

RENATER's White Box CPE in Normandy Regional network

WP6 T1 monitoring and management activity

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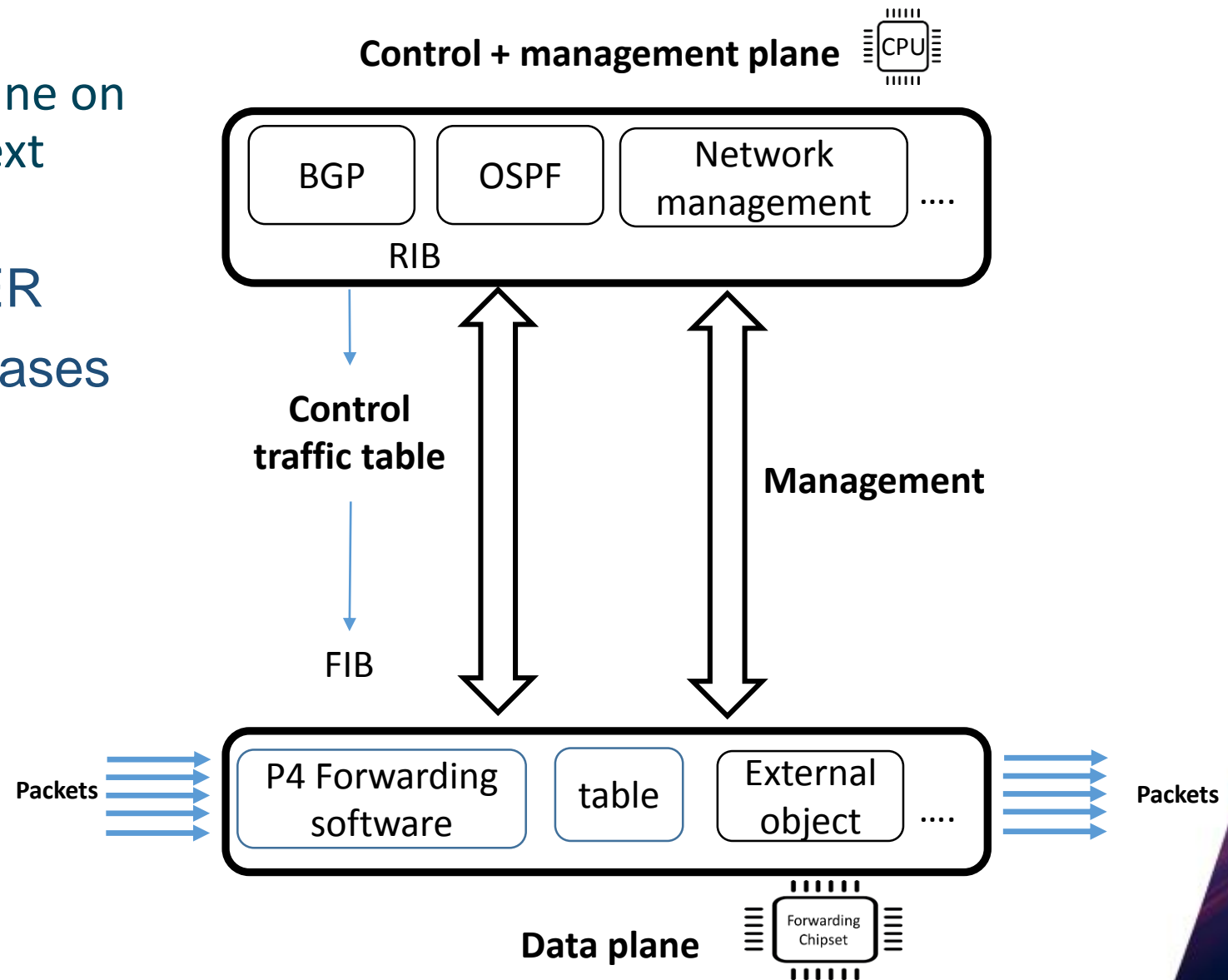
GÉANT 4-3 WP6 Task1: Network Technology Evolution

- LoLa
- Optical Time & Frequency Network
- Quantum Key Distribution
- White-Box for research and education
- Router for Academia, Research and Education
- Data Plane Programming

