Advanced Networking Topics: BGP, BGP Hijacking, MPLS, MPLS-based VPNs, Segment Routing, and others

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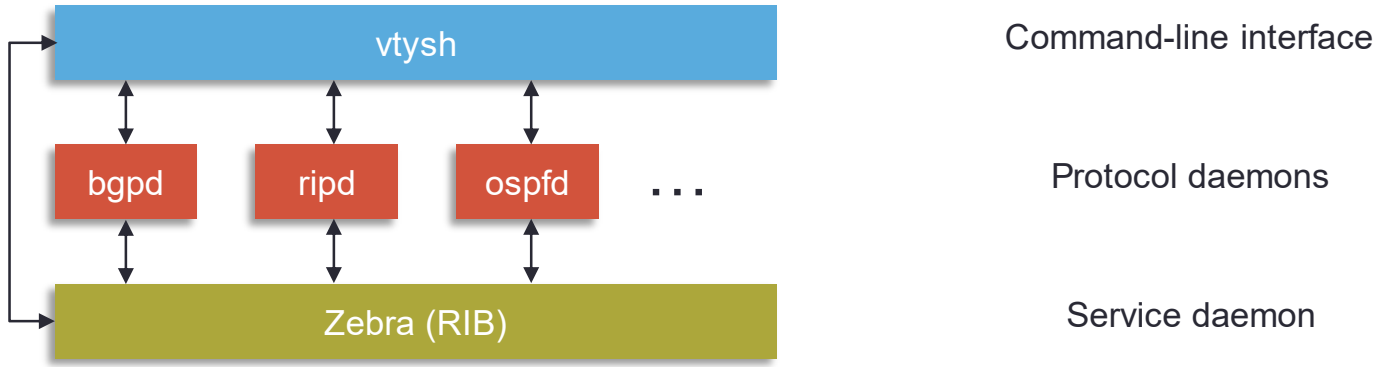
Introduction to FRR

Lab activities are described in Lab 2, BGP Lab Series

What is FRR?

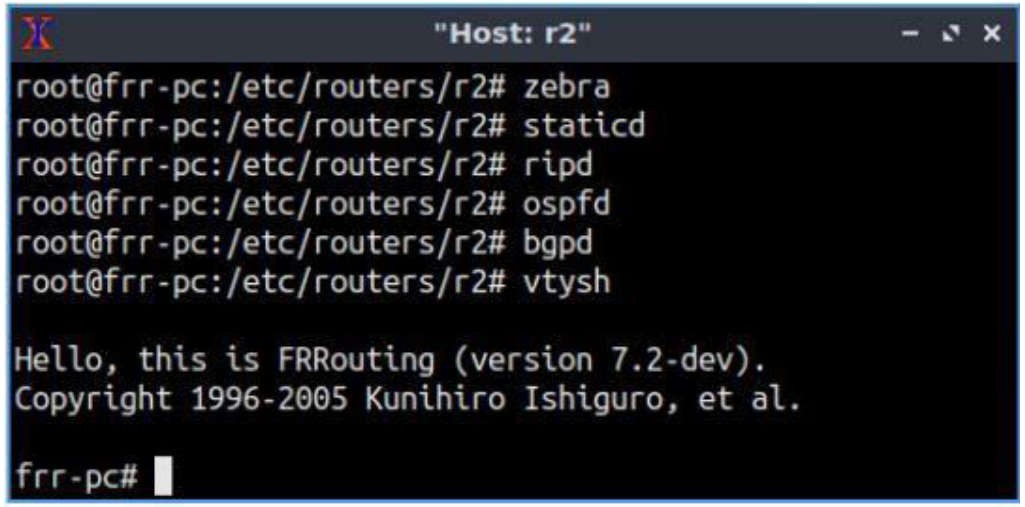
- FRR is an open source routing protocol stack[1]
- The configuration is similar to other vendors
  - Command-line shell and configuration file
- Protocols are implemented as independent processes
- Zebra is the process that controls the routing information base (RIB)



