



Mobile Router DHCP Support for Dynamic CCoA and Foreign Agent Processing

The Mobile Router DHCP Support for Dynamic Collocated Care-of Address (DCCoA) and Foreign Agent (FA) Processing feature adds support for mobile router roaming on Ethernet interfaces that acquire an IP address dynamically via the Dynamic Host Configuration Protocol (DHCP). The interface can register using this acquired IP address as a DCCoA or register using a CoA acquired from a foreign agent. This behavior is true for all platforms that support Mobile IP beginning with Cisco IOS Release 12.3(14)T.

This feature adds support for FA processing of advertisements and registrations on DHCP roaming interfaces.

A Simple Network Management Protocol (SNMP) signaling capability is also added to support this feature on the Cisco 3200 Series Mobile Access Router with a Wireless Mobile Interface Card (WMIC). The WMIC uses SNMP trap messages to signal the mobile router that the Layer 2 wireless local-area network (WLAN) is either up or down.

Feature History for the Mobile Router DHCP Support for Dynamic CCoA and Foreign Agent Processing Feature

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

Finding Support Information for Platforms and Cisco IOS Software Images

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

Contents

- [Prerequisites for Mobile Router DHCP Support for DCCoA and FA Processing, page 2](#)
- [Restrictions for Mobile Router DHCP Support for DCCoA and FA Processing, page 2](#)
- [Information About Mobile Router DHCP Support for DCCoA and FA Processing, page 2](#)



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- [How to Configure Mobile Router DHCP Support for DCCoA](#), page 5
- [Configuration Examples for Mobile Router DHCP Support for DCCoA](#), page 9
- [Additional References](#), page 10
- [Command Reference](#), page 11
- [Glossary](#), page 21

Prerequisites for Mobile Router DHCP Support for DCCoA and FA Processing

There are no prerequisites for DHCP support. However, if a Cisco 3200 Series Mobile Access Router is using a WMIC, the WMIC should be configured for SNMP traps. The 802.11 Layer 2 transitions (associations and disassociations) that take place on the WMIC are signaled to the mobile router via SNMP. Specifically, the Interface MIB linkUp and linkDown traps are sent to the mobile router Ethernet or VLAN interface.

See the [Configuration Guide for the Cisco 3200 Series Mobile Access Router](#) for more information on how to configure SNMP traps on the Cisco 3200 Series router.

Restrictions for Mobile Router DHCP Support for DCCoA and FA Processing

The Mobile IP process will only process SNMP signals from a WMIC. The SNMP signaling functionality for DCCoA is supported on the Cisco 3200 Series Mobile Access Router.

The linkDown and linkUp trap events will not trigger mobile router redundancy.

Information About Mobile Router DHCP Support for DCCoA and FA Processing

Before you configure this feature, you should understand the following concepts:

- [Care-of Addresses](#), page 3
- [Mobile Router DHCP Support](#), page 3
- [Mobile Router Support for SNMP Traps](#), page 4
- [Benefits of Mobile Router DHCP Support for DCCoA and FA Processing](#), page 5

Care-of Addresses

If a mobile router determines that it is connected to a foreign network, it acquires a CoA. This CoA is the exit point of the tunnel from the home agent toward the mobile router. The CoA is included in the mobile router's registration request and is used by the home agent to forward packets to the mobile router in its current location. There are two types of CoAs:

- CoA acquired from a foreign agent
- Collocated care-of address (CCoA)

A foreign agent CoA is an IP address on a foreign agent that is advertised on the foreign network being visited by a mobile router. A foreign agent CoA can be shared by other mobile routers.

A CCoA is an IP address assigned to the interface of the mobile router itself. A CCoA represents the current position of the mobile router on the foreign network and can be used by only one mobile router at a time. A CCoA can be static or dynamic. A static CCoA is a fixed IP address configured on an interface. A dynamic CCoA is an IP address dynamically acquired via DHCP on an Ethernet interface or Point-to-Point Protocol (PPP)/IP Control Protocol (IPCP) on a point-to-point serial interface.

An interface enabled for both foreign agent CoA and CCoA registration will always register a foreign agent CoA instead of a CCoA if a foreign agent CoA is available.

Mobile Router DHCP Support

This feature introduces DCCoA and foreign agent CoA support when IP addresses are obtained via DHCP on a roaming interface. Prior to the introduction of this feature, the mobile router could only support foreign agent CoA registration, static CCoA registration, and DCCoA registration through PPP/IPCP.

For both static and dynamic CCoA, the interface can be configured to exclusively use the CCoA for registration or to use a foreign agent CoA if one is available. An interface enabled for both foreign agent CoA and CCoA registration will always register a foreign agent CoA instead of a CCoA if a foreign agent CoA is available.

