3Com Switch 4800G Family
IRF
Configuration Guide

Switch 4800G 24-Port

Switch 4800G 48-Port

Switch 4800G PWR 24-Port

Switch 4800G PWR 48-Port

Switch 4800G 24-Port SFP

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www.3com.com

3Com Corporation
350 Campus Drive, Marlborough,
MA, USA 01752 3064

ENVIRONMENTAL STATEMENT

It is the policy of 3Com Corporation to be environmentally-friendly in all operations. To uphold our policy, we are committed to:

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Conserving energy, materials and natural resources in all operations.

Reducing the waste generated by all operations. Ensuring that all waste conforms to recognized environmental standards. Maximizing the recyclable and reusable content of all products.

Ensuring that all products can be recycled, reused and disposed of safely.

Ensuring that all products are labeled according to recognized environmental standards.

Improving our environmental record on a continual basis.

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About This Configuration Guide

Organization

The *IRF Configuration Guide* comprises one part:

Content			
IRF Configuration			

Conventions

The manual uses the following conventions:

Command conventions

Convention	Description
Boldface	The keywords of a command line are in **Boldface**.
italic	Command arguments are in *italic*.
[ ]	Items (keywords or arguments) in square brackets [ ] are optional.
{ x | y | ... }	Alternative items are grouped in braces and separated by vertical bars. One is selected.
[x | y | ...]	Optional alternative items are grouped in square brackets and separated by vertical bars. One or none is selected.
{ x | y | ... } *	Alternative items are grouped in braces and separated by vertical bars. A minimum of one or a maximum of all can be selected.
[x | y | ...] *	Optional alternative items are grouped in square brackets and separated by vertical bars. Many or none can be selected.
&<1-n>	The argument(s) before the ampersand (&) sign can be entered 1 to n times.
#	A line starting with the # sign is comments.

GUI conventions

Convention	Description
< >	Button names are inside angle brackets. For example, click <OK>.
[ ]	Window names, menu items, data table and field names are inside square brackets. For example, pop up the [New User] window.
/	Multi-level menus are separated by forward slashes. For example, [File/Create/Folder].

Symbols

Convention	Description
 **Warning**	Means reader be extremely careful. Improper operation may cause bodily injury.
 **Caution**	Means reader be careful. Improper operation may cause data loss or damage to equipment.
 **Note**	Means a complementary description.

Related Documentation

In addition to this manual, each 3com Switch 4800G documentation set includes the following:

Manual	Description
3Com Switch 4800G Family Getting Started Guide	Provides all information you need to install and use the 3Com Switch 4800G Family.
3Com Switch 4800G Family Configuration Guides	Describe how to configure your 4800G Switch using the supported protocols and CLI commands. The 3Com switch 4800G family documentation set includes 10 configuration guides: 1. Fundamentals Configuration Guide 2. IRF Configuration Guide 3. Layer 2 – LAN Switching Configuration Guide 4. Layer 3 – IP Services Configuration Guide 5. Layer 3 – IP Routing Configuration Guide 6. IP Multicast Configuration Guide 7. ACL and QoS Configuration Guide 8. Security Configuration Guide 9. High Availability Configuration Guide 10. Network Management and Monitoring Configuration Guide
3Com Switch 4800G Family Command References	Describes command line interface (CLI) commands and syntax options available on the switch. The 3Com switch 4800G family documentation set includes 10 command references: 1. Fundamentals Command Reference 2. IRF Command Reference 3. Layer 2 – LAN Switching Command Reference 4. Layer 3 – IP Services Command Reference 5. Layer 3 – IP Routing Command Reference 6. IP Multicast Command Reference 7. ACL and QoS Command Reference 8. Security Command Reference 9. High Availability Command Reference 10. Network Management and Monitoring Command Reference

Obtaining Documentation

You can access the most up-to-date 3Com product documentation on the World Wide Web at this URL: http://www.3com.com.

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1 IRF Configuration

When configuring IRF, go to these sections for information you are interested in:

IRF Overview

Introduction

Developed by 3Com, Intelligent Resilient Framework (IRF) provides a new method to connect multiple devices through physical IRF ports. Individual devices join to form a distributed device called IRF virtual device. IRF realizes the cooperation, unified management, and non-stop maintenance of multiple devices.

Advantages

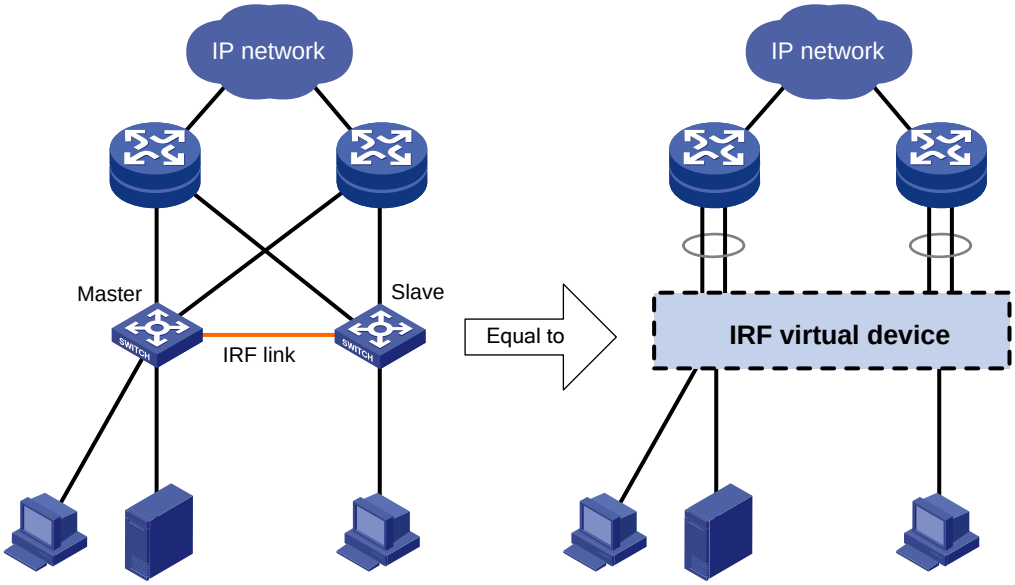
IRF features the following advantages:

- Streamlined management. When an IRF virtual device is established, you can log in to it by connecting to any port of any member to manage all members of the IRF virtual device.
- High reliability. An IRF virtual device comprises multiple member devices: the master runs, manages and maintains the IRF virtual device, whereas the slaves process services as well as functioning as the backups. As soon as the master fails, the IRF virtual device immediately elects a new master immediately to prevent service interruption and implement 1:N redundancy. In addition, not only the IRF links of members can be aggregated, but also the physical links between the IRF virtual device and the upper or lower layer devices can be aggregated, and thus the reliability of the IRF virtual device is increased through link redundancy.
- Powerful network expansion capability. By adding member devices, the number of IRF ports and network bandwidth of an IRF virtual device can be easily expanded. Each member device has its own CPU and they can process and forward protocol packets independently. Therefore, the processing capability of the IRF virtual device also can be easily expanded.

