



# **MA Nextel 1000 System**

## **Installation and Configuration Guide**

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## MobileAccess Nextel 1000

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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*

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**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 10dBi.

**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 Remote Units (RHUs) downlink ports. Therefore, there is no dangerous RF radiation when the antenna is not connected.

## Laser Safety

### LASER WARNING



Fiber optic ports of the MobileAccess 1000/2000 emit invisible laser radiation at the 1310 nm wavelength window.

To avoid eye injury never look directly into the optical ports, patchcords or optical cables. Do not stare into beam or view directly with optical instruments. Always assume that optical outputs are on.

Only technicians familiar with fiber optic safety practices and procedures should perform optical fiber connections and disconnections of the MobileAccess 1000/2000 modules and the associated cables.

The MobileAccess 1000/2000 complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice NO. 50 (July 26, 2001) & IEC 60825-1, Amendment 2 (Jan. 2001).

## Care of Fiber Optic Connectors

### F/O Connectors Cautions

Do not remove the protective covers on the fiber optic connectors until a connection is ready to be made. Do not leave connectors uncovered when not connected.

The tip of the fiber optic connector should not come into contact with any object or dust.

Refer to the cleaning procedure for information on the cleaning of the fiber tip.

## Certification

MobileAccess products have met the approvals of the following certifying organizations:



**ISO 9001**

For US:           FCC 47 CFT part 22,24,90  
                      FDA-CDRH

For Canada:      RSS-118, RSS-119, RSS-133....

**NOTE:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

**Warning!**

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

## Preface

This user guide provides all the information necessary to install and configure the MobileAccess Nextel 1000 System.

## Revision History

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

**Table 1-1: Revision history**

Version	Date	Description
1.0	April 2003	Initial version.
2.0	October 2003	Updated version to MobileAccess.
2.1	November 2003	Review and editing
2.2	December 2003	Adding and updating RHU 1200
2.3	September 2004	Update for Nextel Specific Installs
2.4	September 27	Review Nextel's inputs
2.6	05-FEB-05	Safety and power requirements
2.7	10-FEB-05	RHU 800/900 with no filter jumper illustration
2.8	10-MARCH-05	Updating RHU 800/900 Filter Connections
2.9	MARCH-05	Section 5.1 - Nextel Items Master No.
2.10	MAY-06	Section 3.3.4 Coaxial cable Lengths and Losses

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# 1 Introduction

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## 1.1 About MobileAccess™ 1000

**MobileAccess™ 1000** converged wireless networks solution provides scalable in-building coverage for multiple wireless data and voice services through a single coax and broadband antenna infrastructure.

The solution is based on combining a number of services, both voice and data, at each covered location and distributing them through a common antenna infrastructure.

Voice services are transmitted between the BTS side and the locations via optic fiber after the appropriate conversion from RF to optic, and reconverted to RF at each end. The MA 1000 system provides entry level solutions that can be upgraded *using the same infrastructure* to support additional services as required.

Wireless 802.11/a/b/g coverage may be integrated into the MA 1000 system using the **MA 850** remote module (that supports wireless LAN service distribution).

To optimize system coverage under changing environmental conditions or load, as well as to enable remote monitoring of all system elements from a central location, MobileAccess provides the following MA 1000 system enhancement solutions:

- Manageable BTS interface devices that control the level of the BTS signal fed into the system (Radio Interface Unit)
- Network Management System (NMS) consisting of controllers, adjustment and management software

### 1.1.1 Features

- Support for all current and future technologies such as TDMA, CDMA, WCDMA and GSM, and services such as PCS/CELLULAR, Paging, iDEN and 802.11 (a/b/g) Wireless LAN
- All services are distributed through a *single* coax and antenna infrastructure
- All active components are located in the communication closet/room
- Modular, scalable and future-safe – additional remote units can *easily* be installed
- Support for remote monitoring through MA 410/430 controllers
- Eliminates RF interferences occurring where multiple antenna systems are used to serve multiple services
- Enables fast deployment for corporate enterprises, property owners and WSP's of new services
- Reduces tenant disruption

