PMIP: Multipath Support on MAG and LMA

The PMIP: Multipath Support on MAG and LMA feature enables the Mobile Access Gateway (MAG) to register multiple transport end-points with the Local Mobility Anchor (LMA), allowing the MAG and LMA to establish multiple tunnels and apply path selection on a flow basis.

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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 at the end of this module.

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 PMIP: Multipath Support for MAG and LMA

You must configure UDP as the tunnel encapsulation mode on Mobile Access Gateway (MAG) and the Local Mobility Anchor (LMA).

Information About PMIP: Multipath Support for MAG and 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 an **dynamic mag learning** command to enable an LMA to accept Proxy Mobile IPv6 (PMIPv6) signaling messages from any Mobile Access Gateway (MAG) that is not locally configured.

Mobile Access Gateways

A 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, the MAG is the first-hop router in the localized mobility management infrastructure.

A MAG performs the following functions:

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

Mobile Node

A mobile node (MN) is an IP host whose mobility is managed by the network. An 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. An 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.

Multipath Support

At any given time, many network paths exists between the Local Mobility Anchor (LMA) and Mobile Access Gateway (MAG). The PMIP: Multipath Support on MAG and LMA feature enables the MAG to select any one of the paths on priority basis or select all the existing network paths simultaneously to create tunnels to reach the LMA. All the paths have the same priority when multiple paths are selected.

Mobile Map

Mobile map configuration facilitates application-based routing. More than one mobile map can be configured under the Proxy Mobile IPv6 (PMIPv6) domain, however, at a given point of time, only one mobile map is active at the Mobile Access Gateway (MAG) and the Local Mobility Anchor (LMA). The mobile map and its entries are configured or modified when no bindings are available.

Logical Mobile Node

Logical mobile node (LMN) is a logical entity that represents a mobile node (MN) that is hosted on one of the interfaces of the Mobile Access Gateway (MAG) device. The LMN has a Network Access Indicator (NAI) similar to a regular MN. One or more networks can be associated with each LMN through the interfaces designated as mobile network interfaces. An LMN on mobile network receives an IP address from a DHCP server that runs on the MAG, unlike a mobile node whose address is assigned by the Local Mobility Anchor (LMA).

MAG to MAG Traffic Blocking on the PMIPv6 LMA

To prevent communication between PMIPv6 clients such as, mobile nodes (MNs), or entire mobile networks, that are connected to the same Local Mobility Anchor (LMA), the inter-MAG tunnel traffic is blocked by applying access control list (ACL) on the PMIPv6 tunnels. To enable the blockage of inter-MAG tunnel traffic, the prefixes of all the PMIPv6 addresses mentioned in the address pool configured on the LMA, must be entered in the ACL.

How to Configure PMIP: Multipath Support for MAG and LMA

Configuring PMIP: Multipath Support for MAG and LMA

Configuring UDP Encapsulation for a PMIPv6 Domain

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 mobile pmipv6-domain** *domain-name*
4. **encap udptunnel**
5. **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 PMIPv6 domain and enters PMIPv6 domain configuration mode.
Step 4	**encap udptunnel** **Example:** `Device(config-ipv6-pmipv6-domain)# encap udptunnel`	Configures the tunnel encapsulation mode type between the Mobile Access Gateway (MAG) and the Local Mobility Anchor (LMA).
Step 5	**end** **Example:** `Device(onfig-ipv6-pmipv6-domain)# end`	Exits PMIPv6 domain configuration mode and enters privileged EXEC mode.

Configuring Roaming Interface

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 mobile pmipv6-mag** *mag-id* **domain** *domain-name*
4. **address***dynamic*
5. **roaming interface** *type number*
6. **exit**

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 MAG service on a device, configures the PMIPv6 domain for the MAG, and enters MAG configuration mode.
Step 4	**address***dynamic* **Example:** `Device(config-ipv6-pmipv6-mag)# address dynamic`	Configures dynamic address for the MAG and enters MAG dynamic address configuration mode.
Step 5	**roaming interface** *type number* **Example:** `Device(config-ipv6-pmipv6-mag-addr-dyn)# roaming interface Ethernet 0/0`	Specifies an interface as a roaming interface for the MAG.
Step 6	**exit** **Example:** `Device(config-ipv6-pmipv6-mag-addr-dyn)# exit`	Enters MAG dynamic address configuration mode and returns to privileged EXEC mode.

