PW1900-C Manual

Kisan Telecom

2010. 02

Content

IMPORTANT NOTE:

FCC RF Radiation Exposure Statement:

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

1. Introduction

1.1. General Introduction

As an equipment to clear the shadows inevitably generated among the adjacent cells of CDMA, PW1900-C can supports CDMA application and effectively repeats the signals between terminals in dead area and BTS.

The main objectives of PW1900-C are as follows:

- The expansion of service coverage
- The enhancement of service quality at the specific areas such as in tunnel or in-building
- The enhancement of signal strength at the places where the signal is weak

2. Network configuration of system

2.1. Network configuration

PW1900-C repeater is an equipment to clear the shadows and fill the gaps existing among the adjacent cells and enhances the quality of services by extending coverage of CDMA.
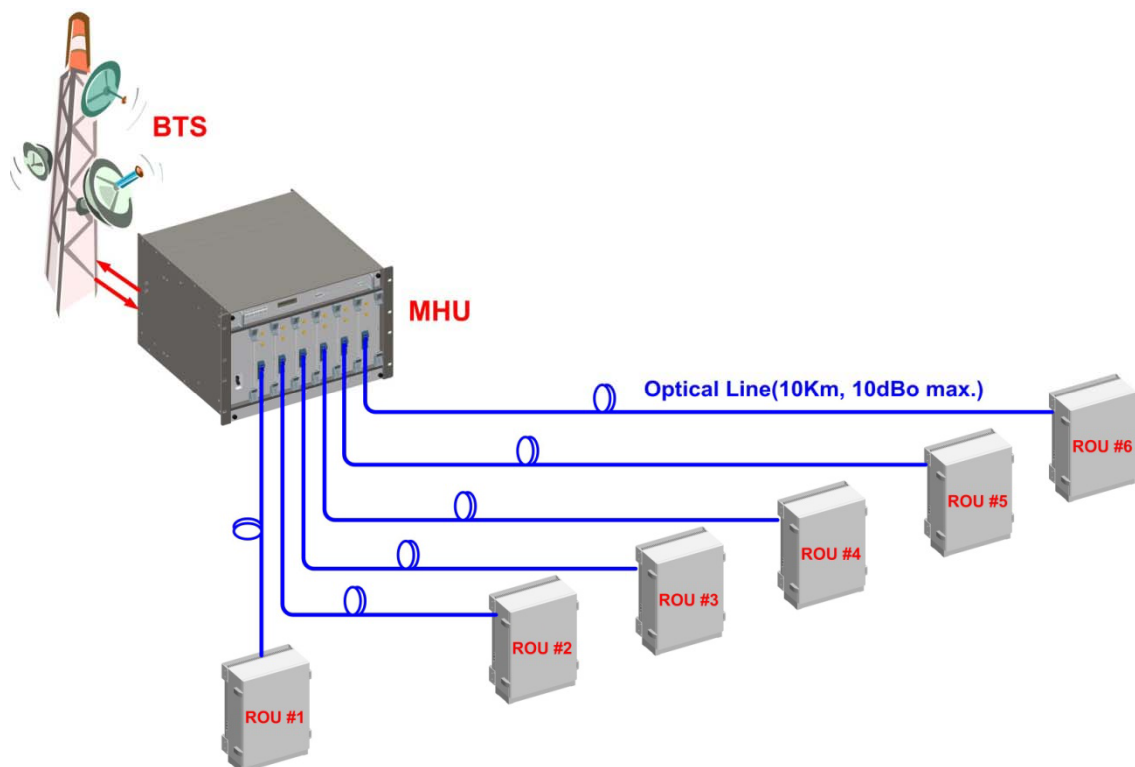
The above architecture is for the case when the MHU is co-located with CDMA BTS, and

the service is provided remotely.

- **System configuration**
  - **MHU Capacity: 1 Optical Branch/DOU and 6 DOU/MHU (6 Optical Branch/MHU)**
  - **System Connection: Optic cable between MHU and RU**
  - **Optic Wavelength: 1310nm for FWD, 1550nm for RVS**
  - **Max loss of optic cable (between MHU and RU): 1 ~ 10dBo**

3. System Specifications

3.1. General Specifications

Item		PW1900-C MHU	PW1900-C RU
Enclosure Type		7U-Shelf type 19″ standard rack mountable In-door use	Cabinet
Dimension (mm)	**W ✕ H ✕ D**	19"(482.4) X 310(7U) X 450mm	450 X 630 X 355 mm
	Weight	15.5Kg	40.5Kg
Power Supply		110-120Vac (Tolerance ±10%), 60Hz	120Vac, 60Hz
Power Connector		ID-NO3BEH	MS3106A16-10S
RF In/Out Port		SMA Female, rear side	N Type Female, bottom
Optic Connector Type		FC/APC, front side	FC/APC, bottom
Optic Wavelength		FWD: 1310nm / RVS: 1550nm	
Operating Temperature		-5℃ ~ 40℃	-5℃ ~ 50℃

- **Environmental requirement**

  The repeater RU shall be operated in the temperature range of -5¡É ~ +50¡É.

3.2. System specifications

3.2.1. Frequency allocation
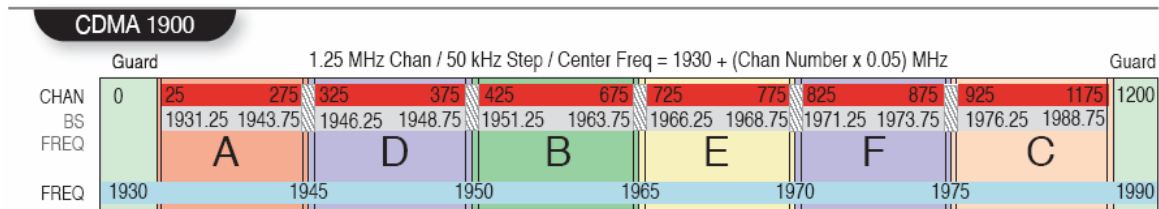
3.2.2. System Specifications

| Item	Specification		Remarks
Tx Frequency Range	1930 ~ 1990MHz		
Frequency Stability	0.0002PPM		
Capable No of FA.	10FA		
System Delay	5usec max.		
Tx-Rx Isolation	100dB min.		
Impedance 50	Ohm		
Pass-Band Ripple	3dB max.		20MHz BW
FWD Input Power	-20 ~ -10dBm/total		
FWD Output Power	43dBm /total @ RU ANT Port		
RVS Input Power	-60dBm/total max.		
RVS Output Power	-20dBm/total max.		
System Gain	FWD: 63dB max.	RVS: 40dB max.	
FWD Spurious	Comply for 3GPP2, FCC regulation		
RVS Noise Figure	5dB max. @ 40dB Gain		Max. Gain
Rho 0.912			
Gain Control Range	FWD: 20dB by 1dB Step	RVS: 20dB by 1dB Step	RU
VSWR	1.5 : 1 max.		
Optical Wavelength	FWD: 1310nm	RVS: 1550nm	
RF I/O Connector	DU : SMA Female	RU : N-type Female	

4. Mechanical Specifications

4.1. PW1900-C MHU
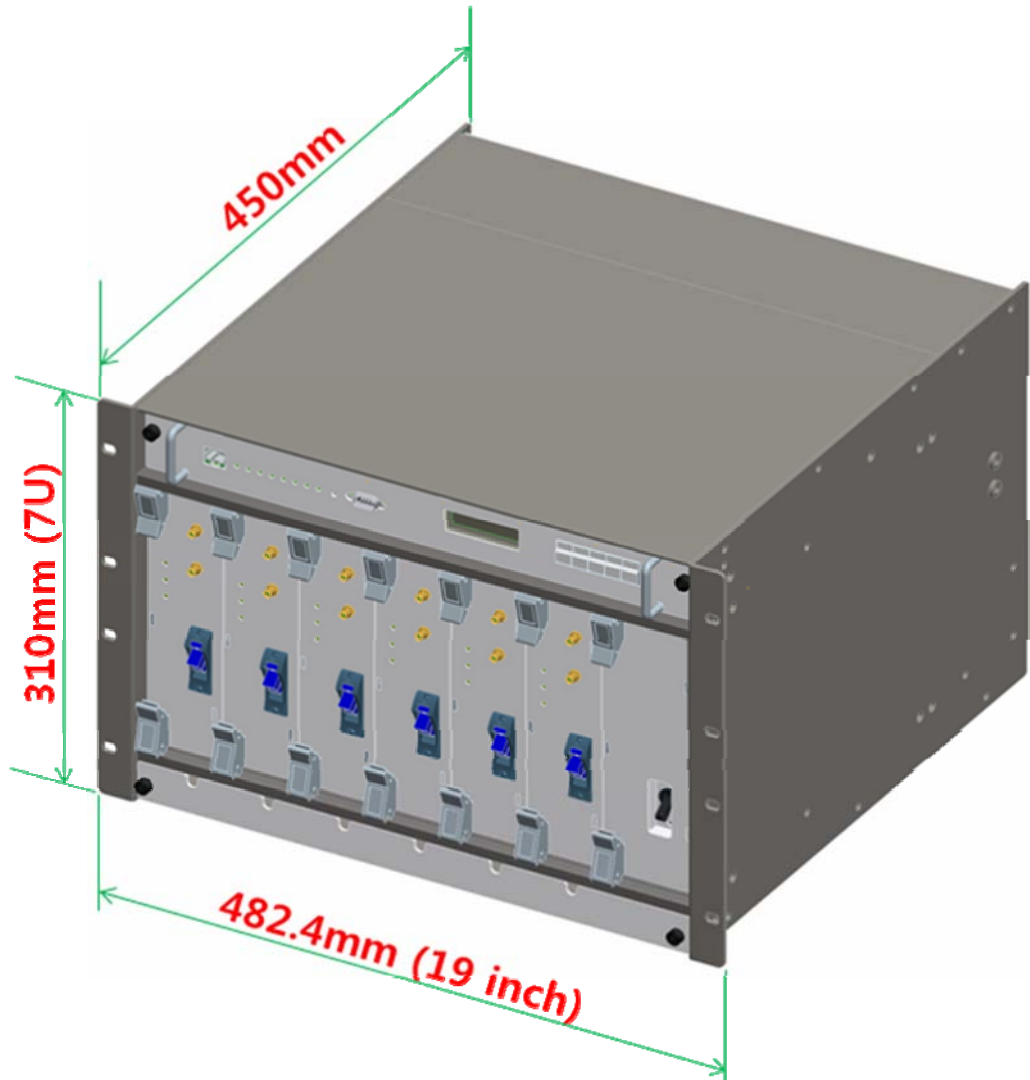
4.1.1. Mechanical Design

[FRONT]