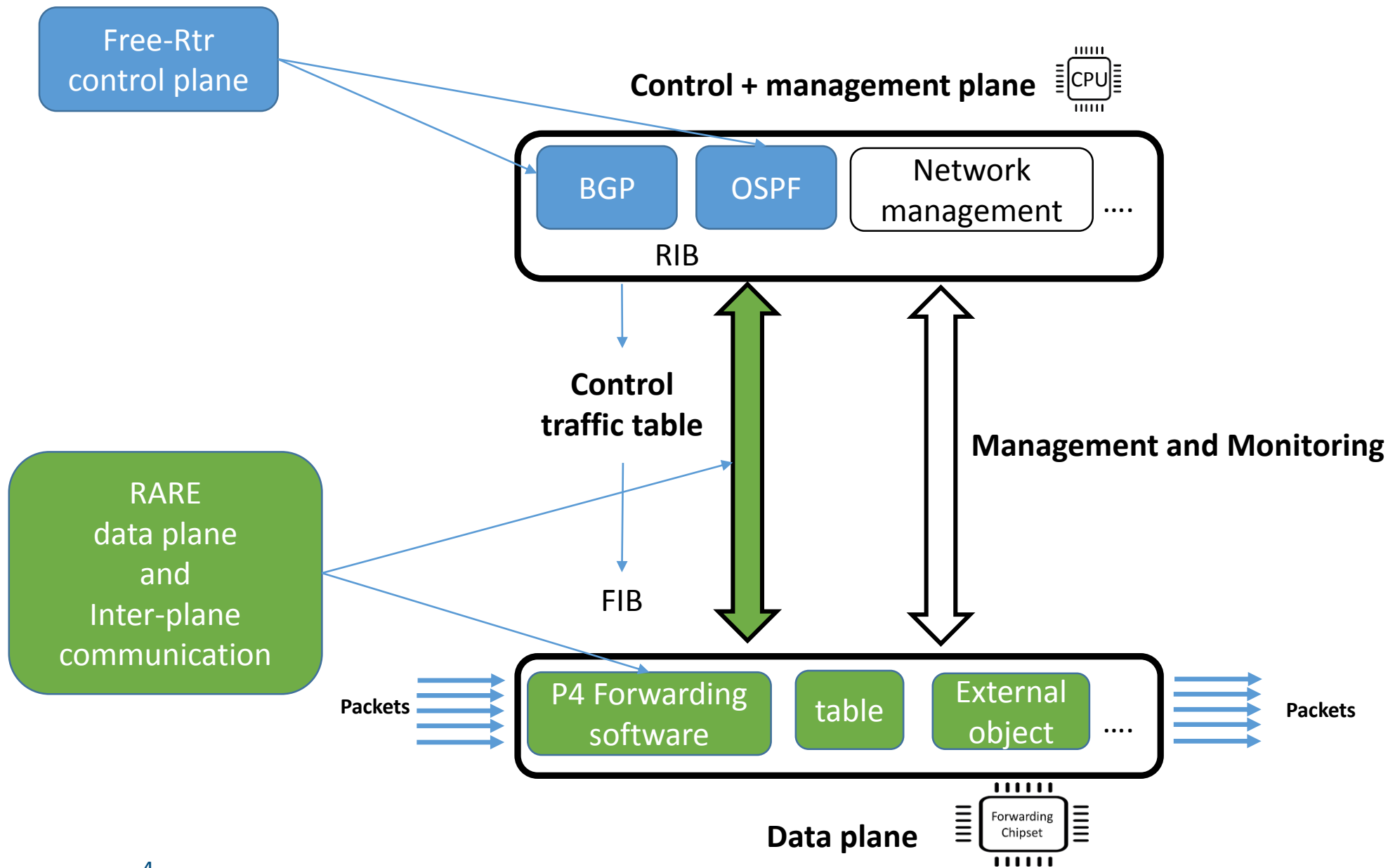
- Several topics of WP6 T1 are related to monitoring and management

RARE Router for Academia Research and Education

- Validate an open source control plane on top of P4 data-plane in NREN context
- Use cases:
 - GIX, DC, CPE, P/LSR, PE/LER
- - Global research project use cases



