UDLD Configuration

Table of Contents

Chapter 1 Unidirectional Link Detection (UDLD)

1.1 UDLD Overview

UDLD is a L2 protocol that monitors the physical location of the cable through the devices which are connected by optical cable or twisted-pair, and detects whether the unidirectional link exists. Only when the connected device supports UDLD can the unidirectional link be detected and shut down. The unidirectional link can cause a lot of problems, including the STP topology ring. Hence, when detecting a unidirectional link, UDLD will shut down the affected interface and notify users.

UDLD works with the physical-layer protocol mechanism to judge the status if the physical link. On the physical layer, the physical signals and incorrect detections are automatically negotiated and processed, while UDLD processes other matters, such as detecting the ID of a neighbor and shutting down the incorrect connection port. If you enable automatic negotiation and UDLD, the detection at layer 1 and layer 2 can prevent physical/logical links and other protocols' problems.

1.1.1 UDLD Mode

UDLD supports two modes, the normal mode (default) and the aggressive mode. In normal mode, UDLD can detect the existence of a unidirectional link according to the unidirectional services of the link. In aggressive mode, UDLD can detect not only the existence of a unidirectional link as in the previous mode but also connection interruption which cannot be detected by L1 detection protocols.

In normal mode, if UDLD determines that the connection is gone, UDLD will set the state of the port to undetermined, not to down. In aggressive mode, if UDLD determines that the link is gone and the link cannot be reconnected, it is thought that interrupted communication is a severe network problem and UDLD will set the state of the protocol to linkdown and the port is in errdisable state. No matter in what mode, if UDLD maintains it is a bidirectional link, the port will be set to bidirectional.

In aggressive mode, UDLD can detect the following cases of the unidirectional link:

➢   On the optical fiber or the twisted pair, an interface cannot receive or transmit services.

➢   On the optical fiber or the twisted pair, the interface of one terminal is down and the interface of the other terminal is up.

➢   One line in the optical cable is broken, and therefore the data can only be transmitted or only be received.

In previous cases, UDLD will shut down the affected interface.

1.1.2 Running Mechanism

UDLD is a L2 protocol running on the LLC layer, which uses 01-00-0c-cc-cc-cc as its destination MAC address. SNAP HDLC is similar to 0x0111. When it runs with layer-1 FEFI and automatic negotiation, the completeness of a link in the physical layer and the logical link layer can be checked.

UDLD can provide some functions that FEFI and automatic negotiation cannot conduct, such as checking and caching the neighbor information, shutting down any mis-configured port and checking the faults and invalidation on the logical ports except the point-to-point logical ports.

UDLD adopts two basic mechanisms: learn the information about neighbors and save it in the local cache. When a new neighbor is detected or a neighbor applies for synchronizing the cache again, a series of UDLD probe/echo (hello) packets will be transmitted.

UDLD transmits the probe/echo packets on all ports and, when a UDLD echo information is received on the ports, a detection phase and an authentication process are triggered. If all effective conditions are satisfied (port is connected in two directions and the cable is correctly connected), this port will be up. Otherwise, the port will be down.

Once a link is established and labeled as bidirectional, UDLD will transmit a probe/echo message every 16 seconds.

1.1.3 Port state

The UDLD interface may be in one of the following states:

Port state	Remark
Detection	Means that the interface is in detection state.
Unknown	Means that the interface is in unknown state, that is, it may be in detection state or it has not conducted detection.
Unidirectional	Means that the unidirectional connection has been detected.
Bidirectional	Means that the bidirectional connection has been detected.

1.1.4 Maintaining the Cache of the Neighbor

UDLD transmits the Probe/Echo packets regularly on each active interface to maintain the completeness of the neighbor's cache. Once a Hello message is received, it will be saved in the memory temporally and an interval that is defined by hold-time will also be saved. If the hold-time times out, the corresponding cache

is fully cleared. If a new Hello message is received in the hold-time, the new Hello message will replace the old one and the timer will be reset to zero.

Once a UDLD-running interface is disabled or the device on the interface is restarted, all the caches on the interface will be removed to maintain the completeness of the UDLD cache. UDLD transmits at least one message to notify the neighbor to remove the corresponding cache items.

1.1.5 Echo Detection

The echo mechanism is the basis of the detection algorithm. Once a UDLD device learns a new neighbor or another synchronization request from an asynchronous neighbor, it will start or restart the detection window of the local terminal and transmit an echo message for full agreement. Because all neighbors are demanded a corresponding action, the echo sender expects an echos message. If the checkup window is over before a legal echo is received, this link is thought to be a unidirectional one. In this case, link reconnection will be triggered or the link down process on the port is enabled.