- Low power required by the system eliminates the need for high power BTS/RBS, reducing operator expenses
- Provides both local and remote monitoring and control capabilities
- Software programmable parameters including output power, AGC (on/off and levels), and system gain
- Real time component setting capabilities for optimal performance (aging, temperature, optical connectors, etc.,)

## 1.2 System Architecture

The MobileAccess™ system provides in-building coverage by routing RF signals from BTS or BDA units (up to three sectors), through optic fibers to remote areas where the signals are converted back to RF and interfaced to antennas covering the remote area. All system elements can be remotely controlled and monitored from a single location.

The MobileAccess™ coax and Fiber Optic hybrid solution consists of the following elements:

- **Radio Interface Unit (RIU)** – Provides direct, simple interface to up to three BTS sectors, RFN MC Series IDEN Microcell (commonly know as Aztec), or BDA units. MobileAccess-1000 has capabilities for supporting up to three different services; however, as of today iDEN service has been the only technology approved by the RAN group in Nextel Communications.

RF connections can be simplex or duplex. RIU output signal is automatically adjusted to respond to a range of BTS or BDA output power levels. This significantly reduces or eliminates the need for extensive manual site measurements and adjustments required to provide the optimal input to the Base Units. The RIU RF output signals are combined and fed via direct coax connection to MobileAccess Base Units.

**Universal RF Interface Panel** (Nextel Item Master Number 25025) – Provides a the appropriate RF signal levels between the RF IDEN source and MobileAccess Radio Interface Unit (RIU.) Which has been designed to be mounted with ease in the Motorola base radios rack or any standard 19-inch wide rack. (Refer to MOPS\_092265\_R1\_Weinschel\_Inbuilding System)

- **Base Units (BUs)** – convert the RF signal received from the RIU (or passive interface) to an optic signal that is then split and routed via optic fiber to Remote Hub Units located in remote locations. Each BU can support up to eight RHUs.
- **Remote Hub Units (RHUs)** – converts the optic signal to an RF signal and feeds it to the antennas in the remote areas in order to provide the required coverage. Each RHU supports two different services (one high-band and one low-band) and provides coax connections to up to four antennas. The RHU filters and amplifies the optic signal received from the BU according to the service it supports.

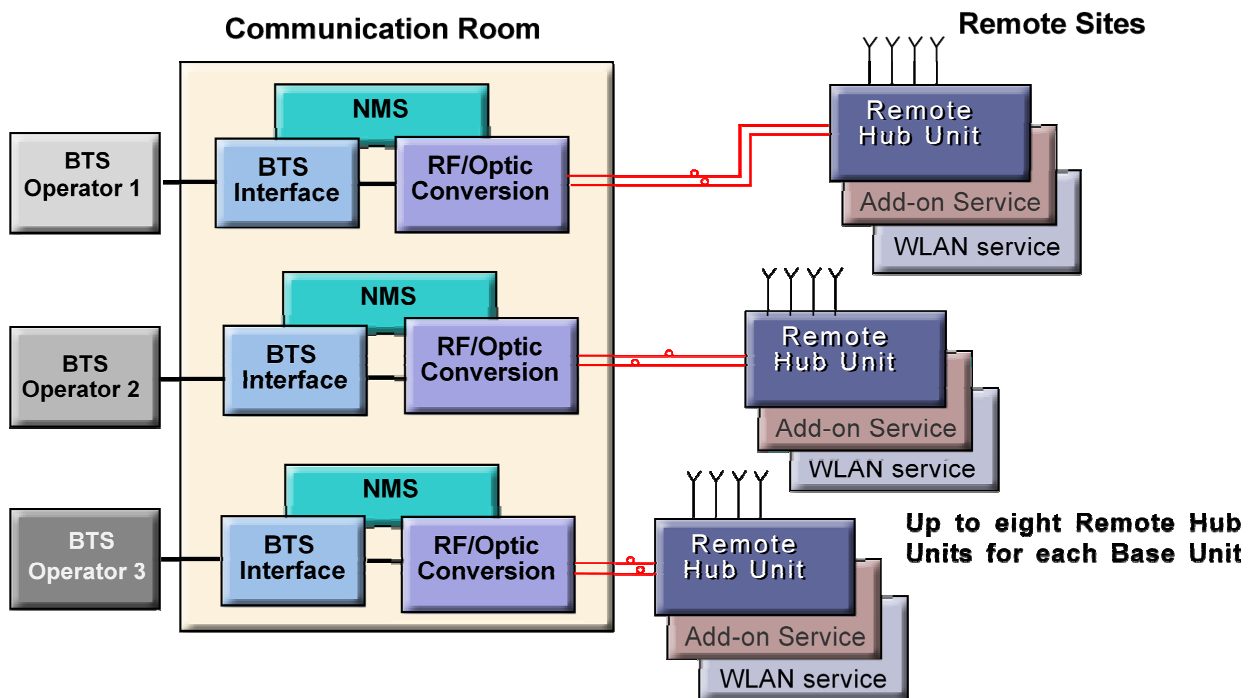
A third service can be added using a **MobileAccess 1200** add-on or independent module.

