Wi-SUN FAN 1.1 PHY Certified Products for IoT Systems Ensuring Stable and Long-Distance Communications

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Overview

Expansion of stable wireless networks and communication coverage areas is a must in a society which seeks to connect all things. With the rapid expansion of the IoT comes a range of new needs. To keep up with these needs, we must accelerate the development of new products and systems.

The Renesas Wi-SUN FAN 1.1 (Wireless Smart Utility Network for Field Area Networks, version 1.1) compliant transceiver LSIs, evaluation kits, protocol stacks, and development/evaluation tools provide the solutions our IoT society requires.

The Wi-SUN FAN is an international standard for wide-range/long-distance communication using radio waves in the Sub-GHz band (860MHz band, 920MHz band, and other bands below 1GHz). The system features high signal reachability, long-distance communications using a multi-hop mesh-type network, and a network automatic rebuild function yielding stable communications, and is already being implemented in smart meters for electricity, gas, and water systems. Wi-SUN FAN is further expected to be adopted and its market expanded as a means of linking IoT devices as our smart society develops.

As a Wi-SUN alliance member, Renesas has been involved in formulation of the standards from the outset and continues to provide compliant products. Our newest is the R9A06G062 transceiver LSI which supports FAN 1.1 (the latest Wi-SUN FAN profile), and a development kit supporting wireless equipment standards (FCC, CE, and Construction Type (Japan) certified). Renesas additionally offers sample software for the R9A06G062, including device driver and development/evaluation tools for the Wi-SUN FAN 1.1 protocol stack, supporting customer product development while contributing to both client IoT system development and the realization of a smart society.

Wi-SUN FAN 1.1

The Sub-GHz band radio waves utilized by Wi-SUN offer several advantages compared to the 2.4GHz band used by Wi-Fi and Bluetooth. Wi-SUN ensures longer reach, obstacle circumvention (better diffraction characteristics), and less radio-frequency interference with other electronic devices. Features of the Wi-SUN FAN 1.1 profile include long-distance communication using multi-hop communication, automatic network rebuild during communication path failure, limited function node (LFN) enabling battery operation (ultra-low-power operation) through intermittent operations, and co-existence of high-speed communication using OFDM modulation and conventional communication using FSK modulation. This rich feature lineup has resulted in the use of Wi-SUN compliant devices in myriad IoT communication applications,

