



802.11ah - HaLow

June 2023

NEWIRACOM

STANDARD & SPECIFICATION



CERTIFICATION & PROMOTION



● Characteristics of IEEE 802.11ah HaLow

Frequency Band	License-exempt bands below 1 GHz, excluding the TV white spaces – Example: 863-868.6 MHz (Europe), 915.9 -928.1 MHz (Japan), 755-787 MHz (China), 917- 923.5 MHz (Korea), 866-869 MHz, 920-925 MHz (Singapore), and 902-928 MHz (U.S.)
Channel Width	1/2/4/8/16 MHz
Range	1Km + (outdoor)
End Node Transmit Power	Dependent on regional regulations (from 1 mW to 1 W)
Data Rate	150 Kbps ~ 346.666 Mbps
Devices per Access Point	8,191
Standard Body	IEEE 802.11 working group
Topology	Star, Tree



Introducing **Wi-Fi HaLow** IEEE 802.11ah



**SUPERIOR
RANGE**

1.5km coverage



**ENERGY
EFFICIENT**

Multi-year battery
operations



**HIGH DATA
RATE**

Up to 15Mbps



**WPA3
SECURITY**



**HIGH
CAPACITY**

8000 STA per AP

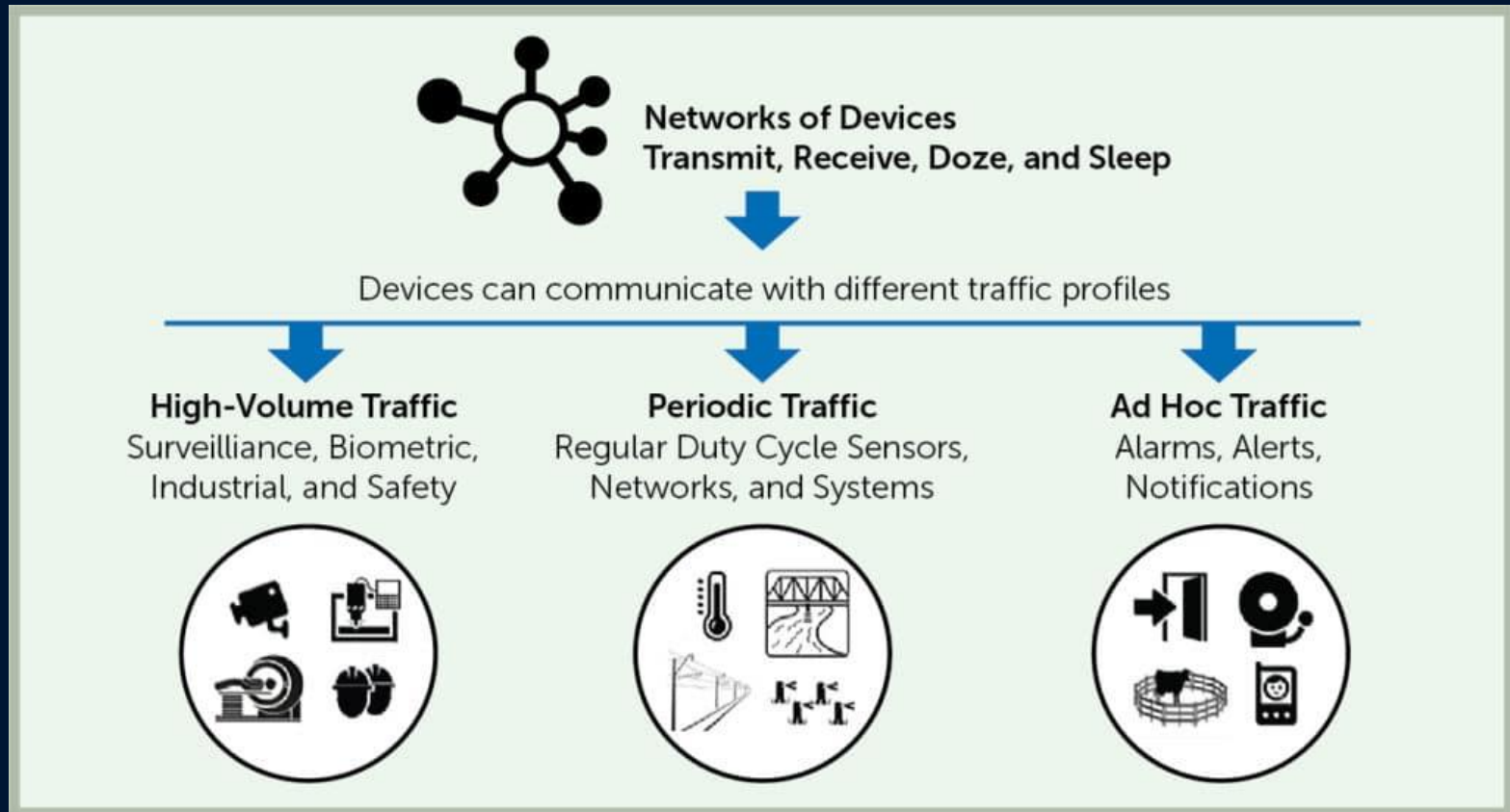


**FLEXIBLE
& EASY**

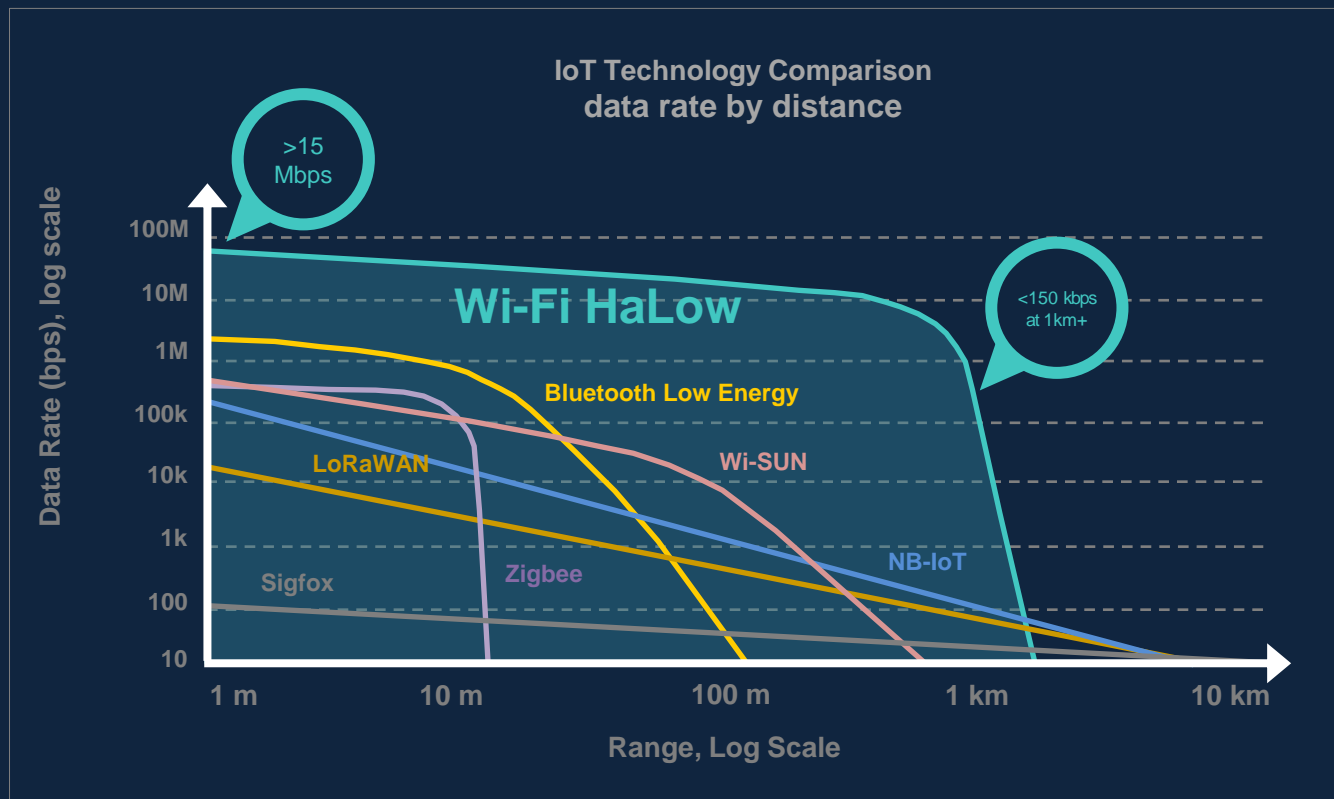
IP Based

Wi-Fi Connectivity. Designed for IoT.

