MPLS—LDP MD5 Global Configuration

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The MPLS—LDP MD5 Global Configuration feature provides enhancements to the Label Distribution Protocol (LDP) implementation of the Message Digest 5 (MD5) password. This feature allows you to enable LDP MD5 globally instead of on a per-peer basis. Using this feature you can set up password requirements for a set of LDP neighbors to help prevent unauthorized peers from establishing LDP sessions and to block spoofed TCP messages.

This document provides information about and configuration information for the global configuration of LDP MD5 protection.

Finding Feature Information in This Module

Your Cisco IOS software release may not support all of the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To reach links to specific feature documentation in this module and to see a list of the releases in which each feature is supported, use the "Feature Information for MPLS—LDP MD5 Global Configuration" section on page 20.

Finding Support Information for Platforms and Cisco IOS and Catalyst OS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS and Catalyst OS software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

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Prerequisites for MPLS—LDP MD5 Global Configuration

- Cisco Express Forwarding or distributed Cisco Express Forwarding must be enabled on the label switch router (LSR).
- Routing (static or dynamic) must be configured for the LSR.
- Multiprotocol Label Switching (MPLS) LDP must be configured on the LSR. However, you can configure LDP MD5 protection before you configure MPLS LDP. You can then use LDP MD5 protection after you configure MPLS LDP.
- A Virtual Private Network (VPN) routing and forwarding instance (VRF) must be configured if you want to configure MPLS LDP MD5 global configuration for a VRF. If you delete a VRF, the LDP MD5 global configuration for that VRF is automatically removed.

Restrictions for MPLS—LDP MD5 Global Configuration

MD5 protection described in this document applies only to the LDP sessions. All enhancements described in this document do not affect Tag Distribution Protocol (TDP) sessions.

Information About MPLS—LDP MD5 Global Configuration

Before you configure the MPLS—LDP MD5 Global Configuration feature, you must understand the following:

Enhancements to LDP MD5 Protection for LDP Messages Between Peers

The MPLS—LDP MD5 Global Configuration feature provides the following enhancements to the LDP support of MD5 passwords:

- You can specify peers for which MD5 protection is required. This can prevent the establishment of LDP sessions with unexpected peers.
- You can configure passwords for groups of peers. This increases the scalability of LDP password configuration management.
- The established LDP session with a peer is not automatically torn down when the password for that peer is changed. The new password is used the next time an LDP session is established with the peer.

- You can control when the new password is used. You can configure the new password on the peer before forcing the use of the new password.
- If the neighboring nodes support graceful restart, then LDP sessions are gracefully restarted. The LDP MD5 password configuration is checkpointed to the standby Route Processors (RPs). The LDP MD5 password is used by the router when the new active RP attempts to establish LDP sessions with neighbors after the switchover.

LDP session, advertisement, and notification messages are exchanged between two LDP peers over a TCP connection. You can configure the TCP MD5 option to protect LDP messages that are exchanged over a TCP connection. You can configure this protection for each potential LDP peer. As a result, an LDP ignores any LDP hello messages sent from an LSR for which you have not configured a password. (LDP tries to establish an LDP session with each neighbor from which a hello message is received.)

Before the introduction of the MPLS—LDP MD5 Global Configuration feature, you needed to configure a separate password for each LDP peer for which you wanted MD5 protection. This was the case even when the same password was used for multiple LDP peers. Before this feature, LDP would tear down LDP sessions with a peer immediately if a password for that peer had changed.

LDP MD5 Password Configuration Information

Before the introduction of the MPLS—LDP MD5 Global Configuration feature, the command used for configuring a password for an LDP neighbor was **mpls ldp neighbor** [**vrf** *vrf-name*] *ip-address* **password** [**0** | **7**] *password*. This command configures a password for one neighbor whose router ID is the IP address in the specified VRF. An LSR can have zero or one such configuration for each LDP neighbor.

You can use the commands provided by the MPLS—LDP MD5 Global Configuration feature to configure passwords for LDP neighbors.

You must understand how LDP determines the password for an LDP session between peers before you configure MD5 password protection for your network. LDP determines the passwords for its sessions based on the commands that you enter.

You can enter an **mpls ldp password vrf** *vrf-name* **required** [**for** *acl*] command, either with an optional *acl* argument that permits the LDP router ID of the neighbor or without an *acl* argument. Make sure that you enter a command that configures a password. Otherwise, LDP might not establish a session with the neighbor in question.

For the commands in the following password-determining process, *A.B.C.D:N* represents the LDP neighbor in VRF vpn1 and the neighbor LDP ID:

- *A.B.C.D* is the neighbor router ID.
- *N* is the neighbor label space ID.

