

Samsung IoT Solutions

Changing the way the world works

Today

April 14

05:00

MONDAY

67%

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CLOUDY

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06:35 AM

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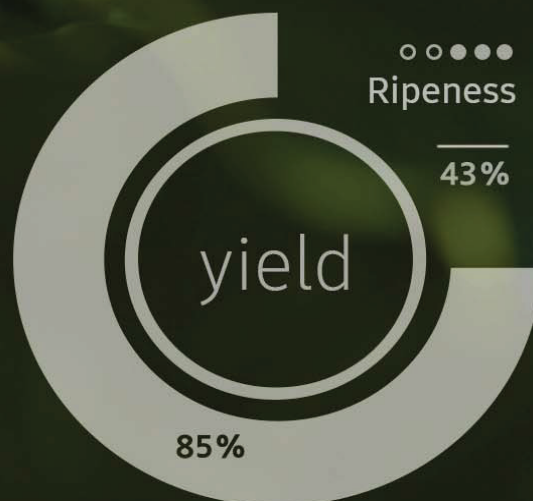
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Internet of Things

Internet of things, or IoT, enables virtually endless opportunities and connections, the impact of which we cannot easily fathom or understand today. Even though we are already seeing numerous connected objects around us, this number will increase incomparably even in the near future.

Up to now, the majority of IoT has been focused on short-range networks for stationary objects or indoor settings such as Smart Homes or Smart Offices. Connection for such objects is supported by short-range communication technologies such as WiFi, Zigbee and Bluetooth. However, the market is starting to require wider coverage for mobile objects and for objects spread out across a wide area. These objects usually do not transmit high amounts of data and are used to track the state of an object or its environment. Against this backdrop, Low Power Wide Area (LPWA) technology has come to the fore. LPWA networks are empowered by technologies such as LTE-Machine (LTE-M), Narrow Band-IoT (NB-IoT), LoRaWAN technology and SIGFOX.

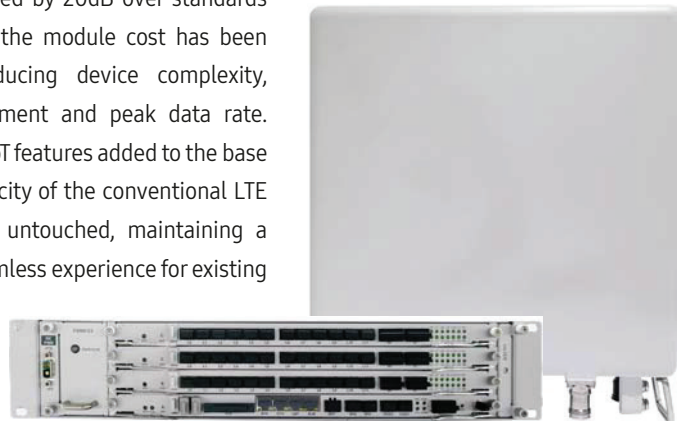
Different operators have different needs and interests; therefore providing a customized and tailored solution is paramount. With this in mind, Samsung is offering to its customers a diverse range of products and solutions that meet the specific requirements of operators. Samsung creates and supports components and products that power the IoT world covering everywhere from indoors to outdoors and across wide distances.

IoT in Licensed Spectrum

LPWA technologies can be broken down depending on whether the technologies are deployed in licensed or unlicensed spectrum. LTE-M and NB IoT-collectively referred to as Cellular IoT (cIoT)-are evolved from LTE technology and utilize licensed spectrum while LoRaWAN technology, SIGFOX and short-range communication technologies are utilized unlicensed spectrum.

Cellular IoT makes use of the already-established LTE network and is based on 3GPP standards. LTE-M can be deployed in the current LTE bands while NB-IoT may be deployed using either LTE or GSM bands. Samsung's base station supports both LTE-M and NB-IoT with a simple software upgrade.