Wi-Fi HaLow – A platform optimized for IOT use cases

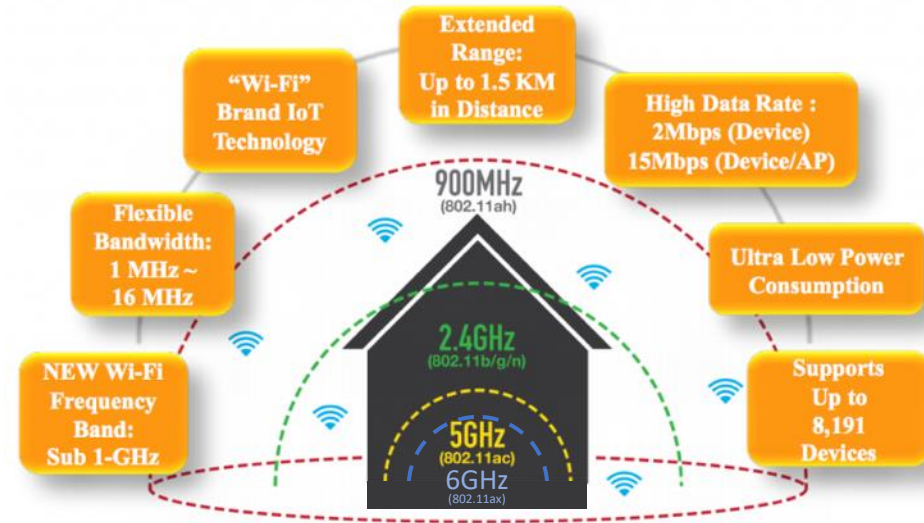
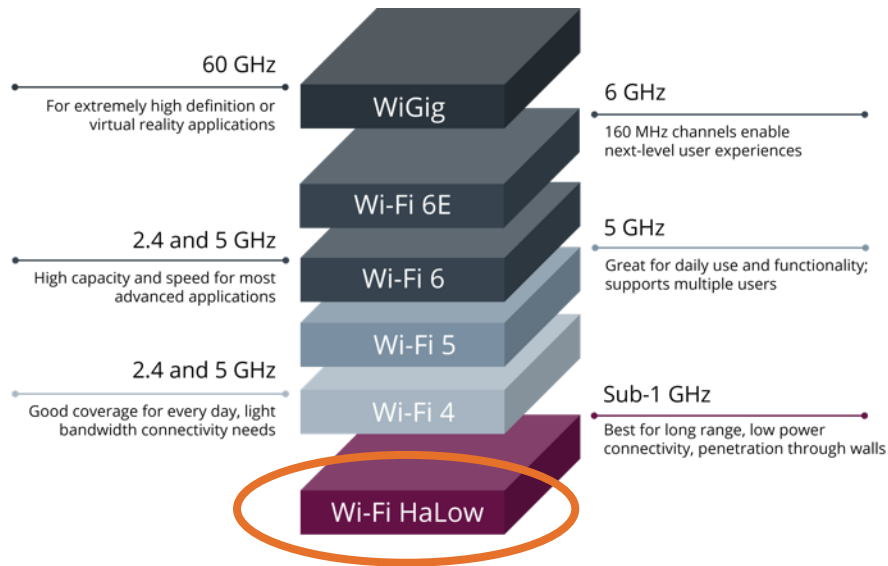


IoT Comparison – Range & Data Rate



Source: "Wi-Fi HaLow: Wi-Fi for IoT Applications" by Wi-Fi Alliance, May 2020.

