



Cisco Mobile Networks—Tunnel Templates for Multicast

The Cisco Mobile Networks—Tunnel Templates for Multicast feature allows the configuration of multicast on statically created tunnels to be applied to dynamic tunnels brought up on the home agent and mobile router. A tunnel template is defined and applied to the tunnels between the home agent and mobile router. The mobile router can now roam and the tunnel template enables multicast sessions to be carried to the mobile networks.

Feature Specifications for Cisco Mobile Networks—Tunnel Templates for Multicast

Feature History

Release	Modification
12.2(15)T	This feature was introduced.

Supported Platforms

For platforms supported in Cisco IOS Release 12.2(15)T, consult Cisco Feature Navigator.

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

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Prerequisites for Cisco Mobile Networks—Tunnel Templates for Multicast

Reverse tunneling must be enabled from the mobile router to the home agent.

Restrictions for Cisco Mobile Networks—Tunnel Templates for Multicast

Tunnels cannot be removed if they are being used as templates.

How to Configure Tunnel Templates for Multicast

This section contains the following procedures:

- [Applying the Tunnel Template on the Home Agent](#) (required)
- [Applying the Tunnel Template on the Mobile Router](#) (required)

Applying the Tunnel Template on the Home Agent

This task describes how to apply the tunnel template to the tunnels brought up at the home agent.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip multicast-routing**
4. **interface tunnel** *interface-number*
5. **ip pim sparse-mode**
6. **exit**
7. **router mobile**
8. **exit**
9. **ip mobile mobile-networks**
10. **template tunnel** *interface-number*
11. **end**
12. **show ip mobile tunnel**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	ip multicast-routing Example: Router(config)# ip multicast-routing	Enables IP multicast routing.
Step 4	interface tunnel <i>interface-number</i> Example: Router(config)# interface tunnel 100	Designates a tunnel interface and enters interface configuration mode. <ul style="list-style-type: none"> This is the tunnel template that will be applied to the mobile networks.
Step 5	ip pim sparse-mode Example: Router(config-if)# ip pim sparse-mode	Enables Protocol Independent Multicast (PIM) on the tunnel interface in sparse mode.
Step 6	exit Example: Router(config-if)# exit	Returns to global configuration mode.
Step 7	router mobile Example: Router(config)# router mobile	Enables Mobile IP on the router.
Step 8	exit Example: Router(config-router)# exit	Returns to global configuration mode.
Step 9	ip mobile mobile-networks Example: Router(config)# ip mobile mobile-networks	Configures mobile networks for the mobile host and enters mobile networks configuration mode.
Step 10	template tunnel <i>interface-number</i> Example: Router(mobile-networks)# template tunnel 100	Designates the tunnel template to apply during registration. <ul style="list-style-type: none"> The <i>interface-number</i> argument is set to the tunnel template defined in Step 4.

	Command or Action	Purpose
Step 11	<code>end</code> Example: Router(mobile-networks)# <code>end</code>	Exits to privileged EXEC mode.
Step 12	<code>show ip mobile tunnel</code> Example: Router# <code>show ip mobile tunnel</code>	Displays active tunnels. <ul style="list-style-type: none"> Use this command to verify the configuration. See the display output in the “Examples” section.

Examples

The following example displays the active Mobile IP tunnels and the template configuration for the tunnel on the home agent:

```
Router# show ip mobile tunnel

Mobile Tunnels:

Total mobile ip tunnels 2
Tunnel1:
  src 1.1.1.1, dest 20.20.0.1
  encap IP/IP, mode reverse-allowed, tunnel-users 1
  IP MTU 1460 bytes
  Path MTU Discovery, mtu:0, ager:10 mins, expires:never
  outbound interface Tunnel0
  HA created, fast switching enabled, ICMP unreachable enabled
  27 packets input, 2919 bytes, 0 drops
  24 packets output, 2568 bytes
Running template configuration for this tunnel:
ip pim sparse-dense-mode

Tunnel0:
  src 1.1.1.1, dest 30.30.10.2
  encap IP/IP, mode reverse-allowed, tunnel-users 1
  IP MTU 1480 bytes
  Path MTU Discovery, mtu:0, ager:10 mins, expires:never
  outbound interface Ethernet1/3
  HA created, fast switching enabled, ICMP unreachable enabled
  0 packets input, 0 bytes, 0 drops
  24 packets output, 3048 bytes
```

Applying the Tunnel Template on the Mobile Router

This task describes how to apply the tunnel template to the tunnels brought up at the mobile router.