Application

As shown in Figure 1-1, a master and a slave form an IRF virtual device, which is a single device to the upper and lower layer devices.

Figure 1-1 IRF networking



Basic Concepts

Role

The devices that form an IRF virtual device are called member devices. Each of them plays either of the following two roles:

- Master: Manages the IRF virtual device.
- Slave: All members that operate as the backups of the master are called slaves. When the master fails, the IRF virtual device automatically elects a new master from one of the slaves.

Master and slaves are elected through the role election mechanism. An IRF virtual device has only one master at a time. Other members are the slaves. For more information about election process, see Role Election.

IRF port

An IRF port is a logical port dedicated to the internal connection of an IRF virtual device. An IRF port can be numbered as IRF-port1 or IRF-port2. An IRF port is effective only after it is bound to a physical IRF port.

Physical IRF port

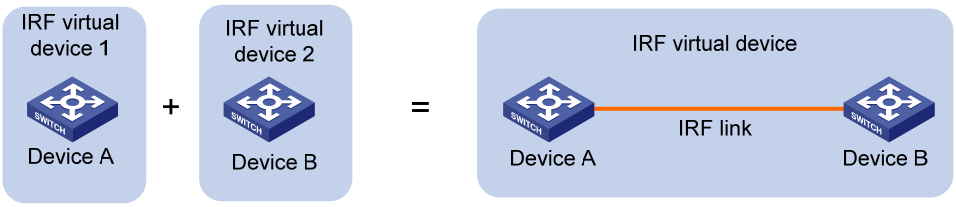
Physical ports used for connecting members of an IRF virtual device are called physical IRF ports. Physical IRF ports can be ports dedicated to the IRF virtual device, Ethernet ports or optical ports (which port can serve as physical IRF ports depends on the device model.).

Typically, an Ethernet port or optical port forwards packets to the network. When bound to an IRF port, it acts as a physical IRF port and forwards data traffic such as IRF-related negotiation packets and data traffic among member devices.

IRF virtual device merge

As shown in Figure 1-2, two IRF virtual devices operate independently and steadily. Connect them physically and perform necessary configurations to make them form one IRF virtual device, and this process is called IRF virtual device merge.

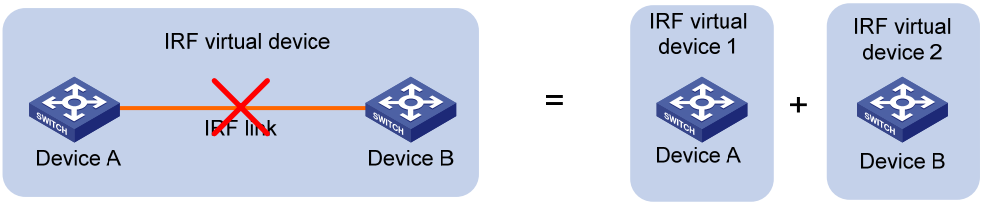
Figure 1-2 IRF virtual device merge



IRF virtual device partition

As shown in Figure 1-3, when an IRF virtual device is formed, the failure of the IRF link causes physical disconnection between the two members, and then the IRF virtual device is divided into two IRF virtual devices. This process is called IRF virtual device partition.

Figure 1-3 IRF virtual device partition



Member priority

Member priority determines the role of a member during a role election process. A member with a higher priority is more likely to be a master. The priority of a device defaults to 1. You can modify the priority at the command line interface (CLI).

Working Process

IRF virtual device management involves four stages: Physical Connections, Topology Collection, Role Election and IRF Virtual Device Management and Maintenance. First physically connect the members of an IRF virtual device, and then the members perform topology collection and role election to establish an IRF virtual device, which then enters the IRF virtual device management and maintenance stage.

Physical Connections

Connection medium

To establish an IRF virtual device, physically connect the physical IRF ports of member devices. For the Switch 4800G series, the 10 GE interface modules can be inserted into the expansion module slots on the rear panel of the switch to provide physical IRF ports. The following 10 GE interface modules can be used to provide physical IRF ports:

- One-port 10 GE XFP interface module
- Dual-port 10 GE XFP interface module

- Short-haul dual-port 10 GE CX4 interface module
- Dual-port 10 GE SFP+ interface module

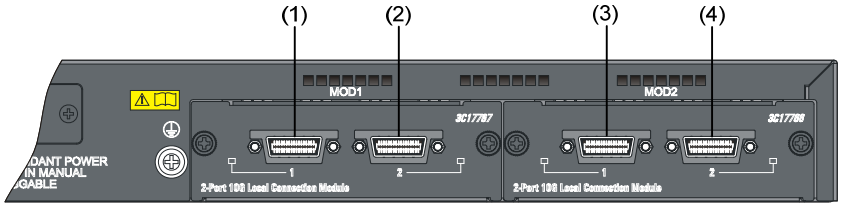
Note

For more information about an interface module, refer to its user manual.

You can connect physical IRF ports of the Switch 4800G series with either the CX4/SFP+ dedicated cables or fibers according to the interface type on the interface module. Dedicated cables provide higher reliability and performance; whereas fibers connect physical devices located very far from each other and provide flexible application.

The physical IRF ports are numbered according to their physical locations on the rear panel of the Switch 4800G series. With the rear panel facing you, the physical IRF ports are numbered successively from left to right: ports on the interface module in slot 1 are numbered 1 and 2, and ports on the interface module in slot 2 are numbered 3 and 4, as shown in Figure 1-4, which illustrates an example of inserting a CX4 dual-port interface module.

