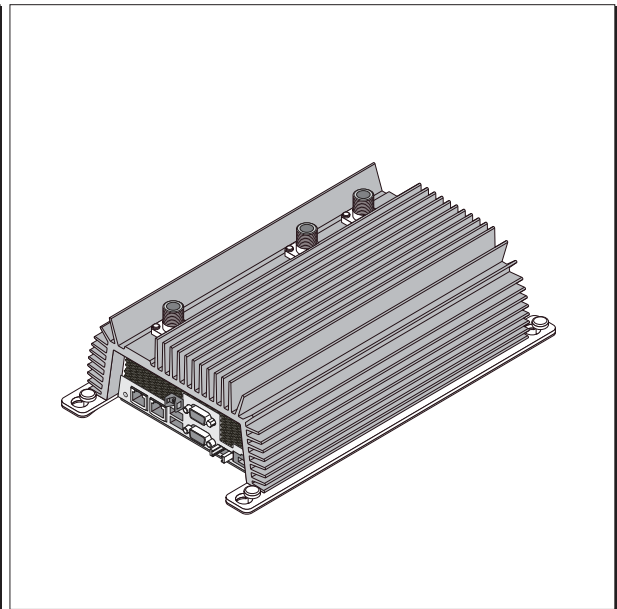
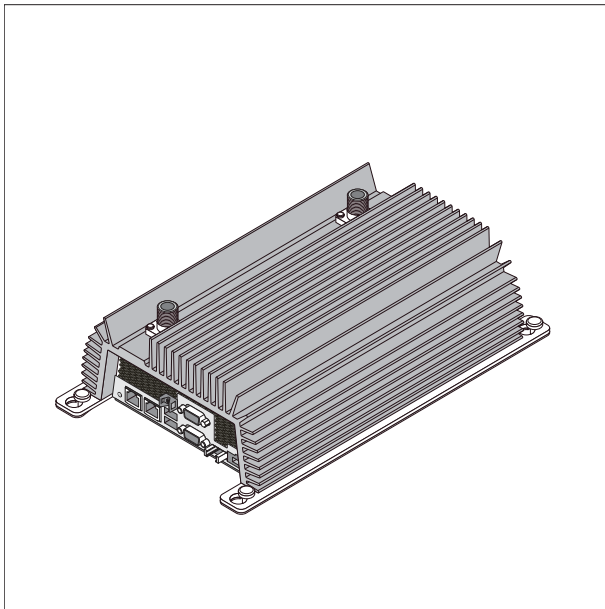


Tropos[®] Networks MetroMesh[™] Router Installation Guide Models 4210 and 9422



Tropos Networks, Inc.
555 Del Rey Ave.
Sunnyvale, CA 94085 USA
www.troposnetworks.com
408-331-6800

Part No. 200148-02 Rev C0
January 2008

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This product includes technology protected by U.S. Patents 6,704,301; 6,965,575; 7,016,328; 7,031,293; and 7,058,021.

FCC Notice to Users and Operators

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 when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by using one of the following measures:

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

This Part 15 radio device operates on a non-interference basis with other devices operating at this frequency. Any changes or modification to said product not expressly approved by Tropos Networks could void the user's authority to operate this device.

FCC Part 90Y Notice for 4.9 GHz Operation

Operation in the 4.9 GHz band requires an FCC license. The following eligibility rules are specified in Part 90.1203 of the FCC rules:

- Entities providing public safety services as defined under section 90.523 are eligible to hold an FCC license for systems operating in the 4940-4990 MHz band. All of the requirements and conditions set forth in that section also govern authorizations in the 4940-4990 MHz band.
- 4.9 GHz band licensees may enter into sharing agreements or other arrangements for use of the spectrum with entities that do not meet these eligibility requirements. However, all applications in the band are limited to operations in support of public safety.



Caution

The mobile router requires shielded CAT5 Ethernet data cables.

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1 Installing the Tropos Mobile MetroMesh Router

This guide explains how to install the Tropos Mobile MetroMesh Router, Models 4210 and 9422. This chapter contains the following sections:

- [Preparing for Installation](#)
- [Installing the Mobile Router](#)
- [Front Panel LED](#)
- [Remote Indicator](#)
- [Service Instructions](#)

Product Summary

This document contains installation instructions for the following products:

- [Tropos 4210 Router](#)
- [Tropos 9422 Router — Public Safety](#)

Tropos 4210 Router

The Tropos 4210 router for the FCC regulatory domain has the following characteristics:

- 802.11b/g dual band, 2400-2483 MHz
- DC power, 10-32 VDC
- CPE and Management 10/100BaseT Ethernet ports

[Table 1](#) lists the Tropos 4210 router model.

Table 1 Tropos 4210 Router Models—FCC

Model	Description
42102100	4210: Mobile router, 2.4 GHz, DC power, NoBatt

Tropos 9422 Router — Public Safety

The Tropos 9422 router for licensed FCC public safety applications has the following characteristics:

- 802.11a/b/g dual band, 2400-2483 MHz/4940-4990 MHz
- DC power, 10-32 VDC
- CPE and Management 10/100BaseT Ethernet ports



Note

Operation in the 4.9 GHz band requires an FCC license. The following eligibility rules are specified in Part 90.1203 of the FCC rules:

- Entities providing public safety services as defined under section 90.523 are eligible to hold an FCC license for systems operating in the 4940-4990 MHz band. All of the requirements and conditions set forth in that section also govern authorizations in the 4940-4990 MHz band.
 - 4.9 GHz band licensees may enter into sharing agreements or other arrangements for use of the spectrum with entities that do not meet these eligibility requirements. However, all applications in the band are limited to operations in support of public safety.
-

[Table 2](#) lists the Tropos 9422 router model for public safety applications.

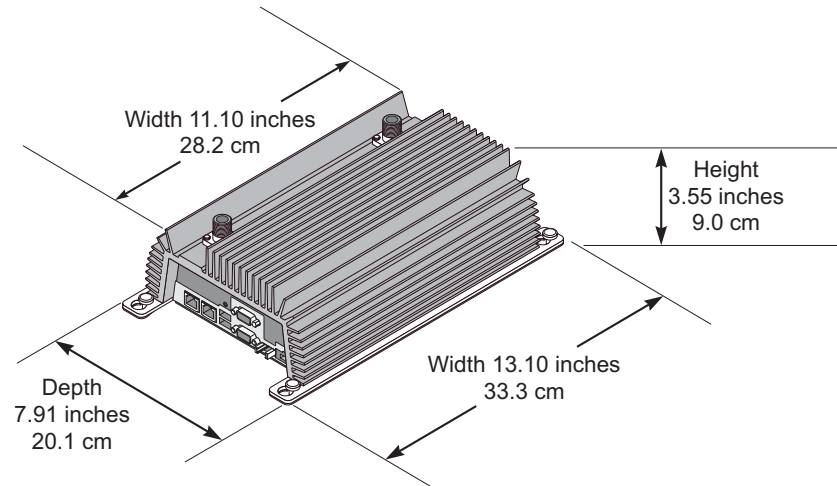
Table 2 Tropos 9422 Routers—Public Safety

Model	Description
94221000	9422: 2.4 and 4.9 GHz, DC power, NoBatt

Preparing for Installation

Figure 1 shows the mobile router unit and dimensions.