[REAR]
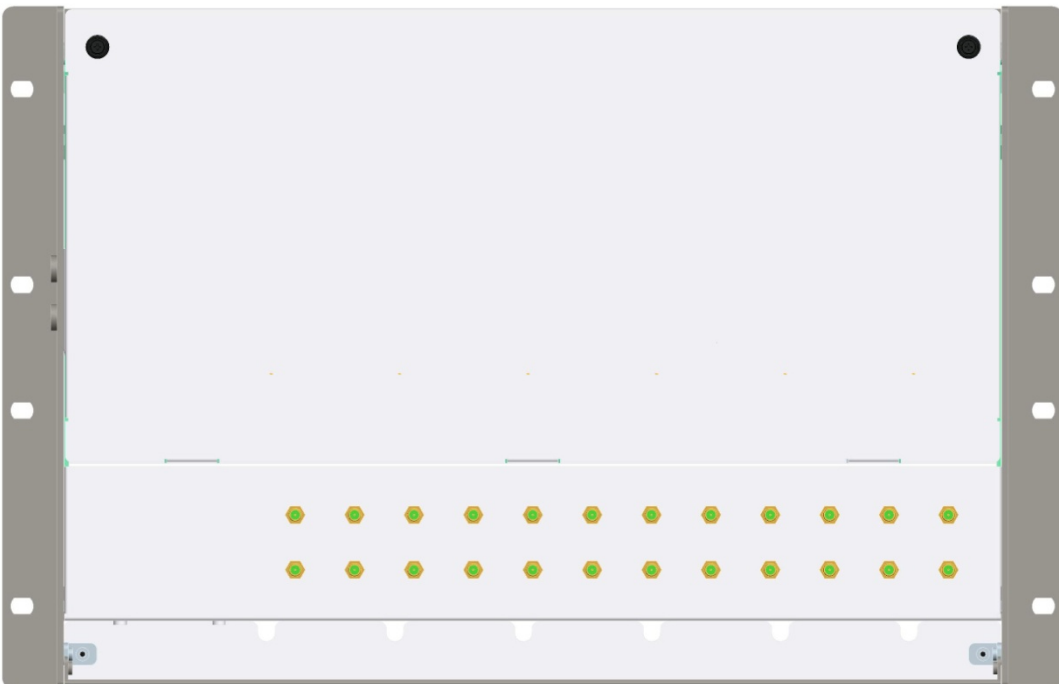
[MHU composition]

4.1.2. Dimension

4.1.3. Mechanical specification

No	Items	Specifications
1	Exterior view	1. Shelf attachable type to both INDOOR and OPEN RACK 2. W 19"(482.4) X H 310(7U) X D 450mm 3. Weight: 15.5 Kg
2	Material	Aluminum (AL5052, AL6063) is mainly used for protection from corrosion by external environments.
3	Connector Type	1. Optic I/O: FC/APC at front side 2. RF I/O: SMA Female at rear side 3. Monitor port: SMA Female at front side
4	Power Input	1.Power: 110-120Vac, 60Hz 2.Connector: IN-NO3BEH
5	Ground	14SQ 2Hole ground pipe (right side of shelf) and M4 "O" rug ground (rear side of shelf)
6	Communication Port	9P D-SUB (GUI), front side

4.1.4. Descriptions of PW1900-C MHU

[Forward Path]

The signal from CDMA BTS is fed to the RF input port of MHU rear side. Initially, in the MHU RVS/FWD COMbiner(MRFCOM) module, the input signal power level is measured and combined with the modem signal(360MHz), and it becomes the input signal to the optic module to be transmitted to RU.

[Reverse Path]

The CDMA RVS signal input from RU through the optic module is divided into RF and modem signal by the Divider. RF RVS signal level is measured at the MRFCOM module, which becomes the input signal to the CDMA BTS.

4.1.5. Port Configuration

No	Items		Description
1	TX_MON		Monitor port for MHU FWD input signal from BTS (-23dB)
2	RX_MON		Monitor port for MHU RVS output signal to BTS (-23dB)
3	LED1	RUN	Green Blinking: CPU run, OFF(Gray): CPU stop
		ALM	Summary Alarm, Green: Normal, Red: Alarm
		RU1	The status of communication with RU1, Green: Normal, Red: Alarm
		RU2	The status of communication with RU1, Green: Normal, Red: Alarm
		RU3	The status of communication with RU1, Green: Normal, Red: Alarm
		RU4	The status of communication with RU1, Green: Normal, Red: Alarm
		RU5	The status of communication with RU1, Green: Normal, Red: Alarm
		RU6	The status of communication with RU1, Green: Normal, Red: Alarm
		RESET	NMS board HW Reset
4	DEBUG		PC connection port for GUI S/W (9pin D-SUB)
5	DISPLAY		Key pad input display
6	DATA INPUT		Equipment status/check, control input
7	Switch		AC110V power ON/OFF switch

| 8	Optic		FC/APC, optic connector
9	LED2	PWR	DC power supply status of the DOU Card
		LD	LD Alarm, Green: Normal, Red: Alarm
		PD	PD Alarm, Green: Normal, Red: Alarm
10	RJ45(Master)		Connection port to the master for the NOC
11	NMS board		Sliding type
12	AC INPUT		External AC power input port (rear part)
13	Tx IN		MHU FWD RF connection port from BTS (rear part)
14	Rx OUT		MHU RVS RF connection port to BTS (rear part)
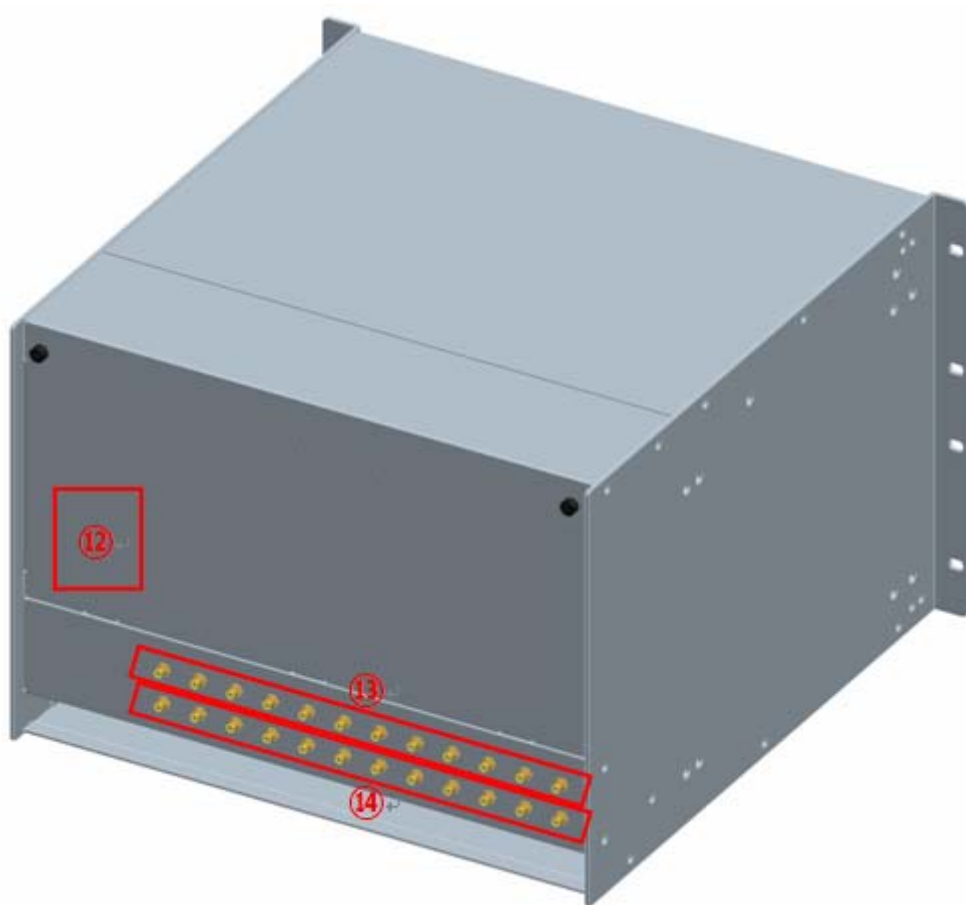
4.1.6. Module Composition
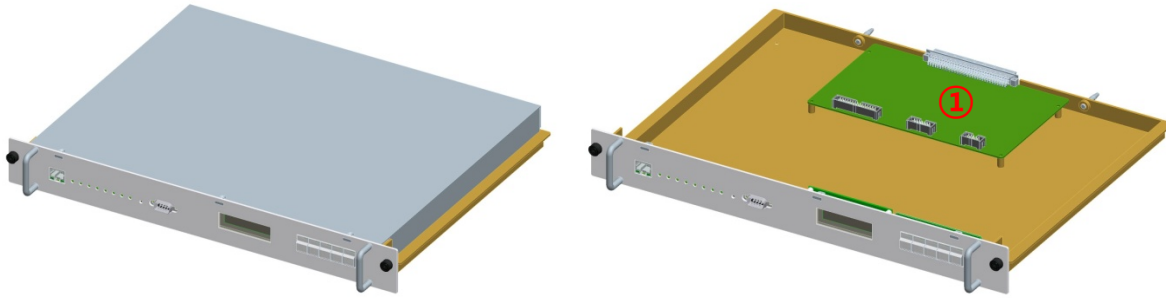
[NMS UNIT]
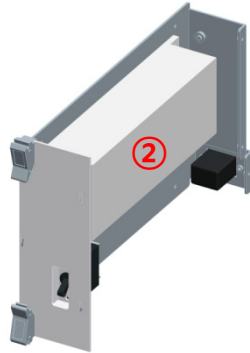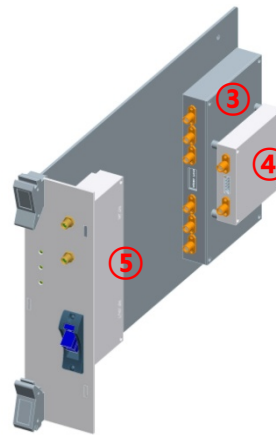
[PSU]   [DOU]