To determine the password for an LDP session for the neighbor label space *A.B.C.D:N*, LDP looks at the password commands in the order indicated by the following statements:

- If you configured this command:

  mpls ldp neighbor vrf vpn1 *A.B.C.D* **password** *pwd-nbr*

  The LDP session password is *pwd-nbr*. LDP looks no further and uses the password you specify.

- Otherwise, LDP looks to see if you configured one or more **mpls ldp vrf vpn1 password option** commands. LDP considers the commands in order of the ascending *number* arguments (*number-1st to number-n*). For example:

  mpls ldp vrf vpn1 password option *number-1st* **for** *acl-1st pwd-1st*

LDP compares the peer router ID of the neighbor (*A.B.C.D)* with this command. If *A.B.C.D* is permitted by the command access list *acl-1st*, the session password is the command password, that is, *pwd-1st*.

If A.B.C.D is not permitted by *acl-1st*, LDP looks at the command with the next ascending *number* argument (*number-2nd*):

mpls ldp vrf vpn1 password option number-2nd **for** *acl-2nd pwd-2nd*

If *A.B.C.D* is permitted by the command access list *acl-2nd*, the session password is *pwd-2nd*.

If *A.B.C.D* is not permitted by the access list *acl-2nd*, LDP continues checking *A.B.C.D* against access lists until LDP:

- Finds *A.B.C.D* permitted by an access list. Then the command password is the session password.
- Has processed the *number-nth* argument of this command (*n* being the highest *number* argument you configured for this command).

- If the **mpls ldp vrf vpn1 password option** *number-nth* **for** *acl-nth pwd-nth* command produces no match and, therefore no password, LDP looks to see if you configured the following command:

  mpls ldp password vrf vpn1 fallback *pwd-fback*

  If you configured this command, the session password is *pwd-fback*.

- Otherwise, if LDP has not found a password, you did not configure a password for the session. LDP does not use MD5 protection for the session TCP connection.

LDP MD5 Password Configuration for Routing Tables

The MPLS—LDP MD5 Global Configuration feature introduces commands that can establish password protection for LDP sessions between LDP neighbors or peers. These commands can apply to routes in the global routing table or in a VRF.

By default, if the **vrf** keyword is not specified in the command, the command applies to the global routing table. The following sample commands would apply to routes in the global routing table:

```
Router# mpls ldp password required
Router# mpls ldp password option 15 for 99 pwd-acl
Router# mpls ldp password fallback pwd-fbck
```

You can configure LDP MD5 password protection for routes in a VRF only when the VRF is configured on the LSR. If you specify a VRF name and a VRF with that name is not configured on the LSR, LDP prints out a warning and discards the command. If you remove a VRF, LDP deletes the password configuration for that VRF. The following sample commands would apply to routes in a VRF, for example, VRF vpn1:

```
Router# mpls ldp vrf vpn1 password required
Router# mpls ldp vrf vpn1 password option 15 for 99 pwd-acl
Router# mpls ldp vrf vpn1 password fallback pwd-flbk
```

How to Configure the MPLS—LDP MD5 Global Configuration Feature

You might require password protection for a certain set of neighbors for security reasons (for example, to prevent LDP sessions being established with unauthorized peers, or to block spoofed TCP messages). To enforce this security, you can configure a password requirement for LDP sessions with those neighbors that must have MD5 protection (TCP session uses a password).

If you configure a password requirement for a neighbor and you did not configure a password for the neighbor, LDP tears down the LDP sessions with the neighbor. LDP also tears down the LDP sessions with the neighbor if you configured a password requirement and a password and the password is not used in the LDP sessions.

If a password is required for a neighbor and the LDP sessions with the neighbor are established to use a password, any configuration that removes the password for the neighbor causes the LDP sessions to be torn down.

To avoid unnecessary LDP session flapping, you should perform the task as described in this section and use caution when you change LDP passwords.

Perform the following tasks to configure the MPLS—LDP MD5 Global Configuration feature:

- Identifying LDP Neighbors for LDP MD5 Password Protection, page 5 (required)
- Configuring an LDP MD5 Password for LDP Sessions, page 7 (required)
- Verifying the LDP MD5 Configuration, page 14 (optional)

Identifying LDP Neighbors for LDP MD5 Password Protection

Perform the following task to identify LDP neighbors for LDP MD5 password protection.

Prerequisites

Before you start to configure passwords for LDP sessions, you must identify neighbors or groups of peers for which you want to provide MD5 protection. For example:

- You might have several customers that all use the same core routers. To ensure security you might want to provide each customer with a different password.
- You could have defined several departmental VRFs in your network. You could provide password protection for each VRF.
- Certain groups of peers might require password protection for security reasons. Password protection prevents unwanted LDP sessions.