Figure 1 Tropos Mobile Router



trp_137BW

Shipping Package Contents

The shipping package contains the following items:

- Tropos mobile router
- *Tropos Mobile MetroMesh Router Installation Guide* (this document)
- 2-pin power plug attached to router
- Fuse attached to router

Installation Accessories

You must supply the following accessories:

- 1/4-20 panhead machine screws, split lock washers, and backing nuts
- Ethernet cable to connect the router to the laptop computer you plan to use for network access (crossover cable if no switch or hub is used)
- #16 AWG wiring to connect the router to vehicle power
- Antennas and antenna cables

The following items are optional:

- USB Global Positioning System (GPS) receiver (with USB cable connector)
- Right angle N-connector (RF cable) adapters

Selecting Router Locations

Tropos routers are radio devices, and as such, they are susceptible to common causes of interference that can reduce throughput and range. Follow these general guidelines when selecting an installation location:

- Install the router away from other possible sources of WLAN interference, such as 2.4 GHz or 4.9 GHz cordless phones, spy cameras, frequency hopping (FHSS) and DSSS LAN transceivers (non-802.11g), electronic news gathering video links, radars, amateur radios, land mobile radio services, local government sites (such as law enforcement), fixed microwave services, local TV transmission and private fixed point transmitters).
- Install only in protected interior locations, as the router is not weather-proofed.
- Choose a mounting surface that is at least 13.25 inches by 8 inches to provide sufficient space to screw the router into the surface ([Figure 1](#)). It is not necessary to level the router.

**Note**

The mobile Tropos router contains integral ESD protection and vehicle power conditioning, so external protection is not required.

Antenna Options

You can purchase any of the Tropos-approved, cable-attached antennas that are listed in “[Ordering Information](#)” on page 26 (see [Figure 2](#) and [Figure 3](#)). Omni-directional antennas are best for systems requiring a signal distribution in more than one direction.

**Caution**

To comply with regulatory RF exposure limits, locate antennas a minimum distance of 7.9 inches (20cm) from people.

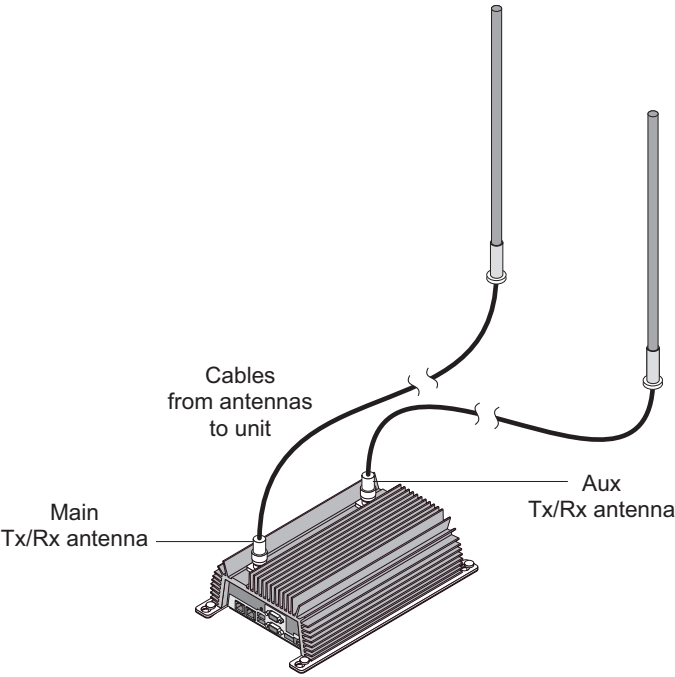
**Note**

It is possible to use a single antenna; however, **two antennas are strongly recommended for enhanced performance and range.**

**Note**

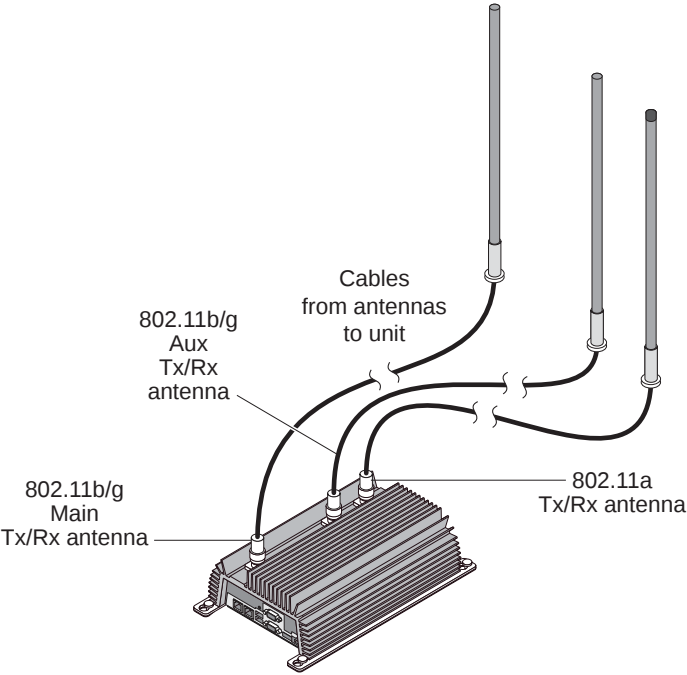
Only use antennas that are approved by Tropos. Operating the unit with non-qualified antennas is a violation of U.S. FCC Rules Part 15.203(c), Code of Federal Regulations, Title 47.

Figure 2 Tropos 4210 Router with Cable-Attached Antennas



trp_128

Figure 3 Tropos 9422 Router with Cable-Attached Antennas



trp_191

Selecting Antenna Locations

Under ideal conditions, the mobile router antennas should be installed on the roof of a vehicle that does not have a light bar or other major obstruction. Follow these guidelines for ideal antenna placement ([Figure 4](#) and [Figure 5](#)):

- Install the antennas on the highest part of the vehicle so that they are clear of obstructions within at least a 3ft radius. Other antennas do not need to be considered as sources of obstruction.
- Install the antennas on the flattest area of the roof with a minimum of 8 inches between the two antennas.
- Keep the antenna cables as short as possible.

