

# **RENATER's White Box CPE in Normandy Regional network**

## **WP6 T1 monitoring and management activity**

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Public

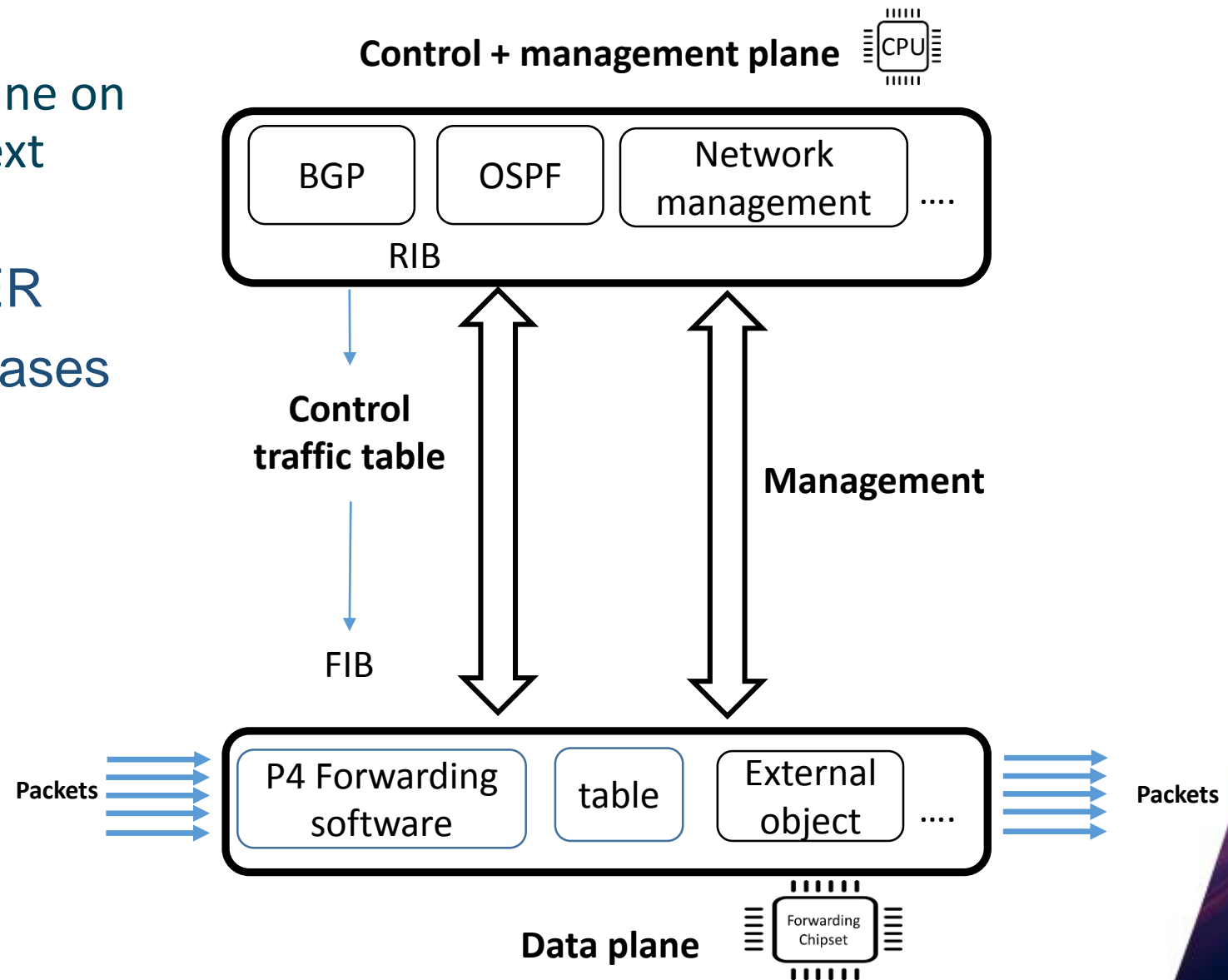
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# GÉANT 4-3 WP6 Task1: Network Technology Evolution