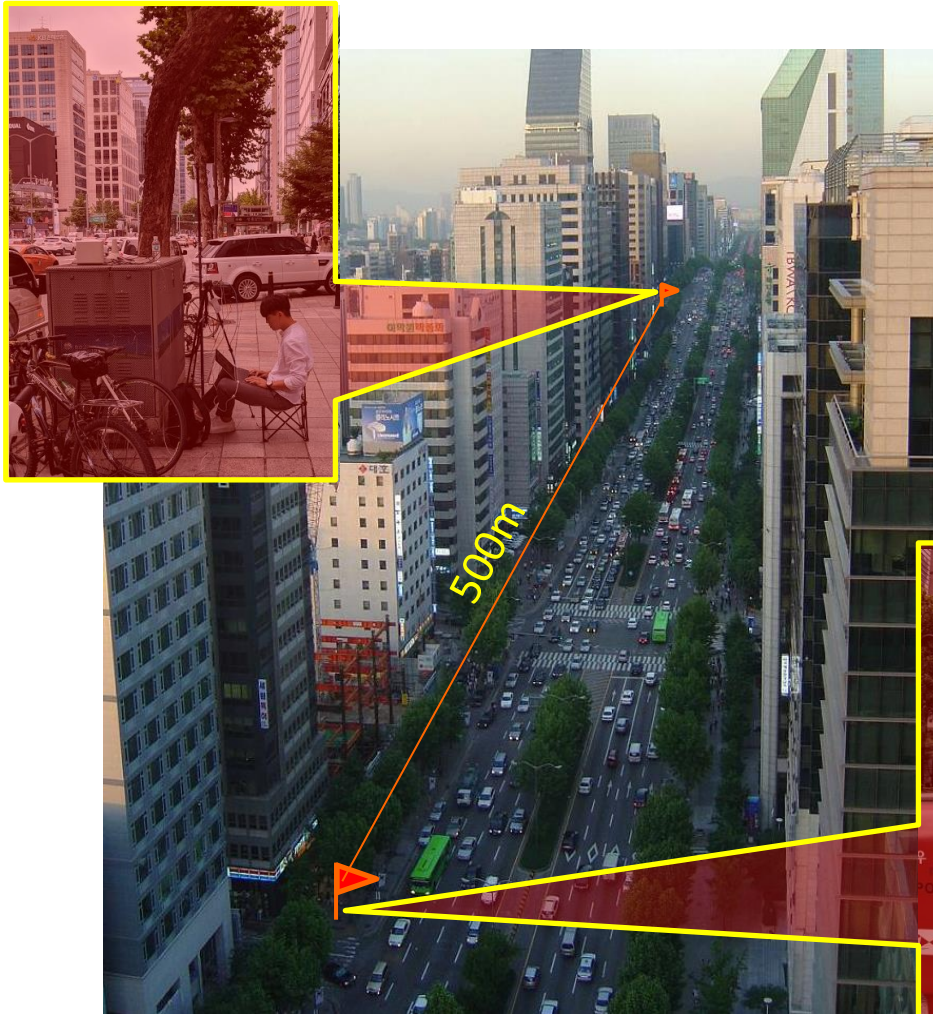
Wi-Fi Technology Portfolio - HaLow



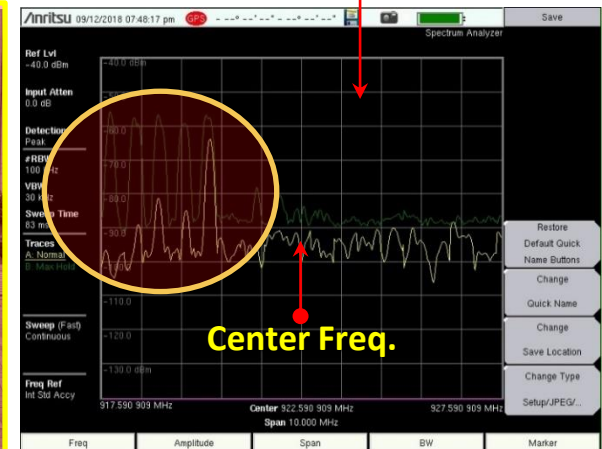
NRC7292 – Long Range

Field Test at Business District

- 1.79 Mbps avg. throughput @ 500m
- 2MHz channel bandwidth
- 922.5MHz center frequency
- 17dBm transmit power
- Noisy channel environment
- Dipole antenna



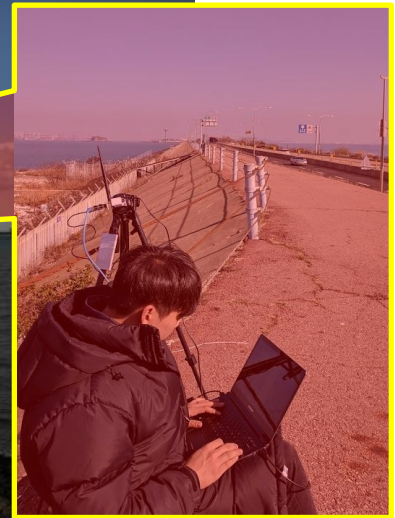
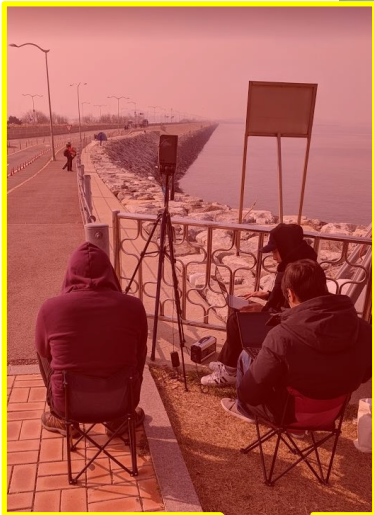
-55dBm peak RFID interference



