# AEON-9030
# USER MANUAL

Version 1.0

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## Glossary

The following is a list of abbreviations and terms used throughout this document.

| Abbreviation/Term | Definition |
|---|---|
| AGC | Automatic Gain Control |
| ALC | Automatic Level Control |
| AROMS | ADRF's Repeater Operation and Management System |
| BTS | Base Transceiver Station |
| CDMA | Code Division Multiple Access |
| CW | Continuous Wave (un-modulated signal) |
| DAS | Distributed Antenna System |
| DL | Downlink |
| Downlink | The path covered from the Base Transceiver Station (BTS) to the subscribers service area via the repeater |
| HPA | High Power Amplifier |
| HW | Hardware |
| iDEN | Integrated Digital Enhanced Network |
| IF | Intermediate Frequency |
| LNA | Low Noise Amplifier |
| MS | Mobile Station |
| PLL | Phased Locked Loop |
| PSU | Power Supply Unit |
| RF | Radio Frequency |
| SW | Software |
| UL | Uplink |
| Uplink | The path covered from the subscribers service area to the Base Transceiver Station(BTS) via the repeater |
| VSWR | Voltage Standing Wave Ratio |

Version 1.0 (July 1, 2009)



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Revision History for Manual

| Version | Author | Description | Date |
|---|---|---|---|
| 1.0 | K.Y.LEE | First Generation. | July 1, 2009 |
| | | | |
| | | | |
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Revision History for Hardware

| Version | Author | Description | Date |
|---|---|---|---|
| 1.0 | Digital Part | First Generation. | July 1, 2009 |
| | RF Hardware | First Generation. | |
| | | | |
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Revision History for Firmware

| Version | Author | Description | Date |
|---|---|---|---|
| 1.0 | Anthony Jang | First Generation | July 1, 2009 |
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# Table of Contents

# 1. Introduction of AEON-9030

## 1.1 Introduction

AEON-9030 repeaters enhance indoor wireless coverage in the most effective and cost efficient way. Intelligent design and versatility make AEON-9030 repeaters the ideal choice for indoor wireless coverage problems. DSP (Digital Signal Processing) technology is utilized to achieve the highest level of performance and filtering agility.

### 1.1.1 Highlights

- Dual Band (PCS, Cellular)
- Covers the 60 MHz PCS band
- Down Link 30 dBm Composite Output Power
- Up Link 30 dBm Composite Output Power
- 90 dB gain
- 30 dB AGC Range @ 0.5 dB Step
- Adjustable AGC Output Power Level
- Automated installation
- Web GUI connectivity via DHCP
- Band Selectable via Web-GUI
- Can Support Non-Contiguous Bands
- Supports Embedded Wireless Modem
- Supports Network Management Monitoring System via SNMP
- Three independent RF PCS channels Each channel supports 1.25 MHz to 18.75 MHz bandwidth
- Adjustable FA (3 channels)
- Digital filtering
- Oscillation detection

### 1.1.2 Parts List

| Label | Qty | Description |
|---|---|---|
| A | 1 | AEON-9030 Repeater |
| B | 1 | Ethernet Cable (crossover) |
| C | 1 | Ground Cable |
| D | 1 Kit (Set of 4) | 3/8” Nuts & Bolts |
| E | 1 Kit (Set of 4) | 1/2” Nuts & Bolts |
| F | 1 | CD** |

Table 1: Parts List

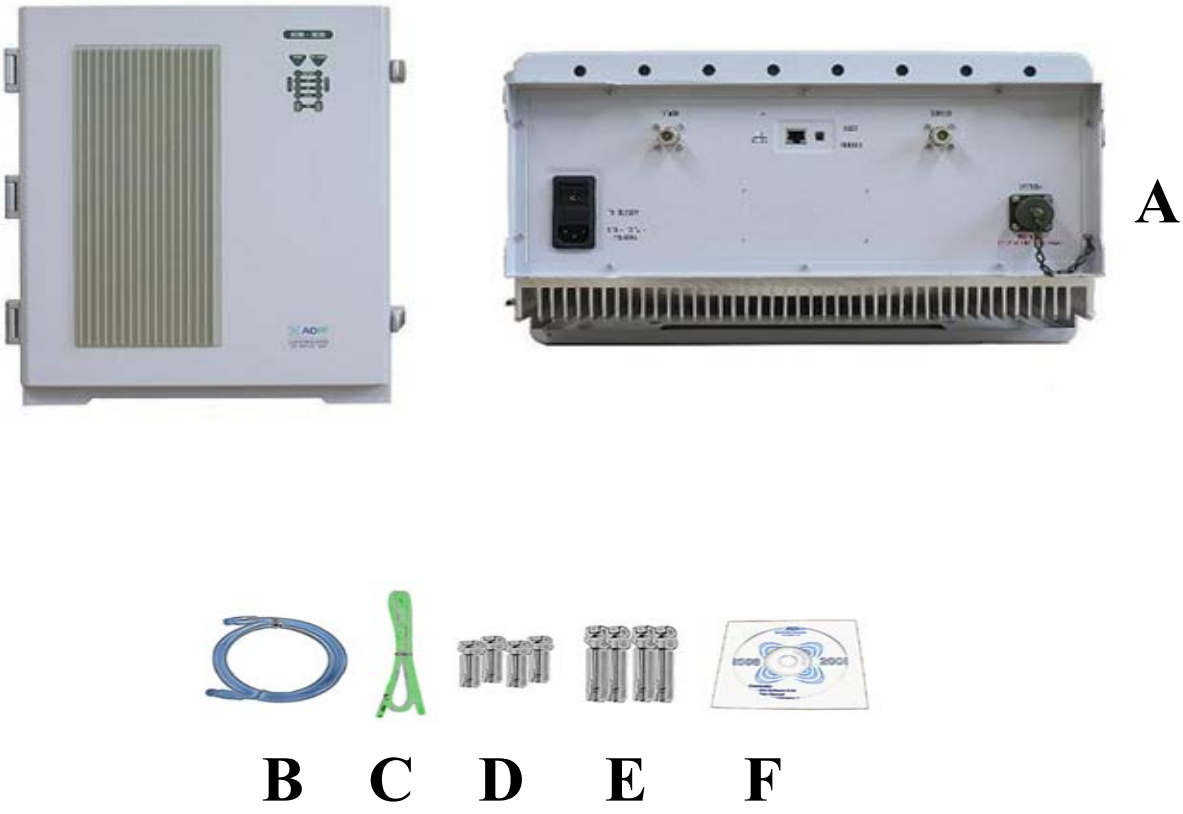


Figure 1: AEON-9030 Repeater Parts List

** CD includes: (1) AEON-9030 User Manual & (2) AEON-9030 Quick Start Guide

### 1.1.3 Repeater Quick View

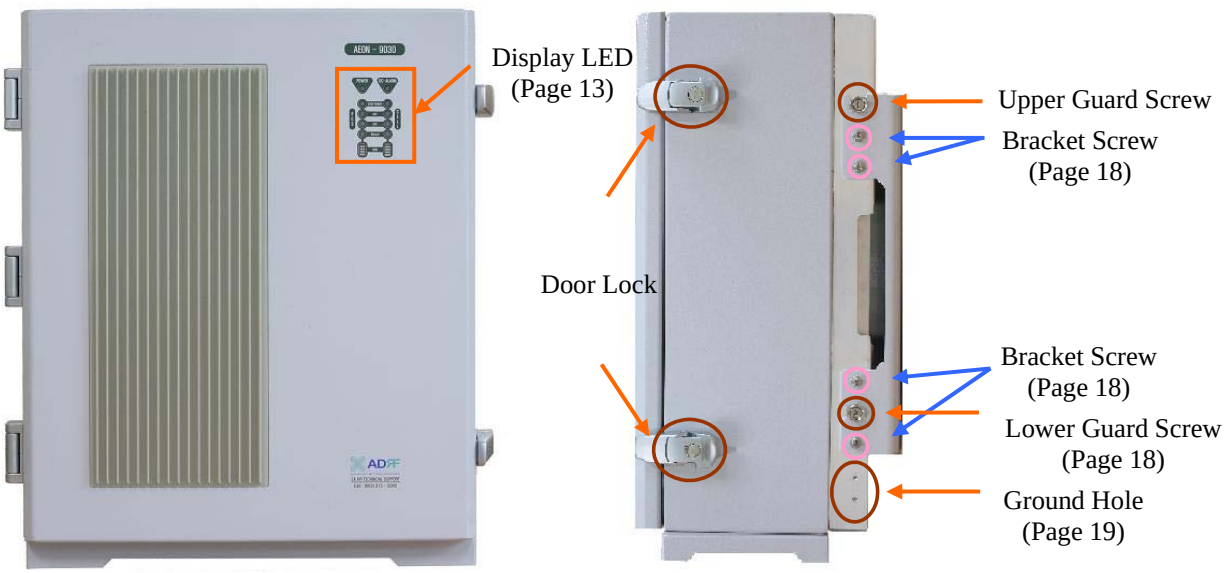


Figure 2: AEON-9030 Front & Side Views

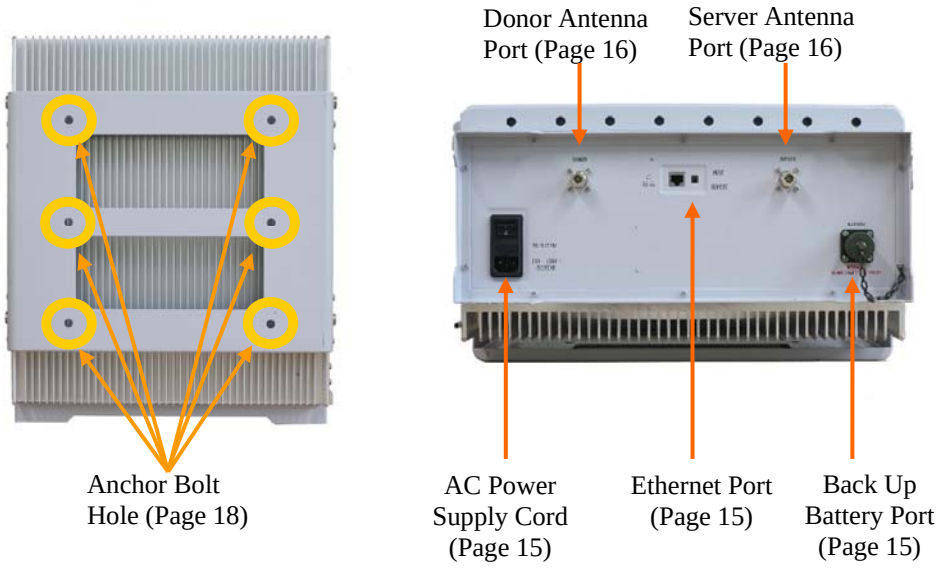


Figure 3: AEON-9030 Back & Bottom Views

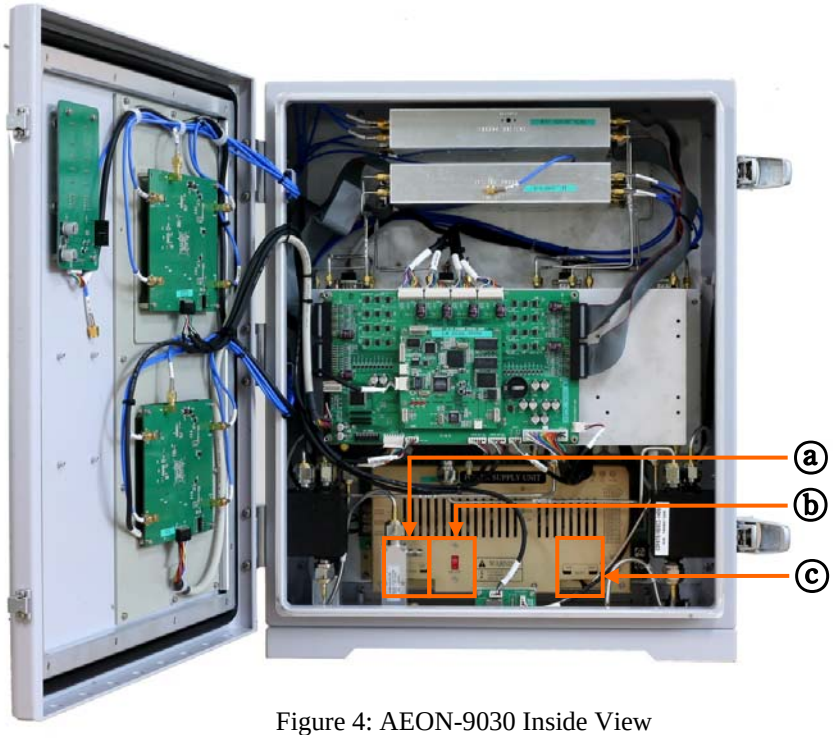


Figure 4: AEON-9030 Inside View

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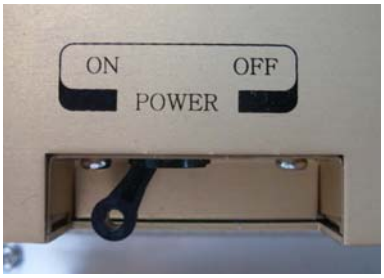