Figure 4 Tropos 4210 Preferred Antenna Mounting Location

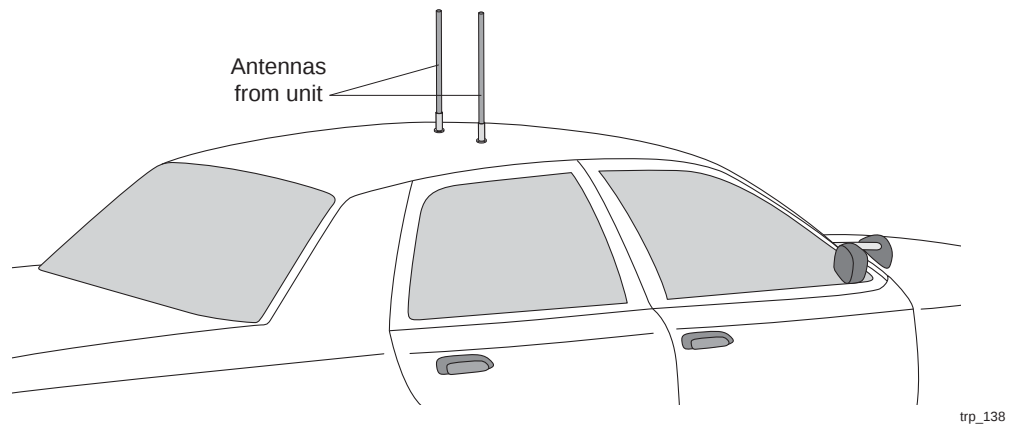
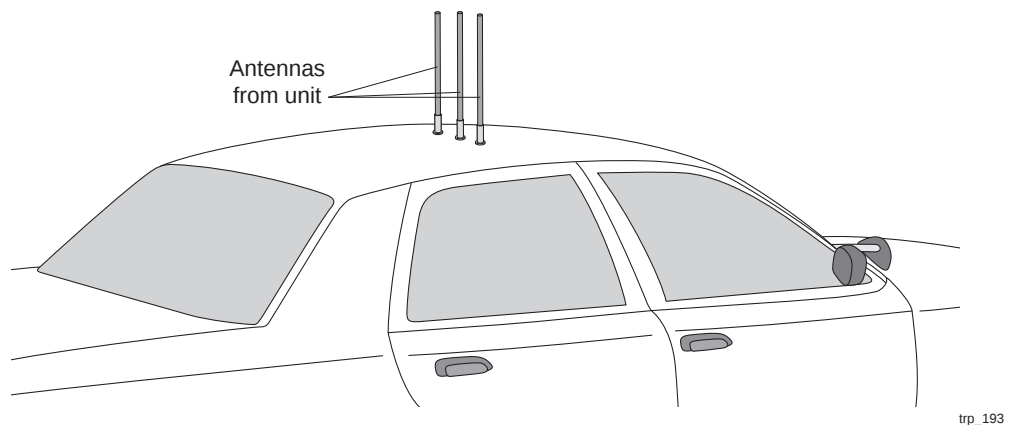


Figure 5 Tropos 9422 Preferred Antenna Mounting Location



If the vehicle has a light bar or other obstruction, follow these guidelines to achieve the best possible results (Figure 6 and Figure 7):

- Install the antennas on the roof of the vehicle as far as possible away from the light bar or other obstruction. Maximizing the distance from the obstruction is more important than installing the antennas on a flat surface.
- Allow at least 8 inches between the antennas.
- Keep the antenna cables as short as possible.

Figure 6 Tropos 4210 Acceptable Antenna Mounting Location

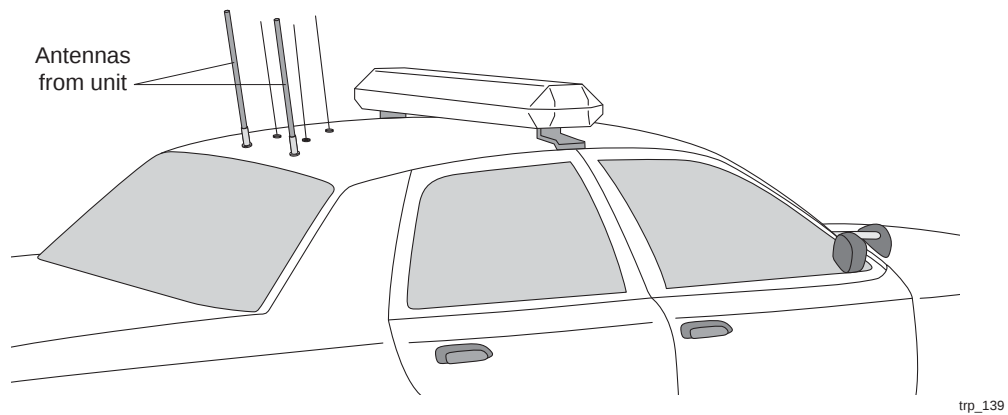
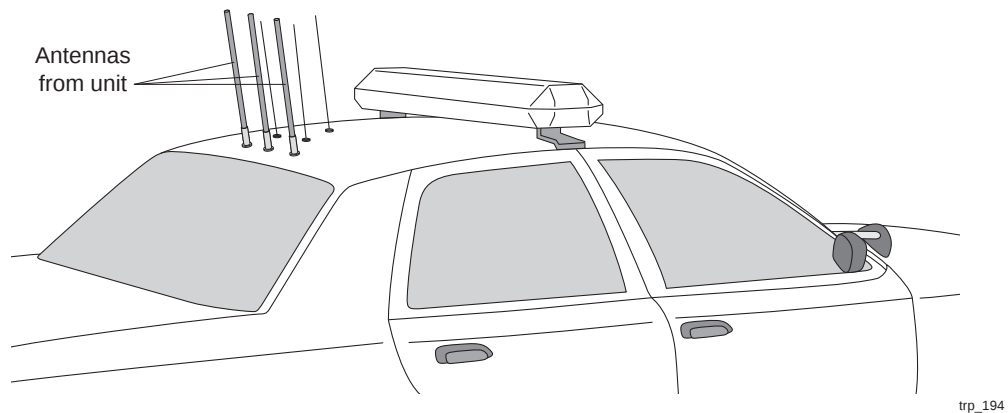


Figure 7 Tropos 9422 Acceptable Antenna Mounting Location



Cable Connections and Power

Figure 8 shows the power and connector ports on the side panel of the mobile router:

- The status indicator is red when the router is not connected to the Tropos network. It is green when the router has a working IP address and network connectivity.
- The CPE port is used to connect the router to the computer that is used for network access. The MGT port is used for router configuration.
- There are two USB ports, either one of which can be used to connect a GPS receiver.
- There are two RS-232 serial ports. The top port should be used to connect to a client PC to transfer GPS data. One RS-232 port is reserved for factory use.
- The fuse is user replaceable (see [“Fuse Replacement”](#) on page 15).
- The power plug accepts #16 AWG wire.

