



# 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

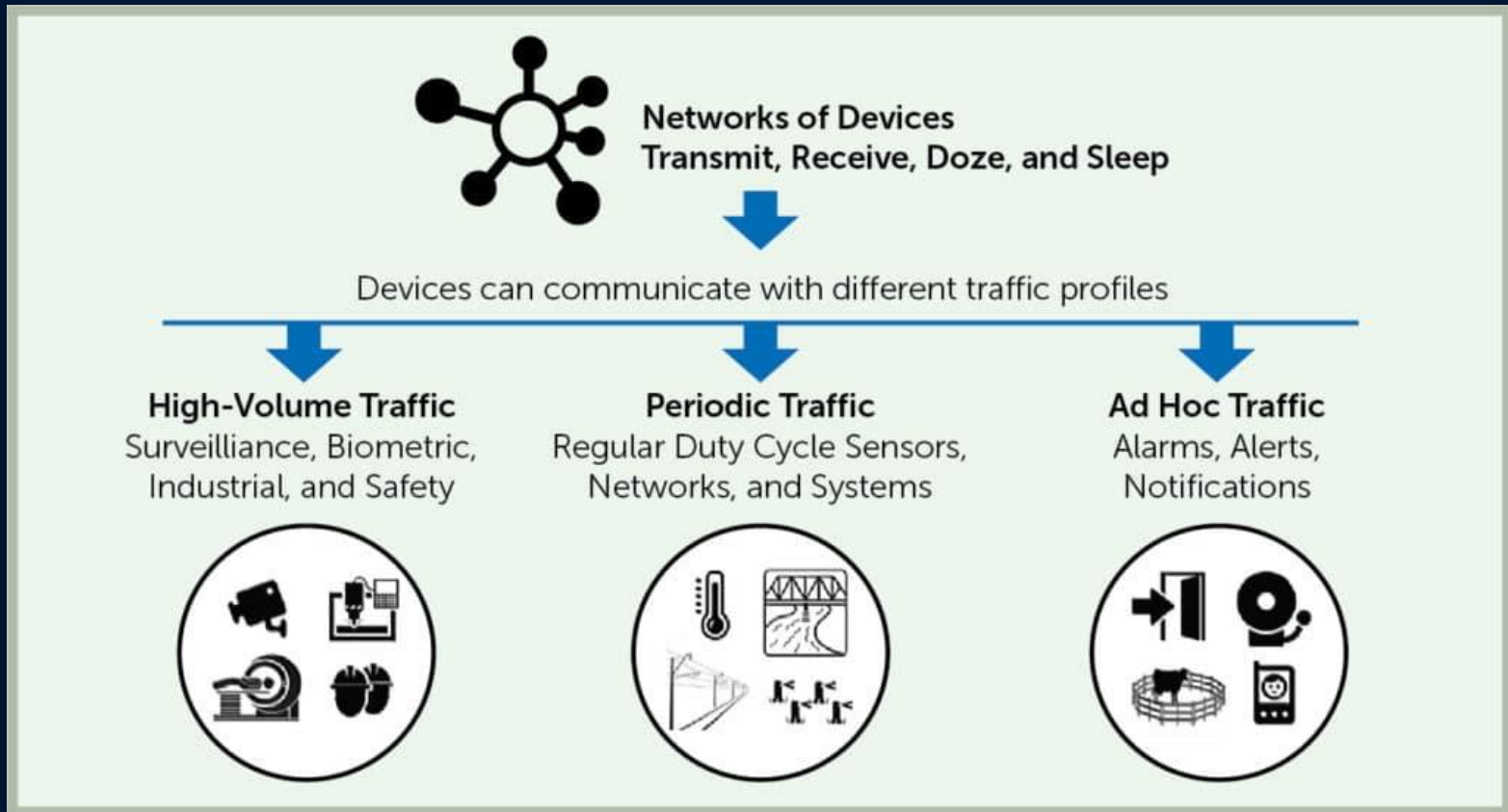