Before you start to configure passwords for LDP sessions, you must identify neighbors or groups of peers for which you want to provide LDP MD5 password protection. This task uses the network in Figure 1 to show how you might identify LDP neighbors for LDP MD5 protection.

After you identify LDP neighbors or a group of peers for LDP MD5 protection, you must decide if password protection is mandatory and what password commands to use for each peer.

SUMMARY STEPS

1. Identify LDP neighbors or groups of peers for LDP MD5 password protection.

2. Decide what LDP MD5 protection is required for each neighbor or group of peers.

DETAILED STEPS

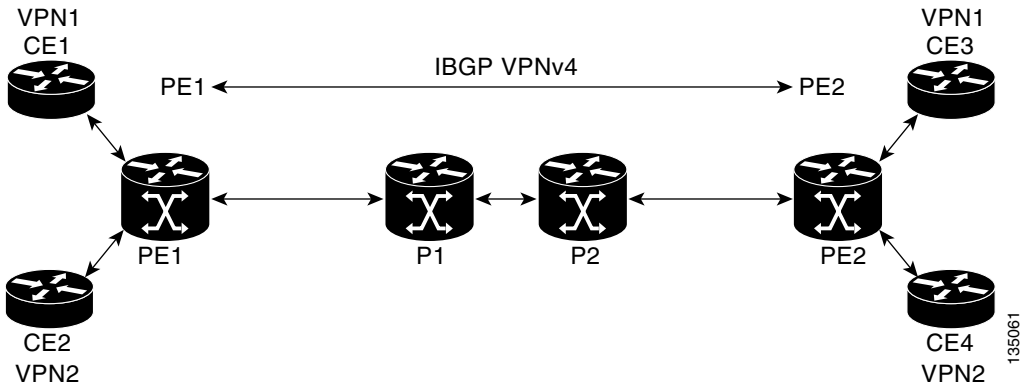
Step 1 Identify LDP neighbors or groups of peers for LDP MD5 password protection.

This task uses the network in Figure 1 to show how you might identify LDP neighbors for LDP MD5 protection.

Figure 1 shows a sample network that has the following topology:

- Carrier Supporting Carrier (CSC) is configured between provider edge (PE) router PE1 and customer edge (CE) router CE1 and between PE1 and CE2.
- Internal Border Gateway Protocol (IBGP) Virtual Private Network (VPN) IPv4 (VPNv4) to support Layer 3 VPNs is configured between PE1 and PE2.
- CE1 and CE3 are in VRF VPN1. CE2 and CE4 are in a different VRF, VPN2.

Figure 1 Sample Network: Identifying LDP Neighbors for LDP MD5 Protection



For the sample network in Figure 1, you could configure separate passwords on PE1 for the following:

- VRF VPN1
- VRF VPN2

You could also configure a password requirement on PE1 for P1, P2, CE1 and CE2.

Step 2 Decide what LDP MD5 protection is required for each neighbor or group of peers.

- If you need to set up a password for an LDP session with one peer or neighbor, for example, from PE1 to CE1, you could use the **mpls ldp neighbor** [**vrf** *vrf-name*] *ip-address* **password** [**0** | **7**] *password-string* command, where *ip-address* is the router ID of the neighbor. See the "Configuring an LDP MD5 Password for LDP Sessions" section on page 7 for instructions.
- If you need to set up an LDP session password for a set of peers, for example for P1 and P2, you could set up an access list that permits access to these routers and denies access to all others. See the "Configuring an LDP MD5 Password for LDP Sessions with a Selected Group of Peers" section on page 12 for instructions.

- If you want to require a password for communication among VRF vpn1 members, you can configure a password requirement and password for VRF vpn1. If your network contains several VRFs, you can configure a password for each VRF. See the "Configuring an LDP MD5 Password for LDP Sessions with Peers from a Specified VRF" section on page 10 for instructions.

Configuring an LDP MD5 Password for LDP Sessions

This section contains information about and instructions for configuring an LDP MD5 password for LDP sessions. You configure an LDP MD5 password to protect your routers from unwanted LDP sessions and provide LDP session security. You can provide LDP session security for a specific neighbor, or for LDP peers from a specific VRF or from the global routing table, or for a specific set of LDP neighbors.

After you have identified the LDP neighbor, LDP neighbors, or LDP peers in your network for which you want LDP MD5 password protection, perform the following procedures, as you require, to configure an LDP MD5 password for LDP sessions:

- Configuring an LDP MD5 Password for a Specified Neighbor, page 7
- Configuring an LDP MD5 Password for LDP Sessions with Peers from a Specified VRF, page 10
- Configuring an LDP MD5 Password for LDP Sessions with a Selected Group of Peers, page 12

Configuring an LDP MD5 Password for a Specified Neighbor

Perform the following task to configure an LDP MD5 password for a specified neighbor.

