

FSOS
UDLD Configuration

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1. UDLD

1.1 UDLD Overview

The actual network sometimes has the following situation: fiber cross connect; an optical fiber is not connected; one line of a fiber or the twisted pair is disconnected. In those cases, one of the ports at both ends of the link can receive the link-layer packet from the opposite side, but the opposite side cannot receive the packet from the local side. This link is a unidirectional link. In a unidirectional link, because the physical layer is in the connected state and can work normally, the detection mechanism of the physical layer (such as auto-negotiation mechanism) cannot find the communication problems between the devices, resulting in incorrect forwarding of traffic.

The role of UDLD (UniDirectional Link Detection) is to detect the existence of unidirectional links and take corresponding measures. It is responsible for monitoring the link status of physical lines on devices connected by fiber or copper twisted pair. When a unidirectional link is found, the device sends alarm information to the user. And according to the user configuration, the device automatically shuts down or notifies the user manually close the corresponding port to prevent network problems.

UDLD Protocol Status:

Status	Description
Initial	The initialization state of disabled UDLD protocol
Inactive	The UDLD protocol is enabled, but the link is Down
Active	The UDLD protocol is enabled and the link is Up, or the neighbor entry is cleared
Undetermined	The new neighbor is discovered in the normal working mode. The neighbor enters the undetermined state when no echo packet is received before the echo wait timer expires (5 seconds). When all the neighbors are in the undetermined state, the port enters the undetermined state
Unidirectional	The neighbor enters the unidirectional state due to the presence of a cross link or a unidirectional link. When all the neighbors enter the unidirectional state, the port will enter the unidirectional state. Output log and trace information. Send the flush packet. Manually or automatically shut down the local port according to the UDLD Down mode configured by the user. The device can only receive and send UDLD packets and delete the neighbor entry.
Bidirectional	Neighbors can correctly answer. When all neighbors are bidirectional, the port is bidirectional.
DelayDown	When the port is linkdown, the neighbor is not deleted

	immediately. Instead, it enters the temporary DelayDown state. In this case, the port can only respond to the linkup event. In this state, the UDLD neighbor information is retained and the DelayDown timer is started.
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UDLD Working Process:

1) Neighbor Discovery: When a port is active, it sends its own information through the probe packet to request neighbor information. After receiving the probe packet, the opposite port implements the neighbor discovery based on the content information of the probe packet. When the port receives a probe packet, it determines whether the sending port is already in the neighbor table. If it is not, indicating that it is a new neighbor, it replies with the echo packet and adds it to the neighbor table and marks it as undetermined. If the sending port is already in the neighbor table but the RSY flag is set in the packet, an echo packet is sent to the port. If the neighbor is a bidirectional neighbor, the neighbor information is updated.

2) Neighbor aging: After the bidirectional neighbor is added to the neighbor table, the port sets an aging time T1f according to the contents of the probe packet, the hello packet and the echo packet. When time T1f is over, the port does not receive any new hello packets from the neighbor. The neighbor is aged out and is deleted from the neighbor table. Normally, the value of the aging time T1f is greater than the keepalive packet transmission interval Tmsg($T1f=3*Tmsg$) of the neighbor. The value of Tmsg is obtained from the TLV of the hello packet.

3) Unidirectional probing: A port will perform a unidirectional probing only when there is a change in the neighbor list. The probe initiator first initiates a probe packet(RSY=1) with a synchronization request. After receiving the packet, the opposite side responds with an echo packet and adds its own neighbor table information to the echo-tlv field of the echo packet. If the initiator receives the echo packet and checks that the echo-tlv field is correct, it considers the port to be bidirectional. If the content of the received echo packet is not correct, the port is considered to be unidirectional. If no echo packet is received, there are different processing methods depending on the UDLD check mode. The processing method will be described in the following sections.

4) Unidirectional processing: After the port state is determined to be unidirectional, the neighbor list of the port is cleared, and then the FLUSH packet is sent to notify the neighbor of deleting the port information, the port is shut down. According to the port shutdown mode, recovery methods are inconsistent.