In the foreign agent case, when an interface first comes up, it will attempt to discover foreign agents on the link by soliciting and listening for agent advertisements. If a foreign agent is found, the mobile router will register using the advertised CoA. The interface will continue to register using a CoA as long as a foreign agent is heard. When foreign agents are not heard, CCoA processing is enabled and the interface registers its CCoA. The CCoA is the interface's statically configured or dynamically acquired primary IP address. If a foreign agent is heard again, the interface will again register using the foreign agent CoA.

In previous releases of CCoA support, the CCoA registration would begin only after a number of solicits were sent or no advertisements were heard. For faster roaming, this delay is now eliminated. Now the interface registers a foreign agent CoA if an agent advertisement is heard or it registers a CCoA if an address is acquired, depending on which event occurs first. In the case where the interface registers a CCoA first, a subsequent receipt of an agent advertisement will then cause the interface to register with the foreign agent.

To support CCoA on Ethernet interfaces, a default gateway address is required. This gateway address is used as the default gateway for CCoA registration and as a default route after the interface is registered. For static CCoA on an Ethernet interface, a default gateway address must be provided through the roaming interface CCoA configuration. See the Cisco IOS Release 12.2(15)T [Mobile Networks Static Collocated Care-of Address](#) feature documentation for configuration details.

When an interface is configured for DCCoA via DHCP, a configured gateway address is not required and the option to configure a gateway address is not offered through the command line interface (CLI). For DHCP interfaces, DCCoA registration uses the DHCP default router address and, once the interface is registered, the address is also used for the mobile router default route and gateway.

Mobile Router Support for SNMP Traps

On a Cisco 3200 Series Mobile Access Router with a WMIC, SNMP traps allow the roaming interface to determine when the connected WLAN link status changes. Without this signaling, a CCoA-registered interface would not be aware of link status changes. The mobile router must be configured to receive SNMP linkUp and linkDown traps from the WMIC and can then make roaming decisions based on the type of trap received.

Mobile Router Processing of linkUp Traps

When a linkUp trap is received on a DHCP roaming interface, the mobile router interface will either renew the current IP address or acquire a new IP address as quickly as possible. If the interface already has a DHCP-acquired IP address, the mobile router will attempt to renew it first. If renewal fails, the interface will attempt to acquire a new IP address.

If a DHCP interface is without an IP address, DHCP address acquisition begins. Address “discovery” attempts are repeated at increasing intervals (up to 60 seconds) and continue until an address is acquired. During address discovery, the interface is “IP-enabled” and IP packets can be processed. This means that foreign agent CoA advertisements can be heard and Mobile IP registration can take place, even though the interface does not have an IP address.

The new **ip dhcp client mobile renew** command allows you to configure the number of renewal attempts and the interval between attempts for renewing the current IP address that was acquired through DHCP. The configured values override any default values.

For roaming purposes, the roaming interface treats a linkUp trap event the same as if the roaming interface just came up. For example, solicits are sent, if foreign agent CoA-enabled, and the mobile router determines if this interface, compared to other roaming interfaces, should register. Dynamic address acquisition can trigger a DCCoA registration.

If the interface is already registered when the linkUp trap arrives and nothing else has changed that affects the registration decision, the mobile router will retain the existing registration.

Mobile Router Processing of linkDown Traps

Receipt of a valid linkDown trap starts a new, configurable reassociation hold-down timer. The purpose of this timer is to delay the mobile router’s response to the trap, which is typically an attempt to register on the next best interface, for a period of time long enough for the WMIC to reassociate with another bridge or access point (AP). The mobile router remains registered during this hold-down period, foreign agent data is retained, and the mobile router interface keeps any DHCP-acquired IP address. The hold-down timer should be set to the maximum time it should take the WMIC to re-establish wireless connectivity while roaming between adjacent bridges or APs.

If a linkUp trap arrives before the hold-down timer expires, the mobile router remains registered and foreign agent data is retained. Solicits are sent to find foreign agents and the DHCP IP address renewal and discovery process begins. If the WMIC has roamed to an AP on the same subnet, address renewal should succeed.

If the hold-down timer expires or the hold-down delay was set to 0, mobile router processing proceeds as if the interface just went down. Any foreign agents heard on this interface are deleted from the foreign agent list and, if registered on the interface, the mobile router deletes the current registration and tries to register by using the next best roaming interface. Solicits are sent to find foreign agents and the DHCP IP address renewal and discovery process begins.

Benefits of Mobile Router DHCP Support for DCCoA and FA Processing

This feature allows a mobile router to roam to foreign networks where foreign agents may or may not be deployed and where IP addresses are obtained dynamically via DHCP. The SNMP trap capability permits the Cisco 3200 Series Mobile Access Router with a WMIC to respond to changes in the WLAN link status.