Figure 1-4 Numbering physical IRF ports



Caution

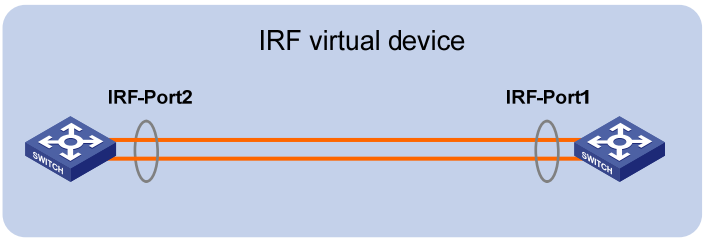
If you insert a one-port interface module into the slot, then the number of the physical IRF port corresponding to the module in slot 1 is 1, and the number of the physical IRF port corresponding to the module in slot 2 is 3. For the number of physical IRF ports, see Configuring IRF Ports.

Physical IRF ports can be used for both IRF connection and service data transmission. When establishing an IRF virtual device, you need to specify that the physical IRF ports are used for the IRF, that is, bind them with IRF port(s) to implement IRF connection and establishment.

Connection requirements

As shown in Figure 1-5, IRF-Port1 on one device can only be connected to the physical port bound to IRF-Port2 of a neighbor device; otherwise, an IRF virtual device cannot be formed.

Figure 1-5 IRF virtual device physical connection

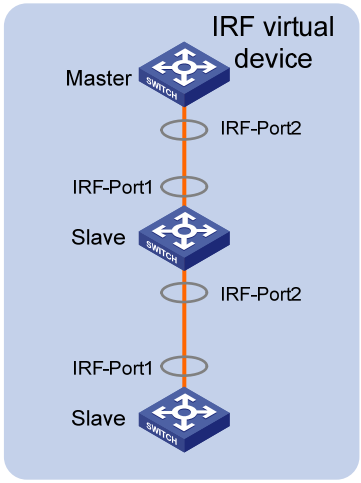


IRF topology

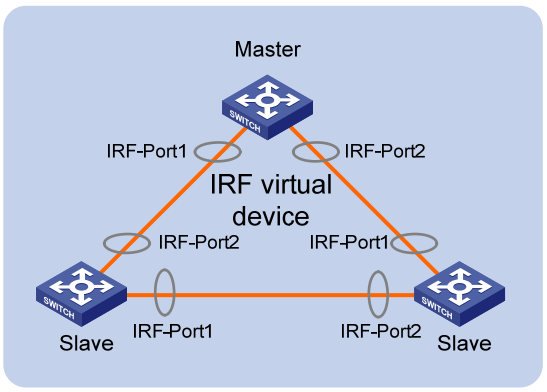
An IRF virtual device typically adopts daisy chain connection or ring connection, as shown in Figure 1-6.

- A daisy chain connection is mainly used in a network where member devices are distributedly located.
- A ring connection is more reliable than the daisy chain connection. In a daisy chained IRF virtual device, the failure of one link can cause the IRF virtual device to partition into two independent IRF virtual devices; where the failure of a link in a ring connection result in a daisy chain connection, not affecting IRF services.

Figure 1-6 IRF connections



Daisy chain connection



Ring connection

Note

You can connect at most nine Switch 4800G series switches to form an IRF virtual device.

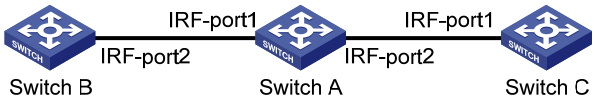
Correspondence between an IRF port and a physical IRF port

The connection of IRF ports is based on that of physical IRF ports; therefore, you need to bind an IRF port with physical IRF port(s). An IRF port can be bound to one physical IRF port or, to realize link backup and bandwidth expansion, bound to two physical IRF ports (aggregated as an aggregate IRF port).

You need to specify the correspondence between an IRF port and physical IRF port(s) through command line. When you specify that an IRF port is bound to one physical IRF port, the serial number of the physical IRF port bound to IRF port 1 must be smaller than that of the physical IRF port bound to IRF port 2; when you specify that an IRF port is bound to two physical IRF ports (aggregate IRF port), these two physical IRF ports must be on the same module.

As shown in Figure 1-7. Switch A connects to Switch B and Switch C through IRF ports IRF-port 1 and IRF-port 2 respectively.

Figure 1-7 IRF port correspondence



Based on the type and number of the interface module inserted on Switch A, you can adopt one of the following typical correspondences to establish an IRF connection.

Note

- The dual-port 10 GE CX4 interface module is used in the following examples to introduce correspondence between the IRF port and the physical IRF port(s).
- When the dual-port 10 GE SFP interface module is used, the correspondence between the IRF port and the physical IRF port(s) is similar.

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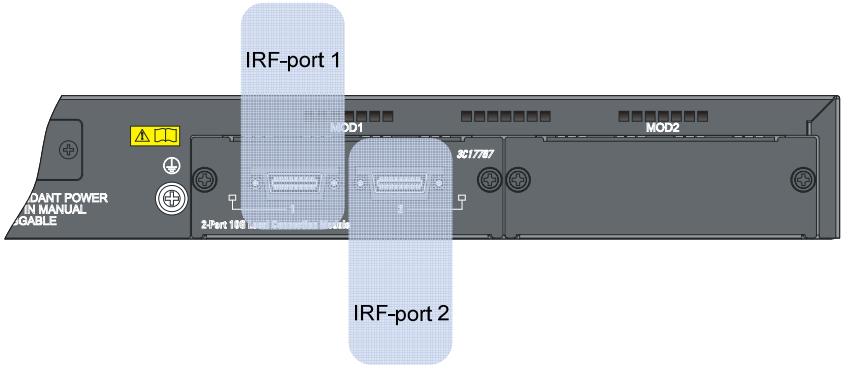
2) IRF port correspondence for one interface module

Figure 1-8 IRF port correspondence for one interface module



When a dual-port interface module is installed, you need to bind IRF-port 1 to physical IRF port 1, and IRF-port 2 to physical IRF port 2 (as shown in Figure 1-8), because the serial number of the physical IRF port bound to IRF-port 1 must be smaller than that of the physical IRF port bound to IRF-port 2. Therefore, you cannot bind IRF-port 1 to physical IRF port 2, and IRF-port 2 to physical port 1.

