

Epoch-III-C9024/9030/9533

USER MANUAL

Version 0.2



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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 [®] Repeater Operation and Management System
BTS	Base Transceiver Station
CDMA	Code Division Multiple Access
CW	Continuous Wave (unmodulated signal)
DAS	Distributed Antenna System
DL	Downlink
Downlink	The path covered from the Base Transceiver Station (BTS) to the subscriber's service area via the Repeater
HPA	High Power Amplifier
HW	Hardware
IF	Intermediate Frequency
LNA	Low Noise Amplifier
MS	Mobile Station
PLL	Phased Locked Loop
PS	Power Supply
RF	Radio Frequency
SQE	Signal Quality Estimate
SW	Software
UL	Uplink
Uplink	The path covered from the subscriber's service area to the Base Transceiver Station(BTS) via the Repeater
VSWR	Voltage Standing Wave Ratio

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1. EPOCH-III-C9024/9030/9533

1.1 Introduction

EPOCH-III-C9024/9030/9533 is a Cellular band RF repeater which enhances in-building wireless coverage in the most effective and cost efficient way. For its intelligent design and versatility, the EPOCH-III-C9024/9030/9533 is the ideal choice for wireless coverage problems indoors. EPOCH-III-C9024/9030/9533 can be used as a stand-alone repeater with passive antennas connected to it or it can also be used as a feeder repeater to a DAS (Distributed Antenna System).

1.1.1 Highlights

- Covers the 25 MHz Cellular band
- AF/BF GUI Selectable
- 24/30/33dBm composite output power
- C9024,C9030(90 dB gain), C9533(95 dB gain)
- 40 dB AGC Range @ 0.5 dB Step
- Sharp out-of-band rejection; 45dBc @ 1 MHz Sub-band edge
- Automated installation
- Web GUI via DHCP

1.1.2 Parts List

Label	Qty	Description
A	1	EPOCH-III-C9024/9030/9533 Repeater
B	1	AC Power Cable
C	1	Ethernet Cable (cross over)
D	1	Ground Cable
E	6	Anchor Bolts
F	1	CD**