**FLEXIBLE  
& EASY**

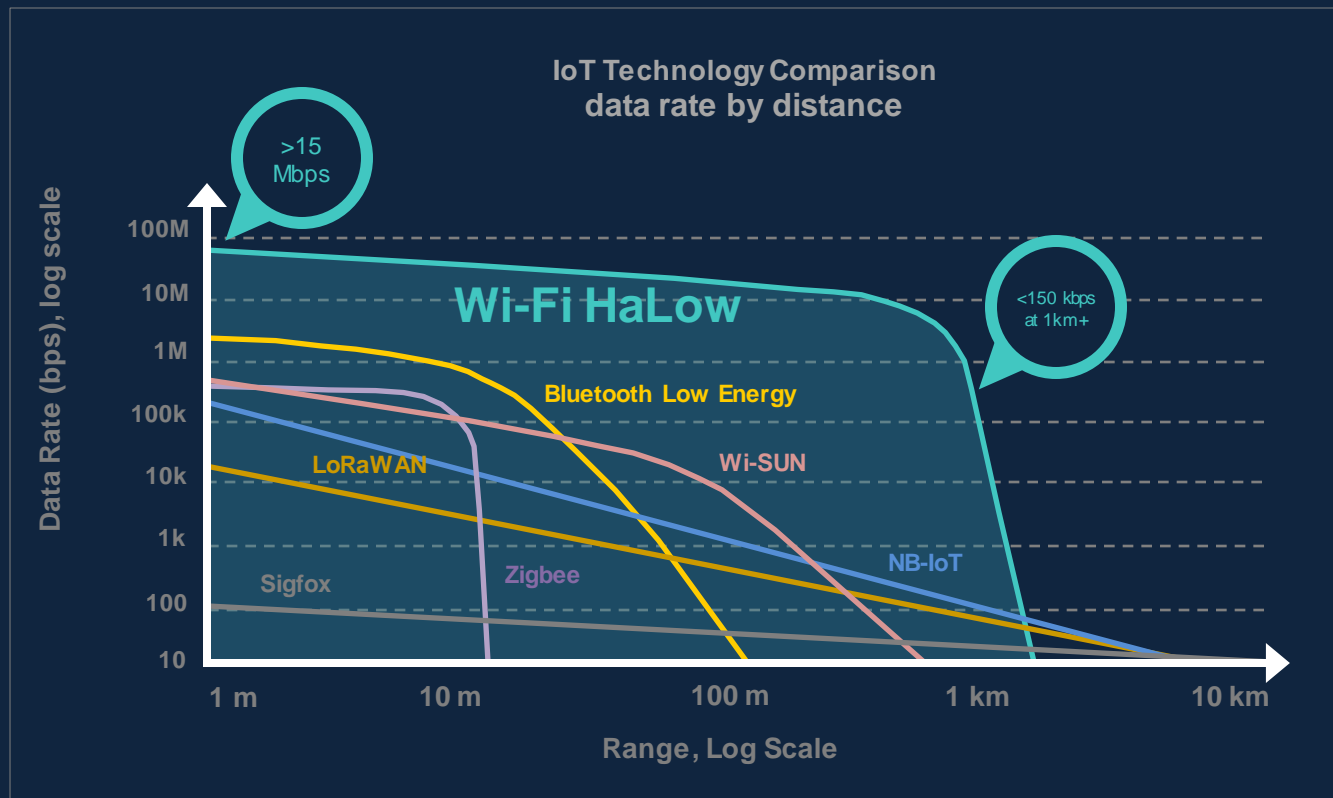
IP Based

Wi-Fi Connectivity. Designed for IoT.

