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Client: Harris Corp.  
ID's: BV8WM4900CL/3670A-WM4900CL  
Model#: VM-WM4900-CL001  
Standards: FCC Pt 90/IC RSS-111  
RTL Report #: 2010195

## **Appendix J: Manual**


Please refer to the following pages.



**VIDA Broadband**  
4.9 GHz Client  
(VM-WM4900-CL001)

## MANUAL REVISION HISTORY

REV	DATE	REASON FOR CHANGE
-	Oct/10	Initial release.



**Harris Corporation**  
Client, 4.9 GHz, 802.16 VBB 5/10  
 14002-1000-01 VM-WM4900-CL001

**THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:  
 (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND  
 (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRE OPERATION.**

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This Class B digital apparatus complies with Canadian ICES-003.  
 Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

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ECR-7378A

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# 1 REGULATORY AND SAFETY INFORMATION

## 1.1 REGULATORY APPROVALS

### 1.1.1 Transmitter

The transmitting devices listed below have been tested and meet the following regulatory requirements:

MODEL	DESCRIPTION	BW (MHz)	FCC ID (PART 90)	INDUSTRY CANADA (RSS-119)
VM-WM4900-CL001	Broadband Client	5 or 10	BV8WM4900CL	3670A-WM4900CL

### 1.1.2 Receiver

This receiver associated with this transmitting device has been tested and declared to meet the regulatory requirements defined in the following sub-sections. Associated FCC labelling may be found on page 2.

### 1.1.3 FCC Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

### 1.1.4 Industry Canada

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.



**The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website [www.hc-sc.gc.ca/rpb](http://www.hc-sc.gc.ca/rpb).**

## 1.2 SAFETY SYMBOL CONVENTIONS

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. Harris Corporation 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.



This symbol indicates the presence of a potential **RF** hazard.

### 1.3 RF ENERGY EXPOSURE INFORMATION FOR FIXED OPERATION

#### 1.3.1 Maximum Permissible Exposure Limits

**DO NOT TRANSMIT** with this Client and antenna when persons are within the **MAXIMUM PERMISSIBLE EXPOSURE (MPE)** Radius of the antenna. The MPE Radius is the minimum distance from the antenna axis that **ALL** persons should maintain in order to avoid RF exposure higher than the allowable MPE level set by the FCC.



**FAILURE TO OBSERVE THESE LIMITS MAY ALLOW ALL PERSONS WITHIN THE MPE RADIUS TO EXPERIENCE RF RADIATION ABSORPTION, WHICH EXCEEDS THE FCC MAXIMUM PERMISSIBLE EXPOSURE (MPE) LIMIT. IT IS THE RESPONSIBILITY OF THE STATION LICENSEE TO ENSURE THAT THE MAXIMUM PERMISSIBLE EXPOSURE LIMITS ARE OBSERVED AT ALL TIMES DURING STATION TRANSMISSION. THE STATION LICENSEE IS TO ENSURE THAT NO BYSTANDERS ARE WITHIN THE RADIUS LIMITS.**

#### 1.3.2 Determining MPE Radius

**THE MAXIMUM PERMISSIBLE EXPOSURE RADIUS** is unique for each site and is determined based on the complete installation environment (i.e., co-location, antenna type, transmit power level, etc.). Determination of the MPE distance is the responsibility of the VIDA Broadband user. Calculation of the MPE radius is required as part of the installation. The limit for **Uncontrolled Exposure Power Density (P<sub>d</sub>)** is 10 W/m<sup>2</sup> for fixed mounted device.

The Harris 4.9 GHz VIDA Broadband Client may be installed as a fixed mounted radio. After installation and commissioning, the safe distance from the 9 dBi omnidirectional antenna is greater than 20 cm (8-inches).

##### 1.3.2.1 **MPE Calculation for Omnidirectional Antenna**

This MPE Minimum Distance Calculation is based on using a 9 dBi gain omnidirectional antenna mounted directly to the Client RF port.

Basic Harris 4.9 GHz VIDA Broadband Client specifications:

**P:** Maximum Peak Conducted Power = 30 dBm

**G:** Maximum Omni Antenna Gain = 9 dBi

Frequency Range = 4.90 to 4.99 GHz

**R:** Minimum Distance between User and Antenna = 0.3 m

##### **Equation from FCC:**

$$P_d = P * G_N / ( 4 * \pi * R_{min}^2 )$$

$$P_d = 1 \text{ W} * 7.94 / (4 * 3.1415926 * 0.3^2) = 7.0 \text{ W} / \text{m}^2 < 10 \text{ W} / \text{m}^2$$

The calculation indicates that the minimum 0.3 meter distance between user and the omnidirectional antenna (directly mounted to the Client RF port) is required when operating the Harris 4.9 GHz VIDA Broadband Client.

### 1.3.2.2 MPE Calculation for Directional Antenna

This MPE Minimum Distance Calculation is based on using a directional antenna with more than 9 dBi antenna gain.

Basic Harris 4.9 GHz VIDA Broadband Client specifications:

**P:** Maximum Peak Conducted Power = 30 dBm

**G:** Maximum Omni Antenna Gain – Cable Loss = 27 dBi – 1 dB = 26 dBi; (Use numerical  $G_N$  value for the calculation):  $G_N = 10^{(G/10)}$ ; For  $G = 26$  dBi,  $G_N = 10^{(26/10)} = 398$

Frequency Range = 4.90 to 4.99 GHz

**R<sub>min</sub>:** Minimum Distance between user and antenna to comply with FCC MPE Level ( $10 \text{ W} / \text{m}^2$ )

#### Equation from FCC:

$$P_d = P * G_N / (4 * \pi * R_{min}^2)$$

$$R_{min} = \text{SQRT} [ 1.0 \text{ W} * G_N / (4 * 3.1415926 * 10) ]$$

$$R_{min} = 1.78 \text{ m, for } G = 26 \text{ (i.e., } G_N = 398 \text{)}$$

The calculation provides guidelines for users to estimate the minimum safe distance when a high gain antenna is connected to the 4.9 GHz VIDA Broadband Client. The user should always keep a safe distance from antenna greater than 30 cm or  $\text{SQRT}(3.9789\text{E-}3 * G_N)$ .