Open Source control plane driving a P4 data plane



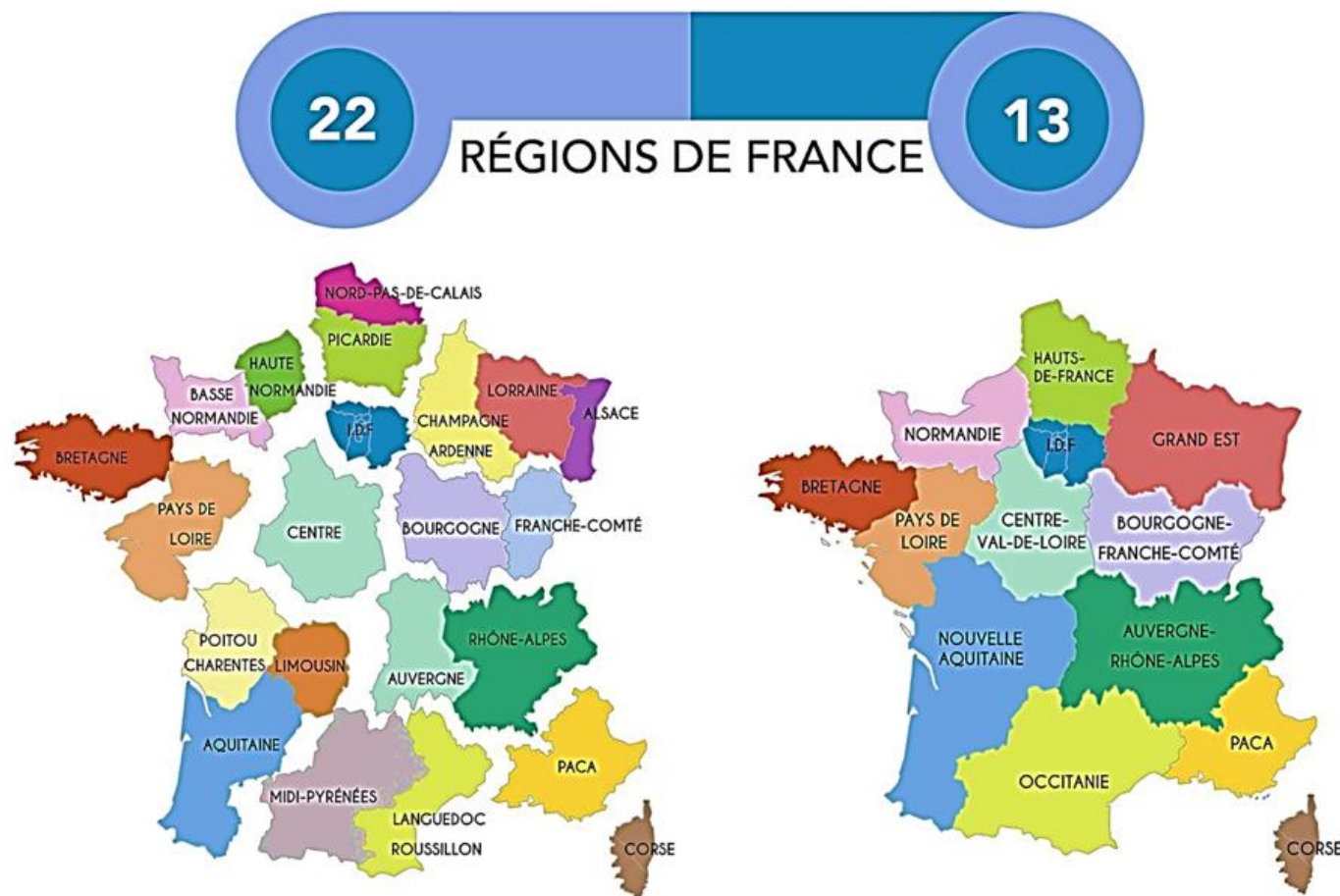
RARE Router for Academia Research and Education

- **Features developed:**
 - IPv4, IPv6, MPLS, SR-MPLS, L3VPN, XConnect, VPLS, EVPN, 6VPE
- New features under development
- Regarding manpower allocated, management and monitoring will be developed after
 - SNMP not envisaged, **streaming telemetry instead**
- What would be an appropriate collector?
 - RARE envisage ELK (Elasticsearch Logstash Kibana)?
- What variable/view should be sent to the collector? Format?
- Contact: gn4-3-wp6-t1-wb-rare@lists.geant.org