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

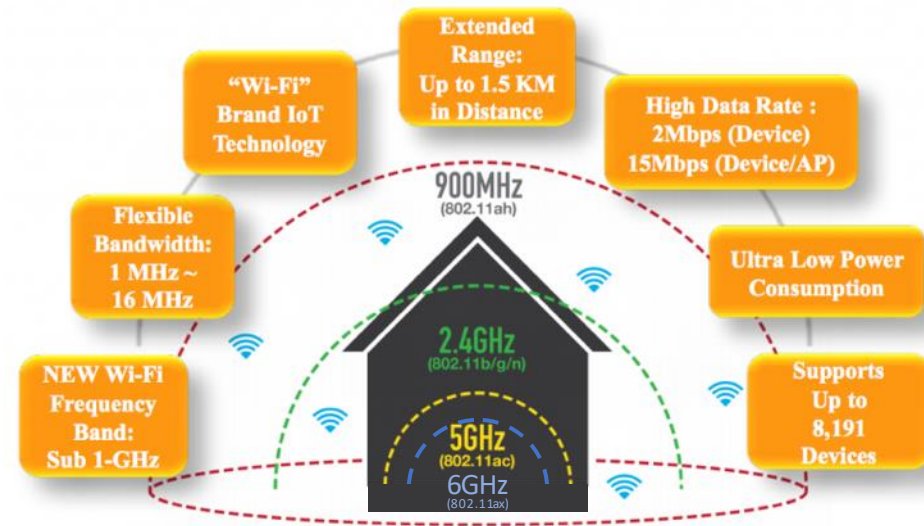
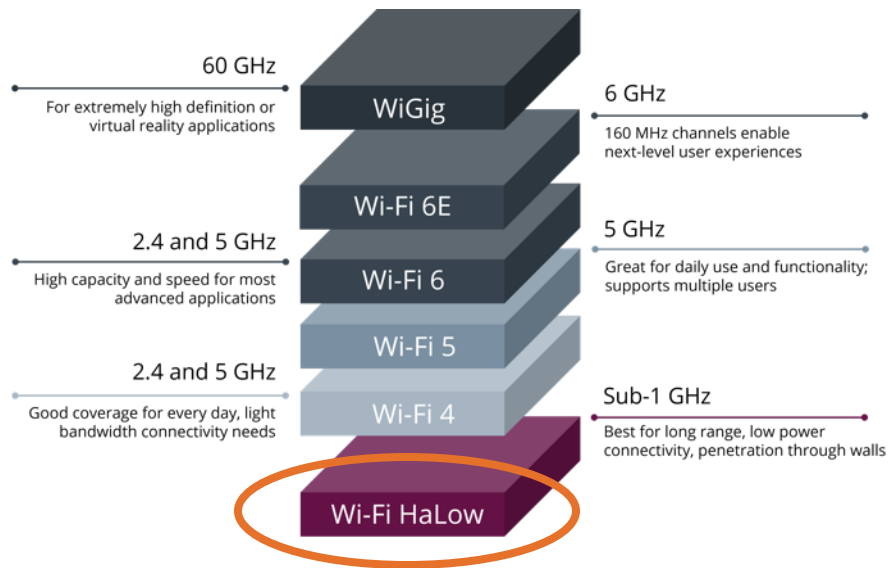


## IoT Comparison – Range & Data Rate



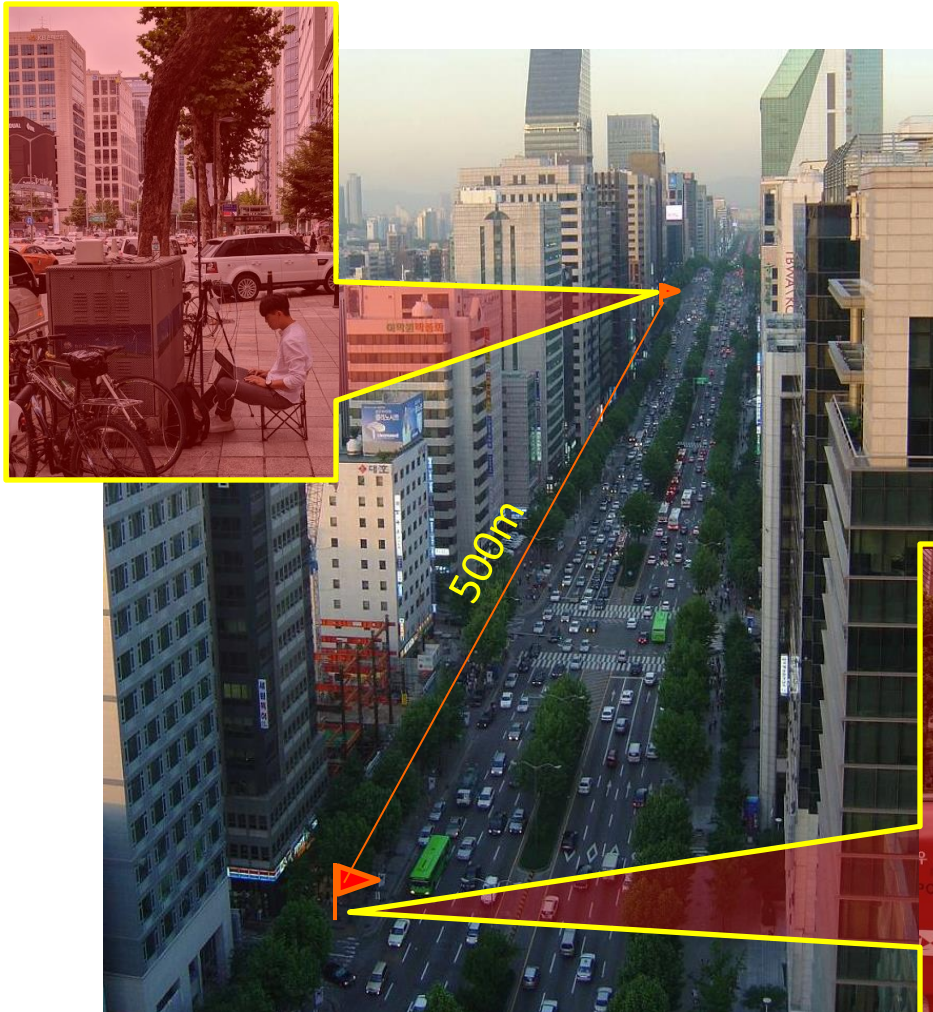
Source: "Wi-Fi HaLow: Wi-Fi for IoT Applications" by Wi-Fi Alliance, May 2020.

