Thoughts on current and future experimentation needs
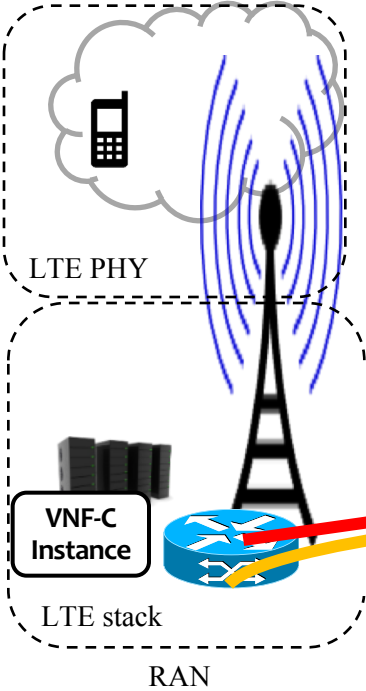
Josep Mangues-Bafalluy, Jorge Baranda, Manuel Requena, Miquel Payaró, Nikolaos Bartzoudis, Mònica Navarro, David Gregoratti

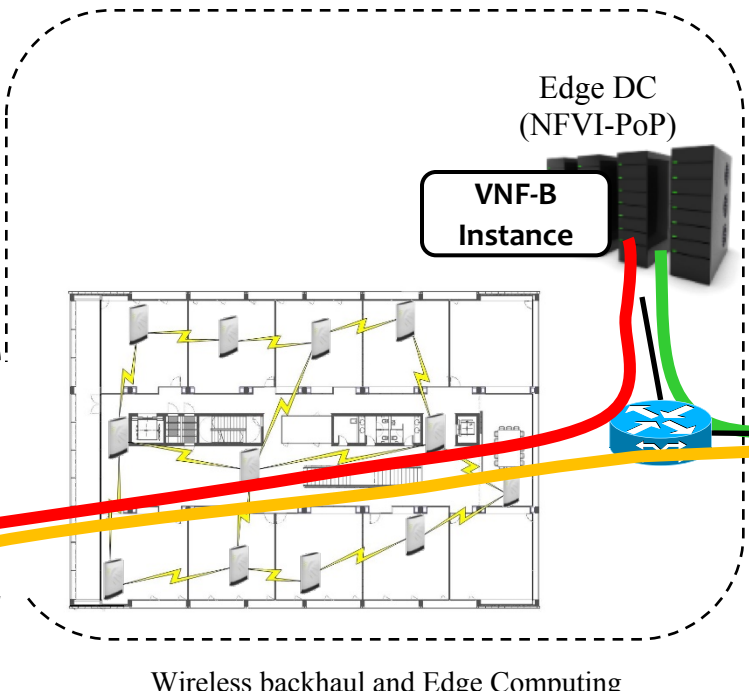**Centre Tecnològic de Telecomunicacions de Catalunya (CTTC/CERCA)**

GEFI 2019 workshop

Key messages

- Move towards softwarization and virtualization of functions brings flexibility for experimentation

- Aggregation of the capabilities of multiple testbeds (Federated testbed)
  - E2E orchestration of multi-technology multi-domain network segments

- Open and commonly agreed APIs for experimentation

- Framework that generates meaningful data and is generic enough for any AI/ML-based application
  - Real-time access to experimentation data