Wireless LAN services can also be added to the MobileAccess 1000 RHU by connecting the **MobileAccess 850** add-on module. This provides wireless LAN signals to the antennas connected to the MobileAccess 1000 RHU.

- **MA 850** – The MA 850 is a wireless LAN module that provides secure and centralized connections for 802.11a/b/g Access Points and distributes the wireless services over the same coax and broadband infrastructure as the voice services.
- **System Controller** – provides monitoring and control to all MobileAccess system elements, from a single location.
- **DC Centralized Power Source** – Designed to be integrated into the MobileAccess-1000 system, it enables supplying up to -48 VDC to the MobileAccess-1000 system elements from a central DC source, as well as providing access to -48 V DC battery back-up systems from our standard approved power plant configurations to the MobileAccess 1000 system devices.

Two Micrin Power Distribution Units have been approved by Nextel Communication, a 6-channel PDU (Main PDU, and an 8-channel PDU. For more information, refer to Nextel MOPS\_091482\_R1\_Micrin\_inbuilding System.

A block diagram of the MobileAccess™ system is given below.



**Figure 1-1. MA 1000 System Overview**

The Base Units, RF Interface Unit (RIU) and Network Manager controller (NMS) will be installed in either a Motorola Controller rack or a standard 19-inch wide rack in the communication room with the RF source equipment, while the RHUs are distributed throughout the locations to be covered.

## 1.3 Configuration Options

The MobileAccess™ 1000/1200 system includes three basic configuration options:

### A) Basic configuration

The Base Unit drives a single or dual band, MobileAccess™ 1000 RHU. The dual band RHU consists of a low band service (cellular 800, iDEN, Paging, or GSM 900) and a high band service (PCS 1900 or DCS 1800).

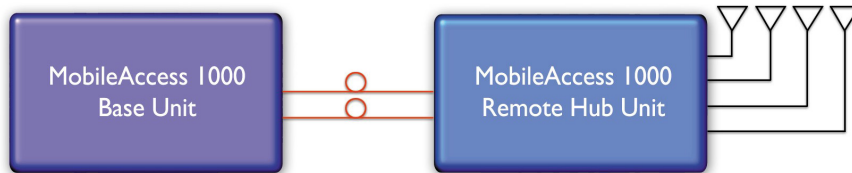


Figure 1-2. MobileAccess 1000 Basic BU – RHU Configuration

### B) Using the MobileAccess 1200 add-on unit to provide an additional service

A MobileAccess™ 1200 add-on unit can be connected to a MA RHU 2000 unit to provide a third service. The add-on unit can be Cellular, PCS, UMTS, 3G, or any future service.

