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Introduction

This document provides examples for setting up an IRF 3.1 system.

IRF 3.1 integrates multiple lower-layer devices with a higher-layer IRF fabric to provide high-density, low-cost connectivity at the access layer. IRF 3.1 is implemented based on IEEE 802.1BR.

In an IRF 3.1 system, the higher-layer IRF fabric is called the parent fabric and the lower-layer devices are called bridge port extenders (PEXs). You manage and configure the PEXs from the parent fabric as if they were interface modules on the parent fabric.

Prerequisites

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 IRF 3.1.

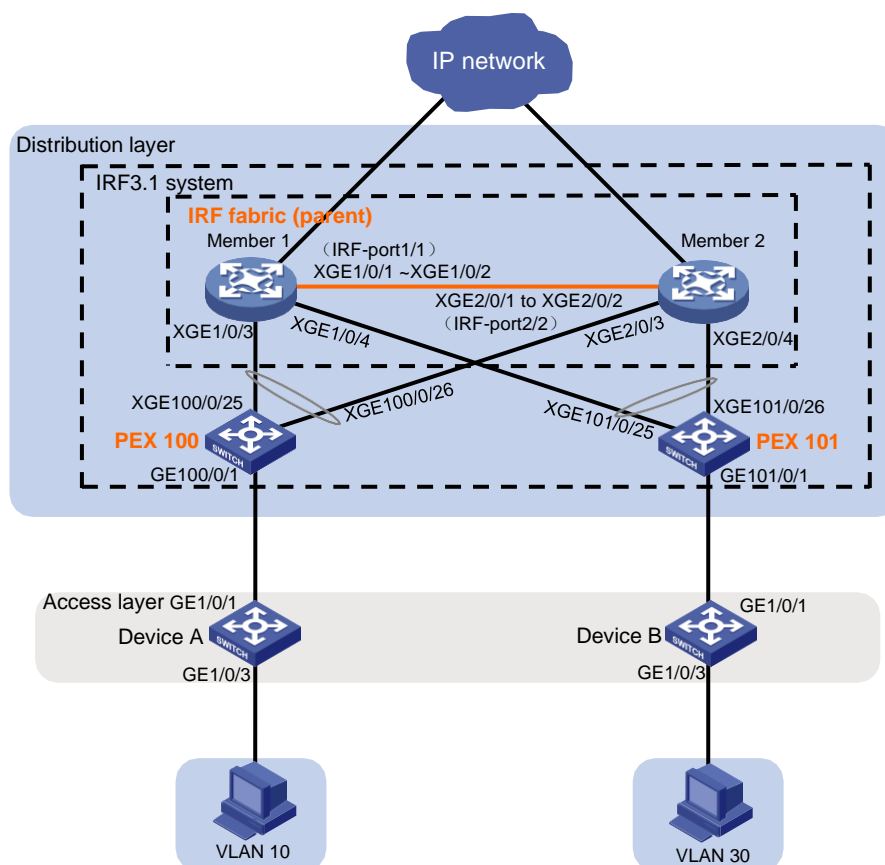
Example: Setting up an IRF 3.1 system

Network configuration

As shown in [Figure 1](#):

- Use Member 1 and Member 2 to set up an IRF fabric at the distribution layer.
- Use the IRF fabric as the parent fabric and attach PEXs to the parent fabric to set up an IRF 3.1 system.
- The IRF 3.1 system acts as the gateway for users in VLANs 10 and 30.

Figure 1 Network diagram



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	Not supported
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	Not supported
SC 3130 switch series	Not supported

Parent IRF fabric and PEX hardware compatibility

Parent IRF fabric	PEX
SC 5525 switch series	FS4100 switch series
SC 5520 switch series	FS4100 switch series

Restrictions and guidelines

To assign extended ports on multiple PEXs to the same Layer 2 extended-link aggregation group, make sure the PEXs meet the following requirements:

- The PEXs belong to the same switch series.
- The PEXs are in the same PEX group.
- The PEXs are at the same tier.

The FS4100 switch series and ES4100 switch series do not support Layer 2 extended-link aggregate interfaces. You can connect a downstream access device to an FS4100 or ES4100 PEX only through a single link.

