Trilogue-1NM
USER MANUAL

Version 1.4

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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
iDEN	Integrated Digital Enhanced Network
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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Revision History

Version	Author	Description	Date
1.0	Julie Song		April 9, 2007
1.1	Julie Song		May 11, 2007
1.2	Namchul Lee		October 17, 2007
1.3	Namchul Lee	Update for UL approval & modem box	January 3 , 2008
1.4	Namchul Lee	Update for FCC	March 31, 2008

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1. Trilogue-1NM

1.1 Introduction

Trilogue-1NM is a tri-band (PCS 1900 MHz, iDEN 800 & 900 MHz) RF repeater which enhances in-building wireless coverage in the most effective and cost efficient way. For its intelligent design and versatility, the Trilogue-1NM is the ideal choice for wireless coverage problems indoors. Trilogue-1NM 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 65 MHz PCS band (including G band) for CDMA, and Dual iDEN bands (800 & 900 MHz) for iDEN.

CDMA:
• Covers the 65 MHz PCS band including G band
• Supports up to three (3) non-contiguous band combinations
• Supports up to six (6) different instantaneous bandwidths; 5, 10, 15, 20, 25 and 30 MHz
• 24 dBm composite output power
• 80 dB gain
• 40 dB AGC Range @ 0.5 dB Step
• Sharp out-of-band rejection; 50 dBc @ 1 MHz Sub-band edge
• Automated installation
• Web GUI via DHCP
• Remote Monitoring Capability using External Modem Box (MBOX-DET1)

iDEN:
• Dual Band Repeater (800 & 900 MHz)
• 25 dBm Composite Output Power
• 65 dB gain
• 25 dB AGC Range @ 0.5 dB Step
• Excellent Out of Band Rejection Characteristics with Sharp Roll-Offs @ 65 dBc
• Re-Banding Capability via Digital Filtering
• Band Adjustable Option @ 200 kHz Step
• Automated installation
• Web GUI via DHCP
• Remote Monitoring Capability using External Modem Box (MBOX-DET1)

1.1.2 Parts List

Label	Qty	Description
A	1	Trilogue-1NM 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 – Trilogue-1NM Repeater Parts List

** CD includes: (1) Trilogue-1NM User Manual & (2) Trilogue-1NM Quick Start Guide

1.1.3 Repeater Quick View

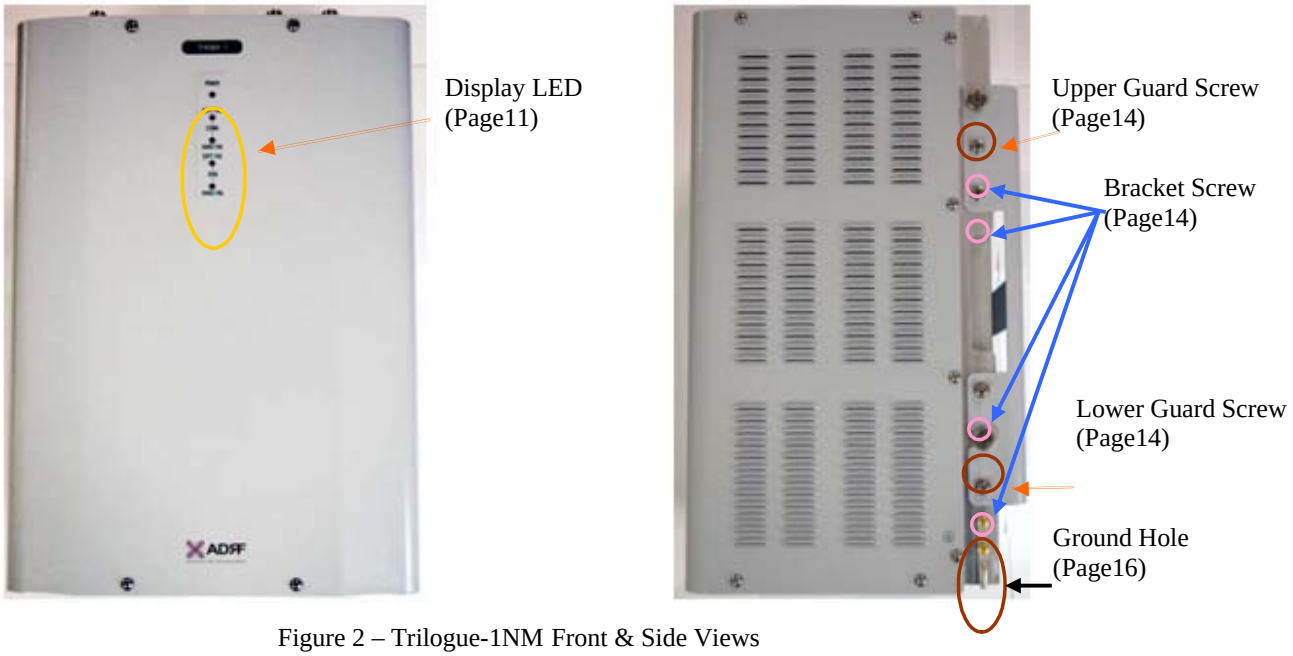


Figure 2 – Trilogue-1NM Front & Side Views

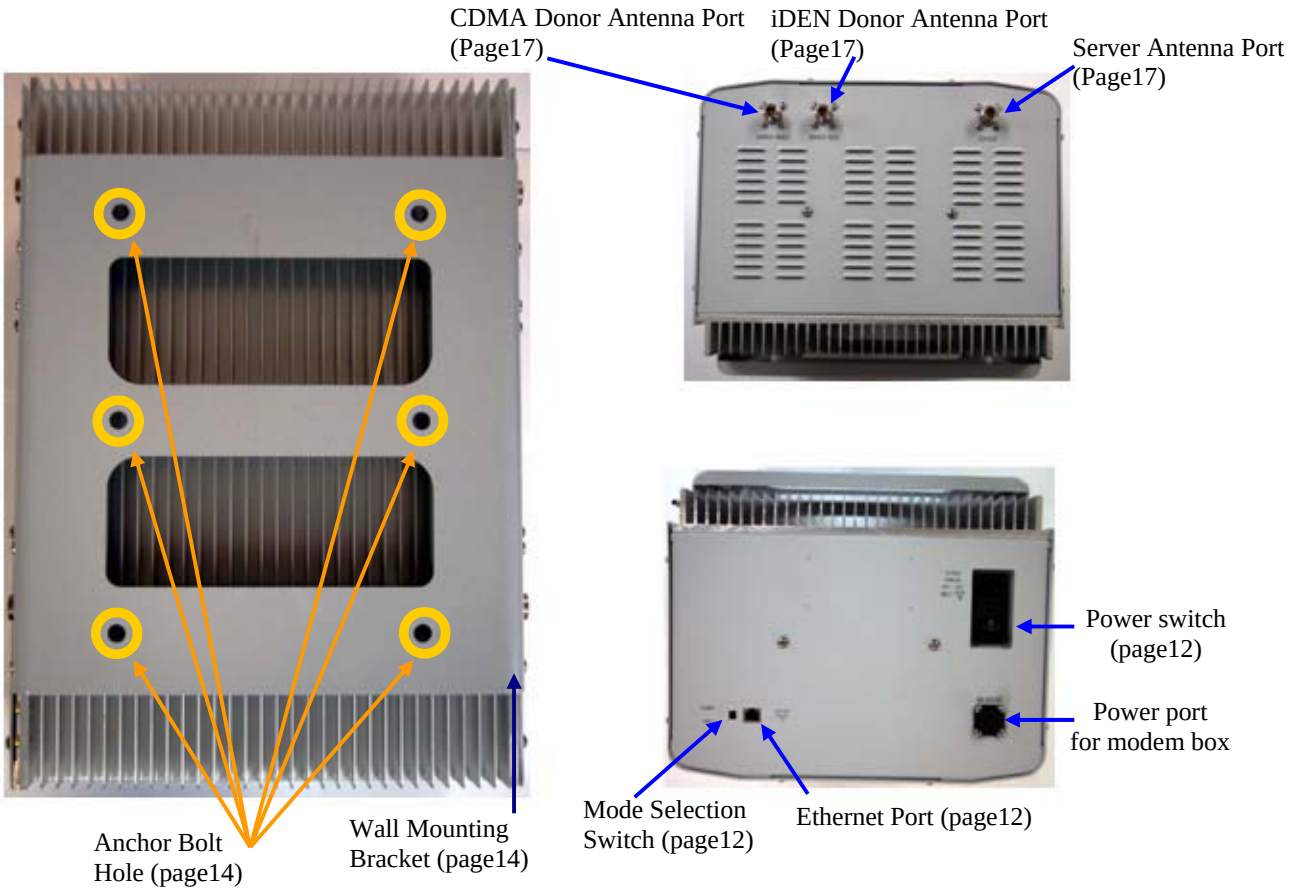


Figure 3 – Trilogue-1NM Back & Bottom Views

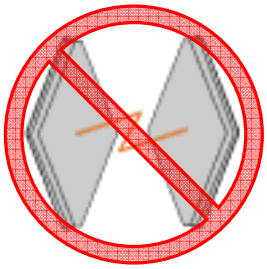
1.2 Warnings and Hazards

WARNING! ELECTRIC SHOCK

Opening the Trilogue-1NM 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 Trilogue-1NM 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 Trilogue-1NM 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. Trilogue-1NM Overview

