AW100 Series

CDMA2000 1xRTT and 1xEV-DO
IP Radio Access Network (IP-RAN)

Installation and Maintenance Manual

Version # 0.4

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Revision History

Version	Date	Person	Description
0.1	07/24/2009	R MacLennan	Initial Draft Document for review
0.2	10/07/2009	N. Kafai	Addition on Introduction
0.3	12/2/12009	N. Kafai	Edited Specifications
0.4	4/7/2010	A Cho	Edited Technical Specs

Revision Numbering Key

0.x	Work in Progress
1.0	Initial Document Approval
1.x	Revisions Following Initial Document Approval
2.0	Revisions Approval

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1 INTRODUCTION

1.1 Proprietary Information Notice

1.2 Purpose of Document

The purpose of this document is to define the Installation, Maintenance and Safety Compliance of AirWalk Communications, Inc. unique CDMA IP Radio Access Network (IP- RAN), referred to herein as the AW100 product.

The AirWalk AW100 series is available in two separate platforms:

- AW100-1X which support CDMA - 1xRTT standard, which includes integrated Base Station Transceiver (BTS) and Base Station Controller (BSC) into a unique single compact enclosure.
- AW100-DO which supports CDMA - 1xEVDO Rev. A standard which includes integrated Radio Node (RN) and Radio Network Controller (RNC) into a unique single compact enclosure.

The target market and applications are in-building areas, corporations, corporate campuses, enterprises, university campuses, large industrial plants, stadiums, airports, shopping malls, blind spots, hot spots, rural areas, neighborhoods, and highways.

1.3 Scope

The scope of this document covers the description, environmental specifications, equipment location, cabling, system installation and maintenance of the AirWalk AW-100. Specific models covered are identified in the section entitled “Model Information”.

1.4 Order of Precedence

This System Installation Manual will take precedence over any previous AirWalk System Installation Manual or Document.

1.5 Terminology

See the section entitled: Appendix A – Acronyms

1.6 Telecom Standards

[1] 3GPP2 C.S0001 – 0006 Radio Interface Specifications for cdma2000 Spread Spectrum System

[2] 3GPP2 X.S0013 – IMS/MMD Specifications

[3] 3GPP2 A.S0013-C Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 3 Features

[4] 3GPP2 A.S0014-C Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 4 (A1, A1p, A2 and A5 Interfaces)

[5] 3GPP2 C.S0015 Short Message Service

[6] RFC 3261 – Session Initiation Protocol

[7] RFC 4566 – SDP: Session Description Protocol

[8] RFC 3455 – Private Header (P-Header) Extensions to the Session Initiation Protocol for the 3rd-Generation Partnership Project (3GPP)

[9] RFC 3325 – Private Extensions to the Session Initiation Protocol for Asserted Identity within Trusted Networks

[10] RFC 3262 – Reliability of Provisional Responses in Session Initiation Protocol

[11] RFC 3311 – The Session Initiation Protocol UPDATE Method

[12] RFC 2976 – The SIP INFO Method

[13] RFC 4028 – Session Timers in the Session Initiation Protocol

[14] RFC 4306 – Internet Key Exchange (IKEv2) Protocol

[15] TIA/EIA/IS-2000 Series Revision: C - Introduction to CDMA2000 Spread Spectrum Systems, 05/00/02

[16] Personal Station – Base Station Compatibility Requirements for 1.8 to 2.0 GHz CDMA PCS.

[17] TIA/EIA-664 - Wireless Features Description, 12/00/00

[18] TIA/EIA Interim Standard 95 Revision A - Mobile Station –Base Station Compatibility Standard for Dual-Mode Wideband Spread Spectrum Cellular Systems, May 1995

[19] TIA/EIA-95-B - Mobile Station-Base Station Compatibility Standard for Dual-Mode Spread Spectrum Systems, October 31, 1998

[20] MSC to BS Interface Inter-Operability Specification (IOS) Sprint PCS IOS Document, v2.0a, December 4, 1997

[21] IMT-2000 Specification, (indoor wireless propagation)

[22] RFC 3558 RTP Payload Format for Enhanced Variable Rate Codecs (EVRC) and Selectable Mode Vocoders (SMV), July 2003

[23] RFC 2833 RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals, May 2000

[24] 3GPP2 A.S0013-C Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 1 Overview

[25] 3GPP2 A.S0013-C Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 2 Transport

[26] 3GPP2 A.S0013-C Interoperability Specification (IOS) for cdma2000 Access Network Interfaces – Part 7 (A10 and A11 Interfaces)

[27] 3GPP2 C.S0002-D, Physical Layer Standard for cdma2000 Spread Spectrum Systems, March 2004

[28] 3GPP2 C.S0004-D, Signaling Link Access Control (LAC) Standard for cdma2000 Spread Spectrum Systems, Feb. 2004

[29] 3GPP2 C.20000.5-D, Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems, March 2004

[30] IS-707-A-2, Data Service Options for Spread Spectrum Systems, March 2001

[31] TIA/EIA/IS-856-A, cdma2000 High Rate Packet Data Air Interface Specification, Mar 2004

[32] C.R1001-D, Administration of Parameter Value Assignments for cdma2000 Spread Spectrum Standards, Release B

[33] RFC 1661, Point-to-Point Protocol, July 1994

[34] RFC 1662, PPP in HDLC-Like Framing, July 1994

[35] RFC 1701, Generic Routing Encapsulation (GRE) Protocol, Oct 1994

[36] RFC 1994, PPP Challenge Handshake Authentication Protocol (CHAP), August 1996

[37] 3GPP2 A.S0008-0 v3.0 (TIA-878-1 pub), “Interoperability Specification (IOS) for High Rate Packet Data (HRPD) Access Network Interfaces”, May 2003

[38] 3GPP2 A.S0007-A v2.0 (TIA-1878 pub), “Interoperability Specification (IOS) for High Rate Packet Data (HRPD) Access Network Interfaces – Rev A”, May 2003

[39] 3GPP2 C.S0024-A v1.0 (TIA-856-A), “cdma2000 High Rate Packet Data Air Interface Specification”, March 2004

[40] 3GPP2 C.S0032 v2.0, Recommended Minimum Performance Standards for cdma2000 High Rate Packet Data Access Networks, Jan. 2004

[41] 3GPP2 X.S0011-001-C v3.0, cdma2000 Wireless IP Network Standard, Oct. 2006

2 AW100 Safety and Compliance Information

2.1 Statement of Intent

The AirWalk AW100 Series IP-RAN is intended for use in a CDMA cellular infrastructure radio access network. The responsible body shall be made aware that, if the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

2.2 Safety Precautions

Power Sources

Use only power sources that are within the specified limits as designated on the equipment labels. Use of power sources outside the specified limits is hazardous and may cause personal injury or property damage.

Equipment Location

Equipment should be located indoors or in a suitable protected environment such as an equipment enclosure. Use of unprotected equipment outdoors is hazardous and may cause personal injury or property damage.

Grounding and Electrical Connections

Electrical connections, including equipment grounding, should be made in accordance with the National Electric Code and any local regulations. Improper electrical connections are hazardous and may cause personal injury or property damage. Consult a licensed electrical installer if in doubt.

DC powered units MUST be externally fused for proper protection.

Hazardous Voltages

Equipment may contain hazardous voltages. Only qualified service personnel should open the equipment for adjustments, repairs or replacements.

Replacement Parts

Damaged parts and protective devices such as fuses should only be replaced by components approved or recommended by AirWalk Communications. Replacement fuses must be of the same rating and type as the original for continued protection.

2.3 Maintenance Information

2.3.1 Cleaning

The AirWalk AW100 units are protected by a high performance paint which does not require normal maintenance. If paintwork is soiled, it can be cleaned using a damp cloth after AC power has been disconnected. Do not use liquids or spray cleaning substances on the unit, since property damage or personal injury may result.

2.3.2 Other Maintenance

Any other required maintenance must be performed by suitable trained service personnel. Do not open covers or attempt to repair unit if not suitably trained.

2.4 Labeling

2.4.1 Grounding

Proper grounding is recommended to ensure good RF performance in addition to personnel safety. Antenna systems should also be suitably grounded for good RF performance.

Grounding connection points on the chassis are located on the rear of the unit and are identified by this symbol:

2.4.2 Label: Model Identification, FCC Identification, Power

The following illustrates the location of the FCC label that will be applied to the AW100 unit to provide model identification, FCC identification and rated power supply information.

Some units are not equipped with FCC identification and therefore operation of these units in the US is not permitted.

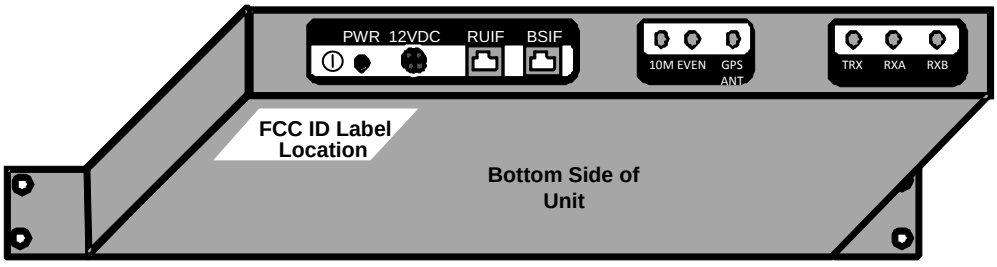


Figure 2-1 **AW100 Main Unit (Bottom - Rear View)**

2.5 Regulatory Compliance Information

The FCC regulatory compliance information provided in this section is applicable only to models equipped with an FCC Identification Number (FCC ID).

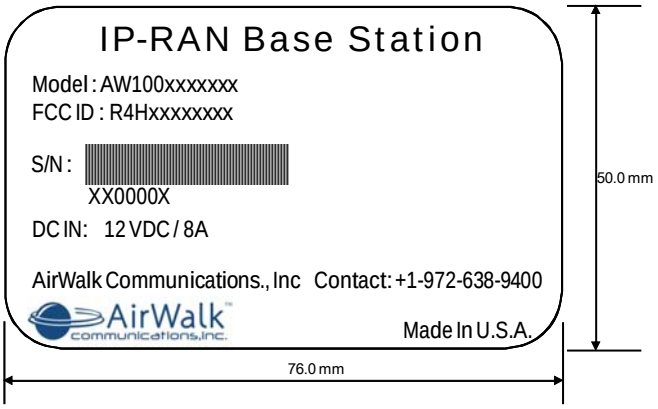


Figure 2-2 **AW-100 FCC Label (SAMPLE)**

2.5.1 Radio Interference (FCC 15.19 Statement)

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

2.5.2 Unauthorized Modifications (FCC 15.21 Statement)

Persons or parties responsible for operation of this equipment are cautioned that any changes or modifications not expressly approved by AirWalk Communications Incorporated could void the user's authority to operate this equipment.

