mobileaccess

860M with WCE

Installation and Configuration Guide

MobileAccess

8391 Old Courthouse Road, Suite 300, Vienna, VA 22182

Tel: (866)436-9266, (703)848-0200 TAC: (800)787-1266, Fax: (703)848-0280

http://www.MobileAccess.com

Preface Material

Policy for Warrantee and Repair

MOBILEACCESS TESTS AND INSPECTS ALL ITS PRODUCTS TO VERIFY THEIR QUALITY AND RELIABILITY. MOBILEACCESS USES EVERY REASONABLE PRECAUTION TO ENSURE THAT EACH UNIT MEETS THEIR DECLARED SPECIFICATIONS BEFORE SHIPMENT. CUSTOMERS SHOULD ADVISE THEIR INCOMING INSPECTION, ASSEMBLY, AND TEST PERSONNEL ABOUT THE PRECAUTIONS REQUIRED IN HANDLING AND TESTING OUR PRODUCTS. MANY OF THESE PRECAUTIONS CAN BE FOUND IN THIS MANUAL.

THE PRODUCTS ARE COVERED BY THE FOLLOWING WARRANTIES:

General Warranty

MOBILEACCESS WARRANTS TO THE ORIGINAL PURCHASER ALL STANDARD PRODUCTS SOLD BY MOBILEACCESS TO BE FREE OF DEFECTS IN MATERIAL AND WORKMANSHIP FOR ONE (1) YEAR FROM DATE OF SHIPMENT FROM MOBILEACCESS. DURING THE WARRANTY PERIOD, MOBILEACCESS WILL REPAIR OR REPLACE ANY PRODUCT THAT MOBILEACCESS PROVES TO BE DEFECTIVE. THIS WARRANTY DOES NOT APPLY TO ANY PRODUCT THAT HAS BEEN SUBJECT TO ALTERATION, ABUSE, IMPROPER INSTALLATION OR APPLICATION, ACCIDENT, ELECTRICAL OR ENVIRONMENTAL OVER-STRESS, NEGLIGENCE IN USE, STORAGE, TRANSPORTATION OR HANDLING.

Specific Product Warranty Instructions

ALL MOBILEACCESS PRODUCTS ARE WARRANTED AGAINST DEFECTS IN WORKMANSHIP, MATERIALS AND CONSTRUCTION, AND TO NO FURTHER EXTENT. ANY CLAIM FOR REPAIR OR REPLACEMENT OF UNITS FOUND TO BE DEFECTIVE ON INCOMING INSPECTION BY A CUSTOMER MUST BE MADE WITHIN 30 DAYS OF RECEIPT OF SHIPMENT, OR WITHIN 30 DAYS OF DISCOVERY OF A DEFECT WITHIN THE WARRANTY PERIOD.

THIS WARRANTY IS THE ONLY WARRANTY MADE BY MOBILEACCESS AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. MOBILEACCESS SALES AGENTS OR REPRESENTATIVES ARE NOT AUTHORIZED TO MAKE COMMITMENTS ON WARRANTY RETURNS.

Returns

IN THE EVENT THAT IT IS NECESSARY TO RETURN ANY PRODUCT AGAINST ABOVE WARRANTY, THE FOLLOWING PROCEDURE SHALL BE FOLLOWED:

1. RETURN AUTHORIZATION IS TO BE RECEIVED FROM MOBILEACCESS PRIOR TO RETURNING ANY UNIT. ADVISE MOBILEACCESS OF THE MODEL, SERIAL NUMBER, AND DISCREPANCY. THE UNIT MAY THEN BE FORWARDED TO MOBILEACCESS, TRANSPORTATION PREPAID. DEVICES RETURNED COLLECT OR WITHOUT AUTHORIZATION MAY NOT BE ACCEPTED.

2. PRIOR TO REPAIR, MOBILEACCESS WILL ADVISE THE CUSTOMER OF OUR TEST RESULTS AND ANY CHARGES FOR REPAIRING CUSTOMER-CAUSED PROBLEMS OR OUT-OF-WARRANTY CONDITIONS ETC.

3. REPAIRED PRODUCTS ARE WARRANTED FOR THE BALANCE OF THE ORIGINAL WARRANTY PERIOD, OR AT LEAST 90 DAYS FROM DATE OF SHIPMENT.

Limitations of Liabilities

MOBILEACCESS'S LIABILITY ON ANY CLAIM, OF ANY KIND, INCLUDING NEGLIGENCE FOR ANY LOSS OR DAMAGE ARISING FROM, CONNECTED WITH, OR RESULTING FROM THE PURCHASE ORDER, CONTRACT, QUOTATION, OR FROM THE PERFORMANCE OR BREACH THEREOF, OR FROM THE DESIGN, MANUFACTURE, SALE, DELIVERY, INSTALLATION, INSPECTION, OPERATION OR USE OF ANY EQUIPMENT COVERED BY OR FURNISHED UNDER THIS CONTACT, SHALL IN NO CASE EXCEED THE PURCHASE PRICE OF THE DEVICE WHICH GIVES RISE TO THE CLAIM.

EXCEPT AS EXPRESSLY PROVIDED HEREIN, MOBILEACCESS MAKES NO WARRANTY, EXPRESSED OR IMPLIED, WITH RESPECT TO ANY GOODS, PARTS AND SERVICES PROVIDED IN CONNECTION WITH THIS AGREEMENT INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. MOBILEACCESS SHALL NOT BE LIABLE FOR ANY OTHER DAMAGE INCLUDING, BUT NOT LIMITED TO, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH FURNISHING OF GOODS, PARTS AND SERVICE HEREUNDER, OR THE PERFORMANCE, USE OF, OR INABILITY TO USE THE GOODS, PARTS AND SERVICE.

Reporting Defects

THE UNITS WERE INSPECTED BEFORE SHIPMENT AND FOUND TO BE FREE OF MECHANICAL AND ELECTRICAL DEFECTS.

EXAMINE THE UNITS FOR ANY DAMAGE THAT MAY HAVE BEEN CAUSED IN TRANSIT. IF DAMAGE IS DISCOVERED, FILE A CLAIM WITH THE FREIGHT CARRIER IMMEDIATELY. NOTIFY MOBILEACCESS AS SOON AS POSSIBLE.

NOTE: KEEP ALL PACKING MATERIAL UNTIL YOU HAVE COMPLETED THE INSPECTION

WARNING: TO COMPLY WITH FCC RF EXPOSURE COMPLIANCE REQUIREMENTS, ANTENNAS USED FOR THIS PRODUCT MUST BE FIXED MOUNTED ON INDOOR PERMANENT STRUCTURES, PROVIDING A SEPARATION DISTANCE OF AT LEAST 20 CM FROM ALL PERSONS DURING NORMAL OPERATION.

WARNING: ANTENNA GAIN SHOULD NOT EXCEED 7dBi (refer to section 3.4.1 for further information).

WARNING: EACH INDIVIDUAL ANTENNA USED FOR THIS TRANSMITTER MUST BE INSTALLED TO PROVIDE A MINIMUM SEPARATION DISTANCE OF 20 CM OR MORE FROM ALL PERSONS AND MUST NOT BE CO-LOCATED WITH ANY OTHER ANTENNA FOR MEETING RF EXPOSURE REQUIREMENTS.

WARNING: THE DESIGN OF THE ANTENNA INSTALLATION NEEDS TO BE IMPLEMENTED IN SUCH A WAY SO AS TO ENSURE RF RADIATION SAFETY LEVELS AND NON-ENVIRONMENTAL POLLUTION DURING OPERATION.

ATTENTION:

COMPLIANCE WITH RF SAFETY REQUIREMENTS:

MOBILEACCESS™ PRODUCTS HAVE NO INHERENT SIGNIFICANT RF RADIATION.

THE RF LEVEL ON THE DOWN LINK IS VERY LOW AT THE DOWNLINK PORTS. THEREFORE, THERE IS NO DANGEROUS RF RADIATION WHEN THE ANTENNA IS NOT CONNECTED.

Safety

WARNING! To comply with FCC RF exposure compliance requirements, antennas used for this product must be fixed mounted on indoor permanent structures, providing a separation distance of at least 20 cm from all persons during normal operation.

1. Each individual antenna used for this transmitter must be installed to provide a minimum separation distance of 20 cm or more from all persons and must not be co-located with any other antenna for meeting RF exposure requirements.

2. The design of the antenna installation needs to be implemented in such a way so as to ensure RF radiation safety levels and non-environmental pollution during operation.

Compliance with RF safety requirements:

- MobileAccess™ products have no inherent significant RF radiation.

- The RF level on the downlink is very low at the downlink ports. Therefore, there is no dangerous RF radiation when the antenna is not connected.

Certification

MA-860M with WCE has met the approvals of the following certifying organizations:

- FCC–47, CFR 15.109, Part 15 Sections B, C, and E
- UL / IEC 60950 -1
- UL1950 Fire Safety requirements
- UL2043 Fire/Plenum (WCE)
- CE EN 60950
- CAN/CSA C22.2 No 60950

NOTE: 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and receiver.
-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-- Consult the dealer or an experienced radio/TV technician for help.

Warning!
Changes or modifications to this equipment not expressly approved by Mobile Access Ltd. could void the user's authority to operate the equipment.

FCC Warning/Notice

WLAN Module With WCE for DAS Model 860M with WCE FCC ID:	Must be used with Access Point	FCC ID
OJFMA860WCE	Cisco 1242 Access Point	OJFMA860WCE
OJFMA860WCO	Colubris MAP-330	OJFMA860WCO
OJFMA860WTR	Trapeze MP-422	OJFMA860WTR
OJFMA860WME	Meru AP200	OJFMA860WME
OJFMA860WAR	Aruba AP70	OJFMA860WAR

Company Certification

ISO ISO 9001: 2000 and ISO 13485: 2003

Professional Installation of Transmitter

According to FCC 15.203, if an intentional radiator has a standard antenna connector, it must be professionally installed according to FCC 15.203 regulations.

In addition, the following also demonstrates compliance with Section 15.204(d), (i):

1. The MA-860 cannot be sold to the general public. It is only marketed and sold by authorized agents. Only professional installation qualified ("licensed") by MobileAccess for this purpose is allowed to install the MA-860.

2. The installation must be controlled and follow the requirement of "Installation Manual" (*P/N:709C002901*). Each potential installer must receive special training, which is a condition for receiving the license from MobileAccess Inc to become a "licensed" installer. The installation procedure as described in the "Installation Manual" includes the mechanical installation and initial setup by a PC based tool.

3. The intended application of the system is exclusively for the commercial/industry use.

About This Guide

This user guide provides essential product functionality with all the information necessary to professionally install and configure the MobileAccess 860M and 860R units.

In this User Manual, the product MA860M with FCE will be referred to as MA860.

Revision History

The revision history for this document is shown in Table 1-1.

Table 1-1: Revision history

P/N and REV	Date	Description
709C002901_v1.0	March 25, 2007	Initial version
709C002901_v1.1	April 10, 2007	Engineering Review
709C002901_v1.2	November 19, 2007	Product Updates
709C002901_v1.3	December 11, 2007	Product Management Review

List of Acronyms

802.11a	WLAN IEEE Standard for 5GHz ISM band
802.11b/g	WLAN IEEE Standard for 2.4GHz ISM band
AGC	Automatic Gain Control
AP	Access Point
ARM	Adaptive Radio Management
BDA	Bi-Directional Amplifier
BU	Base Unit
DFS	Dynamic Frequency Selection
DL	Downlink
ETL	Electrical Safety Testing Organization
FCC	Federal Communications Commission
GUI	Graphical User Interface
HTTP	Hypertext Transfer Protocol
IEEE	Institute of Electrical and Electronic Engineering
IP	Internet Protocol Address
LBS	Location Based Services
LWAPP	Light Weight Access Point Protocol
LED	Light Emission Diode
PSU	Power Supply Unit
RHU	Remote Hub Unit
RP	Reverse polarity
RRM	Remote Radio Management
RTLS	Real Time Location Systems
SCU	Splitting and Combining Unit
SMA	A coaxial connector (Subminiture Version A)
SNMP	Simple Network Management Protocol
SNR	Signal to Noise Ratio
TNC	(Threaded Neill-concelman) Connector
Type-N	Threaded RF type N connector for coaxial cable
UL	Uplink
VoIP	Voice over Internet Protocol
WCE	WiFi Coverage Expander
WiFi	Interoperability of WLAN products based on the IEEE 802.11 standards
WLAN	Wireless Local Area Network

Table of Contents

1   Introduction to the MA-860 System

This chapter provides a description of the MA-860 WLAN solution, architecture, installation configuration, operation and required commissioning procedures.

1.1   About MobileAccess MA-860

Figure 1-1. MobileAccess MA-860

The MA-860 WLAN solution is part of the MobileAccess third generation family of products for Wireless LAN infrastructure. It is comprised of an MobileAccess 860 WLAN module and WCE, WiFi coverage expander, in order, to provide a centralized, secure Wi-Fi AP management system with greater range and coverage visibility by delivering an "access point" in the ceiling behavior and performance with added benefits of security, management, aesthetics, and leveraging a single infrastructure to provide a complete set of wireless services.

The MobileAccess 860 WLAN solution offers the ability to leverage a single antenna infrastructure to deliver not only IEEE 802.11a and 802.11b/g, but a combined services approach which allows the customer the flexibility to choose one or all MobileAccess supported RF technologies for distribution over a single antenna infrastructure: Wi-Fi, cellular/PCS, public safety and/or WMTS while maintaining a reliable application independent architecture.

1.1.1   MA-860 Features and Capabilities

- **Multi-use infrastructure:**
  - o The same cables and antennas used for Wi-Fi can be used to support the simultaneous extension and distribution of other wireless voice and data services
- **Simple installation and maintenance:**
  - o Access Points are co-located in the telecom IDF or closet
  - o All data and voice services distributed via a common coax cabling and broadband antennas
  - o AP Clustering - 802.11 access points (APs) connect to the MA-860 in telecom closets

---

- o   Auto-discovery of WCE, WiFi Coverage Expander units

- o   The WCE is supplied via a low voltage "power over coax" technology to eliminate any additional wiring or incurred costs of installation.

- **Scalable**: Additional APs connected as needed to the MA-860

  - o   Support for four 802.11a/b/g APs (four 'a/b' and four 'g' ports) per 860 WLAN Module

  - o   Mobile services from MobileAccess 1000/2000 or WMTS

- **Cable Compensation**:

  - o   The MobileAccess 860 WLAN solution together offers the capability to compensate for up to 250 feet of coaxial cable when deployed without any additional devices in path of the antenna.

  - o   Compensation allows for standardization on supported Access Point vendor design guidelines

- **Robust Management Features**:

  - o   Remote HTTP management capabilities from any supported MobileAccess Web Browser

  - o   Local port interface for Management and configuration via an on-board RS232 interface

  - o   Familiar standards based SNMP-based management toolset (Standard MIB version 2c)

- **WI-Fi applications transparency** - The MA-860 uses discrete, active or passive antennas to radiate 802.11 signals, providing a coverage architecture that replicates the behaviors necessary to transparently support advanced AP features and location-sensitive Wi-Fi applications such as RTLS or LBS.

- **High-power -** With integral constant gain amplifiers combined with its low-loss architecture, the MA-860 offers scalable support for demanding applications such as advanced LWAPP enabled features (dynamic power and Channel), wireless VoIP, and 802.11a

- **Automatic Gain Control –** by default, when comprised with the WCE unit, the MobileAccess WLAN solution automatically compensates for the attenuation and losses that are incurred from distributing both the 802.11a and 802.11b/g RF across coaxial cables.

- **Redundancy –** reliability; no single point of failure dual power supply option.

1.2 System Architecture

The MA-860 system consists of the following main *functional* modules:

- **MA-860 WLAN module –** provides support for up to four *802.11a and 802.11b/g* access point radios in a 1:1 relationship between the access point connector port(s) and antenna port. Support remote Web based management and configuration through any standard supported HTTP web browser.

- **Wi-Fi Coverage Expander (WCE) unit**s – WLAN signal amplification unit installed adjacent to each antenna via a standard patch cable. This device provides the capability independently compensate for both 802.11a and 802.11b/g. A maximum distance of 250 feet of cable losses can be compensated from the 860 WLAN module.

- **Multi-service Antennas** – MobileAccess or any compatible multi-service antennas. A complete list of MobileAccess certified antennas can be referenced in section 3.4.1.

- **Access Point** – Any MobileAccess certified IEEE 802.11a/b/g access point. A complete list of MobileAccess approved access point vendors can be referenced in section 3.5.1.

