Configuring WCCP

The Web Cache Communication Protocol (WCCP) is a Cisco-developed content-routing technology that intercepts IP packets and redirects those packets to a destination other than that specified in the IP packet. Typically the packets are redirected from their destination web server on the Internet to a content engine that is local to the client. In some WCCP deployment scenarios, redirection of traffic may also be required from the web server to the client. WCCP enables you to integrate content engines into your network infrastructure.

Cisco IOS Release 12.1 and later releases allow the use of either WCCP Version 1 (WCCPv1) or Version 2 (WCCPv2).

The tasks in this document assume that you have already configured content engines on your network. For specific information on hardware and network planning associated with Cisco Content Engines and WCCP, see the Cisco Content Engines documentation at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/webscale/content/index.htm

Finding Feature Information

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

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

Prerequisites for WCCP

- To use WCCP, IP must be configured on the interface connected to the Internet and another interface must be connected to the content engine.
- The interface connected to the content engine must be a Fast Ethernet or Gigabit Ethernet interface.

Restrictions for WCCP

General

The following limitations apply to Web Cache Communication Protocol Version1 (WCCPv1) and WCCP Version 2 (WCCPv2):

- WCCP works only with IPv4 networks.
- WCCP bypasses Network Address Translation (NAT) when Cisco Express Forwarding is enabled.

WCCPv1

- WCCPv1 supports the redirection of HTTP (TCP port 80) traffic only.
- WCCPv1 does not allow multiple routers to be attached to a cluster of content engines.

WCCPv2

- WCCP works only with IPv4 networks.
- For routers servicing a multicast cluster, the Time To Live (TTL) value must be set at 15 or fewer.
- Service groups can comprise up to 32 content engines and 32 routers.
- All content engines in a cluster must be configured to communicate with all routers servicing the cluster.
- Multicast addresses must be from 224.0.0.0 to 239.255.255.255.

WCCP VRF Support

- In Cisco IOS Release 12.2(33)SRE, this feature is supported only on Cisco 7200 NPE-G2 and Cisco 7304-NPE-G100 routers.

WCCP Layer 2 Forwarding and Return

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

The client device and a WAE device or a cache engine cannot be connected to a Cisco device with the same interface and WCCP redirect configured on the interface.

The following two configurations are supported:

- For WCCP Layer 2 return, the client and WAE are connected to a Cisco device with same interface and WCCP output is configured on the interface.
- For WCCP Layer 2 return, the client and WAE are connected to a Cisco device with same physical interface but in different VLANs and sub-interfaces.

Cisco 7600 Series Routers Access Control Lists

When WCCP is using the mask assignment, any redirect list is merged with the mask information from the appliance and the resulting merged ACL is passed down to the Cisco 7600 series router hardware. Only Permit or Deny ACL entries from the redirect list in which the protocol is IP or exactly matches the service group protocol are merged with the mask information from the appliance.

The following restrictions apply to the redirect-list ACL:

- The ACL must be an IPv4 simple or extended ACL.
- Only individual source or destination port numbers may be specified; port ranges cannot be specified.
- The only valid matching criteria in addition to individual source or destination port numbers are **dscp** or **tos**.
- The use of **fragments**, **time-range**, or **options** keywords, or any TCP flags is not permitted.
- If the redirect ACL does not meet the restrictions shown, the system will log the following error message:

```
WCCP-3-BADACE: Service <service group>, invalid access-list entry (seq:<sequence>,
reason:<reason>)
```

- WCCP continues to redirect packets, but the redirection is carried out in software until the access list is adjusted.

Information About WCCP

WCCP Overview

WCCP uses Cisco Content Engines (or other content engines running WCCP) to localize traffic patterns in the network, enabling content requests to be fulfilled locally. Traffic localization reduces transmission costs and download time.

WCCP enables routing platforms to transparently redirect content requests. With transparent redirection, users can fulfill content requests locally without configuring their browsers to use a web proxy. Instead, they can use the target URL to request content, and have their requests automatically redirected to a content engine. The word "transparent" in this case means that the end user does not know that a requested file (such as a web page) came from the content engine instead of from the originally specified server.

A content engine receiving a request attempts to service it from its own local cache. If the requested information is not present, the content engine issues its own request to the originally targeted server to get the required

information. A content engine retrieving the requested information forwards it to the requesting client and caches it to fulfill future requests, thus maximizing download performance and substantially reducing transmission costs.

WCCP enables a series of content engines, called a content engine cluster, to provide content to a router or multiple routers. Network administrators can easily scale their content engines to manage heavy traffic loads through these clustering capabilities. Cisco clustering technology enables each cluster member to work in parallel, resulting in linear scalability. Clustering content engines greatly improves the scalability, redundancy, and availability of your caching solution. You can cluster up to 32 content engines to scale to your desired capacity.

Layer 2 Forwarding Redirection and Return

WCCP uses either generic routing encapsulation (GRE) or Layer 2 (L2) to redirect or return IP traffic. When WCCP forwards traffic via GRE, the redirected packets are encapsulated within a GRE header. The packets also have a WCCP redirect header. When WCCP forwards traffic using L2, the original MAC header of the IP packet is overwritten and replaced with the MAC header for the WCCP client.

Using L2 as a forwarding method allows direct forwarding to the content engine without further lookup. Layer 2 redirection requires that the router and content engines are directly connected, that is, on the same IP subnetwork.

When WCCP returns traffic via GRE, the returned packets are encapsulated within a GRE header. The destination IP address is the address of the router and the source address is the address of the WCCP client. When WCCP returns traffic via L2, the original IP packet is returned without any added header information. The router to which the packet is returned will recognize the source of the packet and prevent redirection.

The WCCP redirection method does not have to match the return method.

L2 forwarding, return, or redirection are typically used for hardware-accelerated platforms. Depending on your release, L2 forwarding, return, and redirection can also be used for software-switching platforms.

For content engines running Application and Content Networking System (ACNS) software, use the **wccp custom-web-cache** command with the **l2-redirect** keyword to configure L2 redirection. For content engines running Cisco Wide Area Application Services (WAAS) software, use the **wccp tcp-promiscuous** command with the **l2-redirect** keyword to configure L2 redirection.

Note Before configuring a GRE tunnel, configure a loopback interface (that is not attached to a VRF) with an IP address so that the internally created tunnel interface is enabled for IPv4 forwarding by unnumbering itself to this dummy loopback interface. You do not need to configure a loopback interface if the system has at least one interface that is not attached to a VRF and that is configured with an IPv4 address.

For information about Cisco ACNS commands used to configure Cisco Content Engines, see the Cisco ACNS Software Command Reference.

For more information about WAAS commands used to configure Cisco Content Engines, see the Cisco Wide Area Application Services Command Reference.

WCCP Mask Assignment

The WCCP Mask Assignment feature enables mask assignment as the load-balancing method (instead of the default hash assignment method) for a WCCP service.

For content engines running Application and Content Networking System (ACNS) software, use the **wccp custom-web-cache** command with the **mask-assign** keyword to configure mask assignment. For content engines running Cisco Wide Area Application Services (WAAS) software, use the **wccp tcp-promiscuous** command with the **mask-assign** keyword to configure mask assignment.

For information about Cisco ACNS commands used to configure Cisco Content Engines, see the Cisco ACNS Software Command Reference.

For more information about WAAS commands used to configure Cisco Content Engines, see the Cisco Wide Area Application Services Command Reference.

Hardware Acceleration

Cisco 7600 series routers provide WCCP Layer 2 Policy Feature Card (PFC) redirection hardware acceleration. Hardware acceleration allows Cisco Content Engines to perform a L2 MAC address rewrite redirection method when directly connected to a compatible router.

Redirection processing is accelerated in the routing hardware, which is more efficient than L3 redirection with Generic Routing Encapsulation (GRE). L2 redirection takes place on the router, and is not visible to the Multilayer Switch Feature Card (MSFC). The WCCP L2 PFC redirection feature requires no configuration on the MSFC. The **show ip wccp** {*service-number* | **web-cache**} **detail** command displays which redirection method is in use for each content engine.