# Wi-Fi Technology Portfolio - HaLow

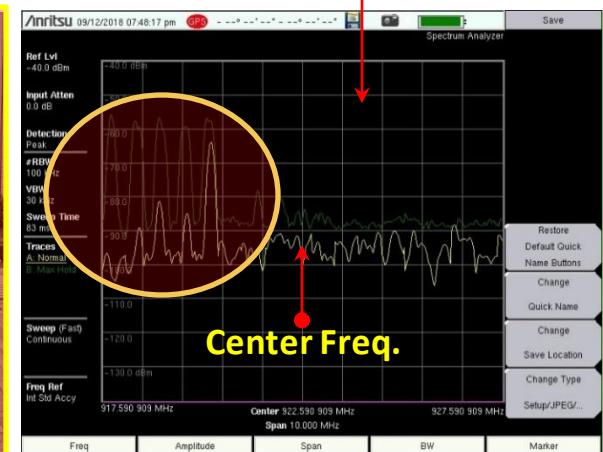


## Field Test at Business District

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



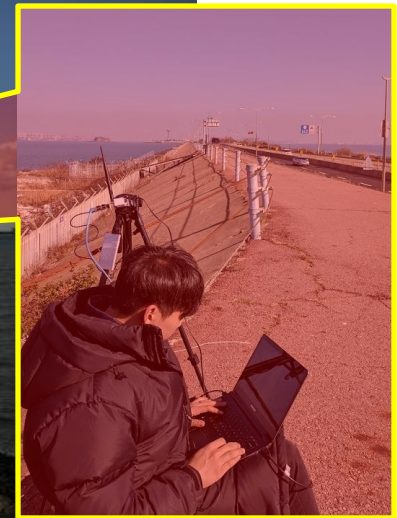
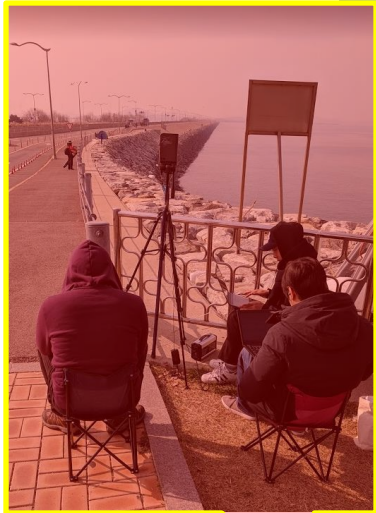
-55dBm peak RFID interference