including smart meters for electricity, gas, and water, industrial infrastructures, smart cities, condition monitoring systems, and digital signage.
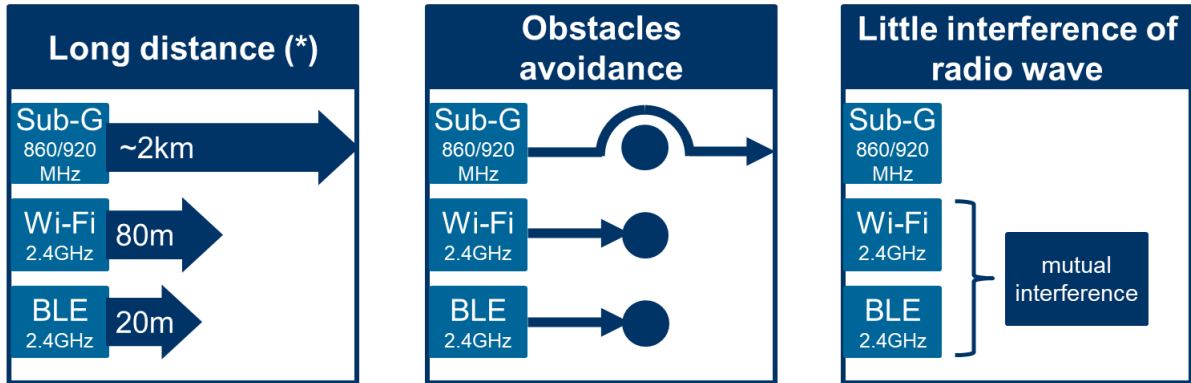
(*) Communication distance is variable by the surrounding environment.
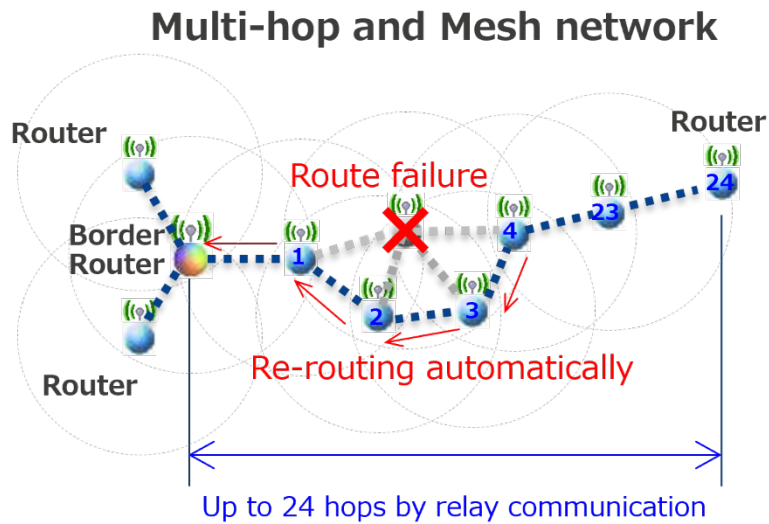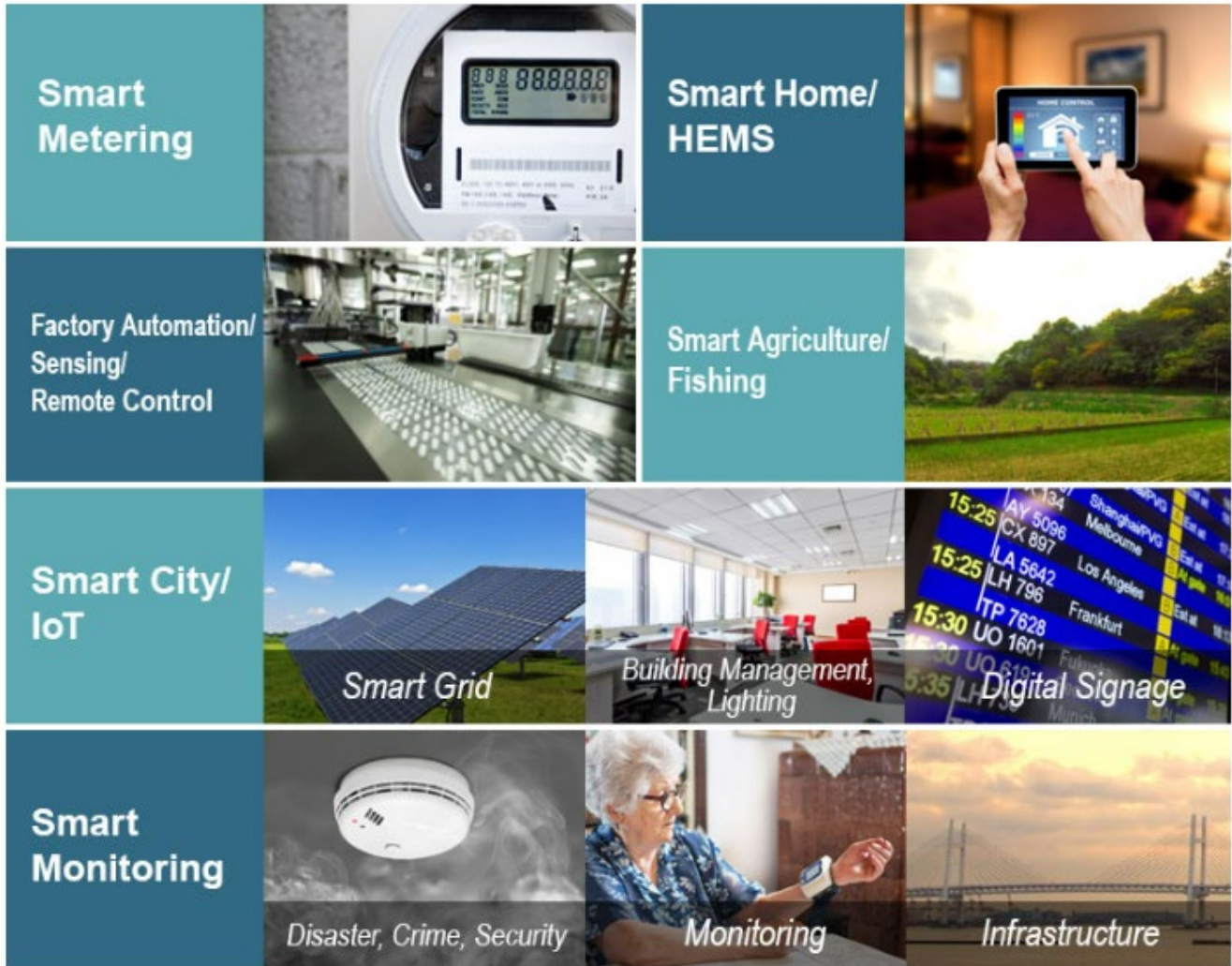
Figure 1: Sub-GHz Band Features

