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Client: M/A-COM, Inc.
ID's: BV8VIDA-BB-CL/3670A-VIDABBCL
Model: VIDA Broadband High Power Client
Standards: FCC Pt 90/IC RSS-111
RTL Report #: 2008221

Appendix C: Manual

Please refer to the following document.



VIDA Broadband Equipment

MANUAL REVISION HISTORY

REV	DATE	REASON FOR CHANGE
-	Jul/08	Initial release.
A	Feb/09	Added the MultiLink, B510 BS information, approved antenna options, and instructions for using the base station Web page.

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1. PREFACE

1.1 ABOUT THIS MANUAL












The manual provides information for installing and configuring VIDA Broadband equipment as a system.

This manual is written for the communications professional responsible for planning, installing, and implementing the VIDA Broadband Network.

1.2 REFERENCE MANUALS

It may be necessary to consult one or more of the following manuals when installing, operating, or maintaining a VIDA Broadband Network.

Table 1-1: Related Documentation

Documentation	Manual Number
 VIDA Broadband BAS/UAS User's Manual	MM-011540-001
 RNM/CNM User's Manual	MM1000018633
 VIDA Broadband System Manual	MM-011541-001
 VIDA Broadband Base Station Product Manual	MM-009804 -001
 VIDA Broadband Client Product Manual	MM-010539-001
 VIDA Broadband B510 Base Station Product Manual	MM-016895 -001
 VIDA Broadband MultiLink Station Product Manual	MM-013752-001
 VIDA Broadband Network Services Installation and Configuration Manual	MM-014640-001
 VIDA Broadband Basic Network Applications Programming Guide	MM-014641-001
 VIDA Broadband Systems Troubleshooting Guide	MM-014642-001
 VIDA Broadband Systems RF Planning Guide	MM-015601-001

1.3 CONVENTIONS AND SAFETY SYMBOLS

The following conventions may be used in this manual to alert the user to general safety precautions that must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Tyco Electronics assumes no liability for the customer's failure to comply with these standards.



The **WARNING** symbol calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a **WARNING** symbol until the conditions identified are fully understood or met.



The **CAUTION** symbol calls attention to an operating procedure, practice, or the like, which, if not performed correctly or adhered to, could result in a risk of danger, damage to the equipment, or severely degrade the equipment performance.



The **NOTE** symbol calls attention to supplemental information, which may improve system performance or clarify a process or procedure.



The **ESD** symbol calls attention to procedures, practices, or the like, which could expose equipment to the effects of Electro-Static Discharge. Proper precautions must be taken to prevent ESD when handling circuit modules.



The electrical hazard symbol is a **WARNING** indicating there may be an electrical shock hazard present.

1.4 CUSTOMER SERVICE

1.4.1 Technical Assistance

The Technical Assistance Center's (TAC) resources are available to help with overall system operation, maintenance, upgrades, and product support. TAC is the point of contact when answers are needed to technical questions.

Product specialists, with detailed knowledge of product operation, maintenance, and repair provide technical support via a toll-free (in North America) telephone number. Support is also available through mail, fax, and e-mail.

For more information about technical assistance services, contact your sales representative, or contact the Technical Assistance Center directly at:

North America:	1-800-528-7711
International:	1-434-385-2400
Fax Number:	1-434-455-6712
E-mail:	tac@tycoelectronics.com

1.4.2 Customer Resource Center

If any part of the system equipment is damaged on arrival, contact the shipper to conduct an inspection and prepare a damage report. Save the shipping container and all packing materials until the inspection and the damage report are completed. In addition, contact the Customer Resource Center to make arrangements for replacement equipment. Do not return any part of the shipment until you receive detailed instructions from a Tyco Electronics representative.

Contact the Customer Resource Center at:

North America:

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International:

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Fax Number:	1-434-455-6676
E-mail:	InternationalCustomerFocus@tycoelectronics.com

1.5 TERMS AND ABBREVIATIONS

Table 1-2: Abbreviations

Term	Definition
AES	Advanced Encryption Standard
BAS	Broadband Administration Server
BE	Best Efforts
BS	Base Station
CID	Connection Identifier
CR	Classifier Rule
DES	Data Encryption Standard
DHCP	Dynamic Host Configuration Protocol
EDACS	Enhanced Digital Access Communications System
GPS	Global Positioning System
IEEE	Institute of Electrical & Electronics Engineers
JDBC	Java Database Connectivity
JSP	Java Server Page
LMR	Land Mobile Radio
MAC	Media Access Control
MIB	Management Information Base
OFDM	Orthogonal Frequency Division Multiplexing
QoS	Quality of Service
RSS	Received Signal Strength
SF	Service Flow
SNMP	Simple Network Management Protocol
SS	Subscriber Station (Client)
TAC	Technical Assistance Center
TFTP	Trivial File Transfer Protocol
UAS	Unified Administration System
UGS	Unsolicited Grant Services
VIDA	Voice, Interoperability, Data, and Access
WAN	Wide Area Network

1.6 SOFTWARE COMPATIBILITY

Table 1-3: Current Software Releases

Media	Part Number	Version
Base Station Media Kit	SK-014991-001	Version R3B
Subscriber Station Media Kit	SK-016517-001	Version R7F

Table 1-4: VIDA Broadband Software Compatibility Chart

Base Station (BS)	Unified Administrator System (UAS)			
	Ver. 3.0.9	Ver. 4.3.1	Ver. 4.3.2	
BS ver. 1.1.0	Compatible	<u>Do Not Use</u>	<u>Do Not Use</u>	
BS ver. 1.1.2	Compatible	<u>Do Not Use</u>	<u>Do Not Use</u>	
BS ver. R2A	<u>Do Not Use</u>	Compatible	Compatible	
BS ver. R2B	<u>Do Not Use</u>	Compatible	Compatible	
BS ver. R3A	<u>Do Not Use</u>	Compatible	Compatible	
BS ver. R3B	<u>Do Not Use</u>	Compatible	Compatible	
Base Station (BS)	Subscriber Station (SS)			
	Ver. 0.194.0.0	Ver. 5.0.23	Ver. 6.6.1.0	Ver. 7.5.7.0
BS ver. 1.1.0	Compatible	Compatible	Compatible	<u>Do Not Use</u>
BS ver. 1.1.2	Compatible	Compatible	Compatible	<u>Do Not Use</u>
BS ver. R2A	Compatible	Compatible	Compatible	<u>Do Not Use</u>
BS ver. R2B	Compatible	Compatible	Compatible	Compatible
BS ver. R3A	Compatible	Compatible	Compatible	Compatible
BS ver. R3B	Compatible	Compatible	Compatible	Compatible
Notes:				
1.	Only the versions listed have been authorized for use in the field.			
2.	All UAS versions are compatible with all SS versions.			
3.	SS ver. 7.5.7.0 is incompatible with all BS versions prior to R2B.			
4.	All BS versions starting with R2A and later require UAS version R4x or later.			

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2. INTRODUCTION

VIDA Broadband provides integrated public safety grade wireless broadband video and data services for mission-critical applications. VIDA Broadband combines the security of the licensed 4.9 GHz public safety frequency band with the robust 802.16 communications industry standard to create a true public safety broadband network. With this state-of-the-art network, public safety customers can implement applications such as streaming video, web applications, economical licensed LMR backhaul, and other bandwidth intensive applications. Since the network provides guaranteed Quality of Service (QoS), it is especially suited for applications such as video surveillance, perimeter control, and mobile command. VIDA Broadband is integrated with the VIDA network allowing seamless sharing of network resources, including hardware network management and administration.

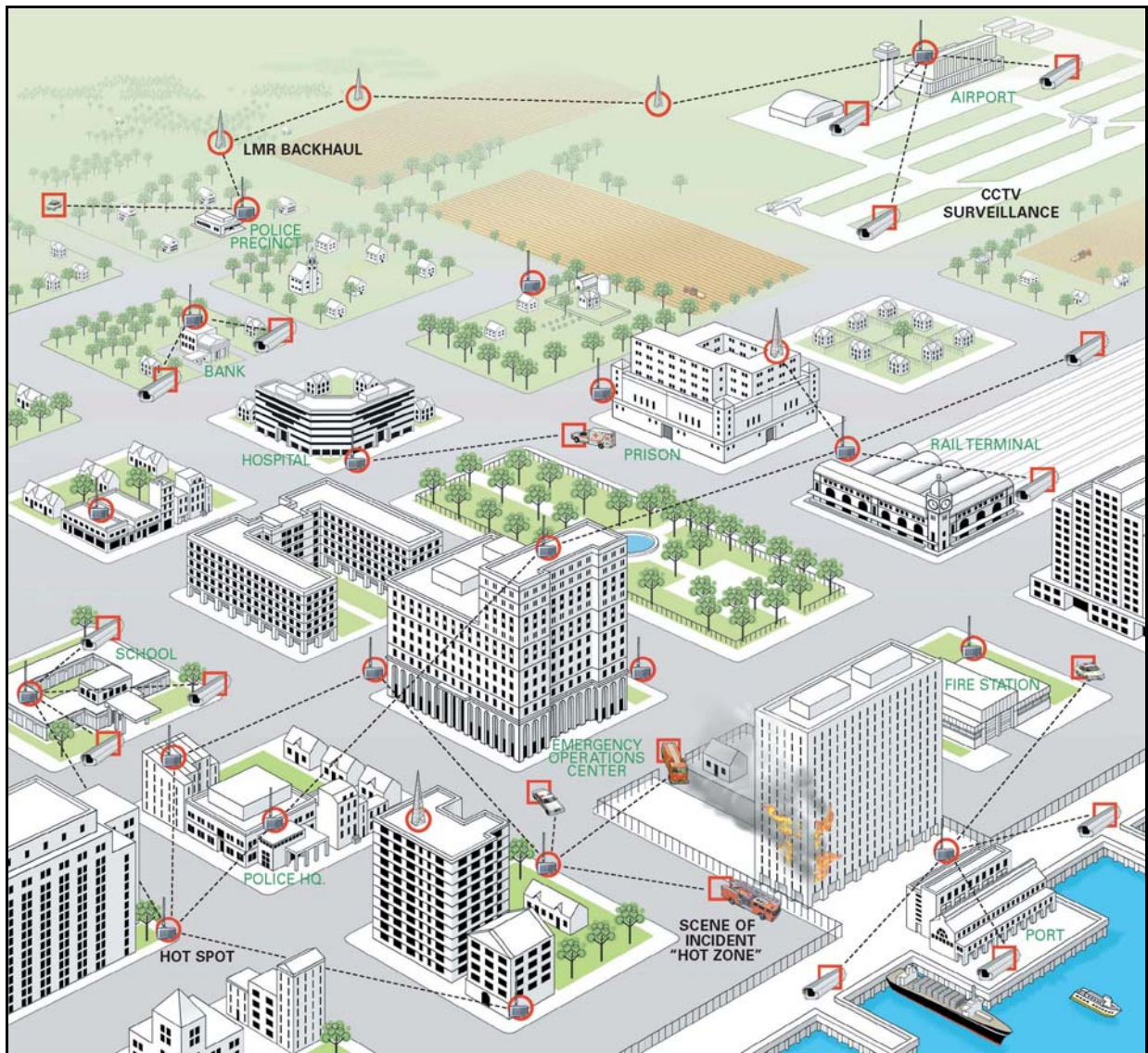


Figure 2-1: VIDA Broadband Network

The basic architecture of the 4.9 GHz VIDA Broadband network is a point-to-multipoint network. A system consists of one or more base station(s) and at least one or more clients per base station as shown in Figure 2-1. There are two configurations of client devices; fixed and nomadic. Fixed client devices are usually mounted outdoors with directional antennas and have a range of up to 10 miles. Nomadic clients are vehicle mounted and use an omnidirectional antenna. The range of a nomadic client to base station is typically a few hundred meters.

The VIDA Broadband Base Station implements the 802.16e-2005 OFDM protocol to deliver an over-the-air throughput from 3 to 19 Mbps (for 5 MHz channel) and 38 Mbps (for 10 MHz channel). All communication over the wireless channel is scheduled by the base station, with contention slots provided for the VIDA Broadband Client to request bandwidth. This coordinated scheduling feature of the protocol provides significant advantages such as:

- Minimizes contention between clients.
- Maximizes channel utilization.
- Maximizes ability to coordinate frequency usage among users.
- Enables guaranteed bandwidth services for critical applications.

3. SYSTEM DESCRIPTION

VIDA Broadband provides a secure, mission critical grade point-multipoint wireless IP networking solution. This system can be seen as providing a wireless extension of customers IP networks and can support a wide variety of fixed and nomadic network applications such as IP surveillance video, secure broadband backhaul, and nomadic network access. The base stations and clients in the VIDA Broadband Network use IPC IP66-rated enclosures for operation in challenging environmental conditions, and the UAS software is the same as that in use by numerous federal and public safety systems across North America.

Both the VIDA Broadband Base Station and client are designed for easy mounting on a variety of outdoor structures including light poles and telephone poles. The VIDA Broadband client can also be vehicle mounted for nomadic applications using an optional vehicle mounting kit.

The VIDA Broadband system comprises the following:

- **Base Station Equipment (BS):** VIDA Broadband Base Stations provide the coordinating point in a point-multipoint network, transferring data between an IP network and remote subscriber stations as well as managing the subscriber stations on the network.
- **Subscriber Station (SS):** VIDA Broadband Client used to transfer data from a fixed or nomadic location to the base station.
- **MultiLink Station Equipment:** VIDA Broadband MultiLink Stations provide full capacity network extension, transferring data between an IP network and remote subscriber stations, with no loss of capacity.
- **Networking Equipment:** Standard Switches and Routers supporting connections to the backbone or Intranet.
- **Management Systems:** UAS Management, RNM system monitoring, and other Operation Support Systems.

3.1 BASE STATION

The VIDA Broadband Base Station operates on a selected channel from eighteen possible 5 MHz channels (10 Public Safety and 8 Federal) or nine possible 10 MHz channels (5 Public Safety and 4 Federal) of the IEEE 802.16e-OFDM profile in the 4.90 to 4.99 GHz communications band. The base station transmits up to 27 dBm power and satisfies the high-power FCC mask. The Base Station is DC powered and has the option of operating with either Copper Ethernet 100Base-TX or Fiber 100Base-FX.

The base stations are available in four configurations:

- MAVM-VMXBA (BS-009214-001) - AC powered with copper Ethernet (5 MHz)
- MAVM-VMXBC (BS-009214-003) - DC powered with copper Ethernet (w/surge protection) (5MHz)
- MAVM-VMXBD (BS-009214-002) - DC powered with Fiber Optic Ethernet (w/surge protection) (5MHz)
- MAVM-MBASE (BS-014648-004) - DC powered with Copper Ethernet and Fiber Optic ports (5MHz/10MHz)

The AC model requires 110 Vac and uses a 100Base-TX Ethernet based data port configuration. The DC models require +24 Vdc. The DC models have built-in surge protection and use either a 100Base-TX Ethernet based data port configuration or a 100Base-FX Fiber Optic data port configuration. The MAVM-MBASE model has both 100Base-TX and 100Base-FX ports.



Figure 3-1: VIDA Broadband Base Station (BS-009214 model shown)

The VIDA Broadband Base Station is housed in a steel NEMA 4 enclosure that satisfies IP66 requirements for outdoor deployments. To provide for flexible RF deployment configurations, the base station provides three antenna mounting options:

- Direct mounting of an omnidirectional antenna on the base station
- Direct mounting of a directional antenna on the front face of the base station, or
- Remote mounting of an antenna through the connection of an RF cable to the base station.

3.2 SUBSCRIBER STATION (CLIENT)

The VIDA Broadband Subscriber Station (SS), shown in Figure 3-2, is part of the VIDA Broadband network. Subscriber stations, also referred to as clients, are available in five configurations:

- MAVM-VMCLL (BS-010700-001) - 4.9 GHz, 0.1W, Copper Ethernet
- MAVM-VMXCH (BS-010700-002) - 4.9 GHz, 0.5W, AC/DC, Copper Ethernet
- MAVM-VMCHN (BS-010700-002)¹ - Nomadic 4.9 GHz, 0.5W, DC, Copper Ethernet
- MAVM-VMCHH (BS-010700-003) - 4.9 GHz, 0.5W, DC, Fiber (w/surge protection)
- MAVM-VMCLH (BS-010700-004) - 4.9 GHz, 0.1W, DC, Fiber (w/surge protection)

The high power (0.5 Watt) copper model is available as a fixed or nomadic application. The low power (0.1 Watt) copper model is typically installed in fixed locations only. Both the high and low power copper models are designed to operate on AC or DC voltage and use an Ethernet based data port configuration.

The High and Low Power Standard models require 11 to 30 Vdc or 16 to 26 Vac. A DC supply is recommended in all applications for cleaner and lower-noise power; however, an AC supply may be used. The fiber models have built-in lightning protection, are powered by DC voltage only, and use a 100Base-FX Fiber Optic data port configuration.



Figure 3-2: VIDA Broadband Client

¹ High Power Copper Client supplied with nomadic installation kit.

The VIDA Broadband Client is housed in a steel NEMA 4 enclosure that satisfies IP66 requirements for outdoor deployments. To provide for flexible RF deployment configurations, the client has three antenna mounting options:

- Direct mounting of an omnidirectional antenna on the base station
- Direct mounting of a directional antenna on the front face of the base station, or
- Remote mounting of an antenna through the connection of an RF cable to the base station.

The VIDA Broadband Client provides public safety grade wireless connectivity for the 4.9 GHz VIDA Broadband network. The VIDA Broadband Client provides public safety grade end-point connectivity for the 4.9 GHz VIDA Broadband network.

3.3 MULTILINK STATION

The VIDA Broadband MultiLink Station's base and subscriber functionality operate on separate single channels selected from the eighteen possible 5 MHz channels (10 Public Safety and 8 Federal) or nine possible 10 MHz channels (5 Public Safety and 4 Federal) of the IEEE 802.16e-OFDM profile in the 4.90 to 4.99 GHz communications band. The MultiLink Station transmits up to 27 dBm power out each antenna port and both satisfy the high power FCC mask. The MultiLink Station is DC powered and has the option of operating with either Copper Ethernet 100Base-TX and/or Fiber 100Base-FX. The MultiLink Station merges the features of a base station with a fully functional subscriber with the same outline and similar weight as a base station-only device. The base station and subscriber functions share the 100-Base-TX Ethernet and 100-Base-FX fiber optic data ports through the internal Ethernet switch. The MultiLink Station is ideal for full capacity network extension

The MultiLink Station, shown in Figure 3-3, is identified as follows:

- MAVM-MLINK (BS-014648-003) – MultiLink Station with Built-in Subscriber Station



Figure 3-3: VIDA Broadband MultiLink Station

The VIDA Broadband MultiLink Station is housed in a steel NEMA 4 enclosure that satisfies IP66 requirements for outdoor deployments. To provide for flexible RF deployment configurations, the base station and built-in subscriber station can use a combination of antenna mounting options, including:

- Direct or remote mounting of an omnidirectional antenna on the base station or subscriber station
- Direct or remote mounting of a directional antenna on the front face of the MultiLink station for either the base station or subscriber station, or
- Direct or remote mounting of an antenna through the connection of an RF cable to the base station or subscriber station.