# NRC7292 – Long Range

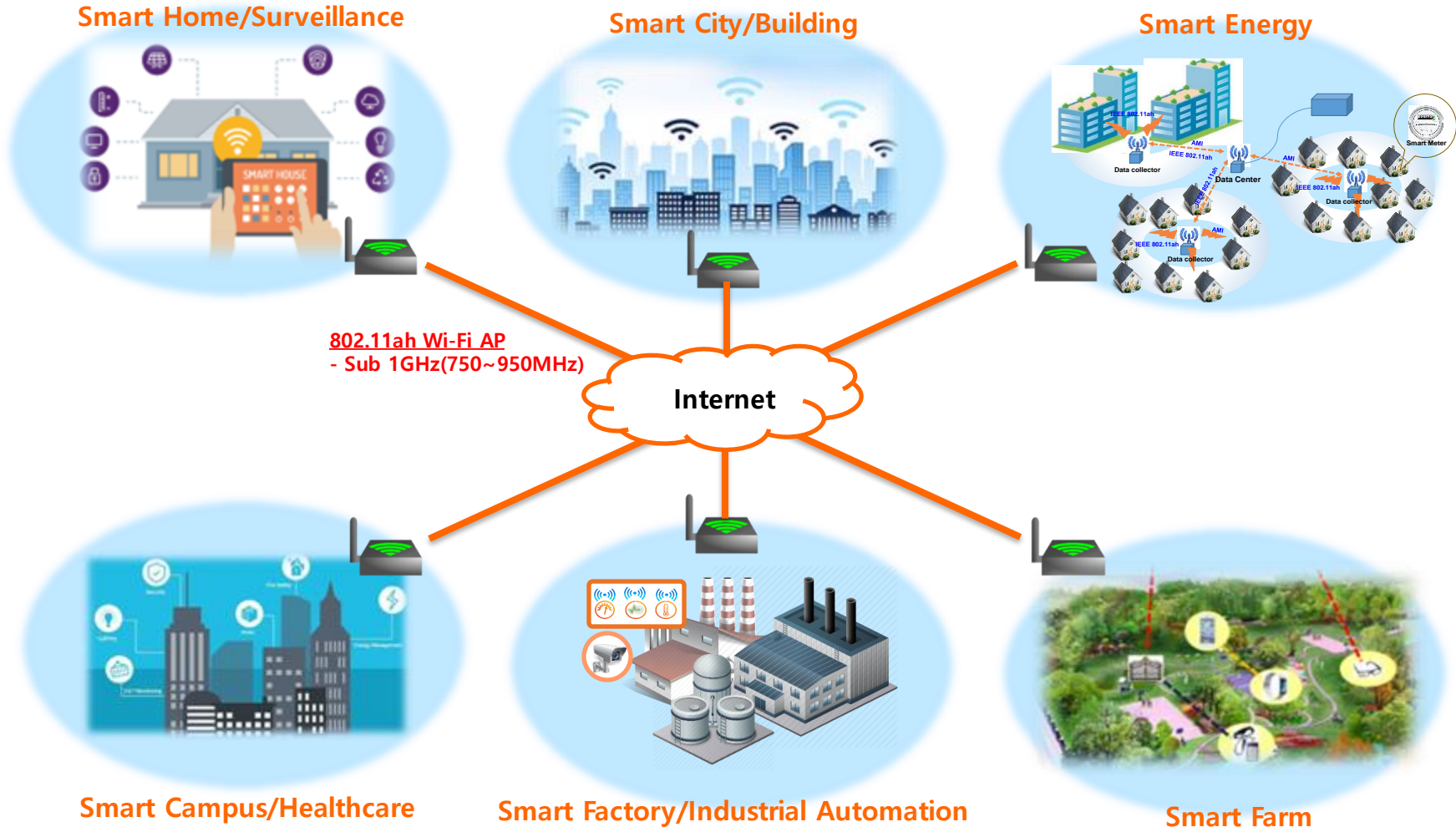
## Field Test at Seawall

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





- 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.