CPE Normandy – French context

- **Regional Network (Réseau d'accès)**

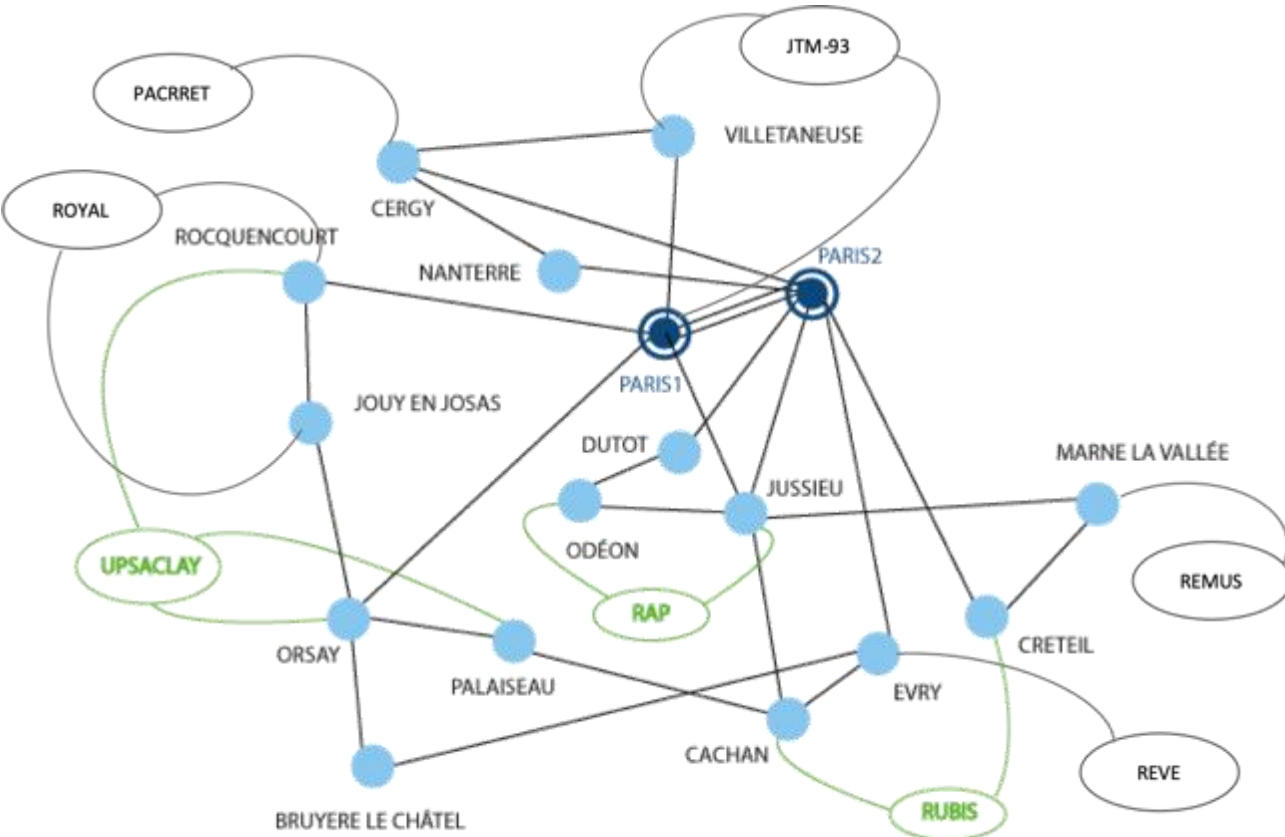
- Network that help connecting user sites. Some of them are « members » of RENATER, the regional network connect them to RENATER PoP for the others (site that are not members of RENATER) the regional network connect them to a commercial Internet provider.