No	Module	Voltage Used	Remarks
①	**MHU NMS Controller**	**9Vdc**	
②	**MHU PSU(Power Supply Unit)**	**9Vdc/6.5Vdc**	
③	**MRFCOM(MHU RVS FWD Combiner)**	**6.5Vdc**	
④	**MHU FSK Modem**	**9Vdc**	
⑤	**MHU Optical Transceiver Unit (DOU)**	**6.5Vdc**	
⑥			
⑦			
⑧			
⑨			
⑩			

4.1.7. Function of modules

No	Module	Functions
1		**[MHU NMS Controller]** Monitors/controls the status and configurable items of each module in MHU
2		**[PSU]** Converts AC110V into DC9V and DC6.5V and provide them to each module in MHU
3		**[MRFCOM]** Detect the FWD/RVS RF signal power level from RU. Also provide the connection pin to FSK modem and this module has -23dB monitor port of module output.
4		**[FSK Modem]** Data modem for MHU and RU communication MHU → RU frequency: 360MHz RU → MHU frequency: 340MHz
5		**[DOU]** Converts E/O (or O/E) of FWD and RVS signals. Wavelength: TX 1310[nm], RX 1550[nm]
6		

4.1.8. PSU

PSU converts external AC110V into DC and supplies +9V, +6.5V to each module in MHU.

The drawing of PSU is as follows.
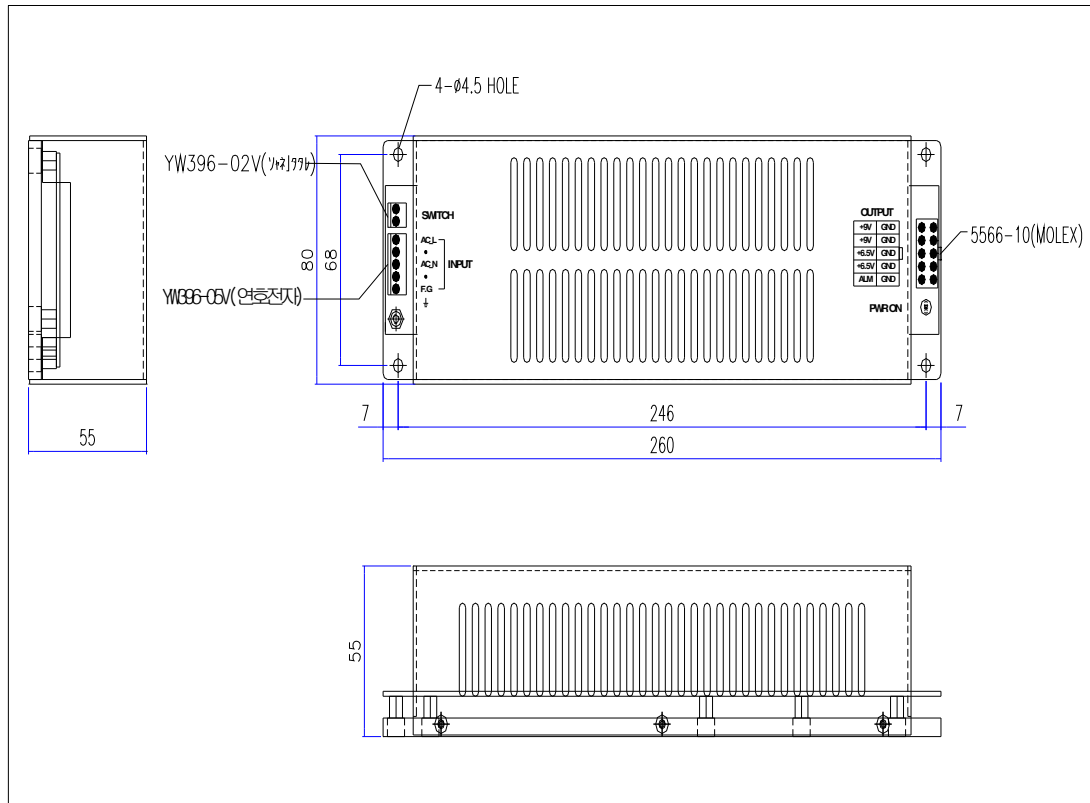
[PSU Capacity]

Output Voltage	Maximum current	Watt
+9V	3 A	59.5 W
+6.5V	5 A	

[PSU Pin Map]

SWITCH PIN Type: YW396-02V

Pin no.	1	2
Spec.	Switch_IN	Switch_Out

INPUT PIN Type: YW396-05V

Pin no.	1	2	3	4	5
Spec.	AC_L	N.C	AC_N	N.C	F.G

OUTPUT PIN type: 5566-10 (MOLEX)

Pin no.	1	2	3	4	5
Spec.	ALARM	+6.5V	+6.5V	+9V	+9V
Pin no.	6	7	8	9	10
Spec.	GND	GND	GND	GND	GND

Circuit Diagram of Power Diagram
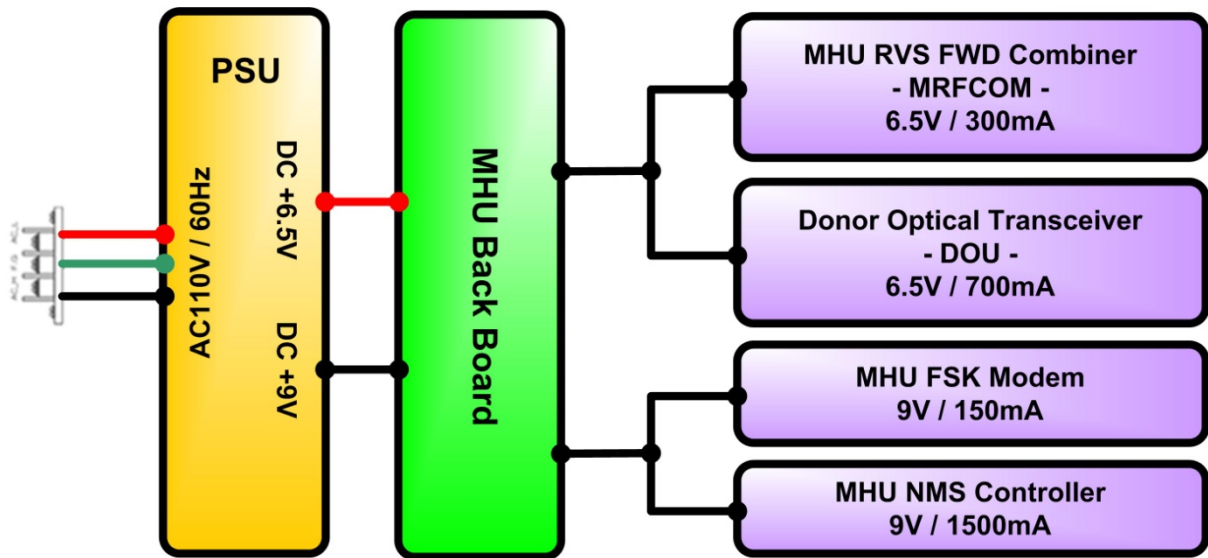
4.2. PW1900-C RU

