5G Mobile Transport and Computing Platform for Verticals

The First Workshop on Control and Management of Vertical Slicing Including the Edge and Fog Systems (COMPASS)

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The support of 5G vertical services requieres to re-design mobile, transport and MEC

Outlook

- Motivation
- 5GT-MTP system architecture
- 5GT-MTP reference points
- 5GT-MTP abstractions
- Use cases:
  - Automotive
  - Cloud robotics
- Conclusions

Motivation

- From:
  - traditional Mobile Transport Networks characterized by rigid interconnection solutions

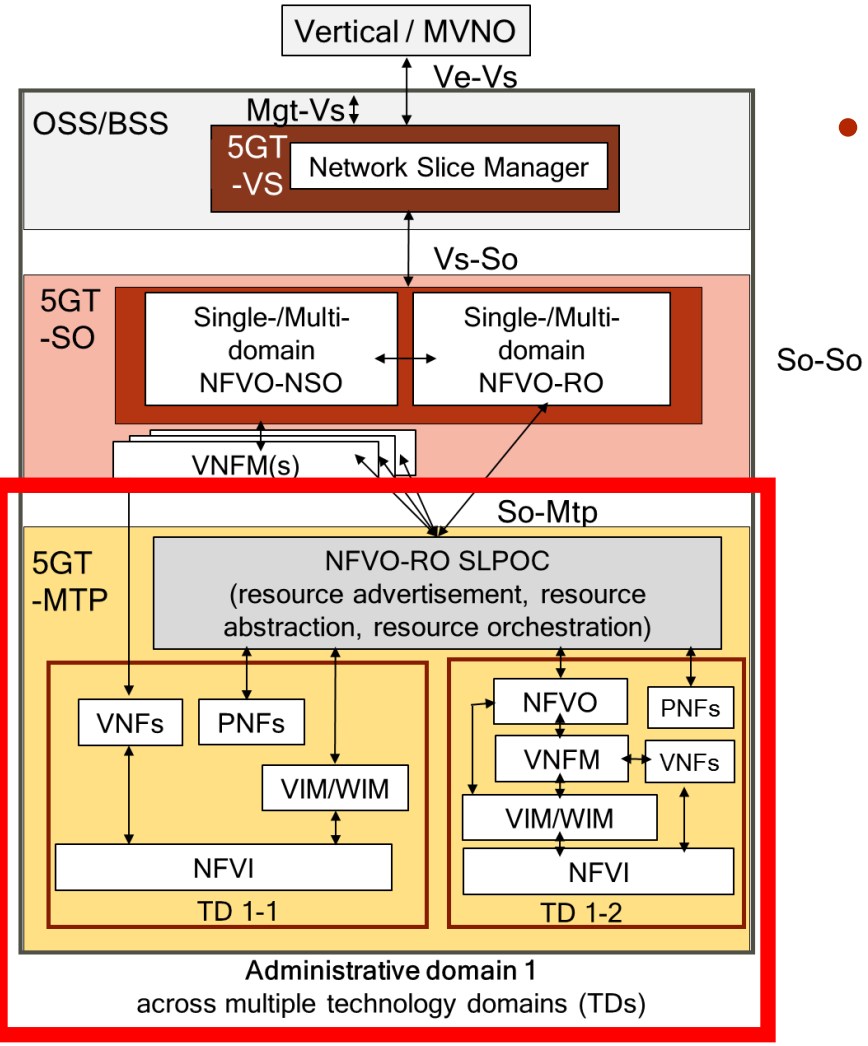
- To:
  - SDN/NFV based 5G MTP able to support simultaneously an extremely diverse range of networking and computing requirements to meet the specific needs of vertical industries
  - Bringing the „network slicing“ paradigm into the mobile transport network

5G-MTP: two main responsabilities

- The coupling of radio, transport, storage and computational resources required by vertical services.