The following table lists fixed installation's minimum distance for different Effective Antenna System Gain Levels (Antenna Gain – Feeder Cable Loss). In all cases, the minimum safe distance defined in Table 1-1 (Clients Stations), or 0.3 meters (12 inches), whichever is greater, is the recommended minimum safe distance for fixed installations.

**Table 1-1: MPE Minimum Distance Calculation for Fixed Client Installations Using High Gain Antennas**

Effective Antenna Gain (dBi)	Fixed Clients (1 Watt)	
	Minimum Safe Distance (Meters)	Minimum Safe Distance (Feet)
<10	0.30	0.98
11	0.32	1.04
12	0.36	1.17
13	0.40	1.31
14	0.45	1.47
15	0.50	1.65
16	0.56	1.85
17	0.63	2.07
18	0.71	2.32
19	0.80	2.61
20	0.89	2.93
21	1.00	3.28
22	1.12	3.68
23	1.26	4.13
24	1.41	4.64
25	1.59	5.20
26	1.78	5.84
>26	Reduce Transmitter Power as required by FCC	

### 1.3.3 Safety Training Information



**YOUR HARRIS VIDA BROADBAND CLIENT GENERATES RF ELECTROMAGNETIC ENERGY DURING TRANSMIT MODE. THIS CLIENT IS DESIGNED FOR AND CLASSIFIED AS “OCCUPATIONAL USE ONLY,” MEANING IT MUST BE USED ONLY IN THE COURSE OF EMPLOYMENT BY INDIVIDUALS AWARE OF THE HAZARDOUS RF ENERGY AND THE WAYS TO MINIMIZE EXPOSURE. THIS STATION IS NOT INTENDED FOR USE BY THE “GENERAL POPULATION” IN AN UNCONTROLLED ENVIRONMENT. IT IS THE RESPONSIBILITY OF THE LICENSEE TO ENSURE THAT THE MAXIMUM PERMISSIBLE EXPOSURE LIMITS ARE OBSERVED AT ALL TIMES DURING TRANSMISSION. THE STATION LICENSEE IS TO ENSURE THAT NO BYSTANDERS COME WITHIN THE RADIUS OF THE LIMITS**

When licensed by the FCC, this Client complies with the FCC RF exposure limits when persons are beyond the MPE radius of the antenna. In addition, your Harris VIDA Broadband Client installation complies with the following Standards and Guidelines with regard to RF energy and electromagnetic energy levels and evaluation of such levels for exposure to humans:

**FCC OET Bulletin 65 Edition 97-01 Supplement C, Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.**

**American National Standards Institute (C95.1 – 1992), IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.**

**American National Standards Institute (C95.3 – 1992), IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave.**



**CAUTION**

**To ensure that your exposure to RF electromagnetic energy is within the FCC allowable limits for occupational use, do not operate the station in a manner that would create an MPE distance in excess of that allowable by the FCC.**



**CAUTION**

**Changes or modifications not expressly approved by Harris Corporation could void the user’s authority to operate the equipment.**

### 1.3.4 Contact Information

For additional information on exposure requirements or other information, contact Harris Corporation at 1-800-528-7711 or at <http://www.pspc.harris.com>.

## 1.4 RF ENERGY EXPOSURE INFORMATION FOR MOBILE OPERATION

The FCC requires licensees and manufacturers to meet radio frequency radiation exposure compliance as defined by FCC rule 47 CFR §2.1091 and as discussed in FCC document OET Bulletin 65: *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields*.

Page 5 of OET Bulletin 65, Supplement C, subtitled: *Mobile Devices* states the following:

“The FCC rules for evaluating mobile devices for RF compliance are found in 47 CFR §2.1091. For purposes of RF exposure evaluation, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to be generally used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structures and the body of the user or nearby persons.”

Page 7 of OET Bulletin 65, Section 2, subtitled: *Guidelines for evaluating Mobile and Portable Devices* states the following:

“Mobile devices identified in 47 CFR §2.1091 that operate at 1.5 GHz or below with an effective radiated power (ERP) of 1.5 watts or more, or those that operate at frequencies above 1.5 GHz with an ERP of 3.0 watts or more are required to perform routine environmental evaluation for RF exposure prior to equipment authorization or use; otherwise, they are categorically excluded.”

The 4.9 GHz Broadband Client radio with 0.5 Watt RF output, installed as a mobile device using the 5.5 dBi mobile antenna and cable mounts referenced in Table 1-2 has a calculated worst case ERP of 1.78 Watts relative to an isotropic radiator (EIRP). Therefore, it can be concluded that a 4.9 GHz Client radio installed as a *mobile device* using the Harris recommended mobile antenna system is ***categorically excluded*** from any requirement to perform routine environmental evaluation for RF exposure. This is true with other mobile antenna systems having gains up to 7.7 dBi.



**CAUTION**

**Changes or modifications not expressly approved by Harris Corporation could void the user's authority to operate the equipment and may require the user to perform routine environmental evaluation of the mobile installation.**

This two-way radio uses electromagnetic energy in the radio frequency (RF) spectrum to provide communications between two or more users over a distance. It uses RF energy or radio waves to send and receive calls. RF energy is one form of electromagnetic energy. Other forms include, but are not limited to, electric power, sunlight, and x-rays. RF energy, however, should not be confused with these other forms of electromagnetic energy, which, when used improperly, can cause biological damage. Very high levels of x-rays, for example, can damage tissues and genetic material.