2.5.3 Digital Device Interference (FCC 15.105 Statement)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

2.5.4 RF Power Requirements

The antenna(s) used for this transmitter must be fixed-mounted on outdoor permanent structures.

3 AW100 System Introduction

3.1 Overview

This document describes the AW100 IP-RAN products developed by AirWalk Communications Inc. The AirWalk AW100 Series is compact, standards compliant, optimal channel capacity, cost effective, and reliable cellular access point designed to provide improved mobile coverage and capacity enhancements for the CDMA mobile operators.

The AW100 is offered in two different platforms:

- **AW100-1X**
    - This product is designed specifically for CDMA2000 1xRTT networks. The principal elements of the AW100-1X product are integrated BTS, BSC, and PCF functionality with the capability to connect to the core network via:
        - IOS 5.X for connectivity to CDMA soft switch networks
        - IOS to SIP messages for connectivity to IMS networks

    The following is a list of general characteristics:

    - Supports both CDMA 1xRTT voice and data calls
    - Supports 32CE and /or 64 CE (Up to 28 or 56 users)
    - Supports CDMA 1xRTT data service transmission up to 144 kbps
    - One carrier/ omni configuration
    - Supports soft handoff, and hard handoff
    - Offered in 0.1 mW or 200 mW transmit power
    - Available with 0.1 mW platform to connect to high power LPA
    - High sensitivity internal GPS system connected with an external antenna
    - Integrated BTS/BSC/PCF functionality
    - Compatible with IOS5.x or native IOS-SIP adaptation
    - IPSec tunnel support (for IOS-SIP Adapter only)
    - Supports Integrated Base Station Management (IBSM)
    - Supports 1900 MHz, 800 MHz, 450 (A) MHz bands
    - 19 inch rack or cabinet mounting options
    - AC or optional DC power supply systems
    - Ethernet backhaul connections, compatible with most routers and multiplexers
    - Remote O&M support through IP network
    - Easy repair by replacement of modular units
    - Improved reliability, and QoS
    - Provides an ‘All-IP’ solution

- **AW100-DO**

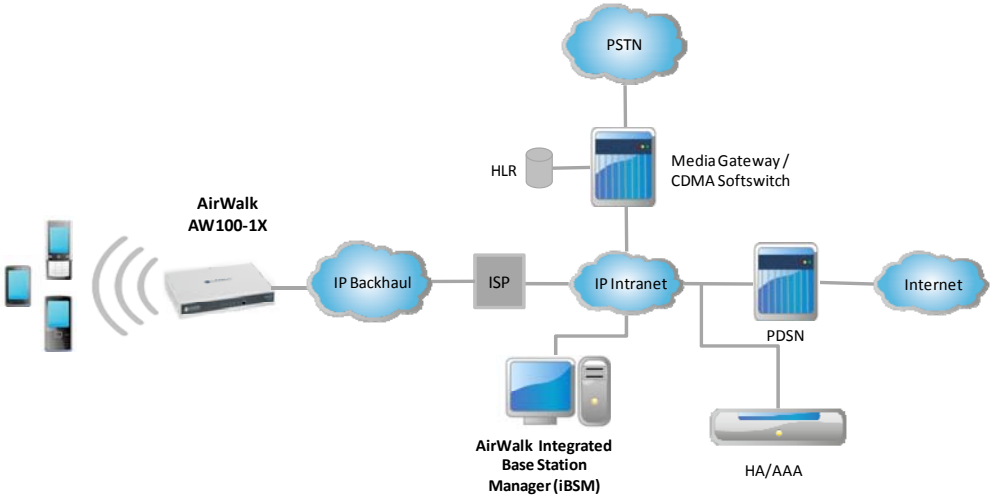
  - This product is designed specifically for CDMA2000 1xEV-DO Rev. A networks. The principal elements of the AW100-DO product are integrated RN, RNC, and PCF functionality with the capability to interface to the core data network via IP-10/100 Base T Ethernet to PDSN and AAA systems

  The following is a list of general characteristics:

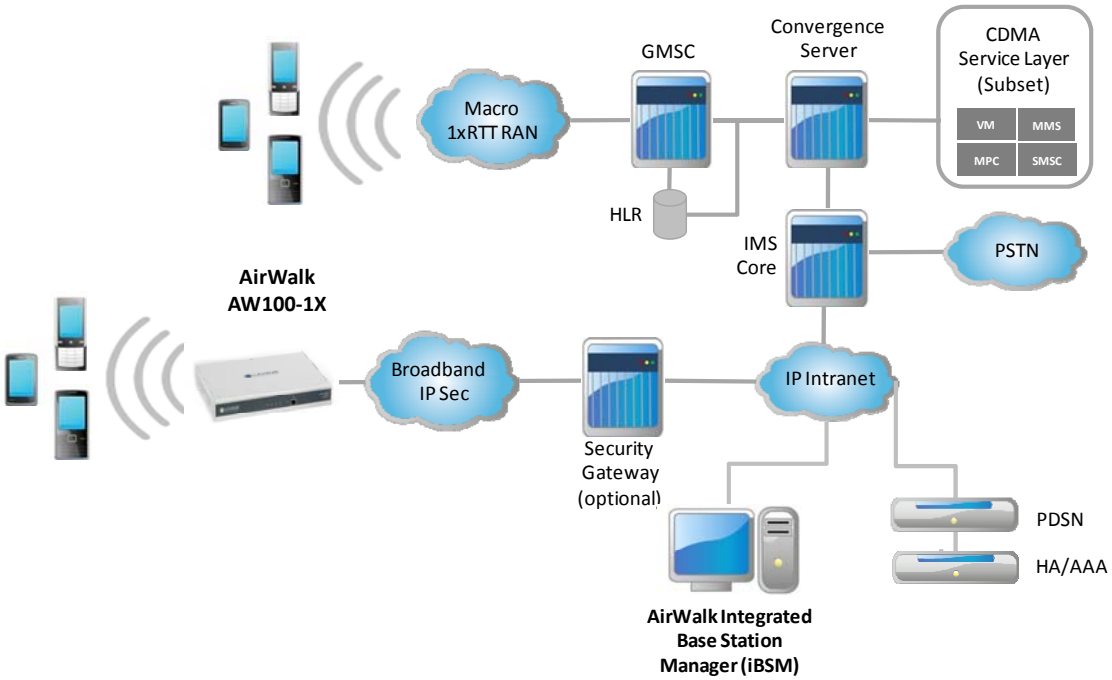
  - Supports high speed packet data, fixed/portable/fully mobile use - “Always-On” experience
  - 3.1 Mbps peak download speed
  - 1.8 Mbps peak upload speed
  - Based on Qualcomm CSM 6800, and supports IS-856A standard
  - Integrated RN and RNC in one compact physical platform
  - Supports up to 192 Channel Elements (CE) – for all configurations
  - Available in 1 carrier / omni configuration
  - Available with low power and high power LPA configurations
  - 19 inch rack or cabinet mounting options
  - AC or optional DC power supply systems
  - Supports 450(A) MHz, 800 MHz, 1.9 GHz bands
  - Supports hard and soft handoffs
  - Provides low latency – similar to 1xRTT
  - Supports QoS priority
  - Backward compatibility and interoperability with legacy DO systems
  - Ethernet backhaul connections, compatible with most routers and multiplexers
  - Powerful OAM&P system – IP-based connectivity
  - Easy repair by replacement of modular units
  - Easy overlay with 1xRTT networks
  - Works seamlessly with existing IP-based network infrastructure
  - 100% end-to-end IP network – all IP Solution

3.2 AW100 Network Diagram

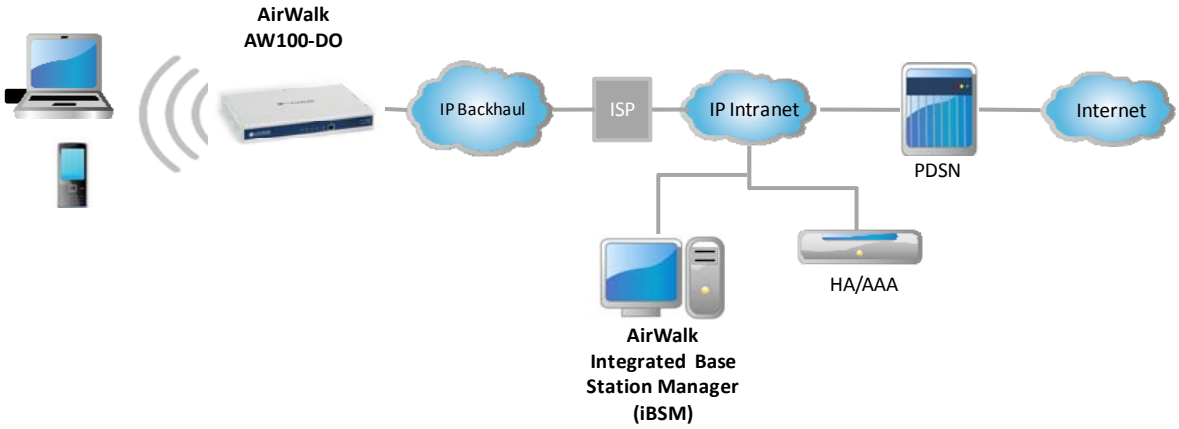
The following diagram is typical network architecture for AW100-1X using IOS5.x standard interfacing to a CDMA softswitch network.



The following diagram is typical network architecture for AW100-1X using IOS to SIP adapter protocol interfacing to an IMS network.



The following diagram is typical network architecture for AW100-DO with connectivity to data core networks.



3.3 Hardware Configuration

The AW00 Series IP-RAN is a unique combination radio and controller in one physical platform that is differentiated from other systems. Other systems have separate radio and controller platforms which add to cost and complexity in order to support CDMA2000 networks.

The main components are (depending on specific model):

- AW100 (Main Unit)
  - CCPB - Call & Channel Processing Board
    - In case of AW100-1X is referred to as CCPB-1X
      - Provides BTS and BSC function
    - In case of AW100-DO is referred to as CCPB-DO
      - Provides RN and RNC function
  - FTRB - Femto Transceiver Board
    - Provides frequency up down function
    - Offered in 1900 MHz, 800 MHz, 450 MHz frequency bands
  - GTIB - GPS & Timing Interface Board
    - Provides highly accurate position information
  - PSU – Power Supply Unit
- Sector RU - Remote RF Unit (Slim Series, for use with MacroCell applications)
  - HPAU - High Power Amplifier Unit
- DC RPSU (DC powered configurations)
  - DC power distribution unit
  - Provided for optional DC powered RU system configurations only

3.3.1 Physical Description

- Main Unit
  - Dimension (H x W x D): 1.75 x 12.25 x 9 (Inc), 4.45 x 31.12 x 22.86 (CM)
  - 19” EIA Rack x 1 Rack Unit
  - Weight: 4 Kg, [2 lbs]
- Remote RF Unit [Slim RU Series]
  - Dimension (H x W x D): 3.5 x19 x 18 (Inc), 8.8 x 48.2 x 45.7 (CM)
  - 19” EIA Rack x 2 Rack Units
  - Weight: 13 kg [29 lbs]
- DC RPSU [DC powered configurations]
  - Dimension (H x W x D):1.75 x 19 x 18 (Inc), 4.4 x 48.2 x 45.7 (CM)
  - 19” EIA Rack x 1 Rack Unit
  - Weight: 2 kg [4.4 lbs]

3.3.2 Typical Configurations

The following shows typical component configurations for common applications.