3.4 NETWORKING EQUIPMENT

The base station equipment is connected to the IP backbone through standard data communication and telecommunication equipment. The 100Base-TX or 100Base-FX fiber ports of the base station can be connected directly to a multi-port router or an Ethernet switch.

The point-to-point link from the base station to the backbone can be either wired or wireless. Data to the Internet is routed to the backbone through standard routers.

The subscriber stations may also use their 100Base-TX or 100Base-FX fiber ports to connect directly to a multi-port router or an Ethernet switch. Use of routers and switches depends on the site configuration (point-to-point, multi-hop, backhaul, etc.) and associated equipment (cameras, cell site, etc.).

3.5 MANAGEMENT EQUIPMENT

Provisioning of the VIDA Broadband system is accomplished using the Unified Administration System (UAS) installed on the Broadband Administration Server (BAS) or as part of the Regional VIDA Manager (RVM) installed on a Sun Server.

For provisioning of a VIDA Broadband standalone system, the BAS is available in one of three configurations. The BAS Laptop Server (CM-014992-003) configuration is useful when initial system configuration is all that is required. For installations that may require frequent system changes or adjustments, it is recommended to use the BAS Rack-mount Server (CM-014992-001) or the BAS Tower Server (CM-014992-002).

For VIDA Broadband systems which are integrated with a radio communication system (P25, OpenSky, etc.), the RVM UAS is required to configure/manage the broadband equipment from a centralized server.

3.5.1 Unified Administration System

The Unified Administration System (UAS) is the centralized access point from which the VIDA Broadband network is provisioned. The network administrator uses the UAS to configure and provision base stations, clients, service flows, and classifier rules to enable enforced QoS across the network. Because VIDA Broadband uses the WiMAX scheduled protocol, the base stations are able to enforce these rules over all traffic to provide guaranteed QoS. In addition, the network administrator can set up and change mission-critical parameters (priorities, etc.) in real time to maximize performance during specific incidents.

UAS > BroadBand > BS_108 > Sub Stations

Add Restore Download

Modify Delete

Select	Name	Ss Mac Addr	Mac Ss Ip Addr	Mac Ss Instantiation
<input type="checkbox"/>	SS3_EB12	00:a0:0a:c1:eb:12	192.168.11.32	fixed
<input type="checkbox"/>	SS4_EA5E	00:a0:0a:c1:ea:5e	192.168.11.40	fixed
<input type="checkbox"/>	SS5_EA6A	00:a0:0a:c1:ea:6a	192.168.11.48	fixed
<input type="checkbox"/>	SS6_EB50	00:a0:0a:c1:eb:50	192.168.11.56	fixed
<input type="checkbox"/>	SS7_EAF2	00:a0:0a:c1:ea:f2	192.168.11.64	fixed
<input type="checkbox"/>	SS9_EB2C	00:a0:0a:c1:eb:2c	192.168.11.80	fixed
<input type="checkbox"/>	SS10_EB7A	00:a0:0a:c1:eb:7a	192.168.11.88	fixed
<input type="checkbox"/>	SS8_EA30	00:a0:0a:c1:ea:30	192.168.11.72	fixed
<input type="checkbox"/>	SS2_EA52	00:a0:0a:c1:ea:52	192.168.11.24	fixed
<input type="checkbox"/>	SS1_EAF4	00:a0:0a:c1:ea:f4	192.168.11.16	fixed

Figure 3-4: Example of UAS Subscriber Stations Screen

3.5.2 Regional Network Manager

The Regional Network Manager (RNM), part of the Regional VIDA Manager (RVM) on a Sun Unix Server, provides system status, fault, and performance data. In addition, the RNM monitors system activity in real time and logs all significant events.

The RNM is a collection of applications and administrative programs that permit the user to view and monitor the VIDA Broadband network components from a centralized access point. The RNM uses a graphically oriented interface that creates a visual representation of the network.

A major feature of the RNM is the graphical visualizations of the VIDA Broadband network. For example, the **Network Viewer** and **Object List** applications offer different representations of the managed objects within the network (such as base stations, clients, routers, etc.). The Network Viewer illustrates the hierarchical relationships, while the Object List allows you to specify powerful filtering clauses. In both applications, the current status of each object is conveyed using descriptive color-coding.

The RNM also displays fault and performance information, allowing you to locate trouble spots in the system and fix them quickly. It can also be set up to emit an audible alert when problems occur, thus making it possible to quickly and effectively recover from problem situations.

4. PLANNING A FIXED STATION INSTALLATION

Careful planning and preparation of any installation will always benefit the end result. Follow these simple recommendations when planning your installation:

1. Always read and follow all installation instructions, local and national building and electrical codes, and general safety rules.
2. Before beginning the installation, collect information from the Site Deployment Order (SDO) specific to the site access such as:
 - Permission to access the site.
 - Important contact names and telephone numbers.
 - Location of and directions to the site.
 - Keys and/or lock combinations to access the site and equipment shelter (if any), or points of contact to obtain them.
 - Site entry alarm system pass-codes and/or disable keys.
 - Information about work practices needed to work safely at the site.
3. Other important information that may or may not be included on the SDO includes:
 - Type of mounting—metal pole, wooden pole, tower base, exterior wall, etc.
 - Drawing or description of each site showing how the equipment is to be installed.
 - Applicable inspections completed (pole installation, electrical, local build code, etc.).
 - Installer must be aware of other transmitters and receivers on site that could cause interference to, or be interfered with by, the broadband equipment. Strong signals from, or to, co-located equipment may inflict permanent damage to either device.



VIDA Broadband equipment has a maximum allowed input power of 0 dBm in the 4.9 to 4.99 GHz band. Although other frequencies may have a higher threshold, any signal, at any frequency, above 0 dBm presented to the Broadband equipment should be cleared by the factory prior to installation.

4. We recommend pre-staging the equipment to become familiar with the specific hardware and cabling, tooling, and supplies that are needed to complete the installation.

4.1 SITE EVALUATION

Before installing the VIDA Broadband Client, the System Engineer and Installer should plan the site installation. Since higher RF frequencies do not readily pass through trees or buildings, consideration should be given to the following:

- Ensure there are no obstructions (such as buildings or trees) in the radio path between base station and client units.
- Ensure that any future building construction or tree growth will not obstruct the radio path.

- Ensure there is sufficient clearance around the Fresnel Zone so there is minimal interference from obstacles along the radio propagation path.
- Ensure the installation adheres to any local and national building codes and permits.
- Ensure sufficient electrical power is available at the installation site.
- When using directional antennas, align the antenna to maximize the Received Signal Strength Indication (RSSI) from the base station.
- Ensure the area around an omnidirectional antenna is clear (at least 30 inches) so as not to distort the RF pattern.
- Locate the client away from any sources of interference that could degrade the performance of the equipment. Consult the RF Planning Guide, MM-015601-001 for additional information.
- Ensure the base station and clients are within each other's maximum RF coverage range.
- Ensure maximum standard CAT-5 cable length connecting the client to the Ethernet LAN is 100 meters (328 ft.) and maximum antenna cable length is five (5) feet.

4.2 ELECTRICAL POWER

The input voltage source required depends on the model being installed. For example, clients use either 11 to 30 Vdc or 16 to 26 Vac. An AC powered base station requires 120 Vac, 50-60 Hz, and DC powered base stations and the MultiLink station require 21 to 27 Vdc.

Careful consideration should be given regarding the voltage drop across the selected power cabling to maintain the input power requirements. If a backup power source is desired, it must be provided by an external backup power source.



Stations using Fiber optic cables use a DC input power source only. **DO NOT** apply an AC power source to these stations.

DC Power Source Options

We recommend using power supplies that are FCC Part 15 Class A or B compliant. Using power supplies that are not compliant could be in violation of FCC Regulations. It is the installer's responsibility to ensure the installation meets FCC Regulations.

4.3 SITE GROUNDING

Installers should review the recommended grounding procedures in the Tyco Electronics *Site Grounding and Lightning Protection Guidelines Manual, AE/LZT 123 4618/1* and ensure a suitable ground is installed between the station ground lug and earth ground. Grounding must also be in compliance with any local and national electrical codes.

4.4 SURGE PROTECTION

When installing a VIDA Broadband Base Station, MultiLink Station, or Subscriber Station you should always install external surge protectors to protect the system components from lightning or transient damage. Table 4-1 lists surge protectors that have been tested in VIDA Broadband systems and are available from Tyco Electronics. Detailed specifications for these devices can be found in Appendix C.1.

Table 4-1: Surge Protection Options

Part Number	Description
PT-016508-001	RF Port Surge Protector, Coax, Type N, 4.9 GHz.
PT-016508-002	GPS Port Surge Protector, Coax, TNC.
PT-016508-003	Cat5e, RJ-45, Data Port Surge Protector.
PT-016508-004	Surge Protector, DC, Wire, 27 Vdc
PT-016508-005	Surge Protector, DC, Wire, 54 Vdc
PT-016508-006	Surge Protector, AC/DC, Wire, 24 Vac/ 30 Vdc
PT-016508-007	Surge Protector, Coax, BNC, CCTV, and PTZ Data
PT-016508-008	Surge Protector, Coax, BNC, CCTV
PT-016508-009	Surge Protector, AC, wire, 120 Vac

4.5 ANTENNA SELECTION

The VIDA Broadband Base Station, MultiLink Stations, and Subscriber Stations allow users to choose from variety of antenna types and installation configurations.

4.5.1 Antenna Requirements

There are several basic “types” of antennas. Each type has certain advantages and disadvantages for particular applications in microwave and broadband wireless networks. Antennas and any associated cabling which connects the antenna to the Broadband equipment comprise an “Antenna System.” In this Antenna System all cable loss is subtracted from the antenna gain, the result being the Effective Antenna System gain. Generally, the antenna system used with a VIDA Broadband device must meet the following requirements:

Omnidirectional Antenna: Vertical or Horizontal Polarization
9 dBi Effective Maximum System Gain

Directional Antenna: Linear Vertical or Horizontal
26 dBi Effective Maximum System Gain

VIDA Broadband equipment is designed to use directional antennas with an antenna system gain up to 26 dBi in a point-to-point or point-to-multipoint configuration.



NOTE

In 5 MHz applications, the Transmitter Output Power must be reduced if the Effective Antenna System Gain is greater than 26 dBi. The power reduction needs to be at least equal to or greater than the amount the antenna system gain exceeds 26 dBi.

In 10 MHz applications, customers may use an Effective Maximum Antenna System Gain up to 29 dBi before a power reduction is required. This is because of the Broadband equipment's self imposed 27 dBm maximum power; versus a permitted power of 30 dBm.

4.5.2 Antenna Types

The following paragraphs describe the different types of antennas that can be used with VIDA Broadband devices. Table 4-2 contains a list of approved antennas. More detailed descriptions of the antennas can be found in Appendix C.1.7.

Omnidirectional Antennas

An omnidirectional antenna is a vertical antenna. A vertical antenna's radiation pattern or signal radiates in all directions, losing power as the distance increases. Their radiation patterns are weaker directly above or below the vertical plane. An omnidirectional antenna also picks up signals from all directions.

Grid Parabolic Antennas

The Grid parabolic antenna is a directional antenna that greatly reduces wind loading on a tower or other mounting structures. Grid antennas have a lower front-to-back ratio than solid parabolic antennas. They are also limited to a single polarization. They are ideal in applications where the best performance is not required and tower and wind loading are the main concern.

Standard Parabolic Antennas

Standard parabolic antennas consist of a parabolic shaped reflector spun from a sheet of aluminum. The parabolic shape focuses energy at the feed point of the antenna. The parabolic antennas have a narrow focused beam of energy and relatively high gain compared to many other types of antennas. These antennas will have a mounting system to attach the antenna to a pipe or tower leg.

High Performance Antennas

High Performance antennas are formed of aluminum, which is spun to precise tolerances. Then a shroud is also fabricated of aluminum and fitted with a planar radome to protect the feed and provide for a significant reduction in side lobes. Often manufacturers will use absorber material to improve the pattern performance of the side lobes and front-to-back ratio.

Sector Antennas

Sector antennas are designed to provide segmented RF coverage over a selected (sector) area; sector antennas deliver a wider beamwidth than point-to-point parabolic antennas. Antenna configurations can consist of flat panel micro strip and slot radiating designs, as well as traditional parabolic configurations. Some common horizontal beamwidths used include 60, 90, 120, and 180 degrees.

Flat Panel Antennas

Flat panel antennas are designed for point-to-point and point-to-multi point applications. Typically, flat panel antennas are designed to be lightweight, easy to install, aligned and durable for years of reliable service. These antennas are ideal for concealment in many architectural environments. In addition to pole mounting, the approved panel antenna can be mounted directly to the VIDA Broadband base station, MultiLink station, or client.

Table 4-2: Antenna Options

Part Number	Description
AN-013386-001	Antenna, Dish, 2 ft, 26.6 dBi, Type N Connector
AN-013386-002	Antenna, 90 degree Sector Panel, 16 dBi, Vertical polarization, Type N Connector
AN-013386-003	Antenna, Sector, 90 degree, 16 dBi, Horizontal, Type N Connector
AN-013386-004	Antenna, 60 degree Sector Panel, 17 dBi, Vertical polarization, Type N Connector
AN-013386-005	Antenna, Sector, 60 degree, 17 dBi, Horizontal, Type N Connector
AN-013386-006	Antenna, Grid, 2 ft, 26.4 dBi, Type N Connector
AN-013386-007	Antenna, Dish, 1 ft, 21.2 dBi, Type N Connector
AN-013386-008	Antenna, 10.5 degree Sector Panel, 1 ft, 18.8 dBi, Type N Connector
AN-013386-009	Antenna, Omnidirectional, 8 dBi, 16 degree, Type N Connector
AN-013386-010	Antenna, Dish, 2 ft, 6 degree, 27.7 dBi, Type N Connector
AN-013386-011	Antenna, Omnidirectional, Vertical polarization, 18 degree, 5.5 dBi, Type N Connector
AN-013386-012	Antenna, Omnidirectional, 8 degree, 9 dBi, Type N Connector
AN-013386-013	Antenna, Panel, 9 degree, 15 x 13 in., 20 dBi, Type N Connector
AN-013386-014	Antenna, 4.9 -5.85 GHz, 12 dBi, 180 Degree Sector Panel with type N Connector.
AN-013386-015	Antenna, 4.94-4.99 GHz, 15 dBi, 120 Degree Sector Panel with type N Connector.

4.6 INSTALLATION EXAMPLES

The following sections contain examples of various installations. These include:

4.6.1 Sample Base Station Installation

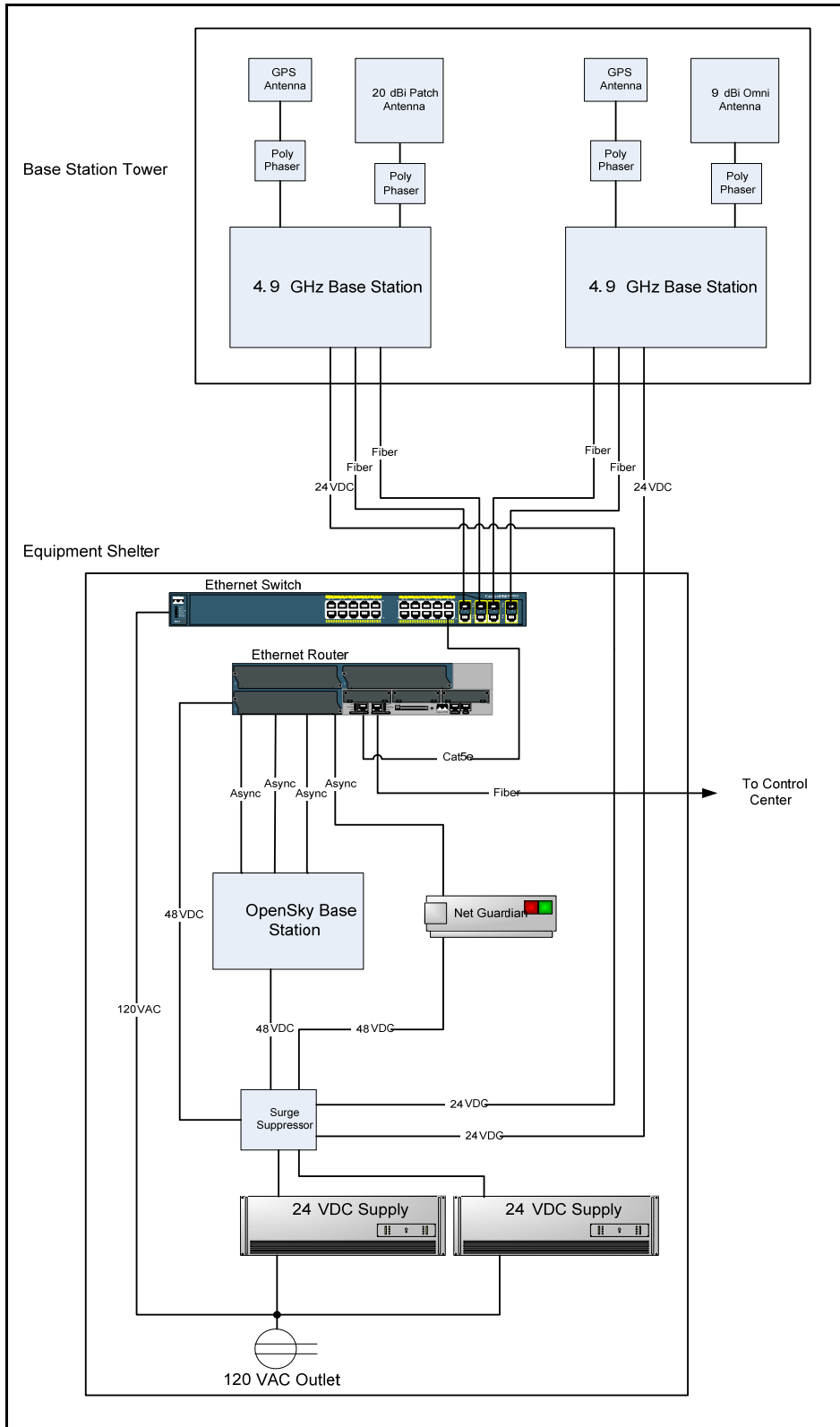


Figure 4-1: Sample Fiber Base Station Installation

4.6.2 Sample Subscriber Station Installation

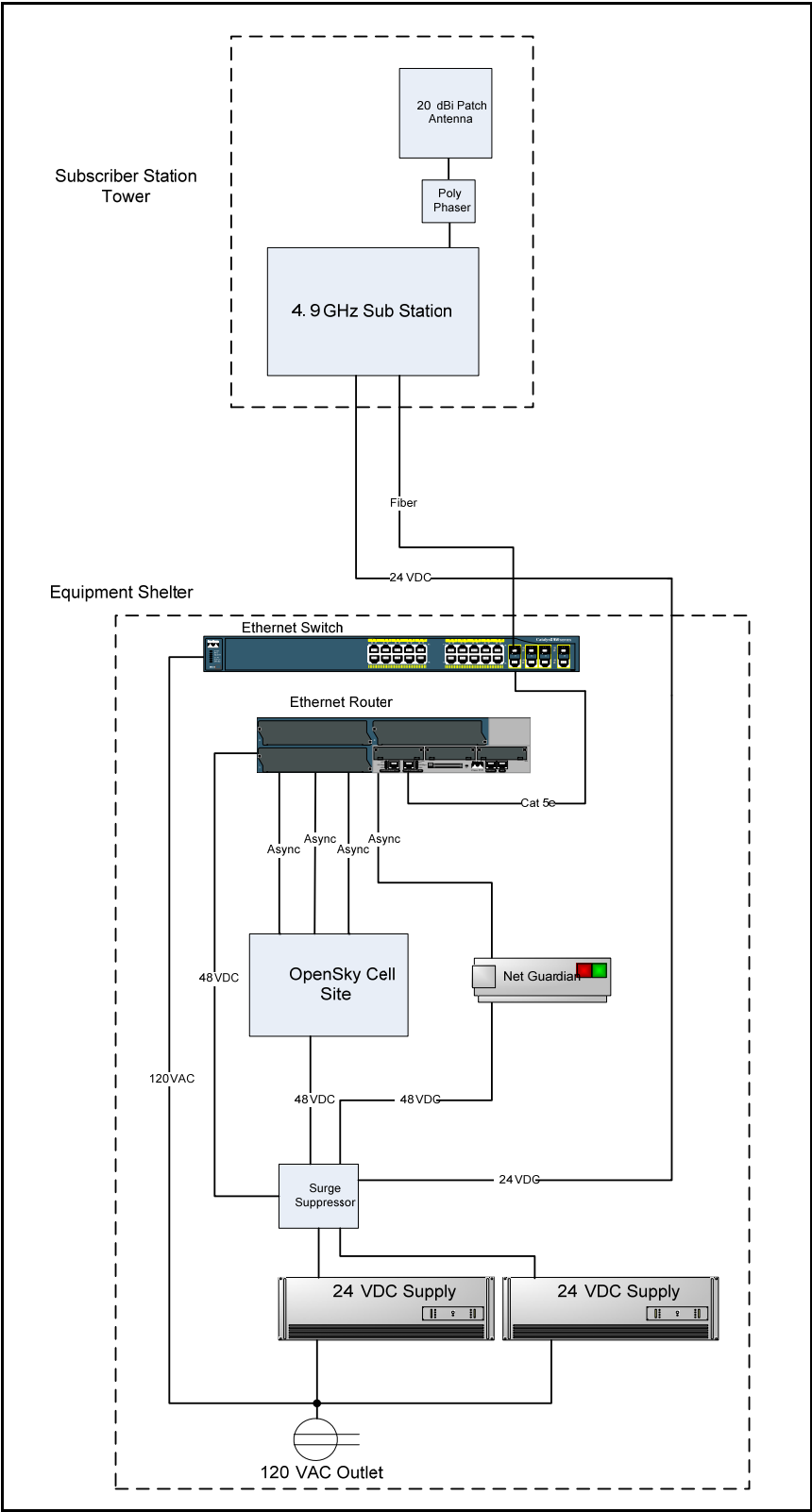


Figure 4-2: Sample Fiber Subscriber Station Installation

5. PRE-STAGING EQUIPMENT

5.1 BASE STATION CONFIGURATION

The base station is designed to acquire an IP address in one of the following ways:

- **Default**

The base station has a default IP address of 10.0.49.1. This address can be used to access the base station as long as it has not been assigned an IP address via DHCP.



NOTE

Once the base station has been given an IP address via DHCP, the default address is no longer valid.

- **Static**

The base station can be configured to use a static IP address. The base station has a default static IP address of 192.168.11.3. When the base station is running in static IP mode, both the default IP address of 10.0.49.1 and the user assigned static IP address can be used to access the base station.

- **DHCP**

If the base station is configured for DHCP, it will always request an IP address via DHCP on boot up. If a DHCP server responds to the request, the base station will continue to use the assigned IP address until it is rebooted. If the base station does not receive an IP address via DHCP, due to no DHCP server or a connectivity problem, it will use its last known IP address until it is rebooted. This address is stored on the base station and will not change unless the base station is assigned a new IP address via DHCP on a subsequent boot up or the base station is configured to use a static address. If DHCP fails, both the last known IP address and the default IP address, which may be different, can be used to access the base station.

When setting up a new BS, and before deploying it into the field, we recommend pre-configuring the BS with the IP address that it will use in the field.

- If the BS will be using a static IP address, manually assign the IP address before installing the BS in the field.
- If the BS will be using DHCP in the field, connect the BS to a DHCP server that contains the actual IP address information that the BS will use in the field.

When the BS boots up for the first time, it will be connected to the DHCP server directly and will have the ability to acquire an IP address from the DHCP server. The BS will then store the address as the last known IP address. This way, if no DHCP server exists in the field's network, or if there is a connectivity problem with the BS in the field before a DHCP server is found, access to the BS will still be possible through the last known IP address given to the BS.

5.1.1 BS Configuration

To configure the BS with transmission parameters such as RF Attenuation and RF Channel/Frequency, a configuration script is used. This script is called **bs_config** and can be found in the **/ixa/wimax** directory in the base station.



The script takes time between configuration steps. After typing Enter, wait for the prompt to come back before typing Enter again. If you do not wait for the prompt to return you may cause the script to fail.

Step 1. Telnet into the BS

```
telnet -l root <BS IP Address>
```

```
password: tyco
```

Step 2. Execute Script

The telnet session will start you in the **/ixa/wimax/** directory. From this directory execute the script:

```
./bs_config
```

The following output will appear:

```
--- Base station file configuration program ---

Mounting flash file systems
Please be patient, this may take several minutes...

Options:
1 - Keep current configuration. Copy the old files
2 - Manually re-configure the base station.
3 - Manually re-configure the base station with advanced options.

Choose Option 3.
```

Each step in the script will first show the current value of the setting. The script will then wait for you to either type in a new value followed by the **Enter** key, or just press the **Enter** key to accept the current value.

Step 3. Assign a Channel/Frequency

When prompted, enter the RF frequency that will be used by the BS. Refer to Table 5-1 for channel/frequency options (5 MHz offset 2500 kHz, 10 MHz offset 5000 kHz):

```
Enter channel in kHz, (range 4900000 - 500000):
```


Table 5-1: Available Frequencies

5 MHz Frequencies	10 MHz Frequencies
4902500	4905000
4907500	
4912500	4915000
4917500	
4922500	4925000
4927500	
4932500	4935000
4937500	
4942500	4945000
4947500	
4952500	4955000
4957500	
4962500	4965000
4967500	
4972500	4975000
4977500	
4982500	4985000
4987500	



NOTE

Frequencies highlighted in gray are only available on 10 MHz products.

Step 4. Set the RF Attenuation

When prompted, enter the RF attenuation to be used by the BS.

For instance, a setting of RF_ATTENUATION = 5 will result in max power, or a BS TX power of 26 dBm. Increasing the RF_ATTENUATION value will result in decreasing the actual BS TX output power. Table 5-2 lists the approximate BS TX output power for the assigned values.

Enter RF ATTENUATION in dB (decimal, range 0 - 31):

Table 5-2: RF Attenuation vs. TX Power

RF_ATTENUATION (Decimal Value)	BS TX Power (dBm)
5	26
6	25
7	24
8	23
9	22
10	21
...	...
31	0

Step 5. Set the GPS Synchronization Value

The GPS synchronization value is a configuration parameter used to synchronize collocated base stations and subscriber stations in order to avoid self interference. This parameter synchronizes the downlink (DL) and uplink (UL) frames from the two base stations. Specifically, the network is configured so the frames between BS1 and BS2 are out of phase. That is, when BS1 is in the downlink mode, BS2 is in uplink mode and the reverse when modes are switched. Thus, when SS2 is receiving the downlink signal from BS1, the collocated BS2 is in uplink mode and is listening to data sent by its subscribers. In the other half of the frame, SS2 is in uplink mode and is transmitting at the same time as BS2. With this coordination, no special isolation is required between the antenna for SS2 and BS2. Two omnidirectional antennas can be used without having any interference issues. When a link is repeated through more than two hops, the phase of the frame at each subsequent hop is flipped (that is, the phase of the third hop BS is the same as the first).

When prompted, enter the synchronization values.

GPS synchronization value:

No Sync: GPS_SYNC = 20040000

TX frame sync: GPS_SYNC = 20040001

RX frame sync: GPS_SYNC = 20040002

Step 6. Set the Channel Bandwidth

Enter the channel bandwidth for the parameter. If using a 5MHz channel, enter 0, if using a 10MHz channel, enter 1.

Bandwidth value, 0 - 5 MHz, 1 - 10MHz:

Step 7. Set the Debug Flag

Press <Enter> and accept the default value for this parameter. This value does not need to be changed unless instructed by the TE support team.

Debug flag, 0 will reboot, 1 will not:

Step 8. Enable Remote Logging

When prompted, enable the syslog option. If syslog is turned on, the BS syslog will be sent to the syslog server.

Enable remote syslog server(1-on,0-off):

Step 9. Identify the Remote Logging Server

If Remote Logging is enabled, you need to enter the IP address of the syslog server. The BS syslog will be sent here.

IP address of a remote host syslog daemon will log to (if enabled):

Step 10. Enable BSCP Trace

This is for BS debugging and should not be modified from the default value unless instructed by the TE support team.

Step 11. BSCP Trace Output

This is for BS debugging and should not be modified from the default value unless instructed by the TE support team.

Step 12. BSCP Trace File Name

This is for BS debugging and should not be modified from the default value unless instructed by the TE support team.

Step 13. BSCP Trace IP Address

This is for BS debugging and should not be modified from the default value unless instructed by the TE support team.

Step 14. BSCP Trace Port

This is for BS debugging and should not be modified from the default value unless instructed by the TE support team.

Step 15. Enable All BSCP Traces

This is for BS debugging and should not be modified from the default value unless instructed by the TE support team.

Step 16. Mcapp Trace Level

This is for BS debugging and should not be modified from the default value unless instructed by the TE support team.

Step 17. Enter the SNMP Community Name

This is the SNMP community name used to talk to the UAS. This name must match the name defined in the UAS configuration. Unless you have specific SNMP requirements, leave the community name as “public.”

Enter community name:

Step 18. Enter SNMP Network Address

This is the SNMP network used to talk to the UAS. This network must match the network that the UAS resides in. If the IP address of the UAS changes, this network address needs to be modified to match the change.

Enter SNMP network addr/size:

Step 19. Enter the SNMP Network Name

This is the SNMP name used to talk to the UAS. This name must match the name defined in the UAS. Unless you have specific SNMP requirements, leave the community name as the default.

Enter network name:

Step 20. Enter the SNMP Trap Community Name

This is the SNMP trap community name. This is used by SNMP trap monitoring applications such as the RNM. Unless you have specific SNMP requirements, leave the community name as “public.”

Enter trap community name:

Step 21. Select the IP Address Mode

When prompted, select the BS IP Address mode. Accept the default value zero (0) if the BS will be using a DHCP assigned IP address. Enter one (1) for the user defined static IP address.

Interface configuration 1 - static IP, 0 - DHCP IP:

Step 22. Set the Static IP Address

When prompted, enter the BS static IP address. If the BS is configured for DHCP, this value will be ignored.

Static IP address (if enabled):

Step 23. Set the Static IP Subnet Mask

When prompted, enter the BS static IP subnet mask. If the BS is configured for DHCP, this value will be ignored.

Static IP subnet mask (if enabled):

Step 24. Set the Default Gateway

When prompted, enter the BS's default gateway. If the BS is configured for DHCP, this value will be ignored.

Default Gateway 1 - enabled, 0 - No Default Gateway:

Step 25. Default Gateway Address

When prompted, enter the BS's default gateway address. If the BS is configured for DHCP, this value will be ignored.

Default Gateway Address:

Step 26. Verify Operation

Any time you run the **bs_config** script, you must restart the base station before the settings will take effect. After the BS reboots, run the **bs_config** script again and make sure your settings are what you expect them to be. When each setting appears, just press the **Enter** key to accept the current value.

5.1.2 Booting the Base Station

The base station will boot from flash memory and acquire an IP address in one of the following ways:

1. Default Address

A BS which has never had an IP Address will default to 10.0.49.1.

2. If the Base station is configured to use DHCP, it submits a DHCP Request:

a. If the BS receives a response:

- The BS will use the DHCP address from this point forward.
- The default address of 10.0.49.1 is no longer valid.

b. If the BS does not receive a response:

- The BS will use the last known assigned address from this point forward.
- The default address of 10.0.49.1 is still valid. Both the last known assigned address and the default address can be used to access the BS.

3. If the Base station is configured to use a static address, it will boot up using the user defined static address.

The default address of 10.0.49.1 is still valid. Both the user defined static address and the default address can be used to access the BS.

Approximate durations from time of Power-up / Reboot:

- Ping works continuously 55 seconds.
- BS access via telnet possible 90 seconds.
- SS registers and traffic flowing 3 ½ - 4 ½ minutes.

5.1.3 IP Address Testing

Before putting the BS in the field, make sure the BS can be accessed with the IP address that is expected. BS connectivity can be tested by connecting both BS network ports to a switch connected to another network device, such as a laptop computer, that can send a ping command to the BS.

ping <BS IP address>

If the BS responds, then this IP address will be stored as the last known address and will be the IP address of the BS until a new IP address is assigned via DHCP or the BS is changed to static IP mode.

If the BS does not respond, refer to Section 5.1.1 and assign an IP address to the BS.

5.2 SUBSCRIBER STATION CONFIGURATION

5.2.1 IP Address Assignment

The subscriber is capable of acquiring an IP address in one of two ways.

- **DHCP**

By default, when the subscriber station boots up it requests an IP address via DHCP. If the request is answered by a DHCP server, the subscriber uses the assigned IP address until it reboots. Whenever a subscriber station reboots, it will request a new IP address via DHCP. If the subscriber does not receive an IP address it will automatically reboot approximately every 30 seconds.

Once the DHCP server has successfully granted an IP address to the subscriber station, the new IP address can be used for communication. However, the subscriber station also has a built-in default IP address of 10.0.0.1. This address can be used to communicate with the SS at any time.

- **Static**

The subscriber can be configured to use a static IP address. When the subscriber is configured to use a static IP address, it no longer requests an IP address via DHCP on boot up. For more information on how to assign the subscriber a static IP address, refer to Section B.16, IP Mode Settings.



NOTE

Any machine that is trying to communicate with the SS via the SS Ethernet port using the 10.0.0.1 address must have an IP address between 10.0.0.2 and 10.0.0.15. Any IP address outside of this range will be ignored.

Any machine trying to communicate across the RF link to the SS, should not use an IP address between 10.0.0.1 and 10.0.0.15. Using an address in this range will allow traffic to flow through the SS, but will not allow direct communication to the SS. For example, video will flow from a camera, through the SS to the BS, but a user on the BS switch will not be able to open the SS webpage.

5.2.2 IP Address Testing

Subscriber connectivity can be tested by connecting the SS network port to a switch connected to another network device, such as a laptop, that can send a ping command to the SS.

```
ping <SS IP address>
```

If the SS responds, then the assigned IP address is valid. If the IP address was assigned via DHCP and the address is the same address that will be used in the field, or the address is static, then it can be used to configure the SS in the future.

If the SS does not respond, refer to Section 5.2.1 to properly assign an IP address to the SS.

5.2.3 Default IP Address

The subscriber is designed to have a default IP address that is always accessible. This address is 10.0.0.1. This address is accessible even if an address has been assigned to the subscriber via DHCP. If accessing the subscriber directly through its Ethernet port, make sure to assign an address between 10.0.0.2 and 10.0.0.15 to the machine being used. Any address outside of this range will be ignored.

5.2.4 Subscriber Station RF Frequency Assignment

We recommend configuring the subscriber station to only look for the RF frequency that it will be communicating with in the field. By only looking for the assigned BS RF frequency, the network registration process will speed up, and multiple BS signal conflicts will be eliminated. It is possible that a subscriber can try to register with a BS if it receives a suitable signal from that BS, even though it does not have permission to register with that particular BS. Assigning only one frequency for the subscriber to look for minimizes this situation. For more information on how to change the subscriber RF frequency, refer to Section B.8, Defining Frequency Channels.

To make sure the subscriber is communicating with the proper BS, open the subscriber Web page and verify the frequency the subscriber is using. This process is explained in more detail in Section B.2.

5.3 NETWORK SERVICES CONFIGURATION

5.3.1 DHCP Configuration

It may be necessary to configure a DHCP server that will grant DHCP addresses to all base stations and subscriber stations in the network. This server can be a stand alone machine or can reside on the BAS and if DHCP is being used by any of the network devices, the server needs to be running at all times. Both the base stations and subscriber stations can be configured to request an IP address on boot up. It is important to note that the DHCP server needs connectivity to both Ethernet ports of the BS. If both ports are not connected to the DHCP server, the SS and the BS may not receive proper IP addresses.

5.3.2 NTP Configuration

Network Time Protocol is available for use by the base station as an option. It is not necessary, and therefore an NTP Server is not necessary unless BS NTP is desired. As with the DHCP server, it is not necessary for the NTP server to be on the same machine as the UAS or the DHCP server.

Instructions for installing and configuring the Network Services can be found in the *VIDA Broadband Network Services Installation and Configuration Manual, MM-014640-001*.

6. INSTALLING A FIXED STATION



NOTE

Become familiar with the hardware and electrical components of the system before attempting installation. Read and follow the installation instructions found in this manual and all other user and installation instructions for associated hardware. If any questions arise that are not answered in this or any other supplied instructions, contact the Tyco Electronics Technical Assistance Center for assistance.

This section provides general information regarding installation of the VIDA Broadband Base Station or Client in fixed station configurations. For best results, the units should be installed by one of the many Tyco Electronics Authorized Service Centers located throughout the United States. Their experienced service personnel can provide a proper radio installation and make any final adjustments that may be needed.

This manual attempts to cover the most common installation requirements for the units. However, variations in sites may require pre-planning to reduce installation time and improve the overall professionalism of the installation. When necessary, pre-stage a site installation to become familiar with specific hardware and cabling requirements, tooling, and supplies that are needed to complete the installation.

The VIDA Broadband Base Stations, MultiLink Stations, and Subscriber Stations (Clients) are enclosed in an outdoor enclosure that satisfies IP66 requirements for outdoor environmental conditions. The user can choose different antenna types (omnidirectional or directional) depending on the application.

The units use weatherproof connectors for the power, RJ-45, and Fiber Optic DATA connections. External protection devices for lightning and power surges should be installed in-line with the antenna ports, power ports, and Ethernet connections on all configurations except models with built in protection.

We recommend using a DC power source for all installations where the VIDA Broadband Base Stations or Clients may experience the effects of frequent thunderstorms. Using a DC power source may provide extra isolation from lightning surges that are usually induced through AC power transformers when connected directly to the AC power mains. Also, the DC models offer greater protection through the use of built-in surge protection devices and Fiber Optic connectivity. Always follow all local and national electrical and building codes when installing surge protection devices.



