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DATE: 17 May 2016

TO: Glenn Parsons, Chair, IEEE 802.1 Working Group

FROM: Wi-Fi Alliance

RE: Wi-Fi HaLow use case for Wireless Field Network on Industry Automation

Dear Glenn,

Wi-Fi Alliance Wi-Fi HaLow Marketing Task Group is developing a Marketing Requirements Document for Interoperability Testing of Wi-Fi HaLow™ (based on 802.11ah; previously known as ERah) devices that operate in frequency bands below one gigahertz, offering longer range, lower power connectivity to Wi-Fi CERTIFIED™ products. Wi-Fi HaLow will enable a variety of new power-efficient use cases in the smart home, connected car, and digital healthcare, as well as industrial, retail, agriculture, and smart city environments.

Attached is an excerpt from the Wi-Fi Alliance Marketing Requirements Document for Interoperability Testing of Certified ERah Devices, which has been adopted by Wi-Fi Alliance as the basis for the Wi-Fi HaLow certification program (Wi-Fi HaLow was previously known as ERah). The excerpt contains a use case which defines a Wireless Field Network for Industry Automation involving IEEE802.15.4g and IEEE802.11ah devices and a device called 15.4g-11ah gateway or bridge.

Bridging between 802.15.4 and 802.11ah is a required functionality for this use case. As far as we know there is currently no standard solution for this bridging functionality.

Wi-Fi Alliance requests IEEE 802.1 Working Group to consider developing a general solution to bridging IEEE 802.15.4g devices using 64-bit MAC addresses with IEEE 802.11ah devices, as well as IEEE 802.3 devices using 48-bit MAC addresses and related issues such as frame format, timing adaptation and dealing with sleeping nodes.

Please feel free to contact Wi-Fi Alliance through Wi-Fi Alliance staff at thanzlik@wi-fi.org with any questions or comments related to this liaison document.

Best Regards,
Wi-Fi Alliance

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Excerpt from Marketing Requirements Document for Interoperability Testing of Certified ERah Devices

3.5.5 Wireless Field Network for Industry Automation

3.5.5.1 Description

Onni works in a large refinery as facility expert. There are thousands of sensors and control valves connected to a distributed control system (DCS) to monitor and control the refinery process.

The refinery is about 1km wide and 2km long.

As wireless technology can provide more flexible and convenient installation and maintenance services, Onni selects ERah technology in deploying sensors and control valves.

