

Planning and performance challenges in power line communications networks for smart grids

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Abstract-

The Smart Grid represents a revolution especially at distribution and customer levels, bringing monitoring and control capabilities, traditionally available up to the primary substations, down to the secondary substations and beyond. Machine-to-Machine (M2M) communications networks are key to enable managing the huge number of sensors and actuators distributed all over the low voltage and medium voltage networks. Such M2M communications networks must meet demanding requirements from the technical perspective (e.g., low latency, high availability), since eventually the stability of the grid may rely on them, and from the economic perspective (e.g., low deployment and operational costs), due to the huge volume of devices to be monitored and controlled. Thus, Power Line Communications (PLC) technologies are winning momentum in these scenarios because they represent a great trade-o between both perspectives. However, electrical networks also represent a harsh communications medium, mainly because they are not designed for data communications, but for power transmission. As a result, although much research has been carried out on this topic recently, PLC networks still present technological problems and challenges. This paper highlights some of the most relevant challenges in this area and presents a set of cutting-edge software tools which are being developed to overcome them, facilitating the planning, deployment and operation of this kind of networks.

Index Terms- Narrowband Power Line Communications, Network Forensics, Machine-to-Machine communications, Medium Voltage Broadband over Power Line, PoweRline Intelligent Metering Evolution, Simulation, Smart Grids

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