The following figure illustrates the MA-860 services converged with MA2000 services. Detailed information on the various installations is given in section 1.4.
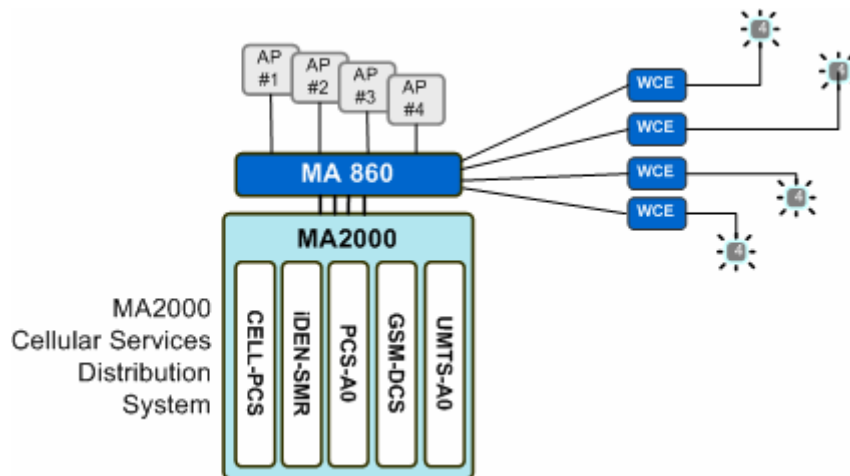
Figure 1-2. MobileAccess 860 WLAN Functional Block Diagram

1.3   Distribution of Services in the MA-860

The MobileAccess 860 WLAN solution offers the capability of distributing any array of MobileAccess supported RF spectrums/technologies: Wi-Fi, Cellular, Public Safety, and/or WMTS services via the same antenna infrastructure. The 802.11a/b/g signals from each AP port are directly connected and distributed to the corresponding antenna port along with any additional mobile services connected to the mobile services ports.

For example, the signals from an AP connected to MA-860 **b/g-1** and **a-1** are routed to **antenna-1** along with mobile services connected to Mobile port-1. Signals from an AP connected to MA-860 **b/g-2** and **a-2** are routed to **antenna-2**, along with mobile services connected to Mobile port-2 for support up to four access points per 860 WLAN module.

Note: Mobile services (in installations where MA-860 units are integrated into MA 1000/2000 installations), the mobile services are distributed over the antenna ports corresponding to the SMA connection ports.
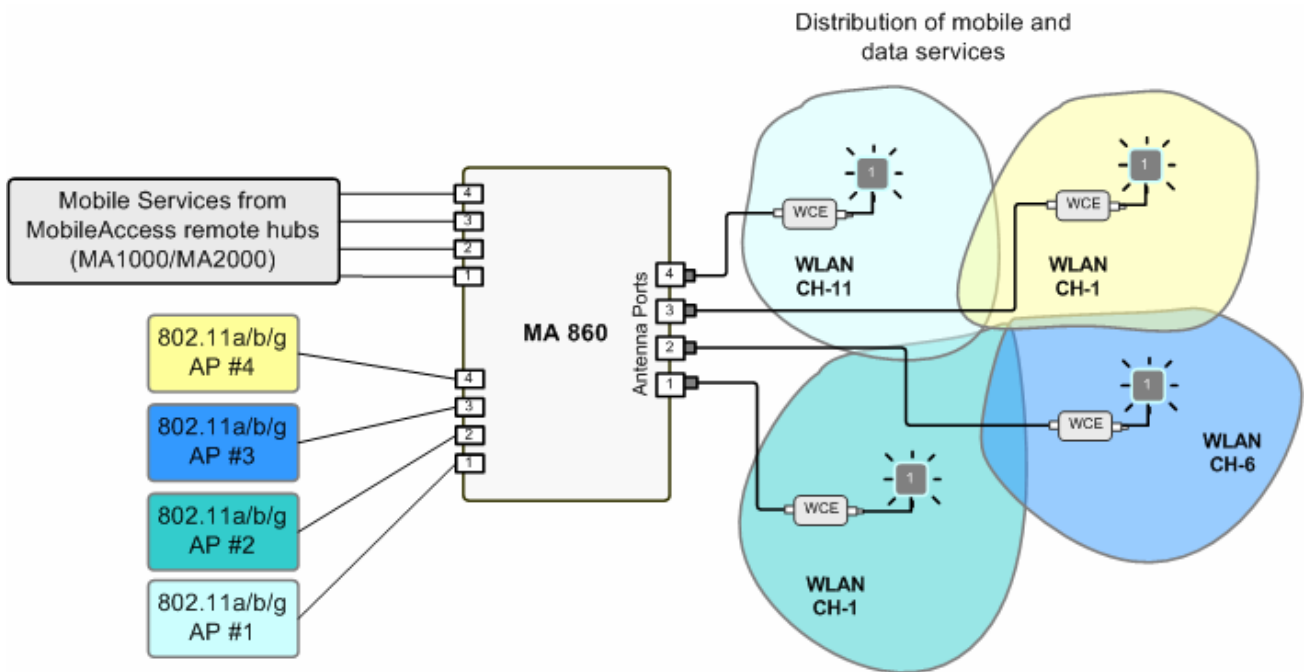
Figure 1-3. Example of 802.11a/b/g Signal Distribution

1.4   Installation Configurations

MA-860 can be installed either as standalone or integrated with other MobileAccess systems:

- Standalone – provides coverage for 802.11a/b/g services only
- Converged with MobileAccess 1000 series RHU (with and without MA 1200 add-on)
- Converged with MobileAccess 2000 system

NOTE: In all installation types, all the signals are converged via the MA-860 and distributed via the WCE connected between the antenna and the **MA-860** antenna ports.

1.4.1   Standalone

In this type of installation architecture, MA-860 WLAN module distributes only 802.11a/b/g services over the connected antenna infrastructure.
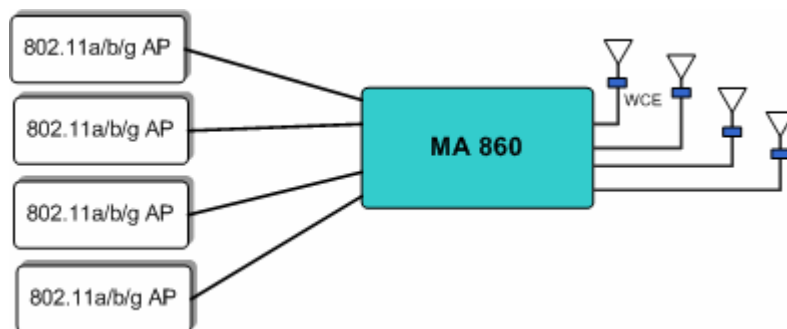
Figure 1-4. MA-860 Standalone Installation Configuration

1.4.2   Converged with MA 1000 RHU Services

The MA-860 can be installed as an add-on unit to a MA 1000 RHU. In this type of installation, the **MA 1000 RHU services** are routed to the **MA-860 inputs** where they are integrated with the MA-860 Wi-Fi data services and routed to the MA-860 antenna ports for distribution over a single coax broadband antenna infrastructure.
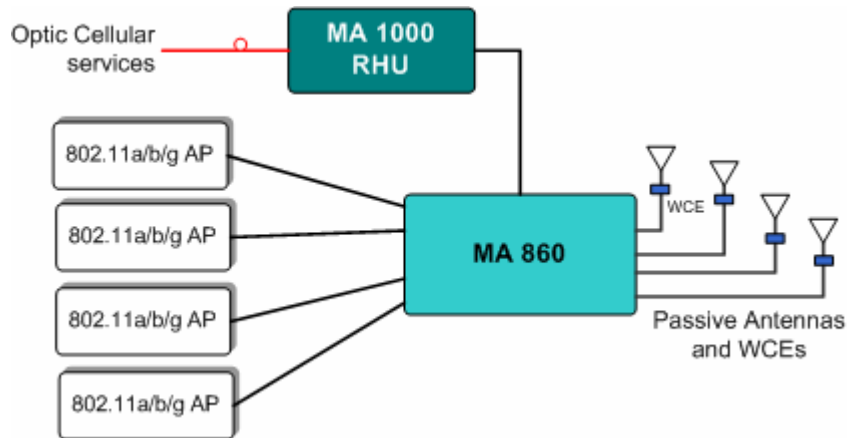
Figure 1-5 MA-860 as Add-On to MA 1000 System

1.4.3   Add-on to MA 2000 System

The MA-860 can be installed as an (external) add-on unit to the MA 2000 system. In this type of installation, the combined MA 2000 services are routed to the MA-860 inputs where they are integrated with the MA-860 Wi-Fi data services and, through the MA-860 antenna connections, distributed through the same coax broadband antenna infrastructure.
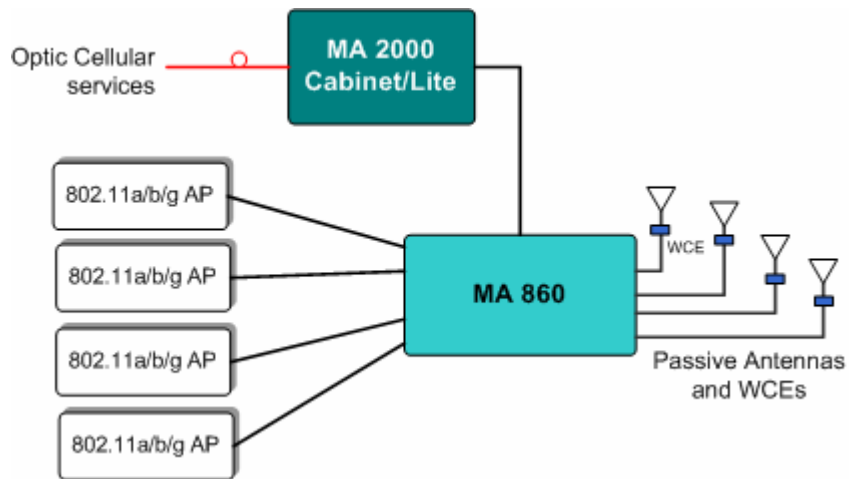
Figure 1-6. MA-860 Add-On to MA 2000 System

1.5   Provisioning and Management

MA-860 supports several interfaces for managing the MobileAccess WLAN solution – Remote, local, and 3rd party application support.

- **Web Based Management** – MobileAccess has integrated a standards based HTTP GUI interface within the 860 WLAN module for remote configuration, calibration, and system provisioning.   The MobileAccess supports the following versions or later web browsers: Microsoft's Internet Explorer 7.0 and Firefox 2.0.0.

- **MA-860 Engineering Tool** – Microsoft Windows® application installed on a computer (i.e. laptop) and used after the system has been installed for initial configuration, calibration and system provisioning. This is done via a local (RS232 connection) between the computer running the application and the MA-860 control module. The application is described in section 5.10)

- **3rd Party Application Support** – MobileAccess has developed a standards based SNMP management MIB library version (2c) which will interface with any standard MIB browser or SNMP based management system, such as, HP OpenView or Tivoli. SNMP-Traps may also be utilized for alerting and reporting critical network events with the MobileAccess product suite.

1.6   Installation and Configuration Workflow

The following workflow diagram shows the recommended approach for using this User Manual to install and provision the system.

Chapter-2 - review the Element Descriptions.

Chapter-3 - prepare the Infrastructure. This includes:
- Required power
- Antenna and coax cable layout

Chapter-4. Mount the MA-860 controller according to the type of installation:
- Stand-alone
- Converged with MA 1000 system
- Converged with MA 2000 system
- Converged with MA WMTS-CH system

Chapter-5. Power-up the MA 860 and provision the system via the remote management interface or 860 engineering tool.

The Provisioning phase is complete. You may now monitor the system via a WEB session from any Web Browser.

2 Element Descriptions

This chapter describes the MA-860 WLAN module and WCE unit system elements and includes detailed information on the elements' interfaces.

The following modules are described:

- MA-860 WLAN Module
- WCE - WiFi Coverage Expander

2.1 MA-860 WLAN Module

The MA-860 WLAN Module performs the following operations:

- Passively distributes the WiFi Radio Frequencies for up to four 802.11a/b/g Access Points in a 1:1 relationship between Access Point Port(s) and antenna port..
- Converges mobile cellulaer services with WiFi services
- Provides local and remote (WEB access) control and management capabilities
- Power Redundancy Capabilities to eliminate any single point of failure
- Provides in-line power for any connected WCE unit
- Automatically detects and provisions connected WCE units
- Antenna Sensing capabilities

2.1.1 Front Panel Connections and LEDs

The front panel contains the antenna interface ports and mobile services ports, redundant power inputs, status indicators, and local RS232 Console Port for local management. The following figure shows the MA-860 front panel display.
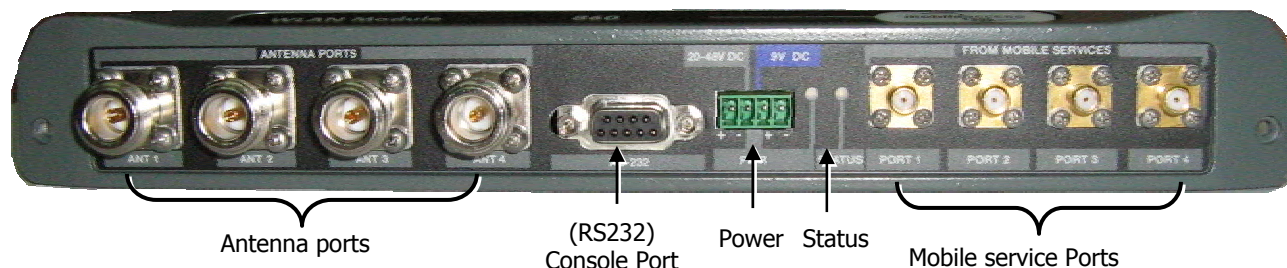
Figure 2-1. MobileAccess MA-860 Front View

Front Panel Ports

The following table describes the front panel ports.

Front Panel Ports	Description
Antenna Ports 1..4	Supports Four N-type female antenna connections
Mobile Services	Four SMA female connections used in installations that integrate MA 860 with MA 1000 RHUs or MA 2000 services. **NOTE:** *To be terminated with 50 ohm terminations when not in use.*
Console Port	RS232 connection for local setup (see section 5.1).
PSU	Power connection to Main and (optional) Redundant power supplies (see section.0).

Front Panel Status LEDs

The front panel contains two LEDs, described in the following table.

Front Panel LEDs	Description
Status	Internal operation and channel operation status: o Green constant – unit performing antenna auto-discovery. This happens only upon power-up. o Green blinking – Auto-discovery completed and unit OK. o Off – fault detected in unit (if power is supplied)
PWR	Green – Power OK. Off – no power supplied to the unit.

2.1.2   Rear Panel Port Connections and LEDs

The rear panel contains the following interfaces: four 802.11a/b/g Access Point input ports, RJ45 Ethernet port for remote management, and an antenna sensing connector.

Figure 2-2. MobileAccess MA-860 Rear View

Rear Panel Ports

The following table describes the rear panel ports.

Rear Panel Ports	Description
802.11b/g APs	Four APs 802.11b/g input connections. (See LED descriptions in the following table). **NOTE:** *To be terminated with 50 ohm terminations when not in use.*
802.11a APs	Four APs 802.11a input connections. **NOTE:** *To be terminated with 50 ohm terminations when not in use.*
(Antenna Sensing) From Add-on to Control	Relevant only when MA-860 is converged with another MA system remote unit (RHU 1000, RHU WiMAX. Connects to RHU 1000 rear panel Control connector. Routes the antenna sensing (indication of whether antenna is present) to the RHU for monitoring via the management application. (RHU Version 3.1 and higher).
Ethernet port	Connection to network for remote configuration and management via any standard MobileAccess supported WEB browser.

AP LEDs

The AP LEDs indicate the status of the corresponding 802.11 AP.

Rear Panel LEDs	Description
Blinking green	AP connected and working.
Green constant	AP connected and working and cable adjustment procedure (see section 5.10.2) for that link succeeded.
Off	AP not connected or no activity detected.

2.2 WCE

2.2.1 About WCE

Each WCE was designed to compensate for up to 250 feet cable loss in both frequency bands for a single antenna. This is done by amplifying each supported 802.11 RF band independently to accurately capture the attenuation for both bands.

This approach conforms to the new WLAN light-weight access point standards by providing uniform 802.11a/b/g coverage radius regardless of coax cable length of up to 250 feet. The WCE unit is equipped with two interface ports: One N-Type male and One N-Type Female for connectivity to the RHU and antenna respectively.