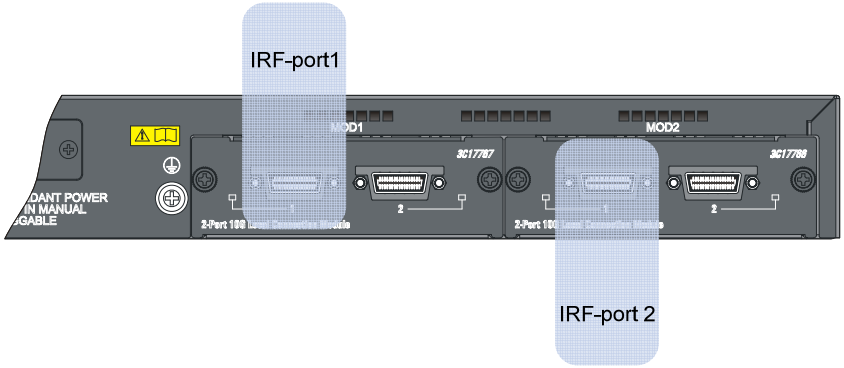
Note

- If only one single-port interface module is installed, the device can be used only as Switch B or Switch C in Figure 1-7, that is, the device should be at either end of a bus connection.
- In this situation, because only one IRF port is needed on Switch B or Switch C, IRF-port 2 or IRF-port 1 can be bound to any physical port on the device.

3) IRF port correspondence for two interface modules

- Correspondence in non-aggregate mode

Figure 1-9 Correspondence in non-aggregate mode for two interface modules



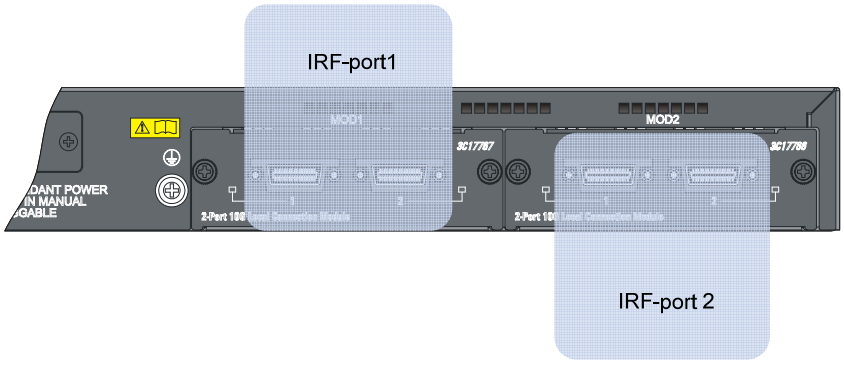
When two dual-port interface modules are installed, if the correspondence is not in the aggregate mode, you can bind an IRF port to any physical IRF port (Figure 1-9 only shows one possibility). However, you must ensure that the serial number of the physical IRF port bound to IRF-port 1 is smaller than that of the physical IRF port bound to IRF-port 2, namely, the physical IRF port bound to IRF-port 2 should be located on the right side of the physical IRF port bound to IRF-port 1. The two physical IRF ports bound to the IRF ports can be located either on one interface module or on different interface modules.

Note

- If two single-port interface modules are installed, you need to bind IRF-port 1 to physical IRF port 1, and IRF-port 2 to physical IRF port 3.
- If one dual-port interface module and one single-port interface module are installed, the correspondence is the same with that when you install two dual-port interface modules. In this situation, IRF-port 2 or IRF-port 1 can be bound to any physical port on the device, because only one IRF port is needed on Switch B or Switch C.

- Correspondence in aggregate mode

Figure 1-10 Correspondence in aggregate mode for two interface modules



Because the two physical IRF ports bound to an aggregate IRF port must be located on the same interface module, two IRF ports (that is, two aggregate IRF ports) can only be bound to the two physical IRF ports on each of the two interface modules respectively (as shown in Figure 1-10). In addition, you can only bind IRF-port 1 to physical IRF ports 1 and 2, and IRF-port 2 to physical ports 3 and 4.

Note

If one dual-port interface module and one single-port interface module are installed, you can bind two physical IRF ports on the dual-port interface module to the IRF port in aggregate mode, and bind the physical IRF port on the single-port interface module to the other IRF port in non-aggregate mode. In this situation, IRF-port 2 or IRF-port 1 can be bound to any physical port on the device, because only one IRF port is needed on Switch B or Switch C.

Topology Collection

Each member exchanges hello packets with the directly connected neighbors to collect topology of the IRF virtual device. The IRF hello packets carry the topology information, including IRF port connection states, member IDs, priorities, and bridge MAC addresses.

Each member records its known topology information locally. At the startup of a member device, the member device records topology information of the local device. When an IRF port of a member becomes up, the member device sends its known topology information from this port periodically. Upon receiving the topology information from the directly connected neighbor, the member device updates the local topology information. After topology collection lasts for a period of time, all members have obtained the complete topology information (known as topology convergence), and then the IRF virtual device enters the next stage: role election.

Role Election

The process of defining the role (master or slave) of members is role election.

Role election is held when the topology changes, such as, forming an IRF virtual device, adding a new member, leaving or failure of the master, or IRF virtual device merge. The master is elected based on

the rules below, in the order specified. If the first rule does not apply, a second rule is tried, and so on, until the only winner is found.

- The current master, even if a new member has a higher priority. (When an IRF virtual device is being formed, and all member devices consider themselves as the master, so this principle is skipped)
- A member with a higher priority.
- A member with the longest system up-time. (The system up-time information of each member device is delivered through IRF hello packets)
- A member with the lowest bridge MAC address.

Then, the IRF virtual device is formed and enters the next stage: IRF virtual device management and maintenance.

Note

- The precision of the system up-time is six minutes. For example, if two devices with the same priority values reboot one after another within six minutes, they will have the same system up-time and the last role election principle will be followed, that is, the one with the lowest bridge MAC address wins.
- During an IRF virtual device merge, an IRF election is held, and role election rules are followed. Members of the loser side reboot and join the winner side as slaves. Whether the device reboots automatically or reboots with the execution of a command depends on the device model.
- To ensure the same configuration as that on the master, a device uses the master's configuration to initialize and boot itself as long as it is elected as a slave, regardless of its original configuration or whether its current configuration is saved.

IRF Virtual Device Management and Maintenance

After role election, an IRF virtual device is established: all member devices operate as one virtual device, and all resources on the member devices are processed by this virtual device and managed by the master.

