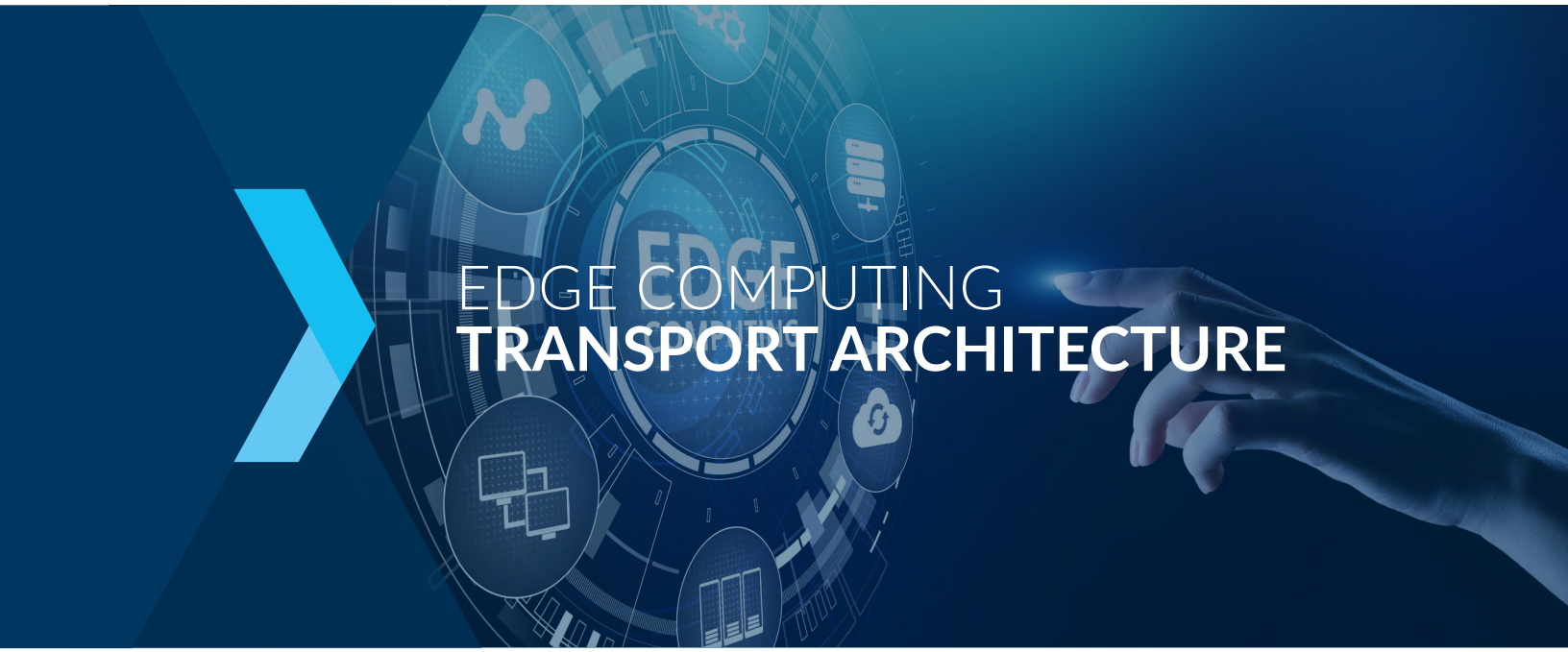

EDGE COMPUTING
TRANSPORT ARCHITECTURE

APPLICATION NOTE
SUMMARY

Edge computing will be driven by 5G and serve as a key technology and architecture. Edge computing is geared to be the basis of all the applications requiring processing with extremely low latency. As a result, a centralized process will not be possible and the distribution of the intelligence in the network will be the only solution to satisfy this requirement.

Initially, edge computing was defined for mobile technology, but it has now grown into a more general concept. At the beginning, the acronym MEC defined by ETSI [1] stood for Mobile Edge Computing; now it stands for Multi-Access Edge Computing.

In this paper, we analyze the impact of edge computing on transport technology along with the basic technologies required to support this architecture.

