



# Layer 3 CPE Mobility

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Cisco IOS 12.2(33)SCH2 introduces the Layer 3 CPE Mobility feature, which allows the mobility CPE devices to move between cable modems with as less disruption of traffic as possible.

## Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see 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 at the end of this document.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to <http://tools.cisco.com/ITDIT/CFN/>. An account on <http://www.cisco.com/> is not required.

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## Prerequisites for Layer 3 CPE Mobility

Table below shows the hardware compatibility prerequisites for this feature.

**Note**

The hardware components introduced in a given Cisco IOS Release will be supported in all subsequent releases unless otherwise specified.

**Table 1: Layer3 CPE Mobility for the Cisco CMTS Routers Hardware Compatibility Matrix**

Cisco CMTS Platform	Processor Engine	Cable Interface Cards
Cisco uBR10012 Universal Broadband Router	Cisco IOS Release 12.2(33)SCH2 and later releases <ul style="list-style-type: none"> <li>• PRE4</li> <li>• PRE5</li> </ul>	<b>Cisco IOS Release 12.2(33)SCC and later releases</b> <ul style="list-style-type: none"> <li>• Cisco UBR-MC20X20V</li> </ul> Cisco IOS Release 12.2(33)SCE and later releases <ul style="list-style-type: none"> <li>• Cisco uBR-MC3GX60V <sup>1</sup></li> </ul>
Cisco uBR7246VXR Universal Broadband Router	Cisco IOS Release 12.2(33)SCA and later releases <ul style="list-style-type: none"> <li>• NPE-G2</li> </ul>	Cisco IOS Release 12.2(33)SCD and later releases <ul style="list-style-type: none"> <li>• Cisco uBR-MC88V <sup>2</sup></li> </ul>
Cisco uBR7225VXR Universal Broadband Router	Cisco IOS Release 12.2(33)SCB and later releases <ul style="list-style-type: none"> <li>• NPE-G2</li> </ul>	Cisco IOS Release 12.2(33)SCD and later releases <ul style="list-style-type: none"> <li>• Cisco uBR-MC88V</li> </ul>

<sup>1</sup> Cisco uBR3GX60V cable interface line card is compatible with PRE4.

<sup>2</sup> Cisco uBR-MC88V cable interface line card is compatible with NPE-G2.

## Restrictions for Layer 3 CPE Mobility

- Layer 3 CPE Mobility feature allows CPE devices to move only in the same bundle or sub-bundle interface.
- The IPv4 or IPv6 subnets that are configured with mobility must match with the IPv4 or IPv6 subnets already configured on bundle or sub-bundle interface. Otherwise, configuration will not be accepted and the following message will be displayed:

Please remove the previous online CPEs or reset CMTS,

- If you remove the IPv4 or IPv6 address on bundle or sub-bundle interface, it also removes the relative mobility subnets at the same time.
- Multicast packets will not trigger the Layer 3 CPE Mobility feature.
- VRF configured under bundle or sub-bundle interface is not supported for CPE mobility feature.

- On Cisco uBR72000 series platform, Layer3 CPE Mobility may fail if cable filter is configured.
- On uBR10k series platform, if PXF is disabled, Layer3 CPE Mobility function may not be fully supported and some behavior may not be consistent with PXF enabled scenario.
- In Layer 3 CPE Mobility feature, the packet lost time period during mobility will be unpredictable, depending on how many CPE devices move at the same time and system loading conditions.
- For CPE devices, which have multiple IPv4 or IPv6 addresses, all of IPv4 or IPv6 addresses will be rebuilt with new source information.
- Layer 3 CPE Mobility may be failed during line card or PRE HA and the trigger upstream packet will be dropped.
- If CPE mobility is turned on, mobility behavior will become effective before cable Ipv4 or IPv6 source verify.
- If Layer 3 CPE Mobility is enabled, some of the security checks will be skipped for the mobility subnets to achieve faster movement of the CPE devices.

## Information About Layer 3 CPE Mobility

The Layer 3 CPE Mobility feature allows CPE devices to move from cable modem to other by trigger of any unicast upstream packets of IPv4 or IPv6.

Each cable modem would be situated at a business hotspot location and the CPE devices move from one business location to another, where the service provider is the same and the head end CMTS is the same. This mobility is allowed for selected IP subnets.

The maximum number of subnets supported is 2 IPv6 and 6 IPv4 subnets per bundle or sub-bundle interface. To support more subnets, configure more bundle or sub-bundle interfaces.