Experts in science, engineering, medicine, health, and industry work with organizations to develop standards for exposure to RF energy. These standards provide recommended levels of RF exposure for both workers and the general public. These recommended RF exposure levels include substantial margins of protection. All two-way radios marketed in North America are designed, manufactured, and tested to ensure they meet government established RF exposure levels. In addition, manufacturers also recommend specific operating instructions to users of two-way radios. These instructions are important because they inform users about RF energy exposure and provide simple procedures on how to control it. Please refer to the following websites for more information on what RF energy exposure is and how to control your exposure to assure compliance with established RF exposure limits.

<http://www.fcc.gov/oet/rfsafety/rf-faqs.html>

<http://www.osha.gov/SLTC/radiofrequencyradiation/index.html>



Table 1-2 lists the recommended minimum lateral distance for a controlled environment and for unaware bystanders in an uncontrolled environment, from transmitting types of antennas the at rated radio power for nomadic Client radios installed in a vehicle. Transmit only when unaware bystanders are at least the uncontrolled recommended minimum lateral distance away from the transmitting antenna.

**Table 1-2: MPE Minimum Distance Calculation for Nomadic Client Installations**

4.9 GHz CLIENT WITH 0.5 WATT OUTPUT IN NOMADIC OPERATION (MOUNTED IN A VEHICLE) USING THE SPECIFIED ANTENNA AND MOUNTS		RECOMMENDED MINIMUM LATERAL DISTANCE FROM TRANSMITTING ANTENNA	
ANTENNA & MOUNT	ERP (Watts)	CONTROLLED	UNCONTROLLED
Antenna: MAXRAD (B)MEFC49005HF (5.5 dBi gain) Mount: MAXRAD MHFML195C (Permanent)	< 3.0	20 cm	20 cm
Antenna: MAXRAD (B)MEFC49005HF (5.5 dBi gain) Mount: MAXRAD GMHFML195C (Magnetic)	< 3.0	20 cm	20 cm

**1.4.1 Nomadic Antennas**



This device must not be co-located or operated in conjunction with any other antenna or transmitter.

Install the radio’s antenna (refer to Table 1-2 for applicable antenna part numbers) in the center of the vehicle’s roof. These nomadic antenna installation guidelines are limited to metal body motor vehicles or vehicles with appropriate ground planes. The antenna installation should additionally be in accordance with the following:

- The requirements of the antenna manufacturer/supplier included with the antenna.
- Installation instructions in this manual, including any minimum antenna cable lengths.
- The installation manual providing specific information of how to install the antennas to facilitate recommended operating distances to all potentially exposed persons.
- Use only the Harris approved/supplied antenna(s) or approved replacement antenna. Unauthorized antennas, modifications, or attachments could damage the radio and may violate FCC regulations.

**1.4.2 Approved Accessories**

This radio has been tested and meets the FCC RF guidelines when used with the Harris accessories supplied or designated for use with this product. Use of other accessories may not ensure compliance with the FCC’s RF exposure guidelines, and may violate FCC regulations.

For a list of Harris approved accessories refer to the product manuals, the Products and Services Catalog, or contact Harris at 1-800-528-7711.

### 1.4.3 Occupational Safety Guidelines and Safety Training Information

To ensure bodily exposure to RF electromagnetic energy is within the FCC allowable limits for occupational use. Always adhere to the following basic guidelines:

1. The radio should only be used for necessary work-related communications.
2. The radio should only be used by authorized and trained personnel. It should never be operated by children.
3. Do not attempt any unauthorized modification to the radio. Changes or modifications to the radio may cause harmful interference and/or cause it to exceed FCC RF exposure limits. Only qualified personnel should service the radio.
4. Always use Harris authorized accessories (antennas, control heads, speakers/mics, etc.). Use of unauthorized accessories can cause the FCC RF exposure compliance requirements to be exceeded.

The information listed above provides the user with information needed to make him or her aware of a RF exposure, and what to do to assure that this radio operates within the FCC exposure limits of this radio.

### 1.4.4 Common Hazards



**The operator of any mobile radio should be aware of certain hazards common to the operation of vehicular radio transmissions. Possible hazards include but are not limited to:**

- **Explosive Atmospheres** — Just as it is dangerous to fuel a vehicle while its motor running, be sure to turn the radio OFF while fueling the vehicle. If the radio is mounted in the trunk of the vehicle, DO NOT transport containers of fuel in the trunk.  
  
Areas with potentially explosive atmosphere are often, but not always, clearly marked. Turn the radio OFF when in any area with a potentially explosive atmosphere. It is rare, but not impossible that the radio or its accessories could generate sparks.
- **Interference To Vehicular Electronic Systems** — Electronic fuel injection systems, electronic anti-skid braking systems, electronic cruise control systems, etc., are typical of the types of electronic devices that can malfunction due to the lack of protection from radio frequency (RF) energy present when transmitting. If the vehicle contains such equipment, consult the dealer for the make of vehicle and enlist his aid in determining if such electronic circuits perform normally when the radio is transmitting.
- **Electric Blasting Caps** — To prevent accidental detonation of electric blasting caps, DO NOT use two-way radios within 1000 feet (305 meters) of blasting operations. Always obey the “Turn Off Two-Way Radios” (or equivalent) signs posted where electric blasting caps are being used. (OSHA Standard: 1926.900).
- **Radio Frequency Energy** — To prevent burns or related physical injury from radio frequency energy, do not operate the transmitter when anyone outside of the vehicle is within the minimum safe distance from the antenna as specified in Table 1-1. Refer to Section 1.2 for additional information.
- **Vehicles Powered By Liquefied Petroleum (LP) Gas** — Radio installation in vehicles powered by liquefied petroleum gas, where the LP gas container is located in the trunk or other sealed-off space within the interior of the vehicle, must conform to the National Fire Protection Association standard **NFPA 58**. This requires:

- The space containing the radio equipment must be isolated by a seal from the space containing the LP gas container and its fittings.
- Outside filling connections must be used for the LP gas container.
- The LP gas container space shall be vented to the outside of the vehicle.
- **Vehicles Equipped with Airbags** — For driver and passenger safety, avoid mounting the radio or any other component above or near airbag deployment areas. In addition to driver-side and passenger-side front-impact airbags, some vehicles may also be equipped with side-impact airbags. For occupant safety, verify the location of all airbags within the vehicle before installing the radio equipment.