Member ID

An IRF virtual device uses member IDs to uniquely identify and manage its members. For example, when the device operates independently, the slot number in the interface number is typically 1; after it joins an IRF virtual device, the slot number will become the member ID. In addition, member IDs are used in file management. Therefore, member IDs in an IRF virtual device must be unique.

If member IDs are not unique, an IRF virtual device cannot be established. A member having the same member ID as an existing one cannot join the IRF virtual device. To ensure the uniqueness of member IDs, use the following two methods:

1) Before establishing an IRF virtual device, plan and configure member IDs for members. Adopt the member ID collision processing mechanism, which is described as follows:

- During the establishment of an IRF virtual device, when two devices that form the IRF virtual device have duplicated member IDs, the master is numbered the first. Then, for a daisy chain

connection, slaves connected to IRF port 1 of the master are numbered from near to far, and then those connected to IRF port 2 of the master are numbered the same way; for a ring connection, the slave connected to IRF port 1 of the master is numbered first, then, other slaves are numbered from near to far, and the slave connected to IRF port 2 of the master is numbered the last. For example, Device A, Device B, Device C, and Device D use their default member IDs (the value is 1) and form an IRF. Suppose Device B has the highest priority and thus is elected as the master. The IRF virtual device first numbers the master as member device 1, and then other devices are numbered one by one. If the four devices form a ring connection, the member IDs of them are 2, 1, 3, and 4, as shown in Figure 1-11; if the four devices form a daisy chain connection, the member IDs of them are 2, 1, 4, and 3, as shown in Figure 1-12.

- When an IRF virtual device is established, if the newly added device and another member have duplicated member IDs, the latter's member ID remains unchanged, and the IRF virtual device assigns a smallest available member ID to the new member.

Figure 1-11 Automatic numbering for a ring connection

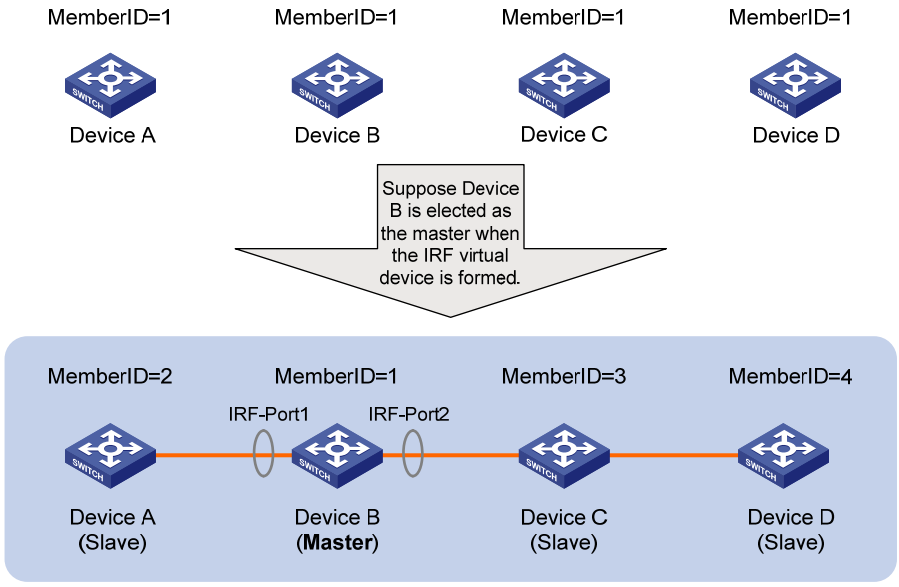
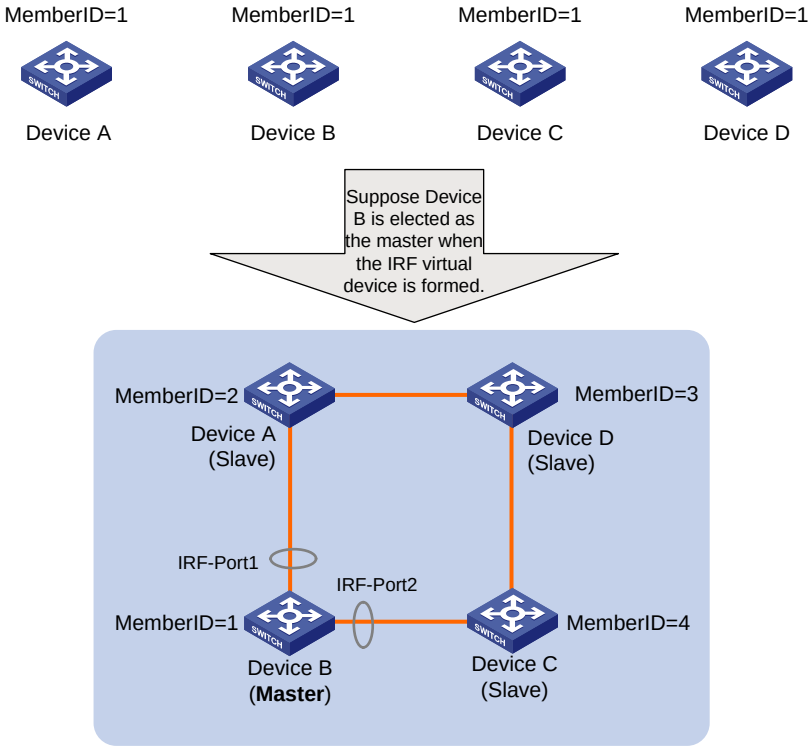


Figure 1-12 Automatic numbering for a daisy chain connection



Interface name

For a device operating independently (that is, the device does not belong to any IRF virtual device), its interface name is in the following format: member ID/slot number/interface serial number, where

- By default, member ID is 1.
- After a device leaves an IRF virtual device, it continues using the member ID when it was in the IRF virtual device as its device ID.
- Subslot number is the number of the slot in which the LPU resides. For a box-type device, LPUs are fixed on the device, so the slot number is a fixed value. On the Switch 4800G series, the subslot on the front panel is numbered 0, and subslots of the two expansion slots on the rear panel are numbered 1 and 2 from left to right.
- Interface serial number is dependent on the number of interfaces supported by the device. View the silkscreen on the interface card for the number of supported interfaces.