NRC7292 – Long Range

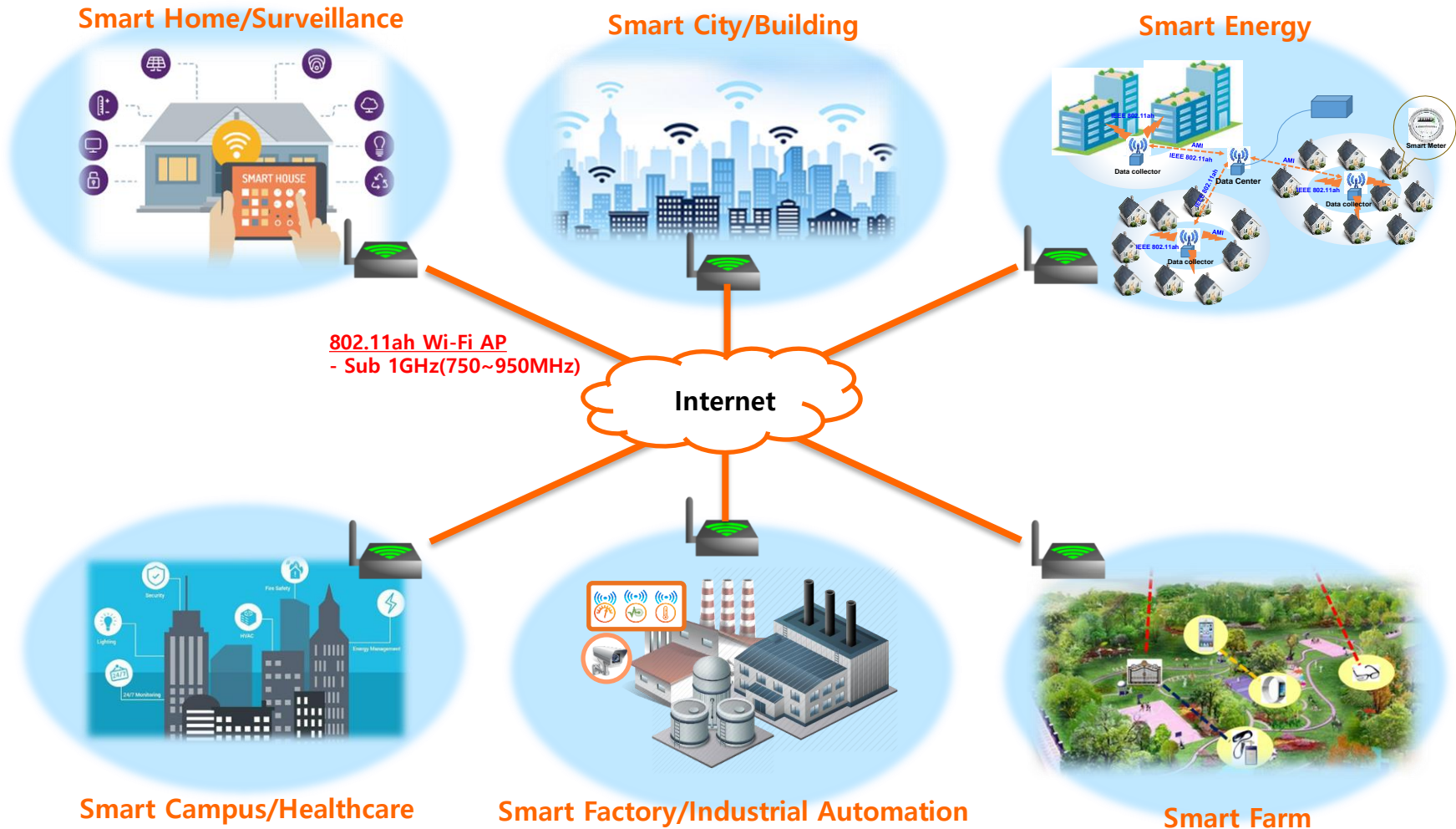
Field Test at Seawall

- 2.58 Mbps avg. throughput @ 3km
- 2MHz channel bandwidth
- 924.5MHz center frequency
- 17dBm transmit power
- Low interference environment
- PCB pattern antenna