2.1 Operation Modes

2.1.1 Local Web GUI

Host Mode

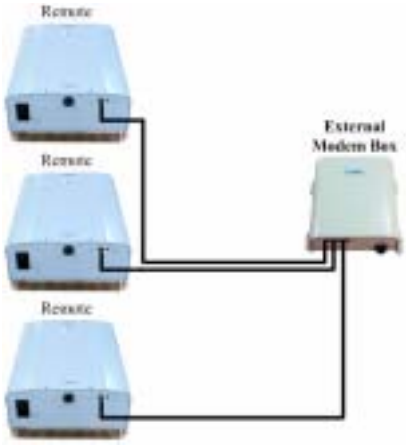
This mode should be selected only if a Trilogue-1NM is used alone without being connected to any other device functioning as a host.

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 Trilogue-1NM for monitoring purposes. In this case, the Trilogue-1NM 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

Trilogue-1NM has five LEDs on the front panel of the repeater as shown below in Figure 4.

Figure 4 – Trilogue-1NM Repeater LED View

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 & DC Power Port for External Modem Box

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 DC Power Port can be used to provide power to the optional External Modem Box (Figure 5).

Figure 5 – Trilogue-1NM Repeater Power Switch

2.2.3 Mode Selection Switch and Ethernet Port

The Ethernet ports and the mode selection switch for DHCP are located on the bottom of the repeater as shown below in Figure 6. The mode selection switch has two modes: Host Mode & Remote Mode.

Figure 6 – Ethernet Port & Mode Selection Switch

2.3 Installation

2.3.1 Tools

No special tools or equipments are needed to install the Trilogue-1NM

2.3.2 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 Trilogue-1NM, 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 Trilogue-1NM 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 Trilogue-1NM is securely placed onto the wall bracket
⑥ Fasten the 8 bracket screws back properly
⑦ Inspect that everything is secure

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

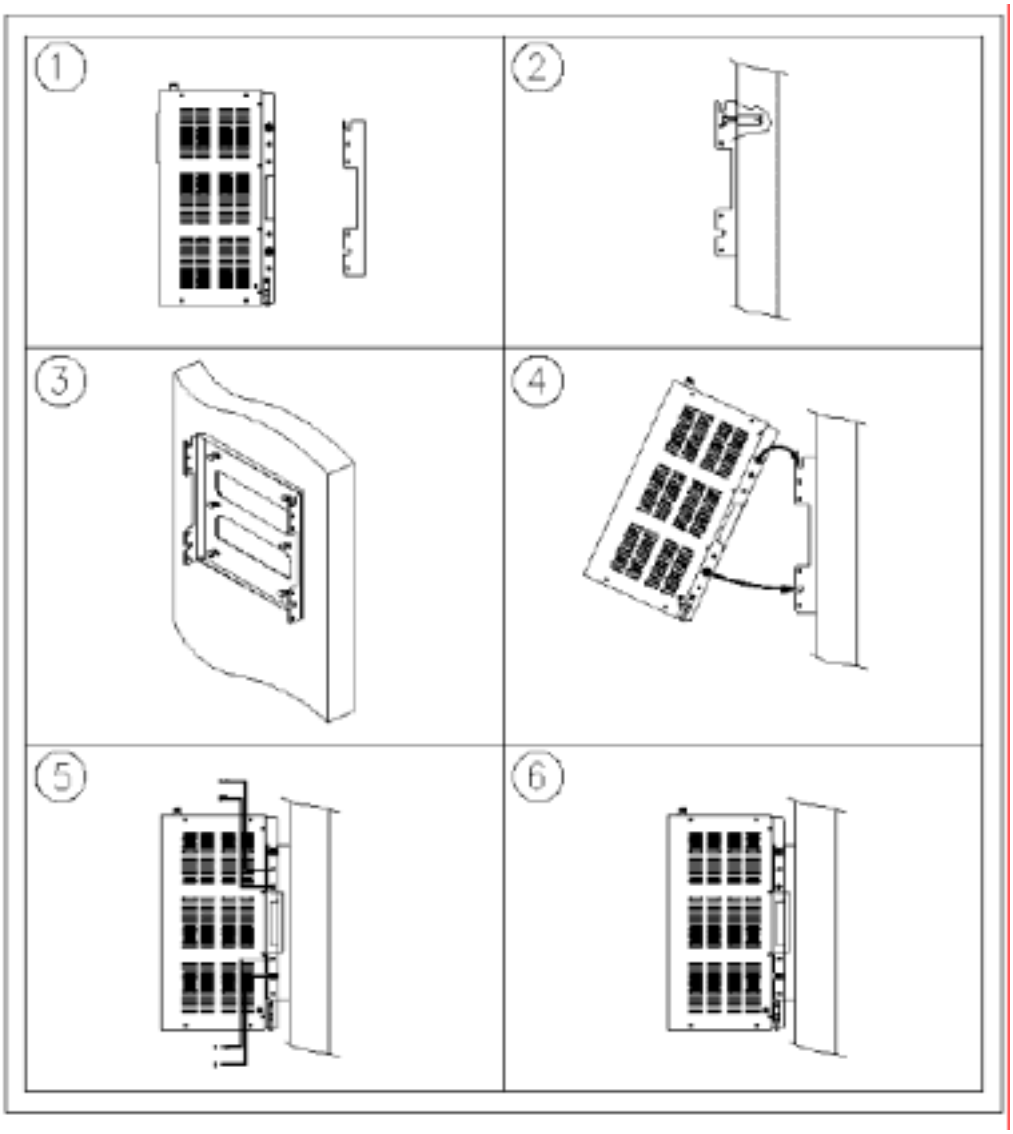


Figure 7 – Repeater Mounting Instructions

2.3.3 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

2.3.4 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.

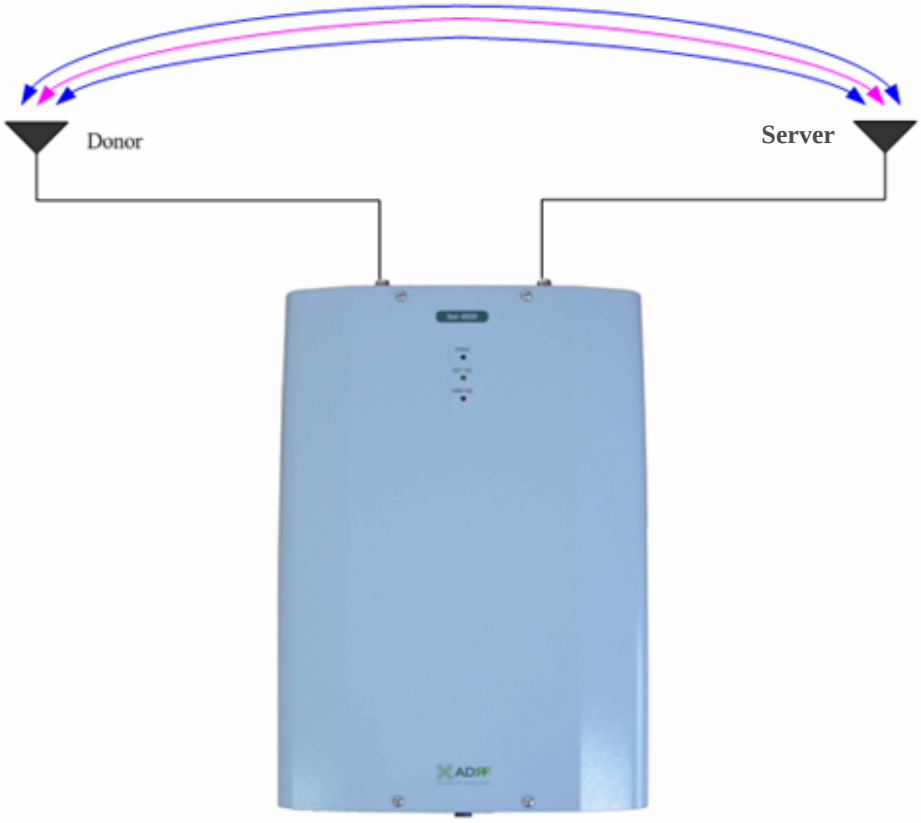


Figure 9 – RF Repeater Oscillation

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 Trilogue-1NM has a maximum gain of 80 dB, it requires an isolation of at least 93 ~ 95 dB.

