

JFW-600 User Manual

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Revision History

Who	Version	Date	Comment
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Important Safety Precautions



The JFW-600 unit is powered by VDC. Only personnel who have received relevant training from Juni are authorised to open any part or section of the JFW-600. To prevent electrical shock when installing or maintaining the equipment, **ENSURE THE SUPPLY OF POWER IS REMOVED** by unplugging the power connectors before accessing any section of the equipment.



Place a protective cap/cover to prevent accidental exposure and eliminate dirt particles contaminating the connection ports.



Wet locations and conditions will increase the risk of electrical shock when installing or using electrical powered equipment. To prevent electrical shock, never install or use electrical equipment in wet locations or during lightning storms.



Static electricity means no risk of personal injury but it can severely damage and corrupt essential circuitry within the equipment, if not handled carefully. Always use ESD protective devices when handling the equipment.



Always observe the warning labels and markings present on the equipment. If unsure, contact Juni Korea on +82 70 8611 5300 for advice.

1 Introduction

The Juni WiMAX Enterprise FemtoMax, JFW-600 is an integrated WiMAX backhauled WiMAX FemtoMax, Wi-Fi access point (802.11 b/g/n), and Ethernet router.

As JFW-600 can provide mobile WiMAX access and WiFi access, ideal applications for this product are hotspot applications such as coffee shops and hotels, enterprise internet access and indoor coverage, and campus coverage solutions.

With MIMO technology and an open R6 Profile Interface, the JFW-600 allows easy installation and operation providing upto 25dBm of output power (22dBm x 2 MIMO).

This User Manual outlines the specifications and the operation for the Juni JFW-600 WiMAX Enterprise FemtoMax™, hereon referred to as JFW-600.

2 System Description

2.1 Configuration

The JFW-600 has been designed to operate in the Mobile WiMAX network using TDD (Time Division Duplexing) technology.

The basic configuration of the JFW-600 connects to the Operator Core Network via the Internet - RJ45 Ethernet cable interface to connect to local xDSL/cable ISP. As an option, the backhaul may be achieved “in-band” using the Juni in-band backhaul unit.

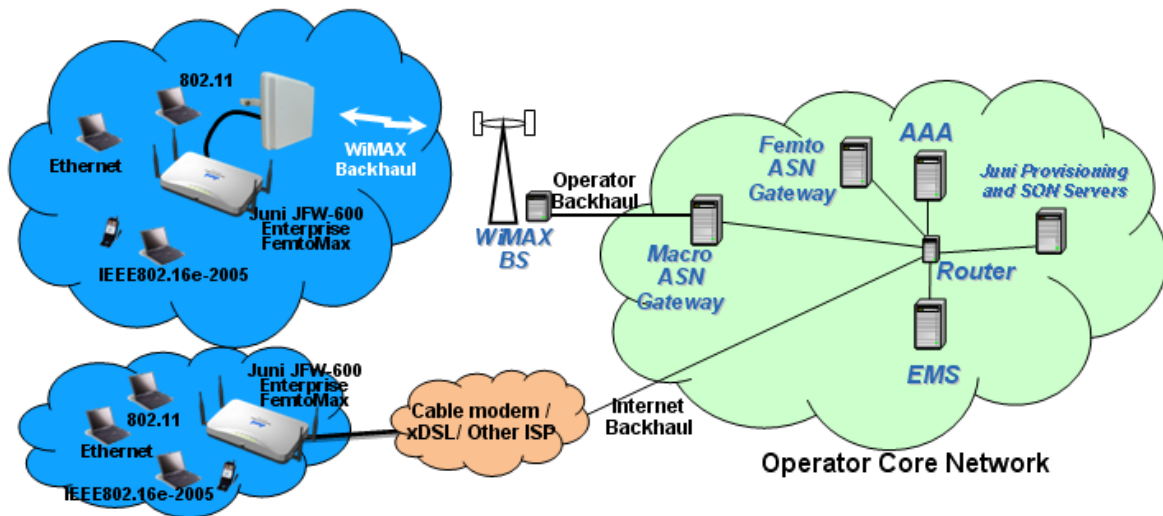


Figure 2-1 Basic JFW-600 Configuration

2.1.1 WiMAX Channel Allocation

The JFW-600 operates on the 2.3GHz, 2.5GHz or 3.5GHz frequency band.

