Layer 3 CPE Mobility

Layer 3 CPE Mobility feature is introduced to 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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Hardware Compatibility Matrix for Cisco cBR Series Routers

Note The hardware components introduced in a given Cisco IOS-XE Release are supported in all subsequent releases unless otherwise specified.

Table 1: Hardware Compatibility Matrix for the Cisco cBR Series Routers

Cisco CMTS Platform	Processor Engine	Interface Cards
Cisco cBR-8 Converged Broadband Router	**Cisco IOS-XE Release 3.15.0S and Later Releases** Cisco cBR-8 Supervisor : • PID—CBR-CCAP-SUP-160G • PID—CBR-CCAP-SUP-60G[1] • PID—CBR-SUP-8X10G-PIC	**Cisco IOS-XE Release 3.15.0S and Later Releases** Cisco cBR-8 CCAP Line Cards: • PID—CBR-LC-8D30-16U30 • PID—CBR-LC-8D31-16U30 • PID—CBR-RF-PIC • PID—CBR-RF-PROT-PIC Cisco cBR-8 Downstream PHY Modules: • PID—CBR-D30-DS-MOD • PID—CBR-D31-DS-MOD Cisco cBR-8 Upstream PHY Modules: • PID—CBR-D30-US-MOD

[1] Effective with Cisco IOS-XE Release 3.17.0S, CBR-CCAP-SUP-60G supports 8 cable line cards. The total traffic rate is limited to 60Gbps, the total number of downstream service flow is limited to 72268, and downstream unicast low-latency flow does not count against the limits.

Prerequisites for Layer 3 CPE Mobility

No special equipment or software is needed to use the Layer 3 CPE Mobility feature.

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 CMs,
```

• 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.

- 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 SUP 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 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 CMs,
```

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 CMs, 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 be updated to aware of the mobility subnets, and the CPU usage will rise up during that time. So it's better to configure the mobility subnets before CM and CPE come online.

Enabling the Layer 3 CPE Mobility feature may, in certain situations, cause excessive punted packets. By default, the Source-Based Rate-Limiting (SBRL) feature rate-limits these punted packets to avoid CPU overload.

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.

Procedure

	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 bundle bundle number|**
	bundle-subif-number
	
	Example:
	
	`Router(config)# interface bundle 1`
	`or`
	`Router(config)# interface Bundle 1.1`
		Enters interface configuration or subinterface mode.

Step 4	**cable l3-mobility** *IP-address mask | IPv6 prefix*
	
	Example:
	
	`Router(config-if)# cable l3-mobility`
	`2001:DB:22:1::1/64`
	
	Example:
	
	`Router(config-subif)# cable l3-mobility`
	`192.0.3.1 255.255.255.0`
	
	Example:
	
	`Router(config-subif)#cable l3-mobility`
	`2001:DB:22:1::1/64`
		Enables mobility for a particular IPv4 or IPv6 subnet.
		
		Note This command can be configured on a interface or a subinterface bundle.

Step 5	**exit** **Example:**	Exits interface configuration mode.

Command or Action	Purpose
Router(config-if)# **exit**	

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
```

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Configure Source-Based Rate Limit (SBRL) for L3-mobility

This section describes how to configure Source-Based Rate Limit (SBRL) for the L3-mobility feature. This procedure is optional and if not configured, the default SBRL configuration will apply.

Note SBRL for L3-mobility is enabled by default, so this configuration is optional.

Subscriber-side SBRL has a global and per-punt-cause configuration. L3-mobility punts are only subject to the per-punt-cause configuration. Traffic streams are identified by hashing the punt-cause and the source-MAC-address. This value is used as the index for rate-limiting. There is no special processing for hash-collisions, so hash-colliding streams are treated as if they are the same stream.

The default rate for L3-mobility punts is 4 packets per second.

Before you begin

Note All punted packets are subject to CoPP and the punt-policer.

Procedure

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

	Command or Action	**Purpose**
Step 2	**configure terminal** **Example:** Router# **configure terminal**	Enters global configuration mode.
Step 3	**platform punt-sbrl subscriber punt-cause** *punt-cause* **rate** *rate* **Example:** Router(config)# **platform punt-sbrl subscriber punt-cause 99 rate 8**	Configures Subscriber-MAC-address SBRL.
Step 4	**exit** **Example:** Router(config-if)# **exit**	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.

Procedure

	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 bundle** *bundle number* | *bundle-subif-number* **Example:** Router(config)# **interface bundle 1** or Router(config)# **interface Bundle 1.1**	Enters interface configuration or subinterface mode.

	Command or Action	Purpose

Step 4	**no cable l3-mobility** *IP-address mask | IPv6 prefix*
	
	Example:
	
	`Router(config-if)# cable l3-mobility 192.0.3.1 255.255.255.0`
	
	`Router(config-if)# cable l3-mobility 2001:DB:22:1::1/64`
		Disbles mobility for a particular IPv4 or IPv6 subnet.
		
		Note This command can be configured on a interface or a subinterface bundle

Step 5	**exit** **Example:** `Router(config-if)# exit`	Exits interface configuration mode.

Verifying Layer 3 Mobility Configuration

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

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 SBRL for L3-mobility

The following example shows how SBRL is configured for L3-mobility:

```
Router# show run | i punt-sbrl
platform punt-sbrl subscriber punt-cause 99 rate 8
```

Additional References

The following sections provide references related to Layer 3 CPE Mobility feature for the Cisco CMTS routers.

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 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

Feature Name	Releases	Feature Information
Layer 3 Mobility	Cisco IOS-XE Release 3.15.0S	This feature was introduced on the Cisco cBR Series Converged Broadband Routers.