EDGE COMPUTING TRANSPORT ARCHITECTURE

Edge computing and virtualization are two concepts that are related, and the capability to move applications from a centralized datacenter to the periphery of the network is allowed by virtualization concepts. Project impacts of this include:

- On the plane level – connectivity will be flexible to allow increases/decreases of data path bandwidth (e.g., MPLS LSP) to transport information from the edge to the core and vice versa
- On the orchestration level – the NRV management needs to drive the transport to create the connectivity required to move information (e.g., MPLS LSP)

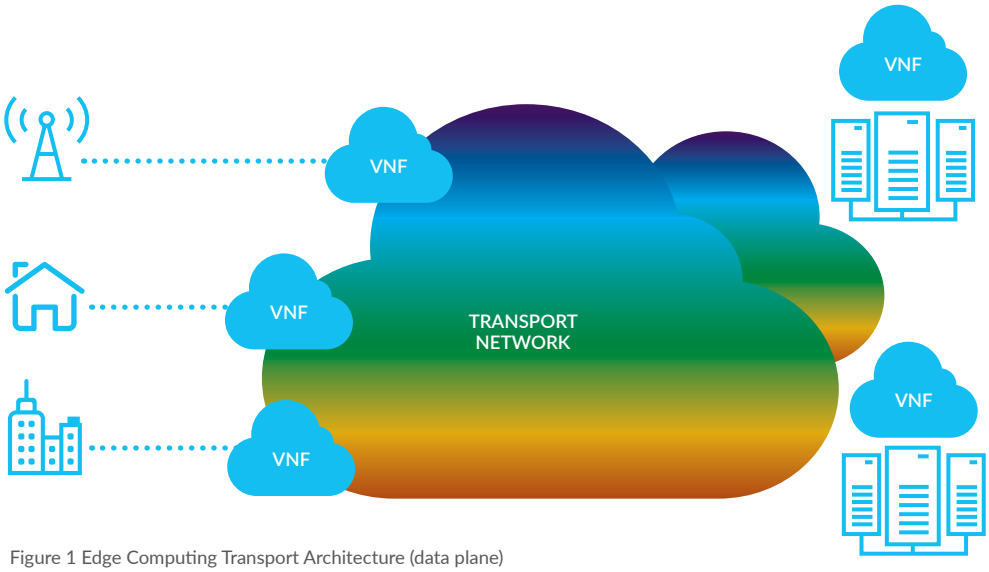

Figure 1 Edge Computing Transport Architecture (data plane)

Network architecture can be quite simple: In principle, all the network functions can be implemented via software (developing specific Virtual Network Functions) on blade servers (x86 based), with the transport network providing the communication (via P2P connection) between each remote server and a pair of datacenters (for redundancy purposes).

In this way, the need for specialized hardware and complex network architectures is eliminated. The connectivity is simpler, and the same hardware can support different functions by implementing a different software.

Key characteristics of transport networks associated to edge computing and cloud architecture include:

- Bandwidth – VNF will be allocated where needed (either centralizing or distributing in the periphery of the network) but this does require bandwidth
- Flexibility – the allocation of bandwidth is not permanent but should allow for fast re configuration

To fully optimize the usage of resources in the network, these characteristics should be applicable not only to the L2/L3 service layer but also to the L0/L1 transport layer.

Localization of computation resources can differ depending on the network context. From an extreme case of association of a computation resource to each access point (for example: to each 5G access point) up to a rural case, where the first Central Office is the ideal position for a mini-datacenter.