2.2 General Appearance of the JFW-600

2.2.1 General Appearance

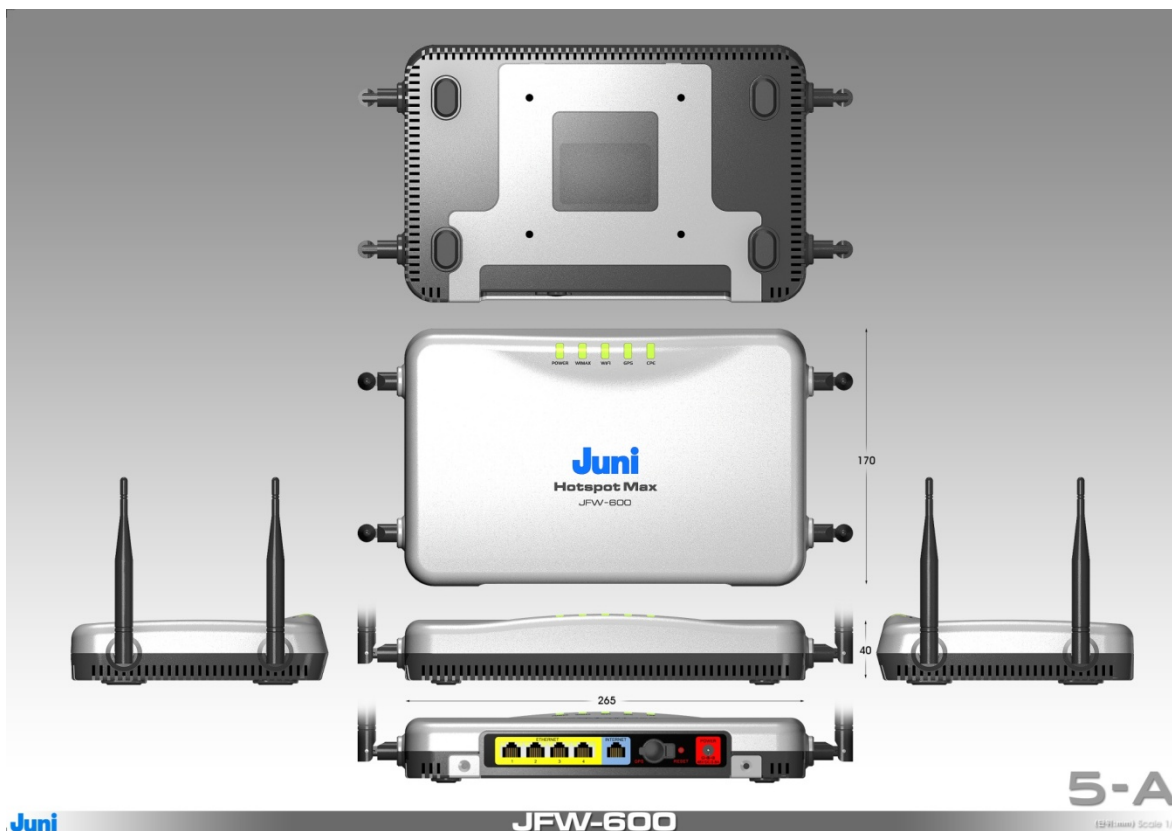


Figure 2-2 JFW-600 FemtoMax

2.3 Port Description

The JFW-600 has 7 (seven) connection ports located at the back of the cabinet and 2 connection ports located on each side. These ports allow for RF, Ethernet, WAN, power and monitoring connections as shown below.

