Proxy Mobile IPv6 Support for MAG Functionality

The Proxy Mobile IPv6 Support for MAG Functionality feature provides network-based IP Mobility management to a mobile node (MN) without requiring the participation of the mobile node in any IP Mobility-related signaling. The Mobile Access Gateway (MAG) tracks the movements of the MN to and from an access link and sends signals to the local mobility anchor of the MN.

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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.

Prerequisites for Proxy Mobile IPv6 Support for MAG Functionality

The DHCP server must be configured.

Information About Proxy Mobile IPv6 Support for MAG Functionality

Proxy Mobile IPv6 Overview

Proxy Mobile IPv6 (PMIPv6) provides network-based IP Mobility management to a mobile node (MN), without requiring the participation of the MN in any IP mobility-related signaling. The mobility entities in the network track the movements of the MN, initiate the mobility signaling, and set up the required routing state.

The major functional entities of PMIPv6 are Mobile Access Gateways (MAGs), Local Mobility Anchors (LMAs), and MNs.

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.

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.

AAA Server Attributes for Proxy Mobile IPv6

If an authentication, authorization, and accounting (AAA) server is available, a Mobile Access Gateway (MAG) obtains the profile information of the Proxy Mobile IPv6 (PMIPv6) domain and the mobile node (MN) from the server during the configuration and call-flow time, respectively.

The following are the AAA attributes required for configuring the PMIPv6 domain and the MN are:

- PMIPv6 domain-specific AAA attributes:
  - cisco-mpc-protocol-interface
  - lma-identifier
  - mag-identifier
  - mag-v4-address
  - mag-v6-address
  - pmip6-domain-identifier
  - pmip6-timestamp-window
  - pmip6-replay-protection
  - pmip6-spi-key
  - pmip6-spi-value
- MN-specific AAA attributes:
  - home-lma
  - home-lma-ipv6-address
  - mn-nai
  - home-lma-ipv4-address
  - mn-apn
  - Mobile-Node-Identifier
  - mn-network
  - mn-service
  - multihomed

How to Configure Proxy Mobile IPv6 Support for MAG Functionality

Configuring a Proxy Mobile IPv6 Domain by Using the Configuration from the AAA Server

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 mobile pmipv6-domain** *domain-name* **load-aaa**
4. **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** *domain-name* **load-aaa** **Example:** `Device(config)# ipv6 mobile pmipv6-domain D1 load-aaa`	Creates a PMIPv6 domain and configures it by using the configuration from the AAA server.
Step 4	**end** **Example:** `Device(config)# end`	Exits global configuration mode and returns to privileged EXEC mode.

Configuring the Minimum Configuration for a MAG to Function

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 mobile pmipv6-domain** *domain-name*
4. **lma** *lma-id*
5. **ipv6-address** *ipv6-address*
6. **exit**
7. Repeat Steps 5 to 8 to configure the second LMA.
8. **nai** [*user*]*@realm*
9. **lma** *lma-id*
10. **service** {**dual** | **ipv4** | **ipv6**}
11. **exit**
12. Repeat Steps 10 to 11 to configure the second MN.
13. **end**