The router is designed to be used with negative ground systems, such as motor vehicle power. There is no internal battery back-up, so the vehicle must be powered for the router to operate.



Note

The router requires quality shielded CAT5 Ethernet data cables.



Note

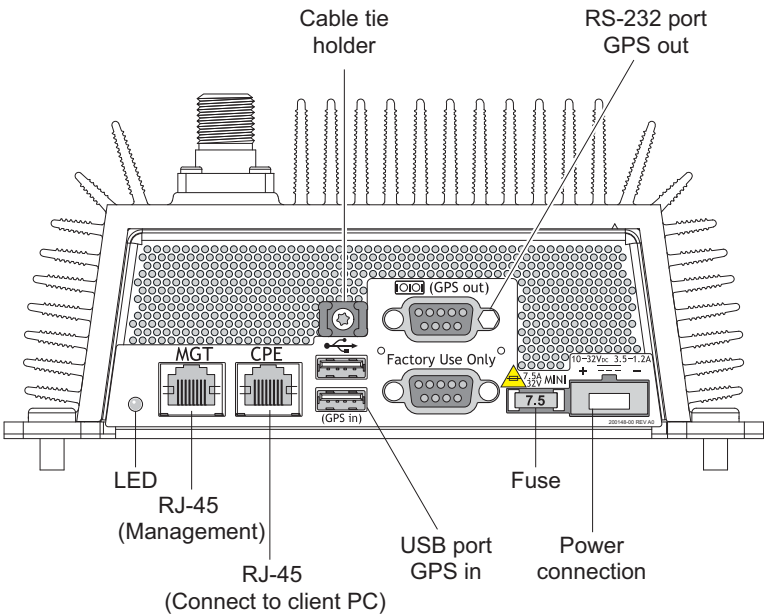
The router does not have a power switch. It is powered when the power plug is attached and then connected to vehicle power. To remove power from an installed router, remove the power plug, remove the fuse, or turn off vehicle power.

GPS Receiver Serial Port Settings

You can connect a GPS receiver to the serial port using the following settings:

- DB9 to DB9 null modem serial cable
- 4800 BAUD
- No start bits
- 1 stop bit
- Hardware flow control on

