

LLDP Configuration

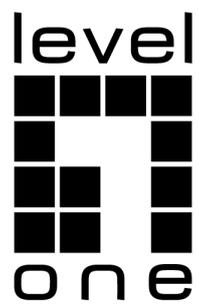


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Chapter 1 LLDP Overview

1.1 LLDP Overview

The link layer discovery protocol (LLDP) at 802.1AB helps to detect network troubles easily and maintain the network topology. It enables neighboring devices to send notifications of their status information to other devices, and each port of all devices stores its own defined information. If necessary, it can also send updated information to neighboring devices directly connected to them. The device will store the information in standard SNMP MIBs. The network management system can query the current connection status of the second layer from the MIB. LLDP does not configure or control network elements or traffic, it just reports the configuration of the second layer.

Simply, LLDP is a neighbor discovery protocol. It sets a standard method for the Ethernet network device, such as switches, routers and WAPs. It enables the Ethernet device notify its existence to other nodes and save the discovery information of neighboring devices. For instance, all information including the device configuration and the device identification can be notified through the protocol. Specifically, LLDP defines a universal notification information set, a transmission notification protocol and a method of storing all notification information. The device need to notify the notification information can transmit many notifications in a LAN data packet. The transmission type is TLV.

TLV has three compulsory types: Chassis ID TLV, Port ID TLV and Time To Live TLV; five optional types: Port Description, System Name, System Description, System Capabilities and Management Address; and three extension TLVs: DOT1 (Port Vlan ID, Protocol Vlan ID, Vlan Name, Protocol Identity); DOT3 (MAC/PHY Configuration/Status, Power Via MDI, Link Aggregation, Max Frame Size); MED (MED Capability, Network Policy, Location Identification, Extended Power-via-MDI, Inventory (Hardware Revision, Firmware Revision, Software Revision, Serial Number, Manufacturer Name, Mode Name, Assert ID).

LLDP is a unidirectional protocol. One LLDP agent transmits its state information and functions through its connected MSAP, or receives the current state information or function information about the neighbor. However, the LLDP agent cannot request any information from the peer through the protocol. During message exchange, message transmission and reception do not affect each other. You can configure only message transmission or reception or both.

1.1.1 Initializing the Protocol

LLDP can work under three modes: transmit-only, receive-only and transmit-and-receive. The default mode is transmit-and-receive.

1.1.2 Initializing LLDP Transmit Mode

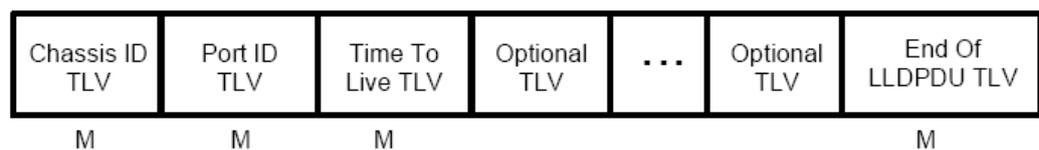
Set LLDP to **transmit-only** in the interface mode. In transmit-only mode, the interface transmits LLDP packets when the state or value of one or more information elements (management object) of the local system change or the transmission timer is timeout. The interface will not transmit LLDP packets when disabling the function.

1.1.3 Initializing LLDP Receive Mode

Set LLDP to **receive-only** in the interface mode. In **receive-only** mode, the interface can receive LLDP packets from the neighbors and save tlv into the remote MIB. The interface will drop LLDP packets when disabling the function.

1.1.4 LLDP PDU Packet Structure Description

In accordance with the order, LLDP PDU includes three compulsory TLVs in the front, one or more optional TLV in the middle and LLDPUD TLV in the end. As shown in figure 1:



M must include TLV.

Figure 1 LLDP PDU Format

- Three compulsory TLVs should be listed in sequence at the beginning of LLDP PDU:
 1. Chassis ID TLV
 2. Port ID TLV
 3. Time To Live TLV
- Optional TLV selected by the network management can be listed randomly.
 4. Port Description
 5. System Name
 6. System Description
 7. System Capabilities
 8. Management Address

Three extensions (including DOT1):

 9. Port Vlan ID
 10. Protocol Vlan ID
 11. Vlan Name
 12. Protocol Identity

DOT3:

13. MAC/PHY Configuration/Status

14. Power Via MDI

15. Link Aggregation

16. Max Frame Size

MED (TLV of MED is not transmitted by default. LLDP packets with MED TLV will be transmitted only when LLDP packets with MED TLV are received.)

