Unidirectional Link Routing Commands

Use the commands in this chapter to configure and monitor unidirectional link routing (UDLR). For configuration information and examples of UDLR, refer to the "Configuring Unidirectional Link Routing" chapter of the *Cisco IOS IP Configuration Guide*.

ip igmp helper-address (UDL)

To configure Internet Group Management Protocol (IGMP) helpering as required for IGMP unidirectional link routing (UDLR), use the **ip igmp helper-address** command in interface configuration mode. To disable such report forwarding, use the **no** form of this command.

ip igmp helper-address udl *type number*

no ip igmp helper-address

Syntax Description

udl *type number*	Interface type and number of a unidirectional interface.

Defaults

No forwarding occurs.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(3)T	This command was introduced.

Usage Guidelines

This command is required on a downstream router on each interface connected to a potential multicast receiver. The command allows the downstream router to helper IGMP reports received from hosts to an upstream router connected to a unidirectional link (UDL) associated with the configured *type* and *number* arguments.

Examples

The following example configures a helper address on a downstream router:

```
ip multicast-routing
!
! Interface that receiver is attached to, configure for IGMP reports to be
! helpered for the unidirectional interface.
!
interface ethernet 0
 description Forward IGMP reports from this interface to UDL querier
 ip address 14.0.0.2 255.0.0.0
 ip pim sparse-dense-mode
 ip igmp helper-address udl serial 0
```

Related Commands

Command	Description
ip igmp proxy-service	Enables the mroute proxy service.
ip igmp unidirectional-link	Configures an interface to be unidirectional and enables it for IGMP UDLR.

ip igmp mroute-proxy

To enable Internet Group Management Protocol (IGMP) report forwarding of proxied (*, G) mroute entries, use the **ip igmp mroute-proxy** command in interface configuration mode. To disable this service, use the **no** form of this command.

> **ip igmp mroute-proxy** *type number*

> **no ip igmp mroute-proxy** *type number*

Syntax Description

type number	Interface type and number.

Defaults

Disabled

Command Modes

Interface configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.

Usage Guidelines

When used with the **ip igmp proxy-service** interface command, this command enables forwarding of IGMP reports to a proxy service interface for all (*, G) forwarding entries for this interface in the multicast forwarding table.

Examples

The following example shows how to configure the **ip igmp mroute-proxy** command on Ethernet interface 1 to request that IGMP reports be sent to loopback interface 0 for all groups in the mroute table that are forwarded to Ethernet interface 1. This example also shows how to configure the **ip igmp proxy-service** command on loopback interface 0 to enable the forwarding of IGMP reports out the interface for all groups on interfaces registered through the **ip igmp mroute-proxy** command.

```
interface loopback 0
ip address 10.7.1.1 255.255.255.0
ip pim dense-mode
ip igmp helper-address udl ethernet 0
ip igmp proxy-service
!
interface ethernet 0
ip address 10.2.1.1 255.255.255.0
ip pim dense-mode
ip igmp unidirectional link
!
interface ethernet 1
ip address 10.1.1.1 255.255.255.0
ip pim sparse-mode
ip igmp mroute-proxy loopback 0
```

■ ip igmp mroute-proxy

Related Commands

Command	Description
ip igmp proxy-service	Enables the mroute proxy service.
ip igmp unidirectional-link	Configures an interface to be unidirectional and enables it for IGMP UDLR.

ip igmp proxy-service

To enable the mroute proxy service, use the **ip igmp proxy-service** command in interface configuration mode. To disable forwarding, use the **no** form of this command.

> **ip igmp proxy-service**

> **no ip igmp proxy-service**

Syntax Description

This command has no arguments or keywords.

Defaults

Disabled

Command Modes

Interface configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.

Usage Guidelines

Based on the Internet Group Management Protocol (IGMP) query interval, the router periodically checks the mroute table for (*, G) forwarding entries that match interfaces configured with the **ip igmp mroute-proxy** command. Where there is a match, one IGMP report is created and received on this interface. This command was intended to be used with the **ip igmp helper-address udl** command, in which case the IGMP report would be forwarded to an upstream router.

