

Contents

Introduction	2
Prerequisites	2
General restrictions and guidelines	2
Example: Configuring Smart Link load sharing.....	2
Network configuration	2
Analysis	3
Applicable hardware and software versions.....	4
Restrictions and guidelines	5
Procedures	6
Configuring Device A	6
Configuring Device B	8
Configuring Device C	8
Configuring Device D	9
Verifying the configuration	10
Configuration files	12
Example: Configuring Smart Link and Monitor Link collaboration	14
Network configuration	14
Analysis	15
Applicable hardware and software versions.....	16
Restrictions and guidelines	18
Procedures	18
Configuring Device A	18
Configuring Device B	19
Configuring Device C	21
Configuring Device D	22
Configuring Device E	23
Verifying the configuration	24
Configuration files	27
Example: Configuring Smart Link in an IRF fabric.....	31
Network configuration	31
Analysis	32
Applicable hardware and software versions.....	32
Restrictions and guidelines	34
Procedures	34
Setting up an IRF fabric.....	34
Configuring Smart Link	35
Verifying the configuration	38
Configuration files	39

Introduction

This document provides Smart Link configuration examples.

Prerequisites

This document is not restricted to specific software or hardware versions.

The configuration examples in this document were created and verified in a lab environment, and all the devices were started with the factory default configuration. When you are working on a live network, make sure you understand the potential impact of every command on your network.

This document assumes that you have basic knowledge of Smart Link, Monitor Link, and IRF.

General restrictions and guidelines

If you configure a port as both an aggregation group member and a smart link group member, only the aggregation group configuration takes effect. The port is not shown in the output from the `display smart-link group` command.

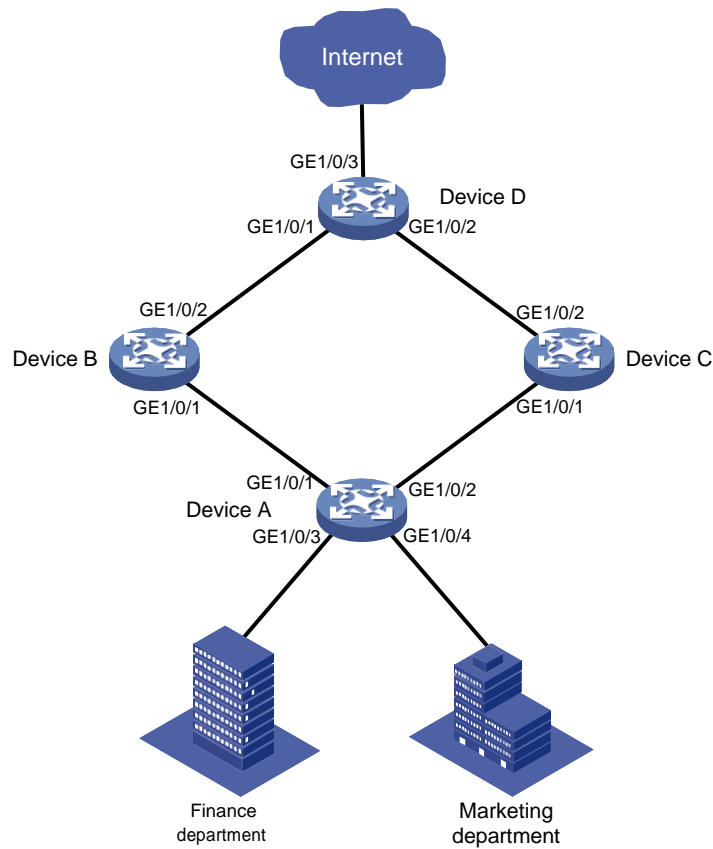
Example: Configuring Smart Link load sharing

Network configuration

As shown in [Figure 1](#), VLAN 10 and VLAN 11 are assigned to the Finance department and the Marketing department of an enterprise, respectively. Traffic of VLAN 10 and VLAN 11 on Device A is dually uplinked to Device D by Device B and Device C. Configure Smart Link to meet the following requirements:

- When the link between Device A and Device B and the link between Device A and Device C are both available, the traffic of the Finance department is forwarded through the link between Device A and Device B. The traffic of the Marketing department is forwarded through the link between Device A and Device C.
- When one link fails, the traffic on the link is switched to another link. When the link recovers, the traffic is switched back to the link.

Figure 1 Network diagram



Device	Interface	VLAN	Device	Interface	VLAN
Device A	GE1/0/1	10, 11	Device C	GE1/0/1	10, 11
	GE1/0/2	10, 11		GE1/0/2	10, 11
	GE1/0/3	10	Device D	GE1/0/1	10, 11
	GE1/0/4	11		GE1/0/2	10, 11
Device B	GE1/0/1	10, 11		GE1/0/3	10, 11
	GE1/0/2	10, 11			

Analysis

To implement load sharing on the two uplinks, create two smart link groups with the same member ports on Device A. The role of each port must be different in the two smart link groups. Use the VLANs of the Finance department and Marketing department as the protected VLANs of the corresponding smart link groups.

For the traffic to switch back to the recovered link, enable role preemption for the two smart link groups.

For the upstream device to refresh MAC address entries and ARP/ND entries when link switchover occurs in a smart link group, perform the following tasks:

- Enable flush message sending on Device A.
- Enable flush message receiving on ports of the primary and secondary links from Device A to Device D.

Applicable hardware and software versions

The following matrix shows the hardware and software versions to which this configuration example is applicable:

Hardware	Software version
SC 3570 switch series	Release 11xx
SC 5525 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 5520 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 3170 switch series	Release 11xx
SC 3130 switch series	Release 63xx

Restrictions and guidelines

When you configure Smart Link load sharing, follow these restrictions and guidelines:

- Before you configure a port as a smart link group member, shut down the port to prevent loops. You can bring up the port only after completing the smart link group configuration.
- Before you configure a smart link group member port or its directly connected port, disable the spanning tree feature and RRPP on the port.
- Make sure the receive control VLAN configured on the upstream device is the same as the transmit control VLAN configured on the smart link device.
- The control VLAN configured for a smart link group must be different from the control VLAN configured for any other smart link groups.
- The control VLAN of a smart link group must also be one of its protected VLANs. Do not remove the control VLAN. Otherwise, flush messages cannot be sent correctly.

Procedures

Configuring Device A

1. Create VLAN 10 and VLAN 11.

```
<DeviceA> system-view
[DeviceA] vlan 10 to 11
```
2. Configure GigabitEthernet 1/0/1:
 - # Shut down GigabitEthernet 1/0/1.

```
[DeviceA] interface gigabitethernet 1/0/1
[DeviceA-GigabitEthernet1/0/1] shutdown
```
 - # Configure GigabitEthernet 1/0/1 as a trunk port.

```
[DeviceA-GigabitEthernet1/0/1] port link-type trunk
```
 - # Assign the port to VLAN 10 and VLAN 11.

```
[DeviceA-GigabitEthernet1/0/1] port trunk permit vlan 10 11
```
 - # Remove the port from VLAN 1.

```
[DeviceA-GigabitEthernet1/0/1] undo port trunk permit vlan 1
```
 - # Disable the spanning tree feature on the port.

```
[DeviceA-GigabitEthernet1/0/1] undo stp enable
[DeviceA-GigabitEthernet1/0/1] quit
```
3. Configure GigabitEthernet 1/0/2 in the same way GigabitEthernet 1/0/1 is configured.

```
[DeviceA] interface gigabitethernet 1/0/2
[DeviceA-GigabitEthernet1/0/2] shutdown
[DeviceA-GigabitEthernet1/0/2] port link-type trunk
[DeviceA-GigabitEthernet1/0/2] port trunk permit vlan 10 11
[DeviceA-GigabitEthernet1/0/2] undo port trunk permit vlan 1
[DeviceA-GigabitEthernet1/0/2] undo stp enable
[DeviceA-GigabitEthernet1/0/2] quit
```
4. Configure GigabitEthernet 1/0/3:
 - # Configure GigabitEthernet 1/0/3 as an access port and assign the port to VLAN 10.

```
[DeviceA] interface gigabitethernet 1/0/3
[DeviceA-GigabitEthernet1/0/3] port access vlan 10
```
 - # Bring up the port.

```
[DeviceA-GigabitEthernet1/0/3] undo shutdown
[DeviceA-GigabitEthernet1/0/3] quit
```
5. Configure GigabitEthernet 1/0/4:

Configure GigabitEthernet 1/0/4 as an access port and assign the port to VLAN 11.

```
[DeviceA] interface gigabitethernet 1/0/4
[DeviceA-GigabitEthernet1/0/4] port access vlan 11
```

Bring up the port.

```
[DeviceA-GigabitEthernet1/0/4] undo shutdown
[DeviceA-GigabitEthernet1/0/4] quit
```

6. Configure VLAN-to-MSTI mappings and activate the MST region configuration:

Enter MST region view.

```
[DeviceA] stp region-configuration
```

Map VLAN 10 to MSTI 1, and VLAN 11 to MSTI 2.

```
[DeviceA-mst-region] instance 1 vlan 10
[DeviceA-mst-region] instance 2 vlan 11
```

Activate the MST region configuration.

```
[DeviceA-mst-region] active region-configuration
[DeviceA-mst-region] quit
```

7. Configure smart link group 1:

Create smart link group 1 and configure the VLAN mapped to MSTI 1, VLAN 10, as the protected VLAN.

```
[DeviceA] smart-link group 1
[DeviceA-smlk-group1] protected-vlan reference-instance 1
```