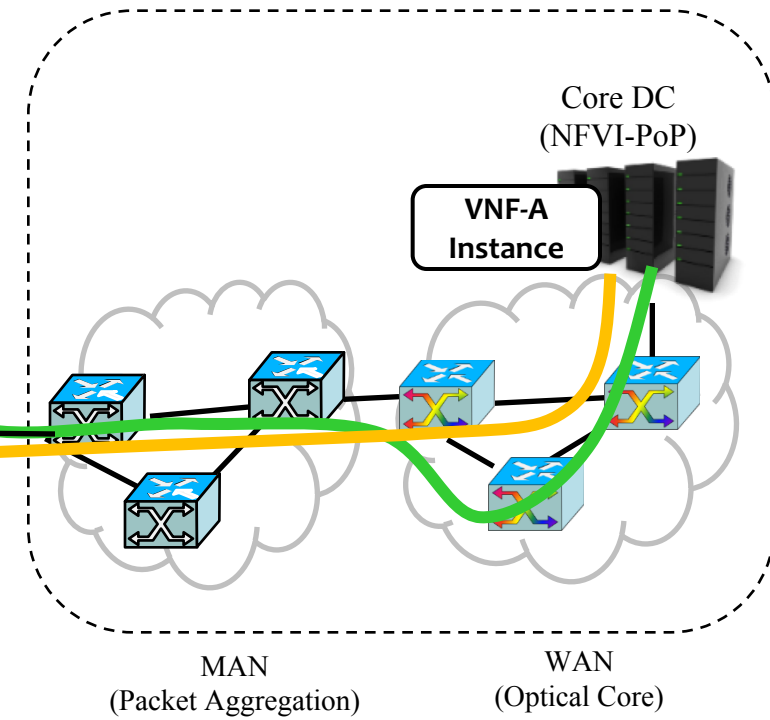- Simulators in emulation mode (e.g., ns-3 LENA)

Programmable mobile network

GEDOMIS® Testbed

LTE PHY

VNF-C Instance

LTE stack

RAN

EXTREME Testbed ®

Edge DC (NFVI-PoP)

VNF-B Instance

Wireless backhaul and Edge Computing

ADRENALINE Testbed ®

Core DC (NFVI-PoP)

VNF-A Instance

MAN (Packet Aggregation)

WAN (Optical Core)

Dynamic deployment of vertical services over shared infrastructure

NFV Service federation as enabler of federated testbeds
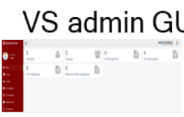
Defining and Managing Vertical Services:
(1) Defining vertical services (VSB->VSD)
(2) VSD/NSD translator: maps vertical's requirements to network slice requirements
(3) Arbitrator: mapping vertical services to network slices, in turn to NFV Network Services

NFV Network Service Orchestration/Federation:
- Service Orchestration (NFVO-NSO)
- Resource Orchestration (NFVO-RO)

- Allocation of resources over the infrastructure
- Providing abstractions
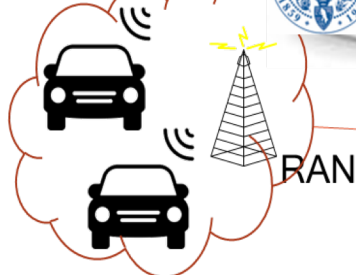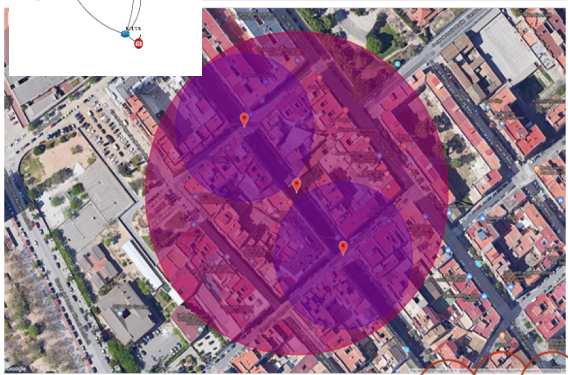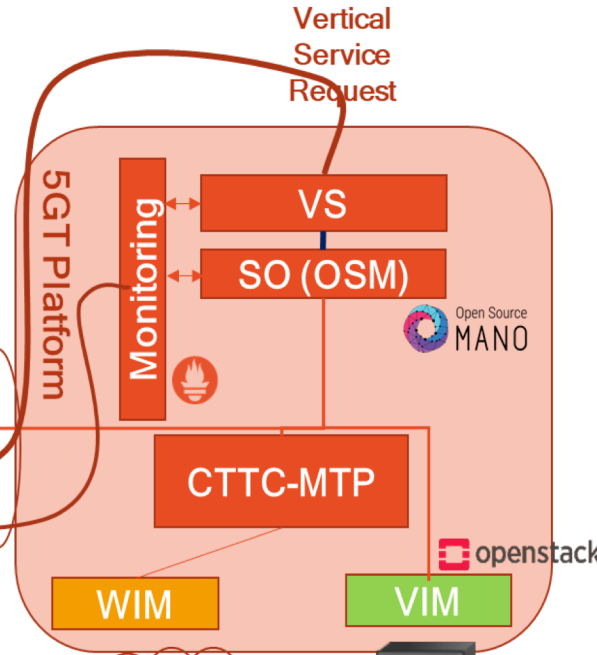
Interfaces are aligned with ETSI NFV Interface and Information Model Specifications (IFA)