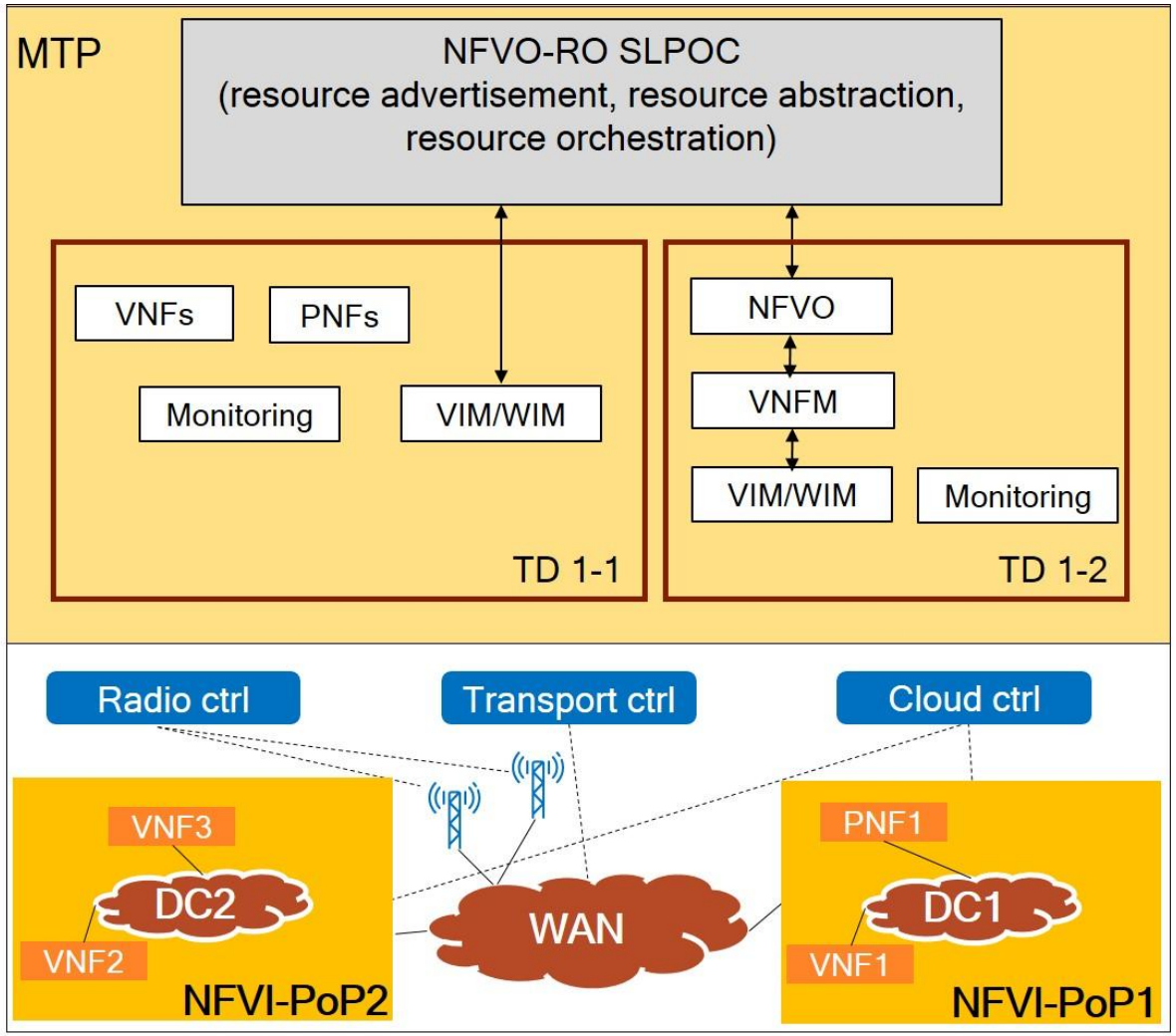
- Providing an abstracted view of the resources to the 5GT-SO, hidding the complexity of the specific underlying technologies