Table 1 – Parts List



Figure 1 – EPOCH-III-C9024/9030/9533 Repeater Parts List

** CD includes: (1) EPOCH-III-C9024/9030/9533 User Manual & (2) EPOCH-III-C9024/9030/9533 Quick Start Guide

1.1.3 Repeater Quick View

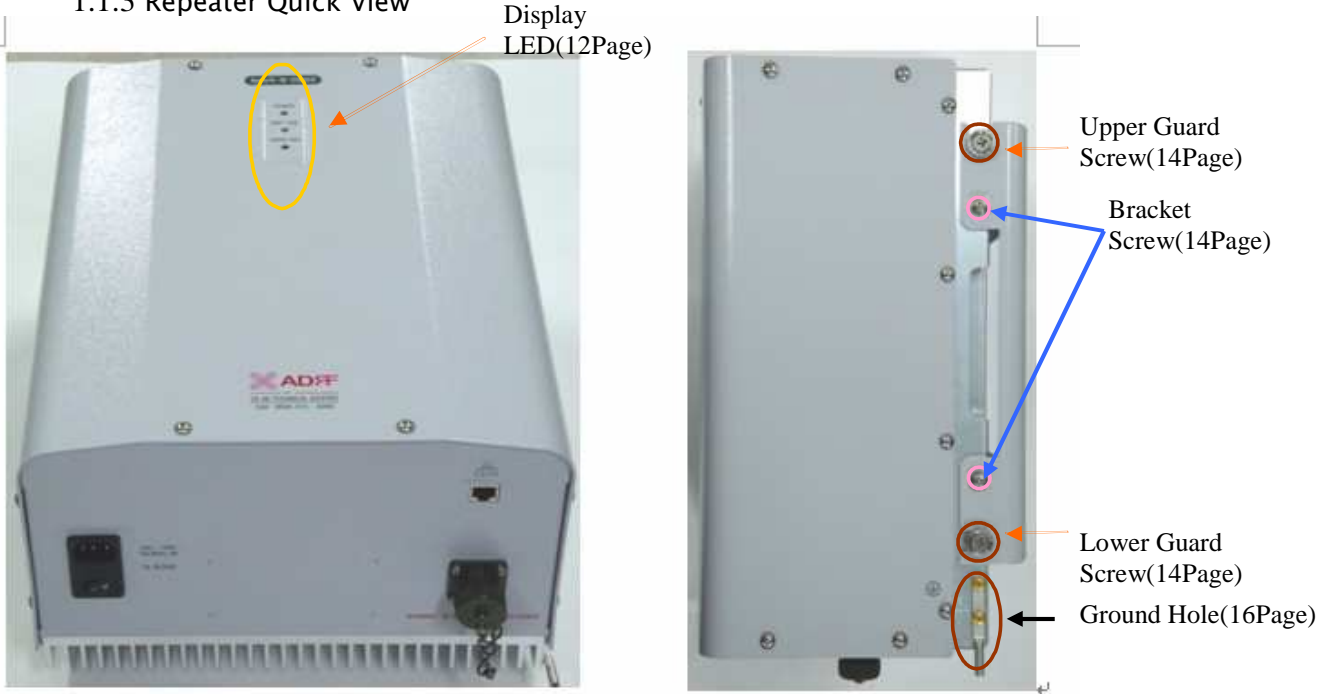


Figure 2 – EPOCH-III-C9024/9030/9533 Front & Side Views

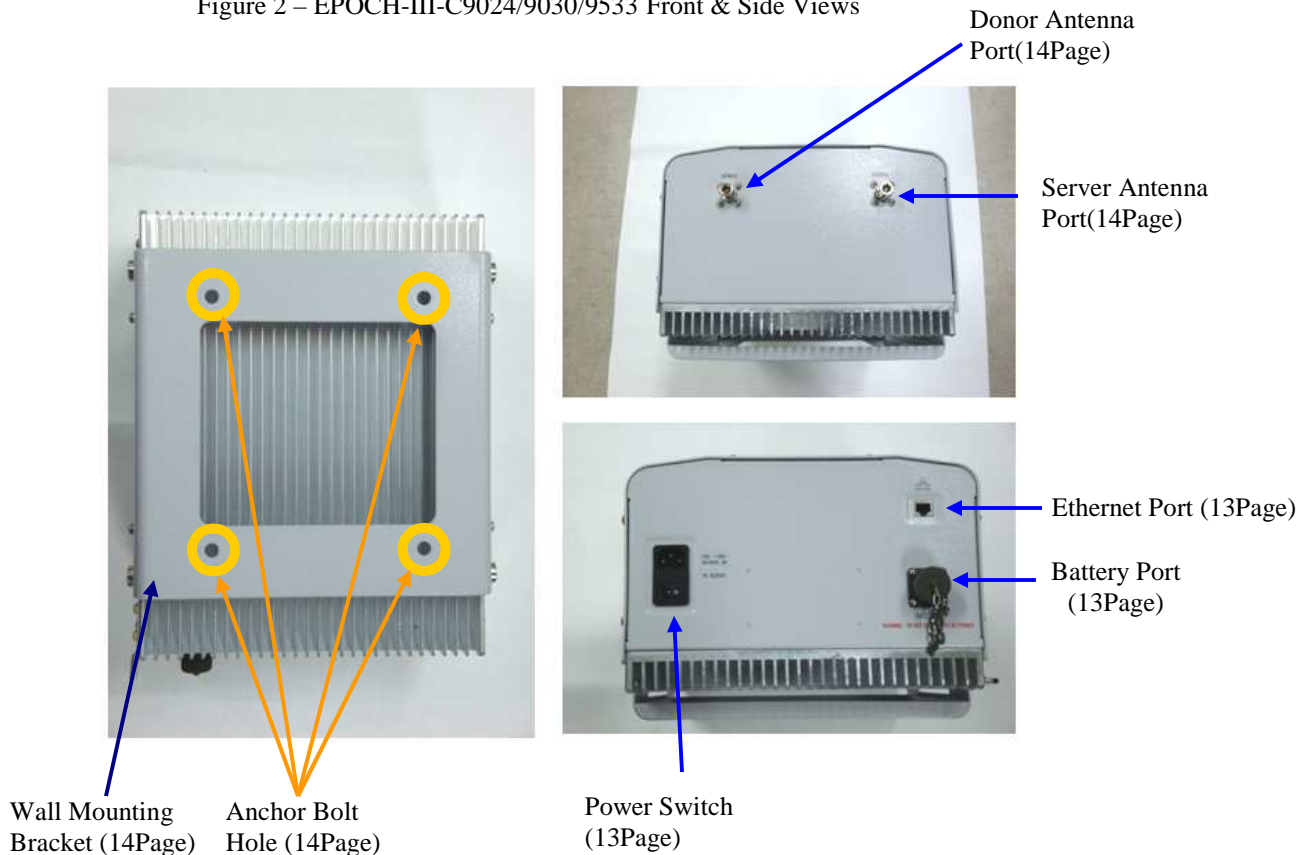


Figure 3 – EPOCH-III-C9024/9030/9533 Back & Bottom Views

1.2 Warnings and Hazards



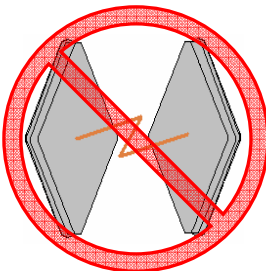
WARNING! ELECTRIC SHOCK

Opening the Epoch-III-C9024/9030/9533 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 Epoch-III-C9024/9030/9533 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 40 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 Epoch-III-C9024/9030/9533 will void all warranties.

Lithium Battery : CAUTION. RISK OF EXPLOSION IF BATTERY IS REPLACED BY INCORRECT TYPE. 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 his own expense.

2. Epoch-III-C9024/9030/9533 Overview

2.1 Operation Modes

2.1.1 Local Web GUI

Host Mode

This mode should be selected only if a Epoch-III-C9024/9030/9533 is used alone without being connected to any other device functioning as a host.

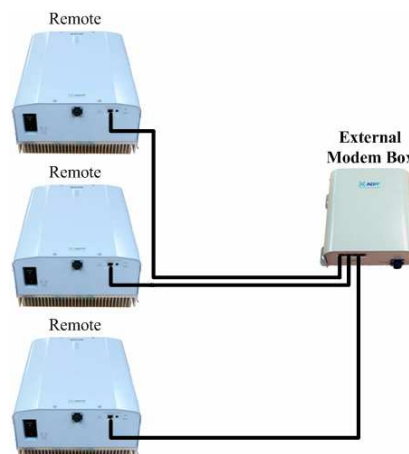
Simply connect one end of the Ethernet cable on the repeater monitor port and the other end on the PC's LAN port. After doing so, launch the Microsoft Internet Browser (Internet Explorer) and the Local Web GUI will be launched through typing the IP address (<http://192.168.63.1/home.asp>)



2.1.1. Remote Web GUI

Remote Mode

This mode should be selected if an external modem box (MBOX-DET1) is being installed along with the Epoch-III-C9024/9030/9533 for monitoring purposes. In this case, the Epoch-III-C9024/9030/9533 works as a remote unit sending its information to the collocated external modem box.



Note: ADRF's Web GUI has not been developed for Microsoft Internet Explorer and other web browsers (e.g. Netscape, FireFox, Mozilla, etc.) may not be compatible. ADRF's Web GUI has not been tested with Microsoft Internet Explorer versions higher than 6.0.

2.2 Switches & Indicators

2.2.1 LEDs

Epoch-III-C9024/9030/9533 has five LEDs on the front panel of the repeater as shown below in Figure 4.



Figure 4 – EPOCH-III-C9024/9030/9533 Repeater

POWER

If the LED is lit GREEN, it indicates that there is AC power to the repeater

SOFT FAIL

If the LED is lit YELLOW, it indicates that there is a soft fail alarm in the system. The detailed alarm information can be viewed via the local web GUI. In the event of a soft fail alarm, the repeater will still function, but the alarm needs to be addressed promptly.

HARD FAIL

If the LED is lit RED, it indicates that there is a hard fail alarm in the system. The detailed alarm information can be viewed via the local web GUI. In the event of a hard fail alarm, the repeater will not function and immediate attention is required.

2.2.2 AC Power Switch & Battery Port for Ethernet Port

The AC Power on/off switch is located on the bottom of repeater (Figure 5). The switch should be powered on after the repeater has been installed properly.

The Battery Port for are located on the bottom of the repeater as shown below in Figure 5.



Figure 5 – EPOCH-III-C9024/9030/9533 Repeater Power Switch & Battery Port (only 9024)

2.2.3 Ethernet Port

The Ethernet ports for DHCP are located on the bottom of the repeater as shown below in Figure 6.

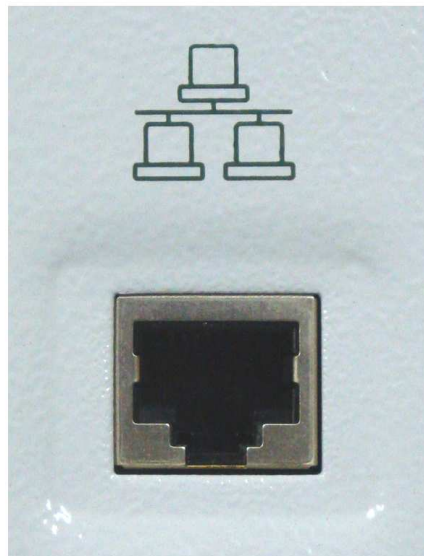


Figure 6 – Ethernet Port

Installation

2.2.4 Tools

No special tools or equipments are needed to install the Epoch-III-C9024

2.2.5 Procedure

Six mounting holes are located on the wall-mounting bracket to attach it to the wall. The wall bracket must be securely attached to sufficiently carry the weight of the Epoch-III-C9024/9030/9533, which is bolted to the wall bracket through the four aligned mounting holes.

The following steps should be followed while mounting the repeater:

Installation Procedure

- ① Take the Epoch-III-C9024/9030/9533 out of the box
- ② Using the four anchor bolts, mount the bracket on the wall
- ③ Make sure the bracket is securely mounted
- ④ Slightly tilt the repeater and mount the repeater onto the wall as shown in the picture. Hook the upper 2 guard screws first and then slide/push in the lower 2 guard screws into the place.
- ⑤ Make sure the Epoch-III-C9024/9030/9533 is securely placed onto the wall bracket
- ⑥ Fasten the 4 bracket screws back properly
- ⑦ Inspect that everything is secure