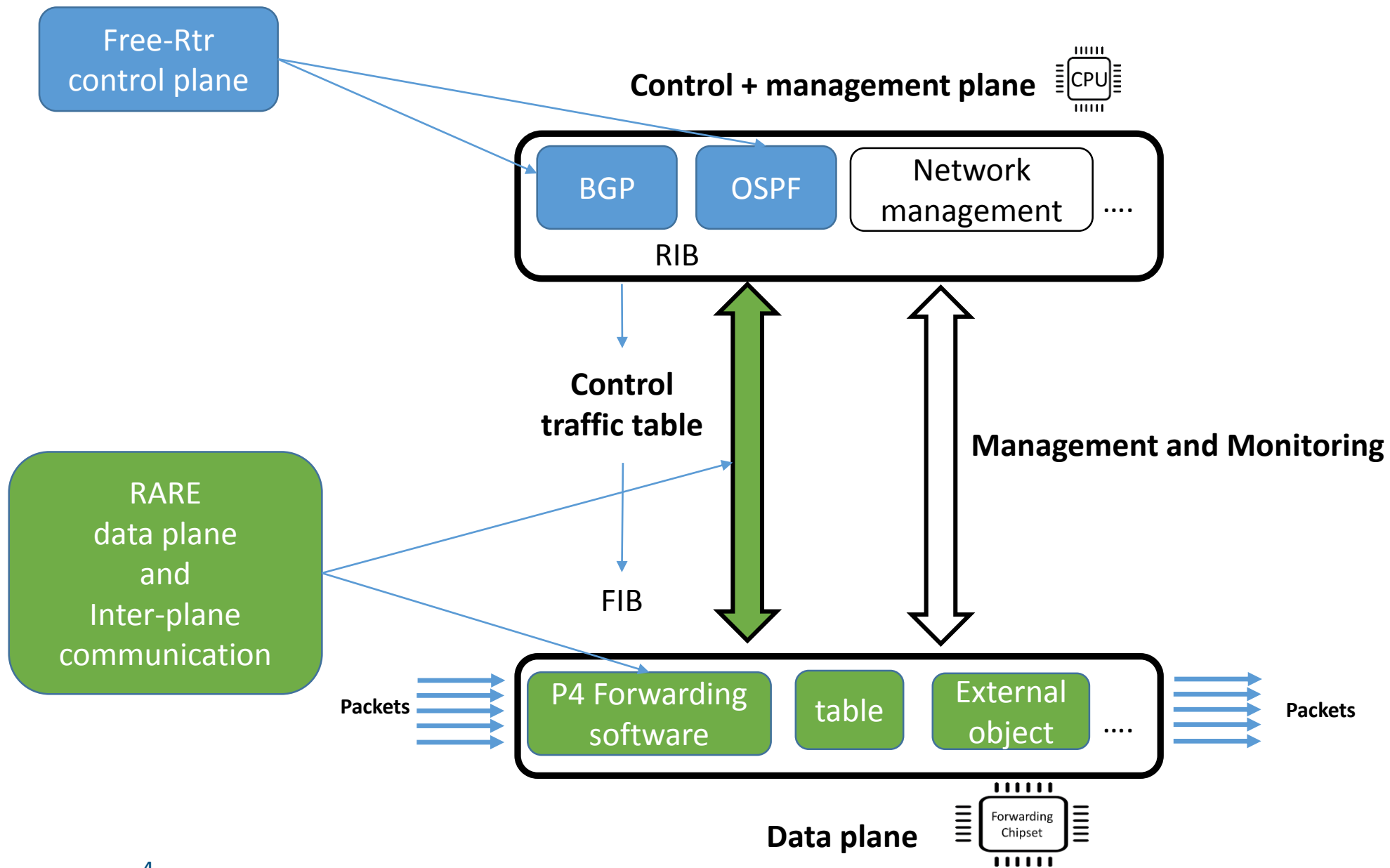
- LoLa
- Optical Time & Frequency Network
- Quantum Key Distribution
- White-Box for research and education
- Router for Academia, Research and Education
- Data Plane Programming
  
- Several topics of WP6 T1 are related to monitoring and management

# 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
- Demonstration of Segment Routing with ISIS at <https://youtu.be/5dD18sJ6pS8>
- 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](mailto:gn4-3-wp6-t1-wb-rare@lists.geant.org)