SUMMARY STEPS

- `enable`
- `configure terminal`
- `ip multicast-routing`
- `interface tunnel interface-number`
- `ip pim sparse-mode`

6. **exit**
7. **router mobile**
8. **exit**
9. **ip mobile router**
10. **template tunnel** *interface-number*
11. **end**
12. **show ip mobile tunnel**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	ip multicast-routing Example: Router(config)# ip multicast-routing	Enables IP multicast routing.
Step 4	interface tunnel <i>interface-number</i> Example: Router(config)# interface tunnel 100	Designates a tunnel interface and enters interface configuration mode. <ul style="list-style-type: none"> • This is the tunnel template that will be applied to the mobile networks.
Step 5	ip pim sparse-mode Example: Router(config-if)# ip pim sparse-mode	Enables PIM on the tunnel interface in sparse mode.
Step 6	exit Example: Router(config-if)# exit	Returns to global configuration mode.
Step 7	router mobile Example: Router(config)# router mobile	Enables Mobile IP on the router.
Step 8	exit Example: Router(config-router)# exit	Returns to global configuration mode.

	Command or Action	Purpose
Step 9	<code>ip mobile router</code> Example: Router(config)# ip mobile router	Enables the mobile router and enters mobile router configuration mode.
Step 10	<code>template tunnel interface-number</code> Example: Router(mobile-router)# template tunnel 100	Designates the tunnel template to apply during registration. <ul style="list-style-type: none"> The <i>interface number</i> argument is set to the tunnel template defined in Step 4.
Step 11	<code>end</code> Example: Router(mobile-router)# end	Exits to privileged EXEC mode.
Step 12	<code>show ip mobile tunnel</code> Example: Router# show ip mobile tunnel	Displays active tunnels. <ul style="list-style-type: none"> Use this command to verify the configuration. See the display output in the “Examples” section.

Examples

The following example displays the active Mobile IP tunnels and the template configuration for the tunnel on the mobile router:

```
Router# show ip mobile tunnel

Mobile Tunnels:

Total mobile ip tunnels 1
Tunnel0:
  src 20.20.0.1, dest 1.1.1.1
  encaps IP/IP, mode reverse-allowed, tunnel-users 1
  IP MTU 1480 bytes
  Path MTU Discovery, mtu:0, age:10 mins, expires:never
  outbound interface Ethernet4/2
  MR created, fast switching enabled, ICMP unreachable enabled
  22 packets input, 2468 bytes, 0 drops
  27 packets output, 2892 bytes
Running template configuration for this tunnel:
ip pim sparse-mode
```

Configuration Examples for Tunnel Templates for Multicast

This section provides the following configuration example:

- [Tunnel Templates for Multicast Example, page 7](#)

Tunnel Templates for Multicast Example

In the following example, a tunnel template is defined and configured to be brought up at the home agent and mobile router. The foreign agent does not require any additional configuration to support the Cisco Mobile Networks—Tunnel Templates for Multicast feature.

Home Agent Configuration

```

!
ip multicast-routing
!
interface Loopback0
 ip address 1.1.1.1 255.255.255.255
 ip pim sparse-mode
!
!
! Tunnel template to be applied to mobile networks
interface tunnel100
 ip address 13.0.0.1 255.0.0.0
 ip pim sparse-mode
!
!
router mobile
ip mobile mobile-networks 11.1.0.1
 description jet
 network 11.1.2.0 255.255.255.0
 network 11.1.1.0 255.255.255.0
! Select tunnel template to apply during registration
 template tunnel100
!
ip mobile secure host 11.1.0.1 spi 101 key hex 12345678123456781234567812345678 algorithm
md5 mode prefix-suffix
!
no ip mobile tunnel route-cache
!