LDP looks first for a password between the router and neighbor that is configured with the **mpls ldp neighbor** [**vrf** *vrf-name*] *ip-address* **password** *pwd-string* command. If a password is configured with this command, LDP uses that password before checking passwords configured by other commands.

You must add a configuration command for each neighbor or peer for which you want password protection.

Prerequisites

Identify the LDP neighbor or peer for which you want MD5 password protection.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **mpls ldp neighbor** [**vrf** *vrf-name*] *ip-address* **password** [**0** | **7**] *password-string*
4. **end**
5. **show mpls ldp neighbor** [**vrf** *vrf-name* | **all**] [*ip-address* | *interface*] [**detail**] [**graceful-restart**]
6. **show mpls ldp neighbor** [**vrf** *vrf-name*] [*ip-address* | *interface*] **password** [**pending** | **current**]
7. **show mpls ldp discovery** [**vrf** *vrf-name* | **all**] [**detail**]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**mpls ldp neighbor** [**vrf** *vrf-name*] *ip-address* **password** [**0** | **7**] *password-string* **Example:** `Router(config)# mpls ldp neighbor vrf vpn1 10.1.1.1 password nbrce1pwd`	Configures a password key for computing MD5 checksums for the session TCP connection with the specified neighbor. • The **vrf** *vrf-name* keyword-argument pair specifies the VPN routing and forwarding instance for the specified neighbor. • The *ip-address* argument specifies the router ID (IP address) that identifies a neighbor. • The [**0** | **7**] keywords specify whether the password that follows is encrypted: – **0** specifies a clear-text (nonencrypted) password. – **7** specifies a Cisco proprietary encrypted password. • The *password-string* argument defines the password key to be used for computing MD5 checksums for the session TCP connection with the specified neighbor.
Step 4	**end** **Example:** `Router(config)# end`	Exits to privileged EXEC mode.

	Command or Action	Purpose
Step 5	**show mpls ldp neighbor** [**vrf** *vrf-name* | **all**] [*ip-address* | *interface*] [**detail**] [**graceful-restart**] **Example:** `Router# show mpls ldp neighbor vrf vpn1 detail`	Displays the status of LDP sessions. • The **vrf** *vrf-name* keyword-argument pair displays the LDP neighbors for the specified VRF instance (*vrf-name*). • The **all** keyword displays LDP neighbor information for all VPNs, including those in the default routing domain. • The *ip-address* argument identifies the neighbor with the IP address for which you configured password protection. • The *interface* argument defines the LDP neighbors accessible over this interface. • The **detail** keyword displays information in long form, including password information for this neighbor. Here are the items displayed: – An indication as to whether a password is mandatory for this neighbor (required or not required) – The password source (neighbor, fallback or number [option number]) – An indication as to whether the latest configured password for this neighbor is used by the TCP session (in use) or the TCP session uses an old password (stale) • The **graceful-restart** keyword displays per-neighbor graceful restart information.

	Command or Action	Purpose
Step 6	**show mpls ldp neighbor** [**vrf** *vrf-name*] [*ip-address* | *interface*] **password** [**pending** | **current**] **Example:** `Router# show mpls ldp neighbor vrf vpn1 password`	Displays password information used in established LDP sessions. • The **vrf** *vrf-name* keyword-argument pair displays the LDP neighbors for the specified VRF instance (*vrf-name*). • The *ip-address* argument identifies the neighbor with the IP address for which you configured password protection. • The *interface* argument defines the LDP neighbors accessible over this interface. • The **pending** keyword displays LDP sessions whose passwords are different from that in the current configuration. • The **current** keyword displays LDP sessions whose password is the same as that in current configuration. If you do not specify an optional keyword for this command, password information for all established LDP sessions is displayed.
Step 7	**show mpls ldp discovery** [**vrf** *vrf-name* | **all**] [**detail**] **Example:** `Router# show mpls ldp discovery vrf vpn1 detail`	Displays the status of the LDP discovery process. • The **vrf** *vrf-name* keyword-argument pair displays the neighbor discovery information for the specified VRF instance (*vrf-name*). • The **all** keyword displays LDP discovery information for all VPNs, including those in the default routing domain. • The **detail** keyword displays detailed information about all LDP discovery sources on an LSR.

Configuring an LDP MD5 Password for LDP Sessions with Peers from a Specified VRF

Perform the following task to configure an LDP MD5 password for LDP sessions with peers from a specified VRF. You can also use this task to configure an LDP MD5 password for LDP sessions with peers from the global routing table.

