



PMIPv6 — Mobile Router Support

PMIPv6 — Mobile Router support feature enables the mobility of a node which is a device that comprises of one or more entire networks moving together, for example, on an airplane, a ship, a train, an automobile, a bicycle, or a kayak. The nodes connected to a network served by the mobile device may themselves be fixed nodes, mobile nodes, or devices.

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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.

Information About PMIPv6 — Mobile Router Support

Mobile Access Gateways

Mobile Access Gateway (MAG) performs mobility-related signaling on behalf of the mobile nodes (MN) attached to its access links. MAG is the access router for the MN; that is, MAG is the first-hop router in the localized mobility management infrastructure.

MAG performs the following functions:

- Obtains an IP address from Local Mobility Anchor (LMA) and assigns it to MN.
- Retains the IP address of an MN when the MN roams across MAGs.
- Tunnels traffic from MN to LMA.

Local Mobility Anchor

Local Mobility Anchor (LMA) is the home agent for a mobile node (MN) in a Proxy Mobile IPv6 (PMIPv6) domain. It is the topological anchor point for MN home network prefixes and manages the binding state of an MN. An LMA has the functional capabilities of a home agent as defined in the Mobile IPv6 base specification (RFC 3775) along with the capabilities required for supporting the PMIPv6 protocol.



Note

Use the **dynamic mag learning** command to enable LMA to accept Proxy Mobile IPv6 (PMIPv6) signaling messages from any Mobile Access Gateway (MAG) that is not configured locally.

PMIPv6 — Mobile Router Support Overview

Logical MN (LMN) within a mobile network is a traditional mobile router. The LMN and a regular mobile node (MN) can reside on a mobile access gateway (MAG) simultaneously.

The LMNs may have their mobile networks. These mobile networks are another set of interfaces present on the MAG. These mobile networks are typically attached to the physical interfaces of the LMN entity.

A mobile network interface has a subnet or a network behind it, to which the MN attaches. The MN gets its IP address from the DHCP server running on the MAG. The DHCP server assigns an IP address to MN from the subnet associated with mobile network interface.

If the MAG is mobile, the LMN and mobile network behind it moves along with the MAG. Where ever the MAG roams, the LMN and the mobile network behind is reachable. The LMN and the mobile network acquire the same IP address from the LMA.

Dynamic Mobile Network Assignment

Mobile Access Gateway (MAG) can dynamically assign mobile prefixes and IP addresses to the associated logical mobile nodes (LMNs). When dynamic assignment of IP addresses occurs, the Home Address (HoA) and the Home Network Prefix (HNP) option in the Proxy Binding Update (PBU) message for LMNs is indicated as 0. However, irrespective of the dynamic assignment, the MAG must configure the home interface with the IP address that the LMA statically assigns to the MAG.

On receiving the dynamically assigned network prefixes in the Proxy Binding Acknowledgement (PBA) message, the MAG configures the first address in each subnet to the mobile network interface. DHCP is configured using the **dhcp local pool** command so any DHCP request that reaches an interface is served with an address from the subnet to which the mobile network interface belongs.

Mobile Node

Mobile node (MN) is an IP host and the mobility of the MN is managed by a network. MN can be an IPv4-only node, an IPv6-only node, or a dual-stack node, which is a node with IPv4 and IPv6 protocol stacks. MN is not required to participate in any IP mobility-related signaling for achieving mobility for an IP address or a prefix that is obtained in the Proxy Mobile IPv6 (PMIPv6) domain.

How to Configure PMIPv6 — Mobile Router Support

Configuring the NAI for LMN in the PMIPv6 Domain

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 mobile pmipv6-domain** *domain-name*
4. **nai** *[user]@realm*
5. **lma** *lma-id*
6. **end**

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	ipv6 mobile pmipv6-domain <i>domain-name</i> Example: Device(config)# ipv6 mobile pmipv6-domain dn1	Creates the Proxy Mobile IPv6 (PMIPv6) domain and enters PMIPv6 domain configuration mode.
Step 4	nai <i>[user]@realm</i> Example: Device(config-ipv6-pmipv6-domain)# nai user1@example.com	Configures a network access identifier for the mobile node (MN) within the PMIPv6 domain and enters PMIPv6 domain mobile node configuration mode.

	Command or Action	Purpose
Step 5	lma <i>lma-id</i> Example: Device(config-ipv6-pmipv6-domain-mn) # lma lma1	Configures an LMA for the MN. Note You can repeat steps 4 and 5 as many times as required - to configure additional network access identifiers and LMAs.
Step 6	end Example: Device(config-ipv6-pmipv6-domain-mn) # end	Exits PMIPv6 domain mobile node configuration mode and returns to privileged EXEC mode.

