China Mobile Smart Parking – Internet of Things Case Study

Introduction

Smart Parking, powered by NB-IoT technology, is making it easier for drivers to find free parking spots.   Cities can better manage their parking assets and maximise the revenue available to them as a result. Drivers searching for parking create congestion and pollution by circling and hunting for available parking. Smart Parking services are able to significantly ease these problems by guiding a driver directly to a parking space.

China Mobile, together with their partner DTMobile have initiated two separate smart parking pilots using NB-IoT connectivity, one in Yunnan and another in Southeast Guizhou. Based on LTE networks, NB-IoT is a good fit for smart parking

as it has support for a long battery life and offers improved coverage which allows sensors to be placed in any location. NB-IoT use of licensed spectrum also ensures a high quality of service. The China Mobile smart parking solution consists of a number of smart parking modules such as parking bay detection, license plate recognition, mobile payments, parking guidance for drivers and an intelligent parking management system for the city.

NB-IoT Smart Parking Deployment

China Mobile have implemented two separate NB-IoT Smart Parking systems. The first has involved installation of smart parking sensors across some of the 4000 spaces identified as part of the Yunnan Intelligent Parking project. The second, in Southeast Guizhou, involves a total of 6 sets of entrance and exit systems around the highlighted parking lot, combined with a parking management system connecting more than 300 parking bays.

These two implementations are designed to showcase the capabilities of NB-IoT for Smart Parking, and China Mobile's Intelligent Parking services. The parking system utilises sensors installed in each parking bay, which are able to detect when the space is occupied, and send the status via the NB-IoT network. Parking attendants and parking management are able to use a tablet device to monitor space occupancy. Using the sensors and NB-IoT network means that charging can commence as soon as a space is occupied to ensure that accurate billing takes place. The system's operational status, the occupancy status of the parking bays, recorded charging details and other information are uploaded to the parking management platform, and data can then be sent down to outdoor information guidance screens in real time to inform car owners of remaining parking bays in each area.

China Mobile have invested heavily in their NB-IoT network, with their partner DTmobile who provide the NB-IoT network equipment. This means that coverage is extensive, allowing the sensors installed in the parking bays to be reliably connected to the network to ensure the service is available.

Benefits to the City

NB-IoT has delivered some significant benefits to the cities that are piloting the NB-IoT smart parking service from China Mobile.

Coverage – Improved coverage offered by NB-IoT over existing mobile networks means that China Mobile have been able to connect smart parking sensors in locations where coverage would of previously been harder to discover. Parking sensors are embedded into pavement of the parking bay, which is normally under a vehicle and often within a large parking garage. These are challenging conditions to obtain coverage, but NB-IoT has proven that it is able to connect sensors even in these challenging conditions

Low power consumption – NB-IoT is designed to use small amounts of power and to be battery powered in many scenarios. This is an important attribute for smart parking sensors, as it is unlikely that they will access to mains power and so must be battery powered. Nb-IoT modules are designed to offer a battery life of many years, meaning that the sensors can be installed without regard to location of power supplies and will need very little maintenance in the years ahead

Low cost – NB-IoT has created a simpler way to manage parking across the different pilot implementations has led to reduced management and maintenance costs. The ability to remotely monitor the status of parking bays, bill more accurately and increase the utilisation of parking bays means that revenue generated is higher and the costs to monitor and maintain the parking bays are lowered.

Outcomes and Lessons Learned

China Mobile's NB-IoT powered smart parking solution has proven to be a success, with many parking bays now connected to the China Mobile management system and local attendant's tablet devices.

The system has helped resolve some of the issues that the two cities had with their parking provision. Previously, parking spaces were harder to find, but now drivers can find available parking much more easily through reliable, up-to-date data on parking availability at the two locations managed by China Mobile. Parking disputes can be more easily managed as a reliable data source is available for the parking management team to investigate reported discrepancies. Congestion and pollution has been reduced by creating a more efficient parking service.

Additionally, by integrating mobile payments with the system, the amount of time it takes drivers to enter and exit car parks has been much reduced by removing the need for them to queue to pay. This is turn frees up spaces faster, resulting in higher utilisation of the parking bays.

NB-IoT offers a number of benefits to enable a smart parking solution – improved coverage, real-time communications and low power consumption - are all beneficial to ensuring that a smart parking service is easy to install, simple to maintain, and able to transmit the data required to enable fast turnaround of parking spaces. Additionally, NB-IoT is based on LTE networks, and uses the same licenced spectrum. This means the network is secure, a wide variety of ecosystem partners are active, and a high quality of service can be achieved.

The pilots deployed in the two locations have shown China Mobile that NB-IoT is a clear contender to connect large numbers of parking sensors in the future. The use of a standardised technology means that China Mobile are able to work with a range of partners from local industries in order to bring new products and services to the market.

Conclusion

NB-IoT has proven that it offers significant benefits to China Mobile in their rollout of their Intelligent Parking service across China. It is more energy efficient, offers better coverage and makes the service more straightforward to install and manage. In the future, NB-IoT will become much more widespread by powering all sorts of services and sensors throughout the city. As such, China Mobile will be able to rollout large scale volumes of connections throughout the city, offering a better customer experience and enabling a new range of services for the intelligent city.

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
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