



RARE/freeRtr

GN5-1 – Work Package 6/Task 1

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Public (PU)

GN5-1

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: **SP4L**
- Network Management as a Service: **NMaaS**
- Community support
- Discussions/Demo



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 a control plane software

and is thus often referred to as

RARE/freeRtr

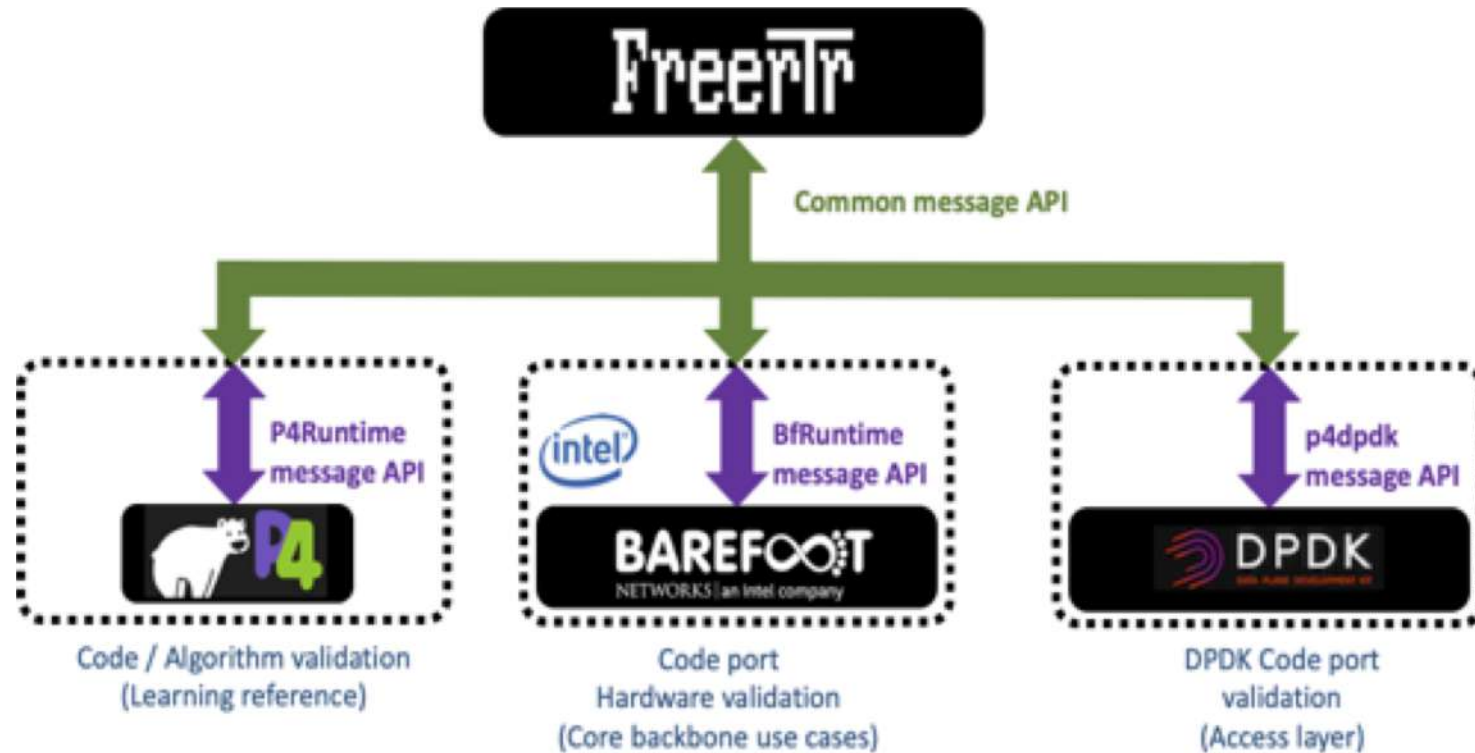
More information:

<https://wiki.geant.org/display/rare>



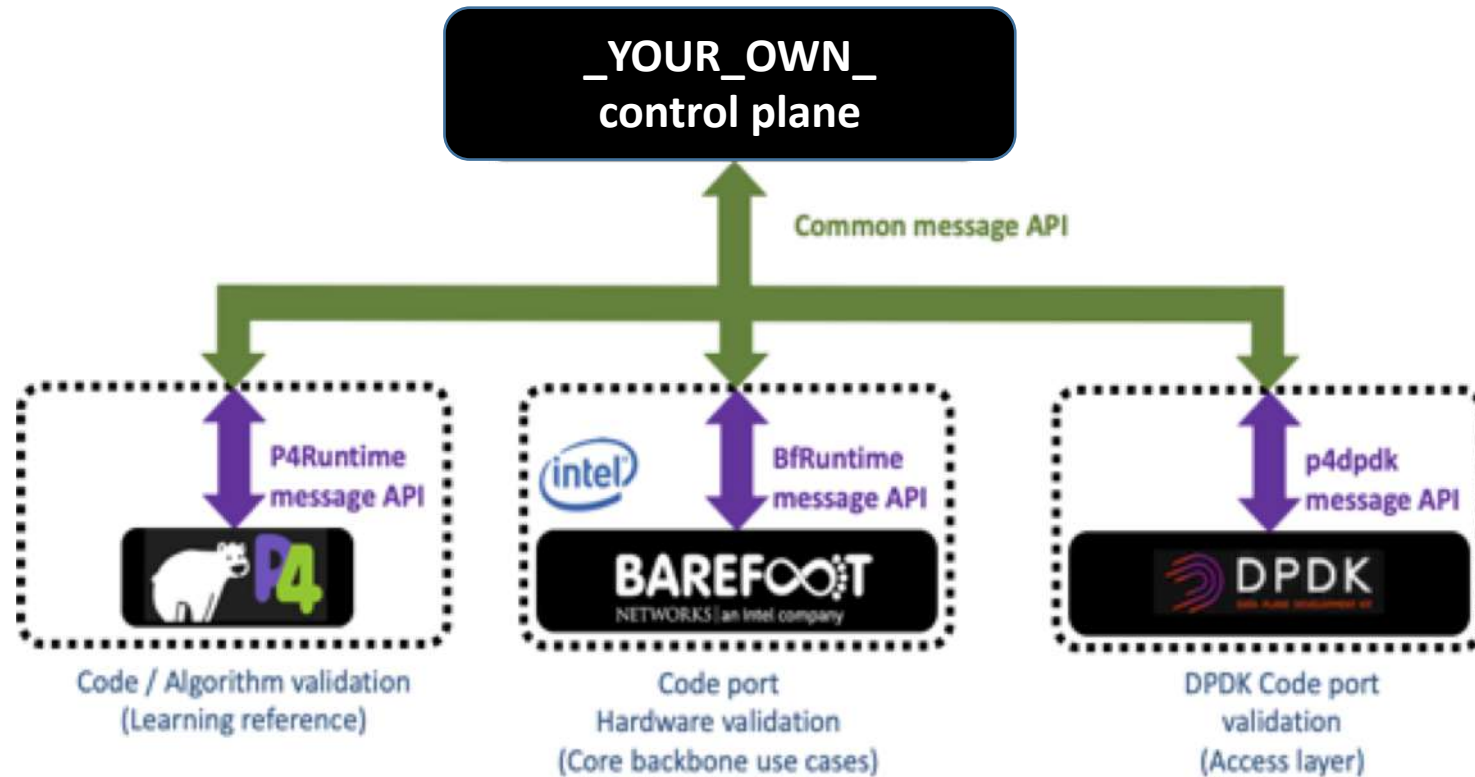
RARE/freeRtr in a nutshell

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



RARE/freeRtr in a nutshell

"... Or not !"



RARE/freeRtr Project in GN5-1

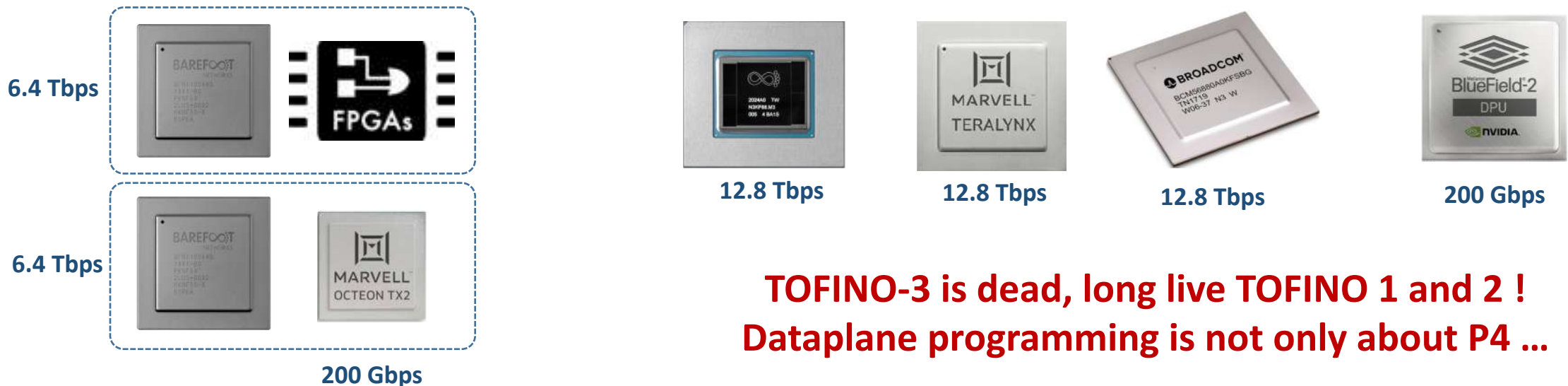
- **User community**
 - Listen user community request
 - Feature wish-list
 - Problem solving approach
 - Attribute priority to production use case
 - Implementation
 - Documentation
 - Turn-key solution
 - docs.freertr.org
 - Reference documentation automation
 - **RARE/freeRTr** Validated Design
- **Developer community**
 - Developer's guide at both
 - Control plane
 - Data plane level
 - Developer section in **docs.freertr.org** ?
 - Enroll new developers

