CellularGrid: Cellular Networks for Real-Time Monitoring of Smart Grid

Motivation – The scope in the smart grid industry has been extended to cover also elements like distributed energy resources, electric vehicles, protection relays, and metering devices, where wired communication is not cost effective to install and maintain. 5G can have comparable performance to wired infrastructure, allowing to discretize and network individual grid elements, which can then implement intelligent sensors and switching decisions to isolate faults, reroute power and self-heal the grid. This project evaluates the connectivity requirements of smart grid applications in 5G.
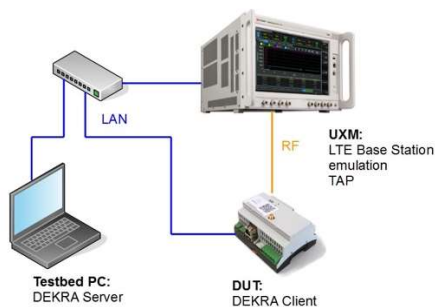
Key Objectives

The objective of the experiment will allow Comsensus to emulate their PMU/PQM devices use in different real life (LTE Cat-3, LTE Cat-M1, LTE Cat-NB1) network scenarios and thereby appropriately select the technology and/or adjust their design.

How Does It Work?

The DEKRA Performance Tool was used as a traffic generator and KPI calculator. The DEKRA server was run on a testbed PC, the client was run on DUT connected to the UXM via RF coaxial cable. The Urban-pedestrian LTE network scenario was chosen as it was the one that reassembles the DUTs target environment the closest
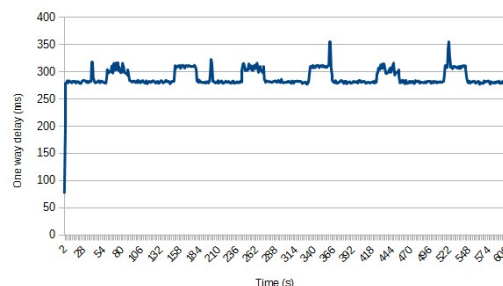The two protocols evaluated were evaluated

i) the IEEE C37.118-2014 protocol and
ii) the IEC 61850-9-2 Sampled Values protocol both using TCP and UDP traffic.

Key Results

The Testbed was used to test the wireless link performance for different location and user density. The KPIs measured during the experiment include end-to-end delay and throughput. The results of the experiment confirmed that low throughput uplink with real-time constraints are viable using LTE Cat-3 even in the case

of challenging channel conditions. In the high throughput scenario the target throughput could not be reached in any of the predefined channel conditions.

Testbed Components Used

UXM RAN Emulator	Test Automation Platform (TAP
TACS4 Performance Tool	

Facts			
Company:	Comsensus		COM SENSUS
Coordinator:	M. Smolnikar	**Company Mission:**	deliver in depth understanding of your business process. Increase your operational efficiency with our customized IT solutions!
Duration:	01/01/2018 - 01/05/2018		

Experimenter's Impression: "Thanks to Triangle we were able shorten the product design cycle, obtain a set of measurements in a controlled environment & experiment with technologies not yet available commercially"