The RHU interface port in directly connected to the 0.5" low loss coaxial cable (running to a remote IDF or telecom closet where it is connected to the MA-860 antenna port). The "To Antenna" port is connected to a low-loss jumper (flexible 1' coax cable) that is directly connected to one of the many MobileAccess supported broadband antennas.
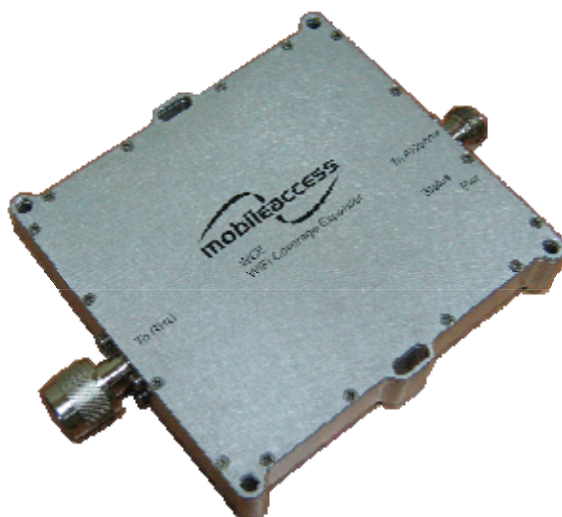
Features

- Independently amplifies the received WLAN signals in the 2.4GHz and 5GHz ISM bands.
- Per-band gain amplifies and delivers optimal coverage for 802.11a/b/g services
- Supports any GE, MobileAccess, or any MobileAccess supported 3PE antenna (with compliance to FCC rules as mentioned in 3.4.1)
- Passively supports all other wireless services in single package
- Powered in-band by the MA-860 via "power over coax"; supports low voltage (6V and 9.8V)

2.2.2   WCE Mounting Support, Connections, and LEDs

The WCE provides the following Mounting Support Options, connection Ports, and LED indicators

Mounting Support and Interface Ports

The following table describes the rear panel ports.

Mounting/Ports	Description
N-Type Male	Used to connect the WCE directly to the coax run from the IDF or Telecom closet as indicated by the "To RHU" label.
N-Type Female	Used to connect any MobileAccess supported broadband connection with a flexible N-Type – N-type Male Jumper cable (typical 1' length) as indicated by the "To Antenna" label.
Mounting Slots	Two mounting slots used to affix the unit to any available building infrastructure via a wire-tie or tie-strap.
Mounting Holes	Four mounting holes that support any standard drywall screw (3/16" in diameter).

WCE Status LEDs

The Status LEDs indicates the status and communication link between the 860 WLAN module and WCE

LEDs	Description
PWR	ON – (normal) power supplied to the unit
Status	Flickering – (normal) unit is operational

3   Infrastructure Preparation

This chapter contains information on the cabling and power requirements for the MA-860 system, as well as the access points that can be used.

3.1   Installation Requirements

The infrastructure preparation consists of two main phases:

1. **Floor Planning**: Planning the distribution of the antennas on each floor to provide the required coverage. This phase varies depending on whether the coverage is only for WLAN or includes voice coverage through the existing infrastructure:

2. **IDF or Telecom Closet Planning**: Planning the layout of the devices and cables in the IDF or Telecom Closet. This includes the MA-860, 802.11 Access Points, cabling and other voice service distribution systems such as MA 1000/2000 that are relevant to the specific installation.

3.2   Coaxial Cable Connections

3.2.1   General Cable Installation Procedures

- Observe the general cable installation procedures in accordance with the building codes in your area.
- The building code requires that all cabling be installed above ceiling level (where applicable). Each length of cable from the risers to each antenna must be concealed above ceiling.
- The cable must be properly supported and maintained straight. This is done either by using tie wraps or cable trays and clamps or hangers every 10 feet (where practical above ceiling level). Where this is not obtainable, the following should be observed:
  - The minimum bending radius of the supplied ½" coax cable should be 7".
  - Cable that is kinked or has a bending radius smaller than 7" must be replaced.
  - Cable runs that span less than two floors should be secured to mechanical structures that are suitably located.
- The cables should be supported only from the building structure.

3.2.2   RF Rules

- Use coax ½", 50ohm, male-to-male N-type, (6-7dB for 1Ghz, 11dB for 2Ghz) for connecting to RHU and RHU ports.

- Use coax RG223, 50ohm, male-to-male N-type for RF connections from the BUs to the BTS/RBS and to the RIU.

- When using the MobileAccess™ system in an environment in which other indoor coverage systems are installed, it is recommended (where possible) that the antennas are placed at least **three** meters apart

- When bending coax cables, verify that the bending radius does not exceed the coax specifications.

- Use only antennas listed in section 3.4.1.

- Use a VSWR meter (i.e. Site Master or equivalent) for checking coax cables, including the antennas. (<2). The VSWR must be measured prior to terminating the RHUs in the remote communication rooms

- Terminate all unused **MA-860** ports with a 50 ohm load

3.3   Power Consumption and Power Supplies

3.3.1   Power Safety Instructions

⚠ **SAFETY WARNINGS**

When installing or selecting the power supplies:
1. Be sure to disconnect all power sources before servicing.
2. Calculate the required power according to the requirements of the specific installation and then determine the configuration of the power supplies. The required DC cables will then be determined by the selected PS configuration.
3. Use only UL approved power supplies
4. AC and DC power supply cables – use only the power cords supplied with the units

3.3.2   MA-860 Power Consumption

Table 3-1. MobileAccess™ Power Requirements

Unit Type	Voltage Input	Typical Power Consumption
MA-860	48VDC	40W
MA-860 Redundant Power Supply	9.8VDC	40W

3.3.3 List of Vendor Approved Power Supplies

Use the following power supplies.

Table 3-2: MobileAccess™ Power Supplies

	Manufacturer	PS Model	Output Voltage	Max Output Power
Main PS	Mean Well	P66A-8AD01	48V	66W
Redundant	SINPEO	SPU-55-104	9.8V	75W

3.4 MA-860 In-building Antennas

The in-building antennas are connected to the coaxial cable distribution system by jumper cables at various points. The antennas will be mounted on the ceiling tiles and should be exposed. All in-building antenna installations will be such that it will not interfere with indoor traffic and will not enable any person to touch the antennas.

3.4.1 List of Vendor Approved Antennas

- Huber Suhner - SWA 0859/360/4/10/V SENCITY-ART

- MobileAccess GE Broadband Antenna - ANT-600-6G-OMN

- Mars Multi Band Omni Antenna - MA-CQ26-1X

NOTE: All of the above listed antennas are of Broadband Monopole type, and their gain does not exceed 7dBi.

3.4.2 860 WLAN Module Antenna Ports

NOTE: If the MA-860 system installation does not include cellular service, it is required to connect **50Ω termination** points to each of the remote connectors in the unit. A 50 Ω termination is also required on each unused AP port.

- 50 Ω, 1/2" or 3/8" Plenum coax cables

- Max cable length: 150' (*future – 200'*)

- 50 ohm terminator on unused connections

- For short jumpers (to MRC antenna ports): RG223 2 ft or 10 ft male-to-male coax jumpers

3.4.3   860 WLAN Module Termination

It is recommended that a 50 Ω termination is used on each unused interface port. The type of termination is type specific:

Interface Port	Termination
Antenna Ports	N-Type DC-12GHz Male 50 ohm terminators
Access Point Ports	SMA male DC-12GHz 50 ohm terminators
Multi-Service Ports	SMA male DC-12GHz 50 ohm terminators

3.5   Access Points

This section lists the vendor approved APs and the procedures required to prepare the APs for operation and installation.

3.5.1   List of Vendor Approved APs

The following vendor Access Points have been verified and FCC approved.

Table 3-3. Approved Access Points

MobileAccess FCC ID	Access Point Manufacturer	Access Point Model	Functionality
OJFMA860WCE	Cisco	1242	Dual radio 802.11 a/b/g
OJFMA860WAR	Aruba	AP70	Dual radio 802.11 a/b/g
OJFMA860WTR	Trapeze	MP-422	Dual radio 802.11 a/b/g
OJFMA860WCO	Colubris	MAP-330	Dual radio 802.11 a/b/g
OJFMA860WME	Meru	AP-200	Dual radio 802.11 a/b/g

3.5.2   Updating FCC Certification on each AP

Each MA-860 system is supplied with FCC certification labels compatible with the MA-860 and the used APs.

Perform the following procedure on each AP

1. Verify that your AP corresponds to the vendor approved list in Table 3-3. verify that your AP corresponds to one of the vendor approved APs.

2. Stick the appropriate FCC ID label (according to the approved list) on the AP, near the existing certification labels, making sure it does not cover or obstruct the view of other certifications or required information.

3.5.3   AP Termination

A 50 Ω termination is required on each unused AP port. The type of termination is vendor specific.

Vendor	Model	Termination
Cisco	1242	RP-TNC 50 ohm terminators
Aruba	AP-70	RP-SMA 50 ohm terminators
Trapeze	MP-422	RP-SMA 50 ohm terminators
Colubris	MAP-330	RP-SMA 50 ohm terminators
Meru	AP-200	RP-SMA 50 ohm terminators

3.5.4   IDF Access Point Planning

MobileAccess recommends that each independent IDF Telecom closet is adequately planned for installation of the access points to increase the amount of isolation and reduce the amount of RF leakage between access points.

MobileAccess recommends the following options for access point installation:

- Wall Mounting of MobileAccess supported Access Point
- Rack-Mounting of MobileAccess supported Access Points

Utilizing the mounting hardware distributed from each supported access point vendor, Access point can be mounted on a wall within the IDF or telecom closet and connected with the appropriate low-loss jumper cables to the appropriate 860 WLAN module interface ports.

MobileAccess has also found that mounting the access points in a 19" rack system has proven to be effective against RF leakage between access points. In this configuration, *two access points can be installed per 19" shelving unit which takes up 1U of space per two access points.*

4 Installation

This chapter contains the installation and connection procedures for various installation configurations. The MobileAccess 860 WLAN Module and system architecture may be installed in the following configurations:

4.1 Accessory Kits

Verify that the supplied accessory kit corresponds to your installation. The accessory kits include a bracket, the required cables and accessories.

Part Number	Description
AK-860-1000	RHU 1000 860 WLAN Accessory Mounting Kit
AK-860-1200	RHU 1200 860 WLAN Accessory Mounting Kit
AK-860-MDLT	Modulite 860 WLAN Accessory Mounting Kit
AK-860-2000	MRC 2000 860 WLAN Accessory Mounting Kit
AK-860-2000L	MRC 2000L 860 WLAN Accessory Mounting Kit
AK-860-SA	Stand alone Mounting Kit
AK-860-PS-9.8V-75W	(Optional) Redundant Power Supply Kit

4.2 Access Point Installation (Recommendation)

MobileAccess recommends that each independent IDF Telecom closet is adequately planned for installation of the access points to increase the amount of isolation and reduce the amount of RF leakage between access points. MobileAccess recommends the following options for access point installation:

- Wall Mounting of MobileAccess supported Access Point
- Rack-Mounting of MobileAccess supported Access Points

Utilizing the mounting hardware distributed from each supported access point vendor, Access point can be mounted on a wall within the IDF or telecom closet and connected with the appropriate low-loss jumper cables to the appropriate 860 WLAN module interface ports.

MobileAccess has also found that mounting the access points in a 19" rack system has proven to be effective against RF leakage between access points. In this configuration as detailed in the picture below, two access points can be installed per 19" shelving unit which takes up 1U of space per two access points.

4.3   Wi-Fi Coverage Expander (WCE) Installation

Note: It is assumed the antennas have already been installed at the remote locations.

A WCE unit is installed near each antenna. The WCE can be installed in the following configurations:

- Tie-Wrap / Wire-Tie to a fixture
- Wall Mounted – using four screws
- In-line with the coax cables

The WCE will be connected on one side to a 0.5" low loss coaxial cable (typically running to a remote wiring closet), and to the Passive Broadband Antenna usually through a jumper (flexible 1' coax cable). The following sections illustrate each type of WCE installation.
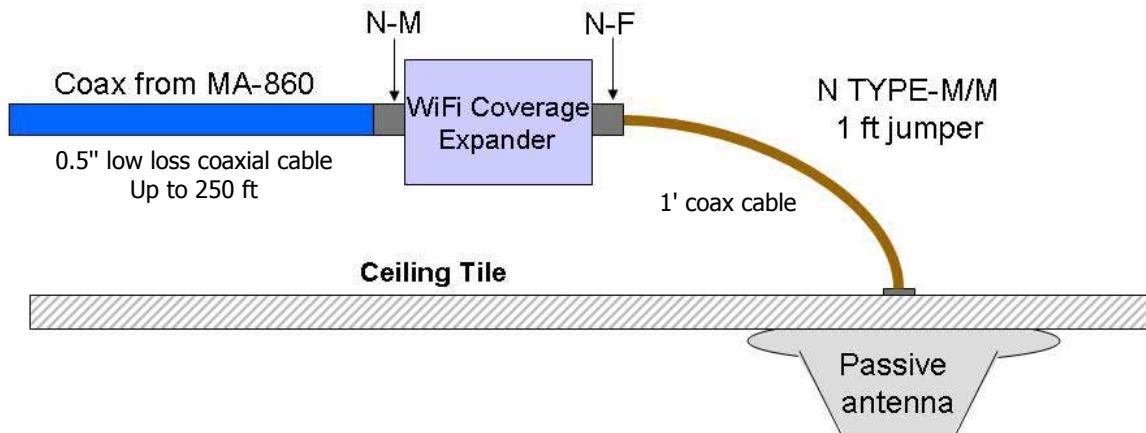
4.3.1 WCE Tie to Fixture Installation

Use the two mounting slots used to affix the unit to any available building infrastructure via a wire-tie or tie-strap.

4.3.2 WCE Wall Mounted Using Four Screws

Secure the WCE using four standard drywall screws (3/16" in diameter).

4.3.3 In Line with Coax Cables

WCE's light design enables connecting it between the two coax cables without additional support.

NOTE: The bending moment for ½" coax cable = 3lbs per foot.

4.4 860 WLAN Module Installation

MA 860 can be mounted in the following configurations:

- Standalone – mounted directly on the wall with four screws
- Mounted onto an MA 1000 RHU
- Mount as add-on to an MA 1000 RHU with an MA 1200 add-on unit
- Add-on to a MA 2000 system

To install the unit

- Depending on your installation mount the unit on the IDF or telecom Closet wall (standalone installation) or assemble it onto the MA system (when converged with other MA systems)
- Record location and serial number of MA860 unit

4.5 MA-860 Unit Installation and Connections

MobileAccess MA-860 is typically installed in the IDF or Telecom Closet of each floor to which WLAN coverage is to be supported. The accessories, mounting and installation procedures vary depending on the installation configuration.

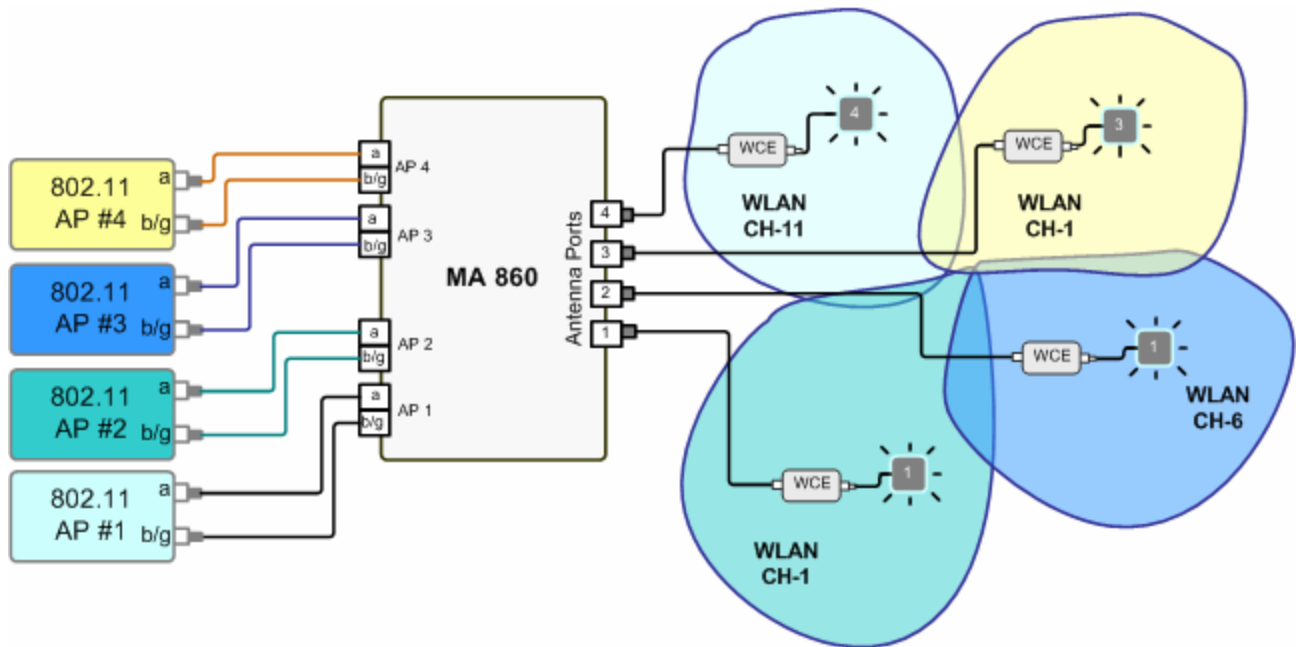### 4.5.1 Standalone Wall Mount Installation

*Figure 4-1. MA-860 Standalone Installation Configuration*

NOTE: It is recommended to record the location of the units and IP address according to the MAC addresses on the sticker at the rear of the units near the Ethernet port.

Although it is not required for a stand-alone installation, it is recommended to set the supplied cable **705102101** aside (usually used when MA-860 is installed in an add-on configuration).You will need it if you want to upgrade your system to provide additional coverage options.

