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CHARISMA – Low Latency, Enhanced Security and Open Access Support through a Hierarchical, Intelligent, SDN/NFV-based 5G Architecture

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OTE
GROUP OF COMPANIES

CHARISMA Partners, Funding and Duration

14 PARTNERS

FUNDACIÓ i2CAT – Spain
ERICSSON – Spain
APFUTURA – Spain
COSMOTE – Greece
NCSR DEMOKRITOS – Greece
ITRACOM – Greece
INNOROUTE – Germany
FRAUNHOFER HHI – Germany
INCITES – Luxemburg
UNIVERSITY OF ESSEX – UK
JCPC – France
ALTICE LABS – Portugal
SLOVENIA TELECOM – Slovenia
ETHERNITY NETWORKS – Israel

FUNDING: 5.9M€ (H2020)

DURATION: 30 MONTHS (7/15 – 12/17)

H2020 5G-PPP
Grant Agreement No. 671704

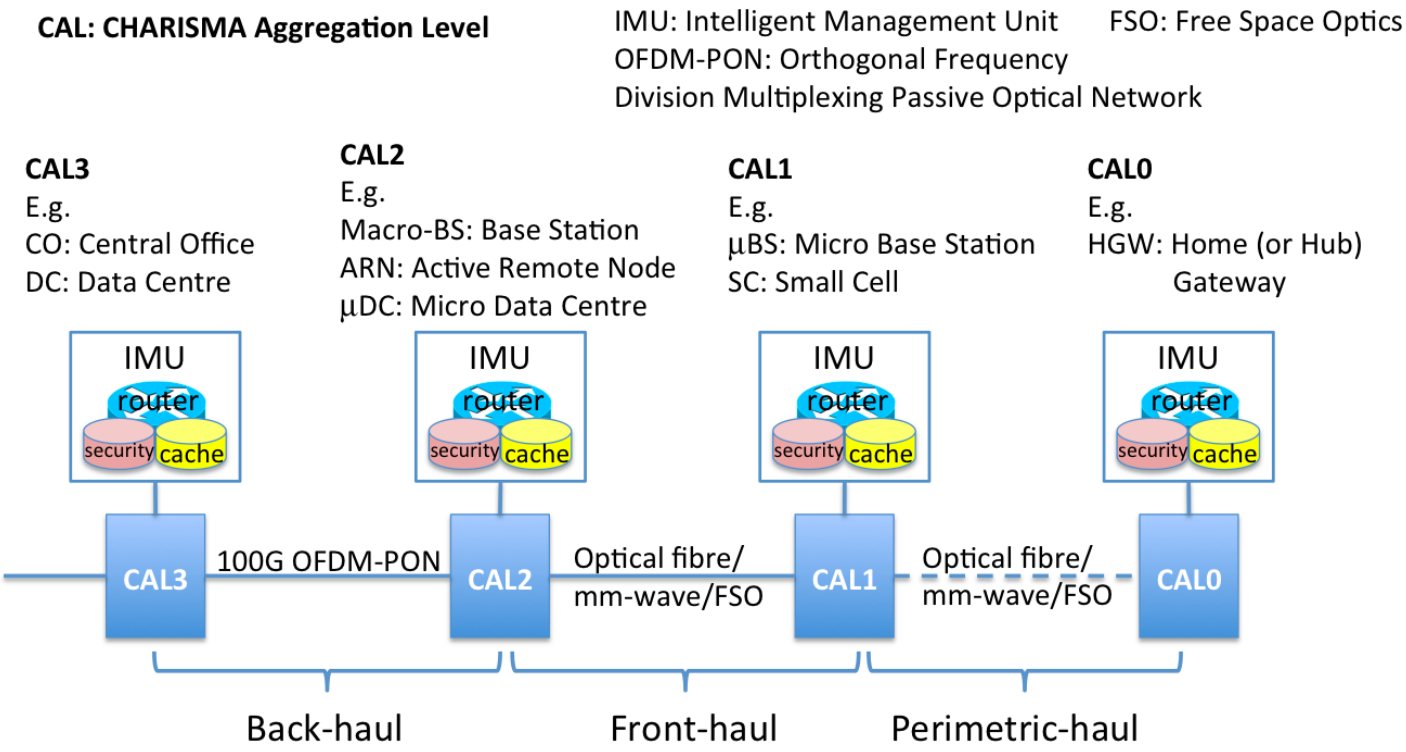
CHARISMA Aim

- CHARISMA proposes a converged, secure & virtualized 5G network architecture that combines optical (100G) and wireless (mm-wave & FSO -10G) cloud-based access solutions through an intelligent RAN which offers:
  - open access
  - low latency
  - enhanced virtualized security.