#### **1.4.5 Operating Rules and Regulations**

Two-way FM radio systems must be operated in accordance with the rules and regulations of the local, regional, or national government.

In the United States, the mobile radio must be operated in accordance with the rules and regulations of the Federal Communications Commission (FCC). Operators of two-way radio equipment must be thoroughly familiar with the rules that apply to the particular type of radio operation. Following these rules helps eliminate confusion, assures the most efficient use of the existing radio channels, and results in a smoothly functioning radio network.



**Under U.S. law, operation of an unlicensed radio transmitter within the jurisdiction of the United States may be punishable by a fine of up to \$10,000, imprisonment for up to two (2) years, or both.**

When using a two-way radio, remember these rules:

- It is a violation of FCC rules to interrupt any distress or emergency message. The radio operates in much the same way as a telephone “party line.” Therefore, always listen to make sure the channel is clear before transmitting. Emergency calls have priority over all other messages. If someone is sending an emergency message – such as reporting a fire or asking for help in an accident, do not transmit unless assistance can be offered.
- The use of profane or obscene language is prohibited by Federal law.
- It is against the law to send false call letters or false distress or emergency messages. The FCC requires keeping conversations brief and confines them to business. To save time, use coded messages whenever possible.
- Using the radio to send personal messages (except in an emergency) is a violation of FCC rules. Send only essential messages.
- It is against Federal law to repeat or otherwise make known anything overheard on the radio. Conversations between others sharing the channel must be regarded as confidential.
- The FCC requires self-identification at certain specific times by means of call letters. Refer to the rules that apply to the particular type of operation for the proper procedure.
- No changes or adjustments shall be made to the equipment except by an authorized or certified electronics technician.



### 1.4.6 Mobile Operating Tips

The following conditions tend to reduce the effective range of two-way radios and should be avoided whenever possible:

- Operating the radio in areas of low terrain, or while under power lines or bridges.
- Obstructions such as mountains and buildings.



NOTE

In areas where transmission or reception is poor, communication improvement may sometimes be obtained by moving a few yards in another direction, or moving to a higher elevation.

## 2 INTRODUCTION

### 2.1 ABOUT THIS MANUAL












This manual is written for the communications professional responsible for installing and maintaining the VIDA Broadband Subscriber Station (Client) equipment installed as part of a VIDA Broadband 4.9 GHz Broadband Network.

This manual provides an overview of the VIDA Broadband Client equipment used in the VIDA network. Equipment specifications and instructions are discussed for installing VIDA Broadband Clients and auxiliary equipment in various mobile and fixed applications.

### 2.2 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 2-1: 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 Installation and Configuration Manual	MM-014720-001
 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

## 2.3 GLOSSARY OF TERMS

The following Table is a list of terms used in this manual.

**Table 2-2: Glossary of Terms**

<b>TERM</b>	<b>DEFINITION</b>
AES	Advanced Encryption Standard
RSA	Rivest, Shamir, and Adleman (creators of RSA Encryption format)
DES	Digital Encryption Standard
DHCP	Dynamic Host Configuration Protocol
EDACS	Enhanced Digital Access Communications System
GPS	Global Positioning Satellite
IEEE	Institute of Electrical & Electronics Engineers
LMR	Land Mobile Radio
MIB	Management Information Base
QoS	Quality of Service
SNMP	Simple Network Management Protocol
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

### 3 DESCRIPTION

The 4.9 GHz VIDA Broadband Client is part of Harris' VIDA Broadband network. The VIDA Broadband Client may be installed in fixed or nomadic applications and is designed to operate using AC or DC input voltage and communicate through a 100Base-TX Ethernet data port.