ATTENTION: Use SMA wrench for the SMA connectors, do not over tighten the connectors.

To install MA 860 wallmount standalone configuration

1. Mount the MA-860 on the wall using four screws. When mounting, consider the following:

   - The type of screws used to mount the unit must suit the type of wall construction (cement, bricks, etc.) so that the mount is secure.
   - The position of the APs and required cable connections.
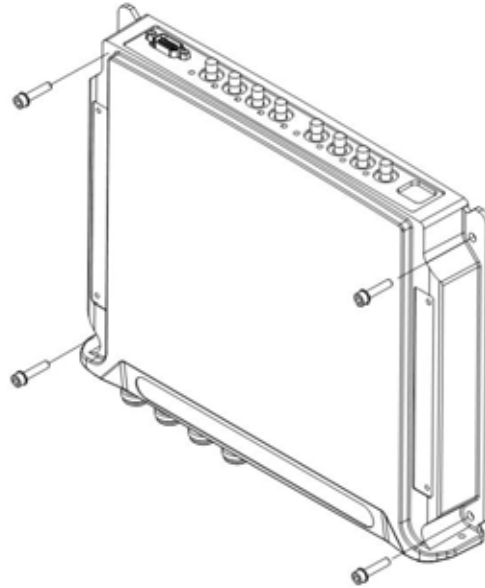
2. Connect the **power** (section 4.7).

3. Connect the 802.11a/b/g Access Points to the corresponding ports on the MA-860 rear panel. Refer to section 1.3 for a description of the connections and distribution patterns.

   NOTE: It is recommended to RESET the unit by removing and reinserting the power connector on the front panel after connecting the APs.

4. Connect the coax **antenna** cables to the MA-860 unit antenna ports on the MA-860 front panel according to the following instructions:

   - Use 50 Ω, N-type male to male, 1/2" or 3/8" Plenum coax cables
   - Max cable length (typically): 150'

5. Fit 50 ohm terminators on all unconnected SMA, AP and antenna ports.

6. Connect the RJ45 network connection to the MA-860 rear panel network port.

   NOTE 1: It is recommended to record the location of the units and IP according to the MAC addresses on the sticker at the rear of the units near the Ethernet port.

4.5.2   Add-on to an MA 1000 System Installation

In this type of installation, the MA-860 and MA 1000 RHU are assembled together with a *bracket* between them.
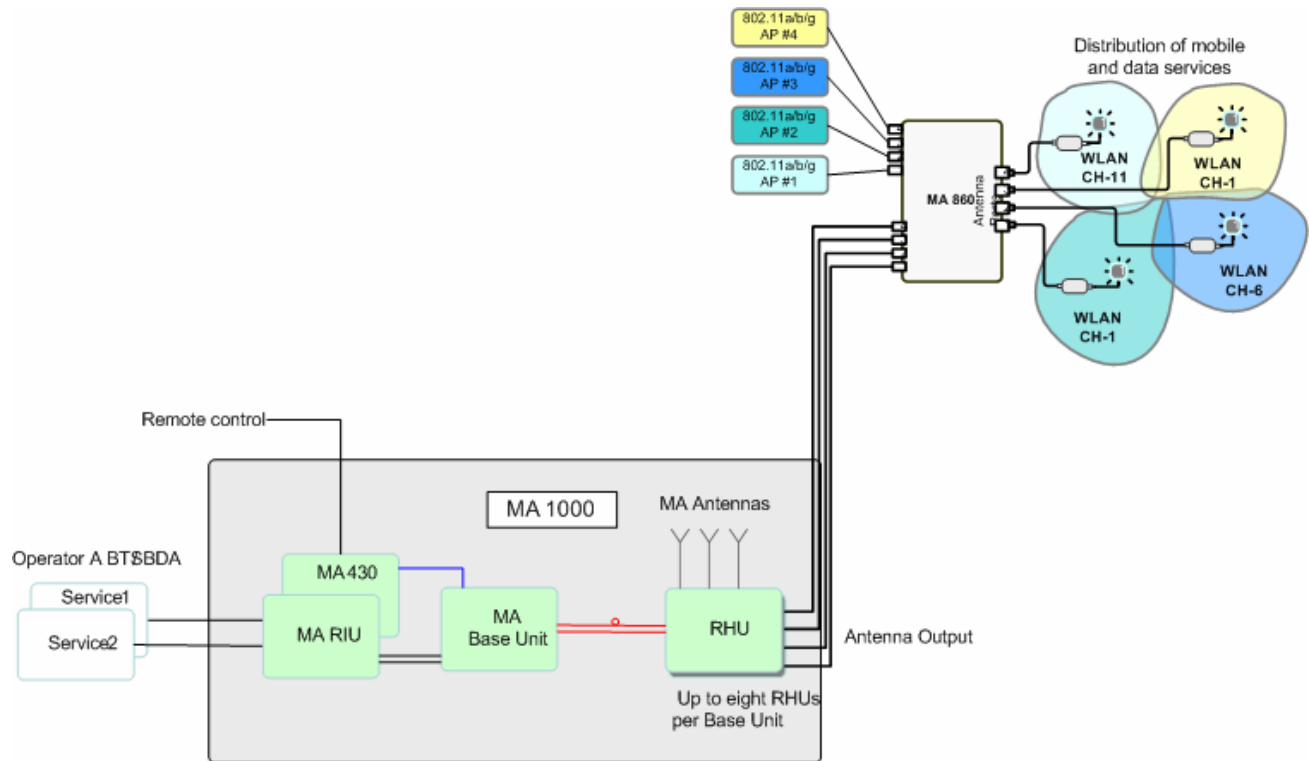
NOTE: It is recommended to mount the MA-860 to the wall, and the MA 1000 on top of the MA 860 (with a bracket between them). However, if a previous MA 1000 RHU is present, you may install the MA-860 on top of the existing MA 1000 RHU (with a bracket between them.)

To assemble an RHU 1000 onto an MA 860

1. Assemble the supplied bracket to the top of the MA-860, where the notched side of the bracket is towards the rear of the unit. Secure the bracket to the MA-860 unit using the four supplied screws.

Two screws

Two screws

Figure 4-2. MA-860 and Bracket Assembly

2. Mount the MA-860 and bracket assembly to the wall. When mounting, consider the following:

   - The type of screws used to mount the unit must suit the type of wall construction (cement, bricks, etc.) so that the mount is secure.

   - The position of the APs and required cable connections.

3. Mount the MA 1000 RHU to the bracket using the four provided screws.

4. For antenna sensing support (RHU 1000 version 3.1 and higher), connect between the **Control** connectors at the rear of both units using cable **705102101**.

NOTE: For antenna sensing support in RHU 1000 version 3.0 and lower, upgrade to a higher version according to the *MA 860 Upgrade Procedure Guide.*

---

5. Connect the 802.11a/b/g Access Points to the corresponding ports on the MA-860 rear panel. Refer to section 1.3 for a description of the connections and distribution patterns.


NOTE: It is recommended to RESET the unit by removing and reinserting the power connector on the front panel after connecting the APs.

---

6. Connect the network connection to the MA-860 rear panel network port.

NOTE 1: It is recommended to record the location of the units according to the MAC addresses on the sticker at the rear of the units near the Ethernet port.

---

5. Connect the **MA 1000 antenna** ports and the **MA-860 Mobile Services** ports using the four SMA to N-type cables *supplied in the accessory kit*.

NOTE: Be sure the connectors are closed at a 45 degree angle so as not to place stress on the cables.

Antenna connections
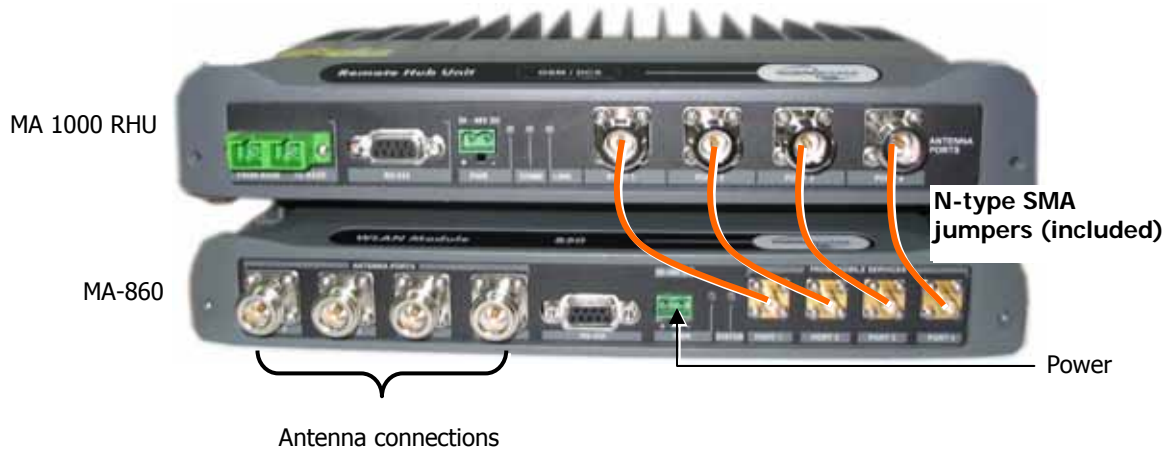
6. Connect the **power** (section 4.7).

7. Connect the coax **antenna** cables to the MA-860 unit antenna ports on the MA-860 front panel according to the following instructions:

   • Use 50 Ω, N-type male to male, 1/2" or 3/8" Plenum coax cables

   • Max cable length (typically): 150'

8. Fit 50 ohm terminators on all unconnected SMA, AP and antenna ports.

4.5.3   Add-on to an MA 1000 with MA 1200

In this type of installation, the MA-860 and MA 1000/1200 assembly are separated by a bracket.

NOTE: It is recommended to mount the MA-860 to the wall, and the MA 10001200 assembly on top of the MA 860 (with a bracket between them). However, if a previous MA 1000/1200 assembly exists, you may install the MA-860 on top of the existing assembly, (with a bracket between them.)
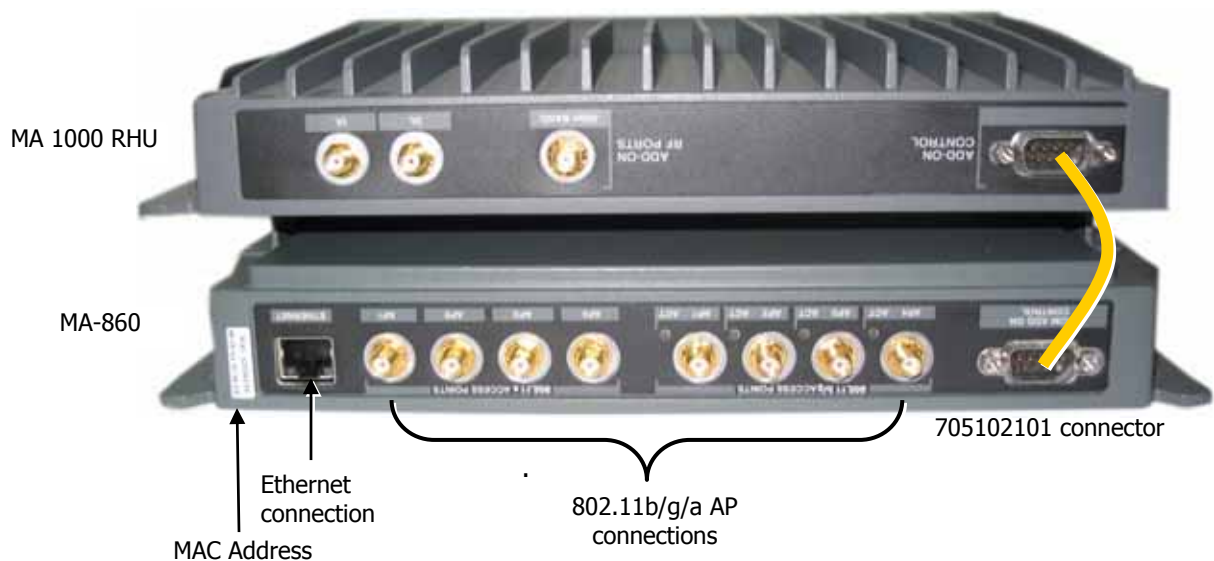

To assemble an RHU 1000 onto MA 860

1. Assemble the supplied bracket to the top of the MA-860, where the notched side of the bracket is towards the rear of the unit. Secure the bracket to the MA-860 unit using the four supplied screws.

Figure 4-3. MA-860 and Bracket Assembly

---

2. Mount the MA-860 and bracket assembly to the wall. When mounting, consider the following:

   • The type of screws used to mount the unit must suit the type of wall construction (cement, bricks, etc.) so that the mount is secure.

   • The position of the APs and required cable connections.

3. Assemble the MA 1000/1200 assembly to the MA-860 bracket.

4. For antenna sensing support (RHU 1000 version 3.1 and higher), connect between the **Control** connectors at the rear of both units using cable **705102101**.

> **NOTE:** For antenna sensing support in RHU 1000 version 3.0 and lower, upgrade to a higher version according to the *MA 860 Upgrade Procedure Guide.*

5. Connect the 802.11a/b/g Access Points to the corresponding ports on the MA-860 rear panel. Refer to section 1.3 for a description of the connections and distribution patterns.

> **NOTE:** It is recommended to RESET the unit by removing and reinserting the power connector on the front panel after connecting the APs.

6. Connect the network connection to the MA-860 rear panel network port.

> **NOTE 1:** It is recommended to record the location of the units according to the MAC addresses on the sticker at the rear of the units near the Ethernet port.

7. Connect the **MA 1000 antenna** ports and the **MA-860 Mobile Services** ports using the four SMA to N-type cables *supplied in the accessory kit*.

NOTE: Be sure the connectors are closed at a 45 degree angle so as not to place stress on the cables.

Figure 4-4. Connection of MA-860 and MA 1000 Service Ports

8. Connect the **power** (section 4.7).

9. Connect the coax **antenna** cables to the MA-860 unit antenna ports on the MA-860 front panel according to the following instructions:

   - Use 50 Ω, N-type male to male, 1/2" or 3/8" Plenum coax cables
   - Max cable length (typically): 150'

10. Fit 50 ohm terminators on all unconnected SMA, AP and antenna ports.

4.5.4   Add-on to an MA 2000 System

MA-860 may be integrated into the MA 2000 system using one of the following installations:

- Installing it directly on the MA 2000 RC top panel (using the supplied plate);
- Mounting it on a rack (using the supplied plate);
- Wall-mount near the MA 2000 cabinet.

NOTE: The coax outputs of the cabinet are connected to the appropriate ports on the MA-860 and the **antennas are connected directly to the MA-860 module**.