Configuring a Logical Mobile Node, Home Interface, and the Mobile Network Interfaces

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 mobile pmipv6-mag** *mag-id* **domain** *domain-name*
4. **logical-mn** [*user*]*@realm*
5. **service** {**dual** | **ipv4** | **ipv6** }
6. **mobile network** *type number* **label** *label-name*
7. **home interface** *type number*
8. **end**

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.

	Command or Action	Purpose
Step 3	ipv6 mobile pmipv6-mag mag-id domain domain-name Example: Device(config)# ipv6 mobile pmipv6-mag mag1 domain dn1	Enables the MAG service on the device, configures the PMIPv6 domain for the LMA, and enters the MAG configuration mode.
Step 4	logical-mn [user]@realm Example: Device(config-ipv6-pmipv6-mag)# logical-mn user1@example.com	Enables the mobile router functionality in MAG and enters the MAG logical-mn configuration mode.
Step 5	service {dual ipv4 ipv6 } Example: Device(config-ipv6-pmipv6mag-logicalmn)# service dual	Configures the service provided to the MN within the PMIPv6 domain.
Step 6	mobile network type number label label-name Example: Device(config-ipv6-pmipv6-mag-logicalmn)# mobile network ethernet 1/0 label ETH1	Configures a physical interface for the mobile network.
Step 7	home interface type number Example: Device(config-ipv6-pmipv6-mag-logicalmn)# home interface loopback 0	Enables a specific interface as the home interface for a logical mobile node.
Step 8	end Example: Device(config-ipv6-pmipv6-mag-logicalmn)# end	Exits MAG logical-mn configuration mode and returns to privileged EXEC mode.

Configuring Dynamic Mobile Network Assignment

SUMMARY STEPS

1. **enable**
2. **enable terminal**
3. **ipv6 mobile pmipv6-mag** *mag-id domain domain-name*
4. **logical-mn** *network-access-identifier*
5. **mobile network** *interface-type interface-number*
6. **address dynamic**
7. **home interface** *type number*
8. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	enable terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	ipv6 mobile pmipv6-mag <i>mag-id domain domain-name</i> Example: Device (config)# ipv6 mobile pmipv6-mag mag1 domain dn1	Enables the MAG service on a device, configures the PMIPv6 domain for the MAG, and enters MAG configuration mode.
Step 4	logical-mn <i>network-access-identifier</i> Example: Device (config-ipv6-pmipv6-mag)# logical-mn mn1@example.com	Enables mobile router functionality in MAG and enters MAG logical MN configuration.
Step 5	mobile network <i>interface-type interface-number</i> Example: Device (config-ipv6-pmipv6-mag-logicalmn)# mobile network ethernet 0/1	Specifies the mobile router interface that is connected to the dynamic mobile network.
Step 6	address dynamic Example: Device (config-ipv6-pmipv6-mag-logicalmn)# address dynamic	Dynamically assigns IP addresses to the home interface, mobile network interface, and mobile network nodes.

	Command or Action	Purpose
Step 7	home interface <i>type number</i> Example: Device (config-ipv6-pmipv6-mag-logicalmn) # home interface loopback 0	Enables the specific interface as the home interface for an LMN.
Step 8	end Example: Device (config-ipv6-pmipv6-mag-logicalmn) # end	Exits global configuration mode and returns to privileged EXEC mode.

Configuration Examples for PMIPv6 - Mobile Router Support

Example: Configuring NAI for LMN in the PMIPv6 Domain

```
Device> enable
Device# configuration terminal
Device(config)# ipv6 mobile pmipv6-domain D1
Device(config-ipv6-pmipv6-domain)# nai user1@example.com
Device(config-ipv6-pmipv6-domain-mn)# lma LMA1
Device(config-ipv6-pmipv6-domain-mn)# end
```

Example: Configuring a Logical Mobile Node, Home Interface, and the Mobile Network Interfaces

```
Device> enable
Device# configuration terminal
Device(config)# ipv6 mobile pmipv6-mag MAG1 domain D1
Device(config-ipv6-pmipv6-mag)# logical-mn user1@example.com
Device(config-ipv6-pmipv6mag-logicalmn)# mobile network ethernet 1/0
Device(config-ipv6-pmipv6mag-logicalmn)# home interface loopback 0
Device(config-ipv6-pmipv6mag-logicalmn)# end
```