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	**ipv6 mobile pmipv6-domain** *domain-name* **Example:** `Device(config)# ipv6 mobile pmipv6-domain dn1`	Creates the Proxy Mobile IPv6 (PMIPv6) domain and enters PMIPv6 domain configuration mode.
Step 4	**lma** *lma-id* **Example:** `Device(config-ipv6-pmipv6-domain)# lma lma1`	Configures an Local Mobility Anchor (LMA) within the PMIPv6 domain and enters PMIPv6 domain LMA configuration mode.
Step 5	**ipv6-address** *ipv6-address* **Example:** `Device(config-ipv6-pmipv6-domain-lma)# ipv6-address 2001:DB8::1`	Configures an IPv6 address for the LMA within the PMIPv6 domain.
Step 6	**exit** **Example:** `Device(config-ipv6-pmipv6-domain-lma)# exit`	Exits PMIPv6 domain LMA configuration mode and returns to PMIPv6 domain configuration mode.
Step 7	Repeat Steps 5 to 8 to configure the second LMA.	—
Step 8	**nai** [*user*]*@realm* **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.
Step 9	**lma** *lma-id* **Example:** `Device(config-ipv6-pmipv6-domain-mn)# lma lma1`	Configures an LMA for the MN.
Step 10	**service** {**dual** | **ipv4** | **ipv6**} **Example:** `Device(config-ipv6-pmipv6-domain-mn)# service ipv4`	Configures the service provided to the MN within the PMIPv6 domain. The type of services provided to the MN are as follows: • **dual**—Specifies both IPv4 and IPv6 services for an MN.

	Command or Action	Purpose
		• **IPv4**—Specifies IPv4 service for an MN. • **IPv6**—Specifies IPv6 service for an MN.
Step 11	**exit** **Example:** `Device(config-ipv6-pmipv6-domain-mn)# exit`	Exits PMIPv6 domain mobile node configuration mode and returns to PMIPv6 domain configuration mode.
Step 12	Repeat Steps 10 to 11 to configure the second MN.	—
Step 13	**end** **Example:** `Device(config-ipv6-pmipv6-domain)# end`	Exits PMIPv6 domain configuration mode and returns to privileged EXEC mode.

Configuring a Detailed Configuration for a MAG When an AAA Server Is Not Available

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 mobile pmipv6-domain** *domain-name*
4. **service password-encryption**
5. **replay-protection timestamp** [**window** *seconds*]
6. **auth-option spi** {*spi-hex-value* | **decimal** *spi-decimal-value*} **key** {**ascii** *ascii-string* | **hex** *hex-string*}
7. **encap** {**gre-ipv4** | **ipv6-in-ipv6**}
8. **local-routing-mag**
9. **lma** *lma-id*
10. **ipv6-address** *ipv6-address*
11. **exit**
12. Repeat Steps 10 to 12 to configure each LMA.
13. **mag** *mag-id*
14. **ipv6-address** *ipv6-address*
15. **exit**
16. **mn-profile-load-aaa**
17. **nai** [*user*]*@realm*
18. **lma** *lma-id*
19. **int att** *interface-access-type* **l2-addr** *mac-address*
20. **gre-encap-key** [**down** | **up**] *key-value*
21. **service** {**dual** | **ipv4** | **ipv6**}
22. **apn** *apn-name*
23. **exit**

24. Repeat Steps 20 to 24 to configure each MN.
25. **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** *domain-name* **Example:** `Device(config)# ipv6 mobile pmipv6-domain dn1`	Creates a Proxy Mobile IPv6 (PMIPv6) domain and enters PMIPv6 domain configuration mode.
Step 4	**service password-encryption** **Example:** `Device(config)# service password-encryption`	Converts unencrypted passwords to encrypted passwords automatically.
Step 5	**replay-protection timestamp** [**window** *seconds*] **Example:** `Device(config-ipv6-pmipv6-domain)# replay-protection timestamp window 200`	Configures the replay protection mechanism within the PMIPv6 domain.
Step 6	**auth-option spi** {*spi-hex-value* | **decimal** *spi-decimal-value*} **key** {**ascii** *ascii-string* | **hex** *hex-string*} **Example:** `Device(config-ipv6-pmipv6-domain)# auth-option spi 67 key ascii key1`	Configures authentication for the PMIPv6 domain.
Step 7	**encap** {**gre-ipv4** | **ipv6-in-ipv6**} **Example:** `Device(config-ipv6-pmipv6-domain)# encap gre-ipv4`	Configures the tunnel encapsulation mode type between the Mobile Access Gateway (MAG) and the Local Mobility Anchor (LMA).
Step 8	**local-routing-mag** **Example:** `Device(config-ipv6-pmipv6-domain)# local-routing-mag`	Enables local routing for the MAG.

