

AEON-9030 RF Repeater User Manual V1.0

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

Revision History for Hardware

Version	Author	Description	Date
1.0	Digital Part	First Generation.	$J_{\rm M}J_{\rm M} = 1 - 2000$
1.0	RF Hardware	First Generation.	July 1, 2009

Revision History for Firmware

Version	Author	Description	Date
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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
А	1	AEON-9030 Repeater
В	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



Figure 5: AC Power Switch

Figure 6: 110/200V Select Switch

- Selector switch

©

See installation instructions before connecting to the supply

ON OFF BATT. BATT. BATT (SS-209)

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	S	Specifications
	Repeater On	Green LED on
LED	Repeater Off	Green LED off

• DC-ALARM LED

Parameter	S	Specifications
	Normal	LED off
LED	Soft fail	Green LED on
	Hard fail	Red LED on
Conditio	on for Alarm	Current > 9A (Hard Fail)
Act	tivation	Current < 2A (Soft Fail)
After Ala	rm Activation	Full Spectrum (PCS/Cellular) shutdown



• OVER POWER LED

Parameters	5	Specifications
	Normal	LED off
LED	Soft fail	PCS/ Cellular Green LED on
	Hard fail	PCS/ Cellular Red LED on
Condition for AlarmSoft failActivationHard fail	Soft fail	Max power +1 <measured <="" max<="" output="" td=""></measured>
	Soft fall	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
		The function associated with the alarm shuts
	Hard fail	down, and the shutdown process goes into
		effect

• AGC LED

Parameter	S	Specifications
LED	AGC On	PCS / Cellular Green LED On
LED	AGC Off	PCS / Cellular LED Off

• OSC LED

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

MANUAL LED

Parameter	S	Specifications
LED	Manually HPA Off/On	PCS / Cellular Green LED On
LED	Factory set or Reboot	PCS / Cellular Green LED Off

• RSSI LED BAR

Paramet	ers	Specifications
	Input < -75dBm	PCS / Cellular All LED Off
	Input < -65dBm	PCS / Cellular one LED On
LED	Input < -55dBm	PCS / Cellular two LED On
LED	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.
- O 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 reenters, 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 $13 \sim 15$ 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 $103 \sim 105$ 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.

ondarg	General Alternate Configuration	
Connect using:	You can get IP settings assigned au	tomatically if your network supports
Realtek RTL8168B/8111B Family PCI-E GBE NIC	this capability. Otherwise, you need for the appropriate IP settings.	l to ask your network administrator
<u>C</u> onfigure	Obtain an IP address automati	cally
nis connection uses the rollowing items:	Use the following IP address:	
Image: Second Seco	IP address:	1
Brile and Printer Sharing for Microsoft Networks	Subnet mask:	
Internet Protocol Version 6 (TCP/IPv6) Internet Protocol Version 4 (TCP/IPv4)	Default gateway:	1
Link-Layer Topology Discovery Mapper I/O Driver Link-Layer Topology Discovery Responder	Obtain DNS server address au	tomatically
	Use the following DNS server a	addresses:
Install Uninstall Properties	Preferred DNS server:	1. 14 . 4
Description	Alternate DNS server:	
Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks		Ad <u>v</u> anced

** 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:

The server 211.232.	
The server 211.232.	
Warning: This server	.62.4 at ADRF REPEATER requires a word. In is requesting that your username and
without a secure cor	administration (basic sacronacado)
Password:	
	Remember my password

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:



Login

** 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

Neon-9030(Site ID: ADRF) - N	Windows Internet Expl	orer					•
• # http://192.10	68.63.1/cgi-bin/status	ripaddress=&1	cascadecode=	- 4	f 🗙 Google		
🔗 🌈 Acon-9030(Site	e ID: ADRF)				🖞 • 🖻 • 🖶	* 🕞 Page * 🍥 Ti	ols
ADF	Status Cont	rol Install	System H	p Logout	A	ROMS	
OVANCED RF TECHNOLOGIES					ADRF Remote Operat	ion & Management System	
eon-9030	PCS Band			lessage Board	Repeater Info		
ite ID : ADRF	Dand	Downlink	Uplink		Repeater S/N	000000000	
	3.75MHz	1932.50MHz	MHz 1852.50MHz Aeou-920 Service Initiated	Lattude			
	8.75MHz	1945.00MHz	1865.00MHz	\cup	Longibude		
PCS	13.79MHz	1957.50MHz	1877.50MHz		Firmware	Ver. 1.A.A.00.16	
- Condition				1	web GUI	Vec 1.0.21A	
discond BE Turbushesis	Power & Gain PCS	Downlink	Uplink		Modem I-fr		
c, supplies innovative	Input [dBm]	-20.0	-20.0		Piodelli 100		
overage solutions to leading	Gain [d9]	50.0	50.0	(c)	Repeater Loca	ition	
round the world.	Output [dBm]	30.0	30.0	O			
Wireless Coverage	Peak Detector	2010					
Has Never Been So Easy	[dBm]	30.0	30.0				
	Alarm				Phone: 1-800-313	9045	
	Over/Under Current Sy		nthesizer Lock	4. F.	E-mail: techsuppo	rt@adrftech.com	
	Voltage Out of R	ange	Oscillation		A		
	Over/Under Tempe	rature	RF Power	Clear Log Pile Alarm History	Installer Cont	act Info	
	Power Supply		VSWR		Company:		
			o y a veni ridik	X Modem	e		
	Downlink			Not Stabled Power	e-mail		
	Signal Low	Sign	al Not Detected		-		
	Normal	Soft Fail	Hard Fail				
	Copyright @ 2002-20	07 Advanced RF	Technologies, Inc.	7 Colorado Blvd + Los Angeles, CA 90041 + U.S.A.			
	Tel (323)254-8131, To	I Free Number ()	1-800-313-9345) tech	pport@adrftech.com http://www.adrftech.com			

Cellular Repeater Status

	Status Con	trol Install	System H	lelp Logout		A	ROMS
OVANDED RF TECHNOLOGIES				-		ADRF Remote Operatio	n & Management System
eon-9030	Cellular Band			llessage Board		Repeater Info	
Ite ID : ADR	Dand	Downlink	Uplink	(b)		Repeater S/N	000000000
	A"+A+B+A'+B'	881.50MHz	836.50MHz	Aeon 9000 Service Initiated	~	Lattude	
) PCS		***				Longitude	
Cellular	Power & Gain			-		Firmware	Ver. 1.A.A.00.16
	Cellular	Downlink	Uplink			Web GUI	Ver. 1.0.21A
duanced RE Technologies	Input [dBm]	-100.0	-100.0			Modem Info	
nc. supplies innovative	Gain (dB)	90.0	90.0	(C)		riodentano	
overage solutions to leading vireless service providers	Output [dBm]	-10.0	-10.0	Ŭ		Repeater Local	tion
round the world.	Peak Detector	10.0	10.0				
Wireless Coverage	[dBm]	-10-0	-1000				
Has Never Been So Easy	Alarm						
	Over/Under Cu	rent Syr	nthesizer Lock		-	Technical Supp	ort
	Voltage Out of R	lange	Oscillation	4.	b.	E-mail: techsuppor	t@adrftech.com
	Over/Under Temp	erature	RF Power			a	
	Power Suppl	y	VSWR	Clear Log File	Alarm History	and taller Conta	ct Info
		1	System Halt			Company:	
	Downlink			Modern	2-	(e)	
	Signal Low	Sign	al Not Detected	Not Stabled	Power	\mathbf{O}	
	Normal N	Call Fail	and the	Indianed			
	PAGE FIGH	Sort Par	Card Par				
	Copyright @ 2002-20 Tel (121)254-8111, Te	07 Advanced RF	Technologies, Inc	507 Colorado Blvd - Los Angeles, CA 90041 - L support/Badiffech.com http://www.adiffech.	com		



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.)

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.

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.

PCS	Downlink	Uplink
Input [dBm]	-20.0	-20.0
Gain [dB]	50,0	50,0
Output [dBm]	30.0	30.0
Peak Detector	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