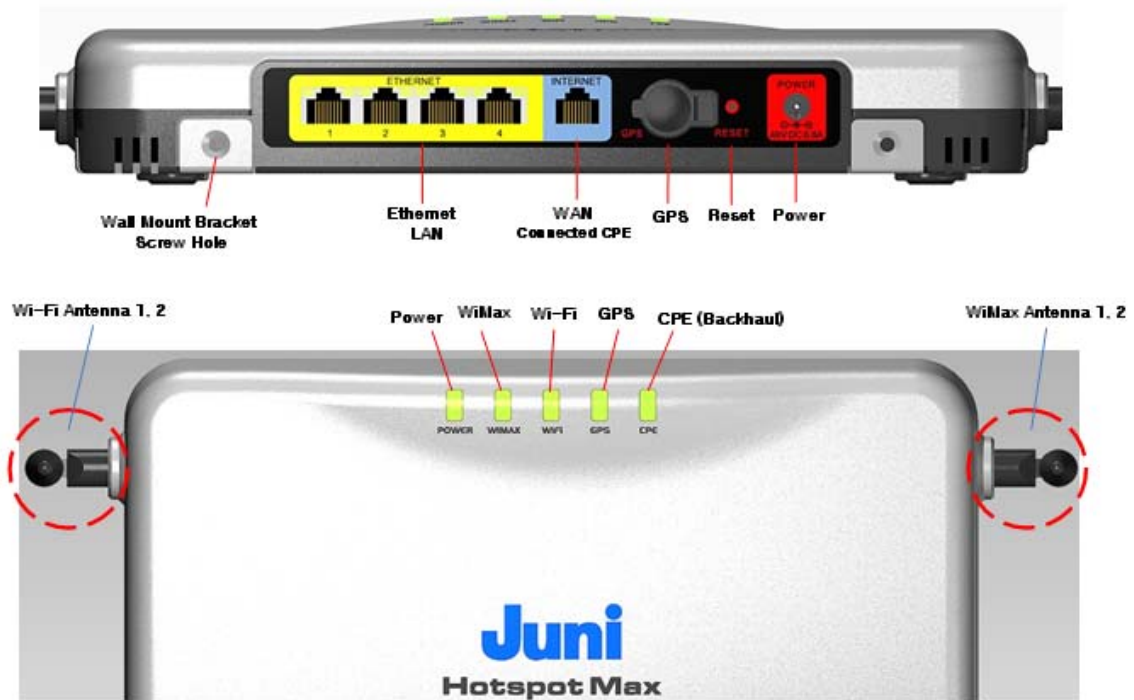


Figure 2-3 Connection Ports of the JFW-600

3 Installation

3.1 Handling of the JFW-600

- To avoid the risk accidental fire or electric shock, do not expose the JFW-600 to rain or any other wet condition during installation and operation.

3.2 Inspection before Installing the JFW-600

- Check if there is any physical damage on the cabinet. If any damage is found, it is advised to perform close inspection on the operating features and RF signal test to verify performance.
- Check if there's any part of the cabinet exposed to water or other liquid substances.
- Before installing the JFW-600, check the serial number of the units to be installed.
- Confirm the correct accessories have been supplied.

