



# RARE/freeRtr

GN5-1 WP6 T1

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standing in for Frédéric Loui, RENATER, RARE/freeRtr Technical Leader

Network Technologies Workshop, Cyberspace

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Public (PU)

# Agenda

- RARE/freeRtr in GN5-1
  - Focus on user/developer community
  - New developments (features, hw support)
- Release management
- RARE/freeRtr **validated design**
- Global P4 lab: GP4L
- Network Management as a Service: **NMaaS**
- Community support
- Discussions

# RARE/freeRtr in a nutshell

RARE is an open source routing platform, used to create a network operating system (NOS) on commodity hardware (a white box switch).



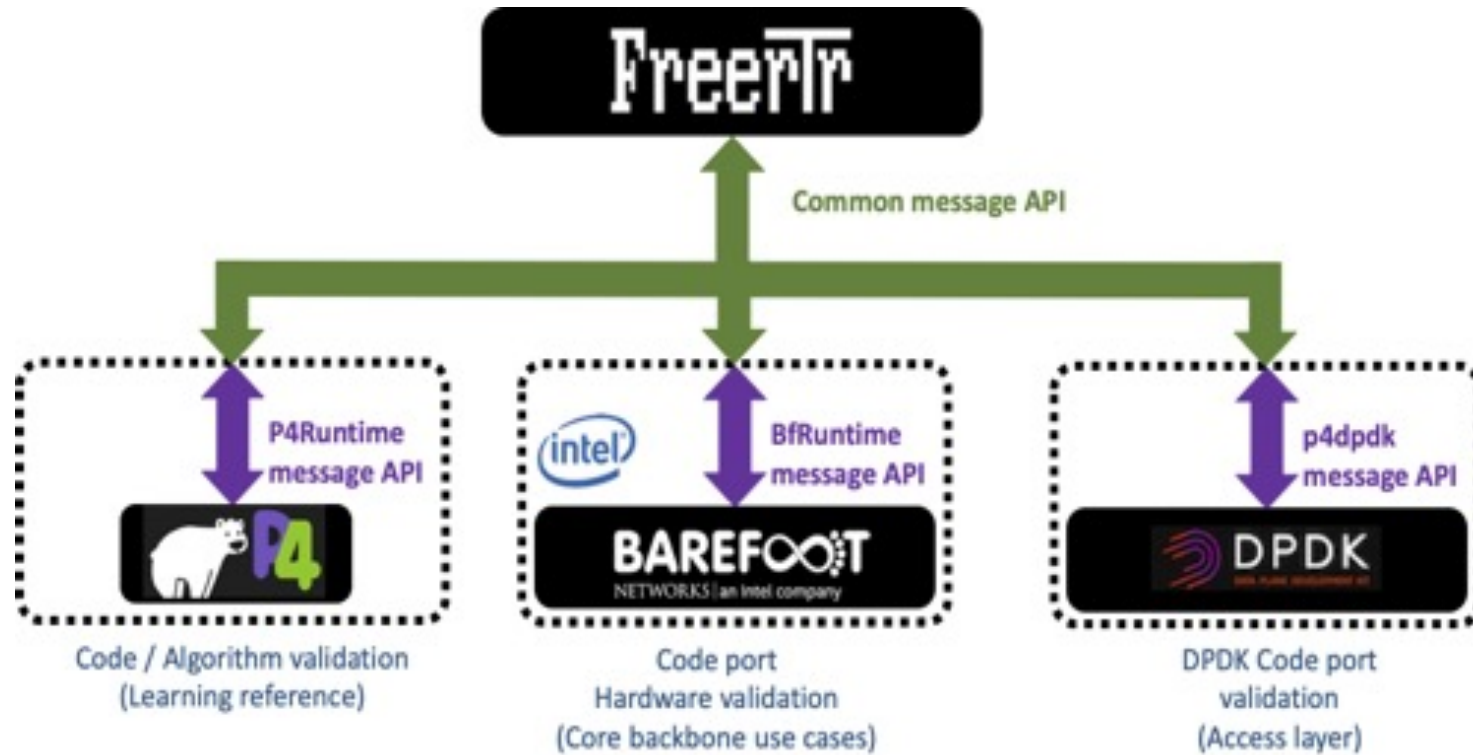
RARE uses FreeRtr as control plane software and is thus often referred to as RARE/freeRtr



**More information:**  
<https://wiki.geant.org/display/rare>

# RARE/freeRtr in a nutshell

"One control plane to rule them all ..."