Aeon-9030(Site ID: ADRF) - V	Vindows Internet Explorer					
🚱 🔾 🔻 🔊 http://192.16	8.63.1/cgi-bin/control?ipaddress=	&?cascadecode=		▼ 4	🕈 🗙 Google	۶ -
😭 🏘 🏈 Aeon-9030(Site	ID: ADRF)				🟠 🔹 🖾 👻 🖶 🔹 🔂 <u>P</u> age 🕶 🍈 T <u>o</u> r	ols 🔻 🦥
Acon-9030 Site ID : ADRF Acon-9030 Site ID : ADRF Collidar Advanced RF Technologie Inc. supplies innovative Collidar Advanced RF Technologie Inc. supplies innovative Collidar Mireless Coverage Has liever Been So To To	Status Control Instal General Setting AGC ON Downlink Uptink HP System Reboot F Heartheat Time Heartheat Time Heartheat ON Periodic Time [min] Copyright © 2002-2007 Advanced R Tel (323)254-8131, Tol Free Number	HPA ON A ON A ON Apply F Technologies, Inc. (1-800-313-9345) tec	Help Logout Manual Gain Control Downlink Gain [dB] Downlink Gain [dB] Downlink AGC Level [dBm] Uptink AGC Level [dBm] Downlink Signal Low [dBm] Downlink Signal Low [dBm] Downlink Signal Not Detected [dBm] Downlink RF Power [dB]	50.0 50.0 50.0 30.0 Apply -80.0 -90.0 6.0 U.S.A. h.com	ARRE Remote Operation & Management System AROM'S Total Control Control Control Control over repeater elements in your networks.	
Done				Internet Pro	otected Mode: Off 🔍 🔍 100%	•

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

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

(a) General Setting

AGC ON	Downlink HPA ON
	D Uplink HPA ON
	Apply

- 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.

(b) 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.

(d) Heartbeat Time

- Heartbeat is disabled.

(e) 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)

0	Downlink Signal Low [dBm]	-80.0 👻
(8)	Downlink Signal Not Detected [dBm]	-90.0 🔻
8	Downlink RF Power [dB]	6.0 -
		Apply



3.4 Repeater Install

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

eon-9030(Site ID: ADRF) - V	Vindows Internet Explorer	
http://192.16	8.63.1/cgi-bin/install?ipaddress=&?cascadecode=	• • • K Google
🕸 🌈 Acon-9030(Site	ID: ADRF)	👌 👻 🔝 👻 📾 💌 🕞 Page 🕶 🎯 Tools 🕶
	Status Control Install System Help Logout	AROMS
con-9030	Band Selection	ADEF Remote Operation & Management System Repeater Location Info
E IU : AURP	Channel Bandwidth Channel 1	Company Channel 3 Address
PCS	Channel 1 10.00 • A1 A2 A3 CAN	D Address2
Collular	Channel 3 12.50 Bi B2 B3	Cty
Ivanced RF Technologies.	16.25 E 22 450 177 500 575 550 575 400 425 450 477 700	2 725 790 775 800 ZIP Code
c. supplies innovative verage solutions to leading	18.75 • 825 856 875 900 925 950 975 1000 1025 1050 1075 110	1123 1130 1173
reless service providers ound the world.		Company Company
ireless Goverage Int Never Been Sa Easy	SNMP Modem Box Settings :	d
	Site ID ADRF Repeater IP Subnet Mask	E-mail
	Gateway	
		Set Set
		Date & Time
	Location Auto Installation	Time 23 • 0 •
	Latitude Progress(PCS)	
	Set	Install Set
	Copyright @ 2002-2007 Advanced RF Technologies, Inc. 2607 Colorado Bivd - Los Angeles, CA 90	0041 · U.S.A.

Cellular Install





(a) PCS Band Selection

Band Selection

Channel	Bandwidth						: Cha	nnel	1		: Cha	nnel 2	2		: Cha	nnel 3	3
Channel 1	10.00 🔺	Ē.	A1			F	A2			F	A3			F	D		
Channel 2 Channel 3	11.25	25	50	75	100	125	150	175	200	225	250	275	399	325	850	375	40
	13.75	-	81			1	82			-	83			1	E		
	15.00 16.25 ≡	425	450	475	500	525	550	575	600	625	650	675	700	725	750	775	80
	17.50		F			ŧ.,	C3			1	C4			1	C5	- 11	
	18.75 -	825	850	875	900	925	950	975	1000	1025	1050	1075	1100	1125	1150	1175	

- 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

	17		22	$x = -\alpha$		64 - C
"+ A+R+ A'+R"	$\Delta^{m} + \Delta$	Δ	B	$\Delta^{in} + \Delta + \Delta^{i}$	$\Delta + \Delta^{v}$	R+R ⁱ

Simply click on the desired operating bandwidth.

(b) 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

Latitude	
Longitude	
	6
	Set

(d) 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

(e) 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.