2.3.5 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.

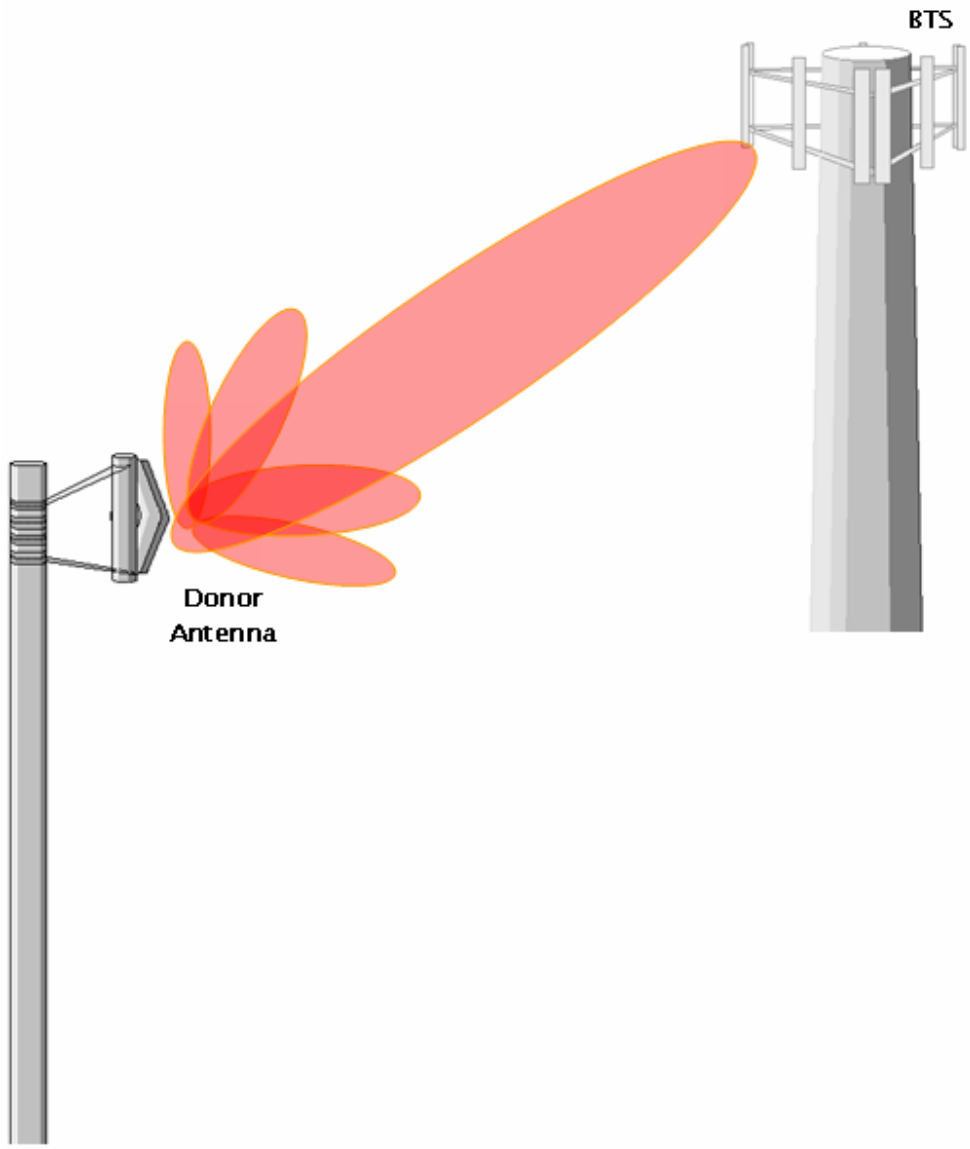


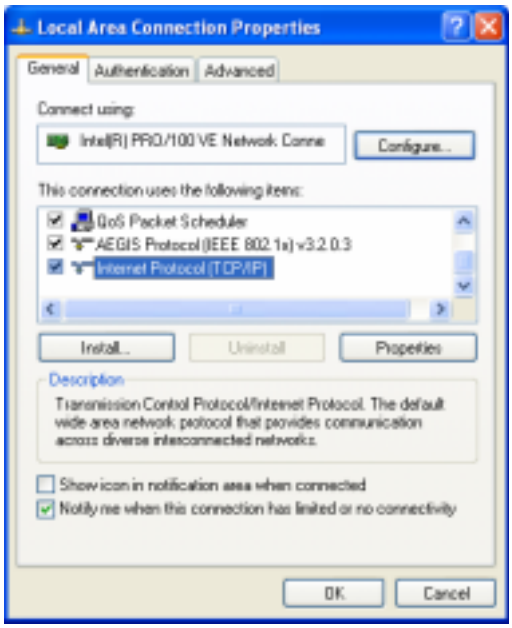
Figure 10 - Direct Line of Sight to the BTS

3. Trilogue-1NM 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.

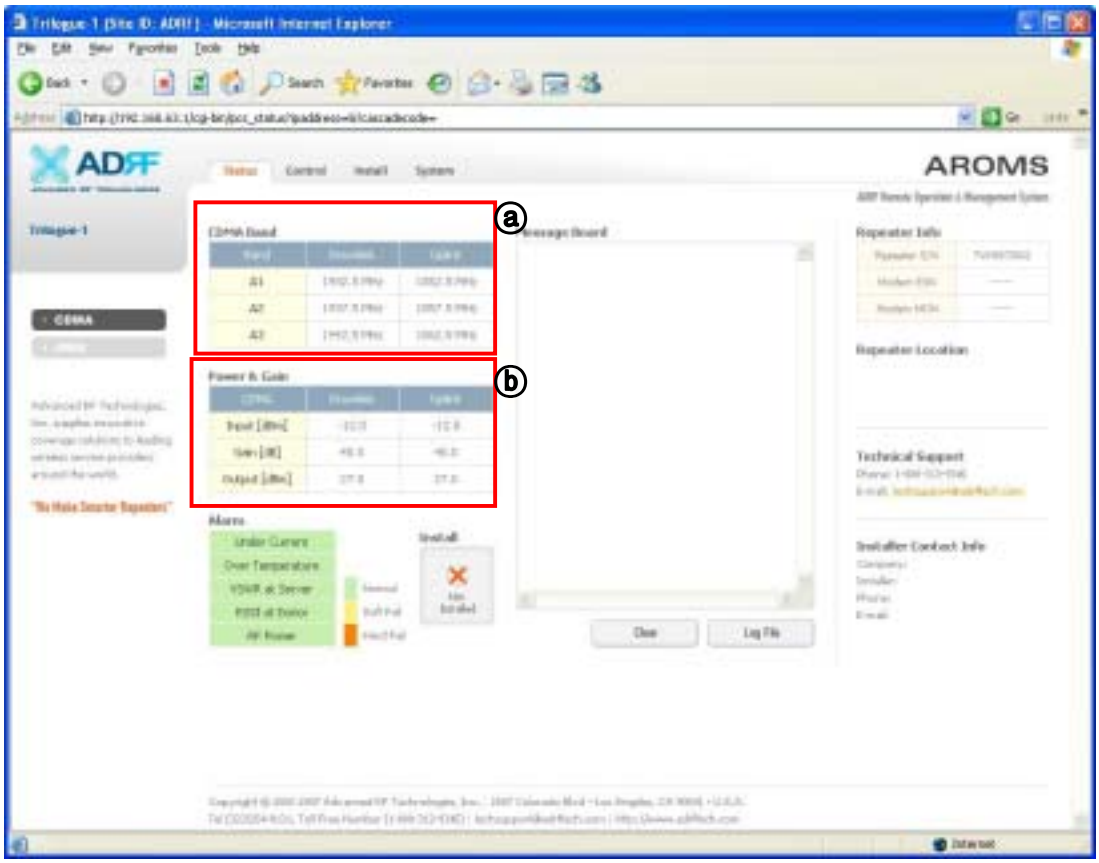
If the username & password is typed in incorrectly, the following screen will appear:

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., PCS Sub-Bands, 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 and the iDEN button turns gray.