Configure GigabitEthernet 1/0/1 as the primary port and GigabitEthernet 1/0/2 as the secondary port.

```
[DeviceA-smlk-group1] port gigabitethernet 1/0/1 primary
[DeviceA-smlk-group1] port gigabitethernet 1/0/2 secondary
```

Enable flush message sending, and configure VLAN 10 as the transmit control VLAN.

```
[DeviceA-smlk-group1] flush enable control-vlan 10
```

Enable role preemption and set the preemption delay to 10 seconds.

```
[DeviceA-smlk-group1] preemption mode role
[DeviceA-smlk-group1] preemption delay 10
[DeviceA-smlk-group1] quit
```

8. Configure smart link group 2:

Create smart link group 2 and configure the VLAN mapped to MSTI 2, VLAN 11, as the protected VLAN.

```
[DeviceA] smart-link group 2
[DeviceA-smlk-group2] protected-vlan reference-instance 2
```

Configure GigabitEthernet 1/0/2 as the primary port and GigabitEthernet 1/0/1 as the secondary port.

```
[DeviceA-smlk-group2] port gigabitethernet 1/0/2 primary
[DeviceA-smlk-group2] port gigabitethernet 1/0/1 secondary
```

Enable flush message sending, and configure VLAN 11 as the transmit control VLAN.

```
[DeviceA-smlk-group2] flush enable control-vlan 11
```

Enable role preemption and set the preemption delay to 10 seconds.

```
[DeviceA-smlk-group2] preemption mode role
[DeviceA-smlk-group2] preemption delay 10
[DeviceA-smlk-group2] quit
```

9. Bring up GigabitEthernet 1/0/1 and GigabitEthernet 1/0/2:

```
[DeviceA] interface gigabitethernet 1/0/1
```

```
[DeviceA-GigabitEthernet1/0/1] undo shutdown
[DeviceA-GigabitEthernet1/0/1] quit
[DeviceA] interface gigabitethernet 1/0/2
[DeviceA-GigabitEthernet1/0/2] undo shutdown
[DeviceA-GigabitEthernet1/0/2] quit
```

Configuring Device B

1. Create VLAN 10 and VLAN 11.

```
<DeviceB> system-view
[DeviceB] vlan 10 to 11
```

2. Configure GigabitEthernet 1/0/1:

Configure GigabitEthernet 1/0/1 as a trunk port.

```
[DeviceB] interface gigabitethernet 1/0/1
[DeviceB-GigabitEthernet1/0/1] port link-type trunk
```

Assign the port to VLAN 10 and VLAN 11.

```
[DeviceB-GigabitEthernet1/0/1] port trunk permit vlan 10 11
```

Remove the port from VLAN 1.

```
[DeviceB-GigabitEthernet1/0/1] undo port trunk permit vlan 1
```

Disable the spanning tree feature on the port.

```
[DeviceB-GigabitEthernet1/0/1] undo stp enable
```

Enable flush message receiving and configure VLAN 10 and VLAN 11 as the receive control VLANs on the port.

```
[DeviceB-GigabitEthernet1/0/1] smart-link flush enable control-vlan 10 11
```

Bring up the port.

```
[DeviceB-GigabitEthernet1/0/1] undo shutdown
[DeviceB-GigabitEthernet1/0/1] quit
```

3. Configure GigabitEthernet 1/0/2:

Configure GigabitEthernet 1/0/2 as a trunk port.

```
[DeviceB] interface gigabitethernet 1/0/2
[DeviceB-GigabitEthernet1/0/2] port link-type trunk
```

Assign the port to VLAN 10 and VLAN 11.

```
[DeviceB-GigabitEthernet1/0/2] port trunk permit vlan 10 11
```

Remove the port from VLAN 1.

```
[DeviceB-GigabitEthernet1/0/2] undo port trunk permit vlan 1
```

Enable flush message receiving and configure VLAN 10 and VLAN 11 as the receive control VLANs on the port.

```
[DeviceB-GigabitEthernet1/0/2] smart-link flush enable control-vlan 10 11
```

Bring up the port.

```
[DeviceB-GigabitEthernet1/0/2] undo shutdown
[DeviceB-GigabitEthernet1/0/2] quit
```

Configuring Device C

1. Create VLAN 10 and VLAN 11.

```
<DeviceC> system-view
[DeviceC] vlan 10 to 11
```

2. Configure GigabitEthernet 1/0/1:

Configure GigabitEthernet 1/0/1 as a trunk port.

```
[DeviceC] interface gigabitethernet 1/0/1
[DeviceC-GigabitEthernet1/0/1] port link-type trunk
```

Assign the port to VLAN 10 and VLAN 11.

```
[DeviceC-GigabitEthernet1/0/1] port trunk permit vlan 10 11
```

Remove the port from VLAN 1.

```
[DeviceC-GigabitEthernet1/0/1] undo port trunk permit vlan 1
```

Disable the spanning tree feature on the port.

```
[DeviceC-GigabitEthernet1/0/1] undo stp enable
```

Enable flush message receiving and configure VLAN 10 and VLAN 11 as the receive control VLANs on the port.

```
[DeviceC-GigabitEthernet1/0/1] smart-link flush enable control-vlan 10 11
```

Bring up the port.

```
[DeviceC-GigabitEthernet1/0/1] undo shutdown
[DeviceC-GigabitEthernet1/0/1] quit
```

3. Configure GigabitEthernet 1/0/2:

Configure GigabitEthernet 1/0/2 as a trunk port.

```
[DeviceC] interface gigabitethernet 1/0/2
[DeviceC-GigabitEthernet1/0/2] port link-type trunk
```

Assign the port to VLAN 10 and VLAN 11.

```
[DeviceC-GigabitEthernet1/0/2] port trunk permit vlan 10 11
```

Remove the port from VLAN 1.

```
[DeviceC-GigabitEthernet1/0/2] undo port trunk permit vlan 1
```

Enable flush message receiving and configure VLAN 10 and VLAN 11 as the receive control VLANs on the port.

```
[DeviceC-GigabitEthernet1/0/2] smart-link flush enable control-vlan 10 11
```

Bring up the port.

```
[DeviceC-GigabitEthernet1/0/2] undo shutdown
[DeviceC-GigabitEthernet1/0/2] quit
```

Configuring Device D

1. Create VLAN 10 and VLAN 11.

```
<DeviceD> system-view
[DeviceD] vlan 10 to 11
```

2. Configure GigabitEthernet 1/0/1:

Configure GigabitEthernet 1/0/1 as a trunk port.

```
[DeviceD] interface gigabitethernet 1/0/1
[DeviceD-GigabitEthernet1/0/1] port link-type trunk
```

Assign the port to VLAN 10 and VLAN 11.

```
[DeviceD-GigabitEthernet1/0/1] port trunk permit vlan 10 11
```

Remove the port from VLAN 1.

```
[DeviceD-GigabitEthernet1/0/1] undo port trunk permit vlan 1
```

Enable flush message receiving and configure VLAN 10 and VLAN 11 as the receive control VLANs on the port.

```
[DeviceD-GigabitEthernet1/0/1] smart-link flush enable control-vlan 10 11
```


Bring up the port.

```
[DeviceD-GigabitEthernet1/0/1] undo shutdown
[DeviceD-GigabitEthernet1/0/1] quit
```

3. Configure GigabitEthernet 1/0/2 in the same way GigabitEthernet 1/0/1 is configured.

```
[DeviceD] interface gigabitethernet 1/0/2
[DeviceD-GigabitEthernet1/0/2] port link-type trunk
[DeviceD-GigabitEthernet1/0/2] port trunk permit vlan 10 11
[DeviceD-GigabitEthernet1/0/2] undo port trunk permit vlan 1
[DeviceD-GigabitEthernet1/0/2] smart-link flush enable control-vlan 10 11
[DeviceD-GigabitEthernet1/0/2] undo shutdown
[DeviceD-GigabitEthernet1/0/2] quit
```

4. Configure GigabitEthernet 1/0/3:

Configure GigabitEthernet 1/0/3 as a trunk port

```
[DeviceD] interface gigabitethernet 1/0/3
[DeviceD-GigabitEthernet1/0/3] port link-type trunk
```

Assign the port to VLAN 10 and VLAN 11.

```
[DeviceD-GigabitEthernet1/0/3] port trunk permit vlan 10 11
```

Remove the port from VLAN 1.

```
[DeviceD-GigabitEthernet1/0/3] undo port trunk permit vlan 1
```

Bring up the port.

```
[DeviceD-GigabitEthernet1/0/3] undo shutdown
[DeviceD-GigabitEthernet1/0/3] quit
```

Verifying the configuration

1. Verify the smart link group configuration when Device A is operating correctly:

Display information about all smart link groups on Device A.

```
[DeviceA] display smart-link group all
```

Smart link group 1 information:

```
Device ID       : 0000-fc00-2500
Preemption mode : Role
Preemption delay: 10(s)
Control VLAN    : 10
Protected VLAN  : Reference Instance 1
```

Member	Role	State	Flush-count	Last-flush-time
GE1/0/1	PRIMARY	ACTIVE	0	NA
GE1/0/2	SECONDARY	STANDBY	2	16:22:40 2019/10/29

Smart link group 2 information:

```
Device ID       : 0000-fc00-2500
Preemption mode : Role
Preemption delay: 10(s)
Control VLAN    : 11
Protected VLAN  : Reference Instance 2
```

Member	Role	State	Flush-count	Last-flush-time
GE1/0/2	PRIMARY	ACTIVE	2	16:22:40 2019/10/29
GE1/0/1	SECONDARY	STANDBY	0	NA

The output shows the following information:

- o In smart link group 1, the primary port GigabitEthernet 1/0/1 is active to transmit traffic from VLAN 10.
- o In smart link group 2, the primary port GigabitEthernet 1/0/2 is active to transmit traffic from VLAN 11.