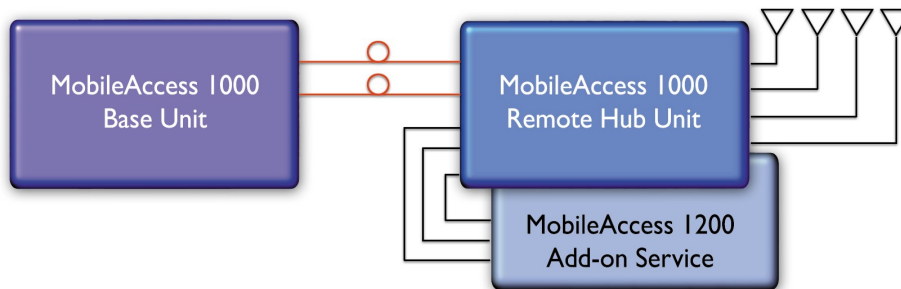
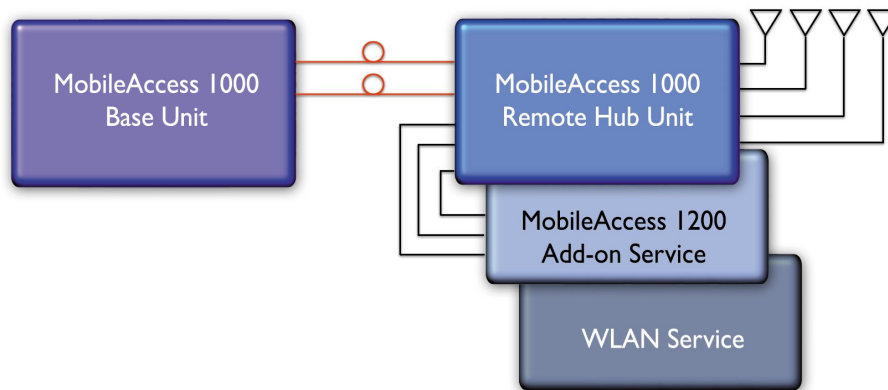


Figure 1-3. MobileAccess 1000/1200 BU – RHU Plus Add-On

**C) Using the MobileAccess 800 WLAN module to provide access to high data-rate service**

A WLAN module (MobileAccess™ 850) may also be added in a configuration that includes both RHU 1000 and RHU 1200 or only RHU 1000.



**Figure 1-4. MobileAccess 1000/1200 BU – RHU Plus Add-on Plus WLAN Configuration**

## 1.4 MA 410/430 Remote Management

The MobileAccess (MA) Network Management System (NMS) provides complete site coverage and network management. It can be used to provision coverage that can compensate for changing loads. It also provides real-time monitoring, control and diagnostics capabilities for *MobileAccess* devices from a single location.

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**NOTE:** The MA NMS System is fully described in the MA NMS System Configuration and Operation Guide.

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**The MA NMS system consists of:**

- **MA 410/430 Controller** – The controller provides the interface between the system elements and the management and control mechanism. Two controller models are available:
  - MobileAccess 410™ – enables management of the connected devices through a local or point-to-point dial-up connection. It can be remotely managed through a connection to the MobileAccess 430 controller.
  - MobileAccess 430™ – enables management of all connected elements and all connected MA 410 controllers and the corresponding elements. Supports SNMP (Simple Network Management Protocol) over TCP/IP connection.
  - MA 430 may be managed through the Network Operator Center (NOC) through Manager of Managers element such as HP OpenView via SNMP.

- **MCT** – a Java based GUI application provided with both controllers. The MCT is used after the installation procedure to adjust MobileAccess devices according to the installation site characteristics in order to optimize coverage for the site.

The application is installed and ran from a computer that is connected either locally or via remote dial-up modem to the controller site to be adjusted or monitored.

- **MobileAccess Manager™** – a Java based GUI software application that provides enhanced monitoring and control capabilities for all your *MA 430™* sites from a single location; each site can consist of a standalone MA 430 controller, or a MA 430 controller in a Master topology with a number of MA 410 controllers connected as slaves. The **MobileAccess Manager** application is not supplied with the controller – it is *purchased separately*.

The MA NMS application is installed on a server and is accessed from any client by connecting to the server from any Web Browser with enhanced Java VM capabilities.