3.3 Installation Procedure

3.3.1 Unit Dimensions

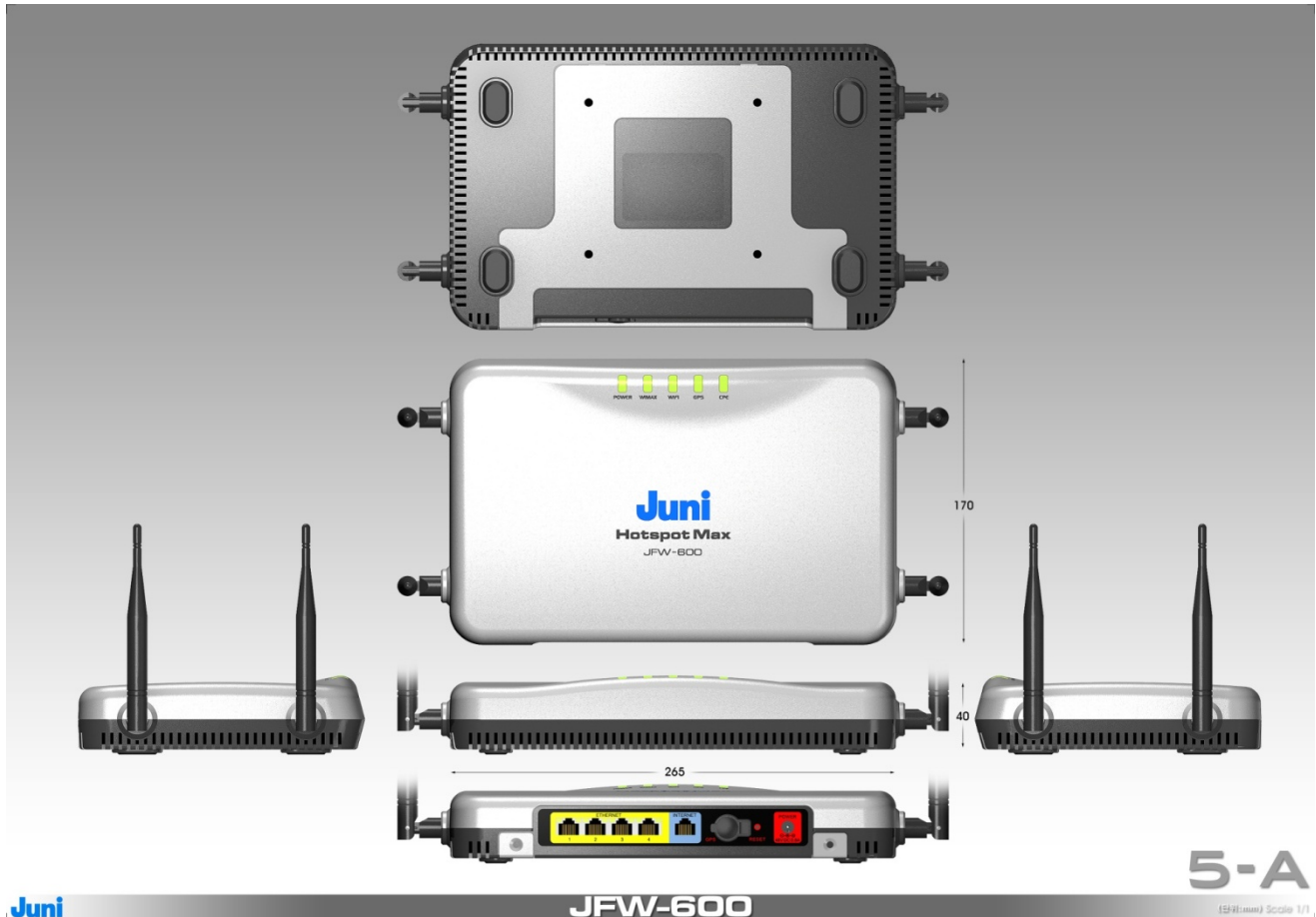


Figure 3-1 JFW-600 Unit Dimensions

3.3.2 Required Materials

The following table lists the materials required for the installation of JFW-600. Ensure all materials are available and ready prior to commencing installation.

Description	Qty	comments
JFW-600 WiMax Hot-SpotMax	1	JFW-600 Set (Body)
External Antenna Wi-Fi 1, 2	2	2.4G
External Antenna Wimax 1, 2	2	2.3~2.4GHz, 2.5G~2.7GHz or 3.4~3.5GHz
External Antenna GPS (3M)	1	1575.42MHz

RJ-45 4Port (LAN) / RJ-45 1Port (WAN)	2	
Wall Mount Bracket	1	Optional
AC Power Adaptor	1	DC: 48V Output
Program Guide (CD1)	1	
Ethernet (LAN) Cable (Default)	2	
User Manual	1	