	Command or Action	Purpose
Step 9	**lma** *lma-id* **Example:** `Device(config-ipv6-pmipv6-domain)# lma lma1`	Configures LMA within the PMIPv6 domain and enters PMIPv6 domain LMA configuration mode.
Step 10	**ipv6-address** *ipv6-address* **Example:** `Device(config-ipv6-pmipv6-domain-lma)# ipv6-address 2001:0DB8:2:3::1`	Configures an IPv6 address for the LMA within the PMIPv6 domain.
Step 11	**exit** **Example:** `Device(config-ipv6-pmipv6-domain-lma)# exit`	Exits PMIPv6 domain LMA configuration mode and returns to PMIPv6 domain configuration mode.
Step 12	Repeat Steps 10 to 12 to configure each LMA.	—
Step 13	**mag** *mag-id* **Example:** `Device(config-ipv6-pmipv6-domain)# mag mag1`	Configures a MAG within the PMIPv6 domain and enters PMIPv6 domain MAG configuration mode.
Step 14	**ipv6-address** *ipv6-address* **Example:** `Device(config-ipv6-pmipv6-domain-mag)# ipv6-address 2001:0DB8:2:4::1`	Configures an IPv6 address for the MAG within the PMIPv6 domain.
Step 15	**exit** **Example:** `Device(config-ipv6-pmipv6-domain-mag)# exit`	Exits PMIP domain MAG configuration mode and returns to PMIPv6 domain configuration mode.
Step 16	**mn-profile-load-aaa** **Example:** `Device(config-ipv6-pmipv6-domain)# mn-profile-load-aaa`	(Optional) Loads the profile configuration from AAA to the mobile node (MN) within the PMIPv6 domain. **Note** Steps 20 to 24 need not be entered if the MN is configured using the configuration from AAA. You can use the specific command to override the configuration for a specific mobile node (MN) parameter.
Step 17	**nai** [*user*]*@realm* **Example:** `Device(config-ipv6-pmipv6-domain)# nai user1@example.com`	Configures the network address identifier (NAI) for the MN within the PMIPv6 domain and enters PMIPv6 domain MN configuration mode.

	Command or Action	Purpose
Step 18	**lma** *lma-id* **Example:** `Device(config-ipv6-pmipv6-domain-mn)# lma lma1`	Configures the LMA for the MN.
Step 19	**int att** *interface-access-type* **l2-addr** *mac-address* **Example:** `Device(config-ipv6-pmipv6-domain-mn)# int att Gigabitethernet l2-addr 02c7.f800.0422`	Configures the access technology type, interface, and MAC address of the MN interface within the PMIPv6 domain.
Step 20	**gre-encap-key** [**down** | **up**] *key-value* **Example:** `Device(config-ipv6-pmipv6-domain-mn)# gre-encap-key down 45`	Configures a generic routing encapsulation (GRE) key for the MN within the PMIPv6 domain.
Step 21	**service** {**dual** | **ipv4** | **ipv6**} **Example:** `Device(config-ipv6-pmipv6-domain-mn)# service ipv4`	Configures the service provided to the MN within the PMIPv6 domain. The type of services provided to the MN are as follows: • **dual**—Specifies both IPv4 and IPv6 services for an MN. • **IPv4**—Specifies an IPv4 service for an MN. • **IPv6**—Specifies an IPv6 service for an MN.
Step 22	**apn** *apn-name* **Example:** `Device(config-ipv6-pmipv6-domain-mn)# apn apn1`	Specifies an access point name (APN) to the MN subscriber within the PMIPv6 domain.
Step 23	**exit** **Example:** `Device(config-ipv6-pmipv6-domain-mn)# exit`	Exits PMIP domain MN configuration mode and returns to PMIPv6 domain configuration mode.
Step 24	Repeat Steps 20 to 24 to configure each MN.	—
Step 25	**end** **Example:** `Device(config-ipv6-pmipv6-domain)# end`	Exits PMIPv6 domain configuration mode and returns to privileged EXEC mode.