2. Verify the smart link group configuration when GigabitEthernet 1/0/1 on Device A is down:

Display information about all smart link groups on Device A.

```
[DeviceA] display smart-link group all
```

Smart link group 1 information:

```
Device ID       : 0000-fc00-2500
Preemption mode : Role
Preemption delay: 10(s)
Control VLAN    : 10
Protected VLAN  : Reference Instance 1
```

Member	Role	State	Flush-count	Last-flush-time
GE1/0/1	PRIMARY	DOWN	0	NA
GE1/0/2	SECONDARY	ACTIVE	3	16:43:06 2019/10/29

Smart link group 2 information:

```
Device ID       : 0000-fc00-2500
Preemption mode : Role
Preemption delay: 10(s)
Control VLAN    : 11
Protected VLAN  : Reference Instance 2
```

Member	Role	State	Flush-count	Last-flush-time
GE1/0/2	PRIMARY	ACTIVE	2	16:22:40 2019/10/29
GE1/0/1	SECONDARY	DOWN	0	NA

The output shows the following information:

- o In smart link group 1, the secondary port GigabitEthernet 1/0/2 is active to transmit traffic from VLAN 10.
- o In smart link group 2, the primary port GigabitEthernet 1/0/2 remains active to transmit traffic from VLAN 11.

Display information about the received flush messages on Device B.

```
[DeviceB] display smart-link flush
```

```
Received flush packets           : 1
Receiving interface of the last flush packet : GigabitEthernet1/0/2
Receiving time of the last flush packet      : 16:43:08 2019/10/29
Device ID of the last flush packet          : 0000-fc00-2500
Control VLAN of the last flush packet       : 10
```

Configuration files

NOTE:

Support for the **port link-mode bridge** command depends on the device model.

- Device A:

```
#
vlan 1
#
vlan 10 to 11
#
stp region-configuration
instance 1 vlan 10
instance 2 vlan 11
active region-configuration
#
smart-link group 1
preemption mode role
preemption delay 10
flush enable control-vlan 10
protected-vlan reference-instance 1
#
smart-link group 2
preemption mode role
preemption delay 10
flush enable control-vlan 11
protected-vlan reference-instance 2
#
interface GigabitEthernet1/0/1
port link-mode bridge
port link-type trunk
undo port trunk permit vlan 1
port trunk permit vlan 10 to 11
undo stp enable
port smart-link group 1 primary
port smart-link group 2 secondary
#
interface GigabitEthernet1/0/2
port link-mode bridge
port link-type trunk
undo port trunk permit vlan 1
port trunk permit vlan 10 to 11
undo stp enable
port smart-link group 1 secondary
port smart-link group 2 primary
#
interface GigabitEthernet1/0/3
port link-mode bridge
```

```

port access vlan 10
#
interface GigabitEthernet1/0/4
port link-mode bridge
port access vlan 11
#

```

- **Device B:**

```

#
vlan 1
#
vlan 10 to 11
#
interface GigabitEthernet1/0/1
port link-mode bridge
port link-type trunk
undo port trunk permit vlan 1
port trunk permit vlan 10 to 11
undo stp enable
smart-link flush enable control-vlan 10 to 11
#
interface GigabitEthernet1/0/2
port link-mode bridge
port link-type trunk
undo port trunk permit vlan 1
port trunk permit vlan 10 to 11
smart-link flush enable control-vlan 10 to 11
#

```

- **Device C:**

```

#
vlan 1
#
vlan 10 to 11
#
interface GigabitEthernet1/0/1
port link-mode bridge
port link-type trunk
undo port trunk permit vlan 1
port trunk permit vlan 10 to 11
undo stp enable
smart-link flush enable control-vlan 10 to 11
#
interface GigabitEthernet1/0/2
port link-mode bridge
port link-type trunk
undo port trunk permit vlan 1
port trunk permit vlan 10 to 11
smart-link flush enable control-vlan 10 to 11
#

```

- **Device D:**

```
#
vlan 1
#
vlan 10 to 11
#
interface GigabitEthernet1/0/1
    port link-mode bridge
    port link-type trunk
    undo port trunk permit vlan 1
    port trunk permit vlan 10 to 11
    smart-link flush enable control-vlan 10 to 11
#
interface GigabitEthernet1/0/2
    port link-mode bridge
    port link-type trunk
    undo port trunk permit vlan 1
    port trunk permit vlan 10 to 11
    smart-link flush enable control-vlan 10 to 11
#
interface GigabitEthernet1/0/3
    port link-mode bridge
    port link-type trunk
    undo port trunk permit vlan 1
    port trunk permit vlan 10 to 11
#
```

Example: Configuring Smart Link and Monitor Link collaboration

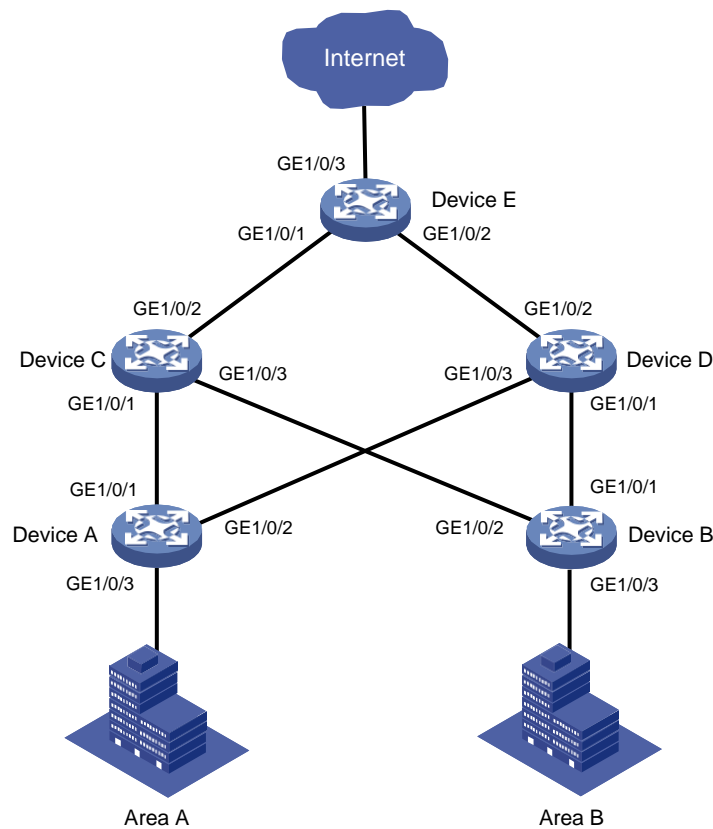
Network configuration

As shown in [Figure 2](#), VLAN 10 and VLAN 11 are assigned to Zone A and Zone B, respectively. Traffic of VLAN 10 is dually uplinked from Device A to Device E by Device C and Device D. Traffic of VLAN 11 is dually uplinked from Device B to Device E by Device C and Device D. Configure Smart Link and Monitor Link to meet the following requirements:

- When the link between Device A and Device C and the link between Device A and Device D are both available, the traffic of Zone A is forwarded through the link between Device A and Device C. When the link between Device A and Device C fails, the traffic is switched to the link between Device A and Device D. When the link between Device A and Device C recovers, the traffic switches back to the link.
- When the link between Device B and Device C and the link between Device B and Device D are both available, the traffic of Zone B is forwarded through the link between Device B and Device D. When the link between Device B and Device D fails, the traffic is switched to the link between Device B and Device C. When the link between Device B and Device D recovers, the traffic switches back to the link.

- Configure Monitor Link on Device C and Device D to associate the state of downlink interfaces with the state of uplink interfaces. When Monitor link shuts down the downlink interfaces because of an uplink failure, Smart Link triggers a link switchover.

Figure 2 Network diagram



Device	Interface	VLAN	Device	Interface	VLAN
Device A	GE1/0/1	10	Device D	GE1/0/1	11
	GE1/0/2	10		GE1/0/2	10, 11
	GE1/0/3	10		GE1/0/3	10
Device B	GE1/0/1	11	Device E	GE1/0/1	10, 11
	GE1/0/2	11		GE1/0/2	10, 11
	GE1/0/3	11		GE1/0/3	10, 11
Device C	GE1/0/1	10			
	GE1/0/2	10, 11			
	GE1/0/3	11			

Analysis

To implement dual uplink backup on Device A and Device B, perform the following tasks:

- Create a smart link group on Device A and Device B, respectively.
- Configure the VLANs of Zone A and Zone B as the protected VLANs of the corresponding smart link groups.

For the traffic to switch back to the recovered link, enable role preemption for the two smart link groups.

For the upstream device to refresh MAC address forwarding entries and ARP/ND entries when link switchover occurs in a smart link group, perform the following tasks:

- Enable flush message sending on Device A and Device B.
- Enable flush message receiving on the downlink ports on Device C and Device D.

Applicable hardware and software versions

The following matrix shows the hardware and software versions to which this configuration example is applicable:

Hardware	Software version
SC 3570 switch series	Release 11xx
SC 5525 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 5520 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 3170 switch series	Release 11xx
SC 3130 switch series	Release 63xx

Restrictions and guidelines

When you configure Smart Link and Monitor Link collaboration, follow these restrictions and guidelines:

- Before you configure a port as a smart link group member, shut down the port to prevent loops. You can bring up the port only after completing the smart link group configuration.
- Before you configure a smart link group member port or its directly connected port, disable the spanning tree feature and RRPP on the port.
- Make sure the receive control VLAN configured on the upstream device is the same as the transmit control VLAN configured on the smart link device.
- The control VLAN configured for a smart link group must be different from the control VLAN configured for any other smart link groups.
- The control VLAN of a smart link group must also be one of its protected VLANs. Do not remove the control VLAN. Otherwise, flush messages cannot be sent correctly.
- You can assign a port to only one monitor link group.
- Do not use the **shutdown** command or the **undo shutdown** command to change the state of the downlink interfaces in a monitor link group.