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

CDMA Band

Band	DownLink	UpLink
A1	1932.5 MHz	1852.5 MHz
----	----	----
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a

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

Power & Gain

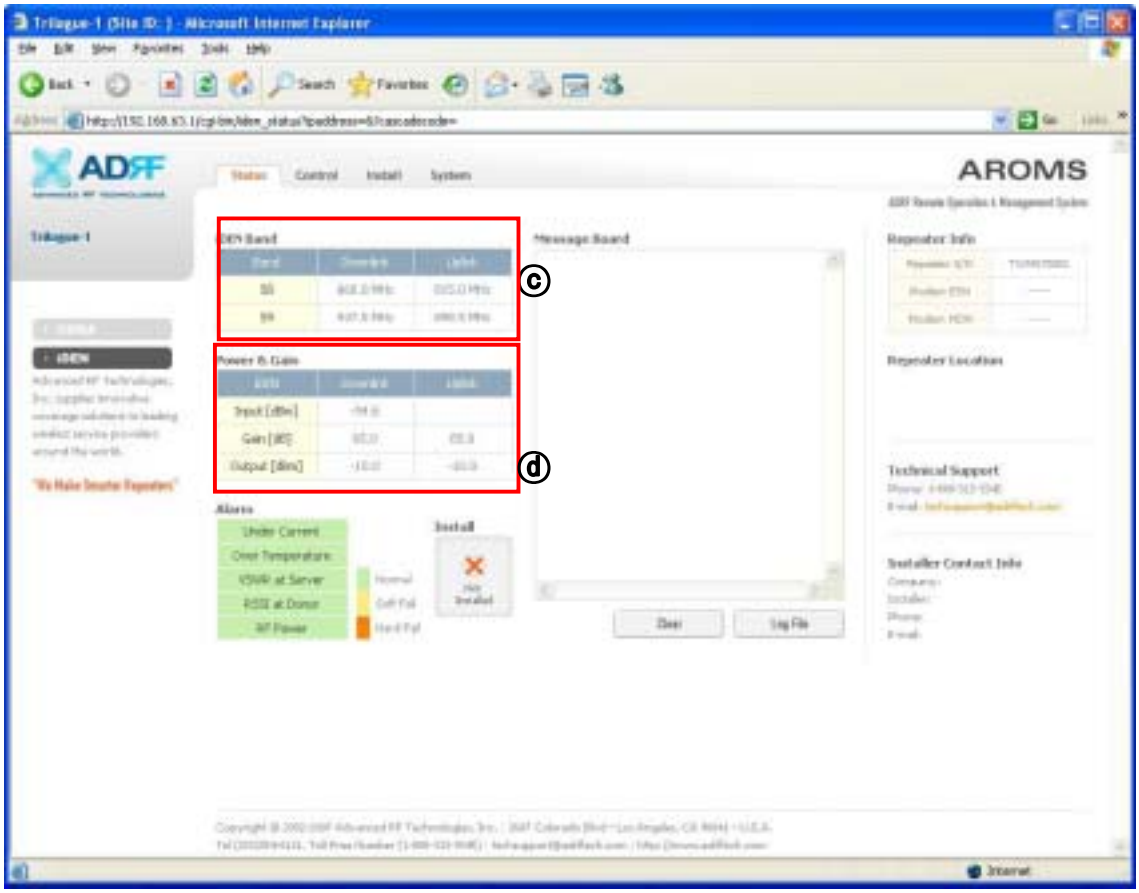
CDMA	DownLink	UpLink
Input [dBm]	-41.0	-97.0
Gain [dB]	65.5	65.5
Output [dBm]	23.8	-10.0

ⓑ

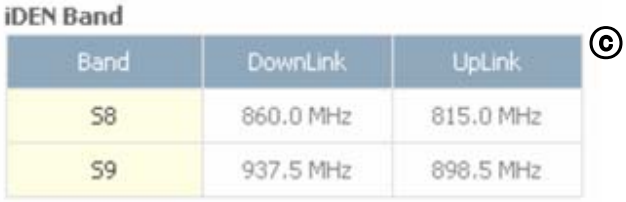
Parameters	Range	Step Size
DL/UL Output Power	-10 ~ 24 dBm	0.1 dB
DL/UL Input Power	-12 ~ -97 dBm	0.1 dB
Gain	40 ~ 80 dB	0.5 dB

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

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



- **iDEN Band**: Will display the center frequencies of the 800 and 900 MHz spectrums on the downlink and uplink respectively.



iDEN Band

Band	DownLink	UpLink
S8	860.0 MHz	815.0 MHz
S9	937.5 MHz	898.5 MHz

ⓒ

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

Power & Gain

iDEN	DownLink	UpLink
Input [dBm]	-45.0	
Gain [dB]	65.0	65.0
Output [dBm]	19.9	-10.0

ⓓ

Parameters	Range	Step Size
DL/UL Output Power	-10 ~ 25 dBm	0.1 dB
DL Input Power	-10~ -95 dBm	0.1 dB
Gain	40 ~ 65 dB	0.5 dB

Table 3 – The displayed value ranges on the iDEN 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 Trilogue-1NM itself. But ‘RSSI at donor’ and ‘RF Power’ are respective alarms for iDEN and CDMA.

- **Message Board (CDMA)**: Will show up to recent 20 log messages for CDMA operation (alarms) & Heartbeats on the CDMA status window.

- **Message Board (iDEN)**: Will show up to recent 20 log messages for iDEN operation (alarms) & Heartbeats on the iDEN status window.

- **Installation (CDMA)**: Will display CDMA repeater’s installation status (Not Installed or Installed).

- **Installation (iDEN)**: Will display iDEN repeater’s installation status (Not Installed or Installed).

- **Repeater Info**: Will display the Trilogue-1NM’s serial number, and location

information (latitude and longitude coordinates).

- **Repeater Location**: Will display the address where the Trilogue-1NM is installed.

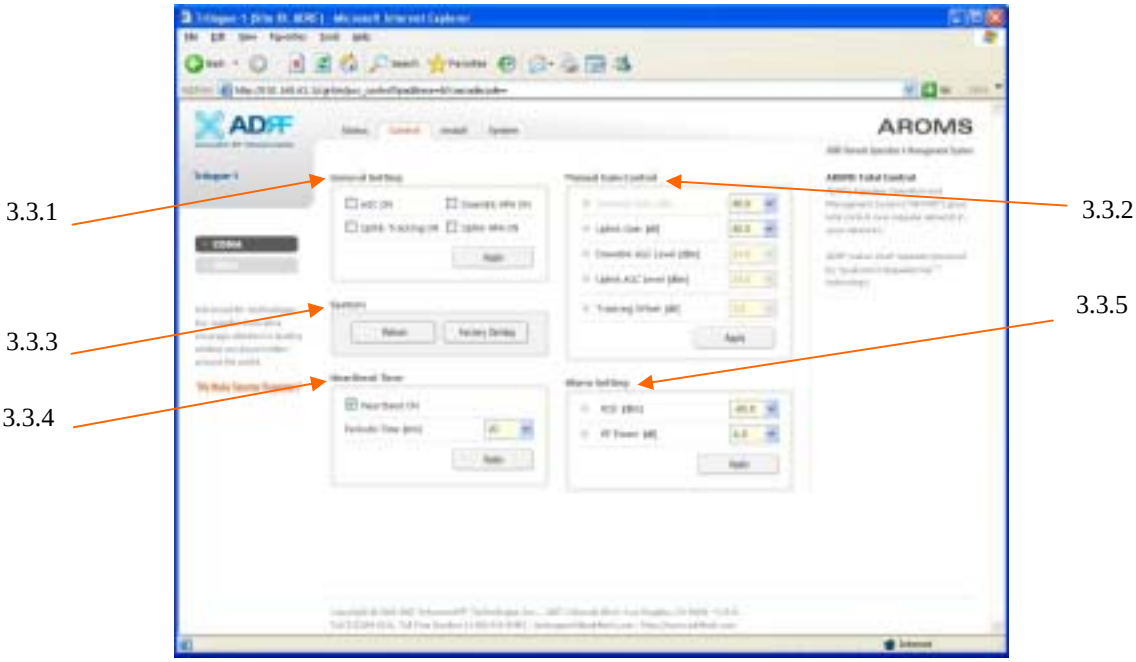
- **Technical Support**: Will display ADRF's technical support contact information.