Figure 8 Connector Panel



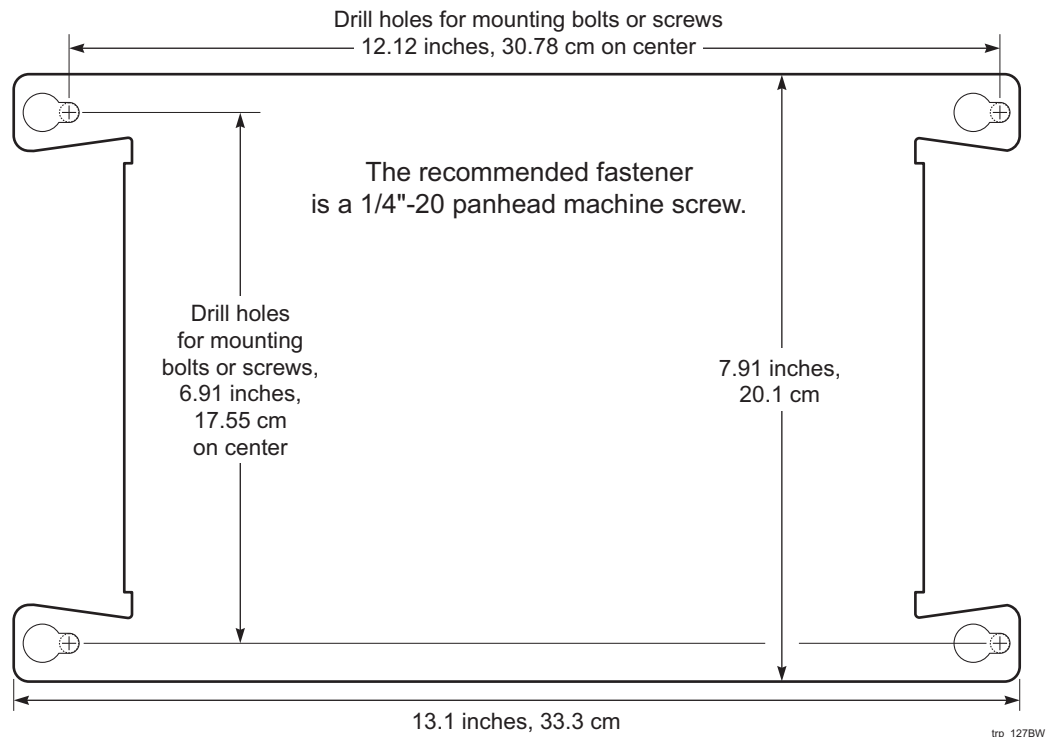
trp_129

Installing the Mobile Router

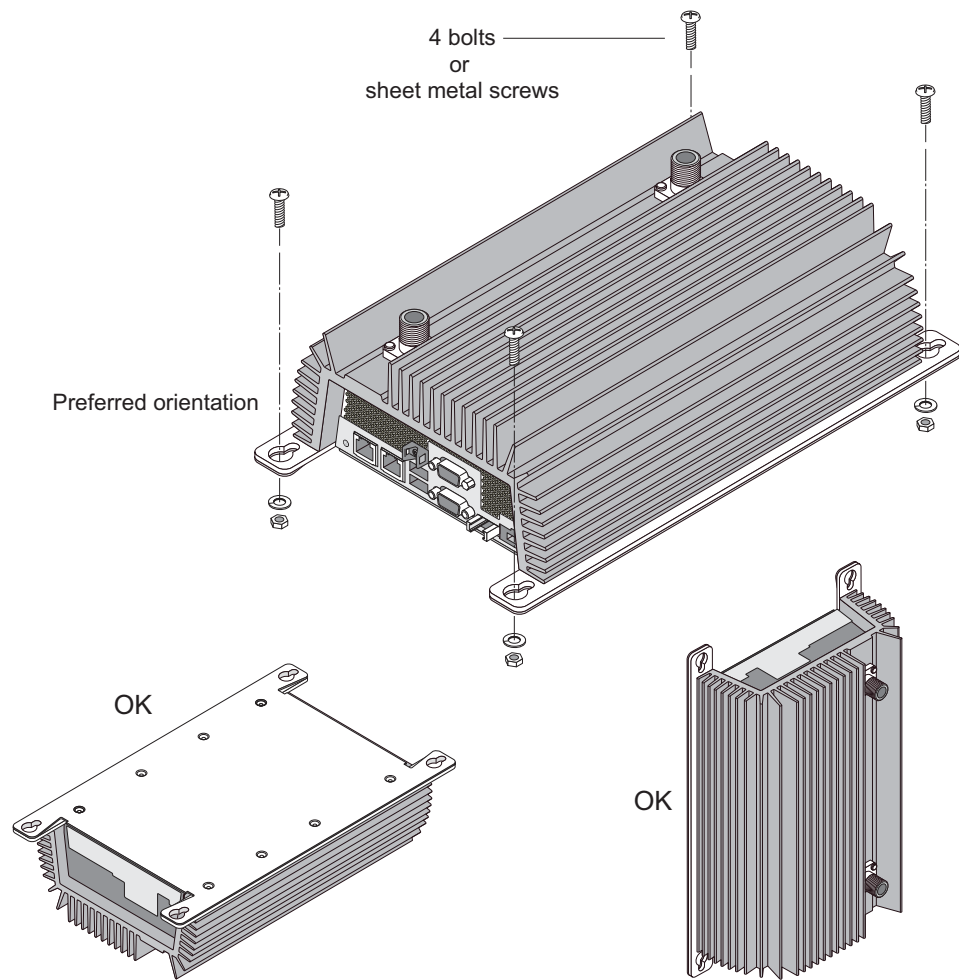
Follow these steps to install the mobile router:

1. Remove the router from the shipping box.
2. Drill four holes with a 7, 8, or 9 drill bit to create four 0.203-inch holes in the mounting surface. Refer to [Figure 9](#) for the mounting dimensions.

Figure 9 Preparing the Mounting Surface



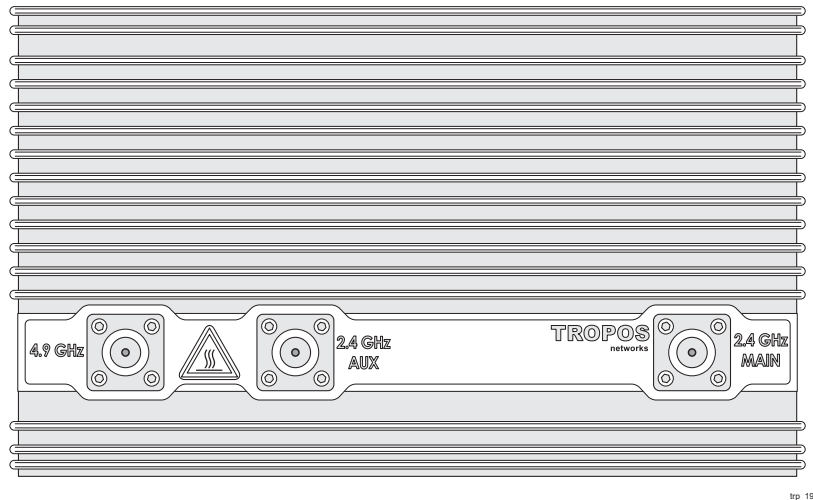
3. Screw the router to the mounting surface using 1/4"-20 panhead screws, backing nuts, and lock washers ([Figure 10](#)).

Figure 10 Attaching the Router to a Mounting Surface

trp_126

4. Attach antennas according to the instructions shipped with the antennas ([Figure 11](#)).

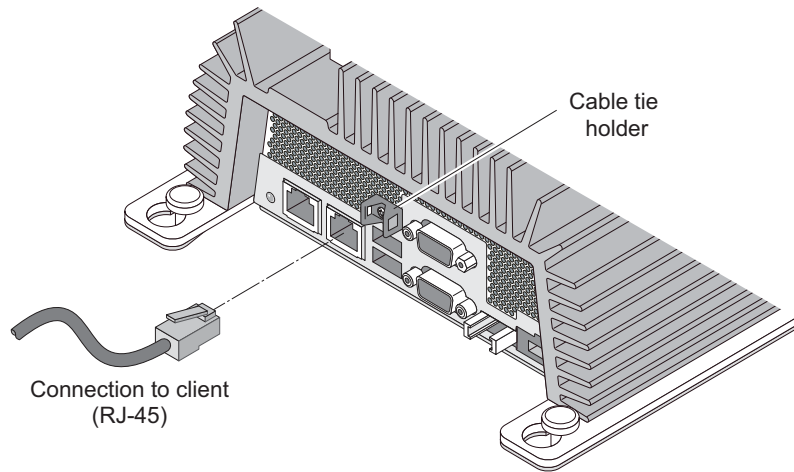
Figure 11 Antenna Ports



trp_185

5. Connect a standard Ethernet crossover cable with RJ45 connectors from the CPE port on the router to the Ethernet port on the client computer ([Figure 12](#)).

Figure 12 Ethernet Cable Connection

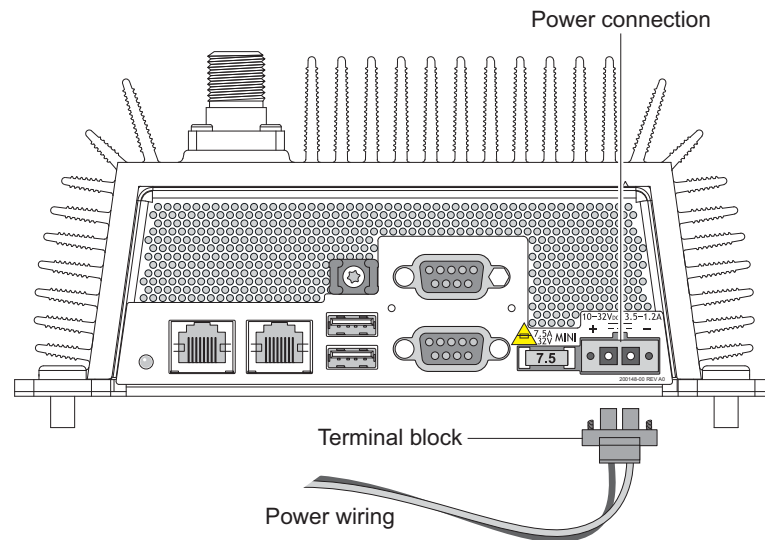


trp_130

6. If you plan to use a GPS receiver, mount the receiver according to the instructions shipped with the receiver. Connect the receiver cable to one of the USB ports on the router.
7. Use a small flat-head screw driver, if necessary, to remove the screws that attach the 2-pin power plug to the router.
8. For vibration security, use the cable tie to secure the RJ45 and USB connectors.