4.5.4.1   MA-860 RC 2000 Assembly

1. Assemble two side brackets to the plate sides as illustrated in Figure 4-5.
2. Assemble the MA-860 module to the supplied bracket using the four screws and washers as illustrated below.
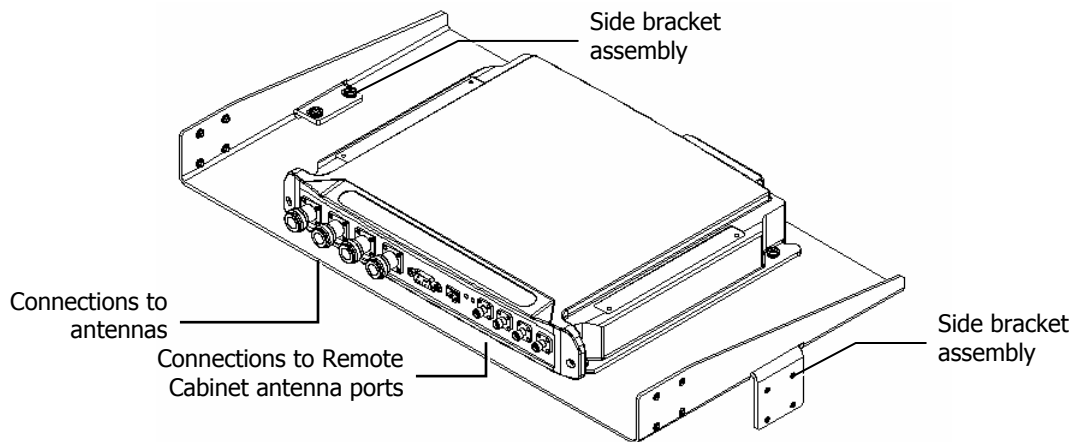

Figure 4-5. MA-860 Rack Installation

3. Assemble the plate to the MA 2000 RC by securing the brackets to the cabinet sides as illustrated below.

Connection to
antennas
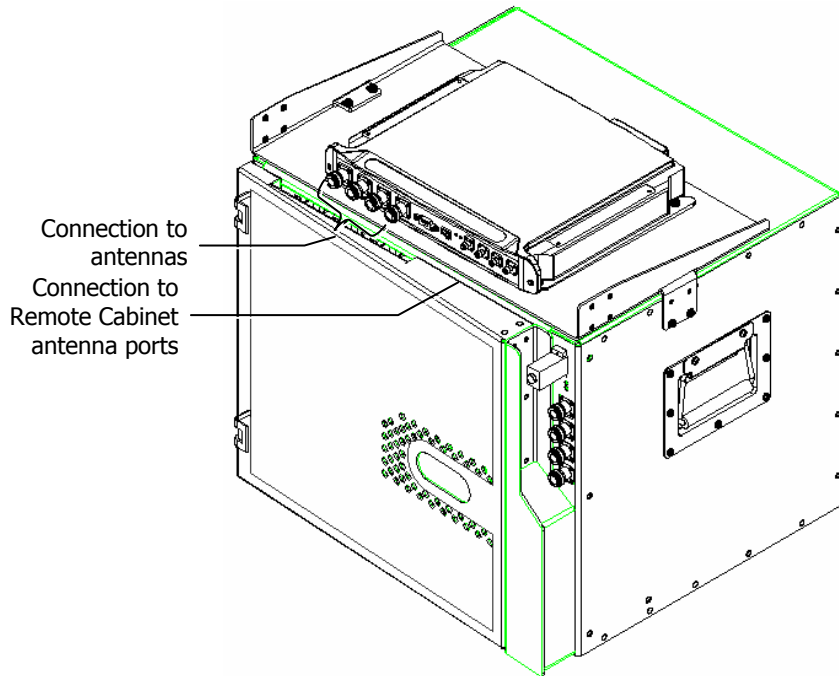Connection to
Remote Cabinet
antenna ports

Figure 4-6. Illustration of MA-860 Mounted on MA 2000 RC

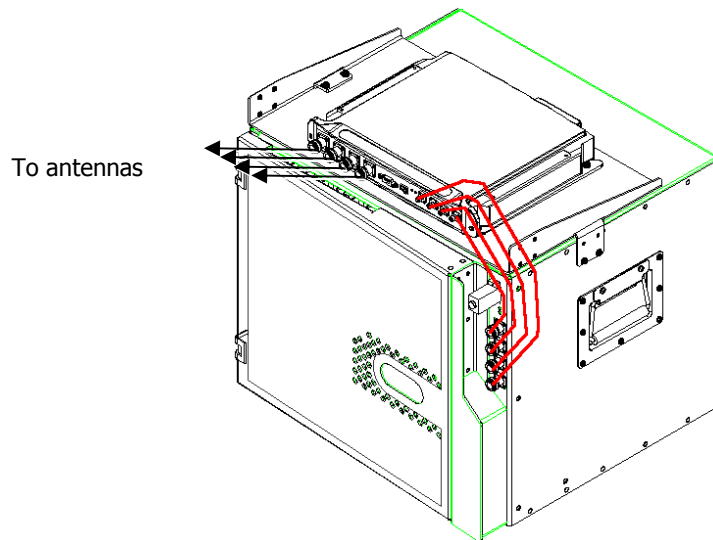4. Connect the RC antenna ports to the MA-860 front panel port connectors as illustrated below.

To antennas

Figure 4-7. Illustration of RC Antenna port connections

5. Connect the antennas to the **MA-860 antenna ports**.

4.5.4.2   MA-860 Rack Mount

1. Assemble the side brackets as illustrated in Figure 4-5.

2. Assemble the MA-860 module to the supplied bracket using the four screws and washers.

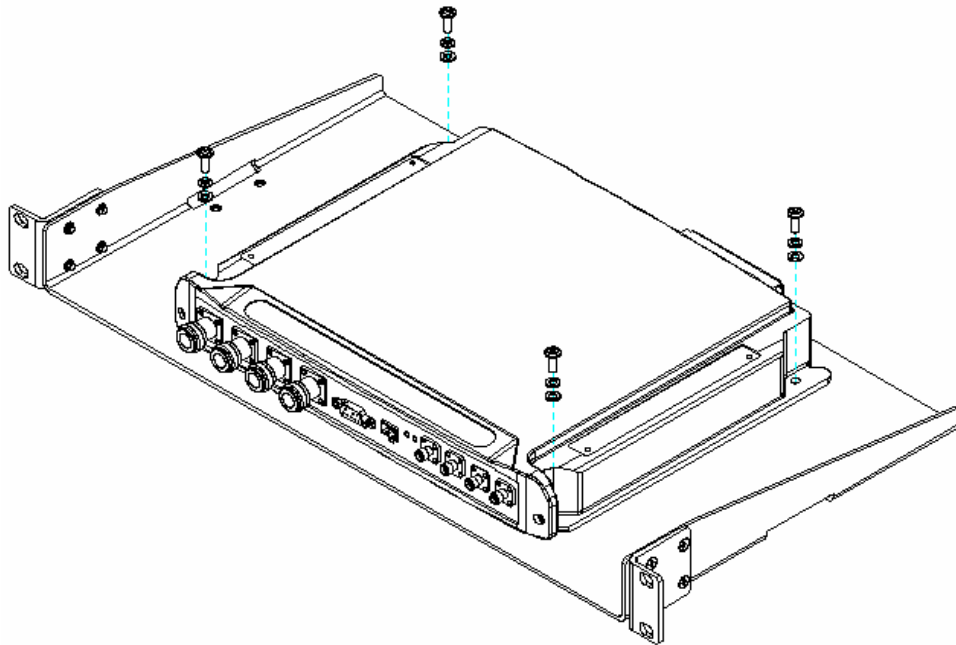3. Mount the assembly in the rack using the side brackets.

Figure 4-8. MA-860 to Bracket Installation

4. Connect the RC antenna ports to the SMA connectors on the MA-860 front panel.

5. Connect the antenna to the **MA-860** antenna ports.

4.6   Add-on to MA WMTS-CH System

Figure-4-9 shows the architecture of an installation supporting the indoor distribution of WMTS, together with mobile and data services over a common coax and antenna infrastructure. Existing or new MA 1000/2000 installations can be converged with WMTS installations through MA SMU.
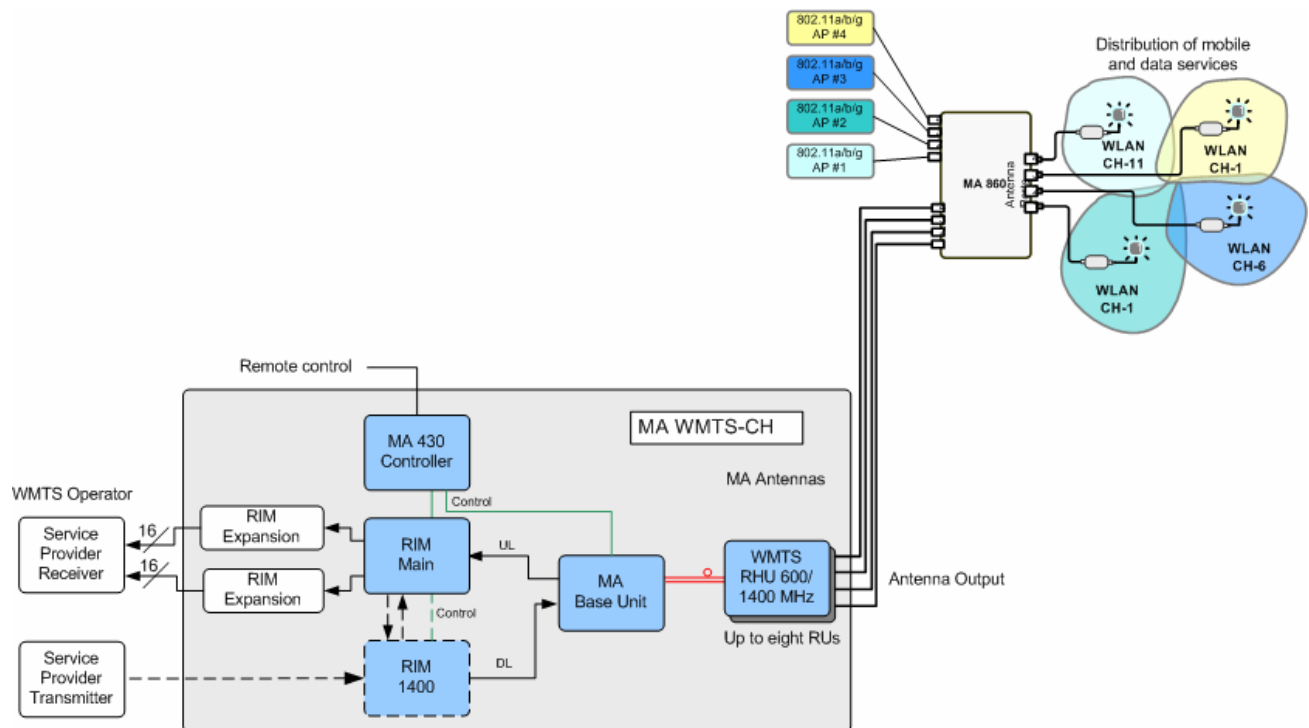

Figure-4-9 –Architecture of MA WMTS System Converged with MA 1000 System Services

4.7   Connecting Power to the MA860

MA 860 is powered by a Main power supply mounted near the unit in the provided bracket. An option for a redundant PS is also available.

In case a redundant power supply is installed with the unit, both (Main and Redundant) power supplies are connected to the MA 860 power connector using the splitter cable.

4.7.1   Power Supplies and Accessories

Shown below are the PS accessories (*redundant PS not shown*).

Main PS connector

Main power supply bracket

Main power supply

Splitter cable for connecting Main and redundant power supply
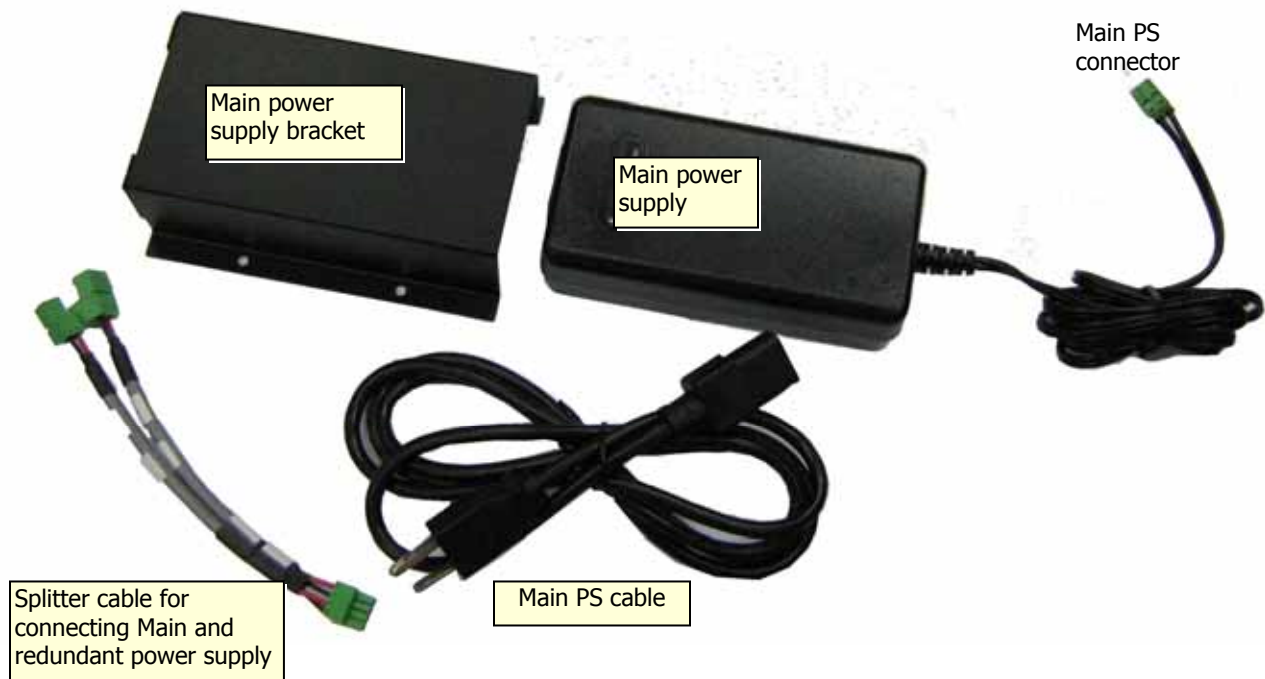
Main PS cable

4.7.2   Power Connections to MA860 Unit

- Only Main PS is connected to the unit – connect directly to 20-48V side of the PWR connector.
- Main and Redundant PSs connected to the unit – connect the provided splitter cable to the unit and the Main and Redundant PSs to the appropriate connectors as shown below.

Connection to Main Power Supply only

Connection to splitter cable for installations with redundant PS

To Main PS

To Redundant PS
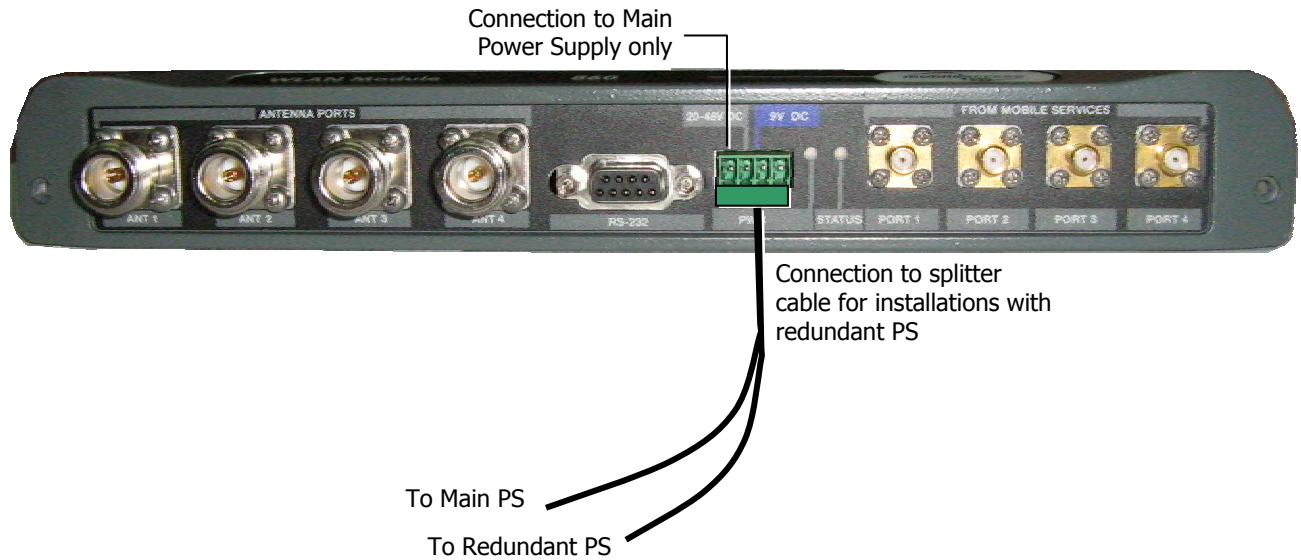
5 Power-up and Provisioning the Unit

Upon power-up, MA-860 automatically performs WCE, WiFi Coverage Expander auto-discovery.

It is recommended to locally connect to the unit using a computer running the telnet session to configure the local configuration options defined below. Following the initial setup and configuration MobileAccess recommends that the administrator verifies that all connected antennas are detected via the Web GUI or Engineering GUI, to perform the adjustment procedures and to verify that the unit is operating properly.

MA860 is by default configured with a *static IP address.* (It may also be configured for DHCP). Once the MA860 IP address is defined and it is connected to the network, it can be remotely managed via a Web access connection.

This section provides the following information:

- Unit power-up and procedures performed by the unit upon power-up
- Opening a session from the MA-860 Engineering Tool application
- Verifying all antennas are connected
- Performing adjustment procedures

5.1 Power-up and WCE Auto-discovery

To power-up the unit

Connect the power to the PWR connector located on the MA-860 as defined in Section 4.7.

Unit initialization and WCE auto-discovery

Upon power-up, the unit performs discovery of the WCE units during which time the RUN LED (located on the front panel) is constant GREEN. *This will take between one to two minutes.*

If you have connected the 860 WLAN Module via the Web GUI or Engineering UI before the auto-discovery process was completed, the dialog will show Auto-discovery in process.

After the initial discovery procedure has been completed, the RUN LED continuously flickers green indicating *normal* operation.

Note: Configuration changes corresponding to the addition or removal of WCE units can be remotely performed at any time via the Web GUI to access the unit.

5.2   System Setup Configuration

Before deploying the device in the field, it is recommended that all system level configurations are configured on the 860 WLAN module as defined in section 5.2

5.2.1.1   Assigning Network Parameters

The unit is factory set with the following static IP address:

IP address:	192.168.1.1
Subnet mask:	255.255.0.0
Default GW:	192.168.254.254

- Change the static address using Telnet as described in section 5.2.1.2

> Note: For networks with DHCP – refer to section 6.2.2

- To set the SNMP parameters – refer to section 5.2.1.3.

5.2.1.2   Changing the Static IP Address

The static IP address is changed from the Telnet window.