Configuring a Minimum Configuration for a MAG

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 mobile pmipv6-mag** *mag-id* **domain** *domain-name*
4. **address ipv6** *ipv6-address*
5. **sessionmgr**
6. **generate grekey**
7. **interface** *type number*
8. **role** {**3gpp** | **lte** | **wimax** | **wlan**}
9. **apn** *apn-name*
10. **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-mag** *mag-id* **domain** *domain-name* **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	**address ipv6** *ipv6-address* **Example:** `Device(config-ipv6-pmipv6-mag)# address ipv6 2001:0DB8:2:4::1`	Configures an IPv6 address for the MAG.
Step 5	**sessionmgr** **Example:** `Device(config-ipv6-pmipv6-mag)# sessionmgr`	Enables the MAG to process the the notification it receives through the mobile client service abstraction (MCSA) from the Intelligent Services Gateway (ISG).
Step 6	**generate grekey** **Example:**	Enables dynamic generation of upstream generic routing encapsulation keys for mobile nodes in an LMA.

	Command or Action	Purpose
	`Device(config-ipv6-pmipv6-mag)# generate grekey`	
Step 7	**interface** *type number* **Example:** `Device(config-ipv6-pmipv6-mag)# interface gigabitethernet 0/0/0`	Enables an interface for the MAG.
Step 8	**role** {**3gpp** | **lte** | **wimax** | **wlan**} **Example:** `Device(config-ipv6-pmipv6-mag)# role lte`	Configures a role for the MAG. The keywords are as follows: • **3gpp**—Specifies the role as the 3rd Generation Partnership Project (3GPP). • **lte**—Specifies the role as Long Term Evaluation (LTE). • **wimax**—Specifies the role as wimax. • **wlan**—Specifies the role as wireless LAN (WLAN).
Step 9	**apn** *apn-name* **Example:** `Device(config-ipv6-pmipv6-mag)# apn apn2`	Specifies an access point name (APN) to the subscriber of the MAG. **Note** Specifying an APN is mandatory if the role of the MAG is 3GPP.
Step 10	**end** **Example:** `Device(config-ipv6-pmipv6-mag)# end`	Exits MAG configuration mode and returns to privileged EXEC mode.

Configuring a Detailed Configuration for a MAG

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **vrf definition** *vrf-name*
4. **exit**
5. **ipv6 mobile pmipv6-mag** *mag-id* **domain** *domain-name*
6. **role** {**3gpp** | **wlan**}
7. **apn** *apn-name*
8. **local-routing-mag**
9. **discover-mn-detach poll interval** *seconds* **timeout** *seconds* **retries** *retry-count*
10. **address ipv4** *ipv4-address*
11. **address ipv6** *ipv6-address*

12. **sessionmgr**
13. **interface** *type number*
14. **binding maximum** *number*
15. **binding lifetime** *seconds*
16. **binding refresh-time** *seconds*
17. **binding init-retx-time** *milliseconds*
18. **binding max-retx-time** *milliseconds*
19. **replay-protection timestamp** [**window** *seconds*]
20. **bri delay min** *milliseconds*
21. **bri delay max** *milliseconds*
22. **bri retry** *number*
23. **lma** *lma-id domain-name*
24. **auth-option spi** {*spi-hex-value* | **decimal** *spi-decimal-value*} **key** {**ascii** | **hex**} *hex-string*
25. **ipv4-address** *ipv4-address*
26. **vrfid** *vrf-name*
27. **encap** {**gre-ipv4** | **ipv6-in-ipv6**}
28. **end**
29. **show ipv6 mobile pmipv6 mag** *mag-id* **globals**

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	**vrf definition** *vrf-name* **Example:** `Device(config)# vrf definition vrf1`	Configures a virtual routing and forwarding (VRF) routing table instance and enters VRF configuration mode.
Step 4	**exit** **Example:** `Device(config-vrf) exit`	Exits VRF configuration mode and returns to global configuration mode.
Step 5	**ipv6 mobile pmipv6-mag** *mag-id* **domain** *domain-name* **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.