Examples

The following example shows how to configure the **ip igmp mroute-proxy** command on Ethernet interface 1 to request that IGMP reports be sent to loopback interface 0 for all groups in the mroute table that are forwarded to Ethernet interface 1. This example also shows how to configure the **ip igmp proxy-service** command on loopback interface 0 to enable the forwarding of IGMP reports out the interface for all groups on interfaces registered through the **ip igmp mroute-proxy** command.

```
interface loopback 0
ip address 10.7.1.1 255.255.255.0
ip pim dense-mode
ip igmp helper-address udl ethernet 0
ip igmp proxy-service
!
interface ethernet 0
ip address 10.2.1.1 255.255.255.0
ip pim dense-mode
ip igmp unidirectional link
!
interface ethernet 1
ip address 10.1.1.1 255.255.255.0
ip pim sparse-mode
ip igmp mroute-proxy loopback 0
```

Related Commands

Command	Description
ip igmp helper-address (UDL)	Configures IGMP helpering as required for IGMP UDLR.
ip igmp mroute-proxy	Enables IGMP report forwarding of proxied (*, G) mroute entries.
ip igmp unidirectional-link	Configures an interface to be unidirectional and enables it for IGMP UDLR.

ip igmp unidirectional-link

To configure an interface to be unidirectional and enable it for Internet Group Management Protocol (IGMP) unidirectional link routing (UDLR), use the **ip igmp unidirectional-link** command in interface configuration mode. To disable the unidirectional link (UDL), use the **no** form of this command.

ip igmp unidirectional-link

no ip igmp unidirectional-link

Syntax Description

This command has no arguments or keywords.

Defaults

No UDLR occurs.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(3)T	This command was introduced.

Usage Guidelines

One example of when you might configure this command is if you have traffic traveling via a satellite.

If you have a small number of receivers, another way to achieve UDLR is to configure a UDLR tunnel. See the descriptions of the **tunnel udlr receive-only** and **tunnel udlr send-only** commands later in this chapter.

Examples

The following example configures an upstream router with UDLR on serial interface 0:

```
ip multicast-routing
!
! Unidirectional link
!
interface serial 0
 description Unidirectional to downlink-rtr
 ip address 10.0.0.1 255.0.0.0
 ip pim sparse-dense-mode
 ip igmp unidirectional-link
 no keepalive
```

■ ip igmp unidirectional-link

Related Commands

Command	Description
ip igmp helper-address (UDL)	Configures IGMP helpering as required for IGMP UDLR.
ip igmp mroute-proxy	Enables IGMP report forwarding of proxied (*, G) mroute entries.
ip igmp proxy-service	Enables the mroute proxy service.
ip multicast default-rpf-distance	Changes the distance given to the default RPF interface when configuring IGMP UDLR.
show ip igmp udlr	Displays UDLR information for directly connected multicast groups on interfaces that have a UDL helper address configured.
tunnel udlr receive-only	Configures a unidirectional, GRE tunnel to act as a back channel that can receive messages, when another interface is configured for UDLR to send messages.
tunnel udlr send-only	Configures a unidirectional, GRE tunnel to act as a back channel that can send messages, when another interface is configured for UDLR to receive messages.

ip multicast default-rpf-distance

When configuring Internet Group Management Protocol (IGMP) unidirectional link routing (UDLR), to change the distance given to the default Reverse Path Forwarding (RPF) interface, use the **ip multicast default-rpf-distance** command in global configuration mode. To restore the default value, use the **no** form of this command.

> **ip multicast default-rpf-distance** *distance*

> **no ip multicast default-rpf-distance**

Syntax Description

distance	Distance given to the default RPF interface. The default value is 15.

Defaults

The distance default value is 15.

Command Modes

Global configuration

Command History

Release	Modification
12.0(3)T	This command was introduced.

Usage Guidelines

This command is optional. If you want to receive all multicast traffic from all sources on the unidirectional link (UDL), as long as 15 is the lowest distance, you need not change the value of 15.

The default RPF interface is selected when an IGMP query message is received on a UDL and indicates to the router that all sources will use RPF to reach the UDL interface.

Any explicit sources learned by routing protocols will take preference as long as their distance is less than the *distance* argument configured with the **ip multicast default-rpf-distance** command.

You might consider changing the default value for one of the following reasons:

- To make IGMP prefer the UDL.
- To configure a value less than existing routing protocols.
- If you want to receive multicast packets from sources on interfaces other than the UDL interface. Configure a value greater than the distances of the existing routing protocols to make IGMP prefer the nonunidirectional link.

Examples

The following example configures a distance of 20:

```
ip multicast default-rpf-distance 20
```

■ ip multicast default-rpf-distance

Related Commands	Command	Description
	ip igmp unidirectional-link	Configures an interface to be unidirectional and enables it for IGMP UDLR.

show ip igmp udlr

To display unidirectional link routing (UDLR) information for directly connected multicast groups on interfaces that have a unidirectional link (UDL) helper address configured, use the **show ip igmp udlr** command in EXEC mode.

show ip igmp udlr [*group-name* | *group-address* | *type number*]

Syntax Description

group-name	*group-address*	(Optional) Name or address of the multicast group for which to show UDLR information.
type number	(Optional) Interface type and number for which to show UDLR information.

Command Modes   EXEC

Command History

Release	Modification
12.0(3)T	This command was introduced.

Usage Guidelines   This command displays which groups are being forwarded and received over the UDL.