This task provides you with LDP session protection with peers from a particular VRF or the global routing table. If you want a password requirement, you can use the **mpls ldp password required** command.

If only LDP sessions with a set of LDP neighbors need MD5 protection, configure a standard IP access list that permits the desired set of LDP neighbors and denies the rest. See the "Configuring an LDP MD5 Password for LDP Sessions with a Selected Group of Peers" section on page 12.

Prerequisites

Identify LDP peers for which you want MD5 password protection.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **mpls ldp** [**vrf** *vrf-name*] **password fallback** [**0** | **7**] *password*
4. **mpls ldp** [**vrf** *vrf-name*] **password required** [**for** *acl*]
5. **end**
6. **show mpls ldp discovery** [**vrf** *vrf-name* | **all**] [**detail**]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**mpls ldp** [**vrf** *vrf-name*] **password fallback** [**0** | **7**] *password* **Example:** `Router(config)# mpls ldp vrf vpn1 password fallback 0 vrfpwdvppn1`	Configures an MD5 password for LDP sessions with peers. • The **vrf** *vrf-name* keyword-argument pair specifies a VRF configured on the LSR. • The [**0** | **7**] keywords specify whether the password that follows is encrypted: – **0** specifies a clear-text (nonencrypted) password. – **7** specifies a Cisco proprietary encrypted password. • The *password* argument specifies the MD5 password to be used for the LDP sessions with peers whose connections are established through a named VRF or the global routing table. The example sets up an MD5 password for a VRF.
Step 4	**mpls ldp** [**vrf** *vrf-name*] **password required** [**for** *acl*] **Example:** `Router(config)# mpls ldp vrf vpn1 password required`	Specifies that LDP must use a password when establishing a session between LDP peers. • The **vrf** *vrf-name* keyword-argument pair specifies a VRF configured on the LSR. • The **for** *acl* keyword-argument pair names an access list that specifies that a password is mandatory only for LDP sessions with neighbors whose LDP router IDs are permitted by the list. Only standard IP access lists can be used for the *acl* argument.

	Command or Action	Purpose
Step 5	**end** **Example:** `Router(config)# end`	Exits to privileged EXEC mode.
Step 6	**show mpls ldp discovery** [**vrf** *vrf-name* | **all**] [**detail**] **Example:** `Router# show mpls ldp discovery detail`	Displays the status of the LDP discovery process. • The **vrf** *vrf-name* keyword-argument pair displays the neighbor discovery information for the specified VPN routing and forwarding instance (*vrf-name*). • The **all** keyword displays LDP discovery information for all VPNs, including those in the default routing domain. • The **detail** keyword displays detailed information about all LDP discovery sources on an LSR. Use this command to verify that password configuration is correct for all LDP neighbors.

Configuring an LDP MD5 Password for LDP Sessions with a Selected Group of Peers

Perform the following task to configure an LDP MD5 password for LDP sessions with a selected group of peers.

If only LDP sessions with a selected group of peers need MD5 protection, configure a standard IP access list that permits sessions with the desired group of peers (identified by LDP router IDs) and denies session with the rest. Configuring a password and password requirement for these neighbors or peers provides security by preventing LDP sessions from being established with unauthorized peers.

Prerequisites

Identify the groups of peers for which you want MD5 password protection and define an access list that permits LDP sessions with the group of peers you require.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **mpls ldp** [**vrf** *vrf-name*] **password option** *number* **for** *acl* [**0** | **7**] *password*
4. **mpls ldp** [**vrf** *vrf-name*] **password required** [**for** *acl*]
5. **end**
6. **show mpls ldp discovery** [**vrf** *vrf-name* | **all**] [**detail**]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**mpls ldp** [**vrf** *vrf-name*] **password option** *number* **for** *acl* [**0** | **7**] *password* **Example:** `Router(config)# mpls ldp password option 25 for 10 aclpwdfor10`	Configures an MD5 password for LDP sessions with neighbors whose LDP router IDs are permitted by a specified access list. • The **vrf** *vrf-name* keyword-argument pair specifies a VRF configured on the LSR. • The *number* argument defines the order in which the access lists are evaluated in the determination of a neighbor password. The valid range is 1–32767. • The **for** *acl* keyword-argument pair specifies the name of the access list that includes the LDP router IDs of those neighbors for which the password applies. Only standard IP access list values (1–99) can be used for the *acl* argument. • The [**0** | **7**] keywords specifies whether the password that follows is encrypted: – **0** specifies a clear-text (nonencrypted) password. – **7** specifies a Cisco proprietary encrypted password. • The *password* argument specifies the MD5 password to be used for the specified LDP sessions.
Step 4	**mpls ldp** [**vrf** *vrf-name*] **password required** [**for** *acl*] **Example:** `Router(config)# mpls ldp password required for 10`	Specifies that LDP must use a password when establishing a session between LDP peers. • The **vrf** *vrf-name* keyword-argument pair specifies a VRF configured on the LSR. • The **for** *acl* keyword-argument pair names an access list. The access list specifies a password is mandatory only for LDP sessions with neighbors whose LDP router IDs are permitted by the list. Only standard IP access lists can be used for the *acl* argument.