# RARE/freeRtr Project in GN5-1

- **User community**
  - Listen to requests from user community
    - Feature wish-list
    - Problem solving approach
  - Attribute priority to production use cases
    - Implementation
    - Documentation
    - Turn-key solution
  - [docs.freertr.org](https://docs.freertr.org)
    - Reference documentation automation
    - [RARE/freeRTr Validated Design](#)
- **Developer community**
  - Developer's guide at both
    - Control plane
    - Data plane level
  - Developer section in [docs.freertr.org](https://docs.freertr.org) ?
  - Onboard new developers

**Objective:**

**to increase RARE/freeRtr software platform uptake and trust ...**

# RARE/freeRtr feature development

- Feature development
  - RIFT (Routing In Fat Trees) → <https://datatracker.ietf.org/wg/rift/about/>
  - FIB compression
  - RARE/freeRTr virtualisation
  - Exposing new metrics (buffer counters)
  - ...
  - Please share your ideas !
- New targets (and thus new use cases)



**Tofino 3 is dead, long live Tofino 1 and 2!**  
**Dataplane programming is not only about P4 ...**



## RARE/freeRtr Validated Design

What can you do with  
**RARE/freeRtr ?**

## RARE/freeRtr Validated Design



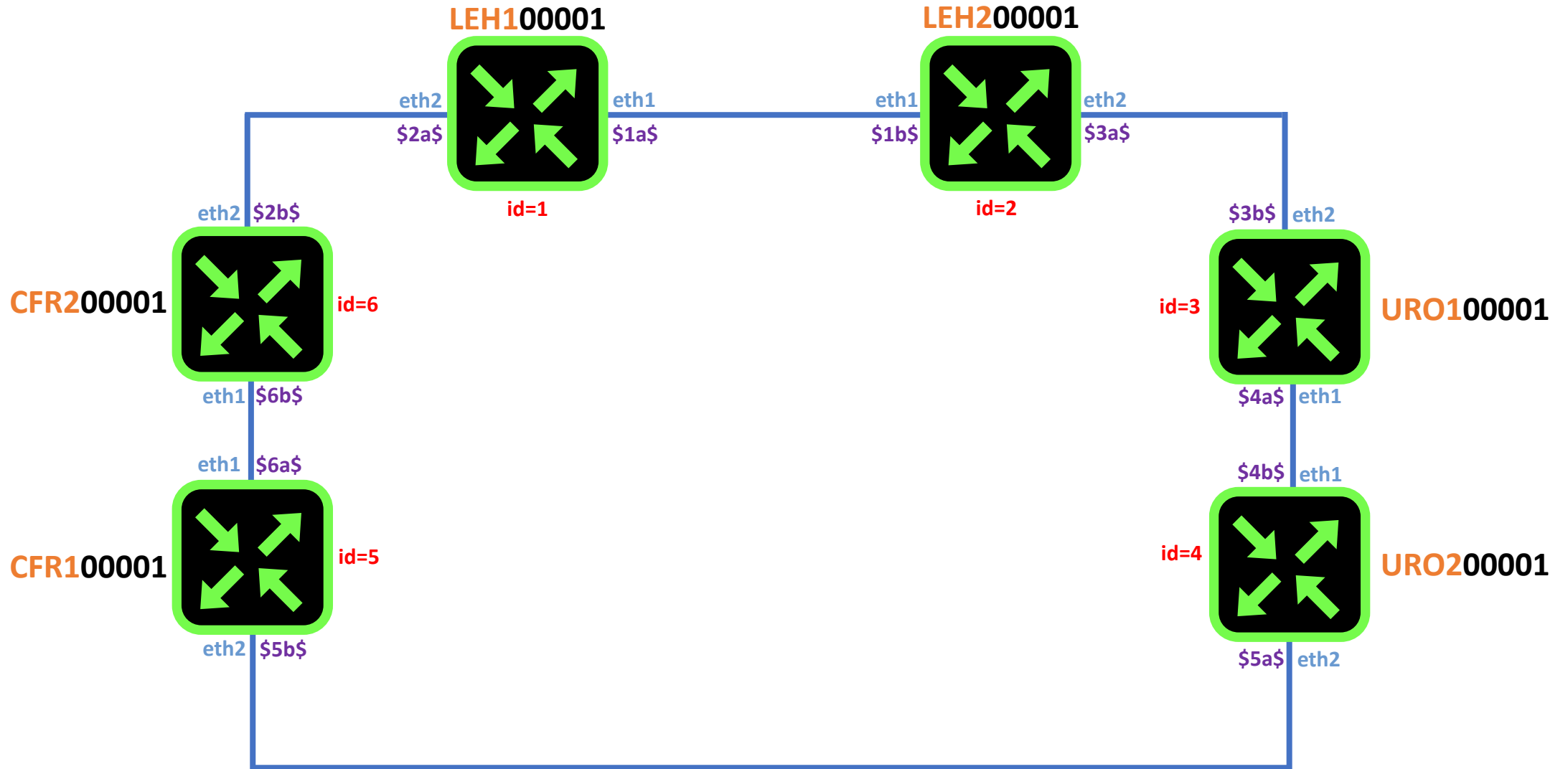
<https://github.com/rare-freertr/validated-design>