NOTE

Both the RJ-45 and AC/DC power connectors achieve weatherproof properties only when properly mated with approved cabling. The dust cap provided for the RJ-45 Service Port should be installed at all times during normal operation.

6.1 TOOLS AND TEST EQUIPMENT REQUIRED

The following tools and test equipment are recommended for installing and testing the stations:

- Common hand tools, including screwdrivers, wire cutters, pliers, open and box end wrenches, etc.
- Tyco Electronics-AMP Modular Plug Hand Assembly 790163-7 and Die Set 790163-8 (or equivalent).
- Cable tester, Ideal VDV MultiMedia Cable Tester #33-856, or equivalent.
- Digital Voltmeter (DVM), capable of measuring AC and DC voltage.
- Received Signal Strength Indication (RSSI), EA-015564.

6.2 CUSTOMER SUPPLIED MATERIALS

The customer or designated installer must provide the following:

- Cat5e Copper Ethernet cable should not to exceed 100 meters (328 ft.). (Refer to Appendix D for cable descriptions and fabrication instructions.)
- Power Cable, length as required. (Refer to Appendix D for cable descriptions and fabrication instructions.)
- RF coaxial cable (for directional or remotely mounted antenna), i.e. LMR-400 low loss 1/2" Superflex coaxial cable.
- Surge Devices, as required. (Refer to Table 4-1 and Appendix C.1 for approved devices.)
- Antenna. (Refer to Table 4-2 and Appendix C.1.7 for approved antennas.)
- Pole mounting straps, i.e. Band-It[®] bands and buckles.
- Power source.

6.3 MOUNTING THE STATION FOR FIXED OPERATION

The VIDA Broadband Base Stations, MultiLink stations, and subscriber stations (clients) are usually pole mounted. Pole mounting may include mounting the unit onto a horizontally suspended light post or side arm, or a vertical telephone pole, mast pipe, or tower leg. An example of each mounting method is depicted in Figure 6-1 and Figure 6-2.

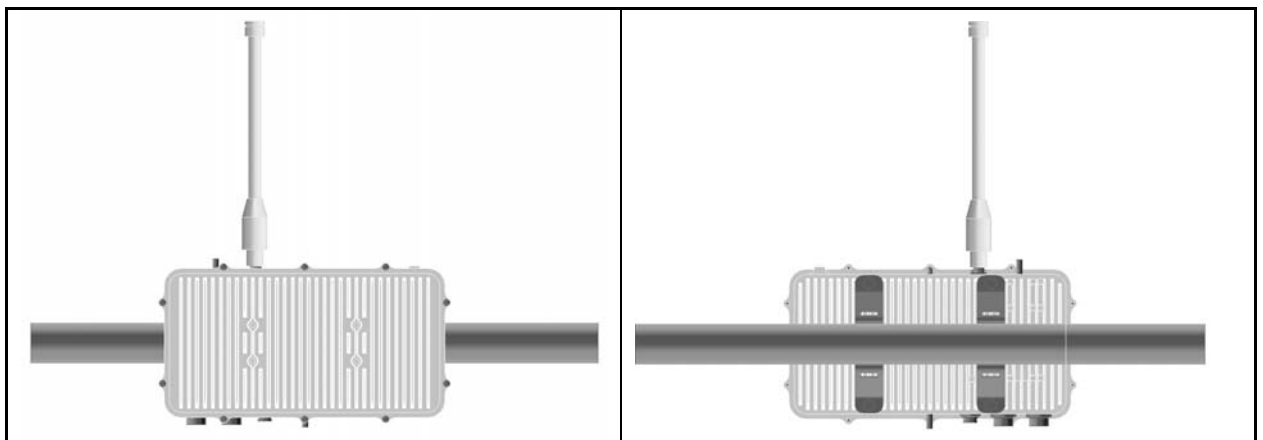


Figure 6-1: Side Bar Mounting Example (VIDA Broadband Base Station shown)

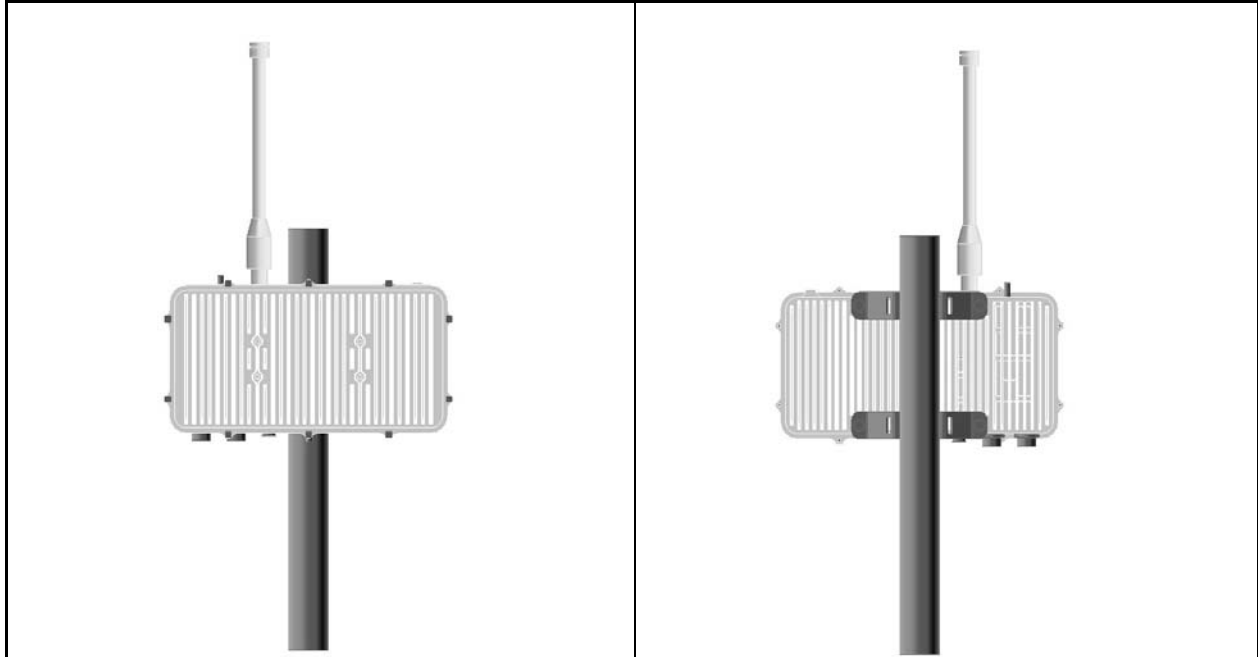


Figure 6-2: Vertical Pole Mounting Example (VIDA Broadband Base Station shown)

Each base station, MultiLink station, or subscriber station package includes two mounting brackets (FM-008586) and necessary hardware for attaching the brackets to the units. The mounting brackets accommodate pole diameters from 2 1/2" to 6" inches. An alternate bracket (FM-015677) is available for mounting units on poles less than 2 1/2" in diameter.

6.3.1 Attaching the Mounting Brackets

1. Install the brackets so when the unit is mounted on a pole, the heat sink fins are vertical. This position provides the best thermal convection (vertical fins) and shields the multiple connectors from rain.

As shown in Figure 6-3, pole-mounting brackets can be installed onto the mounting surface of the base station, MultiLink station, or client such that the units may be mounted horizontally or vertically.



NOTE

It is important to mount the units so their heat sink fins are positioned vertically, as shown in Figure 6-3. This gives the units the best thermal performance, allowing air to move naturally through the fins.

2. Attach mounting brackets to the unit using the flat washer, lock washer, and hex head bolt included with the brackets. (Ensure that the lock washer is closest to the bolt's head followed by the flat washer positioned next to the mounting bracket.)

Mounting the units so the fins are vertical also allows the RF antenna port to be in the best position for attaching an omnidirectional antenna directly to the unit.

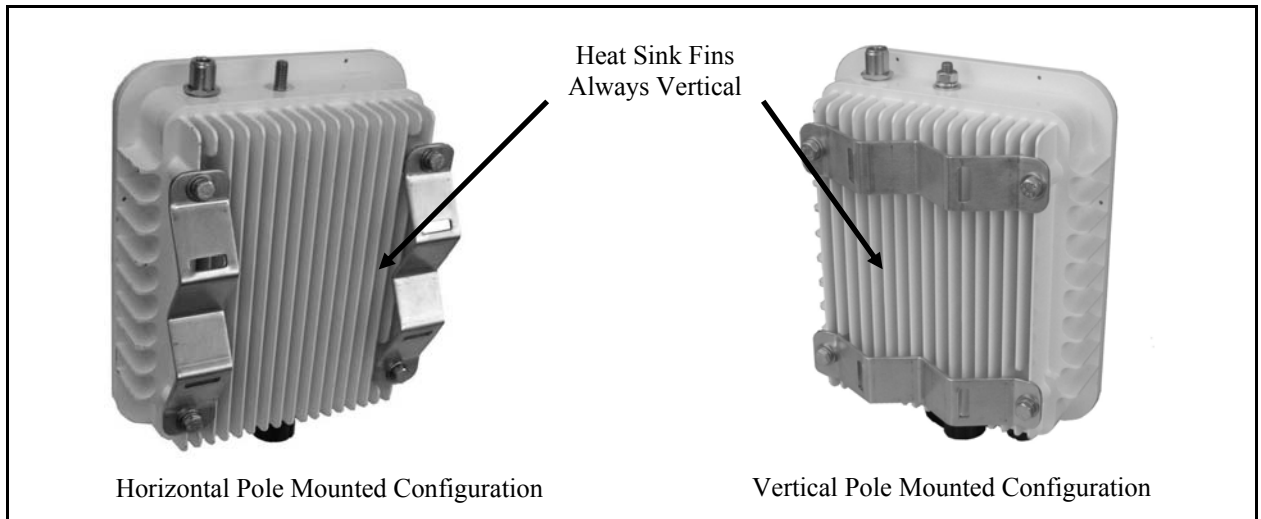


Figure 6-3: Installing Mounting Brackets (VIDA Broadband Client shown)

6.3.2 Attaching the Unit to a Pole

1. Orient the unit on the pole so the fins are vertical and the antenna port is pointing straight up.



When mounting the unit on a pole, the installer must ensure the mounting bands are secure and resist movement or rotation.

2. Strap the unit to pole using Band-It bands and buckles (not supplied). Follow the manufacturer's guidelines for proper band installation techniques.
3. After installation, check the overall unit for stability and verify that the unit is not loose fitting.

6.3.3 Optional Mounting

Optionally, the VIDA Broadband Base Stations, MultiLink stations, and subscriber stations (clients) can be mounted to a flat surface, such as a wall, using the optional mounting bracket FM-010668 shown in Figure 7-1.

1. Using the mounting bracket as a template, mark and prepare the wall mounting location.



NOTE

The installer must provide screws or bolts and wall anchors for mounting the broadband units to the wall. The hardware size and anchor type depends on the structure of the building. When selecting screw or bolt and anchor sizes, consideration must be given to the weight of the unit and load that may be induced in windy conditions.

2. Attach the bracket to the unit using the hardware provided. The bracket should be oriented so when the unit is mounted on the wall the heat sink fins are vertical.
3. Attach the assembly to the wall using screws or bolts (neither is provided). After installation, check the overall unit for stability and verify the unit assembly is secure.

6.4 CONNECTING SUBSCRIBER STATION POWER

Power is supplied to the Subscriber Station (Client) through a 2-pin connector. A 2-pin #12-16 Socket Multi-Con-X mating connector kit, CN-014934 is supplied with the unit. A pre-made 2/12 AWG Power Cable assembly, CA-014984-XXXXX or CA-014988-XXXXX is available in various lengths. Refer to Appendix D.1 for details.

The High and Low Power Standard models require 11 to 30 Vdc or 16 to 26 Vac. A DC supply is recommended in all applications for cleaner and lower-noise power; however, an AC supply may be used. Connect the supply voltage per the pin out shown in Table 6-1 (DC) or Table 6-2 (AC).

6.4.1 Subscriber Station DC Connections



When making cables for DC connections, pay close attention to polarity and the connector keyway. Reversing polarity will cause serious damage to the unit.

Table 6-1: Client DC Power Connector

Connection	Pin	Power Connector
PWR+ (+11 to +30 Vdc)	1	
PWR- (Return)	2	

6.4.2 Subscriber Station AC Connections



The client models MAVM-VMCHH (BS-010700-003) and MAVM-VMCLH (BS-010700-004) use DC input power. **DO NOT** apply AC power to these units. Failure to observe this warning will result in damage to the equipment.



The AC supply must be isolated from AC mains; the use of an isolating step-down transformer is necessary. The Vac supply must not have a ground path; ground should be supplied through a separate wire to the grounding stud. Failure to observe this warning may result in electrical shock or damage to equipment.

Table 6-2: Client AC Power Connector

Connection	Pin	Client AC Power Connector
HOT (16 to 26 Vac)	1	
Neutral	2	

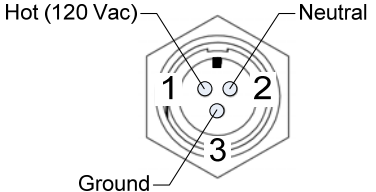
6.5 CONNECTING BASE STATION AND MULTILINK STATION POWER

The MAVM-VMXBA base station uses AC power. All other base stations and the MultiLink stations require DC input power. Power is supplied to the AC powered base station through a three-pin connector. The DC powered units use a two-pin connector.

6.5.1 Base Station AC Connections

The AC powered VIDA Broadband Base Station (MAVM-VMXBA) requires 120-230 Vac, 50-60 Hz power applied to the following contacts. A 3-pin #12-16 Socket Multi-Con-X mating connector kit, CN-014935 is supplied with the unit. A pre-made 3/12 AWG Power Cable assembly, CA-014985-XXXXX is available in various lengths. Refer to Appendix D.1 for details.

Table 6-3: Base Station AC Power Connector

Connection	Pin	Power Connector
Hot (120 \pm 15% Vac 50-60 Hz)	1	
Neutral	2	
Ground	3	

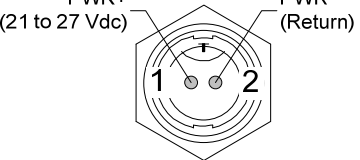
6.5.2 Base Station and MultiLink Station DC Connections

A DC powered VIDA Broadband Base Station requires 24 \pm 3 Vdc applied to the following contacts. A 2-pin #12-16 Socket Multi-Con-X mating connector kit, CN-014934 is supplied with the unit. A pre-made 2/12 AWG Power Cable assembly, CA-014984-XXXXX or CA-014988-XXXXX is available in various lengths. Refer to Appendix D.1 for details.



When making cables for DC connections, pay close attention to polarity and the connector keyway. Reversing polarity will cause serious damage to the unit.

Table 6-4: Base Station and MultiLink Station DC Power Connector

Connection	Pin	Power Connector
PWR+ (+24 \pm 3 Vdc)	1	
Return (PWR-)	2	

6.5.3 Attaching Power Cables



When installing cables, ensure they are not under any stress, a service loop is maintained, and the cables are restrained according to industry best practices.

To connect power:

1. Connect the proper power cable (refer to Appendix D.1 for cable details) to the appropriate power source.
2. Mate the other end of the power cable's connector to the unit's power connector by visually aligning the connector key and firmly push and turn the outer locking ring clockwise until it stops. A click will be sensed to confirm proper mating.
3. For added protection against long-term exposure to weather, seal the connectors using approved industry techniques for sealing the connectors.
4. Install a power cable grounding kits as required. Refer to the *Site Grounding and Lightning Protection Guidelines Manual, AE/LZT 123 4618/1* for additional details on proper grounding techniques.



The cable conveying power to the base station, MultiLink station, or subscriber station(s) should be grounded at the radio and then every 75 feet until terminated at the surge suppressor or power source. The recommended kit for grounding the power cable is Andrew[®] Part Number 223158-2 (Tessco # 493736), as described in Appendix C.3.1. Follow the instructions provided in the kit for proper installation.

6.6 NETWORK/DATA CONNECTIONS

Network connections are made using either a standard Ethernet RJ-45 protocol or Fiber Optic connection. All DATA connectors are industrial grade, rugged, UV rated, weatherproof, dustproof and made for use in extreme electrical and climatic conditions. Each connector meets the IP67 industrial standard for weatherproof and dustproof electrical connections.



When installing cables, ensure they are not under any stress, a service loop is maintained, and the cables are restrained according industry best practices.

To connect the Data cable:

1. Select proper length Ethernet or Fiber Optic cables. Ethernet cables are described in Appendix D.2, and Fiber Optic cables are described in Appendix D.2.5.
2. Connect one end of the cable to the LAN or Fiber Optic network connection.
3. Mate the other end of the Data cable to the station data connector by visually aligning the connector key and firmly push and turn the outer locking ring clockwise until it clicks.

4. Be sure to install a dust cap on any ports not being used.
5. For added protection against long-term exposure to weather, use appropriate industry approved methods to seal the connector.
6. For Cat5e copper Ethernet cables, install a grounding kit within six inches of the unit and then every 75 feet. Refer to the *Site Grounding and Lightning Protection Guidelines Manual, AE/LZT 123 4618/1* for additional details on proper grounding techniques.



NOTE

The base station, MultiLink station, or subscriber station(s) Ethernet cable should be grounded at the radio and then every 75 feet until terminated at the surge suppressor. The recommended kit for grounding the power cable is Andrew[®] Part Number 223158-2 (Tessco # 493736), as described in Appendix C.3.1. Follow the instructions provided in the kit for proper installation.

6.7 GROUNDING STUDS

Mounting studs for grounding are provided the base stations, MultiLink Stations, and clients. For safety purposes, earth ground and lightning protection connections should be made as required by local ordinances and the *Site Grounding and Lightning Protection Guidelines Manual, AE/LZT 123 4618/1*.



CAUTION

On units with two grounding studs, only use one ground stud. This will prevent unwanted ground paths through the unit housing.

6.8 ANTENNA INSTALLATION

There are three basic methods for mounting a fixed station antenna. These methods include the following:

- Connecting the antenna directly to the Antenna Port, typically used with an omnidirectional antenna.
- Mounting the antenna to the base station, MultiLink station, or subscriber station case using built-in mounting holes, typically used for a directional antenna. A short RF cable connects the antenna to the RF Port.
- Remotely mounting the antenna using mounting brackets recommended by the antenna manufacturer and an RF cable connects the antenna to the base station or subscriber.



NOTE

The RF cables connecting the base station, MultiLink station, or subscriber station to the antenna should be kept as short as possible. The cable should be constructed from a high quality heliax cable such as Andrew LDF4-50A or equivalent.

If the distance between the radio equipment and the antenna exceeds 30 feet, use a larger low loss cable such as Andrew LDF5-50A or equivalent.

The 1/2" LDF 4-50A cable offers approximately 5.5 dB of loss per 100 feet and LDF 5-50A cable offers approximately 3.2 dB of loss per 100 feet.

The losses are in addition to any connector losses that may occur.