	Command or Action	Purpose
Step 5	**end** **Example:** `Router(config)# end`	Exits to privileged EXEC mode.
Step 6	**show mpls ldp discovery** [**vrf** *vrf-name* | **all**] [**detail**] **Example:** `Router# show mpls ldp discovery detail`	Displays the status of the LDP discovery process. • The **vrf** *vrf-name* keyword-argument pair displays the neighbor discovery information for the specified VPN routing and forwarding instance (*vrf-name*). • The **all** keyword displays LDP discovery information for all VPNs, including those in the default routing domain. • The **detail** keyword displays detailed information about all LDP discovery sources on an LSR. Use this command to verify password configuration is correct for all LDP neighbors.

Verifying the LDP MD5 Configuration

Perform the following task to verify that the LDP MD5 secure sessions are as you configured for all LDP neighbors.

SUMMARY STEPS

1. **enable**
2. **show mpls ldp discovery detail**
3. **show mpls ldp neighbor detail**
4. **show mpls ldp neighbor password** [**pending** | **current**]
5. **exit**

DETAILED STEPS

Step 1 **enable**

Use this command to enable privileged EXEC mode. Enter your password if prompted. For example:

```
Router> enable
Router#
```

Step 2 **show mpls ldp discovery detail**

Use this command to verify that the LDP MD5 password information is as you configured for each neighbor. For example:

```
Router# show mpls ldp discovery detail

 Local LDP Identifier:
    10.1.1.1:0
    Discovery Sources:
    Interfaces:
```

```
    Ethernet1/0 (ldp): xmit/recv
        Hello interval: 5000 ms; Transport IP addr: 10.1.1.1
        LDP Id: 10.4.4.4:0
          Src IP addr: 10.0.20.4; Transport IP addr: 10.4.4.4
          Hold time: 15 sec; Proposed local/peer: 15/15 sec
          Password: not required, none, stale
Targeted Hellos:
    10.1.1.1 -> 10.3.3.3 (ldp): passive, xmit/recv
        Hello interval: 10000 ms; Transport IP addr: 10.1.1.1
        LDP Id: 10.3.3.3:0
          Src IP addr: 10.3.3.3; Transport IP addr: 10.3.3.3
          Hold time: 90 sec; Proposed local/peer: 90/90 sec
          Password: required, neighbor, in use
```

The Password field might display any of the following for the status of the password:

- Required or not required—Indicates whether password configuration is required.
- Neighbor, none, option #, or fallback—Indicates the password source when the password was configured.
- In use (current) or stale (previous)—Indicates the current LDP session password usage status.

Look at the output of the command to verify your configuration.

Step 3 **show mpls ldp neighbor detail**

Use this command to verify that the password information for a neighbor is as you configured. For example:

```
Router# show mpls ldp neighbor detail

    Peer LDP Ident: 10.3.3.3:0; Local LDP Ident 10.1.1.1:0
        TCP connection: 10.3.3.3.11018 - 10.1.1.1.646
        Password: required, neighbor, in use
        State: Oper; Msgs sent/rcvd: 167/167; Downstream; Last TIB rev sent 9
        Up time: 02:24:02; UID: 5; Peer Id 3;
        LDP discovery sources:
          Targeted Hello 10.1.1.1 -> 10.3.3.3, passive;
            holdtime: 90000 ms, hello interval: 10000 ms
        Addresses bound to peer LDP Ident:
          10.3.3.3         10.0.30.3
        Peer holdtime: 180000 ms; KA interval: 60000 ms; Peer state: estab
    Peer LDP Ident: 10.4.4.4:0; Local LDP Ident 10.1.1.1:0
        TCP connection: 10.4.4.4.11017 - 10.1.1.1.646
        Password: not required, none, stale
        State: Oper; Msgs sent/rcvd: 9/9; Downstream; Last TIB rev sent 9
        Up time: 00:05:35; UID: 6; Peer Id 1;
        LDP discovery sources:
          Ethernet1/0; Src IP addr: 10.0.20.4
            holdtime: 15000 ms, hello interval: 5000 ms
        Addresses bound to peer LDP Ident:
          10.0.40.4       10.4.4.4         10.0.20.4
        Peer holdtime: 180000 ms; KA interval: 60000 ms; Peer state: estab
```

Step 4 **show mpls ldp neighbor password** [**pending** | **current**]

Use this command to verify that LDP sessions are using the password configuration that you expect, either the same as or different from that in the current configuration. The **pending** keyword displays information for LDP sessions whose password is different from that in the current configuration. The **current** keyword displays information for LDP sessions whose password is the same as that in the current configuration.