Objective:

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
 - New metric exposition (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 ...**

What can you do with
RARE/freeRtr ?

RARE/freeRtr Validated Design

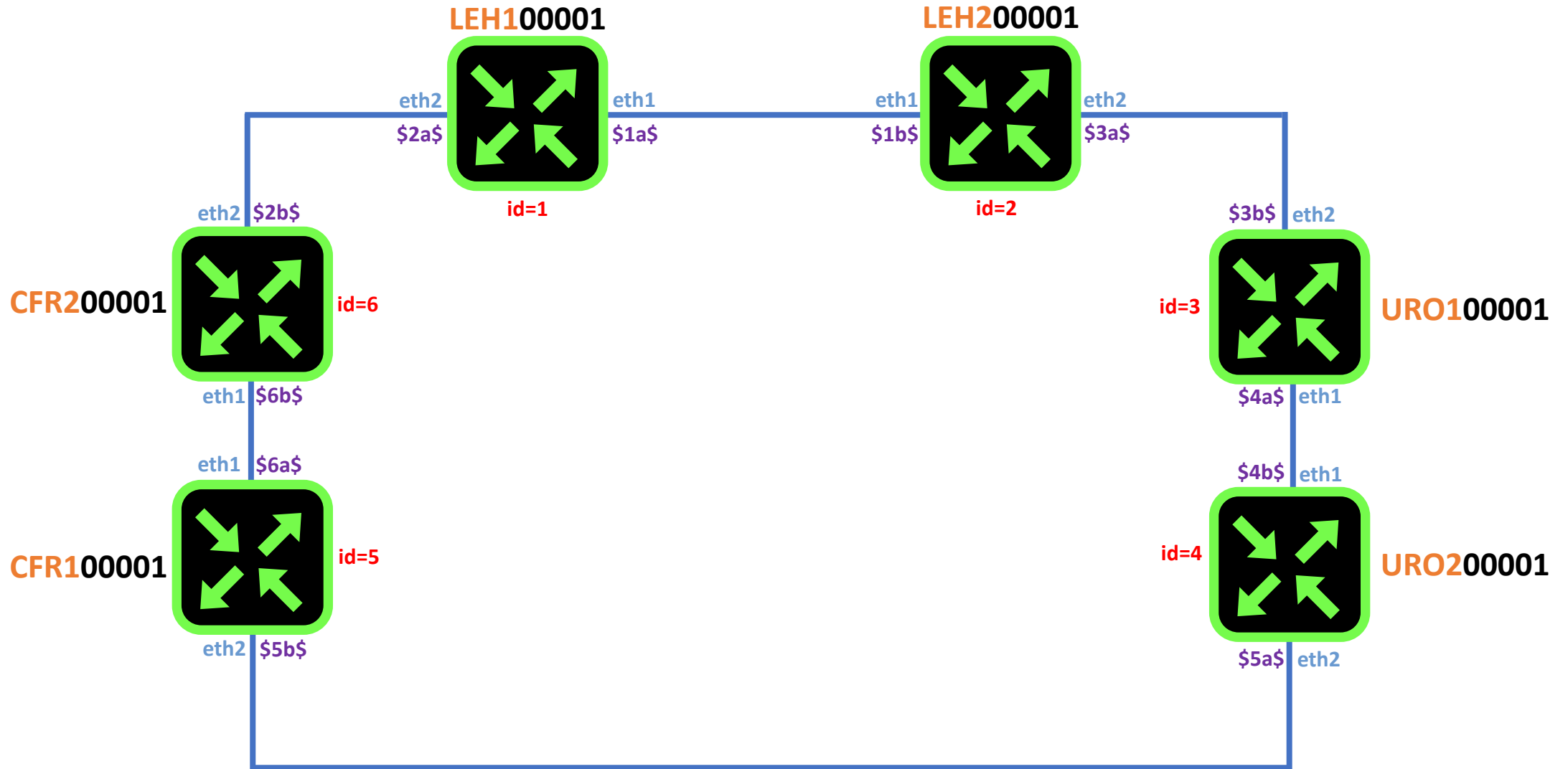


<https://github.com/rare-freertr/validated-design>

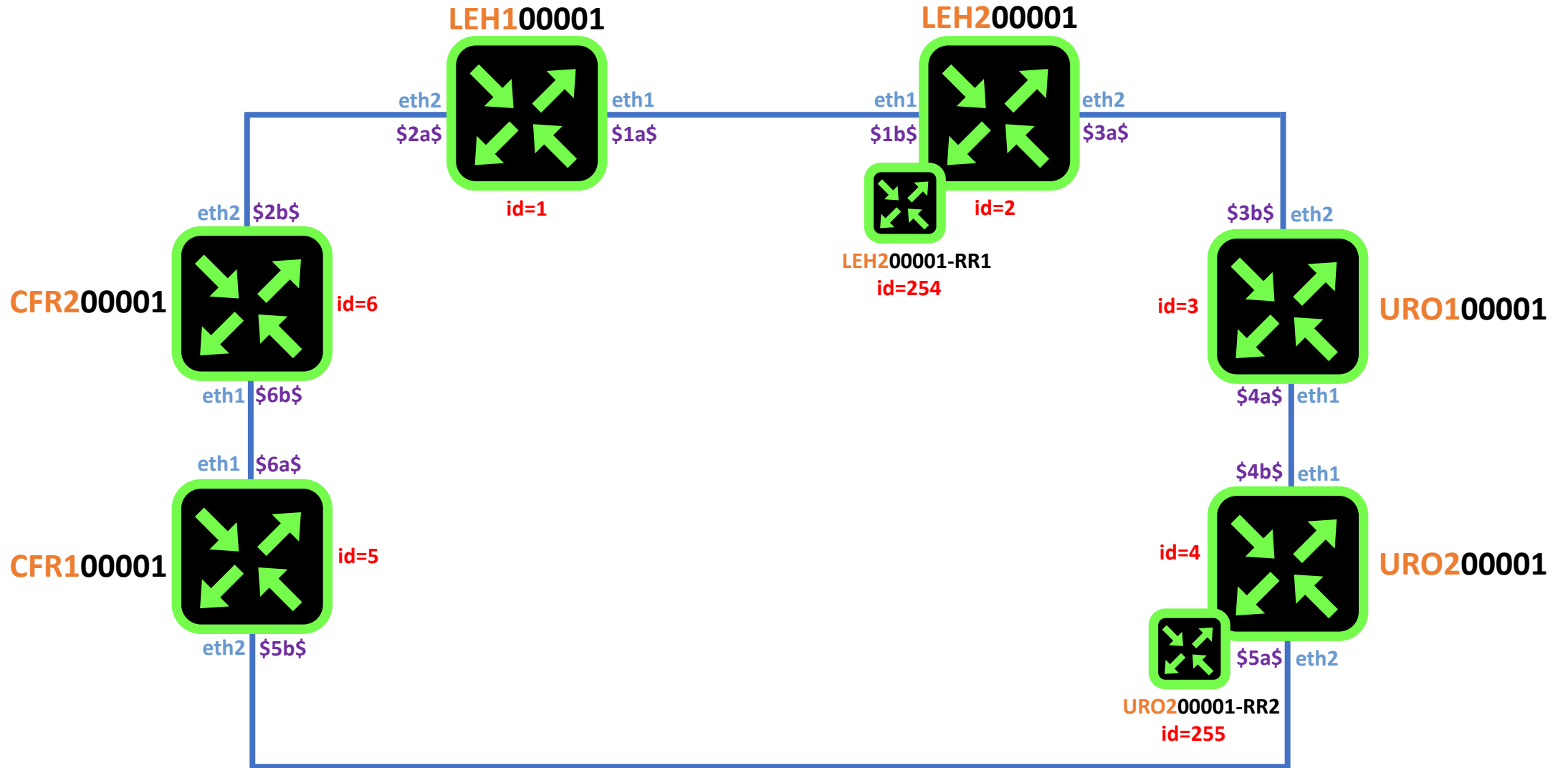
- Network Design description
 - Validated in production environment
 - Fully documented
 - Turn key solution platform
 - Virtual use case mockup
 - freeRtr socket forwarder
 - p4emu
 - p4dpdk
 - TOFINO [1/2] dataplane
 - Upgrade server with Nix
 - Network infrastructure as a Code - CI/CD
 - Testing capability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