How to Configure Mobile Router DHCP Support for DCCoA

This section contains the following procedures:

- [Enabling DHCP Support for DCCoA Processing on a Mobile Router Interface, page 5](#) (required)
- [Configuring SNMP on the Mobile Router, page 7](#) (optional)
- [Verifying the Dynamic CCoA Configuration, page 8](#) (optional)

Enabling DHCP Support for DCCoA Processing on a Mobile Router Interface

Perform this task to enable dynamic CCoA processing on a mobile router interface through DHCP.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **ip address dhcp**
5. **ip dhcp client mobile renew count** *number interval msec*
6. **ip mobile router-service roam**
7. **ip mobile router-service collocated** [**ccoa-only**]
8. **ip mobile router-service hold-down reassociate** *msec*

DETAILED STEPS

	Command or Action	Purpose
Step 1	<p>enable</p> <p>Example: Router> enable</p>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> Enter your password if prompted.
Step 2	<p>configure terminal</p> <p>Example: Router# configure terminal</p>	<p>Enters global configuration mode.</p>
Step 3	<p>interface <i>type number</i></p> <p>Example: Router(config)# interface FastEthernet 1</p>	<p>Configures an interface type and enters interface configuration mode.</p>
Step 4	<p>ip address dhcp</p> <p>Example: Router(config-if)# ip address dhcp</p>	<p>Acquires an IP address on an interface from DHCP.</p> <ul style="list-style-type: none"> DHCP address acquisition time can be reduced by turning off the pings normally sent out by the DHCP server to verify that the IP address is not in use. If using a Cisco IOS router as a DHCP server, use the ip dhcp ping packets <i>number</i> command and set the <i>number</i> argument to 0 (zero).
Step 5	<p>ip dhcp client mobile renew count <i>number</i> interval <i>msec</i></p> <p>Example: Router(config-if)# ip dhcp client mobile renew count 4 interval 25</p>	<p>(Optional) Configures the number of renewal attempts and the interval between attempts for renewing the current IP address acquired by DHCP.</p> <ul style="list-style-type: none"> By default the interface will attempt to renew its address twice and wait 50 milliseconds between attempts. You only need to use this command if you want to adjust the number of attempts or the interval between attempts.
Step 6	<p>ip mobile router-service roam</p> <p>Example: Router(config-if)# ip mobile router-service roam</p>	<p>Enables roaming on an interface.</p>

	Command or Action	Purpose
Step 7	ip mobile router-service collocated [ccoa-only] Example: Router(config-if)# ip mobile router-service collocated	Enables CCoA processing on a mobile router interface. <ul style="list-style-type: none"> The interface will first solicit foreign agent advertisements and register with a foreign agent CoA if an advertisement is heard. If no advertisements are received, CCoA registration is attempted. The ccoa-only keyword enables the interface to use CCoA processing only.
Step 8	ip mobile router-service hold-down reassociate msec Example: Router(config-if)# ip mobile router-service hold-down reassociate 2000	(Optional) Specifies the delay, after receiving a linkDown trap, that the mobile router waits for a linkUp trap. <ul style="list-style-type: none"> The default is 1000 msec. The range is from 0 to 5000 seconds. This reassociate hold-down period is the interval of time (in milliseconds) that the mobile router will wait, after receiving an SNMP linkDown trap, for a linkUp trap from the WMIC indicating that the wireless link is available for use.

Configuring SNMP on the Mobile Router

If a Cisco 3200 Series Mobile Access Router is using a WMIC, the router must be configured for SNMP. The WMIC uses SNMP trap messages to signal the mobile router that the WLAN is either up or down. See the [Configuration Guide for the Cisco 3200 Series Mobile Access Router](#) for additional information on how to configure SNMP traps.

Perform this task to configure SNMP on the mobile router.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **snmp-server engineID remote remote-ip-address remote-engineID-string**
4. **snmp-server user username group-name remote remote-ip-address v3**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.

	Command or Action	Purpose
Step 3	<pre>snmp-server engineID remote remote-ip-address remote-engineID-string</pre> <p>Example: Router(config)# snmp-server engineID remote 172.21.58.1 800000090300000F23AD8F30 </p>	Specifies the SNMP engine ID of a remote SNMP device.
Step 4	<pre>snmp-server user username group-name remote remote-ip-address v3</pre> <p>Example: Router(config)# snmp-server user labusr labgrp remote 172.21.58.1 v3 </p>	Configures a new user to an SNMP group.

Verifying the Dynamic CCoA Configuration

To verify the dynamic CCoA configuration, perform the following steps.