	Command or Action	Purpose
Step 6	**role** {**3gpp** | **wlan**} **Example:** `Device(config-ipv6-pmipv6-mag)# role 3gpp`	Configures a role for the MAG. The keywords are as follows: • **3gpp**—Specifies the role as 3GPP. • **lte**—Specifies the role as LTE. • **wimax**—Specifies the role as wimax. • **wlan**—Specifies the role as wireless LAN (WLAN).
Step 7	**apn** *apn-name* **Example:** `Device(config-ipv6-pmipv6-mag)# apn apn2`	Specifies an access point name (APN) to the subscriber of the MAG.
Step 8	**local-routing-mag** **Example:** `Device(config-ipv6-pmipv6-mag)# local-routing-mag`	Enables local routing for the MAG.
Step 9	**discover-mn-detach poll interval** *seconds* **timeout** *seconds* **retries** *retry-count* **Example:** `Device(config-ipv6-pmipv6-mag)# discover-mn-detach poll interval 11 timeout 3 retries 4`	Enables periodic verification of the MN attachment with the MAG-enabled interface.
Step 10	**address ipv4** *ipv4-address* **Example:** `Device(config-ipv6-pmipv6-mag)# address ipv4 10.1.3.1`	Configures an IPv4 address for the MAG.
Step 11	**address ipv6** *ipv6-address* **Example:** `Device(config-ipv6-pmipv6-mag)# address ipv6 2001:0DB8:2:4::1`	Configures an IPv6 address for the MAG.
Step 12	**sessionmgr** **Example:** `Device(config-ipv6-pmipv6-mag)# sessionmgr`	Configures an IPv6 address for the MAG.
Step 13	**interface** *type number* **Example:**	Enables an interface for the MAG.

	Command or Action	Purpose
	`Device(config-ipv6-pmipv6-mag)# interface gigabitethernet 0/0/0`	
Step 14	**binding maximum** *number* **Example:** `Device(config-ipv6-pmipv6-mag)# binding maximum 200`	Specifies the maximum number of Proxy Binding Update (PBU) entries allowed for the MAG.
Step 15	**binding lifetime** *seconds* **Example:** `Device(config-ipv6-pmipv6-mag)# binding lifetime 5000`	Specifies the maximum lifetime permitted for the PBU entry.
Step 16	**binding refresh-time** *seconds* **Example:** `Device(config-ipv6-pmipv6-mag)# binding refresh-time 2000`	Specifies the PBU entry refresh time.
Step 17	**binding init-retx-time** *milliseconds* **Example:** `Device(config-ipv6-pmipv6-mag)# binding init-retx-time 110`	Specifies the initial timeout interval between the PBU and Proxy Binding Acknowledgment (PBA) until a PBA is received.
Step 18	**binding max-retx-time** *milliseconds* **Example:** `Device(config-ipv6-pmipv6-mag)# binding max-retx-time 4000`	Specifies the maximum timeout interval between the PBU and the PBA until a PBA is received.
Step 19	**replay-protection timestamp** [**window** *seconds*] **Example:** `Device(config-ipv6-pmipv6-mag)# replay-protection timestamp window 200`	Configures the replay protection mechanism within the PMIPv6 domain.
Step 20	**bri delay min** *milliseconds* **Example:** `Device(config-ipv6-pmipv6-mag)# bri delay min 500`	Specifies the minimum time for which an LMA should wait before transmitting the Binding Revocation Indication (BRI) message.
Step 21	**bri delay max** *milliseconds* **Example:** `Device(config-ipv6-pmipv6-mag)# bri delay max 4500`	Specifies the maximum time for which an LMA should wait for the Binding Revocation Acknowledgment (BRA) message before retransmitting the BRI message.

