

# **Fujitsu 2.4G Mesh Radio Module And NIC (Network Interface Card) User Manual**

**V1.0 – 25 June, 2014**

## Revision History

<b>Ve</b>	<b>Category</b>	<b>Description of Change</b>	<b>Date</b>	<b>Author</b>
1.0	First version	-	25.06.2014	Fujitsu
1.1	Update content	1. Add operating Voltage and Temperature 2. Add warning.	25.06.2014	WNC

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## 1. About This Manual

### 1-1. Covered Product

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This User Manual contains information on how to install and use Fujitsu 2.4G Mesh Radio Module and Fujitsu 2.4G Mesh Radio NIC (Network Interface Card). Specifically below products are covered.

- Part Number WR-H1R0WM1 (Fujitsu Intelligent Society Solution Smart Grid Communications 2.4GHz Mesh Radio Module)
- Part Number WR-H2R0WN1 (Fujitsu Intelligent Society Solution Smart Grid Communications 2.4GHz Mesh Radio Interface Card)

## 2. Product Description

### 2-1. General

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Fujitsu 2.4G Mesh Radio Module and Fujitsu 2.4G Mesh Radio NIC (Network Interface Card) provide future-proof communications features to smart and advanced multi-functional static single/poly-phase revenue meter from Siemens, IM100 and IM300.

The NIC, in an integrated form with IM100/300 as field replaceable extended communications module, are essential components in Fujitsu Intelligent Society Solution Smart Grid Communications infrastructure solution for electricity, gas and water utility service providers.

The Module is integral part of the NIC.

### 2-2. Technology

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Fujitsu RF Mesh technology – DFF (Depth-First Forwarding) – is Fujitsu's wireless ad hoc mesh networking technology which enables autonomous formation of large scale networks and self-healing by application of artificial intelligence. Its scalability and reliability is proven by large utility provider's deployment of more than one million smart meters in remotely reading power consumptions in real time through the Fujitsu RF Mesh network.

DFF is a global standard adopted by IETF (Internet Engineering Task Force) as RFC 6971 and works upon standard wireless media such as IEEE802.11 (Wi-Fi) and conveys standard IPv4/v6 packets with advanced over-the-air security of AES, robust authentication and intrusion prevention mechanism.

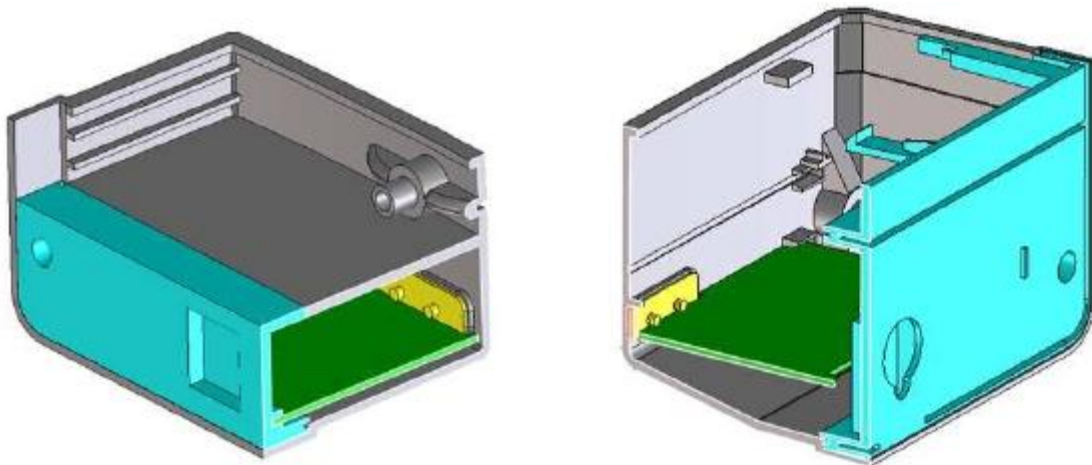
Most importantly, DFF enables users to enjoy future-proof communications performance. For it heuristically adapts to environment, over-the-air data rate is utilized at maximum so that DFF can perform in ultra-low latency and high bandwidth which are essential to deliver other smart grid applications such as Distribution Automation.

### 3. Product Installation And Use

#### 3-1. Installation

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Fujitsu 2.4G Mesh Radio NIC is designed to work only with smart and advanced multi-functional static single/poly-phase revenue meter from Siemens, IM100 and IM300.



Fujitsu 2.4G Mesh Radio NIC into iM100 (left) and into iM300 (right)

#### 3-2. Use

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Fujitsu 2.4G Mesh Radio NIC is powered from IM100 and IM300 through connector cable. When IM100/300 is turned on, the NIC is also booted up and start wireless communications.

As network settings are pre-configured in the factory, users do not have to do anything to use the NIC in Fujitsu RF Mesh network system.