Configuring Multipath under LMA and MAG Configurations

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 mobile pmipv6-lma** *lma-id* **domain** *domain-name*
4. **multipath**
5. **exit**
6. **ipv6 mobile pmipv6-mag mag1 domain dn1**
7. **multipath**
8. **exit**

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-lma** *lma-id* **domain** *domain-name* **Example:** `Device(config)# ipv6 mobile pmipv6-lma lma1 domain dn1`	Enables LMA service on the device, configures the PMIPv6 domain for the Local Mobility Anchor (LMA), and enters LMA configuration mode.
Step 4	**multipath** **Example:** `Device(config-ipv6-pmipv6-lma)# multipath`	Enables multipath support on the LMA.
Step 5	**exit** **Example:** `Device(config-ipv6-pmipv6-lma)# exit`	Exits LMA configuration mode and enters global configuration mode.
Step 6	**ipv6 mobile pmipv6-mag mag1 domain dn1** **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 7	**multipath** **Example:** `Device(config-ipv6-pmipv6-mag)# multipath`	Enables multipath support on the MAG.
Step 8	**exit** **Example:** `Device(config-ipv6-pmipv6-mag)# exit`	Exits MAG configuration mode and enters global configuration mode.

Configuring Mobile Map Support on LMA

Configuring Access Lists in LMA

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip access-list extended** *access-list-name*
4. **permit** *protocol* **any any**
5. **exit**
6. **ip access-list extended** *access-list-name*
7. **permit** *protocol* **any any**
8. **exit**
9. **ip access-list extended** *access-list-name*
10. **permit** *protocol* **any any**
11. **exit**
12. **ip access-list extended** *access-list-name*
13. **permit ip any** *destination-address destination-wildcard*
14. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable**	Enables privileged EXEC mode.

	Command or Action	Purpose
	Example: `Router> enable`	• Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ip access-list extended** *access-list-name* **Example:** `Router(config)# ip access-list extended tcp`	Configures an extended named ACL specific to TCP.
Step 4	**permit** *protocol* **any any** **Example:** `Router(config-ext-nacl)# permit tcp any any`	Sets conditions in named IP lists that permit packets.
Step 5	**exit** **Example:** `Router(config-ext-nacl)# exit`	Exits extended-ACL configuration mode and returns to global configuration mode.
Step 6	**ip access-list extended** *access-list-name* **Example:** `Router(config)# ip access-list extended icmp`	Configures an extended named ACL specific to Internet Control Message Protocol (ICMP).
Step 7	**permit** *protocol* **any any** **Example:** `Router(config-ext-nacl)# permit icmp any any`	Sets conditions in named IP lists that permit packets.
Step 8	**exit** **Example:** `Router(config-ext-nacl)# exit`	Exits extended-ACL configuration mode and returns to global configuration mode.
Step 9	**ip access-list extended** *access-list-name* **Example:** `Router(config)# ip access-list extended udp`	Configures an extended named ACL specific to UDP.

	Command or Action	Purpose
Step 10	**permit** *protocol* **any any** **Example:** `Router(config-ext-nacl)# permit udp any any`	Sets conditions in named IP lists that permit packets.
Step 11	**exit** **Example:** `Router(config-ext-nacl)# exit`	Exits extended-ACL configuration mode and returns to global configuration mode.
Step 12	**ip access-list extended** *access-list-name* **Example:** `Router(config)# ip access-list extended LB010ACL`	Configures an extended named ACL
Step 13	**permit ip any** *destination-address destination-wildcard* **Example:** `Router(config-ext-nacl)# permit ip any 10.255.224.0 0.0.0.255`	Sets conditions in named IP lists that permit packets.
Step 14	**end** **Example:** `Router(config-ext-nacl)# end`	Exits extended-ACL configuration mode and returns to privileged EXEC mode.