In order for the router to make complete use of hardware redirection, the content engine must be configured with L2 redirection and mask assignment.

Use the **ip wccp web-cache accelerated** command on hardware-based platforms to enforce the use of L2 redirection and mask assignment. Using this command configures the router to form a service group and redirect packets with an appliance only if the appliance is configured for L2 and mask assignment.

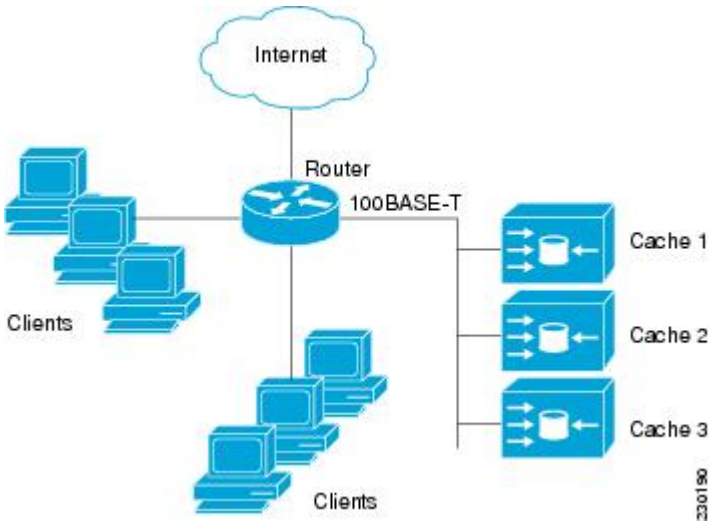
The following guidelines apply to WCCP Layer 2 PFC redirection:

- The WCCP Layer 2 PFC redirection feature sets the IP flow mask to full-flow mode.
- You can configure the Cisco Cache Engine software Release 2.2 or later releases to use the WCCP Layer 2 PFC redirection feature.
- L2 redirection takes place on the PFC and is not visible to the MSFC. The **show ip wccp** {*service-number* | **web-cache**} **detail** command on the MSFC displays statistics for only the first packet of an L2 redirected flow, which provides an indication of how many flows, rather than packets, are using L2 redirection. You can view information about L2 redirected flows by entering the **show platform flow ip** command. The PFC3 provides hardware acceleration for GRE. If you use WCCP Layer 3 redirection with GRE, there is hardware support for encapsulation, but the PFC3 does not provide hardware support for decapsulation of WCCP GRE traffic.

WCCPv1 Configuration

With WCCPv1, only a single router services a cluster. In this scenario, this router is the device that performs all the IP packet redirection. The figure below illustrates the WCCPv1 configuration.

Figure 1: WCCPv1 Configuration



Content is not duplicated on the content engines. The benefit of using multiple content engines is that you can scale a caching solution by clustering multiple physical content engines to appear as one logical cache.

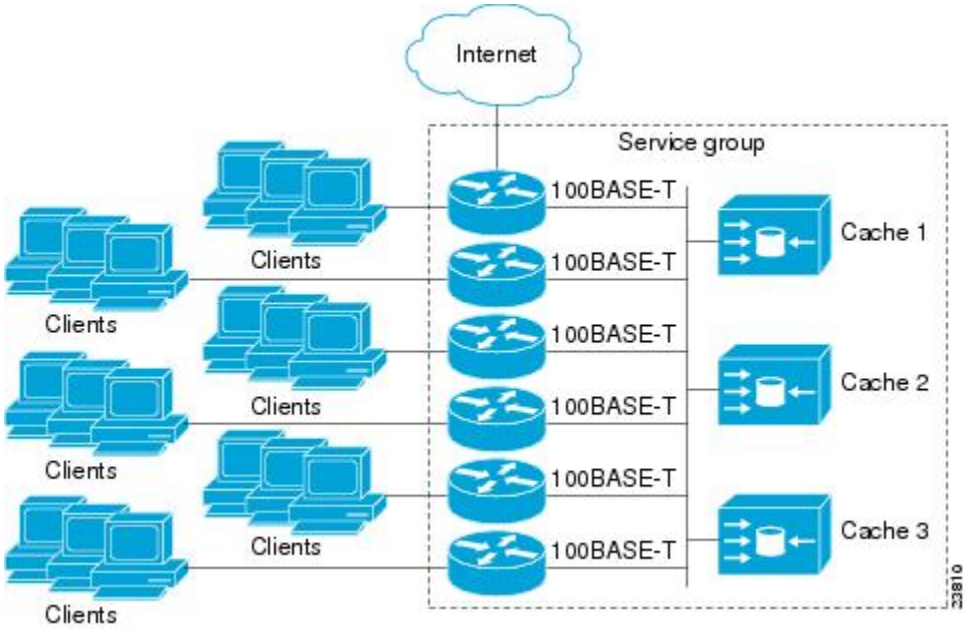
The following sequence of events details how WCCPv1 configuration works:

1. Each content engine is configured by the system administrator with the IP address of the control router. Up to 32 content engines can connect to a single control router.
2. The content engines send their IP addresses to the control router using WCCP, indicating their presence. Routers and content engines communicate to each other via a control channel; this channel is based on UDP port 2048.
3. This information is used by the control router to create a cluster view (a list of caches in the cluster). This view is sent to each content engine in the cluster, essentially making all the content engines aware of each other. A stable view is established after the membership of the cluster remains the same for a certain amount of time.
4. When a stable view has been established, one content engine is elected as the lead content engine. (The lead is defined as the content engine seen by all the content engines in the cluster with the lowest IP address). This lead content engine uses WCCP to indicate to the control router how IP packet redirection should be performed. Specifically, the lead content engine designates how redirected traffic should be distributed across the content engines in the cluster.

WCCPv2 Configuration

Multiple routers can use WCCPv2 to service a content engine cluster. In WCCPv1, only one router could redirect content requests to a cluster. The figure below illustrates a sample configuration using multiple routers.

Figure 2: Cisco Content Engine Network Configuration Using WCCPv2



The subset of content engines within a cluster and routers connected to the cluster that are running the same service is known as a service group. Available services include TCP and UDP redirection.

In WCCPv1, the content engines were configured with the address of the single router. WCCPv2 requires that each content engine be aware of all the routers in the service group. To specify the addresses of all the routers in a service group, you must choose one of the following methods:

- Unicast—A list of router addresses for each of the routers in the group is configured on each content engine. In this case the address of each router in the group must be explicitly specified for each content engine during configuration.
- Multicast—A single multicast address is configured on each content engine. In the multicast address method, the content engine sends a single-address notification that provides coverage for all routers in the service group. For example, a content engine could indicate that packets should be sent to a multicast address of 224.0.0.100, which would send a multicast packet to all routers in the service group configured for group listening using WCCP (see the **ip wccp group-listen** or the **ipv6 wccp group-listen** interface configuration command for details).

The multicast option is easier to configure because you need only specify a single address on each content engine. This option also allows you to add and remove routers from a service group dynamically, without needing to reconfigure the content engines with a different list of addresses each time.

The following sequence of events details how WCCPv2 configuration works:

1. Each content engine is configured with a list of routers.
2. Each content engine announces its presence and a list of all routers with which it has established communications. The routers reply with their view (list) of content engines in the group.
3. When the view is consistent across all content engines in the cluster, one content engine is designated as the lead and sets the policy that the routers need to deploy in redirecting packets.

WCCPv2 Support for Services Other Than HTTP

WCCPv2 allows redirection of traffic other than HTTP (TCP port 80 traffic), including a variety of UDP and TCP traffic. WCCPv2 supports the redirection of packets intended for other ports, including those used for proxy-web cache handling, File Transfer Protocol (FTP) caching, FTP proxy handling, web caching for ports other than 80, and Real Audio, video, and telephony applications.

To accommodate the various types of services available, WCCPv2 introduced the concept of multiple *service groups*. Service information is specified in the WCCP configuration commands using dynamic services identification numbers (such as 98) or a predefined service keyword (such as **web-cache**). This information is used to validate that service group members are all using or providing the same service.