# CPE Normandy – French context

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

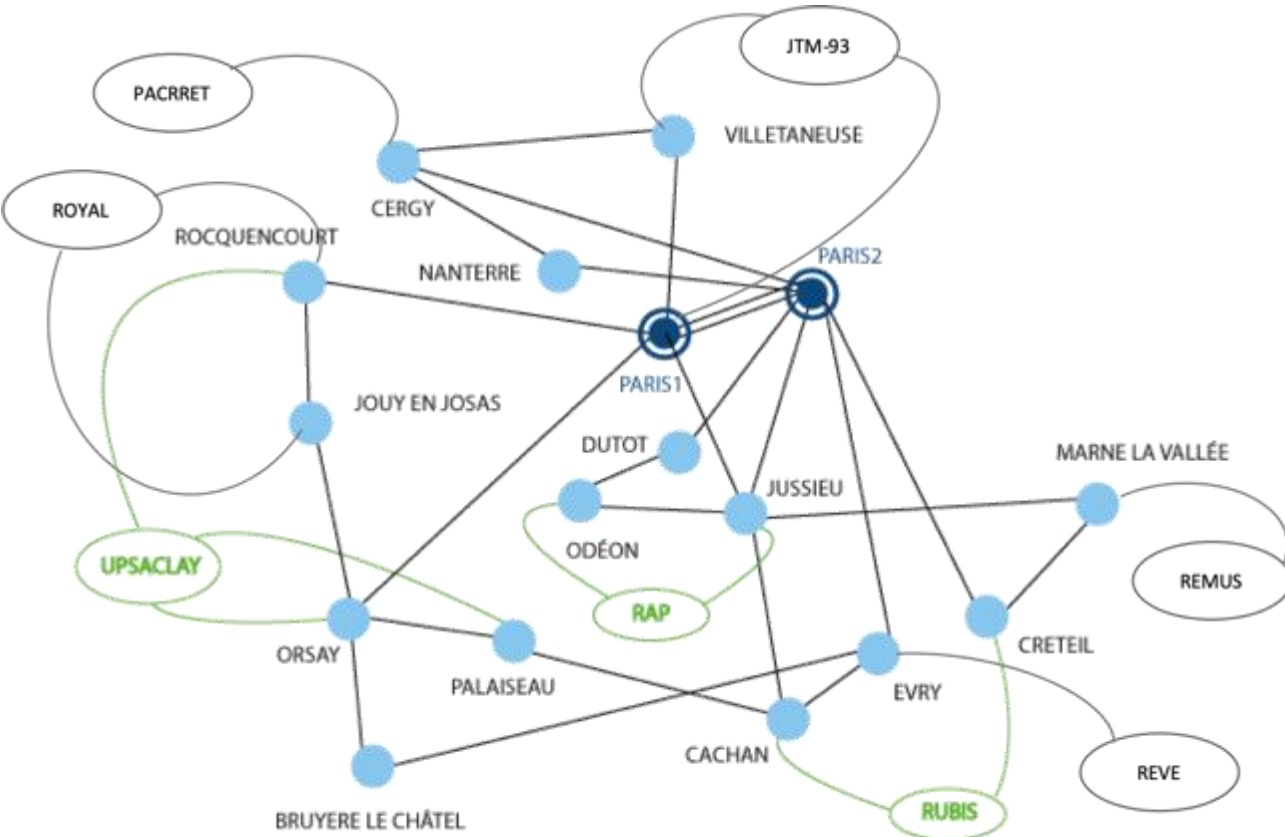
- Network that help connecting user sites. Some of them are « members » of RENATER, the regional network connect them to RENATER PoP for the others (site that are not members of RENATER) the regional network connect them to a commercial Internet provider.



