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Secure smart grid communications

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Smart grid technology facilitates the integration of storage and renewables with the grid to ensure sustainability of electricity supply, mitigate rising power outages and help meet the rapidly rising demand for clean energy in urban and rural areas. Reliable, fast and secure communication infrastructure is required to attain these benefits of smart grids. Several communication architectures and protocols have been defined for efficient smart grid communications using terrestrial telecommunication technologies. ETSI Open Smart Grid Protocol, DNP-3, IEC 61850, etc., define the communications between devices in transmission, distribution and substation automation systems. IEC 62351 defines cyber security for the communication protocols defined by the previous four sets. This talk will also introduce the security and QoS requirements for smart grid communications and present the integration of satellites with terrestrial communications for the purpose of connecting virtual power plants. Key security vulnerabilities, types of attacks and arising security challenges will be detailed. The talk will also present a comparison of some of the proposed security solutions and show the weakness in these. Finally the talk will present some novel cyber security mechanisms to provide efficient security in a modern power system.

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Big sensed data in the Internet of Things

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The Internet of Things (IoT) is opening new horizons in systems intelligence, where physical objects (embedded with sensory, identification and networking capabilities) can interact with other objects through the global infrastructure of wireless/wired Internet. These systems can be monitored and controlled by filtering and processing collected data. Such intelligent design will naturally result in efficient and cost effective systems. Several architectures are being built to implement IoT from two different perspectives. The first, also known as sensor-oriented, is based on large-scale sensors deployment targeting the collection of accurate sensory data. The second architecture, also known as service-oriented, targets the association of unique identifiers with specific services. In such architecture, the service is invoked upon receiving the unique identifier from a specific ID collecting node considering the context in which it was collected. The rise of ad hoc sensors, and new manifestations of sensing systems within the Internet of Things resulted in a tide of sensed data that is potentially drowning our communication resources. In this talk, I overview the evolution of sensing systems as they contributed to Big Data, and outline the rising challenges in both communicating and understanding this data. I argue that a solution lies not in sensing systems alone, but in the expedited funneling and processing of data as we attempt to prune the unnecessary, and make sense of the valuable. The quest for energy efficiency that dominated Sensor Networks for so long, is now matched with a more pressing demand for ubiquity and real-time latency.

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