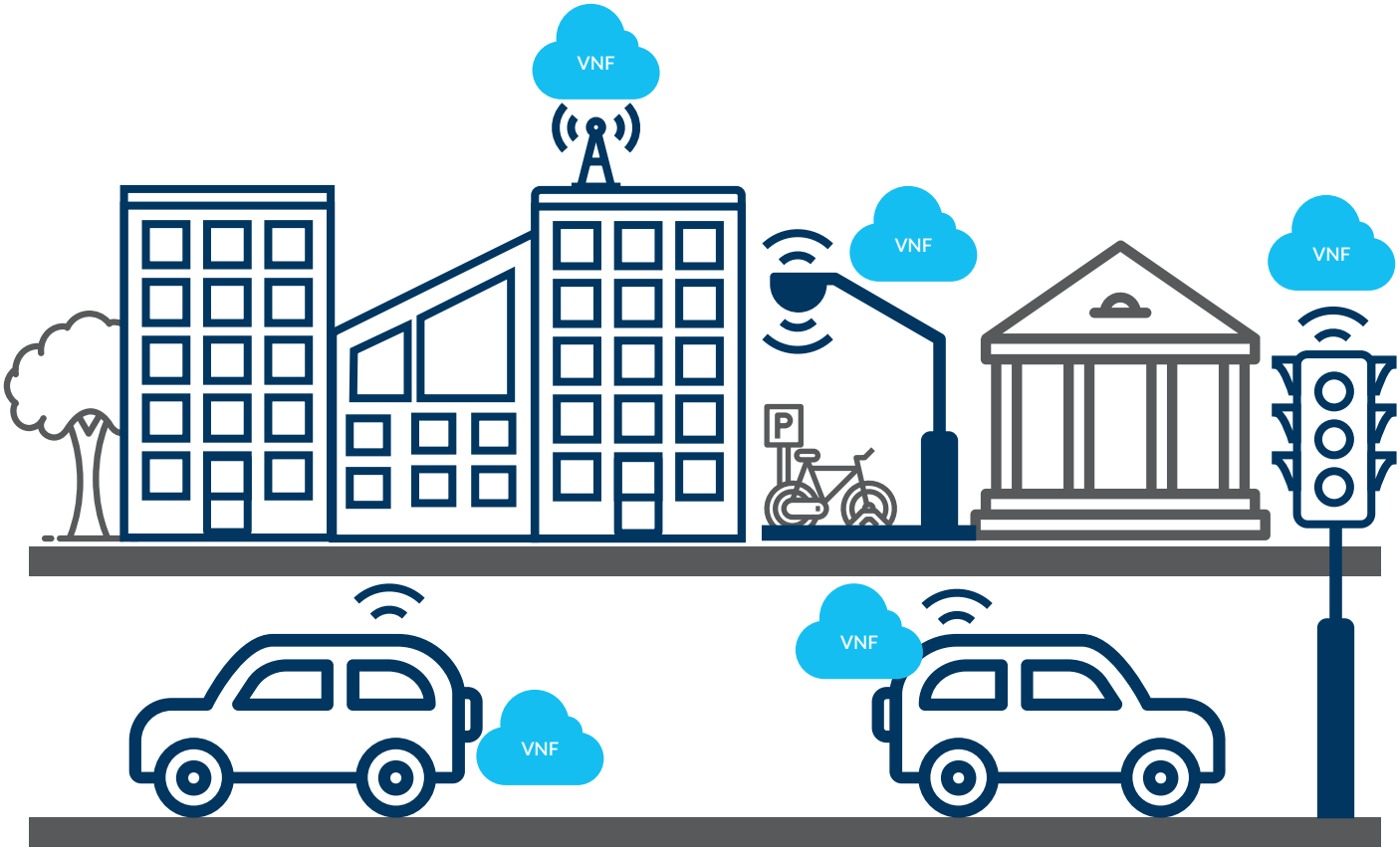

Figure 2 VNF localization for smart city application.

In any case, one of the most important and critical points in this architecture is the Network Orchestration.

NETWORK ORCHESTRATION

Network Orchestration is the process of managing both the cloud resources (VNF) and the transport resources from a single multi-purpose platform. One of the architectures defined for NFV Orchestration is the ETSI MANO [2] that has been developed in the ETSI context as an open project.