SUMMARY STEPS

1. **show ip mobile router interface**
2. **show ip mobile router agent**
3. **show ip mobile router registration**
4. **show ip mobile router**
5. **show ip mobile binding**

DETAILED STEPS

	Command or Action	Purpose
Step 1	<pre>show ip mobile router interface</pre> <p>Example: Mobilerouter# show ip mobile router interface </p>	Displays information about the interface that the mobile router is using for roaming. <ul style="list-style-type: none"> • If the interface is configured for CCoA, the CCoA (IP address) is displayed even if the interface is down. • If the interface is configured for DCCoA via DHCP, the Layer 2 linkDown hold-down value and the most recently processed link state trap will be displayed.
Step 2	<pre>show ip mobile router agent</pre> <p>Example: Mobilerouter# show ip mobile router agent </p>	Displays information about the agents for the mobile router. <ul style="list-style-type: none"> • If the interface configured for CCoA is up, an entry is shown.
Step 3	<pre>show ip mobile router registration</pre> <p>Example: Mobilerouter# show ip mobile router registration </p>	Displays the pending and accepted registrations of the mobile router.

	Command or Action	Purpose
Step 4	show ip mobile router Example: Mobilerouter# show ip mobile router	Displays configuration information and monitoring statistics about the mobile router.
Step 5	show ip mobile binding Example: Homeagent# show ip mobile router	Displays the mobility binding table. <ul style="list-style-type: none"> If a CCoA is registered with the home agent, (D) direct-to-mobile node is displayed in the Routing Options field.

Configuration Examples for Mobile Router DHCP Support for DCCoA

This section provides the following configuration example:

- [Mobile Router DCCoA Acquired Through DHCP: Example, page 9](#)

Mobile Router DCCoA Acquired Through DHCP: Example

The following example shows a mobile router configured to obtain a CCoA dynamically through DHCP:

Mobile Router

```
! This is the roaming interface using DCCoA
interface FastEthernet0
 ip address dhcp
 ip dhcp client mobile renew count 3 interval 20
 ip mobile router-service roam
 ip mobile router-service collocated
 ip mobile router-service hold-down reassociate 2000
!
! Receive v1 or v2 traps
snmp-server community public RO
snmp-server enable traps tty
!

! Receive v3 traps
snmp-server engineID remote 85.85.85.3 1234
snmp-server user labusr labgrp remote 85.85.85.2 v3 auth md5 <SNMP user password on WGB>
snmp-server group labgrp v3 auth
```

Additional References

The following sections provide references related to the Mobile Router DHCP Support for DCCoA and FA Processing feature.

Related Documents

Related Topic	Document Title
Cisco 3200 Series Mobile Access Router documentation	Configuration Guide for the Cisco 3200 Series Mobile Access Router
Mobile IP commands: complete command syntax, command mode, defaults, usage guidelines, and examples	Cisco IOS IP Command Reference, Volume 4 of 4: IP Mobility, Release 12.3T
Mobile IP commands and configuration tasks related to mobile networks	Cisco Mobile Networks feature document, Release 12.2(4)T and 12.2(13)T
Static CCoA documentation	Mobile Networks Static Collocated Care-of Address feature document, Release 12.2(15)T
Dynamic CCoA documentation	Mobile Networks Dynamic Collocated Care-of Address feature document, Release 12.3(4)T

Standards

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

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

RFCs

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

Technical Assistance

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

Command Reference

This section documents new and modified commands.

- [ip dhcp client mobile renew](#)
- [ip mobile router-service](#)
- [show ip mobile router agent](#)
- [show ip mobile router interface](#)

ip dhcp client mobile renew

To configure the number of renewal attempts and the interval between attempts for renewing the current IP address acquired by DHCP, use the **ip dhcp client mobile renew** command in interface configuration mode. To disable this functionality, use the **no** form of this command.

ip dhcp client mobile renew count *number* **interval** *msec*

no ip dhcp client mobile renew count *number* **interval** *msec*

Syntax Description

count <i>number</i>	Number of renewal attempts to renew the current IP address before starting the DHCP discovery process. The range is from 0 to 10 attempts. The default is 2 attempts.
interval <i>msec</i>	Interval to wait between renewal attempts. The range is from 1 to 1000 msec. The default is 50 msec.

Defaults

count *number*: 2
interval *msec*: 50

Command Modes

Interface configuration

Command History

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

Usage Guidelines

Mobile DHCP clients automatically attempt to renew an existing IP address in response to certain events, such as moving between wireless access points. The number of renewal attempts, and the interval between those attempts, depending on network conditions, can be modified by using the **ip dhcp client mobile renew** command.

