Chapter 38. Flexlink

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Chapter 38 FlexLink

38.1 FlexLink Overview

Flex links is layer 2 links backup protocol which provides for STP option scheme. Choose Flex links to realize link backup when the STP is not wanted in customer network. If STP enables, flex links is disabled. Flex links consists of a pair of interfaces (can be ports or convergent interface). One interface is transmitting data, the other is standby. The backup interface starts transmitting data when there is default in master link. The failure interface will be standby when it turns well and it will be transmitting data in 60 seconds when preempt mechanism is set. Flex links interface should disable STP and Flex links interface canconfigure bandwidth and delay being preempt mechanism and the superior one will be the master interface. There must be trap alarm when master or backup link default.

Flex Link is dedicated to dual-uplink networks. It delivers the following benefits:

  - Keeping one uplink connected and the other blocked when both uplinks in a dual uplink network are healthy, thus preventing broadcast storms caused by network loops.

  - Switching the traffic to the backup link within a few sub-seconds when the primary link fails, thus ensuring the normal forwarding of traffic in the network.

  - Easy to configure.

38.1.1 Basic Concept of Flex Links

1. Flex Links group

A Flex link group consists of only two member ports: the master and the slave. At a time, only one port is active for forwarding, and the other port is blocked, that is, in the standby state. When link failure occurs on the active port due to port shutdown or presence of unidirectional link for example, the standby port becomes active to take over while the original active port transits to the blocked state.

2. Master port

The master port of a Flex link group is a port role specified using commands. It can be an Ethernet port (electrical or optical), or an aggregate interface.

3. Slave port

The slave port of a Flex link group is another port role specified using commands. It can be an Ethernet port (electrical or optical), or an aggregate interface. The link on which the slave port resides is called the backup link.

4. MMU (MAC address-table Move Update) message

When link Switch over occurs in a Flex link group, the old forwarding entries are no longer useful for the new topology. Therefore, all devices in the network need to refresh their MAC address forwarding entries. Flex Link notifies devices to refresh their MAC address forwarding entries by sending MMU messages to them.

38.1.2 Operating Mechanism of Flex Link

This section uses the network shown in the below figure to describe the Flex link mechanism

as the link status transiting from normal, to faulty, and then to recovery.
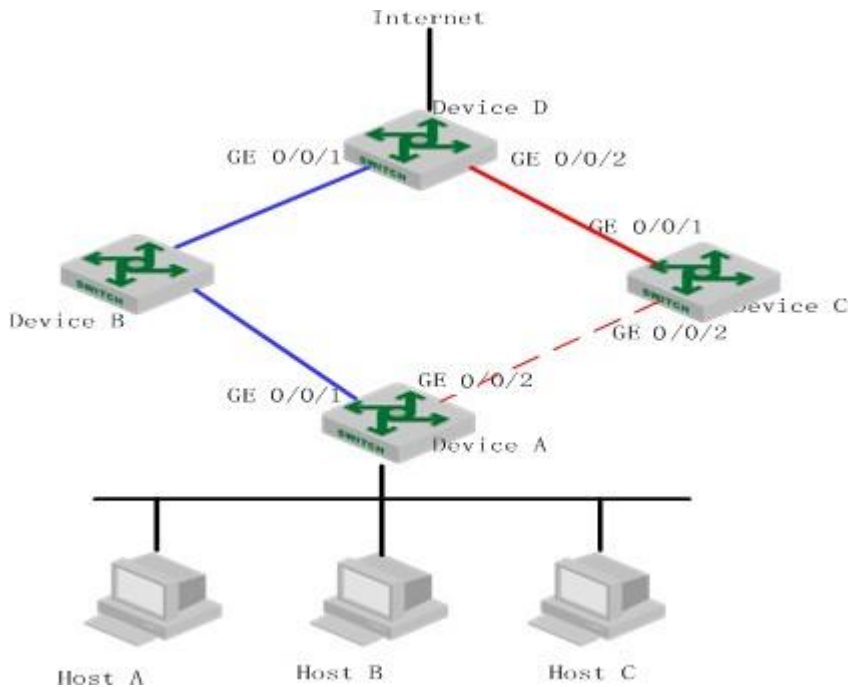
Link-Normal Operating

GigabitEthernet 0/0/1 and GigabitEthernet 0/0/2 of Switch A form a Flex link group, with the former as the master port and the latter as the slave port. When both uplinks are healthy, the master port is in the forwarding state, while the slave port is in the standby state, and the links on which the two ports are seated respectively are called the primary link and the backup link. In this case, data is transmitted along the link indicated by the blue line. There is no loop in the network, hence no broadcast storms either.

Link-Faulty Handling

When the primary link on Switch A fails, the master port GigabitEthernet 0/0/1 transits to the

standby state, while the slave port GigabitEthernet 0/0/2 transits to the forwarding state. A link Switchover occurs. After the link Switch over, the MAC address forwarding entries kept on the devices in the network may become incorrect, and need to be refreshed, so that traffic can be rapidly Switched to another link, thus avoiding traffic loss. Currently, one mechanism is available for refreshing MAC address forwarding entries: MMU message-notified refreshing.

This mechanism is applicable when the upstream devices (such as Switch B, Switch C, and Switch D in the Figure) support Flex Link and are able to recognize MMU messages.

To enable rapid link Switch over, you need to enable Switch A to send MMU messages, and all upstream devices' ports that are on the dual uplink network to receive and process MMU messages.

After link Switchover occurs on Switch A, MMU messages are sent along the new primary link, that is, through GigabitEthernet 0/0/2. When an upstream device receives and handles a MMU message, transmit MAC address carried in the MMU message to the receiving port.