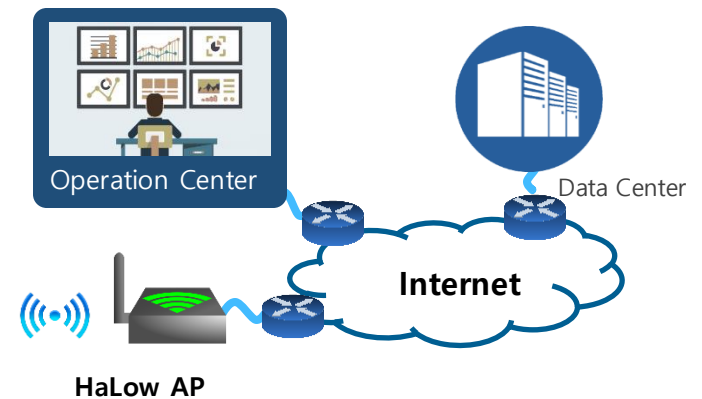


## Advantages

- 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.)

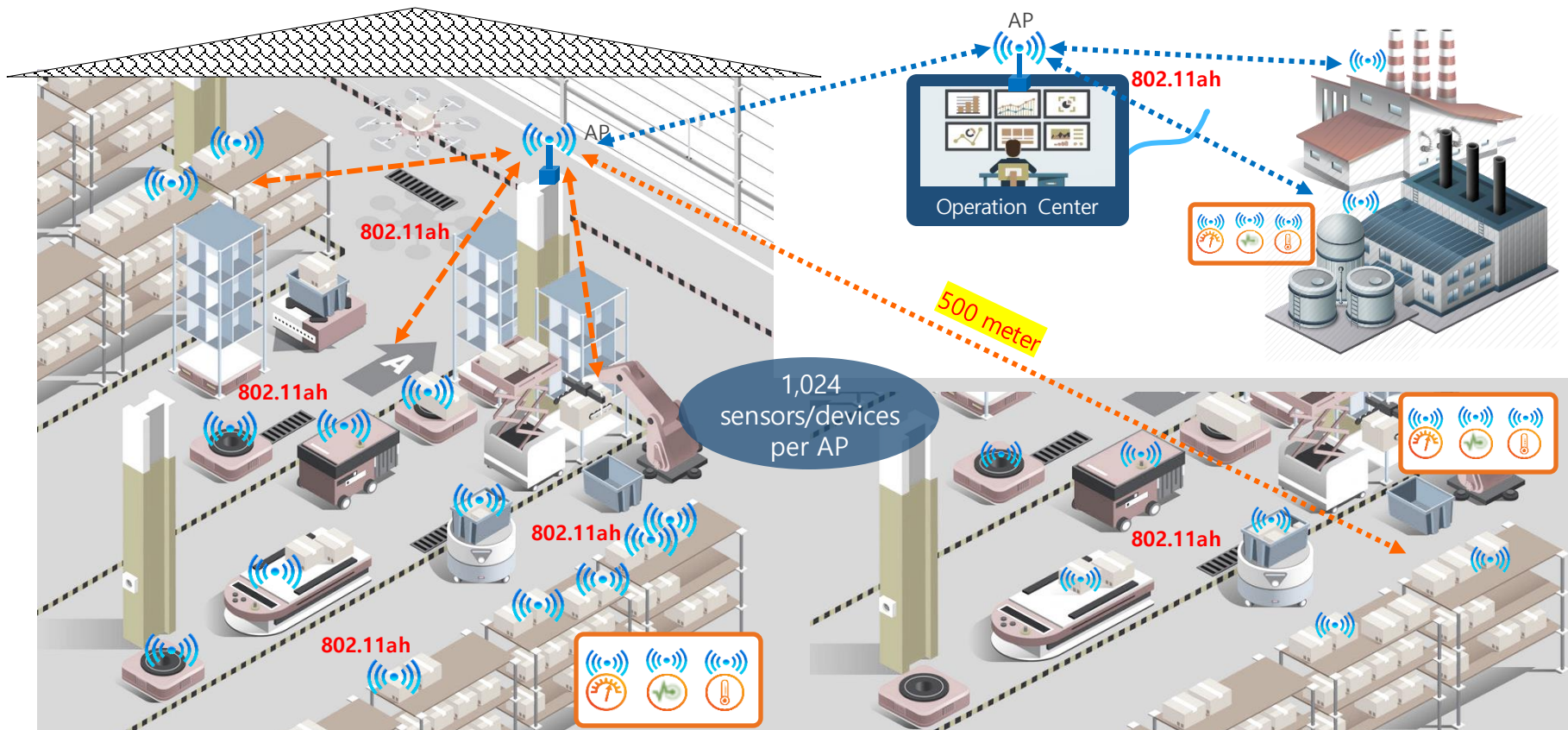


## Advantages

- 