Table 3-1 Required Materials for Installation

3.3.3 Wall Mounting

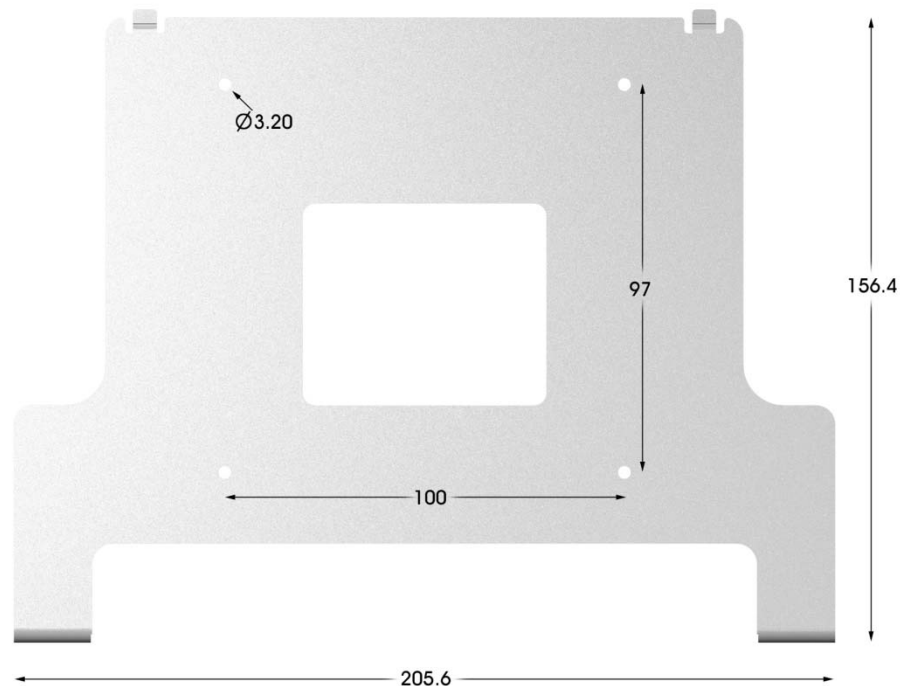


Figure 3-2 JFW-600 Wall Mounting Bracket

3.3.4 Cable Connections



CAUTION

Before making any cable connections or supplying any power to JFW-600, ensure there is sufficient earth connection to the equipment by connecting an earth cable to the supplied Earth Terminal on the unit.

- 1) Connect the Ethernet cable from the backhaul equipment (xDSL, Cable modem or etc.) to the "INTERNET" port of the JFW-600.
- 2) Connect LAN devices such as computers/notebooks to the "ETHERNET" ports of JFW-600.
- 3) Connect the GPS to the "GPS" port of the unit.
- 4) Connect the DC power adapter to the "POWER" port of the unit.

3.4 Cautions during Installation

- 1) Supply power to JFW-600 only after the correct cable connections are made.
 - All cable connections should be made correctly before supplying power to the equipment.

3.5 Storage of the JFW-600

- When storing the unit, it is recommended to pack the unit in its original packaging supplied by Juni.
- The JFW-600 should not be stored in a high temperature or humid environment. Avoid direct sunlight.

3.6 Maintenance

- The JFW-600 should not require regular maintenance under normal operation, however, it is recommended to check the condition of the unit occasionally for any abnormal alarms.
- If JFW-600 requires cleaning, avoid static electricity and use a dry cloth.

3.7 Safety Instructions

- If replacement is required, the power should be turned 'OFF' before taking any action.
- To avoid the risk of accidental fire or electric shock, do not expose this product to rain or any other wet condition during installation or maintenance.
- Only a qualified technician should service this equipment. Opening or removing covers may expose you to dangerous voltage and/or other risks. Incorrect assembly may cause electric shock when the appliance is subsequently used.
- **Observe ALL warning and caution labels on JFW-600 and in this document.**

4 Functions and Features

4.1 Introduction

The JFW-600 supports various functions and features to enhance its performance including (but not limited to) the following:

- Web Management
- MIMO Operation
- Automated provisioning, configuration and alarm management
- Automated optimisation and interference management
- GPS or optional aGPS

4.2 Web Management

The Web Management tool allows the user to connect a PC to the system allowing full control of JFW-600. The user is required to be on the same network as the JFW-600, and all required is a web browser with the correct authentication details.

Once logged in, the Web Management tool enables simple yet comprehensive control of all JFW-600 functions and parameters in a user-friendly GUI.

For detailed information on the Web Management operation, see section **4.2 JFW-600 Web Management**.