After that, when Switch D receives a data packet destined for Host A, Host B, Host C, Switch D will broadcasts the packet at Layer 2; Switch C will search MAC address table after receiving it, and forward it to Switch A from GE0/0/2; Switch A forward it to Host A, Host B, Host C. In this way, data traffic can be forwarded correctly.

This mechanism will update MAC address without waiting for entry aged. Generally, the whole link will be shifted in milliseconds without traffic lost.

Link-Recovery Working Modes
Flex Link supports three working modes: role preemption, non-role preemption and bandwidth

preemption. Under different modes, the port state changes are different:

● If role preemption is configured, when the primary link recovers, the master port enters the forwarding state and takes over the traffic, while the slave port enters the standby state. The slave port transits from standby to forwarding only when the primary link fails.

● If non-role preemption is configured, when the primary link recovers, the slave port remains in the forwarding state, while the master port remains in the standby state, so as to keep the traffic stable.

● If bandwidth preemption is configured, when the primary link recovers, the slave port remains in the forwarding state if it occupies more bandwidth, while the master port remains in the standby state; the slave port transits from forwarding to standby only when master port occupies more bandwidth.

As shown in the Figure, if role preemption is configured on the Flex link group on Switch A, when the link of GigabitEthernet 0/0/1 on Switch A recovers, GigabitEthernet 0/0/2 is immediately blocked and transits to the standby state, while GigabitEthernet 0/0/1 transits to the forwarding state. If non-role preemption is configured, when the link of GigabitEthernet 0/0/1 on Switch A recovers, GigabitEthernet 0/0/1 remains in the standby state, and no link Switchover occurs, thus keeping the traffic stable.

38.2 Configure FlexLinks

38.2.1 FlexLinks Configuration List

Configuration Task	Description	Detailed Configuration
Configure Flex Links group	Required	38.2.2
Configure Flex Links preemption mode	Optional	38.2.3

Configure Flex links preemption delay	Optional	38.2.4
Configure Flex links MMU	Optional	38.2.5
Flex Links monitor and maintenance	Optional	38.2.6

38.2.2 Configure FlexLinks group

Configure Flex Links group needs specify master and slave port. If master port is Ethernet port, the configuration should be in interface configuration mode; if master port is channel-group port member, the configuration should be in global configuration mode.

Operation	Command	Remarks
Enter global configuration mode	**system-view**	
Configure Flex Links group	**channel-group** *channel-group-number_1* **backup** { **interface** *device/slot/port_2* | **channel-group** *channel-group-number_2* }	*channel-group-number_1* is master port,*port_2/channel-group-number_2* is slave port
Delete Flex Links group	**undo channel-group** *channel-group-number_1* **backup**	
Enter interface configuration mode	**interface ethernet** *device/slot/port_1*	
Configure Flex Links group	**port backup** { **interface** *device/slot/port_2* | **channel-group** *channel-group-number_2* }	*port_1* is master port, *port_2/channel-group-number_2* is slave port
Delete Flex Links group	**undo port backup**	

Note:

The STP of master port and slave port should be disabled, and cannot be ERRP port.

38.2.3 Configure FlexLinks Preemption Mode

At a time, only one port is active for forwarding, and the other port is blocked, that is, in the

standby state. When link failure occurs on the active port due to port shutdown or presence of unidirectional link for example, the standby port becomes active to take over while the original active port transits to the blocked state.

Operation	Command	Remarks
Enter global configuration mode	**system-view**	-
Configure Flex Links preemption mode	**channel-group** *channel-group-number_1* **backup** { **interface** *device/slot/port_2* | **channel-group** *channel-group-number_2* } **preemption mode** { **forced** | **bandwidth** | **off** }	*channel-group-number_1* is master port,*port_2/channel-group-number_2* is slave port
Enter interface configuration mode	**interface ethernet** *device/slot/port_1*	
Configure Flex Links preemption mode	**port backup** { **interface** *device/slot/port_2* | **channel-group** *channel-group-number_2* } **preemption mode** { **forced** | **bandwidth** | **off** }	*port_1* is master port, *port_2/channel-group-number_2* is slave port

38.2.4 Configure FlexLinks Preemption Delay

After Configure Flex Links preemption mode, the port will not be active status immediately. There has to be a time delay. The default delay is 45s.

Operation	Command	Remarks
Enter global configuration mode	**system-view**	-
Configure Flex links preemption delay	**channel-group** *channel-group-number_1* **backup** { **interface** *device/slot/port_2* | **channel-group** *channel-group-number_2* } **preemption delay** <1-60>	*channel-group-number_1* is master port,*port_2/channel-group-number_2* is slave port
Enter interface configuration mode	**interface ethernet** *device/slot/port_1*	-
Configure Flex links preemption	**port backup** { **interface** *device/slot/port_2* |	*port_1* is master

delay	**channel-group** *channel-group-number_2* } **preemption mode** <1-60>	port, *port_2/channel-g* *roup-number_2* is slave port

38.2.5 Configure FlexLinks MMU

MMU messages are used by a Flex link group to notify other Switches to refresh their MAC address forwarding entries and ARP/ND entries when link Switchover occurs in the Flex link group. MMU messages are common unicast data packets, and will be dropped by a blocked receiving port. This function is disabled by default.

Operation	Command	Remarks
Enter global configuration mode	**system-view**	-
Configure Flex links MMU	**mac-address-table move update** { **transmit** | **receive** }	*port_1* is master port, *port_2/channel-g* *roup-number_2* is slave port

38.2.6 FLexLinks Monitor and Maintenance

After finishing above configuration, user can check the configurations by command below.

Operation	Command	Remarks
Display configured Flex Links group	**display interface Switch backup**	
Display Flex Links MMU status	**display mac-address-table move update**	