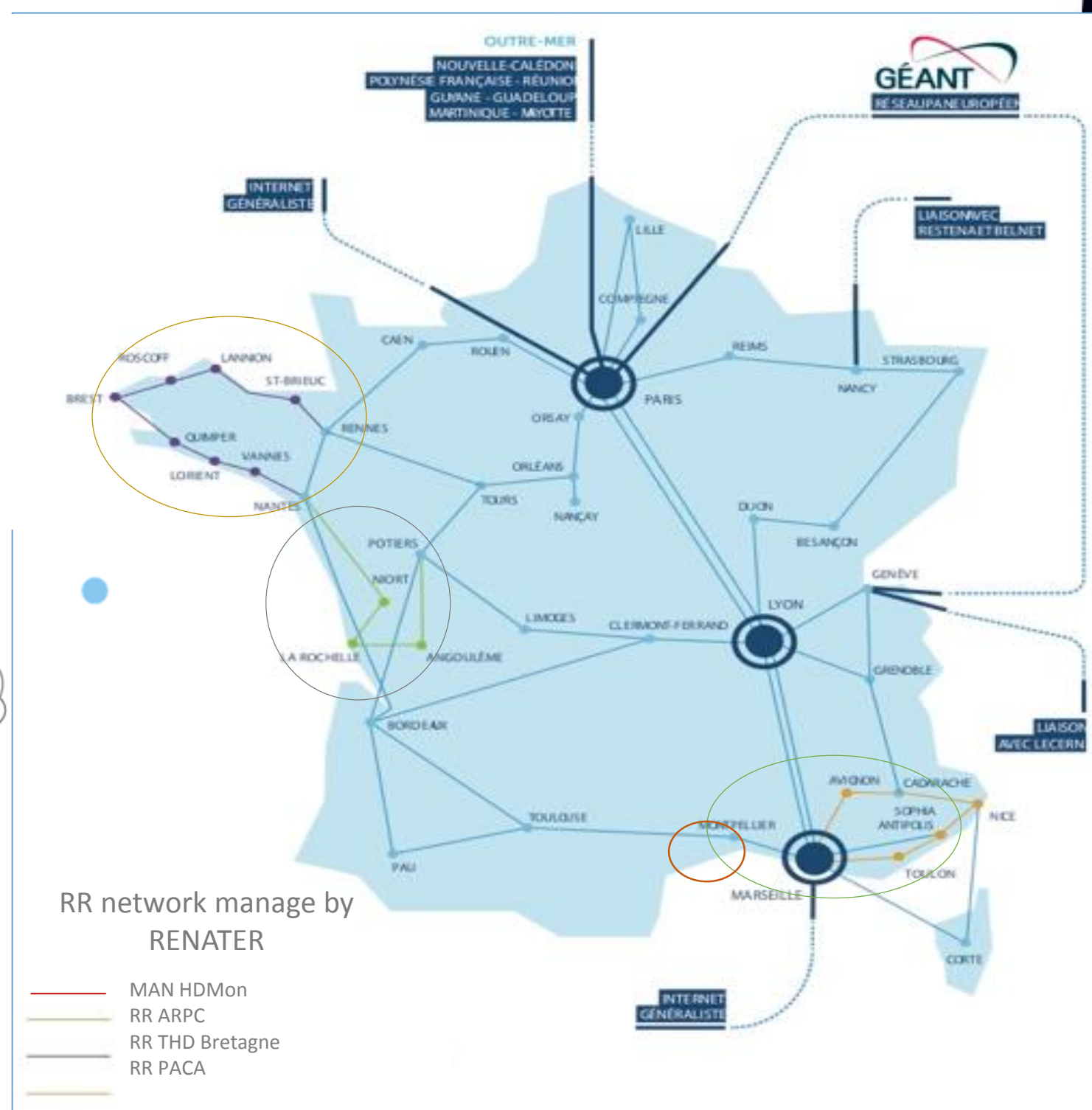
# Regional networks

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	<b>RUHD Bretagne</b>	<b>Bretagne Très Haut Data</b>	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	<b>IdF RENATER</b>			PACRRET (Val d'Oise), ROYAL (Yvelines), <b>RAP</b> (Paris), JTM93, REVE (Evry), <b>RUBIS</b> (Hauts de Seine-Essonne-Val de Marne), REMUS (Marne la Vallée), <b>UPSaclay</b> (Plateau de Saclay)
NORMANDIE	SYVIK	SYRHANO, VIKMAN		
NOUVELLE-AQUITAINE	<b>RNA</b>	GREPA, <b>SPIN</b>	<b>SPIN</b> , RAIHV	REUMUR (Bordeaux), RELIER (Limoges)
OCCITANIE	THD'Oc	ASTER, R3LR6	THD'Oc., SYNAPSE	REMIP (Toulouse), <b>HDMon</b> (Montpellier)
PAYS DE LA LOIRE	GIGALIS		COLLECTE - LEMANS	OR-ANGERS, Le Mans, Omega
PROVENCE-ALPES-COTE D'AZUR	<b>Extension RENATER</b>	R2THD	REALYCE	RARE (Avignon), RMES (Toulon), RAIMU (Marseille)
GUADELOUPE				
GUYANE	<b>RENATER 3 points</b>			
LA REUNION	GAZELLE			
MARTINIQUE	RIME			
MAYOTTE (TOM)				
Polynesie Française COM)	<b>POLYREN</b>			