**MA NMS manager provides the following features and capabilities:**

- Remote SNMP management from a single location
- Client/server management capability over a TCP/IP network with enhanced monitoring and control capabilities
- Intuitive GUI that enables end-to-end fault sourcing from RIU to antennas. The GUI includes:
  - System status at a glance through multi-color tree with upward propagation of fault indications
  - Graphical view of system elements including LED status displays and auxiliary connections
  - Multi-color event monitoring display
  - RF Connections



## 1.5 MobileAccess Models

Table 1-1: MobileAccess™ BU Models

<b>MobileAccess Universal Base Units (1000, 1200, 2000 support)</b>	
WB-B8U	Wide Band Base 8 Unit supporting 8 RHUs
WB-B4U	Wide Band Base 4 Unit supporting 4 RHUs

Table 1-2: MobileAccess™ RHU Models with Add-on Capabilities

<b>MobileAccess 1000 RHUs (ready for add-on units)</b>	
1000-CELL-4E	Single band-Cellular, 4 ports
<b>1000S-IDEN-4</b>	<b>Single band-iDEN, 4 ports</b>
1000-PCS-4E	Single band-PCS 4 ports
1000D-IDEN-PCS4	Dual band-iDEN/PCS, 4 ports
1000D-SMR-PCS4	Dual band-SMR/PAGING/PCS, 4 ports
1000-CELL-PCS4E	Dual band-Cell/PCS, 4 ports
1000-CELL-DCS4E	Dual band Cell/DCS 4P ready for add-on units
1000-GSM-DCS4E	Dual band GSM/DCS 4P ready for add-on units
1000-GSMO-DCS4E	Dual band GSM orange/DCS 4P ready for add-on units
<b>1000D-iDEN-SMR4</b>	<b>Dual band iDEN/SMR 4P add-on ready</b>
<b>1000-SMR-FILTER</b>	<b>Filter kit for SMR 900</b>
<b>1000-IDEN-SMR4F</b>	<b>Dual band iDEN/SMR 4P add-on ready with Filter kit</b>

Table 1-3: MobileAccess™ RHU Models

<b>MobileAccess 1000 RHUs (Litenna compatible)</b>	
10L-D-IDEN-PCS4	Dual band-iDEN/PCS, 4 ports, LBC
10L-D-SMR-PCS4	Dual band-SMR/PAGING/PCS, 4 ports, LBC
10L-D-CELL-PCS4	Dual band-Cell/PCS, 4 ports, LBC
10L-D-CELL-DCS4	DB Cell/DCS 4P ready for add-on units-LBC
10L-D-CL-M-DCS4	DB Cell multi opr/DCS 4P ready for add-on units-LBC
10L-D-GSM-DCS4	DB GSM/DCS 4P ready for add-on units-LBC
10L-D-GSMO-DCS4	DB GSM orange/DCS 4P ready for add-on units-LBC

Table 1-4: MobileAccess™ 1200 RHU Models

<b>MobileAccess 1200 RHU</b>	
1200-PCS-SA-1	Stand Alone high power PCS, one port
1200-UMTS-SA-1	Stand Alone high power UMTS, one port RHU
1200-PCS-AO	Add-on RHU supporting a PCS service
1200-UMTS-AO	Add-on RHU supporting UMTS service

Table 1-5: MobileAccess™ UMTS Ready RHU Models

<b>MobileAccess 1200 RHU (Litenna UMTS Ready compatible)</b>	
12L-UMTS-AO	Add-on RHU supporting UMTS service LBC

Table 1-6: MobileAccess™ Controller Models

<b>Network Controller</b>	
410	Network Controller – Serial Interface (dial-up)
430	Network Controller –Ethernet/IP Interface

Table 1-7: MobileAccess™ Management System

<b>Network Management System</b>	
NMS-SW-SERVER	GUI and server S/W package (one per site)
NMS-SW-MFEE	NMS annual S/W maintenance fee (per 430-CTLR)