- **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:



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

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)

iDEN
- 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
  CDMA: 40 to 80 dB @ 0.5 dB step
  iDEN: 40 to 65 dB @ 0.5 dB step

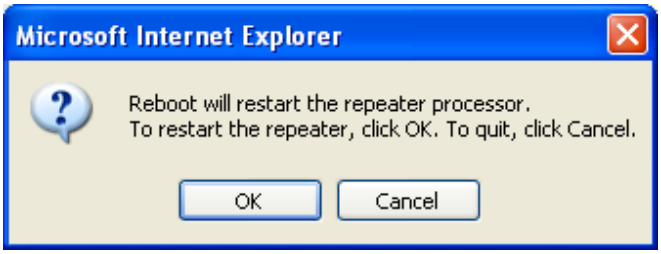
- Uplink Gain Control
  CDMA: 40 to 80 dB @ 0.5 dB step
  iDEN: 40 to 65 dB @ 0.5 dB step

- Downlink AGC Level
  CDMA: 0 to 24 dBm @ 0.5 dB step, default value: 24 dBm
  iDEN: 15 to 25 dBm @ 0.5 dB step, default value: 25 dBm

- Uplink AGC Level
  CDMA: 0 to 24 dBm @ 0.5 dB step, default value: 24 dBm
  iDEN: 15 to 25 dBm @ 0.5 dB step, default value: 25 dBm

- Uplink Tracking Offset
  CDMA: (0 to 10 dB @ 0.5 dB step, default value is 3 dB)
  iDEN: (0 to 10 dB @ 0.5 dB step, default value is 3 dB)

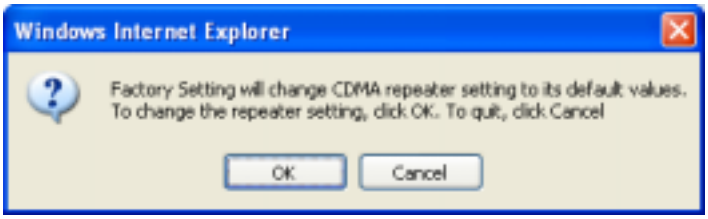
3.3.3 System
- If you click the Reboot button, the following message box will appear:
When the system reboots, the last settings for CDMA and iDEN will be saved.



- If you click the Factory Setting buttons for CDMA and iDEN 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;



When you click the iDEN 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

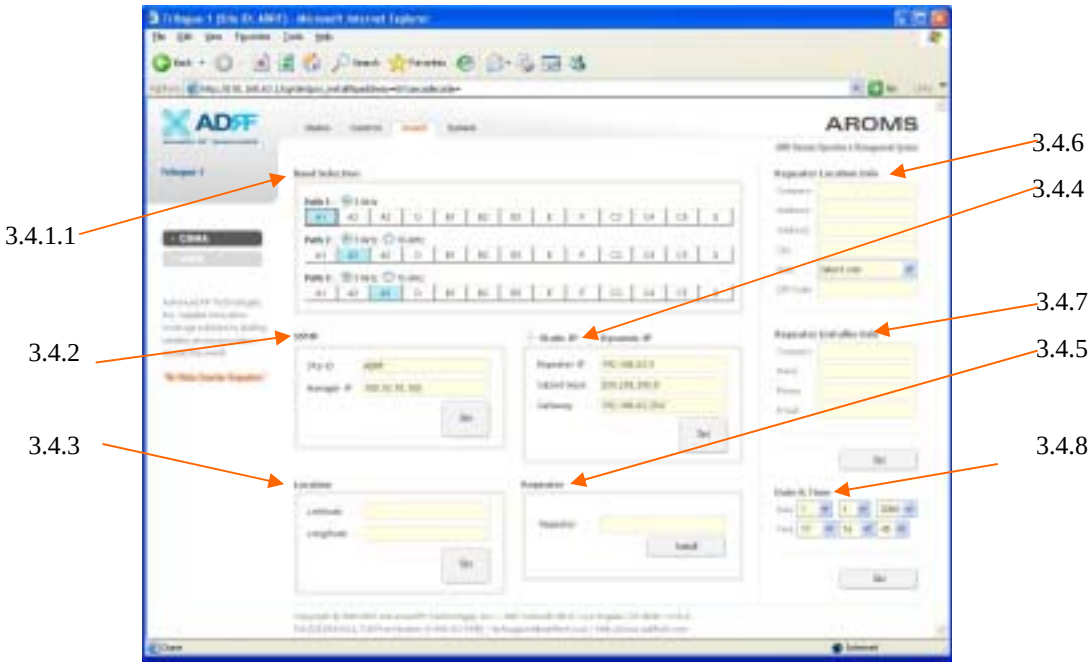
- RSSI Alarm at Donor (-100 ~ -50 dBm @ 0.5 dB step, default value is -85 dBm)
- RF Power Alarm (2 ~ 10 dB @ 0.5 dB step, default value is 6 dB)

iDEN

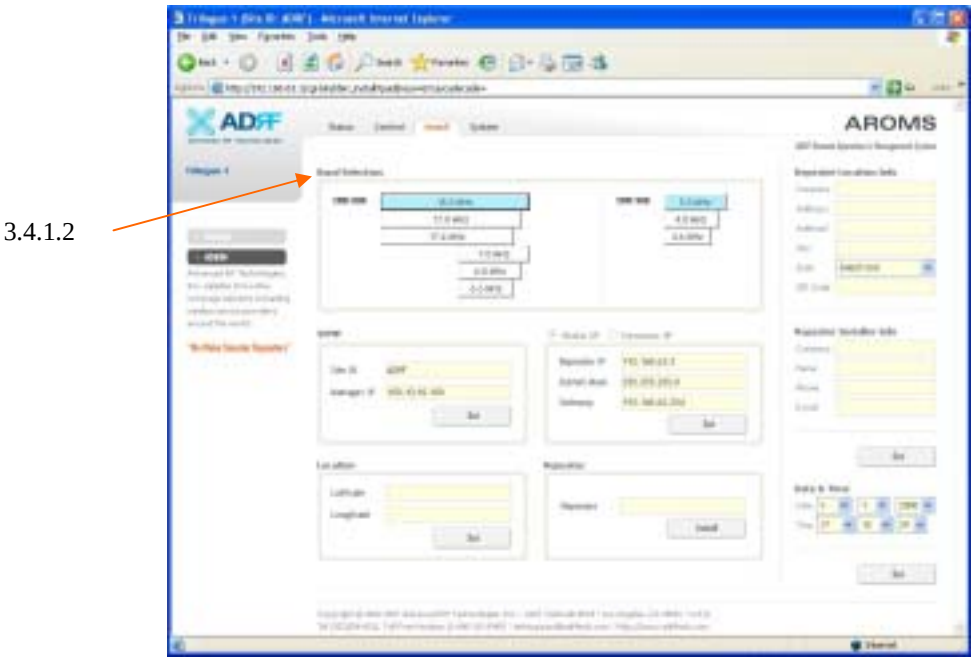
- RSSI Alarm at Donor (-95 ~ -50 dBm @ 0.5 dB step, default value is -75 dBm)
- RF Power Alarm (2 ~ 10 dB @ 0.5 dB step, default value is 6 dB)

3.4 Install

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



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



3.4.1 Band Selection

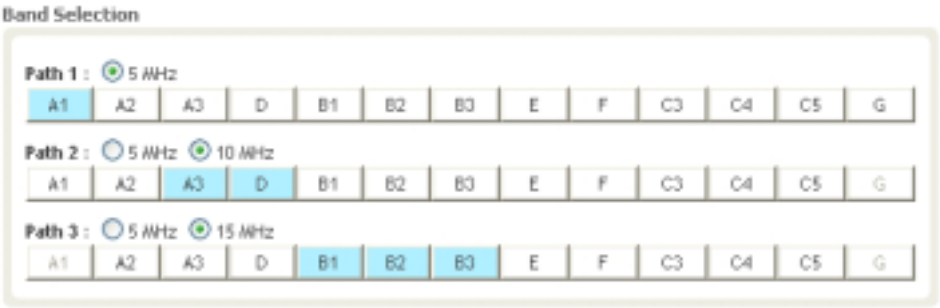
Simply click on the desired operating bandwidth. The selected band will be highlighted in blue. To deselect, click again on the undesired band. The deselected band will turn back gray. Please see below Band Selection screen shot.