Configuring Mobile Maps under the PMIPv6 domain

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 mobile pmipv6-domain** *domain-name* **terminal**
4. **mobile-map** *map-name sequence-number*
5. **match access-list** *acl-list-name*
6. **set link-type** {*link-name1*} [*link-name2*] [*link-name2*] **null**
7. **exit**
8. **mobile-map** *map-name seuence-number*
9. **match access-list** *acl-list-name*
10. **set link-type** { *link-name1* } *null*
11. **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* **terminal** **Example:** `Device(config)# ipv6 mobile pmipv6-domain dn1`	Creates a PMIP domain and enters PMIPv6 domain configuration mode.
Step 4	**mobile-map** *map-name sequence-number* **Example:** `Device(config-ipv6-pmipv6-domain)# mobile-map mobilemap1 10`	Configures a mobile map for the PMIPv6 domain and enters mobile-map configuration mode.

	Command or Action	Purpose
Step 5	**match access-list** *acl-list-name* **Example:** `Device(config-ipv6-pmipv6-domain-mobile-map)# match access-list LB010ACL`	Specifies an access list (ACL) name.
Step 6	**set link-type** {*link-name1*} [*link-name2*] [*link-name2*] **null** **Example:** `Device(config-ipv6-pmipv6-domain-mobile-map)# set link-type lte_intf 3g_intf wifi_intf null`	Specifies the link type for a match clause.
Step 7	**exit** **Example:** `Device(config-ipv6-pmipv6-domain-mobile-map)# exit`	Exits mobile-map configuration mode and enters global configuration mode.
Step 8	**mobile-map** *map-name seuence-number* **Example:** `Device(config-ipv6-pmipv6-domain)# mobile-map mobilemap1 20`	Configures a mobile map for a PMIPv6 domain and enters mobile-map configuration mode.
Step 9	**match access-list** *acl-list-name* **Example:** `Device(config-ipv6-pmipv6-domain-mobile-map)# match access-list icmp`	Specifies an access list (ACL) name.
Step 10	**set link-type** { *link-name1* } *null* **Example:** `Device(config-ipv6-pmipv6-domain-mobile-map)# set link-type 3g_intf_lte_intf null`	Specifies the link type for a match clause.
Step 11	**end** **Example:** `Device(config-ipv6-pmipv6-domain-mobile-map)# end`	Exits mobile-map configuration mode and enters privileged EXEC mode.

Configuring a Mobile Map under LMA Configuration and Applying it on an Interface

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 mobile pmipv6-lma** *lma-id* **domain** *domain-name*
4. **mobile-map** *map-name*
5. **interface** *type number*
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-lma** *lma-id* **domain** *domain-name* **Example:** `Device(config)# ipv6 mobile pmipv6-lma lma1 domain dn1`	Enables the LMA service on the device, configures the PMIP domain for the LMA, and enters LMA configuration mode.
Step 4	**mobile-map** *map-name* **Example:** `Device(config-ipv6-pmipv6-lma)# mobile-map mobilemap1`	Configures a mobile map for the PMIPv6 domain and enters mobile-map configuration mode. **Note** If you modify one or more access-list entries, for the modified access list to be applied, you must unconfigure the mobile map from the LMA configuration and reconfigure it.
Step 5	**interface** *type number* **Example:** `Device(config-ipv6-pmipv6-lma)# interface gigabitethernet 0/0/0`	Enables an interface for the mobile map.

	Command or Action	Purpose
Step 6	**end** **Example:** `Device(config-ipv6-pmipv6-lma)# end`	Exits mobile-map configuration mode and enters privileged EXEC mode.

Configuring the MTU to be Applied on the PMIPv6 Tunnel

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 mobile pmipv6-lma** *lma-id* **domain** *domain-name*
4. **tunnel mtu 1360**
5. **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-lma** *lma-id* **domain** *domain-name* **Example:** `Device(config)# ipv6 mobile pmipv6-lma lma1 domain dn1`	Enables the LMA service on the device, configures the PMIP domain for the LMA, and enters LMA configuration mode.
Step 4	**tunnel mtu 1360** **Example:** `Device(config-ipv6-pmipv6-lma)# tunnel mtu 1360`	Configures a maximum transmission unit (MTU) on a PMIPv6 tunnel.