On the upstream router, this command shows which interface is a UDL interface and which IP multicast groups are being forwarded out that interface. The UDL Reporter is the IP address of the downstream interface on the receiving router. If there is more than one downstream router, this field shows which downstream router forwarded the IGMP host report to the upstream router over the ground-based network. This report is forwarded over the UDL so that all downstream routers know which groups have already have been requested by other downstream routers, so that additional IGMP host reports are suppressed.

On the downstream router, this command (in the Interface field) shows which local interface received an IGMP host report (from a directly connected host for a specific group). The UDL Reporter is the IP address of the router that had forwarded the IGMP host report to the upstream router over the ground-based network. The UDL Interfaces column shows the interface on which IP multicast packets are being received.

Examples   The following is sample output of the **show ip igmp udlr** command on an upstream router:

```
upstream-rtr# show ip igmp udlr

IGMP UDLR Status, UDL Interfaces: Serial0
Group Address    Interface         UDL Reporter     Reporter Expires
224.2.127.254    Serial0           10.0.0.2         00:02:12
224.0.1.40       Serial0           10.0.0.2         00:02:11
225.7.7.7        Serial0           10.0.0.2         00:02:15
```

The following is sample output of the **show ip igmp udlr** command on a downstream router:

```
downstream-rtr# show ip igmp udlr
```

```
IGMP UDLR Status, UDL Interfaces: Serial0
Group Address    Interface          UDL Reporter      Reporter Expires
224.2.127.254    Serial0            10.0.0.2          00:02:49
224.0.1.40       Serial0            10.0.0.2          00:02:48
225.7.7.7        Serial0            10.0.0.2          00:02:52
```

Table 31 describes the significant fields shown in the first display.

Table 31   show ip igmp udlr Field Descriptions

Field	Description
Group Address	All groups helpered by the UDL Reporter on the interface.
Interface	Interface type and number to which the group is connected.
UDL Reporter	IP address of the router on the UDL network that is IGMP helpering for the group.
Reporter Expires	How soon the UDL Reporter will become inactive, in hours:minutes:seconds. This can occur under the following conditions: • The UDL Reporter has become nonoperational. • The link or network to the reporter has become nonoperational. • The group member attached to the UDL Reporter has left the group.

tunnel udlr address-resolution

To enable the forwarding of the Address Resolution Protocol (ARP) and Next Hop Resolution Protocol (NHRP) over a unidirectional link (UDL), use the **tunnel udlr address-resolution** command in interface configuration mode. To disable forwarding, use the **no** form of this command.

tunnel udlr address-resolution

no tunnel udlr address-resolution

Syntax Description   This command has no arguments or keywords.

Defaults   Disabled

Command Modes   Interface configuration

Command History

Release	Modification
12.1(5)T	This command was introduced.

Usage Guidelines   This command is configured on the send-only tunnel interface of a downstream router.

Examples   The following example shows how to configure the **tunnel udlr address-resolution** command on an interface to enable ARP and NHRP over a send-only tunnel. An ARP address resolution request received from the upstream router on the UDL (Ethernet interface 0) will be replied to over the send-only tunnel of the receiver. Likewise, an ARP request may be sent by the downstream router over the send-only tunnel, and the response will be received over the UDL.

```
interface tunnel 0
tunnel udlr send-only ethernet 0
tunnel udlr address-resolution
```

Related Commands

Command	Description
tunnel udlr send-only	Configures a unidirectional, GRE tunnel to act as a back channel that can send messages, when another interface is configured for UDLR to receive messages.

tunnel udlr receive-only

To configure a unidirectional, generic routing encapsulation (GRE) tunnel to act as a back channel that can receive messages, when another interface is configured for unidirectional link routing (UDLR) to send messages, use the **tunnel udlr receive-only** command in interface configuration mode. To remove the tunnel, use the **no** form of this command.

tunnel udlr receive-only *type number*

no tunnel udlr receive-only *type number*

Syntax Description

type number	Interface type and number. The *type* and *number* arguments must match the unidirectional send-only interface type and number specified by the **interface** command. Thus, when packets are received over the tunnel, the upper layer protocols will treat the packets as if they are received over the unidirectional send-only interface.

Defaults

No UDLR tunnel is configured.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(3)T	This command was introduced.

Usage Guidelines

Use this command to configure a router that has a unidirectional interface with send-only capabilities. One example of when you might configure this command is if you have traffic traveling via a satellite.

The *type* and *number* arguments must match the send-only interface type and number specified by the **interface** command.

You must configure the **tunnel udlr send-only** command at the opposite end of the tunnel.

If you have a large number of receivers, you should configure UDLR by an alternative means: Internet Group Management Protocol (IGMP) UDLR. See the description of the **ip igmp unidirectional-link** command earlier in this chapter.