** Rack Mount option is also available. Please contact ADRF for additional information.*

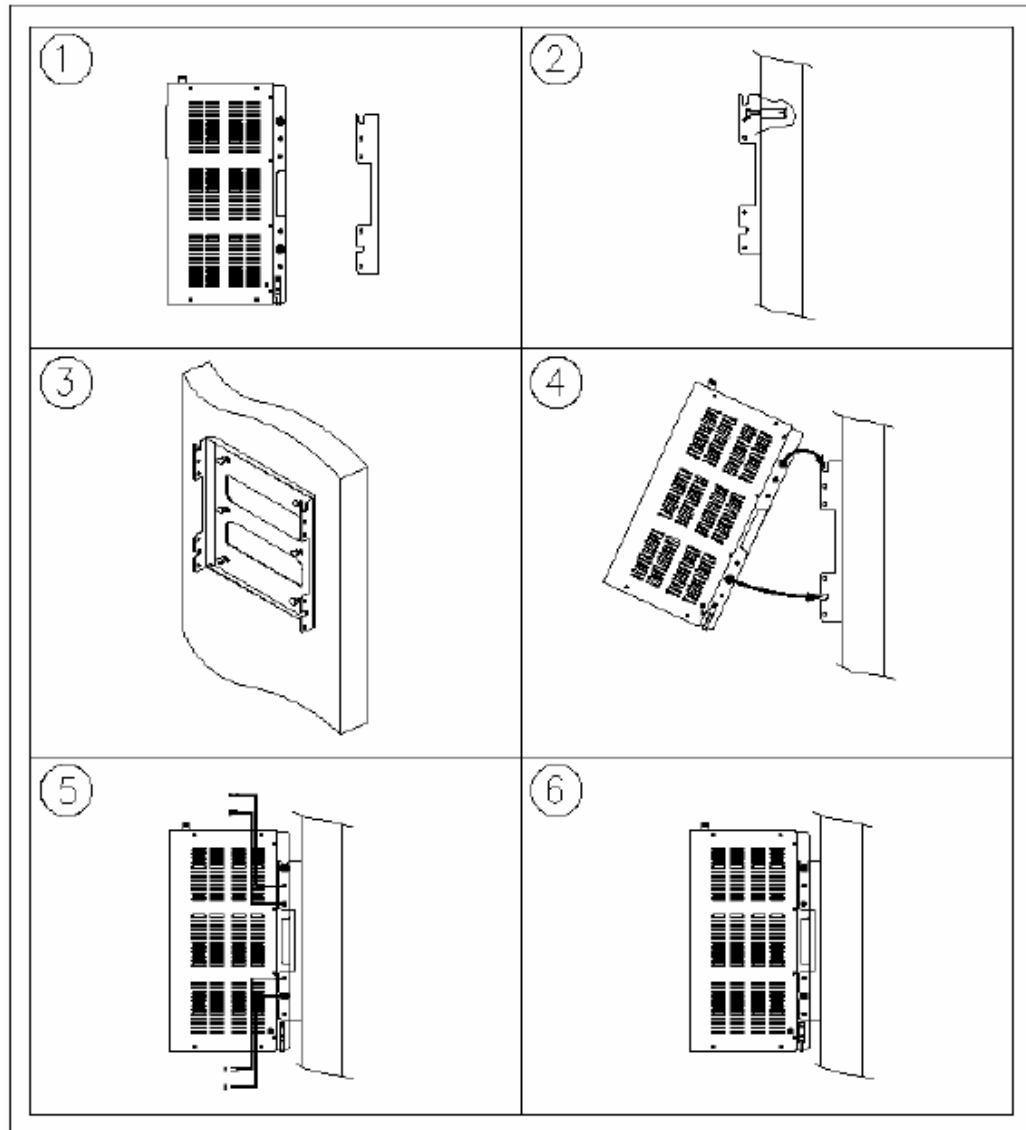


Figure 7 – Repeater Mounting Instructions

2.2.6 Grounding

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



Figure 8 – Ground Cable Connection

2.2.7 Antenna Separation/Isolation

Separation between the antennas is necessary to prevent oscillation. Oscillation occurs when the signal entering the system continually reenters, due to the lack of separation between the donor and server antennas. In other words, the signal is being fed back into the system. This creates a constant amplification of the same signal. As a result, the noise level rises above the signal level.

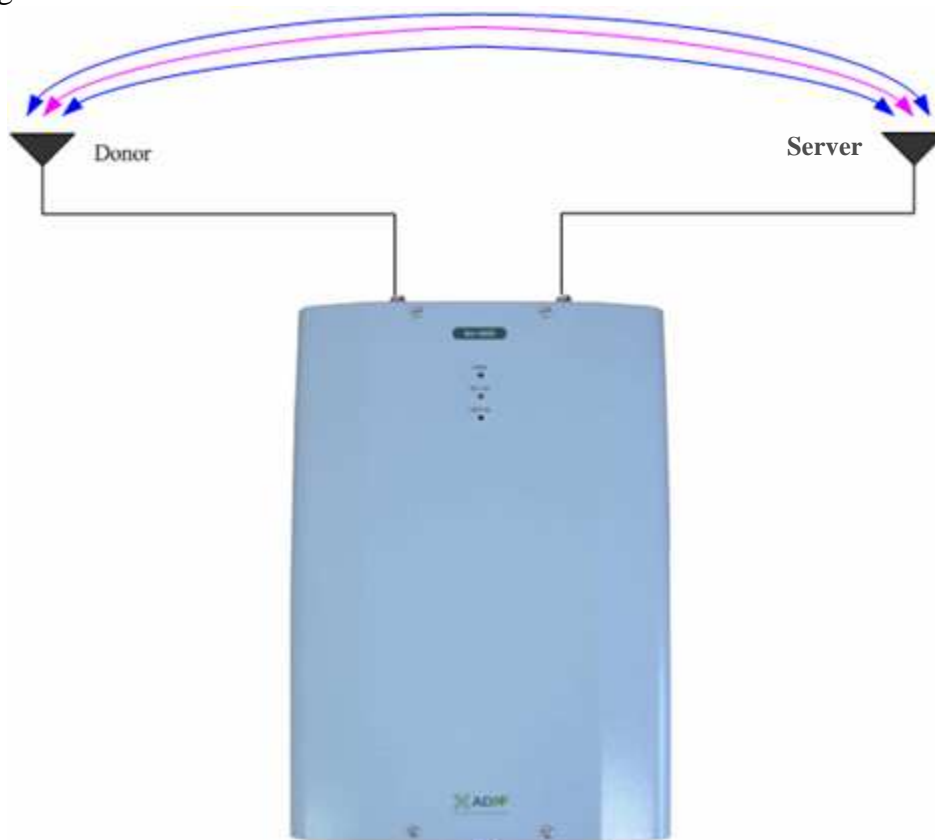


Figure 9 – RF Repeater Oscillation

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

A sufficient isolation value is 13 ~ 15 dB greater than the maximum gain of the repeater. For example, if the gain of the repeater is 50 dB, then an isolation of 63 ~ 65 dB or greater is required. In the same manner, because the Epoch-III-C9024 has a maximum gain of 90 dB, it requires an isolation of at least 103 ~ 105 dB.

2.2.8 Line of Sight

The donor antenna which points towards 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.