4.2.1. Mechanical Design
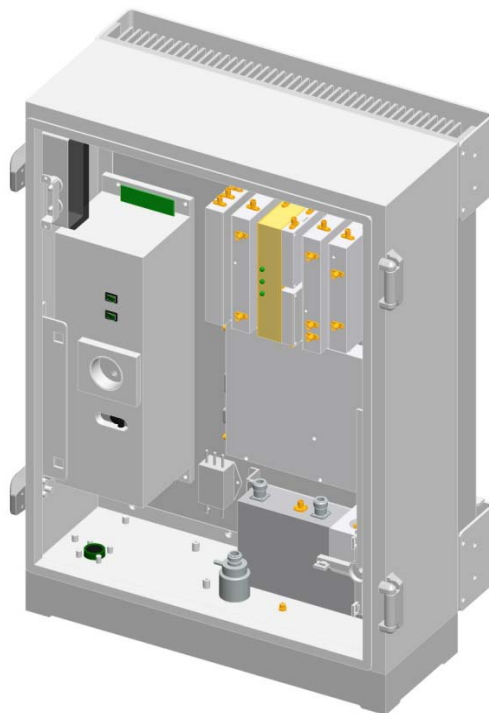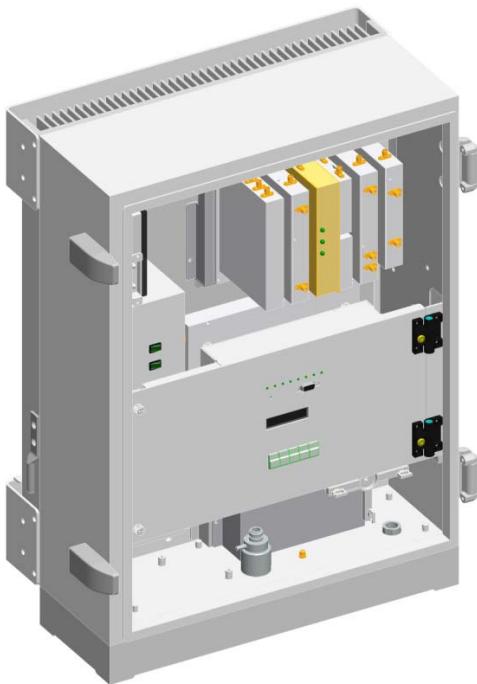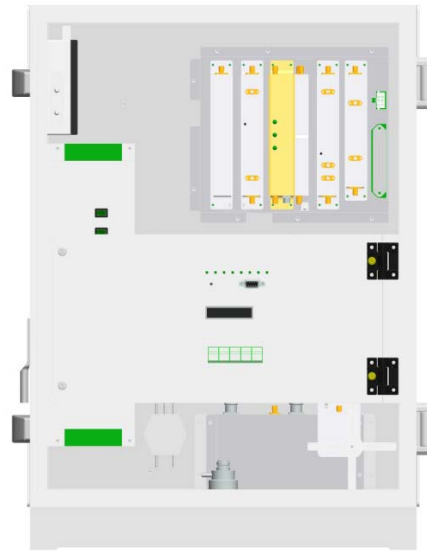
4.2.2. Dimension
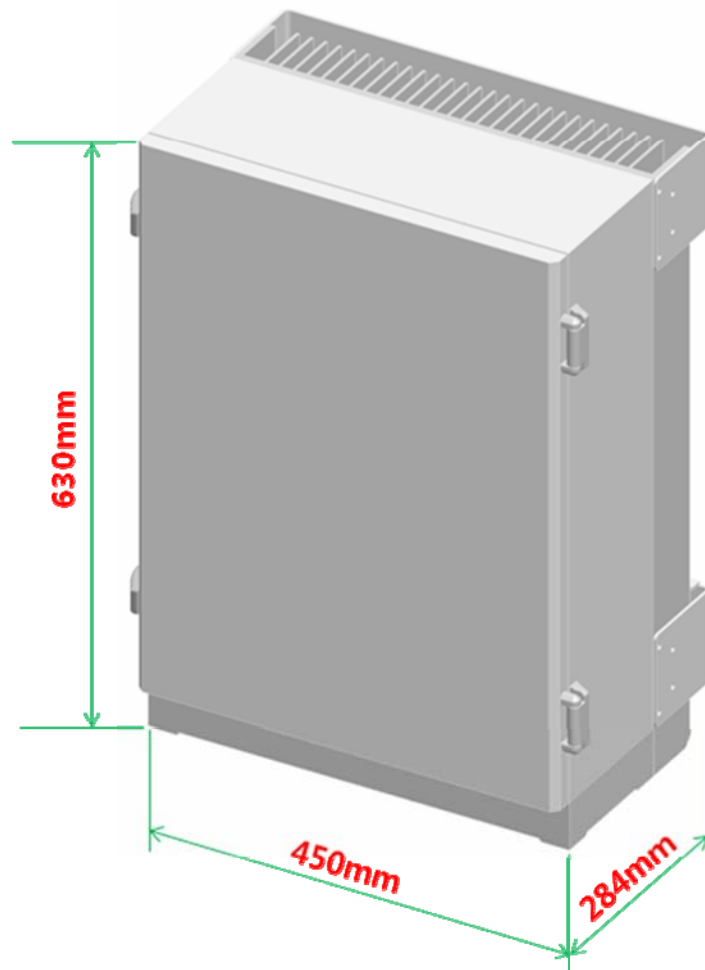
630mm

450mm

284mm

4.2.3. Mechanical Specification

No	Item	Description
1	Dimension & Weight	1. Dimension: W 450mm ✖ H 630mm ✖ D 284mm (plinth included) 2. Weight: 40.5Kg
2	Method of Cooling	Natural convection (Heat-sink)
3	Door Locking Type	Two locks on the left side of the front of cabinet
4	Optic I/O	1. Position: Cabinet inside 2. Connector type: FC/APC * Optic cable tray is provided in the inside of cabinet.
5	ANT PORT	1. location: 1 Port at bottom of cabinet 2. Connector Type: N Type Female
6	Power Input	1. Power: 110VAC 2. Position: bottom side of cabinet 3. Connector: MS3106A 16-10S
7	Ground	2Hole 16SQ at the left side of cabinet
8	Waterproof condition	IP54 compliant
9	Misc. Features	1. Easy to maintain 2. Pole mountable (i.e., telegraph pole) 3. Lamp embedded with automatic On/Off function according to the door opening status 4. Torque hinge used

4.2.4. Description of PW1900-C RU

[Forward path]

The CDMA signal(RF combined with modem signal) sent from optic module of MHU is first divided into RF and modem signal at RFAGC module, then the RF signal(CDMA) is amplified and filtered at the Driver Amp module(RFBS) and the modem signal is conveyed to CPU of NMS controller through FSK modem.

The RF signal from the Driver Amp module(RFBS) is linearly amplified up to high power level at HPA, passed through the Front-End Filter Unit, and finally transmitted through an antenna.

[Reverse Path]

CDMA Rx signals incoming from an antenna are first passed by the Front-End Filter Unit, amplified on a low noise and high gain performance at RRLNA/RRBS, and combined with modem signal at combiner(RRCOM). The combined signal is transmitted

to MHU through the optic module.

4.2.5. Port Configuration
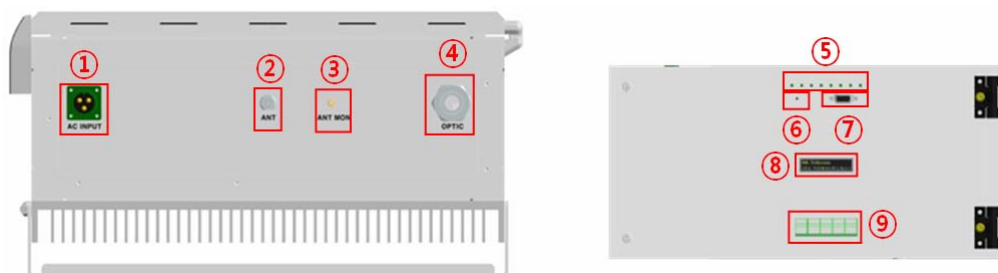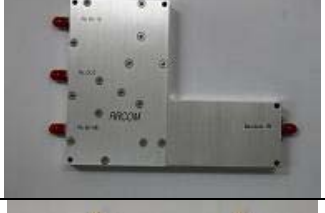
No	Item		Description
1	POWER		AC 110V
2	ANT		Antenna connection port
3	ANT MON		A monitor port with -40dB output compared to the output power of the Front-End Filter
4	OPTIC Inlet		Optic cable connection hole
5	LED	RUN	Green Blinking: CPU run, OFF(Gray): CPU stop
		TxD	Green: data sending to MHU, OFF(Gray): no data sending
		RxD	Green: data receiving from MHU, OFF(Gray): no data receiving
		PSU	Green: PSU normal, Red: PSU Alarm
		HPA1	Green: HPA normal, Red: HPA alarm
		HPA2	Not used
		LD	Green: Normal, Red: Alarm
		PD	Green: Normal, Red: Alarm
6	RESET		NMS Board Hardware Reset
7	DEBUG		Connection port to GUI program (9pin D-SUB)
8	DISPLAY		Key pad input display
9	DATA INPUT		Equipment status/check, control input

4.2.6. Module Composition
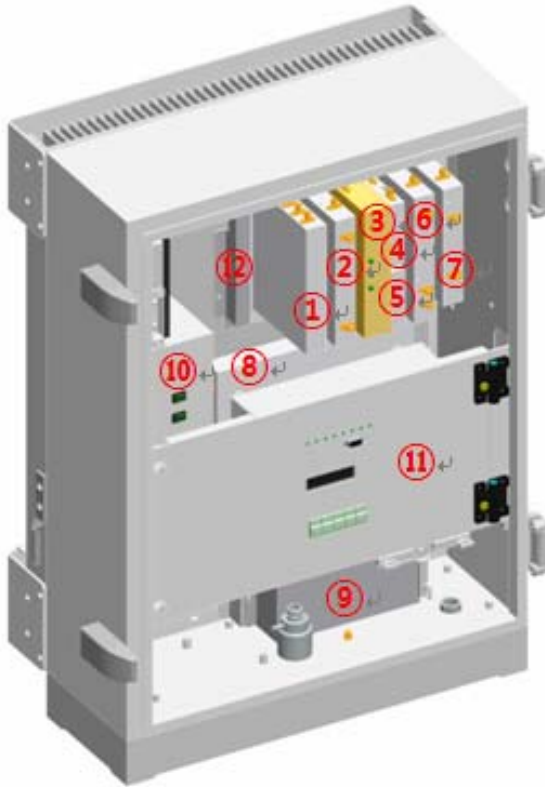
No	Module	Voltage Used	Remarks
①	RF FWD AGC (RFAGC)	6.5Vdc	
②	RF FWD Band Selector for 1900MHz (RFBS)	6.5Vdc	
③	Slave Optical Transceiver Unit (SOU)	6.5Vdc	
④	RF Modem (FSK Modem)	9Vdc	
⑤	RU RVS COM for Signal combing (RRCOM)		
⑥	RU RVS Band Selector for 1900MHz (RRBS)	6.5Vdc	
⑦	RU RVS LNA for 1900MHz (RRLNA-WG)	9Vdc	
⑧	HPA for 1900MHz	29Vdc	
⑨	Front-End Filter Unit (FE-Duplexer) for 1900MHz		
⑩	PSU	110Vac	
⑪	NMS Controller	9Vdc	
⑫	Back Board Ass'y	6.5Vdc / 9Vdc	

4.2.7. Function of Modules

| No	Module	Description
1		**[RFAGC]** Divides RF signal to 850MHz, 1900MHz and modem signal, and amplify the lossy RF signal due to optic cable.
2		**[RFBS]** Controls the gain of FWD output signal, filtered FWD band and perform the ALC function. The module output is sent to HPA.
3		**[SOU]** Converts E/O (or O/E) of FWD and RVS signals. Wavelength: TX 1550[nm], RX 1310[nm]
4		**[FSK Modem]** Data modem for RU and MHU communication RU → MHU frequency: 340MHz MHU → RU frequency: 360MHz
5		**[RRCOM]** Combines RF signal(850MHz and 1900MHz) and data signal, and provides the combined signal to optical module in order to convert E/O.
6		**[RRBS]** Amplifies RVS CDMA signal, select the filtering band and control the RVS path gain of RU.
7		**[RRLNA]** A low noise amplifier module for RVS CDMA signal. RRLNA amplify the CDMA Rx signal with low noise and high gain. It has 20dB coupling port compared to the output of the module. And built-in local oscillator to check reverse path gain.