## 4. Product Information

### 4-1. Technical Specification

Standard	IEEE802.11b/g/n compliant
Frequency Range	2412-2462MHz (1-11ch)
Modulation	DSSS (CCK, DQPSK, DBPSK) for IEEE802.11b OFDM (64QAM, 16QAM, DQPSK, DBPSK) for IEEE802.11g/n
Data Rate	Default: 1Mbps for 11b, 6Mbps for 11g/n (configurable)
Transmission Power	100mW (20dBm)
Antenna	On-board Chip Antenna
Operating Voltage	Module: 3.3 VDC, NIC: 5 VDC
Operating Temperature	Working temperature: 0 ~ 70°C Storage temperature: -40 ~ 85°C

This device is a Wireless LAN Module which operate at 2.4G band support IEEE 802.11 b/g/n operating mode. It has 2 chain that max can support 2T2R. Inside this module has an WiFi SoC and 2 PA, 2 LNA, 2 RF Switch, 1 DDR2, 1 SPI Flash and 1 Switching regulator. Because of highly integration, this module is easy to be use by simply adding few external components.

### 4-2. Regulatory Compliances (EN)

Fujitsu 2.4G Mesh Radio Module and Fujitsu 2.4G Mesh Radio NIC complies with the essential requirements of Article 3 of the R&TTE 1999/5/EC Directive, if used for its intended use and that the following standards have been applied:

1. Health (Article 3.1(a) of the R&TTE Directive)  
Applied Standard(s): EN 62311 : 2008
2. Safety (Article 3.1(a) of the R&TTE Directive)  
Applied Standard(s): EN 60950-1: 2006 + A11: 2009 + A1: 2010 + A12: 2011
3. Electromagnetic compatibility (Article 3.1 (b) of the R&TTE Directive)  
Applied Standard(s): EN 301 489-1 V1.9.2 / -17 V2.2.1
4. Radio frequency spectrum usage (Article 3.2 of the R&TTE Directive)  
Applied Standard(s): EN 300 328 V1.8.1

### 4-3. Regulatory Compliances (FCC)

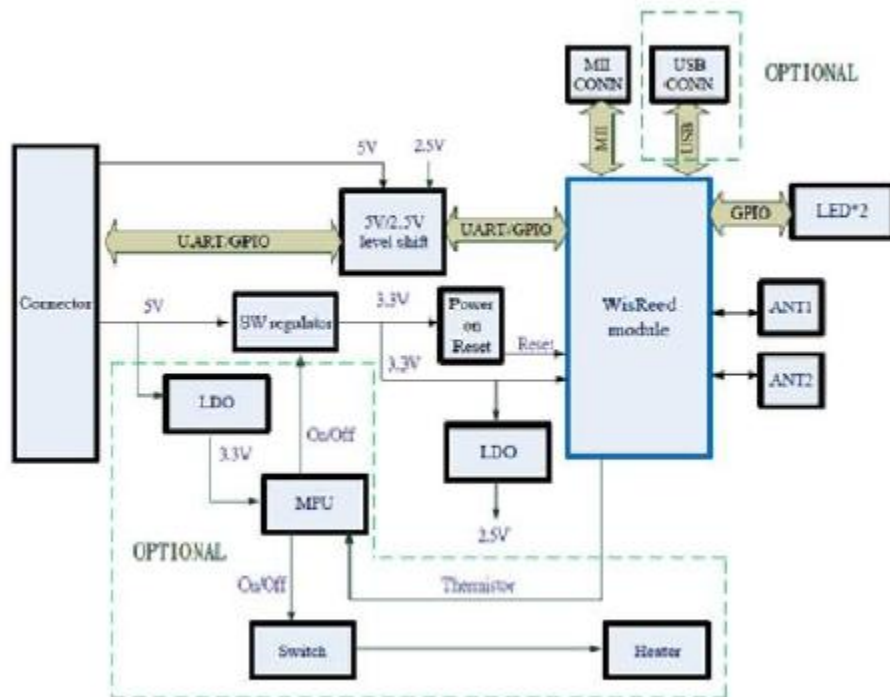
This device, FCC ID: O4D-IC400, Model Name: Fujitsu 2.4G Mesh Radio NIC, is declared to be of conformance does not support any non-US channels in all the operational mode(s) in North America.

All non-US frequencies and Country code selection are disabled through proprietary software and is not user changeable.

4-4. Product Label (Sample)



4-5. NIC Block Diagram



### **Federal Communication Commission Interference Statement**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

**Radiation Exposure Statement:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

**This device is intended only for OEM integrators under the following conditions:**

- 1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and the maximum antenna gain allowed for use with this device is 3.12 dBi.
- 2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed

**IMPORTANT NOTE:** In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

**End Product Labeling**

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains FCC ID: O4D-IC400". The grantee's FCC ID can be used only when all FCC compliance requirements are met.

**Manual Information To the End User**

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.