9. Trim 1/4-inch from the end of the #16AWG wire. Attach the red wire to the + side of the power plug and the black wire to the - side.

Figure 13 Power Plug Connection



trp_133BW

10. Return the power plug to its location on the router and screw down tightly. Note that the unit is powered as soon as the plug is connected and the other ends of the power wires are attached to vehicle power.



Note

Surfaces may become hot. Use caution when accessing the router.

Front Panel LED

Table 3 lists the front panel LED states. Pin 9 is used for the Remote Indicator (“Remote Indicator” on page 14).

Table 3 LED States

LED Color	Network State	Pin 9
Red	Not connected	Open circuit
Green	Connected	Closed circuit to ground (DC-)

**Caution**

Voltage on pin 9 must always be greater than the voltage at pin 5 (ground). Pin 5 is electrically connected to the chassis ground (negative ground). Maximum current from pin 9 to pin 5 is 50mA. Maximum voltage on pin 9 at any time is 32V (the same as for the router.) Exceeding these maximums can damage the router.

Service Instructions

This section contains service information.

Resetting the Router

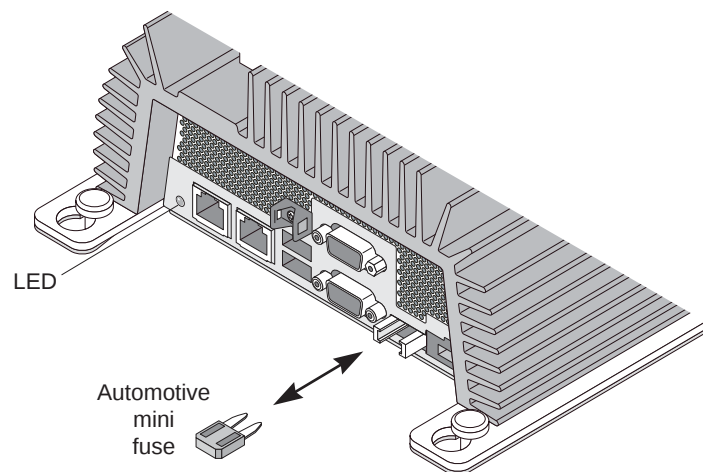
To perform a hardware reset of the router, unplug the router, pull the fuse out, or turn off the vehicle power. Wait 10 seconds and then reconnect the plug, fuse, or vehicle power.

To reset the router configuration to factory defaults, use the Tropos Configuration Utility, as described in the *Tropos Networks User Guide*.

Fuse Replacement

The 7.5A mini automotive fuse is located to the right of the power plug. The dark red color enables you to detect when the fuse has blown. Use needle-nose pliers or a fuse puller to pull the fuse out. Push the new fuse firmly into the fuse socket. To confirm that the new fuse is working, check the status light on the left side of the panel (see [Figure 15](#)).

Figure 15 Fuse Replacement



trp_134

Clock Battery



Note

The router has no internal user serviceable parts. The following information is intended for trained service personnel only.

Tropos routers have a real-time clock which is powered by a small lithium rechargeable battery. If the real-time clock fails, return the unit to Tropos Networks for servicing.

2 Product Specifications

This chapter contains the product specifications for the Tropos 4210 and 9422 mobile routers:

- [Physical Specifications](#)
- [Interfaces](#)
- [Power Options](#)
- [Certifications](#)

Table 4 Physical Specifications

Specification	Value
Physical Dimensions	
Inches	Height: 3.55 Width: 13.10 Depth: 7.91
Centimeters	Height: 9.0 Width: 33.3 Depth: 20.1
Weight	
lbs - maximum	10.0 (includes all brackets)
Kg - maximum	4.54
Temperature	Min
Operating Range	Min: -40° C Max: 70° C
Storage Range	Min: -45° C Max: 85° C
Color	Unpainted metal
Shock and Vibration	
Operational:	5-500Hz 0.5G 3 axis

Table 4 Physical Specifications

Specification	Value
Transportation:	ISTA 2A Random Bounce Random Vibration 6 Corner Drop Test

Table 5 Interfaces

Specification	Value
Data Interface	
IEEE 802.3 10/100BaseT	• 800 (10BaseT Half and Full Duplex Setting) • 300 (100BaseT Half and Full Duplex Setting) • RJ45 connector
Management Interface	
IEEE 802.3 10/100Base T	• 800 (10BaseT Full Duplex Setting) • 300 (100BaseT Full Duplex Setting) • RJ45 connector
802.11b/g Wireless Interface	
Standard	IEEE 802.11b/g Wi-Fi
Frequency Range	2400 to 2483 MHz ISM Band (CH 1-11) FCC Part 15
Modulation	DSSS; DBPSK @ 1 Mbps, DQPSK @ 2 Mbps, CCK @ 5.5 and 11 Mbps OFDM @ 54, 48, 36, 24, 18, 12, 9, 6
Rx Sensitivity	-100dBm (1 Mbps) -98dBm (2 Mbps) -95dBm (5.5 Mbps) -91dBm (11 Mbps) -94dBm (6 Mbps) -93dBm (9 Mbps) -92dBm (12 Mbps) -89dBm (18 Mbps) -86dBm (24 Mbps) -83dBm (36 Mbps) -78dBm (48 Mbps) -76dBm (54 Mbps)

Table 5 Interfaces (continued)

Specification	Value
Rx Saturation Maximum Power at Antenna Port	-5dBm (1 Mbps) -5dBm (2 Mbps) -5dBm (5.5 Mbps) -5dBm (11 Mbps) -5dBm (6 Mbps) -5dBm (9 Mbps) -5dBm (12 Mbps) -10dBm (18 Mbps) -30dBm (24 Mbps) -35dBm (36 Mbps) -35dBm (48 Mbps) -35dBm (54 Mbps)
802.11a Wireless Interface	
Standard	IEEE 802.11a Wi-Fi
Frequency Range	4940 - 4990 MHz Public Safety (FCC Part 90)
Modulation	OFDM @ 54, 48, 36, 24, 18, 12, 9, 6
Rx Sensitivity	-94dBm (6 Mbps) -93dBm (9 Mbps) -92dBm (12 Mbps) -89dBm (18 Mbps) -86dBm (24 Mbps) -83dBm (36 Mbps) -78dBm (48 Mbps) -76dBm (54 Mbps)
Rx Saturation Maximum Power at Antenna Port	-30dBm (6 Mbps) -30dBm (9 Mbps) -30dBm (12 Mbps) -30dBm (18 Mbps) -30dBm (24 Mbps) -35dBm (36 Mbps) -35dBm (48 Mbps) -35dBm (54 Mbps)
RF Interface	
Antennas	External
Antenna Diversity	802.11b/g: Transmit/Receive 802.11a: No diversity