Examples

In the following example, the DHCP client will make four attempts to renew its current IP address with an interval of 30 milliseconds between attempts :

```
interface FastEthernet0
 ip dhcp client mobile renew count 4 interval 30
```

Related Commands

Command	Description
ip address dhcp	Acquires an IP address on an interface from DHCP.

ip mobile router-service

To enable mobile router service on an interface, use the **ip mobile router-service** command in interface configuration mode. To disable this service, use the **no** form of this command.

```
ip mobile router-service {hold-down [foreign-agent seconds | reassociate msec] | roam [priority
value] | solicit [interval seconds] [retransmit initial minimum maximum seconds retry
number]}
```

```
no ip mobile router-service {hold-down [foreign-agent seconds | reassociate msec] | roam
[priority value] | solicit [interval seconds] [retransmit initial minimum maximum seconds
retry number]}
```

Syntax Description	
hold-down	Specifies a delay period for mobile router registration.
foreign-agent <i>seconds</i>	(Optional) Time (in seconds) to wait before the mobile router registers to agents heard on an interface. The default is zero. The range is from 0 to 3600 seconds.
reassociate <i>msec</i>	(Optional) Specifies the delay (in milliseconds), after receiving a linkDown trap, that the mobile router waits for a linkUp trap. The default is 1000 msec. The range is from 0 to 5000 seconds.
roam	Enables the mobile router interface to roam.
priority <i>value</i>	(Optional) Priority value that is compared among multiple configured interfaces to select the interface in which to send the registration request. When multiple interfaces have highest priority, the highest bandwidth is the preferred choice. When multiple interfaces have the same bandwidth, the interface with the highest IP address is preferred. The range is from 0 to 255; the default is 100. Higher values equate to a higher priority.
solicit	Instructs the mobile router to send agent solicitation messages periodically.
interval <i>seconds</i>	(Optional) Interval (in seconds) to wait before the mobile router sends the next agent solicitation message after an advertisement is received on an interface. The range is from 1 to 65535 seconds; the default interval is 600 seconds (10 minutes).
retransmit initial	(Optional) Wait period before a retransmission of a registration request when no reply is received. The range is from 10 to 10000 milliseconds (10 seconds); the default is 1000 milliseconds (1 second).
<i>minimum</i>	(Optional) Minimum wait period (in seconds) before retransmission of a registration request when no reply is received.
maximum <i>seconds</i>	(Optional) Maximum wait period (in seconds) before retransmission of a registration request when no reply is received. Each successive retransmission timeout period is twice the previous period, as long as that is less than the maximum value.
retry <i>number</i>	(Optional) Number of times to retry sending the retransmission request. Retransmission stops after the maximum number of retries are attempted. The range is from 0 to 10; the default retry is 3. A value of 0 means no retransmission.

Defaults

hold-down foreign agent *seconds*: zero
hold-down reassociate *msec*: 1000
priority *value*: 100
interval *seconds*: 600 seconds
retransmit initial *minimum maximum* *seconds*: 1000 milliseconds (1 second)
retry number : Three retries

Command Modes

Interface configuration

Command History

Release	Modification
12.2(4)T	This command was introduced.
12.3(14)T	The foreign-agent <i>seconds</i> and reassociate <i>msec</i> keywords and arguments were added.

Usage Guidelines

The mobile router discovers home agents and foreign agents by receiving agent advertisements.

**Note**

In release 12.3(14)T, the **ip mobile router-service hold-down** command was changed to the **ip mobile router-service hold-down foreign-agent** command. The previous version of the command is still accepted but the new command will appear in the running configuration.

When a wireless link connected to an interface is lossy, the mobile router must not immediately register with the foreign agent even when heard on a preferred interface. The **ip mobile router-service hold-down foreign-agent** *seconds* command allows existing communications to continue with mobile networks while the mobile router gauges the quality of the link to the new foreign agent.

The **ip mobile router-service solicit** command instructs the mobile router to send agent solicitation messages periodically. Some networks only send out agent advertisements periodically or when solicited. For networks on which agents do not advertise periodically, this function must be enabled to detect agents. The mobile router always sends solicitation messages when roaming interfaces come up.

If a mobile router interface is configured for solicitations, you should set both **ip irdp maxadvertinterval** *seconds* and **ip irdp holdtime** *seconds* to 0 seconds on the foreign agent. These settings ensure that the foreign agent will not send out any IRDP advertisements unless solicited. If a foreign agent or home agent are sending IRDP advertisements periodically, then a solicitation will trigger the agent to send an advertisement immediately instead of at the next time interval.