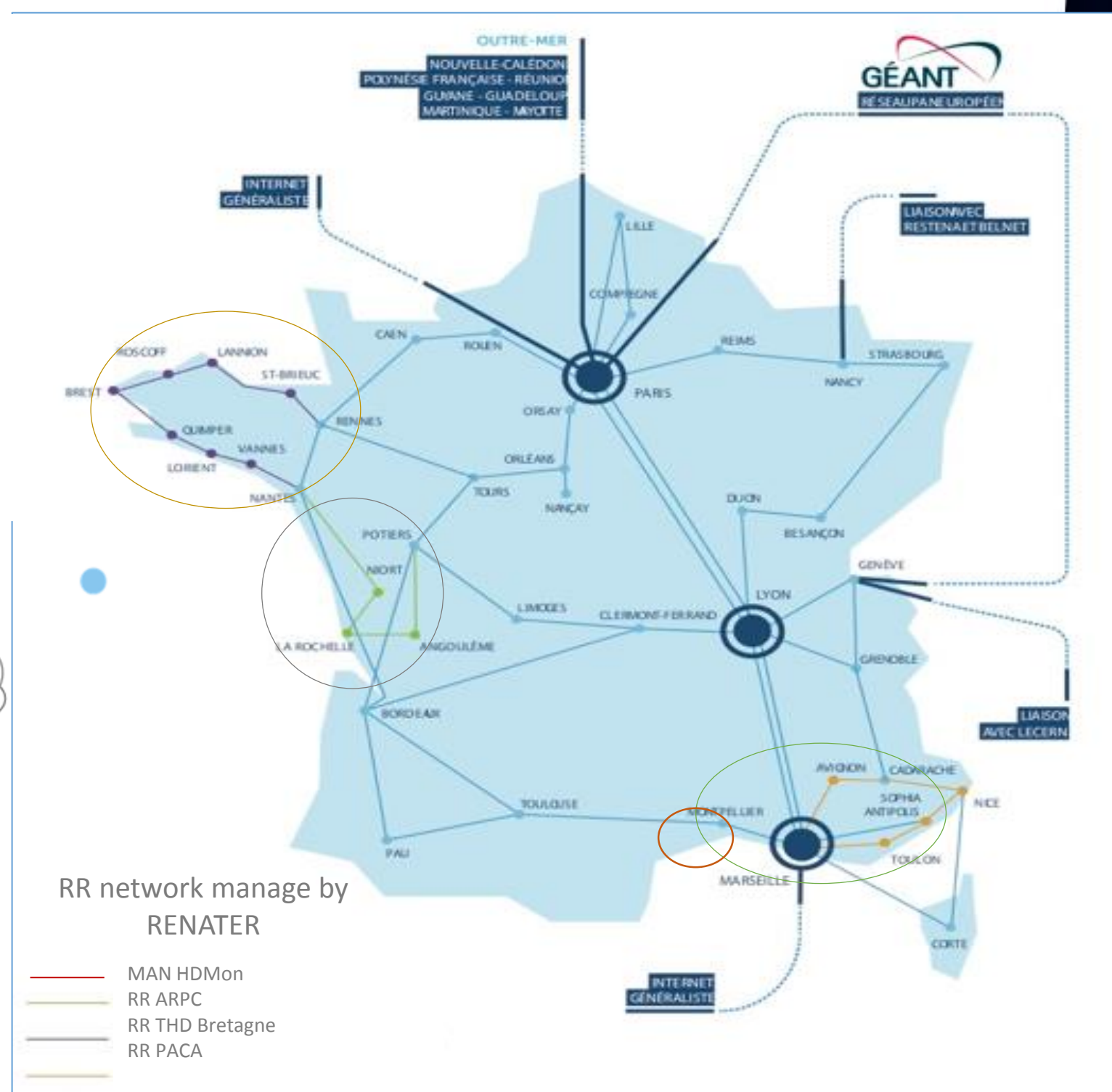
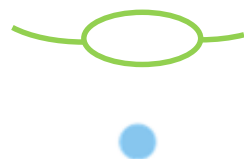
Regional networks