- Network Design description
  - Validated in production environment
  - Fully documented
  - Turn key solution platform
    - Virtual use case mockup
    - freeRtr socket forwarder
    - p4emu
    - p4dpdk
    - Tofino [1/2] dataplane
    - Upgrade server with Nix
    - Network infrastructure as a Code - CI/CD
    - Testing capability [?] → cross activity with GP4L
- We should not forget **Network Management** !

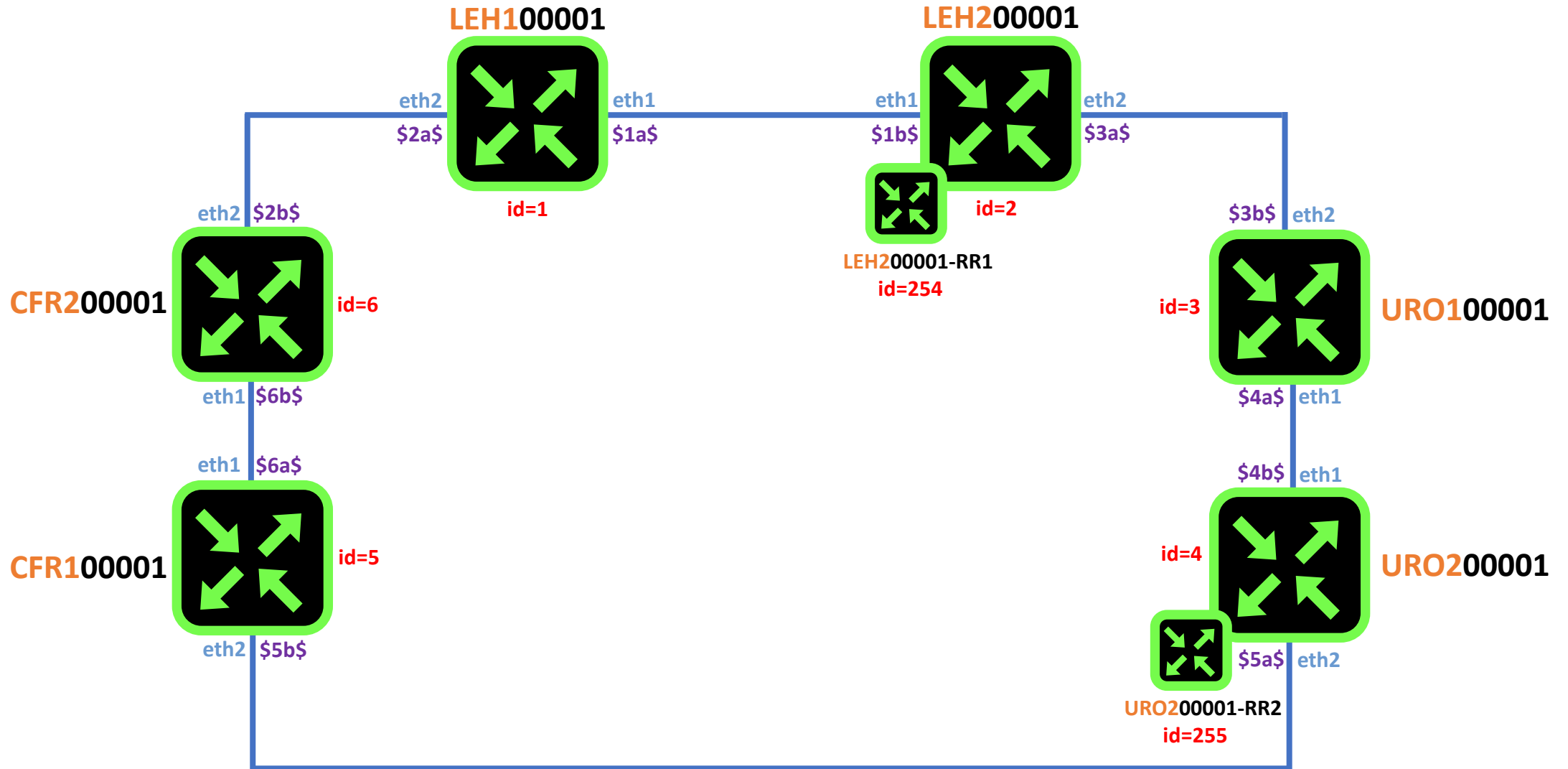




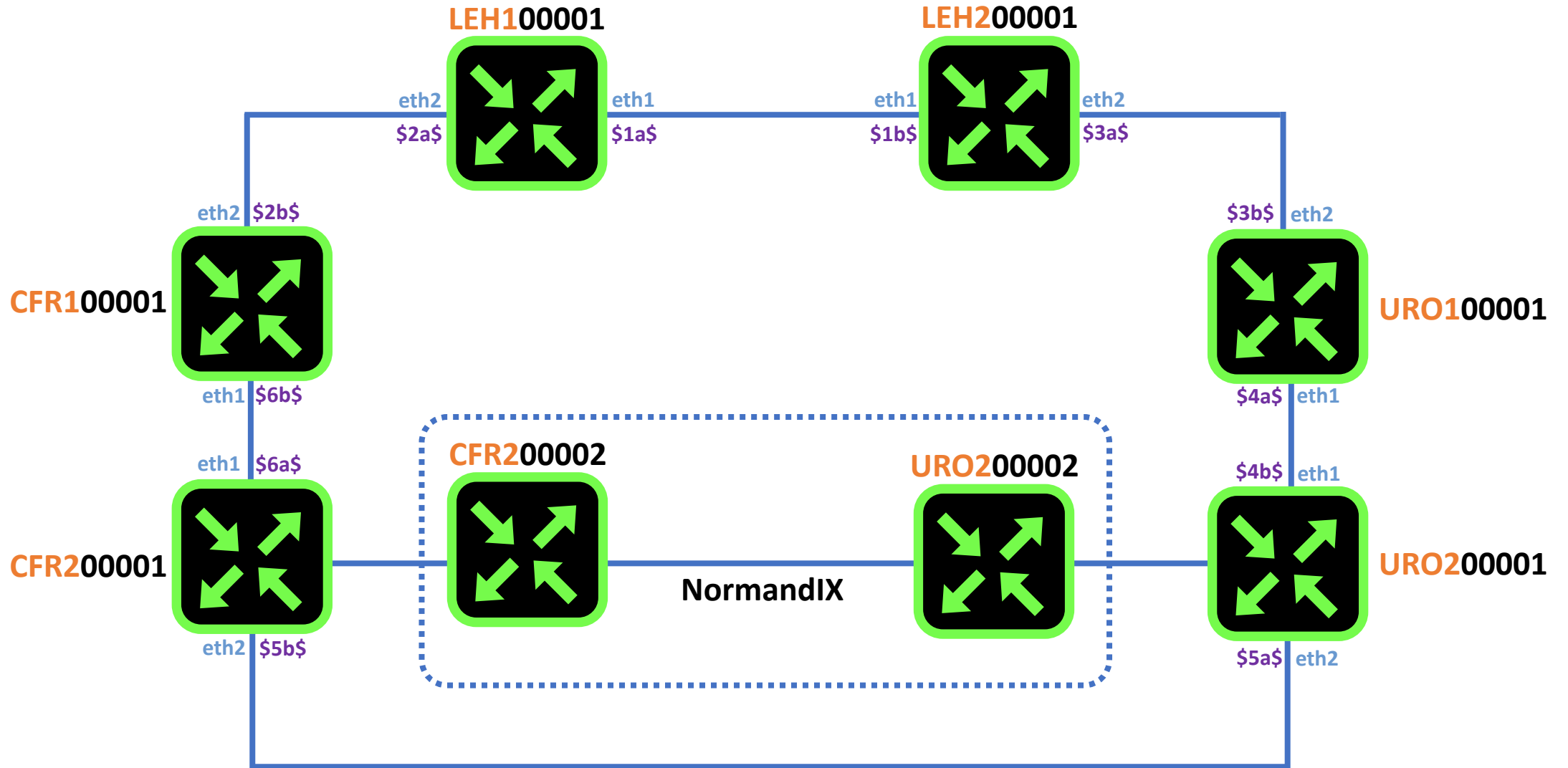
# CRIANN / SYVIK-2: Regional network use case