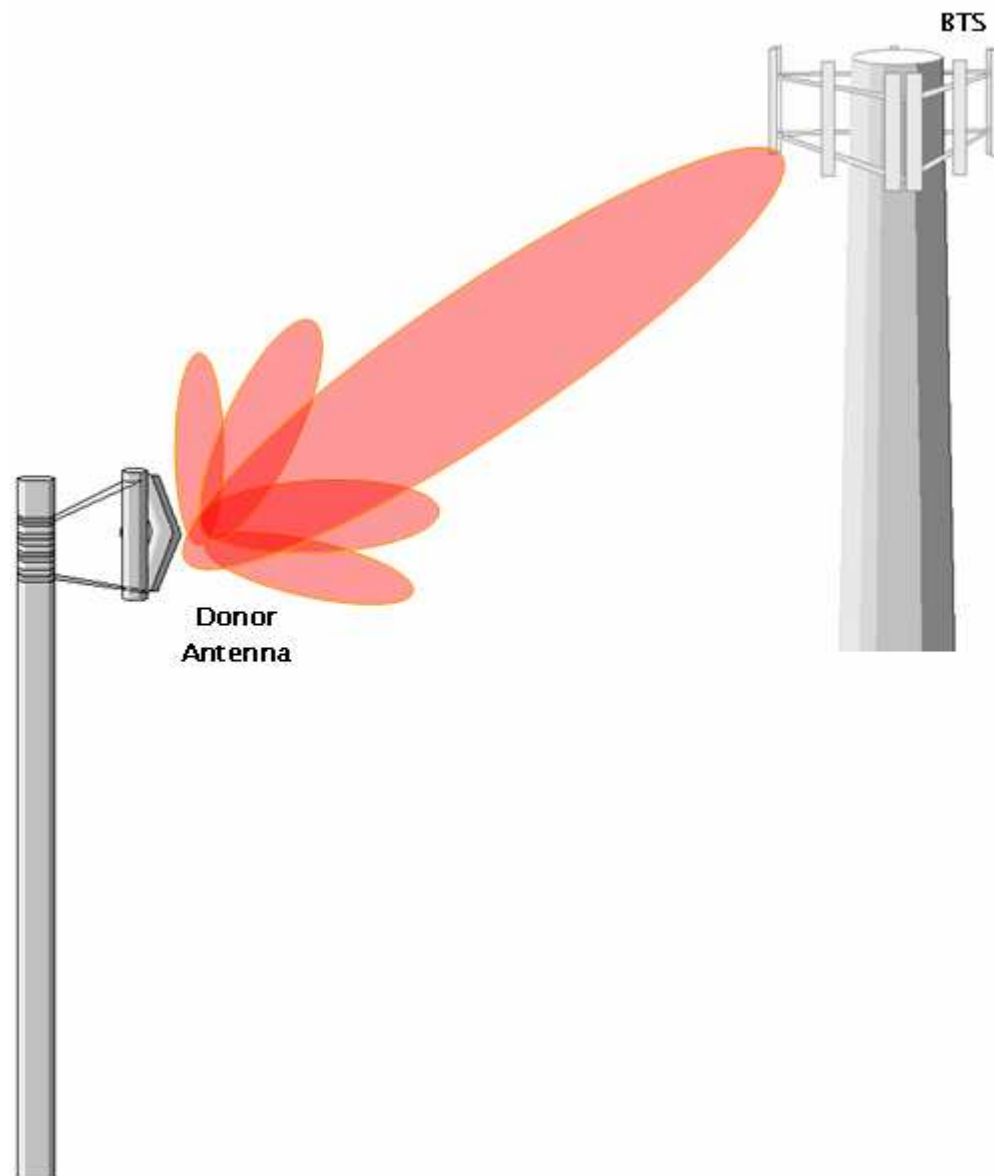


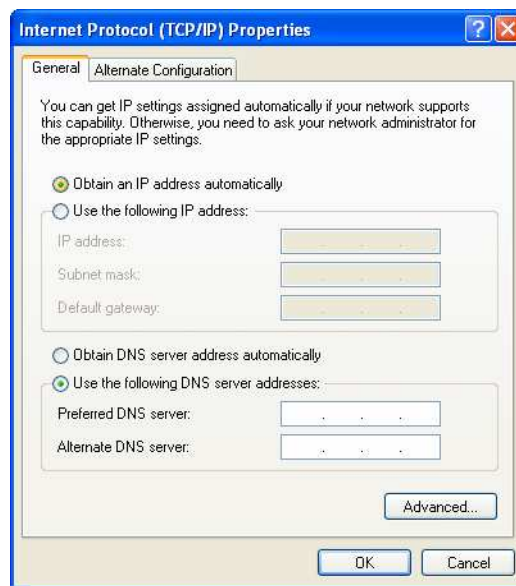
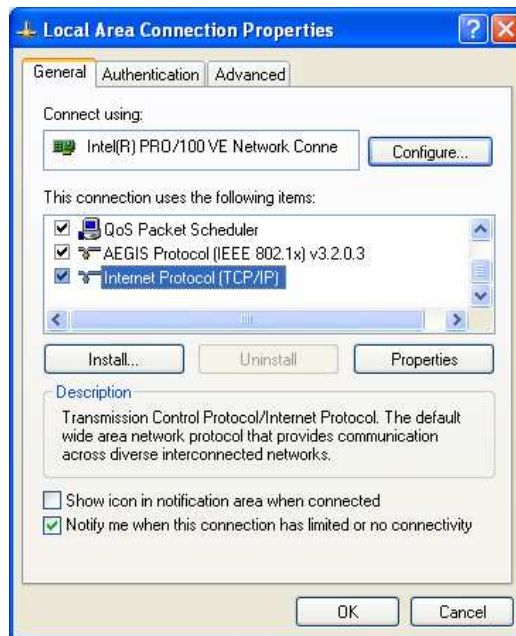
Figure 10 - Direct Line of Sight to the BTS

3. Epoch-III-C9024/9030/9533 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.



ii) Launch MS Internet Explorer (Version 6.0)

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

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

<http://192.168.63.1/home.asp>

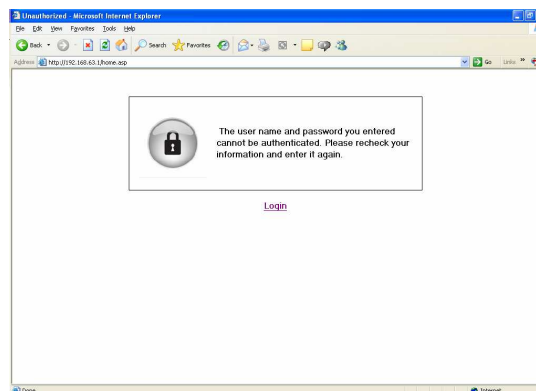
iv) The following login screen will appear:



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:

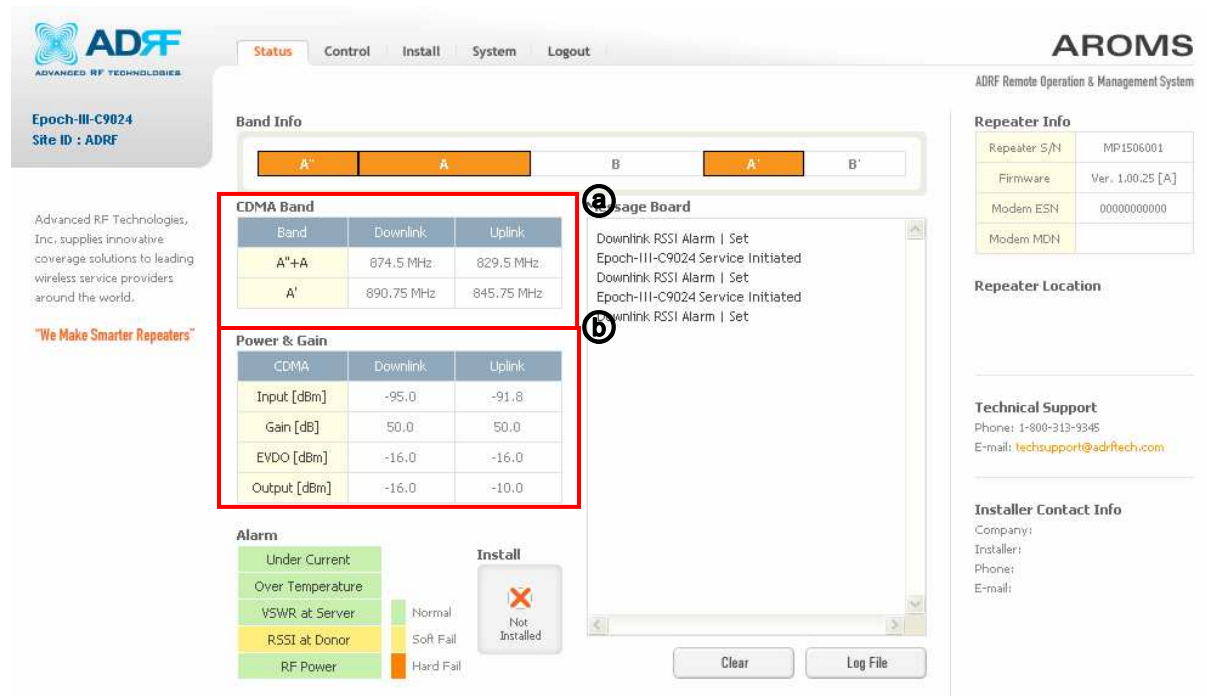


3.2 Repeater Status

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

In this window, the user can view the following:
(To **change** any parameters, e.g., **Instantaneous Band Width, Gain Settings, AGC Level, etc.**, you must go to the **Install** or the **Control** window.)

By clicking the CDMA button, the user can check the status of the CDMA subsystem. The CDMA button turns black gray.



CDMA Band

Band	Downlink	Uplink
A"+A	874.5 MHz	829.5 MHz
A'	890.75 MHz	845.75 MHz

Power & Gain

CDMA	Downlink	Uplink
Input [dBm]	-95.0	-91.8
Gain [dB]	50.0	50.0
EVDO [dBm]	-16.0	-16.0
Output [dBm]	-16.0	-10.0

Message Board

- Downlink RSSI Alarm | Set
- Epoch-III-C9024 Service Initiated
- Downlink RSSI Alarm | Set
- Epoch-III-C9024 Service Initiated
- Downlink RSSI Alarm | Set

Alarm

- Under Current: ■
- Over Temperature: ■
- VSWR at Server: ■ Normal
- RSSI at Donor: ■ Soft Fail
- RF Power: ■ Hard Fail

Install

Not Installed

- **CDMA Band:** Will display the center frequencies of the 800 MHz spectrums on the downlink and uplink respectively.

a

CDMA Band		
Band	Downlink	Uplink
A"+A	874.5 MHz	829.5 MHz
A'	890.75 MHz	845.75 MHz

- **Power & Gain(CDMA):** Will display the repeater input, gain and output power on the downlink and uplink.