802.11ah HaLow

- IEEE 802.11ah uses a sub-1GHz bandwidth, which allows a greater coverage of a distance up to 1.5 km while transmitting data at reasonable rates. Therefore, it is suitable for almost all IoT applications such as smart home, smart city, smart energy, smart building, smart factory and smart farm.

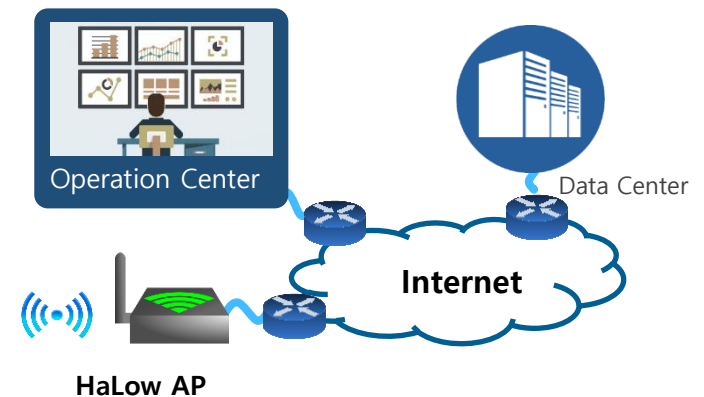
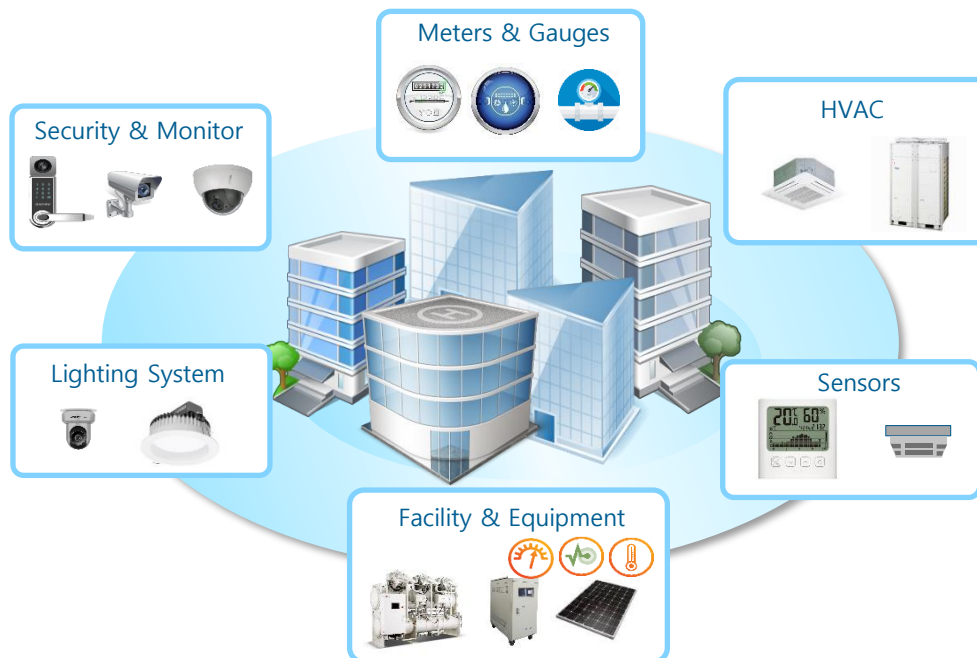


Advantages

- One AP can cover about 300m distance and multiple floors
- Simple configuration (star or tree topology)
- Mbps throughput enable large amount of data gathering for big data analysis
- Saving Installation cost for wired network and regular fee

Use Cases

- Building energy management system (Meters & gauges)
- HVAC & air-conditioner
- Various sensor devices
- Lighting system
- Security & surveillance system
- Facility & equipment maintenance
- Communication between indoor and outdoor unit
- Backhaul network for other short-range devices (Wi-Fi, BT, Zigbee, z-wave etc.)