```

Mobile Router Configuration

```

!
ip multicast-routing
!
interface Loopback0
 ip address 11.1.0.1 255.255.255.255
 ip pim sparse-mode
!
!
! Tunnel template to be applied to mobile networks
interface tunnel 100
 no ip address
 ip pim sparse-mode
!
!
interface Ethernet1/1
 ip address 20.0.0.1 255.0.0.0
 ip pim sparse-mode
 ip mobile router-service roam
!
router mobile
ip pim rp-address 7.7.7.7
ip mobile secure home-agent 1.1.1.1 spi 102 key hex 23456781234567812345678123456781
algorithm md5 mode prefix-suffix
ip mobile router

```

```
address 11.2.0.1 255.255.0.0
home-agent 1.1.1.1
! Select tunnel template to apply during registration
template tunnel 100
register extend expire 5 retry 2 interval 15
register lifetime 10000
reverse-tunnel
!
```

Additional References

For additional information related to Cisco Mobile Networks—Tunnel Templates for Multicast, see the following sections:

- [Related Documents](#)
- [Standards](#)
- [MIBs](#)
- [RFCs](#)
- [Technical Assistance](#)

Related Documents

Related Topic	Document Title
Mobile IP configuration tasks	“Configuring Mobile IP” chapter in the <i>Cisco IOS IP Configuration Guide</i> , Release 12.2
Mobile IP commands: complete command syntax, command mode, defaults, usage guidelines, and examples	“Mobile IP Commands” chapter in the <i>Cisco IOS IP Command Reference, Volume 1 of 3: Addressing and Services</i> , Release 12.2
Multicast configuration tasks	“Configuring IP Multicast Routing” chapter in the <i>Cisco IOS IP Configuration Guide</i> , Release 12.2
Multicast commands: complete command syntax, command mode, defaults, usage guidelines, and examples	“IP Multicast Routing Commands” chapter in the <i>Cisco IOS IP Command Reference, Volume 3 of 3: Multicast</i> , Release 12.2
Mobile IP commands related to Cisco Mobile Networks	<i>Cisco Mobile Networks</i> feature document, Releases 12.2(4)T and 12.2(13)T.

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
None	To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB website on Cisco.com at the following URL: http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

RFCs

RFCs	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
Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/public/support/tac/home.shtml

Command Reference

This section documents new and modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.2 T command reference publications.

Modified Command

- [show ip mobile tunnel](#)

New Commands

- [template tunnel \(mobile networks\)](#)
- [template tunnel \(mobile router\)](#)

show ip mobile tunnel

To display active tunnels, use the **show ip mobile tunnel** command in EXEC mode.

```
show ip mobile tunnel [interface]
```

Syntax Description	<i>interface</i>	(Optional) Displays a particular tunnel interface. The <i>interface</i> argument is tunnel <i>x</i> .
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Command Modes	EXEC
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Command History	Release	Modification
	12.0(1)T	
12.2(13)T		The output was enhanced to display route maps configured on the home agent.
12.2(15)T		The output was enhanced to display tunnel templates for multicast configured on the home agent or mobile router.

Usage Guidelines This command displays active tunnels created by Mobile IP. When no more users are on the tunnel, the tunnel is released.

Examples The following is sample output from the **show ip mobile tunnel** command:

```
Router# show ip mobile tunnel

Mobile Tunnels:

Tunnel0:
  src 68.0.0.32, dest 68.0.0.48
  encaps IP/IP, mode reverse-allowed, tunnel-users 1
  IP MTU 1480 bytes
  HA created, fast switching enabled, ICMP unreachable enabled
  0 packets input, 0 bytes, 0 drops
  1591241 packets output, 1209738478 bytes
  Route Map is: MoIPMap
Running template configuration for this tunnel:
ip pim sparse-dense-mode
```

[Table 1](#) describes the significant fields shown in the display.