CHARISMA Objectives

- CHARISMA builds upon:
  - hierarchical architecture
  - virtualized slicing of network resources to different service providers
  - 60 GHz/E-band
  - cloud-RAN (C-RAN)
  - distributed intelligence across the back/front/perimetric-haul
  - ad-hoc mobile device interconnects
  - content delivery networks (CDN)
  - mobile distributed caching (MDC)
  - improved energy efficiency

CHARISMA Architecture (1/2)

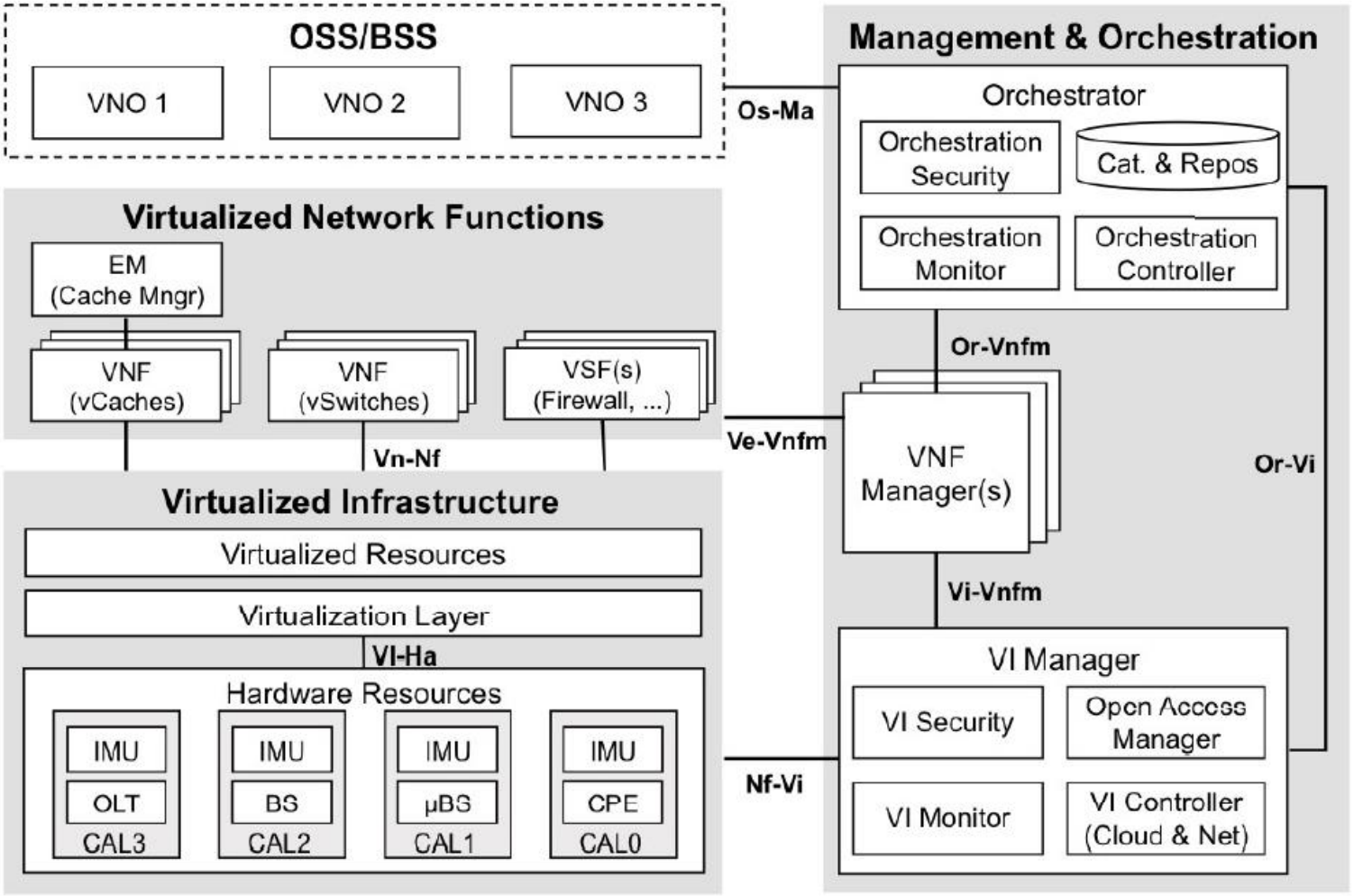


- Hierarchical approach, assuming the existence of active nodes between the Central Office (CO) and the end-users
- Each active node is called Converged Aggregation Level (CAL).