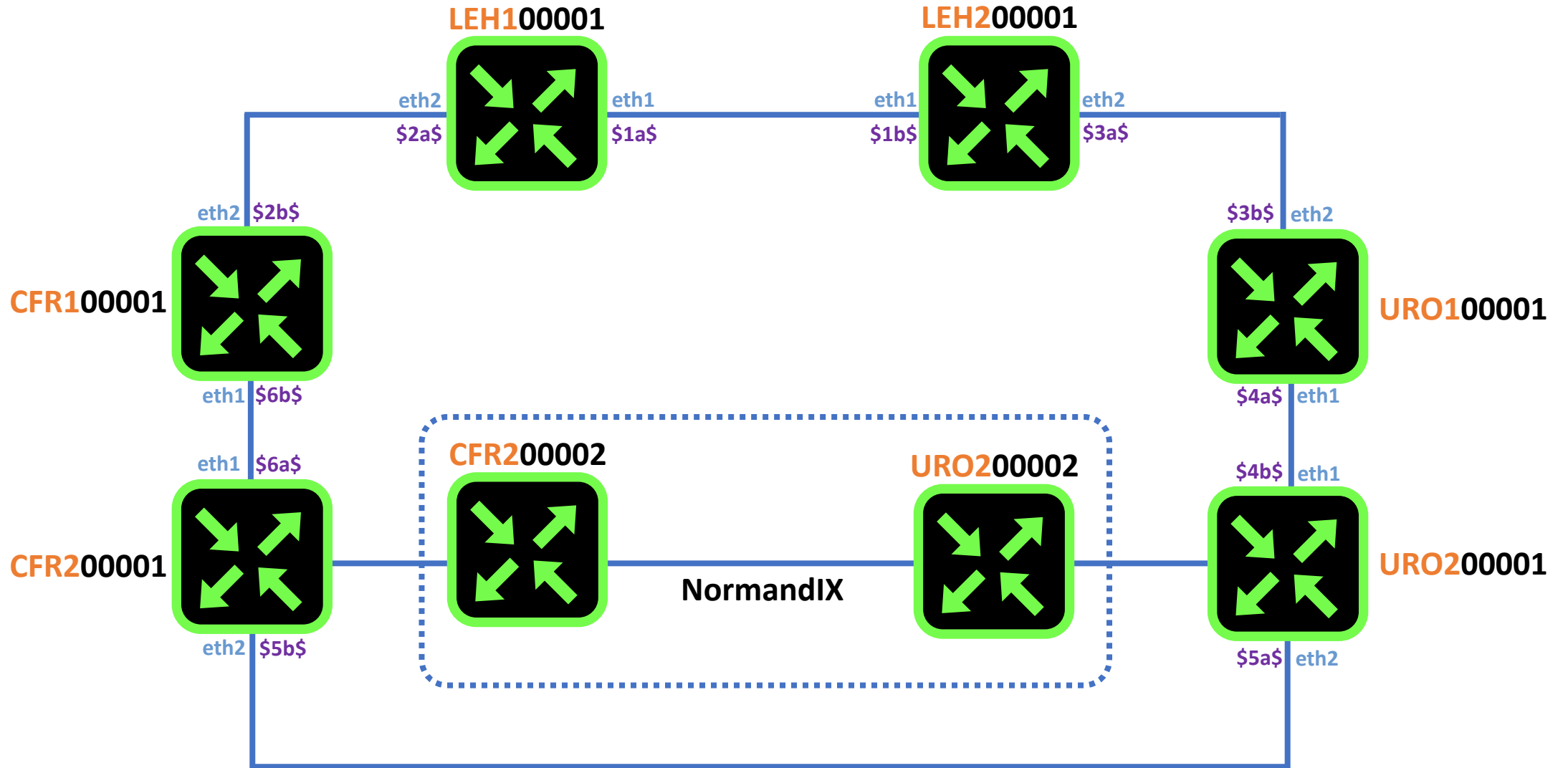
CRIANN / SYVIK-2: Regional network use case