Table 1 show ip mobile tunnel Field Descriptions

Field	Description
src	Tunnel source IP address.
dest	Tunnel destination IP address.

Table 1 *show ip mobile tunnel Field Descriptions (continued)*

Field	Description
encap	Tunnel encapsulation type.
mode	Either reverse-allowed or reverse-off for reverse tunnel mode.
tunnel-users	Number of users on the tunnel.
HA created	Home agent created (or mobile router created).
fast switching	Enabled or disabled.
ICMP unreachable	Enabled or disabled.
packets input	Number of packets in.
bytes	Number of bytes in.
0 drops	Number of packets dropped. Packets are dropped when there are no visitors to send to after the foreign agent deencapsulates incoming packets. This prevents loops because the foreign agent will otherwise route the deencapsulated packets back to the home agent.
packets output	Number of packets output.
bytes	Number of bytes output.
Route Map is	Name of the route map.
Running template configuration	If tunnel templates for multicast are enabled or disabled, this information is displayed or absent, respectively.

Related Commands

Command	Description
show ip mobile binding	Displays the mobility binding table.
show ip mobile host	Displays mobile node information.
show ip mobile visitor	Displays the table of the visitor list of the foreign agent.

template tunnel (mobile networks)

To apply a tunnel template to tunnels brought up at the home agent, use the **template tunnel** command in mobile networks configuration mode. To remove the tunnel template, use the **no** form of this command.

template tunnel *interface-number*

no template tunnel *interface-number*

Syntax Description	<i>interface-number</i>	Tunnel interface number.
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Defaults	No default behavior or values
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Command Modes	Mobile networks configuration
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Command History	Release	Modification
	12.2(15)T	This command was introduced.

Usage Guidelines	This command allows the configuration of multicast on statically created tunnels to be applied to dynamic tunnels brought up on the home agent.
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Examples	The following example shows the template tunnel applied at the home agent:
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```
! Tunnel template to be applied to mobile networks
interface tunnel 100
 ip pim sparse-mode
!
! Select tunnel template to apply during registraton
ip mobile mobile-networks 10.1.0.1
 template tunnel 100
```

Related Commands	Command	Description
	template tunnel (mobile router)	Applies a tunnel template to tunnels brought up at the mobile router.

template tunnel (mobile router)

To apply a tunnel template to tunnels brought up at the mobile router, use the **template tunnel** command in mobile router configuration mode. To remove the tunnel template, use the **no** form of this command.

template tunnel *interface-number*

no template tunnel *interface-number*

Syntax Description	<i>interface-number</i>	Tunnel interface number.
---------------------------	-------------------------	--------------------------

Defaults	No default behavior or values
-----------------	-------------------------------

Command Modes	Mobile router configuration
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Command History	Release	Modification
	12.2(15)T	This command was introduced.

Usage Guidelines	This command allows the configuration of multicast on statically created tunnels to be applied to dynamic tunnels brought up on the mobile router.
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Examples	The following example shows the template tunnel applied at the mobile router:
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```
! Tunnel template to be applied to mobile networks
interface tunnel100
 ip pim sparse-mode
!
! Select tunnel template to apply during registration
ip mobile router
 template tunnel100
```

Related Commands	Command	Description
	template tunnel (mobile networks)	Applies a tunnel template to tunnels brought up at the home agent.

Glossary

home agent—A router on a home network of the mobile node or that tunnels packets to the mobile node or mobile router while they are away from home. It keeps current location information for registered mobile nodes called a *mobility binding*.

mobile network—A network that moves with the mobile router. A mobile network is a collection of hosts and routes that are fixed with respect to each other but are mobile, as a unit, with respect to the rest of the Internet.

mobile router—A mobile node that is a router. It provides for the mobility of one or more entire networks moving together, perhaps on an airplane, a ship, a train, an automobile, a bicycle, or a kayak. The nodes connected to a network served by the mobile router may themselves be fixed nodes or mobile nodes or routers.



Note

Refer to [Internetworking Terms and Acronyms](#) for terms not included in this glossary.