Samsung's cellular IoT solution fully complies with the 3GPP IoT standards of CAT-0, CAT-1, CAT-M and NB-IoT. The battery life of devices in these categories is typically designed to last more than 10 years through a Power Saving Mode (PSM) and Extended Discontinuous Reception (DRX) function, NB-IoT, especially, is best suited for an LPWA network; coverage has been extended by 20dB over standards mobile LTE and the module cost has been lowered by reducing device complexity, memory requirement and peak data rate. Even with such IoT features added to the base station, the capacity of the conventional LTE system remains untouched, maintaining a positive and seamless experience for existing LTE users.



Standalone type BS

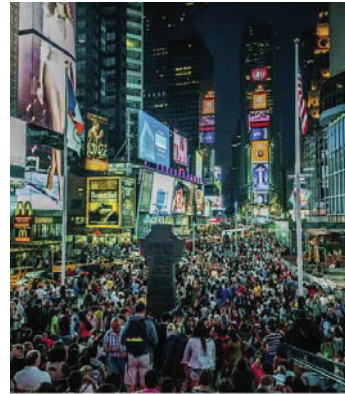
Samsung also provides an IoT standalone base station which supports NB-IoT exclusively. The standalone base station is handy for operators seeking to deploy a dedicated IoT dedicated network. The standalone base station is a light and east-to-deploy solution with the digital unit and radio unit integrated into one body. It is also highly cost effective with only a small number of base stations needed to cover wide areas. And because the base stations are deployed as an independent network, they do not need to be co-located with the operator's existing LTE cell sites. Operators thus have more freedom to design the independent network in accordance with IoT demand and other IoT-related metrics.

Such an IoT "overlay" network is an ideal solution for areas with coverage holes, hotspots in cities with explosive data usage or factories and rural areas where regular base stations have not been deployed. It may also be better to keep the LTE and IoT networks separately for an efficient network operation.

IoT Standalone Base Station Use Cases

[Case 1]

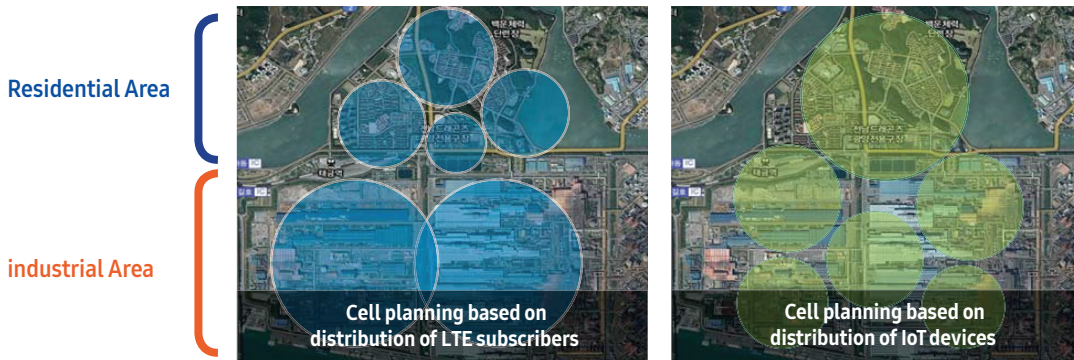
Let's take, for example, a busy, crowded metropolitan area like New York City. The city is packed with department stores, hotels, theaters, shopping centers and offices and plays host to hundreds of thousands of IoT sensors and devices. Office workers, city residents, and tourists alike come and go in the bustling streets with their own LTE and IoT devices including smartphones, tablets and wearables. The sheer number of the combined devices is enormous, generating incredible amounts of data traffic.



At certain times of the year, such as New Year's Eve or the annual Thanksgiving Day parade, LTE traffic spikes even further. Or, a crisis may occur, such as a fire or earthquake, and the IoT sensors embedded within the city will create enormous traffic. With an LTE and NB-IoT combined base station, it then becomes a challenge to effectively process resource sharing between LTE and NB-IoT without influencing each other, causing service degradation. Because of such constant and high traffic, LTE and NB-IoT processing may interfere with each other and cause degradation. In such circumstances, a separate NB-IoT Standalone Base Station is more favorable.