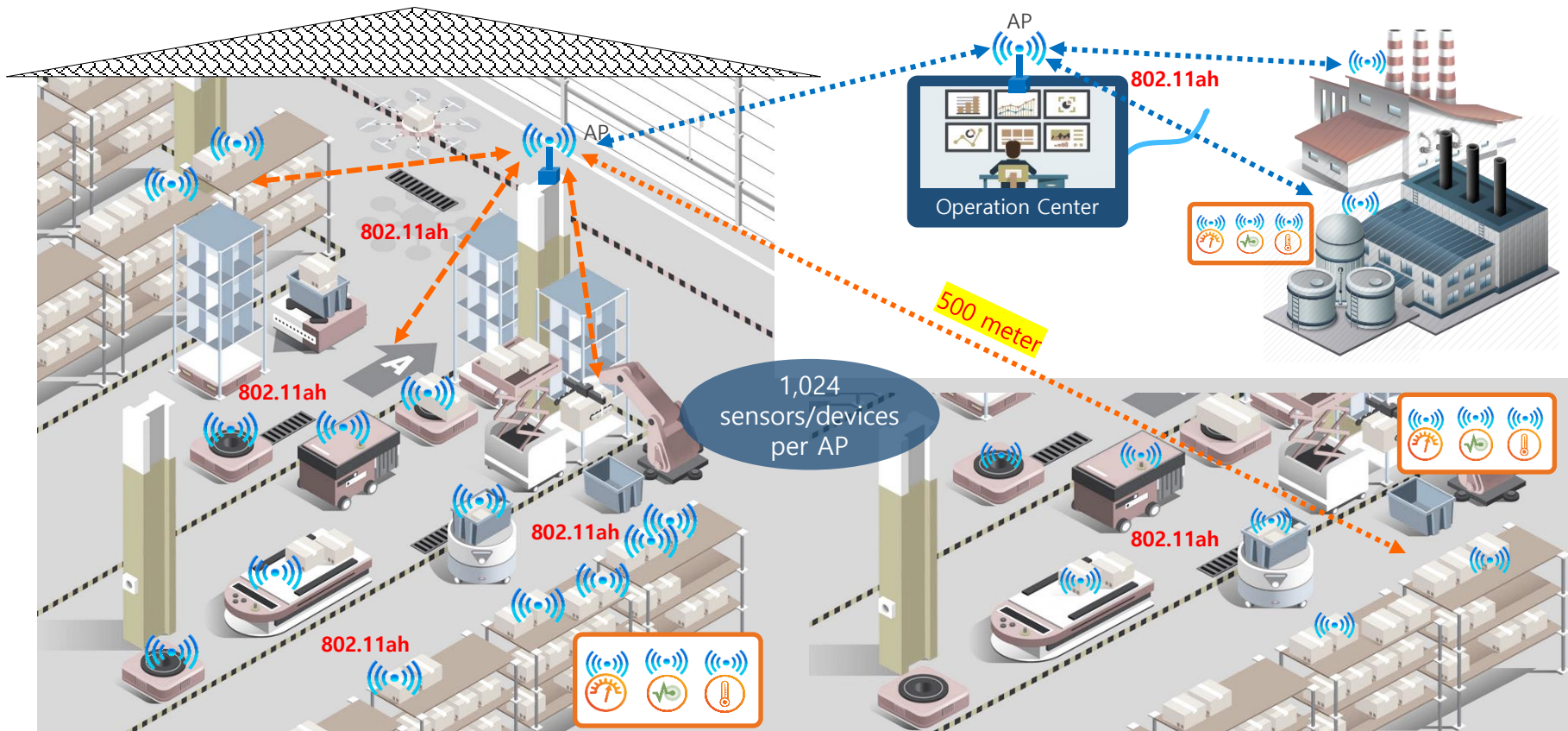


Advantages

- Coverage : 300~500m with max 1024 STA per AP
- Mbps throughput enables sensor signal data collection for big data analysis or pattern recognition
- Low latency suitable for emergency warning or failure detection