Vertical / MVNO — Ve-Vs

OSS/BSS — Mgt-Vs
5GT-VS — Network Slice Manager

(Os-Ma-Nfvo, IFA 013)

NSaaS: Or-Or, IFA 013
NFVIaaS: Or-Vi, IFA 005
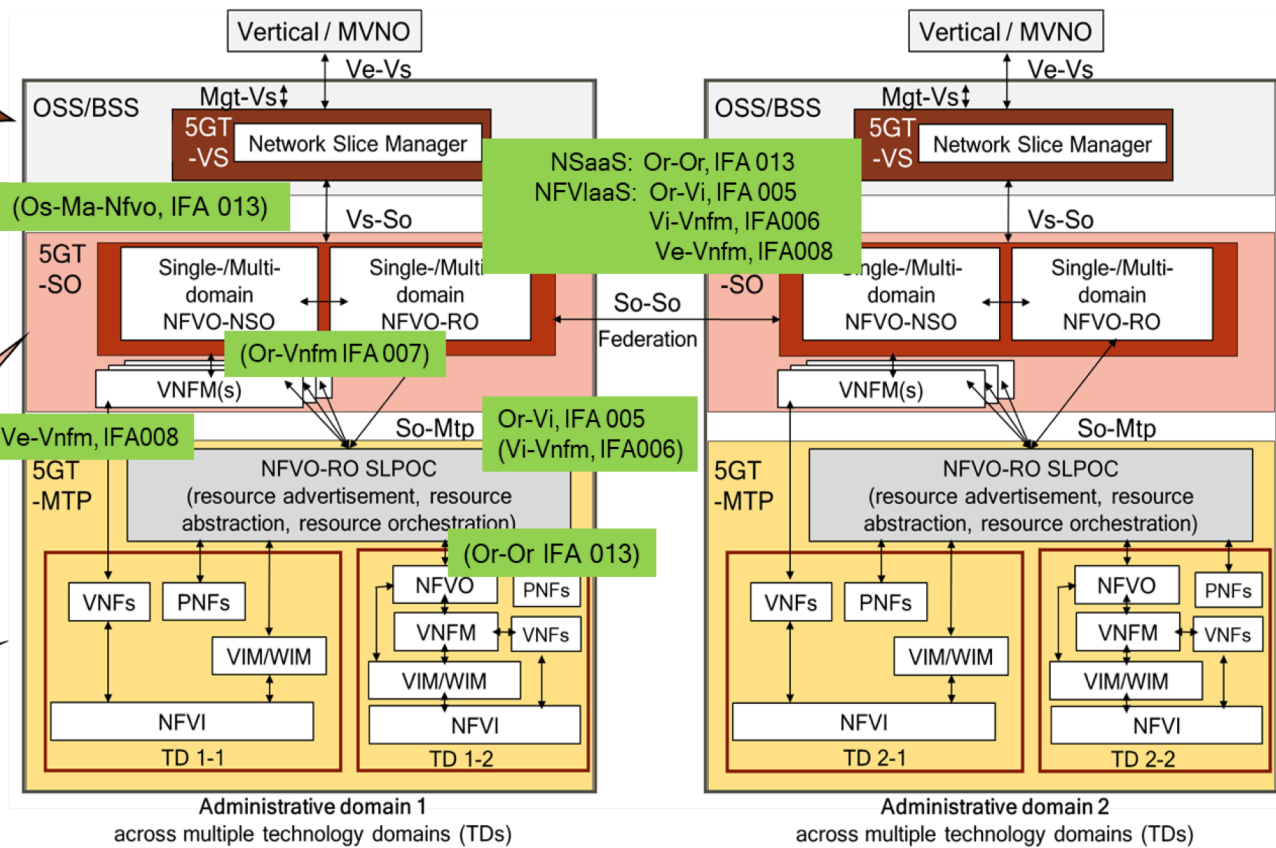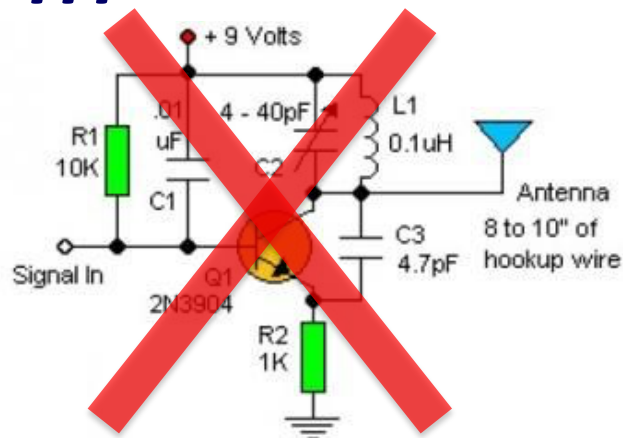Vi-Vnfm, IFA006
Ve-Vnfm, IFA008