**Figure 3-1: VIDA Broadband Client**

#### 3.1 SUBSCRIBER STATION CONFIGURATIONS

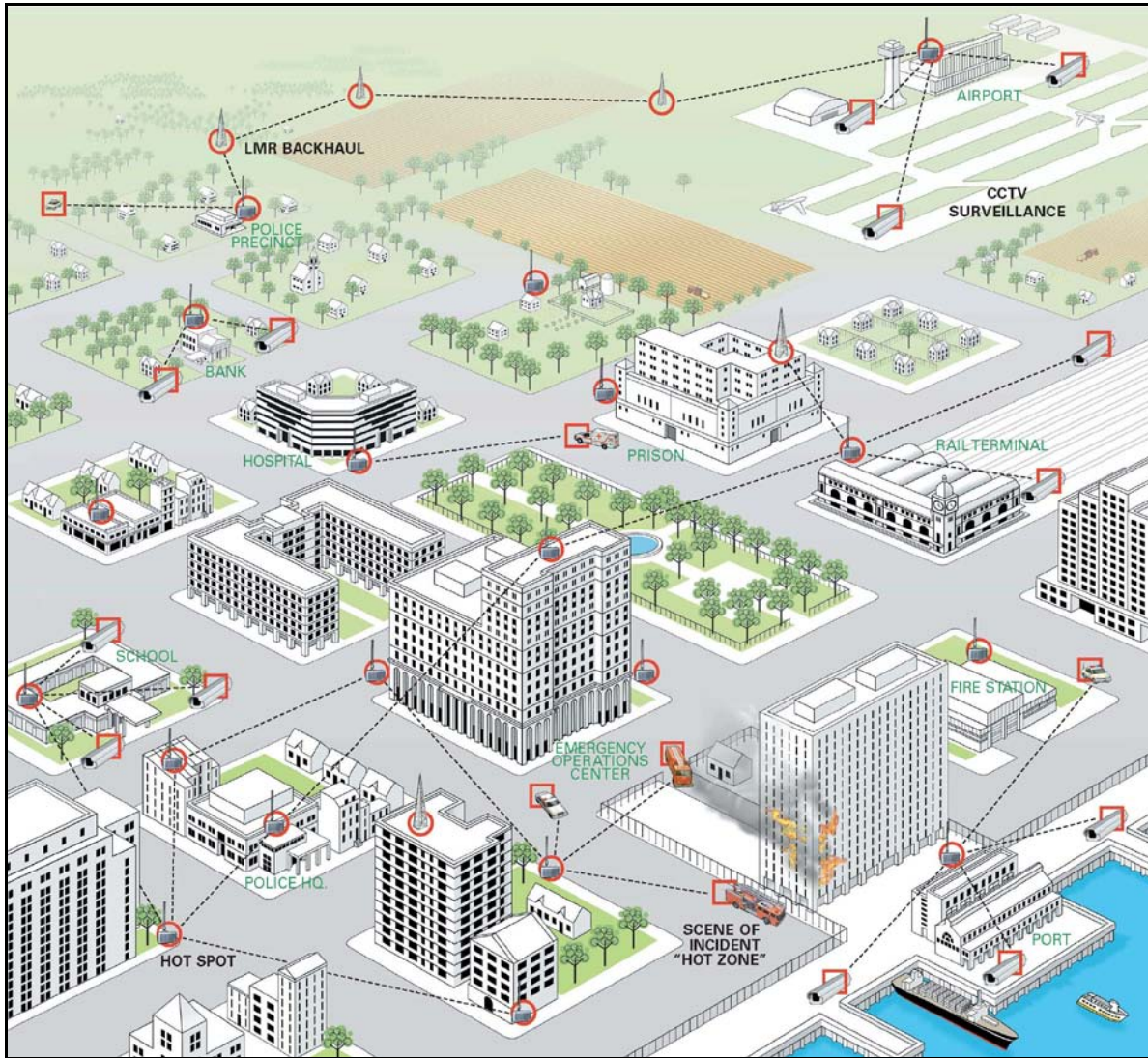
The 4.9 GHz VIDA Broadband Client is shown in Figure 3-1. The Client is housed in a ruggedized enclosure suitable for nomadic or outdoor installations. The NEMA 4 housing satisfies IP66 requirements for outdoor deployments. The Client is designed for multiple mounting configurations to allow nomadic or fixed structure mounting.

The Client is available for fixed or nomadic applications and is approved for 5 or 10 MHz channel bandwidth. The Client is designed to operate on 11 to 30 Vdc or 24 Vac and use a 100Base-TX Ethernet data port configuration. However, a DC supply is recommended in all applications for cleaner and lower-noise power.

#### 3.2 VIDA BROADBAND SYSTEM OVERVIEW

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 3-2: 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 3-2. 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 3 to 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.

## 4 UNPACKING AND CHECKING EQUIPMENT

Before unpacking, installing or operating the VIDA Broadband equipment, read this section of the manual thoroughly. It contains detailed unpacking and handling instructions, and safety precautions to protect users and equipment.

### 4.1 UNPACKING EQUIPMENT

The VIDA Broadband equipment may be shipped in separate transit packages. The associated cabling and accessories for each unit, if any, may also be shipped in separate containers.

When unpacking the equipment, check the contents against the packing list. Contact your Harris VIDA Broadband equipment representative and the carrier if any discrepancies are noted.



NOTE

Save the shipping cartons and packing materials in case the equipment needs to be shipped back to the Harris for service.

### 4.2 INSPECTING AND INVENTORYING EQUIPMENT

Carefully unpack the equipment and examine each item. If there is any damage to the equipment, contact the carrier immediately and have their representative verify the damage. If you fail to report the shipping damages immediately, you may forfeit any claim against the carrier.



CAUTION

After removal from the carton, examine the VIDA Broadband equipment for broken, damaged, loose, or missing parts. Examine the RF connector(s), circular power connector and ground lug for cracks, bent or damaged threads, or damage to any paint or seals. If any are noted, contact the Harris Customer Resource Center immediately. Any unauthorized attempts to repair or modify this equipment will void the warranty and could create a safety hazard.

### 4.3 ITEMS INCLUDED

The following items are included in the Client package:

- VIDA Broadband Client (Part # 14000-1000-01)
- Mounting Bracket (Part # 14000-0067-01)
- Mating Power Plug (Part # CN-014934)
- Mating Network Plug (Part # J68-0021-001)
- Strain Relief Fitting (Part # E40-0021-001)
- Mounting Hardware Kit includes four each –8-32 x 3/8” SS Screw with washer (Part # H21-0001-206)

## 5 PLANNING A FIXED STATION INSTALLATION

### 5.1 GENERAL

Careful planning and preparation of any installation will always benefit the end result. Please refer to the *VIDA Broadband Installation Manual, MM-014720-001* for detailed planning and installation instructions.

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.

### 5.2 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.).

### 5.3 ELECTRICAL POWER

The input voltage source required depends on the model being installed. For example, clients use either 11 to 30 Vdc or 24 Vac +/- 10%.

The VM-WM4900-CL001 client supports power over Ethernet (IEEE 802.3-2005 compliant).

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.

#### 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.

### 5.4 SITE GROUNDING

Installers should review the recommended grounding procedures in the *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.

## 5.5 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 5-1 lists surge protectors that have been tested in VIDA Broadband systems and are available from Harris. Detailed descriptions of these devices can be found in the *VIDA Broadband Installation Manual, MM-014720-001*.

**Table 5-1: 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

## 5.6 ANTENNA OPTIONS

The VIDA Broadband Client allows users to choose many different antenna types to meet their application requirements. For fixed installations, a directional antenna can significantly extend the effective range of the Client. For example, a high gain directional antenna may improve signal quality over a long distance while antennas with less gain or omnidirectional may perform better in densely patterned city regions.

Three basic methods exist for mounting the base station antenna used with a Client. Two of the three methods mount the antenna directly on the Client and the third requires a separate mounting location and hardware. The three methods include the following:

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

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

### 5.6.1 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 System:** Linear Vertical or Horizontal  
26 dBi Effective Maximum System Gain

(Reduction of Transmitter Power is required if the Effective Maximum Antenna System Gain is greater than 26 dBi for 5 MHz operation or 29 dBi for 10 MHz operation.)