4.3 MIMO Operation

Using multiple antennas with MIMO (multiple-input and multiple-output) operation improves performance by increasing its spectral efficiency and link diversity, leading to increased data throughput and link range. The JFW-600 operates on 2 x 2 MIMO using two antennas to transmit and receive WiMAX signals. Each output is capable of 22dBm of power.

4.4 Automated Provisioning

Through a connection to JS-100, automatic provisioning is provided. Automatic provisioning is by CWMP technology based on TR-069 and provide Remote Firmware Update, Alarm Management & Logging Statistics, Automatic Configuration of PHY/MAC parameters. For more details, see the JS-100 Manual.

4.5 Automated Optimisation

Through a connection with JS-200(SON Server), automatic optimization is provided. Automatic Optimization provides Radio Parameter Optimization for Interference Mitigation, optimization of Ranging, HO, QoS and Load Balancing Parameters, adaptation when other basestation added and etc.. For more details, see the JS-200 manual.

4.6 GPS or optional aGPS

GPS operation uses radio signals from satellites. In very poor signal conditions, for example in a city, these signals may suffer multipath where signals bounce confusingly off buildings, or be weakened by passing through walls or tree cover. When first turned on in these conditions, some non-assisted GPS devices may not be able to work out a position due to the fragmentary signal, rendering them unable to function until a clear signal can be received continuously for up to 40 seconds (the time needed to download the GPS ephemeris).

An Assisted GPS system can address these problems by using data available from a network. Assistance falls into two categories:

- 1) Using information known to the assistance server but not the GPS receiver
 - It can supply orbital data or almanac for the GPS satellites to the GPS receiver, enabling the GPS receiver to lock to the satellites more rapidly in some cases.
 - The network can provide precise time.
 - The device captures a snapshot of the GPS signal, with approximate time, for the server to later process into a position.
 - Accurate, surveyed coordinates for the cell site towers allow better knowledge of local ionospheric conditions and other conditions affecting the GPS signal than the GPS receiver alone, enabling more precise calculation of position. (See also Wide Area Augmentation System and CellHunter.)
- 2) Calculation of position by the server using information from the GPS receiver
 - The assistance server has a good satellite signal, and plentiful computation power, so it can compare fragmentary signals relayed to it by GPS receivers, with the satellite signal it receives directly, and then inform the GPS receiver or emergency services of the GPS receiver's position.

Appendix 1. Specifications

A1.1 System Specification

Characteristics		Specification	Remarks
Frequency Range	DL	2302 ~ 2400MHz, 2496 ~ 2690MHz 3425 ~ 3550MHz	TDD
	UL	Same with above	
Output Power	DL	22dBm x 2 (MIMO)	64-QAM Full Sub-channel PUSC
Channel Bandwidth		5MHz or 10MHz	8.75 in 2.3GHz
Power Control		0~22dBm	1dB steps
Noise Figure		6dB	
Tx/Rx Transition Time		35 usec	
EVM		Minimum -30dB	
Size		170 x 265 x 40mm	W x D x H
Weight		Under 0.7Kg (AC Power Adapter, Bracket not included)	
Power Supply		Input : 100-240VAC (Rated Input), 1.0A Max Output : +48VDC at 0.67A	
Power Consumption		< 15W	
Operating Temperature		0 °C ~ 40 °C	
Storage Temperature		-20 °C ~ 70 °C	

Table A-1 RF, Mechanical & Electrical Specifications

A1.2 General Specifications

- IEEE 802.16e-2005/Cor2 PHY and MAC
- R6 Profile C
- 160 milli Watt x 2 (25 dBm MIMO) RF output power
- 5MHz, 8.75MHz or 10MHz channel bandwidth
- QPSK, 16QAM, 64QAM modulation
- 1/8 cyclic prefix, 5 msec frame
- 25 concurrent users (active + sleep mode)
- GPS or optional aGPS support
- Juni Provisioning (JS-100) and SON Servers (JS-200) support
- In-band backhaul unit.support

