Global use cases support with distributed campus networks

FUDGE-5G Project Newsletter #4 January 2022

FUDGE-5G is aiming to showcase the usability of multi-administrated 5G Non-Public Networks (NPNs) for the purpose of requirements specific small-size local network deployment and providing connectivity among them, in order to build a coherent network ecosystem. In the cases where mobility among these local networks are required, there will be a need for global use case support with distributed networks.

Among the innovative concepts that FUDGE 5G is offering, providing interconnectivity among the NPNs and supporting roaming capability between the NPNs is one of them.

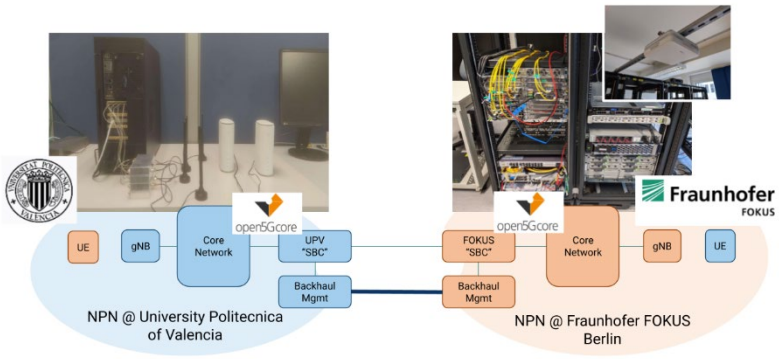
Be it Non-Public Networks (NPNs), Campus Networks, Local/On-Premises 5G, Micro-operators, all these names address the same type of localized network deployment, enabling a specific use case in each specific area. Usually having a reduced number of connected devices and increased reliability, availability and security requirements, these networks address the requirements of a use case in its specific environment. The focus is mainly on localization of the service and independence from the wide-area deployments which we are accustomed to for thirty years from the network operators.

Then why are we talking about global use cases at all? With the adoption of the campus networks across the different industries and in different countries across the world, a large need is created for being able to communicate with another network. Starting from Over-The-Air (OTA) upgrades of sensors and devices, extensive supply and quality chains in factory environments up to device roaming in health or education environments, the devices need to pass the borders of the local communication and communicate with servers and devices in other campus networks. Be it agriculture, content acquisition or manufacturing, global availability is needed.

How could these campus networks enable global use cases? First, global does not mean in any location across the globe. Only specific locations are needed such as factories, hospitals or research facilities in other countries. And for this type of coverage, the local campus networks are enough. However, to reach this new way of making global networks, we need a new sort of roaming in which networks can discover each other, safely connect and enable remote authentication and authorization while at the same time maintaining the privacy of each administrative domain. On these features for interconnecting non-public networks, we are concentrating on FUDGE-5G to be able to prove the technological feasibility for these networks. In FUDGE-5G to prove this, NPNs will be deployed using the Open5GCore (https://www.open5gcore.org), a comprehensive software toolkit based on 3GPP standards able to be integrated with commercial RAN and devices as a core network in R&D testbeds. To perform the first phase of trials

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 957242

NPNs were deployed at two campuses- Fraunhofer FOKUS, Germany and Polytechnic University of Valencia, Spain (UPV). The NPNs were connected over a VPN to ensure security and interconnectivity testing were performed between the deployed cores. The tests consisted in registering an emulated UE in Valencia's core and performing the authentication in the Fokus's core, validating the concept of roaming between NPNs. In September and October of 2021, strong efforts in order to test the setup with real UEs were made. Using an Amarisoft Callbox Ultimate as the RAN and a ZTE MC801A as the 5G modem, Fraunhofer FOKUS and UPV managed to prove that interconnecting NPNs and roaming between the NPNs works with a real UE. For the next phase, the plan is to provide access to local services as well as home network services to the roaming UEs.



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