Examples

In the following example, Router A (the upstream router) is configured with Open Shortest Path First (OSPF) and Protocol Independent Multicast (PIM). Serial interface 0 has send-only capability. Therefore, the UDLR tunnel is configured as receive-only, and points to serial interface 0.

Router A Configuration

```
ip multicast-routing
!
! Serial0 has send-only capability
!
interface serial 0
 encapsulation hdlc
 ip address 10.1.0.1 255.255.0.0
 ip pim sparse-dense-mode
!
! Configure tunnel as receive-only UDLR tunnel.
!
interface tunnel 0
 tunnel source ethernet 0
 tunnel destination <downstream-router>
 tunnel udlr receive-only serial 0
!
! Configure OSPF.
!
router ospf <pid>
 network 10.0.0.0 0.255.255.255 area 0
```

Router B (the downstream router) is configured with OSPF and PIM. Serial interface 1 has receive-only capability. Therefore, the UDLR tunnel is configured as send-only, and points to serial interface 1.

Router B Configuration

```
ip multicast-routing
!
! Serial1 has receive-only capability
!
interface serial 1
 encapsulation hdlc
 ip address 10.1.0.2 255.255.0.0
 ip pim sparse-dense-mode

!
! Configure tunnel as send-only UDLR tunnel.
!
interface tunnel 0
 tunnel source ethernet 0
 tunnel destination <upstream-router>
 tunnel udlr send-only serial 1
!
! Configure OSPF.
!
router ospf <pid>
 network 10.0.0.0 0.255.255.255 area 0
```

Related Commands	Command	Description
	interface	Defines the IP addresses of the server, configures an interface type, and enters interface configuration mode.
	interface tunnel	Configures a tunnel interface.
	ip igmp unidirectional-link	Configures an interface to be unidirectional and enables it for IGMP UDLR.
	tunnel udlr send-only	Configures a unidirectional, GRE tunnel to act as a back channel that can send messages, when another interface is configured for UDLR to receive messages.

tunnel udlr send-only

To configure a unidirectional, generic routing encapsulation (GRE) tunnel to act as a back channel that can send messages, when another interface is configured for unidirectional link routing (UDLR) to receive messages, use the **tunnel udlr send-only** command in interface configuration mode. To remove the tunnel, use the **no** form of this command.

tunnel udlr send-only *type number*

no tunnel udlr send-only *type number*

Syntax Description

type number	Interface type and number. The *type* and *number* arguments must match the unidirectional receive-only interface type and number specified by the **interface** command. Thus, when packets are sent by upper layer protocols over the interface, they will be redirected and sent over this GRE tunnel.

Defaults

No UDLR tunnel is configured.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(3)T	This command was introduced.

Usage Guidelines

Use this command to configure a router that has a unidirectional interface with receive-only capabilities. The UDLR tunnel will act as a back channel. One example of when you might configure this command is if you have traffic traveling via a satellite.

The *type* and *number* arguments must match the receive-only interface type and number specified by the **interface** command.

You must configure the **tunnel udlr receive-only** command at the opposite end of the tunnel.

Examples

In the following example, Router A (the upstream router) is configured with Open Shortest Path First (OSPF) and Protocol Independent Multicast (PIM). Serial interface 0 has send-only capability. Therefore, the UDLR tunnel is configured as receive-only, and points to serial interface 0.

Router A Configuration

```
ip multicast-routing
!
! Serial0 has send-only capability
!
interface serial 0
 encapsulation hdlc
 ip address 10.1.0.1 255.255.0.0
 ip pim sparse-dense-mode
```

```
!
! Configure tunnel as receive-only UDLR tunnel.
!
interface tunnel 0
 tunnel source ethernet 0
 tunnel destination <downstream-router>
 tunnel udlr receive-only serial 0
```

Router B (the downstream router) is configured with OSPF and PIM. Serial interface 1 has receive-only capability. Therefore, the UDLR tunnel is configured as send-only, and points to serial interface 1.

Router B Configuration

```
ip multicast-routing
!
! Serial1 has receive-only capability
!
interface serial 1
 encapsulation hdlc
 ip address 10.1.0.2 255.255.0.0
 ip pim sparse-dense-mode

!
! Configure tunnel as send-only UDLR tunnel.
!
interface tunnel 0
 tunnel source ethernet 0
 tunnel destination <upstream-router>
 tunnel udlr send-only serial 1
```

Related Commands

Command	Description
interface	Defines the IP addresses of the server, configures an interface type, and enters interface configuration mode.
interface tunnel	Configures a tunnel interface.
ip igmp unidirectional-link	Configures an interface to be unidirectional and enables it for IGMP UDLR.
tunnel udlr address-resolution	Enables the forwarding of ARP and NHRP over a UDL.
tunnel udlr receive-only	Configures a unidirectional, GRE tunnel to act as a back channel that can receive messages, when another interface is configured for UDLR to send messages.

■ **tunnel udlr send-only**