Figure 5: AC Power Switch

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Figure 6: 110/200V Select Switch

- **Selector switch**
  See installation instructions before connecting to the supply

ⓒ

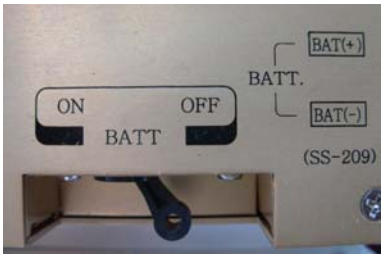



Figure 7: Battery Select Switch

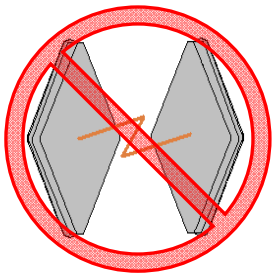
## 1.2 Warnings and Hazards


### WARNING! ELECTRIC SHOCK

Opening the AEON-9030 could result in electric shock and may cause severe injury.


### WARNING! EXPOSURE TO RF

Working with the repeater while in operation, may expose the technician to RF electromagnetic fields that exceed FCC rules for human exposure. Visit the FCC website at www.fcc.gov/oet/rfsafety to learn more about the effects of exposure to RF electromagnetic fields.



### WARNING! DAMAGE TO REPEATER

Operating the AEON-9030 with antennas in very close proximity facing each other could lead to severe damage to the repeater.

### RF EXPOSURE & ANTENNA PLACEMENT Guidelines

Actual separation distance is determined upon gain of antenna used.
Please maintain a minimum safe distance of at least 50 cm while operating near the donor and the server antennas. Also, the donor antenna needs to be mounted outdoors on a permanent structure.

# WARRANTY

Opening or tampering the AEON-9030 will void all warranties.

Lithium Battery: CAUTION. REPLACEMENT OF BATTERY WITH THE INCORRECT TYPE MAY LEAD TO A RISK OF EXPLOSION. DISPOSE OF USED BATTERIES ACCORDING TO INSTRUCTIONS.

Ethernet Instructions: This equipment is for indoor use only. All cabling should be limited to inside the building.

# FCC Part 15 Class A

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

# 2. AEON-9030 Overview

## 2.1 Switches & Indicators

### 2.1.1 LEDs

The AEON-9030 has ten LEDs on the front panel of the repeater as shown below in Figure 8.

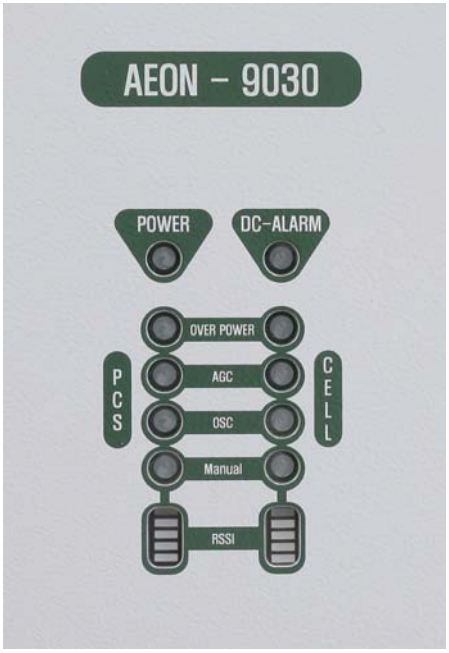



Figure 8: AEON-9030 Repeater LED View

- POWER LED

| Parameters | | Specifications |
|---|---|---|
| LED | Repeater On | Green LED on |
| | Repeater Off | Green LED off |

- DC-ALARM LED

| Parameters | | Specifications |
|---|---|---|
| LED | Normal | LED off |
| | Soft fail | Green LED on |
| | Hard fail | Red LED on |
| Condition for Alarm Activation | | Current > 9A (Hard Fail)<br>Current < 2A (Soft Fail) |
| After Alarm Activation | | Full Spectrum (PCS/Cellular) shutdown |

- OVER POWER LED

| Parameters | | Specifications |
|---|---|---|
| LED | Normal | LED off |
| | Soft fail | PCS/ Cellular Green LED on |
| | Hard fail | PCS/ Cellular Red LED on |
| Condition for Alarm Activation | Soft fail | Max power +1 <measured output < max power+2 |
| | Hard fail | measured output > max power + 2 |
| Following Alarm Activation | Soft fail | Only the alarm is activated and the repeater operates as normal |
| | Hard fail | The function associated with the alarm shuts down, and the shutdown process goes into effect |

- AGC LED

| Parameters | | Specifications |
|---|---|---|
| LED | AGC On | PCS / Cellular Green LED On |
| | AGC Off | PCS / Cellular LED Off |

- OSC LED

| Parameters | | Specifications |
|---|---|---|
| LED | Normal | LED off |
| | Hard fail | Red LED on |
| Condition for Alarm Activation | | Repeater goes into oscillation |
| Following Alarm Activation | | The portion associated with the oscillation shuts down, and at time of oscillation the defined procedure goes into effect |

- MANUAL LED

| Parameters | | Specifications |
|---|---|---|
| LED | Manually HPA Off/On | PCS / Cellular Green LED On |
| | Factory set or Reboot | PCS / Cellular Green LED Off |

- RSSI LED BAR

| Parameters | | Specifications |
|---|---|---|
| LED | Input < -75dBm | PCS / Cellular All LED Off |
| | Input < -65dBm | PCS / Cellular one LED On |
| | Input < -55dBm | PCS / Cellular two LED On |
| | Input < -45dBm | PCS / Cellular three LED On |
| | Input < -35dBm | PCS / Cellular four LED On |
| | Input > -25dBm | PCS / Cellular five LED On |

### 2.1.2 AC Power Switch


Figure 9: AC Power Switch

The AC Power on/off switch is located on the inside and bottom of repeater (Figure 9). The switch should be powered on after the repeater has been installed properly.

### 2.1.3 Back Up Battery Switch & Battery Port

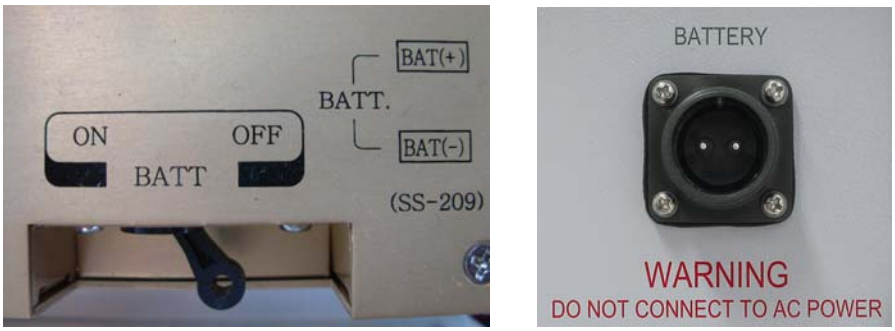



Figure 10: Battery Switch & Battery Port

The Battery Switch can be used to provide power to the optional External Backup Battery.
If a backup battery is utilized, please connect the battery to the unit via the external battery port as shown in Figure 10.
**(WARINING: If the Circuit Protector Switch is not turned OFF there may be a risk of damage or electric shock)**

Note: Please contact ADRF Technical Support for assistance if you are unfamiliar with the installation procedure of our battery box.

### 2.1.4 Ethernet Port

Figure 11 shows the Ethernet port which is used to interface with the unit via RJ-45 crossover cable. Verify that the Host/Remote switch is set to Host and set your network adapter to "Obtain an IP Address Automatically" and the repeater will assign an IP Address via DHCP. The Host/Remote switch should only be set to Remote when an external modem box is being used to monitor the unit.


Figure 11: Ethernet Port

### 2.1.5 Modem Module

Figure 12 shows the Modem Module that is used to remotely interface with the unit via modem. The modem will allow for remote configuration and monitoring via SNMP.


Figure 12: Modem Module

### 2.1.6 Other Ports

- **Donor Antenna Port**
  Port where the Donor Antenna will be connected.

- **Sever Antenna Port**
  Port where the Server Antenna will be connected.

## 2.2 Installation

### 2.2.1 Tools

No special tools or equipments are needed to install the AEON-9030.

### 2.2.2 Procedure

The wall-mounting bracket has six mounting holes which are used to mount the bracket to the wall. The wall bracket must be securely attached to the wall in order to support the weight of the AEON-9030. After mounting the bracket to the wall, the AEON-9030 is placed on the mounting bracket using the four guard screws attached to the AEON-9030.

The following steps should be followed while mounting the repeater:

**Installation Procedure**

① Take the AEON-9030 out of the box.
② Using the six anchor bolts, mount the bracket on the wall.
③ Make sure the bracket is securely mounted.
④ Slightly tilt the top portion of the repeater and mount the repeater onto the wall as shown in the picture on page 18. Hook the upper 2 guard screws first and then slide/push in the lower 2 guard screws into place.
⑤ Make sure the AEON-9030 is securely placed onto the wall bracket.
⑥ Fasten the 8 bracket screws back properly on both sides.
⑦ Verify that the repeater is secure and properly grounded.