Progress	(PCS)	
		Install

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	Location Info
Company	

Company		
Address1		
Address2		
City		
State	Select one	•
ZIP Code		

(2) Repeater Installer Info

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

Company	
Name	
Phone	
E-mail	
1	Set

(h) **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:

ADVANCED RF TECHNOLOGIES	Status Co	ontrol Install <mark>S</mark> i	ystem Help	Logout		ADRF Remote Operation & Management System
Epoch-H Site ID : ADRF	Account Manag	gement / New account	/ Administrator			Our mission is to make repeaters.
	No	Login Name	Password	Status	Edit	smarter so that they can seamlessly and flawlessly be integrated into wireless
Advanced RE Technologies.	1	admin	admin	administrator	1.21	networks,
Inc. supplies innovative	2	adrf	adrf	member	delete	At ADRF, we take great pride in providing innovative and cost-efficient
wireless service providers around the world.						coverage solutions so that everyone can be heard everywhere at anytime.
Wireless Coverage						

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.

AD9F	Status Control Install System Help Logout	AROMS
ADVANCED RF TECHNOLOGIES		ADRF Remote Operation & Management System
Epoch-H Site ID : ADRF	Account Management / New account / Administrator	Our mission is to make repeaters smarter so that they can seamlessly and
Advanced RF Technologies, Inc. supplies innovative coverage solutions to leading wireless service providers around the world. Wireless Coverage Has Never Reen Sp Easy	New User Name Password Confirm password	Rawlestly be integrated into wireless networks. At ADRF, we take great pride in providing innovative and cost-efficient coverage solutions so that everyone
	Please add a new login name and password	can be heard everywhere at anytime.
	Apply Cancel	

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

	Status Control Install System Help Logout	AROMS
ADVANCED RF TECHNOLOGIES		ADRF Remote Operation & Management System
Epoch-HC-10AF Site ID : ADRF	Account Management / New account / Administrator	Our mission is to make repeaters smarter so that they can seamlessly and
Advanced RF Technologies, Inc. supplies innovative coverage solutions to leading wireless service providers	New Administrator Password Confirm password	Rewlessly be integrated into wireless networks. At ADRF, we take great pride in providing innovative and cost-efficient coverage solutions so that everyone
around the world. Wireless Coverage Has Never Been So Easy	Please enter new super user name and password	can be heard everywhere at anytime.
	Apply Cancel	



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.

	Status	Control Install	System Help	Logout	AROMS
ADVANCED RF TECHNOLOGIES					ADRF Remote Operation & Management System
eon-9030	User Log				
ite ID : ADRF	Number	Date	Username	Log Message	Our mission is to make repeaters
	1	06/29/2009 23:02:08	admin	[Cellular]DL/UL HPA Set On	smarter so that they can seamlessly and flawlessly be integrated into wireless
	2	06/29/2009 23:02:08	admin	[Cellular]AGC Set On	networks.
	3	06/29/2009 23:02:03	admin	[PCS]DL/UL HPA Set On	At ADRF, we take great pride in
dvanced RF Technologies,	4	06/29/2009 23:02:03	admin	[PCS]AGC Set Off	providing innovative and cost-efficient
nc, supplies innovative overage solutions to leading	5	06/29/2009 23:00:43	admin	[Cellular]Set 1st Band to Band : A"+A+B+A'+B'	coverage solutions so that everyone can be heard everywhere at anytime.
vireless service providers	6	06/29/2009 23:00:22	admin	[PCS]Set 3rd Band to Band : 13.75MHz	
round the world.	7	06/29/2009 23:00:16	admin	[PCS]Set 2nd Band to Band : 8.75MHz	
Wireless Coverage	8	06/29/2009 23:00:11	admin	[PCS]Set 2nd Band to Band : 7.50MHz	
Has never been ov casy	9	06/29/2009 23:00:09	admin	[PCS]Set 2nd Band to Band : 7.50MHz	
	10	06/29/2009 23:00:00	admin	[PCS]Set 3rd Band to Band : 18.75MHz	
	11	06/29/2009 22:59:55	admin	[PCS]Set 2nd Band to deselecte	
	12	06/29/2009 22:59:51	admin	[PCS]Set 2nd Band to Band : 18.75MHz	
	13	06/29/2009 22:59:46	admin	[PCS]Set 1st Band to Band : 3.75MHz	

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.