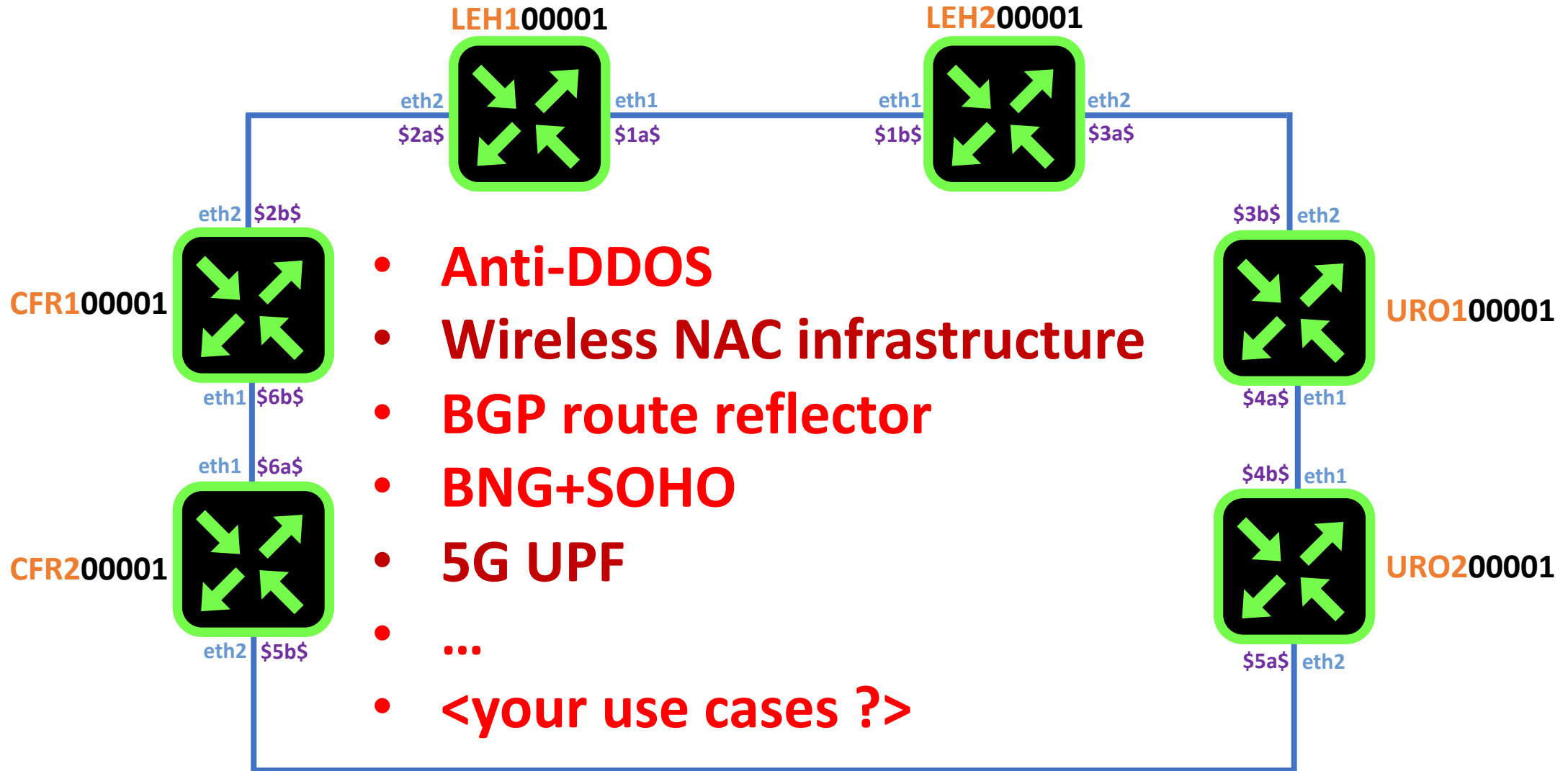
# CRIANN / SYVIK-2: Regional network with iBGP route reflection



# CRIANN / SYVIK-2: Regional network + NormandIX use case



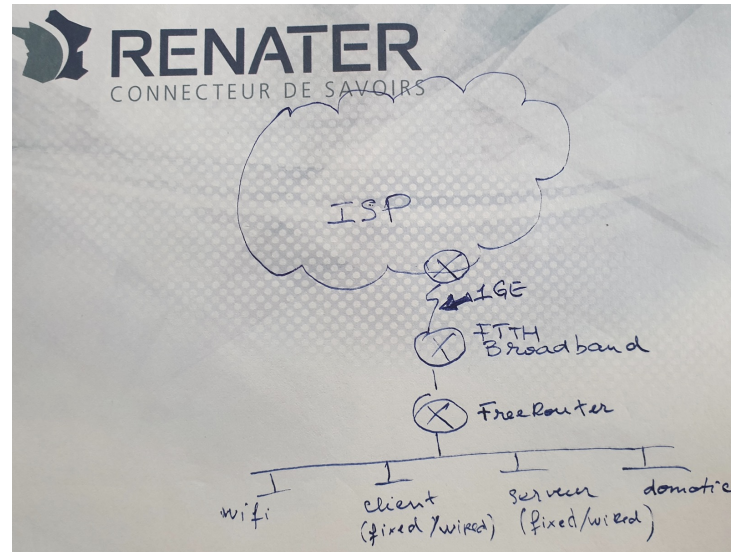
## CRIANN / SYVIK-2: Regional network + anti-DDOS use case