3.4.1.1 CDMA Band Selection

The CDMA subsystem of the Trilogue-1NM has three (3) independent RF paths:
Path 1 supports 5 MHz bandwidth;
Path 2 supports 5 or 10 MHz bandwidths; and
Path 3 supports 5 or 15 MHz bandwidths.

One can use only one Path (single band: Path 1, Path 2 or Path 3), any of the two Paths (Two contiguous or non-contiguous sub-bands: Path 1 and Path 2, Path 2 and Path 3, Path 1 and Path 3), or all three Paths (Three contiguous or non-contiguous sub-bands: Path1, Path 2 and Path 3). Therefore, the instantaneous bandwidths that the Trilogue-1NM support are 5, 10, 15, 20, 25 or 30 MHz.

The following Band Selection shows that A1 (5 MHz) is selected in Path 1, A3+D (10 MHz) is selected in Path 2, and the entire B band (15 MHz) is selected in Path 3. With this setting, Trilogue-1NM amplifies A1+A3+B bands.



3.4.1.2 iDEN Band Selection

The iDEN subsystem of the Trilogue-1NM covers dual bands (800 and 900 MHz paths) and can support rebanding via software.
Simply click the desired band. The selected band will be highlighted in blue.
See below iDEN Band Selection screen shot.

SMR 800: There are five (6) bandwidth options:

	DOWN	UP
18.0 MHz	851 ~ 869	806 ~ 824
17.8 MHz	851 ~ 868.8	806 ~ 823.8
17.6 MHz	851 ~ 868.6	851 ~ 823.6
7.0 MHz	862 ~ 869	817 ~ 824
6.8 MHz	862 ~ 868.8	817 ~ 823.8
6.6 MHz	862 ~ 868.6	817 ~ 823.6

SMR 900: There are three (3) bandwidth options:

	DOWN	UP
5.0 MHz	935 ~ 940	896 ~ 901
4.8 MHz	935 ~ 939.8	896 ~ 900.8
4.6 MHz	935 ~ 939.6	896 ~ 900.6

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).

3.4.4 Static IP/ Dynamic IP

Will display the Repeater's Static IP Address, Subnet Mask, and Gateway. This information is necessary when using the Repeater in conjunction with the External Modem Box (MBOX-DET1). Default values are:

Repeater IP: 192.168.63.5
Subnet Mask: 255.255.255.0
Gateway: 192.168.63.254

3.4.5 Repeater

There are two Repeater Install buttons for CDMA and iDEN, 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(or iDEN) 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 Trilogue-1NM 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.

3.4.6 Repeater Location

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

3.4.7 Repeater Installer Info

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

3.4.8 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.

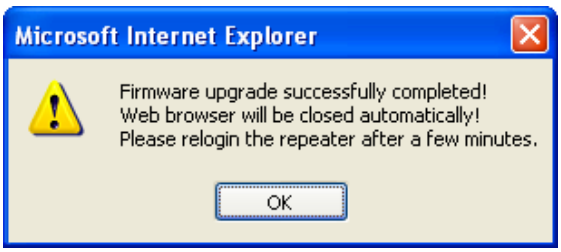
Super-User
Only the Super-User can add, delete and modify a user. The following window illustrates how a new user can be added by simply clicking on New Account.

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 in done, you will see the following pop-up window.



4. Maintenance Guide for Trilogue-1NM

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 Trilogue-1NM 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

A.1 Electrical Specifications

Parameters		Specifications			Remarks
		SMR800/900		PCS1900	
Frequency Range	Downlink	SMR800	851~869 MHz	1930~1995 MHz	
		SMR900	935~940 MHz		
	Uplink	SMR800	806~824 MHz	1850~1915 MHz	
		SMR900	896~901 MHz		
Frequency Error		≤ ±0.05 ppm		≤ ±0.05 ppm	
Band Selection		N/A		5/10 MHz+5/15 MHz +5 MHz	
Band Reconfiguration	Downlink	851~869 MHz ➔ 862~869 MHz		N/A	
	Uplink	806~824 MHz ➔ 817~824 MHz			
Adjustable band edge	SMR800 Downlink	Default: 869 MHz Adjust: 868.8 MHz, 868.6 MHz		N/A	
	SMR900 Downlink	Default: 940 MHz Adjust: 939.8 MHz, 939.6 MHz			
Gain Flatness	Full band	≤ ±1.25 dB		≤ ±1.25 dB	
	Each band	≤ ±1.25 dB		≤ ±1.25 dB	
Gain	Maximum	65 dB		80 dB	
	Step	0.5 dB		0.5 dB	
	Range	25 dB		40 dB	
	Tolerance	≤ ±0.5 dB		≤ ±0.5 dB	
Output	Downlink	25 dBm		24 dBm	Composite power
	Uplink	25 dBm		24 dBm	
ALC (SQE Degradation)		≤ 20% @25 dB ALC		N/A	
		≤ 10% @15 dB ALC			
AGC Control Error		N/A		AGC ± 0.5 dB	
Spurious emissions		≤ -15 dBm			
OIP3		≥ 45 dBm		N/A	
Inter modulation		≤ -105 dBm		N/A	
Roll offs		> 65dBc @ 0.5 MHz outside Passband		> 50 dBc @ 1 MHz outside passband	
Delay		≤ 8 us		≤ 5 us	

Noise Figure	≤ 8 dB @max gain	≤ 4.5 dB @max gain	
VSWR	≤ 1.5:1	≤ 1.5:1	
Coupling for Modem		15 ± 2 dB	

A.2 Mechanical Specifications

Parameters		Specifications	Remarks
Cabinet		Wall Mounting	
Casing Class		IP 20 Minimum	Indoor Type
Weight		72.75 lbs	
Size		13.95 x 19.5 x 10.58 Inches	
Color		7414B	
Connector Type	Input/output	N Female	
	Ethernet	RJ45 Female	
	Frame ground	Hex Nut(M6)	
Cooling		Air Convection	
Rack Mount Bracket		19”	Provide an option
Plenum Option		Plenum rated device	Provide an option