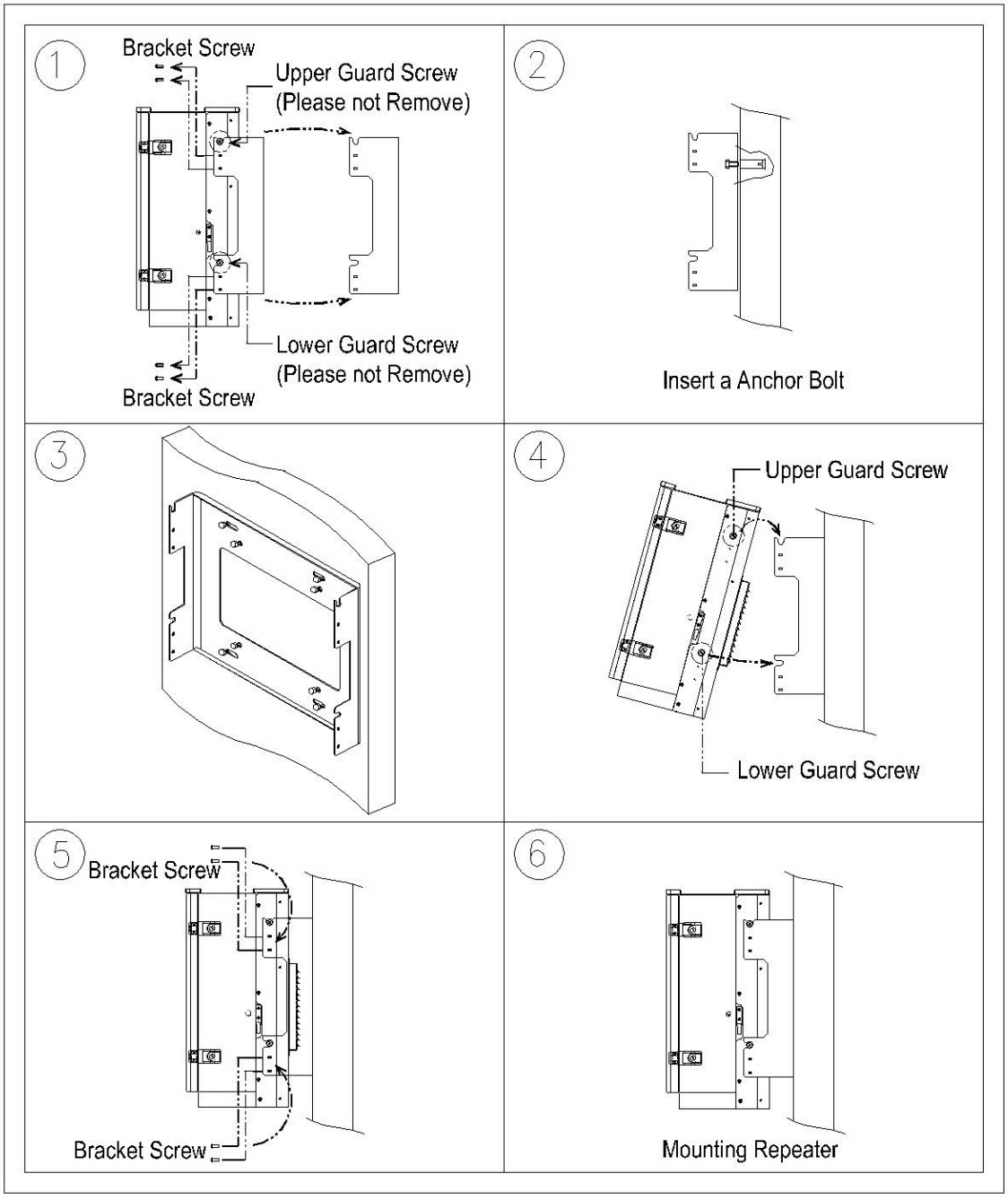



Figure 13: Repeater Mounting Instructions

### 2.2.3 Grounding

A ground cable is included in the packaging and should be properly connected to the repeater as shown below.

Figure 14: Ground Cable Connection

## 2.3 Antenna Separation/Isolation

Separation between antennas is necessary to prevent oscillation. Oscillation occurs when the signal entering the system continually re-enters, due to the lack of separation between the donor and server antenna. This creates a constant amplification of the same signal. As a result, the noise level rises above the signal level.

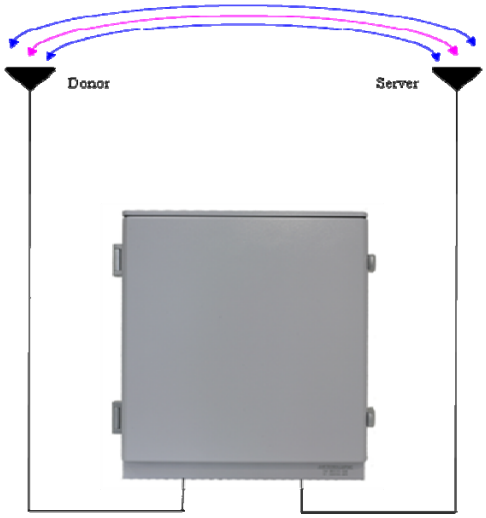



Figure 15: RF Repeater Oscillation

To prevent feedback, the donor and server antenna must be separated by an appropriate distance to provide sufficient isolation. Isolation is attained by creating sufficient distance between the donor and nearest server antenna so that the output of one antenna does not reach the input of the other. This distance is determined by the gain of the repeater.

A sufficient isolation value is 13 ~ 15 dB greater than the maximum gain of the repeater. The AEON-9030 has a maximum gain of 90 dB, thus it requires an isolation of at least 103 ~ 105 dB.

## 2.4 Line of Sight

The donor antenna which points toward the base station typically has a narrow beam antenna pattern. As a result, a slight deviation away from the direction of the BTS can lead to less than optimum results. In addition, obstacles between the repeater and the BTS may impair the repeater from obtaining any BTS signal. As a result, the repeater cannot transmit signal to the coverage area. Therefore, a direct line of sight to the BTS for the donor antenna is vital to the function of a repeater. For the same reason, placing the server antenna in direct line of sight of the coverage area is also necessary.

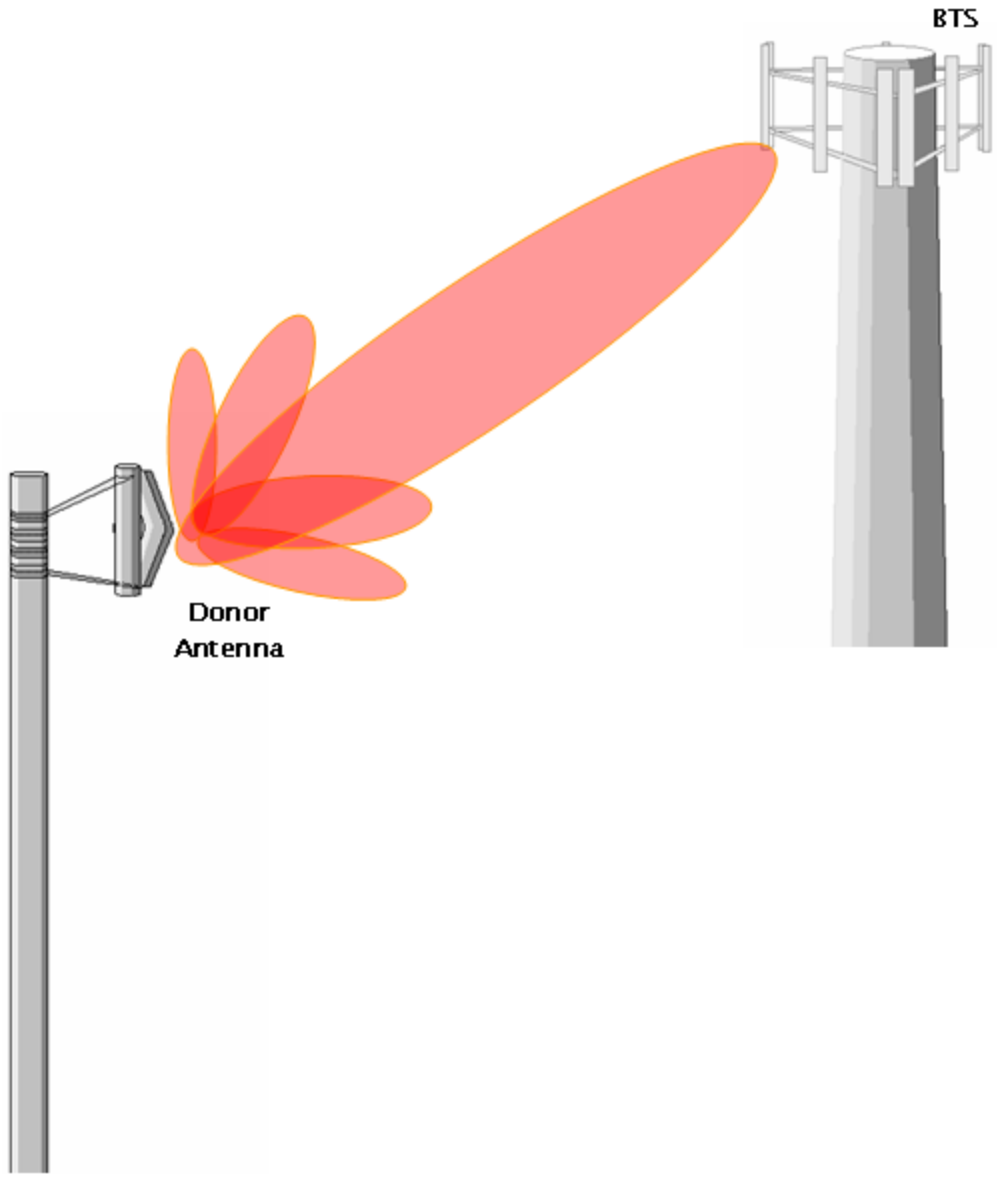


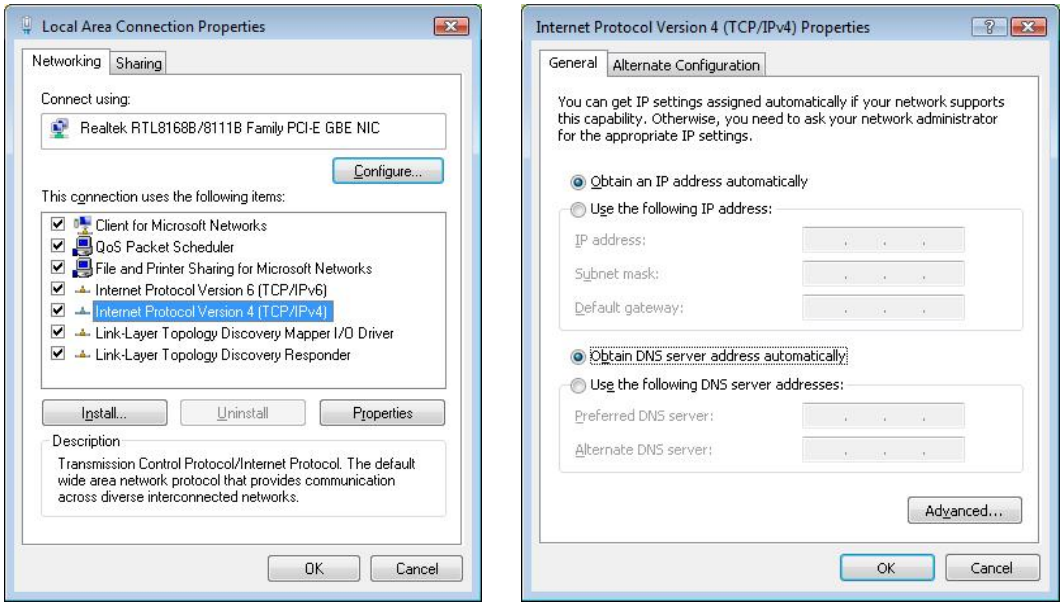

Figure 16: Direct Line of Sight to the BTS

# 3. AEON-9030 AROMS Setup

## 3.1 Repeater/PC Connection Using AROMS

i) Wait until the Power LED is lit in green. Connect the LAN cable between the laptop's Ethernet port and the repeater's Ethernet port.

Note: Under Local Area Connection in Network Settings, make sure to select **Obtain an IP address automatically** under Internet Protocol (TCP/IP) properties.




