



## Configuring Flex Links

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This chapter describes how to configure Flex Links, a pair of Layer 2 interfaces, where one interface is configured to act as a backup to the other.

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## Restrictions for Configuring Flex Links

- Flex Links is supported on NCS 4201 and NCS 4202 routers only.
- You can configure only one Flex Link backup link for any active link, and it must be a different interface from the active interface.
- An interface can belong to only one Flex Link pair. An interface can be a backup link for only one active link. An active link cannot belong to another Flex Link pair.
- Neither of the links can be a port that belongs to an EtherChannel nor port channel
- A backup link does not have to be the same type (Fast Ethernet, Gigabit Ethernet) as the active link.
- STP is disabled on Flex Link ports. If STP is configured on the switch, Flex Links do not participate in STP in all VLANs in which STP is configured. With STP not running, be sure that there are no loops in the configured topology.
- Flex link is only supported on trunk EFP.
- In bi-directional traffic, FlexLink Convergence will be high in one-direction due to mac address black holing.

## Information About Flex Links

The feature provides an alternative solution to the Spanning Tree Protocol (STP), allowing you to turn off STP and still provide basic link redundancy. Flex Links are typically configured in service provider or enterprise networks, where, you do not want to run STP on the router. If the router is running STP, it is not necessary to configure Flex Links, because STP already provides link-level redundancy or backup. Flex Links are supported only on Trunk EFP and are not supported on other EVCs.

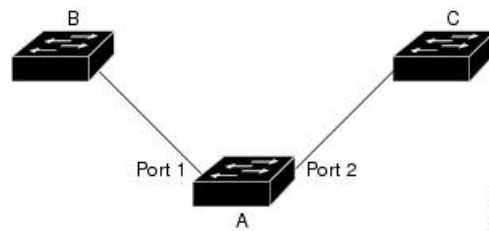
Following are the two flex link modes supported:

- Active-Alone Forwarding Method
- Active-Backup-Both Forwarding Method

## Active-Alone forwarding Method

From the schematic representation, ports 1 and 2 on switch A are connected to uplink switches B and C. Because they are configured as Flex Link in active-backup both forwarding mode, both the interfaces will be forwarding traffic. If port 1 is the active link, all mutually inclusive VLANs (common VLANs configured in both active / backup interface) would be forwarded on active interface and mutually exclusive VLANs would be forwarded from the respective active / backup interfaces. If port 1 goes down, then port 2 will start forwarding only the traffic for the common VLANs along with its specific exclusive vlans. All traffic belonging to the exclusive VLANS as part of active interface configuration would be dropped until port 1 comes back to operational state.

**Figure 1: Active-Alone Forwarding Method**



## Configuring Active Alone Forwarding Method

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *interface-id*
4. **no shutdown**
5. **ethernet backup interface** *interface-id*
6. **end**

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Router> <b>enable</b>	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> Router# <b>configure terminal</b>	Enters global configuration mode.

	Command or Action	Purpose
Step 3	<b>interface</b> <i>interface-id</i> <b>Example:</b> Router(config)# <b>interface</b> gigabitEthernet 0/0/5	Specify the interface, and enter interface configuration mode. The interface can be a physical Layer 2 interface or a port channel (logical interface). The port-channel range is 1 to 48.
Step 4	<b>no shutdown</b> <b>Example:</b> Router(config-if)# <b>no shutdown</b>	Enable the port, if necessary. By default, UNIs are disabled, and NNIs are enabled.
Step 5	<b>ethernet backup interface</b> <i>interface-id</i> <b>Example:</b> Router(config)# <b>ethernet backup interface</b> gigabitEthernet 0/0/5	Configure a physical Layer 2 interface (or port channel) as part of a Flex Link pair with the interface. When one link is forwarding traffic, the other interface is in standby mode.
Step 6	<b>end</b> <b>Example:</b> Router(config-if)# <b>end</b>	Return to privileged EXEC mode.

### Configuration Example

#### On Active interface (Port 5)

```
Router> enable
Router# configure terminal
Router# service instance trunk 1000 ethernet
Router# encapsulation dot1q 1-1000
Router# rewrite ingress tag pop 1 symmetric
Router# bridge-domain from-encapsulation
```

#### Backup interface (Port 6)

```
Router> enable
Router# configure terminal
Router# service instance trunk 1000 ethernet
Router# encapsulation dot1q 1-1000
Router# rewrite ingress tag pop 1 symmetric
Router# bridge-domain from-encapsulation
```

#### Flexlink Configuration

```
Router> enable
Router# configure terminal
Router(config)# interface gigabitEthernet 0/0/5
Router(config-if)# no shutdown
Router(config-if)# ethernet backup interface gigabitEthernet 0/0/6
Router(config-if)# end
```

## Verifying Active Alone Forwarding Method Configuration

### SUMMARY STEPS

1. enable
2. configure terminal
3. show ethernet backup detail

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b> <b>Example:</b> Router> <b>enable</b>	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b> <b>Example:</b> Router# <b>configure terminal</b>	Enters global configuration mode.
Step 3	<b>show ethernet backup detail</b> <b>Example:</b> Router# <b>show ethernet backup detail</b>	This displays the flex link configuration.