A.3 Environmental Specifications

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

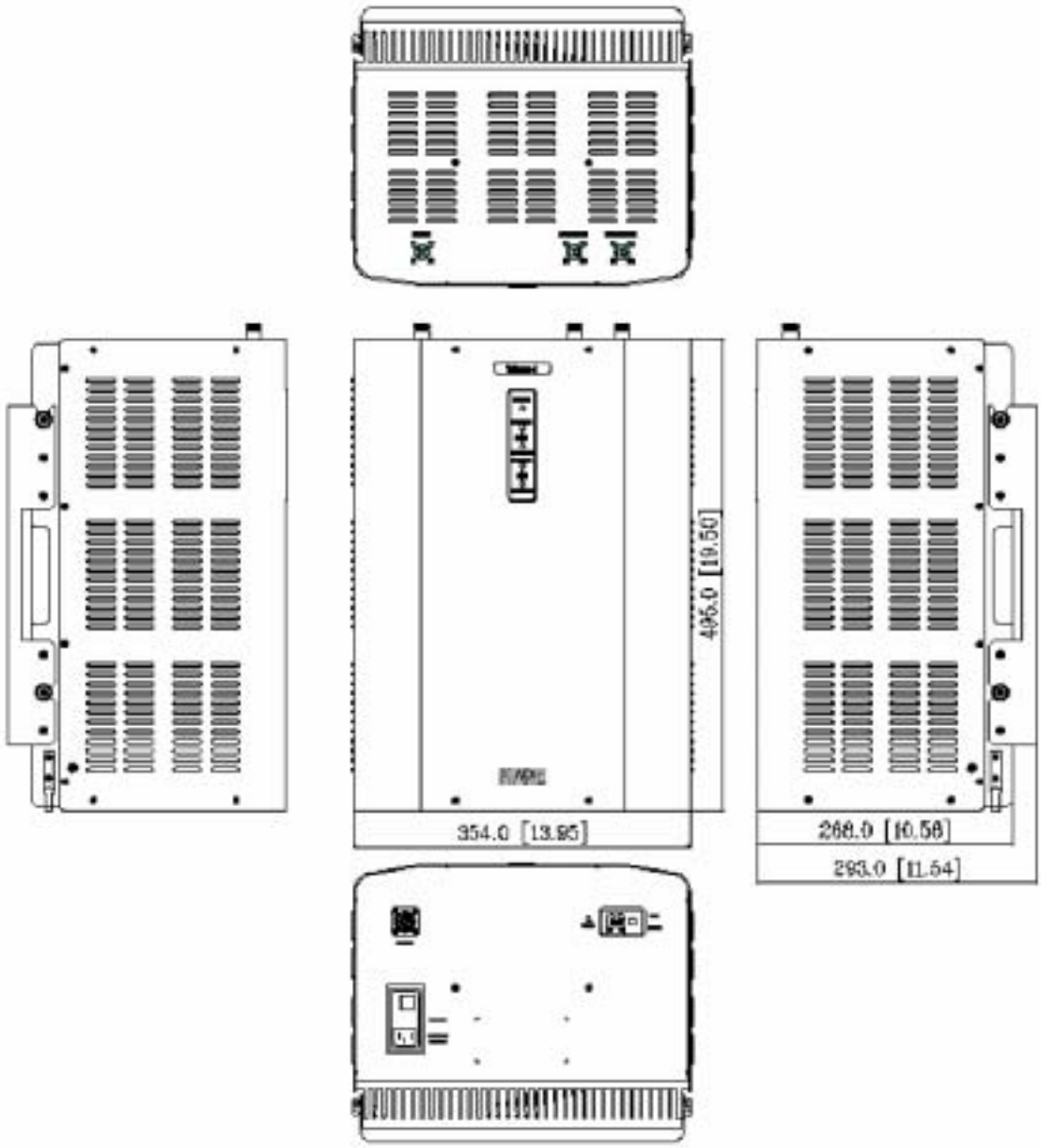
A.4 Power Specifications

Parameters	Specifications	Remark
AC Power	100~130 VAC	
AC Frequency	45~65 Hz	
AC Supply Protection	Fuse	
DC Power Option	-40 ~ -60 VDC or +20 ~ 30 VDC	Change Power Supply Module
Power Consumption	≤ 205 W	
Ground	External threaded stud	

A.5 Other Specifications

Parameters	Specifications	Remarks
MTBF	> 100,000 hours	
Certificates	UL 60950	
	FCC CFR47 part 24	
	FCC CFR47 part 15	
	FCC CFR47 part 90	
Warranty	5 Years	