For example:

```
Router# show mpls ldp neighbor password

    Peer LDP Ident: 10.4.4.4:0; Local LDP Ident 10.1.1.1:0
        TCP connection: 10.4.4.4.11017 - 10.1.1.1.646
        Password: not required, none, stale
        State: Oper; Msgs sent/rcvd: 57/57
    Peer LDP Ident: 10.3.3.3:0; Local LDP Ident 10.1.1.1:0
        TCP connection: 10.3.3.3.11018 - 10.1.1.1.646
        Password: required, neighbor, in use
        State: Oper; Msgs sent/rcvd: 216/215

Router# show mpls ldp neighbor password pending

    Peer LDP Ident: 10.4.4.4:0; Local LDP Ident 10.1.1.1:0
        TCP connection: 10.4.4.4.11017 - 10.1.1.1.646
        Password: not required, none, stale
        State: Oper; Msgs sent/rcvd: 57/57

Router# show mpls ldp neighbor password current

    Peer LDP Ident: 10.3.3.3:0; Local LDP Ident 10.1.1.1:0
        TCP connection: 10.3.3.3.11018 - 10.1.1.1.646
        Password: required, neighbor, in use
        State: Oper; Msgs sent/rcvd: 216/215
```

This command displays password information used in established LDP sessions. If you do not enter an optional **pending** or **current** keyword for the command, password information for all established LDP sessions is displayed.

Step 5 **exit**

Use this command to exit to user EXEC mode. For example:

```
Router# exit
Router>
```

Configuration Examples for Configuring the MPLS—LDP MD5 Global Configuration Feature

This section contains the following example for configuring the MPLS—LDP MD5 Global Configuration feature:

- Configuring an LDP MD5 Password for LDP Sessions: Examples, page 16

Configuring an LDP MD5 Password for LDP Sessions: Examples

The section contains the following examples for configuring an LDP MD5 password for LDP sessions:

- Configuring an LDP MD5 Password for LDP Sessions for a Specified Neighbor: Example, page 17
- Configuring an LDP MD5 Password for LDP Sessions with Peers from a Specified VRF: Example, page 17

- Configuring an LDP MD5 Password for LDP Sessions with a Selected Group of Peers: Example, page 17

Configuring an LDP MD5 Password for LDP Sessions for a Specified Neighbor: Example

The following example shows how to configure an LDP MD5 password for LDP sessions for a specified neighbor:

```
enable
configure terminal
mpls ldp vrf vpn1 10.1.1.1 password nbrscrtpwd
end
```

This sets up nbrscrtpwd as the password to use for LDP sessions for the neighbor whose LDP router ID is 10.1.1.1. Communication with this neighbor is through VRF vpn1.

Configuring an LDP MD5 Password for LDP Sessions with Peers from a Specified VRF: Example

The following example shows how to configure an LDP MD5 password for LDP sessions with peers from a specified VRF. The password vrfpwdvpn1 is configured for use with LDP peers that communicate using VRF vpn1. A password is required; otherwise, LDP tears down the session.

```
enable
configure terminal
mpls ldp vrf vpn1 password fallback vrfpwdvpn1
mpls ldp vrf vpn1 password required
end
```

The following example shows how to configure a password that is used for sessions for peers that communicate using the global routing table:

```
enable
configure terminal
mpls ldp password fallback vrfpwdvppn1
end
```

Configuring an LDP MD5 Password for LDP Sessions with a Selected Group of Peers: Example

The following example shows how to configure an LDP MD5 password for LDP sessions with a selected group of peers. The required password aclpwdfor10 is configured for access list 10. Only those LDP router IDs permitted in access list 10 are required to use the password.

```
enable
configure terminal
mpls ldp password option 25 for 10 aclpwdfor10
mpls ldp password required for 10
end
```

Access list 10 might look something like this:

```
enable
configure terminal
access-list 10 permit 10.1.1.1
access-list 10 permit 10.3.3.3
access-list 10 permit 10.4.4.4
access-list 10 permit 10.1.1.1
access-list 10 permit 10.2.2.2
end
```

Additional References

The following sections provide references related to the MPLS—LDP MD5 Global Configuration feature.