Macrocell Solution - Omni High Power Systems (20W)

- AW100 Main Unit
- 20W Slim Radio Unit (external RF power amplifier)
- Optional DC RPSU for DC powered systems

Minicell Solution - Omni Medium Power Systems (up to 4W)

- AW-100 Main Unit
- 4W Slim Radio Unit (external RF power amplifier)
- Optional DC RPSU for DC powered systems

Pico / Enterprise Solution - Omni Low Power Systems (up to 200mW)

- AW100 Main Unit

3.3.3 Unit Photographs

The following photographs (front views) show the rack mountable units for AW100 systems:

Pico/ Enterprise Solution - One Carrier / Omni configuration with 200 mW transmit power

Figure 3-2 **AW100-1X Main Unit**

Mini / Macro Solution - One Carrier / Omni configuration with 4/20 W External RU

Figure 3-3 **AW100-DO with 20W Slim Radio Unit (RU- external RF power amplifier)**

3.4 System Capacities and Specifications

3.4.1 AW-100 Technical Specifications

AW100 Specifications		1xEV-DO Rev A	1xRTT
RADIO	Transmit Power	Picocell: 200mW / 23dBm Microell: 4W / 36dB External RU Macrocell: 20W / 43dB External RU	
	Air Interface	CDMA2000, 1xEV-DO Rev. A	CDMA2000, 1xRTT, IS-95 A/B
	Frequency Bands	450 MHz, 800MHz, 1900 MHz	450 MHz, 800MHz, 1900 MHz
	Simultaneous Calls	Up to 60	Up to 28
	Transmit Power	Picocell:200 mW Macrocell: 0.1 mW with 20W/4W external RU	Picocell: 200 mW Macrocell: 0.1 mW with 20W/4W external RU
	Channel Elements	192 CEs per enclosure	32/64 CE per enclosure
	Configuration	1 carrier / 1 sector omni	1 carrier / 1 sector omni
CONTROLLER	Handoff	Soft/Hard	Soft/Hard
	Integrated	RN, RNC, PCF and O&M	BTS, BSC, PCF and O&M
INTERFACES	Core Network Interface	----------	IOS4.2 – 5.0 (CDMA Softswitch) 3GPP2/MMD/SIP (IMS Network)
	PDSN	IP-10/100 Base T Ethernet – (A10, A11)	IP-10/100 Base T Ethernet – (A10, A11)
	(AN) AAA+HA	IP-10/100 Base T Ethernet – (A12)	IP-10/100 Base T Ethernet – (A12)
POWER	AC	100 VAC ~240 VAC	
	DC	+12 VDC	
	Consumption	60W	
ENVIRONMENTAL	Temperature	Operating 0°C to 50°C (32°F to 122°F)	
	Humidity	5 to 95% non-condensing	
	Cooling	Forced air	
HARDWARE	Dimensions H x W x D	1.75” x 12.25” x 9” 4.45 cm x 31.12 cm x 22.86 cm	
	Installation	Rack Mount	
	Weight	< 4 lbs; < 2 kg	
	Cooling	Forced air	
	Type	Indoor / outdoor with air conditioned enclosure	
	Regulatory	FCC certified, UL	

Mechanical Specification		
RF Input and Output Connector	SMA Female (Input/Output)	From/To RU
GPS Antenna Connector	TNC Female	Phantom powered
AC Power Connector	IEC	
RNC/RNC/RN Ethernet Connectors	RJ-45	Ethernet Interface
RU Control and ENV Connectors	RJ-45	Serial Interface

Table 3-1 **AW100 Mechanical Specifications**

3.4.2 Radio Unit Technical Specification (Slim RU Series)

Tx				
Frequency		1930 ~ 1950 MHz		N American PCS (A/D)
		1945 ~ 1970 MHz		N American PCS (B/D/E)
		1965 ~ 1990 MHz		N American PCS (C/E/F)
		869 ~ 894 MHz		800 MHz Cellular Band
		A/B/H Sub Bands available		450 MHz Band (incl NMT)
Output Power		43dBm, 20 Watt		CDMA
Gain		53 ± 1.0dB		
In/Out VSWR		1.5: 1		Output: Isolator Included
Coupling Value		43 ± 1.0dB		
Attenuation	Rx Freq. Range	100dBc		
Spurious Emission @43dBm(20W)_1FA (Band Class 0,2,3,5,7,9)		Fc±750KHz	-32dBc Min	Max Hold Marker
		Fc±1.98MHz	-48dBc Min	
		Fc±2.75MHz	-18dBm Min	RBW, VBW=30KHZ, BW=1MHz
Spurious Emission @43dBm(20W)_1FA (Band Class 1,4,6,8)		Fc±885KHz	-42dBc Min	Max Hold Marker
		Fc±1.98MHz	-52dBc Min	
		Fc±2.75MHz	-18dBm Min	RBW, VBW=30KHZ, BW=1MHz
Over Power		45 + 0.7dBm		
Over VSWR Protection		Alarm 3:1		30~43dBm
Over Temp. Protection		Alarm @ $90^{o} \pm 2^{o}$		Base Plate Temperature

Rx			
Frequency		1850 ~ 1870 MHz	N American PCS (A/D)
		1865 ~ 1890 MHz	N American PCS (B/D/E)
		1885 ~ 1910 MHz	N American PCS (C/E/F)
		824 ~ 849 MHz	800 MHz Cellular Band
		A/B/H available	450 MHz Band (incl NMT)
Gain		24 ± 1.0dB	
Gain Flatness		1.0dB max	
In/Out VSWR		1.5: 1	
Attenuation	Tx Freq. Range	100dBc min	
Noise Figure		2.2dB max	

Mechanical Specification		
RF Input and Output Connector	SMA Female (Input)	N Female (Output)
AC Power Connector	IEC	
RU Control Connector	RJ-45	Serial Interface
Weight	13 kg (28.55 lbs.)	Per RU
Dimensions (W x H x D)	482mm(W) x 457mm(D) x 88mm(H) 19”(H) x 18”(D) x 3.5”(H)	2 Rack Units

Table 3-2 **Radio Unit Specifications (Slim RU Series)**

3.4.3 Power Supply and Environment Technical Specification

AC Input Power Supply For AC Powered Models	
Input Voltage:	AC 100Volts ~ 250Volts
Input Frequency:	50Hz ~ 60Hz
AC Power Connector:	IEC
Dissipated Power For AC Powered Models	
AW100 Main Unit:	60 Watt Max (Efficiency 75%)
Radio Unit (Slim RU)	400 Watt Max (Efficiency 85%)
Maximum AW100 IP-BS	460 Watt Max (Main Unit & 1x Radio Unit)

Table 3-3 **AC Power Supply Specifications**

DC Input Power Supply For DC Powered Models (DC RPSU)	
Input Voltage:	DC 12 Volts ~ 30 Volts (float charge compatible)
Fuse Rating:	50A
DC Power Connector (DC RPSU)	Bolted Bus Bar; 2 hole lugs; ¼” holes; ¾” spacing (Use Blackburn CTL2-2516 or equivalent connector lug)
Dissipated Power For DC Powered Models	
AW-100 Main Unit:	60 Watt Max
Radio Unit (Slim RU)	270 Watt Max
Maximum AW-100 IP-BS	330 Watt Max (Main Unit & 1x Radio Unit)

Table 3-4 **DC Power Supply Specifications (DC RPSU)**

Environment Specification	
Operating Temperature	-0^{o} ~ $+50^{o}$ C
Storage Temperature	-30^{o} ~ $+60^{o}$
Relative Humidity	5% ~ 95% - Non-condensing
Noise	Less than 60dBA, distance 1.5m
Airborne Particle	0 ~ 90 µg/m³

Table 3-5 **Environment Specifications**

4 AW-100 Components

4.1 AW-100 Main Unit

Figure 4-1 **AW-100 Main Unit Photo (Front View)**

Figure 4-2 **AW-100 – Line Diagram (Front View)**

Figure 4-3 **AW-100 Main Unit Photo (Back View)**

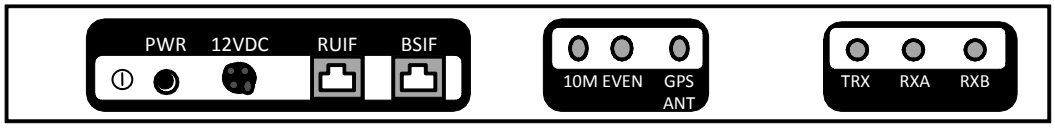


Figure 4-4 **AW-100 – Line Diagram (Back View) (AC Version)**

4.2 Radio Unit (RU - Slim RU Series)

The Slim RU series Radio Unit provides high power macrocell capabilities for the omni site configurations. The Radio Unit functions include a 4W or 20W power amplifier (measured at the antenna port), RF filtering for Tx and Rx paths, a duplexer function system, and a power supply. All components are packaged in a compact two rack unit package.

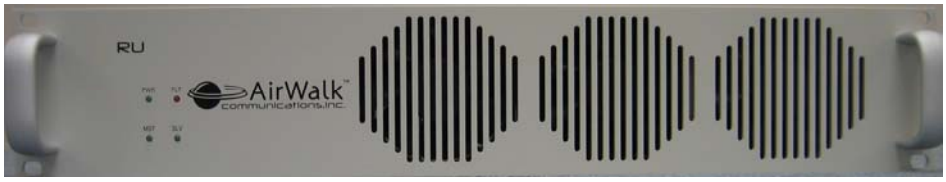


Figure 4-5 **Radio Unit (RU – Slim RU Series) - Photo (Front View)**

Figure 4-6 **Radio Unit (RU – Slim RU Series) - Photo (Rear View - AC Version)**

Figure 4-7 **Radio Unit (RU – Slim RU Series) - Photo (Rear View – DC Version)**

4.3 Optional DC RPSU (DC Power Configurations Only)

DC powered Radio Unit (RU) systems are equipped with a separate DC power distribution unit which provides a single connection point for DC power source. Connections are provided for the 12v DC AW100 unit and the 27v DC Radio Unit. Front panel circuit breakers and voltage/current measurements are provided. The RPSU is also equipped with an alarm interface to deliver RPSU alarms to the RU system.