For example, GigabitEthernet 1/0/1 is an interface on the independently operating device **Sysname**. To set the link type of GigabitEthernet 1/0/1 to trunk, perform the following steps:

```
<Sysname> system-view
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] port link-type trunk
```

For an IRF member, the interface name also adopts the previously introduced format: member ID/slot number/interface serial number, where

- The member ID identifies the IRF member on which the interface resides
- Meaning and value of the subslot number and the interface serial number are the same as those on an independently operating device.

For example, Ethernet 1/0/1 is an interface on IRF member slave 3 (member ID is 3). To set the link type of GigabitEthernet 1/0/1 to trunk, perform the following steps:

```
<Master> system-view
[Master] interface gigabitethernet 3/0/1
[Master-GigabitEthernet3/0/1] port link-type trunk
```

File system name

You can use the name of the storage device to access the file system of an independently operating device. For the naming rules of a storage device, see *File Management Configuration* in the *Fundamentals Configuration Guide*.

For example, flash is the storage device on the independently operating device Sysname. To back up the file **aa.cfg** under the root directory of the flash to the **test** folder, perform the following steps:

```
<Sysname> mkdir test
...
%Created dir flash:/test.

<Sysname>copy aa.cfg test/aa(20080714).cfg
Copy flash:/aa.cfg to flash:/test/aa(20080714).cfg?[Y/N]:y
..
%Copy file flash:/aa.cfg to flash:/test/aa(20080714).cfg...Done.
<Sysname> cd test
<Sysname> dir
Directory of flash:/test/
   0     -rw-      1568  Jul 14 2008 11:54:04   aa(20080714).cfg
30861 KB total (20956 KB free)
```

To access the file system of the master, use the name of the storage device; to access the file system of a slave, use the name in the following format: Member-ID#Storage-device-name.

For example:

1) To access the **test** folder under the root directory of the flash on the master, perform the following steps:

```
<Master> mkdir test
...
%Created dir flash:/test.
<Master> dir
Directory of flash:/
   0     -rw-  10105088  Apr 26 2000 13:44:57   test.bin
   1     -rw-      2445  Apr 26 2000 15:18:19   config.cfg
   2     drw-         -  Jul 14 2008 15:20:35   test
30861 KB total (20961 KB free)
```

2) To create and access the **test** folder under the root directory of the flash on IRF member slave 3, perform the following steps:

```
<Master> mkdir slot3#flash:/test
%Created dir slot3#flash:/test.
<Master> cd slot3#flash:/test
<Master> pwd
slot3#flash:/test
```

Or:

```
<Master> cd slot3#flash:/
<Master> mkdir test
%Created dir slot3#flash:/test.
```

3) To copy the **test.bin** file on the master to the root directory of the flash on IRF member slave 3, perform the following steps:

```
<Master> pwd
slot3#flash:
```

//The above information indicates that the current working path is the root directory of the flash on slave 3.

```
<Master> cd flash:/
<Master> pwd
flash:
```

// The above operations indicate that the current working path is the root directory of the flash on the master.

```
<Master> copy test.bin slot3#flash:/
Copy flash:/test.bin to slot3#flash:/test.bin?[Y/N]:y
%Copy file flash:/test.bin to slot3#flash:/test.bin...Done.
```

Configuration file management

1) Configuration file synchronization

IRF uses a strict configuration file synchronization mechanism to ensure that devices in an IRF virtual device can work as a single device on the network, and to ensure that after the master fails, the other devices can operate normally.

- When a slave starts up, it automatically finds out the master, synchronizes the master's configuration file, and executes the configuration file; if all devices in an IRF virtual device start up simultaneously, the slaves synchronize the master's initial configuration file and execute it.
- When the IRF virtual device operates normally, all your configurations will be recorded into the current configuration file of the master, and are synchronized to each device in the IRF virtual device; when you save the current configuration file of the master as the initial configuration file by using the **save** command, all slaves execute the same saving operation to make the initial configuration files of all devices consistent.

Through the real-time synchronization, all devices in the IRF virtual device keep the same configuration file. If the master fails, all the other devices can execute various functions according to the same configuration file.

2) Configuration file application

The configuration file can be divided into two parts: global configuration and port configuration. When a slave applies these two kinds of configurations of the master, it deals with them in different ways:

- Global configuration: All slaves execute the current global configuration on the master exactly, that is, all members in the IRF virtual device apply the same global configuration.
- Port configuration: When a slave applies the port configuration on the master, it cares about the configuration related to its own port, for example, the slave with the member ID of 3 only cares about the configuration related to the GigabitEthernet 3/0/x port on the master. If there is a configuration related to its own port, it will apply the configuration; if not, no matter what configuration has been made to the port before the slave joins the IRF virtual device, the slave will function using null-configuration.

IRF virtual device topology maintenance

In an IRF, direct neighbors exchange hello packets periodically (the period is 200 ms). Without receiving any hello packet from a direct neighbor for ten periods, a member considers that the hello

packets timed out, and the IRF isolates the expired device in the topology and updates its topology database.

When an IRF port of a member becomes down, the member broadcasts the information to all the other members immediately. If the IRF port of the master is down, an election is triggered.

IRF Virtual Device Configuration Task List

Before configuring an IRF virtual device, you need to define the roles and functions of all the members for better planning. Because the configuration of some parameters takes effect after device reboot, you are recommended to first configure parameters, power off the devices, connect devices physically, power on the devices, and finally the devices will join in the IRF virtual device automatically. After an IRF virtual device is formed, you can configure and manage the IRF virtual device by logging in to any device in the IRF virtual device. The operations you make take effect on the master, and will be applied to the member devices in the IRF virtual device. For easy fault location and device maintenance, the Switch 4800G series provide slave view, where you can execute the **display**, **terminal**, and **debug** commands.

Complete the following tasks to configure IRF:

Task		Remarks
Configuring IRF Virtual Device	Configuring IRF Ports	Required
	Setting a Member ID for a Device	Optional
	Specifying a Priority for a Member Device	Required
	Specifying the Preservation Time of the Bridge MAC Address	Optional
	Enabling Auto Upgrade of Boot Files	Optional
	Setting the Delay Time for the Link Layer to Report a Link-Down Event	Optional
Connect the physical IRF ports of devices by using IRF cables (a ring connection is recommended) or fibers, and then power on the devices.		
Accessing an IRF Virtual Device	Accessing the Master	Required
	Accessing a Slave	Optional

Configuring IRF Virtual Device

Configuring IRF Ports

IRF ports are logical. IRF can be enabled on a device only after the IRF ports are configured (in other words, the IRF ports are bound to physical IRF ports).