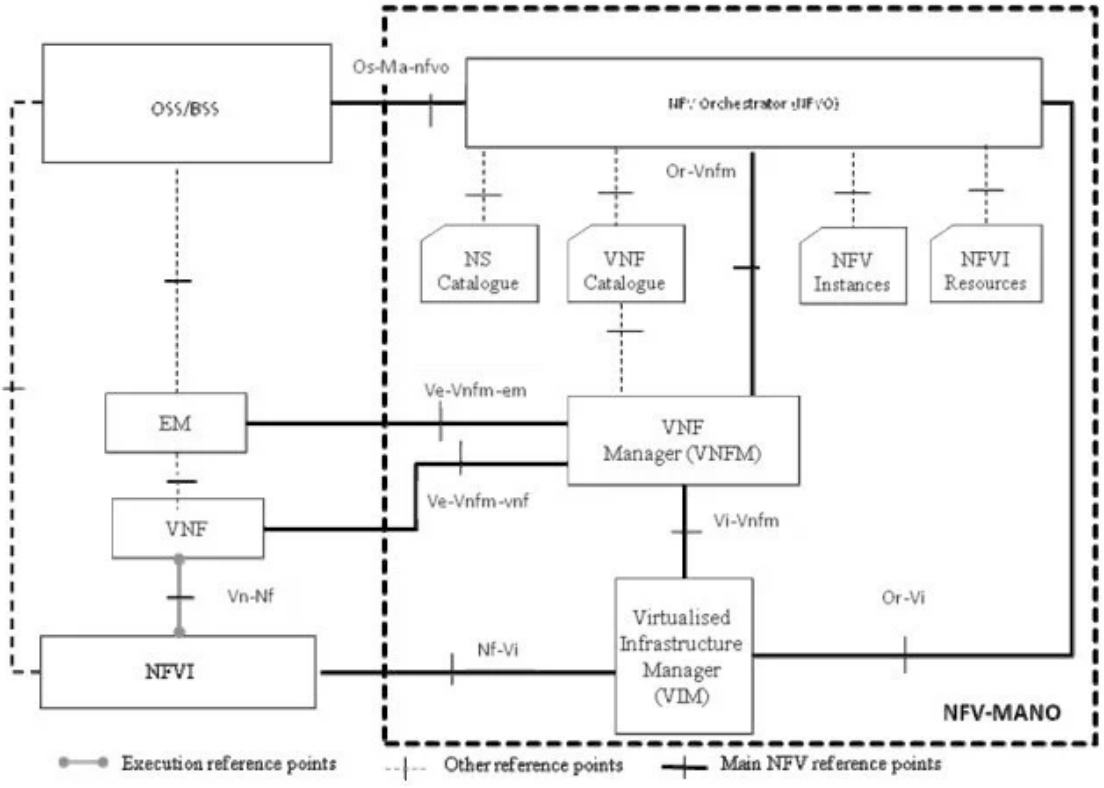

Figure 3 ETSI MANO Architecture

Interfaces have been defined to automatically drive the transport resources (typically managed by the SDN Controller) from the NFV Orchestrator.

KEY TECHNOLOGIES

Transport networks optimized for edge computing requires:

- WDM technology to increase bandwidth and minimize latency
- ROADM (WSS based) function to enable reconfigurability transport resources according to the requested connectivity and bandwidth
- Coherent technology to provide high-capacity network connectivity

ABOUT JABIL PHOTONICS

Jabil Photonics is a business unit within Jabil with extensive photonics expertise and a comprehensive portfolio of optical products, including optical components, passive and active fiber optical components, EDFA amplifiers and complex optical modules. With Jabil's reputation as a leading global EMS provider, in conjunction with the company's growing focus and investment in the photonics space, Jabil Photonics provides an unparalleled set of solutions and capabilities for the photonics industry, including market-proven advanced photonics packaging services (APPS) to support silicon photonics technologies and an in-house developed 100G/200G CFP2 Coherent pluggable (DCO).

In addition to product offerings and manufacturing services, Jabil Photonics has a strong focus on R&D and provides value-add services including HW and SW design, testing and verification.

Jabil Photonics offers its expertise for the main optical building blocks for cable network evolution, in both subsystems and customized design, which can be integrated in products or utilized as stand-alone systems:

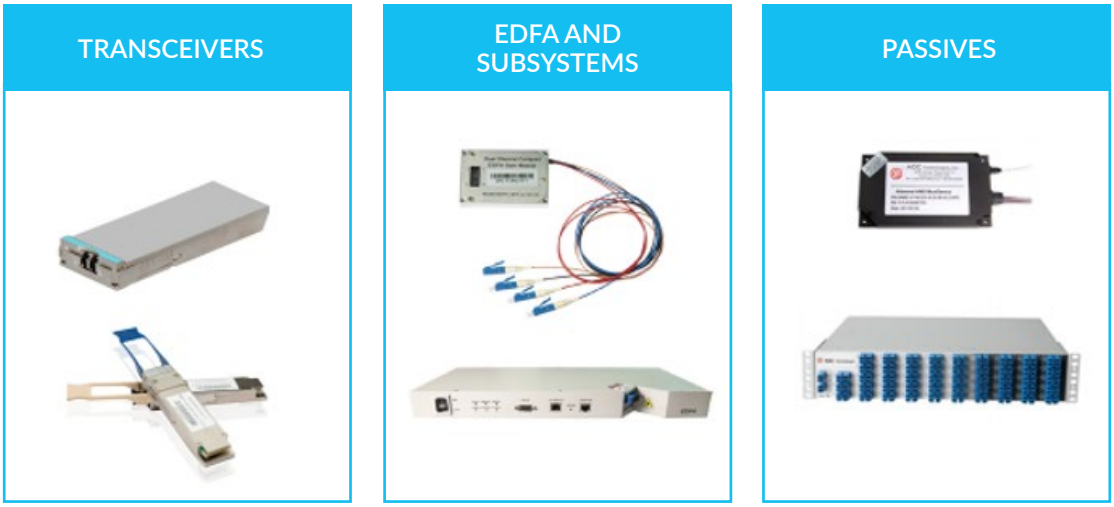

Figure 7 Jabil Photonics Portfolio

References

[1] ETSI – Multi-access Edge Computing architecture

[2] ETSI GS NFV-MAN