Table 5 Interfaces (*continued*)

Specification	Value
Lightning Protection	<= 0.5μJ for 3kA @ 8/20μS Waveform
Impedance	50 ohms
VSWR	1.5 : 1
Connectors (two or three)	N (female)
Indicator - Status Lamp	Red/Green
Remote Network Status Indicator	32VDC max 50mA Open - No connection Closed - Connected

Table 6 Power Options

Specification	Value
DC	10.0-32.0 VDC 4210: 8W/30W typical/max 9422: 10W/30W typical/max Polarity protected Negative return - common chassis ground
ESD Protection	EN61000-4-2 Level 2 ESD Immunity EN61000-4-5 Level 4 Surge Immunity
Fuse	Automotive mini-blade 32 VDC 7.5A

Table 7 Certifications

Certifications
CFR 47 FCC Part 15; Class B CFR 47 FCC Part 90 UL 60950-1 CSA 22.1 No. 950 EN 60950 IEC 950 Industry Canada RSS 210

3

Approved Antenna Configurations and Attenuation Settings

This chapter lists approved antenna configurations and attenuation settings:

- [“High Power Product Antennas”](#) on page 22
- [“Public Safety Product Antennas”](#) on page 23

High Power Product Antennas

The information in this section applies to the following Tropos router model:

- 42102100—Tropos mobile router for FCC markets (802.11b/g 2.4 GHz)

Table 8 lists antenna configurations.



Note

CANADA ONLY: This device has been designed to operate with the antennas listed in Table 8, and having a maximum gain of 12dBi. Antennas not included in this list or having a gain greater than 12dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the Effective Isotropic Radiated Power (EIRP) is not more than that permitted for successful communication.

Table 8 802.11b/g Antenna Configurations (2400-2483 MHz)

Antenna	Ordering Number	Measured Cond. Avg. Power (dBm)	Tx Attenuation Software Setting (dB)	Approximate EIRP (dBm)
7.4dBi omni, unit mounted	AN074090 AN074091 AN074095	28.6	0	36
5.0dBi omni antenna, external mounting	AN050024 AN050090 AN050091 AN050095	28.6	0	33.6

Attenuation with External Antennas

If external antennas are used, it is necessary to adjust the transmit power attenuation to provide the correct power level for the router. Use the following formulas to compute the required attenuation level:

$$\text{Gain}' \text{ (dBi)} = \text{Antenna Gain (dBi)} - \text{Cable Loss (dB)}$$

802.11b/g:

$$\text{Tx Antenna Setting (dB)} = \begin{matrix} 0 & \text{if Gain}' < 7 \text{ dBi} \\ \text{Gain}' - 7 & \text{if Gain}' > 7 \text{ dBi} \end{matrix}$$

Public Safety Product Antennas

The information in this section applies to the following Tropos router model:

- 94221000—Tropos mobile router for FCC public safety markets (802.11b/g 2.4 GHz and 802.11a 4.9 GHz)

Certifications:

- USA: PJ9-BF4P9
- Canada: 4751A-BF4P9



Note

Operation in the 4.9 GHz band requires an FCC license. The following eligibility rules are specified in Part 90.1203 of the FCC rules:

- Entities providing public safety services as defined under section 90.523 are eligible to hold an FCC license for systems operating in the 4940-4990 MHz band. All of the requirements and conditions set forth in that section also govern authorizations in the 4940-4990 MHz band.
- 4.9 GHz band licensees may enter into sharing agreements or other arrangements for use of the spectrum with entities that do not meet these eligibility requirements. However, all applications in the band are limited to operations in support of public safety.

[Table 9](#) lists antenna configurations for the 802.11b/g antennas, and [Table 10](#) lists antenna configurations for the 802.11a antennas.



Note

CANADA ONLY: This device has been designed to operate with the antennas listed in [Table 9](#), and having a maximum gain of 12dBi. Antennas not included in this list or having a gain greater than 12dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the Effective Isotropic Radiated Power (EIRP) is not more than that permitted for successful communication.

Table 9 802.11b/g Antenna Configurations for Public Safety (2400-2483 MHz)

Antenna	Ordering Number	Measured Cond. Avg. Power (dBm)	Tx Attenuation Software Setting (dB)	Approximate EIRP (dBm)
7.4dBi omni, unit mounted	AN074090 AN074091 AN074095	28.6	0	36
5.0dBi omni antenna, external mounting	AN050024 AN050090 AN050091 AN050095	28.6	0	33.6

Table 10 802.11a Antenna Configurations for Public Safety (4940-4990 MHz)

Antenna	Ordering Number	Channel Bandwidth / Operating Frequency (MHz)	Measured Conducted Power (dBm)	Tx Attenuation Software Setting (dB)	Approximate EIRP (dBm)
9.0dBi omni, magnetic mount	AN090049	20 4950 - 4980	20.0	4	29.0
9.0dBi omni, magnetic mount	AN090049	10 4945 - 4985	17.0	7	26.0
9.0dBi omni, magnetic mount	AN090049	5 4945 - 4985	14.0	10	23.0
6.0dBi omni, magnetic mount	AN060049	20 4950 - 4980	20.0	4	26.0
6.0dBi omni, magnetic mount	AN060049	10 4945 - 4985	17.0	7	23.0
6.0dBi omni, magnetic mount	AN060049	5 4945 - 4985	14.0	10	20.0
5.0dBi omni, vehicle mounted	AN050049	20 4950 - 4980	20.0	4	25.0
5.0dBi omni, vehicle mounted	AN050049	10 4945 - 4985	17.0	7	22.0
5.0dBi omni, vehicle mounted	AN050049	5 4945 - 4985	14.0	10	19.0

Attenuation with External Antennas

If external antennas are used, it is necessary to adjust the transmit power attenuation to provide the correct power level for the router. Use the following formulas to compute the required attenuation level:

$$\text{Gain}' \text{ (dBi)} = \text{Antenna Gain (dBi)} - \text{Cable Loss (dB)}$$

802.11b/g:

$$\text{Tx Antenna Setting (dB)} = \begin{cases} 0 & \text{if Gain}' < 7 \text{ dBi} \\ \text{Gain}' - 7 & \text{if Gain}' > 7 \text{ dBi} \end{cases}$$

802.11a:

Tx Antenna Setting (dB) = 4 if Gain' < 9 dBi
 Gain' - 5 if Gain' > 9 dBi

4

Ordering Information

Table 11 contains ordering information for the Tropos mobile routers and related equipment. These items can be ordered from Tropos Networks, Inc.