5GT-SO — Single-/Multi-domain NFVO-NSO — Single-/Multi-domain NFVO-RO

Vs-So

So-So Federation

(Or-Vnfm IFA 007)

VNFM(s)

Ve-Vnfm, IFA008

Or-Vi, IFA 005
(Vi-Vnfm, IFA006)

So-Mtp

5GT-MTP — NFVO-RO SLPOC (resource advertisement, resource abstraction, resource orchestration)

(Or-Or IFA 013)

VNFs | PNFs | VIM/WIM | NFVI — TD 1-1
NFVO | PNFs | VNFM | VNFs | VIM/WIM | NFVI — TD 1-2

Administrative domain 1 across multiple technology domains (TDs)

Vertical / MVNO — Ve-Vs

OSS/BSS — Mgt-Vs
5GT-VS — Network Slice Manager

Vs-So

-SO — Single-/Multi-domain NFVO-NSO — Single-/Multi-domain NFVO-RO

VNFM(s)

So-Mtp

5GT-MTP — NFVO-RO SLPOC (resource advertisement, resource abstraction, resource orchestration)

VNFs | PNFs | VIM/WIM | NFVI — TD 2-1
NFVO | PNFs | VNFM | VNFs | VIM/WIM | NFVI — TD 2-2

Administrative domain 2 across multiple technology domains (TDs)
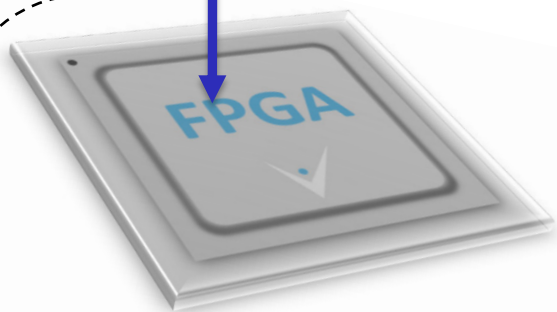
Dynamic Programmable PHY

LTE stack

Dedicated
RF circuitry

HDL

C / Python / MATLAB …

- Equipped with run-time **partial reconfiguration** (PR)
  - Extends and enforces their agility, upgradability and adaptability.
- Especially relevant in 5G and beyond networks
  - functionalities that require flexibility and hardware-acceleration: multi-RAT operation, dynamic function placement, and network function virtualization

SDR Platforms

Thanks for your kind attention!

- Questions?

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