VANGED RF TECHNOLOGIES	Account User Log F/W Update	ADRF Remote Operation & Management Syste
och-H	Firmware Update	
e ID : ADRF	File Name Browse	Our mission is to make repeaters smarter so that they can seamlessly and Rawlessly, be integrated into wireless networks.
ivanced RF Technologies, supplies innovative verage solutions to leading veless service providers pund the world.	Click Upgrade to update the repeater firmware, or click Cancel to abort the upgrade	At ADRF, we take great pride in providing innovative and cost-efficient coverage solutions so that everyone can be heard everywhere at anytime.
reless Coverage las Never Been So Easy		
	Windows Internet Explorer	x
	Windows Internet Explorer Image: Second	×



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)



- 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.



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

<u>Double-Click</u> Network Connections → <u>Right-Click</u> Local Area Connection → <u>Left-Click</u> Properties → Scroll down to the bottom of the list → <u>Double-Click</u> 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.



General					
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.					
O <u>O</u> btain an IP address automatically					
☐ Use the following IP address: —					
IP address:	192.168.63.2				
S <u>u</u> bnet mask:	255.255.255.0				
Default gateway:	· · ·				
C Obtain DNS server address automatically					
─● Use the following DNS server add	Use the following DNS server addresses:				
Preferred DNS server:					
Alternate DNS server:	· · ·				
Ad <u>v</u> anced					
	OK Cancel				

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.



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 <u>Super-User</u>, please type in your assigned username & password which you should have received from the <u>Super-User</u>. 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:



Login

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).



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5.2 Troubleshooting Guide for Repeater

Alarm	Status	Parameter			Troubleshooting
VSWR	Hard Fail	VSWR Over 3:1		 Make sure connectors are tight at each port. Sweep lines. 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.) 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. 	
	Soft Fail	UL/DL	31dBm~32dBm	>Max Output Power+1dB	 Check Input/Gain/Output values in the Status Page' Check Input Level (If the input exceeds the more roted power odd on Attenuate to the
Over Power	Hard Fail	UL/DL	Output Power +33dBm	> Max Output Power +3dB	 input/ Donor port) 3. Check whether AGC is On (In the case of UL Shutdown, make sure that Tracking is OFF) 4. Factory Setting & Reboot
RF Power	Soft Fail		Invalid Output Level of Gain		 Check whether Input/Gain/Output are invalid. From the Control page, check the Alarm Settings.



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



Connectivity Issue	Unable to Interface to repeater with GUI Software.	 Please verify under 'Device Manager' of Windows that the necessary drivers for the USB to serial adapter are installed. Be sure to use the GUI software from the CD that came with the repeater. If for some reason the CD is not available, contact 24HR tech support to acquire the appropriate one. 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. 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. 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. 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 1-800-313-934	5 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

	Parame	eters	Specification	Comments
		Down Link	869 - 894MHz	
*Frequency	Cellular	Up Link	824 - 849MHz	
Bands	DCC	Down Link	1930MHz ~ 1990MHz	
	PCS	Up Link	1850MHz ~ 1910MHz	
Mar DE auto		Down Link (Max)	30dBm / 3FA	
Max KF outp	ut power	Up Link (Max)	30dBm / 3FA	
(Cellular Sul	o 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)
PC	S Band Sele	ect Feature	1~3 selectable bands Selectable in blocks of 1.25~18.75 MHz	1FA=1.25MHz
Down Link		Down Link	-60dBm/Typ, -30dBm/Max	
Max RF inpu	it power	Up Link (Max)	-60dBm/Typ, -30dBm/Max	
Ga	ain Adjusta	ble Range	30dB(0.5dB/Step)	
Noise Figure(Reverse)		(Reverse)	5.5dB @max gain	
System Delay		Delay	5.5 µs (max)	
	Input VS	SWR	1.5 : 1 (max)	
	Rho		12.5% (max at 16/64 QAM)	
	Gair	1	90dB (max)	
	Passband l	Ripple	±1.5dB	
Filter Out of Band		Cellular	> -35dBc @±0.5MHz >-60dBc @±1MHz	
Attenuation		PCS	> -60dBc @±1MHz	
Freq Error		Cellular	± 300 Hz	
rieg Enor		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	А	
	4	880~890MHz	В	
2 BAND Selection	1	869~880MHz, 890~891.5MHz	A"+A, A'	
	2	870~880MHz, 890~891.5MHz	Α, Α'	
	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 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	$\leq 350 \text{ W}$	
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







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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).