8		[HPA] 30Watt(45dBm) High power amplifier that linearly amplifies the RU CDMA signal and send to RU ANT through the FE-Duplexer.
9		[FE-Duplexer] Front end duplexer that passes through desired frequency bands.
10		[PSU] Converts AC 110V to DC 29V, DC 9V, and DC 6.5V, and distributes the voltages to different modules. It includes AC power on/off switch and HPA 29V power on/off switch.
11		[NMS] Monitors the status of RU each module, and controls the configurable items of the RU modules.
12		[Interface BD] Provides DC current to modules which are connected to interface B'D and supports a connection port to communicate with NMS B'D.

4.2.8. PSU

PSU converts external AC110V into DC and supplies +27V, +9V and +6.5V to modules in RU. In PSU, there two (2) on/off switches: one for AC110V, and another for HPA only. The drawing of PSU is below.
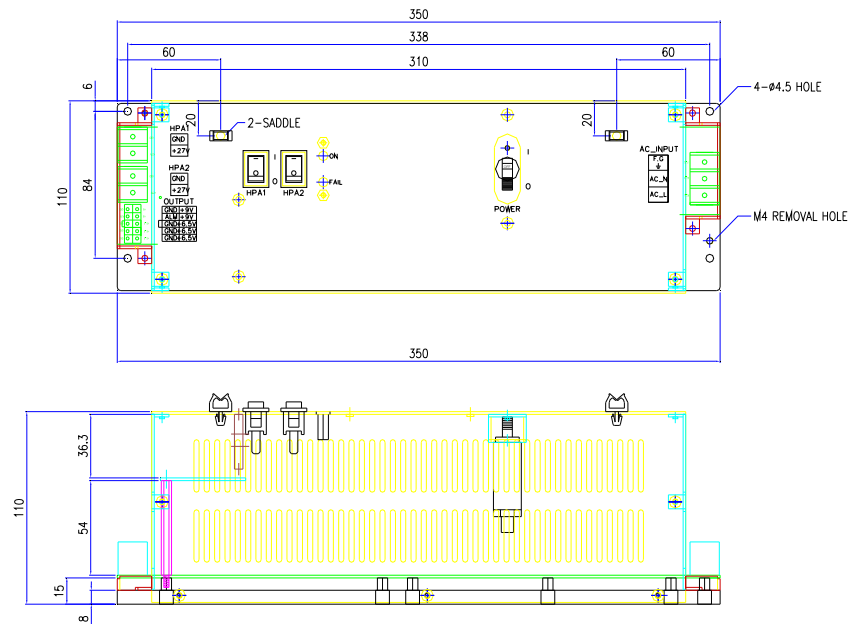
[PSU Capacity]

Output Voltage	Maximum Current	Watt
27V	16 A	
+9V	3 A	511
+6.5V	8 A	

[PSU Pin Map]

AC Input PIN Type: BR-1100-3P

Pin No.	1	2	3
Spec.	FG	AC-N	AC-L

HPA 1, 2 PIN Type: BR-1100-2P

Pin No.	1	2
Spec.	GNS	+27

SUB Output PIN Type: 5566-10P (Molex)

Pin No.	1	2	3	4	5
Spec.	+9V	+9V	+6.5V	+6.5V	+6.5V
Pin No.	6	7	8	9	10
Spec.	GND	GND	GND	GND	GND

Circuit Diagram of Power
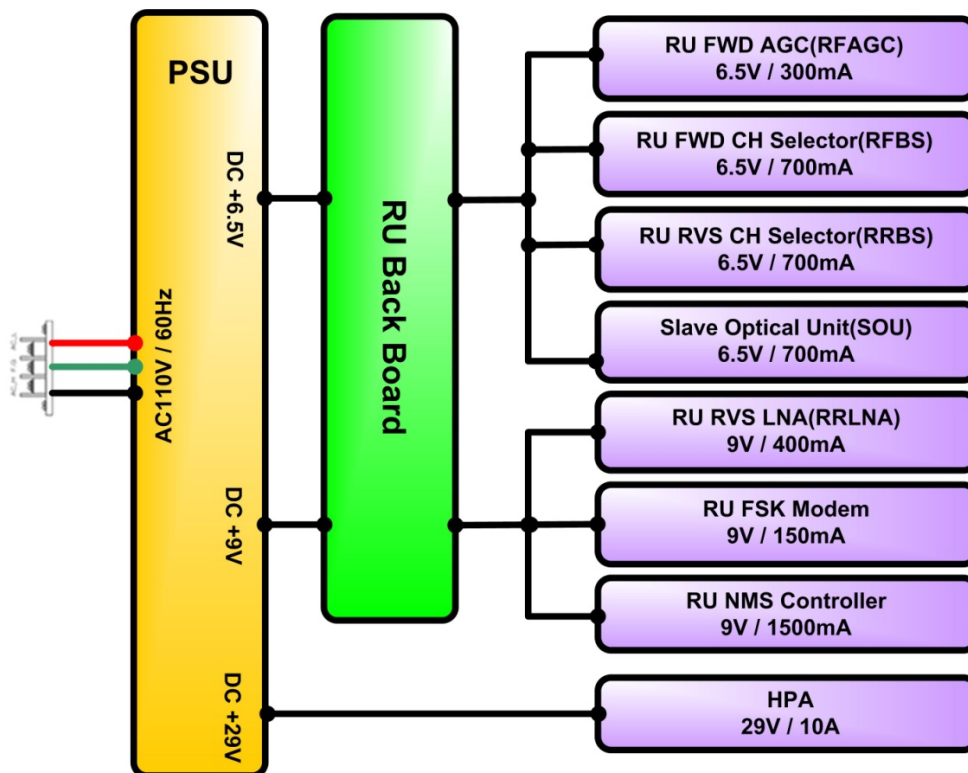
5. Block Diagram

Public Wireless DAS Block Diagram
Model : PWI900-C   Version 0.0
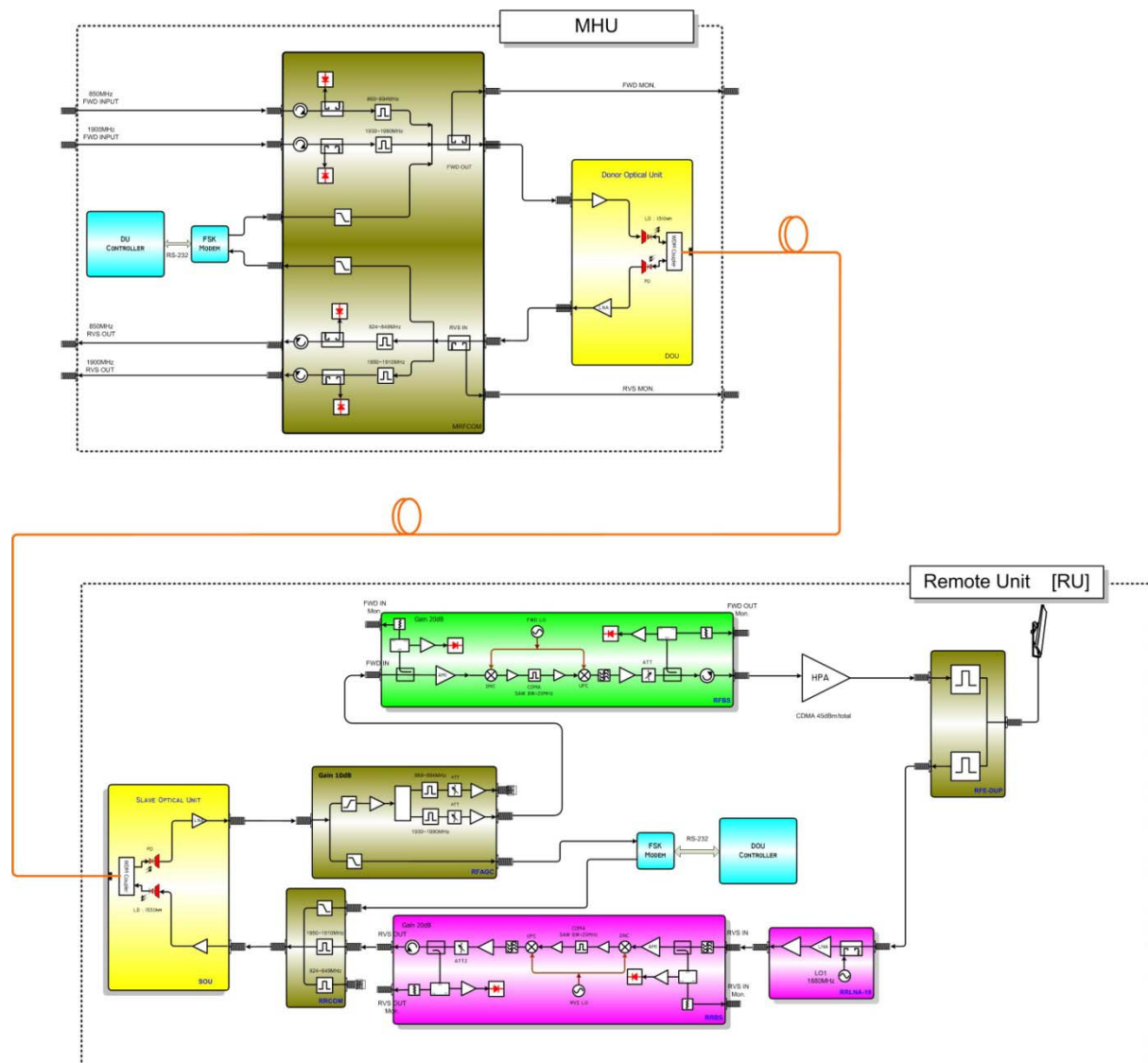
6. Administration Program (RptMan1900)

Administration program (RptMan1900) is a management program for PW1900-C and provides status monitoring and control functions to users.