	Command or Action	Purpose
Step 22	**bri retry** *number* **Example:** `Device(config-ipv6-pmipv6-mag)# bri retry 6`	Specifies the maximum number of times an LMA should retransmit a BRI message, until a BRA is received.
Step 23	**lma** *lma-id domain-name* **Example:** `Device(config-ipv6-pmipv6-mag)# lma lma3 dn1`	Configures the LMA for the MAG and enters MAG-LMA configuration mode.
Step 24	**auth-option spi** {*spi-hex-value* | **decimal** *spi-decimal-value*} **key** {**ascii** | **hex**} *hex-string* **Example:** `Device(config-ipv6-pmipv6mag-lma)# auth-option spi decimal 258 key hex BDF`	Configures authentication for the LMA within the MAG.
Step 25	**ipv4-address** *ipv4-address* **Example:** `Device(config-ipv6-pmipv6mag-lma)# ipv4-address 172.16.0.1`	Configures an IPv4 address for the LMA within the MAG. **Note** You can repeat this command to configure multiple IP addresses.
Step 26	**vrfid** *vrf-name* **Example:** `Device(config-ipv6-pmipv6mag-lma)# vrfid vrf1`	Specifies a VRF for an LMA peer.
Step 27	**encap** {**gre-ipv4** | **ipv6-in-ipv6**} **Example:** `Device(config-ipv6-pmipv6mag-lma)# encap gre-ipv4`	Configures a tunnel encapsulation mode type between the MAG and the LMA.
Step 28	**end** **Example:** `Device(config-ipv6-pmipv6mag-lma)# end`	Exits MAG-LMA configuration mode and returns to privileged EXEC mode.
Step 29	**show ipv6 mobile pmipv6 mag** *mag-id* **globals** **Example:** `Device# show ipv6 mobile pmipv6 mag mag1 globals`	(Optional) Displays MAG global configuration details.

Example

The following example shows the MAG global configuration:

```
Router# show ipv6 mobile pmipv6 mag mag1 globals

--------------------------------------------------
Domain  : D1
Mag Identifier  : M1
        MN's detach discover            : disabled
        Local routing                   : disabled
        Mag is enabled on interface     : GigabitEthernet0/0/0
        Mag is enabled on interface     : GigabitEthernet0/1/0
        Max Bindings                    : 3
        AuthOption                      : disabled
        RegistrationLifeTime            : 3600 (sec)
        BRI InitDelayTime               : 1000 (msec)
        BRI MaxDelayTime                : 40000 (msec)
        BRI MaxRetries                  : 6
        BRI EncapType                   : IPV6_IN_IPV6
        Fixed Link address is           : enabled
        Fixed Link address              : aaaa.aaaa.aaaa
        Fixed Link Local address is     : enabled
        Fixed Link local address        : 0xFE800000 0x0 0x0 0x2
        RefreshTime                     : 300 (sec)
        Refresh RetxInit time           : 20000 (msec)
        Refresh RetxMax time            : 50000 (msec)
        Timestamp option                : enabled
        Validity Window                 : 7

Peer :  LMA1
        Max Bindings                    : 3
        AuthOption                      : disabled
        RegistrationLifeTime            : 3600 (sec)
        BRI InitDelayTime               : 1000 (msec)
        BRI MaxDelayTime                : 40000 (msec)
        BRI MaxRetries                  : 6
        BRI EncapType                   : IPV6_IN_IPV6
        Fixed Link address is           : enabled
        Fixed Link address              : aaaa.aaaa.aaaa
        Fixed Link Local address is     : enabled
        Fixed Link local address        : 0xFE800000 0x0 0x0 0x2
        RefreshTime                     : 300 (sec)
        Refresh RetxInit time           : 20000 (msec)
        Refresh RetxMax time            : 50000 (msec)
        Timestamp option                : enabled
        Validity Window                 : 7
Peer :  LMA2
        Max Bindings                    : 3
        AuthOption                      : disabled
```