Power & Gain

CDMA	Downlink	Uplink
Input [dBm]	-106.0	-104.0
Gain [dB]	50.0	50.0
EVDO [dBm]	-16.0	-16.0
Output [dBm]	-16.0	-10.0

Parameters	Range	Step Size
DL/UL Output Power	-10 ~ 24 dBm	0.1 dB
DL/UL Input Power	-12 ~ -97 dBm	0.1 dB
Gain	50 ~ 90 dB	0.5 dB

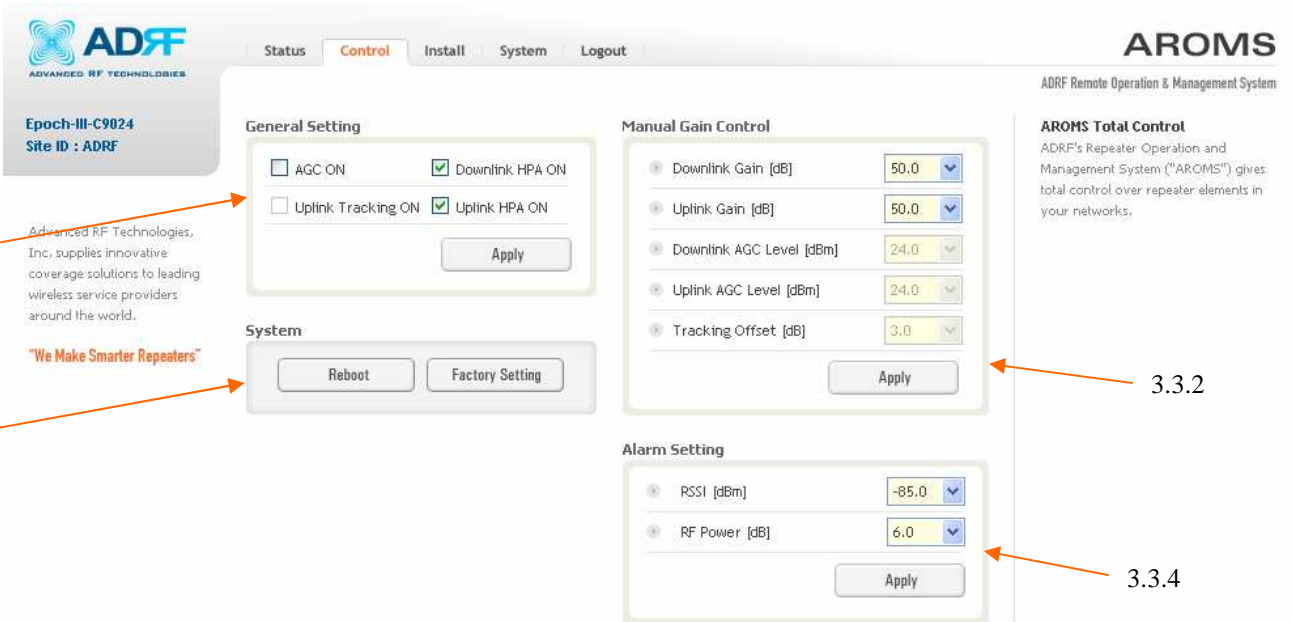
Table 2 – The displayed value ranges on the CDMA status.

- **Alarm:** Will display five alarms with three different status conditions (Normal, Soft Fail or Hard Fail). ‘Under Current’, ‘Over Temperature’, and ‘VSWR at Server’ are common alarms for Epoch-III-C9024/9030/9533 it self. But ‘RSSI at donor’ and ‘RF Power’ are respective alarms for CDMA.
- **Message Board (CDMA):** Will show up to recent 20 log messages for CDMA operation (alarms) & Heartbeats on the CDMA status window.
- **Installation (CDMA):** Will display CDMA repeater’s installation status (Not Installed or Installed).
- **Repeater Info:** Will display the Epoch-III-C9024/9030/9533 serial number, and location information (latitude and longitude coordinates).
- **Repeater Location:** Will display the address where the Epoch-III-C9024/9030/9533 is installed.
- **Technical Support:** Will display ADRF’s technical support contact information.
- **Installer Contact Info:** Will display the installer’s name, phone and e-mail address.

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

3.3 Control

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



3.3.1 points to the General Setting section.

3.3.2 points to the Manual Gain Control section.

3.3.3 points to the System section.

3.3.4 points to the Alarm Setting section.

At these windows, the user can adjust the following parameters:

3.3.1 General Setting

CDMA

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

3.3.2 Manual Gain Control

- Downlink Gain Control
50 to 90 dB @ 0.5 dB step
- Uplink Gain Control
50 to 90 dB @ 0.5 dB step
- Downlink AGC Level
0 to 24 dBm @ 0.5 dB step, default value: 24 dBm
- Uplink AGC Level
0 to 24 dBm @ 0.5 dB step, default value: 24 dBm
- Uplink Tracking Offset
(0 to 10 dB @ 0.5 dB step, default value is 3 dB)

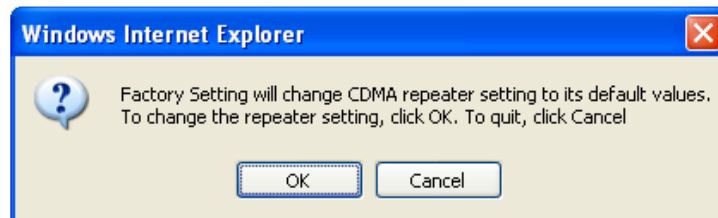
3.3.3 System

- If you click the Reboot button, the following message box will appear:
When the system reboots, the last settings for CDMA will be saved.



- If you click the Factory Setting buttons for CDMA respectively, the following message boxes will appear:
Factory setting will erase the saved settings by the user and change all the parameters to the factory default settings.

When you click the CDMA Factory Setting;



3.3.4 Heartbeat Time

- Heartbeat on and off (Default mode is On)
- Heartbeat periodic time
(Range: 1 to 59 min @ 1 min step, default period is 20 min)

