

Demonstration of **5G** solutions for **SMART** energy **GRID**s of the future





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### An evolving scenario

The high penetration of distributed renewable energy resources modified the behaviour of the power grids. Modern smart grids need a strong digital telecommunication network to mitigate the challenges coming from this transition that, among other benefits, should provide fast transmission and low latency for relevant data to support real-time grid operations, even in critical condition. Such digital network should also be flexible, reliable and affordable.

In parallel, as the use of Cloud Technology is increasing, the use of microservices is replacing the traditional way how software is implemented. The limit of Cloud is the physical distance, that introduces certain latency that can be tolerated for general purposes, but not for real-time controls.

Among all possible actual solutions, 5G seems to be the "most promising technology", as it conjugates the flexibility of a mobile implementation that has similar performances with more expensive and less flexible technologies such as Optical Fiber. In addition, 5G wireless technology offers several advantages towards the digital transformation of utilities, as it is standards based; benefits from a huge global ecosystem; has built-in security and reliability mechanisms; supports quality of service for critical applications; and is scalable able to reach any network size, including massive numbers of IoT devices.

5G is more than a data transmission layer: being a digital network, the 5G infrastructure can be programmed according to user specific needs, by dedicated APIs, also being able to serve various distinct vertical sectors of the market. This paradigm shift is enabling traditional Communication Service Providers, to effectively transform their networks into service enablement platforms. Moreover, business partners can leverage this openness and programmability to compose profitable, tailored customer experiences.

While the 5G implementation roadmap is still a dynamic and an on-going process, experimental projects like Smart5Grid are able to access the main key features of 5G infrastructures for serving testing purposes. This allows us to be among the first who learn on field how to interact with the core functionalities and be ready for the upcoming scenario of fully integrated 5G.

### The edge computing

To reduce the delay from the source of information and the system that must process it, we need to bring the computational power closer to the information source, thus realizing the so-called edge computing. A key opportunity offered by the 5G technology is to enable the edge computing in an integrated way, bringing the computational power next to the final user for reducing latency.

### Our platform is now open for you!

To demonstrate how easy is to create a Network App, we made available our experimental platform, to allow any developer, Start-Upper or SME to get familiar with such approach and get ready to move to the edge.

As the telecom infrastructure relies on standards and specifications not common in the public clouds, an abstraction called **Network Application** has been introduced, together with the cloud computing capabilities. In this way, it would be easier for developers with cloud implementation knowledge to combine their microservices with those offered by our platform.

# The Network App

As a first simplification, we could imagine a Network Application (or Network App) as a sort of "chaining" of micro-services that run at the edge. It is defined by a descriptor that contains the reference to the Network services or helm charts, the requirements of the edge-node that will run it and some other information needed for its lifecycle and monitoring aspects.

A Network Application Controller with Edge orchestration capabilities is then responsible for managing the lifecycle of the Network Application, offering the capability of migrating the Network App (container or virtual machine) to another available edge node or to a remote cloud in case of unavailability of the edge node.

# Towards an ecosystem creation

To facilitate the diffusion of the Network App paradigm and foster a broader knowledge on edge computing, we implemented an **Open Service Repository** (OSR) to share the content of single micro services or full Network Apps to developers and interactively learn from each other. The OSR is supporting the full Network App lifecycle, from its creation to its testing and deployment. The testing phase is supported by a **Verification and Validation** (V&V) Framework, to foster the DevOps approach providing immediate feedback on the platform checks.

# Are you ready for the challenge?

Be one of the first developers to implement your own Network App, using our experimental platforms and get ready for the next generation of edge computing in the modern 5G era!

In case you participate in our test, we are listing you in our channels and we will showcase your achievements in all our activities at European level.

## We have all the tools you need

Discover our platforms, implement your own 5G Edge feature and help us to improve!



### The Smart5Grid Project Consortium



# Join us! Image: Solution of the solution of the

Among its core objectives, the Smart5Grid project aims to investigate the potential of 5G-based Edge-Cloud Computing in the Energy vertical industry, by introducing the concept of **Network App** for simplifying the 5G complexity. The project platform is now available for third parties' experimenters, fostering the creation of a new market-segment for Network Apps.

