IOT Digital Assignment

Anmol Middha
16BCE1235

Patras: IOT Case-Study

Introduction
Patras is Greece's third largest city, and the regional capital of Western Greece. It is also a smart cities pioneer, with a dedicated smart cities hub located in the Patras Science Park. This has lead Patras to build a relationship with Deutsche Telekom and their local partners to investigate smart cities and how NB-IoT can help the city deploy new services, including smart parking and smart street lighting. Deutsche Telekom's local affiliate Cosmote has undertaken the first Greek implementation of NB-IoT in Patras along with their partners to prove that Smart Cities powered by NB-IoT are able to help the local municipality become more efficient and cut costs. 4

NB-IoT Deployment
Patras have implemented NB-IoT to power two municipal services on the same network – smart parking and smart lighting.

Smart Parking

The NB-IoT smart parking service has initially been installed along Patreos Street, a long street running through the city centre that offers on-street parking. Sensors embedded into the street under the parking spaces are able to sense when a space is free or empty by the presence of a vehicle above them. This status is then communicated through Cosmote's NB IoT radio access network, which was upgraded for this pilot by Huawei, and linked to Deutsche Telekom's core network. The parking data are then collected by a Cosmote's local partner, who provide a parking app that residents can use to view where there are parking spaces available. The app is then able to guide the driver direct to the available parking spot.

Smart Lighting

The smart lighting solution has been installed on Othonos kai Amalias street, which runs along the seafront at Patras. The lighting system uses NB-IoT to control the streetlighting, which is able to be adjusted to different light levels at different times of day, reducing electricity consumption and improving safety in the local area. The system again uses Cosmote's NB IoT radio access network, linked to Deutsche Telekom's core network. The lighting system uses LED technology and Flashnet smart lighting controllers, control of which is made available to the city through the partner's applications.

Single Network

The NB-IoT characteristics used by these two different service deployments demonstrate the flexibility inherent to the design of NB-IoT. The smart parking services requires real-time data to ensure that as a car leaves or arrives at a parking space, the status detailing availability is updated in real-time. Vehicles may stay in place for minutes or hours, which proves that NB-IoT can cope with messages being sent instantly at any time. Where there is a high turnover of parking spots, the volume of messages can be quite high. By contrast, the smart lighting service has different characteristics. The lighting service operates autonomously, but needs occasional large updates to its schedules and to transmit maintenance reports. The contrast between these two services demonstrates that a single NB-IoT network can cope with applications that require either rapid messaging responses or large data downloads, or both.

Benefits to the city of Patras

The city of Patras is able to benefit from this dual service deployment in a number of ways

Improved city environment – By giving citizens access to real-time parking information and enabling dimming of streetlights, the city's environment can be improved quickly – smart parking means that less traffic circles around looking for free parking spots, resulting in less pollution and better air quality, whilst the use of dimmable smart lighting means that safety in the streets at night can be improved.

Flexibility – The use of NB-IoT for both parking and lighting reduces the cost of building separate proprietary networks for each service, and also allows the city to scale the services as needed, without having to complete one project before embarking on the second. The use of a single network also means that one supplier is responsible, simplifying support issues and improving the overall quality of service available to the city.

Big Data – The use of a common NB-IoT network for both services means that data from each service can be readily combined to create detailed actions based on behaviours – so for example lighting could be dimmed when a parking space is vacant to save on energy costs.

Outcomes and Learnings

NB-IoT performance - The initial deployments using the NBIoT network have proven to be successful. The smart lighting controller, for example, has been sending one status update message of 40 bytes every five minutes and a message containing energy consumption data every hour without fail. This adds up to around 5kb sent per controller per day on average. These devices are mains powered and so the effect on battery life has not been measured.

The deployment of two different services on the same NB-IoT network has not hindered performance.

System Flexibility – NB-IoT is based on existing mobile networks and so coverage is already in place. The deployments in the city of Patras have shown that installation sites for new services are flexible and not dictated by physical infrastructure. By not having to install new communications network hardware to provide coverage as services are rolledthe process needed to get services up and running has been much simplified.

Conclusion

The Deutsche Telekom NB-IoT deployments in Patras demonstrates that the communications technology is adaptable to different services, whether they need real-time open communications data to turn around parking spaces quickly, or occasional communications to update lighting schedules, NB-IoT is a capable technology.

NB-IoT can help smart cities by providing a flexible, standards based route to connecting and controlling assets in the field. Mobile operator support around the world means that the use of NB-IoT is a low risk option, and can enable many services with minimal effort.