The solicit timer for the **ip mobile router-service solicit** command is reset and no solicitation is sent out on the roaming interface if the mobile router receives an advertisement from a foreign agent before the solicit timer expires. For example, if the mobile router is configured to solicit every 10 seconds and the foreign agent advertises every 3 seconds, the mobile router will never solicit.

Use the **ip mobile router-service hold-down reassociate** *msec* command to specify the interval of time that the mobile router will wait, after receiving an SNMP linkDown trap, for a linkUp trap from the Wireless Mobile Interface Card (WMIC) indicating that the wireless link is available for use. This hold-down delay should be long enough for the WMIC to establish connectivity with a new AP or bridge when roaming.

Use the **show ip mobile router agent** command to display agents learned from advertisements and the mobile router's available CCoAs. Use the **show ip mobile router interface** command to display the configuration of the interfaces used for roaming.

Examples

The following example configures roaming interfaces, solicitation services, and hold-down timers on serial interface 0 and roaming interfaces and hold-down timers on Ethernet interface 0 of the mobile router.

In this example, the mobile router has two interfaces. The serial interface is connected to a serial interface of a foreign agent and the Ethernet interface is connected to an Ethernet interface of a foreign agent. The mobile router will prefer to register on the Ethernet interface if possible because it has a higher priority than the serial interface. If the mobile router does not receive any agent advertisements on the Ethernet interface, it will use the serial interface to solicit foreign agents.

If the Ethernet interface hears a new foreign agent advertisement after the mobile router has already registered using the serial interface, it will wait the duration of the hold-down timer (20 seconds) before registering with the foreign agent on the Ethernet interface. The **ip mobile router-service hold-down foreign-agent seconds** command allows communications to continue with mobile networks while the mobile router gauges the quality of the link to the new foreign agent. The Ethernet interface is configured with a higher priority so the mobile router prefers to register with this interface.

Once it receives an agent advertisement on the Ethernet interface, it will use the Ethernet interface to register to its home agent.

```
interface s0
  ip mobile router-service roam
  ! s0 solicits every 5 seconds after last advertisement received on the interface
  ip mobile router-service solicit interval 5
  ip mobile router-service hold-down foreign-agent 20
interface e0
  ip mobile router-service roam priority 101
  ip mobile router-service hold-down foreign-agent 20
```

In the following example, the mobile router is configured to receive dynamic CCoA from DHCP. The mobile router will wait 2000 milliseconds for the SNMP linkUp trap from the WMIC indicating that layer 2 has reassociated. This interval of time allows the mobile router to roam and still maintain wireless connectivity.

```
interface FastEthernet0
  ip address dhcp
  ip dhcp client mobile renew count 3 interval 20
  ip mobile router-service roam
  ip mobile router-service collocated
  ip mobile router-service hold-down reassociate 2000
```

Related Commands

Command	Description
show ip mobile router agent	Displays information about the agents for the mobile router.
show ip mobile router interface	Displays information about the interface that the mobile router is using for roaming.

show ip mobile router agent

To display information about the agents for the mobile router, use the **show ip mobile router agent** command in privileged EXEC mode.

show ip mobile router agent

Syntax Description This command has no arguments or keywords.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(4)T	This command was introduced.
	12.2(15)T	This command was enhanced to display information about the retry interval used in static collocated care-of address (CCoA) processing.
	12.3(4)T	This command was enhanced to display information about dynamic CCoA processing.
	12.3(14)T	This command was enhanced to display the default gateway for dynamic CCoA acquired through DHCP.

Usage Guidelines This command displays a list containing information on all foreign agents currently discovered on the mobile router. This list also displays information about each interface configured for static or dynamic CCoA. An interface must be “up” to be displayed on the list and a dynamic CCoA must have acquired an IP address.

You can use the **clear ip mobile router agent** command to clear foreign agent care-of addresses (CoAs) but not static or dynamic CCoAs. CCoAs cannot be cleared.

Examples The following is sample output from the **show ip mobile router agent** command when a CCoA is configured on a mobile router interface:

```
Router# show ip mobile router agent

Mobile Router Agents:

Foreign agent 45.0.0.2:
  Care-of address 42.0.0.2
  Interface Ethernet1, MAC 0030.9492.6627
  Agent advertisement seq 56649, Flags rbhFmGvt, Lifetime 36000
  IRDP advertisement lifetime 30, Remaining 29
  Last received 02/13/02 17:55:48
  First heard 02/13/02 11:21:46

Collocated Care-of address 48.0.0.1 (static):
  Interface Ethernet2
  Default gateway 48.0.0.2
  Registration retry interval 60
  Next CCoA reg attempt in 00:00:55 seconds
```

```
Collocated Care-of address 11.0.0.7 (dynamic):
  Interface Serial0
  Registration retry interval 60
```

Table 1 describes the significant fields shown in the display.

