Configuring LLDP and LLDP-MED

This chapter describes how to configure the Link Layer Discovery Protocol (LLDP) and LLDP Media Endpoint Discovery (LLDP-MED) on the switch. Unless otherwise noted, the term *switch* refers to a standalone switch and to a switch stack.

For complete syntax and usage information for the commands used in this chapter, see the command reference for this release and the “System Management Commands” section in the *Cisco IOS Configuration Fundamentals Command Reference, Release 12.2*.

This chapter consists of these sections:

- Understanding LLDP and LLDP-MED, page 21-1
- Configuring LLDP and LLDP-MED, page 21-3
- Monitoring and Maintaining LLDP and LLDP-MED, page 21-7

Understanding LLDP and LLDP-MED

This section contains this conceptual information:

- Understanding LLDP, page 21-1
- Understanding LLDP-MED, page 21-2

Understanding LLDP

The Cisco Discovery Protocol (CDP) is a device discovery protocol that runs over Layer 2 (the data link layer) on all Cisco-manufactured devices (routers, bridges, access servers, and switches). CDP allows network management applications to automatically discover and learn about other Cisco devices connected to the network.

To support non-Cisco devices and to allow for interoperability between other devices, the switch supports the IEEE 802.1AB Link Layer Discovery Protocol (LLDP). LLDP is a neighbor discovery protocol that is used for network devices to advertise information about themselves to other devices on the network. This protocol runs over the data-link layer, which allows two systems running different network layer protocols to learn about each other.
LLDP supports a set of attributes that it uses to discover neighbor devices. These attributes contain type, length, and value descriptions and are referred to as TLVs. LLDP supported devices can use TLVs to receive and send information to their neighbors. Details such as configuration information, device capabilities, and device identity can be advertised using this protocol.

The switch supports these basic management TLVs. These are mandatory LLDP TLVs.

- Port description TLV
- System name TLV
- System description
- System capabilities TLV
- Management address TLV

These organizationally specific LLDP TLVs are also advertised to support LLDP-MED.

- Port VLAN ID TLV (IEEE 802.1 organizationally specific TLVs)
- MAC/PHY configuration/status TLV (IEEE 802.3 organizationally specific TLVs)

**Note**
A switch stack appears as a single switch in the network. Therefore, LLDP discovers the switch stack, not the individual stack members.

**Understanding LLDP-MED**

LLDP for Media Endpoint Devices (LLDP-MED) is an extension to LLDP that operates between endpoint devices such as IP phones and network devices such as switches. It specifically provides support for voice over IP (VoIP) applications and provides additional TLVs for capabilities discovery, network policy, Power over Ethernet, and inventory management.

LLDP-MED supports these TLVs:

- LLDP-MED capabilities TLV
  Allows LLDP-MED endpoints to determine the capabilities that the connected device supports and what capabilities the device has enabled.

- Network policy TLV
  Allows both network connectivity devices and endpoints to advertise VLAN configurations and associated Layer 2 and Layer 3 attributes for the specific application on that port. For example, the switch can notify a phone of the VLAN number that it should use. The phone can connect into any switch, obtain its VLAN number, and then start communicating with the call control.

- Power management TLV
  Enables advanced power management between LLDP-MED endpoint and network connectivity devices. Allows switches and phones to convey power information, such as how the device is powered, power priority, and how much power the device needs.

- Inventory management TLV
  Allows an endpoint to transmit detailed inventory information about itself to the switch, including information hardware revision, firmware version, software version, serial number, manufacturer name, model name, and asset ID TLV.
LLDP and LLDP-MED cannot operate simultaneously in a network. By default, a network device sends only LLDP packets until it receives LLDP-MED packets from an endpoint device. The network device then sends out LLDP-MED packets until it receives LLDP-only packets.

Configuring LLDP and LLDP-MED

This section contains this configuration information:
- Default LLDP Configuration, page 21-3
- Configuring LLDP Characteristics, page 21-3
- Disabling and Enabling LLDP Globally, page 21-4
- Disabling and Enabling LLDP on an Interface, page 21-5
- Configuring LLDP-MED TLVs, page 21-6

