Connecting to the Experiments

DE-CIX Academy

Version 3.1

1 Introduction

For our practical experiments during this training we are using virtualized machines running Docker, and FRRouting as routing software.

Docker is a lightweight virtualization software, which allows running processes sandboxed in so-called containers.

FRRouting is a fork and modern extension of well-known open source routing software Quagga, its command and configuration language is very much alike Cisco IOS. It contains a nearly full feature implementation of BGP (and also OSPF, IS-IS and others).

2 Connecting

2.1 Connecting to *your* Docker Container

All docker containers run on the same host but on different ports. You can only connect with a browser. Try it out now:

- Connect your laptop to wifi network
- You have received a card with the URL of *your* router - just enter either the URL or the IP address in your browser. Do not forget the port number (":90xx").

2.2 Working with FRRouting

A shell to FRRouting should open. You can use your keyboard to enter commands (try *show ip route*), change to config mode (*configure*) and more. See below for some basic commands. You can use your computers cut and paste functionality as well.

A question-mark *?* at any time shows you possible commands and command completions. For command completion you can also use the *Tab* key of your computer (hit it twice to see multiple completion options).

To save your current configuration use the *write mem* command.

FRRouting has two modes for interaction:

Terminal mode - this is the one you get when you connect. Here you can use the *show* command to show you all kinds of information or you can save your configuration using *write mem*.

Configuration mode - you enter configuration mode if you type *configure* in terminal mode. Here you can do all kind of configuration changes. To leave configuration mode type "*end*".

You see in which mode you in at the *prompt* - in terminal mode the prompt is `routername#`, in config mode the prompt is `routername(config)#` .

3 Some FRRouting Commands

3.1 Overview

All commands can be entered shortened, so instead of "configure" you can also enter "conf". A question mark at any time shows you what you can enter, so if you enter "conf?" you see that you can complete this to "configure". A tabulator also completes the current command.

This lists only the very basic commands, you will learn about the rest during the training when you need them.

3.2 Terminal mode - Basic commands

write terminal lists current configuration. Useful for showing the config and the cut and pasting it into your local text editor.

show running-config is the same

list lists available commands

config terminal changes into configuration mode

write mem saves your current configuration to disk

terminal monitor switch on receiving log messages on your terminal session

3.3 Terminal mode - IP commands

show interface shows you all interfaces, including IPv4 and IPv6 address details of all interfaces

show ip route shows you the curent IPv4 routing table

show ipv6 route does the same for IPv6

3.4 Configuration mode - Basic commands

All commands here are only valid when in *config mode*. To enter config mode type “configure”, to leave config mode type “end”.

end leaves config mode

exit leaves current config level. When on top, also leaves config mode.

no ... negates a command or removes a line of configuration

interface ... enters config mode of an interface. In interface config mode you can use commands like:

ip address ... set ip address and netmask of interface

router ... enters config mode of a router daemon. This will be covered in later experiments. “exit” brings you back to top config mode.

! starts a comment. Comments are not saved on your router but come handy when preparing configurations in a text file.

4 Slides

Connecting

- You only need a web browser
- The URL of your router is on your router card
- All routers run on the same server
- They run on different *ports* - if your card shows *router id* **01** you connect to port **7001** and so on.
- Both *http* and *https* are available. *http* is in the 9xxx port range, while *https* is in the 7xxx port range.
- Connect to your router now

Entering commands

- Your router has two modes of operation
- **Terminal Mode** - this is the one you start with.
- The prompt in terminal mode is your router name followed by "#"
- Your router can *autocomplete* commands - just use the *tab* key (type twice for a list of possible completions).
- Or type "?" for a list of possible things you can enter

Lets try that now!

```
r01# sh?
```

Terminal Mode - more commands

Let’s try the following commands and see the output:

```
show version

show running-config

terminal paginate

show interface

write
```

Important:

- “write” saves your configuration
- please do this from time to time

Some commands have arguments

Let’s have a look at "show interface":

```
show interface ?
```

- You can add an interface name
- You can ask for a “brief” output
- Try it out!

Configuration mode

- The other mode is *configuration mode*
- If you are in configuration mode, your prompt says:
  `r01(config)#`

To get into and out of configuration mode:

```
r01# configure
r01(config)#
r01(config)#
r01(config)# end
r01#
```

What do we do in which mode?

- in *terminal mode* we mostly use the `show` command
- in *configuration mode* well, we configure things
- to see what we have configured we can use:
  - in terminal mode: `show running-config`
  - in configuration mode: `do show running-config`
- Remember: a “?” always tells you which commands are possible.

Let's configure something

- Something simple
- a *static* route - in IPv4
- we put in a route for network *10.120.1.0/24* pointing at interface *loopback0*
- do a "`show ip route`" to see which routes already exist
- and then configure - see below.
  Here all commands are shown (on future slides we will skip the "configure" and "end" commands).

```
configure

! this is a comment
ip route 10.120.1.0/24 loopback0

end
```

Show commands:

- show running-config
- show ip route
- show ip route 10.120.1.0

BGP - some “show” commands

- We use BGP with *IPv4* and *IPv6*, so we must always tell the router which one we want
- the *show* commands explained here will be needed over and over again
- Your router has a few prefixes from the internet - time to play!

Show commands to try out:

- `show bgp ipv4 summary`
  `show bgp ipv6 summary`
  This shows you the state of your BGP *sessions*
- `show bgp ipv4`
  `show bgp ipv6`
  Lists the complete BGP prefix table - currently very small, but on a full router this can be really long.
- `show bgp ipv4 a.b.c.d`
  `show bgp ipv6 aa:bb:cc:dd::`
  Get detailed information about a prefix. Try it with one of the prefixes you got as output from the previous command.
- `show bgp ipv4 | include <regex>`
  `show bgp ipv6 | include <regex>`
  Filters the output and only shows lines which match the regular expression <*regex*>. You can filter for all kinds of stuff. Keep in mind for later.

Debugging

- FRRouting has extensive debugging commands
- Debugging is configured in terminal mode
- You need to make the messages visible first

Show commands to try out:

- `terminal monitor`
  makes logging and debugging messages visible
- `no terminal monitor`
  switches logging off again
- `debug bgp neighbor-events`
  starts debugging BGP neighbor related events
- `debug bgp ?`
  lists all possible BGP debugging subcommands.
- `no debug all`
  turn off all debugging