To change the static IP address

1. Set your laptop IP to the same subnet as the static IP address assigned to the Repeater (e.g 192.168.1.2)

2. Connect the unit to your laptop with a cross cable.

3. Click the Windows **Start** option, choose **Run** and type **Telnet** and press **Enter**.

4. At the prompt Microsoft Telnet> **o 192.168.1.1 9999**. Press **Enter**.

5. Click **OK** and immediately press **Enter** to go into Setup Mode. The current settings will be displayed, followed by the **Change Setup** menu.

```
Change Setup:
  0 Server configuration
  1 Channel 1 configuration
  3 SNMP configuration
  8 exit without save
  9 save and exit            Your choice 0
```

6. Enter **0** (Server Configuration).

7. You will be prompted to change the IP address one byte at a time –Enter the new value for each byte as you are prompted and press Enter. For example, the value entered below is 192.168.10.55

```
IP Address : (000) 192.(000) 168.(000) 10.(000) 55
```

---

8. You will be are prompted to set the *Gateway, Netmask, telnet Config password and to Change the DHCP device name.*

```
IP Address : (000) .(000) .(000) .(000)
Set Gateway IP Address (Y) ?
Gateway IP Address : (192) .(168) .(010) .(245)
Netmask: Number of Bits for Host Part (0=default) (16)
Change telnet config password (N) ?
Change DHCP device name (not set) ? (N) ?
```

9. Press **Enter** to run through the rest of the parameters. When the Setup Menu is displayed again, select **9 – Save and Exit**.

5.2.1.3 Setting SNMP Parameters

1. Click the Windows **Start** option, choose **Run** and type **Telnet** and press **Enter**.

2. At the prompt Microsoft Telnet> **o** xxxx.xxxx.xxxx.xxxx **9999** (where xxxx.. is the IP address of the unit). Press **Enter**.

3. Click **OK** and immediately press **Enter** to go into Setup Mode. The current settings will be displayed, followed by the **Change Setup** menu.

```
Change Setup:
  0 Server configuration
  1 Channel 1 configuration
  3 SNMP configuration
  8 exit without save
  9 save and exit             Your choice 3
```

4. Enter **3** (SNMP Configuration).

5. Set the SNMP Read and Write community names and the SNMP traps destination addresses (up to three addresses can be defined).

```
SNMP community name for read (): public
SNMP community name for write (): private
Enter IP addresses for SNMP traps:
    1: (000) 192.(000) 168.(000) 10.(000) 22
    2: (000) .(000) .(000) .(000)
    3: (000) .(000) .(000) .(000)
```

6. Press **Enter** to run through the rest of the parameters. When the Setup Menu is displayed again, select **9 – Save and Exit**.

5.3   Default Login and User Account Levels

You may login to the MA 860 unit through any Web browser or 860 WLAN Engineering GUI. The available login credentials and default passwords are defined below:

- **Operator (oper)** – monitoring options only
- **Field Engineer (eng)** – monitoring and configuration options
- **TechSuport** – for MA technical personnel only

NOTE: The password is **case** sensitive – use **lower case** letters.

5.4   Remote Web Management

Once the system level attributes are defined as in section 5.2, the 860 WLAN module can then be accessed remotely on the network LAN from any Web Browser by connecting to the IP Address of the specific MA 860 unit or through any Network Operating Center (NOC) using SNMP.

Use the Remote Web management options to make configuration changes, adjustments, and to monitor the unit status.

To login to the MA 860 configuration application

1. Run a Web Browser application (i.e. Internet Explorer).
2. Enter the IP Address of the MA 860 unit. (i.e. **http://192.168.10.127**). The Login dialog appears. The application version is displayed at the top of the window.

Figure 5-1. Login Window

3. Select the User (**Oper** or **Field Eng)** where **Field Eng** has configuration privileges. Enter the password (see 5.3.)

4. Click **Login**. ()

   The Main configuration window appears. The Main window is described in the following section.

5.4.1 MA 860 View

Upon login, the MA-860 View shows the General tab that provides general information on the MA860 unit and on the WCE connections on each channle.

NOTE: The display is refreshed automatically; however, if necessary, click the same tab again (do **not** use the Web Browser Refresh option).

Note that there are six tab – three tabs on the upper window area and three in the lower window area. Table 5-1.
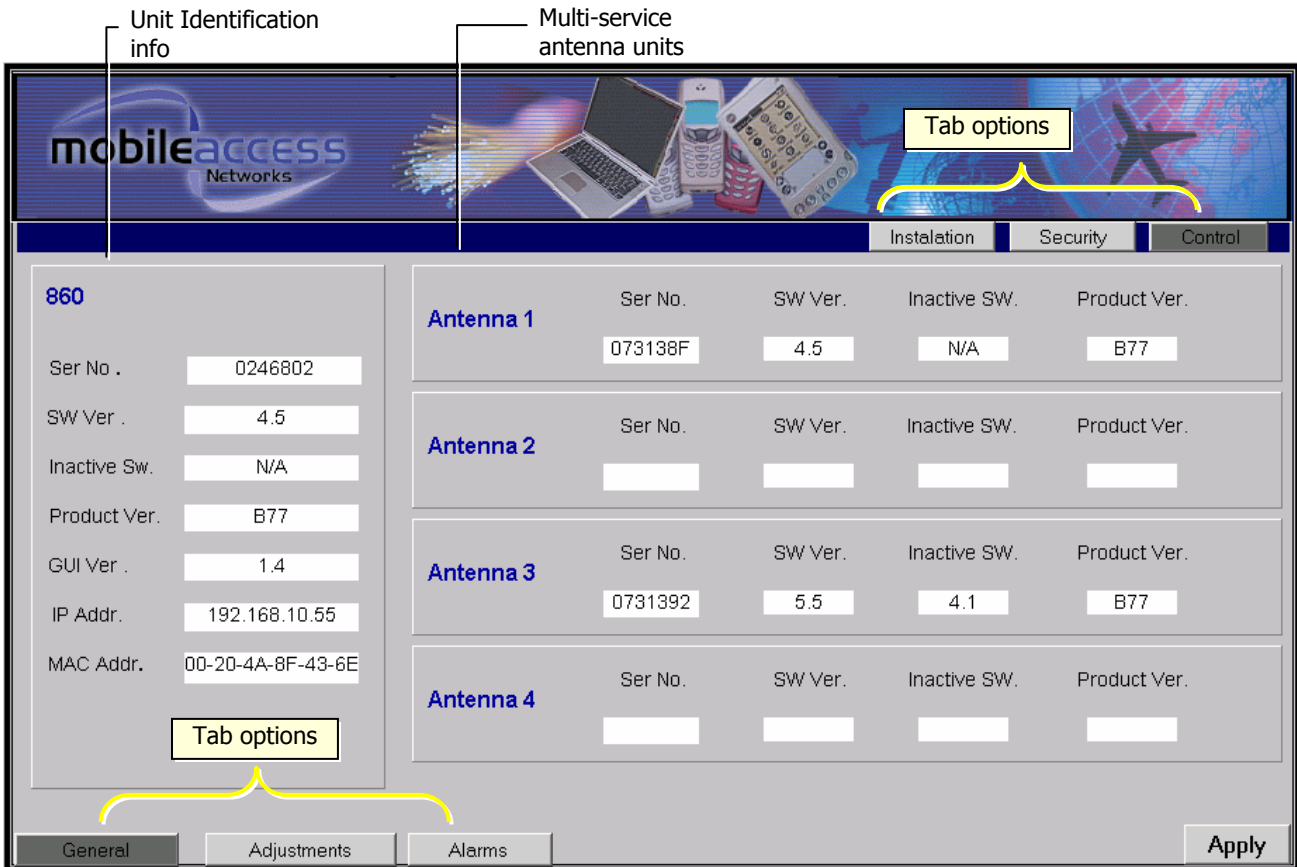

Figure 5-2. Main Window

Table 5-1. MA 860 View Menu Options

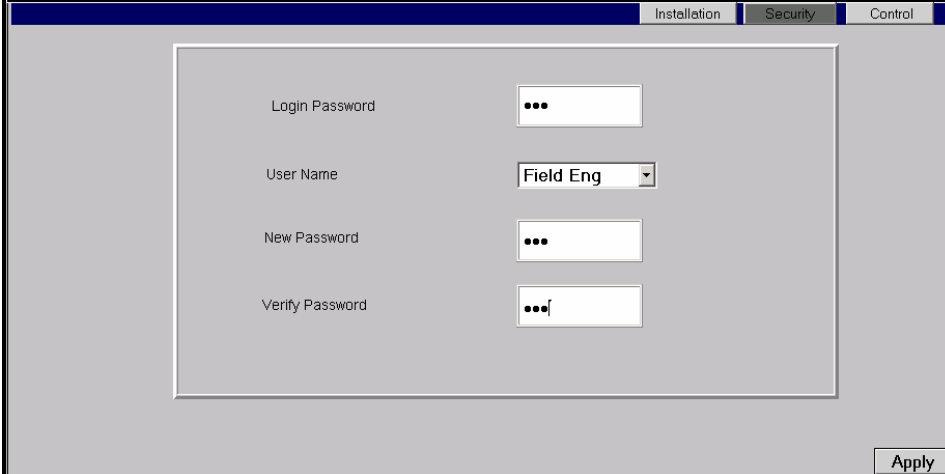| Menu Option	Description
Installation	User definable unit identification parameters and read-only IP address and MAC address.
Security	Password change options.
Control	Shows the General, Adjustment and Alarms tab in the bottom window area.
General	Unit identification and version information, and WCE information for each channel.
Adjustments	Unit adjustment pane. Used to calibrate cables.
Alarms	Alarm monitoring

5.5 Unit Location and IP

The Installation tab shows user defined information on the unit location, name, etc. and the unit IP and MAC address.
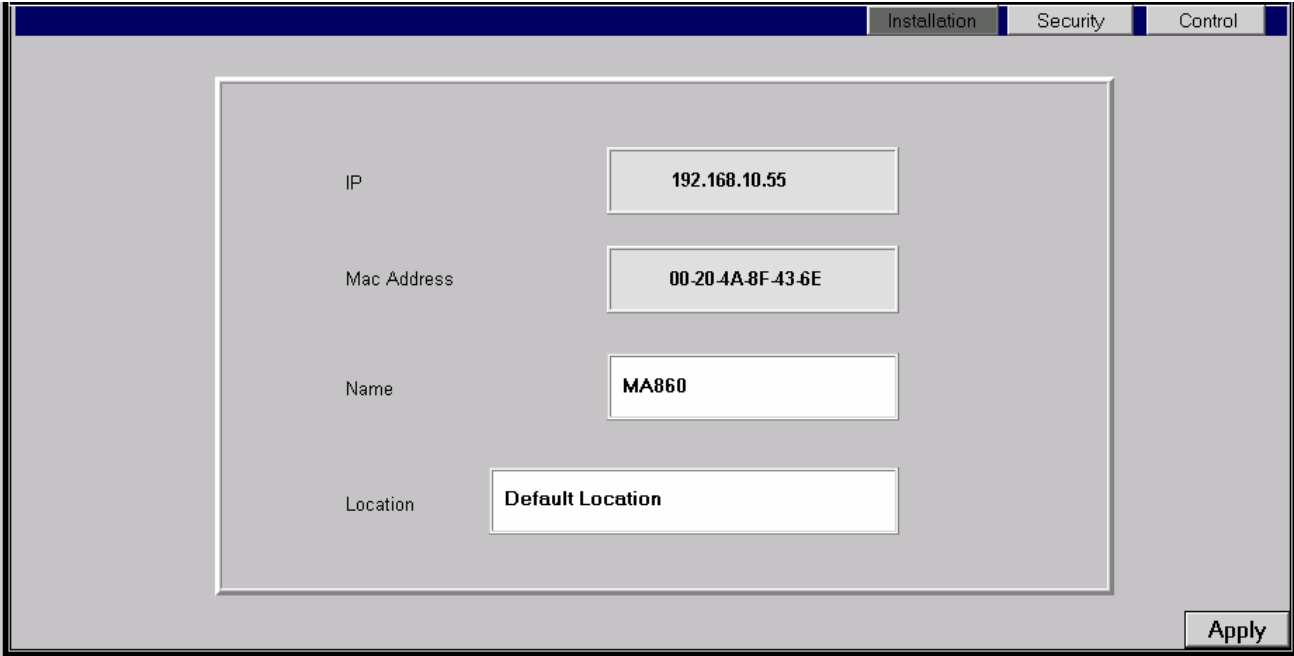
5.6   Changing Password

To change the password of the User Name:

1. Click the **Security** tab in the Main window.

2. To change the password:
    - In the **Login Password** field, enter the password to login to the current session.
    - In the **User Name** field, select the User Name whose password is to be changed.
    - In the **New Password** field, enter the new password.
    - In the **Verify Password** field, type the new password again.
    - Click **Apply**.

5.7   Web Access Adjustment

Note: The default gain for each channel is set to 0dB.

By default, the AGC is enabled, therefore the adjustment procedures are automatically performed at power-up and no manual adjustment procedure is required.

The system periodically verifies that the AP RF signal level and the WCE output signal level are within 2dB of each other. If it is out of range of the 2dB, the system automatically performs adjustment (if the AGC is enabled).

The manual adjustment procedure can be used by MobileAccess service personnel to readjust the system any time. The manual adjustment procedure can only be performed if AGC is disabled (where AGC can be disabled by MobileAccess service personnel).

To manually adjust the gain

1. The window is divided areas corresponding to each channel. Four control buttons are available:

   - Full Discovery – performs complete discovery of the antennas
   - Partial Discovery – performs discovery on new or undiscovered elements
   - Reset – sets adjustment values to the factory default levels
   - Apply – downloads configuration and adjustment values to the MA860 unit
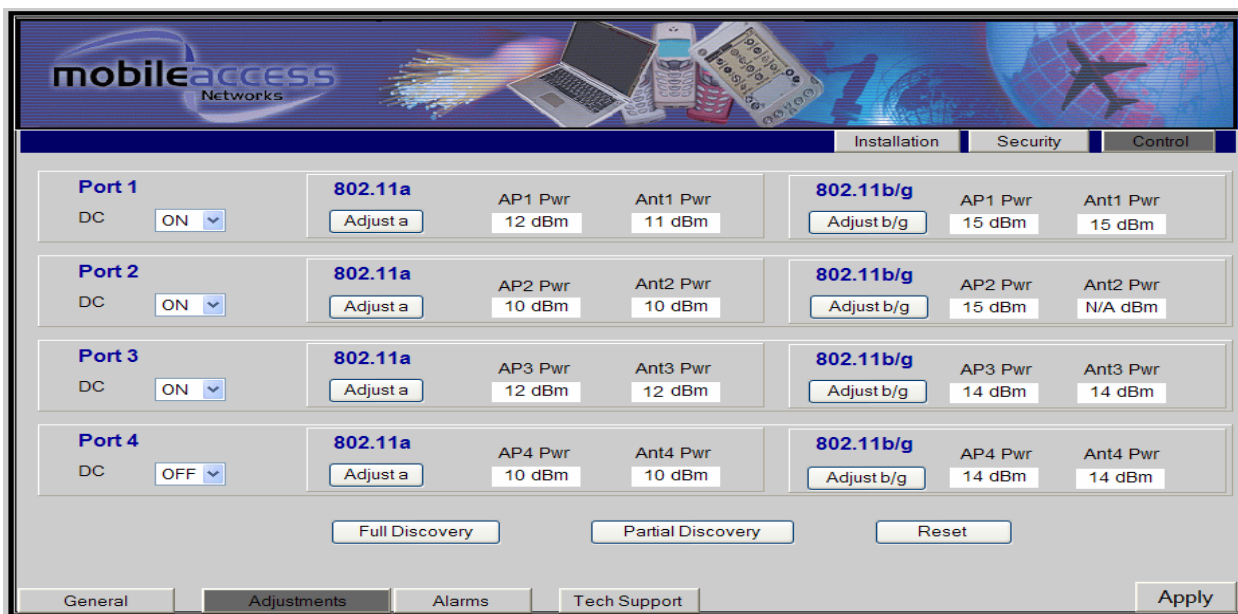

Figure 5-3. Gain Setting Options

NOTE: The **Full Discovery** button checks for each and every antenna. During Full Discovery, the unit DOES NOT transmit or receive data. To discover changes from the last Discovery, click the **Partial Discovery** button. Partial Discovery does not affect the unit output.

2. In the **DC** field of each channel to which an antenna is connected, verify that the **DC** parameter is **ON**. (This field is enabled by default).

Note: If **OFF** is displayed, it indicates that 1) absence of WCE was detected by the system or 2) that no power is being delivered over the coax.

3. Perform **802.11a** cable adjustments as follows:

   - Statically configure the AP for maximum output power for 802.11a/bg.
   - Click the corresponding Adj a button. Verify that the AP PWR and Ant PWR values of the corresponding channel are equivalent.
   - Repeat for each link (i.e. four times).
   - For each channel, verify that AP1..4 Pwr is equal to Ant1..4 Pwr.