5GT- system architecture

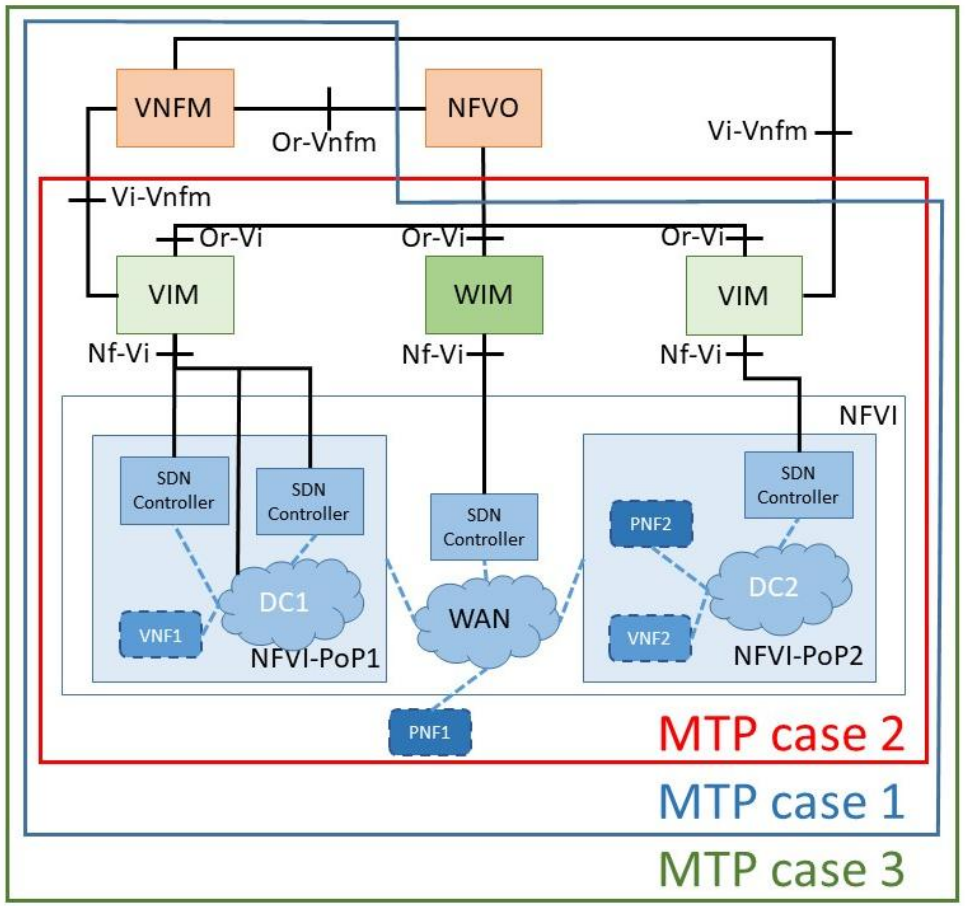


- Mobile Transport and Computing Platform
  - Orchestration of resources
  - Manages network, compute, storage infrastructure
  - New mechanisms for sharing resources by multiple tenants and slices
  - Integrated MEC services
  - New abstraction models for vertical services
  - The MTP forward the SO requests to:
    - VIM/WIM
    - VNFM
    - PNF
    - NFVO