CHARISMA Architecture (2/2)

- Each CAL has its own scalable intelligent management unit (IMU) performing data storage/caching, processing and routing functionalities.
- Distributing intelligence even closer to the end-user assists in reducing network latency, and allows for more precise SDN and NFV control of the CHARISMA 5G network.
- Data is routed to the lowest common aggregation point, to assist in achieving low-latency networking.
- For Device-to-Device (D2D) communications, data is routed directly among the devices (CAL0).
- For devices within a micro-cell, routing is via the CAL1 level.
- Within a macro-cell, routing is via the CAL2 level.
- For non-local routing, this is performed at the CAL3 level, at CO or Distributed Caching (DC).

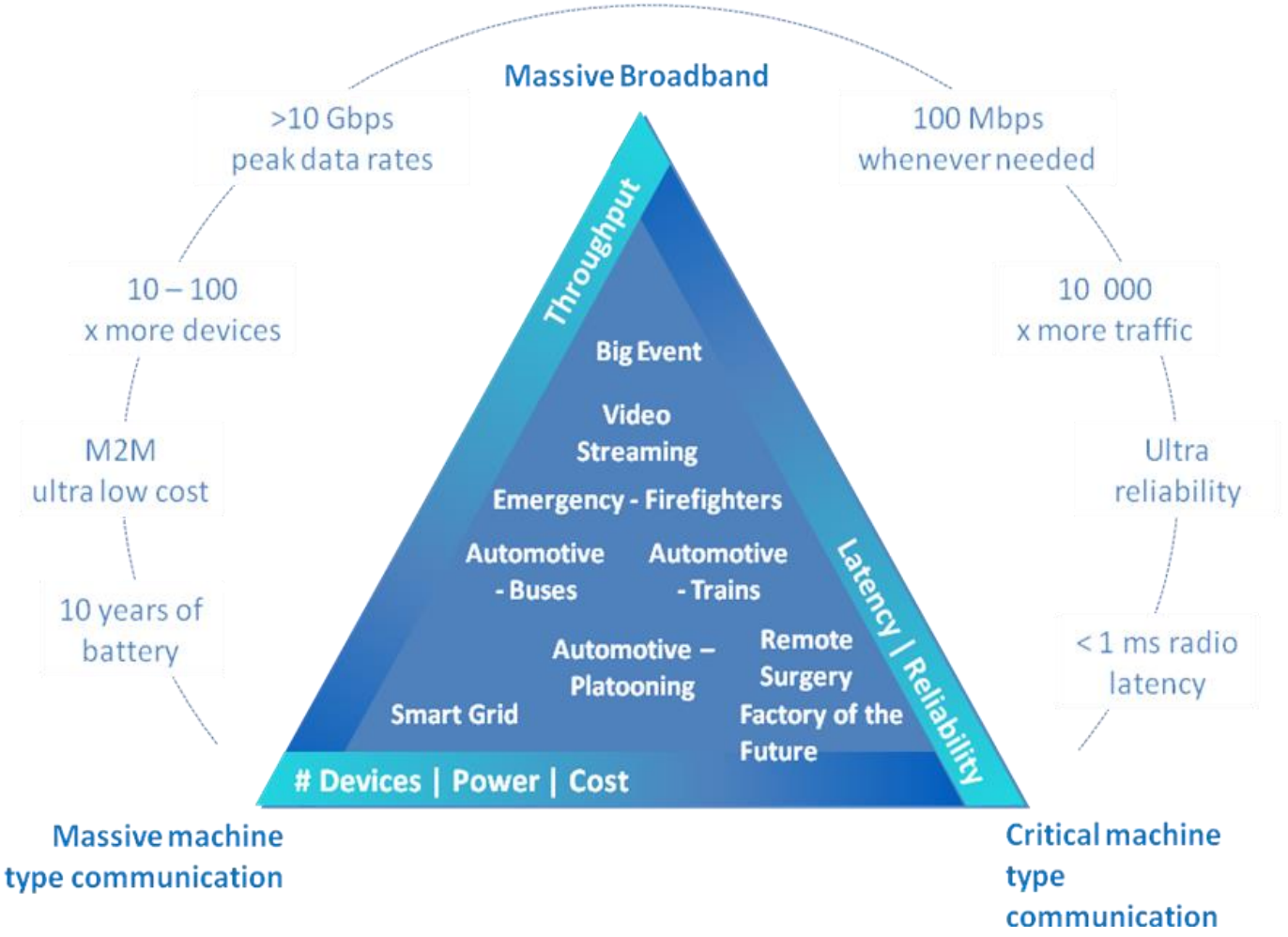
CHARISMA control, management and orchestration (1/2)



