860M with WCE

Installation and Configuration Guide

MobileAccess

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Preface Material

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

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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.

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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:**
  - 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:**
  - Access Points are co-located in the telecom IDF or closet
  - All data and voice services distributed via a common coax cabling and broadband antennas
  - 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.
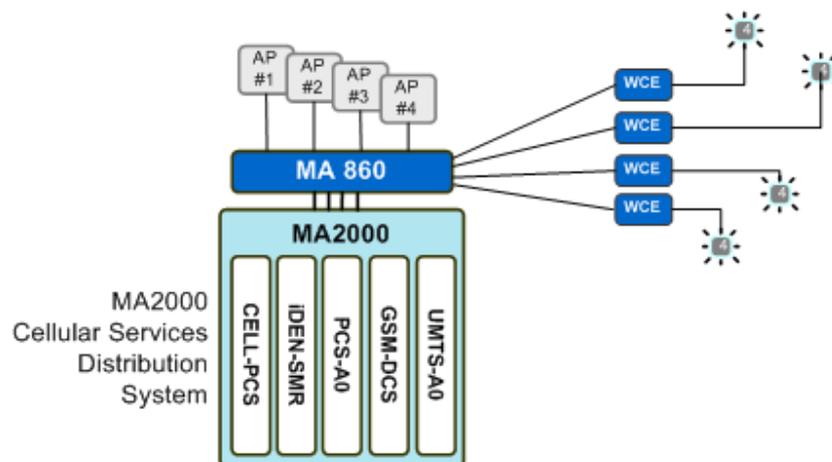
Figure 1-2. MobileAccess 860 WLAN Functional Block Diagram

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.
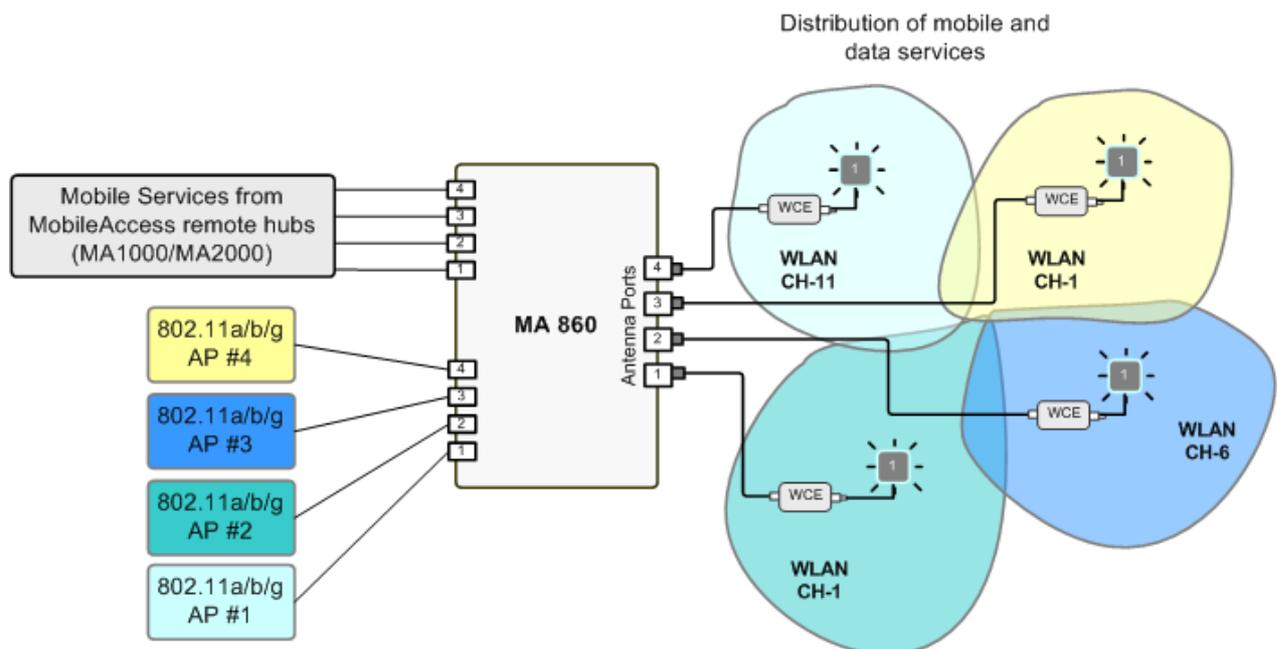
Figure 1-3. Example of 802.11a/b/g Signal Distribution