Table 1-8: MobileAccess™ RIU

Radio Interface Unit	
<b>RIU-IM</b>	<b>Radio Interface Unit</b>
RIU-BTSC-CELL	BTS Conditioner for Cellular
<b>RIU-BTSC-IDEN</b>	<b>BTS Conditioner for iDEN</b>
RIU-BTSC-PCS	BTS Conditioner for PCS
<b>RIU-BTSC-SMR</b>	<b>BTS Conditioner for SMR-Paging</b>
RIU-BTSC-GSM	BTS Conditioner for GSM 900MHz
RIU-BTSC-GSM-O	BTS Conditioner for GSM 900MHz for Orange
RIU-BTSC-DCS	BTS Conditioner for DCS 1800MHz
RIU-BTSC-UMTS	BTS Conditioner for UMTS 2100MHz

### 1.5.1 Nextel Item Master Numbers for MobileAccess-1000 iDEN

IM#	CCODE	NOUN	QUALIFIER	SUPPLIER NAME	Model Number	Description	Price
25027	DISTRIBUTED RF EQUIPMENT	IN_BUILDING	MAIN	MobileAccess	WB-B8U	(WB-B8U) Wide Band Base 8 Unit supporting 8 RHUs, 851-866 MHz, 806-821 MHz, 120/220VAC and 48VDC	\$5,411
25028	DISTRIBUTED RF EQUIPMENT	IN_BUILDING	MAIN	MobileAccess	WB-B4U	(WB-B4U) Wide Band Base 4 Unit supporting 4 RHUs, 851-866 MHz, 806-821 MHz, 120/220VAC and 48VDC	\$2,954
25029	DISTRIBUTED RF EQUIPMENT	IN_BUILDING	MAIN	MobileAccess	RIU-IM	(RIU-IM) Radio Interface Unit, 120/220VAC and 48VDC	\$1,750
25030	DISTRIBUTED RF EQUIPMENT	IN_BUILDING	MAIN	MobileAccess	410	(NMS-410) Network Controller, Serial Interface (dial-up), 120/220VAC and 48VDC	\$1,050
25031	DISTRIBUTED RF EQUIPMENT	IN_BUILDING	MAIN	MobileAccess	430	(NMS-430) Network Controller, Ethernet/IP Interface, 120/220VAC and 48VDC	\$3,500
25032	DISTRIBUTED RF EQUIPMENT	IN_BUILDING	REMOTE	MobileAccess	1000S-IDEN-4	(1000S-IDEN-4) Remote Single Band-IDEN, 4 ports, 120/220VAC and 48VDC	\$1,386
25033	DISTRIBUTED RF EQUIPMENT	IN_BUILDING	Accessory	MobileAccess	RIU-BTSC-IDEN	(RIU-BTSC-IDEN) BTS Conditioner for iDEN, 120/220VAC and 48 VDC	\$850

## 2 System Elements

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This chapter describes each of the system elements, and their individual connections. It can be used as reference to verify the connections of each module or to upgrade your system.

### 2.1 Remote Modules

The Optical to RF conversion of each service at the individual building floors is performed by remote units corresponding to the service types. These consist of MA 1000 RHUs and in addition, may include MA 1200 add on modules and MA 850 modules.

The configurations depend on the requirements of the site and the supported services. The following sections describe each of the system elements.

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**NOTE:** *The connections as they relate to the MA 1000 system are described in Chapter 4 - System Installation.*

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#### 2.1.1 MA 1000 RHUs

Each RHU supports two different services (one high-band and one low-band). All RHUs are add-on ready, meaning that their optic interface and control functionality can support a third (high-power) service through the connections of a MA 1200 Add-on module (see section 2.1.3).

Each RHU 1000 is connected to the corresponding BU (located in the communication room) through a fiber optic connection. Remote monitoring is provided through the BU connections to the MA 410/430 controller (see section 2.4).

The RHU 1000 services, MA 1200 add-on service and data services (provided by MA 850 - 2.1.4) at each location are combined and then transmitted over a common infrastructure to strategically placed antennas.