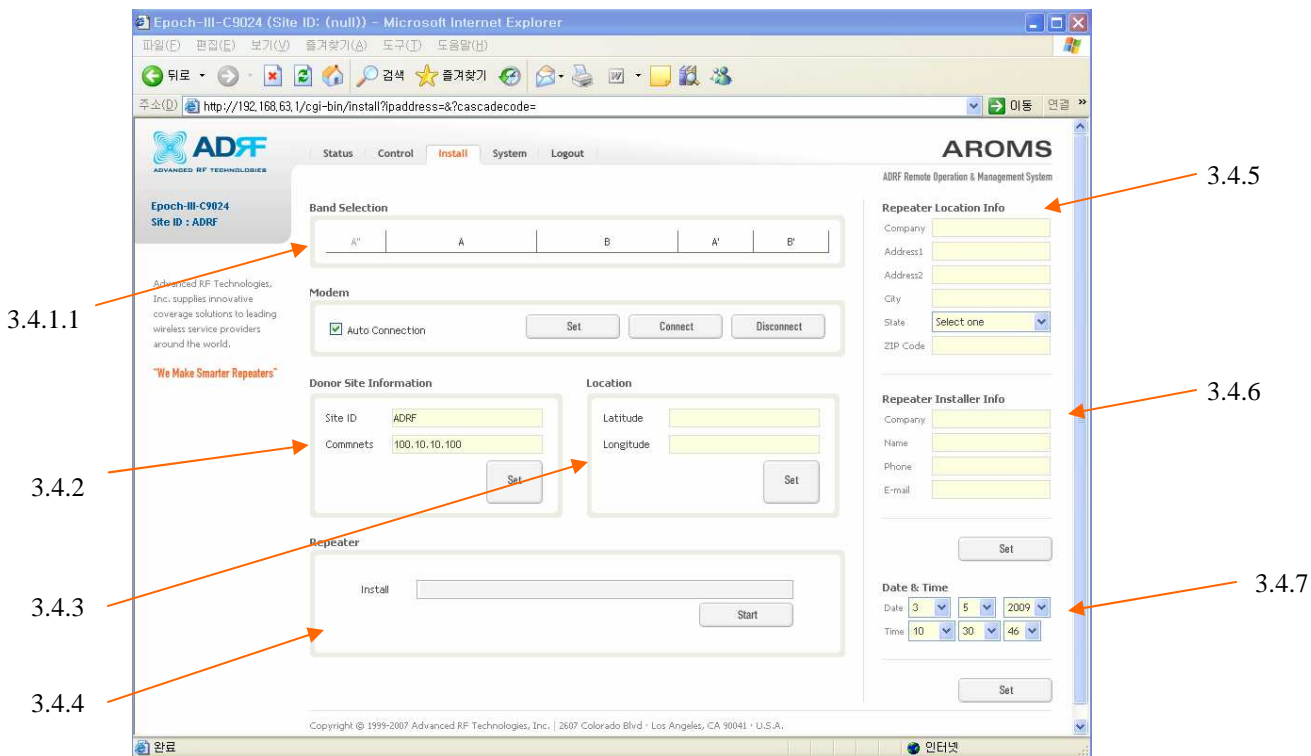
3.3.5 Alarm Setting

CDMA

- RSSI Alarm at Donor (-100 ~ -50 dBm @ 0.5 dB step, default value is -85 dBm)
- RF Power Alarm (2 ~ 10 dB @ 0.5 dB step, default value is 6 dB)

3.4 Install

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



3.4.1 Band Selection

Simply click on the desired operating bandwidth. The selected band will be highlighted in blue. To deselect, click again on the undesired band. The deselected band will turn back gray. Please see below Band Selection screen shot.

3.4.1.1 CDMA Band Selection

The CDMA subsystem of the Epoch-III-C9024/9030/9533 has three (3) independent RF paths:

Path 1 supports A+A' bandwidth;

Path 2 supports B+B' bandwidths; Band Selection

Band Selection



3.4.2 SNMP

Type in the assigned Site/Cascade ID and Manager IP Address.

Default Site ID is ADRF.

Default Manager IP address is 100.10.10.100

3.4.3 Location

Please type in the location information (Latitude & Longitude) where the repeater is installed. If there are no location information with latitude and longitude, any heartbeat will not be sent out to NOC (Network Operation Center).

Ex) Latitude:E43.123 , Longitude:N232.111

3.4.4 Repeater

There are two Repeater [Install](#) buttons for CDMA and respectively. Please click the [Install](#) button to automatically setup the repeater on both Install windows.

It may take up to 3 minutes to complete the CDMA install. You will see a gradual progress bar display. After the process is completed, a pop-up window will display “*Installation Successfully Completed*” message.

Click on [Status](#) window, the Installation box now changes from “[Not Installed](#)” to “[Installed](#).”

If the Epoch-III-C9024/9030/9533 detects a problem during the installation process, it will show a prompt message, e.g., “Low RSSI.” Please follow the instructions and address the problem to finish the installation process. If the problem persists, please contact our technical support.

3.4.5 Repeater Location

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

3.4.6 Repeater Installer Info

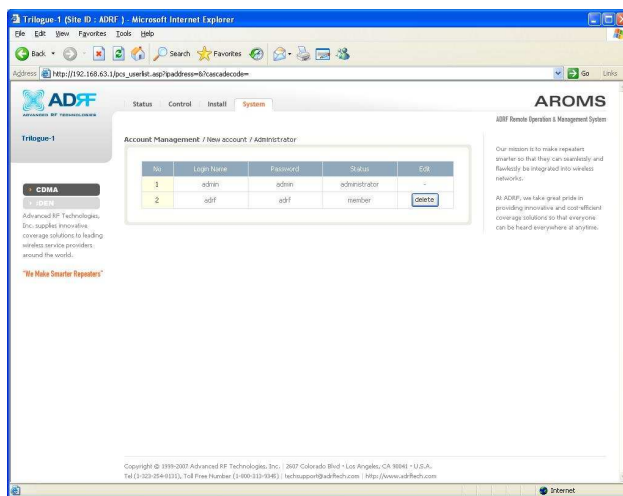
Please type in the installer’s name, phone number and e-mail address for technical support.

3.4.7 Date & Time

Sets the date and time for the internal clock (required for Log Messages)

3.5 System

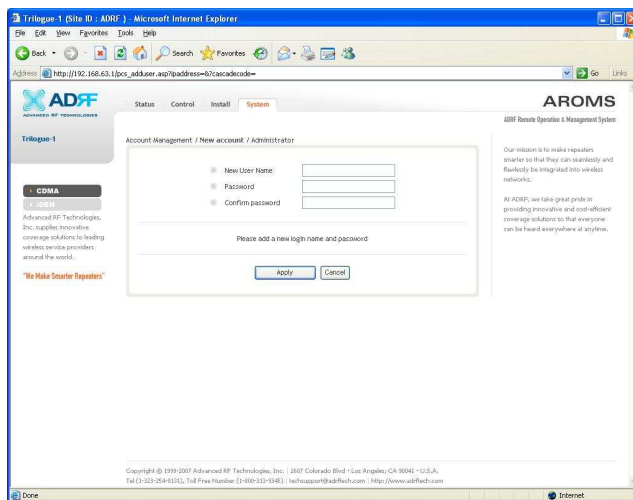
If you click on the **System** window, the following window will appear:



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

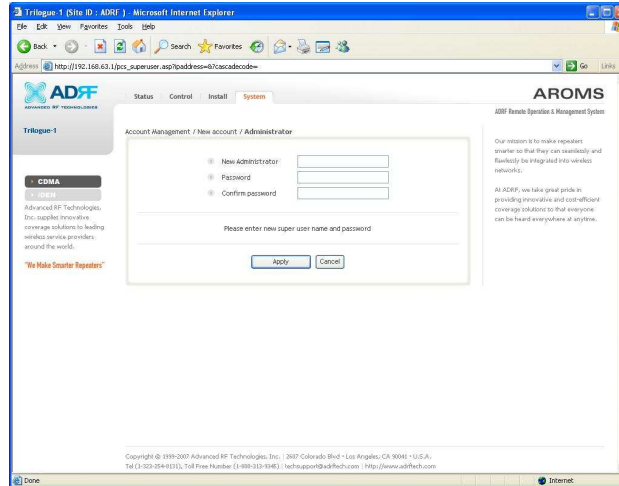
Super-User

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**.



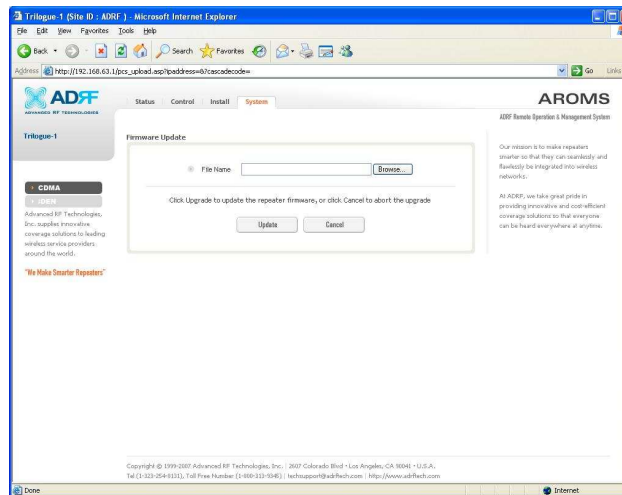
Administrator

The following window illustrates how a new administrator can be added by simply clicking on **Administrator**.



Firmware Upgrade

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, simply click on [Update](#) and it'll upload the desired firmware automatically and close the session. You will need to re-login again.