## BGP Classful Transport Interoperability Demonstration

- BGP Classful Transport Planes ([draft-ietf-idr-bgp-ct](#))
- Recent proposal to support network “slices” (e.g. for 5G) across AS boundaries
- Implemented by Juniper... **and RARE/freeRtr**
- Currently discussed in IETF Inter-Domain Routing ([idr](#)) Working Group
- Demonstrated at [EANTC Interop Showcase 2023](#) (Berlin)

# RARE/freeRtr Hardware example: **SOHO (small sites: schools, small labs)**





RARE/freeRtr Hardware example: **[MAN MPLS P/PE, IXP]@ 100GE !**

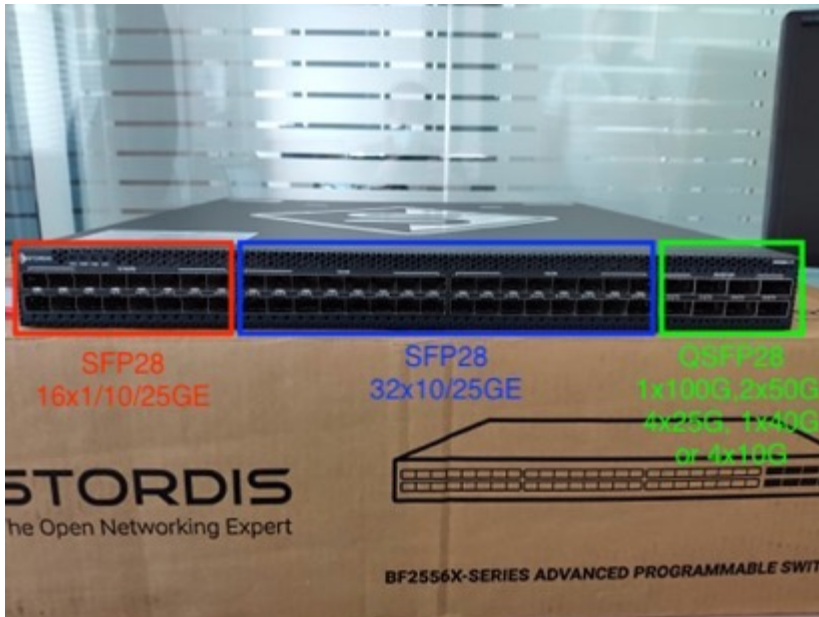
### EdgeCore - Wedge100BF32X



**32x100GE - QSFP28**

# RARE/freeRtr Hardware example: **MAN MPLS P/PE, Spine/Leaf/ToR, IXP**

## Stordis – BF2556X-1

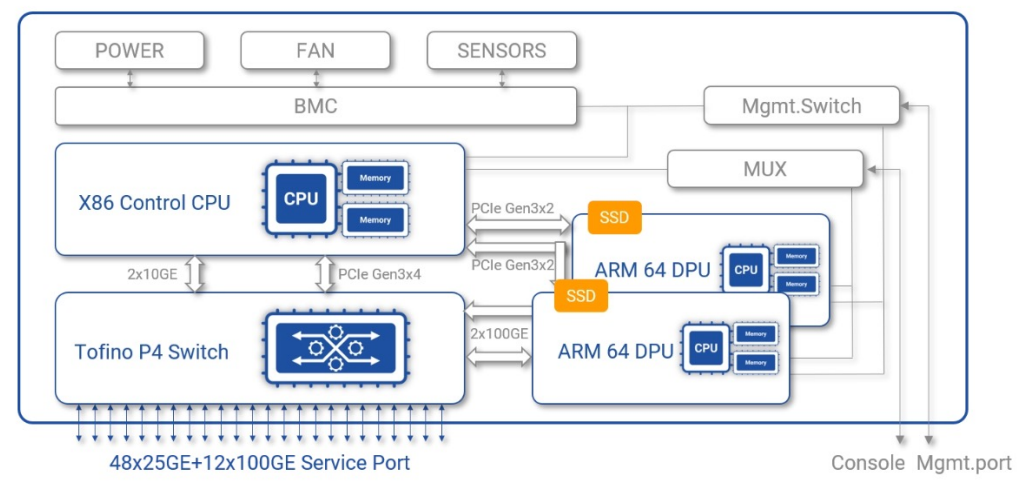