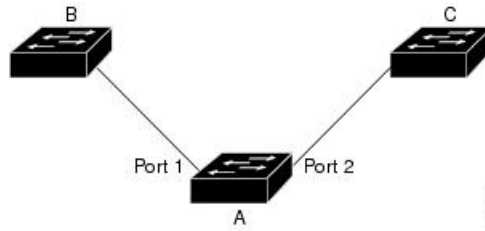
### Configuration Output

```
Switch Backup Interface Pairs:
Active Interface      Backup Interface      State
-----
GigabitEthernet0/0/5  Te0/0/12              Active Up/Backup Standby
  Preemption Mode    : off
  Multicast Fast Convergence : Off
  Bandwidth : 1000000 Kbit (Gi0/0/3), 1000000 Kbit (Te0/0/12)
  Mac Address Move Update Vlan : auto
  Forwarding : Active-Only
```

## Active-Backup-Both forwarding Method

From the schematic representation, ports 1 and 2 on switch A are connected to uplink switches B and C. Because they are configured as Flex Link in active-backup both forwarding mode, both the interfaces will be forwarding traffic. If port 1 is the active link, all mutually inclusive vlans (common vlans configured in both active / backup interface) would be forwarded on active interface and mutually exclusive vlans would be forwarded from the respective active / backup interfaces. If port 1 goes down, then port 2 will start forwarding only the traffic for the common vlans along with its specific exclusive vlans. All traffic belonging to the exclusive vlans as part of active interface configuration would be dropped until port 1 comes back to operational state.

Figure 2: Active-Backup-Both Forwarding Method



## Configuring Active Backup Both Forwarding Method

### SUMMARY STEPS

1. enable
2. configure terminal
3. interface *interface-id*
4. no shutdown
5. ethernet backup interface *interface-id* prefer forwarding
6. end

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b> <b>Example:</b> Router> <b>enable</b>	Enables privileged EXEC mode. <ul style="list-style-type: none"><li>• Enter your password if prompted.</li></ul>
Step 2	<b>configure terminal</b> <b>Example:</b> Router# <b>configure terminal</b>	Enters global configuration mode.
Step 3	<b>interface <i>interface-id</i></b> <b>Example:</b> Router(config)# <b>interface gigabitEthernet 0/0/8</b>	Specify the interface, and enter interface configuration mode. The interface can be a physical Layer 2 interface or a port channel (logical interface). The port-channel range is 1 to 48.
Step 4	<b>no shutdown</b> <b>Example:</b> Router(config-if)# <b>no shutdown</b>	Enable the port, if necessary. By default, UNIs are disabled, and NNIs are enabled.
Step 5	<b>ethernet backup interface <i>interface-id</i> prefer forwarding</b> <b>Example:</b> Router(config)# <b>ethernet backup interface gigabitEthernet 0/0/8 prefer forwarding</b>	Configure a physical Layer 2 interface (or port channel) as part of a Flex Link pair with the interface. When one link is forwarding traffic, the other interface is in standby mode.
Step 6	<b>end</b> <b>Example:</b>	Return to privileged EXEC mode.

	Command or Action	Purpose
	Router(config-if)# <b>end</b>	

### Configuration Example

On Active interface (Port 7)

```
Router> enable
Router# configure terminal
Router# service instance trunk 1000 ethernet
Router# encapsulation dot1q 1-512
Router# rewrite ingress tag pop 1 symmetric
Router# bridge-domain from-encapsulation
```

Backup interface (Port 8)

```
Router> enable
Router# configure terminal
Router# service instance trunk 1000 ethernet
Router# encapsulation dot1q 512-1000
Router# rewrite ingress tag pop 1 symmetric
Router# bridge-domain from-encapsulation
```

Flexlink Configuration

```
Router> enable
Router# configure terminal
Router(config)# interface gigabitEthernet 0/0/8
Router(config-if)# no shutdown
Router(config-if)# ethernet backup interface gigabitEthernet 0/0/8 prefer forwarding

Router(config-if)# end
```

## Verifying Active-Backup-Both Forwarding Method Configuration

### SUMMARY STEPS

1. enable
2. configure terminal
3. show ethernet backup detail

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> Router> <b>enable</b>	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>

	Command or Action	Purpose
Step 2	<b>configure terminal</b> <b>Example:</b> Router# <b>configure terminal</b>	Enters global configuration mode.
Step 3	<b>show ethernet backup detail</b> <b>Example:</b> Router# <b>show ethernet backup detail</b>	This displays the flex link configuration.

### Configuration Output

```

Switch Backup Interface Pairs:
Active Interface      Backup Interface      State
-----
GigabitEthernet0/0/3  Te0/0/12              Active Up/Backup Standby
  Preemption Mode    : off
  Multicast Fast Convergence : Off
  Bandwidth : 1000000 Kbit (Gi0/0/3), 1000000 Kbit (Te0/0/12)
  Mac Address Move Update Vlan : auto
  Forwarding : Active-Backup-Both

```

## Unsupported Functions

Following functions are not supported:

- MMU Notification
- IGMP Fast convergence
- Preemption Support
- Flex links support on a Port channel interface.
- Flex links support on EVC
- Flex links with VLB
- Flex links on IP configured Physical interface.
- Flexlink cannot be configured on a REP / G8032 configured interface and vice-versa.
- STP can be enabled globally but will not be applied on flex link configured interfaces alone.

# Additional References

## Related Documents

Related Topic	Document Title
Cisco IOS commands	<a href="https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/mcl/allreleasemcl/all-book.html">https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/mcl/allreleasemcl/all-book.html</a>

## Standards and RFCs

Standard/RFC	Title
No specific Standards and RFCs are supported by the features in this document.	—

## MIBs

MB	MIBs Link
—	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:  <a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a>

## Technical Assistance

Description	Link
<p>The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.</p> <p>To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.</p> <p>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.</p>	<a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a>