Table 1 *show ip mobile router agent Field Descriptions*

Field	Description
Foreign Agent (or Home Agent)	IP address of the foreign agent (or home agent).
Care-of address	Attachment point in the foreign network.
Interface	Roaming interface.
MAC	MAC address of the learned agent.
Agent advertisement seq/Flags/Lifetime	Agent advertisement sequence number, flags, and lifetime (in seconds). The sequence number can be used to detect reboot by the agent. The flags are services provided by the agent. The lifetime is the limit advertised by the agent.
IRDP advertisement lifetime/Remaining	The IRDP advertisement lifetime is the interval in which this foreign agent will provide service. When the lifetime expires, the foreign agent is disconnected from the mobile router. The remaining field shows the time before expiration.
Last received	Date and time when advertisement was received.
First heard	Date and time when the agent was first heard. This information is useful in determining which agent to use when multiple learned agents are heard by the mobile router.
Collocated Care-of address	CCoA configured on the mobile router interface. The type of CCoA (static or dynamic) is given in parentheses.
Default gateway	The next-hop IP address for registration packets. Upon successful registration, this address will be used as the default gateway and default route. This field is displayed if the IP address is fixed (static) on an Ethernet interface or a default gateway is acquired through DHCP.
Registration retry interval	The interval that the mobile router waits before sending another registration request if a registration request failed.
Next CCoA reg attempt in 00:00:55 seconds	If the interval timer is running, the time remaining (in seconds) until the next registration attempt. Only appears if a registration attempt (and its retries) has failed and the registration retry interval timer is running.

Related Commands

Command	Description
clear ip mobile router agent	Deletes learned agents and the corresponding care-of address of the foreign agent from the mobile router agent table.

show ip mobile router interface

To display information about the interfaces configured for roaming, use the **show ip mobile router interface** command in privileged EXEC mode.

show ip mobile router interface

Syntax Description This command has no arguments or keywords.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.2(4)T	This command was introduced.
	12.2(15)T	This command was enhanced to display information about static collocated care-of addresses (CCoAs).
	12.3(4)T	This command was enhanced to display information about dynamic CCoAs.
	12.3(7)T	This command was enhanced to display information about a request for a generic routing encapsulation (GRE) tunnel.
	12.3(14)T	This command was enhanced to display information about Layer 2 signaling on roaming interfaces.

Usage Guidelines The mobile router uses the interfaces for roaming, discovering foreign agents, and registering its location on the foreign network.

Use this command to display information about roaming interfaces. If the interface is configured for a collocated care-of address (CCoA), the CCoA IP address is displayed. If it is not configured for a CCoA, “disabled” is displayed. The interface can be up or down.

Examples The following is sample output from the **show ip mobile router interface** command. Fast Ethernet interface 0/0 and Fast Ethernet interface 2/0 have no CCoA configuration, serial interface 1/0 has a static CCoA configuration, and serial interface 1/1 has a dynamic CCoA address with CCoA only. GRE encapsulation is configured on Fast Ethernet interface 2/0.

```
Router# show ip mobile router interface

Mobile Router Interfaces:

Listed in order of preference.

FastEthernet0/0:
  Priority 102, Bandwidth 10000, Address 10.0.0.9
  Periodic solicitation disabled, Interval 600 sec
  Retransmit Init 1000, Max 5000 msec, Limit 3
  Current 0, Remaining 0 msec, Count 0
  Hold down 0 sec
  Routing disallowed
  Collocated CoA disabled
```

```

Serial1/0:
  Priority 100, Bandwidth 1544, Address 10.0.0.7
  Periodic solicitation disabled, Interval 600 sec
  Retransmit Init 1000, Max 5000 msec, Limit 3
  Current 1000, Remaining 0 msec, Count 1
  Hold down 0 sec
  Routing disallowed
  Collocated CoA 10.0.0.7 (static)

Serial1/1
  Priority 100, Bandwidth 1544, Address 10.0.0.5
  Periodic solicitation disabled, Interval 600 sec
  Retransmit Init 1000, Max 5000 msec, Limit 3
  Current 0, Remaining 0 msec, Count 0
  Hold down 0 sec
  Routing disallowed
  Collocated CoA 10.0.0.5 - Solicit FA first

FastEthernet2/0
  Priority 110, Bandwidth 16000, Address 10.52.52.2
  Periodic solicitation disabled, Interval 600 sec
  Retransmit Init 1000, Max 5000 msec, Limit 3
  Current 2000, Remaining 0 msec, Count 2
  Hold down 0 sec
  Routing disallowed
  Collocated CoA disabled
  Request GRE tunnel