5GT-MTP architecture

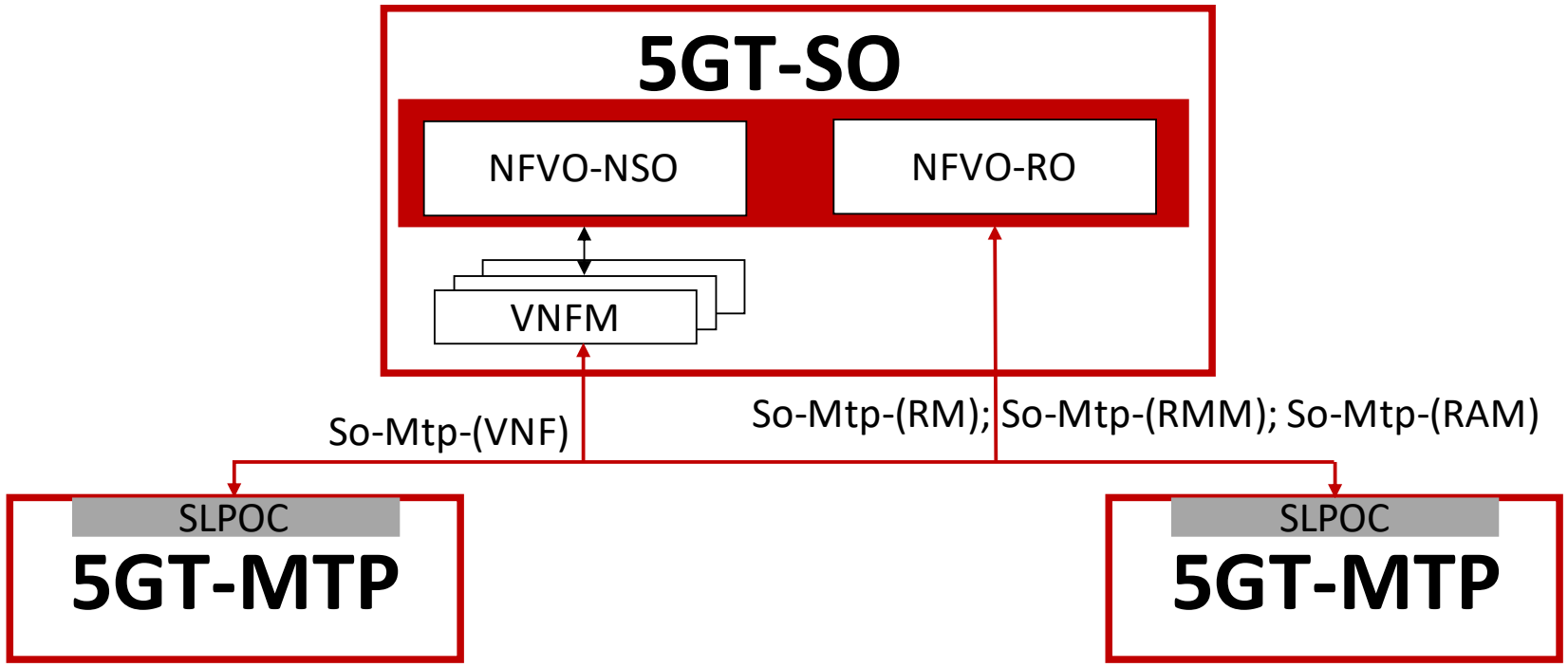


5GT-MTP mapping with ETSI NFV MANO



- **Case 1**: the 5GT-MTP exposes virtual resources and the possibility to instantiate entire VNFs through the VNFM;
- **Case 2**: the 5GT-MTP exposes PNFs that can be configured but not instantiated (e.g. a physical BTS). At the VIM/WIM level the 5GT-MTP only instantiates virtual resources related to networking;
- **Case 3**: the 5GT-MTP abstracts an entire network service to the 5GT-SO and it takes care internally about how to orchestrate it, through the NFVO – VNFM - VIM/WIM stack.

5GT-SO 5GT-MTP reference points



5G-MTP abstractions towards 5GT-SO

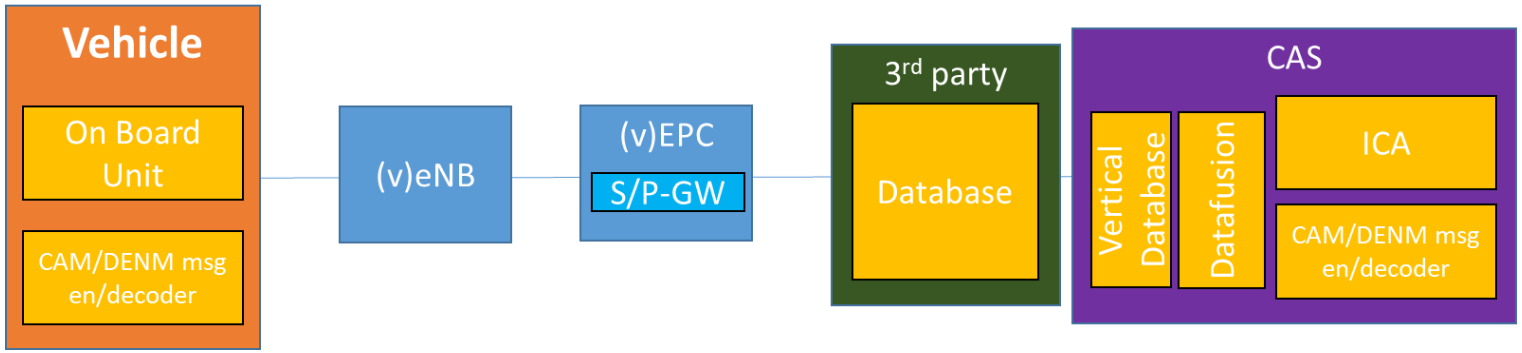
- Resources are abstracted, they are simplified to the 5GT-SO
- Resources are virtualized, they are offered to the 5GT-SO as a set of resources dedicated to a specific VNF-NS
- Keep independency betweeen technology in transport and radio and the information model
- Simplify the tasks of transport and radio, separation of roles and responsabilities, fault isolation
- Decouple the radio and transport solutions
- Associate radio and transport to different providers (N:M)