A1.3 Data Access

- 10 / 100Base Ethernet 4 Ports
- IPv4, IPV6, VLAN IEEE 802.1Q
- DHCP Router

- PoE Support

A1.4 Standards Compliance

- IEEE 802.16e-2005/Cor2
- IPSec

A1.6 RF Tx Specification

Parameter	Condition	Target Spec	Remark
RF Frequency Range	All modulation and coding scheme supported about the mobile WiMAX standard	2496 ~ 2690MHz	
Output Power	64-QAM Full Sub-channelPUSC	160mW(=22dBm)	Measured at the antenna connector
Power Control Step		1dB	Measured at the antenna connector
Power Control Dynamic Range	From 0dBm to 30dBm @ the antenna connector, 64-QAM Full Sub-channelPUSC	Minimum 30dB	Measured at the antenna connector
TX EVM	64-QAM Full Sub-channelPUSC	Minimum -30dB	About all operating frequency range
TX Spectrum Mask	Fc 5.34MHz	-35dBBr(-14dBm/MHz)	About all operating frequency range, 64-QAM Full Sub-channel PUSC, 1W output power
	Fc +/- 8MHz	-39dBBr(-18dBm/MHz)	
	Fc +/- 8.5MHz	-41dBBr(-20dBm/MHz)	
	Fc +/- 10.38MHz	-45dBBr(-24dBm/MHz)	
Harmonic Suppression	2 nd , 3 rd Harmonic	Minimum -50dBc	Same as the above
TX Spurious(30MHz ≤ F < 1000MHz)	30MHz ≤ F < 1000MHz @ RBW 100KHz	Minimum -36dBm	Same as the ITU-R standard
TX Spurious(1GHz ≤ F < 13.45GHz)	2.5 x BW ≤ Fc-F < 10 x BW @ RBW 30KHz	Minimum -30dBm	
	10 x BW ≤ Fc-F < 12 x BW @ RBW 300KHz		
	12 x BW ≤ Fc-F @ RBW 1MHz		
Receiver – Transmitter Switching Time	The Transition From RX to TX	Maximum 35uS	

Table A-2 RF Tx Specification

A1.7 RF Rx Specification

Parameter	Condition	Target Spec	Remark
RF Frequency Range	All modulation and coding scheme supported about the mobile WiMAX standard	2496 ~ 2690MHz	
Noise Figure	6dB		
RX Sensitivity(2 Branch: 2 Receiver) @ AWGN	QPSK- 1/2, PER: 0.05%	Minimum -108dBm	1 PDU/Frame, 10 Slots/PDU, PDU Size: 60 Bytes
	QPSK- 3/4, PER: 0.04%	Minimum -107dBm	1 PDU/Frame, 6 Slots/PDU, PDU Size: 54 Bytes
	16QAM- 1/2, PER: 0.05%	Minimum -104dBm	1 PDU/Frame, 5 Slots/PDU, PDU Size: 60 Bytes
	16QAM- 3/4, PER: 0.04%	Minimum -104dBm	1 PDU/Frame, 3 Slots/PDU, PDU Size: 54 Bytes
	16QAM- 3/4, PER: 0.04%, Full Sub-channel	Minimum -85dBm	Full Sub-channel
RX Maximum Input Level @ AWGN	QPSK- 1/2, PER: 0.05%	Minimum -35dBm	1 PDU/Frame, 10 Slots/PDU, PDU Size: 60 Bytes
	16QAM- 3/4, PER: 0.04%	Minimum -35dBm	1 PDU/Frame, 3 Slots/PDU, PDU Size: 54 Bytes

Table A-3 RF Rx Specification

A1.8 WiFi

- 2.4GHz Support
- IEEE 802.11n and IEEE 802.11b/g Support
- Security : WEP64/128, WPA, WPA2

A1.9 Installation

- Wall Mount Bracket Support (Optional)