After the firmware update process is done, you will see the following pop-up window.



4. Maintenance Guide for Epoch-III-C9024/9030/9533

4.1 Periodic Inspection Checklist

- a. Check for loose connections between the repeater and antennas. If connections are loose, make sure that all connections are tightly fastened properly.
- b. Cables and connectors are in good condition.
- c. 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 semiannually.

4.2.2 Precautions

- Do not operate the repeater with the antennas in extremely close proximity to one another as this may cause damage to the repeater.
- Do not change the 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 is necessary.

5. Warranty and Repair Policy

5.1 General Warranty

The Epoch-III-C9024/9030/9533 carries a Standard Warranty period of five (5) years unless indicated otherwise on the package or in the acknowledgment of the purchase order.

5.2 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.

5.3 Limitation of Damages

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

5.4 No Consequential Damages

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

5.5 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.

5.6 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 (323) 254-8131 or send an email to techsupport@adrftech.com.

Appendix A: Specifications

Parameters		Specifications	Remarks
Frequency Range	Downlink	869~894MHz	
	Uplink	824~849MHz	
Frequency Error		$\leq \pm 0.1\text{ppm}$	
Band Selection		AF/BF	
Band Reconfiguration	Downlink	AF(A-869~880 MHz,A'-890~891.5MHz)	GUI Selectable
		BF(B-880~890 MHz,B'-892~894MHz)	
	Uplink	AF(A-824~835 MHz,A'-845~846.5MHz)	
		BF(B-835~845 MHz,B'-847~849 MHz)	
Gain Flatness	Full band	$\leq \pm 1.5\text{ dB}$	
	Each band	$\leq \pm 1.5\text{ dB}$	
Gain	Maximum	90 dB @ C9024, C9030 95 dB @ C9533	
	Step	0.5dB	
	Range	40dB	
	Tolerance	$\leq \pm 2.0\text{dB}$	
Output	Downlink	C9024(24 dBm),C9030(30 dBm), C9533(33 dBm)	Composite power
	Uplink	C9024(24 dBm),C9030(30 dBm), C9533(33 dBm)	
AGC Control Error		AGC $\pm 0.5\text{ dB}$	
Spurious emissions		$\leq -15\text{ dBm}$	
OIP3		$\geq 45\text{ dBm}$	
Inter modulation		$\leq -105\text{ dBm}$	
Roll offs		$> 45\text{dBc @ } 1\text{MHz outside Passband}$	
Delay		$\leq 5\text{ us}$	
Noise Figure		$\leq 5.0\text{ dB @max gain}$	
VSWR		$\leq 1.5:1$	
Coupling for Modem		$18 \pm 2\text{ dB}$	

A.1 Mechanical Specifications

Parameters		Specifications	Remarks
Cabinet		Wall Mounting	
Casing Class		IP 20 Minimum	Indoor Type
Weight		37.5 lbs	
Size		16.15 x 11.98 x 8.75 Inches	
Color		7414B	
Connector Type	Input/output	N Female	
	Ethernet	RJ45 Female	
	Frame ground	Hex Nut(M6)	
Cooling		Convection Cooling(No fan)	

A.2 Environmental Specifications

Parameters		Specifications	Remarks
Operating Temperature		-10 ~ +50°C	Ambient
Relative humidity		5~90%, non-condensing	
dust		Industrial dust per Telcordia GR63 core	
Cooling Method		Convection Cooling (No fan)	

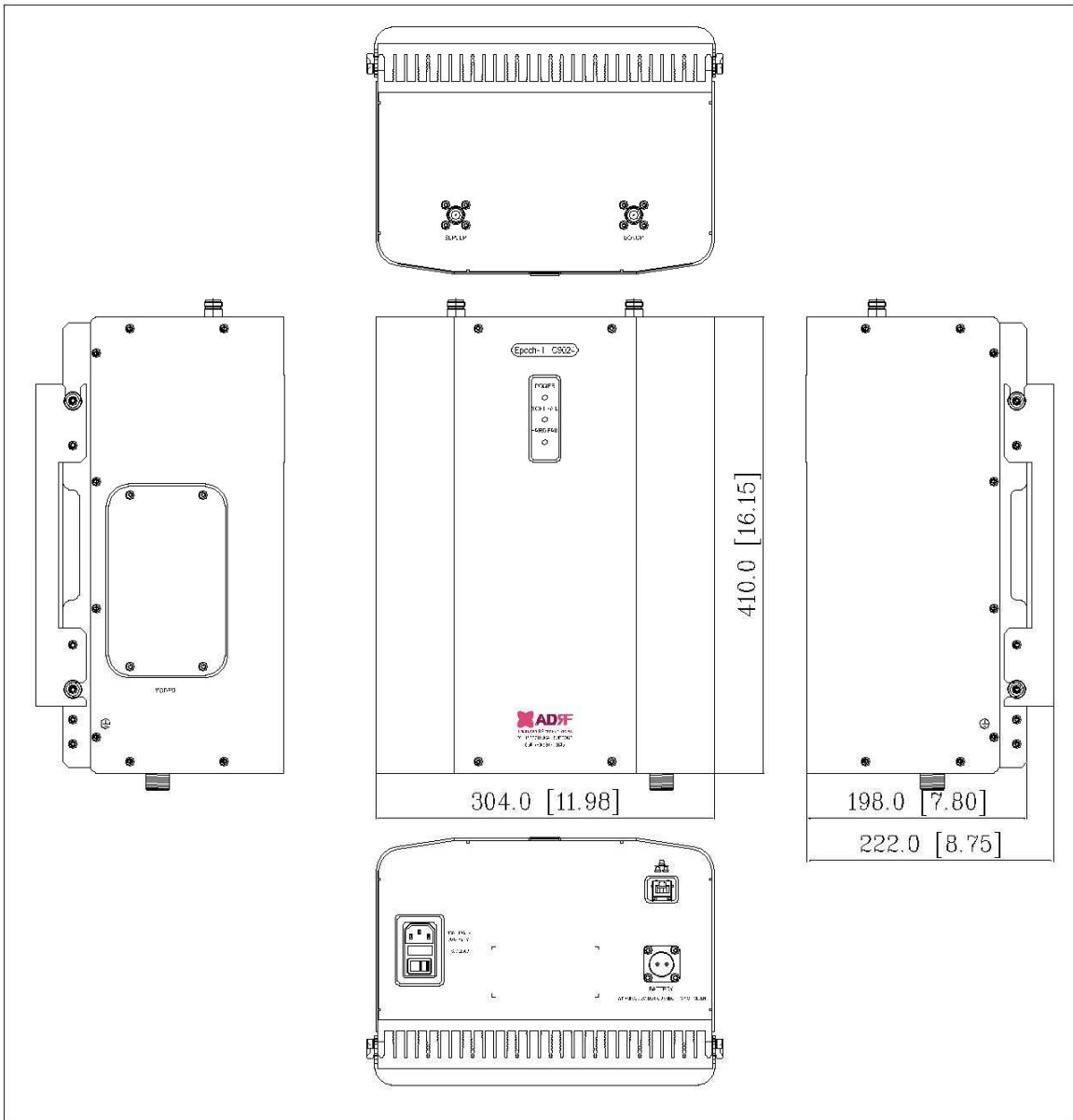
A.3 Power Specifications

Parameters		Specifications	Remark
AC Power		100~130 VAC	
AC Frequency		45~65 Hz	
AC Supply Protection		Fuse	
Back Up Battery option		12V(only C9024)	8 Hours
Ground		External threaded stud	