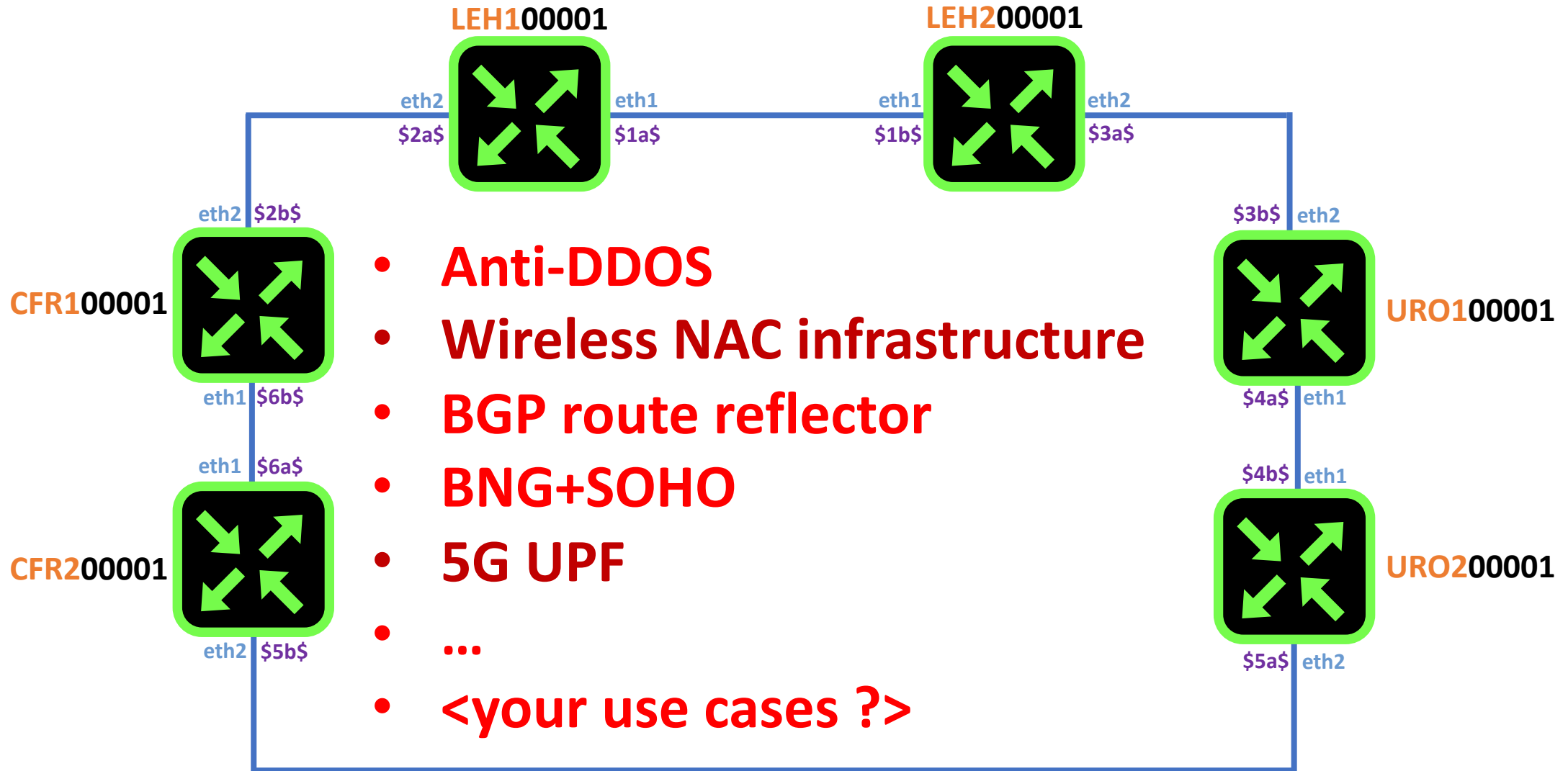
CRIANN / SYVIK-2: Regional network with iBGP route reflection



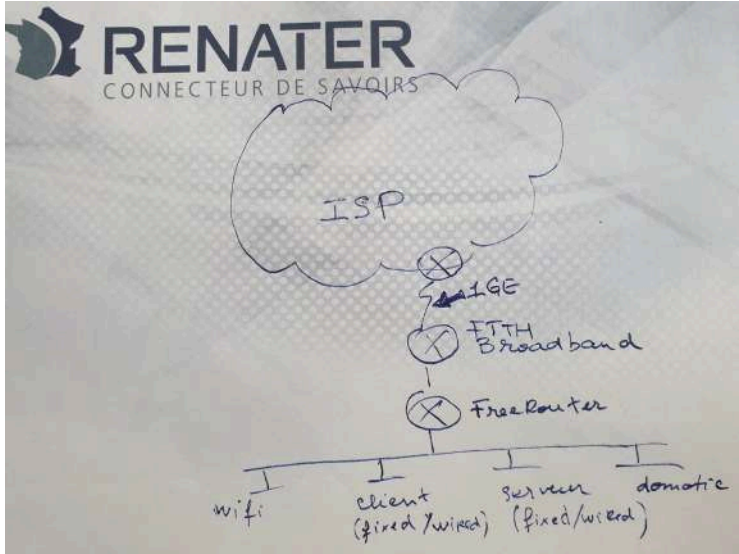
CRIANN / SYVIK-2: Regional network + NormandIX use case