6.1. System Requirement

- System: Desktop or laptop PC
- OS: Windows XP or later version
- Resolution: 1024 ✕ 768 or more
- Connection Cable: 9 pin serial cable (cross type)
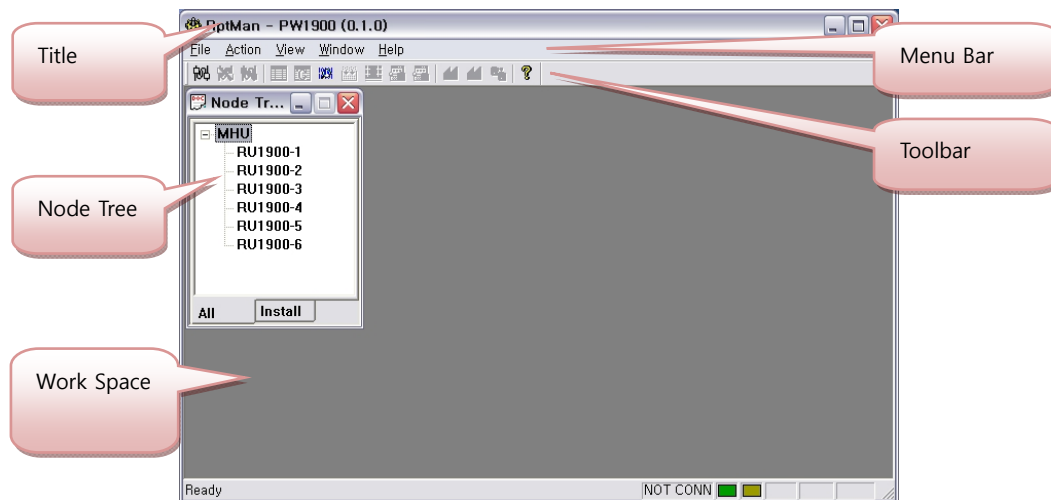
6.2. Cable connection

The cable connection between repeater and PC (GUI program) is illustrated below.
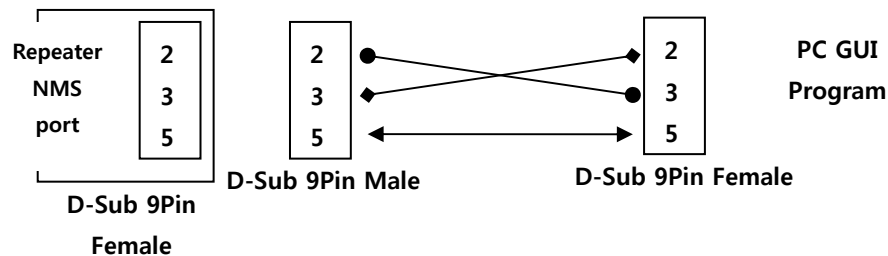
The NMS port of repeater MHU provides two (2) ports; one is D-sub port for GUI and another is Ethernet port for NOC(Network Operating Center).
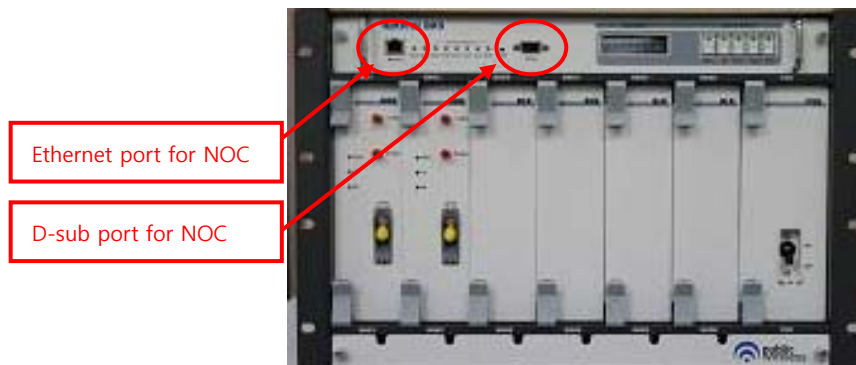
6.3. Screen

Section	Description
Window Title	![RptMan - PW1900 (0.1.0) - [RU1900-1]](title) Displays the name of management program (GUI), i.e. RptMan-PW1900. Displays the type of equipment which is currently connected to program (MHU or RU).
Menu Bar	File Action View Window Help Presents working menu for operators. It is associated with tool icons, which can activate the tool bar menus.
Toolbar	(toolbar icons) Presents icons (button type) for frequently used command. User friendly icons are used. Icons are activated or disabled as to the status of repeater.
Work Space	Status information and control function are provided with a block diagram view of MHU and RU. Provides the working space of windows or dialogs.

6.4. Status Display

Status of repeater is displayed by LED and values. The meanings are as follows.

- **LED**
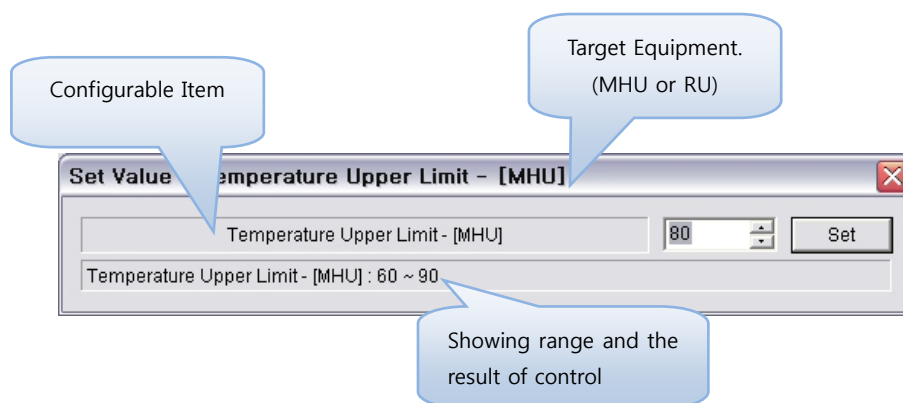 - **Alarm:** ■/■ blinking means ALARM, ■ means NORMAL
  - **On/Off:** ■ ON, ☐ OFF
    - Exception) for HPA, ■ is ON, ■ is OFF

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- **Value**
  - **Units are not displayed (omitted).**
  - **Value displayed in box (`0.0`)**

- **Control**
  - **The shape of mouse cursor is changed to 🖑 on controllable item.**
  - **The texts of controllable LED or values are displayed in BOLD font.**

6.5. Control Policy
- **System parameter is controlled one at a time.**
- **Click a control item (button) to popup a control popup dialog.**

Configurable Item

Target Equipment.
(MHU or RU)

Set Value   emperature Upper Limit – [MHU]

Temperature Upper Limit - [MHU]   80   Set

Temperature Upper Limit - [MHU] : 60 ~ 90

Showing range and the result of control

- **Once a dialog popup window is opened, it stays there for repeated control.**

6.6. Menu

Menu	Sub Menu	Function
File	Connect	Connects GUI and repeater to communicate
	Disconnect	Disconnects GUI and repeater
	Exit	Finishes admin program.
Action	Power Table	Presents a dialog to manipulate RF power table
	TC Table	Presents a dialog to manipulate temperature compensation table
	Image Compression	Compressed the firmware file (executable file of repeater) to download
	Image Downloader	Downloads compressed firmware file to repeater
	Factory Setting	Sets configured values of repeater back to values of factory settings
	Gain Setting	Tx: set ATT to have 38dBm remote HPA output. Rx: set ATT to have 40dB of Rx total gain from RU to MHU including optical loss.

View	MHU Window	Presents MHU status window in work space
	Remote Window	Presents RU status window in work space
Window	Cascade	Cascade or tile horizon arrangement of repeater status windows in work space
	Tile Horizon	
	Packet Debug	Presents debug window in work space displaying packets between repeater and GUI program
Help	About RptMan1900	Displays version of GUI program named RptMan (Repeater Manager)

6.7. Toolbar

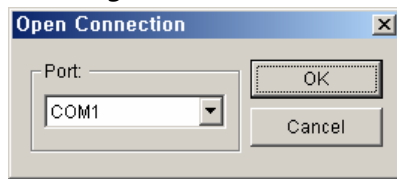| ITEM	ICON	Function
Communication Establishment		Establishes RS-232C connection to the repeater, then GUI starts to communicate and status of repeater are polled and displayed.
Communication Disconnection		Disconnects communication with connected repeater. Status of repeater is not updated.
Polling Stop/Resume		Stops or resumes polling action of GUI program. (activated in toggling way)
Power Table		Presents a dialog to manipulate RF power table
T/C table		Presents a dialog to manipulate temperature compensation table
Debug Packet		Displays packet data between GUI and repeater like protocol analyzer and it may help debugging of software
Compression of image file		Compresses image file of repeater
Gain Setting		TX: set ATT to have 38dBm of output at the RU ANT Port RX: set ATT to have 40dB gain of Rx path → Tx/Rx Gain setting function carry out Tx/Rx gain including optical loss compensation automatically.
MHU Download		Download MHU firmware files to a designated equipment.
Remote Download		Download RU firmware files.
MHU Factory Setting		Changes MHU parameters to factory setting.
RU Factory Setting		Changes RU parameters to factory setting.
Help		Shows version information

6.8. Progrm operation

6.8.1. Initiating communication

Function	Establishment of communication between GUI and repeater	
Method	Click 📶 button in toolbar of GUI program	
Description	Port	Combo box to choice com port (COM1, COM2, …)
	OK Button	Initiates communication between GUI and repeater, then close this popup window("Open Connection") When communication port is establish correctly, you can see the communication status by the icon blinking of (right-bottom side of the main screen)
	Cancel Button	Cancels communication establishment and close the popup window

6.8.2. Disconnection

Function	Disconnection of GUI and repeater
Method	Click 🔀 button in toolbar of GUI program
Description	GUI on PC and repeater disconnect communication with each other by this action.

