

IETF Hackathon RARE/freeRtr

IETF 113

19-20 March 2022

Online

What is RARE/freeRtr?

freeRtr: Free/Open Source IP/MPLS router control plane

- lightweight Java implementation
- supports *many* IETF protocols

RARE: *Router for Academia, Research, and Education*

- funded by EU as part of GÉANT/GN4-3
- add data planes (P4/Tofino, DPDK, XDP/BPF...)
- enhance usability for use cases in actual (R&E) networks
- support R&E users with special needs! **Examples:**
 - PolKA (see lightning talk in IRTF [PANRG, Thu 1300–1400!](#))
 - HEP traffic flow marking using IPv6 Flow Label
(see Shawn McKee's talk in [HEPiX topics in IETF](#))

Hackathon Plan

Bring the nascent RARE/freeRtr developer community together!

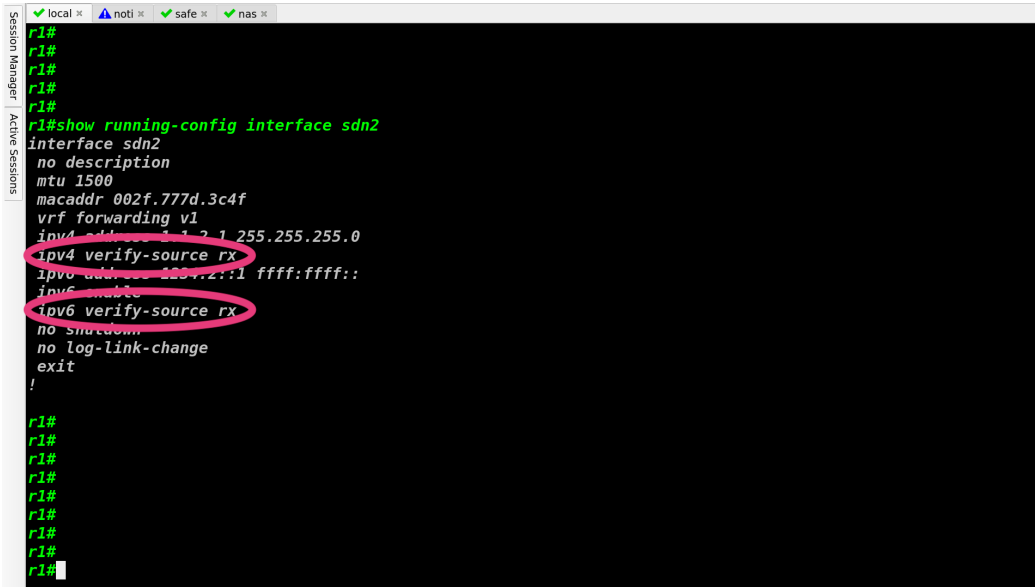
- Create automation tools based on freeRtr NETCONF API
- Investigate alignment with standard YANG modules (IETF/OpenConfig)
- Streaming telemetry from hardware (Tofino) counters and integrate freeRtr telemetry to external visualization tools with a robust telemetry collection agent queuing write information into K,V database
- Nix packaging for Intel's open-source IPDK (on top of the Tofino SDE)
- Switchdev support (For Spectrumv2/v3 ASIC)
- Elaborate and propose IPFIX/Netflow/sFlow/PSAMP design
- Add new Tofino counters
- Leverage NETCONF to provide FW-UI(?)
- Add Polka/TE GUI via NextUI automating NETCONF commands
- AMT interworking
- BIER interworking
- MCAST-MENU update from freeRtr
- Set up a scrubbing solution as reference design for DDOS with WEDGE100BF32X
- (M)PolKA testing

What got done

- Inter-op testing against IETF DHCPv4 server led to bug fix
- P4/Tofino implementation of unicast RPF (BCPs 38/84)



uRPF: per-interface configuration



```
local x noti x safe x nas x
r1#
r1#
r1#
r1#
r1#
r1#show running-config interface sdn2
interface sdn2
no description
mtu 1500
macaddr 002f.777d.3c4f
vrf forwarding v1
ipv4 address 1.1.2.1 255.255.255.0
ipv4 verify-source rx
ipv6 address 1::1 ffff:ffff::
ipv6 verify-source rx
no shutdown
no log-link-change
exit
!
```

r1#
r1#
r1#
r1#
r1#
r1#
r1#
r1#
r1#

New P4 LPM tables for uRPF Checks

```
local x noti x safe x nas x
*****
Dumping entry 0xf
Match key:
* ipv4.src_addr : LPM 01010402/32
* scalars.userMetadata.vrf: EXACT 0001
Action entry: ig_ctl.ig_ctl_ipv4c.act_ipv4_cpl_found - 1f46
=====
Dumping default entry
Action entry: ig_ctl.ig_ctl_ipv4c.act_set_drop -
=====
RuntimeCmd: table_dump ig_ctl.ig_ctl_ipv6c.tbl_ipv6_fib_lpm
=====
TABLE ENTRIES
*****
Dumping entry 0x0
Match key:
* ipv6.src_addr : LPM 12340001000000000000000000000000/32
* scalars.userMetadata.vrf: EXACT 0001
Action entry: ig_ctl.ig_ctl_ipv6c.act_ipv6_cpl_ours - 01
*****
Dumping entry 0x1
Match key:
* ipv6.src_addr : LPM 12340001000000000000000000000001/128
* scalars.userMetadata.vrf: EXACT 0001
Action entry: ig_ctl.ig_ctl_ipv6c.act_ipv6_cpl_ours - 01
*****
Dumping entry 0x2
Match key:
* ipv6.src_addr : LPM 12340002000000000000000000000000/32
* scalars.userMetadata.vrf: EXACT 0001
```

What we learned

- freeRtr feature development workflow
 - configuration
 - P4 dataplane
 - CP/DP interface
 - integration tests
 - ...
- uRPF more complex in IPv6 than in IPv4 due to ND integration

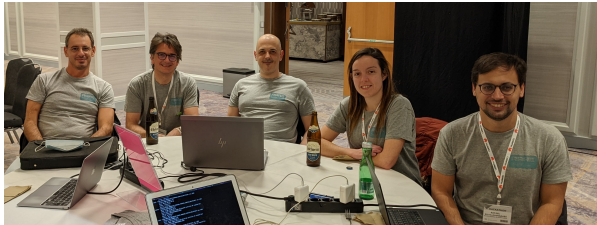
Wrap up

Team members (left-to-right):

- Everson Scherrer Borges
- Simon Leinen
- Csaba Mate (mc36)
- Carmen Misa
- Rafael Guimarães

Other links:

- <http://www.freertr.net/>
- <http://rare.freertr.net/>
- <http://demo.freertr.net/>



First timers @ IETF/Hackathon:

- Csaba Mate (mc36)
- Carmen Misa
- Rafael Guimarães
- Everson Scherrer Borges

Notes and contacts:

- <http://docs.freertr.net/contacts/>