1.2 UDLD Configuration Task List

- Globally Enabling or Disabling UDLD

- Enabling or Disabling the UDLD Interface

- Setting the Message Interval of the Aggressive Mode

- Restarts the interface shut down by UDLD.

- Displaying the UDLD State

1.3 UDLD Configuration Tasks

1.3.1 Globally Enabling or Disabling UDLD

In global configuration mode, run the following command to enable the UDLD function of all interfaces.

Command	Purpose
**udld [enable	aggressive]**	Enables the UDLD modules of all interfaces in some mode.

In global configuration mode, run the following command to disable the UDLD function of all interfaces.

Command	Purpose
**no udld [enable	aggressive]**	Shuts down the UDLD modules of all interfaces.

Note: If you enable or disable the UDLD function in global configuration mode, the UDLD function will be performed on all interfaces.

UDLD of the Aggressive mode is a variation of UDLD, which can provide extra benefits. When UDLD is in aggressive mode and the port stops transmitting the UDLD packets, UDLD will try to establish a link with its neighbor again. If the times of tries exceed a certain number, the state of the port is changed into the Error-Disable state and the link of the port is down. When UDLD is running, the ports at both terminals should run in the same mode, or the expecting result cannot be obtained.

1.3.2 Enabling or Disabling the UDLD Interface

In interface configuration mode, run the following command to enable the UDLD function of an interface.

Command	Purpose
udld port [**aggressive**]	Enables the UDLD module of an interfaces in some mode. If the aggressive parameter is not entered, the UDLD function of the interface is enabled in normal mode; if the aggressive parameter is entered, the UDLD function of the interface is enabled in aggressive mode.

In interface configuration mode, run the following command to disable the UDLD function of an interface.

Command	Purpose
no udld port [**aggressive**]	Disables the UDLD module of the interface by entering the corresponding command in some mode.

Note: When UDLD is running, the ports at both terminals should run in the same mode, or the expecting result cannot be obtained.

1.3.3 Sets the message interval of the aggressive mode.

In global configuration mode, run the following command to set the message interval of the aggressive mode.

Command	Purpose
udld message *time*	Sets the message interval of the aggressive mode.

1.3.4 Restarts the interface shut down by UDLD.

In the EXEC mode, run the following command to restart the interface that is shut down by the UDLD module.

Command	Purpose
udld reset	Restarts the interface shut down by UDLD.

1.3.5 Displaying the UDLD State

Run the following command to display the states of the UDLD modules of all current interfaces.

Command	Purpose
show udld	Displays the states of the UDLD modules of all current interfaces.

Run the following command to display the state of the UDLD module of the specified interface.

Command	Purpose
show udld interface *interface*	Run the following command to display the state of the UDLD module of the specified interface.

The UDLD displaying command is used to browse the state and the mode of UDLD, the current detection state, the state of the current link and some information about the neighbors.

It is used to display the running states of the UDLD modules of the current interfaces.

```
Switch#show udld


Interface GigaEthernet0/1
---
Port enable administrative configuration setting: Enabled interface UDLD
configuration state
Port enable operational state: Enabled interface UDLD starting state
Current bidirectional state: Bidirectional or not
Current operational state: Advertisment                UDLD operating state
Message interval: 15                                  information interval
Time out interval: 5                                     timeout interval
      Entry 1                                          cache item
      ---
      Expiration time: 42                              expiration aging time
      Cache Device index: 1                            information index
number
      Device ID: CAT0611Z0L9                           neighbor device ID
      Port ID: GigaEthernet0/1                         Connecting interface
ID
      Neighbor echo 1 device: S35000202                Neighbor's neighor's
```

```
device ID
       Neighbor echo 1 port: GigaEthernet0/1          Neighbor's neighor's
interface ID


       Message interval: 15                                  neighbor's
information interval
       Time out interval: 5                                  neighbor's
timeout interval
       UDLD Device name: Switch


Interface GigaEthernet0/2
---
Port enable administrative configuration setting: Disabled
Port enable operational state: Disabled
Current bidirectional state: Unknown


Interface GigaEthernet0/3
---
Port enable administrative configuration setting: Disabled
Port enable operational state: Disabled
Current bidirectional state: Unknown


…………………
```