Figure 4-8 **RPSU DC Distribution Unit - Photo (Front View)**

Figure 4-9 **RPSU DC Distribution Unit – Line Diagram**

Figure 4-10 **RPSU DC Distribution Unit – Photo (Rear View)**

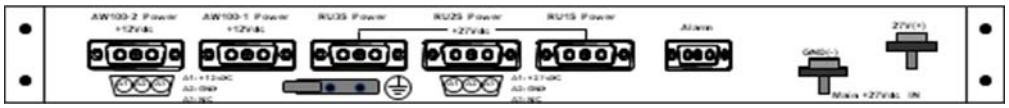


Figure 4-11 **RPSU DC Distribution Unit – Line Diagram (Rear View)**

4.4 Component LED Configuration

4.4.1 CCPB- (Call and Channel Processing Board)

LED status indicators are provided on the AW100 IP-RAN. LED functions are described in the following pictures and tables.

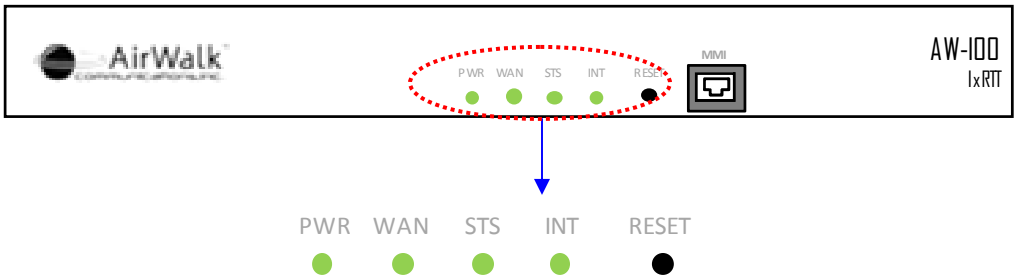


Figure 4-12 **LED Highlight**

	Name	Color	On	Off	Brink	Note
1	PWR	Green	Power on	Power off		
2	WAN	Green		Disconnect network	Connect network	
3	STS	Green	Lock			
		Orange	GPS ANT cable status is OFF			
		Green/Orange	UNLOCK			
4	INT	Orange	PLL lock			
		Green			Even_sec	

Table 4-1 **AW100 Indicator Codes**

4.4.2 RU DC Power Distribution Unit (RPSU) [DC powered models only]

The RU RPSU (DC Power Distribution Unit) is equipped with a digital voltmeter and digital ammeter as shown in Figure 4-13.

Figure 4-13 **RPSU DC Power Measurement Indicators (Front View)**

The following values are displayed on the front panel.

AW100-DC Out (V) : Internal RU control unit voltage (nominally 12-14V)
RUDC Out (V) : Main system DC voltage (nominally 27-28V)
Main DC In (A) : Overall system current consumption (5-50A, load dependent)

Circuit breakers are also provided for system protection. A master circuit breaker controls power to the complete IP-RAN unit. Individual circuit breakers are provided for protection of the main unit and RU amplifier system.

Only DC powered models are equipped with the RPSU DC power distribution module.

4.4.3 Radio Units Front Panel Indicators (Slim RU Series)

The Radio Unit is equipped with indicators for power, communication activities and alarms. The location of the RU front panel indicators is shown in Figure 4-14 (each RU).

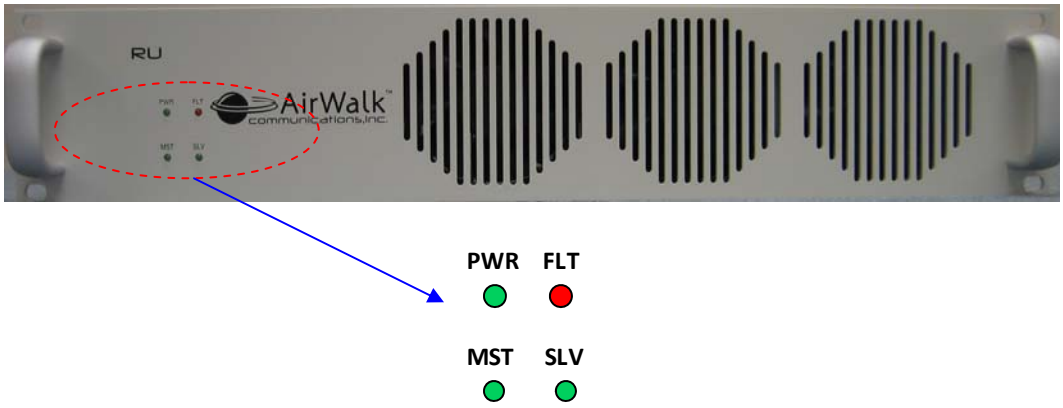


Figure 4-14 **Radio Unit Front Panel Diagram**

A description of Radio Unit Front Panel indicator functions is shown in Table 4-2.

LED	Color	On	Flash	Off	Note
PWR	Green	Normal	N/A	No Power	AFEU power on indicator
FLT	Orange	Fault	N/A	Normal	RU Alarm(s) detected
MST	Green	N/A	Comm	No Comm	Communications with AW100
SLV	Green	N/A	Comm	No Comm	Communications with other RU

Table 4-2 **Radio Unit Front Panel Indicator Codes**

5 AW-100 Cabling

5.1 Power Supply Wiring (AC / DC Powered Versions)

The majority of the AW-100 systems will be powered via the AC/DC power supply. Connect the AW-100 main unit and if applicable the optional Radio Unit system to suitable AC power sources as shown in Figure 5-1. Use only the AC / DC power supply and AC cables provided by AirWalk to ensure continued safe operation.

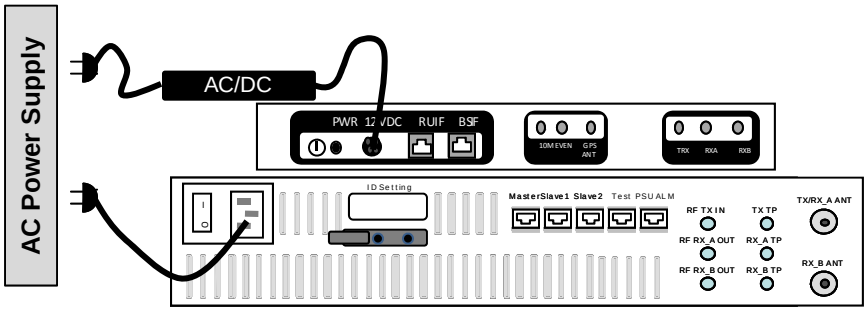


Figure 5-1 **Power Supply Wiring** ***(shown with optional RU)***

5.2 Grounding

Grounding of the AW-100 system to the local site grounding system is essential for both safety and proper RF performance. The grounding of the IP-RAN system should be integrated with the overall site grounding plan as designed by the site planning engineer. A “halo” perimeter grounding system is recommended for sites equipped with external antennas that are subject to possible lightning strikes.

A ground strap is provided with each AW-100 system and each RU system to allow bonding to a ground bus bar or to a common rack grounding point. Each ground wire is installed on the AW-100 main unit and on the RU amplifier system as shown in Figure 5-2.

Customer to provide and install (crimp to existing lug) ground cable (AWG 10-12) between system and the common ground.

Other ground cabling or bus bars used in site installation must be suited to the purpose and meet any applicable local electrical codes.

Ground connections should be tested for continuity after installation.

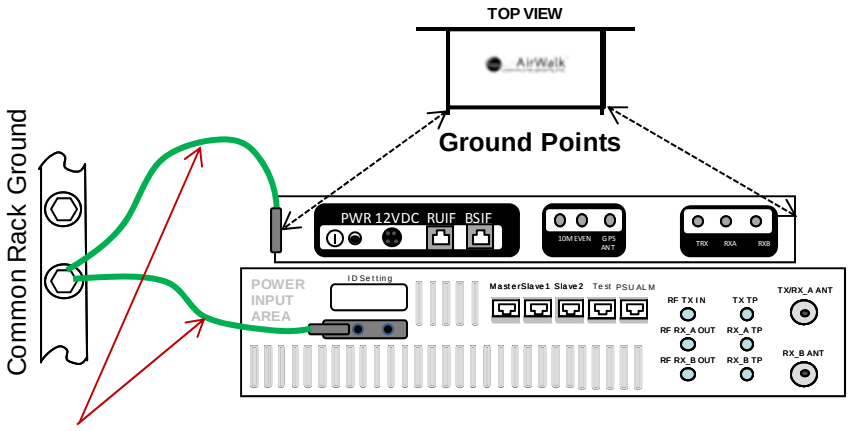


Figure 5-2 **Ground Wiring** ***(shown with optional RU)***

5.3 RF Cabling with RU

The AW-100 transmitter output and diversity receiver inputs are connected to the Radio Units, which contain the duplexer, LNA (Low Noise pre-Amplifier) and HPA (High Power Amplifier) functions. Connect using RF jumper cables as shown in Figure 5-3.

Communication between the AW100 and the RU is accomplished with the Master / Slave LAN cable (KDR45AE). This cable is connected from the AW100 RUIF port to the Master port on the RU as shown in Figure 5.3.

Use only the cables supplied with the RU system for interconnection to the AW-100. Cables are labeled for ease of installation. See Figure 5-4 for RF cable specification.

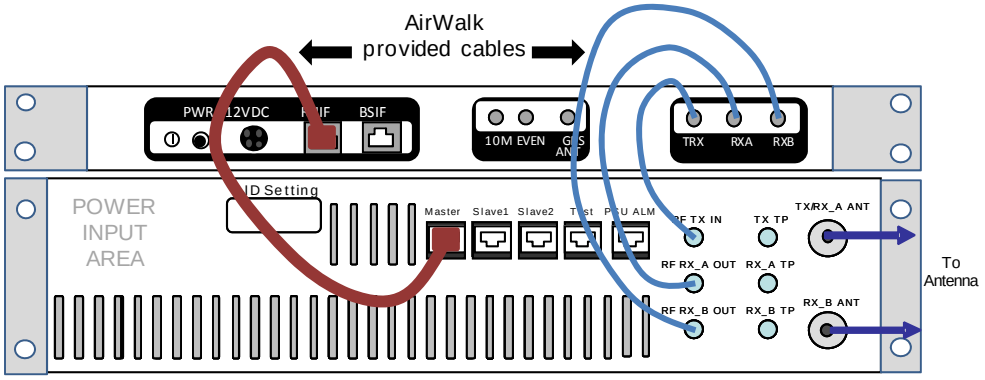


Figure 5-3 **Radio Unit RF Cabling Diagram**

It is important to ensure transmit and receive connections are made correctly to prevent damage or field operational problems such as:

- Damage due to transmitting into a receiver port
- Crossed over diversity receive ports

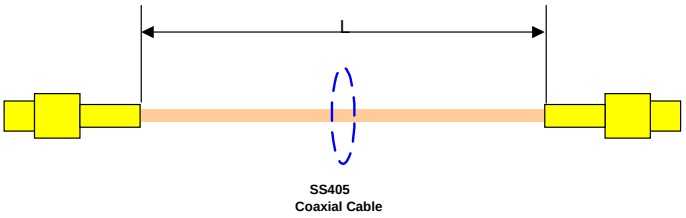


Figure 5-4 **AW-100 to RU RF Cable Specification**

Connect the external transmission lines from the diversity antenna systems to the RU Antenna connections as shown in Figure 5-3. External connectors are “N-Type”.