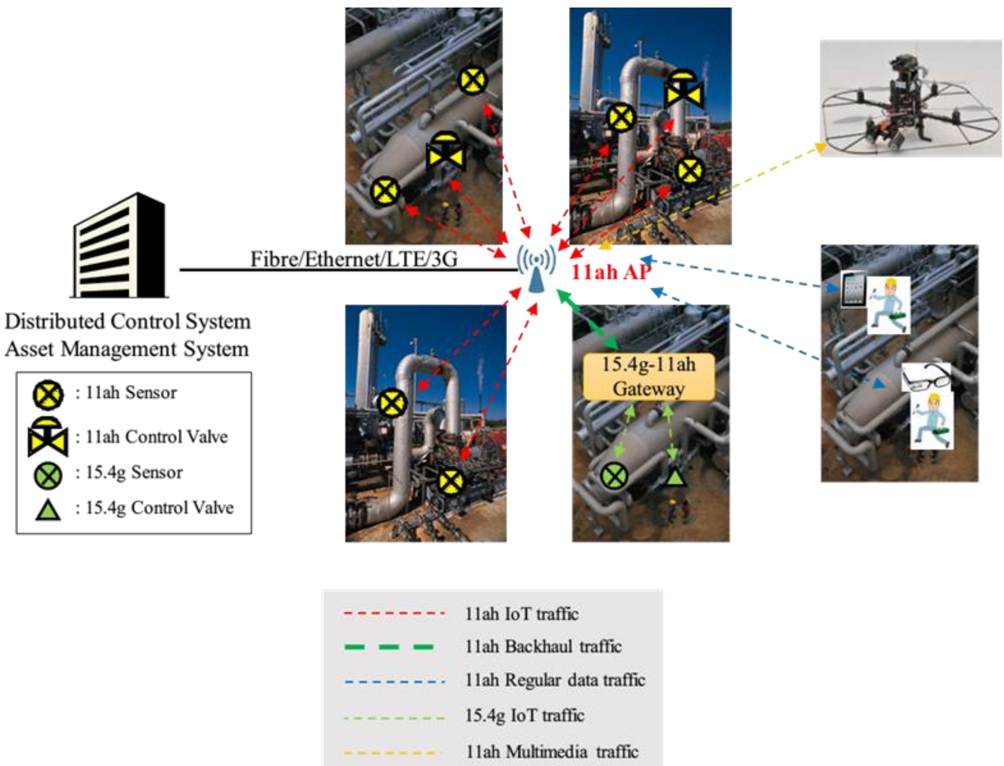

Figure 5. Wireless Field Network for Industry Automation

A significant advantage of ERah technology is greater coverage and capacity, as well as lower power consumption Onni uses ERah-enabled sensors and control valves in the refinery. He deploys outdoor AP or APs (900MHz, ERah-enabled). The ERah AP or APs can provide accessing service for all sensors and control valves. The devices (sensor or control valve) periodically communicate with the DCS using relatively small size (5 to 32 bytes) data. The communication intervals may range from few hundreds of milliseconds to few minutes. Delay of transmission shall be less than the communication interval.

Reliability is crucial for the process control. Raw PER (Packet Error Rate) shall be less than 1%. Long lifetime of devices and long mean period between maintenances are also required. If a battery powers a device, battery life longer than 5 years is required.

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The refinery also has some IEEE 802.15.4g devices, which are needed to connect to the DCS. A gateway supporting ERah and 15.4g can be deployed to bridge two wireless technologies. The ERah network can be the backhaul link for the 15.4g network. The maximum distance between an AP and a gateway is 500m. The communication intervals of the 15.4g devices may range from few seconds to few hours. The maximum bit rate of anERah backhaul link is about 1Mbps.

Onni sometimes goes to the different fields of refinery to install new devices or to service malfunctioning devices. He brings a mobile terminal (Tablet) that can connect to an asset management system (ASM) via ERah AP. He configures the device using the mobile terminal, and the ASM records his operation to the asset database. The traffic of tablet is common webpage data. In addition, he may request self-diagnosis of some devices. The ASM requests the devices to perform diagnostics, and then, the devices will return the diagnosis report to the ASM. The size of report data is about few hundred bytes.

Smart glasses can help Onni do more field checking work, for example fire alerts. Using ERah, smart glasses can operate in large coverage in refinery, and the maximum bit rate of smart glasses can be 4Mbps when transmitting video. One day, Onni receives an alert message of detecting a fire. Onni immediately puts on his smart glasses in order to track the location of fire indicated in the alert message and retrieves a map to that location. Upon retrieval, Onni sends the map details to the fire department for immediate attention.

Every day, there are many vehicles in refinery bringing materials for production. Up until recently, Onni had to hire few security guards to observe and deter the un-authorized vehicles, but now he has deployed small size flying robots instead. These flying robots are able to follow a vehicle and to work as an airborne surveillance camera monitoring a wide area with a bird-eye view or can take a close up picture of a license plate of a suspicious target vehicle.

Each flying robot is equipped as an ERah STA function over which the transactions of periodic short data frames for remote manipulation are carried. These frames are sent without excessive latency, up to a few hundred milliseconds at most. Additionally, they can transmit a half VGA 10-30fps moving picture (up to 2.0Mbps of a required reference bit rate if MPEG4 compression is used). Onni can check the suspicious vehicles from his tablet.

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