The content engines in a service group specify traffic to be redirected by protocol (TCP or UDP) and up to eight source or destination ports. Each service group has a priority status assigned to it. The priority of a dynamic service is assigned by the content engine. The priority value is in the range of 0 to 255 where 0 is the lowest priority. The predefined web-cache service has an assigned priority of 240.

WCCPv2 Support for Multiple Routers

WCCPv2 allows multiple routers to be attached to a cluster of cache engines. The use of multiple routers in a service group allows for redundancy, interface aggregation, and distribution of the redirection load. WCCPv2 supports up to 32 routers per service group. Each service group is established and maintained independently.

WCCPv2 MD5 Security

WCCPv2 provides optional authentication that enables you to control which routers and content engines become part of the service group using passwords and the Hashed Message Authentication Code—Message Digest (HMAC MD5) standard. Shared-secret MD5 one-time authentication (set using the **ip wccp** [**password** [**0** | **7**] *password*] global configuration command) enables messages to be protected against interception, inspection, and replay.

WCCPv2 Web Cache Packet Return

If a content engine is unable to provide a requested object it has cached due to error or overload, the content engine will return the request to the router for onward transmission to the originally specified destination server. WCCPv2 provides a check on packets that determines which requests have been returned from the content engine unserviced. Using this information, the router can then forward the request to the originally targeted server (rather than attempting to resend the request to the content engine cluster). This process provides error handling transparency to clients.

Typical reasons why a content engine would reject packets and initiate the packet return feature include the following:

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

WCCPv2 Load Distribution

WCCPv2 can be used to adjust the load being offered to individual content engines to provide an effective use of the available resources while helping to ensure high quality of service (QoS) to the clients. WCCPv2 allows the designated content engine to adjust the load on a particular content engine and balance the load across the content engines in a cluster. WCCPv2 uses three techniques to perform load distribution:

- Hot spot handling—Allows an individual hash bucket to be distributed across all the content engines. Prior to WCCPv2, information from one hash bucket could go to only one content engine.
- Load balancing—Allows the set of hash buckets assigned to a content engine to be adjusted so that the load can be shifted from an overwhelmed content engine to other members that have available capacity.
- Load shedding—Enables the router to selectively redirect the load to avoid exceeding the capacity of a content engine.

The use of these hashing parameters prevents one content engine from being overloaded and reduces the potential for bottlenecking.

WCCP VRF Support

The WCCP VRF Support feature enhances the WCCPv2 protocol by implementing support for virtual routing and forwarding (VRF).

The WCCP VRF Support feature allows service groups to be configured on a per-VRF basis in addition to those defined globally.

Along with the service identifier, the VRF of WCCP protocol packets arriving at the router is used to associate cache-engines with a configured service group.

The same VRF must have the interface on which redirection is applied, the interface which is connected to cache engine, and the interface on which the packet would have left if it had not been redirected.

WCCP VRF Tunnel Interfaces

In releases that support the WCCP VRF Support feature, the use of GRE redirection results in the creation of new tunnel interfaces. You can display these tunnel interfaces by entering the **show ip interface brief | include tunnel** command:

```
Device# show ip interface brief | include tunnel

Tunnel0                172.16.0.1      YES unset  up                    up
Tunnel1                172.16.0.1      YES unset  up                    up
Tunnel2                172.16.0.1      YES unset  up                    up
Tunnel3                172.16.0.1      YES unset  up                    up
Device#
```

The tunnel interfaces are automatically created in order to process outgoing GRE-encapsulated traffic for WCCP. The tunnel interfaces appear when a content engine connects and requests GRE redirection. The tunnel interfaces are not created directly by WCCP, but are created indirectly via a tunnel application programming interface (API). WCCP does not have direct knowledge of the tunnel interfaces, but can redirect packets to them, resulting in the appropriate encapsulation being applied to the packets. After the appropriate encapsulation is applied, the packet is then sent to the content engine.

Note The tunnel interfaces are not used to connect with incoming WCCP GRE return packets.

One tunnel is created for each service group that is using GRE redirection. One additional tunnel is created to provide an IP address that allows the other tunnel group interfaces to be unnumbered but still enabled for IPv4.

You can confirm the connection between the tunnels and WCCP by entering the **show tunnel groups wccp** command:

```
Device# show tunnel groups wccp

WCCP : service group 0 in "Default", ver v2, assgnmnt: hash-table
   intf: Tunnel0, locally sourced
 WCCP : service group 317 in "Default", ver v2, assgnmnt: hash-table
   intf: Tunnel3, locally sourced
 WCCP : service group 318 in "Default", ver v2, assgnmnt: hash-table
   intf: Tunnel2, locally sourced
```

You can display additional information about each tunnel interface by entering the **show tunnel interface** *interface-number* command:

```
Device# show tunnel interface t0

Tunnel0
   Mode:multi-GRE/IP, Destination UNKNOWN, Source 10.1.1.80
   Application ID 2: WCCP : service group 0 in "Default", ver v2, assgnmnt: hash-table
   Linestate - current up
   Internal linestate - current up, evaluated up

Device# show tunnel interface t1

Tunnel1
   Mode:multi-GRE/IP, Destination UNKNOWN, Source 172.16.0.1
   Application ID 2: unspecified
   Linestate - current up
   Internal linestate - current up, evaluated up

Device# show tunnel interface t2

Tunnel2
   Mode:multi-GRE/IP, Destination UNKNOWN, Source 10.1.1.80
   Application ID 2: WCCP : service group 318 in "Default", ver v2, assgnmnt: hash-table
   Linestate - current up
   Internal linestate - current up, evaluated up

Device# show tunnel interface t3

Tunnel3
   Mode:multi-GRE/IP, Destination UNKNOWN, Source 10.1.1.80
   Application ID 2: WCCP : service group 317 in "Default", ver v2, assgnmnt: hash-table
   Linestate - current up
   Internal linestate - current up, evaluated up
Device#
```

Note that the service group number shown in the examples is the internal tunnel representation of the WCCP service group number. Group 0 is the web-cache service. To determine the dynamic services, subtract 256 from the displayed service group number to convert to the WCCP service group number. For interfaces that are used for redirection, the source address shown is the WCCP router ID.

You can display information about the connected content engines and encapsulation, including software packet counters, by entering the **show adjacency** [*tunnel-interface*] [**encapsulation**] [**detail**] [**internal**] command:

```
Device# show adjacency t0

Protocol Interface                 Address
IP       Tunnel0                   10.1.1.82(3)

Device# show adjacency t0 encapsulation

Protocol Interface                 Address
IP       Tunnel0                   10.1.1.82(3)
  Encap length 28
  4500000000000000FF2F7D2B1E010150
  1E0101520000883E00000000
  Provider: TUNNEL
  Protocol header count in macstring: 3
    HDR 0: ipv4
       dst: static, 10.1.1.82
       src: static, 10.1.1.80
      prot: static, 47
       ttl: static, 255
        df: static, cleared
      per packet fields: tos ident tl chksm
    HDR 1: gre
      prot: static, 0x883E
      per packet fields: none
    HDR 2: wccpv2
       dyn: static, cleared
      sgID: static, 0
      per packet fields: alt altB priB

Device# show adjacency t0 detail

Protocol Interface                 Address
IP       Tunnel0                   10.1.1.82(3)
                                   connectionid 1
                                   0 packets, 0 bytes
                                   epoch 0
                                   sourced in sev-epoch 1
                                   Encap length 28
                                   4500000000000000FF2F7D2B1E010150
                                   1E0101520000883E00000000
                                   Tun endpt
                                   Next chain element:
                                    IP adj out of Ethernet0/0, addr 10.1.1.82
Device# show adjacency t0 internal

Protocol Interface                 Address
IP       Tunnel0                   10.1.1.82(3)
                                   connectionid 1
                                   0 packets, 0 bytes
                                   epoch 0
                                   sourced in sev-epoch 1
                                   Encap length 28
                                   4500000000000000FF2F7D2B1E010150
                                   1E0101520000883E00000000
                                   Tun endpt
                                   Next chain element:
                                    IP adj out of Ethernet0/0, addr 10.1.1.82
                                    parent oce 0x4BC76A8
                                    frame originated locally (Null0)
                                   L3 mtu 17856
```

```
                                        Flags (0x2808C4)
                                        Fixup enabled (0x40000000)
                                              GRE WCCP redirection
                                        HWIDB/IDB pointers 0x55A13E0/0x35F5A80
                                        IP redirect disabled
                                        Switching vector: IPv4 midchain adj oce
                                        IP Tunnel stack to 10.1.1.82 in Default (0x0)
                                         nh tracking enabled: 10.1.1.82/32
                                         IP adj out of Ethernet0/0, addr 10.1.1.82
                                        Adjacency pointer 0x4BC74D8
                                        Next-hop 10.1.1.82
Device#
```

WCCP Bypass Packets

WCCP intercepts IP packets and redirects those packets to a destination other than the destination that is specified in the IP header. Typically the packets are redirected from a web server on the Internet to a web cache that is local to the destination.