Appendix 2. Block Diagram

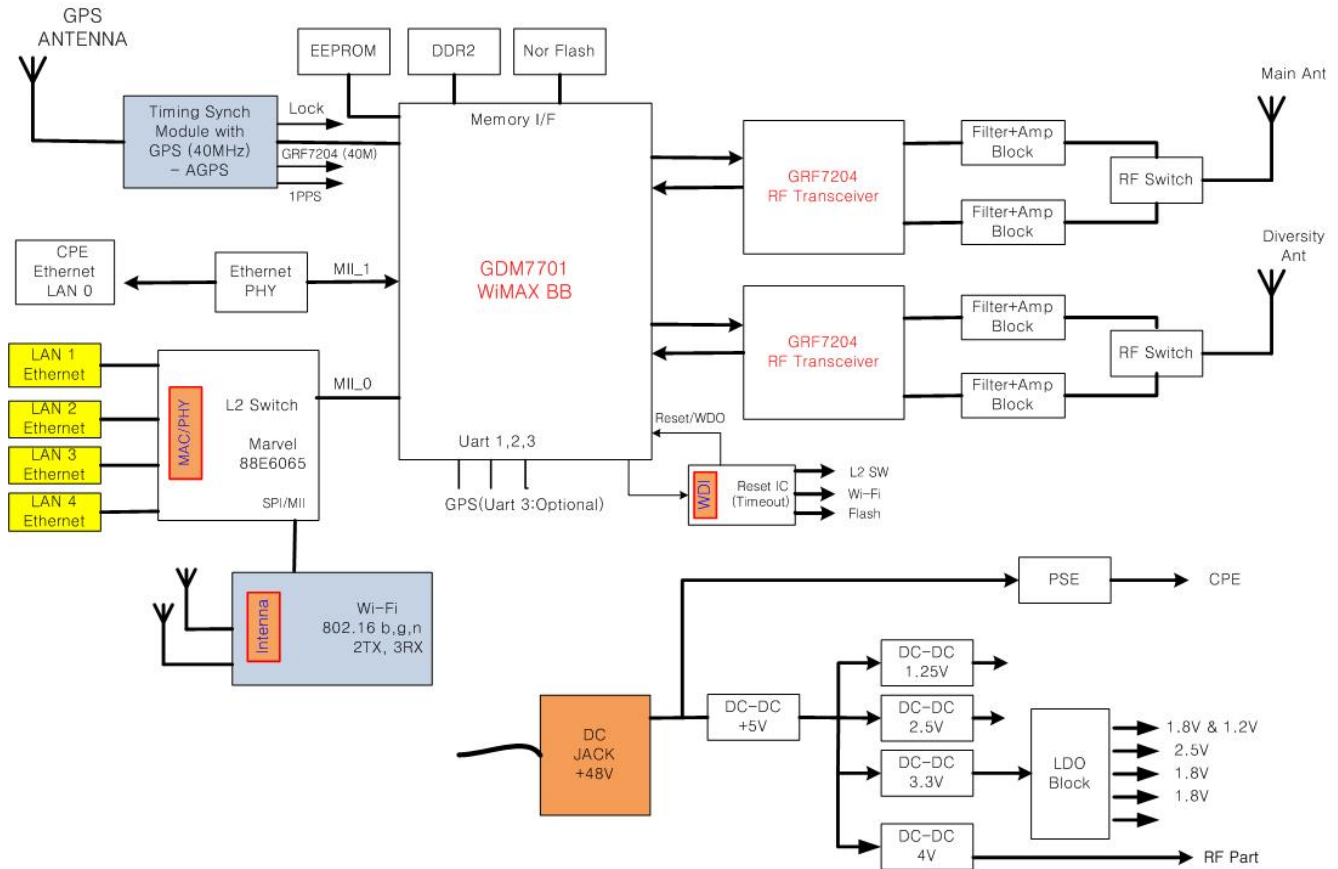



Figure A-1 JFW-600 Block Diagram

MPE Information

	<p>Warning: Exposure to Radio Frequency Radiation The radiated output power of this device is far below the FCC radio frequency exposure limits. Nevertheless, the device should be used in such a manner that the potential for human contact during normal operation is minimized. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna should not be less than 20cm during normal operation. The gain of the antenna is 2.79 dBi.The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.</p>
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changes or modifications not expressly approved by the responsible party for complaince could void your authority to operate the equipment.