# 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

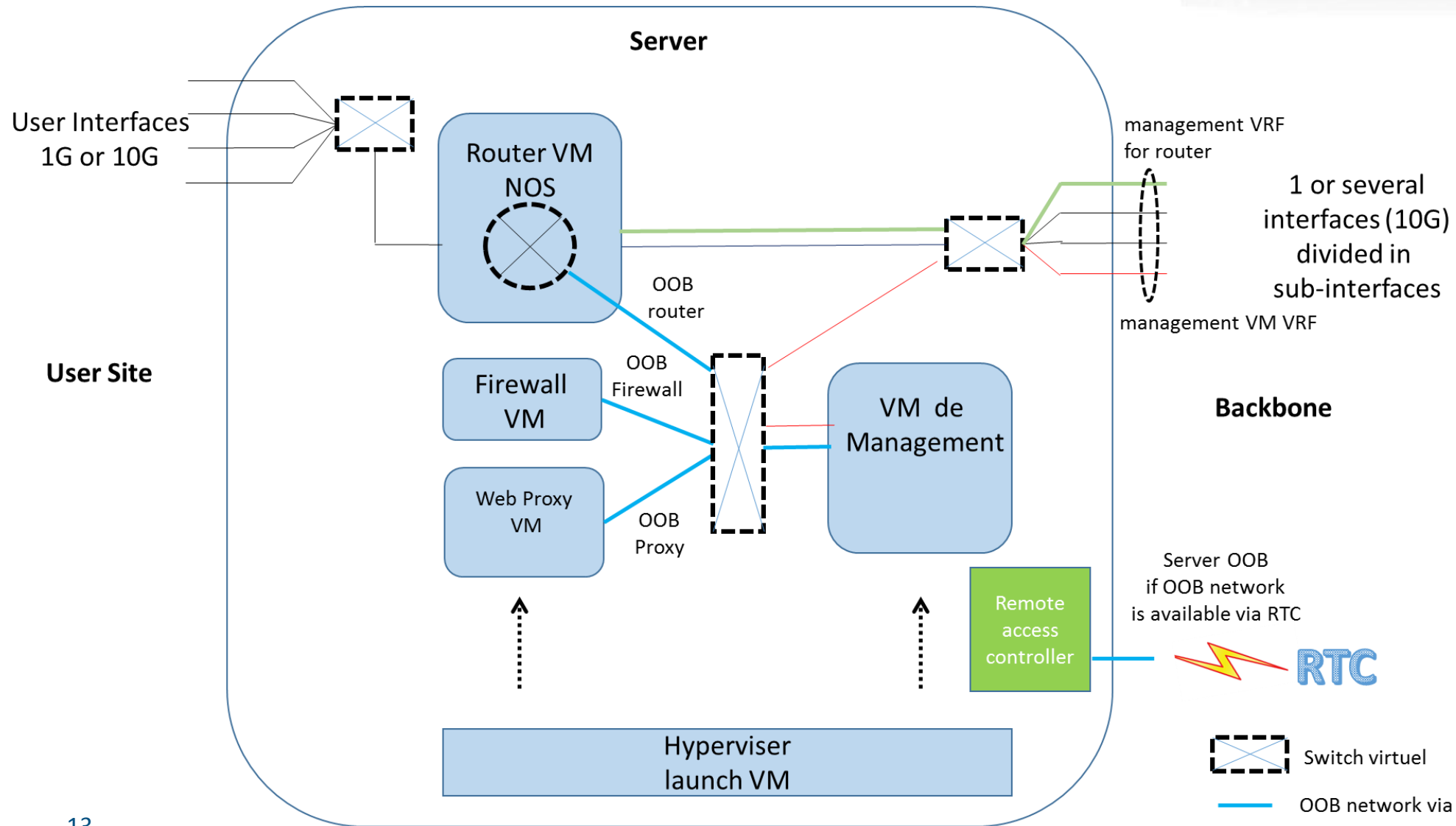
- Upgrade the high schools CPE routers (Normandy region manage 140 high schools)
- Requirement
  - At least 1Gb/s throughput
  - BGP peering, IGP, VLAN, Logical interface, VRF lite), management (SSH, Syslog, SNMPv2) and security (line-rate IPv4/IPv6 L3 ACLs, Broadcast storm protection)
  - Automation.
  - 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 (Dell VEP 4600)
  - 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 an 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 22<sup>nd</sup>) in 2 first high schools

# Thank you

## Any questions?



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