System antenna gain is defined as the antenna gain minus any cable or other losses between the base station antenna port and the antenna.



NOTE

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.

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.

### 5.6.2 Antenna Types

The following paragraphs describe the different types of antennas that can be used with VIDA Broadband devices. Table 5-2 contains a list of approved antennas. Detailed antenna descriptions can be found in the *VIDA Broadband Installation Manual, MM-014720-001*.

#### **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 client.

**Table 5-2: 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, 21 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, Nomadic, 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.

## 5.7 CLIENT MOUNTING

The VIDA Broadband Client is designed for pole or structure mounting. Pole mounting a Client may include mounting the unit onto a horizontally suspended light post or side arm, or a vertical telephone pole, mast pipe or tower leg. Mounting on a structure requires using an optional mounting plate.

Each subscriber station package includes a mounting bracket (14000-0067-01) and necessary hardware for attaching the brackets to the units. The mounting brackets accommodate pole diameters of 1½ inches and larger.

The subscriber station (client) can also be mounted to a flat surface, such as a wall, directly or using the mounting bracket, shown in Figure 6-1.

Installers should refer to the *VIDA Broadband Installation Manual, MM-014720-001* for detailed installation instructions.

## 6 PLANNING A NOMADIC CLIENT INSTALLATION

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 Harris 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.

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.

## 6.1 RECOMMENDED KITS AND ACCESSORIES

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

### 6.1.1 Mounting Bracket

The mounting bracket 14000-0067-01, shown in Figure 6-1, attaches to the bottom of the client and provides easy installation of the client in a variety of applications. Attach the bracket to the client using the hardware provided.

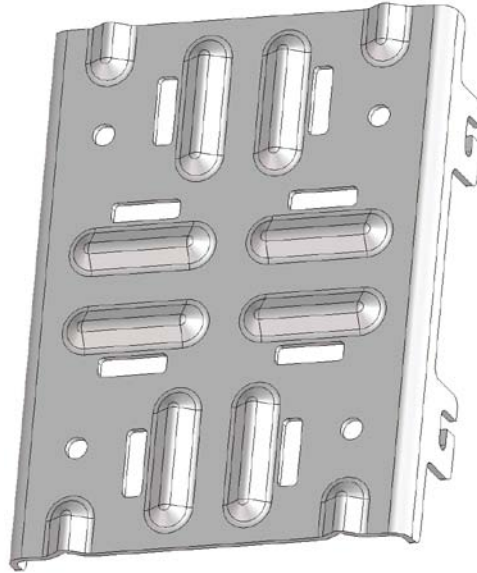


Figure 6-1: Mounting Bracket

### 6.1.2 DC Power Cable Kit





**WARNING**

**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 6-1: Fuse Distribution Rail Kit**




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



## 6.2 NOMADIC STATION ANTENNA OPTIONS

The recommended nomadic antenna model is the AN-013386-011. 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, listed in Table 6-2, are also available.

**Table 6-2: Nomadic Antenna and Mounts**

PART NUMBER	DESCRIPTION	PICTORIAL
<b>AN-013386-011</b> 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).	

## 6.3 INSTALLING THE NOMADIC CLIENT

Please refer to the installation instructions contained in the *VIDA Broadband Installation Manual, MM-014720-001*. This manual provides detailed instructions for installing and configuring a nomadic client.



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.

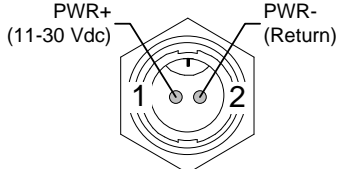
## 7 SUBSCRIBER STATION CONNECTIONS

### 7.1 POWER CONNECTIONS

Power is supplied to the client through a 2-pin connector. A #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 the *VIDA Broadband Installation Manual, MM-014720-001* for details.

#### 7.1.1 Subscriber Station DC Connections

**Table 7-1: Client DC Power Connector**

CONNECTION	PIN	POWER CONNECTOR
PWR+ (+11 to +30 Vdc)	1	
PWR- (Return)	2	

#### 7.1.2 Subscriber Station AC Connections



The AC supply must be isolated from AC mains; the use of an isolating step-down transformer is necessary. The AC 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 7-2: Client AC Power Connector**

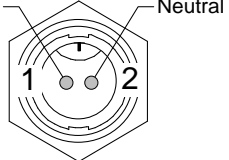
CONNECTION	PIN	CLIENT AC POWER CONNECTOR
HOT (16 to 26 Vac)	1	



Figure 7-1: VIDA Broadband Client Interface Diagram

## 7.2 NETWORK/DATA CONNECTIONS

Network connections are made using a standard Ethernet RJ-45 protocol 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.



CAUTION

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 cable. Instructions for selecting and fabricating Ethernet cables are provided in the *VIDA Broadband Installation Manual, MM-014720-001*.

2. Connect one end of the cable to the LAN 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 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 Ethernet cable should be grounded at the unit and then every 75 feet until terminated at the surge suppressor. Refer to the *VIDA Broadband Installation Manual, MM-014720-001* for grounding kit recommendations.

### **7.3 GROUNDING STUDS**

A grounding connection is provided on the client. 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*.

### **7.4 ANTENNA CONNECTIONS**



**WARNING**

**See Section 1.3 for further information regarding Maximum Permissible Exposure (MPE) limits of RF radiation set by the FCC.**

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

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



**NOTE**

The RF cable connecting the 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.

