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Highly Reliable Automatic Metering Infrastructure with Narrow Band Power Line Communication

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Abstract

To enable reliable Automatic Metering Infrastructure(AMI), we developed a system using Narrow Band Power Line Communication(PLC) which virtually achieves data collection rate of 100%. Since increasing of the electric power demand, it's important to improve the energy efficiency. AMI strongly enhances the efficiency by providing clean and precise data of the electricity demand. To implement AMI, stable communication between the data concentrator and meters is a key functionality and it means the ''communication module'' for smart meter is the most important component.

We developed the communication module based on Narrow Band PLC technologies to satisfy requirements of AMI for high-rise residential building in Japan. It requires almost 100% data collection. AMI system with our PLC module has been adopted by several power utility companies in Japan from FY2013. A data concentrator covers and controls 100 smart meters and it communicates with the meters every 30 minutes intervals over PLC to collect consumption data and to control an internal switch of the meters. Our systems have been deployed for high-rise residential building in Japan since FY2016 and achieved data collection rate of 100% against communication errors by adopting our original retransmission process.

The advantages of PLC are easy deployment, quite stable communication, and strong tolerance for noise and lightning surges on the power line. In the case of wireless system, the communication depends on obstacles such as reinforced thick concrete wall. Therefore, users must design based on onsite review of the placement of the wireless repeaters to enable stable communication before installation. On the other hand, the design and installation of PLC is easier because PLC uses existing AC power line and users can design based on offsite review of electrical diagram. Also, PLC could avoid voltage difference on the board, which is caused by lighting surges typically and it happens especially on the system with additional communication wiring.

We are now developing new PLC products for general IoT purpose. It can be applied not only for smart meter, but also for various IoT applications such as transmission of sensor information, voice and picture. We have strong confidence our products with PLC technology solve various demands from society.