Default LLDP Configuration

Table 21-1 shows the default LLDP configuration. To change the default settings, use the LLDP global configuration and LLDP interface configuration commands.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Default Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLDP global state</td>
<td>Enabled</td>
</tr>
<tr>
<td>LLDP holdtime (before discarding)</td>
<td>120 seconds</td>
</tr>
<tr>
<td>LLDP timer (packet update frequency)</td>
<td>30 seconds</td>
</tr>
<tr>
<td>LLDP reinitialization delay</td>
<td>2 seconds</td>
</tr>
<tr>
<td>LLDP tlv-select</td>
<td>Enabled to send and receive all TLVs.</td>
</tr>
<tr>
<td>LLDP interface state</td>
<td>Enabled</td>
</tr>
<tr>
<td>LLDP receive</td>
<td>Enabled</td>
</tr>
<tr>
<td>LLDP transmit</td>
<td>Enabled</td>
</tr>
<tr>
<td>LLDP med-tlv-select</td>
<td>Enabled to send all LLDP-MED TLVs.</td>
</tr>
</tbody>
</table>

Configuring LLDP Characteristics

You can configure the frequency of LLDP updates, the amount of time to hold the information before discarding it, and the initialization delay time. You can also select the LLDP and LLDP-MED TLVs to be sent and received.

Beginning in privileged EXEC mode, follow these steps to configure these characteristics:

Note Steps 2 through 5 are all optional and can be performed in any order.
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Configuring LLDP and LLDP-MED

Use the `no` form of each of the LLDP commands to return to the default setting.

This example shows how to configure LLDP characteristics.

```
Switch# configure terminal
Switch(config)# lldp holdtime 120
Switch(config)# lldp reinit 2
Switch(config)# lldp timer 30
Switch(config)# end
```

For additional LLDP `show` commands, see the “Monitoring and Maintaining LLDP and LLDP-MED” section on page 21-7.

Disabling and Enabling LLDP Globally

LLDP is enabled by default.

Beginning in privileged EXEC mode, follow these steps to disable LLDP:

<table>
<thead>
<tr>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>configure terminal</td>
</tr>
<tr>
<td>Step 2</td>
<td>no lldp run</td>
</tr>
<tr>
<td>Step 3</td>
<td>end</td>
</tr>
</tbody>
</table>

Beginning in privileged EXEC mode, follow these steps to enable LLDP-MED when it has been disabled:

<table>
<thead>
<tr>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>configure terminal</td>
</tr>
<tr>
<td>Step 2</td>
<td>lldp run</td>
</tr>
<tr>
<td>Step 3</td>
<td>end</td>
</tr>
</tbody>
</table>
This example shows how to disable LLDP.
Switch# configure terminal
Switch(config)# no lldp run
Switch(config)# end

This example shows how to enable LLDP.
Switch# configure terminal
Switch(config)# lldp run
Switch(config)# end

### Disabling and Enabling LLDP on an Interface

LLDP is enabled by default on all supported interfaces to send and to receive LLDP information.

Beginning in privileged EXEC mode, follow these steps to disable LLDP on an interface:

<table>
<thead>
<tr>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 configure terminal</td>
<td>Enter global configuration mode.</td>
</tr>
<tr>
<td>Step 2 interface interface-id</td>
<td>Specify the interface on which you are disabling LLDP, and enter interface configuration mode.</td>
</tr>
<tr>
<td>Step 3 no lldp transmit</td>
<td>No LLDP packets are sent on the interface.</td>
</tr>
<tr>
<td>Step 4 no lldp receive</td>
<td>No LLDP packets are received on the interface.</td>
</tr>
<tr>
<td>Step 5 end</td>
<td>Return to privileged EXEC mode.</td>
</tr>
<tr>
<td>Step 6 copy running-config startup-config</td>
<td>(Optional) Save your entries in the configuration file.</td>
</tr>
</tbody>
</table>

Beginning in privileged EXEC mode, follow these steps to enable LLDP on an interface when it has been disabled:

<table>
<thead>
<tr>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 configure terminal</td>
<td>Enter global configuration mode.</td>
</tr>
<tr>
<td>Step 2 interface interface-id</td>
<td>Specify the interface on which you are enabling LLDP-MED, and enter interface configuration mode.</td>
</tr>
<tr>
<td>Step 3 lldp transmit</td>
<td>LLDP packets are sent on the interface.</td>
</tr>
<tr>
<td>Step 4 lldp receive</td>
<td>LLDP packets are received on the interface.</td>
</tr>
<tr>
<td>Step 5 end</td>
<td>Return to privileged EXEC mode.</td>
</tr>
<tr>
<td>Step 6 copy running-config startup-config</td>
<td>(Optional) Save your entries in the configuration file.</td>
</tr>
</tbody>
</table>

This example shows how to enable LLDP on an interface.
Switch# configure terminal
Switch(config)# interface GigabitEthernet1/0/1
Switch(config-if)# lldp transmit
Switch(config-if)# lldp receive
Switch(config-if)# end
Configuring LLDP-MED TLVs

By default, the switch only sends LLDP packets until it receives LLDP-MED packets from the end device. The device continues to send LLDP-MED packets until it receives LLDP packets only.

