FRRouting Project © a Linux Foundation Collaborative Project

Industrial Managed Switch-10G-L3

IMS 5328 / 5314 series

Routing CLI Configuration

Quick Guide

L3 functions active:

OSPF, RIP, ISIS, BGP

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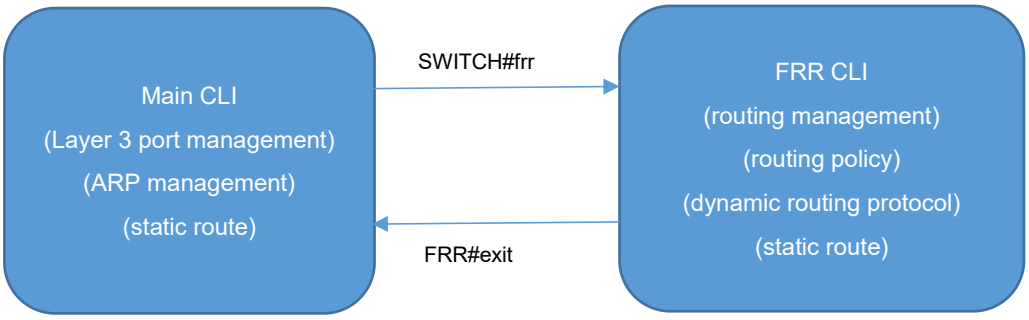
1. FRR CLI

FRRouting is an independent routing package, and its CLI is also independent. FRRouting is an optional component for devices and only supported by Layer 3 devices. The CLI of FRRouting is called FRR CLI.

The relationship between the FRR CLI and the main CLI of the device is shown in the following figure:



When you need to configure FRRouting, enter the FRR CLI interface through the command "frr" in the privileged mode of the main CLI. When you need to exit the FRR CLI, enter the command "exit" in the privileged mode to complete.

The network equipment corresponding to FRRouting is not limited to the three-layer switch, as long as the network equipment with the three-layer function is used, it is exactly the same. The meanings of "routing device", "layer 3 switch" and "router" in the following all refer to network nodes with layer 3 functions.

1.1. Functional division with the main CLI

- Layer 3 port management

  Layer 3 interface management function refers to:

  - Layer 3 port creation/deletion
  - IP address setting/deletion
  - shutdown/no shutdown
  - mtu setting

  Layer 3 port management is done on the main CLI. In the FRR CLI, you can use the following command to view the corresponding layer-3 port settings: (note that in the FRR CLI, only the name of the layer-3 port can be used to represent the layer-3 port)

For SVI, the interface name of the layer-3 interface is: "Vlan+vlan_id", for example, the layer-3 interface corresponding to vlan 100 is "Vlan100" (note: the first letter V is capitalized).

```
FRR# show int Vlan1
Interface Vlan1 is up, line protocol is up
  Link ups:           1    last: 1970/01/01 00:00:33.99
  Link downs:         0    last: (never)
  PTM status: disabled
  vrf: Default-IP-Routing-Table
  index 8 metric 0 mtu 2000 speed 10
  flags: <UP,BROADCAST,RUNNING,MULTICAST>
  Type: Unknown
  HWaddr: 00:aa:bb:09:26:16
  inet 192.168.100.50/24 broadcast 192.168.100.255
  inet6 fe80::2aa:bbff:fe09:2616/64
  Interface Type Other
```

- ARP management

  In FRRouting, the ARP function is not involved.

- Routing management

  Static routes can be set in both the main CLI and the FRR CLI. **It is recommended to use the FRR CLI to configure static routes for Layer 3 devices.**

  The show ip route command of the main CLI can only view the static routes configured on the main CLI and the direct routes configured with IP addresses automatically generated.