***** Before proceeding to the next step, please close the cabinet door (do not lock) at this time in order to avoid inadvertent RF feedback going inside the repeater."***

ii) Launch Microsoft Internet Explorer

Note: ADRF's Web GUI has not been tested for compatibility with any other web browsers (e.g. Netscape, Mozilla, etc.).

iii) Please type the following IP address into the address bar of MS Internet Explorer:

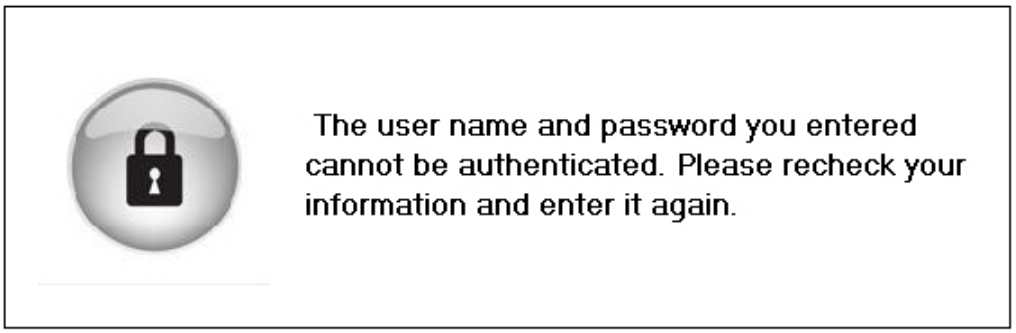
http://192.168.63.1/home.asp

iv) The following login screen will appear:


If you are not the Super-User, please type in your assigned username & password which you should have received from the Super-User.

The default username and password for the General User is adrf & adrf, respectively.

If the username & password is typed in incorrectly, the following screen will appear:

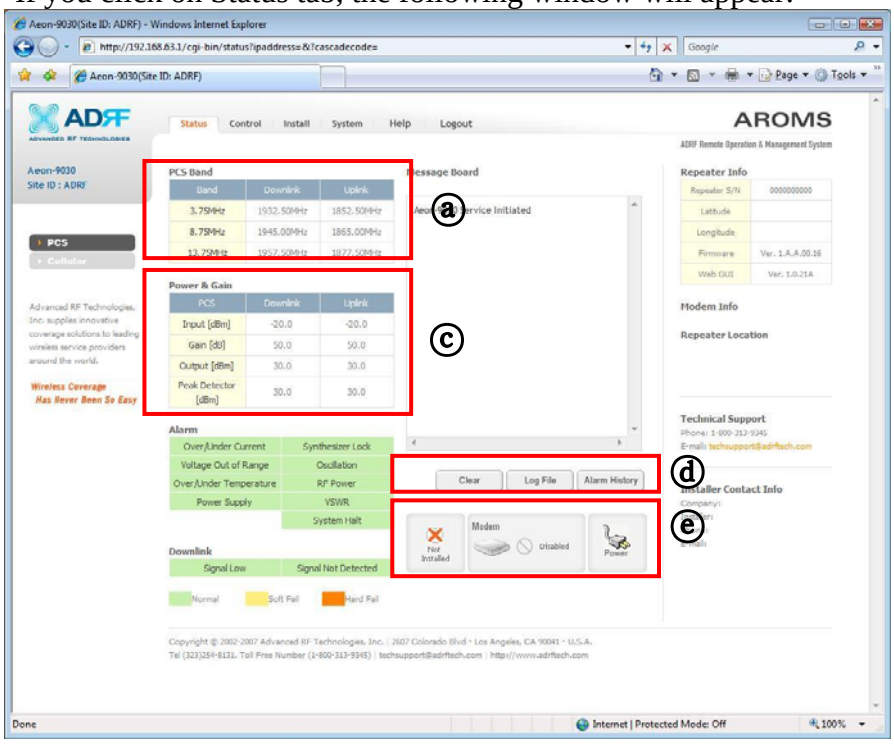



** If you cannot connect to the Web GUI, Please see the LAN Connectivity Troubleshooting Guide on Page 38 or visit http://www.adrftech.com/wiki/index.php?n=Connectivity.ConnectingViaLAN

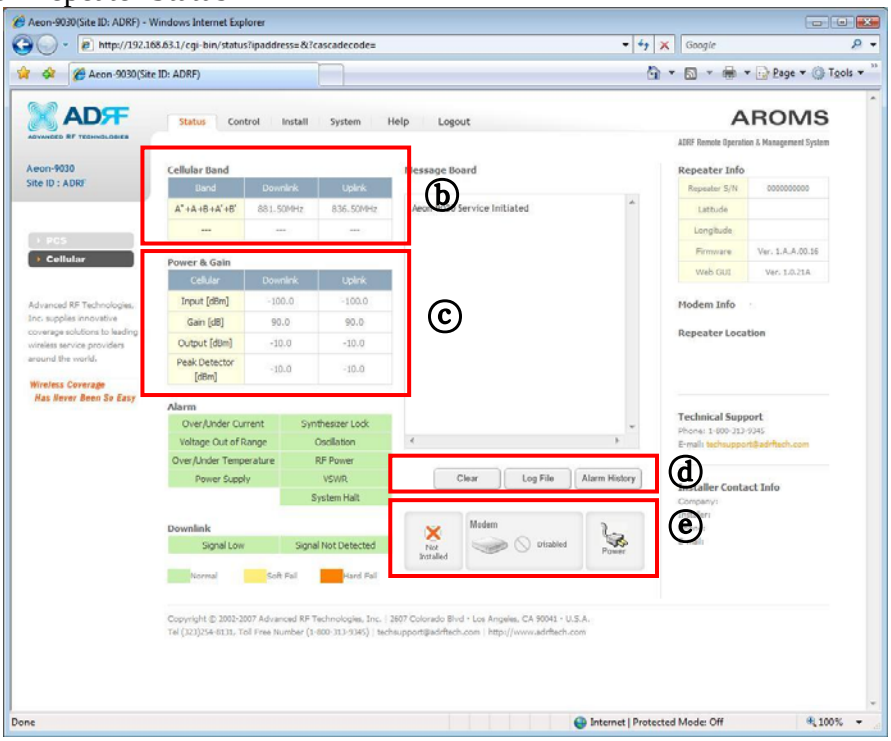
## 3.2 Repeater Status

### PCS Repeater Status

If you click on Status tab, the following window will appear:




### Cellular Repeater Status



In this window, the user can view the following:

(To change any parameters, e.g., Channel frequency, bandwidth, Gain Settings, AGC Level, etc., you must go to the **Install** or the **Control** window.)

ⓐ **PCS Band**

| Band | Downlink | Uplink |
|---|---|---|
| 3.75MHz | 1932.50MHz | 1852.50MHz |
| 8.75MHz | 1945.00MHz | 1865.00MHz |
| 13.75MHz | 1957.50MHz | 1877.50MHz |

- CDMA Band: Will display the center frequencies of the 1900 MHz filtered BWs on the downlink and uplink respectively.

ⓑ **Cellular Band**

| Band | Downlink | Uplink |
|---|---|---|
| A"+A+B+A'+B' | 881.50MHz | 836.50MHz |
| --- | --- | --- |

- Cellular Band: Will display the center frequencies of the 800 MHz filtered BWs on the downlink and uplink respectively.

ⓒ **Power & Gain**

| PCS | Downlink | Uplink |
|---|---|---|
| Input [dBm] | -20.0 | -20.0 |
| Gain [dB] | 50.0 | 50.0 |
| Output [dBm] | 30.0 | 30.0 |
| Peak Detector [dBm] | 30.0 | 30.0 |

- Power & Gain: Will display the repeater's input, gain and output power on the downlink and uplink.

ⓓ 


- Clear: Will delete message board contents.
- Log File: Will download repeater's log file.
- Alarm History: Will provide additional alarm log for repeater's status.

ⓔ 

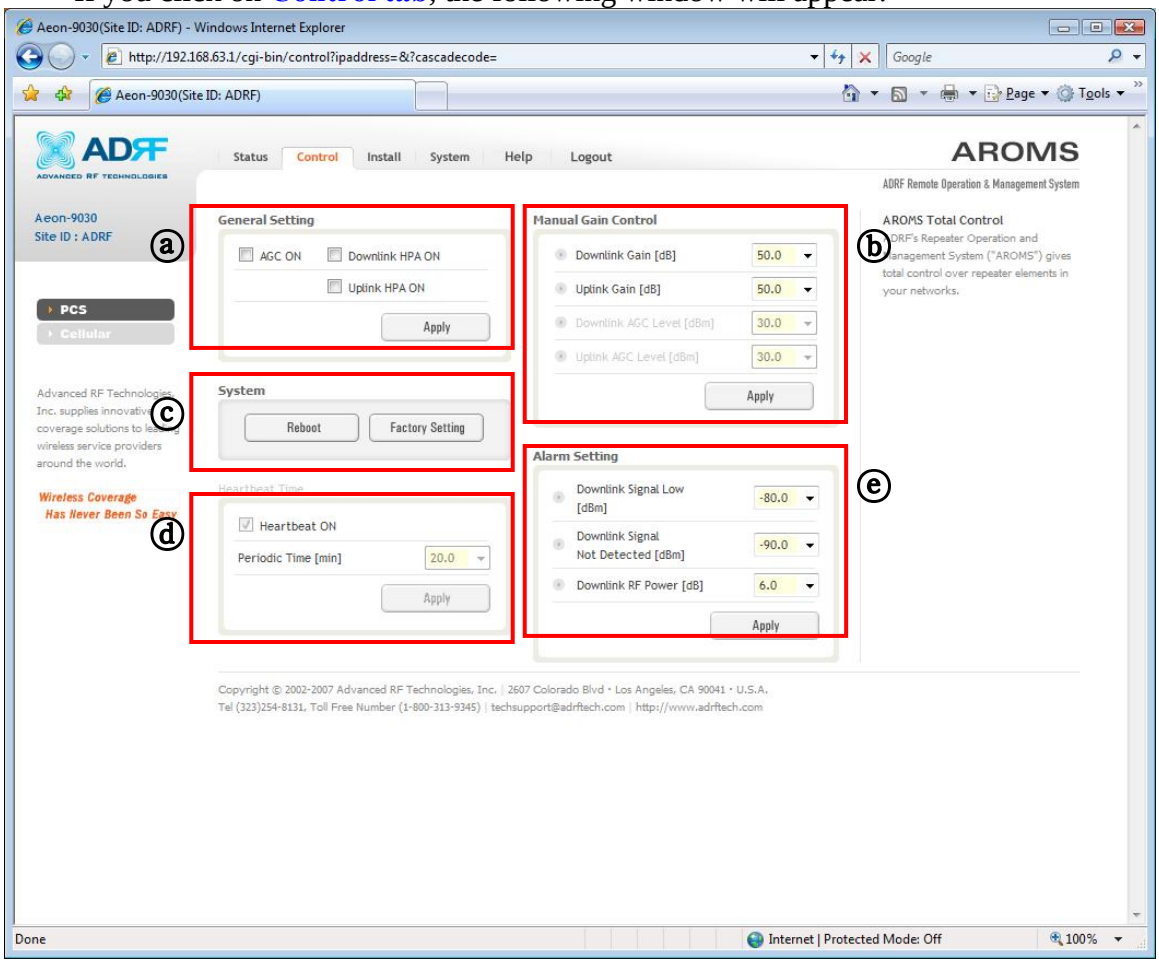

- Installed icon: Shows the current "Install" status (Installed or Not Installed).
- Modem icon: Shows the current modem status (Disabled, Connected, Not connected).
- Power icon: Shows the current electric source [AC power, Battery (Shown when an external battery box is installed)].

- **Alarms**: The unit will display seven alarms with three different status conditions (Normal, Soft Fail or Hard Fail).
- **Message Board**: Displays the 20 most recent log messages (Alarms & Heartbeats).
- **Installation**: Displays the repeater's installation status (Not Installed or Installed).
- **Repeater Info**: Displays the repeater's serial number, and location information (latitude and longitude coordinates).
- **Repeater Location**: Displays the address where the repeater is installed
- **Technical Support**: Displays ADRF's technical support contact information.
- **Installer Contact Info**: Displays the installer's name, phone and e-mail address.
- **Modem *(only applicable if a wireless modem is connected to the repeater):*** The *Auto Connection* box needs to be checked when the wireless modem is installed inside the repeater. A wireless modem is used in order to send the alarms and the heartbeat over the air to the Wireless Provider's NOC.