6.8.1 Mounting an Antenna Directly to the Antenna Port

Certain smaller sized lower gain omnidirectional antennas may be mounted directly to the base station, MultiLink station, or subscriber station RF antenna port. This eliminates the need for an RF transmission line. Attention must be given to the antenna gain, physical size, and wind loading characteristics when choosing the right antenna for direct mounting to the antenna port.

Mounting an Omnidirectional Antenna Directly to the Unit:

An omnidirectional antenna may be mounted vertically directly to the unit using the following procedure:

1. Connect an N-type male to male RF adapter (not included) to the omnidirectional antenna. Hand-tighten the connector.
2. For units without built-in lightning protection, external lightning protection is required to provide maximum protection to the site. Connect the optional lightning suppressor to the antenna assembly as shown in Figure 6-4.

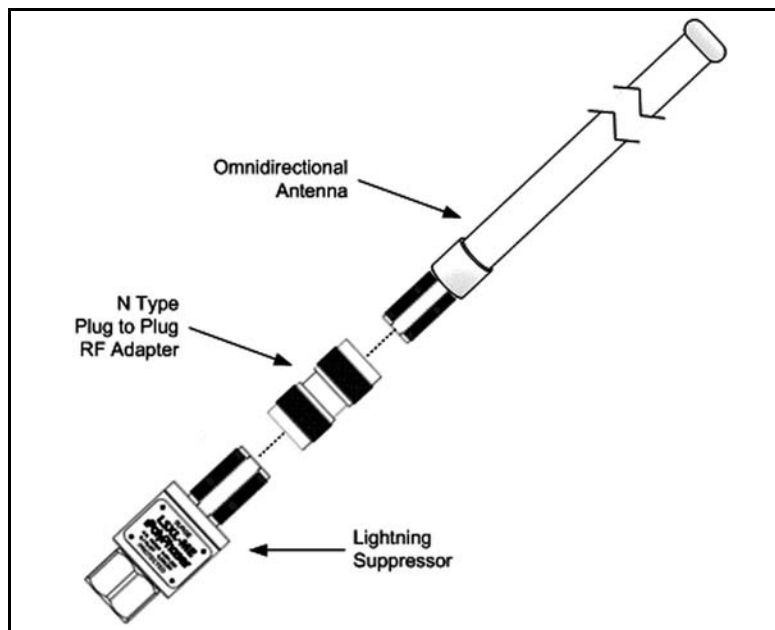


Figure 6-4: VIDA Broadband Client Antenna with External Lightning Protection

3. Connect the completed antenna assembly to the RF antenna connector.

6.8.2 Mounting a Directional Antenna to the Case

A directional antenna can be mounted directly on the unit using the optional universal mounting bracket MNT-2 kit. After the universal mounting bracket is attached, it can be adjusted to point the forward beam pattern of the antenna in the direction needed for network connectivity. (Refer to Section 8.3 for antenna alignment instructions.)

Four mounting holes are provided for mounting an antenna to the front cover housing of the base station, MultiLink station, and subscriber stations. These mounting holes are spaced at a 1.772" x 5.118" (45 mm x 130 mm) rectangular pattern tapped to accept 1/4-20 UNC-2B hardware with a minimum hole depth of 0.31".

A low loss RF cable (not included) is needed to connect between the unit's antenna connector and the directional antenna. The RF cable and connectors must be capable of passing frequencies up to 5.2 GHz with minimal loss.

To install Universal Mounting Bracket:

1. Using the four bolts, lock washers, and flat washers included in the kit, attach the universal antenna mounting bracket, shown in Figure 6-5-A, to the unit as shown in Figure 6-5-B.
2. Attach the antenna panel bracket assembly to the antenna panel, as shown in Figure 6-5-C.
3. Attach the two bracket assemblies together with the universal knuckle, as shown in Figure 6-5-D.
4. Attach a short RF cable between the antenna and the unit's antenna port.

Recommend using LMR-400 Low loss coaxial cable with N Type Male connectors.

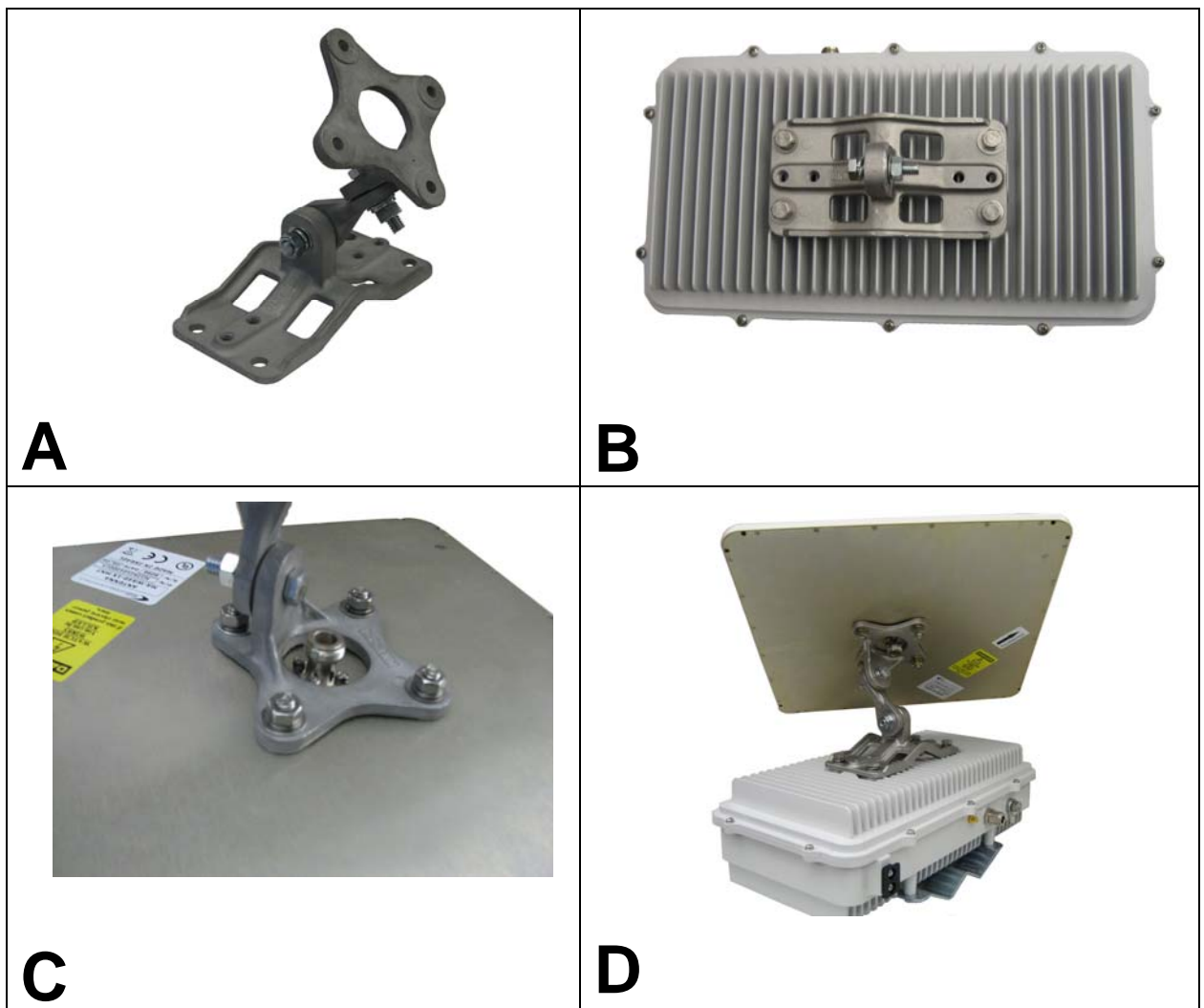


Figure 6-5: Mounting a Directional Antenna to a unit (VIDA Broadband Base Station shown)

6.8.3 Remotely Mounting an Antenna

When installing an antenna remotely, always observe best practices and the antenna manufacturer's recommendations.

6.8.3.1 Mounting an Omnidirectional Antenna on a Pole

The omnidirectional antenna can also be mounted on a pole using the following procedure:

1. Attach mounting bracket to pole using hardware provided with bracket.
2. Remove antenna mounting hardware from antenna base.
3. Insert antenna into mounting bracket and secure with hardware removed in previous step. Do not over tighten.
4. Connect the optional lightning suppressor, if required, to the base station RF antenna port.
5. Connect a short RF cable between the antenna and the base station RF port (or lightning suppressor, if installed in previous step).

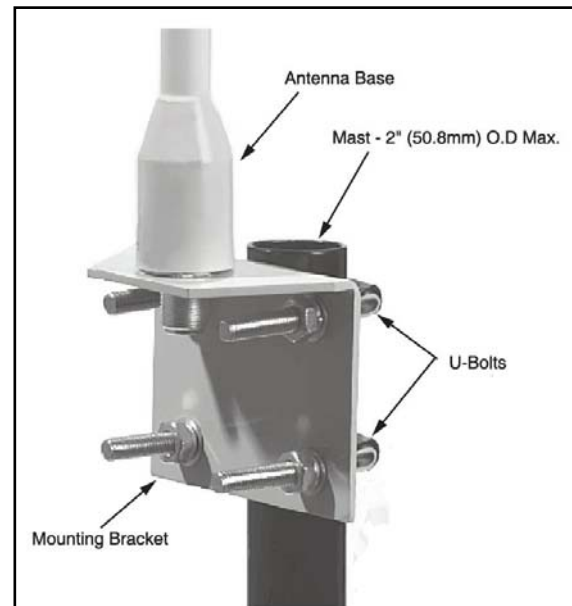


Figure 6-6: Pole Mounted Omni Antenna Example

6.8.3.2 Mounting a Directional Antenna on a Pole

1. Disassemble the universal antenna mounting bracket.
2. Attach the antenna panel bracket assembly to the antenna panel.
3. Attach the mounting section to the pole using an adjustable pipe clamp (part of MNT-2 kit), as shown in Figure 6-7
4. Attach the two bracket assemblies together with the universal knuckle.
5. Connect an RF cable between the antenna and the antenna port. Keep cable as short as possible. Install grounding straps are required.

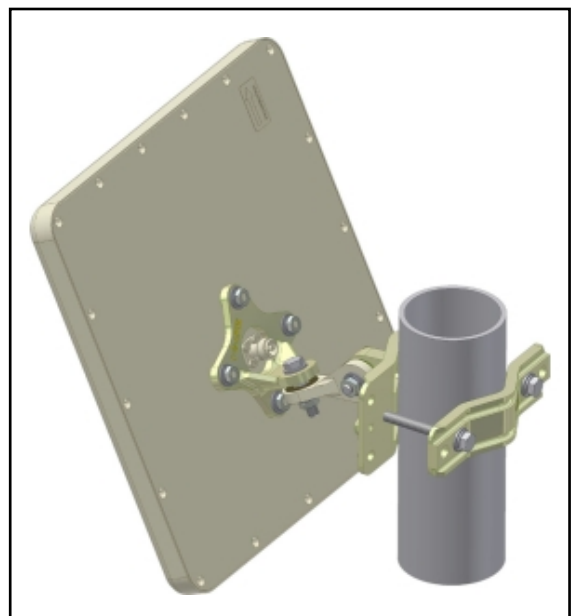


Figure 6-7: Pole Mounted Directional Antenna Example

6.9 GPS ANTENNA INSTALLATION

The base station performs time synchronization through GPS. Although there are many GPS antennas on the market, we recommend the M/A-COM GPS Antenna kit (Part # MAMROS0023). This antenna can be mounted directly onto the base station, or alternatively attached to any surface with an unobstructed view to the sky.

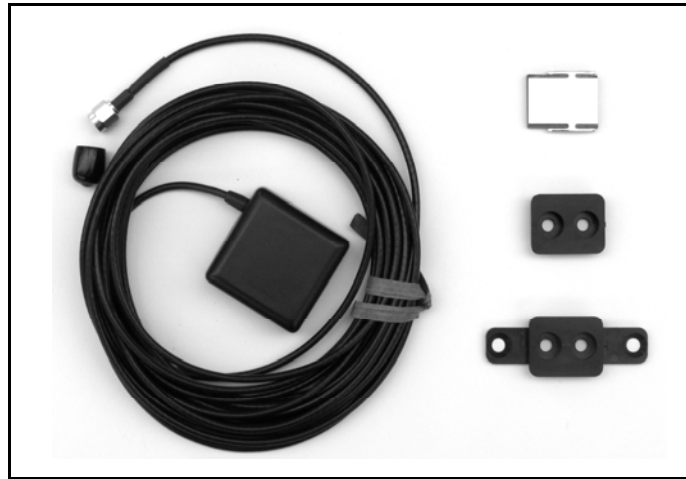


Figure 6-8: MAMROS0023 GPS Antenna Kit

To Install the Optional GPS Antenna

1. Connect the SMA-type plug of the GPS antenna cable to the SMA receptacle on the base station. Hand tighten the connector, this is a temporary connection until the installation is complete.
2. If you are using the optional lightning protection device, install it between the antenna cable and the base station GPS antenna connector.
3. Route the cable/antenna to the GPS antenna mounting location.
4. Install one of the three GPS antenna mounts: show-mount, no-show-mount, or magnetic mount.

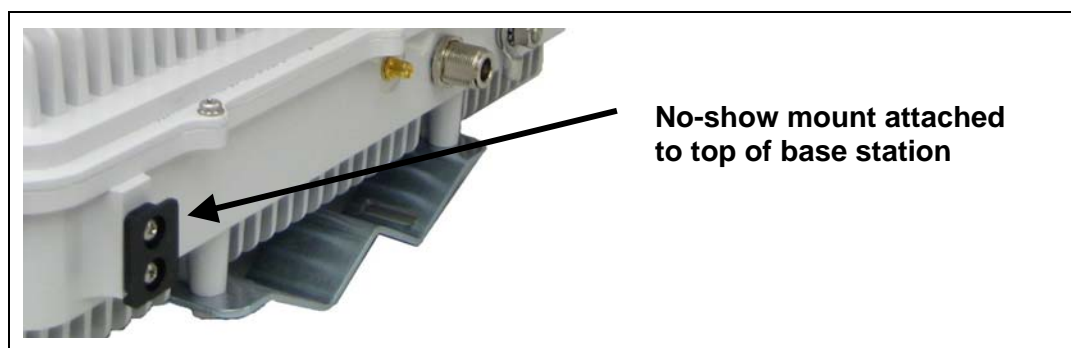


Figure 6-9: GPS Antenna Mounting Example

5. Attach the antenna to the mount.
6. After mounting the antenna, dress and secure the cable and tighten connectors.

7. INSTALLING A NOMADIC CLIENT

This section provides general information regarding installation of the VIDA Broadband Client in nomadic station configurations. For best results, the client should be installed by one of the many Tyco Electronics Authorized Service Centers located throughout the United States. Their experienced service personnel can provide a proper radio installation and make any final adjustments that may be needed.

7.1 PLANNING THE INSTALLATION

Before starting the installation, plan carefully to ensure the installation meets the following requirements:

- Safe for the operator and passengers.
- Away from airbag deployment area.
- Convenient for the operator to use.
- Neat, safe and clean.
- Protected from water damage.
- Easy to service.
- Cable connections are accessible.
- Out of the way of auto mechanics.
- Out of the way of passengers.



Vehicular Electronics - Electronic fuel injection systems, electronic anti-skid braking systems, electronic cruise control systems, etc., are typical of the types of electronic devices which may be prone to malfunction due to the lack of protection from radio frequency energy present when a radio is transmitting. If the vehicle contains such equipment, consult the dealer to determine if such electronic equipment will perform normally when the radio is transmitting.



Air Bags – For driver and passenger safety, avoid mounting the radio above or near airbag deployment areas. Note that vehicles may contain front driver and passenger side airbags as well as side airbags. For occupant safety, verify the location of all airbags before installing radio equipment.



For passenger safety, mount the radio securely so that the unit will not break loose in the event of a collision. This is especially important in station wagons, vans, and similar type installations where a loose radio could be extremely dangerous to the vehicle occupants.

When determining a mounting location for the client and associated peripherals, avoid high traffic environments within the passenger compartment, trunk, or other compartment where feet, tools or other objects may accidentally damage cable connections. The client and other peripherals should be mounted such that connectors and other fragile components face away from high traffic areas, yet accessible for servicing.

Also, careful attention must be given to ventilation and heat dissipation. The client should be mounted with the heat sink fins vertically positioned and ample air space around the unit.

7.1.1 Tools Required

The following tools may be required when installing a client in nomadic applications:

- Crimping tool for fuse holder.
- Electric drill for drilling mounting holes.
- Drills, drill bits, 5/16" nut driver bit and circle cutters.
- Phillips and flat-blade screwdrivers.

7.1.2 Recommended Kits and Accessories

We recommend using the following parts and accessories during installation of the client in a nomadic configuration.

7.1.2.1 Nomadic Mounting Bracket

The nomadic mounting bracket FM-010668 shown in Figure 7-1 installs to the bottom of the client and provides easy installation of the client in a variety of nomadic applications. Attach the bracket to the client using the hardware provided.

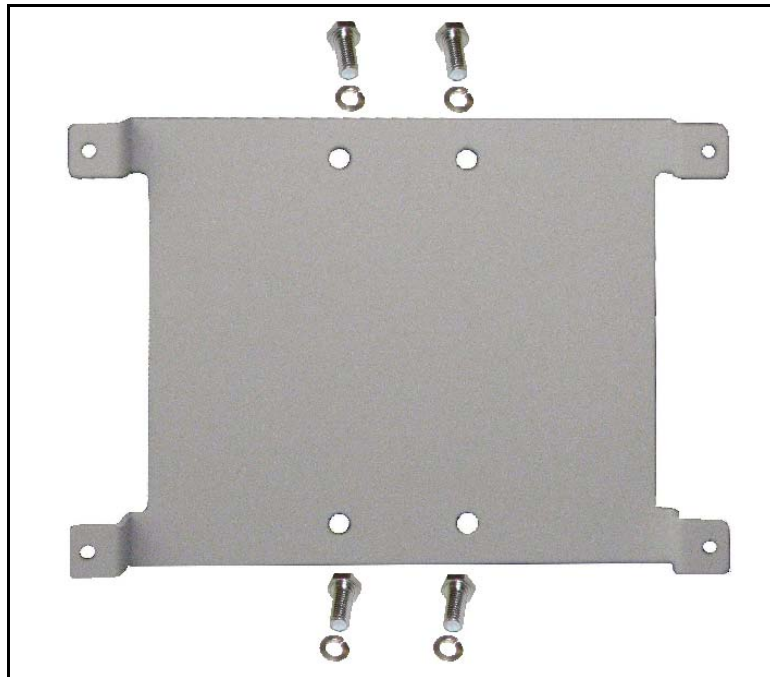


Figure 7-1: Nomadic Mounting Bracket (FM-010668)

7.1.2.2 DC Power Cable Kit



The 4.9 GHz client may be installed **ONLY** in vehicles where the negative battery post is connected to the chassis of the vehicle (NEGATIVE GROUND ONLY).

