

B1)

- a) Open the daemon file using the command --- `sudo nano /etc/quagga/daemons`
- b) Set zebra and ripd fields inside that to 'yes'
- c) Save the above file
- d) Include the standard configuration of zebra and ripd use the commands below:
`sudo cp /usr/share/doc/quagga/examples/zebra.conf.sample /etc/quagga/zebra.conf`
`sudo cp /usr/share/doc/quagga/examples/ripd.conf.sample /etc/quagga/ripd.conf`
- e) Change the owner and permissions of the config files using the command
`sudo chown quagga:quaggavty /etc/quagga/*.conf`
`sudo chmod 640 /etc/quagga/*.conf`
- f) Now restart the quagga daemon by the command `sudo /etc/init.d/quagga restart`
- g) Copy the newly configuration files in the `/etc/quagga/*` to the config nodes in the folder, `./configs/*` where * corresponds to the names of different routes and hosts generated in the configs folder

B2)

Steps:

- 1) Run `sudo python start.py`
 - 2) Run `mininet>source enable_forward.sh`
 - 3) Run `mininet>source interface.sh`
 - 4) Now open another terminal and navigate to '`~/miniNExT/util`' and follow the steps as shown in the screenshots named 'Step*.png' and where ever prompted for a password enter 'zebra' and * is 1,2,3,4.
 - 5) Run pingall in the previous terminal
- a) To obtain the quagga routing tables, go back to the previous terminal with miniNExT/util and run the following commands
 - 1) `./mx r1`
 - 2) `telnet localhost 2602`
 - 3) `show ip rip`Run the same for all the nodes and the results have been put in this folder with the names `quagga_routing_*.png`

The corresponding kernel routing tables have been put in the 'Kernel_routing.png'

- b) The result has been put as an image named 'traceroute_before_r1_r2_down.png'
- c) The result of the ping has been put as an image named 'ping_stats.png' and the time of ping is ~9sec
- d) The convergence time can also be inferred from the ping_stats image and it is 47ms

B3)

- a) The link can be made down by entering the command:
`mininet> link r1 r2 down`
- b) The time it takes to re-establish the connectivity is 10sec and it has been measured using a stop watch
- c) The corresponding image is named as 'tracepath_after_r1_r2_down.png'

Reference:

<https://cyruslab.net/2012/05/12/install-and-start-quagga/>

<https://buildbot.quagga.net/docs/nightly/quagga/quagga.html#How-to-Announce-RIP-route>