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



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



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

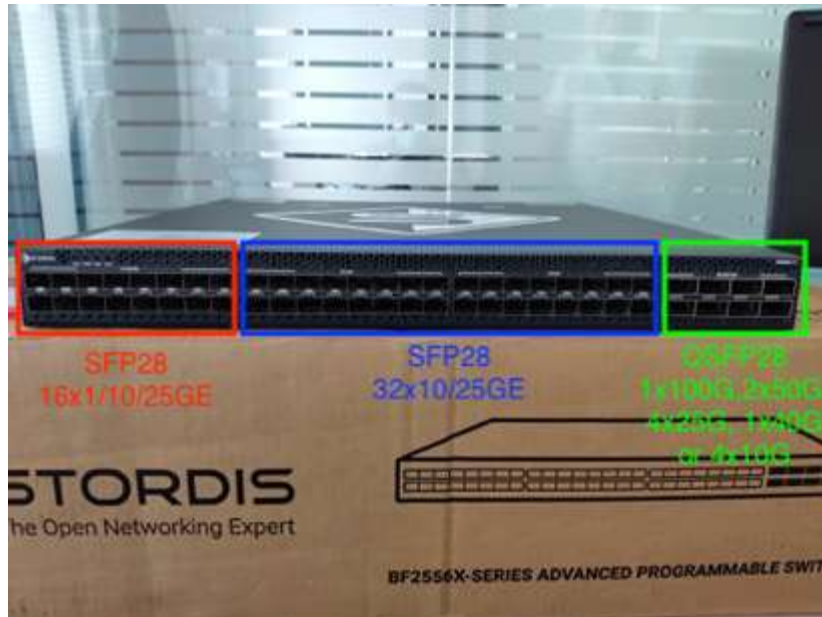
EdgeCore - Wedge100BF32X



32x100GE - QSFP28

RARE/freeRtr Hardware example: **MAN MPLS P/PE, Spine/Leave/Tor, IXP**

Stordis – BF2556X-1

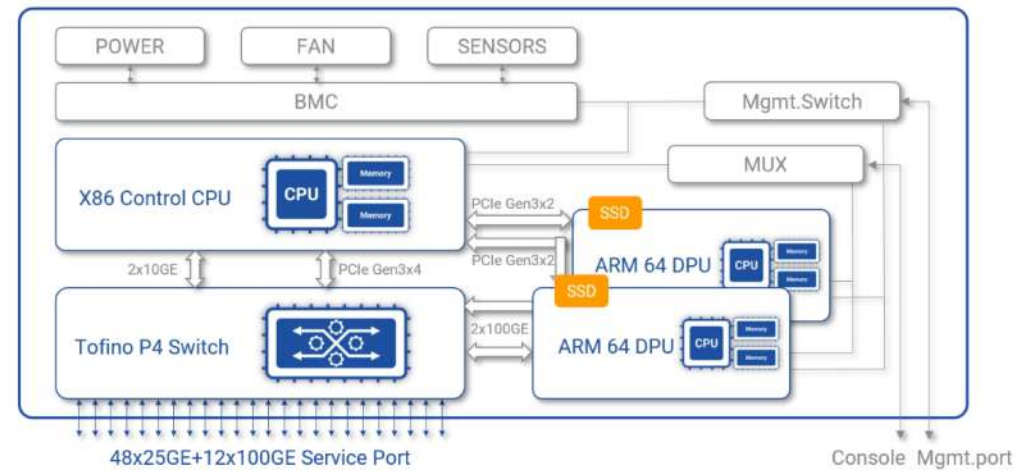
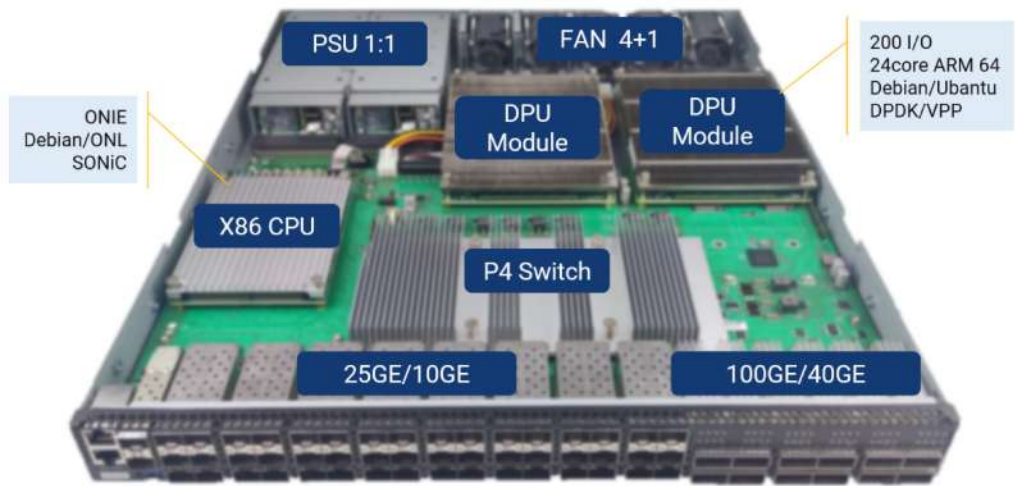