The IPv4 or IPv6 subnets that are configured with mobility must match with the IPv4 or IPv6 subnets already configured on bundle or sub-bundle interface. Otherwise, configuration will not be accepted and the following message will be displayed:

```
Please remove the previous online CPEs or reset CMTS,
```

When you remove mobility subnets under bundle or sub-bundle interface. The following warning message will be displayed after mobility subnets is configured or removed.

```
Warning: Please remove the previous online CPEs or reset CMTS, to make the mobility scope change works for every device !!!
```

**Note**

If you have enabled mobility configuration for a subnet, the existing online CPE devices will not be aware of the mobility subnets. So after mobility subnets is configured, in order to make the mobility feature work for every CPE device, remove the online CPE devices or reset cable modem.

## Benefits of Layer 3 CPE Mobility

The feature provides the movement of CPE devices from one cable modem to another without change in the IP address and the TCP or UDP sessions established are maintained.

# How to Configure Layer 3 Mobility

## Configuring CPE Mobility

This section describes how to enable mobility on a particular IP subnet on a interface or subinterface bundle.

### Before You Begin

Mobility subnets should match the IPv4 or IPv6 address configured on the bundle or sub-bundle interface.

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b>  <b>Example:</b> Router> <b>enable</b>	Enables privileged EXEC mode. Enter your password if prompted.
<b>Step 2</b>	<b>configure terminal</b>  <b>Example:</b> Router# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 3</b>	<b>interface bundle bundle number  bundle-subif-number</b>  <b>Example:</b> Router(config)# <b>interface bundle 1</b> or Router(config)# <b>interface Bundle 1.1</b>	Enters interface configuration or subinterface mode.
<b>Step 4</b>	<b>cable l3-mobility IP-address mask   IPv6 prefix</b>  <b>Example:</b> Router(config-if)# <b>cable l3-mobility 2001:DB:22:1::1/64</b>  <b>Example:</b> Router(config-subif)# <b>cable l3-mobility 192.0.3.1 255.255.255.0</b>  <b>Example:</b> Router(config-subif)# <b>cable l3-mobility 2001:DB:22:1::1/64</b>	Enables mobility for a particular IPv4 or IPv6 subnet.  <b>Note</b> This command can be configured on a interface or a subinterface bundle.

	Command or Action	Purpose
Step 5	<b>exit</b>  <b>Example:</b> Router(config-if)# <b>exit</b>	Exits interface configuration mode.

### What to Do Next

#### Troubleshooting Tips

If the mobility IP address does not match with the mobility subnet, the following warning message is displayed:

```
Mobility IP should match the IDB subnet!
```

If you remove the IPv4 or IPv6 address from the interface, the mobility scope is removed for the IP address and the following warning message is displayed.

```
IPv6 2001:DBB:3:111::1 removed from Mobility subnets on Bundle1
```

## Configuring PXF Divert-Limit

This section describes how to configure or modify the PXF divert limit. This procedure is optional and if not configured, will set the value to the default value.



**Note** If **cable I3 mobility** command on the bundle or sub-bundle interface is enabled, the PXF divert limit is also enabled by default. So this configuration is optional.

### Before You Begin

Ensure that the **cable I3 mobility** command is enabled on the bundle or sub-bundle interface. If disabled, the **service divert-limit I3-mobility** function does not work.

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> <b>enable</b>	Enables privileged EXEC mode. Enter your password if prompted.

	Command or Action	Purpose
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# <b>configure terminal</b>	Enters global configuration mode.
Step 3	<b>service divert-limit l3-mobility-counter limit   l3-mobility-timeslot timeslot</b>  <b>Example:</b> Router(config-if)# <b>service divert-limit l3-mobility-counter 1</b>  Router(config-if)# <b>service divert-limit l3-mobility-timeslot 1</b>	Configures the PXF threshold limit and timeslot. <ul style="list-style-type: none"> <li>• <b>l3-mobility-counter</b> — Configures the layer 3 CPE mobility counter threshold limit.</li> <li>• <i>limit</i>— Specifies the mobility counter threshold limit in packets. The default is 16.</li> <li>• <b>l3-mobility-timeslot</b> — Configures the layer 3 CPE mobility timeslot in ms. The default is 300.</li> <li>• <i>timeslot</i> — Specifies the mobility timeslot in milliseconds. The range is from 1 to 4095. The range is from 1 to 127.</li> </ul>
Step 4	<b>exit</b>  <b>Example:</b> Router(config-if)# <b>exit</b>	Exits global configuration mode.