4. Perform cable adjustments for **802.11bg** as follows:

    - Configure the AP for 20dBm output power (or Constant Power configuration).
    - Click the corresponding **Adj bg**. Click the corresponding **Adj a** button. Verify that the **AP PWR** and **Ant PWR** values of the corresponding channel are **EQUAL**.
    - Repeat for each link (i.e. four times).
    - For each channel, verify that **AP1..4 Pwr** is equal to **Ant1..4 Pwr**.

5. Click **Apply** to save adjustment and to save any changes in the DC settings of the ports.

6. Validate that the AP output power level is equal WCE output power level.

5.8 What next?

After performing the adjustment procedure:

Click the **Alarms** tab. Referring to the following section (5.9) do the following:

- Disable (filter out) irrelevant alarms (where antennas or APs are not connected).
- Verify that the connected Access Point and antenna indicators are Green.
- Verify that the calibration indicators are Green.

5.9   Monitoring Alarms

To monitor MA860 status

Click the **Alarms** button in the Main window. The Alarms pane appears. The pane is divided into four areas corresponding to each channel and a fifth area (MA 860) for the unit as a whole.

Figure 5-4. Alarms Window

To disable trap monitoring of irrelevant channels

For irrelevant channel, disable the **Trap Select** field.

Status color codes

Each status is color codes as follows:

- Green   - OK
- RED   - Fail
- GREY   - Not relevant.

Trap descriptions

Trap	Description
Temp	RED - temperature is above 60C; otherwise GREEN.
AP a	RED – 802.11a port or AP is not detected; otherwise GREEN
AP bg	RED – 802.11b/g port or AP is not detected; otherwise GREEN
MA860 ANT	RED - WCE not detected; otherwise GREEN.
WCE Antenna	RED – antenna connected to WCE is not detected; otherwise GREEN.
DC	RED - Antenna disconnected due to detected overcurrent or overcurrent detected a the antenna
Adjust a	RED – 802.11a cable adjustment procedure of channel failed.
Adjust b/g	RED – 802.11b cable adjustment procedure of channel failed.
WCE HW	RED – WCE hardware failure.
MA-860	RED – MA860 temperature over 60°C; GREEN – MA860 normal temperature

5.10 Provisioning via the MA-860 Engineering Tool

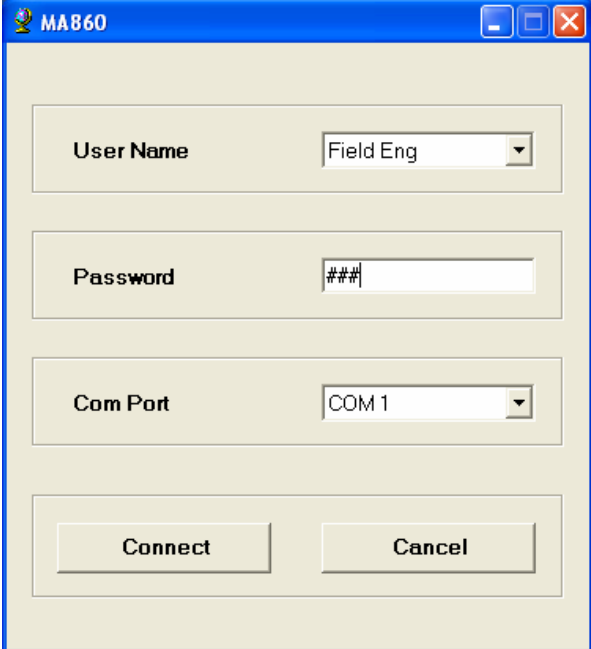This procedure is performed via a local connection to a computer running the **MA-860 Engineering Tool** application.

5.10.1 Opening a Session to the Unit

To provision the MA-860 control unit using the Configuration Tool

1. Install the **MA-860 MA Engineering Tool** application on your computer.

2. Connect to the MA-860 front panel **Local** connector using the RS232 9-pin cable provided with the MA-860 unit.

RS232

Computer running MA-860
Configuration Tool

3. Launch the MA-860 Engineering Tool application on the computer. The Login dialog is invoked.

4. Select **Field Eng,** and enter the corresponding **Password** (**eng**).

5. Select the **COM Port** corresponding to the physical COM port on the computer to which the unit is connected.

6. Click **Connect**. The application main window appears with the General tab displayed by default.

The General tab provides SW and HW information for the MA 860 unit and for each WCE.

If the antenna discovery process has not been completed, you will see a message indicating antenna discovery is in process – as illustrated below.

MA 860 SW and HW info

SW and HW info for each WCE

Antenna discovery in process message
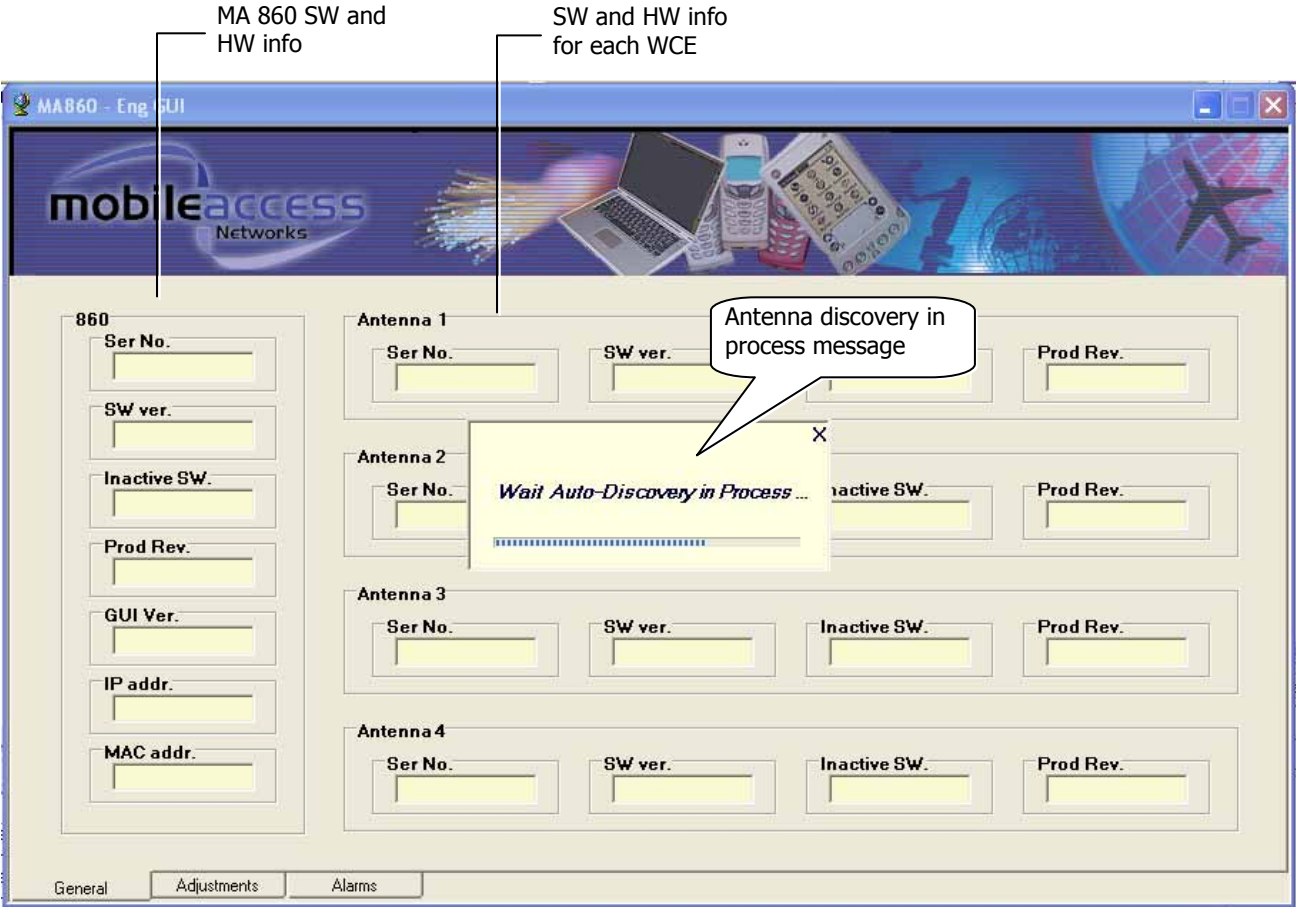
5.10.2   Provisioning Procedure

Notes:

1. The provisioning procedure is NOT required by default since the unit is supplied with AGC enabled and the provisioning procedure is performed automatically. This provisioning procedure is only required only if AGC is **disabled** (by MobileAccess service personnel).

2. Refer to 6.1 and Table 6-1 for the locations and descriptions of the parameters described in this section.

To provision the unit

1.   Select the **Adjustment** tab. The following window appears.
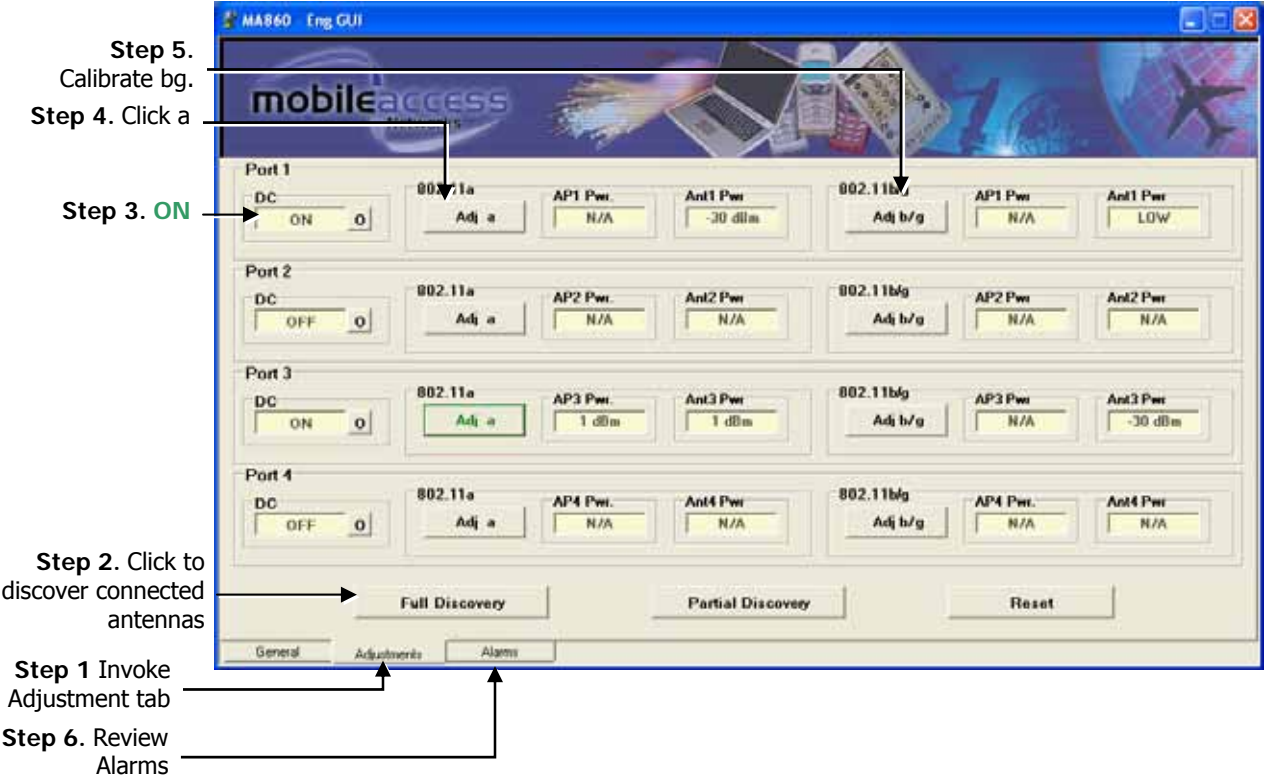
NOTE: The **Full Discovery** button checks for each and every antenna. During Full Discovery, the unit DOES NOT transmit or receive data. To discover changes from the last Discovery, click the **Partial Discovery** button. Partial Discovery does not affect the unit output.

---

2.   In the **DC** field of each channel to which an antenna is connected, verify that the **DC** parameter is **ON**.

NOTE: If OFF is displayed, it indicates that there is no power or that the WCE was not detected.

3. Perform **802.11a** cable adjustments as follows:

   - Set the AP power to 20dBm.
   - Click the corresponding **Adj a** button. The adjustment status will be indicated by the color of the button:

     BLACK   – not adjusted or waiting for connection. Try again.

     YELLOW – adjustment in process.

     GREEN   – successful adjustment.

     RED   – adjustment failure. Try again.
   - Repeat for each link (i.e. four times).
   - For each channel, verify that **AP1**..**4 Pwr** is equal to **Ant1**..**4 Pwr**.

4. Perform cable adjustments for **802.11bg** as follows:

   - Set the AP power to 20dBm.
   - Click the corresponding **Adj bg**. The adjustment status will be indicated by the color of the button as detailed in the previous step.
   - Repeat for each link (i.e. four times).
   - For each channel, verify that **AP1**..**4 Pwr** is equal to **Ant1**..**4 Pwr**.

5. Click the **Alarms** tab. Referring to the following section (5.9):

   - Under **Traps Select**, uncheck (filter out) irrelevant alarms (where antennas or APs are not connected).
   - Verify that the connected Access Point and antenna indicators are Green.
   - Verify that the calibration indicators are Green.

To disable trap monitoring of irrelevant channels

For irrelevant channel, disable the **Trap Select** field.

Status color codes

Each status is color codes as follows:

- Green - OK
- RED   - Fail
- GREY   - Not relevant.

Trap descriptions

Trap	Description
Temp	RED - temperature is above 60C; otherwise GREEN.
AP a	RED – 802.11a port or AP is not detected; otherwise GREEN
AP bg	RED – 802.11b/g port or AP is not detected; otherwise GREEN
MA860 ANT	RED - WCE not detected; otherwise GREEN.
WCE Antenna	RED – antenna connected to WCE is not detected; otherwise GREEN.
DC	RED - Antenna disconnected due to detected overcurrent at the corresponding antenna.
Adjust a	RED – 802.11a cable adjustment procedure of channel failed; otherwise GREEN.
Adjust b/g	RED – 802.11b cable adjustment procedure of channel failed; otherwise GREEN.
WCE HW	RED – WCE hardware failure; otherwise GREEN.
MA-860	Last row in the window.
	RED – MA860 over temperature; otherwise GREEN.

6   Appendix

6.1   Adjustment Tab Parameters

This tab is used to:

- Configure the antennas manually and perform auto-discovery of antennas
- Perform cable adjustment for each channel
- View the power level at each antenna port and at each AP port
- Reset the MA-860 unit

Table 6-1. MA-860 Engineering Tool Window Parameter Descriptions

Window Item	Description
DC	Used to show and configure status of voltage at each antenna port.
	Voltage is automatically disabled (Off) to a port where an antenna was not detected during auto-discovery (upon power-up and upon command from the user).
	The button adjacent to each DC field is used to manually disable or enable voltage to the corresponding antenna (relevant for service personnel under conditions where an antenna is disconnected or replaced).
Adj a/bg	Used to perform cable adjustment for 802.11a and 802.11/bg services.
	Note: this is a required configuration procedure.
	The color of the buttons indicate the status of the corresponding adjustment procedure:
	Black – adjustment not initiated or communication error during the adjustment.
	Yellow – adjustment in process
	Green – successful adjustment
	Red – failed adjustment
Antenna Power	Power supplied to the antenna
AP Power	AP1..4 .11a – shows the 802.11a service power provided by the corresponding (1 to 4) AP. *Note: During normal operation, this value should be equal to the power transmitted by the relevant antenna (parameter **Pwr 11.a** of the corresponding antenna*).*

Window Item	Description
	AP1..4 .11b/g – shows the 802.11b/g service power provided by the corresponding (1 to 4) AP. *Note: During normal operation, this value should be equal to the power transmitted by the relevant antenna (parameter **Pwr 11.b/g** of the corresponding antenna*).*
Antenna 1..4	Four window areas corresponding to each antenna. *Only the areas of antennas detected during auto-discovery (automatically performed when power is connected) are accessible.* Each area contains the following parameters: o Pwr .11a – 802.11a service power measured at antenna output. Should be the same as the 802.11a service power output by the corresponding AP (AP .11a under AP Pwr). o Pwr .11bg – 802.11b/g service power measured at antenna output. Should be the same as the 802.11b/g service power output by the corresponding AP (AP .11b/g under AP Pwr) *. o AP a DCA – Digital Control Attenuator for 802.11a Tx/Rx antenna Gains. Used to manually attenuate (reduce) the signal under special conditions of Cable Adjustment failure. *The greater the DCA value, the smaller the signal.* o AP bg DCA – Digital Control Attenuator for 802.11b/g Tx/Rx antenna Gains. Used to manually attenuate (reduce) the signal under special conditions of Cable Adjustment failure. *The greater the DCA value, the smaller the signal.* o N/Tx 11a – power level of 802.11a signal transmitted by the antenna. Should be preset to "Normal" mode (Tx mode is used only for factory testing). o 5V .11a – input voltage for the TDD Amplifier of 802.11b/g o 5V .11bg – input voltage for the TDD Amplifier of 802.11b/g (normal values are 4-5V) o 3V – input voltage level for 802.11a Rx o 6V – Antenna Input DC Power o 3.3V – Digital Control voltage level

*This is relevant only AFTER the adjustment procedure is performed.