8 x 100GE - QSFP28
32 x 10GE/25GE – SFP28
16 x 1GE SFP28

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 flavour (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 you preferred emulation environment !



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



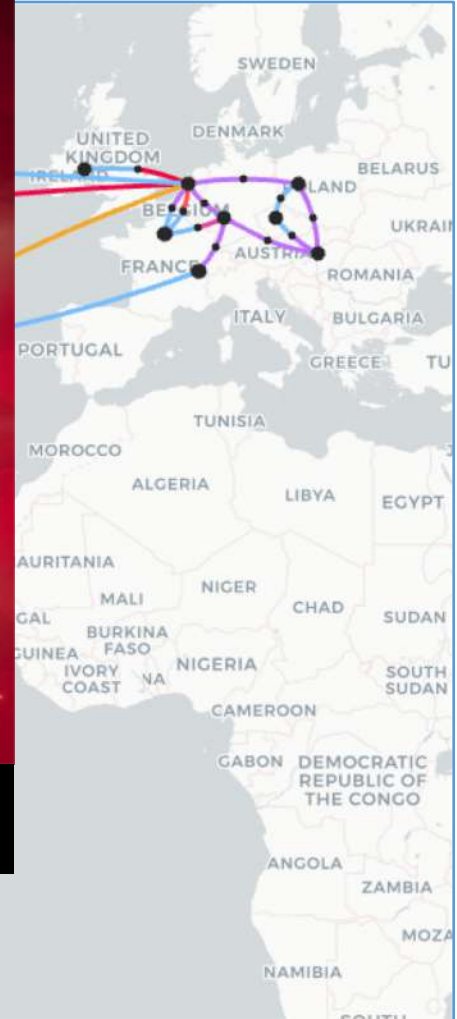
- December 2022 (presented to Supercomputing 2022 conference)



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



- December 2022 (presented to Supercomputing 2022 conference)



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



Key take-away



$$+ \text{NMaaS} + \text{SD-WAN} = \text{Key-Puzzle}$$
 A visual equation showing the combination of 'NMaaS' (Network Managed as a Service) and 'SD-WAN' (Software Defined Wide Area Network) leading to a 'Key-Puzzle' icon, which is a blue puzzle piece with a keyhole in the center.

CAPEX decrease dramatically

OPEX increase but:

This is not a bad thing **RARE/freeRtr empowers** local staff

Therefore it can reduce digital divide by providing an innovative networking solution at an affordable TCO

Power user or not, If you have DIY mindset (whether you are a Tier 1 NREN or not)

RARE/freeRtr is for you !



Please join **RARE/freeRtr** community !

A world map with various countries labeled. Overlaid on the map are several colored lines (blue, purple, yellow, red) representing network connections between different geographical locations. The lines connect major hubs like the United States, Europe, and South America. A large red ampersand is placed in the center of the map, between the words 'Digital twin' and 'ORCHESTRATION'.

Digital twin & ORCHESTRATION



RARE/freeRtr in GN5-1

**Questions
Discussions
Ideas ?**

Quick demo !

RARE/freeRtr community support

- **Community channels**

- Mailing list
 - rare-users, rare-dev
 - gn5-1-wp6-t1-rare is internal to the GÉANT project
- RARE messaging
 - IRC #freertr@DN42
 -  **RARE/freeRTr**
 -  rare_freerouter

- **Dissemination**

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



Thank You

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