[Case 2]

Let's take, for example, areas with considerable differences between LTE subscribers and IoT sensors and devices. The below two photos show a city with two distinct areas; a residential area and an industrial area. As easily imaginable, the residential area has a large LTE subscription base while the industrial area, in the future, will have a large IoT subscription base with many installed sensors. Currently, LTE base stations are installed according to LTE subscriptions with many cells planned for the residential area and only two cells planned for the industrial area. However, for IoT devices, cell deployment should be completely different and there should be many cells planned for the industrial area and



IoT in Unlicensed Spectrum

As mentioned above, LPWA technologies include not only cellular IoT but also new technologies such as LoRaWAN technology and SIGFOX that are deployed on unlicensed bands. These technologies are developed for the sole purpose of enabling Machine Type Communication (MTC). At the same time, short-range communication technologies such as WiFi, Zigbee and Bluetooth also utilize unlicensed spectrum for IoT purposes.

LoRaWAN technology



LoRaWAN technology is a great example of Low Power Wide Area (LPWA) technologies that uses unlicensed spectrum; the particular spectrum used is called the Industrial Scientific and Medical (ISM) frequency band. LoRaWAN technology supports Listen Before Talk (LBT) functionality to prevent competition with, and therefore degradation of, other industrial communications already using the ISM band.

The LoRaWAN technology-based Unlicensed LPWA base station is already commercially available. Samsung will jointly deploy the world's first nationwide network based on LoRaWAN technology and solely dedicated for the Internet of Things. Samsung will provide LoRaWAN technology base stations for Korea's IoT city construction project. The city is to be designated as an information communication technology (ICT) regulation-free zone and the project will serve as a testbed for next-generation services, applications and products as well as future services.

Samsung will contribute to creating an ecosystem that enables significant changes driven by new IoT services. The Korea Ministry of Science, ICT and Future Planning's recent decision to revise that maximum transmit power of LoRaWAN technology in the 900MHz frequency band from 10mW to 200mW is expected to help operators overcome limitations caused by the original low transmit power and to secure the basis for new IoT services. For instance, when building an IoT dedicated network with the previous transmit power of 10 mW, it took 100 base stations to cover a certain area. However, by raising the transmit power to 200mW, it only takes 27 base stations to cover the same area, reducing the installation cost by about 70%.¹⁾

Remote Metering

measure and collect energy consumption data of utilities



Location Tracing

collect and manage location information of vehicles, persons, objects



Monitoring

control and manage environment of manufacturing, public facilities



¹⁾ <http://www.msip.go.kr/web/msipContents/contentsView.do?catelId=mssw311&artId=1293358>