Prerequisites

On PEXs, only some high-speed ports can act as member interfaces of upstream ports. Before you set up an IRF 3.1 system, use either of the following methods to identify these ports and select upstream member interfaces from among them as needed:

- If you have not placed the switch in PEX mode, use the virtual technologies configuration guide (or IRF configuration guide) for the switch to identify candidate upstream member interfaces.
- If the switch has been placed in PEX mode, identify the candidate upstream member interfaces from the CLI:
 - a. Execute the **probe** command to enter probe view.
 - b. Execute the **display system internal pex upstreamport** command.

Table 1 lists the candidate upstream member interfaces on the PEXs to which this example is applicable:

Table 1 Candidate upstream member interfaces on the PEXs

PEX	Candidate upstream member interfaces
FS4100 switch series	The two highest numbered ports on the front panel

Procedures

Setting up the parent fabric

1. Configure Member 1:

```
# Place the device in 802.1BR mode.
<Sysname> system-view
[Sysname] switch-mode 2
# Set the device operating mode to switch mode.
[Sysname] pex system-working-mode switch
# Shut down Ten-GigabitEthernet 1/0/1 and Ten-GigabitEthernet 1/0/2.
```

```
[Sysname] interface range ten-gigabitethernet 1/0/1 to ten-gigabitethernet 1/0/2
[Sysname-if-range] shutdown
[Sysname-if-range] quit
```

Bind Ten-GigabitEthernet 1/0/1 and Ten-GigabitEthernet 1/0/2 to IRF-port 1/1.

```
[Sysname] irf-port 1/1
[Sysname-irf-port1/1] port group interface ten-gigabitethernet 1/0/1
[Sysname-irf-port1/1] port group interface ten-gigabitethernet 1/0/2
[Sysname-irf-port1/1] quit
```

Bring up Ten-GigabitEthernet 1/0/1 and Ten-GigabitEthernet 1/0/2 and save the configuration.

```
[Sysname] interface range ten-gigabitethernet 1/0/1 to ten-gigabitethernet 1/0/2
[Sysname-if-range] undo shutdown
[Sysname-if-range] quit
[Sysname] save
```

Activate the IRF port configuration.

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

2. Configure Member 2:

Place the device in 802.1BR mode.

```
<Sysname> system-view
[Sysname] switch-mode 2
```

Set the device operating mode to switch mode.

```
[Sysname] pex system-working-mode switch
```

Change the IRF member ID to 2 and reboot the device for the new member ID to take effect.

```
[Sysname] irf member 1 renumber 2
Renumbering the member ID may result in configuration change or loss. Continue? [Y/N]:y
[Sysname] quit
<Sysname> reboot
```

Log in to the device and shut down Ten-GigabitEthernet 2/0/1 and Ten-GigabitEthernet 2/0/2.

```
<Sysname> system-view
[Sysname] interface range ten-gigabitethernet 2/0/1 to ten-gigabitethernet 2/0/2
[Sysname-if-range] shutdown
[Sysname-if-range] quit
```

Bind Ten-GigabitEthernet 2/0/1 and Ten-GigabitEthernet 2/0/2 to IRF-port 2/2.

```
[Sysname] irf-port 2/2
[Sysname-irf-port2/2] port group interface ten-gigabitethernet 2/0/1
[Sysname-irf-port2/2] port group interface ten-gigabitethernet 2/0/2
[Sysname-irf-port2/2] quit
```

Bring up Ten-GigabitEthernet 2/0/1 and Ten-GigabitEthernet 2/0/2 and save the configuration.

```
[Sysname] interface range ten-gigabitethernet 2/0/1 to ten-gigabitethernet 2/0/2
[Sysname-if-range] undo shutdown
[Sysname-if-range] quit
[Sysname] save
```

Connect the IRF physical interfaces on Member 2 to the IRF physical interfaces on Member 1. (Details not shown.)

Activate the IRF port configuration on Member 2.

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

Member 1 and Member 2 perform master election. The device that fails the election will reboot automatically to form an IRF fabric with the other device.