Troubleshooting Tips

You can use the following commands to troubleshoot the MAG configuration:

- **debug ipv6 mobile mag event**
- **debug ipv6 mobile mag info**
- **show ipv6 mobile pmipv6 mag bindings**
- **show ipv6 mobile pmipv6 mag globals**

Configuration Examples for Proxy Mobile IPv6 Support for MAG Functionality

Example: Configuring a Proxy Mobile IPv6 Domain by Using the Configuration from the AAA Server

The following example shows how to configure the PMIPv6 domain by using the AAA server configuration:

```
Device# configure terminal
Device(config)# ipv6 mobile pmipv6-domain D1 load-aaa
```

The following example shows how to configure the PMIPv6 domain by using the configuration from the AAA server and how to override the configuration for specific PMIPv6 domain parameters:

```
Device# configure terminal
Device(config)# ipv6 mobile pmipv6-domain D11 load-aaa
Device(config)# ipv6 mobile pmipv6-domain D11
Device(config-ipv6-pmipv6-domain)# gre-ipv4
Device(config-ipv6-pmipv6-domain)# auth-option spi 67 key ascii key1
```

Example: Configuring a Proxy Mobile IPv6 Domain When the Configuration from an AAA Server Is Not Available

The following example shows how to configure the PMIPv6 domain when an AAA server configuration is not available:

```
Device# configure terminal
Device(config)# ipv6 mobile pmipv6-domain D2
Device(config-ipv6-pmipv6-domain)# replay-protection timestamp window 200
Device(config-ipv6-pmipv6-domain)# auth-option spi 100 key ascii hi
Device(config-ipv6-pmipv6-domain)# encap ipv6-in-ipv6
!
Device(config-ipv6-pmipv6-domain)# lma lma1
Device(config-ipv6-pmipv6-domain-lma)# ipv4-address 10.1.1.1
Device(config-ipv6-pmipv6-domain-lma)# ipv6-address 2001:0DB8:2:3::1
Device(config-ipv6-pmipv6-domain-lma)# exit
!
Device(config-ipv6-pmipv6-domain)# mag mag1
Device(config-ipv6-pmipv6-domain-mag)# ipv4-address 10.1.3.1
Device(config-ipv6-pmipv6-domain-mag)# ipv6-address 2001:0DB8:2:5::1
Device(config-ipv6-pmipv6-domain-mag)# exit
!
Device(config-ipv6-pmipv6-domain)# nai example1@example.com
Device(config-ipv6-pmipv6-domain-mn)# lma lma1
Device(config-ipv6-pmipv6-domain-mn)# int att gigabitethernet l2-addr 02c7.f800.0422
Device(config-ipv6-pmipv6-domain-mn)# gre-encap-key up 1234
Device(config-ipv6-pmipv6-domain-mn)# gre-encap-key down 5678
Device(config-ipv6-pmipv6-domain-mn)# service ipv4
Device(config-ipv6-pmipv6-domain-mn)# end
```