Figure 2: Wi-SUN FAN Multi-Hop and Re-Routing

The Wi-SUN FAN market

R9A06G062 Sub-GHz wireless communication solutions

1. R9A06G062 Sub-GHz transceiver

The IEEE802.15.4-2020, Wi-SUN FAN 1.1-compliant R9A06G062GNP features the industry's highest level of transmission/reception characteristics, providing a stable communication network in the 863MHz-928MHz radio frequency band. Renesas also provides board design guidelines and other application notes to ensure early product commercialization. These notes may be downloaded from Renesas website.

2. R9A06G062 Sub-GHz wireless communication evaluation kit

We also provide Sub-GHz wireless communication evaluation kits for Wi-SUN FAN 1.1 profile PHY layer-certified products. Kits are available with FCC, CE, or Construction Type (Japan) certification, and can be used for wireless characteristic evaluation and prototype system development.

Figure 3: Wi-SUN FAN 1.1-Compliant Evaluation Kit

- RTK0EE0013D10001BJ (FCC certified)
- RTK0EE0013D10002BJ (CE certified)
- RTK0EE0013D10003BJ (Construction Type (Japanese standard) certified)

3. Sample Software

Software for the R9A06G062 device driver and the Wi-SUN FAN 1.1 protocol stack for the Renesas MCU (RX6 and RA6 series) is available at no cost.

*A software licensing agreement is required. Please contact **Renesas** for further details.

4. Development/evaluation tools

Tools supporting evaluation of R906G062 communication characteristics and Wi-SUN FAN system development using R9A06G062 are available at no cost. Please contact **Renesas** for more details.

Advantages of R9A06G062 Sub-GHz wireless communication solutions

The R9A06G062 Sub-GHz wireless communication evaluation kits (RTK0EE0013D10001BJ, RTK0EE0013D10002BJ, RTK0EE0013D10003BJ) are certified under major radio laws, and can be utilized immediately upon purchase. Moreover, as the first product adopted as a Certified Test Bed Unit for the Wi-SUN FAN 1.1 profile PHY layer, developers can use this with confidence as compatibility is not a concern. Implementing this Renesas solution enables clients to focus on both application-layer and system development, facilitating shorter development and product-to-market times.
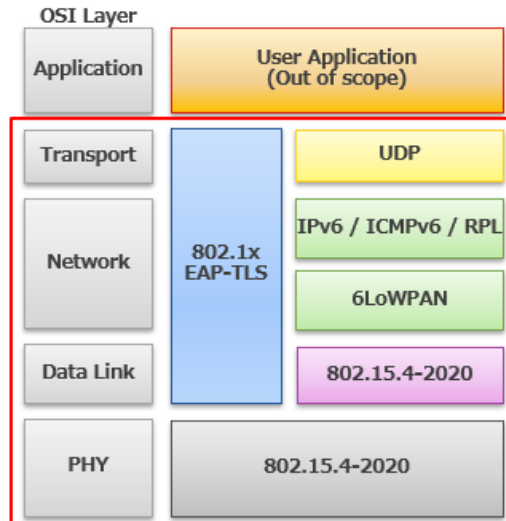
Figure 5: Wi-SUN FAN Protocol Stack

Conclusion

As the R9A06G062 supports both the Wi-SUN FAN 1.0 and the newest FAN 1.1 profiles, it is the ideal Sub-GHz transceiver in the rapidly expanding IoT communications market. Renesas provides evaluation kits, sample software, development/evaluation tools, and design guidelines to enable clients the quickest possible product-to-market time. Renesas encourages use of its Sub-GHz products to help realize a smart society.

Reference Information

- R9A06G062GNP : Sub-GHz/Wi-SUN Transceiver Supporting OFDM
- RTK0EE0013D10001BJ : R9A06G062GNP FCC-Compliant Sub-GHz Wireless Communication Evaluation Kit
- RTK0EE0013D10002BJ : R9A06G062GNP CE/UKCA-Compliant Sub-GHz Wireless Communication Evaluation Kit
- RTK0EE0013D10003BJ : R9A06G062GNP Japan Radio Law-Compliant Sub-GHz Wireless Communication Evaluation Kit
- Sub-GHz/Wi-SUN Protocol Stack: Software used in different solutions – RF driver and Simple MAC package, and IP stack package.

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