	Command or Action	Purpose
Step 5	**end** **Example:** `Device(config-ipv6-pmipv6-lma)# end`	Exits LMA configuration mode and enters privileged EXEC mode.

Applying an ACL on the PMIPv6 Tunnel

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip access-list extended** *access-list-name*
4. **deny** *protocol* **host** *addr* **any**
5. **permit** *protocol* **any any**
6. **exit**
7. **ipv6 mobile pmipv6-mag** *mag-id* **domain** *domain-name*
8. **tunnel acl** *acl-list-name*
9. **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	**ip access-list extended** *access-list-name* **Example:** `Device(config)# ip access-list extended acl1`	Defines an IP access list by name and enters the extended access-list configuration mode.

	Command or Action	Purpose
Step 4	**deny** *protocol* **host** *addr* **any** **Example:** `Device(config-ext-nacl)# deny ip host 10.2.2.2 any`	Sets conditions in a named IP access list that will deny packets.
Step 5	**permit** *protocol* **any any** **Example:** `Device(config-ext-nacl)# permit ip any any`	Sets conditions to allow a packet to pass a named IP access list.
Step 6	**exit** **Example:** `Device(config-ext-nacl)# exit`	Exits the extended access-list configuration mode and returns to the global configuration mode.
Step 7	**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 PMIP domain for the LMA, and enters MAG configuration mode.
Step 8	**tunnel acl** *acl-list-name* **Example:** `Device(config-ipv6-pmipv6-lma)# tunnel acl acl1`	Specifies an ACL to be applied on the PMIPv6 tunnel in an LMA.
Step 9	**end** **Example:** `Device(config-ipv6-pmipv6-lma)# end`	Exits LMA configuration mode and enters privileged EXEC mode.

Configuring Multiple Mobile Network IPv4 or IPv6 Address Pools for a Network Under LMA Configuration

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 mobile pmipv6-lma** *lma-id* **domain** *domain-name*
4. **network** *name*
5. Depending on whether you are configuring IPv4 or IPv6 address pools, perform one of the following tasks:
   - **mobile-network pool** *address* **pool-prefix** *pool-prefix* **network-prefix** *network-prefix*
   - **mobile-network v6pool** *address* **pool-prefix** *pool-prefix* **network-prefix** *network-prefix*
6. Depending on whether you are configuring IPv4 or IPv6 address pools, perform one of the following tasks:
   - **mobile-network pool** *address* **pool-prefix** *pool-prefix* **network-prefix** *network-prefix*
   - **mobile-network v6pool** *address* **pool-prefix** *pool-prefix* **network-prefix** *network-prefix*
7. **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-lma** *lma-id* **domain** *domain-name* **Example:** `Device(config)# ipv6 mobile pmipv6-lma lma1 domain dn1`	Enables the LMA service on the device, configures the PMIP domain for the LMA, and enters LMA configuration mode.
Step 4	**network** *name* **Example:** `Device(config-ipv6-pmipv6-lma)# network name`	Specifies mobile address pools, from which a mobile network prefix is allocated to a logical mobile node (LMN) and enters LMA-network configuration mode.

	Command or Action	Purpose

Step 5	Depending on whether you are configuring IPv4 or IPv6 address pools, perform one of the following tasks:
	• **mobile-network pool** *address* **pool-prefix** *pool-prefix* **network-prefix** *network-prefix*
	• **mobile-network v6pool** *address* **pool-prefix** *pool-prefix* **network-prefix** *network-prefix*
	Example:
	`Device(config)# mobile-network pool 10.20.2.1 pool-prefix 24 network-prefix 30`
	Example:
	`Device(config)# mobile-network pool 2001:DB8:: pool-prefix 48  pool-prefix 48 network-prefix 30`
		Associates a network, to which an IPv4 or IPv6 pool can be configured, with a Local Mobility Anchor (LMA).