For how to bind the IRF port and physical IRF port(s) on a Switch 4800G series, see Correspondence between an IRF port and a physical IRF port.

Follow these steps to configure IRF ports

To do…	Use the command…	Remarks
Enter system view	**system-view**	—

To do…	Use the command…	Remarks
Bind physical IRF ports to an IRF port, and enable IRF on the current device	**irf member** *member-id* **irf-port** *irf-port-id* **port** *port-list*	Required By default, no IRF port is configured.

Caution

- The above configuration takes effect after the reboot of the device.
- An IRF port that is bound with multiple physical IRF ports is an aggregation IRF port, which increases the bandwidth and reliability on the IRF port. If you specify multiple physical IRF ports with the *port-list* argument, you can configure an aggregation IRF port. You can configure at most two physical IRF ports as an aggregation IRF port for a Switch 4800G series switch, and you can only aggregate physical IRF ports 1 and 2, and physical IRF ports 3 and 4.
- The *irf-port-id* argument represents the IRF port number. The *port-list* argument represents the physical IRF port number. For the correspondence of IRF ports, refer to Correspondence between an IRF port and a physical IRF port.
- When you insert a one-port interface module into the slot on the rear panel, if the interface module is in slot 1, the port on it will be numbered 1; and if the interface module is in slot 2, the port on it will be numbered 3.

Setting a Member ID for a Device

The member ID of a device defaults to 1. During the establishment of an IRF virtual device, when the devices that form the IRF have duplicated member IDs, the member ID of the master is decided first, and then the member IDs of slaves are decided by the member ID collision processing mechanism. After the IRF virtual device is established, if the newly added device and another member have duplicated IDs, the IRF system assigns the smallest available ID for the new member. You can also set the member IDs according to network planning.

For a device that is already in an IRF virtual device, you can use commands in Table 1-1 to modify the member ID of the device, and this modification will be effective after the reboot of the device.

For a device that is not in an IRF virtual device, you are recommended to set its member ID in the following way:

1) Plan the member IDs in advance. You can view the member IDs of an IRF virtual device, and find out an unused ID for the new device.
2) Log in to the device to be added into the IRF virtual device, and change its member ID to the unused ID found out in step 1.
3) Save the current configuration. Power off the device, connect the device with IRF cables and power it on. Use the configuration introduced in this section to enable IRF on the device and add it into the IRF virtual device.

Table 1-1 Set a member ID for a device

To do…	Use the command…	Remarks
Enter system view	**system-view**	—
Set a member ID for a device	**irf member** *member-id* **renumber** *new-id*	Optional The member ID of a device defaults to 1

Caution

- The above setting takes effect after the reboot of the device.
- You can use the **display irf configuration** command to view the current member ID of the device and the member ID will be used after the device reboot.
- Members IDs are used to identify members of an IRF virtual device. Therefore, modifying a member ID may cause device configuration change or even loss. Please modify member IDs with caution. For example, three members (of the same device model) with the member IDs of 1, 2 and 3 are connected to an IRF port. Suppose that each member has several ports: change the member ID of device 2 to 3, change that of device 3 to 2, reboot both devices, and add them into the IRF virtual device again. Then device 2 will use the original port configurations of device 3, and device 3 will use those of device 2.

Specifying a Priority for a Member Device

The greater the priority value, the higher the priority. A member with a higher priority is more likely to be a master.

Follow these steps to specify a priority for a member device:

To do…	Use the command…	Remarks
Enter system view	**system-view**	—
Specify a priority for a member of an IRF virtual device	**irf member** *member-id* **priority** *priority*	Optional The priority of a member defaults to 1

Note

The setting of priority takes effect right after your configuration without the need of rebooting the device.

Specifying the Preservation Time of the Bridge MAC Address

A device uses the bridge MAC address when it communicates with the external networks as a bridge. Some Layer 2 protocols (like LACP) use bridge MAC addresses to identify different devices. During of Layer 2 packet forwarding, if the destination MAC address of a packet is the bridge MAC address of a

device, the packet is sent to this device; otherwise, the packet is discarded. Therefore, a bridge device on your network must have a unique bridge MAC address. If two devices on your network have the same bridge MAC addresses, bridge MAC address collision occurs and the communication fails.

An IRF virtual device communicates with external networks as a single device; therefore, it also has a bridge MAC address. Typically, an IRF virtual device uses the bridge MAC address of the master as its bridge MAC address.

Bridge MAC address collision causes communication failure, and bridge MAC address switching causes traffic interruption. Therefore, configure the preservation time of the bridge MAC address of the IRF virtual device:

- Preserve for six minutes: When the master leaves, the bridge MAC address does not change within six minutes. If the master does not come back when the preserve time is expired, the IRF virtual device uses the bridge MAC address of the newly elected master as its bridge MAC address. If the master leaves the IRF for a short time due to device reboot or link failure, this configuration can reduce unnecessary switch of bridge MAC address and thus avoid traffic interruption.
- Preserve permanently: No matter whether the master leaves the IRF virtual device or not, the bridge MAC address of the IRF virtual device remains unchanged.
- Not preserved: As soon as the master leaves, the IRF virtual device uses the bridge MAC address of the newly elected master as its bridge MAC address.

Follow these steps to specify the preservation time of the bridge MAC address of an IRF virtual device:

To do…	Use the command…	Remarks
Enter system view	**system-view**	—
Configure the bridge MAC address of the IRF virtual device to be preserved permanently when the master leaves	**irf mac-address persistent always**	Optional By default, IRF bridge MAC address is preserved for 6 minutes after the master leaves.
Specify the preservation time of the bridge MAC address of the IRF virtual device as 6 minutes when the master leaves	**irf mac-address persistent timer**	
Configure that the bridge MAC address of the IRF virtual device changes as soon as the master leaves	**undo irf mac-address persistent**	

Caution

- Bridge MAC address change may cause a temporary traffic interruption.
- If two IRF virtual devices have the same bridge MAC address, they cannot be merged into one IRF virtual device.