Note: Once successfully logged in, the repeater model name and the site/cascade ID will be displayed on the top left of all the windows.

## 3.3 Repeater Control

If you click on **Control tab**, the following window will appear:




In this window, the user can adjust the following parameters:

### ⓐ General Setting


- Automatic Gain Control (Default mode is Off)
- Downlink HPA on/off (Default mode is Off)
- Uplink HPA on/off (Default mode is Off)

**AGC Mode**

AGC (Auto Gain Control) adjusts the variable gain of the repeater on both downlink and uplink to ensure a constant specified output power. The functionality of the AGC feature is assured under the condition that the input BTS signal is within the specified AGC range and that sufficient isolation exists between antennas. By default, the *AGC ON* box is not checked. To change the AGC levels on the Uplink and Downlink, *AGC ON* must be checked.

**ⓑ Manual Gain Control**

- Downlink Gain Control (60 to 90 dB @ 0.5 dB step)

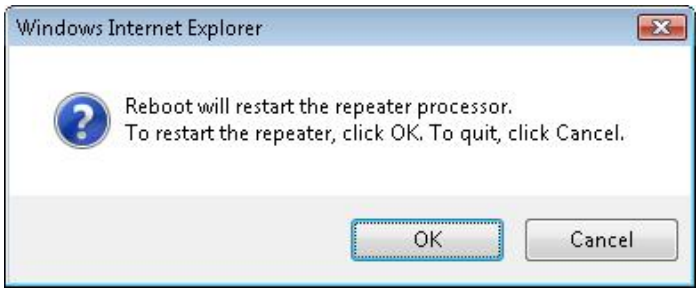
- Uplink Gain Control (60 to 90 dB @ 0.5 dB step)

- Downlink AGC Level
  AEON-9030: 10 to 30dBm @ 0.5 dB step, default value: 30dBm

- Uplink AGC Level
  AEON-9030: 10 to 30dBm @ 0.5 dB step, default value: 30dBm

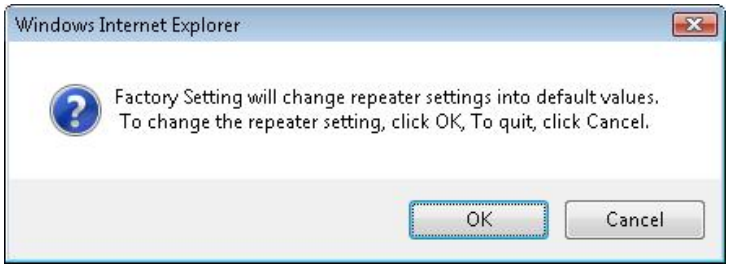

**ⓒ System**

- If you click the **Reboot** button, the following message box will appear:




When a system reboot is performed, no settings are changed, but coverage is temporarily lost.
Please wait approximately 30 seconds to 1 minute for the system to reboot.

- If you click the **Factory Setting** button, the following message box will appear:




Factory Setting will erase the saved settings by the user and change all the parameters to the factory default settings.

### ⓓ Heartbeat Time

- Heartbeat is disabled.

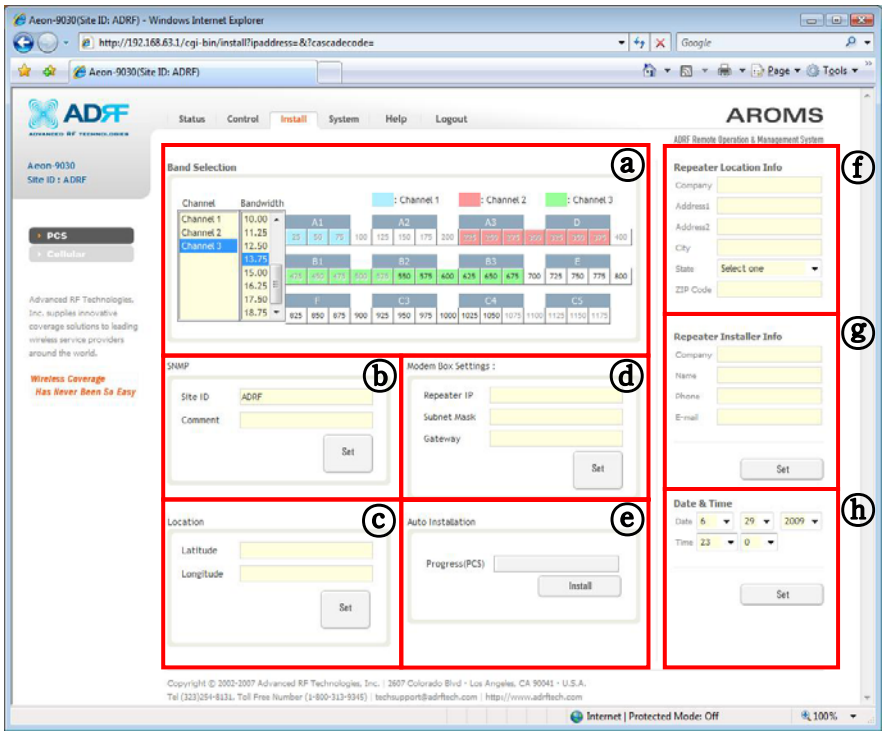
### ⓔ Alarm Setting

- Downlink Signal Low (-90 ~ -30 dBm @ 0.5 dB step, default value: -80 dBm)
- Downlink Signal Not Detected (-90 ~ -96 dBm @ 0.5 dB step, default value: -90 dBm)
- Downlink RF Power (2 ~ 10 dB @ 0.5 dB step, default value: 6 dB)

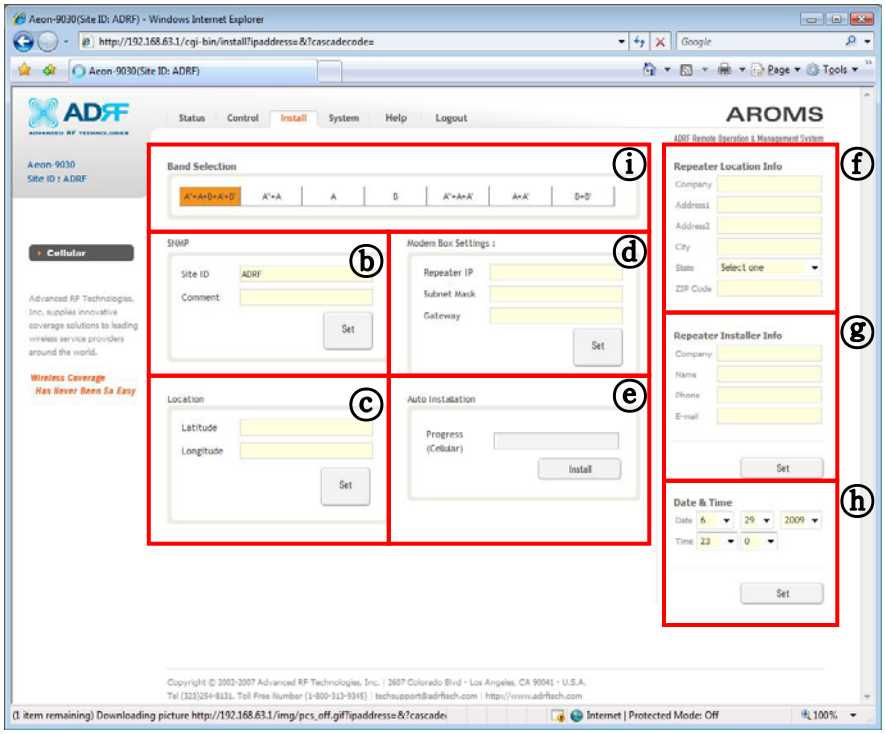
## 3.4 Repeater Install

If you click on the **Install** tab, the following window will appear:

PCS Install




Cellular Install



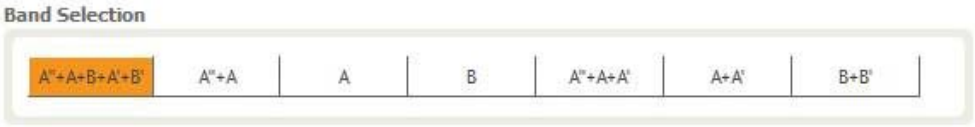
### ⓐ PCS Band Selection


- Step 1: Channel Select
- Step 2: Bandwidth Select
- Step 3: FA Select

* 3 Separate Channel Selections are possible.

The AEON-9030 has three independent RF PCS channels: Channel 1, Channel 2 and Channel 3. Each channel supports 1.25 MHz to 18.75MHz bandwidth.
One can use any of the three channels (three contiguous: Unit will not filter 1FA as guard band nor non-contiguous channels). Therefore, the instantaneous bandwidths that the AEON-9030 supports is 1.25MHz to 56.25MHz.

### □ Cellular Band Selection




Simply click on the desired operating bandwidth.

### ⓑ SNMP

Type in the assigned Site/Cascade ID and Comment.
Default Site ID is ADRF.


### ⓒ Repeater Location

Please type in the coordinates where the repeater is installed.
Ex) Latitude: N/S (Upper Case) 034.123456
Longitude: E/W (Upper Case) 034.123456


ⓓ Modem Box Settings: Will display the Repeater's Static IP Address, Subnet Mask, and Gateway. This information is necessary when using the Repeater in conjunction with an External Modem Box. Default values are:

**Repeater IP**: 192.168.63.5
**Subnet Mask**: 255.255.255.0
**Gateway**: 192.168.63.254

ⓔ **Auto Installation**

Click the Install button to automatically setup the repeater.
It may take up to 3 minutes to complete the process. You will see a gradual progress bar display. After the process is completed, a pop-up window will display a "*Installation Successfully Completed"* message.


After the Installation Routine is complete, click on the Status tab and the Installation box should have changed from "Not Installed" to "Installed".

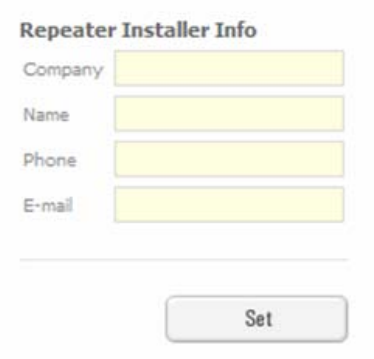
If the AEON-9030 detects a problem during the installation process, a pop-up message will appear stating the issue, e.g., "Modem is not detected." Please follow the instructions and address the problem to finish the installation process. If the problem persists, please contact our technical support.

**Repeater Location Info**

Please type in the physical address where the repeater is installed.


**ⓖ Repeater Installer Info**

Please type in the installer's: company, name, phone number and e-mail address for technical support.