  The show ip route of the FRR CLI can view all routing information of the device. Including the direct route automatically generated from the main CLI configuration IP address and the static route configured on the main CLI. **The static route configured on the main CLI will be reflected as a kernel route in the FRR CLI to distinguish it from the static route configured on the FRR CLI**. In the following example, both the main CLI and the FRR CLI are configured with a route with the prefix 192.168.40.0/24. After route optimization by FRRouting, the static route configured on the main CLI is selected to take effect.

```
FRR# show ip route
Codes: K - kernel route, C - connected, S - static, R - RIP,
       O - OSPF, I - IS-IS, B - BGP, E - EIGRP, N - NHRP,
       T - Table, v - VNC, V - VNC-Direct, A - Babel, D - SHARP,
       F - PBR,
       > - selected route, * - FIB route

C>* 3.3.3.0/24 is directly connected, Vlan33, 1d18h00m
R     192.168.1.0/24 [120/2] via 192.168.2.1, Vlan2, 1d01h18m
B>* 192.168.1.0/24 [20/0] via 192.168.2.1, Vlan2, 1d18h10m
C>* 192.168.2.0/24 is directly connected, Vlan2, 1d18h11m
S>    192.168.33.0/24 [1/0] via 192.168.1.100 (recursive), 15:01:22
  *                           via 192.168.2.1, Vlan2, 15:01:22
  *                         unreachable (blackhole), 15:01:22
  *                         via 192.168.100.3, Vlan1, 15:01:22
S     192.168.40.0/24 [1/0] via 192.168.1.5, 00:00:02
K>* 192.168.40.0/24 [0/0] via 192.168.100.3, Vlan1, 00:00:44
C>* 192.168.100.0/24 is directly connected, Vlan1, 1d18h11m
```

1.2. Command line mode

The FRR CLI is similar to the command line mode of the main CLI. The management interface is divided into several different modes. The command mode that the user is currently in determines the commands that can be used. Enter the question mark key (?) at the command prompt to list the supported commands for each command mode. When a user switches from the main CLI to the FRR CLI, they are first in privileged mode. When switching back to the main CLI from the FRR CLI, you must be in privileged mode or user mode.

Schema Name	Prompt	Switch Mode	Schema Description
user mode	FRR>	Configure enable to switch to the privileged mode; configure exit to exit the FRR CLI and switch back to the main CLI.	Support device information display, debug command line, etc.
privileged mode	FRR#	Configure “configure terminal” to switch to global mode; configure “disable” to switch to user mode; configure “exit” to exit FRR CLI and switch back to the main CLI.	Support network testing; Support function module information viewing; Support configuration saving and other operations.
global mode, or configuration mode	FRR(config)#	Configure "exit" to switch to privileged mode; configure "interface" to switch to interface mode; configure "router" to switch to routing mode; configure "route-map" to switch to routing map mode.	Global based configuration commands are supported.
interface mode	FRR(config-if)#	Configure "exit" to switch to global mode; configure "end" to switch to privileged	Interface-based configuration commands are supported.

		mode.	
routing pattern	FRR(config-router)#	Configure "exit" to switch to global mode; configure "end" to switch to privileged mode; for "bgp" routing mode, configure "address-family xxx" to enter BGP address cluster mode.	Different routing protocols have different configuration commands in this mode.
BGP address cluster mode	FRR(config-router-af)#	Configure "exit" to switch to routing mode, configure "end" to switch to privileged mode	Only for the BGP protocol
route map pattern	FRR(config-route-map)#	Configure "exit" to switch to global mode, configure "end" to switch to privileged mode.	Configure a specific policy in the routing map.

1.3. Configuration save/clear

Since the FRR CLI is separate from the main CLI, the show running of the two can only see their respective configuration information.

- configuration save

  The configuration of FRRouting can be saved in both the FRR CLI and the main CLI (choose one method). The commands on both sides are the same, there are two ways to implement, and the two ways are equivalent:

  - Write command

    FRR CLI： FRR#write

    Or Main CLI: SWITCH#write

  - Copy command

    FRR CLI: FRR#copy running-config startup-config

    Or Main CLI: SWITCH#copy running-config startup-config

- configuration clear

The configuration clearing of FRRouting can only be done on the main CLI, **and the device needs to be restarted to take effect after the configuration is cleared.**
Main CLI:

```
SWITCH#copy empty-config startup-config
SWITCH#reload
```

1.4. Command Format Description

In the configuration commands in this document, keywords are in **bold font**. Arguments that are not keywords are in *italics*.