5) Keepalive mechanism: After the port is in stable state, the port periodically sends hello packets to notify other ports of its status. The opposite side will use this packet to refresh the neighbor state. If no hello packet is received within the keepalive period, the port will be deleted from the neighbor table. Hello packets carry all the neighbor information of the port. The sending period Tmsg of hello packets can be set using the global command.

The received UDLD packets are processed as follows:

Packet Type	Processing						
Hello packet	Remove the neighbor information (device-id and port-id)		If there is no neighbor entry on the local device, the packet is discarded				
			If the neighbor entry exists on the local device and echo-TLV is correct, the entry aging timer is refreshed if the neighbor is bidirectional. Otherwise, the entry is discarded. If the neighbor entry exists and the echo-TLV is incorrect, it indicates that a cross-link occurs and the neighbor is marked as a cross-link neighbor. If the neighbor is bidirectional, it is set to unidirectional. If all the neighbors are unidirectional, the port enters the unidirectional state and sends the Flush packet. The port will be shut down manually or automatically according to the configured UDLD Down mode, and the neighbor entry will be deleted.				
Flush packet	Delete the neighbor entry on the local device. If the neighbor entry is empty, the port enters a unidirectional state. Otherwise, the port status is determined according to the status of all the neighbors.						
Probe packet	Send the Echo packet containing neighbor information and its own information to the opposite side.		If the neighbor does not exist on the local device, the neighbor entry is created				
			If the neighbor entry exists on the local device, the entry aging timer is refreshed.				
Echo packet	Check whether the neighbor information carried in the packet is the same as that of the local device		different	A cross-link occurs, if the machine has a related neighbor, the neighbor is marked as a cross-link neighbor, if the neighbor is bidirectional, it is set to unidirectional. If all the neighbors are unidirectional, the port enters the unidirectional state and sends the Flush packet. The port will be shut down manually or automatically according to the configured UDLD down mode, and the neighbor entry will be deleted.			
			same	The device detects whether a related neighbor exists based on the	existent	If the neighbor is in the undetermined or unidirectional state, the neighbor is set to bidirectional. If all the neighbors are bidirectional, the port enters the bidirectional state. Refresh neighbor entries.	
				non-existent	The packet is discarded		

			device-id and port-id in the packet	ent	
--	--	--	---	-----	--

 Note:

S6000 does not support unidirectional, if both ends are S6000, you can not detect unidirectional link. So if UDLD is to be used, S6000 needs to be connected with other vendor devices that support unidirectional..

1.2 UDLD Configuration

1.2.1 Enable/disable UDLD

UDLD has global switch and port switch, you must enable both global switch and port switch simultaneously to work normally, the default configuration are turned off. DUT connected ports must be enabled the function to work normally.

Enable/disable UDLD

Operation	Command	Remarks
Enter the global configuration	configure terminal	required
Enable/disable UDLD	[no] udld	required
Port configuration mode	interface ethernet <i>port-num</i>	optional
Enable/disable UDLD	[no] udld	required
Display udld information	show udld interface [ethernet <i>port-num</i>]	optional

1.2.2 Reset

When UDLD detects a unidirectional link, and the port is Down, the port state can be reset through reset command, and then re-perform the UDLD.

Reset

Operation	Command	Remarks
Enter the global configuration	configure terminal	optional
Configure reset	udld reset	optional

Port configuration mode	interface ethernet <i>port-num</i>	optional
Configure reset	udld reset	optional

1.2.3 Configure Time Parameters

Configure Time Parameters

Operation	Command	Remarks
Enter the global configuration	configure terminal	optional
Configure hello send interval	udld message-interval <i>value</i>	optional

1.2.4 Configure the Working Mode

UDLD works in two modes: Normal and Aggressive. The default is Normal.

In normal mode, if a port does not receive a packet from the opposite side, the neighbor is aged out. And the port is in an undetermined state; If the port receives a probe keepalive packet or an echo packet without the information of the local port, which causes all neighbors of the local port to be aged out, the port is considered to be in a unidirectional state. Normal mode is used to check for the unidirectional link due to cross-connections. S6000 hardware temporarily does not support the unidirectional caused by cross-connections.

