China Mobile Electric Smart Metering – Internet of Things Case Study

Introduction

Smart meters have been deployed by many utilities around the world, and with the technology available to smart meter manufacturers and utilities improving rapidly over the past few years, there is always an opportunity to refresh implementations or add new, more efficient technology to a rollout.

China Mobile's automated meter reading (AMR) service for electric utilities consists of an NB-IoT connected smart meter and the cloud based OneNET management and application development platform, all supplied by China Mobile, and which can be deployed by a utility or in industrial parks and intelligent buildings. The solution optimises the meter reading process and enables accurate billing for electricity consumption, which has been an issue in some Chinese markets.

NB-IoT Electric Smart Meter Deployment

China Mobile have developed an NB-IoT smart meter and have partnered with the State Grid Electric Power Research Institute and Provincial Metrology Institute to deploy and test the NB-IoT connected smart meters in the field. 200 NB-IoT smart meters have been deployed by China Mobile in a number of cities in cooperation with State Grid Corporation of China (CEPRI) - Yingtan, Wuxi, Zhuhai, Chengdu, Chongqing and Beijing.

The China Mobile AMR service, using 2G or 4G, is able to collect real-time voltage, current, power consumption and other information from the meter. Through big data analysis the actual electricity consumption of each device can be assessed, allowing an effective electricity supply strategy to be developed across an area. The 200 NB-IoT enabled smart meters are designed to offer the same functionality. Additionally, device management is also conducted through the OneNET platform, so data and commands can be sent to and from the smart meters at any time.

Coverage is very important to allow smart electricity meters to be connected wherever they may be installed. Meters are typically installed in locations that are hard to reach, such as in basements or inside cupboards and cabinets. Therefore, network coverage is critical to ensure that every smart meter can be connected to the management platform. NB-IoT offers enhanced network coverage, allowing more smart meters to be connected.

Benefits to the City

NB-IoT has delivered some significant benefits to the cities and utilities that are piloting the NB-IoT AMR service from China Mobile.

Simplification – compared to the existing meter reading services available to Chinese utilities the NB-IoT Smart Meters are much simpler to install and operate. This in turn lowers costs as maintenance demands and manual meter reads are no longer required. NB-IoT support for frequent data transmissions also means that real-time data is available to the city or utility for fast data analysis. Issues such as power outages can be quickly identified.

Network Coverage – NB-IoT is designed to offer enhanced coverage over existing mobile networks. This means that it is suitable for connected meters in hard to reach locations, such as in buildings or in meter cabinets, where other networks may not be able to provide coverage. Additionally, as NB-IoT is based on existing mobile networks, coverage is available across the whole existing network.

Deployment – as NB-IoT coverage is already in place, there are no restrictions on how the smart meters are rolled out. This means that coverage planning is not required, which makes rollout planning more straightforward. Smart meters can be installed in residential properties at the convenience of the resident, as opposed to a rollout confined by network coverage constraints.

Data Security – NB-IoT is designed to be secure. It operates in licensed spectrum meaning that interference from other networks is avoided and quality of service can be assured. Based on 4G networks, NB-IoT shares the same characteristics, offering secure, encrypted communications to smart meters and other IoT devices.

Outcomes and Lessons Learned

All 200 NB-IoT powered smart meters that have been deployed have been able to connect successfully to the NB-IoT network in their deployment location and transmit data and commands, connect to the AMR cloud platform and provide insight into real-time energy consumption.

A variety of test scenarios have been tested as part of the pilot, including meter reading, device management, report generation and displaying installation locations. All of these test scenarios have been completed successfully on all installed NB-IoT smart meters, showing that NB-IoT is a technology fit for smart meter operations in the future.

The improved coverage offered by NB-IoT has been crucial in ensuring that every meter has been able to connect across a wide range of locations – indoors, outdoors and in basements across different city topography. This means that installation location does not have to be compromised in order to obtain network coverage, which makes rollout planning easier, and also means meters can be hidden away from view where required.

NB-IoT, as a globally standardised technology, has proven to offer several advantages over other networks that have been used for smart metering. For China Mobile, this means that the platform architecture is simplified as it does not have to support proprietary protocols, the network infrastructure is simpler to update and manage, and the hardware costs for the smart meter are lower with a wider variety of suppliers to choose from. This means that cost savings are available, which when spread over a large scale smart metering deployment, which may expand to millions of devices in the future, there are real cost savings and economies of scale to be taken advantage of.

Conclusion

NB-IoT has proven itself to be a technology that is a very good fit to the demands of China Mobile's AMR solution and wider smart metering connectivity. It offers a high quality of service, essential for operation of critical national infrastructure such as smart meters and grids, wider network coverage to connect more meters in hard to reach locations, and simplifies device management and integration into cloud management platforms. After the success of this pilot, China Mobile will be investigating more widespread rollouts of their NB-IoT connected smart meters to bring these benefits to electricity networks across China.

The GSMA Internet of Things programme is an initiative to help operators add value and accelerate the delivery of new connected devices and services in the IoT. This is to be achieved by industry collaboration, appropriate regulation, optimising networks as well as developing key enablers to support the growth of the IoT in the longer term. Our vision is to enable the IoT, a world in which consumers and businesses enjoy rich new services, connected by an intelligent and secure mobile network

For more information visit the website:
www.gsma.com/smartcities

GSMA, Floor 2, The Walbrook Building, 25 Walbrook, London EC4N 8AF UK
Tel: +44 (0)207 356 0600
smartcities@gsma.com
www.gsma.com/smartcities