Procedures

Configuring Device A

1. Create VLAN 10 and VLAN 11.

```
<DeviceA> system-view
[DeviceA] vlan 10 to 11
```

2. Configure GigabitEthernet 1/0/1:

Shut down GigabitEthernet 1/0/1.

```
[DeviceA] interface gigabitethernet 1/0/1
[DeviceA-GigabitEthernet1/0/1] shutdown
```

Configure GigabitEthernet 1/0/1 as a trunk port.

```
[DeviceA-GigabitEthernet1/0/1] port link-type trunk
```

Assign the port to VLAN 10.

```
[DeviceA-GigabitEthernet1/0/1] port trunk permit vlan 10
```

Remove the port from VLAN 1.

```
[DeviceA-GigabitEthernet1/0/1] undo port trunk permit vlan 1
```

Disable the spanning tree feature on the port.

```
[DeviceA-GigabitEthernet1/0/1] undo stp enable
[DeviceA-GigabitEthernet1/0/1] quit
```

3. Configure GigabitEthernet 1/0/2 in the same way GigabitEthernet 1/0/1 is configured.

```
[DeviceA] interface gigabitethernet 1/0/2
[DeviceA-GigabitEthernet1/0/2] shutdown
[DeviceA-GigabitEthernet1/0/2] port link-type trunk
[DeviceA-GigabitEthernet1/0/2] port trunk permit vlan 10
[DeviceA-GigabitEthernet1/0/2] undo port trunk permit vlan 1
[DeviceA-GigabitEthernet1/0/2] undo stp enable
[DeviceA-GigabitEthernet1/0/2] quit
```


4. **Configure GigabitEthernet 1/0/3:**
Configure GigabitEthernet 1/0/3 as an access port and assign the port to VLAN 10.

```
[DeviceA] interface gigabitethernet 1/0/3
[DeviceA-GigabitEthernet1/0/3] port access vlan 10
```

Bring up the port.

```
[DeviceA-GigabitEthernet1/0/3] undo shutdown
[DeviceA-GigabitEthernet1/0/3] quit
```
5. **Configure VLAN-to-MSTI mappings and activate the MST region configuration:**
Enter MST region view.

```
[DeviceA] stp region-configuration
```

Map VLAN 10 to MSTI 1.

```
[DeviceA-mst-region] instance 1 vlan 10
```

Activate the MST region configuration.

```
[DeviceA-mst-region] active region-configuration
[DeviceA-mst-region] quit
```
6. **Configure smart link group 1:**
Create smart link group 1 and configure the VLAN mapped to MSTI 1, VLAN 10, as the protected VLAN.

```
[DeviceA] smart-link group 1
[DeviceA-smlk-group1] protected-vlan reference-instance 1
```

Configure GigabitEthernet 1/0/1 as the primary port and GigabitEthernet 1/0/2 as the secondary port.

```
[DeviceA-smlk-group1] port gigabitethernet 1/0/1 primary
[DeviceA-smlk-group1] port gigabitethernet 1/0/2 secondary
```

Enable flush message sending, and configure VLAN 10 as the transmit control VLAN.

```
[DeviceA-smlk-group1] flush enable control-vlan 10
```

Enable role preemption and set the preemption delay to 10 seconds.

```
[DeviceA-smlk-group1] preemption mode role
[DeviceA-smlk-group1] preemption delay 10
[DeviceA-smlk-group1] quit
```
7. **Bring up GigabitEthernet 1/0/1 and GigabitEthernet 1/0/2:**

```
[DeviceA] interface gigabitethernet 1/0/1
[DeviceA-GigabitEthernet1/0/1] undo shutdown
[DeviceA-GigabitEthernet1/0/1] quit
[DeviceA] interface gigabitethernet 1/0/2
[DeviceA-GigabitEthernet1/0/2] undo shutdown
[DeviceA-GigabitEthernet1/0/2] quit
```

Configuring Device B

1. **Create VLAN 10 and VLAN 11.**

```
<DeviceB> system-view
[DeviceB] vlan 10 to 11
```
2. **Configure GigabitEthernet 1/0/1:**
Shut down GigabitEthernet 1/0/1.

```
[DeviceB] interface gigabitethernet 1/0/1
[DeviceB-GigabitEthernet1/0/1] shutdown
```

- ```
Configure GigabitEthernet 1/0/1 as a trunk port.
[DeviceB-GigabitEthernet1/0/1] port link-type trunk

Assign the port to VLAN 11.
[DeviceB-GigabitEthernet1/0/1] port trunk permit vlan 11

Remove the port from VLAN 1.
[DeviceB-GigabitEthernet1/0/1] undo port trunk permit vlan 1

Disable the spanning tree feature on the port.
[DeviceB-GigabitEthernet1/0/1] undo stp enable
[DeviceB-GigabitEthernet1/0/1] quit
```
3. **Configure GigabitEthernet 1/0/2 in the same way GigabitEthernet 1/0/1 is configured.**

```
[DeviceB] interface gigabitethernet 1/0/2
[DeviceB-GigabitEthernet1/0/2] shutdown
[DeviceB-GigabitEthernet1/0/2] port link-type trunk
[DeviceB-GigabitEthernet1/0/2] port trunk permit vlan 11
[DeviceB-GigabitEthernet1/0/2] undo port trunk permit vlan 1
[DeviceB-GigabitEthernet1/0/2] undo stp enable
[DeviceB-GigabitEthernet1/0/2] quit
```
  4. **Configure GigabitEthernet 1/0/3:**

```
Configure GigabitEthernet 1/0/3 as an access port and assign the port to VLAN 11.
[DeviceB] interface gigabitethernet 1/0/3
[DeviceB-GigabitEthernet1/0/3] port access vlan 11

Bring up the port.
[DeviceB-GigabitEthernet1/0/3] undo shutdown
[DeviceB-GigabitEthernet1/0/3] quit
```
  5. **Configure VLAN-to-MSTI mappings and activate the MST region configuration:**

```
Enter MST region view.
[DeviceB] stp region-configuration

Map VLAN 11 to MSTI 1.
[DeviceB-mst-region] instance 1 vlan 11

Activate the MST region configuration
[DeviceB-mst-region] active region-configuration
[DeviceB-mst-region] quit
```
  6. **Configure smart link group 1.**

```
Create smart link group 1 and configure the VLAN mapped to MSTI 1, VLAN 11, as the
protected VLAN.
[DeviceB] smart-link group 1
[DeviceB-smlk-group1] protected-vlan reference-instance 1

Configure GigabitEthernet 1/0/1 as the primary port and GigabitEthernet 1/0/2 as the
secondary port.
[DeviceB-smlk-group1] port gigabitethernet 1/0/1 primary
[DeviceB-smlk-group1] port gigabitethernet 1/0/2 secondary

Enable flush message sending, and configure VLAN 11 as the transmit control VLAN.
[DeviceA-smlk-group1] flush enable control-vlan 11

Enable role preemption and set the preemption delay to 10 seconds.
[DeviceB-smlk-group1] preemption mode role
[DeviceB-smlk-group1] preemption delay 10
[DeviceB-smlk-group1] quit
```

**7. Bring up GigabitEthernet 1/0/1 and GigabitEthernet 1/0/2:**

```
[DeviceB] interface gigabitethernet 1/0/1
[DeviceB-GigabitEthernet1/0/1] undo shutdown
[DeviceB-GigabitEthernet1/0/1] quit
[DeviceB] interface gigabitethernet 1/0/2
[DeviceB-GigabitEthernet1/0/2] undo shutdown
[DeviceB-GigabitEthernet1/0/2] quit
```

## Configuring Device C

**1. Create VLAN 10 and VLAN 11.**

```
<DeviceC> system-view
[DeviceC] vlan 10 to 11
```

**2. Configure GigabitEthernet 1/0/1:**

**# Configure GigabitEthernet 1/0/1 as a trunk port.**

```
[DeviceC] interface gigabitethernet 1/0/1
[DeviceC-GigabitEthernet1/0/1] port link-type trunk
```

**# Assign the port to VLAN 10.**

```
[DeviceC-GigabitEthernet1/0/1] port trunk permit vlan 10
```

**# Remove the port from VLAN 1.**

```
[DeviceC-GigabitEthernet1/0/1] undo port trunk permit vlan 1
```

**# Disable the spanning tree feature on the port.**

```
[DeviceC-GigabitEthernet1/0/1] undo stp enable
```

**# Enable flush message receiving and configure VLAN 10 as the receive control VLAN on the port.**

```
[DeviceC-GigabitEthernet1/0/1] smart-link flush enable control-vlan 10
```

**# Bring up the port.**

```
[DeviceC-GigabitEthernet1/0/1] undo shutdown
[DeviceC-GigabitEthernet1/0/1] quit
```

**3. Configure GigabitEthernet 1/0/2:**

**# Configure GigabitEthernet 1/0/2 as a trunk port.**

```
[DeviceC] interface gigabitethernet 1/0/2
[DeviceC-GigabitEthernet1/0/2] port link-type trunk
```

**# Assign the port to VLAN 10 and VLAN 11.**

```
[DeviceC-GigabitEthernet1/0/2] port trunk permit vlan 10 11
```

**# Remove the port from VLAN 1.**

```
[DeviceC-GigabitEthernet1/0/2] undo port trunk permit vlan 1
```

**# Enable flush message receiving and configure VLAN 10 and VLAN 11 as the receive control VLANs on the port.**

```
[DeviceC-GigabitEthernet1/0/2] smart-link flush enable control-vlan 10 11
```