```

The following sample output shows that the mobile router is configured to support signaling on roaming interfaces via SNMP interface MIB traps.

```
Router# show ip mobile router interface
```

```
Mobile Router Interfaces:
```

```
Listed in order of preference.
```

```

Ethernet1:
  Priority 110, Bandwidth 10000, Address 55.0.0.8
  Periodic solicitation disabled, Interval 600 sec
  Retransmit Init 1000, Max 5000 msec, Limit 3
  Current 5000, Remaining 0 msec, Count 4
  Foreign agent hold down 0 sec
  Layer 2 reassociation hold down 5000 msec
  Last layer 2 link-state trap: linkDown
  Routing disallowed
  Collocated CoA 55.0.0.8 - Solicit FAs

```

Table 2 describes the significant fields shown in the display.

Table 2 *show ip mobile router interface* Field Descriptions

Field	Description
Priority	Interface priority. Comparison to decide the preferred interface to register by the mobile router. The interface with the highest priority is used to send registrations.
Bandwidth	Interface bandwidth. When multiple interfaces have the highest priority, the highest bandwidth is the preferred choice.
Address	Interface IP address. If priority and bandwidth are the same among roaming interfaces, the highest address is preferred by the mobile router.

Table 2 *show ip mobile router interface Field Descriptions (continued)*

Field	Description
Periodic solicitation	Send solicitations periodically (enabled) or wait for periodic advertisements (disabled).
Interval	Period of time (in seconds) to wait before sending the next periodic solicitation.
Retransmit Init/Max/Limit	Solicitation retry settings. Displays the initial and maximum transmission timers and the limit on the number of retries allowed.
Current/Remaining	Current retransmission interval and remaining time (in milliseconds) before it expires.
Count	Retransmission count.
Hold down	Period of time (in seconds) to wait before registering to a learned agent.
Layer 2 reassociation hold down	Period of time (in milliseconds) that the mobile router will wait for an SNMP linkUp trap from the WMIC indicating that the wireless link is available for use.
Last layer 2 link-state trap	The last layer 2 linkDown and linkUp trap events signaled via SNMP.
Routing	Routing is disallowed when the mobile router is roaming and allowed when the mobile router is home.
Collocated CoA	IP address is displayed if the interface is configured for CCoA; otherwise “Collocated CoA disabled” is displayed. The CCoA is displayed if configured, even if the interface is down. The type of CCoA (static or dynamic) is given in parentheses.
Solicit FA first	Interface will solicit foreign agents first. If none are heard, CCoA processing is enabled on the interface.
Request GRE tunnel	Interface will request GRE encapsulation when it registers with an agent.

Related Commands

Command	Description
ip mobile router-service	Enables mobile router service on an interface.
ip mobile router-service collocated	Enables static or dynamic CCoA processing on a mobile router interface.
keepalive	Enables keepalive packets and specifies the number of times that the Cisco IOS software tries to send keepalive packets without response before bringing the tunnel protocol down for a specific interface.

Glossary

care-of address—The termination point of the tunnel to a mobile node or mobile router. This can be a collocated care-of address, by which the mobile node or mobile router acquires a local address and detunnels its own packets, or a foreign agent care-of address, by which a foreign agent detunnels packets and forwards them to the mobile node or mobile router.

collocated care-of address—The termination point of a tunnel toward a mobile node or mobile router. A CCoA is a local address that the mobile node or mobile router associated with one of its own network interfaces.

DHCP—Dynamic Host Configuration Protocol. Provides a mechanism for allocating IP addresses and other configuration parameters dynamically so that addresses can be reused when hosts no longer need them.

foreign agent—A router on the visited network of a foreign network that provides routing services to the mobile node or mobile router while registered. The foreign agent detunnels and delivers packets to the mobile node or mobile router that were tunneled by the home agent of the mobile node. For packets sent by a mobile node, the foreign agent may serve as a default router for registered mobile nodes.

home agent—A router on a home network of the mobile node or that tunnels packets to the mobile node or mobile router while they are away from home. It keeps current location information for registered mobile nodes called a mobility binding.

IPCP—IP Control Protocol. The protocol used to establish and configure IP over PPP.

PPP—Point-to-Point Protocol. Provides router-to-router and host-to-network connections over synchronous and asynchronous circuits. PPP is most commonly used for dial-up Internet access. Its features include address notification, authentication via CHAP or PAP, support for multiple protocols, and link monitoring.

trap—Message sent by an SNMP agent to an NMS console, or terminal to indicate the occurrence of a significant event, such as a specifically defined condition or a threshold that was reached.

**Note**

Refer to [Internetworking Terms and Acronyms](#) for terms not included in this glossary.

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