It is used to display the operational state of the UDLD module of the current interface.

```
Switch#show udld interface g0/1
Interface GigaEthernet0/1
---
Port enable administrative configuration setting: Enabled interface UDLD
configuration state
Port enable operational state: Enabled interface UDLD starting state
Current bidirectional state: Bidirectional or not
Current operational state: Advertisment                 UDLD operating state
Message interval: 15                                 information interval
Time out interval: 5                                    timeout interval
       Entry 1                                       cache item
       ---
       Expiration time: 42                           expiration aging time
       Cache Device index: 1                            information index
number
       Device ID: CAT0611Z0L9                        neighbor device ID
       Port ID: GigaEthernet0/1                      Connecting interface
ID
       Neighbor echo 1 device: S35000202          Neighbor's neighor's ID
       Neighbor echo 1 port: GigaEthernet0/1         Neighbor's neighor's
interface ID


       Message interval: 15                                   neighbor's
```

```
information interval
      Time out interval: 5                                    neighbor's
timeout interval
      UDLD Device name: Switch
```

1.4 Configuration Example

1.4.1 Network Environment Requirements

Configure LLDP protocol in the global configuration or on the port connecting two switches.
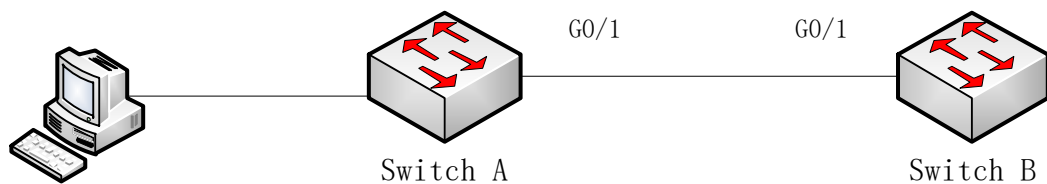
1.4.2 Network Topology

Figure 2   Network Topology

1.4.3 Configuration Procedure

Configuring Switch A:

Switch_config#udld enable

Switch_config#interface g0/1

Switch_config_g0/1#udld port

Switch_config_g0/1#quit

Configuring Switch B:

Switch_config#udld enable

Switch_config#interface g0/1

Switch_config_g0/1#udld port

Switch_config_g0/1#quit

Entering the show command on Switch A:

Switch_config#show udld interface g0/1

Interface GigaEthernet0/1

Port enable administrative configuration setting: Enabled

Port enable operational state: Enabled

Current bidirectional state: Unknown

Current operational state: Detection

Message interval: 15

Time out interval: 1

Entry 1

Expiration time: 44

Cache Device index: 1

Device ID: S35043000

Port ID: GigaEthernet0/1

Neighbor echo 1 device: S32030079

Neighbor echo 1 port: GigaEthernet0/1

Message interval: 15

Time out interval: 1

UDLD Device name: SwitchB

Switch_config#

Switch_config#show udld interface g0/1

Interface GigaEthernet0/1

Port enable administrative configuration setting: Enabled

Port enable operational state: Enabled

Current bidirectional state: Unknown

Current operational state: Advertisment

Message interval: 15

Time out interval: 7

> Entry 1
>
> ---
>
> Expiration time: 43
>
> Cache Device index: 1
>
> Device ID: S35043000
>
> Port ID: GigaEthernet0/1
>
> Neighbor echo 1 device: S32030079
>
> Neighbor echo 1 port: GigaEthernet0/1
>
>
> Message interval: 15
>
> Time out interval: 7
>
> UDLD Device name: SwitchB

Switch_config#

Switch_config#show udld interface g0/1

Interface GigaEthernet0/1

Port enable administrative configuration setting: Enabled

Port enable operational state: Enabled

Current bidirectional state: Bidirectional

Current operational state: Advertisment

Message interval: 15

Time out interval: 15

> Entry 1
>
> ---
>
> Expiration time: 36

Cache Device index: 1

Device ID: S35043000

Port ID: GigaEthernet0/1

Neighbor echo 1 device: S32030079

Neighbor echo 1 port: GigaEthernet0/1

Message interval: 15

Time out interval: 15

UDLD Device name: SwitchB

Switch_config#

From the information above, you can find the three phases of the link state which UDLD detects:

1.Detection phase: In this phase, the UDLD packets are transmitted every other second.

2.Unknown phase: In this phase, the UDLD packets are transmitted every seven seconds.

3.Known bidirectional/unidirectional connection phase: Once a link is established and labeled as bidirectional, UDLD will transmit a probe/echo message every 16 seconds.