The Fuse Distribution Rail Kit FS23057 provides the necessary hardware to wire up the Standard client to a vehicle’s power system. This kit provides an ATC style fused common buss lead that is designed to connect to the vehicle’s battery. The fused buss lead provides power to a Fuse Distribution Rail assembly. This assembly may be mounted nearby the client and, if necessary, be expanded to power multiple hardware components.

Table 7-1: Fuse Distribution Rail Kit




Kit Number	Description	Pictorial
<p>FS23057</p>	<p>Kit, Fuse Distribution Rail. Includes:</p> <ul style="list-style-type: none"> (1) Fuse Distribution Rail Assembly (1) In-Line ATC Fuse Holder (1) 15-Amp ATC Fuse (1) 30-Amp ATC Fuse 20 Feet of 10-AWG Red Wire 1 Foot of 10-AWG Black Wire (1) Moisture-Resistant Butt Splice (2) 3/8-Inch Ring Terminals. 	
<p>FS23058</p>	<p>Kit, Fuse Distribution Accessory. Includes:</p> <ul style="list-style-type: none"> (1) Fuse Block (1) Protective Marker (1) Fuse Block Jumper (1) 5-Amp ATC Fuse (1) 15-Amp ATC Fuse 	

7.1.2.3 Nomadic Station Antenna Options

The recommended nomadic antenna model (B) MEFC49005HF (see Table 7-2) is an elevated feed, 5.5 dBi gain antenna. Electrically, the antenna requires no ground plane to meet VSWR performance specifications. However, it may be necessary to use this antenna with a ground plane to meet MPE requirements. Low loss high frequency permanent and magnetic mount cable kits are also available and shown in Table 7-2.

For nomadic subscriber station applications, both permanently installed and magnetic antenna mounts are available. Careful consideration of the type of nomadic installation will help determine which mount is most appropriate for a specific installation.

Table 7-2: Nomadic Antenna and Mounts

Part Number	Description	
AN-013386-011 MAXRAD: MEFC49005HF	Antenna, collinear, elevated feed, 5.5 dBi, no ground plane.	
MAXRAD: MHFML195C	Permanent mount, 17 ft. Cable, TNC male (loose).	
MAXRAD: GMHFML195C	Magnetic Mount, 17 ft. Cable, TNC male (attached).	



Be careful to avoid damaging vital parts (fuel tank, transmission housing, etc.) of the vehicle when drilling mounting holes. Always check to see how far the mounting screws will extend below the mounting surface before installing.



If pilot holes must be drilled, remove all metal shavings from drilling holes before installing screws.

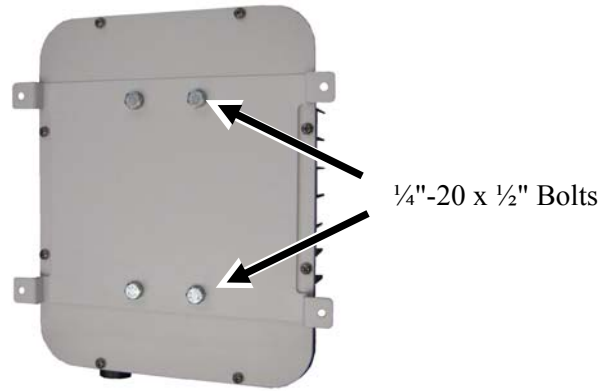
7.2 INSTALLING THE NOMADIC CLIENT

Refer to Section 7.1 when choosing a mounting location for the client and other peripherals. Re-check the locations for brake lines, gas tanks, batteries, or other objects located behind the locations where holes will be drilled or screws installed.

1. Install the nomadic mounting bracket to the bottom of the client using four (4) ¼" - 20 x ½" hex head bolts and lock washers.
2. Place the client into the desired mounting location in the vehicle.
3. Secure the client by one of the following methods:

Use four No. 10 x ¾" self-tapping screws supplied (alternately, use No. 10 x 1-1/2 if needed.); or,

Use the client as a template to mark locations and pre-drill pilot holes. Install using appropriate hardware.



7.3 POWER AND DATA CABLE INSTALLATION

To assure the feasibility of planned cable routing, it is suggested to run the cables before mounting the client. Other associated hardware options such as cameras, nomadic terminals, etc. should be considered when planning cabling. Also, the client may be installed only in vehicles with **Negative Ground** chassis.

Be sure to leave slack in each cable so the radio may be pulled out for servicing. Coil any surplus cables and secure them out of the way. Try to route the cables away from locations where they will be exposed to heat (exhaust pipes, mufflers, tailpipes, etc.), battery acid, sharp edges or mechanical damage or where they will be a nuisance or hazard to automobile mechanics, the driver, or passengers. Keep wiring away from electronic computer modules, other electronic modules, and ignition circuits to help prevent interference between these components and radio equipment.

In addition, try to use existing holes in the firewall, trunk wall and the channels above or beneath doors. Channels through door and window columns that are convenient for running cables may also be used when practical. Again, protect cable runs from accidental damage by avoiding sharp edges and unprotected cable access holes.

7.3.1 Installing the Main Power Cable

Power is supplied to the client through a two-pin Conxall Multi-Con-X connector. The mating connector, part number CN-014934 is supplied with the unit. In nomadic applications, the High and Low Power Standard client will operate from 11 to 30 Vdc, negative ground only. Pre-wire the DC power cable per the following instructions.

7.3.1.1 Install Main Fuse Holder and 10-AWG Red Wire

The main power fuse, its holder, and related items are included in Fuse Distribution Rail Kit FS23057 illustrated in Table 7-1. Follow the procedure in this section to wire fused main power from the vehicle's battery to the location of the radio and the Fuse Distribution Rail Assembly in the vehicle's trunk. The Fuse Distribution Rail Assembly is installed during the subsequent procedure (Section 7.3.1.2).



DO NOT install the fuse holder or the red wire near the engine, transmission or exhaust system. Excessive engine heat can cause permanent damage to these components and can lead to intermittent electrical connection to the battery.



The 4.9 GHz client may be installed **ONLY** in vehicles where the negative battery post is connected to the chassis of the vehicle (**NEGATIVE GROUND ONLY**).



A fuse must not be installed in the main fuse holder until all wiring is complete. This will prevent the unit from powering up prematurely and/or causing an in-rush of current that could lead to shorting of the battery, sparks, or even fire.



Before making connections to the battery's positive post, carefully disconnect the battery's negative (ground) cable. This will prevent tools or other metallic objects which come in contact with the battery's positive terminal from shorting to vehicle chassis ground, causing sparks or even a fire or an explosion! When disconnecting the negative cable, cover/insulate the positive post if it is not already so a tool cannot short between the posts.

1. Strip one of the ATC Fuse Holder's wires and crimp a 3/8-inch ring terminal to it. Both items are included in the Fuse Distribution Rail Kit.
2. Verify the fuse is **NOT** in the Fuse Holder.
3. Connect the ring terminal directly to the battery's positive post (or if present, to a stud on the vehicle's main/non-switched power distribution terminal block).

4. Strip the fuse holder's other wire, strip one end of the 20-foot long 10-AWG red wire, and then connect these two wires together using a 10-AWG moisture-resistant butt splice. The red wire and the butt splice for this connection are included in the Fuse Distribution Rail Kit.



CAUTION

Plan the routing of the 10-AWG red wire carefully, using an existing access hole in the vehicle's firewall if possible. Alternately, drill a new hole approximately 3/8-inch in diameter and install a small rubber grommet to protect the wire from chafing on the hole's sharp metal edge.

To prevent fumes and moisture from entering the passenger compartment, this hole/grommet/wire combination must also be sealed with a silicon-based sealer before completing the installation.

5. Route the other (load) end of the 20-foot long red wire through a wire-loom then through the grommet in the firewall. This load end of the red wire will later be connected to a Fuse Block clipped on the Fuse Distribution Rail Assembly (both parts of the Fuse Distribution Rail Kit). The Fuse Distribution Rail Assembly will be located near the radio in the trunk.
6. Continue routing the 20-foot red wire through channels in the vehicle to the location of the client. Remove interior panels, door kick panels, etc. Protect the wire from possible chafing where necessary.

7.3.1.2 Assemble and Install Fuse Distribution Rail Assembly

The Fuse Distribution Rail Assembly must be completely assembled and installed in the vicinity near the client. This rail assembly, included in Fuse Distribution Rail Kit FS23057, comes preassembled with only one (1) Fuse Block on the rail.

The Fuse Distribution Rail Assembly has a DIN-type rail allowing additional Fuse Blocks to be added if fuse expansion is necessary in the future, such as for multiple radio installations. The rail may be cut to decrease its length if necessary, but enough room for additional future expansion should be considered first. Install the rail in accordance with the following procedure:

1. Mount the Fuse Distribution Rail Assembly near the client's mounting location, but where casual contact is not likely. Use self-threading screws (not supplied) and any available mounting slots in the DIN rail to mount the block.
2. Strip one end of the 10-AWG black wire (included with the Fuse Distribution Rail Kit) and crimp a 3/8-inch ring terminal to it.
3. Near the Fuse Distribution Rail Assembly, locate an area of vehicle chassis ground within approximately six (6) inches of the assembly and strip the area of any paint or dirt to expose a bare metal surface.
4. Drill a hole as necessary and connect the ring terminal to chassis ground. Use a self-threading screw or other appropriate hardware to ensure a reliable metal-to-metal contact. Tighten securely.
5. Cut the black wire to a length long enough to reach a green-yellow Grounding Block on the Fuse Distribution Rail Assembly, plus length for a service loop. Strip the end to prepare it to connect to a Grounding Block.

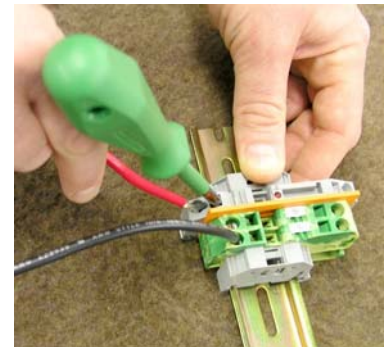
6. The Fuse Distribution Rail Assembly has two green-yellow Grounding Blocks. Each Grounding Block has two wire-clamps with associated wire-clamp release slots. As shown in the photo at the right, insert a #1 or #2 flat-blade screwdriver completely into one of the wire-clamp release slots. Insert the screwdriver until it is captured in a vertical position as shown in the photo in the next step.



7. Insert the stripped end of the black wire fully into the wire-clamp beside the screwdriver, and then remove the screwdriver to lock the wire in the clamp. The adjacent Grounding Block is electrically connected together, so this black wire grounds both blocks.



8. Prepare to connect the 10-AWG red wire from the Fuse Holder at the vehicle battery to the Fuse Block of the DIN rail assembly by cutting off the excess length and stripping the end. Leave enough wire length for a service loop.
9. As shown in the photo at the right, connect the 10-AWG red wire to the Fuse Block's supply-side wire-clamp.



7.3.1.3 Installing the DC Power Cable to the Client

1. Prepare a short 12 to 14 AWG red and black wire (not supplied) to run between the fuse block and the client's DC power connection.
2. Assemble the mating connector, part number CN-014934 (supplied) as directed in the following steps and shown in Figure 7-2.
 - a. Install a Conxall pin on one end of the red wire. Install the red wire into Pin 1 of the Conxall connector.
 - c. Install a Conxall pin on one end of the black wire. Install the black wire into Pin 2 of the Conxall connector.
 - d. Assemble the shell and strain relief to the connector body.

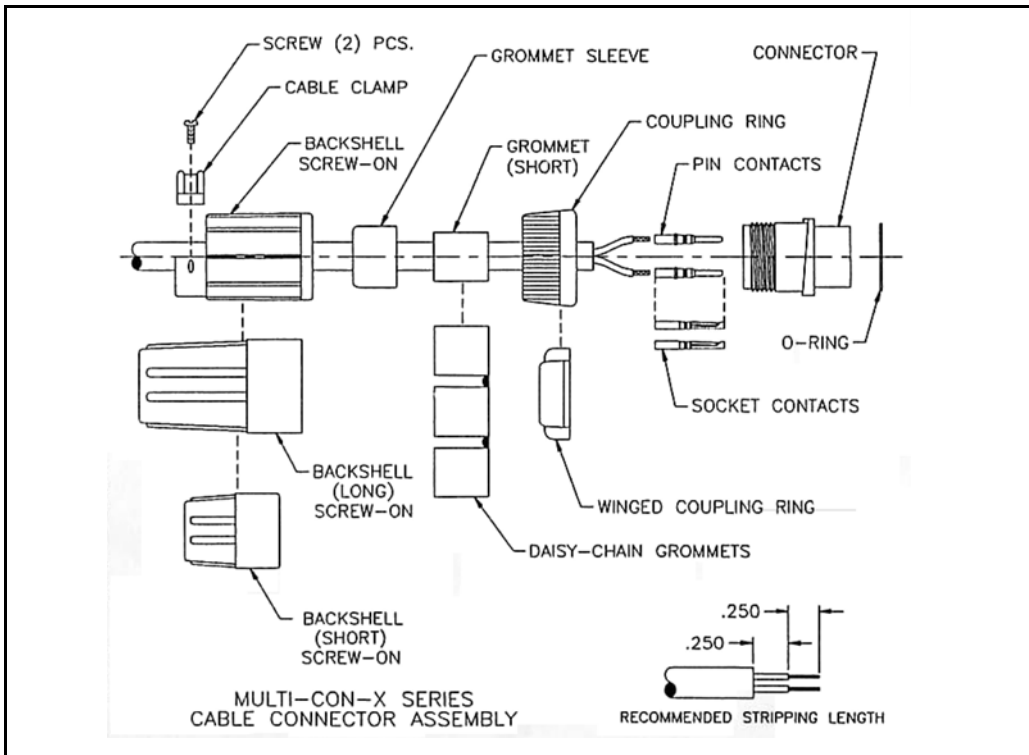
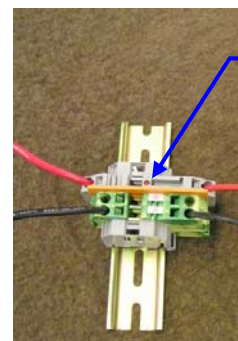


Figure 7-2: Assembling DC Power Connector

3. Mate the assembled connector to the client's 2-pin power connector by visually aligning the key and firmly push and turn the outer locking ring clockwise until it stops. A click will be sensed to confirm proper mating.
4. Prepare the client DC cable by cutting excess length from both wires and stripping the ends. Leave enough wire length for service loops.
5. Connect the red wire to the wire-clamp on the Fuse Block's load-side wire-clamp.
6. Connect the black wire to the wire-clamps on the Grounding Block.



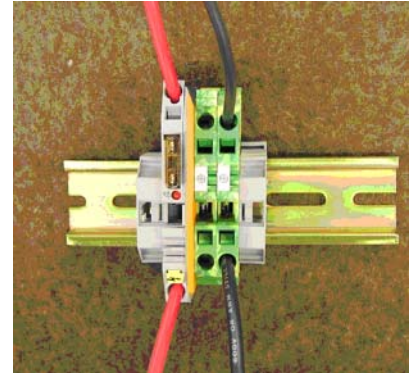
- Fuse Blown Indicator Light (on **input** side of ATC Fuse)
- DC Power Cable's red power wire (to client)
- DC Power Cable's black ground wire (to client)

7. Install a 2 AMP ATC automotive fuse into the Fuse Block.



Installing a fuse with the wrong current rating could cause an unsafe condition and/or a prematurely blown fuse. Verify the correct fuse value for the device being installed.

DO NOT install the fuse until the installation is completed and all connections have been checked.



8. Tie and stow all cables and wires as necessary so they remain out of the way of casual contact, and so wire chafe is avoided.
9. Apply the sticker, included in the Fuse Distribution Rail Kit, near the Fuse Block as future reference for service personnel.

7.3.2 Grounding Studs

Mounting studs for grounding the client are located on two sides of the client. While these studs are primarily used for grounding in Fixed Station installations, it is recommended to run a ground strap from one of the two ground studs to a nearby chassis ground.



DO NOT connect the Return (PWR-) connection directly to the negative battery post. In the event the negative battery post wiring becomes disconnected from the chassis, this would cause all vehicle current to source back through the client connection to ground, thus causing damage to the client.

7.3.3 Network/Data Connection

The standard client in a nomadic configuration connects to the network using a standard Ethernet RJ-45 protocol. The DATA connector is a Tyco Electronics Industrial Circular Ethernet Connector Part number: 1738607-1 (provided). This is an industrial grade, rugged, UV rated, weatherproof, and dustproof connector made for use in extreme electrical and climatic conditions. The connector meets IP67 industrial standard for weatherproof and dustproof electrical connections. Refer to Appendix D.2 for Ethernet cable or Appendix D.2.5 for Fiber Optic cable information.

The service port has a dust cap which is normally installed to provide sealing when not in use. Sealing of all other ports on the client is provided through mandatory usage connections.

8. SYSTEM VERIFICATION

8.1 VERIFY BASE STATION CONNECTIONS

Before the signal strength and airlink connection can be verified, the power and network connections must be functional. Power connections may be verified with standard methods using voltmeters and ammeters. The network connection can be initially verified using link lights available on switches and routers. A functional check of packet transfer can then be used to complete the connection verification. Packet transfer function check is performed using the “**ping**” command available in Linux and DOS (**cmd** line in MS-Windows).