[1]FRRouting website, https://frrouting.org

FRR and Mininet Integration

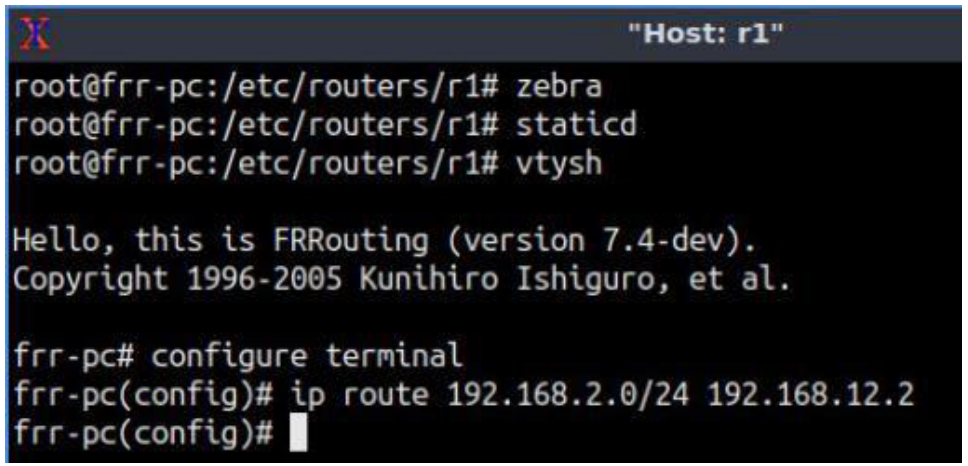
- Mininet provides network emulation, allowing all network software at any layer to be simply run as is
- The set of commands provided by FRR are inherited and can be run using Mininet's command-line interface

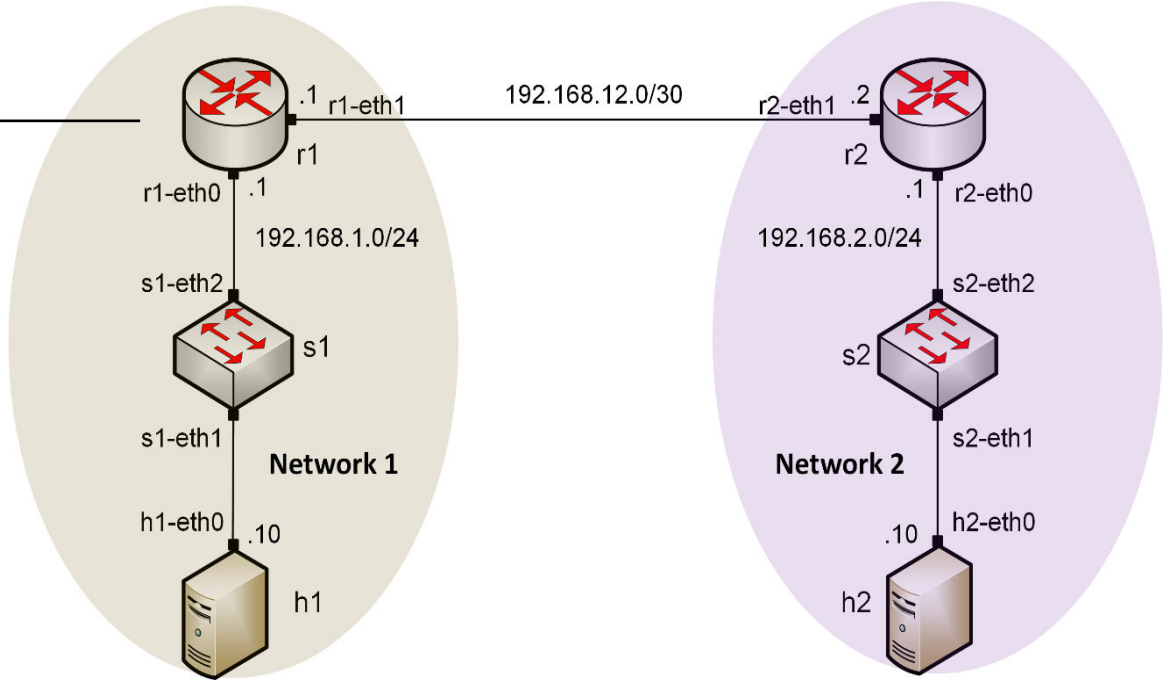


Lab Topology

- Two hosts: h1 and h2; two switches: s1 and s2; two routers: r1 and r2
- Static routing is configured on both routers so that the hosts can ping