17. MED Capability (TLV is compulsory if MED TLV is added.)

18. Network Policy

19. Location Identification

20. Extended Power-via-MDI

21. Inventory (including Hardware Revision, Firmware Revision, Software Revision, Serial Number, Manufacturer Name, Mode Name or Assert ID)

- The end TLV should be the last one in LLDP PDU.

1.2 LLDP Configuration Task List

- Disabling/enabling LLDP
- Configuring Holdtime
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- Configuring Reinit
- Configuring the Transmission or Reception Mode
- Specifying the Management IP Address of a Port
- Configuring Show-Relative Commands

1.3 LLDP Configuration Tasks

1.3.1 Disabling/enabling LLDP

When the LLDP is enabled, the local port periodically sends the LLDP frame out to inform the opposite end about the information of the local.

Run the following command in global configuration mode to enable LLDP:

Step	Command	Purpose
Step 1	config	Enters the global configuration mode.
Step 2	lldp run	Enables LLDP

Run the following command to disable LLDP:

Step	Command	Purpose
Step 1	config	Enters the global configuration mode.
Step 2	no lldp run	Disables LLDP

Note:

Only when the LLDP function is enabled can the received LLDP message be processed, otherwise the LLDP frame will be forwarded directly.

1.3.2 Configuring Holdtime

Normally, the remote information stored in the MIB will be updated before aging. But the information in the MIB will also be aging because the update frame may be lost in the process of sending. To prevent this, you can set the TTL value so that update LLDP frames are sent multiple times during the aging time. You can control the timeout time of transmitting the LLDP message through modifying **holdtime**:

Run the following command in global configuration mode to configure **holdtime** of LLDP:

Step	Command	Purpose
Step1	config	Enters the global configuration mode.
Step2	lldp holdtime time	Configures the timeout time of LLDP. Range from: 0 to 65535, default 120s.

Run the following command to resume the timeout time to default:

Step	Command	Purpose
Step1	config	Enters the global configuration mode.
Step2	no lldp holdtime	Resumes the default timeout time, that is, 120 seconds.

Note:

To ensure the former neighbor information is not lost owing to aging when receiving next LLDP frame, the timeout time should be longer than the LLDP packet transmit interval.

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You can control the interval of the switch to transmit message by configuring the timer of LLDP.

Run the following command in global configuration mode to configure **timer** of LLDP:

Step	Command	Purpose
------	---------	---------

Step1	config	Enters the global configuration mode.
Step2	lldp timer time	Configures the interval of message transmission of LLDP. The value ranges from 5 to 65534. The default time is 30 seconds.

Run the following command to resume the default interval:

Step	Command	Purpose
Step1	config	Enters the global configuration mode.
Step2	no lldp timer	Resumes the default interval, that is, 30 seconds.

1.3.4 Configuring Reinit

LLDP information is automatically sent when the status or value of one or more information elements (managed objects) in the local system changes and the transmission timer expires. Since a single information change requires the transmission of LLDP frames, a continuous series of information changes may trigger the transmission of many LLDP frames. Because only one change is reported in each frame. To avoid this situation, network management defines waiting time between two consecutive transmissions of LLDP frames. You can control the interval of the switch to continuously transmit two messages by configuring reinit of LLDP.

Run the following command in global configuration mode to configure reinit of LLDP:

Step	Command	Purpose
Step1	config	Enters the global configuration mode.
Step2	lldp reinit time	Resumes the default interval of continuously transmitting message. The value ranges from 2 to 5. The default interval value is two seconds.

Run the following command to resume the default reinit:

Step	Command	Purpose
Step1	config	Enters the global configuration mode.
Step2	no lldp reinit	Resumes the default interval of continuously transmit message, that is, 2 seconds.

1.3.5 Configuring the Transmission or Reception Mode

LLDP can work under three modes: transmit-only, receive-only and transmit-and-receive.