6.8.3. PW1900-C MHU Status Retrieval and Control
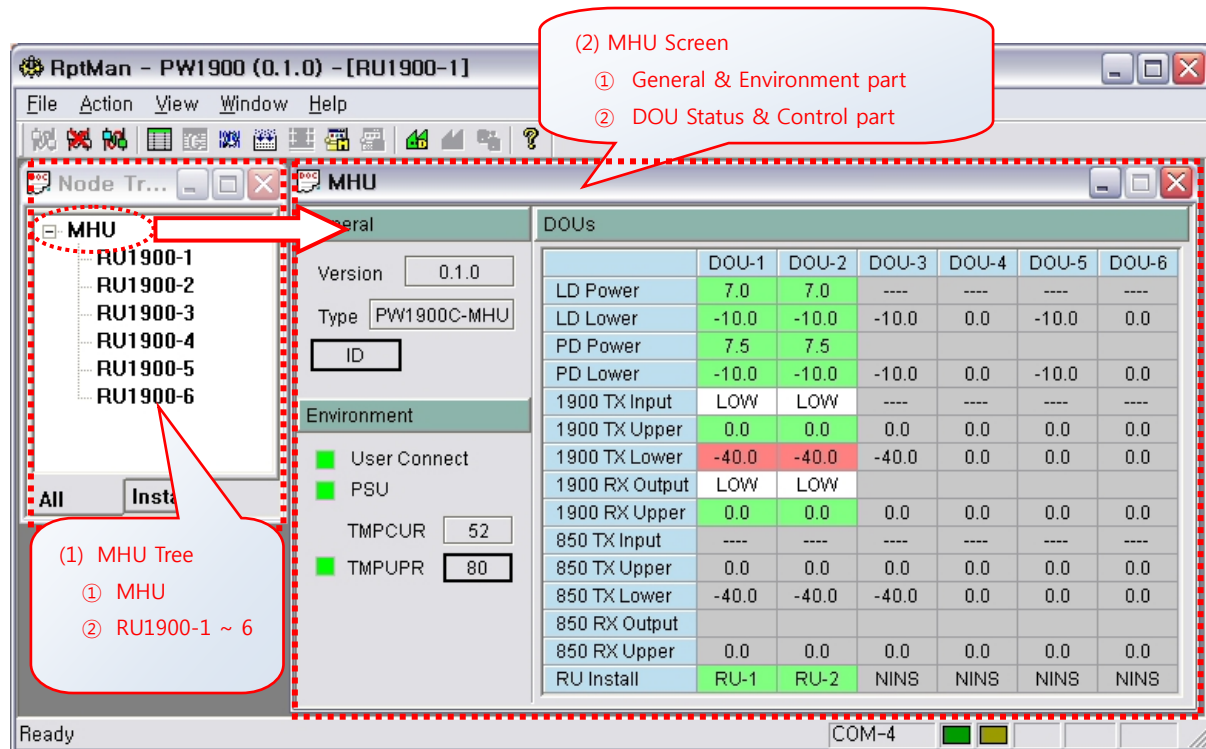
(1) MHU Tree: This window display the tree configuration of RUs connected with MHU

(1) MHU Tree	① MHU	Press MHU to open the MHU screen
	② RU1900-1 ~ 6	Press RU1900 to open each RU screen

(2) MHU Screen window

(3) MHU Screen	① General & Environment	This part included common parameter of MHU like information of Environment
	② DOU Status/Control	This screen provides information of 6DOUs ➔ LD Power & Lower limit value ➔ PD Power & Lower limit value ➔ Tx Input, Rx Output Power & Limit value ➔ RU Install information

Group	Description
	● Version: Version of firmware ● Type: Repeater unit type ● ID: ID of MHU for the communication

Environment

- User Connect
- PSU
- TMPCUR: 46
- TMPUPR: 80

- User Connect: Connection status of COM port of repeater
- PSU: Status of PSU
- TMPCUR: Current temperature of repeater
- TMPUPR: Value/control of upper threshold of temperature (button) and alarm status (LED)

DOUs

	DOU-1	DOU-2	DOU-3	DOU-4	DOU-5	DOU-6
LD Power	7.0	7.0	----	----	----	----
LD Lower	-10.0	-10.0	-10.0	0.0	-10.0	0.0
PD Power	7.5	7.5				
PD Lower	-10.0	-10.0	-10.0	0.0	-10.0	0.0
1900 TX Input	LOW	LOW	----	----	----	----
1900 TX Upper	0.0	0.0	0.0	0.0	0.0	0.0
1900 TX Lower	-40.0	-40.0	-40.0	0.0	0.0	0.0
1900 RX Output	LOW	LOW				
1900 RX Upper	0.0	0.0	0.0	0.0	0.0	0.0
850 TX Input	----	----	----	----	----	----
850 TX Upper	0.0	0.0	0.0	0.0	0.0	0.0
850 TX Lower	-40.0	-40.0	-40.0	0.0	0.0	0.0
850 RX Output						
850 RX Upper	0.0	0.0	0.0	0.0	0.0	0.0
RU Install	RU-1	RU-2	NINS	NINS	NINS	NINS

- LD Power: Transmitted optical power level to RU
- LD Lower: Lower limit level of the LD power
- PD Power: Received optical power level from RU
- PD Lower: Lower limit level of the PD power
- 1900 Tx Input: Tx level input from 1900MHz BTS
- 1900 Tx Upper: Upper limit of Tx input level
- 1900 Tx Lower: Lower limit of Tx input level
- 1900 Rx output: Rx level output to 1900MHz BTS
- 1900 Rx Upper: Upper limit of Rx output level
- 850 Tx Input: Tx level input from 850MHz BTS
- 850 Tx Upper: Upper limit of Tx input level
- 850 Tx Lower: Lower limit of Tx input level
- 850 Rx output: Rx level output to 850MHz BTS
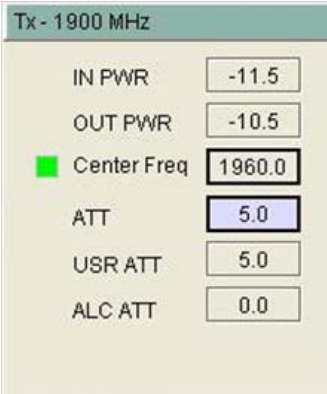- 850 Rx Upper: Upper limit of Rx output level
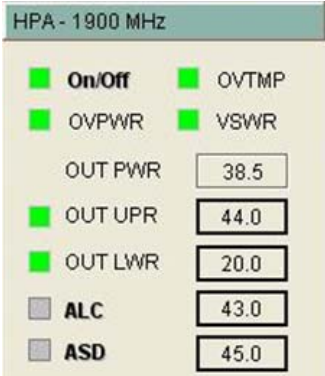- RU install: display the RU installation status

6.8.4. PW1900-C RU Status Retrieval and Control

Group	Description
	● **Version: Version of firmware** ● **Type: Type of repeater** ● **ID: ID of repeater RU**
	● **User Connect: Connection status of COM port of repeater** ● **PSU: Status of PSU** ● **TMPCUR: Current temperature of repeater RU** ● **TMPUPR: Value/control of upper threshold of temperature (button) and alarm status (LED)**

	● **LDPWR: Value of LD power (box) and status of LD (LED)** ● **LDLWR: Value/control of lower threshold of LD power (button) and lower alarm status of LD power (LED)** ● **PDPWR: Value of PD power (box) and status of PD (LED)** ● **PDLWR: Value/control of lower threshold of PD power (button) and lower alarm status (LED)**
	● **INPWR: FWD RF input power display of RFBS** ● **OUTPWR: FWD RF output power display of RFBS** ● **Center Freq: Set the FWD Center frequency value, and shows PLL alarm status** ● **ATT: Set ATT to control FWD gain, and shows it's value. When ATT is set manually, ALC ATT is set to zero, and USR ATT is set to ALC ATT + (ATT change). Displayed ATT value = USR ATT + ALC ATT** ● **USR ATT: When ATT is set, USR ATT is set to ALC ATT + (ATT change).** ● **ALC ATT: It is automatically adjusted by HPA ALC to control FWD gain, and it is set to "0" when ATT is controlled.**
	● **ASD: When input upper threshold alarm occurs, set ASD activation, and shows its status.** ● **Pilot On/Off: Set CW signal generation, and shows its status. It is used for RVS gain setting.** ● **IN PWR: RVS input power value of RRBS** ● **IN UPR: Set RVS input upper threshold, and shows the alarm status of input upper threshold RVS.** ● **OUTPWR: RVS RF output power of RRBS** ● **ATT: Set ATT to control RVS gain, and shows it's value.** ● **Center Freq: Set the RVS Center frequency value, and shows PLL alarm status**

	● On/Off: Status/control the operation state of HPA ● OVTMP: Alarm status of HPA Over-temperature ● OVPWR: Alarm status of HPA Over-Power (LED) ● VSWR: Alarm status of HPA VSWR (LED) ● OUT PWR: Output power level of HPA (box) ● OUT UPR: Value/control of upper threshold of HPA output power (button), alarm status (LED) ● OUT LWR: Value/control of lower threshold of HPA output power (button), alarm status (LED) ● ALC: Set ALC level for HPA output, and shows ALC status. RFBS ALC ATT is used to control HPA level. ● ASD(Auto Shutdown): ASD level (button), and running status of function (LED)

6.8.5. Firmware download

Download of firmware is normally required when functional upgrade is needed or when bug or erroneous actions of firmware are fixed.

Downloading improper images (executable file of repeater CPU) may cause seriously harmful damages to equipment.

Download takes the following steps.

① Convert firmware source file (*.bin) to a downloadable file format.

Main menu: Action → Image Compression,   toolbar:

② Open a pop-up window showing the status of the target equipment for firmware download.