5G-MTP abstractrions towards 5GT-SO (ii)

- New abstraction models for available resources
  - RAN and core network, transport network, MEC, compute, storage

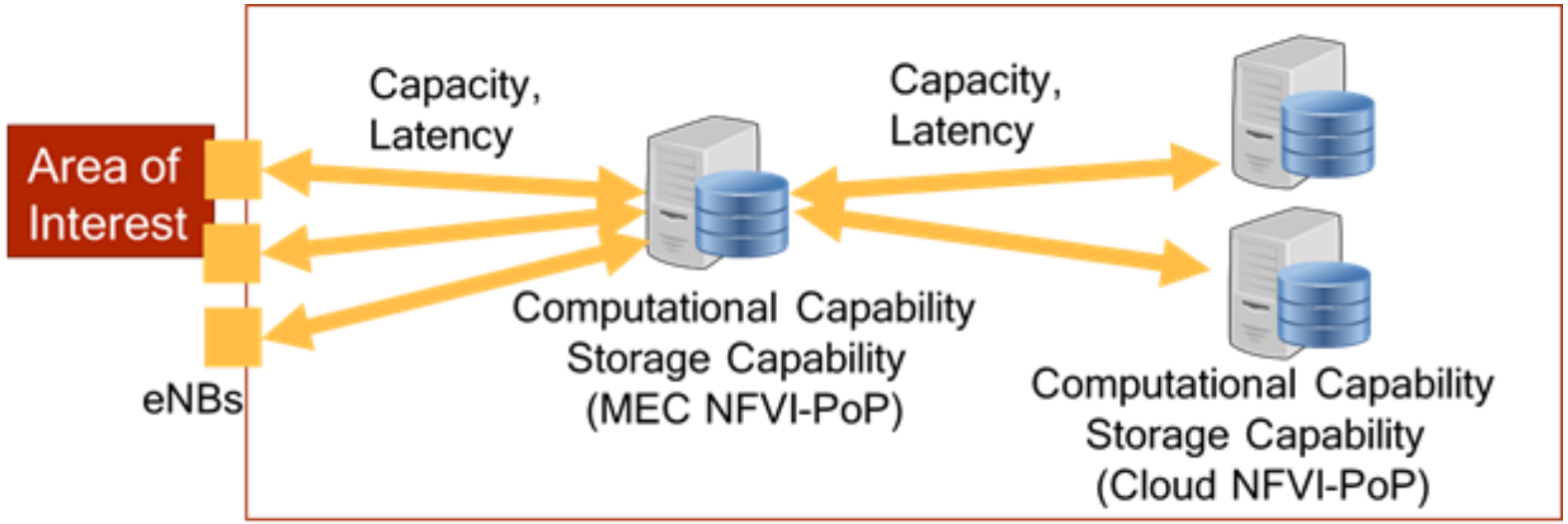
- 5GT-MTP will expose (with suitable level of abstraction) information about:
  - Availability of NFVI-PoP resources, geolocation of servers for a correct placement of the V(N)Fs.
  - Type and characteristic of available connectivity