| REGION | RA régional ER | Réseaux anciennes régions | Réseau EN | MAN |
|----------------------------|--------------------------|--------------------------------|--|--|
| AUVERGNE-RHONE-ALPES | AMPLIVIA | ARAMIS, AUVERDATA, RRHD | AMPLIVIA | TIGRE (ex GRENET), RMESS (St. Etienne), LyRes (Lyon), CRATERE (Clermont Ferrand) |
| BOURGOGNE-FRANCHE-COMTE | | RESUBIE, SEQUANET | | |
| BRETAGNE | RUHD Bretagne | Bretagne Très Haut Data | Collecte Cotes d'Amor, Finistère, Morbihan | |
| CENTRE-VAL DE LOIRE | RRTHD | | RECIA | SIRRUS (Tours), MAN (Orléans), OSIRIS (Strasbourg) |
| CORSE | RETECOR | | | |
| GRAND EST | RAREST | RAMSES, LOTHAIRE, TELEMUS | e-Lorraine | JUPITER (Reims), OSIRIS (Strasbourg), STANNET (Nancy), AMPERNET (Metz), EPINET (Epinal) |
| HAUTS-DE-FRANCE | RRT2 NOROPALE | R RTP | R RTP | RAOUL (Lille) |
| ILE-DE-FRANCE | IdF RENATER | | | PACRRET (Val d'Oise), ROYAL (Yvelines), RAP (Paris), JTM93, REVE (Evry), RUBIS (Hauts de Seine-Essonne-Val de Marne), REMUS (Marne la Vallée), UPSaclay (Plateau de Saclay) |
| NORMANDIE | SYVIK | SYRHANO, VIKMAN | | |
| NOUVELLE-AQUITAINE | RNA | GREPA, SPIN | SPIN , RAIHV | REUMUR (Bordeaux), RELIER (Limoges) |
| OCCITANIE | THD'Oc | ASTER, R3LR6 | THD'Oc., SYNAPSE | REMIP (Toulouse), HDMon (Montpellier) |
| PAYS DE LA LOIRE | GIGALIS | | COLLECTE - LEMANS | OR-ANGERS, Le Mans, Omega |
| PROVENCE-ALPES-COTE D'AZUR | Extension RENATER | R2THD | REALYCE | RARE (Avignon), RMES (Toulon), RAIMU (Marseille) |
| GUADELOUPE | | | | |
| GUYANE | RENATER 3 points | | | |
| LA REUNION | GAZELLE | | | |
| MARTINIQUE | RIME | | | |
| MAYOTTE (TOM) | | | | |
| Polynesie Française COM) | POLYREN | | | |

Operational activity regarding regional network (RR)



RR managed by RENATER
in Paris region
Backbone RENATER node



RENATER and regional networks

- Active collaboration with regional network
 - Work on regional network backup access
- Project management assistance and consulting
 - Network architecture design
 - Tender/Request For Information management support
- Collaboration with regional network around innovation and technical
 - MD-VPN
 - White box project: CPE-Normandy
 - In the future → Network Management as a Service

What is white box?

- A white box is a switch/router manufactured from commodity components that allows different Network Operating Systems (NOS) to be run on the same piece of commodity hardware
- Decoupling the software (NOS) from the hardware → 2 levels of independence :
 - independence from the hardware
 - you can change the hardware vendor and keep the software
 - independence from the NOS
 - you change the NOS and keep the hardware