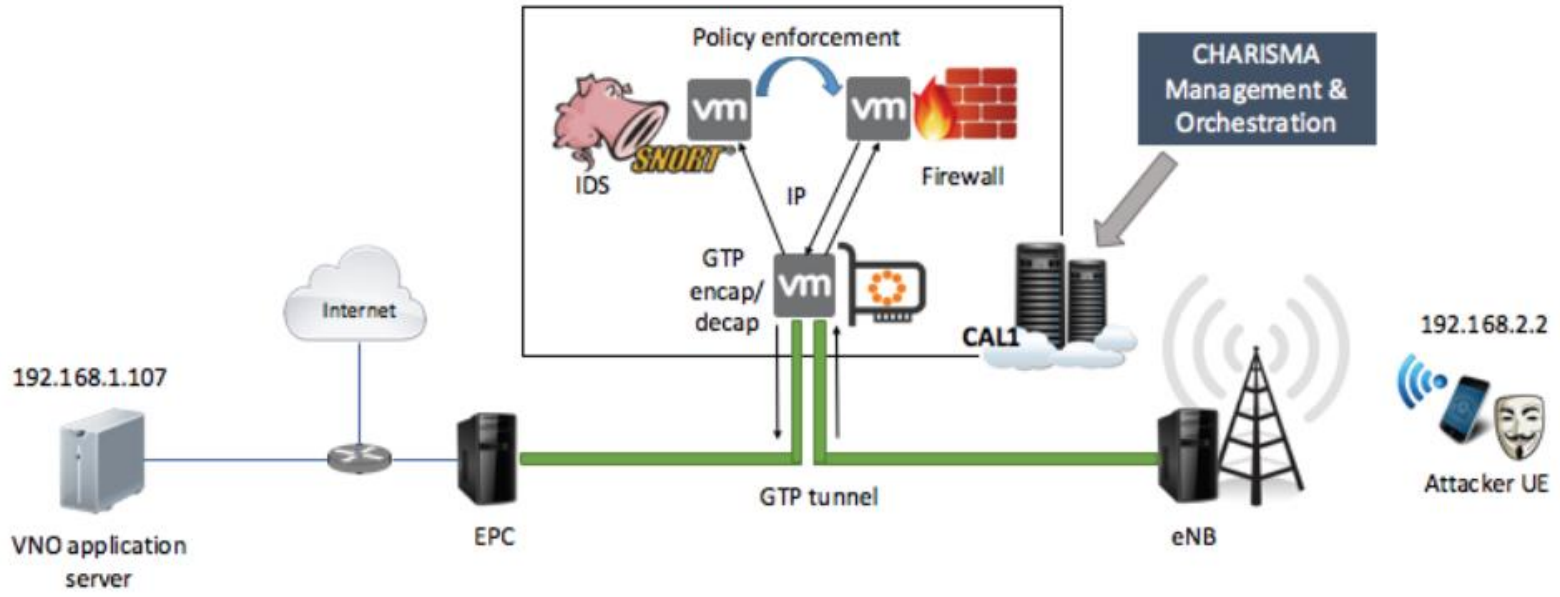
CHARISMA control, management, and orchestration (2/2)

- The VI group virtualizes the hardware resources (computing, storage, and network) via e.g., a hypervisor at the Virtualization Layer, which pools the resources and exposes them for consumption by VNFs.
- The VNFs group comprises software components that implement network functions destined to run on the VI (and finally on the IMUs). CHARISMA looks specifically to implement VNFs for caching, switching and security.
- The MANO group includes components for the combination of VNFs into graphs implementing network services, the lifecycle management of VNFs, the coordination of allocating VNFs to virtualized resources, the homogenized control and management of the hardware resources, and the slicing of resources for supporting multi-tenancy.