* The LoRa® mark is a trademark of Semtech Corporation

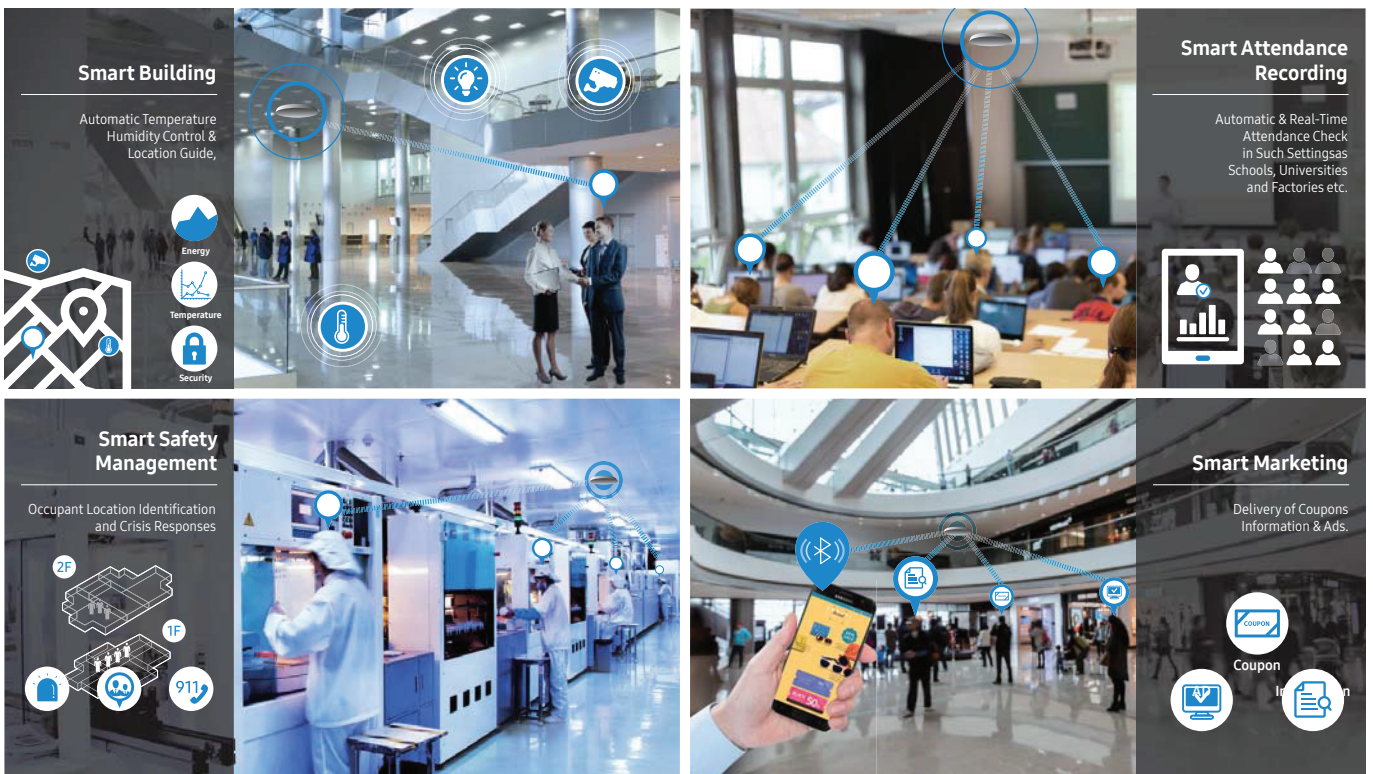
IoT Gateway

Apart from LPWA technologies, Samsung is also ready to provide an IoT product for short range communication, the IoT gateway. Samsung is already a strong provider of WiFi Access Point (AP) and has added IoT technologies to the existing AP for in-building IoT services. Therefore, the IoT gateway is an all-in-one product, supporting WiFi, Zigbee and Bluetooth Low Energy (BLE) within a single unit. The gateway is embedded with both a BLE Beacon Hub and Wireless Intrusion Prevention System (WIPS) sensor. The BLE Beacon Hub is able to control the multiple devices that are connected to the AP. The WIPS sensor monitors the user status of the gateway in real time, preventing unwarranted connections to maximize security.



There are many situations where such a gateway may be utilized. In school or offices, the gateway may be used for automatic light control depending on room occupancy for energy efficiency and user convenience or automatic attendance recording with real-time location tracking to enhance accuracy. The gateway can also provide smart safety management in factories with occupant location tracking and crisis responses and smart marketing with coupons, ads and other push service sent to potential customers.

Samsung, as seen above, is equipped with a diverse IoT solution portfolio from licensed to unlicensed, short range to long range, and outdoor to indoor. Operators may pick and choose whichever technology best suits their environment.



Smart Building
Automatic Temperature Humidity Control & Location Guide,
Energy, Temperature, Security

Smart Attendance Recording
Automatic & Real-Time Attendance Check in Such Settings as Schools, Universities and Factories etc.

Smart Safety Management
Occupant Location Identification and Crisis Responses
2F, 1F, 911

Smart Marketing
Delivery of Coupons Information & Ads.
Coupon

SAMSUNG

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Samsung inspires the world and shapes the future with transformative ideas and technologies. The company is redefining the worlds of TVs, smartphones, wearable devices, tablets, digital appliances, network systems, and memory, system LSI, foundry and LED solutions.

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