Occasionally a web cache cannot manage the redirected packets appropriately and returns the packets unchanged to the originating router. These packets are called bypass packets and are returned to the originating router using either Layer 2 forwarding without encapsulation (L2) or encapsulated in generic routing encapsulation (GRE). The router decapsulates and forwards the packets normally. The VRF associated with the ingress interface (or the global table if there is no VRF associated) is used to route the packet to the destination.

GRE is a tunneling protocol developed by Cisco that encapsulates packet types from a variety of protocols inside IP tunnels, creating a virtual point-to-point link over an IP network.

WCCP Closed Services and Open Services

In applications where packets are intercepted and redirected by a Cisco IOS router to external WCCP client devices, it may be necessary to block the packets for the application when a WCCP client device is not available. This blocking is achieved by configuring a WCCP closed service. When a WCCP service is configured as closed, the packets that fulfill the services, but do not have an active client device, are discarded.

By default, WCCP operates as an open service, wherein communication between clients and servers proceeds normally in the absence of an intermediary device.

The **ip wccp service-list** or the **ipv6 wccp service-list** command can be used for both closed-mode and open-mode services. Use the **service-list** keyword and *service-access-list* argument to register an application protocol type or port number. Use the **mode** keyword to select an open or closed service.

WCCP Outbound ACL Check

When WCCP is enabled for redirection on an ingress interface, the packets are redirected by WCCP and instead egress on an interface other than the destination that is specified in the IP header. The packets are still subject to ACLs configured on the ingress interface. However, redirection can cause the packets to bypass the ACL configured on the original egress interface. Packets that would have been dropped because of the ACL configured on the original egress interface can be sent out on the redirect egress interface, which poses a possible security problem. Enabling the WCCP Outbound ACL check feature ensures that redirected packets are subject to any ACL conditions configured on the original egress interface.

WCCP Service Groups

WCCP is a component of Cisco IOS software that redirects traffic with defined characteristics from its original destination to an alternative destination. The typical application of WCCP is to redirect traffic bound for a remote web server to a local web cache to improve response time and optimize network resource usage.

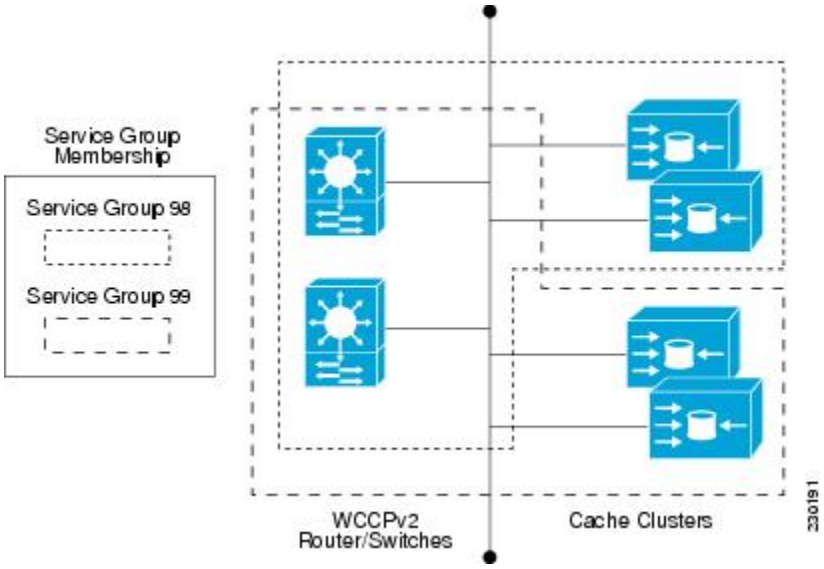
The nature of the selected traffic for redirection is defined by service groups (see figure below) specified on content engines and communicated to routers by using WCCP. The maximum number of service groups allowed across all VRFs is 256.

WCCPv2 supports up to 32 routers per service group. Each service group is established and maintained independently.

WCCPv2 uses service groups based on logical redirection services, deployed for intercepting and redirecting traffic. The standard service is web cache, which intercepts TCP port 80 (HTTP) traffic and redirects that traffic to the content engines. This service is referred to as a *well-known service*, because the characteristics of the web cache service are known by both the router and content engines. A description of a well-known service is not required beyond a service identification. To specify the standard web cache service, use the **ip wccp** or the **ipv6 wccp** command with the **web-cache** keyword.

Note More than one service can run on a router at the same time, and routers and content engines can be part of multiple service groups at the same time.

Figure 3: WCCP Service Groups



The dynamic services are defined by the content engines; the content engine instructs the router which protocol or ports to intercept, and how to distribute the traffic. The router itself does not have information on the characteristics of the dynamic service group's traffic, because this information is provided by the first content engine to join the group. In a dynamic service, up to eight ports can be specified within a single protocol.

Cisco Content Engines, for example, use dynamic service 99 to specify a reverse-proxy service. However, other content engine devices may use this service number for some other service.

WCCP—Check All Services

An interface may be configured with more than one WCCP service. When more than one WCCP service is configured on an interface, the precedence of a service depends on the relative priority of the service compared to the priority of the other configured services. Each WCCP service has a priority value as part of its definition. When an interface is configured with more than one WCCP service, the precedence of the packets is matched against service groups in priority order.

Note The priority of a WCCP service group cannot be configured via Cisco IOS software.

With the **ip wccp check services all** or the **ipv6 wccp check services all** command, WCCP can be configured to check all configured services for a match and perform redirection for those services if appropriate. The caches to which packets are redirected can be controlled by a redirect ACL and by the service priority. The **ip wccp check services all** commands must be configured at global level to support multiple WCCP services.

If no WCCP services are configured with a redirect ACL, the services are considered in priority order until a service is found that matches the IP packet. If no services match the packet, the packet is not redirected. If a service matches the packet and the service has a redirect ACL configured, then the IP packet will be checked against the ACL. If the packet is rejected by the ACL, the packet will not be passed down to lower priority services unless the **ip wccp check services all** or the **ipv6 wccp check services all** command is configured. When the **ip wccp check services all** or the **ipv6 wccp check services all** command is configured, WCCP will continue to attempt to match the packet against any remaining lower priority services configured on the interface.

WCCP Interoperability with NAT

To redirect traffic using WCCP to a router running WAAS software that is also configured with NAT, enable the **ip nat inside** or the **ipv6 nat inside** command on the WAAS interface. If you are not able to configure the **ip nat inside** or the**ipv6 nat inside** command on the WAAS interface, disable Cisco Express Forwarding. You must also update the WCCP redirect ACL to include a private address to ensure that pretranslated traffic is redirected.

WCCP Troubleshooting Tips

CPU usage may be very high when WCCP is enabled. The WCCP counters enable a determination of the bypass traffic directly on the router and can indicate whether the cause is high CPU usage due to enablement of WCCP. In some situations, 10 percent bypass traffic may be normal; in other situations, 10 percent may be high. However, any figure above 25 percent should prompt a closer investigation of what is occurring in the web cache.

If the counters suggest that the level of bypass traffic is high, the next step is to examine the bypass counters in the content engine and determine why the content engine is choosing to bypass the traffic. You can log in to the content engine console and use the CLI to investigate further. The counters allow you to determine the percent of traffic being bypassed.