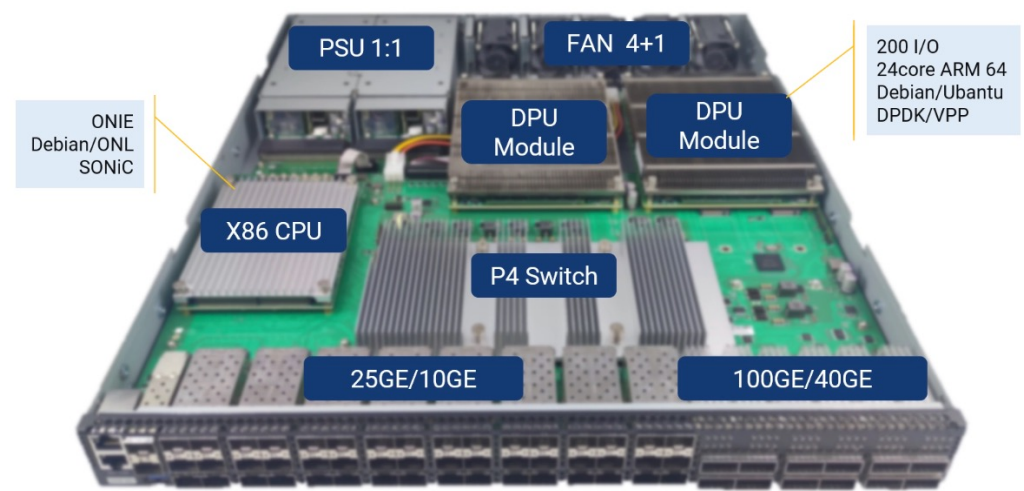


**8 x 100GE - QSFP28**  
**32 x 10GE/25GE – SFP28**  
**16 x 1GE SFP28**

# RARE/freeRtr Hardware example: **need more hardware processing power ?**



## Hardware Architecture of X312P-48Y-T Barefoot Tofino Switch



**What is RARE/freeRtr  
software life cycle management  
And how is it tested ?**



# RARE/freeRtr release management

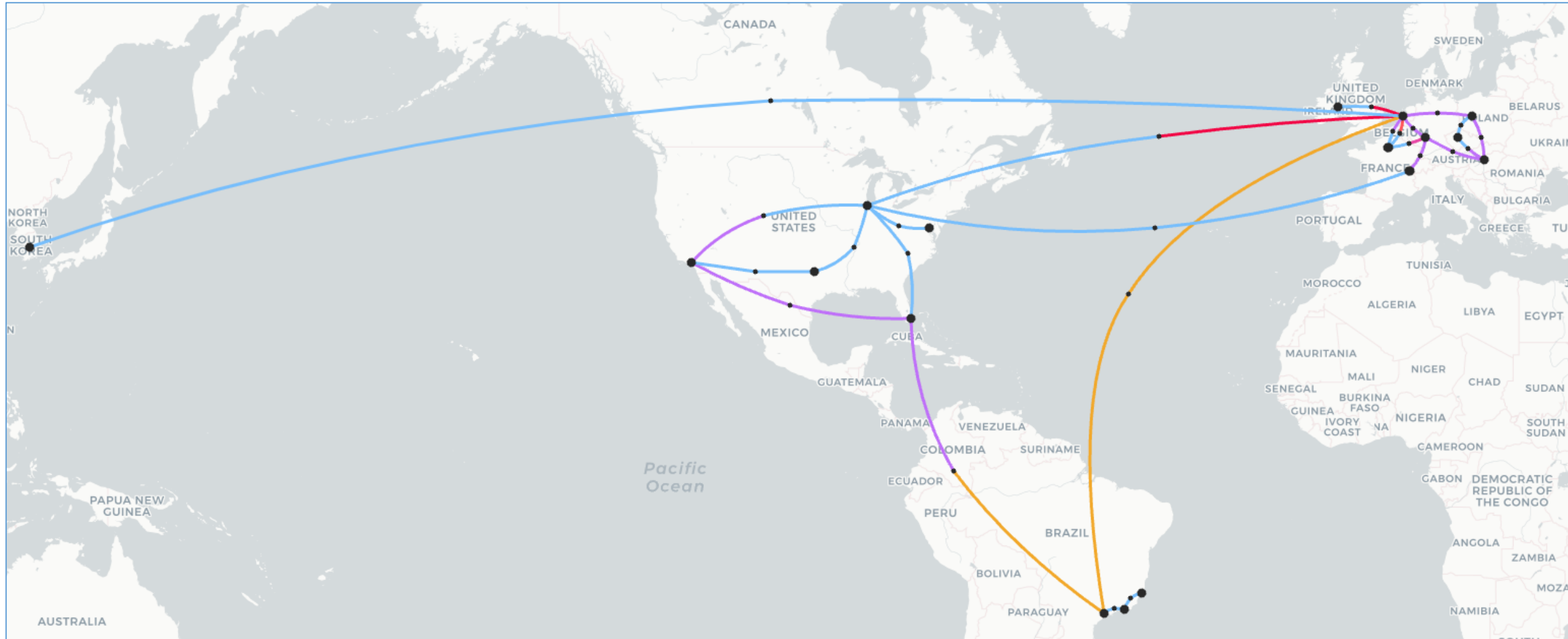
- Release management
  - Based on **Nix package manager**
  - All RARE/freeRtr flavours (control plane and dataplane)
- Software life cycle management management
  - Testing
    - Automated CI/CD (~2300 tests run after each bulk commit)
    - Performance testing (maybe in GP4L ?)
  - You can test RARE/freeRtr with your preferred emulation environment !