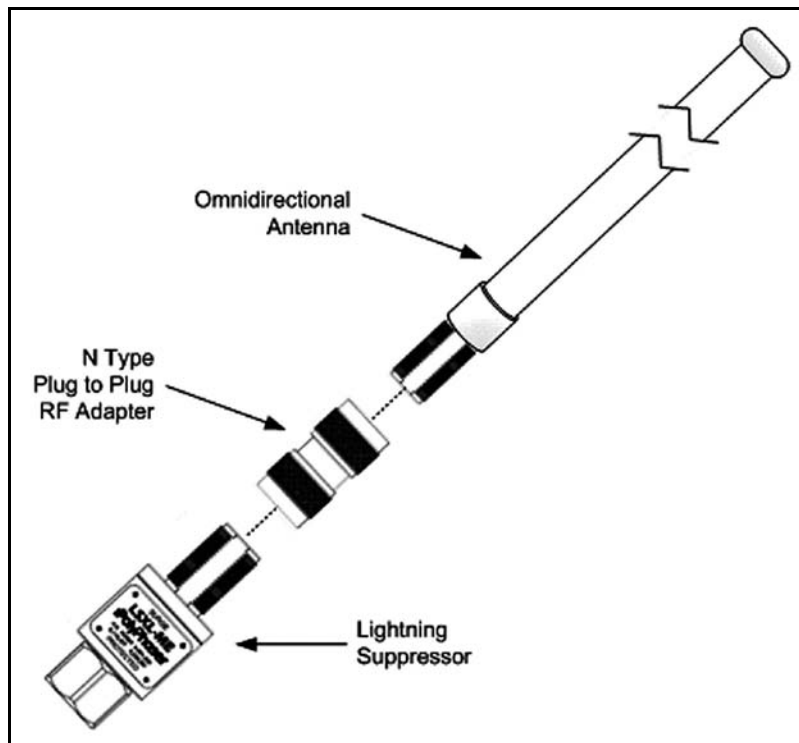
### 7.4.1 Installing an Omnidirectional Antenna

An omnidirectional antenna may be mounted directly to the Client 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 Copper Clients, 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 7-2.

A list of approved surge protection devices can be found in the *VIDA Broadband Installation Manual, MM-014720-001*.

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



**Figure 7-2: VIDA Broadband Client Antenna with External Lightning Protection**

### 7.4.2 Installing a Directional Antenna

A directional antenna can be mounted directly on the unit using the optional universal mounting bracket 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 the *VIDA Broadband Installation Manual, MM-014720-001* for alignment instructions.

Four mounting holes are provided for mounting an antenna to the front cover housing of the 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.

### **7.4.3 Remotely Mounting an Antenna**

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

Refer to the *VIDA Broadband Installation Manual, MM-014720-001* for installation instructions.

## 8 TROUBLESHOOTING AND SERVICING



There are no user serviceable components within the VIDA Broadband radio equipment assemblies. These assemblies contain ESD sensitive components and should only be serviced by Harris qualified personnel.

### 8.1 TROUBLESHOOTING

If a unit is suspected to be faulty or need service and repair, perform the following checks:

1. Visually inspect the installation for obvious defects such as worn, weathered, or frayed cabling.
2. Verify that the unit is receiving sufficient voltage and current to the power input connector.
3. Replace any defective antenna or power source components as required, and return any inoperable Clients to the manufacturer for repairs.



NOTE

Detailed troubleshooting information is available in the *VIDA Broadband Systems Troubleshooting Guide, MM-014642-001*.

### 8.2 TUNING AND ALIGNMENT

Every VIDA Broadband Client is fully aligned, including TX Frequency and RF Power Output, before shipment to ensure compliance with various regulatory requirements and product performance. No further tuning or alignment is required by the customer or installer during the installation process. Basic control of the Client, including RF power output and channel assignment, is accomplished by the UAS during site configuration. Refer to the *VIDA Broadband Installation Manual, MM-014720-001* for configuration and alignment instructions.

### 8.3 SERVICING

The Client is not a field repairable unit. If a unit is suspected to need servicing or re-alignment, then the unit should be removed from service and returned to Harris for repairs. Periodic checks of frequency and modulation bandwidth should be performed during routine preventative maintenance checks.

## **9 CUSTOMER SERVICE**

### **9.1.1 Technical Support**

The Technical Assistance Center (TAC) resources are available to help you with overall system operation, maintenance, upgrades, and product support. TAC is your point of contact when you need technical questions answered.

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

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

North America:	1-800-528-7711
International:	1-434-385-2400
FAX:	1-434-455-6712
E-mail:	<a href="mailto:PSPC_tac@harris.com">PSPC_tac@harris.com</a>

### **9.1.2 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 Harris representative.

Contact the Customer Resource Center at:

#### **North America:**

Phone Number:	1-800-368-3277 (toll free)
Fax Number:	1-800-833-7592 (toll free)
E-mail:	<a href="mailto:PSPC_CustomerFocus@harris.com">PSPC_CustomerFocus@harris.com</a>

#### **International:**

Phone Number:	1-434-455-6403
Fax Number:	1-434-455-6676
E-mail:	<a href="mailto:PSPC_InternationalCustomerFocus@harris.com">PSPC_InternationalCustomerFocus@harris.com</a>



## 10 SPECIFICATIONS

### 10.1 GENERAL SPECIFICATIONS

**Model Number:**

VM-WM4900-CL001

**Physical Characteristics:**

Electrical Power:	Power over Ethernet, +24 Vdc (nominal) or 24 Vac
Power Consumption:	6 Watts typical
Size (H x W x D):	8.2 × 4.9 × 1.6 in (20.9 × 12.4 × 4.1 cm)
Weight:	1.6 lbs (0.7 kg) (less mounting hardware)

**Environmental Specifications:**

Operating Temperature:	-22°F to +140°F (-30°C to +60°C)
Storage Temperature:	-40°F to +185°F (-40°C to +85°C)
Environmental (Enclosure):	NEMA4
Altitude:	15,000 ft. (operational)

**System Interfaces:**

Data Plane:	100Base-TX
Management:	100Base-TX, 100Base-FX, or over the air
4.9 GHz RF:	Type-N(f) connector

