version	The version of WCCP being used by the router in the service group.
<i>WCCP Cache-Engine information</i>	Contains fields for information on cache engines.
IP Address	The IP address of the cache engine in the service group.
Protocol Version	The version of WCCP being used by the cache engine in the service group.
State	Indicates whether the cache engine is operating properly and can be contacted by a router and other cache engines in the service group.
Initial Hash Info	The initial state of the hash bucket assignment.
Assigned Hash Info	The current state of the hash bucket assignment.
Hash Allotment	The percent of buckets assigned to the current cache engine. Both a value and a percent figure are displayed.
Packets Redirected	The number of packets that have been redirected to the cache engine.
Connect Time	The amount of time it took for the cache engine to connect to the router.

Related Commands

Command	Description
show ip wccp view	Displays which cache engines in a particular service group have or have not been detected by all other routers to which the current router is connected.
show ip wccp	Displays global statistics related to the WCCP feature.

show ip wccp view

To display which other members of a particular service group have or have not been detected by all other routers to which the current router is connected, use the **show ip wccp view** EXEC command.

```
show ip wccp {web-cache | service-number} view
```

Syntax Description

web-cache	Directs the router to display statistics for the web cache service.
<i>service-number</i>	The identification number of the cache engine service group being controlled by a router. The number can be from 0 to 99. The reverse proxy service is indicated by a value of 99.

Defaults

No default behavior or values.

Command Modes

EXEC

Command History

Release	Modification
11.1 CA	This command was introduced.
11.2 P	This command was introduced.
12.0(3)T	This command was expanded to show a router that does not have a cache engine mapped to it.

Examples

The following sample shows output from the **show ip wccp service 1 view** command:

```
show ip wccp service 1 view
```

```
WCCP Router Informed of:
```

```

192.168.88.10
192.168.88.20

WCCP Cache Engines Visible
192.168.88.11
192.168.88.12

WCCP Cache Engines Not Visible:
-none-

```

If any cache engine is displayed under the WCCP Cache Engines Not Visible field, the router needs to be reconfigured to map the cache engine that is not visible to it. Table 4 describes the fields shown in the example.

Table 4 *show ip wccp view Field Descriptions*

Field	Description
<i>WCCP Routers Informed of</i>	A list of routers detected by the current router.
WCCP Cache Engines Visible	A list of cache engines that are visible to the router and other cache engines in the service group.
WCCP Cache Engines Not Visible	A list cache engines in the service group that are not visible to the router and other cache engines in the service group.

Related Commands

Command	Description
show ip wccp detail	Queries the router for information on which other members of a specific service group the router has detected.
show ip wccp	Displays global statistics related to the Web Cache Communication Protocol feature.

Glossary

Cisco cache engine—A device that stores objects being downloaded from the web for future use by the host.

cache engine cluster—A collection of cache engines that are controlled by one or more routers.

Cisco Express Forwarding (CEF)—A scalable, distributed, Layer 3 switching solution designed to meet performance requirements of the Internet and enterprise networks.

hash buckets—A pool of IP addresses to which individual servers are mapped.

reverse proxy service—A service that duplicates network content and distributes it across a small number of destination World Wide Web servers.

service group—A subset of cache engines within a cluster and routers connected to the cluster that are running the same service, either web cache or reverse proxy.

view—A list of addresses of the cache engines in the service group.

WCCP-Version 1—A protocol that allows you to use a cache engine to handle World Wide Web traffic, thus reducing transmission costs and downloading time. The specified services can be mapped to multiple routers. The cache engines in the cluster can be mapped to only one router.

WCCPv2—A protocol that allows you to use a cache engine to handle World Wide Web traffic in a similar manner to WCCP-Version 1. Specified services can be mapped to multiple routers.

web cache service—A service that handles large collections of destination World Wide Web servers with various IP addresses throughout the network. The network content, rather than being duplicated across all cache engines, is assigned to a particular cache engine.