Step 6	Depending on whether you are configuring IPv4 or IPv6 address pools, perform one of the following tasks:
	• **mobile-network pool** *address* **pool-prefix** *pool-prefix* **network-prefix** *network-prefix*
	• **mobile-network v6pool** *address* **pool-prefix** *pool-prefix* **network-prefix** *network-prefix*
	Example:
	`Device(config)# mobile-network pool 10.20.2.2 pool-prefix 24 network-prefix 30`
	Example:
	`Device(config)# mobile-network pool 2001:DB8:0:1::1 pool-prefix 64 pool-prefix 48 network-prefix 30`
		Associates a network, to which an IPv4 or IPv6 pool can be configured, with a Local Mobility Anchor (LMA).

Step 7	**end** **Example:** `Device(config-ipv6-pmipv6lma-network)# end`	Exits LMA-network configuration mode and enters privileged EXEC mode.

Configuring Heartbeat under LMA Configuration

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ipv6 mobile pmipv6-lma** *lma-id* **domain** *domain-name*
4. **heartbeat** [**interval** *interval* **retries** *retries* [**label** *label*] **natreboot**]]
5. **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-lma** *lma-id* **domain** *domain-name* **Example:** `Device(config)# ipv6 mobile pmipv6-lma lma1 domain dn1`	Enables the LMA service on the device, configures the PMIP domain for the LMA, and enters LMA configuration mode.
Step 4	**heartbeat** [**interval** *interval* **retries** *retries* [**label** *label*] **natreboot**]] **Example:** `Device(config-ipv6-pmipv6-lma)# heartbeat interval 300 retries 2 label label1 natreboot`	Configures heartbeat detection between MAG and LMA.
Step 5	**end** **Example:** `Device(config-ipv6-pmipv6-lma)# end`	Exits LMA configuration mode and enters privileged EXEC mode.

Configuration Examples for PMIPv6 Multipath Support for MAG and LMA

Example: Configuring Multipath on LMA

Example: Configuring UDP Encapsulation under PMIPv6 Domain

```
Device> enable
Device# configuration terminal
Device(config) ipv6 mobile pmipv6-domain D1
Device(config-ipv6-pmipv6-domain)# encap udptunnel
Device(config-ipv6-pmipv6-domain)# end
```

Example: Configuring Roaming Interface

```
Device> enable
Device# configuration terminal
Device(config) ipv6 mobile pmipv6-ma mag1 domain D1
Device(config-ipv6-pmipv6-mag) address dynamic
Device(config-ipv6-pmipv6-mag-addr-dyn)# roaming interface Ethernet 0/0
Device(config-ipv6-pmipv6-mag-addr-dyn)# exit
```

Example: Configuring PMIP: Multipath Support on LMA

```
Device> enable
Device# configuration terminal
Device(config) ipv6 mobile pmipv6-lma LMA1 domain D1
Device(config-ipv6-pmipv6-lma)# multipath
Device(config-ipv6-pmipv6-lma)# end
```

Example: Configuring Mobile Map on an LMA

Example: Configuring Access List on an LMA

```
Device> enable
Device# configuration terminal
Device(config)# ip access-list extended tcp
Device(config-ext-nacl)# permit tcp any any
Device(config-ext-nacl)# exit
Device(config)# ip access-list extended icmp
Device(config-ext-nacl)# permit icmp any any
Device(config-ext-nacl)# exit
Device(config)# ip access-list extended udp
Device(config-ext-nacl)# permit udp any any
Device(config-ext-nacl)# exit
Device(config)# ip access-list extended LB010ACL
Device(config-ext-nacl)# permit ip any 10.255.224.0 0.0.0.255
Device(config-ext-nacl)# end
```

Example: Applying an ACL on the PMIPv6 Tunnel

```
Device> enable
Device# configure terminal
Device(config)# ip access-list extended acl1
Device(config-ext-nacl)# deny ip host 10.2.2.2 any
Device(config)# permit ip any any
Device(config)# ipv6 mobile pmipv6-lma lma1 domain dn1
Device(config-ipv6-pmipv6-lma)# tunnel acl acl1
Device(config-ipv6-pmipv6-lma)# end
```