Example: Configuring a Mobile Access Gateway

The following example shows the minimum configuration required to enable MAG:

```
Device# configure terminal
Device(config)# ipv6 mobile pmipv6-domain D2
Device(config-ipv6-pmipv6-domain)# lma lma1
Device(config-ipv6-pmipv6-domain-lma)# ipv4-address 10.1.1.1
Device(config-ipv6-pmipv6-domain-lma)# ipv6-address 2001:0DB8:2:3::1
Device(config-ipv6-pmipv6-domain-lma)# exit
Device(config-ipv6-pmipv6-domain)# lma lma2
Device(config-ipv6-pmipv6-domain-lma)# ipv4-address 10.2.1.1
Device(config-ipv6-pmipv6-domain-lma)# ipv6-address 2001:0DB8:2:4::1
Device(config-ipv6-pmipv6-domain-lma)# exit
Device(config-ipv6-pmipv6-domain)# nai example1@example.com
Device(config-ipv6-pmipv6-domain-mn)# lma lma1
Device(config-ipv6-pmipv6-domain-mn)# exit
Device(config-ipv6-pmipv6-domain)# nai example2@example.com
Device(config-ipv6-pmipv6-domain-mn)# lma lma2
Device(config-ipv6-pmipv6-domain-mn)# exit
Device(config)# ipv6 mobile pmipv6-mag mag1 domain D2
Device(config-ipv6-pmipv6-mag)# address ipv6 2001:DB8:0:0:E000::F
Device(config-ipv6-pmipv6-mag)# address ipv4 10.2.1.1
Device(ipv6-mag-config)# interface gigabitethernet 0/0/0
Device(ipv6-mag-config)# role 3gpp
Device(ipv6-mag-config)# apn a
Device(ipv6-mag-config)# exit
```

Where to Go Next

The MAG entity works with the LMA provided by the ASR 5000 devices. To configure the LMA in the Cisco ASR 5000, see the “PDN Gateway Configuration” module in the Cisco ASR 5000 Series Packet Data Network Gateway Administration Guide.

Additional References

Related Documents

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

Standards and RFCs

Standard/RFC	Title
RFC 3775	*Mobility Support in IPv6*
RFC 5213	*Proxy Mobile IPv6*

Standard/RFC	Title
RFC 5844	*IPv4 Support for Proxy Mobile IPv6*
RFC 5845	*Generic Routing Encapsulation (GRE) Key Option for Proxy Mobile IPv6*
RFC 5846	*Binding Revocation for IPv6 Mobility*

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

Feature Information for Proxy Mobile IPv6 Support for MAG Functionality

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.

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.

Table 1: Feature Information for Proxy Mobile IPv6 MAG Functionality Support

Feature Name	Releases	Feature Information
Proxy Mobile IPv6 MAG Functionality Support	Cisco IOS XE Release 3.4S	The Proxy Mobile IPv6 Support for MAG Functionality feature provides network-based IP Mobility management to a mobile node without requiring the participation of the mobile node in any IP mobility-related signaling. The Mobile Access Gateway tracks the movements of the mobile node to and from the access link, and sends signals to the local mobility anchor of the mobile node. In Cisco IOS XE Release 3.4S, this feature was introduced on the Cisco ASR Series Aggregation Services 1000 routers. The following commands were introduced: **address**, **apn**, **auth-option**, **binding**, **bri**, **clear ipv6 mobile pmipv6 mag**, **debug ipv6 mobile mag**, **debug ipv6 mobile packets**, **discover-mn-detach**, **encap**, **fixed-link-layer-address**, **fixed-link-local-address**, **gre-encap-key**, **int att**, **interface**, **ipv4-address**, **ipv6 mobile pmipv6-domain**, **ipv6 mobile pmipv6-mag**, **ipv6-address**, **lma**, **local-routing-mag**, **mag**, **mn-profile-load-aaa**, **multi-homed**, **nai**, **replay-protection**, **role**, **service**, **show ipv6 mobile pmipv6 mag binding**, **show ipv6 mobile pmipv6 mag globals**, **show ipv6 mobile pmipv6 mag stats**.
IPv6 Client Support on Proxy Mobile IPv6 Mobile Access Gateway	Cisco IOS XE Release 3.5S	Prior to the introduction of the IPv6 Client Support on Proxy Mobile IPv6 Mobile Access Gateway feature, only IPv4 service could be provided to an MN within the PMIP domain. The IPv6 client support on Proxy Mobile IPv6 MAG feature is an enhancement to provide IPv4, IPv6, and dual service to the MN within the PMIP domain. The following command was modified: **service**.