Using the `lldp` interface command, you can configure the interface not to send the following TLVs:

### Table 21-2 LLDP-MED TLVs

<table>
<thead>
<tr>
<th>LLDP-MED TLV</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>inventory-management</td>
<td>LLDP-MED inventory management TLV</td>
</tr>
<tr>
<td>network-policy</td>
<td>LLDP-MED network policy TLV</td>
</tr>
<tr>
<td>power-management</td>
<td>LLDP-MED power management TLV</td>
</tr>
</tbody>
</table>

Beginning in privileged EXEC mode, follow these steps to disable a TLV on an interface:

<table>
<thead>
<tr>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 configure terminal</td>
<td>Enter global configuration mode.</td>
</tr>
<tr>
<td>Step 2 interface interface-id</td>
<td>Specify the interface on which you are configuring an LLDP-MED TLV, and enter interface configuration mode.</td>
</tr>
<tr>
<td>Step 3 no lldp med-tlv-select tlv</td>
<td>Specify the TLV to disable.</td>
</tr>
<tr>
<td>Step 4 end</td>
<td>Return to privileged EXEC mode.</td>
</tr>
<tr>
<td>Step 5 copy running-config startup-config</td>
<td>(Optional) Save your entries in the configuration file.</td>
</tr>
</tbody>
</table>

Beginning in privileged EXEC mode, follow these steps to enable a TLV on an interface:

<table>
<thead>
<tr>
<th>Command</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 configure terminal</td>
<td>Enter global configuration mode.</td>
</tr>
<tr>
<td>Step 2 interface interface-id</td>
<td>Specify the interface on which you are configuring an LLDP-MED TLV, and enter interface configuration mode.</td>
</tr>
<tr>
<td>Step 3 lldp med-tlv-select tlv</td>
<td>Specify the TLV to enable.</td>
</tr>
<tr>
<td>Step 4 end</td>
<td>Return to privileged EXEC mode.</td>
</tr>
<tr>
<td>Step 5 copy running-config startup-config</td>
<td>(Optional) Save your entries in the configuration file.</td>
</tr>
</tbody>
</table>

This example shows how to enable a TLV on an interface when it has been disabled.

```
Switch# configure terminal
Switch(config)# interface GigabitEthernet1/0/1
Switch(config-if)# lldp med-tlv-select inventory management
Switch(config-if)# end
```
Monitoring and Maintaining LLDP and LLDP-MED

To monitor and maintain LLDP and LLDP-MED on your device, perform one or more of these tasks, beginning in privileged EXEC mode.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>clear lldp counters</td>
<td>Reset the traffic counters to zero.</td>
</tr>
<tr>
<td>clear lldp table</td>
<td>Delete the LLDP table of information about neighbors.</td>
</tr>
<tr>
<td>show lldp</td>
<td>Display global information, such as frequency of transmissions, the holdtime for packets being sent, and the delay time for LLDP to initialize on an interface.</td>
</tr>
<tr>
<td>show lldp entry entry-name</td>
<td>Display information about a specific neighbor.</td>
</tr>
<tr>
<td></td>
<td>You can enter an asterisk (*) to display all neighbors, or you can enter the name of the neighbor about which you want information.</td>
</tr>
<tr>
<td>show lldp interface [interface-id]</td>
<td>Display information about interfaces where LLDP is enabled.</td>
</tr>
<tr>
<td></td>
<td>You can limit the display to the interface about which you want information.</td>
</tr>
<tr>
<td>show lldp neighbors [interface-id] [detail]</td>
<td>Display information about neighbors, including device type, interface type and number, holdtime settings, capabilities, and port ID.</td>
</tr>
<tr>
<td></td>
<td>You can limit the display to neighbors of a specific interface or expand the display to provide more detailed information.</td>
</tr>
<tr>
<td>show lldp traffic</td>
<td>Display LLDP counters, including the number of packets sent and received, number of packets discarded, and number of unrecognized TLVs.</td>
</tr>
</tbody>
</table>