5G-COMPLETE

5G-COMPLETE approach

The 5G-COMPLETE project proposes an architectural approach inspired by state-of-the-art standardisation activities pursued by ETSI, 3GPP, IEEE and the Open-RAN (O-RAN) alliance that efficiently integrates a variety of advanced wireless technologies including digital and analogue transport schemes as well as mmWave and THz solutions with optical and packet networking to support the required network connectivity for 5G. In addition, 5G-COMPLETE proposes full integration of network with compute and storage resources in support of the very demanding current and upcoming 5G services. The architectural principles of 5G-COMPLETE exploit the benefits of softwarisation migrating from the notion of network elements to network functions, the separation of user plane and control plane and Radio Access Network (RAN) disaggregation. RAN disaggregation refers to functional decomposition of the RAN baseband processing functions, corresponding to the relevant protocol-layer stack, to a set of functions that can be processed independently at the Remote, the Distributed and Central Units (RUs, DUs, CUs), placed either at one or more locations supporting a variety of functional splits. Another architectural principle of 5G-COMPLETE relates with the adoption of cloud computing in support of the processing requirements of the various Fronthaul (FH) and Backhaul (BH) services the solution will support. The proposed approach introduces flexibility in the way compute resources are allocated across the 5G-COMPLETE infrastructure as it allows both integration of a central cloud solution as well as more distributed approaches where smaller scale compute and storage resources are placed at the network edge closer to the end user in accordance with the Mobile Edge Computing (MEC) paradigm. MEC will play a key role in order to further guarantee the capability of the 5G-COMPLETE solution to support demanding requirements associated with reduced end-to-end latency and transport network capacity.

5G-COMPLETE Functional Connectivity

5G-COMPLETE project adopts a flexible architectural approach that allows integration of a variety of technologies able to support a large number of different telecom and vertical industries related use cases and services with very different requirements and characteristics. These include transport network technologies such as advanced wireless networks and optical as well as packet transport network solutions integrating compute and storage resources in line with the MEC and Central Cloud approaches. The different 5G NR deployment options supported by the project along with the technologies used to implement these are summarised in Figure 24. These options combined can be used to provide any service with highly variable Key Performance Indicators (KPIs) for Ultra-Reliable Low-Latency Communication (URLLC), Massive Machine-Type Communication (mMTC) and enhanced Mobile Broadband (eMBB) services.
5G-COMPLETE demonstrations

All systems and components developed within the 5G-COMPLETE project will be demonstrated at several lab-scale and live field-trial demonstrators.

Two separate lab-scale demos will be held in Athens, Greece:

- The objective of the first demo, which will be hosted by NKUA/IASA and COSMOTE, is to evaluate the 5G-COMPLETE architecture in a lab scale environment through the end-to-end provisioning of infrastructure slices supporting smart energy metering services.
- Within the second demo, ICCS/NTUA will validate through lab-scale experiments the potential of the THz transceiver and of the optical hybrid node supporting mixed analog/digital optical transport to meet the specifications of the 5G-COMPLETE infrastructure. These blocks will be also used to provide proof-of-concept experiments that showcase the potential of these technologies towards B5G networks.

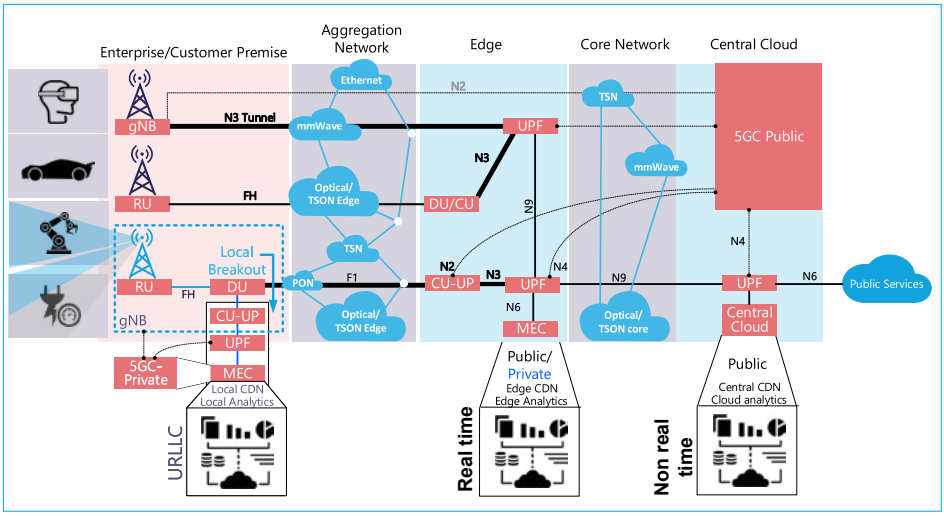

Fig. 24: 5G-COMPLETE deployment options

Also, three Live demonstrations will be held in Athens, Lannion and Bristol, respectively:

- The first phase of the incremental integration of 5G-COMPLETE technologies will be demonstrated in Athens, focusing on the management and orchestration of the infrastructure virtualisation layer comprising transport network and compute infrastructure resources. In this first technology demo, non-3GPPP access nodes will be considered connected through a flexible mmWave mesh network to MEC and Central Cloud infrastructure. The end-to-end service deployment and resource provisioning will be supported by the MANO framework.
- The demo that will be hosted in Orange's facilities in Lannion, will be performed over a converged architecture, involving several types of physical connections, physical and virtual resources as well as 5GRAN deployment options. The performance of multi-technology transport network will be assessed under realistic traffic flows provided through a virtualised 5GRAN solution comprising vCU/vDU/vRU. From an application point of view, the demonstration will permit to evaluate the transmission of the interfaces connecting the different equipments of a mobile network. It will also permit to validate that the optical network infrastructure can cope with the needs of the mobile users.
- The 5G-COMPLETE project's final demonstration will be held in Bristol 5G UK Testbed. University of Bristol will develop a 5G-COMPLETE network integrating its technologies within the 5GUK test network and will create service slices to demonstrate a set of 5G-COMPLETE Use Cases. The deployment of 5G-COMPLETE technologies includes among others: Open RAN deployment of a 5G cellular network, a mix of access connectivity using wired and wireless solutions in licensed and unlicensed bands for the service delivery, fibre network connectivity across the city of Bristol, TSON demonstrating high capacity and flexible optical transport connectivity between two sites in the city of Bristol, central cloud services, MEC technologies and an NFV Orchestration framework.