Enabling Auto Upgrade of Boot Files

- If auto upgrade of boot files is disabled, when the software of slaves and that of the master are in different versions, the new member or the member with a low priority will not boot normally. Update the device version and add the device into the IRF virtual device again.

- If auto upgrade of boot file is enabled, as soon as a device is added into an IRF virtual device, the IRF virtual device compares its software version with that of the master. If the versions are not consistent, the device automatically downloads the boot file from the master, reboots with the new boot file, and joins the IRF virtual device again. If the downloaded boot file and the local boot file have duplicate file names, the local file is overwritten.

Follow these steps to enable auto upgrade of boot files for an IRF virtual device:

To do…	Use the command…	Remarks
Enter system view	**system-view**	—
Enable auto upgrade of boot files for an IRF virtual device	**irf auto-update enable**	Optional Enabled by default

Caution

- Although IRF supports the auto upgrade of boot files, to shorten the time for IRF virtual device establishment and reduce the influences caused by the IRF virtual device establishment to the network, you are recommended to ensure that the device and the master have the same software version before adding a device into an IRF virtual device.
- After automatically loading the master's boot file, a slave configures the file as the boot file to be used at the next boot and reboots automatically.
- To make the auto upgrade succeed, ensure that there is enough space on the storage media of the slave.

Setting the Delay Time for the Link Layer to Report a Link-Down Event

After you set the delay time for the link layer to report a link-down event:

- If the IRF link state changes from up to down, the port does not immediately report the link state changes to the IRF virtual device. If the IRF link state is still down when the configured time is reached, the port reports the link state changes to the IRF virtual device, which then handles the problem accordingly.
- If the link state changes from down to up, the link layer immediately reports the event to the IRF virtual device .

Use this function to avoid unnecessary IRF virtual device partition and merge caused by frequent link state changes of a port in a short time.

Follow these steps to set the delay time for the link layer to report a link-down event of an IRF virtual device:

To do…	Use the command…	Remarks
Enter system view	**system-view**	—
Set the delay time for the link layer to report a link-down event of an IRF virtual device	**irf link-delay** *interval*	Optional The function is disabled by default.

Caution

Do not set the delay time to a very long time; otherwise, the IRF virtual device will not be aware of the IRF topology changes in time and thus the service will be recovered slowly.

Accessing an IRF Virtual Device

Accessing the Master

Access an IRF virtual device in either of the following two ways:

- Local login: Log in through the AUX or console port of a member device.
- Remote login: Configure an IP address for a Layer 3 Ethernet interface of a member device and make sure that the route is reachable, and then access the IRF virtual device remotely through Telnet, Web, or SNMP.

When you log in to the IRF virtual device, actually you log in to the master. The master is the configuration and control center of an IRF virtual device. When you configure the IRF virtual device on the master, the IRF virtual device synchronizes the configurations to the slaves.

Accessing a Slave

When you log in to an IRF virtual device, actually you log in to the master. The operation interface of the access terminal displays the master console. To print the logs or debugging information of a slave, redirect to the specified slave device. After that, the user access terminal displays the console of the slave device instead of that of the master device. The system enters user view of the salve device and the command prompt is changed to <Sysname-Slave#X>, where X is the member ID of the device, for example, <Sysname-Slave#2>. What you have input on the access terminal will be redirected to the specified slave device for processing. At present, only the following commands are allowed to be executed on a slave device:

- **display**
- **quit**
- **return**
- **system-view**
- **debugging**
- **terminal debugging**
- **terminal trapping**
- **terminal logging**

To return to the master console, use the **quit** command. At this time, the master console is reactivated and can output logs.

Follow the step below to log in to the specified slave device:

To do…	Use the command…	Remarks
Log in to the specified slave device of an IRF virtual device	**irf switch-to** *member-id*	Required By default, you actually log in to the master when you log in to the IRF virtual device. Available in user view

Note

Because users' login to the IRF system occupies large memory space, an IRF system allows at most six users to log in at the same time. The permitted login user types are console and virtual type terminal (VTY).

Displaying and Maintaining an IRF Virtual Device

To do…	Use the command…	Remarks
Display related information about the IRF virtual device	**display irf**	Available in any view
Display topology information about the IRF virtual device	**display irf topology**	Available in any view
Display all members' configurations that take effect after device reboots	**display irf configuration**	Available in any view
Display the master/slave switchover states of IRF members	**display switchover state** [*member-id*]	Available in any view

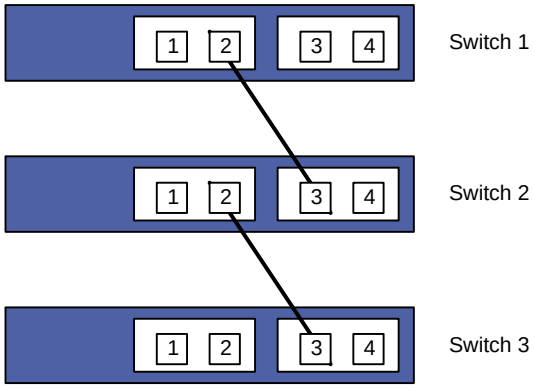
IRF Virtual Device Configuration Examples

IRF Virtual Device Configuration Example

Network requirements

Three Switch 4800G series switches in an IRF form a daisy chain connection. Their member IDs are 1, 2, and 3, as shown in Figure 1-13.

Figure 1-13 Network diagram for IRF virtual device configuration example



Configuration procedure

1) The three devices are not connected. Power them on and configure them separately.

Configure Switch 1.

```
<Switch1> system-view
[Switch1] irf member 1 renumber 1
Warning: Renumbering the switch number may result in configuration change or loss.
Continue?[Y/N]:y
[Switch1] irf member 1 irf-port 1 port 2
```

Configure Switch 2.

```
<Switch2>system-view
[Switch2] irf member 1 renumber 2
Warning: Renumbering the switch number may result in configuration change or loss.
Continue?[Y/N]:y
[Switch2] irf member 1 irf-port 1 port 2
[Switch2] irf member 1 irf-port 2 port 3
```

Configure Switch 3.

```
<Switch3> system-view
[Switch3] irf member 1 renumber 3
Warning: Renumbering the switch number may result in configuration change or loss.
Continue?[Y/N]:y
[Switch3] irf member 1 irf-port 2 port 3
```

2) Power off the three devices. Connect them as shown in Figure 1-13 with IRF cables. Power them on, and the IRF virtual device is formed

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