You can use the **clear ipv6 wccp***service-id* command to remove the IPv6 WCCP statistics (counts) maintained on the router for a particular service.

You can use the **clear wccp** command to remove all (IPv4 and IPv6) WCCP statistics (counts) maintained on the router for a particular service.

You can use the **show ipv6 wccp** command to display the IPv6 WCCP global statistics (counts).

You can use the **show wccp** command to display all (IPv4 and IPv6) WCCP global statistics (counts).

How to Configure WCCP

The following configuration tasks assume that you have already installed and configured the content engines you want to include in your network. You must configure the content engines in the cluster before configuring WCCP functionality on your routers or switches. Refer to the Cisco Cache Engine User Guide for content engine configuration and setup tasks.

Configuring WCCP

Perform this task to configure WCCP.

Until you configure a WCCP service using the **ip wccp**{**web-cache** | *service-number*} global configuration command, WCCP is disabled on the device. The first use of a form of the **ip wccp** command enables WCCP. By default WCCPv2 is used for services, but you can use WCCPv1 functionality instead. To change the running version of WCCP from Version 2 to Version 1, or to return to WCCPv2 after an initial change, use the **ip wccp version** command in global configuration mode.

If a function is not allowed in WCCPv1, an error prompt will be printed to the screen. For example, if WCCPv1 is running on the device and you try to configure a dynamic service, the following message will be displayed: "WCCP V1 only supports the web-cache service." The **show ip wccp** EXEC command will display the WCCP protocol version number that is running on your device.

Use the **ip wccp web-cache password** command to set a password for a device and the content engines in a service group. MD5 password security requires that each device and content engine that wants to join a service group be configured with the service group password. The password must be up to eight characters in length. Each content engine or device in the service group will authenticate the security component in a received WCCP packet immediately after validating the WCCP message header. Packets failing authentication will be discarded.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip wccp version** {**1** | **2**}
4. **ip wccp** {**web-cache** | *service-number*} [**group-address** *multicast-address*] [**redirect-list** *access-list*] [**group-list** *access-list*] [**password** *password* [**0** | **7**]]
5. **interface** *type number*
6. **ip wccp** {**web-cache** | *service-number*} **redirect** {**in** | **out**}
7. **exit**
8. **interface** *type number*
9. **ip wccp redirect exclude in**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable**	Enables privileged EXEC mode.

	Command or Action	Purpose
	Example: `Device> enable`	• Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**ip wccp version** {**1** | **2**} **Example:** `Device(config)# ip wccp version 2`	Specifies which version of WCCP to configure on a device. • WCCPv2 is the default running version.
Step 4	**ip wccp** {**web-cache** | *service-number*} [**group-address** *multicast-address*] [**redirect-list** *access-list*] [**group-list** *access-list*] [**password** *password* [**0** | **7**]] **Example:** `Device(config)# ip wccp web-cache password pwd`	Specifies a web-cache or dynamic service to enable on a device, specifies the IP multicast address used by the service group, specifies any access lists to use, specifies whether to use MD5 authentication, and enables the WCCP service. • **Note** The password length must not exceed 8 characters.
Step 5	**interface** *type number* **Example:** `Device(config)# interface Gigabitethernet 0/0`	Targets an interface number for which the web cache service will run, and enters interface configuration mode.
Step 6	**ip wccp** {**web-cache** | *service-number*} **redirect** {**in** | **out**} **Example:** `Device(config-if)# ip wccp web-cache redirect in`	Enables packet redirection on an outbound or inbound interface using WCCP. • As indicated by the **out** and **in** keyword options, redirection can be specified for outbound interfaces or inbound interfaces.
Step 7	**exit** **Example:** `Device(config-if)# exit`	Exits interface configuration mode.
Step 8	**interface** *type number* **Example:** `Device(config)# interface GigabitEthernet 0/2/0`	Targets an interface number on which to exclude traffic for redirection, and enters interface configuration mode.
Step 9	**ip wccp redirect exclude in** **Example:** `Device(config-if)# ip wccp redirect exclude in`	(Optional) Excludes traffic on the specified interface from redirection.

Configuring Closed Services

Perform this task to specify the number of service groups for WCCP, to configure a service group as a closed or open service, and to optionally specify a check of all services.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. Enter one of the following commands:
   - **ip wccp** [**vrf** *vrf-name*] *service-number* [**service-list** *service-access-list* **mode** {**open** | **closed**}]
   - or
   - **ip wccp** [**vrf** *vrf-name*] **web-cache mode** {**open** | **closed**}
4. **ip wccp check services all**
5. **ip wccp** [**vrf** *vrf-name*] {**web-cache** | *service-number*}
6. **exit**

DETAILED STEPS

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

Step 3	Enter one of the following commands:
	• **ip wccp** [**vrf** *vrf-name*] *service-number* [**service-list** *service-access-list* **mode** {**open** | **closed**}]
	• or
	• **ip wccp** [**vrf** *vrf-name*] **web-cache mode** {**open** | **closed**}
	Example:
	`Device(config)# ip wccp 90 service-list 120 mode closed`
	or
	`Device(config)# ip wccp web-cache mode closed`
		Configures a dynamic WCCP service as closed or open.
		or
		Configures a web-cache service as closed or open.
		Note When configuring the web-cache service as a closed service, you cannot specify a service access list.
		Note When configuring a dynamic WCCP service as a closed service, you must specify a service access list.

Step 4	**ip wccp check services all** **Example:**	(Optional) Enables a check of all WCCP services.

	Command or Action	Purpose
	`Device(config)# ip wccp check services all`	• Use this command to configure WCCP to check the other configured services for a match and perform redirection for those services if appropriate. The caches to which packets are redirected can be controlled by the redirect ACL and not just the service description. **Note** The **ip wccp check services all** command is a global WCCP command that applies to all services and is not associated with a single service.
Step 5	**ip wccp** [**vrf** *vrf-name*] {**web-cache** | *service-number*} **Example:** `Device(config)# ip wccp 201`	Specifies the WCCP service identifier. • You can specify the standard web-cache service or a dynamic service number from 0 to 255. • The maximum number of services that can be specified is 256.
Step 6	**exit** **Example:** `Device(config)# exit`	Exits to privileged EXEC mode.

Registering a Router to a Multicast Address

If you decide to use the multicast address option for your service group, you must configure the router to listen for the multicast broadcasts on an interface.

For network configurations where redirected traffic needs to traverse an intervening router, the router being traversed must be configured to perform IP multicast routing. You must configure the following two components to enable traversal over an intervening router:

- Enable IP multicast routing using the **ip multicast-routing** global configuration command.
- Enable the interfaces to which the cache engines will connect to receive multicast transmissions using the **ip wccp group-listen** interface configuration command.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip multicast-routing** [**vrf** *vrf-name*] [**distributed**]
4. **ip wccp** [**vrf** *vrf-name*] {**web-cache** | *service-number*} **group-address** *multicast-address*
5. **interface** *type number*
6. **ip pim** {**sparse-mode** | **sparse-dense-mode** | **dense-mode** [**proxy-register** {**list** *access-list* | **route-map** *map-name*}]}
7. **ip wccp** [**vrf** *vrf-name*] {**web-cache** | *service-number*} **group-listen**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**ip multicast-routing** [**vrf** *vrf-name*] [**distributed**] **Example:** `Device(config)# ip multicast-routing`	Enables IP multicast routing.
Step 4	**ip wccp** [**vrf** *vrf-name*] {**web-cache** | *service-number*} **group-address** *multicast-address* **Example:** `Device(config)# ip wccp 99 group-address 239.1.1.1`	Specifies the multicast address for the service group.
Step 5	**interface** *type number* **Example:** `Device(config)# interface ethernet 0/0`	Enables the interfaces to which the content engines will connect to receive multicast transmissions for which the web cache service will run, and enters interface configuration mode.
Step 6	**ip pim** {**sparse-mode** | **sparse-dense-mode** | **dense-mode** [**proxy-register** {**list** *access-list* | **route-map** *map-name*}]} **Example:** `Device(config-if)# ip pim dense-mode`	(Optional) Enables Protocol Independent Multicast (PIM) on an interface. **Note** To ensure correct operation of the **ip wccp group-listen** command on Cisco 7600 series routers, you must enter the **ip pim** command in addition to the **ip wccp group-listen** command.
Step 7	**ip wccp** [**vrf** *vrf-name*] {**web-cache** | *service-number*} **group-listen** **Example:** `Device(config-if)# ip wccp 99 group-listen`	Configures an interface to enable or disable the reception of IP multicast packets for WCCP.