By default, LLDP works under the transmit-and-receive mode. You can modify the working mode of LLDP through the following commands.

Step	Command	Purpose
------	---------	---------

Step1	config	Enters the global configuration mode.
Step2	interface intf-type intf-id	Enters the interface configuration mode.
Step3	no lldp transmit	Disables the transmit-only mode of the port.
Step4	no lldp receive	Disables the receive-only mode of the port.

Run the following commands in the interface configuration mode and set lldp to the transmit-and-receive mode.

Step	Command	Purpose
Step1	config	Enters the global configuration mode.
Step2	interface intf-type intf-id	Enters the interface configuration mode.
Step3	lldp transmit	Enables the transmit mode of the port.
Step4	lldp receive	Enables the receive mode of the port.

Note: Except the above mode, the interface can also be configured to the transmit-only mode or the receive-only mode.

1.3.6 Specifying the Management IP Address of a Port

In port configuration state, you can randomly configure the management address of the port, from which the LLDP packets are transmitted. This management address should be an IP address related with this port, and only in this way the normal communication of this port can be guaranteed.

Run the following commands in port configuration mode to set the management IP address:

Step	Command	Purpose
Step1	config	Enters the global configuration mode.
Step2	interface intf-type intf-id	Enters the interface configuration mode.
Step3	lldp management-ip A.B.C.D	Sets the management IP address of a port.

Note: Both the no lldp management-ip command can be used to resume the default management address of the port and the default management address is the IP address of the VLAN interface that corresponds to the PVID port. When the corresponding VLAN interface does not exist, the management address is 0.0.0.0.

1.3.7 Configuring Show-Relative Commands

You can observe the information about the neighbor, statistics or port state received by the LLDP module by running show-relative commands.

Run the following commands in EXEC or global configuration mode:

Command	Purpose
Show lldp neighbors	Displays the abstract information about the neighbor.
Show lldp neighbors detail	Displays the detailed information about the neighbor.

1.4 Configuration Examples

1.4.1 Network Environment Requirements

Configure LLDP protocol on the port connecting two switches.

1.4.2 Network Topology

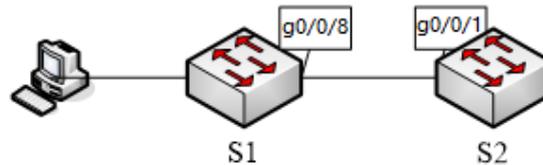


Figure 2 Network Topology

1.4.3 Configuration Steps

1. Basic Configuration

Configuring switch S1:

```
Switch(config)#lldp run
```

```
Switch(config)#
```

Configuring switch S2:

```
Switch(config)#lldp run
```

```
Switch(config)#
```

The information of Neighbor B will be displayed on Switch A about 1 minute later.

S1:

```
Switch(config)#show lldp neighbors
```

Capability Codes:

(R)Router,(B)Bridge,(C)DOCSIS Cable Device,(T)Telephone

(W)WLAN Access Point, (P)Repeater,(S)Station,(O)Other

Device-ID	Local-Intf	Hldtme	Port-ID	Capability
Switch	Gig0/0/8	99	Gig0/0/1	B

Total entries displayed: 1

Switch(config)#show lldp neighbors detail

chassis id: 00e0.0fac.32ff

port id: Gig0/0/1

port description: GigaEthernet0/0/1

system name: Switch

system description: SWITCH Software, Version 5700

Serial: S24090103

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Time remaining: 96

system capabilities: R B

enabled capabilities: B

Management Address:

IP: 90.0.0.21

Port VLAN ID: 1

PPVID: 1

VLAN 1 name: Default

Auto Negotiation: supported,enabled

Physical media capabilities:

1000baseX(FD)

1000baseX(HD)

100baseTX(FD)

100baseTX(HD)

Operational MAU type: 2 pair category 5 UTP, full duplex mode(16)

Power Via MDI:

MDI power support --

PSE MDI power support: support

Port class: PSE

PSE MDI power state: enabled

PSE pairs selection control ability: can not be controlled

PSE power pair: signal

Power Classification: Class 0

Link Aggregation:

Aggregation capability: capable of being aggregated

Aggregation status: not currently in aggregation

Maximum frame size: 1500

Total entries displayed: 1