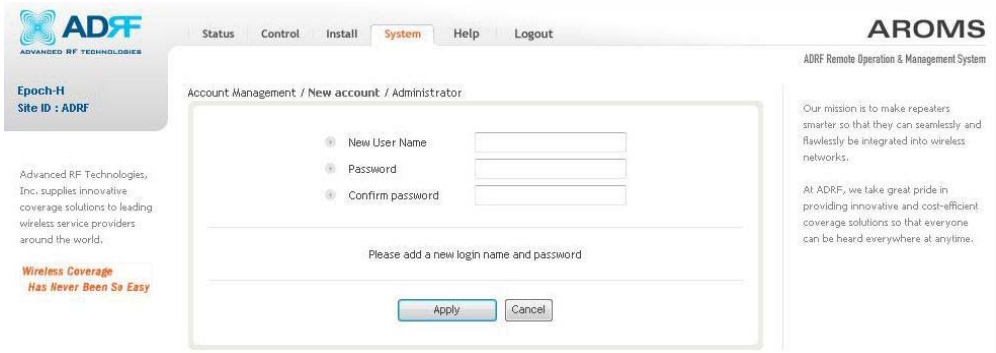

ⓗ **Date and Time**: Sets the date and time for the internal clock (required for Log Messages)

## 3.5 Repeater System

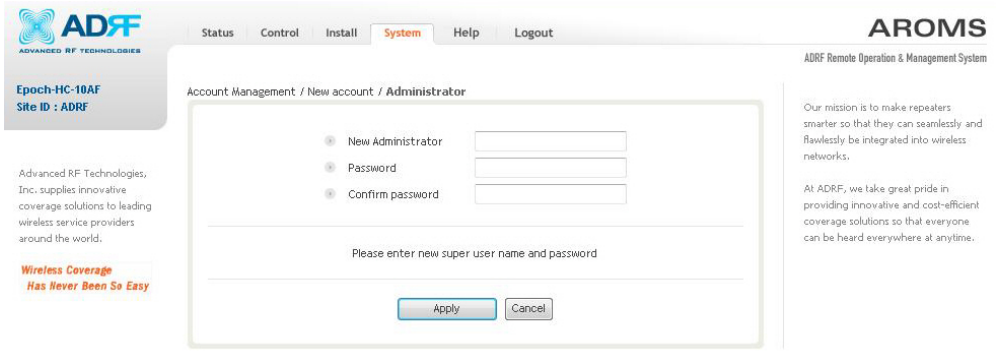
If you click on the **Account** menu under the System tab, the following window will appear:


Note: If you are the Super-User, you will see account management section under the System Window. If you are a general user, you will not be able to see the account management portion.

Only the Super-User can add, delete and modify a user. The following window illustrates how a new user can be added by simply clicking on New Account.

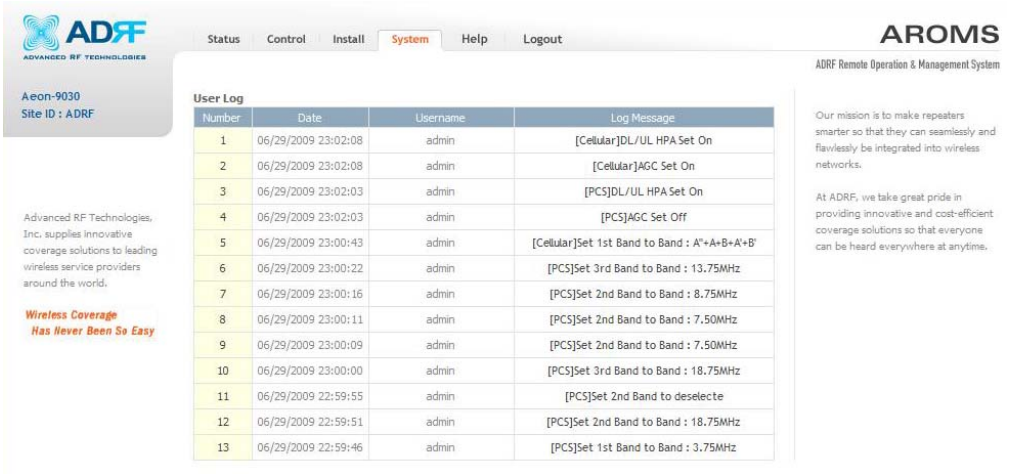



The following window illustrates how an administrator can be changed or removed by simply clicking on Administrator.



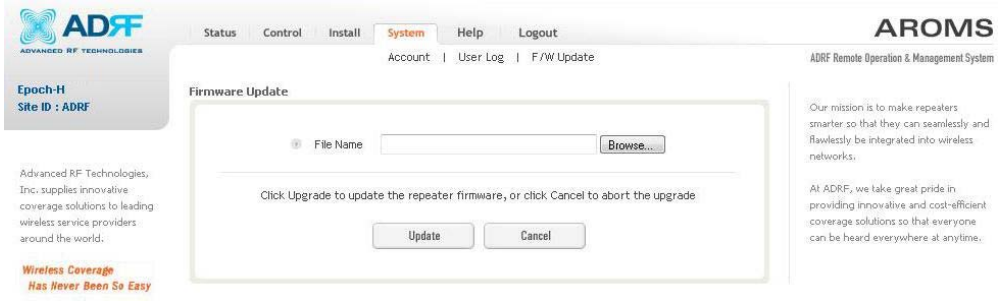
## User Log

If you click on the **User Log** menu under the System tab, the following window will appear. The following window displays the changes made to the Repeater settings.




## Firmware Update

If you click on Firmware Upgrade, the following window will appear. You can browse through your PC and locate the firmware file. Once it's selected, click on Update and it will upload the firmware automatically and close the session. You will need to re-login again after the firmware update is performed. This will cause a temporary loss in coverage.




# 4. Maintenance Guide for AEON-9030

## 4.1 Periodic Inspection Checklist

4.1.1 Check for loose connections to the repeater and antennas. If connections are loose, make sure that all connections are tightly fastened.
4.1.2 Check that cables and connectors are in good condition.
4.1.3 Ensure that the repeater brackets are in good condition and that the repeater is securely fastened.

## 4.2 Preventive Measures for Optimal Operation

### 4.2.1 Recommendations

Perform the Periodic Inspection Checklist quarterly or semi-annually.

### 4.2.2 Precautions

- Do not operate the repeater with the antennas in extremely close proximity as this may cause damage to the repeater.
- Do not change parameters unless instructed to do so by an authorized supervisor.
- Do not move the repeater unless instructed to do so by an authorized supervisor.
- Do not detach any cables to the repeater unless repair of respective components are necessary.

# 5. AEON-9030 Troubleshooting Guide

## 5.1 Connectivity Guide for LAN

If you are unable to connect to the Web GUI, please follow the steps listed below:

i) If you see the icon below (Figure 17)

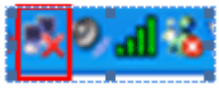


Figure 17

- Check the Power Line to see whether or not the repeater is being powered correctly.
- Use the Cross-over Cable that came with the repeater to connect the repeater to your laptop. If you still cannot connect, replace the cross-over cable with another one.
- If unsuccessful, power the repeater down and wait for at least 5-10 seconds for it to electrically discharge, then power the repeater back up. Wait for the PWR LED to light up before attempting the IP address in browser again. (When the repeater powers up, you will hear a faint click)

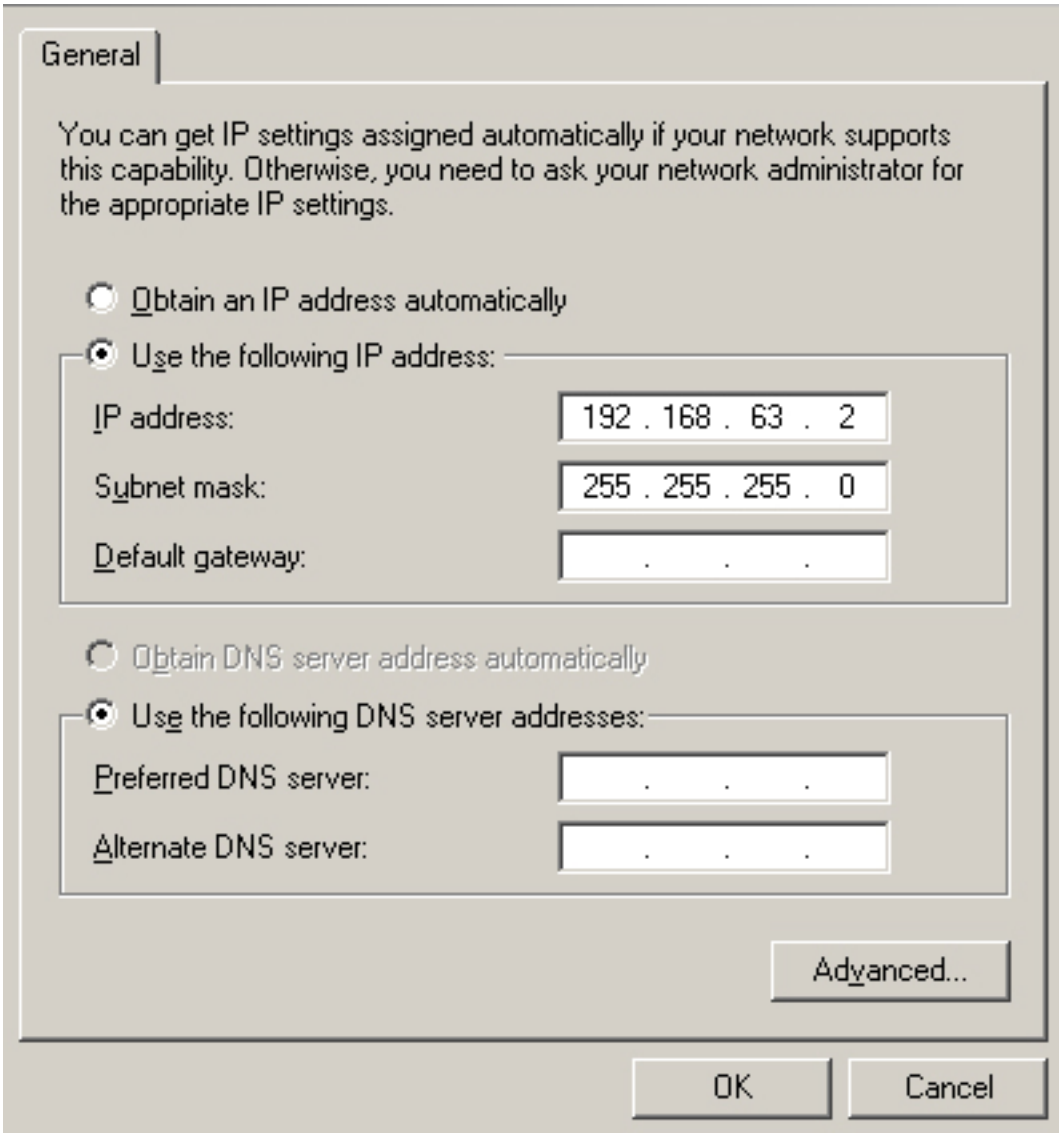
ii) If you see the icon in Figure 18, then the computer is in the process of obtaining an IP Address and you will not be able to connect to the unit. Once you see the icon in Figure 19 then you can attempt to connect to the unit.

Figure 18

Figure 19

- If unsuccessful: Go to Start → Control Panel or Start → Settings →Control Panel.

Double-Click Network Connections→ Right-Click Local Area Connection → Left-Click Properties →Scroll down to the bottom of the list →Double-Click Internet Protocol (TCP/IP)
Instead of “Obtain an IP address automatically”, please select “Use the following IP address” and input the same values as shown in Figure.




iii) If you see the icon in Figure 20, then the IP Address has been obtained. If you see this icon and still cannot connect to the unit, then please follow the steps listed below.

Figure 20

Verify HOST/REMOTE switch is set to the HOST mode.

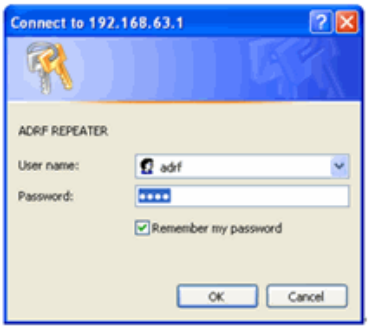
- When the unit is set to Host Mode, the IP address for the unit is 192.168.63.1
- When the unit is set to Remote Mode, the IP address for the unit is 192.168.63.5

Please note the only time 'REMOTE' mode is utilized is for modem box monitoring.