## Disabling CPE Mobility

This section describes how to disable mobility on a particular IP subnet.

### Before You Begin

The CPE mobility should be enabled on a particular IP subnet before you complete this procedure.

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> <b>enable</b>	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# <b>configure terminal</b>	Enters global configuration mode.

	Command or Action	Purpose
Step 3	<b>interface bundle</b> <i>bundle number</i>   <i>bundle-subif-number</i>  <b>Example:</b>  Router(config)# <b>interface bundle 1</b> or Router(config)# <b>interface Bundle 1.1</b>	Enters interface configuration or subinterface mode.
Step 4	<b>no cable l3-mobility</b> <i>IP-address mask</i>   <i>IPv6 prefix</i>  <b>Example:</b>  Router(config-if)# <b>cable l3-mobility 192.0.3.1 255.255.255.0</b>  Router(config-if)# <b>cable l3-mobility 2001:DB:22:1::1/64</b>	Disables mobility for a particular IPv4 or IPv6 subnet.  <b>Note</b> This command can be configured on a interface or a subinterface bundle
Step 5	<b>exit</b>  <b>Example:</b>  Router(config-if)# <b>exit</b>	Exits interface configuration mode.

## Verifying Layer 3 Mobility Configuration

To verify the layer 3 mobility configuration, use the **show cable bundle** command.

```
Router# show cable bundle 1 mobility Interface IP/IPv6 Subnet
-----
Bundle1 ---
Bundle1.1 192.0.3.0/16
           192.0.3.1/16
           192.0.4.1/16
           2001:DB:5:4:100::1/32
           2001:DB:5:4:101::1/32
Bundle1.2 192.0.3.1/16
```

## Configuration Examples for Layer 3 Mobility

This section provides the following configuration examples:

### Example: Configuring CPE Layer 3 Mobility

The following example shows how to configure the layer 3 CPE mobility on a interface bundle:

```
Router#show running interface bundle 10
Building configuration...
Current configuration : 1247 bytes
```

```

!
interface Bundle10
ip address 192.0.3.1 255.255.255.0 secondary
ip address 192.2.21.1 255.255.255.0 secondary
ip address 192.3.23.1 255.255.255.0
ip pim sparse-dense-mode
ip igmp static-group 231.1.1.1
no cable arp filter request-send
no cable arp filter reply-accept
cable l3-mobility 192.0.3.1 255.255.255.0
cable l3-mobility 192.2.21.1 255.255.255.0
cable l3-mobility 192.3.23.1 255.255.255.0
cable l3-mobility 2001:DB:26:1::1/64
cable l3-mobility 2001:DB:27:1::1/96
cable dhcp-giaddr primary
cable helper-address 20.1.0.3
ipv6 address 2001:DB:26:1::1/64
ipv6 address 2001:DB:27:1::1/96
ipv6 enable
ipv6 nd reachable-time 3600000
ipv6 nd managed-config-flag
ipv6 nd other-config-flag
ipv6 dhcp relay destination 2001:DB:1:1:214:4FFF:FEA9:5863
end

```

## Example: Configuring PXF Divert-Rate-Limit

The following example shows how to configure the PXF divert rate limit mobility counter and mobility timeslot:

```

Router# show run | in divert-limit
service divert-limit l3-mobility-counter 127
service divert-limit l3-mobility-timeslot 100

```

## Additional References

The following sections provide references related to Spectrum Management and Advanced Spectrum Management for the Cisco CMTS routers.

### Related Documents

Related Topic	Document Title
CMTS Command Reference	<a href="http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_book.html">http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_book.html</a> Cisco Broadband Cable Command Reference Guide.

### 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: <a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a>

**RFCs**

RFC	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
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.	<a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a>

## Feature Information for Layer 3 CPE Mobility

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to <http://tools.cisco.com/ITDIT/CFN/>. An account on <http://www.cisco.com/> is not required.

**Note**

The below table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

**Table 2: Feature Information for Layer 3 CPE Mobility**

<b>Feature Name</b>	<b>Releases</b>	<b>Feature Information</b>
Layer 3 Mobility	12.2(33)SCH2	This feature was introduced for the Cisco uBR10012 and Cisco uBR7200 series universal broadband routers.