In addition, the special symbols in the configuration command are explained as follows:

- Angle brackets <>: Represents a configurable range of values
  For example: **area** *area-id* **virtual-link** *A.B.C.D* **message-digest-key** <*1-255*> **md5** *KEY*
  <*1-255*>: Indicates that the value range that can be entered in this position is: the minimum is 1, and the maximum is 255.
- Square brackets []: Indicates that the commands enclosed in parentheses are optional.
  For example: **no router-id** *[A.B.C.D]*，Indicates the following two situations:
  1） **no router-id**
  2） **no router-id** *A.B.C.D*
- Parentheses（|）：Among them, "|" is used to separate multiple commands, and the last position can be empty, which means optional, which has the same meaning as the square brackets.
  For example, the command in the above example can also be written as:**no router-id** （*A.B.C.D* | ），It is exactly equivalent to using square brackets.
  Several commands can be used in parentheses, separated by "|", which means to select one from multiple commands.
  （A | B | C）: Either A, or B, or C, three situations.
  （A | B | C | ）: Either A, or B, or C, or neither, four situations.
  Example 1：**redistribute (static|connect|kernel|rip|isis|bgp),** Indicates that there may be 6 situations:
  1） **redistribute static**
  2） **redistribute connect**
  3） **redistribute kernel**
  4） **redistribute rip**
  5） **redistribute isis**

6） **redistribute bgp**

Example 2：**ip ospf authentication (message-digest|null|),** Indicates that there may be 3 situations:

1） **ip ospf authentication**

2） **ip ospf authentication message-digest**

3） **ip ospf authentication null**

- Curly brackets {|}：Where "|" is used to separate multiple commands. Brackets cannot end with "|".

  Generally speaking, there must be at least two commands in curly brackets, indicating that at least one command is selected from the two commands, and the order of the commands is irrelevant.。

  { A | B | C }:The possibilities of expression are: three command selections from 1 to 3 arbitrary permutations. There are 3 + 6 + 6 = 15 cases in total.

  For example：**distance ospf {intra-area** *distance* **| inter-area** *distance* **| external** *distance***}**，Indicates that there may be 15 situations.

  1） **distance ospf intra-area** *distance*

  2） **distance ospf intra-area** *distance* **inter-area** *distance*

  3） **distance ospf intra-area** *distance* **external** *distance*

  4） **distance ospf intra-area** *distance* **inter-area** *distance* **external** *distance*

  5） **distance ospf intra-area** *distance* **external** *distance* **inter-area** *distance*

  6） **distance ospf inter-area** *distance*

  7） **distance ospf inter-area** *distance* **intra-area** *distance*

  8） **distance ospf inter-area** *distance* **external** *distance*

  9） **distance ospf inter-area** *distance* **intra-area** *distance* **external** *distance*

  10） **distance ospf inter-area** *distance* **external** *distance* **intra-area** *distance*

  11） **distance ospf external** *distance*

  12） **distance ospf external** *distance* **intra-area** *distance*

  13） **distance ospf external** *distance* **inter-area** *distance*

  14） **distance ospf external** *distance* **intra-area** *distance* **inter-area** *distance*

  15） **distance ospf external** *distance* **inter-area** *distance* **intra-area** *distance*

  If you want the content inside the curly brackets to be optional, you can use bracket nesting, add a square bracket [] outside the curly brackets {|}, or parentheses (|) with a "|".

  In this way, one more possible situation of the above command is added, that is, all the commands in the curly brackets are not selected.

- ellipsis "…"：

  An ellipsis is placed after a certain command, indicating that the command can be entered one to several times.

  For example：**set as-path exclude** *AS_NUM*…　Several situations can be represented as follows:

  1） **set as-path exclude** *AS_NUM*

  2） **set as-path exclude** *AS_NUM AS_NUM*

  3） **set as-path exclude** *AS_NUM AS_NUM AS_NUM*

  4） **…**