Using Access Lists for a WCCP Service Group

Perform this task to configure the device to use an access list to determine which traffic should be directed to which content engines.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **access-list** *access-list-number* **remark** *remark*
4. **access-list** *access-list-number* **permit** {*source* [*source-wildcard*] | **any**} [**log**]
5. **access-list** *access-list-number* **remark** *remark*
6. **access-list** *access-list-number* **deny** {*source* [*source-wildcard*] | **any**} | [**log**]
7. Repeat some combination of Steps 3 through 6 until you have specified the sources on which you want to base your access list.
8. **ip wccp** [**vrf** *vrf-name*] **web-cache group-list** *access-list*
9. **ip wccp** [**vrf** *vrf-name*] **web-cache redirect-list** *access-list*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**access-list** *access-list-number* **remark** *remark* **Example:** `Device(config)# access-list 1 remark Give access to user1`	(Optional) Adds a user-friendly comment about an access list entry. • A remark of up to 100 characters can precede or follow an access list entry.
Step 4	**access-list** *access-list-number* **permit** {*source* [*source-wildcard*]	**any**} [**log**] **Example:** `Device(config)# access-list 1 permit 172.16.5.22 0.0.0.0`	Creates an access list that enables or disables traffic redirection to the cache engine and permits the specified source based on a source address and wildcard mask. • Every access list needs at least one permit statement; it does not need to be the first entry. • Standard IP access lists are numbered 1 to 99 or 1300 to 1999. • If the *source-wildcard* is omitted, a wildcard mask of 0.0.0.0 is assumed, meaning match on all bits of the source address. • Optionally use the keyword **any** as a substitute for the *source source-wildcard* to specify the source and source wildcard of 0.0.0.0 255.255.255.255.

	Command or Action	Purpose
		• In this example, host 172.16.5.22 is allowed to pass the access list.
Step 5	**access-list** *access-list-number* **remark** *remark* **Example:** `Device(config)# access-list 1 remark Give access to user1`	(Optional) Adds a user-friendly comment about an access list entry. • A remark of up to 100 characters can precede or follow an access list entry.
Step 6	**access-list** *access-list-number* **deny** {*source* [*source-wildcard*] | **any**} | [**log**] **Example:** `Device(config)# access-list 1 deny 172.16.7.34 0.0.0.0`	Denies the specified source based on a source address and wildcard mask. • If the *source-wildcard* is omitted, a wildcard mask of 0.0.0.0 is assumed, meaning match on all bits of the source address. • Optionally use the abbreviation any as a substitute for the *source source-wildcard* to specify the source and source wildcard of 0.0.0.0 255.255.255.255. • In this example, host 172.16.7.34 is denied passing the access list.
Step 7	Repeat some combination of Steps 3 through 6 until you have specified the sources on which you want to base your access list.	Remember that all sources not specifically permitted are denied by an implicit **deny** statement at the end of the access list.
Step 8	**ip wccp** [**vrf** *vrf-name*] **web-cache group-list** *access-list* **Example:** `Device(config) ip wccp web-cache group-list 1`	Indicates to the device from which IP addresses of content engines to accept packets.
Step 9	**ip wccp** [**vrf** *vrf-name*] **web-cache redirect-list** *access-list* **Example:** `Device(config)# ip wccp web-cache redirect-list 1`	(Optional) Disables caching for certain clients.

Enabling the WCCP Outbound ACL Check

Note When all redirection is performed in the hardware, the mode of redirection will change when outbound ACL checking is enabled. The first packet is switched in software to allow the extra ACL check to be performed before a shortcut is installed.

SUMMARY STEPS

1. **enable**

2. **configure terminal**
3. **ip wccp** [**vrf** *vrf-name*] {**web-cache** | *service-number*} [**group-address** *multicast-address*] [**redirect-list** *access-list*] [**group-list** *access-list*] [**password** *password*]
4. **ip wccp check acl outbound**
5. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**ip wccp** [**vrf** *vrf-name*] {**web-cache**	*service-number*} [**group-address** *multicast-address*] [**redirect-list** *access-list*] [**group-list** *access-list*] [**password** *password*] **Example:** `Device(config)# ip wccp web-cache`	Enables the support for a Cisco content engine service group or any content engine service group and configures a redirect ACL list or group ACL. **Note** The **web-cache** keyword is for WCCP version 1 and version 2 and the *service-number* argument is for WCCP version 2 only.
Step 4	**ip wccp check acl outbound** **Example:** `Device(config)# ip wccp check acl outbound`	Checks the access control list (ACL) for egress interfaces for packets redirected by WCCP.
Step 5	**exit** **Example:** `Device(config)# exit`	Exits global configuration.

Enabling WCCP Interoperability with NAT

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **ip nat inside**
5. **ip wccp** *service-number* **redirect in**
6. **exit**

7. **interface** *type number*
8. **ip nat outside**
9. **ip wccp** *service-number* **redirect in**
10. **exit**
11. **interface** *type number*
12. **ip nat inside**
13. **ip wccp redirect exclude in**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface** *type number* **Example:** `Router(config)# interface ethernet 1`	Specifies an interface on which to enable NAT and enters interface configuration mode. • This is the LAN-facing interface.
Step 4	**ip nat inside** **Example:** `Router(config-if)# ip nat inside`	Designates that traffic originating from or destined for the interface is subject to NAT and indicates that the interface is connected to the inside network (the network subject to NAT translation).
Step 5	**ip wccp** *service-number* **redirect in** **Example:** `Router(config-if)# ip wccp 61 redirect in`	Enables packet redirection on an inbound interface using WCCP.
Step 6	**exit** **Example:** `Router(config-if)# exit`	Exits interface configuration mode and returns to global configuration mode.
Step 7	**interface** *type number* **Example:** `Router(config)# interface ethernet 2`	Specifies an interface on which to enable NAT and enters interface configuration mode. • This is the WAN-facing interface.

	Command or Action	Purpose
Step 8	**ip nat outside** **Example:** `Router(config-if)# ip nat outside`	Designates that traffic originating from or destined for the interface is subject to NAT and indicates that the interface is connected to the outside network.
Step 9	**ip wccp** *service-number* **redirect in** **Example:** `Router(config-if)# ip wccp 62 redirect in`	Enables packet redirection on an inbound interface using WCCP.
Step 10	**exit** **Example:** `Router(config-if)# exit`	Exits interface configuration mode and returns to global configuration mode.
Step 11	**interface** *type number* **Example:** `Router(config)# interface ethernet 3`	Specifies an interface on which to enable NAT and enters interface configuration mode. • This is the WAAS-facing interface.
Step 12	**ip nat inside** **Example:** `Router(config-if)# ip nat inside`	Designates that traffic originating from or destined for the interface is subject to NAT and indicates that the interface is connected to the inside network (the network subject to NAT translation).
Step 13	**ip wccp redirect exclude in** **Example:** `Router(config-if)# ip wccp redirect exclude in`	Configures an interface to exclude packets received on an interface from being checked for redirection..

Verifying and Monitoring WCCP Configuration Settings

SUMMARY STEPS

1. **enable**
2. **show ip wccp** [**web-cache** |*service-number*] [**detail view**]
3. **show ip interface**
4. **more system:running-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:**	Enables privileged EXEC mode. • Enter your password if prompted.