**# Bring up the port.**

```
[DeviceC-GigabitEthernet1/0/2] undo shutdown
[DeviceC-GigabitEthernet1/0/2] quit
```

**4. Configure GigabitEthernet 1/0/3:**

**# Configure GigabitEthernet 1/0/3 as a trunk port.**

```
[DeviceC] interface gigabitethernet 1/0/3
[DeviceC-GigabitEthernet1/0/3] port link-type trunk
```

**# Assign the port to VLAN 11.**

```
[DeviceC-GigabitEthernet1/0/3] port trunk permit vlan 11
```

**# Remove the port from VLAN 1.**

```
[DeviceC-GigabitEthernet1/0/3] undo port trunk permit vlan 1
```

**# Disable the spanning tree feature on the port.**

```
[DeviceC-GigabitEthernet1/0/3] undo stp enable
```

**# Enable flush message receiving and configure VLAN 11 as the receive control VLAN on the port.**

```
[DeviceC-GigabitEthernet1/0/3] smart-link flush enable control-vlan 11
```

**# Bring up the port.**

```
[DeviceB-GigabitEthernet1/0/3] undo shutdown
```

```
[DeviceB-GigabitEthernet1/0/3] quit
```

**5. Configure monitor link group 1:**

**# Create monitor link group 1.**

```
[DeviceC] monitor-link group 1
```

**# Configure the uplink interface threshold for triggering monitor link group state switchover as 1.**

```
[DeviceC-mtlk-group1] uplink up-port-threshold 1
```

**# Configure GigabitEthernet 1/0/2 as the uplink port and GigabitEthernet 1/0/1 and GigabitEthernet 1/0/3 as the downlink ports.**

```
[DeviceC-mtlk-group1] port gigabitethernet 1/0/2 uplink
```

```
[DeviceC-mtlk-group1] port gigabitethernet 1/0/1 downlink
```

```
[DeviceC-mtlk-group1] port gigabitethernet 1/0/3 downlink
```

```
[DeviceC-mtlk-group1] quit
```

## Configuring Device D

**1. Create VLAN 10 and VLAN 11.**

```
<DeviceD> system-view
```

```
[DeviceD] vlan 10 to 11
```

**2. Configure GigabitEthernet 1/0/1:**

**# Configure GigabitEthernet 1/0/1 as a trunk port.**

```
[DeviceD] interface gigabitethernet 1/0/1
```

```
[DeviceD-GigabitEthernet1/0/1] port link-type trunk
```

**# Assign the port to VLAN 11.**

```
[DeviceD-GigabitEthernet1/0/1] port trunk permit vlan 11
```

**# Remove the port from VLAN 1.**

```
[DeviceD-GigabitEthernet1/0/1] undo port trunk permit vlan 1
```

**# Disable the spanning tree feature on the port.**

```
[DeviceD-GigabitEthernet1/0/1] undo stp enable
```

**# Enable flush message receiving and configure VLAN 11 as the receive control VLAN on the port.**

```
[DeviceD-GigabitEthernet1/0/1] smart-link flush enable control-vlan 11
```

**# Bring up the port.**

```
[DeviceD-GigabitEthernet1/0/1] undo shutdown
```

```
[DeviceD-GigabitEthernet1/0/1] quit
```

**3. Configure GigabitEthernet 1/0/2:**

**# Configure GigabitEthernet 1/0/2 as a trunk port.**

- ```
[DeviceD] interface gigabitethernet 1/0/2
[DeviceD-GigabitEthernet1/0/2] port link-type trunk
# Assign the port to VLAN 10 and VLAN 11.
[DeviceD-GigabitEthernet1/0/2] port trunk permit vlan 10 11
# Remove the port from VLAN 1.
[DeviceD-GigabitEthernet1/0/2] undo port trunk permit vlan 1
# Enable flush message receiving and configure VLAN 10 and VLAN 11 as the receive control VLANs on the port.
[DeviceD-GigabitEthernet1/0/2] smart-link flush enable control-vlan 10 11
# Bring up the port.
[DeviceD-GigabitEthernet1/0/2] undo shutdown
[DeviceD-GigabitEthernet1/0/2] quit
```
- 4. Configure GigabitEthernet 1/0/3:**
- ```
Configure GigabitEthernet 1/0/3 as a trunk port.
[DeviceD] interface gigabitethernet 1/0/3
[DeviceD-GigabitEthernet1/0/3] port link-type trunk
Assign the port to VLAN 10.
[DeviceD-GigabitEthernet1/0/3] port trunk permit vlan 10
Remove the port from VLAN 1.
[DeviceD-GigabitEthernet1/0/3] undo port trunk permit vlan 1
Disable the spanning tree feature on the port.
[DeviceD-GigabitEthernet1/0/3] undo stp enable
Enable flush message receiving and configure VLAN 10 as the receive control VLAN on the port.
[DeviceD-GigabitEthernet1/0/3] smart-link flush enable control-vlan 10
Bring up the port.
[DeviceD-GigabitEthernet1/0/3] undo shutdown
[DeviceD-GigabitEthernet1/0/3] quit
```
- 5. Configure monitor link group 1:**
- ```
# Create monitor link group 1.
[DeviceD] monitor-link group 1
# Configure the uplink interface threshold for triggering monitor link group state switchover as 1.
[DeviceD-mtlk-group1] uplink up-port-threshold 1
# Configure GigabitEthernet 1/0/2 as the uplink port and GigabitEthernet 1/0/1 and GigabitEthernet 1/0/3 as the downlink ports.
[DeviceD-mtlk-group1] port gigabitethernet 1/0/2 uplink
[DeviceD-mtlk-group1] port gigabitethernet 1/0/1 downlink
[DeviceD-mtlk-group1] port gigabitethernet 1/0/3 downlink
[DeviceD-mtlk-group1] quit
```

Configuring Device E

- 1. Create VLAN 10 and VLAN 11.**

```
<DeviceE> system-view
[DeviceE] vlan 10 to 11
```
- 2. Configure GigabitEthernet 1/0/1:**

```
# Configure GigabitEthernet 1/0/1 as a trunk port.
```

- ```
[DeviceE] interface gigabitethernet 1/0/1
[DeviceE-GigabitEthernet1/0/1] port link-type trunk
Assign the port to VLAN 10 and VLAN 11.
[DeviceE-GigabitEthernet1/0/1] port trunk permit vlan 10 11
Remove the port from VLAN 1.
[DeviceE-GigabitEthernet1/0/1] undo port trunk permit vlan 1
Enable flush message receiving and configure VLAN 10 and VLAN 11 as the receive control VLANs on the port.
[DeviceE-GigabitEthernet1/0/1] smart-link flush enable control-vlan 10 11
Bring up the port.
[DeviceE-GigabitEthernet1/0/1] undo shutdown
[DeviceE-GigabitEthernet1/0/1] quit
```
- 3. Configure GigabitEthernet 1/0/2 in the same way GigabitEthernet 1/0/1 is configured.**
- ```
[DeviceE] interface gigabitethernet 1/0/2
[DeviceE-GigabitEthernet1/0/2] port link-type trunk
[DeviceE-GigabitEthernet1/0/2] port trunk permit vlan 10 11
[DeviceE-GigabitEthernet1/0/2] undo port trunk permit vlan 1
[DeviceE-GigabitEthernet1/0/2] smart-link flush enable control-vlan 10 11
[DeviceE-GigabitEthernet1/0/2] undo shutdown
[DeviceE-GigabitEthernet1/0/2] quit
```
- 4. Configure GigabitEthernet 1/0/3:**
- # Configure GigabitEthernet 1/0/3 as a trunk port.**
- ```
[DeviceE] interface gigabitethernet 1/0/3
[DeviceE-GigabitEthernet1/0/3] port link-type trunk
```
- # Assign the port to VLAN 10 and VLAN 11.**
- ```
[DeviceE-GigabitEthernet1/0/3] port trunk permit vlan 10 11
```
- # Remove the port from VLAN 1.**
- ```
[DeviceE-GigabitEthernet1/0/3] undo port trunk permit vlan 1
```
- # Bring up the port.**
- ```
[DeviceE-GigabitEthernet1/0/3] undo shutdown
[DeviceE-GigabitEthernet1/0/3] quit
```

Verifying the configuration

- 1. Verify the smart link group configuration when Device A and Device B are operating correctly:**

Display information about all smart link groups on Device A.

```
[DeviceA] display smart-link group all
```

Smart link group 1 information:

```
Device ID       : 0000-fc00-2500
Preemption mode : Role
Preemption delay: 10(s)
Control VLAN    : 10
Protected VLAN  : Reference Instance 1
```

Member	Role	State	Flush-count	Last-flush-time
GE1/0/1	PRIMARY	ACTIVE	1	17:37:49 2019/10/29

The output shows that in smart link group 1, the primary port GigabitEthernet 1/0/1 is active to transmit traffic from VLAN 10.

Display information about all smart link groups on Device B.

```
[DeviceB] display smart-link group all
```

Smart link group 1 information:

```
Device ID       : 0000-fc01-2501
Preemption mode : Role
Preemption delay: 10(s)
Control VLAN    : 11
Protected VLAN  : Reference Instance 2
```

Member	Role	State	Flush-count	Last-flush-time
GE1/0/1	PRIMARY	ACTIVE	2	17:22:40 2019/10/29
GE1/0/2	SECONDARY	STANDBY	0	NA

The output shows that in smart link group 1, the primary port GigabitEthernet 1/0/1 is active to transmit traffic from VLAN 11.