1. Verify that power connection has been made and power is applied.
2. Verify that both Ethernet ports are connected from the BS to an accessible Ethernet switch.
3. Plug a laptop, desktop, or rack-mount computer into the switch.
4. Ensure all appropriate link lights are illuminated.
5. Example output from the ping command is shown in the next section. Use the connected computer to Ping the base station:

```
ping <base station ip address>
```

8.2 VERIFY SUBSCRIBER CONNECTIONS

1. Verify that power connection has been made and power is applied.
2. Verify that the Ethernet cable is connected to an accessible Ethernet switch.
3. Plug a laptop, desktop, or rack-mount computer into the switch.
4. If a switch is unavailable the subscriber Ethernet cable may be connected to another computer directly if the computer NIC supports auto MDI/MDIX. Otherwise a cross-over patch can be used.
5. Configure the connected computer’s Ethernet port to have a static IP address of 10.0.0.10 and a subnet mask of 255.0.0.0 and no default gateway.
6. Ensure all appropriate link lights are illuminated.
7. For Windows XP go to the START tab and select the run command.
8. When the run dialog box appears, enter **cmd** and then press enter.
9. Open a command line window and issue the following command: **ping 10.0.0.1**
10. You should get a response similar to the following:

```
Pinging 10.0.0.1 with 32 bytes of data:  
Reply from 10.0.0.1: bytes=32 time <2 ms TTL=64  
Reply from 10.0.0.1: bytes=32 time <2 ms TTL=64  
Reply from 10.0.0.1: bytes=32 time <2 ms TTL=64
```

```
Reply from 10.0.0.1: bytes=32 time <2 ms TTL=64
Ping statistics for 10.0.0.1:
Packets: Sent = 4, Received = 4, Lost 0 (0% loss),
Approximate round trip time in milliseconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

11. The connection to the subscriber has been verified by the 0% packet loss.
12. Remove the connected computer from the switch or subscriber.

8.3 VERIFY ANTENNA ALIGNMENT

The task of antenna alignment is to physically align the antenna's azimuth and elevation for maximum signal transfer in a radio link. The antenna alignment for short distance links can most often be accomplished solely by a manual visual adjustment with line-of-sight to the target. Longer distance links require additional optimization to maximize signal transfer.

For an omnidirectional antenna, the azimuth pattern is uniform and only antenna tilt needs to be controlled. Omnidirectional antennas are typically whip-type monopoles. Alignment is accomplished by holding the antenna in a vertical orientation. A spirit level can be used to ensure the antenna is vertical.

Directional antennas provide more gain at the expense of a narrow azimuth beamwidth and so it is the directional antenna which requires alignment in both axes. Directional antennas can be adjusted by visually sighting the target and pointing the major lobe of the antenna pattern at the target. A certain amount of experience is useful in this task, but with good line-of-sight, optimized links can be achieved.

Directional antenna alignment can also be achieved by calculating the bearing between the two ends of the link and then using a compass to align the antennas. The elevation may be set with an angle finder level used by tradesmen.

After visual alignment, the link should be functional and can be used immediately to verify signal levels or to optimize and accurately align the antennas. This is a preferred method because no additional equipment is needed and it simultaneously verifies the airlink as well as the network. The subscriber Signal Parameters Web page (see Section 8.3) provides a wealth of information such as downlink signal strength, signal-to-noise ratio, and uplink transmitted power and modulation. The base station also provides signal quality parameters of subscribers entered into the network.

The subscriber received signal strength and signal-to-noise ratio are reported through the command line. This method benefits from using cell-phones or two-way radios to communicate with a partner viewing the subscriber signal Web page or base station stats from a distant location while the antenna is being adjusted. Of course this method requires that all power and network connections are functional.

Optimization can also be accomplished by Received Signal Strength (RSS) alignment. The RSS Indicator is a handheld instrument (see Figure 8-1) that allows you to accurately align the antenna of a VIDA Broadband Client to a base station. When connected to the service port of the client the RSS Indicator provides a visual indication of the RSS from the base station. The instrument's LEDs provide an indication of DC power and signal strength.

The RSS Indicator has two 15-pin D-type connectors: the Radio port connector (DB15M) connects to the client through a DB15F-to-RJ45 adapter. Any straight-through CAT5 cable may be used to connect the adapter to the client service port. The DB15F connector on the RSS Indicator provides pass-through connection and is unused in this application.



Figure 8-1: RSS Indicator EA-015564

The following procedure is based on having a transmitting base station within reception distance and clear line-of-sight and a client with settings to scan the frequency at which the base station is transmitting.

Antenna Alignment Procedure Using the RSS Indicator:

1. Visually align the antennas using one of the methods described in the previous section.
2. Apply power to the client.
3. Uncover the service port by turning the dust cap counter-clockwise.
4. Connect the CAT5 cable from the RSS Indicator to the service port.
5. Verify the power LED on the RSS Indicator is illuminated.
 - Check DC power to the client if the power LED is not illuminated.
6. One of following conditions should exist:
 - A fixed set of LEDs are lit indicating RSS from the BS.
 - The RSS LEDs are cycling indicating that a frequency scan is being performed.

Allow the frequency scan to complete as indicated by a fixed RSS indication. RSS Alignment can only proceed after scanning has completed.

7. Align the client antenna to maximize the number of RSS LEDs illuminated.
 - Once aligned, tighten the alignment bolts of the antenna mount.
8. Antenna alignment by RSS is complete.
9. Disconnect the CAT5 cable and cover the client service port with the dust cap.

The number of solidly illuminated LEDs corresponds to a quantitative value of RSS. The following table gives the value of RSS power for a given set of illuminated LEDs.

Table 8-1: RSSI Relative Power Indications

LEDs Illuminated	RSS Range (dBm)	
	min	max
1	-93	-90
2	-89	-86
3	-85	-82
4	-81	-78
5	-77	-74
6	-73	-70
7	-69	-66
8	-65	--
Cycling	Scanning	

Example 1:

The client is receiving a signal from the base station at a power level of -75 dBm. The RSS Indicator will have 5 LEDs illuminated.

Example 2:

The RSS Indicator has 7 LEDs illuminated. We know the client is receiving a signal from the base station at a power level between -69 and -66 dBm.

8.4 VERIFY LINK PERFORMANCE

The BS has a built in Web page that you can use to monitor SS connectivity and link performance. The BS Web page monitors activity between that base station and up to 16 subscriber stations connected to that base station and it displays this information in real time. This includes the subscriber station connectivity, signal strength, SNR, link throughput, and the GPS synchronization status of the base station. This tool enables you to verify expected link performance and functionality. For additional details on setting up and using the Web Page, please refer to Appendix A.

8.4.1 Link Verification

To access the Web page, enter the base station's IP address (for example: 192.168.11.108) in the browser's address bar. The browser will open a BS Network Status page similar to the page shown in Figure 8-2.

The screenshot shows a web browser window titled "VIDA Broadband - Tyco Electronics - Mozilla Firefox" with the address bar set to "http://192.168.11.120/". The page content includes the Tyco Electronics logo and the title "Vida Broadband Network Management". Below the title are three tabs: "Network Status", "Link Monitor", and "Version". The "Network Status" tab is active, displaying the following information:

Base Station

Base Station	IP Address	MAC Address	Channel Frequency (GHz) [#]	Tx Power (dBm)	System Up-Time
BS_120 - Operational	192.168.11.120	00:17:f3:00:01:2d	4.9425 [1]	5	33 min

Subscriber Stations

Show Detail	Subscriber Stations	IP Address	MAC Address
+	SS8_EA30 - Operational	192.168.11.72	00:a0:0a:c1:ea:30
+	SS2_EA5A - Operational	192.168.11.24	00:a0:0a:c1:ea:5a
+	SS4_EA5E - Operational	192.168.11.40	00:a0:0a:c1:ea:5e
+	SS5_EA6A - Operational	192.168.11.48	00:a0:0a:c1:ea:6a
+	SS7_EAF2 - Operational	192.168.11.64	00:a0:0a:c1:ea:f2
+	SS1_EAF4 - Operational	192.168.11.16	00:a0:0a:c1:ea:f4
+	SS3_EB12 - Operational	192.168.11.32	00:a0:0a:c1:eb:12
+	SS9_EB2C - Operational	192.168.11.80	00:a0:0a:c1:eb:2c
+	SS6_EB50 - Operational	192.168.11.56	00:a0:0a:c1:eb:50

At the bottom of the page, there are links for "Home" and "Browser Support", and a copyright notice: "© 2007 Tyco Electronics Corporation All Rights Reserved".

Figure 8-2: Network Status Showing BS Status and Connected Subscriber Stations

The Network Status page lists the subscriber stations connected to the Base Station. If the SS is highlighted green, the BS and SS are communicating properly. If the SS is highlighted red, it is not properly communicating with the BS.

If the SS is highlighted red, check the following:

- Verify that the SS is associated with the BS in the UAS

- Verify the SS has SF's associated with it in the UAS.
- Make sure the SS MAC address in the UAS matches the MAC address of the unit.

Once the SS is highlighted green on the Web page, you review the SS details. To view the details for a particular SS, click the **+** symbol next to the SS entry and expand the selected SS properties, as shown in Figure 8-3. Expanding the selected SS will display the Service Flows and Classifier Rules that are associated with the SS. The SFs, CRs, SS IP, and MAC address should match up with the SS configuration defined in the UAS.

The screenshot shows the 'Vida Broadband Network Management' web interface. The 'Base Station' section displays a table with one entry: 'BS_120 - Operational' with IP Address 192.168.11.120, MAC Address 00:17:f3:00:01:2d, Channel Frequency (GHz) 4.9425 [1], Tx Power (dBm) 5, and System Up-Time 38 min. The 'Subscriber Stations' section shows a table with columns for Service Status, Identifier, Name, QoS, Priority, Rate (Kbps), Type, Address, Mask, Port Start, and Port End. The entry 'SS8_EA30 - Operational' is expanded, showing three active service flows: SS8_ARP_UL_SF (Uplink BE, 100 Kbps, ARP), SS8_COMM_DL_SF (Downlink, 100 Kbps, DST IP), and SS8_DATA_UL_SF (Uplink RTPS, 3000 Kbps, SRC IP). The MAC address for SS8_EA30 is 00:a0:0a:c1:ea:30.

Figure 8-3: Network Status Showing Subscriber Station Details

8.4.2 Link Performance

Click on the Link Monitor hyperlink in the VIDA Broadband Network Management menu bar. This will open a Link Monitor Web page similar to the page shown in Figure 8-4.

The Link Monitor page displays a number of link characteristics; such as UL modulation type, UL RX power, UL SNR, UL Traffic Rate, and UL and DL utilization.

Make sure that the RF characteristics of the link match the RF characteristics you expect. If you are sending video over the link, the throughput monitor should display the application data rate plus link overhead. This overhead is automatically built into the Link Design Spreadsheet so the UL Traffic Rate shown on the Web page should closely match the calculated Traffic Rate from the Spreadsheet. The DL and UL utilization percentage should also closely match the calculated values from the Spreadsheet. If these values do not closely match, make sure the reported UL/DL Modulation is the same as the UL/DL modulation used in the Spreadsheet.

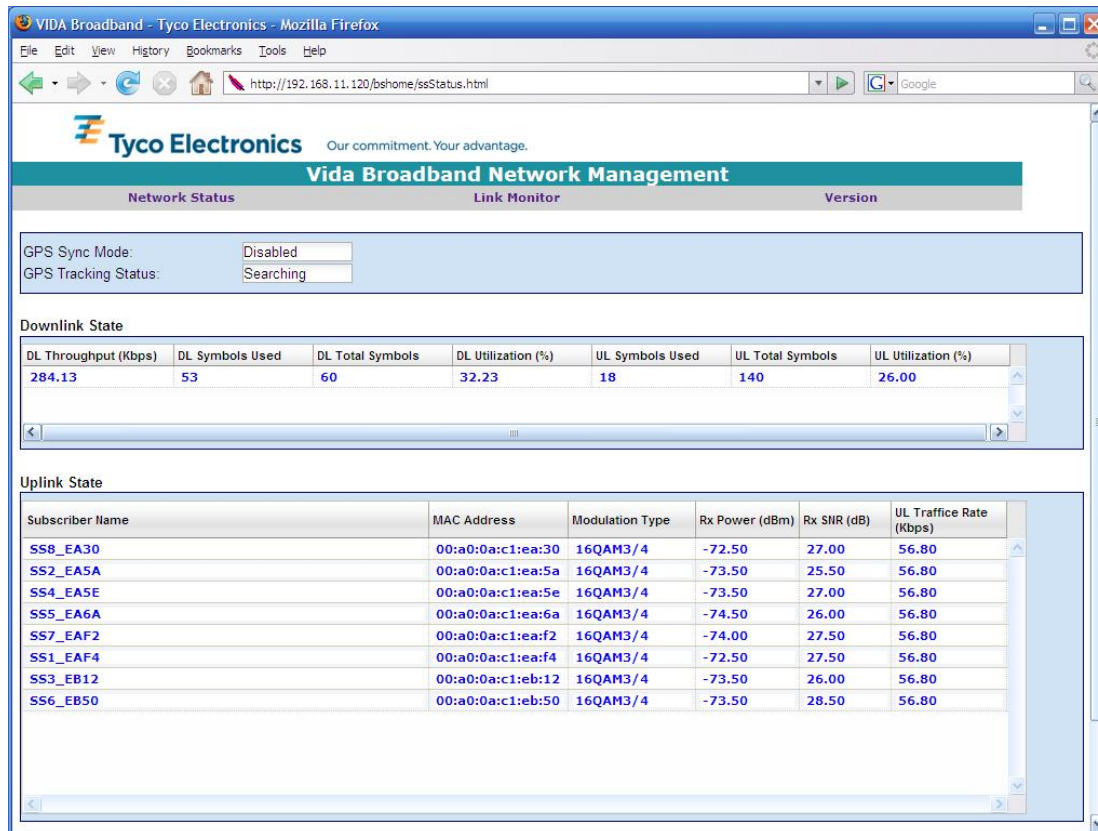


Figure 8-4: Link Monitor Showing UL and DL Link Performance

Also, make sure that the application is not pulling more data than expected. For example, make sure the IndigoVision Control Center is not pulling more than one stream of video. Verify that when you increase the number of video streams, the Web page indicates the same increase. For example, if the encoder is streaming at 600 kbps and only one stream is being pulled by the Control Center, the Web page should indicate between 600-800 kbps throughput. If you open a second stream in the Control Center, the Web page should now report a throughput between 1200-1600 kbps. This throughput will vary depending on how much data the encoder is actually sending at any given time.