6.2 Using the Lantronix Device Installer

NOTE: Be sure the installed version is 3.6 or higher.

6.2.1 Installing and Navigating the Application

NOTE: Be sure the installed version is 4.1.0.3 or higher.

1. Install the **Lantronix DeviceInstaller** application on your computer and launch the application. The DeviceInstaller Main window appears.
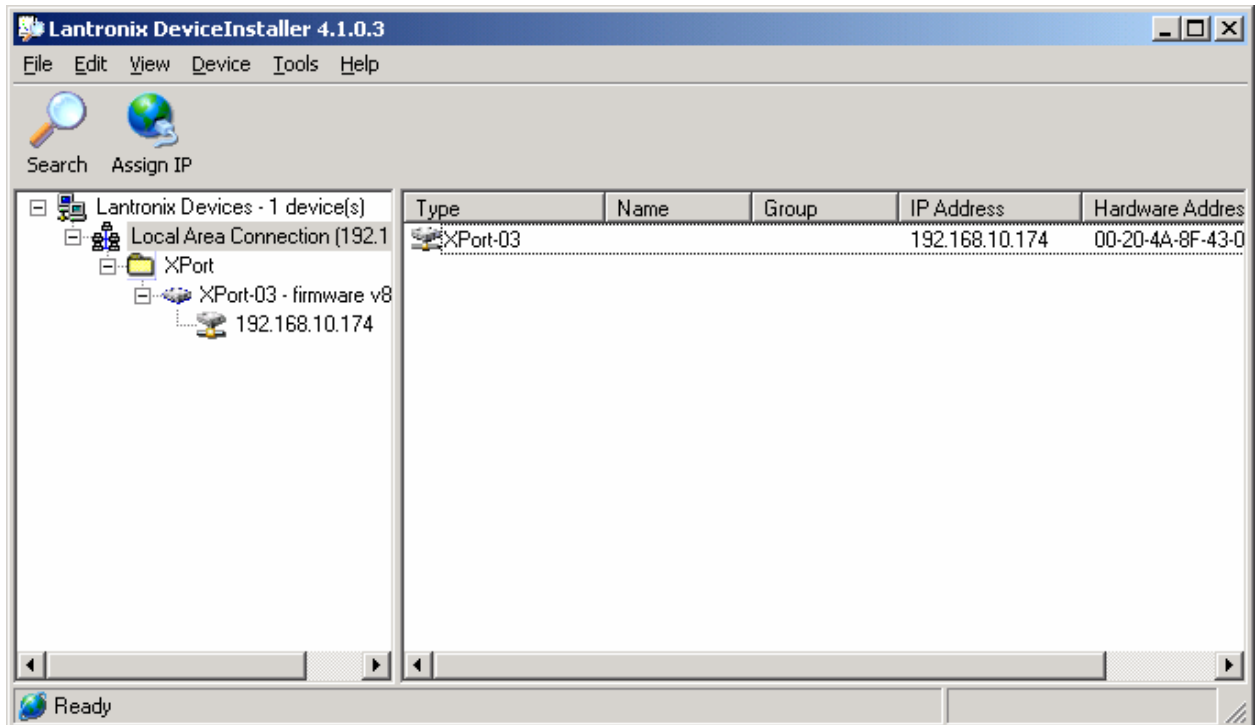

Figure 6-1. DeviceInstaller Main Window

2. In the toolbar, click **Search** to perform auto-discovery. The currently connected MA 860 units in the network will be identified and listed in the window according to:

- Type - communication hardware version - XPort-03
- IP Address – currently defined IP address
- Hardware Address – MAC address
- Additional identification parameters may be available.

6.2.2 Assigning Dynamic IP with DHCP

Note: Refer to the previous section for instructions on installing and navigating the required application.

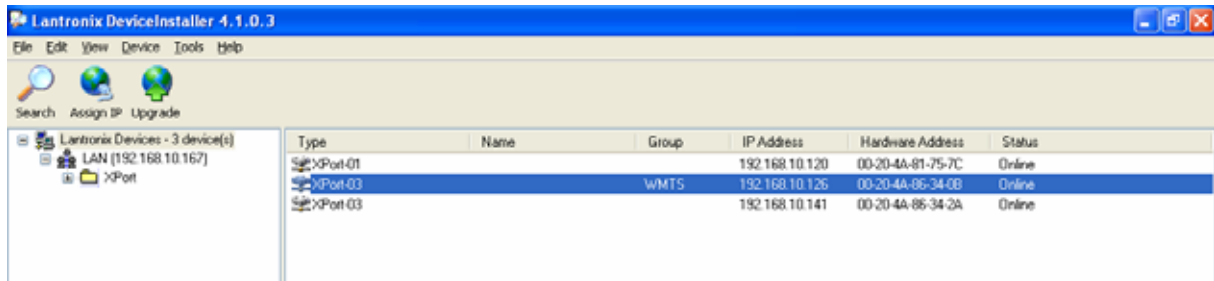1. Select the MA860 unit and click the icon **Assign IP** in the toolbar.

Figure 6-2. Assigning Static IP Address
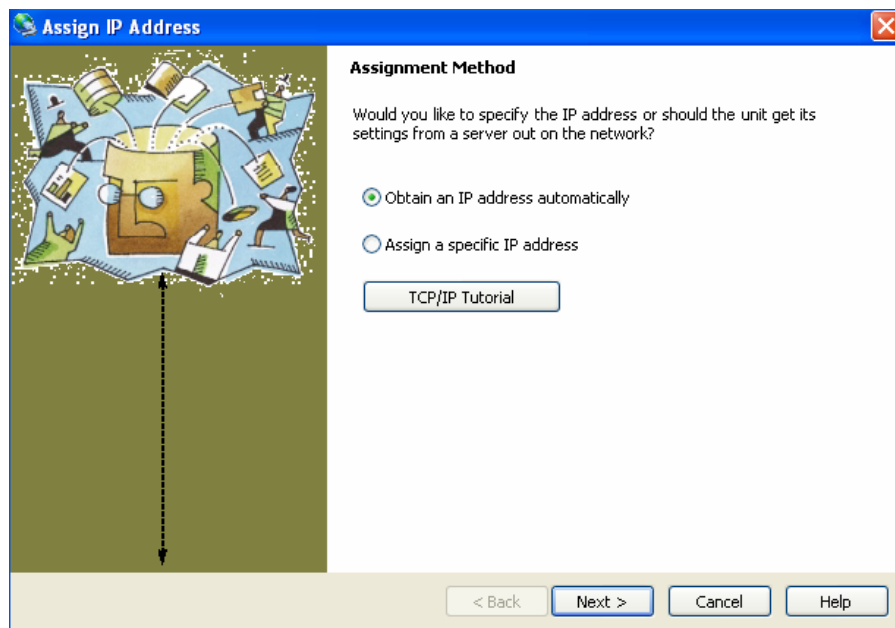
3. The IP Address Assignment Method window appears.

Figure 6-3. IP Assignment Method Window

4. Select **Obtain an IP Address automatically –** do NOT select *Assign a specific IP address*. Then, click **Next**. The IP Discovery Settings window appears.
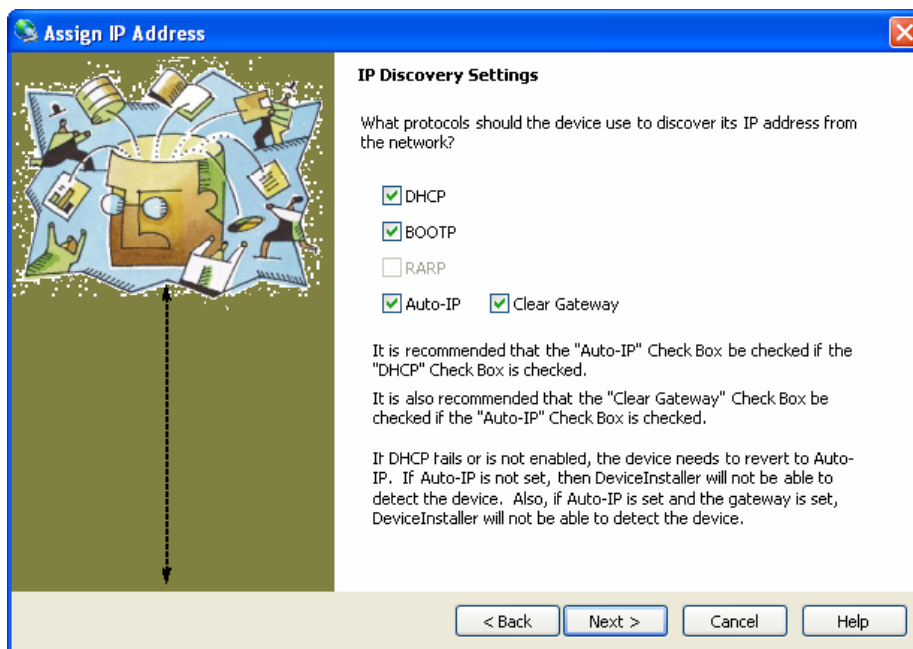
Figure 6-4.Automatic IP Discovery Settings Window

5. Enable the following checkboxes: **DHCP**, **BOOTP**, **Auto-IP** and **Clear Gateway**.

6.. Click **Next**. The Assignment window appears.

7. Click **Assign** to assign the MA860 unit the defined parameters. Once the parameters have been assigned, the message 'Completed Successfully' appears and the **Finish** button is enabled.
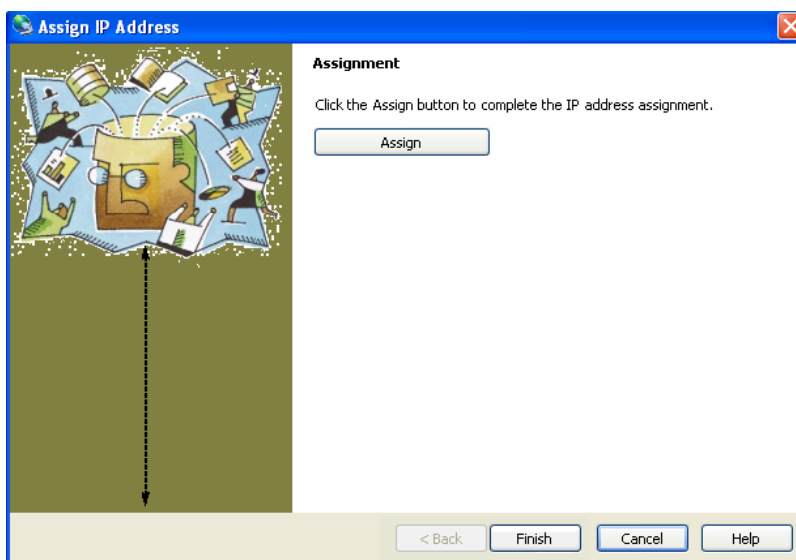

Figure 6-5. Finish Static IP Address Definition

8. Click **Finish**. The **Device Installer** Main window reappears and the installed unit will be listed in the window.

6.3 SNMP Management Using a Standard SNMP Manager

The MA 860 packages provide MIBSs that enable standard SNMP (Version 2.0) managers such as HP OpenView to view event traps sent by the MA 860 unit and to configure the unit.

NOTE: These traps provide a general indication of the type of failure. The MA MA 860 enables identifying the source of the problem and system monitoring parameters. (Trap destinations and community names were defined in section 5.2.1.3.

6.3.1 Traps List

NOTE: Traps are only sent to defined trap destinations 5.2.1.3.

The following traps are provided:

Table 6-2. List of MA 860 Traps

Name	Type	Severity	OID	Description
ma860powerUp	NOTIFICATION-TYPE	notification	81.4.2.0.1	System On.
ma860SerialNotify	NOTIFICATION-TYPE	notification	81.4.2.0.2	serial communication status failed success
ma860WceOverTemperature	NOTIFICATION-TYPE	major	81.4.2.0.3	WCE Temperature over 60°C
ma860WceNormalTemperature	NOTIFICATION-TYPE	info	81.4.2.0.4	WCE Temperature Normal
ma860APaDisconnect	NOTIFICATION-TYPE	major	81.4.2.0.5	AP type 802.11 a DisConnected
ma860APaDetected	NOTIFICATION-TYPE	info	81.4.2.0.6	AP type 802.11 a Connected
ma860APbgDisconnect	NOTIFICATION-TYPE	major	81.4.2.0.7	AP type 802.11 bg DisConnected
ma860APbgDetected	NOTIFICATION-TYPE	info	81.4.2.0.8	AP type 802.11 bg Connected
ma860WceDisconnected	NOTIFICATION-TYPE	major	81.4.2.0.9	WCE Disconnected
ma860WceDetected	NOTIFICATION-TYPE	info	81.4.2.0.10	WCE detected by MA860

Name	Type	Severity	OID	Description
ma860WceDCFault	NOTIFICATION-TYPE	major	81.4.2.0.11	DC OFF - disconnected by system due to falure
ma860WceDCOn	NOTIFICATION-TYPE	info	81.4.2.0.12	DC ON
Ma860adjust11aFailed	NOTIFICATION-TYPE	minor	81.4.2.0.13	Adjustment on type 802.11 a Failed
Ma860adjust11aSuccess	NOTIFICATION-TYPE	info	81.4.2.0.14	Adjustment on type 802.11 a Succeeded
Ma860adjust11bgFailed	NOTIFICATION-TYPE	minor	81.4.2.0.15	Adjustment on type 802.11 bg Failed
Ma860adjust11bgSuccess	NOTIFICATION-TYPE	info	81.4.2.0.16	Adjustment on type 802.11 bg Succeeded
ma860OverTemperature	NOTIFICATION-TYPE	major	81.4.2.0.17	MA860 Temperature over 60°C
ma860NormalTemperature	NOTIFICATION-TYPE	info	81.4.2.0.18	MA860 Temperature Normal
ma860WceAntDisconnected	NOTIFICATION-TYPE	major	81.4.2.0.19	WCE antenna DisConnected
ma860WceAntDetected	NOTIFICATION-TYPE	info	81.4.2.0.20	WCE antenna Connected
ma860WceFailure	NOTIFICATION-TYPE	major	81.4.2.0.21	WCE HW failure
ma860WceOK	NOTIFICATION-TYPE	info	81.4.2.0.22	WCE HW OK

6.3.2 Viewing and Configuring Using a Standard MIB Browser

To view and configure using any standard SNMP manager

NOTE: It is assumed that the IP Address of at least one destination is already defined.

From a computer *configured as a trap destination* (configured to receive the traps), load the MIB file to the SNMP manager. The following figure shows the MIB tree that includes the loaded MobileAccess MA 860 file.
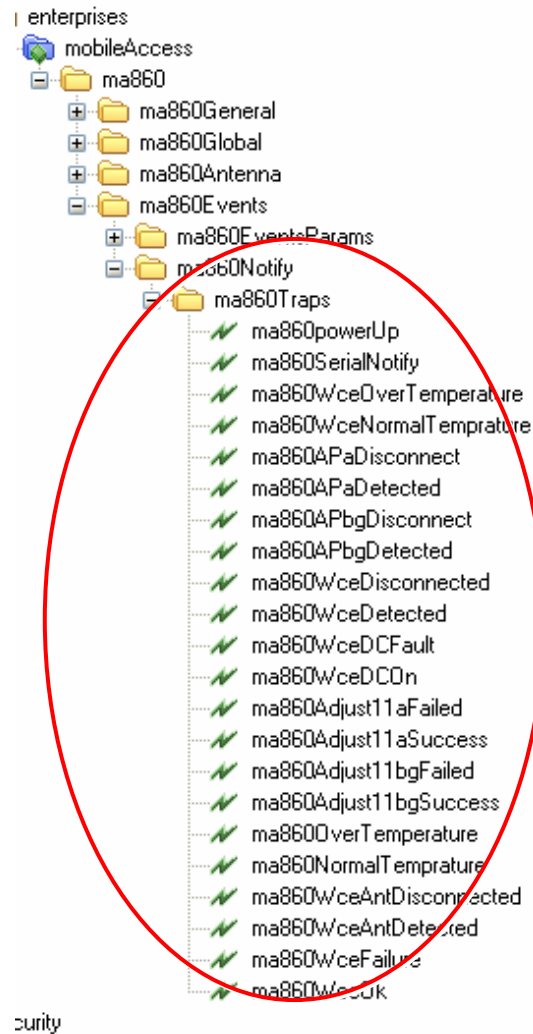

Figure 6-6. MIB Tree with Loaded MobileAccess MA 860