In aggressive mode, a port does not receive a packet from the opposite side or receives packet without the local port information, as a result, all its neighbors are aged out, and the port is considered to be in a unidirectional state. Aggressive mode is used to check for the unidirectional connection caused by fiber-optic cross-connections or disconnections..

The following table compares the two modes:

Working mode	Whether to actively detect the presence of a neighbor when aging the neighbor table	Whether to enable the Entry aging timer when aging the neighbor table	Whether to enable the aggressive timer when the Entry aging timer expires
Normal mode	Active detection is not performed	Yes (After the Entry aging timer expires, it directly ages the neighbor entry)	No
Aggressive mode	Active detection is performed	Yes (After the Entry aging timer expires, the aggressive timer is enabled)	Yes (After the aggressive timer expires, the neighbor state is set to unidirectional, and the neighbor entry is aged out)

Configure the Working Mode


Operation	Command	Remarks
Port configuration mode	interface ethernet <i>port-num</i>	optional
Configure the working mode	udld work-mode { normal aggressive }	optional

1.2.5 Configure Unidirectional Processing

When a port is detected as a unidirectional port, a different processing is adopted depending on the working mode. Send out the alarm information (need to turn on the logging function). If it is Auto mode, it will automatically shut down / restore the port; if it is Manual, the administrator needs to shut down / restore port at the command line.

Configure Unidirectional Processing

Operation	Command	Remarks
Enter port mode	interface ethernet <i>port-num</i>	optional
Configure the working mode	udld unidirectional-shutdown { Auto Manual }	optional
Manually close in unidirectional state	udld port shutdown	optional
Restore closed port	no udld port shutdown	optional

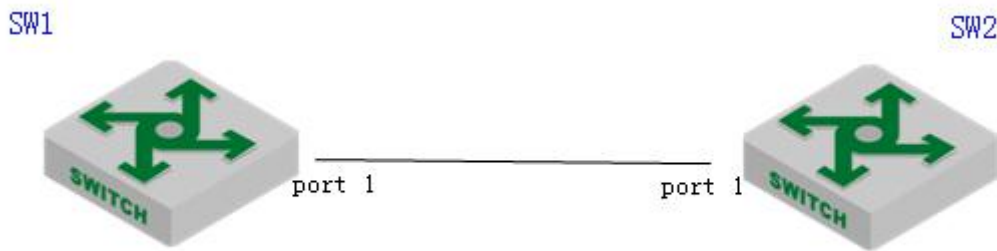
 Note:

“[no]udld port shutdown “Only in the Manual mode need to configure;

1.3 Configuration Example

1. Network description

SW1 and SW2 are directly connected through port 1, and then turn on UDLD function.



sketch map of networking

2.Configuration steps

#SW1 CONFIGURATION:

```
SW1(config)#udld
```

```
SW1ch(config)#interface ethernet 0/0/1
```

```
SW1(config-if-ethernet-0/0/1)#udld
```

```
SW1(config-if-ethernet-0/0/1)#udld work-mode aggressive
```

#SW2 CONFIGURATION:

```
SW2(config)#udld
```

```
SW2(config)#interface ethernet 0/0/1
```

```
SW2(config-if-ethernet-0/0/1)#udld
```

```
SW2(config-if-ethernet-0/0/1)#udld work-mode aggressive
```

3.Result validation

When the unidirectional state is detected, the following information is displayed:

```
SW1(config)#show udld interface e 0/0/1
```

```
Udld state           : ON
```

```
Message interval     : 15
```

```
TimeOut interval     : 5
```

```
DelayDown time       : 1
```

```
port udld information:
```

```
Port ID               : e0/0/1
```

```
NOTICE:this port'ingress was shutdown by manual!
```

```
Port udld state       : ON
```

```
Port status           : Unidirectional
```

```
Port link status      : LinkUp
```

```
Port udld work mode   : Aggressive
```

```
Port shutdown mode    : Auto
```

```
neighbor information:
```

```
Total Neighbor Record: 0
```