Transmission line (or jumpers to transmission line) type and length will impact the overall link budget calculations for the cell site. Be sure to include these losses in the RF system design calculations for coverage.

5.4 Power Supply Wiring (DC Powered Models)

Applications that dictate only DC systems are to be used will require a separate DC Distribution Unit (RPSU) which provides DC power distribution and over current protection for connected equipment. The RPSU also provides voltage and current measurement meters on the front panel. The RPSU will support the AW-100 and the optional RU.

The RPSU must also be grounded in a similar manner as the other system components.

Connect the AW-100 main unit power interconnect cable between the main unit and the RPSU Power Supply as shown in Figure 5-5. Use only the cable supplied with the RU system for this purpose. Tighten connector captivating screws to prevent accidental disconnection.

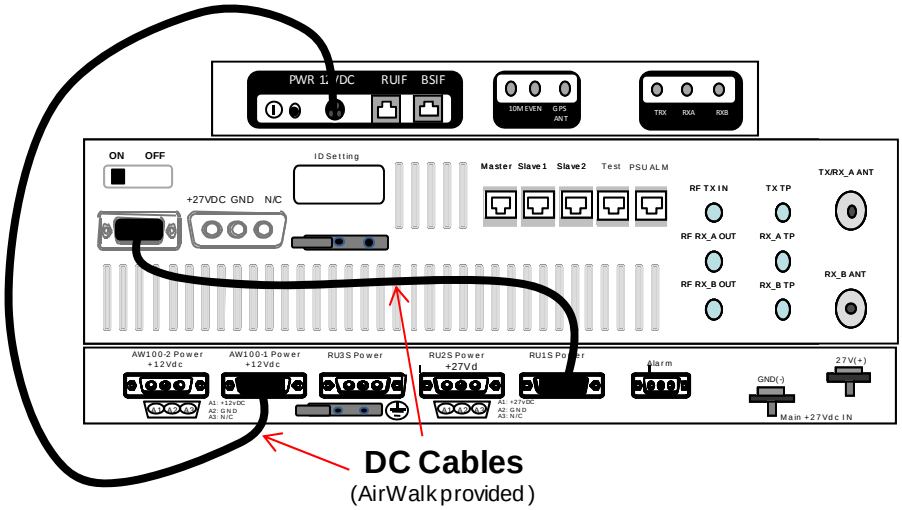


Figure 5-5 **AW-100 and RU to RPSU Power Connections [DC models]**

Connect the RPSU main power bus to the external DC power supply system using the two-hole bolted connections as shown in Figure 5-6.

Power lugs and connection bolts are NOT supplied with the AirWalk system

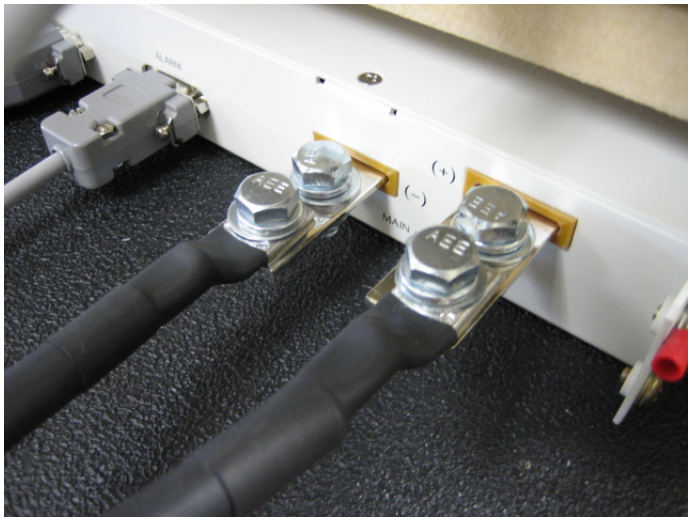


Figure 5-6 **External DC Bus Power Connections [DC models]**

The following practices are recommended for DC bus connections:

- Use suitable lugs (Blackburn CTL2-2516 or equivalent lug recommended)
- Use suitable gauge cables (#2/#4 gauge flexible stranded recommended)
- Tighten bolts firmly to prevent movement or arcing
- Use heat shrink tubing, or equivalent, to cover and protect connections
- Power source should be independently fused at the origin point

IMPORTANT – Do not turn on power source until installation is fully completed.

IMPORTANT – Extra care is required when working with high current DC power systems to avoid personal injury. Protect all DC connections to avoid accidental short circuits.

5.5 GPS Antenna Cable Wiring

The AW-100 utilizes a 5.0V GPS system. GPS antennas can be ordered as optional equipment or supplied by customer. Connect the external GPS antenna RF cable to the "SMA" GPS antenna port on the AW-100 unit as shown in Figure 5-7.

The GPS antenna must be located outdoors in a position to see the general sky. The GPS antenna must see at least four GPS satellites in the sky to receive enough time information for proper system operation.

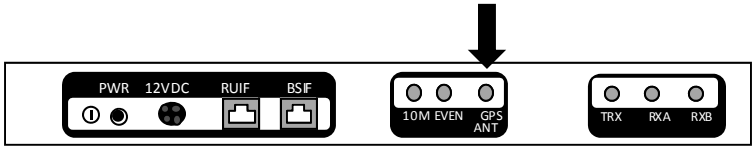


Figure 5-7 **GPS Antenna Connection**

6 Frequency Setting Procedures

This section provided to meet regulatory requirements in certain jurisdictions which require local frequency setting procedures. Normally frequency settings should be made only in the iBSM system which will subsequently download them to the base station. Refer to the iBSM manuals for configuration and operating instructions.

6.1 iBSM Management

The AW-100 series base stations are normally managed by the centrally located iBSM (Integrated Base Station Manager) system which communicates with the AW-100 over an IP connection.

The iBSM downloads system software and configuration information which includes the physical FA (Frequency Assignment) for each base station. The base station tunes to the correct frequency as defined by the BSM configuration files.

Refer to the iBSM operations manual for instructions on base station remote configuration.

6.2 Local FA Setting

It may be required to set the AW-100 series base station physical FA locally for specialized test purposes or when the iBSM connection is unavailable (for example during early RN installations). This can be done using the local MMI (Man Machine Interface) port and a local PC.

The configuration data downloaded from the iBSM will override local settings when iBSM connections are established.

6.2.1 MMI Connection

Connect the serial port of the PC to the “RN MMI” port on the AW-100 front panel. Use only the Serial MMI cable provided by AirWalk and the following port settings:

- 115200 baud
- 8 bit
- No Parity
- 1 stop bit
- No flow control

Figure 6-1 **Serial MMI Cable Connection**

6.2.2 FA Change Procedure

The AW-100 is consists of two different family of IP-RAN.

AW100- 1xRTT

The following menu driven commands permit local changes of the FA.

Step 1

At the prompt enter the following:

```
> pn3383
```

// this will take you to the menu screen similar to below:

```
================  PN 3383  ====================
```

1. Tx Test
2. Rx Test
3. ParameterSetup
4. Rf Gain Display
5. xcvrSetup
6. ampSetup
7. Normal Gain Display
8. MakeTestCall
9. callClear
10. Overhead Calibration Control
11. Test Phone Setup (678 4711709)
12. Handoff Test
13. Set RF Test
14. System Calibration
15. Display BTS Status
0. Exit

Select Number ===>

Step 2

Enter the following:

```
Select number => 5
```

// this will take you to the below menu screen.

```
================  XCVR SETUP  ====================
  1. SET CHAN
  2. SET TX ON
  3. SET TX OFF
--------------------------------------------------
  4. Show Channel
  5. SHOW XCVR MODEL ID
  6. SHOW XCVR STATUS
  7. SHOW XCVR LEVEL
  8. Show RSSI1
  9. Show RSSI2
 10. Show TSSI
 11. Show RSSI1PWR
 12. Show RSSI2PWR
 13. Show TSSIPWR
 14. Show XCVR Temperature
 15. Show XCVR Version
 16. Show XCVR Reset Reason
 17. Show XCVR Cable Status
 18. Show XCVR PLL LOCK
 19. Show XCVR Power Status
   0. Exit
--------------------------------------------------
   Select Input Number =====>
```

Step 3

Enter the following:

```
Select Input Number => 1
```

// choosing 1 will take you to the below menu.

ALPHA : xcvrChangeCh Num [001 ~ 1500] [1175] [/0:Exit]==>

Step 4

From the above menu, type the new channel desired (CDMA channels from 1 to 1500) and 0 to exit.

Only standard CDMA channel numbers within the designated band capability of the radio is accepted by the base station.

PS)

Step 5

CDMA Channel to CDMA Frequency Assignment Correspondence

Band	CDMA Channel Number	Transmit Frequency Band (MHz) (Base Station)
0 (800MHz)	1 ≤ N ≤ 799	880.02 ~ 893.37
	991 ≤ N ≤ 1023	869.04 ~ 870.00
1 (1900MHz)	0 ≤ N ≤ 1199	1930.00 ~ 1989.95

AW100- 1xEV-DO

The following menu driven commands permit local changes of the FA.

Step 1

At the prompt enter the following:

```
> mpt32a
```

// this will take you to the menu screen similar to below:

```
 ================================================
```

1. Transmitter Test
2. Receiver Test
3. Parameter Setup
4. RF Gain Display
5. XCVR Setup
6. Turn Debug Messages On
7. Turn Debug Messages Off
0. Exit

```
 ================================================
```

Select Number ===>

Step 2

Enter the following

Select Number ==> 5

// this will take you to the below menu screen.

========== XCVR SETUP ==========

1. Set Channel
2. Set TX On
3. Set TX Off
4. Set Att. Gain
5. Set Reset Reason

---

6. Show Channel
7. Show XCVR Model ID
8. Show Att. Gain
9. Show RSSI1

10. Show RSSI2
11. Show TSSI
12. Show RSSI1PWR
13. Show RSSI2PWR
14. Show TSSIPWR
15. Show XCVR Temperature
16. Show XCVR Reset Reason
17. Show XCVR Cable Status
18. Show XCVR PLL LOCK
19. Show XCVR Power Status
20. Show TX Status
0. Exit

==========

Step 3

Enter the following:

`Select Input Number => 1`

// choosing 1 will take you to the below menu.