Configuring cascade ports for PEXs on the parent fabric

Enter system view.

```
<Sysname> system-view
```

Enable LLDP globally.

```
[Sysname] lldp global enable
```

Create PEX group 1.

```
[Sysname] pex group 1
```

```
[Sysname-pex-group-1] quit
```

Create Layer 2 aggregate interface Bridge-Aggregation 100. The aggregate interface will act as the cascade port connecting to the PEX in slot 100. For easy maintenance, this example assigns the aggregate interface the same number as the PEX virtual slot.

```
[Sysname] interface bridge-aggregation 100
```

Enable PEX connection capability on Bridge-Aggregation 100 and assign Bridge-Aggregation 100 to PEX group 1.

```
[Sysname-Bridge-Aggregation100] pex-capability enable group 1
```

The aggregate interface was automatically set to dynamic aggregation mode and configured as an STP edge port.

Assign virtual slot number 100 to the PEX.

```
[Sysname-Bridge-Aggregation100] pex associate slot 100
```

```
[Sysname-Bridge-Aggregation100] quit
```

Enable LLDP on Ten-GigabitEthernet 1/0/3 and Ten-GigabitEthernet 2/0/3 in interface range view. By default, LLDP is enabled on a port.

```
[Sysname] interface range ten-gigabitethernet 1/0/3 ten-gigabitethernet 2/0/3
```

```
[Sysname-if-range] lldp enable
```

Assign Ten-GigabitEthernet 1/0/3 and Ten-GigabitEthernet 2/0/3 to aggregation group 100. The ports will act as the cascade member interfaces.

```
[Sysname-if-range] port link-aggregation group 100
```

```
[Sysname-if-range] quit
```

Create Layer 2 aggregate interface Bridge-Aggregation 101. The aggregate interface will act as the cascade port connecting to the PEX in slot 101.

```
[Sysname] interface bridge-aggregation 101
```

Enable PEX connection capability on Bridge-Aggregation 101 and assign the interface to PEX group 1.

```
[Sysname-Bridge-Aggregation101] pex-capability enable group 1
```

The aggregate interface was automatically set to dynamic aggregation mode and configured as an STP edge port.

Assign virtual slot number 101 to the PEX.

```
[Sysname-Bridge-Aggregation101] pex associate slot 101
```

```
[Sysname-Bridge-Aggregation101] quit
```

Enable LLDP on Ten-GigabitEthernet 1/0/4 and Ten-GigabitEthernet 2/0/4 in interface range view. By default, LLDP is enabled on a port.

```
[Sysname] interface range ten-gigabitethernet 1/0/4 ten-gigabitethernet 2/0/4
```

```
[Sysname-if-range] lldp enable
```

Assign Ten-GigabitEthernet 1/0/4 and Ten-GigabitEthernet 2/0/4 to aggregation group 101. The ports will act as the cascade member interfaces.

```
[Sysname-if-range] port link-aggregation group 101
[Sysname-if-range] quit
```

Configuring PEXs

Configure the devices to be used as PEXs to operate in auto or PEX mode. This example uses PEX 100 to describe the configuration procedure. You configure PEX 101 in the same way PEX 100 is configured.

1. Configure PEX 100 to operate in auto mode:

! IMPORTANT:

Skip this step if the PEXs are FS4100 switches or ES4100 switches.

Change the operating mode to auto mode. By default, the operating mode is auto.

```
<Sysname> system-view
[Sysname] pex system-working-mode auto
```

Save the running configuration.

```
[Sysname] save
```

2. Select upstream member interfaces.

In this example, Ten-GigabitEthernet 1/0/25 and Ten-GigabitEthernet 1/0/26 are used. For information about candidate upstream member interfaces, see the configuration and installation guides for the PEX. (Details not shown.)

3. Connect the upstream member interfaces on PEX 100 to the cascade member interfaces on the parent fabric as shown in [Figure 1](#). (Details not shown.)