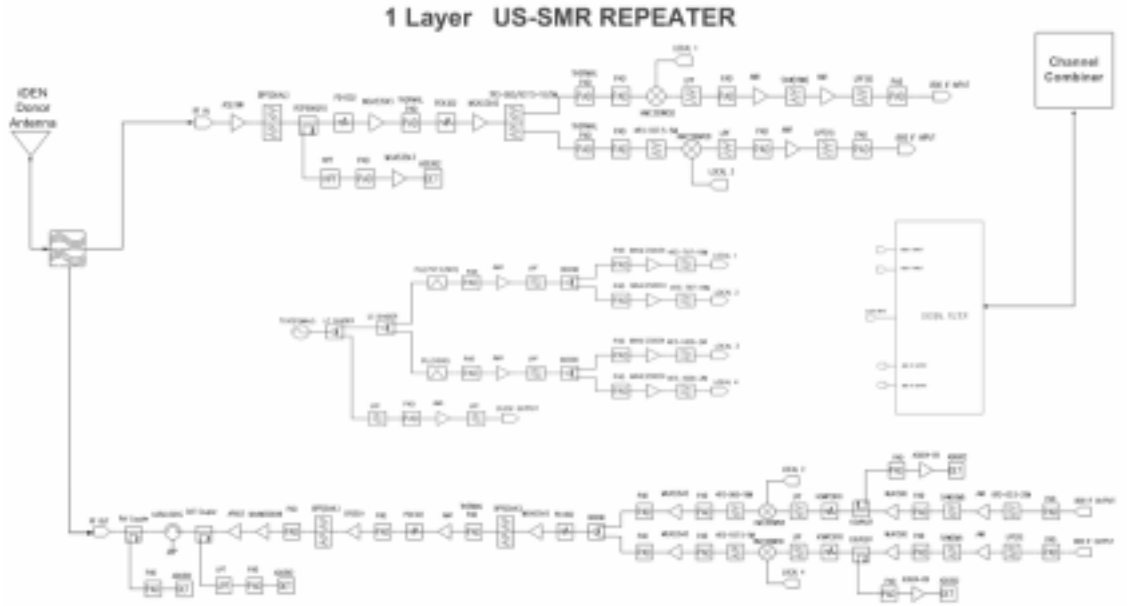
Appendix B: Mechanical Drawing



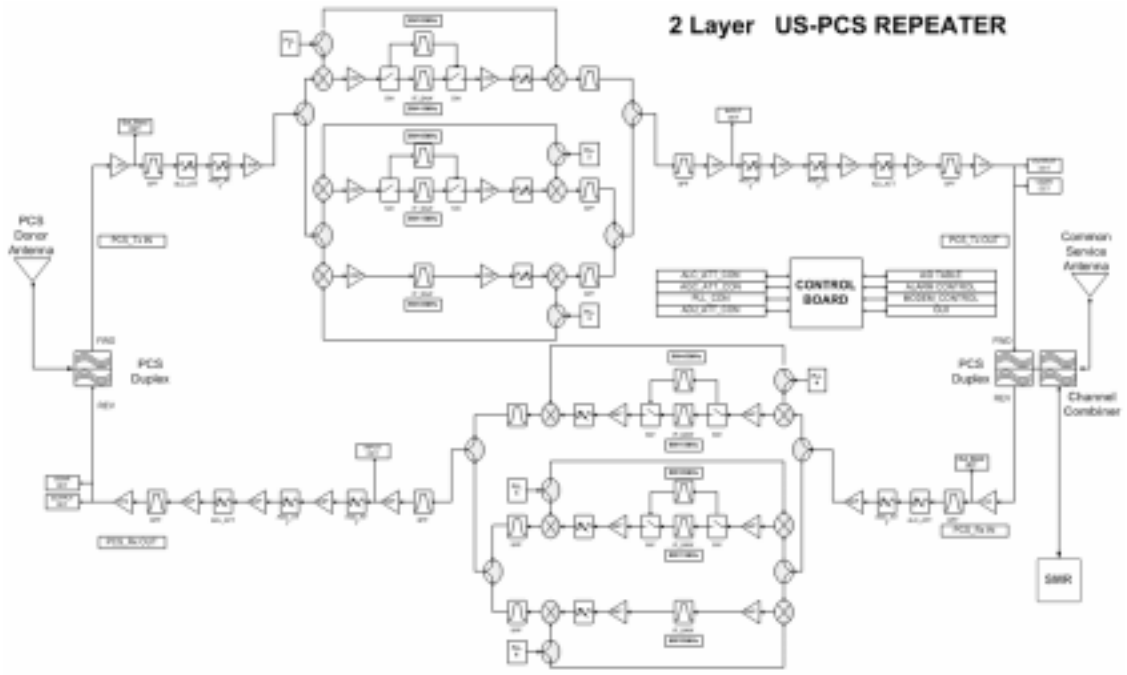
Appendix C: Trilogue-1NM Overview

C.1 Block Diagram

- 1 Layer [iDEN] -

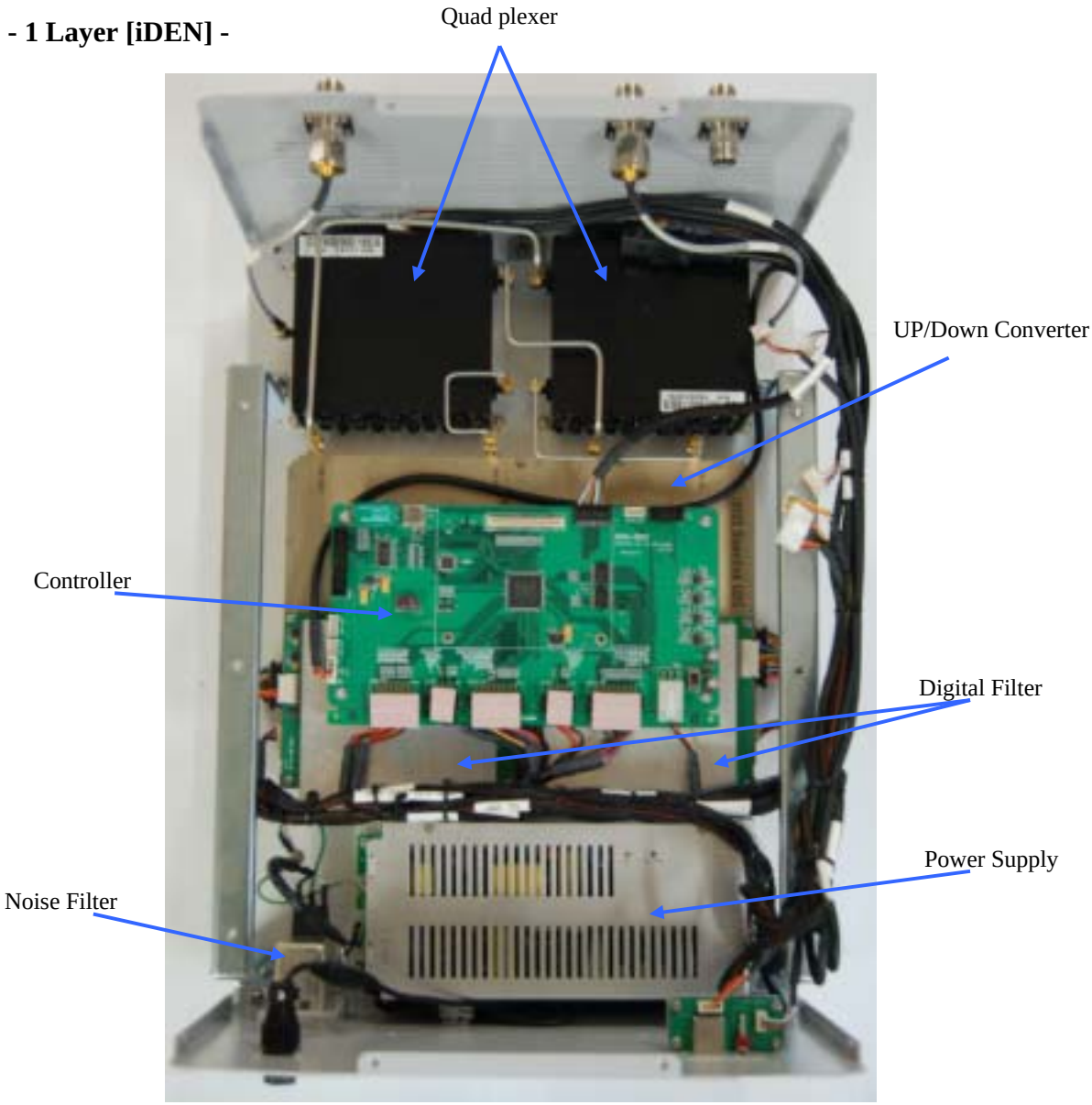


- 2 Layer [CDMA] -

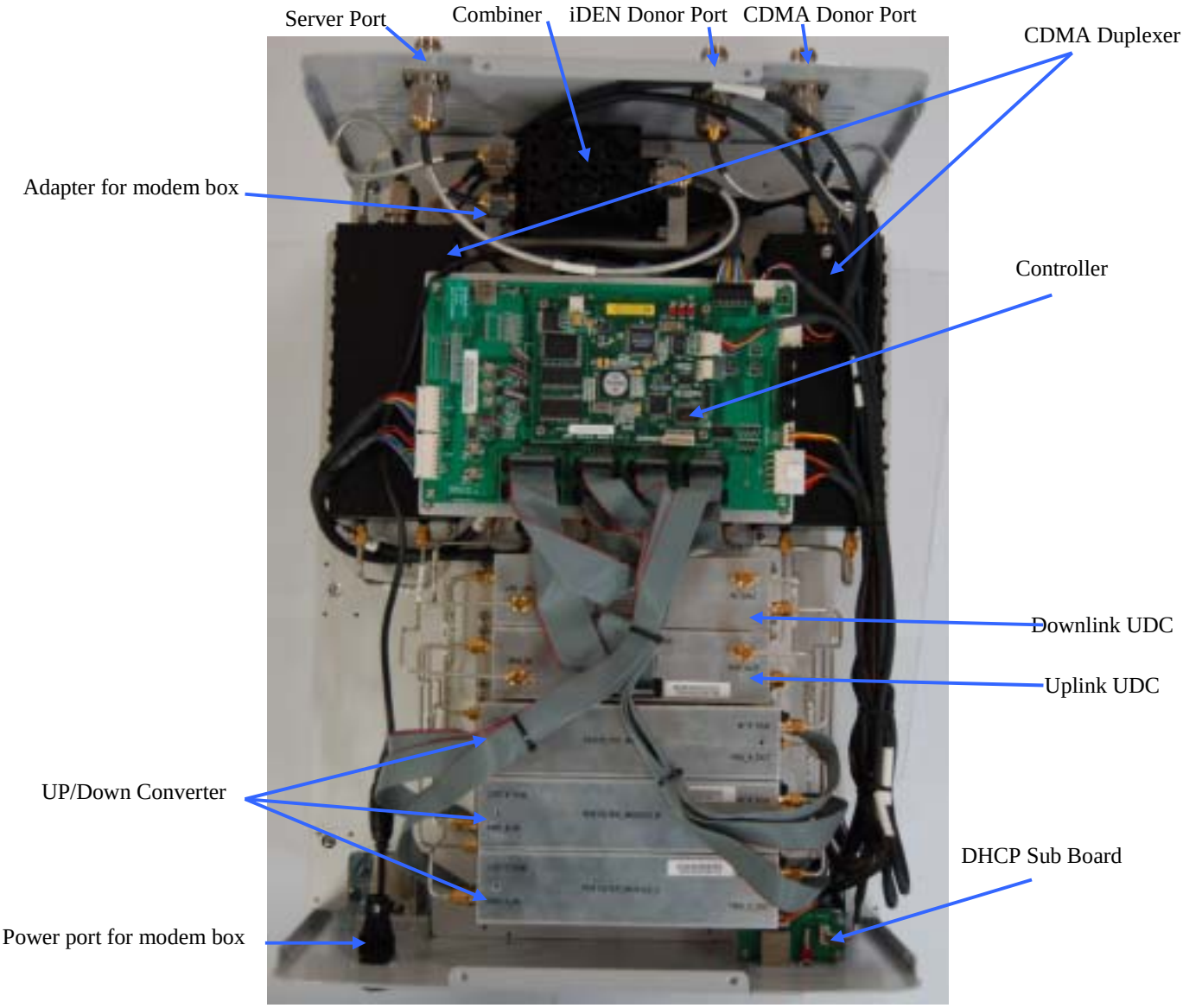


C.2 Components

- 1 Layer [iDEN] -



- 2 Layer [CDMA] -


Server Port
Combiner
iDEN Donor Port
CDMA Donor Port
CDMA Duplexer
Adapter for modem box
Controller
Downlink UDC
Uplink UDC
UP/Down Converter
DHCP Sub Board
Power port for modem box

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 Converter Module

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 Converter Module

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): PCS TX (1930 ~ 1995 MHz) & RX (1850 ~ 1915 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 Box Adapter

Adapter for modem box