ALPHA : xcvrChangeCh Num [001 ~ 1500] [1175] [/0:Exit]==>

Step 4

From the above menu, type the new channel desired (CDMA channels from 1 to 1500) and 0 to exit.

Only standard CDMA channel numbers within the designated band capability of the radio is accepted by the base station.

PS)

Step 5

CDMA Channel to CDMA Frequency Assignment Correspondence

Band	CDMA Channel Number	Transmit Frequency Band (MHz) (Base Station)
0 (800MHz)	1 ≤ N ≤ 799	880.02 ~ 893.37
	991 ≤ N ≤ 1023	869.04 ~ 870.00
1 (1900MHz)	0 ≤ N ≤ 1199	1930.00 ~ 1989.95

7 Installation Procedures

This Section gives instructions for installing the AW100 Series IP-RAN and for connecting it to the wireless infrastructure.

Always refer to the Cell Site Installation documents provided by the Project Engineer for the specific project. These instructions will include site specific installation requirements in addition to generic installation practices. Site specific installation instructions could also include special arrangements for power supplies, cabling, backhaul equipment connections and other specific requirements.

Prior to installation, it is necessary to assign IP addresses and a permanent base station ID for each IP-RAN system installed. The IP address of the managing iBSM system is also required. This essential information is needed for site configuration prior to leaving the site. Once the IP-RAN ID, IP addresses and managing iBSM IP address are installed in the AW-100 Series IP-RAN base station, the base station can then establish a link to the iBSM and download the site specific configuration information in addition to any updated software loads.

It is recommended that the central managing iBSM system be installed and each base station configuration exists in the iBSM prior to installation of the site. If this preparation is performed, then each installed base station will obtain a correct configuration immediately after installation and proper operation can be verified by the installer before leaving the site.

If the managing iBSM is not present prior to installation, then the IP-RAN can be installed and will continuously attempt communication with the iBSM until found, and a configuration downloaded. This allows base stations to be installed prior to the installation of a central managing iBSM system installation if the project schedule requires early installation of the base stations.

7.1 Verify Customer Contact and Equipment location

7.1.1 Contact customer1

1) Verify customer and installer contact names for the installation. Contacts names should be provided for all persons or groups involve in site preparation or planning.

2) Verify a site specific installation plan is available and includes details on:

   a) Power connections

   b) Backhaul and LAN connections

   c) RF antenna system connections

   If not verifiable, have main customer contact provided names and method of contacting.

3) Ensure Installation team (if more than one person on team).

[1] NOTE: Make sure all changes are sent to the Installation Coordinator immediately.

4) Determine when contacts are available for help (e.g.; Time of day, day of week.) for customer, installation teams and persons involved in the site planning.

5) Obtain any site access or security requirements (e.g.: ID Badges, Card-keys, Keys, Access codes) required to access installation site.

6) Locate the AirWalk IP-RAN equipment and any required support equipment. Arrange transportation of equipment to the site, if required.

7) Check for any visible shipment damage to the equipment prior to transportation or installation. If any damage is observed, then notify the carrier or responsible party to resolve any insurance inspection issues prior to handling or opening the packages.

7.1.2 Locate and verify floor space

1) Determine where the IP-RAN equipment is to be installed. Obtain and review site documentation including diagrams, floor plans and connection requirements before visiting the site.

2) Visit the site and verify that there is enough space to safely install the AirWalk units (refer to Site Preparation Checklist in Appendix B).

7.1.3 Uncrate and arrange for packing material disposal2

1) Carefully unpack the AW-100 and related components from packing material.

2) Check for any shipment damage.[3]

3) Be certain that all components match system order.[4]

4) Make arrangements for the disposal of all packing material discarded during installation.

Some crating materials may require return to the manufacturer or warehouse for reuse and therefore suitable arrangements must be made.

7.1.4 Verify location of power distribution points

1) Locate the customer or site provided power connection points and verify adequacy.

2) AC powered models require a designated 120 VAC minimum 15A or 240 VAC minimum 7A outlet. No other equipment or receptacles should be connected to this outlet, other than low power accessories needed to support the IP-RAN operation such as an Ethernet switch. Use only the 6' power cord supplied with the IP-RAN unit.

---

[2] NOTE: If any visible damage, contact the Installation Coordinator immediately.

[3] NOTE: Note any damage on the receivables receipt, and Installation Checklist. Contact the Installation Coordinator immediately.

[4] NOTE: If components do not match the system order, contact the Coordinator immediately.

3) +12 VDC Models require a rectified and filtered nominal 24V DC power source. Voltage can range from 22 VDC to 28 VDC to allow use with a float charged battery system. A designated 50A source with independent over current protection is required for each IP-RAN unit (fused or circuit breaker). No other equipment should be connected to the designated circuit breaker.

4) DC powered models require suitable cables with connector lugs to be supplied by the installer for connection to the DC power source. A #4 or a #2 AWG gauge fine stranded cable is recommended. Other gauges may be required depending on the calculated voltage drop. The recommended bolted bus bar connection is a Blackburn p/n CLT2-2516 or equivalent. Use the bolts supplied with the IP-RAN to connect to the bus bar.

5) Proper ground connections are essential for both safety and for proper RF performance. Racks must be equipped with either a grounded bus bar running the height of the rack, or a common bonding point with a dedicated ground cable connected to a common cell site ground system. Installation requires that both the IP-RAN main unit and the RU amplifier system be connected to a common site ground using ground straps provided with the system. The site ground system must be independently tested and verified for low resistance to ground.

7.1.5 Verify location of LAN facilities and connection points

1) Locate the customer provided LAN connection points. This could be a dedicated Ethernet switch, or a set of Ethernet connection points on an IP transport system terminal.

2) The IP-RAN system requires one IP address for proper operation. RNC(BSC) and RN(BTS) are working by one.

3) All Ethernet connection should be made using RJ-45 connectors and Category 5 or 6 Ethernet cables capable of supporting 10/100BaseT operation.

4) The static IP Address setting for the IP-RAN will be done after power up using the web server tool (ref BSM Operations Manual). A site connection and IP addressing diagram should be prepared for each site and posted at the site after installation.

5) It is strongly recommended that a copy of local site IP routing and addressing diagrams be sent to AirWalk at the following address to support any remote diagnostics needed.

Mail to:
AirWalk Customer Service Centre
1830 North Greenville Ave.,
Richardson, Texas 75081

E-mail to:
techsupport@airwalkcom.com

7.1.6 Verify location of RF Antenna Systems, including GPS

1) Locate the site antenna systems, transmission lines and interconnection jumpers. Follow the site interconnection diagrams provided by the RF Systems Engineer. It is essential both for proper system operation and for regulatory or licensing requirements that the antennas are connected to the correct sectors using the correct jumper cables.

2) Any discrepancies or problems must be clarified and changes approved by the designated RF Systems Engineer prior to powering up any base station.

3) Locate the GPS antenna cables and verify the cable is equipped with a TNC connector for connection to the IP-RAN base station.

Base station operation is still possible without a GPS connection; however, it will not be possible to implement soft handoff and related features. In cases where GPS is not provided, the base station will obtain local time from the BSM time server to ensure mobile handset display is correct.

7.1.7 Verify physical mounting racks are present and suitable

1) Rack mounted IP-RAN systems must be mounted in a suitable 19" EAI standard rack system that can support the weight of the IP-RAN and also provide adequate rear support for the power supply. Mounting height requirements are as follows:

    a) Main Unit 1 RU (Rack Units) [1 RU = 1.75" (44mm)]

    b) RU System 2 RU (Rack Units) [Omni RU System]

    c) DC RPSU 1 RU [DC models only]

2) The normal unit stacking lineup is (from bottom to top): RPSU; RU; Main Unit. Do not change this lineup since all the factory supplied cables are sized for this stack model.

3) It is MANDATORY that suitable rear support be provided at the bottom of the IP-RAN stack.

    a) In the case of 4 post racks, provide rear support using either a rear cross bar support, a shelf, or mounting brackets for the rear of the chassis.

    b) In the case of 2 post racks, provide a suitable heavy duty shelf capable of holding at least 100 lbs (45 kg). Other options include using a centre balanced shelf or installing a 4 post conversion kit with a support shelf.

4) Rack mounting screws are to be supplied by the installer as required.

7.2 IP-RAN Installation Procedures

7.2.1 IP-RAN System physical installation

1) First, install any support shelves or brackets required to provide rear support.

2) Locate the correct holes and install the heaviest rack unit first, which will normally be the RU system. Installation normally requires at least two people to lift and locate the unit due to the heavy weight. Secure the RU system to the rack using appropriate rack mounting screws. Install a screw for each RU rack mounting hole to ensure enough physical support is provided.

The RU is heavy; At least two people are required to lift and position the RU.

3) Install the RPSU (DC models only) below the RU system. Ensure the RPSU engages with the rear weight support mechanism (shelf or brackets). Secure the RPSU using suitable rack mounting screws.

4) Install the IP-RAN main unit above the RU system. Secure the IP-RAN main unit using suitable rack mounting screws.

7.2.2 Internal system cable connections

1) Install the RU control interface cable between the IP-RAN main unit and RU..

2) Install the optional IPC jumper cable on the IP-RAN front panel.

3) DC Models Only :Install the alarm interface cable between the RPSU and the RU

4) DC Models Only: Install the DC power cable between the RPSU and the RU amplifier chassis.

5) DC Models Only: Install the DC power cable between the RPSU and the IP-RAN main unit.

6) Install the RF cables between the IP-RAN main unit and the RU system as illustrated in this manual. Verify all RF cable connections are correct before proceeding.

Use only cables provided with the IP-RAN system to ensure proper operation.

7.2.3 External system Connections[5]

1) Establish external grounding points and install ground strap connections from the IP-RAN main unit and the RU amplifier system to the common site ground points (refer to Section 5.2 for grounding details). Rack should be equipped with ground bus bars or bonding points that are cabling to a common cell site ground system.

2) Connect the external Ethernet backhaul connections. Use category 5 or category 6 cable that is certified for use in 10/100 Ethernet systems.

---

[5] ⚠ ***WARNING: Make sure <u>all</u> system power supplies are turned off. All breakers / fuses are pulled on all main and intermediate panels. Then proceed with the installation.***

3) Connect the external GPS antenna to the IP-RAN GPS antenna input. Use a suitable RF cable (RG-58 or equivalent) equipped with a TNC connector.

4) Connect the external RF antenna systems. Follow site specific cable installation drawings prepared by the RF system/planning engineer for cable type and routing. The IP-RAN unit is equipped with N-type RF connectors. Ensure the individual sector antenna systems are connected to the correct IP-RAN sector antenna connections. Incorrect sector connections may cause operational or coverage problems.

5) AC Models Only: Connect the AC line cords for the IP-RAN a dedicated AC power source.

Only use the cables provided with the system for continued safe operation.