8.4.3 GPS Synchronization

The BS Link Monitor Web page also indicates the GPS synchronization. When configuring the BS, GPS synchronization was set to either none, TX, or RX. If the BS acquires a GPS signal, the BS Web page will indicate the type of synchronization being used. For instance, if the Web page reports no GPS synchronization, the GPS antenna may not be attached to the BS or could be malfunctioning. If the Web page reports TX or RX, the BS is synchronized to the GPS signal, meaning that the GPS antenna installation was successful.



It is important to remember that GPS synchronization only confirms the BS is locked onto a GPS signal. It does not necessarily mean that the BS is properly configured for the collocated equipment.

8.5 VERIFY SUBSCRIBER STATION SIGNAL STRENGTHS

Each subscriber station (client) has a pre-configured IP address that is used to access the SS Web page. This Web page communicates with the Web server software embedded in the client. Verification of the subscriber station signals involves monitoring both the BS and SS Web pages. For additional details on setting up and using the BS Web Page and SS Web page, please refer to Appendix A and Appendix B, respectively.

8.5.1 Check Downlink SS Signal Levels

1. Log onto SS Web page using your network browser.

http://192.168.11.61 (use the IP of your SS)

If connected to the SS, the SS Web Page - System Page will open.

2. Select the **Signal Parameters** option from the menu bar.

The browser will display the Signal Parameters page.

System Signal Parameters Addresses Log Advanced

Signal Parameters

Link Status

OPERATIONAL

Downlink Parameter	Value
BS Identifier	0017F3000190
Downlink Frequency	4947.500 MHz
Downlink Channel Bandwidth	5 MHz
SNR	29.4 dB
Received Signal Strength	-71.4 dBm
Modulation	64QAM 2/3

Uplink Parameter	Value
Uplink Frequency	4947.500 MHz
Uplink Channel Bandwidth	5 MHz
Tx Power	23.0 dBm
Modulation	16QAM 3/4

Done

Figure 8-5: SS Web Page – Signal Parameters Page

3. Evaluate downlink parameters.
 - Ensure that downlink signal strength and SNR are reasonable.

8.5.2 Check Uplink SS Signal Levels

The section describes the procedure to ensure the BS receive power is optimal, and the BS optimal received power should be between -90 dBm and -70 dBm. The procedure contains two steps: calculate the expected BS receive power and confirm the actual BS receive power.

1. Calculate expected BS receive power.
 - a. The system signal loss is defined as the difference between the BS transmit power and the SS receive power. The BS transmit power is configured in the installation, and the typical value is 27 dBm. The SS receive power can be retrieved from the SS Web page.

$$\text{System Signal Loss} = \text{BS Tx Power} - \text{SS Rx Power}$$

- b. Assume the channel is symmetric, which means the downlink signal loss is equal to uplink signal loss, then the BS receive power is equal to:

$$\text{BS Rx Power} = \text{SS Tx Power} - \text{System Signal Loss}$$

The SS transmit power can be retrieved from the SS Web page.

For example, if BS Tx Power = 26 dBm

From SS web page	SS Rx Power	-48 dBm	-53 dBm
	Loss	74 dB	79 dB
	SS Tx Power	5 dBm	9 dBm
	BS Rx Power	-69 dBm	-70 dBm

2. Confirm actual BS receive power.

The actual BS receive power can be obtained from the BS using the BS Web page described in the following steps.

- a. To access the Web page, enter the BS's IP address in a browser.
A window similar to Figure 8-6 should be loaded.
- b. Click on Link Monitor at the top of the page in order to open the BS link Monitor.
A page similar to Figure 8-7 should be loaded. Each SS reports an RX power on this page.
- c. Review the received power from each SS.

The RX Power value should be within 5 dBm of the expected BS receive power calculated in Step 1. If the RX Power is not what you expected; you should suspect RF interference.

Vida Broadband Network Management

Network Status Link Monitor Version

Base Station

Base Station	IP Address	MAC Address	Channel Frequency (GHz) [#]	Tx Power (dBm)	System Up-Time
BS_120 - Operational	192.168.11.120	00:17:f3:00:01:2d	4.9425 [1]	5	33 min

Subscriber Stations

Show Detail	Subscriber Stations	IP Address	MAC Address
+	SS8_EA30 - Operational	192.168.11.72	00:a0:0a:c1:ea:30
+	SS2_EA5A - Operational	192.168.11.24	00:a0:0a:c1:ea:5a
+	SS4_EA5E - Operational	192.168.11.40	00:a0:0a:c1:ea:5e
+	SS5_EA6A - Operational	192.168.11.48	00:a0:0a:c1:ea:6a
+	SS7_EAF2 - Operational	192.168.11.64	00:a0:0a:c1:ea:f2
+	SS1_EAF4 - Operational	192.168.11.16	00:a0:0a:c1:ea:f4
+	SS3_EB12 - Operational	192.168.11.32	00:a0:0a:c1:eb:12
+	SS9_EB2C - Operational	192.168.11.80	00:a0:0a:c1:eb:2c
+	SS6_EB50 - Operational	192.168.11.56	00:a0:0a:c1:eb:50

Home | Browser Support
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Figure 8-6: BS Web Page – Network Status

Vida Broadband Network Management

Network Status Link Monitor Version

GPS Sync Mode:
GPS Tracking Status:

Downlink State

DL Throughput (Kbps)	DL Symbols Used	DL Total Symbols	DL Utilization (%)	UL Symbols Used	UL Total Symbols	UL Utilization (%)
284.13	53	60	32.23	18	140	26.00

Uplink State

Subscriber Name	MAC Address	Modulation Type	Rx Power (dBm)	Rx SINR (dB)	UL Traffic Rate (Kbps)
SS8_EA30	00:a0:0a:c1:ea:30	16QAM3/4	-72.50	27.00	56.80
SS2_EA5A	00:a0:0a:c1:ea:5a	16QAM3/4	-73.50	25.50	56.80
SS4_EA5E	00:a0:0a:c1:ea:5e	16QAM3/4	-73.50	27.00	56.80
SS5_EA6A	00:a0:0a:c1:ea:6a	16QAM3/4	-74.50	26.00	56.80
SS7_EAF2	00:a0:0a:c1:ea:f2	16QAM3/4	-74.00	27.50	56.80
SS1_EAF4	00:a0:0a:c1:ea:f4	16QAM3/4	-72.50	27.50	56.80
SS3_EB12	00:a0:0a:c1:eb:12	16QAM3/4	-73.50	26.00	56.80
SS6_EB50	00:a0:0a:c1:eb:50	16QAM3/4	-73.50	28.50	56.80

Figure 8-7: BS Web Page – Link Monitor

8.5.3 Check Device Connectivity

1. Ping from network computer to each device/subnet (i.e. IP camera) that is connected to each SS.

If Ping fails:

- Check that the MAC/IP addresses for endpoints are in computer ARP.
- Evaluate the link to ensure it is up/good RF state.
- Check classifier rules/service flows in UAS for SS to ensure they are properly configured.

2. Once connectivity to endpoints is established, run network applications (i.e. IP video).

If Ping succeeds, but network applications do not run:

- Check that service flows can pass maximum packet size for application (relevant to UGS).
- Check that classifier rules are properly configured for application traffic.

Refer to the *VBB Basic Network Applications Programming Guide, MM-014641-001*, for additional information.

APPENDIX A BASE STATION EMBEDDED WEB SERVER

This section provides instructions for setting up and using the base station embedded web server.

A.1 SETTING UP THE BROWSER

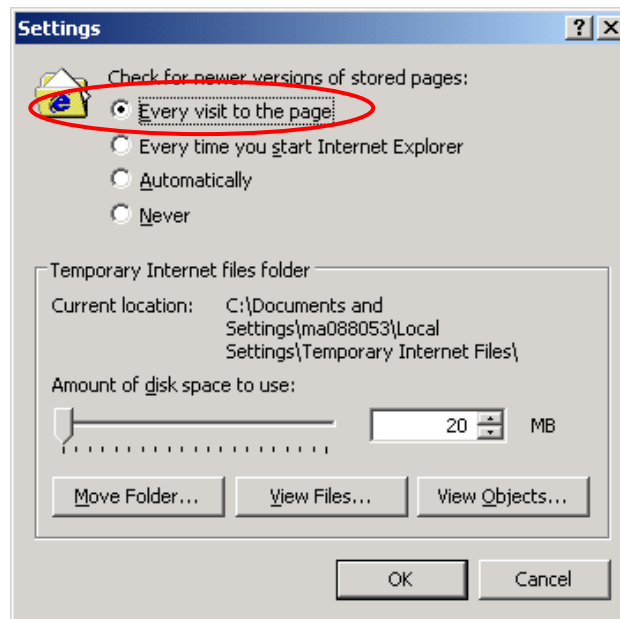
This section provides details for accessing and viewing the Web pages residing in the VIDA Broadband Base Station.

When accessing the Web Page we recommend using Mozilla Firefox 2.0 (or higher), or Microsoft Internet Explorer 6.0 (or higher). In addition, before you can access the BS Web Page, you need to ensure that your Web browser's settings will enable access to the tool. The following procedure describes how to configure the browsers for this purpose.

A.1.1 Configuring the Browser

For Internet Explored Browser:

1. Start Internet Explorer.
2. From the **IE** menu, select **Tools** → **Internet Options**.
3. In the Internet Options window, click the **General** tab, and then in the “Temporary Internet Files” group, click the **Settings** button. The Settings window opens.
4. In response to “Check for newer versions of stored pages”, select the “Every visit to the page” option, and then click **OK**. This ensures you will always view current information.

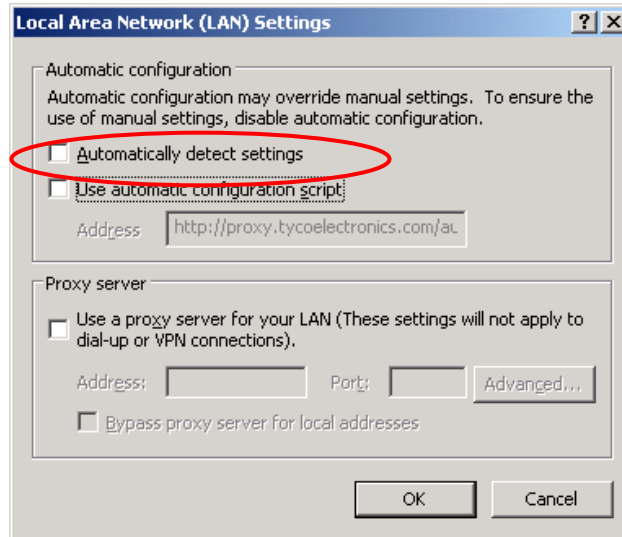


5. Click on the **Connections** tab and then click the **LAN Settings** button. Select the desired configuration settings, and then click **OK**.



For permanent access to the BS web pages, without affecting your overall web access, you may need to contact your IT department and have them add the Base Station's IP Address to the bypass list.

For temporary access to the BS, you can simply uncheck the “**Use automatic configuration script**” box. You will not be able to access the internet while this box is unchecked.

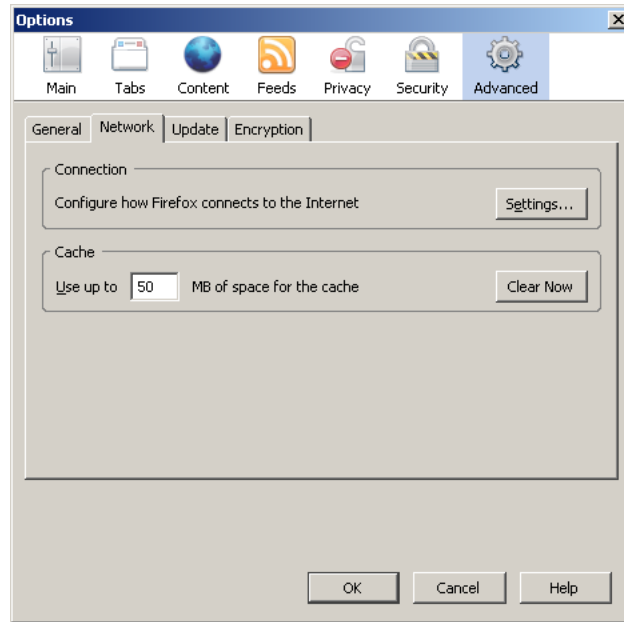


6. In the Internet Options window, click the **Apply** button, and then click **OK**.

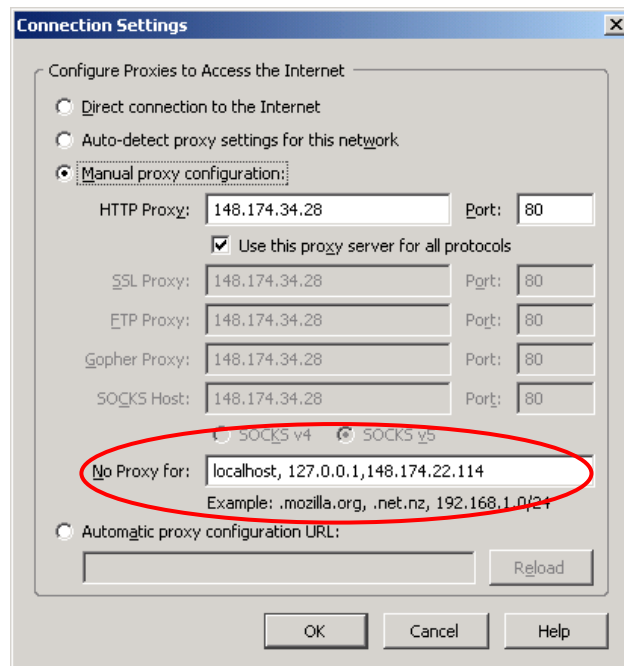
Read this section and follow carefully if you are accessing the base station from a laptop connected to a corporate network or from a laptop configured to a proxy.

For Mozilla Firefox Browser:

1. Open the Mozilla Firefox browser.
2. From the main menu, select **Tools → Options**.
3. Click the **Advanced** icon and then the **Network** tab.
4. Click the Settings button to open the “Connections Settings” window.



5. Select “**Manual proxy configuration**” and add the Base Station’s IP Address to the “**No Proxy for:**” field, as shown below and click **OK**.



A.2 ACCESSING THE BASE STATION EMBEDDED WEB SERVER

A.2.1 Opening the Base Station Web Server

1. Open a Web browser session.
2. Enter the base station's IP address in the URL address field and press the <Enter> key or click the **Go** button to open the Base Station "Network Status" page.

Format: `http://<ip address of the base station>`

Example: `http://192.168.11.120`

The screenshot shows a web browser window titled "VIDA Broadband - Tyco Electronics - Mozilla Firefox". The address bar contains "http://192.168.11.120/". The page content includes the Tyco Electronics logo and the heading "Vida Broadband Network Management". Below this, there are three tabs: "Network Status", "Link Monitor", and "Version". The "Network Status" tab is active, showing a "Base Station" table with one entry: "BS_120 - Operational" with IP address 192.168.11.120, MAC address 00:17:f3:00:01:2d, Channel Frequency 4.9425 [1], Tx Power 5 dBm, and System Up-Time 33 min. Below this is a "Subscriber Stations" section with a table listing various subscriber stations (SS) and their IP addresses and MAC addresses. The table has columns for "Show Detail", "Subscriber Stations", "IP Address", and "MAC Address". The "Subscriber Stations" column contains entries like "SS8_EA30 - Operational", "SS2_EA5A - Operational", etc. The "Show Detail" column contains plus signs (+) for each row. The footer of the page includes "Home | Browser Support" and "© 2007 Tyco Electronics Corporation All Rights Reserved".

Base Station	IP Address	MAC Address	Channel Frequency (GHz) [#]	Tx Power (dBm)	System Up-Time
BS_120 - Operational	192.168.11.120	00:17:f3:00:01:2d	4.9425 [1]	5	33 min

Show Detail	Subscriber Stations	IP Address	MAC Address
+	SS8_EA30 - Operational	192.168.11.72	00:a0:0a:c1:ea:30
+	SS2_EA5A - Operational	192.168.11.24	00:a0:0a:c1:ea:5a
+	SS4_EA5E - Operational	192.168.11.40	00:a0:0a:c1:ea:5e
+	SS5_EA6A - Operational	192.168.11.48	00:a0:0a:c1:ea:6a
+	SS7_EAF2 - Operational	192.168.11.64	00:a0:0a:c1:ea:f2
+	SS1_EAF4 - Operational	192.168.11.16	00:a0:0a:c1:ea:f4
+	SS3_EB12 - Operational	192.168.11.32	00:a0:0a:c1:eb:12
+	SS9_EB2C - Operational	192.168.11.80	00:a0:0a:c1:eb:2c
+	SS6_EB50 - Operational	192.168.11.56	00:a0:0a:c1:eb:50

Figure A-1: BS Web Page – Home Page

3. To view the details for a particular Subscriber Station, click the **+** symbol to expand the selected SS properties as shown in Figure A-2.

The page shown in Figure A-3 is an example of a Subscriber Station failing to communicate with the base station. Note the SS entry is highlighted in red, indicating a problem.

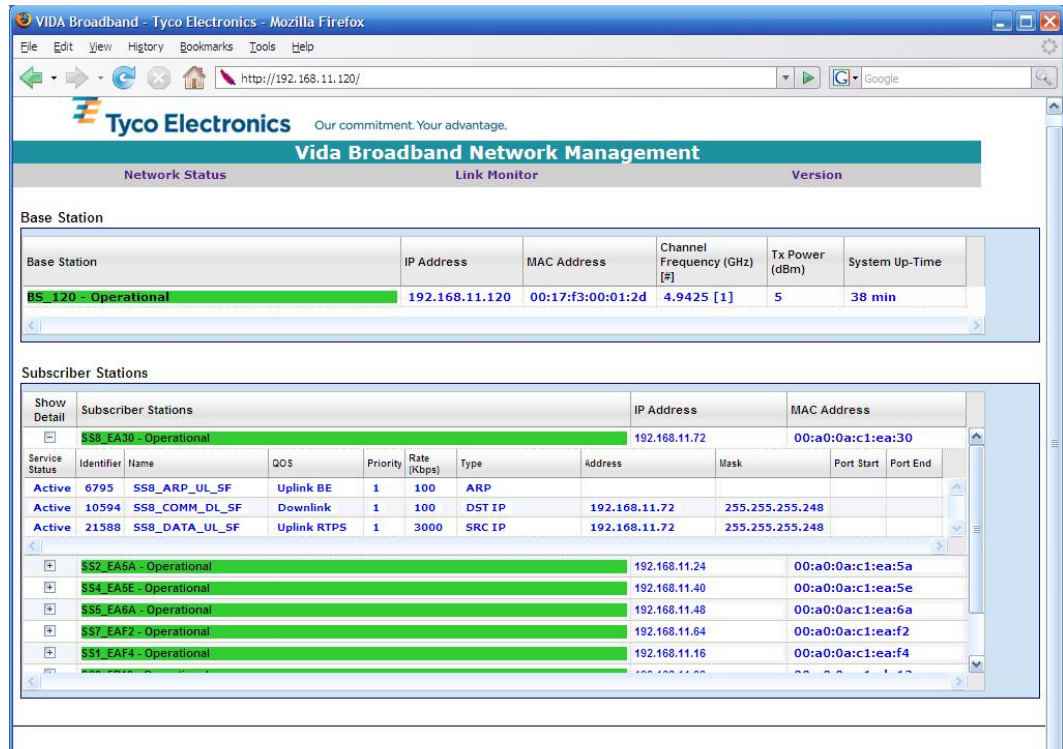


Figure A-2: BS Web Page – Subscriber Station Details

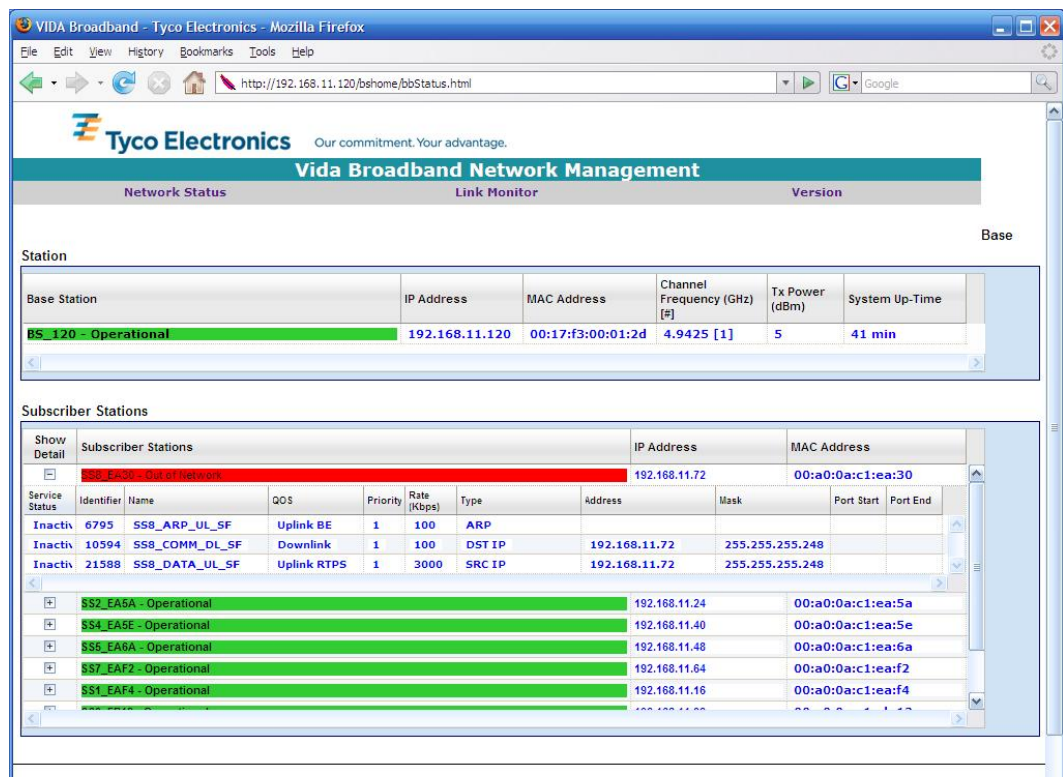


Figure A-3: BS Web Page – Subscriber Station Not Communicating

A.2.2 Viewing the Base Station Software Version

1. On the VIDA Broadband Network Management menu bar, click the **Version** tab.

The “Version” page lists details about the software running on the Base Station.



Figure A-4: BS Web Page – Version Page

A.2.3 Monitoring the Uplink and Downlink Performance

1. On the VIDA Broadband Network Management menu bar, click the **Link Monitor** tab.

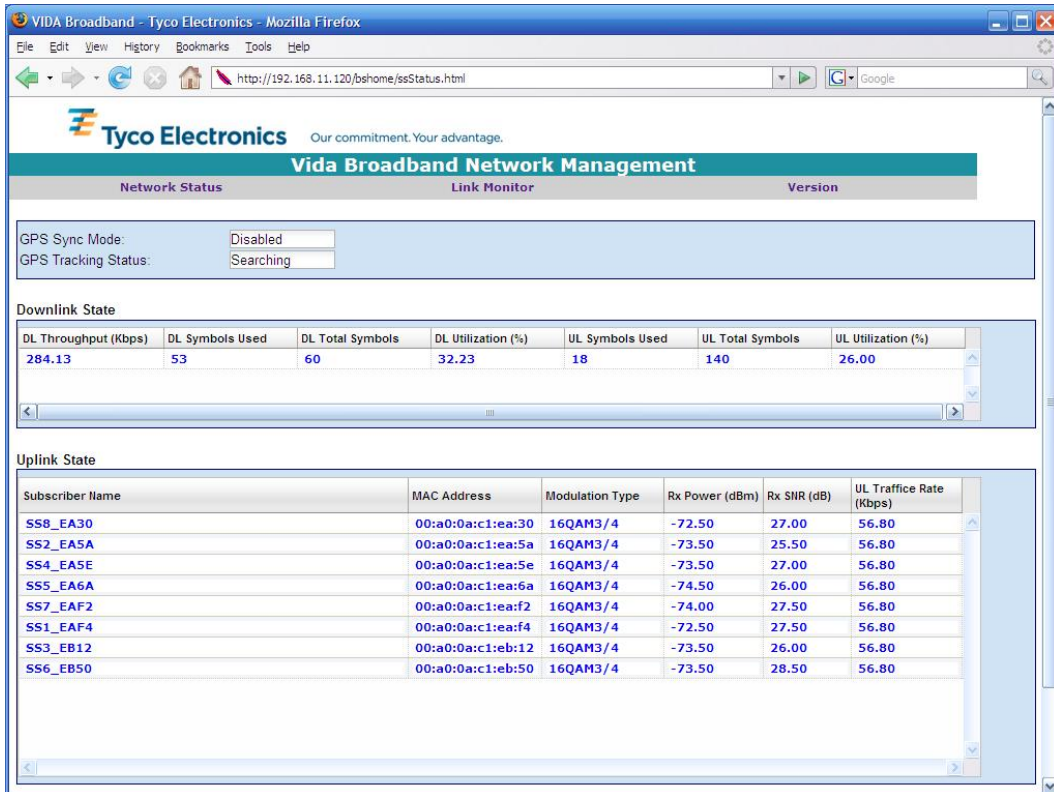


Figure A-5: BS Web Page – Link Monitor