Method 1) Main menu View ¡æ Select Donor Windows or Remote Windows

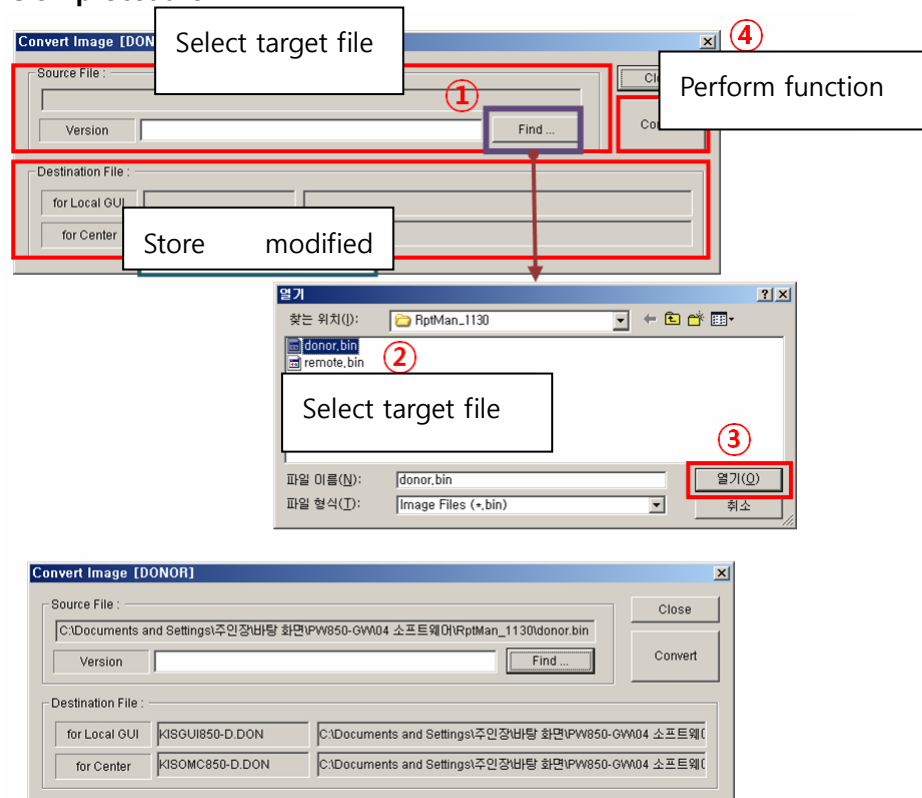Method 2) In Block View Dialog window, select Donor Windows or Remote Windows

③ Download firmware to the target equipment.

Method 1) Main menu Action ¡æ select Image Download menu

Method 2) In toolbar, select for MHU, and select for RU

After that, download firmware after selecting the firmware file for the target equipment.

File conversion procedure

Download procedure

Display selected file information

Select file ①

Perform operation

Display progress of firmware download ②
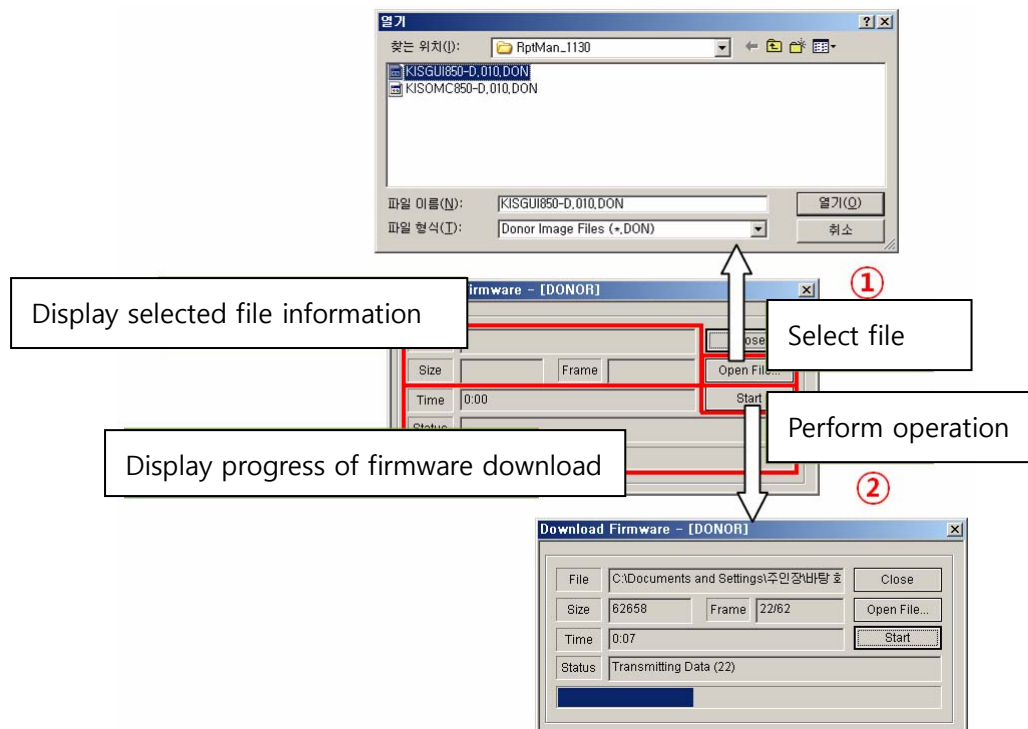
6.9. Additional features

6.9.1. ASD (Auto Shutdown) Function

1. If the power level is above the shut down level for longer than 1 second, turn off HPA.

2. **During shut down state, monitor RFCHS output power. If the level is below 5dB from shut down level, turn on HPA automatically.**

3. Monitor HPA output power in normal operation, and monitor RFCHS output power during shut down.

Longer than 1 sec, HPA off
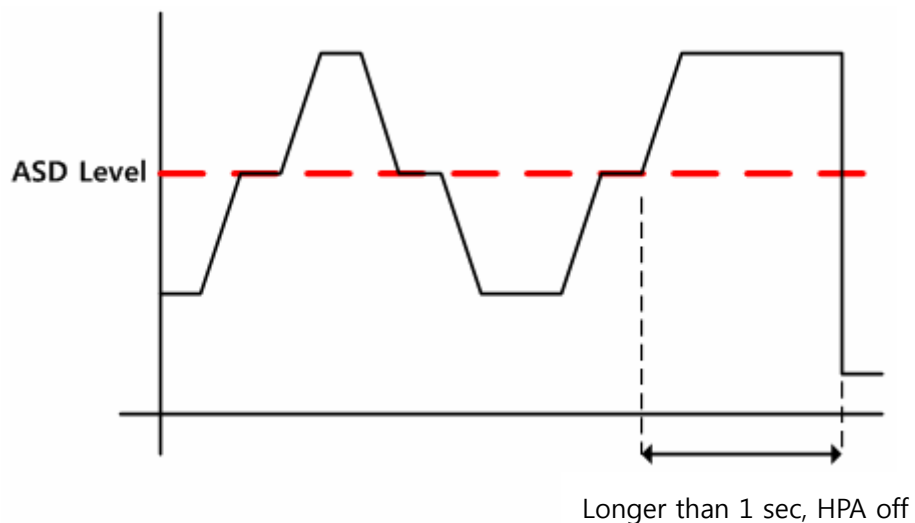
6.9.2. ALC (Auto Level Control) Function

1. If the power level reaches the ALC level, keep the current ATT in order to maintain the ALC level.
2. By memorizing the existing ATT value, the ATT value before ALC can be reused even when the power is reduced.

$+\delta$

ALC Level

No ATT change   ATT increase
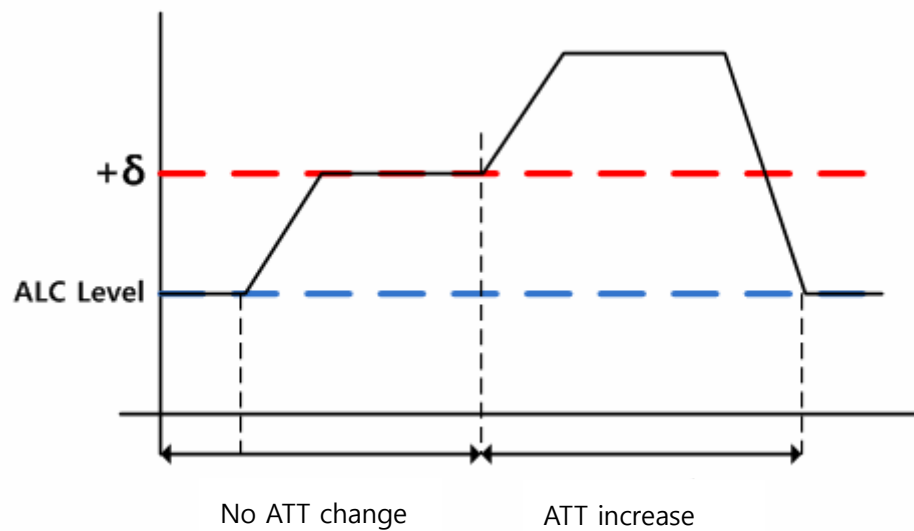
Appendix A Factory setting for each equipment

MHU RU			Item	Value
Item V	alue			
MHU TEMP UPR	80		RU TEMP UPR	80
1900/850MHz Tx IN UPR	-10		RFBS ATT	30
1900/850MHz Tx IN LWR	-20		Hidden ATT	-
1900/850MHz Rx OUT UPR	-10		PLL	-
Optic LD LWR	0		RFAGC ATT	30
Optic PD LWR	-10		HPA On/off	Off
			HPA OUT UPR	44
			HPA OUT LWR	20
			ALC Level	43
			ALC On/Off	ON
			ASD Level	45
			ASD On/Off	ON
			RRBS ASD	ON
			RRBS IN UPR	-10
			RRBS ATT	30
			RRBS Hidden ATT	-
			RRBS PLL	-
			Optic LD LWR	0
			Optic PD LWR	-10

Appendix B VFD Item of the Repeater each equipment(MHU and RU)

Unit	Item	C / M	Unit	Item	C / M
MHU	PW1900-C [MHU]	M	RU	PW1900-C [RU]	M
	F/W Version	M		F/W Version	M
	Current Temp.	M		Current Temp.	M
	Link Status(RU1 ~ RU6)	M		Link Status	M
	LD PWR(RU1 ~ RU6)	M		LD PWR	M
	PD PWR(RU1 ~ RU6)	M		PD PWR	M
	1900MHz Tx IN Level (RU1 ~ RU6)	M		FWD OUT PWR	M
	850MHz Tx IN Level (RU1 ~ RU6)	M		RVS IN PWR	M
	1900MHz Rx OUT Level (RU1 ~ RU6)	M		FWD ATT	C / M
	850MHz Rx OUT Level (RU1 ~ RU6)	C / M		RVS ATT	C / M
	PSU	C / M		HPA Enable	C / M