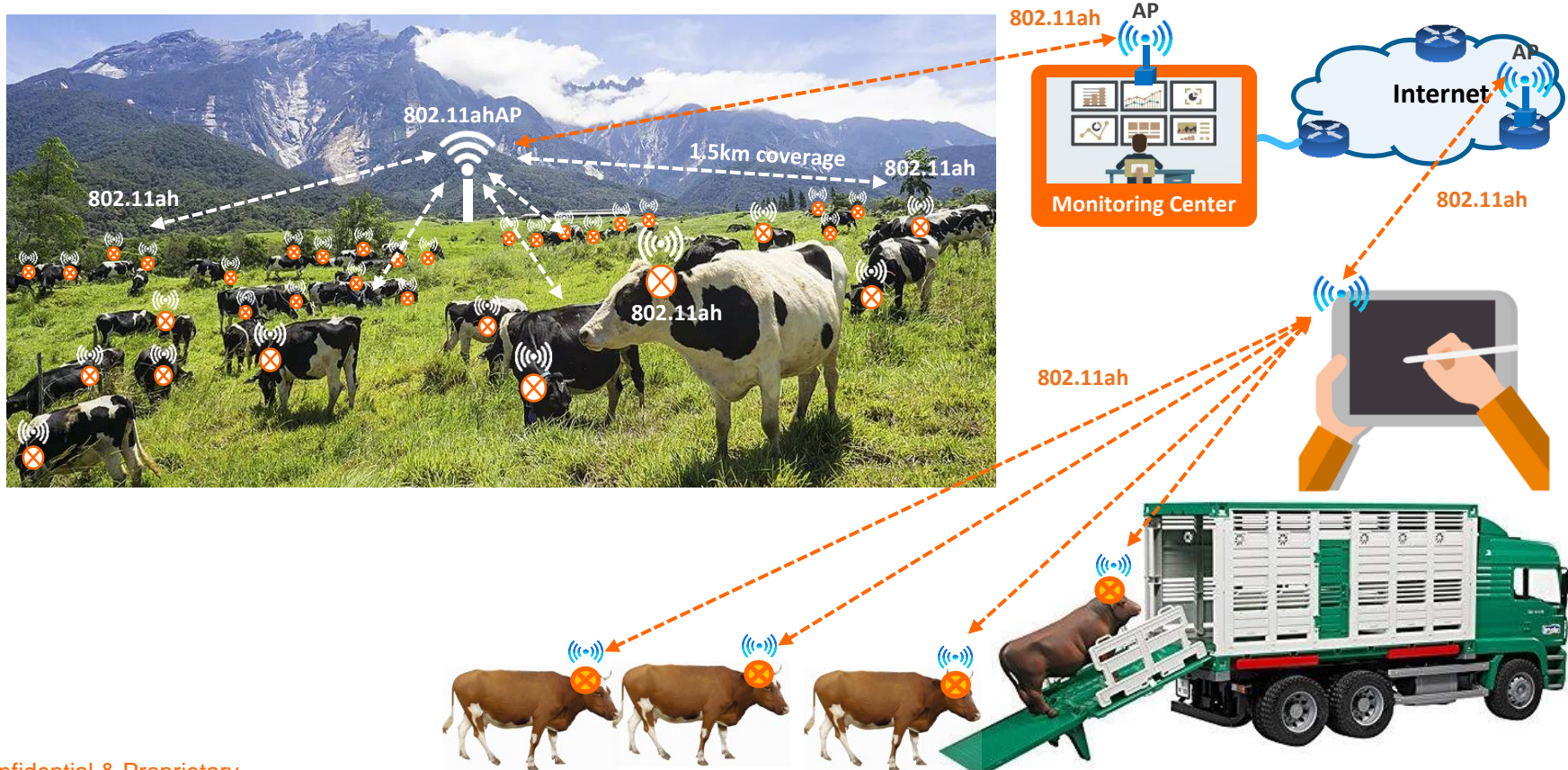
Use Cases

- Equipment and process monitoring and diagnosis
- Realtime sensor data collection (vibration, temp/humidity, strain gauge or leakage)
- Safety or security
- CCTV/Thermal camera
- Factory Energy Management System (FEMS)
- Wearable (Helmet camera, Watch, Walky-talky, etc.)



Cattle Tracking & Monitoring

- IoT sensors (temperature, humidity, etc.) are implanted in the animal's skin/ear (cow, pig, lamb, etc.) for tracking and monitoring activity levels and disease with Wi-Fi HaLow-enabled tags which support extended coverage with secured data
- Keep tracking cattle's activity levels and healthy condition during the transportation process



Thank you



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