A.4 Other Specifications

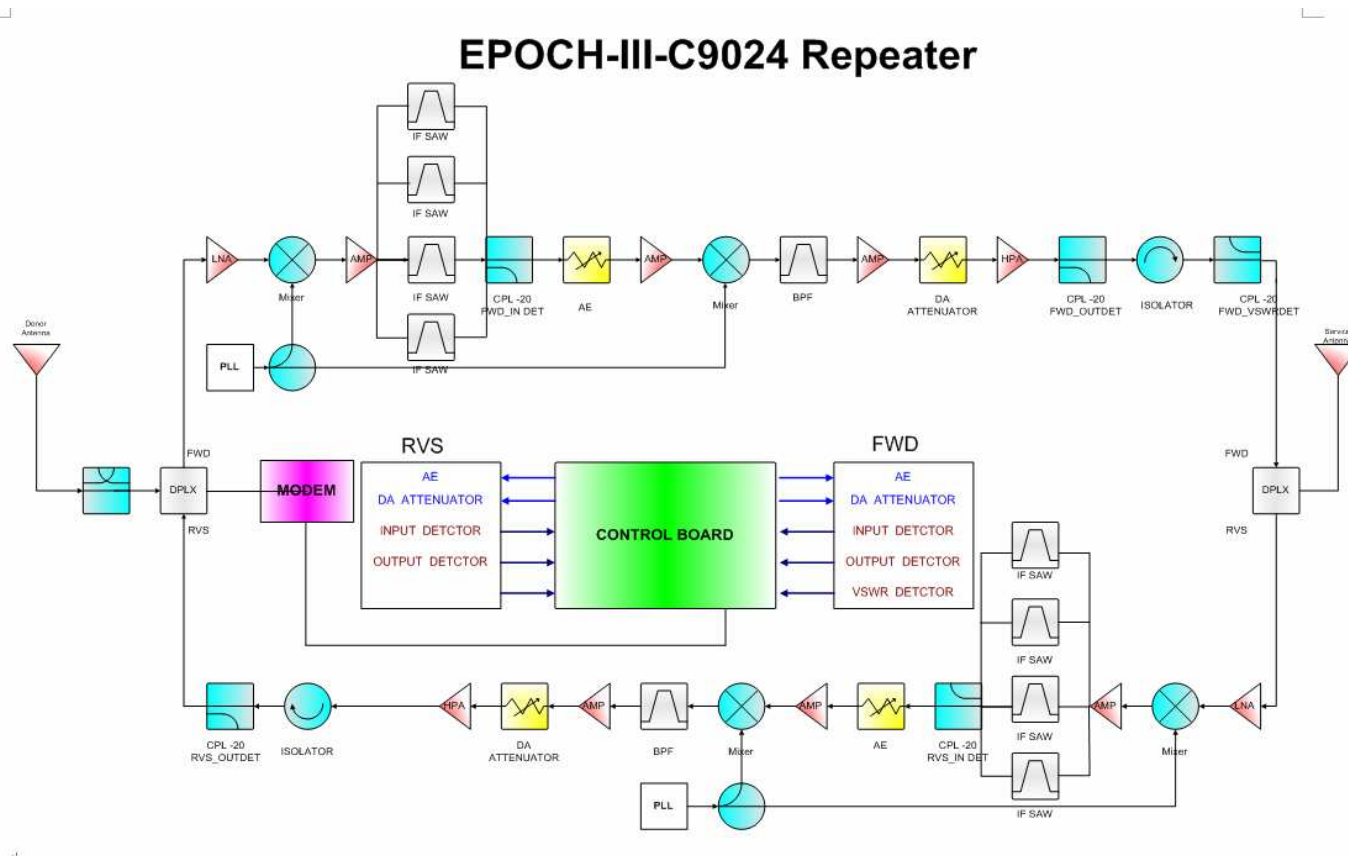
Parameters		Specifications	Remarks
MTBF		> 50,000 hours	
Certificates	UL 60950		
	FCC CFR47 part 15		
Warranty		3 Years	

Appendix B: Mechanical Drawing

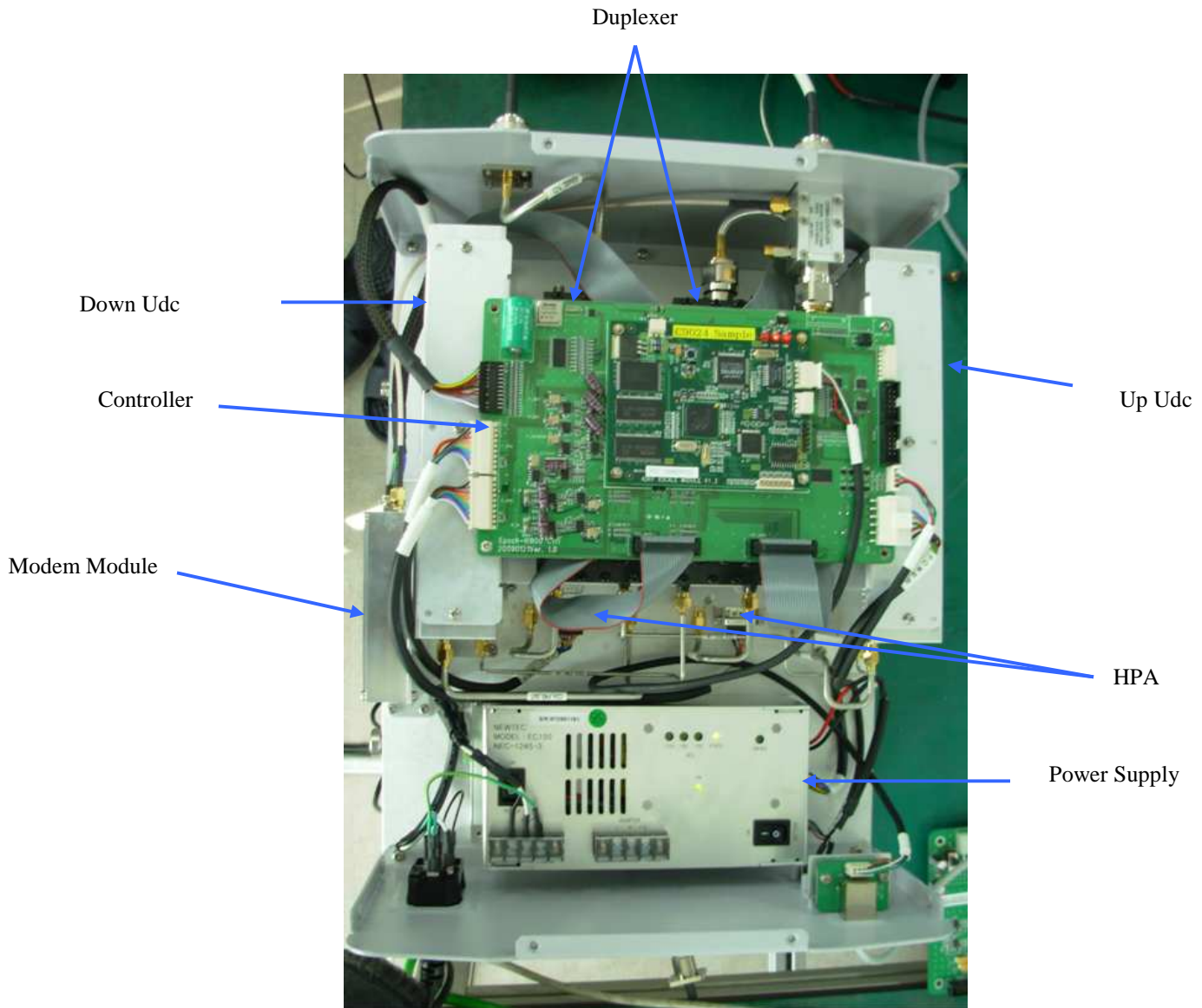


Appendix C: Epoch-III-C9024/9030/9533 Overview

C.1 Block Diagram



C.2 Components



Power Supply

It provides DC power to each module within the repeater.

Controller

It is responsible for monitoring the status of each module and controls the parameters.

Down Udc

The downlink RF signal that enters through the cavity filter is converted to IF frequency, which is later converted back to RF frequency through SAW filtering.

Up Udc

The uplink RF signal that enters through the cavity filter is converted to IF frequency, which is later converted back to RF frequency through SAW filtering.

Duplexer

It consists of two BPFs (band-pass filters): Cellular TX (869 ~ 894 MHz) & RX (824 ~ 849 MHz)

HPA

It receives the output signal from the Up/Down converter module and amplifies the signal to the repeater's rated maximum power level.

Modem Module

modem Module