Router r1





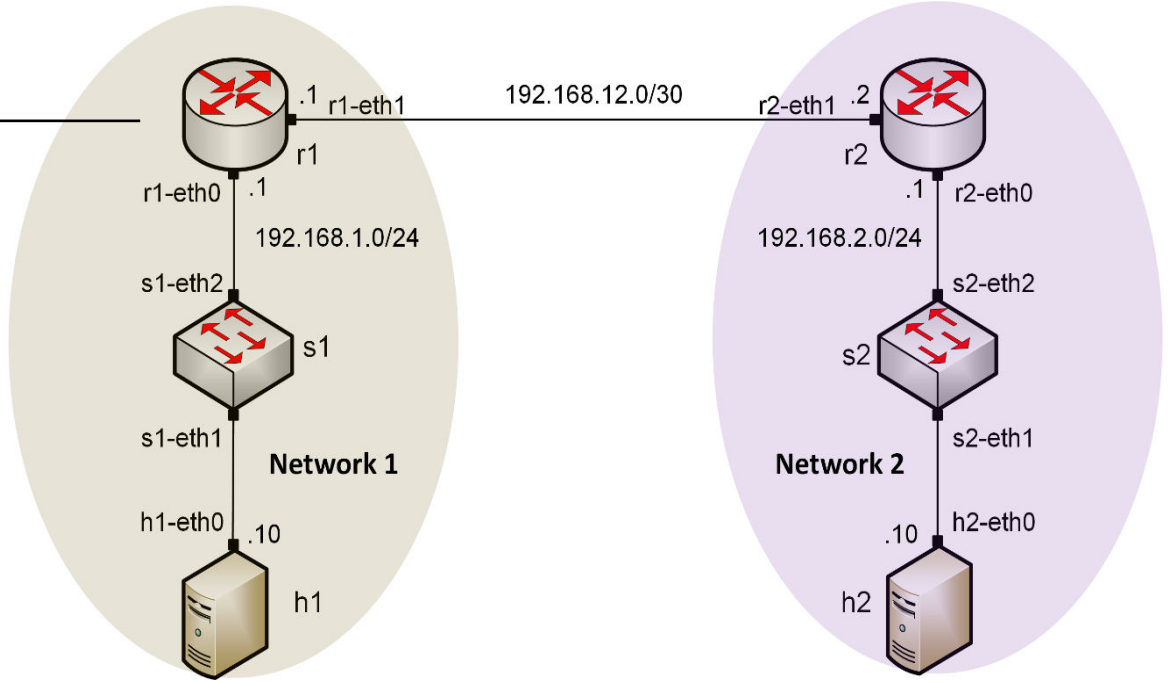
Routing Table

- After configuring static routing, the routing table of router r1 will know how to reach the network 192.168.2.0/24

Router r1

```
"Host: r1"
frr-pc# configure terminal
frr-pc(config)# ip route 192.168.2.0/24 192.168.12.2
frr-pc(config)# exit
frr-pc# 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, f - OpenFabric,
       > - selected route, * - FIB route, q - queued route, r - rejected route

C>* 192.168.1.0/24 is directly connected, r1-eth0, 00:08:55
S>* 192.168.2.0/24 [1/0] via 192.168.12.2, r1-eth1, 00:08:28
C>* 192.168.12.0/30 is directly connected, r1-eth1, 00:08:55
frr-pc#
```



Routing Table

- After configuring static routing, the routing table of router r2 will know how to reach the network 192.168.1.0/24

Router r2