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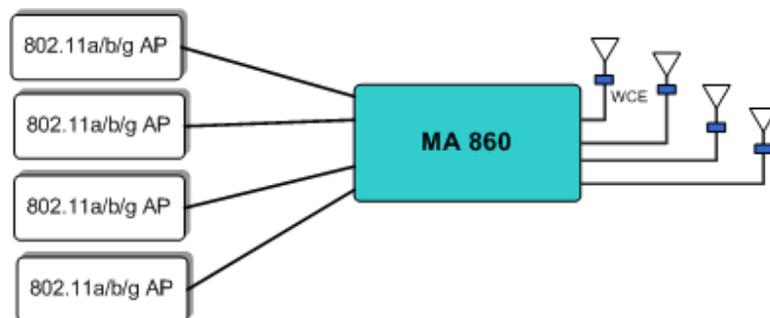
Figure 1-4. MA-860 Standalone Installation Configuration

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.
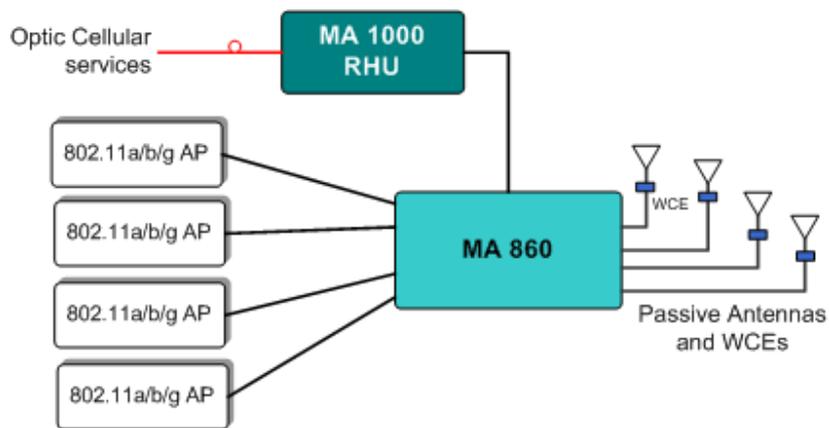
Figure 1-5 MA-860 as Add-On to MA 1000 System

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.
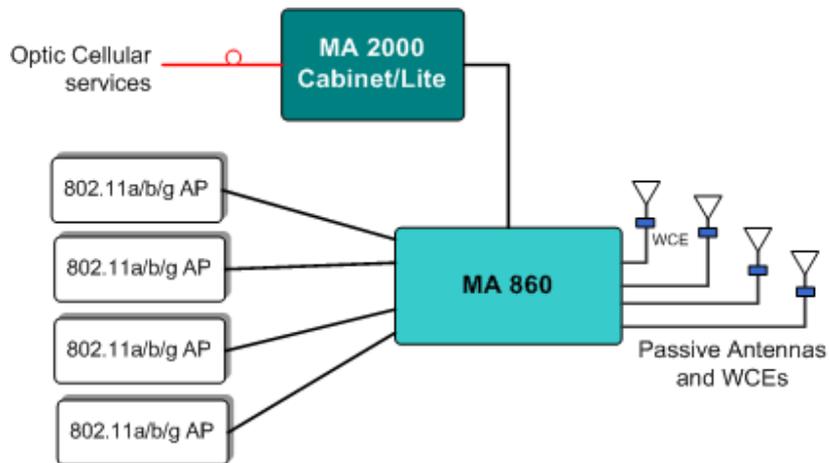
Figure 1-6. MA-860 Add-On to MA 2000 System

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.

Antenna ports   (RS232) Console Port   Power Status   Mobile service Ports
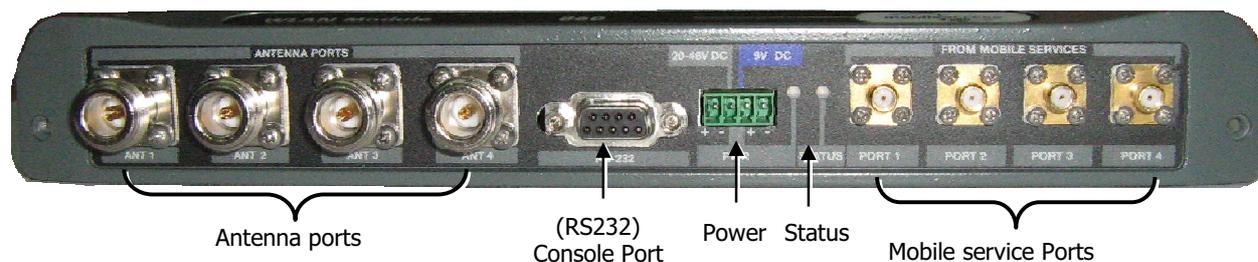
Figure 2-1. MobileAccess MA-860 Front View

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.