# Liaison with GN5-1 WP6-T2 platform – Global P4 Lab



- December 2022 (presented to Supercomputing 2022 conference)

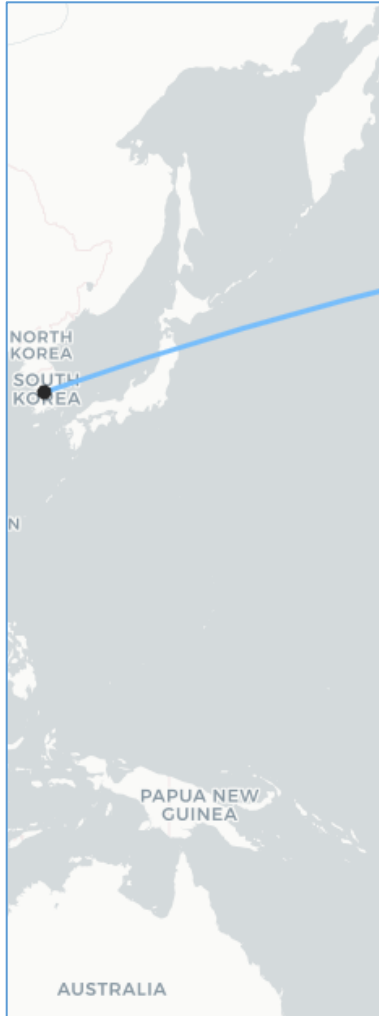




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## RARE/freeRtr Network Management as a Service

What about  
RARE/**freeRtr**  
monitoring?

# NMaaS Network Management as a Service



**Grafana**

★★★★★5

Open source analytics & monitoring solution for every database



**Prometheus**

★★★★★5

Monitoring system & time series database



**Icinga2**

★★★★★0

Scalable and extensible monitoring system



**SPA Inventory**

★★★★★0

Resource and Service Inventory with TMF-compliant API



**Routinator**

★★★★★0

RPKI Validator



**WebDAV Server**

★★★★★5

WebDAV Server with Git versioning



**Uptime Kuma**

★★★★★5

Self-hosted monitoring tool like "Uptime Robot"



**NetBox**

★★★★★5

Infrastructure resource modeling application



**WiFiMon**

★★★★★0

Wireless Crowdsourced Performance Monitoring and...



**Zabbix**

★★★★★0

Enterprise-class monitoring solution for networks and applications



**SPA**

★★★★★0

SPA for the E-Line service



**Healthchecks**

★★★★★0

A cron monitoring tool



**Kubernetes**  
Inside 

## RARE/freeRtr in GN5-1

**Questions  
Discussions  
Ideas ?**

# RARE/freeRtr community support

- **Community channels**

- Mailing lists
  - rare-users, rare-dev
  - gn5-1-wp6-t1-rare is internal to the GÉANT project
- RARE messaging
  - IRC #freertr@DN42
  -  RARE/freeRTr
  -  [@rare\\_freerouter](https://twitter.com/rare_freerouter)

- **Dissemination**

- Liaison with international WG (GNA-G, APAN, LHC, UbuntuNet alliance etc.)
- Conferences
  - SC23/24, EANTC Interop, IETF hackathon, TNC, APAN, RIPE etc.
- Would you like to host a RARE/GP4L Workshop ?



# Thank You

[www.geant.org](http://www.geant.org)



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