## 10.2 DATA SPECIFICATIONS

### Security Features:

Authentication:	X.509 Digital Certificate
Authorization:	RSA Public Key Encryption
Encryption:	AES 128 bit

### Network Features:

Management:	SNMP
Convergence:	IPv4 IEEE 802.3/Ethernet
Configuration:	DHCP, TFTP

### PHY Characteristics:

PHY:	OFDM 256 FFT
Channel Bandwidth:	5 or 10 MHz
Modulation Rates:	BPSK, QPSK (1/2, 3/4), 16QAM (1/2, 3/4), 64QAM (1/2, 3/4)
Duplexing:	Time Division Duplexing (TDD)
Frame Durations:	5 msec, 10 msec
CP:	1/32, 1/16, 1/8, 1/4
Throughput:	1-19 Mbps for 5 MHz Channel 2-38 Mbps for 10 MHz Channel

### MAC Characteristics:

Duplexing:	Time Division Duplexing (TDD)
Service Classes Supported:	Real-Time Polling Service (rtPS) Non-Real-Time Polling Service (nrtPS) Unsolicited Grant Service (UGS) Best Efforts (BE)

## 10.3 TRANSMITTER SPECIFICATIONS

Frequency:	4.905-4.995 GHz
Channel Bandwidth:	5 or 10 MHz

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RF Power Output:	27 dBm maximum
Output Power Control:	50 dB
FCC ID:	BV8WM4900CL
Industry Canada:	3670A-WM4900CL
Spectrum Mask:	FCC Mask M (90.210)

## 10.4 RECEIVER SPECIFICATIONS

Frequency Band:	4.905-4.995 GHz
Channel Bandwidth:	5 or 10 MHz
Sensitivity at BER $10^{E-6}$ :	
BPSK -1/2:	-96 dBm
QPSK -3/4:	-89 dBm
16-QAM – 3/4:	-83 dBm
Max RX Input Power:	-30 dBm
Max/RX Input Power (no damage):	0 dBm

**WARRANTY**

Please register this product within 10 days of purchase. Registration validates the warranty coverage, and enables Harris to contact you in case of any safety notifications issued for this product.

Registration can be made on-line at [www.pspc.harris.com/CustomerService](http://www.pspc.harris.com/CustomerService) or by contacting Harris Warranty Administration at the following:

**U.S. & Canada:**

Phone Number: 1-800-368-3277, Option 4 (toll free)

Fax Number: 1-434-455-6821

E-mail: <mailto:WarrantyClaims@Harris.com>

**International:**

Phone Number: 1-434-455-6403

Fax Number: 1-434-455-6676

E-mail: <mailto:WarrantyClaims@Harris.com>

- A. Harris Corporation, a Delaware Corporation, through its RF Communications Division (hereinafter "Seller") warrants to the original purchaser for use (hereinafter "Buyer") that Equipment manufactured by or for the Seller shall be free from defects in material and workmanship, and shall conform to its published specifications. With respect to all non-Seller Equipment, Seller gives no warranty, and only the warranty, if any, given by the manufacturer shall apply. Rechargeable batteries are excluded from this warranty but are warranted under a separate Rechargeable Battery Warranty (ECR-7048).
- B. Seller's obligations set forth in Paragraph C below shall apply only to failures to meet the above warranties occurring within the following periods of time from date of sale to the Buyer and are conditioned on Buyer's giving written notice to Seller within thirty (30) days of such occurrence:
1. for fuses and non-rechargeable batteries, operable on arrival only.
  2. for parts and accessories (except as noted in B.1), ninety (90) days.
  3. for P7300, P7200, P7100<sup>IP</sup>, P5400, P5300, P5200, P5100, P3300, M7300, M7200 (including V-TAC), M7100<sup>IP</sup>, M5300 and M3300 radios, two (2) years, effective 10/01/2007.
  4. for Unity<sup>®</sup> XG-100P, three (3) years.
  5. for all other equipment of Seller's manufacture, one (1) year.
- C. If any Equipment fails to meet the foregoing warranties, Seller shall correct the failure at its option (i) by repairing any defective or damaged part or parts thereof, (ii) by making available at Seller's factory any necessary repaired or replacement parts, or (iii) by replacing the failed Equipment with equivalent new or refurbished Equipment. Any repaired or replacement part furnished hereunder shall be warranted for the remainder of the warranty period of the Equipment in which it is installed. Where such failure cannot be corrected by Seller's reasonable efforts, the parties will negotiate an equitable adjustment in price. Labor to perform warranty service will be provided at no charge during the warranty period only for the Equipment covered under Paragraph B.3 and B.4. To be eligible for no-charge labor, service must be performed at Seller's factory, by an Authorized Service Center (ASC) or other Servicer approved for these purposes either at its place of business during normal business hours, for mobile or personal equipment, or at the Buyer's location, for fixed location equipment. Service on fixed location equipment more than thirty (30) miles from the Service Center or other approved Servicer's place of business will include a charge for transportation.
- D. Seller's obligations under Paragraph C shall not apply to any Equipment, or part thereof, which (i) has been modified or otherwise altered other than pursuant to Seller's written instructions or written approval or, (ii) is normally consumed in operation or, (iii) has a normal life inherently shorter than the warranty periods specified in Paragraph B, or (iv) is not properly stored, installed, used, maintained or repaired, or, (v) has been subjected to any other kind of misuse or detrimental exposure, or has been involved in an accident.
- E. The preceding paragraphs set forth the exclusive remedies for claims based upon defects in or nonconformity of the Equipment, whether the claim is in contract, warranty, tort (including negligence), strict liability or otherwise, and however instituted. Upon the expiration of the warranty period, all such liability shall terminate. The foregoing warranties are exclusive and in lieu of all other warranties, whether oral, written, expressed, implied or statutory. NO IMPLIED OR STATUTORY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE SHALL APPLY. IN NO EVENT SHALL THE SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL, INDIRECT OR EXEMPLARY DAMAGES.

This warranty applies only within the United States.

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