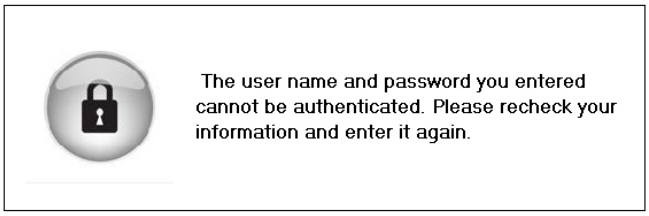
iv) Use Microsoft Internet Explorer to log into the Web-GUI

Note: ADRF's Web GUI is not compatible with other web browsers such as Netscape, Mozilla's Firefox, Opera, etc.
Please type the following IP address into the address bar of MS Internet Explorer:
http://192.168.63.1/home.asp or http://192.168.63.1/

- The following login screen will appear:




If you are not the Super-User, please type in your assigned username & password which you should have received from the Super-User. The default username and password for the General User is adrf & adrf, respectively.
If the username & password is typed in incorrectly, the following screen will appear:




v) If the steps above do not remedy the situation and you still cannot connect to the Web-GUI, please contact ADRF Tech Support (800-313-9345).

## 5.2 Troubleshooting Guide for Repeater

| Alarm | Status | Parameter | | | Troubleshooting |
|---|---|---|---|---|---|
| VSWR | Hard Fail | VSWR Over 3:1 | | | 1. Make sure connectors are tight at each port. Sweep lines.<br>2. Use a 50 Ω dummy load, connect it to the Alarming Port to check whether the repeater is faulty. (e.g. if the Down Link is alarming, connect the dummy to the Server Port.)<br>3. If multiple Server Antennas are connected, connect only one antenna and recheck the Alarm. If the Alarm clears, faulty connectors like combiners/ splitters in the serving line and lightning arrestors (polyphasers) may be causing the problem. |
| Over Power | Soft Fail | UL/DL | 31dBm~32dBm | >Max Output Power+1dB | 1. Check Input/Gain/Output values in the 'Status Page'<br>2. Check Input Level (If the input exceeds the max rated power, add an Attenuator to the input/ Donor port)<br>3. Check whether AGC is On (In the case of UL Shutdown, make sure that Tracking is OFF)<br>4. Factory Setting & Reboot |
| | Hard Fail | UL/DL | Output Power +33dBm | > Max Output Power +3dB | |
| RF Power | Soft Fail | Invalid Output Level of Gain | | | 1. Check whether Input/Gain/Output are invalid.<br>2. From the Control page, check the Alarm Settings. |

| | | | |
|---|---|---|---|
| | | | (Default 6dB)<br>3. Go under 'Control' tab and turn off AGC and change gain manually to verify BDA is responding to changes. Recheck the measured values. |
| Signal Low | Soft Fail | Downlink Input Value is less than threshold:<br>PCS / Cell: -80dBm minimum | 1. Ensure proper ports are connected (Donor/ Server).<br>2. Verify the Donor antenna is pointed toward the correct cell site.<br>3. Verify the selected band(s) and be sure it is the right band(s) for the area.<br>4. Please be aware that our BDA typically require well above -85dBm (threshold) of incoming RSSI on the DL side. |
| Under/Over Current | Soft Fail<br>Hard Fail | Current falls out of the permitted range | 1. Factory Setting & Reboot<br>2. Recheck, if continues, contact Tech Support. |
| Over Temperature | Soft Fail<br>Hard Fail | Repeater's internal temperature exceeds the permitted range | 1. Factory Setting & Reboot<br>2. Recheck, if continues, contact Tech Support. |
| Input Overload | Hard Fail | Input Signal Level increases beyond the set range:<br>PCS/ Cell: -30dBm max input | 1. Add attenuator to donor/server antenna (Applicable to DAS)<br>2. Factory Setting & Reboot |
| Low Isolation Oscillation | | Antennas are located too close to one another, causing RF output to feed input. | 1. Check Input Level. (fluctuates drastically)<br>2. We recommend 13~15dB + max gain of repeater between the donor and the server antenna as an isolation value.<br>3. Check antenna direction (make sure that the Donor and Server antennas are not facing one another)<br>4. Placing an attenuator before the nearest serving antenna can also help to increase isolation. |

| | | | |
|---|---|---|---|
| Connectivity Issue | | Unable to Interface to repeater with GUI Software. | 1. Please verify under 'Device Manager' of Windows that the necessary drivers for the USB to serial adapter are installed.<br>2. Be sure to use the GUI software from the CD that came with the repeater.<br>3. If for some reason the CD is not available, contact 24HR tech support to acquire the appropriate one.<br>4. In the event of using a USB-to-serial converter, you must be sure to the 'COM port' number on the 'STATUS PAGE' matches the COM port number of the USB to- serial adapter in your 'Device Manager' of Windows.<br>5. If the GUI software at any time reports a missing file error such as "component missing", please be sure to contact our tech support staff directly at the number provided below.<br>6. Connectivity is accomplished successfully when both TX/RX lights are blinking green in the lower right-hand corner of the GUI software. |
| Connecting to DAS | | All our PCS as well as Cellular BDAs can have the 'AGC' function enabled and the 'Downlink AGC Level' set from 0dBm to whichever value is specified by the manufacturer for common DAS applications.<br>PCS: lowest DL AGC value 0dBm | To get output power on the Downlink side of the BDA even lower to plug into a DAS system, the use of 5dB or 10dB attenuators/pads with the proper tolerance of wattage is recommended. |
| **For any other issues, contact ADRF Tech Support at 1-800-313-9345 or 1-323-514-9070** | | | |

# 6. Warranty and Repair Policy

## 6.1 General Warranty

The AEON-9030 carries a Standard Warranty period of three (3) years unless indicated otherwise on the package or in the acknowledgment of the purchase order.

## 6.2 Limitations of Warranty

Your exclusive remedy for any defective product is limited to the repair or replacement of the defective product. Advanced RF Technologies, Inc. may elect which remedy or combination of remedies to provide in its sole discretion. Advanced RF Technologies, Inc. shall have a reasonable time after determining that a defective product exists to repair or replace the problem unit. Advanced RF Technologies, Inc. warranty applies to repaired or replaced products for the balance of the applicable period of the original warranty or ninety days from the date of shipment of a repaired or replaced product, whichever is longer.

## 6.3 Limitation of Damages

The liability for any defective product shall in no event exceed the purchase price for the defective product.

## 6.4 No Consequential Damages

Advanced RF Technologies, Inc. has no liability for general, consequential, incidental or special damages.

## 6.5 Additional Limitation on Warranty

Advanced RF Technologies, Inc. standard warranty does not cover products which have been received improperly packaged, altered, or physically damaged. For example, broken warranty seal, labels exhibiting tampering, physically abused enclosure, broken pins on connectors, any modifications made without Advanced RF Technologies, Inc. authorization, will void all warranty.

## 6.6 Return Material Authorization (RMA)

No product may be returned directly to Advanced RF Technologies, Inc. without first getting an approval from Advanced RF Technologies, Inc. If it is determined that the product may be defective, you will be given an RMA number and instructions in how to return the product. An unauthorized return, i.e., one for which an RMA number has not been issued, will be returned to you at your expense. Authorized returns are to be shipped to the address on the RMA in an approved shipping container. You will be given our courier information. It is suggested that the original box and packaging materials should be kept if an occasion arises where a defective product needs to be shipped back to Advanced RF Technologies, Inc. To request an RMA, please call (800) 313-9345 or send an email to techsupport@adrftech.com.

# Appendix A: Specifications

## A.1 Electrical Specifications

| Parameters | | | Specification | Comments |
|---|---|---|---|---|
| *Frequency Bands | Cellular | Down Link | 869 - 894MHz | |
| | | Up Link | 824 - 849MHz | |
| | PCS | Down Link | 1930MHz ~ 1990MHz | |
| | | Up Link | 1850MHz ~ 1910MHz | |
| Max RF output power | | Down Link (Max) | 30dBm / 3FA | |
| | | Up Link (Max) | 30dBm / 3FA | |
| Cellular Sub Bands | | | A"+A+B+A'+B', A"+A, A+A', B+B', A, B, A+A"+ A' Selectable blocks of 10, 12.5 and 25 MHz | Max 7 combinations (*1) |
| PCS Band Select Feature | | | 1~ 3 selectable bands Selectable in blocks of 1.25~18.75 MHz | 1FA=1.25MHz |
| Max RF input power | | Down Link | -60dBm/Typ, -30dBm/Max | |
| | | Up Link (Max) | -60dBm/Typ, -30dBm/Max | |
| Gain Adjustable Range | | | 30dB(0.5dB/Step) | |
| Noise Figure(Reverse) | | | 5.5dB @max gain | |
| System Delay | | | 5.5 $\mu$s (max) | |
| Input VSWR | | | 1.5 : 1 (max) | |
| Rho | | | 12.5% (max at 16/64 QAM) | |
| Gain | | | 90dB (max) | |
| Passband Ripple | | | ±1.5dB | |
| Filter Out of Band Attenuation | Cellular | | > -35dBc @±0.5MHz >-60dBc @±1MHz | |
| | PCS | | > -60dBc @±1MHz | |
| Freq Error | Cellular | | ± 300 Hz | |
| | PCS | | ± 150 Hz | |

(*1) Cellular Sub Bands

| | | | | |
|---|---|---|---|---|
| 1 BAND Selection | 1 | 25MHz FULL (869~894MHz) | Full band | |
| | 2 | 869~880MHz | A"+A | |
| | 3 | 870~880MHz | A | |
| | 4 | 880~890MHz | B | |
| 2 BAND Selection | 1 | 869~880MHz, 890~891.5MHz | A"+A, A' | |
| | 2 | 870~880MHz, 890~891.5MHz | A, A' | |
| | 3 | 880~890MHz, 891.5~894MHz | B, B' | |

## A.2 Mechanical Drawing

| Parameters | Specifications | Comments |
|---|---|---|
| Dimension | 22" X 17.9." X 9.65" Inches | W x H x D<br>Bracket excluded |
| Weight | 80.5lbs | Bracket excluded |
| RF Ports | N-Type (F) | Donor & Server Antenna Ports |
| Local Interface | RJ45 (DHCP) | |
| Cooling | AIR Type | |
| NEMA | NEMA 4, IP56 | Outdoor Type |

## A.3 Power Specifications

| Parameters | Specifications | Comments |
|---|---|---|
| AC Power | 100 ~ 130V / 200 ~ 240V AC | Select Switch Type |
| AC Frequency | 50 ~ 60 Hz | |
| AC Supply Protection | Fuse | |
| Power Consumption | ≤ 350 W | |
| Ground | External Threaded Stud | |

## A.4 Environmental Specifications

| Parameters | Specifications | Comments |
|---|---|---|
| Operating Temperature | -5 ~ +50 ℃ | Ambient |
| Relative Humidity | 5 ~ 95 %, (Non-Condensing) | |
| Dust | Industrial Dust Per Telcordia GR63 Core | |