6) DC Models Only: Locate and verify the polarity of the DC power source cables. Slip a 4" length of heat shrink tubing over each DC cable. Connect the cable lugs to the RPSU DC power bus bars using the supplied connector lug bolts. Tighten the bolts firmly to ensure a solid electrical connection. The use of electrical contact grease is acceptable if desired. Slide the heat shrink tubing over the bus bar connection and use a heat gun to secure the connection.

Short circuits in high current DC power systems can be dangerous. All exposed DC connections must be protected to prevent accidental short circuits.

7.2.4 Power-up procedure

Verify all connections are correct prior to powering up base station.

1) AC Models Only

   a. Switch on the AC power source.

   b. Switch on the IP-RAN main unit power switch located on the rear panel power entry point. The switch is located adjacent to the DC PWR connection.

2) DC Models Only

   a. Switch on or engage the circuit breakers at the +12 VDC power source.

   b. Switch on the RPSU main circuit breaker located on the RPSU front panel.

   c. Use the RPSU voltmeter to verify the presence of +24/27 VDC power.

   d. Switch on the RPSU RU circuit breaker located on the RPSU front panel. Note the increase in current consumption on the RPSU current meter.

   e. Switch on the IP-RAN main unit (AW-100) circuit breaker located on the RPSU front panel. Note the increase in current consumption on the RPSU current meter.

3) The IP-RAN unit will automatically initiate the startup procedure.

4) Verify communication between the IP-RAN main unit and the RU amplifier system by observing the communications indicators (led MST) on the RU front panel. The indicators should on to indicate communication is occurring.

5) Verify the Ethernet backhaul links are communicating by observing the activity indicators on the external Ethernet switch. The activity indicators are typically found on the front panel or adjacent to the connection point on Ethernet switches. The indicators should be flashing intermittently to indicate the presence of IP packet activity.

7.2.5 Installation Completion

Completion of the installation requires that all cables be suitably routed and bundled for a neat appearance. All cables should be tie wrapped as needed to ensure cables will not move or be stressed in normal system operation. External cables should be labeled in accordance with the site specific installation drawings prepared by the site planning engineer.

All garbage and installation materials, including wire clippings and tie wrap ends, must be removed from the site prior to completing the installation.

7.3 Initial System Configuration

Each IP-RAN system requires configuration of key site specific information prior to operation to allow the system to communicate and contact the controlling iBSM system. One this initial information is configured the system will automatically download software and configuration information from the iBSM. No additional on-site configuration is required after this initial configuration is completed.

The following items must be configured in the base station after installation using the Web Server installation support tool:

- IP-RAN IP Address: Locally valid static IP address (allows IP communications)
- IP-RAN Identity: Unique identifier associated with a iBSM site configuration
- Host iBSM IP Address of RNC: IP address of the controlling iBSM (allows initial contact)

Additional capabilities are provided in the Web Server Installation Tool to identify sub-net masks and net gateways, and the ability to select optional boot modes.

The required IP addresses and base station identity for a particular site are normally set up in advance by the network control center engineers prior to site deployment. Ensure this information has been provided prior to installation configuration.

7.3.1 Web Server Installation Tool Set-up

The Web Server Installation Tool is built into the IP-RAN base station. Connection to the tool requires only a PC equipped with an Ethernet capability and a common browser such as Explorer.

Connection from the PC to the base station is made over the local Ethernet connection at the cell site, usually via the local on site Ethernet switch (Figure 7-1).

Refer to the Web Server Installation Tool document for complete instructions on configuring the PC and browser to access the web server tool. Abbreviated instructions are provided in the remainder of this section for users previously familiar with the Web Server Tool.

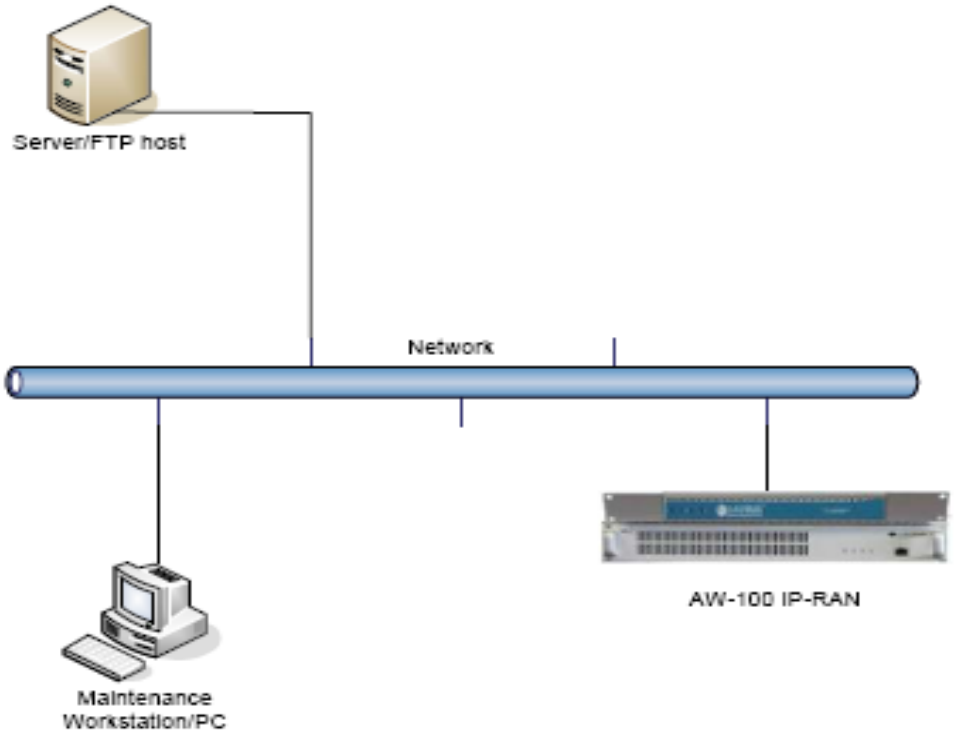


Figure 7-1 **Initial Configuration Using Local Web Server**

7.3.2 Web Server Connections

There are some rules that should be followed when making the parameter changes. Some of the parameters have to be used with a valid IP address format such as "xxx.xxx.xxx.xxx", where xxx is a digit between 0 to 255.

The parameters that are important for the configuration of the AW100 are Primary IP Address, Subnet Mask, Host IP Address, and Gateway. In addition BSID, Base Station ID, should be composed of number between 0 to 4095. The value of 5000 is a special

BSID number that will be used for the manufacturing default number. This number should be changed before the operation can begin.

Use these default addresses to access the AW100 functions for the first time using the PC browser. Enter these IP addresses in the browser address bar to gain access to the AW100 functions.

Once a base station has been configured, the default addresses are not longer valid.

To gain access locally to a base station that has already been configured (running), use either the new IP address (the primary address) or a secondary IP address in the AW-100 IP-RAN system. It depends up the BSID value. This secondary IP address is an alternate means to access the system from within the unit's LAN. The secondary IP Address takes the following format:

172.3X.YYY.ZZZ

X = 0 for 1xEV-DO systems

X= 1 for 1xRTT systems.

Internally, the dotted fields are represented by eight bits per field for a total 32 bits per address. YYY and ZZZ fields are derived from the BSID by shifting the 12 bit BSID that range from 0 to 4095 as mentioned above. To calculate the BSID into YYY.ZZZ, shift the BSID by 4 bits then add the final bits. The final two bits are 01 for RN. For example BSID = 4095 can be calculated as follow:

Decimal 4095 = hex FFF = bin 1111 1111 1111

Then shift 4 to left then add 01 = 1111 1111 1111 0001

Calculate it back to Hex = FF F1

YYY.ZZZ becomes FF.F1 and this will come up with secondary IP Address.

For the above example of 1xRTT with BSID 4095 will have secondary IP Address as follow:

172.31.255.241

where X = 1 since it is 1xRTT product with YYY=FF=255 and ZZZ = F1 = 241.

For the factory default setting with BSID=5000, following are secondary IP address:

For 1xRTT system: **172.31.255.251**

For EVDO system: **172.30.255.251**

You must know either the base station id or the current IP address to access the web server function when the base station is running.

The Web Server function is also equipped with a security log in to prevent unauthorized access from the local IP network. The following default log-in parameters are used:

Login ID: `air`

Password: `airairair`

7.3.3 IP-RAN Initial Configuration (default “booting mode”)

Connection the PC to the RN using either the default factory IP address (new systems), or the primary address or secondary address (systems already configured). The window shown in Figure 7-2 will appear in the browser:

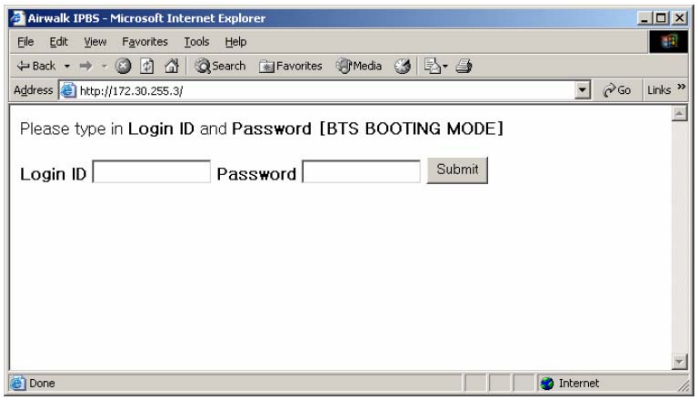


***Figure 7-2* Web Server Login Screen**

Enter the default login id and password to gain access to the configuration screen, which looks similar to Figure 7-3.

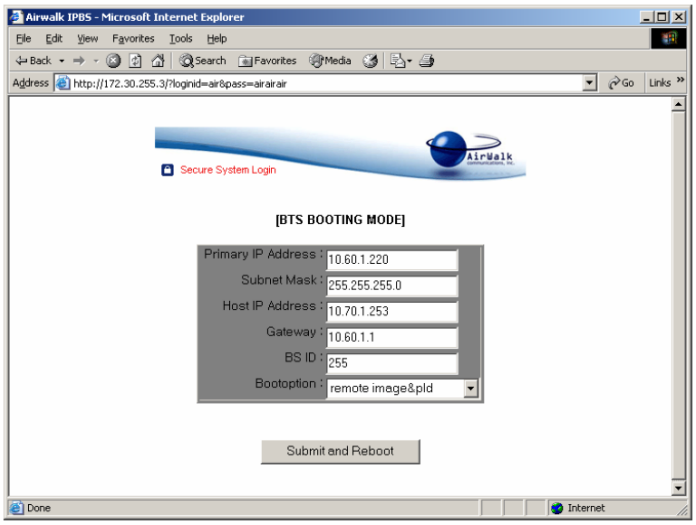


Figure 7-3 IP-RAN Configuration Screen (default “booting mode”)

Enter the required information and click on “Submit and Reboot” to set the parameters. The system will present the screen as shown in Figure 7-4. At this point, the system sets the configuration parameter and then proceeds to reboot. During reboot, the iBSM contacts and downloads the full site configuration. The reboot process can be interrupted by clicking on “RECONNECT”.