Configuring the gateway settings on the IRF 3.1 system

Enter system view.

```
<Sysname> system-view
```

Create VLANs 10 and 30.

```
[Sysname] vlan 10 30
```

Create VLAN-interface 10 and assign IP address 192.168.1.1/24 to the VLAN interface.

```
[Sysname] interface vlan-interface 10
[Sysname-Vlan-interface10] ip address 192.168.1.1 24
[Sysname-Vlan-interface10] quit
```

Create VLAN-interface 30 and assign IP address 192.168.3.1/24 to the VLAN interface.

```
[Sysname] interface vlan-interface 30
[Sysname-Vlan-interface30] ip address 192.168.3.1 24
[Sysname-Vlan-interface30] quit
```

Assign GigabitEthernet 100/0/1 to VLAN 10.

```
[Sysname] interface gigabitethernet 100/0/1
[Sysname-GigabitEthernet100/0/1] port access vlan 10
[Sysname-GigabitEthernet100/0/1] quit
```

Assign GigabitEthernet 101/0/1 to VLAN 30.

```
[Sysname] interface gigabitethernet 101/0/1
[Sysname-GigabitEthernet101/0/1] port access vlan 30
```



```
[Sysname-GigabitEthernet101/0/1] quit
```

Configuring access layer devices

1. Configure Device A:

Enter system view.

```
<Sysname> system-view
```

Create VLAN 10.

```
[Sysname] vlan 10
```

```
[Sysname-vlan10] quit
```

Assign GigabitEthernet 1/0/1 and GigabitEthernet 1/0/3 to VLAN 10.

```
[Sysname] interface range gigabitethernet 1/0/1 gigabitethernet 1/0/3
```

```
[Sysname-if-range] port access vlan 10
```

```
[Sysname-if-range] quit
```

2. Configure Device B:

Enter system view.

```
<Sysname> system-view
```

Create VLAN 30.

```
[Sysname] vlan 30
```

```
[Sysname-vlan30] quit
```

Assign GigabitEthernet 1/0/1 and GigabitEthernet 1/0/3 to VLAN 30.

```
[Sysname] interface range gigabitethernet 1/0/1 gigabitethernet 1/0/3
```

```
[Sysname-if-range] port access vlan 30
```

```
[Sysname-if-range] quit
```

Verifying the configuration

Use the **display device** command to display device information on the parent fabric. If the IRF 3.1 system has been set up, the system displays information about both parent IRF member devices and PEXs. (Details not shown.)

Test the gateway service of the IRF 3.1 system. Verify that hosts in VLANs 10 and 30 can ping each other. (Details not shown.)

Configuration files

- IRF 3.1 system:

```
#
pex group 1
#
lldp global enable
#
pex system-working-mode switch
#
vlan 10
#
vlan 30
#
```

```

irf-port 1/1
  port group interface Ten-GigabitEthernet1/0/1
  port group interface Ten-GigabitEthernet1/0/2
#
irf-port 2/2
  port group interface Ten-GigabitEthernet2/0/1
  port group interface Ten-GigabitEthernet2/0/2
#
interface Bridge-Aggregation100
  pex-capability enable group 1
  pex associate slot 100
  link-aggregation mode dynamic
  stp edged-port
#
interface Bridge-Aggregation101
  pex-capability enable group 1
  pex associate slot 101
  link-aggregation mode dynamic
  stp edged-port
#
interface Vlan-interface10
  ip address 192.168.1.1 255.255.255.0
#
interface Vlan-interface30
  ip address 192.168.3.1 255.255.255.0
#
interface GigabitEthernet100/0/1
  port link-mode bridge
  port access vlan 10
#
interface GigabitEthernet101/0/1
  port link-mode bridge
  port access vlan 30
#
interface Ten-GigabitEthernet1/0/3
  port link-mode bridge
  port link-aggregation group 100
#
interface Ten-GigabitEthernet1/0/4
  port link-mode bridge
  port link-aggregation group 101
#
interface Ten-GigabitEthernet2/0/3
  port link-mode bridge
  port link-aggregation group 100
#
interface Ten-GigabitEthernet2/0/4
  port link-mode bridge

```

```
port link-aggregation group 101
```

- **Device A:**

```
#
vlan 10
#
interface GigabitEthernet1/0/1
port link-mode bridge
port access vlan 10
#
interface GigabitEthernet1/0/3
port link-mode bridge
port access vlan 10
```

- **Device B:**

```
#
vlan 30
#
interface GigabitEthernet1/0/1
port link-mode bridge
port access vlan 30
#
interface GigabitEthernet1/0/3
port link-mode bridge
port access vlan 30
```