CHARISMA Use Cases within the 5G Ecosystem



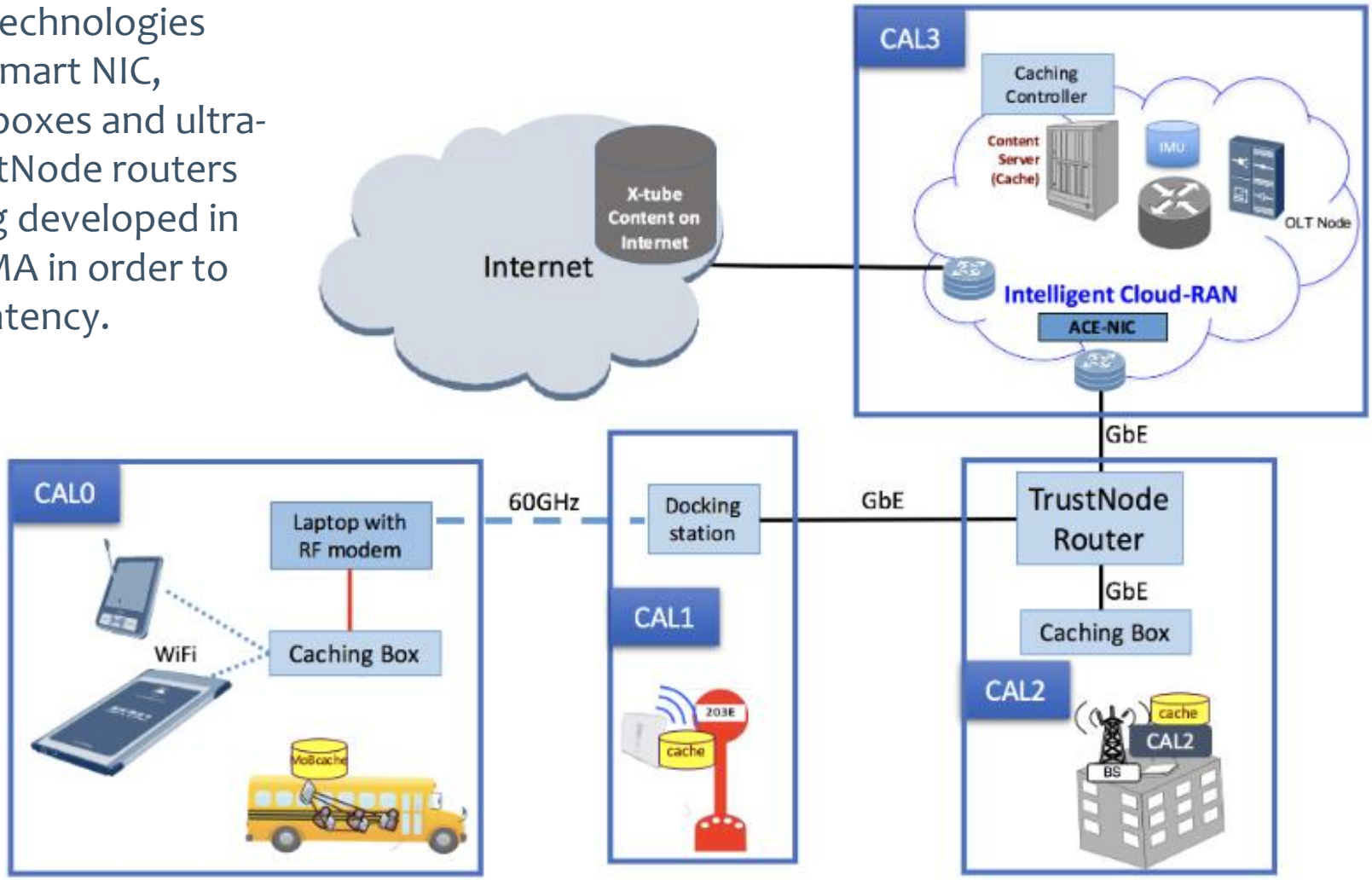
CHARISMA Security Demonstrator



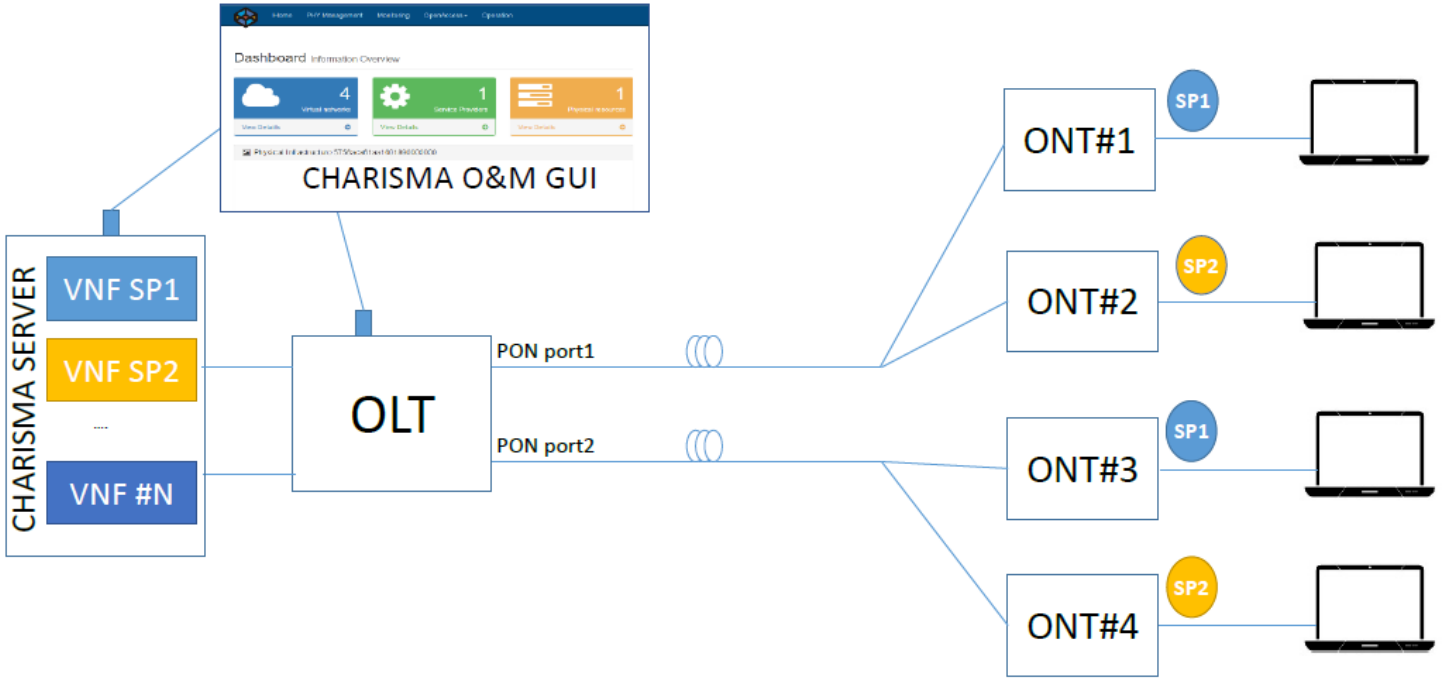
- Packets flowing in the GTP tunnel between the EPC and the eNB are intercepted and forwarded to the GTP decapsulator VM to remove GTP headers. IP traffic is forwarded to the security functions deployed at the cloud.
- In case the intrusion detection system detects an attack, the firewall will be automatically configured with the right rules to mitigate the attack.

CHARISMA Low Latency Demonstrator

Various technologies such as smart NIC, caching boxes and ultra-fast TrustNode routers are being developed in CHARISMA in order to reduce latency.



CHARISMA Open Access/Multi Tenancy Demonstrator



- A FTTH system is demonstrated using a GPON solution with 2 PON ports plus 2 ONTs on each of them and a CHARISMA server supporting the slicing infrastructure.
- CHARISMA O&M GUI enables to dynamically create virtual network slices over the available infrastructure.
- Virtual resources are bundled together into a slice constituting an independent virtual edge network for a service provider.

CHARISMA Field Trials

- The CHARISMA intermediate demos will be integrated into two different field trials at the end of the project.
  - Ljubljana (Slovenia)
  - Barcelona (Spain)

Thank You