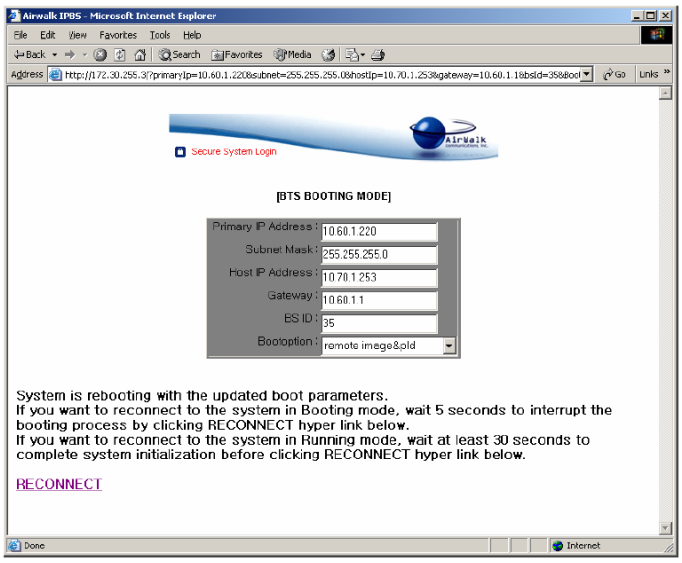


Figure 7-4 IP-RAN Configuration Screen (default "booting mode")

7.3.4 IP-RAN Re-Configuration ("running mode")

An IP-RAN equipped with an existing configuration can again be accessed via the Web Server tool to change parameters. The connection to the IP-RAN must be made using either the current primary IP address or the secondary address which is based on the base station id. After connection, the login screen will appear as shown in Figure 7-5, indicating "running mode".

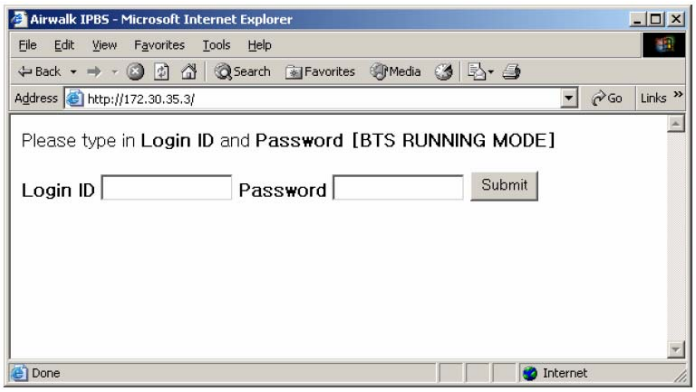


***Figure 7-5* IP-RAN Re-Configuration Screen ("running mode")**

Enter the default login id and password to access the configuration screen:

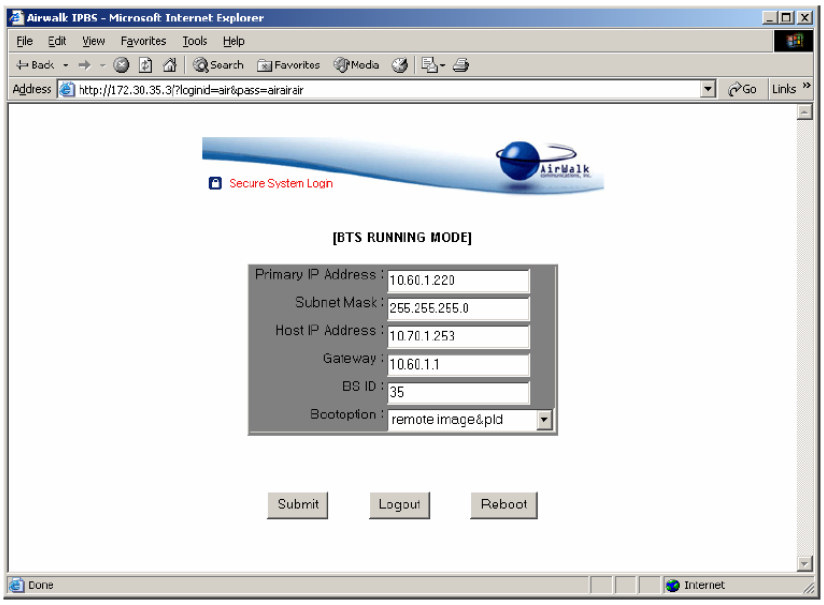


Figure 7-6 **IP-RAN Configuration Screen ("running mode")**

Configuration changes are entered using this screen and accepted by the IP-RAN by clicking on the "Submit" button. However, the new changes will NOT become effective until the IP-RAN unit is rebooted. This can be done by clicking on the "Reboot" button.

Once the IP-RAN unit reboots, it will use the new configuration information to contact the controlling iBSM system to download software images and/or configurations, as required or defined in the "bootoptions" setting.

7.3.5 Additional Operation Tests

Additional operational tests may be required by the RF system/planning engineer, the network control centre engineers, or others in order to complete the base site installation.

Such tests could include:

- Power output measurement (PPS or PN3383)
- Alarm function testing
- Test calls using mobile handsets or data terminals
- Drive testing and RF coverage/performance measurement

Refer to the individual test checklists for completion and recording of any additional installation test activities.

7.4 Site Cleanup and Customer Signoff

The following activities must be undertaken prior to completion of the site installation:

- Disposal of all packing and installation materials, including wire clippings
- Replace all equipment, covers, doors and other site equipment

- Completion of the installation checklist
- Final approval by the relevant customer authority

7.5 Recommended Installation Tools and Supplies

1) Hand Tools:
   a) Screwdriver set
   b) Pliers set
   c) Nut Driver set
   d) Cutter set
   e) Punch Down tool, or wire-wrap tool (site dependent)
   f) RJ-45 crimper tool
2) Test Equipment:
   a) Multi-meter and adapter kit
   b) PC equipped with Ethernet card and browser
   c) RF test set (power measurement, or optionally a CDMA test set)
   d) RF adapters
3) Supplies:
   a) RJ-45 connectors
   b) Cat 5 or 6 Cable
   c) Cable tie-wraps
   d) Rack mounting screws and related rack hardware

7.6 Troubleshooting Procedures

The AW-100 Series CDMA IP-RAN system is designed to provide reliable and consistent high performance in all network environments. The installation procedure described in this manual for the IP-RAN is quite straightforward and simple to implement.

Should problems develop during installation, this section is intended to help locate, identify, and correct these types of problems. Please follow the suggestions listed in the following sections prior to contacting the AirWalk Customer Support Center. If you are unsure of the procedures described in this section, contact the installation coordinator immediately for clarification.

7.6.1 Before Calling for Assistance

1) If difficulty is encountered with a specific component of the IP-RAN, refer back to the Installation Section for that component.
2) Check the cables and connectors to ensure that they have been properly connected and the cables/wires have not been crimped or impaired in some way during installation.

As a rule, 90% of component problems can be attributed to wiring and connector problems).

a) Check cable

b) Check connector

c) Check for solid connection

d) Check with site specific installation documentation

3) Make sure that all power cords are properly attached to each IP-RAN component. Be certain that all power cords are plugged into a functioning electrical outlet. Use the PWR LED's and the voltage meters to verify each unit is receiving power. Check intermediate breakers or fuses.

4) If the problem is isolated to something other than the IP-RAN, contact the appropriate parties responsible for that system.

5) Verify whether or not the problem is corrected. If not, go to Step 6 below. If the problem is corrected, continue with installation.

6) If the problem continues after completing Step 4 above, contact the Installation Project Manager to determine the next course of action. If the problem persists after review, then contact the AirWalk Customer Support Center for assistance.

7.6.2 When Calling for Assistance

Please be prepared to provide the following information.

1) A complete description of the problem, including the following points:

a) The nature and duration of the problem

b) Situations when the problem occurs

c) The components involved in the problem

d) Any particular application that, when used, appears to create the problem

2) A record of changes that have been made to the IP-RAN configuration prior to the occurrence of the problem.

3) Any changes to the system should all be noted.

AirWalk Customer Service Center
1830 North Greenville Ave.,
Richardson, Texas 75081

E-mail to:
techsupport@airwalkcom.com

8 Appendix A - Acronyms

Acronym	Description
2G	Second Generation in CDMA wireless network
3G	Third Generation in CDMA wireless network
AAA	Authentication, Authorizing, and Accounting
BHCA	Busy Hour Call Attempts
BSC	Base Station Controller
BTS	Base station Transceiver Subsystem
CA	Call Agent – Softswitch
CALEA	Communications Assistance for Law Enforcement Act
CDMA	Code Division Multiple Access
CPE	Customer Premise Equipment
CPU	Central Processing Unit
CSM5000	Cell Site Modulator 5000 (CDMA ASIC chip released by Qualcomm for cdma2000)
DC	Direct Current
DHCP	Dynamic Host Control Protocol
EVDO	Evolution Data Only
EVRC	Enhanced Variable Rate CODEC
FA	Frequency Assignment
FCC	Federal Communications Commission
FM	Fault Management
FO	Frame Offset
GPS	Global Positioning System
HLR	Home Location Register
HO	Handoff
HSS	Home Subscriber Server
iBSM	Integrated Base Station Management
IF	Intermediate Frequency
IMSI	International Mobile Subscriber Identity
I-CSCF	Interrogating Call Session Control Function
IOS	Interoperability System
IP	Internet Protocol
IKE	Internet Key Exchange
IMS	IP Multimedia Subsystem
IPSec	IP Security
LAN	Local Area Network
MG	Media Gateway
MN	Mobile Node
MS	Mobile Station
MSC	Mobile Switching Center
MTBF	Mean Time between Failure
PCF	Packet Control Function in BSC
PSTN	Public Switched Telephone Network
QCELP	Qualcomm Code Excited Linear Prediction
QOF	Quasi-Orthogonal Function
QOF	Quasi Orthogonal Function
QoS	Quality of Service
RAN	Radio Access network

Acronym	Description
RC	Radio Configuration
RN	Radio Node
RF	Radio Frequency
RNC	Radio Network Controller
RPSU	Remote RF Power Supply Unit
RTP	Real-Time Transport Protocol
RU	Remote RF Unit
SDU	Selection and Distribution Unit
SMS	Short Message Service
SS	Soft Switch
SIP	Session Initiation Protocol
S-CSCF	Serving Call Session Control Function

9 Appendix B - Installation Certification Document

Date: _____

Subject: _____

The subject AW-100 Series IP-RAN has been installed and proper system operation has been verified on this date.

_____ _____

Installation Team Representative Date

_____ _____

Authorized Carrier Representative Date

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