2. Verify the monitor link group configuration when Device C and Device D are operating correctly:

Display information about all monitor link groups on Device C.

```
[DeviceC] display monitor-link group all
```

Monitor link group 1 information:

```
Group status      : UP
Downlink up-delay: 0(s)
Last-up-time      : 17:07:26 2019/10/29
Last-down-time    : -
Up-port-threshold: 1
```

Member	Role	Status
GE1/0/2	UPLINK	UP
GE1/0/1	DOWNLINK	UP
GE1/0/3	DOWNLINK	UP

The output shows that in monitor link group 1, the uplink port GigabitEthernet 1/0/2 is up, and the downlink ports GigabitEthernet 1/0/1 and GigabitEthernet 1/0/3 are up.

Display information about all monitor link groups on Device D.

```
[DeviceD] display monitor-link group all
```

Monitor link group 1 information:

```
Group status      : UP
Downlink up-delay: 0(s)
Last-up-time      : 17:09:33 2019/10/29
Last-down-time    : -
Up-port-threshold: 1
```

Member	Role	Status
GE1/0/2	UPLINK	UP
GE1/0/1	DOWNLINK	UP

```
GE1/0/1                DOWNLINK    UP
```

The output shows that in monitor link group 1, the uplink port GigabitEthernet 1/0/2 is up, and the downlink ports GigabitEthernet 1/0/1 and GigabitEthernet 1/0/3 are up.

3. Verify the smart link group configuration when GigabitEthernet 1/0/1 on Device A is down:

Display information about all smart link groups on Device A.

```
[DeviceA] display smart-link group all
```

Smart link group 1 information:

```
Device ID       : 0000-fc00-2500
Preemption mode : Role
Preemption delay: 10(s)
Control VLAN    : 10
Protected VLAN  : Reference Instance 1
```

Member	Role	State	Flush-count	Last-flush-time
GE1/0/1	PRIMARY	DOWN	1	17:37:49 2019/10/29
GE1/0/2	SECONDARY	ACTIVE	4	17:49:06 2019/10/29

The output shows that in smart link group 1, the secondary port GigabitEthernet 1/0/2 is active to transmit traffic from VLAN 10.

Display information about the received flush messages on Device C.

```
[DeviceC] display smart-link flush
```

```
Received flush packets           : 1
Receiving interface of the last flush packet : GigabitEthernet1/0/2
Receiving time of the last flush packet      : 17:49:08 2019/10/29
Device ID of the last flush packet          : 0000-fc00-2500
Control VLAN of the last flush packet       : 10
```

4. Verify the monitor link group configuration when the uplink port GigabitEthernet 1/0/2 on Device C is down:

Display information about all monitor link groups on Device C.

```
[DeviceC] display monitor-link group all
```

Monitor link group 1 information:

```
Group status : DOWN
Downlink up-delay: 0(s)
Last-up-time  : 17:07:26 2019/10/29
Last-down-time : 18:01:05 2019/10/29
Up-port-threshold: 1
```

Member	Role	Status
GE1/0/2	UPLINK	DOWN
GE1/0/1	DOWNLINK	DOWN (Monitor Link)
GE1/0/3	DOWNLINK	DOWN (Monitor Link)

The output shows that monitor link group 1 is down, and the downlink ports GigabitEthernet 1/0/1 and GigabitEthernet 1/0/3 in monitor link group 1 are down.

Display information about all monitor link groups on Device D.

```
[DeviceD] display monitor-link group all
```

Monitor link group 1 information:

```
Group status : UP
```



```

Downlink up-delay: 0(s)
Last-up-time      : 17:09:33 2019/10/29
Last-down-time    : -
Up-port-threshold: 1

```

Member	Role	Status
GE1/0/2	UPLINK	UP
GE1/0/1	DOWNLINK	UP
GE1/0/3	DOWNLINK	UP

The output shows that monitor link group 1 is up, and the downlink ports GigabitEthernet 1/0/1 and GigabitEthernet 1/0/3 in monitor link group 1 are up.

Display information about all smart link groups on Device A.

```
[DeviceA] display smart-link group all
```

Smart link group 1 information:

```

Device ID       : 0000-fc00-2500
Preemption mode : Role
Preemption delay: 10(s)
Control VLAN    : 10
Protected VLAN  : Reference Instance 1

```

Member	Role	State	Flush-count	Last-flush-time
GE1/0/1	PRIMARY	DOWN	2	17:57:49 2019/10/29
GE1/0/2	SECONDARY	ACTIVE	5	18:01:06 2019/10/29

The output shows that GigabitEthernet 1/0/1 on Device A is down. In smart link group 1, the secondary port GigabitEthernet 1/0/2 becomes active to transmit traffic from VLAN 10.

Configuration files

NOTE:

Support for the **port link-mode bridge** command depends on the device model.

- Device A:

```

#
vlan 1
#
vlan 10
#
stp region-configuration
instance 1 vlan 10
active region-configuration
#
smart-link group 1
preemption mode role
preemption delay 10
flush enable control-vlan 10
protected-vlan reference-instance 1

```

```
#
interface GigabitEthernet1/0/1
 port link-mode bridge
 port link-type trunk
 undo port trunk permit vlan 1
 port trunk permit vlan 10
 undo stp enable
 port smart-link group 1 primary
#
interface GigabitEthernet1/0/2
 port link-mode bridge
 port link-type trunk
 undo port trunk permit vlan 1
 port trunk permit vlan 10
 undo stp enable
 port smart-link group 1 secondary
#
interface GigabitEthernet1/0/3
 port link-mode bridge
 port access vlan 10
#
```

- **Device B:**

```
#
vlan 1
#
vlan 11
#
stp region-configuration
 instance 1 vlan 11
 active region-configuration
#
smart-link group 1
 preemption mode role
 preemption delay 10
 flush enable control-vlan 11
 protected-vlan reference-instance 1
#
interface GigabitEthernet1/0/1
 port link-mode bridge
 port link-type trunk
 undo port trunk permit vlan 1
 port trunk permit vlan 11
 undo stp enable
 port smart-link group 1 primary
#
interface GigabitEthernet1/0/2
 port link-mode bridge
 port link-type trunk
```

```

undo port trunk permit vlan 1
port trunk permit vlan 11
undo stp enable
port smart-link group 1 secondary
#
interface GigabitEthernet1/0/3
port link-mode bridge
port access vlan 11
#

```

- **Device C:**

```

#
vlan 1
#
vlan 10 to 11
#
monitor-link group 1
#
interface GigabitEthernet1/0/1
port link-mode bridge
port link-type trunk
undo port trunk permit vlan 1
port trunk permit vlan 10
undo stp enable
smart-link flush enable control-vlan 10
port monitor-link group 1 downlink
#
interface GigabitEthernet1/0/2
port link-mode bridge
port link-type trunk
undo port trunk permit vlan 1
port trunk permit vlan 10 to 11
smart-link flush enable control-vlan 10 to 11
port monitor-link group 1 uplink
#
interface GigabitEthernet1/0/3
port link-mode bridge
port link-type trunk
undo port trunk permit vlan 1
port trunk permit vlan 11
undo stp enable
smart-link flush enable control-vlan 11
port monitor-link group 1 downlink
#

```

- **Device D:**

```

#
vlan 1
#
vlan 10 to 11

```

```

#
monitor-link group 1
#
interface GigabitEthernet1/0/1
port link-mode bridge
port link-type trunk
undo port trunk permit vlan 1
port trunk permit vlan 11
undo stp enable
smart-link flush enable control-vlan 11
port monitor-link group 1 downlink
#
interface GigabitEthernet1/0/2
port link-mode bridge
port link-type trunk
undo port trunk permit vlan 1
port trunk permit vlan 10 to 11
smart-link flush enable control-vlan 10 to 11
port monitor-link group 1 uplink
#
interface GigabitEthernet1/0/3
port link-mode bridge
port link-type trunk
undo port trunk permit vlan 1
port trunk permit vlan 10
undo stp enable
smart-link flush enable control-vlan 10
port monitor-link group 1 downlink
#

```

- **Device E:**

```

#
vlan 1
#
vlan 10 to 11
#
interface GigabitEthernet1/0/1
port link-mode bridge
port link-type trunk
undo port trunk permit vlan 1
port trunk permit vlan 10 to 11
smart-link flush enable control-vlan 10 to 11
#
interface GigabitEthernet1/0/2
port link-mode bridge
port link-type trunk
undo port trunk permit vlan 1
port trunk permit vlan 10 to 11
smart-link flush enable control-vlan 10 to 11

```

```
#
interface GigabitEthernet1/0/3
port link-mode bridge
port link-type trunk
undo port trunk permit vlan 1
port trunk permit vlan 10 to 11
#
```

Example: Configuring Smart Link in an IRF fabric

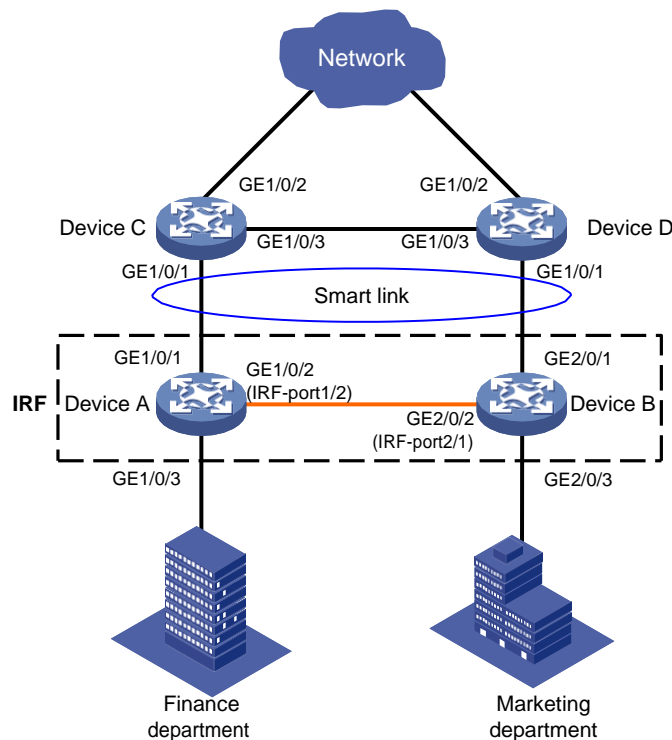
Network configuration

As shown in [Figure 3](#), the Finance department in VLAN 10 and the Marketing department in VLAN 11 are connected to Device A and Device B, respectively. Device A and Device B form an IRF fabric and are connected to Device C and Device D.