	Command or Action	Purpose
	`Device> enable`	
Step 2	**show ip wccp** [**web-cache** |*service-number*] [**detail view**] **Example:** `Device# show ip wccp 24 detail`	Displays global information related to WCCP, including the protocol version running, the number of content engines in the router service group, which content engine group is allowed to connect to the router, and which access list is being used. • *service-number*—(Optional) Dynamic number of the web-cache service group being controlled by the content engine. The range is from 0 to 99. For web caches that use Cisco Content Engines, the reverse proxy service is indicated by a value of 99. • **web-cache**—(Optional) statistics for the web-cache service. • **detail**—(Optional) other members of a particular service group or web cache that have or have not been detected. • **view**—(Optional) information about a router or all web caches.
Step 3	**show ip interface** **Example:** `Device# show ip interface`	Displays status about whether any **ip wccp redirection** commands are configured on an interface; for example, "Web Cache Redirect is enabled / disabled."
Step 4	**more system:running-config** **Example:** `Device# more system:running-config`	(Optional) Displays contents of the running configuration file (equivalent to the **show running-config** command).

Configuration Examples for WCCP

Example: Changing the Version of WCCP on a Router

The following example shows how to change the WCCP version from the default of WCCPv2 to WCCPv1, and enabling the web-cache service in WCCPv1:

```
Device# show ip wccp

% WCCP version 2 is not enabled
Device# configure terminal

Device(config)# ip wccp version 1
```

```
Device(config)# end
Device# show ip wccp

% WCCP version 1 is not enabled
Device# configure terminal

Device(config)# ip wccp web-cache
Device(config)# end
Device# show ip wccp

Global WCCP information:
    Router information:
        Router Identifier:                   10.4.9.8
        Protocol Version:                    1.0
.
.
.
```

Example: Configuring a General WCCPv2 Session

```
Device# configure terminal
Device(config)# ip wccp web-cache group-address 224.1.1.100 password password
Device(config)# ip wccp source-interface GigabitEthernet 0/1/0
Device(config)# ip wccp check services all
! Configures a check of all WCCP services.
Device(config)# interface GigabitEthernet 0/1/0
Device(config-if)# ip wccp web-cache redirect in
Device(config-if)# exit
Device(config)# interface GigabitEthernet 0/2/0
Device(config-if)# ip wccp redirect exclude in
Device(config-if)# exit
```

Example: Setting a Password for a Router and Content Engines

```
Router# configure terminal
Router(config)# ip wccp web-cache password password1
```

Example: Configuring a Web Cache Service

```
Device# configure terminal
Device(config)# ip wccp web-cache
Device(config)# interface GigabitEthernet 0/1/0
Device(config-if)# ip wccp web-cache redirect in
Device(config-if)# exit
Device# copy running-config startup-config
```

The following example shows how to configure a session in which redirection of HTTP traffic arriving on Gigabit Ethernet interface 0/1/0 is enabled:

```
Device# configure terminal
Device(config)# interface GigabitEthernet 0/1/0
Device(config-if)# ip wccp web-cache redirect in
Device(config-if)# exit
Device# show ip interface GigabitEthernet 0/1/0
.
```

```
.
.
WCCP Redirect inbound is enabled
WCCP Redirect exclude is disabled
.
.
.
```

Example: Running a Reverse Proxy Service

The following example assumes that you are configuring a service group using Cisco cache engines, which use dynamic service 99 to run a reverse proxy service:

```
Router# configure terminal
Router(config)# ip wccp 99
Router(config)# interface gigabitethernet 0/1/0
Router(config-if)# ip wccp 99 redirect out
```

Example: Registering a Router to a Multicast Address

```
Device# configure terminal
Device(config)# ip wccp web-cache group-address 224.1.1.100
Device(config)# interface gigabitethernet 0/1/0
Device(config-if)# ip wccp web cache group-listen
```

The following example shows a router configured to run a reverse proxy service, using the multicast address of 224.1.1.1. Redirection applies to packets outgoing via Gigabit Ethernet interface 0/1/0:

```
Device# configure terminal
Device(config)# ip wccp 99 group-address 224.1.1.1
Device(config)# interface gigabitethernet 0/1/0
Device(config-if)# ip wccp 99 redirect out
```

Example: Using Access Lists

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

```
Device(config)# access-list 10 permit host 10.1.1.1
Device(config)# access-list 10 permit host 10.1.1.2
Device(config)# access-list 10 permit host 10.1.1.3
Device(config)# ip wccp web-cache group-list 10
```

To disable caching for certain clients, servers, or client/server pairs, you can use WCCP access lists. The following example shows that any requests coming from 10.1.1.1 to 10.3.1.1 will bypass the cache, and that all other requests will be serviced normally:

```
Device(config)# ip wccp web-cache redirect-list 120
Device(config)# access-list 120 deny tcp host 10.1.1.1 any
Device(config)# access-list 120 deny tcp any host 10.3.1.1
Device(config)# access-list 120 permit ip any any
```

The following example configures a device to redirect web-related packets received via Gigabit Ethernet interface 0/1/0, destined to any host except 209.165.200.224:

```
Device(config)# access-list 100 deny ip any host 209.165.200.224
Device(config)# access-list 100 permit ip any any
Device(config)# ip wccp web-cache redirect-list 100
Device(config)# interface gigabitethernet 0/1/0
Device(config-if)# ip wccp web-cache redirect in
```

Example: WCCP Outbound ACL Check Configuration

The following configuration example shows that the access list prevents traffic from network 10.0.0.0 leaving Gigabit Ethernet interface 0/1/0. Because the outbound ACL check is enabled, WCCP does not redirect that traffic. WCCP checks packets against the ACL before they are redirected.

```
Device(config)# ip wccp web-cache
Device(config)# ip wccp check acl outbound
Device(config)# interface gigabitethernet 0/1/0
Device(config-if)# ip access-group 10 out
Device(config-if)# exit
Device(config)# ip wccp web-cache redirect-list redirect-out
Device(config)# access-list 10 deny 10.0.0.0 0.255.255.255
Device(config)# access-list 10 permit any
```

If the outbound ACL check is disabled, the HTTP packets from network 10.0.0.0 would be redirected to a web cache. Users with that network address could retrieve web pages even though the network administrator wanted to prevent it.

Example: Verifying WCCP Settings

The following example shows how to verify your configuration changes by using the **more system:running-config** command in privileged EXEC mode. The following example shows that both the web cache service and dynamic service 99 are enabled on the device:

```
Device# more system: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 password1
 !
 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 GigabitEthernet0/1/1
ip address 10.3.1.2 255.255.255.0
no ip directed-broadcast
ip wccp web-cache redirect in
ip wccp 99 redirect in
no ip route-cache
no ip mroute-cache
!
interface GigabitEthernet0/1/0
ip address 10.4.1.1 255.255.255.0
no ip directed-broadcast
ip wccp 99 redirect in
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 password1
login
!
end
```

The following example shows how to display global statistics related to WCCP:

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

WCCP Client information:
WCCP Client ID:      10.1.1.2
Protocol Version:    2.0
State:               Usable
Redirection:         L2
Packet Return:       L2
Packets Redirected:  0
Connect Time:        00:20:34
Assignment:          MASK
Mask  SrcAddr    DstAddr    SrcPort DstPort
```

```
----  -------    -------    ------- -------
0000: 0x00000000 0x00001741 0x0000  0x0000
Value SrcAddr    DstAddr   SrcPort DstPort CE-IP
----- -------    -------   ------- ------- -----
0000: 0x00000000 0x00000000 0x0000 0x0000 0x3C010102 (10.1.1.2)
0001: 0x00000000 0x00000001 0x0000 0x0000 0x3C010102 (10.1.1.2)
0002: 0x00000000 0x00000040 0x0000 0x0000 0x3C010102 (10.1.1.2)
0003: 0x00000000 0x00000041 0x0000 0x0000 0x3C010102 (10.1.1.2)
0004: 0x00000000 0x00000100 0x0000 0x0000 0x3C010102 (10.1.1.2)
0005: 0x00000000 0x00000101 0x0000 0x0000 0x3C010102 (10.1.1.2)
0006: 0x00000000 0x00000140 0x0000 0x0000 0x3C010102 (10.1.1.2)
```

For more information about the **show ip wccp web-cache** command, see the *Cisco IOS IP Application Services Command Reference*.

Example: Enabling WCCP Interoperability with NAT