Automotive: collision avoidance use case



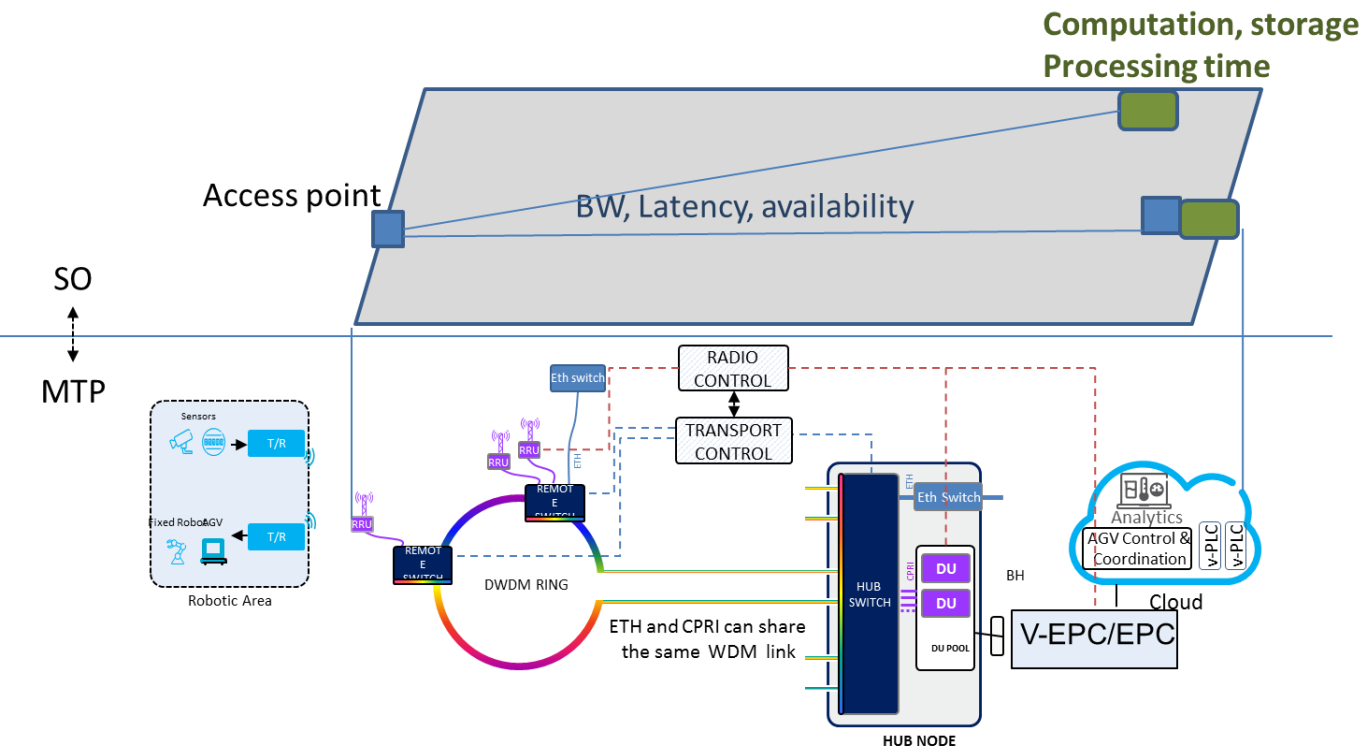
- Strict latency
- High reliable positioning accuracy
- Reliable coverage over monitoring area
- This application (ICA) is a strong candidate for a MEC-based implementation

Example of abstraction for the ICA application



- **Access resources**
  - 5GT-MTP presents each eNodeB with its coverage and mobility
- **Transport resources**
  - 5GT-MTP hides the complexity of the network connectivity, showing only the logical connectivity between the access network and the NFVI-PoPs or between the NFVI-PoPs
- **Computation and storage**
  - both at the MEC and the Cloud NFVI-PoP

Cloud Robotics



- 5GT-MTP hides the complexity of the underlying physical network, reporting only logical link between source and destinatin node
- Logical links: BW, latency, availability
- DC resources: computation, storage, processing time

Conclusions

- 5GT-MTP system architecture
- Examples of use cases:
  - Automotive
  - Cloud Robotics
- New definition of data models for the abstracted resources
- Specification of resource orchestration algorithms
- Extension of standard interfaces to support the 5GT-MTP and 5GT-SO interaction.