Configure Smart Link to meet the following requirements:

- When the uplinks of Device A and Device B are available, traffic is forwarded through the link between Device A and Device C.
- When the link between Device A and Device C fails, the traffic switches to another link.
- When the link recovers, the traffic is switched back to the link.

Figure 3 Network diagram



Device	Interface	VLAN	Device	Interface	Device
Device A	GE1/0/1	10, 11	Device B	GE2/0/1	10, 11
	GE1/0/3	10		GE2/0/3	11

Device	Interface	VLAN	Device	Interface	Device
Device C	GE1/0/1	10, 11	Device D	GE1/0/1	10, 11
	GE1/0/2	10, 11		GE1/0/2	10, 11

Analysis

To implement dual uplink redundancy on Device A and Device B, configure a smart link group for the IRF fabric formed by Device A and Device B.

For the traffic to switch back to the recovered link, enable role preemption for the two smart link groups.

For the upstream device to refresh MAC address forwarding entries and ARP/ND entries when link switchover occurs in a smart link group, perform the following tasks:

- Enable flush message sending on Device A and Device B.
- Enable flush message receiving on GigabitEthernet 1/0/1 on Device C and Device D.

Applicable hardware and software versions

The following matrix shows the hardware and software versions to which this configuration example is applicable:

Hardware	Software version
SC 3570 switch series	Release 11xx
SC 5525 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 5520 switch series	Release 63xx, Release 65xx, Release 6615Pxx, Release 6628Pxx
SC 3170 switch series	Release 11xx
SC 3130 switch series	Release 63xx

Restrictions and guidelines

When you configure Smart Link in an IRF fabric, follow these restrictions and guidelines:

- Before you configure a port as a smart link group member, shut down the port to prevent loops. You can bring up the port only after completing the smart link group configuration.
- Before you configure a smart link member port or its directly connected port, disable the spanning tree feature and RRPP on the port.
- Make sure the receive control VLAN configured on the upstream device is the same as the transmit control VLAN configured on the smart link device.
- The control VLAN of a smart link group must also be one of its protected VLANs. Do not remove the control VLAN. Otherwise, flush messages cannot be sent correctly.
- For the restrictions and guidelines for configuring IRF, see *HPE xxxx Virtual Technologies Configuration Guide*.

Procedures

Setting up an IRF fabric

Configuring Device A

Bind GigabitEthernet 1/0/2 to IRF port 1/2 and save the configuration.

```
[DeviceA] interface gigabitethernet 1/0/2
[DeviceA-GigabitEthernet1/0/2] shutdown
[DeviceA-GigabitEthernet1/0/2] quit
[DeviceA] irf-port 1/2
[DeviceA-irf-port1/2] port group interface gigabitethernet 1/0/2
[DeviceA-irf-port1/2] quit
[DeviceA] interface gigabitethernet 1/0/2
[DeviceA-GigabitEthernet1/0/2] undo shutdown
[DeviceA-GigabitEthernet1/0/2] quit
[DeviceA] save
```

Activate the IRF port.

```
[DeviceA] irf-port-configuration active
```

Configuring Device B

Assign IRF member ID 2 to Device B and reboot the device.

```
<DeviceB> system-view
```

```
[DeviceB] irf member 1 renumber 2
```

Warning: Renumbering the member ID may result in configuration change or loss. Continue?

```
[Y/N]:y
```

```
[DeviceB] quit
```

```
<DeviceB> reboot
```

After you connect the ports as shown in [Figure 3](#), log in to the device again. Bind GigabitEthernet 2/0/2 to IRF port 2/1 and save the configuration.

```
<DeviceB> system-view
```

```
[DeviceB] interface gigabitethernet 2/0/2
```

```
[DeviceB-GigabitEthernet2/0/2] shutdown
```

```
[DeviceB-GigabitEthernet2/0/2] quit
```

```
[DeviceB] irf-port 2/1
```

```
[DeviceB-irf-port2/1] port group interface gigabitethernet 2/0/2
```

```
[DeviceB-irf-port2/1] quit
```

```
[DeviceB] interface gigabitethernet 2/0/2
```

```
[DeviceB-GigabitEthernet2/0/2] undo shutdown
```

```
[DeviceB-GigabitEthernet2/0/2] quit
```

```
[DeviceB] save
```

Activate the IRF port.

```
[DeviceB] irf-port-configuration active
```

Device A and Device B start a master election. When the master (Device A in this example) is elected, the other device reboots. An IRF fabric is formed after the reboot.

Configuring Smart Link

Configuring Device A

1. Create VLAN 10 and VLAN 11.

```
<DeviceA> system-view
```

```
[DeviceA] vlan 10 to 11
```

2. Configure GigabitEthernet 1/0/1:

Shut down GigabitEthernet 1/0/1.

```
[DeviceA] interface gigabitethernet 1/0/1
```

```
[DeviceA-GigabitEthernet1/0/1] shutdown
```

Configure GigabitEthernet 1/0/1 as a trunk port.

```
[DeviceA-GigabitEthernet1/0/1] port link-type trunk
```

Assign the port to VLAN 10 and VLAN 11.

```
[DeviceA-GigabitEthernet1/0/1] port trunk permit vlan 10 11
```

Remove the port from VLAN 1.

```
[DeviceA-GigabitEthernet1/0/1] undo port trunk permit vlan 1
```

Disable the spanning tree feature on the port.

```
[DeviceA-GigabitEthernet1/0/1] undo stp enable
```

```
[DeviceA-GigabitEthernet1/0/1] quit
```

3. Configure GigabitEthernet 2/0/1 in the same way GigabitEthernet 1/0/1 is configured.

```
[DeviceA] interface gigabitethernet 2/0/1
```



```
[DeviceA-GigabitEthernet2/0/1] shutdown
[DeviceA-GigabitEthernet2/0/1] port link-type trunk
[DeviceA-GigabitEthernet2/0/1] port trunk permit vlan 10 11
[DeviceA-GigabitEthernet2/0/1] undo port trunk permit vlan 1
[DeviceA-GigabitEthernet2/0/1] undo stp enable
[DeviceA-GigabitEthernet2/0/1] quit
```

4. Configure GigabitEthernet 1/0/3:

Configure GigabitEthernet 1/0/3 as an access port and assign the port to VLAN 10.

```
[DeviceA] interface gigabitethernet 1/0/3
[DeviceA-GigabitEthernet1/0/3] port access vlan 10
```

Bring up the port.

```
[DeviceA-GigabitEthernet1/0/3] undo shutdown
[DeviceA-GigabitEthernet1/0/3] quit
```

5. Configure GigabitEthernet 2/0/3:

Configure GigabitEthernet 2/0/3 as an access port and assign the port to VLAN 11.

```
[DeviceA] interface gigabitethernet 2/0/3
[DeviceA-GigabitEthernet2/0/3] port access vlan 11
```

Bring up the port.

```
[DeviceA-GigabitEthernet2/0/3] undo shutdown
[DeviceA-GigabitEthernet2/0/3] quit
```

6. Configure VLAN-to-MSTI mappings and activate the MST region configuration::

Enter MST region view.

```
[DeviceA] stp region-configuration
```

Map VLAN 10 and VLAN 11 to MSTI 1.

```
[DeviceA-mst-region] instance 1 vlan 10 11
```

Activate the MST region configuration

```
[DeviceA-mst-region] active region-configuration
[DeviceA-mst-region] quit
```

7. Configure smart link group 1:

Create smart link group 1 and configure the VLANs mapped to MSTI 1, VLAN 10 and VLAN 11, as the protected VLANs.

```
[DeviceA] smart-link group 1
[DeviceA-smlk-group1] protected-vlan reference-instance 1
```

Configure GigabitEthernet 1/0/1 as the primary port and GigabitEthernet 2/0/1 as the secondary port.

```
[DeviceA-smlk-group1] port gigabitethernet 1/0/1 primary
[DeviceA-smlk-group1] port gigabitethernet 2/0/1 secondary
```

Enable flush message sending, and configure VLAN 10 as the transmit control VLAN.

```
[DeviceA-smlk-group1] flush enable control-vlan 10
```

Enable role preemption and set the preemption delay to 10 seconds.

```
[DeviceA-smlk-group1] preemption mode role
[DeviceA-smlk-group1] preemption delay 10
[DeviceA-smlk-group1] quit
```

8. Bring up GigabitEthernet 1/0/1 and GigabitEthernet 2/0/1:

```
[DeviceA] interface gigabitethernet 1/0/1
[DeviceA-GigabitEthernet1/0/1] undo shutdown
[DeviceA-GigabitEthernet1/0/1] quit
```

```
[DeviceA] interface gigabitethernet 2/0/1
[DeviceA-GigabitEthernet2/0/1] undo shutdown
[DeviceA-GigabitEthernet2/0/1] quit
```