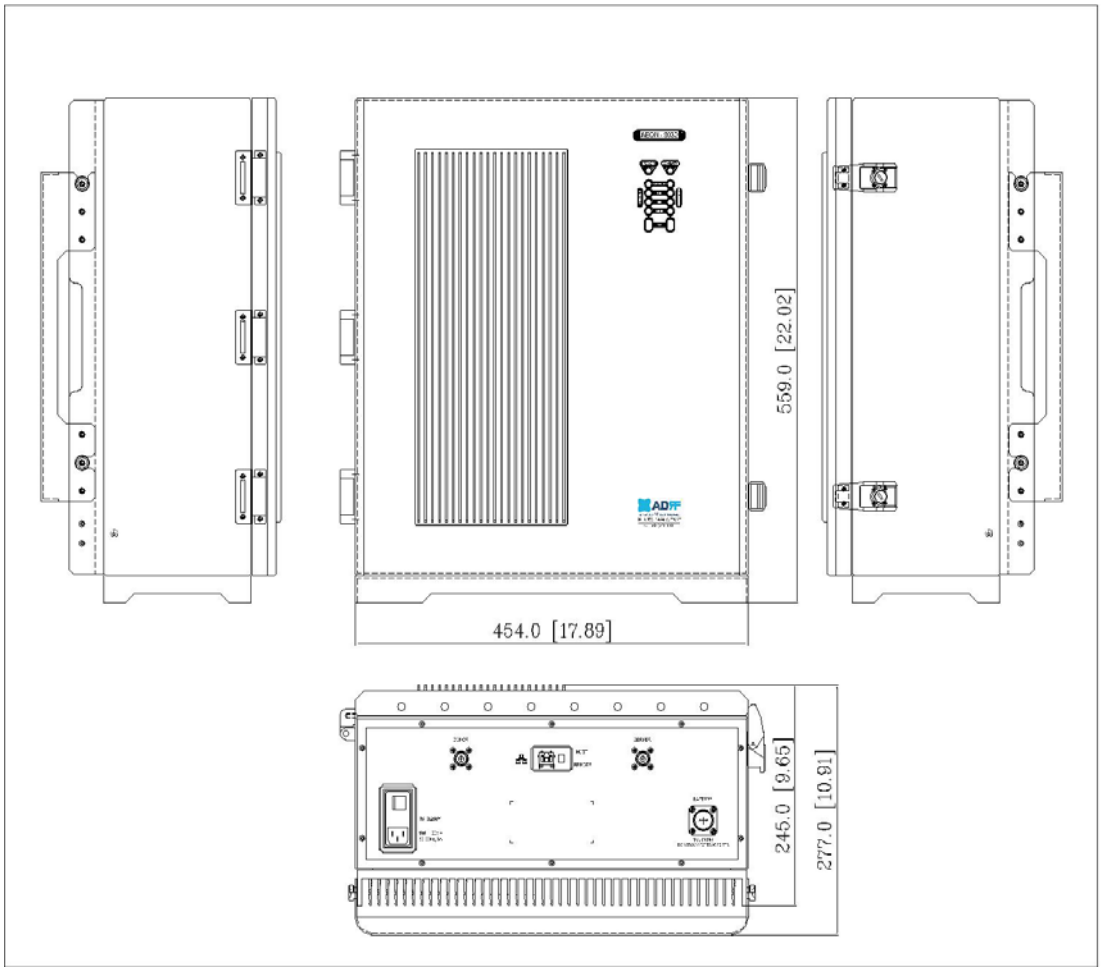
| | | |
|---|---|---|
| Over voltage category | Over voltage category II | |
| Pollution degree | Pollution degree 2 | |

## A.5 Other Specifications

| Parameters | Specifications | Comments |
|---|---|---|
| MTBF | > 100,000 Hours | |
| Certificates | UL 60950, FCC Part 15, 24 | |
| Warranty | 3 Years | |

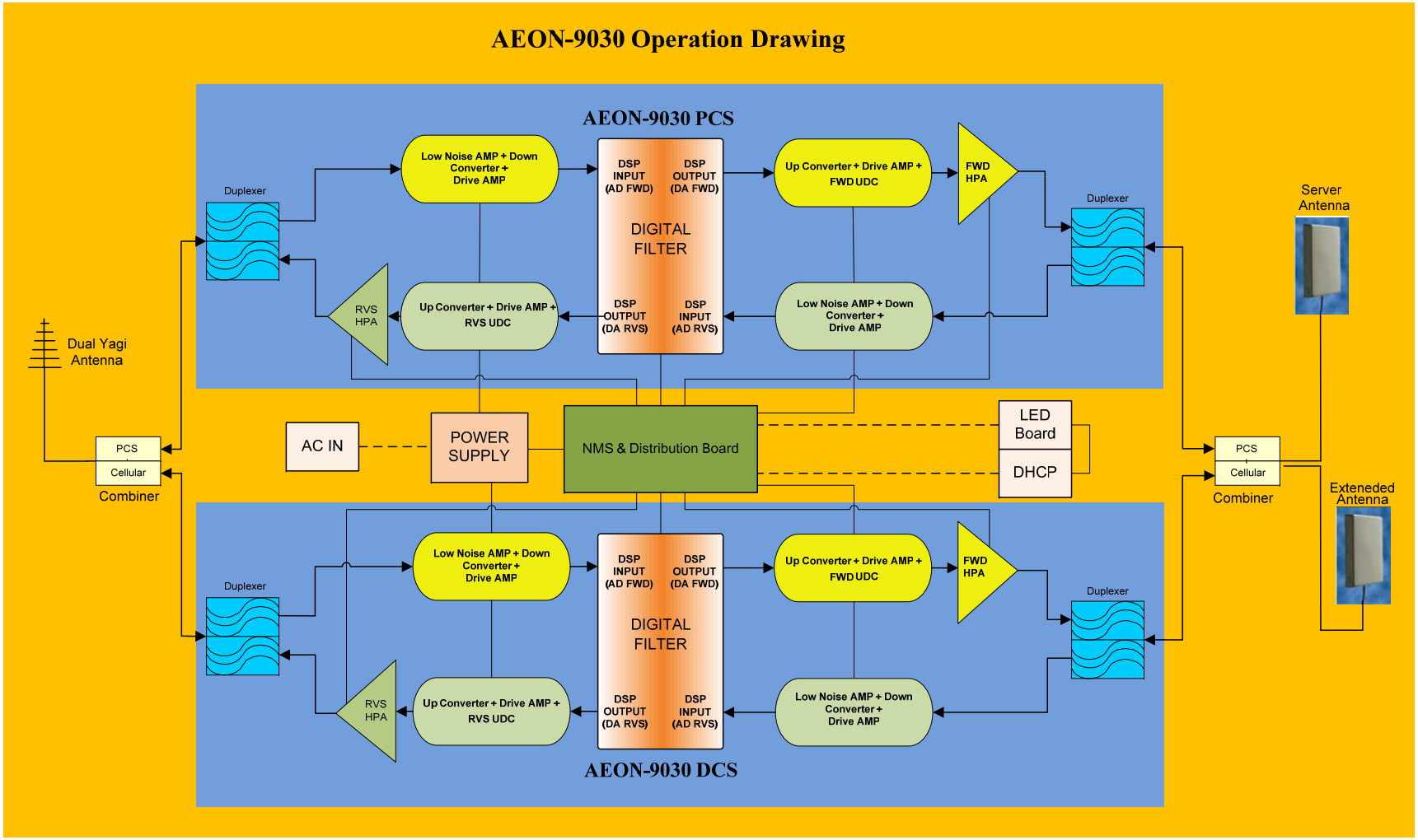
# Appendix B: Mechanical Drawing

## AEON-9030



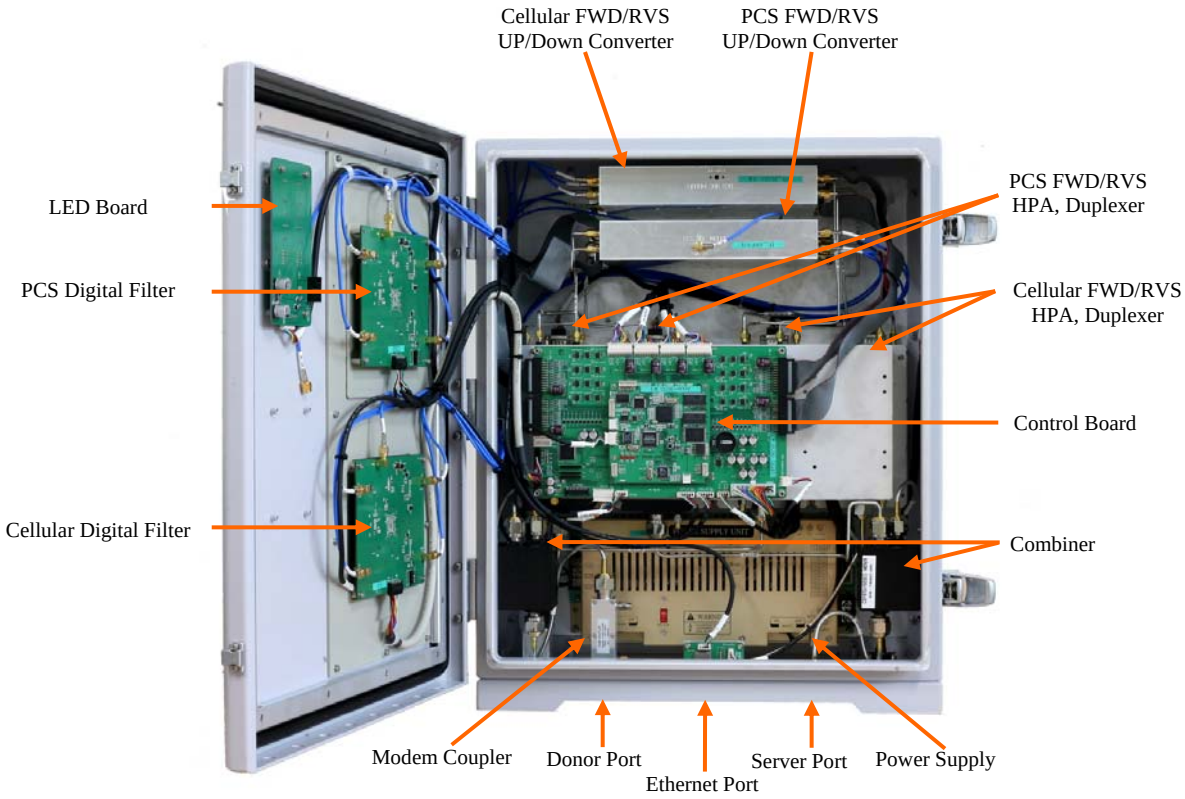
# Appendix C: AEON-9030 Overview

## C.1 Black Diagram



## C.2 Components

### AEON-9030




AEON-9030 Internal Components

**Power Supply**
Provides DC power to each module within the repeater.

**Controller**
Responsible for monitoring the status of each module and controls the parameters. Also interfaces with PC through Ethernet port.

**Donor Antenna Port**
Connect Donor Antenna.

**Sever Antenna Port**
Connect Sever Antenna.

**PCS Down Converter Module**
The PCS downlink RF signal that enters through the cavity filter is converted to IF frequency, which is later, converted back to RF frequency through digital filtering.

**PCS Up Converter Module**
The PCS uplink RF signal that enters through the cavity filter is converted to IF frequency, which is later, converted back to RF frequency through digital filtering.

**Cellular Down Converter Module**
The Cellular downlink RF signal that enters through the cavity filter is converted to IF frequency, which is later, converted back to RF frequency through digital filtering.

**Cellular Up Converter Module**
The PCS uplink RF signal that enters through the cavity filter is converted to IF frequency, which is later, converted back to RF frequency through digital filtering.

**Digital Filter**
DSP (Digital Signal Processing) technology is utilized to achieve the highest level of performance and filtering agility.

**Duplexer**
Consists of four BPFs (band-pass filters): PCS TX (1930 ~ 1990 MHz) & RX (1850 ~ 1910 MHz), Cellular TX (869 ~ 894 MHz) & RX (824 ~ 849 MHz)

**HPA**
Receives the output signal from the PCS, Cellular Up / Down converter module and amplifies the signal up to the repeater's maximum rated power level.

**LED Board**
LED Board displays the state of the repeater. The detailed alarm information can be viewed via the Web GUI.

**PCS, Cellular Digital Filter**
The Digital Filter is IF frequency converted back to RF frequency through digital filtering.

**Combiner**
Combines Cellular and PCS signals. It consists of three BPFs (band-pass filters): PCS and Cellular TX and RX.

**Modem Module**
Contains the CDMA 2000 modem (Kyocera M200).