```
Router(config)# interface ethernet1 ! This is the LAN-facing interface
Router(config-if)# ip nat inside
Router(config-if)# ip wccp 61 redirect in
Router(config-if)# exit
Router(config)# interface ethernet2 ! This is the WAN-facing interface
Router(config-if)# ip nat outside
Router(config-if)# ip wccp 62 redirect in
Router(config-if)# exit
Router(config)# interface ethernet3 ! This is the WAAS-facing interface
Router(config-if)# ip nat inside
Router(config-if)# ip wccp redirect exclude in
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
Cisco ACNS software configuration information	• *Cisco ACNS Software Caching Configuration Guide, Release 4.2* • Cisco ACNS Software listing page on Cisco.com
IP access list overview, configuration tasks, and commands	*Cisco IOS Security Command Reference*
IP addressing and services commands and configuration tasks	• *Cisco IOS IP Addressing Services Configuration Guide* • *Cisco IOS IP Addressing Services Command Reference*

Related Topic	Document Title
WCCP commands: complete command syntax, command mode, command history, defaults, usage guidelines, and examples	*Cisco IOS IP Application Services Command Reference*

Standards

Standard	Title
No new or modified standards are supported, and support for existing standards has not been modified.	—

MIBs

MIB	MIBs Link
No new or modified MIBs are supported, and support for existing MIBs has not been modified.	To locate and download MIBs for selected platforms, Cisco software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
No new or modified RFCs are supported, and support for existing RFCs has not been modified.	—

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for WCCP

Table 1: Feature Information for WCCP

Feature Name	Releases	Feature Information
WCCP Bypass Counters	Cisco IOS XE Release 2.2	The WCCP Bypass Counters feature allows you to display a count of packets that have been bypassed by a web cache and returned to the originating router to be forwarded normally. The **show ip wccp** command was modified by this feature.
WCCP: Check Services All	Cisco IOS XE Release 3.1S	The WCCP: Check Services All feature enables you to configure WCCP to search all service groups and redirect ACLs in priority order for a match. The following command was modified by this feature: **ip wccp check services all**
WCCP Closed Services	Cisco IOS XE Release 3.1S	The WCCP Closed Services feature permits WCCP services to be configured so that WCCP always intercepts traffic for such services but, if no WCCP client (such as a content engine) has registered to receive this traffic, packets are discarded. This behavior supports Application-Oriented Network Services (AONS) applications, which require traffic to be transparently intercepted using WCCP but do not want the packets to be forwarded to their destination if the WCCP client is unavailable to perform its processing. (This is contrary to the traditional use of WCCP to assist caches where the absence of a cache does not change the behavior as observed by the user.) The following command was modified by this feature: **ip wccp**.
WCCP—Configurable Router ID	Cisco IOS XE Release 3.1S	The WCCP--Configurable Router ID feature permits the router ID which WCCP uses to be configurable, rather than relying on the router's selection mechanism. The following command was modified by this feature:**ip wccp source-interface** .
WCCP Egress Redirection Support	Cisco IOS XE Release 3.1S	The WCCP Egress Redirection Support feature enables WCCP based redirection applied to the outbound traffic on the outbound interface. The following command was modified by this feature: **ip wccp redirect**.
WCCP Exclude Interface	Cisco IOS XE Release 3.1S	The WCCP Exclude Interface feature enables you to configure an interface to exclude packets received on an interface from being checked for redirection by configuring. The following command was introduced by this feature: **ip wccp redirect exclude in**

Feature Name	Releases	Feature Information
WCCP Fast Timers	Cisco IOS XE Release 3.1S	The WCCP Fast Timers feature enables WCCP to establish redirection more quickly when a WCCP client is added to a service group or when a WCCP client fails. The following command was modified by this feature: **show ip wccp**.
WCCP Group List	Cisco IOS XE Release 3.1S	The WCCP Group List feature enables you to configure the IP addresses of cache engines from which a router accepts packets. Configuring a group list is used to validate the protocol packets received from the cache engine. Packets matching the address in a configured group-list are processed, others are discarded. The following command was modified by this feature: **ip wccp**.
WCCP—Group Listen and Multicast Service Support	Cisco IOS XE Release 3.1S	The WCCP--Group Listen and Multicast Service Support feature adds the ability to configure a multicast address per service group for sending and receiving protocol messages. In the multicast address method, the cache engine sends a single-address notification that provides coverage for all routers in the service group. The following command was modified by this feature: **ip wccp group-listen**.
WCCP Increased Services	Cisco IOS XE Release 3.1S	The WCCP Increased Services feature increases the number of services supported by WCCP to a maximum of 256 across all VRFs. The following commands were modified by this feature: **ip wccp**, **ip wccp check services all**, **ip wccp outbound-acl-check**, **show ip wccp**.
WCCP Layer 2 Redirection/Forwarding	Cisco IOS XE Release 2.2	The WCCP Layer 2 Redirection/Forwarding feature allows directly connected Cisco content engines to use Layer 2 redirection, which is more efficient than Layer 3 redirection via GRE encapsulation. You can configure a directly connected Cache Engine to negotiate use of the WCCP Layer 2 Redirection/Forwarding feature. The WCCP Layer 2 Redirection/Forwarding feature requires no configuration on the router or switch. There are no new or modified commands associated with this feature.
WCCP L2 Return	Cisco IOS XE Release 2.2	The WCCP L2 Return feature allows content engines to return packets to WCCP routers directly connected at Layer 2 by swapping the source and destination MAC addresses rather than tunneling packets back to the router inside a Layer 3 GRE tunnel. There are no new or modified commands associated with this feature.

Feature Name	Releases	Feature Information
WCCP Mask Assignment	Cisco IOS XE Release 2.2	The WCCP Mask Assignment feature introduces support for ACNS/WAAS devices using mask assignment as a cache engine assignment method. There are no new or modified commands associated with this feature.
WCCP Outbound ACL Check	Cisco IOS XE Release 3.1S	The WCCP Outbound ACL Check feature enables you to ensure that traffic redirected by WCCP at an input interface is subjected to the outbound ACL checks that may be configured on the output interface prior to redirection. This feature is supported by Web Cache Communication Protocol (WCCP) Version 1 and Version 2. The following commands were introduced or modified by this feature: **ip wccp**, **ip wccp check acl outbound**.
WCCP Redirection on Inbound Interfaces	Cisco IOS XE Release 2.2 Cisco IOS XE Release 3.0S	The WCCP Redirection on Inbound Interfaces feature enables interfaces to be configured for input redirection for a particular WCCP service. When this feature is enabled on an interface, all packets arriving at that interface are compared against the specified WCCP service. If the packets match, they will be redirected. The following commands were introduced or modified by this feature: **ip wccp redirect-list**.
WCCP Version 2	Cisco IOS XE Release 2.2	The WCCP Version 2 feature provides several enhancements and features to the WCCP protocol, including: • The ability of multiple routers to service a content engine cluster. • Redirection of traffic other than HTTP (TCP port 80 traffic), including a variety of UDP and TCP traffic. • Optional authentication that enables you to control which routers and content engines become part of the service group using passwords and the HMAC MD5 standard. • A check on packets that determines which requests have been returned from the content engine unserviced. • Load adjustments for individual content engines to provide an effective use of the available resources while helping to ensure high quality of service (QoS) to the clients. The following commands were introduced or modified by this feature: **clear ip wccp, ip wccp, ip wccp group-listen, ip wccp redirect, ip wccp redirect exclude in, ip wccp version, show ip wccp**.

Feature Name	Releases	Feature Information
WCCP VRF Support	Cisco IOS XE Release 3.1S	The WCCP VRF Support feature provides enhancements to the existing WCCPv2 protocol which support VRF awareness. In Cisco IOS Release 12.2(33)SRE, this feature is supported only on Cisco 7200 NPE-G2 and Cisco 7304-NPE-G100 routers. The following commands were introduced or modified by this feature: **clear ip wccp**, **debug ip wccp**, **ip wccp**, **ip wccp group-listen**, **ip wccp redirect**, **show ip wccp**.