Table 11 Tropos Ordering Information

Part No.	Description
42102100	Tropos 4210 Mobile MetroMesh Router, variable power, N connectors
RC009100	Right angle N-connector adapter: male/female
AN074090	One vehicle mounted 7.4dBi omni antenna and cable kit, 2400-2500 MHz
AN074091	One vehicle magnetic mounted 7.4dBi omni antenna and cable kit, 2400-2500 MHz
AN074095	One vehicle mounted 7.4dBi omni antenna (cable kit not included), 2400-2500 MHz
AN050024	One vehicle mounted 5.0dBi omni antenna, N connector female, no cable, 2400-2500 MHz
AN050090	One vehicle mounted 5.0dBi omni antenna and cable kit, 2400-2500 MHz
AN050091	One vehicle magnetic mounted 5.0dBi omni antenna and cable kit, 2400-2500 MHz
AN050095	One vehicle mounted 5.0dBi omni antenna (cable kit not included), 2400-2500 MHz
AN090049	9.0dBi omni antenna, 4.9 GHz, magnetic mount, 10 foot cable, N-male
AN060049	6.0dBi omni antenna, 4.9 GHz, magnetic mount, 10 foot cable, N-male
AN050049	5.0dBi omni antenna, 4.9 GHz, vehicle mount, antenna and cable kit
GR000350	Vehicle mounted GPS receiver with USB interface and cable
PS011002	One 12V automobile power adapter

5 Antennas and Accessories

Table 12 contains antenna and accessory ordering information for mobile antennas.

Table 12 Mobile Antennas and Accessories

Part Number	Description	Supplier
Littlefuse 29707.5 (or equivalent)	Mini fuse, 32Vdc 7.5A	www.digikey.com
SF-245SPR	7.4dBi mobile antenna, N connector, black	www.cometantenna.com
MG-4N	Magnetic mount and 12 ft. cable - N for 7.4dBi mobile antenna	www.cometantenna.com
5D4N	Bulkhead mount and 12-ft. cable for 7.4dBi mobile antenna	www.cometantenna.com
NMO5E2400B	Antenna, 5.0dBi omni, vehicle mount, NMO connector	www.radiallarsen.com
NMOKHFUDSMA	NMO mount with cable, SMA, RG-58U, dual shield	www.radiallarsen.com
RSA-3478	Adapter, SMA female to N male	RF Connectors
BMMG24005ML 195UN	Antenna, 5.0dBi, omni, magnetic mount, 12-ft cable, N male connector	MaxRad
SAA004-050300	Antenna, 2.4 GHz 5dBi, mobile mount, N connector male, no cable	blueflexsolutions.com
ECOM9-4900	ECO series magnetic mount antenna, 4.9 GHz, 9dBi, 10 feet, RF195 with N-male connector	MobileMark
ECOM6-4900	ECO series magnetic mount antenna, .9 GHz, 6dBi, 10 feet, RF195 with N-male connector	MobileMark
MEFC49005HF	Fixed mount parts, 4.9 to 5.0 GHz, 5dBi	PCTEL
MHFML	Adaptor from NMO to N bulkhead for MEFC49005HF	PCTEL

Table 12 Mobile Antennas and Accessories

Part Number	Description	Supplier
Optional Power Connectors		
Weidmuller 1803040000	2-pin 90° power connector (included)	www.alamedaelectric.com
Weidmuller 1844220000	2-pin 180° power connector	www.alamedaelectric.com
Weidmuller 1712110000	Crimp pin for 180° power housing	www.alamedaelectric.com
Weidmuller 1626880000	Lock blocks for crimp pin for 180° power housing	www.alamedaelectric.com
Weidmuller 1567070000	Crimp pins for 14-16 AWG wire	www.alamedaelectric.com
Weidmuller 9014140000	Crimp tool for crimp pins for 14-16 AWG wire	www.alamedaelectric.com

Abbreviations

The following abbreviations are used in referring to Tropos products and specifications.

Table 13 Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
AWG	American Wire Gauge
C	Celsius
CAT	Category
CCK	Complementary Code Keying
CE	Conformite Europeene
CFR	Code of Federal Regulations
CISPR	International Special Committee on Radio Interference
CPE	Customer Premise Equipment
CSA	Canadian Standard Association
dB	Decibels
dBi	Decibels Relative to an Isotropic Radiator
dBm	Decibels Referred to 1 Milliwatt
DBPSK	Differential-Binary Phase-Shift Keying
DC	Direct Current
DGT	Directorate General of Telecommunications (Taiwan)
DQPSK	Differential-Quadrature Phase-Shift Keying
DSSS	Direct-Sequence Spread Spectrum

Table 13 Abbreviations (*continued*)

EFT	Electrically Fast Transients
EMC	Electromagnetic Compatibility
EN	IEC standard
ESD	Electrostatic Discharge
ETSI	European Telecommunications Standards Institute
FCC	Federal Communications Commission
FHSS	Frequency Hopping Spread Spectrum
Hz	Hertz
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IP67	Ingress Protection Standard
ISM	Instrumentation, Scientific, and Medical band
ISTA	International Safe Transit Association
LAN	Local Area Network
Mbps	Megabits Per Second
MHz	Megahertz
MIL-STD	Military Standard
MPHPT	Ministry of Public Management, Home Affairs, Posts and Telecommunications (Japan)
N	Neutral
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NMEA	National Marine Electronics Association
OFDM	Orthogonal Frequency Division Multiplexing
RJ45	Registered Jack 45
RSS	Received Signal Strength
Rx	Receive
RXD	Receive Data

Table 13 Abbreviations (*continued*)

TUV	Technical Inspection Association
Tx	Transmit
TXD	Transmit Data
UL	Underwriters' Laboratories
UPS	Uninterruptible Power Supply
VAC	Voltage (Alternating Current)
VCCI	Voluntary Control Council for Interference (Japan)
VDC	Voltage (Direct Current)
VSWR	Voltage Standing Wave Ratio
W	Watts

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