Related Documents

Related Topic	Document Title
Configuration tasks for LDP	*MPLS LDP MD5 Global Configuration*

Standards

Standard	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	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
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/techsupport

Feature Information for MPLS—LDP MD5 Global Configuration

Table 1 lists the release history for this feature.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS and Catalyst OS software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note Table 1 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

Table 1 Feature Information for MPLS—LDP MD5 Global Configuration

Feature Name	Releases	Feature Information
MPLS—LDP MD5 Global Configuration	12.2(28)SB 12.0(32)SY 12.2(33)SRB 12.4(20)T	The MPLS—LDP MD5 Global Configuration feature provides enhancements to the Label Distribution Protocol (LDP) implementation of the Message Digest 5 (MD5) password. This feature allows you to enable LDP MD5 globally instead of on a per-peer basis. Using this feature you can set up password requirements for a set of LDP neighbors to help prevent unauthorized peers from establishing LDP sessions and to block spoofed TCP messages. In 12.2(28)SB, this feature was introduced. In 12.0(32)SY, this feature was integrated into Cisco IOS Release 12.0(32)SY. This feature was integrated into Cisco IOS Release 12.2(33)SRB. This feature was integrated into Cisco IOS Release 12.4(20)T.
		The following sections provide information about this feature: • Enhancements to LDP MD5 Protection for LDP Messages Between Peers, page 2 • LDP MD5 Password Configuration Information, page 3 • LDP MD5 Password Configuration for Routing Tables, page 4 • You might require password protection for a certain set of neighbors for security reasons (for example, to prevent LDP sessions being established with unauthorized peers, or to block spoofed TCP messages). To enforce this security, you can configure a password requirement for LDP sessions with those neighbors that must have MD5 protection (TCP session uses a password)., page 5 • Identifying LDP Neighbors for LDP MD5 Password Protection, page 5 • Identifying LDP Neighbors for LDP MD5 Password Protection, page 5 • Configuring an LDP MD5 Password for LDP Sessions, page 7 • Verifying the LDP MD5 Configuration, page 14
		The following commands were modified by this feature: **mpls ldp password fallback**, **mpls ldp password option**, **mpls ldp password required**, **show mpls ldp discovery**, **show mpls ldp neighbor**, **show mpls ldp neighbor password**.

Glossary

BGP—Border Gateway Protocol. An interdomain routing protocol that replaces External Gateway Protocol (EGP). BGP systems exchange reachability information with other BGP systems. BGP is defined by RFC 1163.

EGP—Exterior Gateway Protocol. An internet protocol for exchanging routing information between autonomous systems. EGP is documented in RFC 904. EGP is not to be confused with the general term exterior gateway protocol. EGP is an obsolete protocol that was replaced by Border Gateway Protocol (BGP).

CE router—customer edge router. A router that is part of a customer network and that interfaces to a provider edge (PE) router.

CSC—Carrier Supporting Carrier. A situation where one service provider allows another service provider to use a segment of its backbone network. The service provider that provides the segment of the backbone network to the other provider is called the backbone carrier. The service provider that uses the segment of the backbone network is called the customer carrier.

LDP—Label Distribution Protocol. A standard protocol between Multiprotocol Label Switching (MPLS)-enabled routers that is uses in the negotiation of the labels used to forward packets. The Cisco proprietary version of this protocol is the Tag Distribution Protocol (TDP).

LDP peer—A label switch router (LSR) that is the receiver of label space information from another LSR. If an LSR has a label space to advertise to another LSR, or to multiple LSRs, one Label Distribution Protocol (LDP) session exists for each LSR (LDP peer) receiving the label space information.

MD5—Message Digest 5. A one-way hashing algorithm that produces a 128-bit hash. Both MD5 and Secure Hash Algorithm (SHA) are variations on MD4 and are designed to strengthen the security of the MD4 hashing algorithm. Cisco uses hashes for authentication within the IPSec framework. SNMP v.2 uses MD5 for message authentication, to verify the integrity of the communication, to authenticate the message origin, and to check its timeliness.

MPLS—Multiprotocol Label Switching. A switching method that forwards IP traffic through use of labels. Each label instructs the routers and the switches in the network where to forward a packet based on preestablished IP routing information.

PE router—provider edge router. A router that is part of a service provider's network connected to a customer edge (CE) router. All Multiprotocol Label Switching (MPLS) Virtual Private Network (VPN) processing occurs in the PE router.

VPN—Virtual Private Network. Enables IP traffic to travel securely over a public TCP/IP network by encrypting all traffic forwarded from one network to another. A VPN uses tunneling to encrypt all information at the IP level.

VRF—A VPN routing and forwarding instance. A VRF consists of an IP routing table, a derived forwarding table, a set of interfaces that use the forwarding table, and a set of rules and routing protocols that determine what goes into the forwarding table. In general, a VRF includes the routing information that defines a customer VPN site that is attached to a PE router.