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

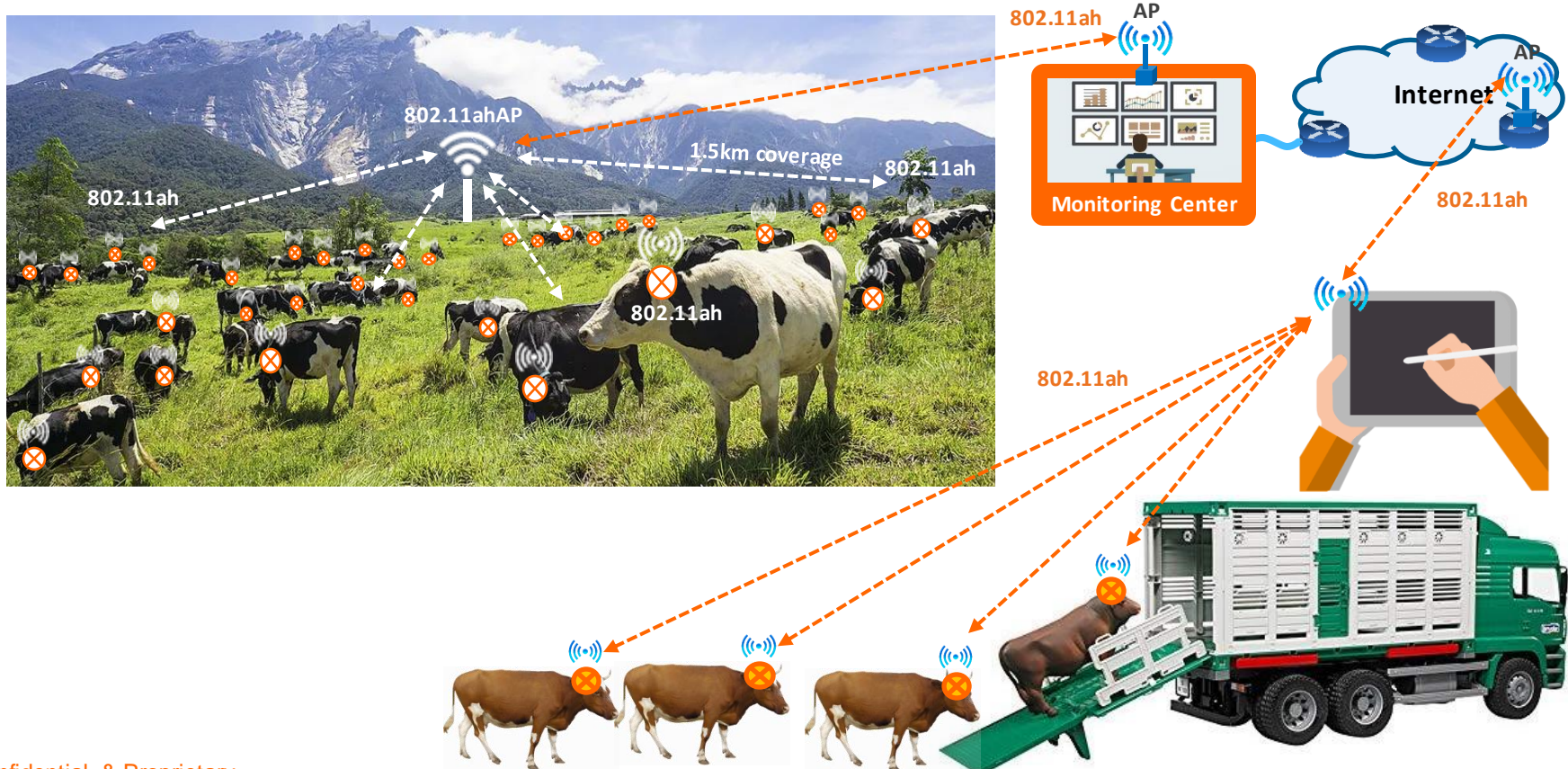
## Use Cases

- 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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