CPE for Normandy Region

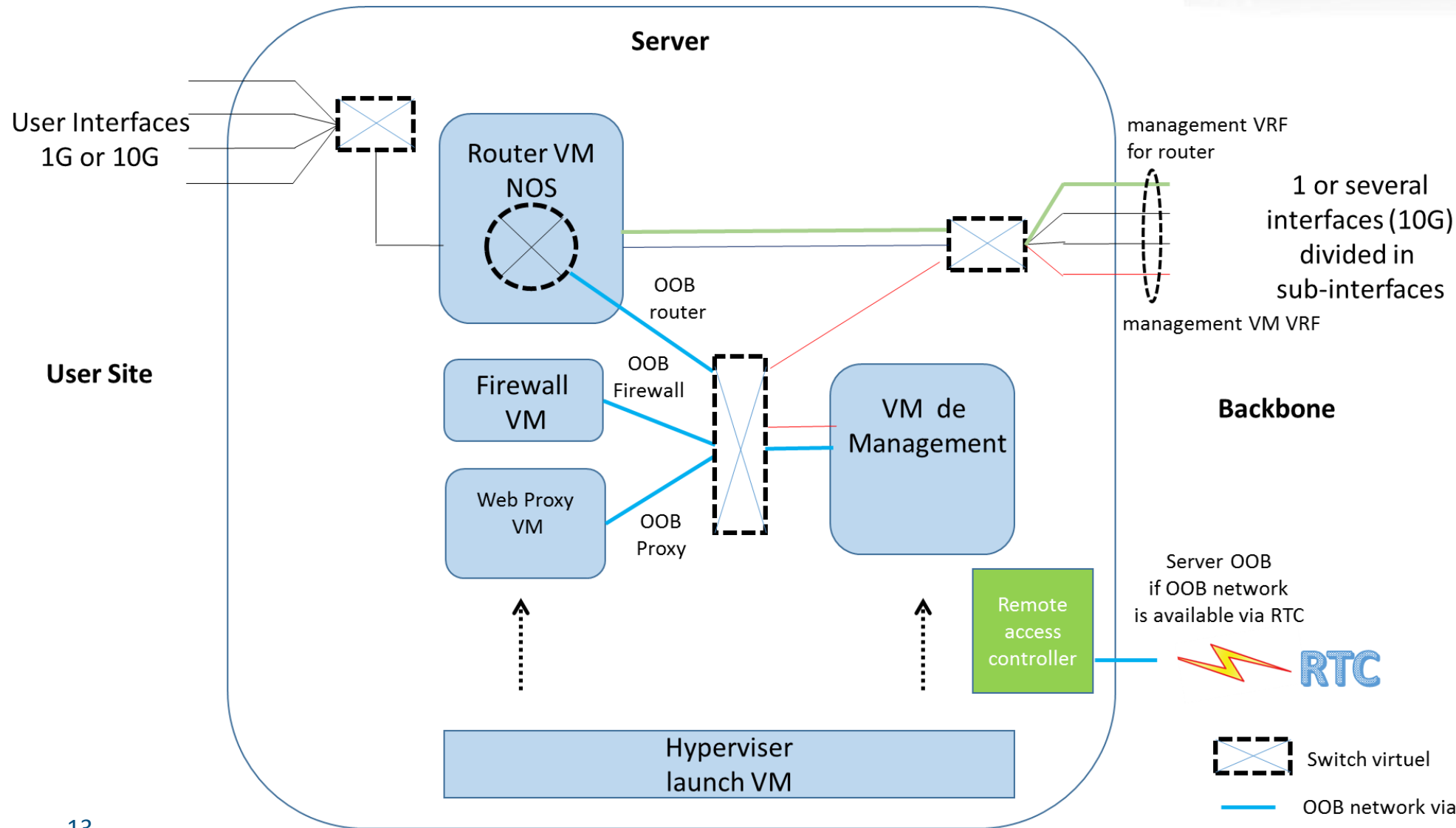
- Upgrade the high schools CPE routers (Normandy region manage 140 high schools)
- Requirement
 - At least 1Gb/s throughput
 - BGP peering, IGP, VLAN, Logical interface, VRF lite), management (SSH, Syslog, SNMPv2) and security (line-rate IPv4/IPv6 L3 ACLs, Broadcast storm protection)
 - Automation.
 - The cost must not exceed the cost of the existing solution.

CPE for Normandy Region



- White boxes were originally designed for data centre use
- Not cost effective in comparison to a very small router.
- A solution based on x86 servers with a switch-style form factor
 - 1 socket 8 cores Intel Xeon D-2145NT @1.9GHz
 - 1x 32 GB of RAM (7 of 8 slots free)
 - 1 TB M.2 SSD
 - 2x10G ports + 4x 1Gbps RJ45 ports + some other RJ45 for management (console, ...)
- Router implemented as network virtualized function
 - Capacity to activate additional network virtualized function(s)
 - CUMULUS and FRR solution tested – FRR chosen
 - No dedicated forwarder chipset so the forwarding capacity decrease according to the number of NFV implemented

X86 server CPE design



Same automation type as in a data center

1. Hypervisor provisioned on the server by the NOC
 - First, configured (IP address, ...) using a USB stick
 - In future via PXE
 - by adding the MAC and IP address in Ansible inventory and launching a playbook
2. Using a set of Ansible playbooks, the stack is set up:
 1. hypervisor configuration (bridges, VLANs, ...)
 2. CPE virtual machine provisioning on the hypervisor
 3. CPE installation (Operating System, IP addresses and additional packages)
 4. CPE configuration (routing daemon configuration: VRF, BGP, management ACL, ...)

Deployment and validation

- Deployment during last week of October (foreseen October 22nd) in 2 first high schools

Thank you

Any questions?



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