Towards Ubiquitous Connected Objects that also Connect Outside the Home

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Any smart home system, independently of the final application, requires the exchange of information between various sensors and actuators inside the home to some sort of central controller hosting the control application. Wiring-up all those devices into a network has proved totally unrealistic and radio communication seems to be the medium of choice for in-house and out of house communications. However the technical challenge of designing a radio network with the desired properties has kept the industry busy for the last 10 years with very little results up to now.

Radio communication is both an age old and an existing brand new technology field where innovation continues to spark. We will try to present the briefly the essential theoretical concepts involved in any radio communication system and their impact on real world products.

Starting from basic home automation and energy management use cases this presentation will highlight the required radio system requirements to ubiquitously connect smart home objects to the cloud and give a brief review of existing wireless technologies. All those technologies are in reality different implementations with different trade-offs of the same basic network topologies: meshed network or star network.

We will try to analyze why these existing technologies failed to deliver the required functionalities level of service and how those obstacles can be overcome using new radio access methods.

Those new radio network topologies enable radically different applications and allow connecting virtually any battery powered object to the internet in the home but also outside by a combination of extremely low power operation, long range radio connection, built-in security and object mobility tolerance. Those networks do not necessitate any kind of radio gateways to be installed in each home but directly connect objects to a sparse out-door radio infrastructure exactly like existing cellular networks but at a fraction of the cost and the power.

In conclusion those new network topologies and the operator based deployment scenario allow spreading the network cost over multiple applications: Asset tracking, smart grid, home security, city management, etc. … and may contribute to create a valid business model for energy monitoring and control applications.