Configuring Device C

1. Create VLAN 10 and VLAN 11.

```
<DeviceC> system-view
[DeviceC] vlan 10 to 11
```

2. Configure GigabitEthernet 1/0/1:

Configure GigabitEthernet 1/0/1 as a trunk port.

```
[DeviceC] interface gigabitethernet 1/0/1
[DeviceC-GigabitEthernet1/0/1] port link-type trunk
```

Assign the port to VLAN 10 and VLAN 11.

```
[DeviceC-GigabitEthernet1/0/1] port trunk permit vlan 10 11
```

Remove the port from VLAN 1.

```
[DeviceC-GigabitEthernet1/0/1] undo port trunk permit vlan 1
```

Disable the spanning tree feature on the port.

```
[DeviceC-GigabitEthernet1/0/1] undo stp enable
```

Enable flush message receiving, and configure VLAN 10 and VLAN 11 as the receive control VLANs on the port.

```
[DeviceC-GigabitEthernet1/0/1] smart-link flush enable control-vlan 10 11
```

Bring up the port.

```
[DeviceC-GigabitEthernet1/0/1] undo shutdown
[DeviceC-GigabitEthernet1/0/1] quit
```

3. Configure GigabitEthernet 1/0/2:

Configure GigabitEthernet 1/0/2 as a trunk port.

```
[DeviceC] interface gigabitethernet 1/0/2
[DeviceC-GigabitEthernet1/0/2] port link-type trunk
```

Assign the port to VLAN 10 and VLAN 11.

```
[DeviceC-GigabitEthernet1/0/2] port trunk permit vlan 10 11
```

Remove the port from VLAN 1.

```
[DeviceC-GigabitEthernet1/0/2] undo port trunk permit vlan 1
```

Enable flush message receiving, and configure VLAN 10 and VLAN 11 as the receive control VLANs on the port.

```
[DeviceC-GigabitEthernet1/0/2] smart-link flush enable control-vlan 10 11
```

Bring up the port.

```
[DeviceC-GigabitEthernet1/0/2] undo shutdown
[DeviceC-GigabitEthernet1/0/2] quit
```

Configuring Device D

1. Create VLAN 10 and VLAN 11.

```
<DeviceD> system-view
[DeviceD] vlan 10 to 11
```

2. Configure GigabitEthernet 1/0/1:

Configure GigabitEthernet 1/0/1 as a trunk port.

```
[DeviceD] interface gigabitethernet 1/0/1
[DeviceD-GigabitEthernet1/0/1] port link-type trunk
```

Assign the port to VLAN 10 and VLAN 11.

- ```
[DeviceD-GigabitEthernet1/0/1] port trunk permit vlan 10 11
```
- # Remove the port from VLAN 1.**
- ```
[DeviceD-GigabitEthernet1/0/1] undo port trunk permit vlan 1
```
- # Disable the spanning tree feature on the port.**
- ```
[DeviceD-GigabitEthernet1/0/1] undo stp enable
```
- # Enable flush message receiving and configure VLAN 10 and VLAN 11 as the receive control VLANs on the port.**
- ```
[DeviceD-GigabitEthernet1/0/1] smart-link flush enable control-vlan 10 11
```
- # Bring up the port.**
- ```
[DeviceD-GigabitEthernet1/0/1] undo shutdown
[DeviceD-GigabitEthernet1/0/1] quit
```
- 3. Configure GigabitEthernet 1/0/2:**
- # Configure GigabitEthernet 1/0/2 as a trunk port.**
- ```
[DeviceD] interface gigabitethernet 1/0/2
[DeviceD-GigabitEthernet1/0/2] port link-type trunk
```
- # Assign the port to VLAN 10 and VLAN 11.**
- ```
[DeviceD-GigabitEthernet1/0/2] port trunk permit vlan 10 11
```
- # Remove the port from VLAN 1.**
- ```
[DeviceD-GigabitEthernet1/0/2] undo port trunk permit vlan 1
```
- # Enable flush message receiving and configure VLAN 10 and VLAN 11 as the receive control VLANs on the port.**
- ```
[DeviceD-GigabitEthernet1/0/2] smart-link flush enable control-vlan 10 11
```
- # Bring up the port.**
- ```
[DeviceD-GigabitEthernet1/0/2] undo shutdown
[DeviceD-GigabitEthernet1/0/2] quit
```

Verifying the configuration

1. Verify the IRF fabric configuration after you complete the configuration:

Display IRF fabric information on Device A.

```
<Sysname> display irf
```

MemberID	Role	Priority	CPU-Mac	Description
*+1	Master	1	0210-fc01-0001	-----
2	Standby	1	0210-fc02-0002	-----

```
-----
```

```
* indicates the device is the master.
```

```
+ indicates the device through which the user logs in.
```

```
The Bridge MAC of the IRF is: 00e0-fc00-1000
```

```
Auto upgrade : yes
```

```
Mac persistent : 6 min
```

```
Domain ID : 0
```

The output shows that an IRF fabric has been established successfully.

2. Verify the smart link group configuration when Device A is operating correctly:

Display information about all smart link groups on Device A.

```
[DeviceA] display smart-link group all
```

Smart link group 1 information:

Device ID : 00e0-fc00-c518

Preemption mode : Role

Preemption delay: 10(s)

Control VLAN : 10

Protected VLAN : Reference Instance 1

Member	Role	State	Flush-count	Last-flush-time
GE1/0/1	PRIMARY	ACTIVE	3	18:16:44 2019/10/29
GE2/0/1	SECONDARY	STANDBY	0	NA

The output shows that in smart link group 1, the primary port GigabitEthernet 1/0/1 is active to transmit traffic from VLAN 10 and VLAN 11.

3. Verify the smart link group configuration when GigabitEthernet 1/0/1 on Device A is down.

Display information about all smart link groups on Device A.

[DeviceA] display smart-link group all

Smart link group 1 information:

Device ID : 00e0-fc00-c518

Preemption mode : Role

Preemption delay: 10(s)

Control VLAN : 10

Protected VLAN : Reference Instance 1

Member	Role	State	Flush-count	Last-flush-time
GE1/0/1	PRIMARY	DOWN	3	18:16:44 2019/10/29
GE2/0/1	SECONDARY	ACTIVE	1	18:22:37 2019/10/29

The output shows that in smart link group 1, the secondary port GigabitEthernet 2/0/1 is active to transmit traffic for VLAN 10 and VLAN 11.

Display information about the received flush messages on Device C.

[DeviceC] display smart-link flush

Received flush packets : 1
Receiving interface of the last flush packet : GigabitEthernet1/0/3
Receiving time of the last flush packet : 18:22:39 2019/10/29
Device ID of the last flush packet : 00e0-fc00-c518
Control VLAN of the last flush packet : 10

Display information about the received flush messages on Device D.

[DeviceD] display smart-link flush

Received flush packets : 1
Receiving interface of the last flush packet : GigabitEthernet1/0/1
Receiving time of the last flush packet : 18:22:38 2019/10/29
Device ID of the last flush packet : 00e0-fc00-c518
Control VLAN of the last flush packet : 10

Configuration files

NOTE:

Support for the `port link-mode bridge` command depends on the device model.

- **Device A:**

```
#
 sysname DeviceA
#
vlan 10 to 11
#
 irf mac-address persistent always
 irf auto-update enable
 undo irf link-delay
 irf member 1 priority 1
 irf member 2 priority 1
#
irf-port 1/2
 port group interface GigabitEthernet1/0/2
#
irf-port 2/1
 port group 1 interface GigabitEthernet2/0/2
#
stp region-configuration
 instance 1 vlan 10 to 11
 active region-configuration
#
smart-link group 1
 preemption mode role
 preemption delay 10
 flush enable control-vlan 10
 protected-vlan reference-instance 1
#
interface GigabitEthernet1/0/1
 port link-mode bridge
 port link-type trunk
 undo port trunk permit vlan 1
 port trunk permit vlan 10 to 11
 undo stp enable
 port smart-link group 1 primary
#
interface GigabitEthernet1/0/3
 port link-mode bridge
 port access vlan 10
#
interface GigabitEthernet2/0/1
 port link-mode bridge
 port link-type trunk
 undo port trunk permit vlan 1
 port trunk permit vlan 10 to 11
 undo stp enable
 port smart-link group 1 secondary
#
```

```

interface GigabitEthernet2/0/3
 port link-mode bridge
 port access vlan 11
#

```

- **Device C:**

```

#
 sysname DeviceC
#
vlan 10 to 11
#
interface GigabitEthernet1/0/1
 port link-mode bridge
 port link-type trunk
 undo port trunk permit vlan 1
 port trunk permit vlan 10 to 11
 undo stp enable
 smart-link flush enable control-vlan 10 to 11
#
interface GigabitEthernet1/0/2
 port link-mode bridge
 port link-type trunk
 undo port trunk permit vlan 1
 port trunk permit vlan 10 to 11
 smart-link flush enable control-vlan 10 to 11
#

```

- **Device D:**

```

#
 sysname DeviceD
#
vlan 10 to 11
#
interface GigabitEthernet1/0/1
 port link-mode bridge
 port link-type trunk
 undo port trunk permit vlan 1
 port trunk permit vlan 10 to 11
 undo stp enable
 smart-link flush enable control-vlan 10 to 11
#
interface GigabitEthernet1/0/2
 port link-mode bridge
 port link-type trunk
 undo port trunk permit vlan 1
 port trunk permit vlan 10 to 11
 smart-link flush enable control-vlan 10 to 11
#

```