Example: Configuring mobile maps under the PMIPv6 domain

```
Device> enable
Device# configure terminal
Device(config)#  ipv6 mobile pmipv6-domain dn1
Device(config-ipv6-pmipv6-domain)# mobile-map mobilemap1 10
Device(config-ipv6-pmipv6-domain-mobile-map)# match access-list LB010ACL
Device(config-ipv6-pmipv6-domain-mobile-map)# set link-type lte_intf_3g_intf null
Device(config-ipv6-pmipv6-domain-mobile-map)# exit
Device(config-ipv6-pmipv6-domain)# mobile-map mobilemap1 20
Device(config-ipv6-pmipv6-domain-mobile-map)# match access-list icmp
Device(config-ipv6-pmipv6-domain-mobile-map)# set link-type lte_intf 3g_intf wifi_intf null
Device(config-ipv6-pmipv6-domain-mobile-map)# end
```

Example: Configuring a Mobile Map Under LMA Configuration and Applying it on an Interface

```
Device> enable
Device# configure terminal
Device(config)# ipv6 mobile pmipv6-lma lma1 domain dn1
Device(config-ipv6-pmipv6-domain)# mobile-map mobilemap1 10
Device(config-ipv6-pmipv6-domain-mobile-map)# interface gigabitethernet 0/0/0
Device(config-ipv6-pmipv6-domain-mobile-map)# end
```

Example: Configuring the MTU to be Applied on the PMIPv6 Tunnel

```
Device> enable
Device# configure terminal
Device(config)# ipv6 mobile pmipv6-lma lma1 domain dn1
Device(config-ipv6-pmipv6-lma)# tunnel mtu 1360
Device(config-ipv6-pmipv6-lma)# end
```

Example: Configuring Multiple Mobile Network Pools for a Network Under LMA Configuration

```
Device> enable
Device# configure terminal
Device(config)# ipv6 mobile pmipv6-lma lma1 domain dn1
Device(config-ipv6-pmipv6-lma)# network name
Device(config-ipv6-pmipv6lma-network)# mobile-network pool 10.20.2.1 pool-prefix 24
network-prefix 30
Device(config-ipv6-pmipv6lma-network)# mobile-network pool 10.20.3.1 pool-prefix 24
```

```
network-prefix 30
Device(config-ipv6-pmipv6lma-network)# end
```

Example: Configuring Heartbeat under LMA Configuration

```
Device> enable
Device# configure terminal
Device(config)# ipv6 mobile pmipv6-lma lma1 domain dn1
Device(config-ipv6-pmipv6-lma)# heartbeat interval 300 retries 2 label label1 natreboot
Device(config-ipv6-pmipv6-lma)# end
```

Additional References

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	*Mobility Support in IPv6*
RFC 5213	*Proxy Mobile IPv6*
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 PMIP: Multipath Support on MAG and LMA

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 PMIP: Multipath Support on MAG and LMA

Feature Name	Releases	Feature Information
PMIP: Multipath Support on MAG and LMA	Cisco IOS XE Release 3.10S	The PMIP: Multipath Support on MAG and LMA feature enables the Mobility Access Gateway (MAG) to register multiple transport end-points with the Local Mobility Anchor (LMA), allowing the MAG and LMA to establish multiple tunnels and apply path selection on a flow basis. The following commands were introduced or modified: **encap (proxy mobile IPv6)**, **heartbeat** , **interface (proxy mobile IPv6)** , **match access-list (PMIPv6)**, **mobile-map (PMIPv6 domain)**, **mobile-map (LMA)** , **mobile-network PMIPv6)**, **multipath**, **set link-type**, and **tunnel mtu** .

Feature Name	Releases	Feature Information
MAG to MAG Traffic Blocking on the PMIPv6 LMA	Cisco IOS XE Release 3.12S	The MAG to MAG Traffic Blocking on the PMIPv6 LMA feature is an enhancement that enables prevention of communication between PMIPv6 clients connected to the same LMA. The inter-MAG tunnel traffic is blocked by applying ACLs on the PMIPv6 tunnels. The following commands were introduced or modified: **tunnel acl** and **mobile-network**