Example: Dynamic Mobile Network Assignment

```
Device> enable
Device# configuration terminal
Device(config)# ipv6 mobile pmipv6-mag MAG1 domain D1
Device(config-ipv6-pmipv6-mag) logical-mn user1@example.com
Device(config-ipv6-pmipv6-mag-logicalmn) mobile network ethernet 1/0
Device(config-ipv6-pmipv6-mag-logicalmn) address dynamic
Device(config-ipv6-pmipv6-mag-logicalmn) home interface loopback 0
Device(config-ipv6-pmipv6-mag-logicalmn) end
```

Example: Complete Configuration of a PMIPv6 MAG with the Mobile Router Communicating with a 3GPP LMA

```

Device> enable
Device# configuration terminal
Device(config)# ipv6 mobile pmipv6-domain LMA-DOMAIN
Device(config-ipv6-pmipv6-domain)# nai IMSI@APN
Device(config-ipv6-pmipv6-domain-mn)# lma LMA_SVC
Device(config-ipv6-pmipv6-domain-mn)# end
Device#

Device> enable
Device# configuration terminal
Device(config)# ipv6 mobile pmipv6-mag MAG819 domain LMA-DOMAIN
Device(config-ipv6-pmipv6-mag)# tunnel-template tun100
Device(config-ipv6-pmipv6-mag)# role 3GPP
Device(config-ipv6-pmipv6-mag)# apn 1234.mcs
Device(config-ipv6-pmipv6-mag)# address dynamic
Device(config-ipv6-pmipv6mag-addr-dyn)# roaming interface Cellular 0 priority 1 egress-att
LTE label LTE
Device(config-ipv6-pmipv6mag-addr-dyn)# exit
Device(config-ipv6-pmipv6-mag)# no generate grekey
Device(config-ipv6-pmipv6-mag)# ignore grekey
Device(config-ipv6-pmipv6-mag)# interface Loopback10
Device(config-ipv6-pmipv6-mag)# lma LMA_SVC LMA-DOMAIN
Device(config-ipv6-pmipv6mag-lma)# ipv4-address 1.1.1.1
Device(config-ipv6-pmipv6mag-lma)# encaps gre-ipv4
Device(config-ipv6-pmipv6mag-lma)# exit
Device(config-ipv6-pmipv6-mag)# logical-mn IMSI@APN
Device(config-ipv6-pmipv6mag-logicalmn)# mobile network e0/1
Device(config-ipv6-pmipv6mag-logicalmn)# reverse-tunnel route ipv4 0.0.0.0 0 210
Device(config-ipv6-pmipv6mag-logicalmn)# home interface Loopback10
Device(config-ipv6-pmipv6mag-logicalmn)# end

```



Note

- A global tunnel template is configured under the MAG configuration.
- PMIPv6 tunnelling mode is GRE-IPv4 with no GRE keys programmed on the tunnel using the **ignore grekey** configuration.
- Reverse tunnelling is enabled for the mobile router using the **reverse-tunnel route** configuration which adds a IPv4 default route with a given metric over the dynamically created PMIPv6 GRE-IPv4 tunnel.

Additional References for PMIPv6 - Mobile Router Support

Related Documents

Related Topic	Document Title
Cisco IOS commands	Master Command List, All Releases
IP mobility commands	IP Mobility Command Reference

Standards and RFCs

Standard/RFC	Title
RFC 3775	<i>Mobility Support in IPv6</i>
RFC 5213	<i>Proxy Mobile IPv6</i>
RFC 5844	<i>IPv4 Support for Proxy Mobile IPv6</i>
RFC 5845	<i>Generic Routing Encapsulation (GRE) Key Option for Proxy Mobile IPv6</i>
RFC 5846	<i>Binding Revocation for IPv6 Mobility</i>

MIBs

MIB	MIBs Link
None	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

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

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Feature Information for PMIPv6 - Mobile Router Support

The following table provides release information about the feature or features described in this module. This 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.

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Table 1: Feature Information for PMIPv6 - Mobile Router Support

Feature Name	Releases	Feature Information
PMIPv6 - Mobile Router Support	15.4(1)T	PMIPv6 - Mobile Router support feature enables the mobility of a node that is device comprising of one or more entire networks moving together, for example, on an airplane, a ship, a train, an automobile, a bicycle, or a kayak. The nodes connected to a network served by the mobile device may themselves be fixed nodes or mobile nodes or devices.
Dynamic Mobile Network Assignment	15.5(1)T	Dynamic Mobile Network Assignment feature enables dynamically assignment of IP addresses to the associated logical mobile nodes. The following command was added: address dynamic