External Antenna Mounting

Model	Chameleon CTM-200 gateway
Revision:	Rev 1.1

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Revision Control

Description	Revision	Date
Customer Release	Rev 1.0	Oct. 21, 2011
Updated *Wi-Fi Antenna* section	Rev 1.1	Dec. 5, 2011

Contents

1 Overview

To take advantage of the CTM-200's features, proper external antenna connections must be made. If the cellular antenna is not connected, the device may fail to negotiate a connection to the wireless network. If the GPS antenna is not connected, the CTM-200 will not obtain a GPS fix.

This application note provides recommendations for external antenna mounting, especially for CTM-200 devices being mounted in vehicles with other equipment and potential sources of RF interference. The audience of this document includes IT personnel and antenna installers.

2 CTM-200 Antenna Connections

The CTM-200 has 2 standard antenna connections:

- RF or Cellular Connection
- GPS Antenna

The CTM-200 has the following antenna connections for optional features:

- 802.11b/g/n Wi-Fi support

- 802.15.4 Internal WPAN Gateway support

Antennas come in various form factors depending on the application. For mobile applications there are "tri-band" antennas that combine the RF and GPS into one antenna. For fixed site there are "high gain" antennas for use in environments where the wireless signal is weak.

Since the RF and GPS signals are independent, separate physical antennas can be used for RF and GPS. This allows the use of specific antennas tailored to achieve maximum RF performance and GPS performance without compromise. A negative impact of this type of installation is that two physical antennas must be installed per vehicle. This can add to the installation/cable routing time required and detract from vehicle appearance (two antennas).

A more common antenna available for vehicle or mobile applications is the “tri-band” antenna. This style antenna combines the cellular/PCS bands with GPS into one physical package. The antenna has two leads, one for RF and one for GPS. The advantage to this style of antenna is that only one physical installation is required and routing of cables is simplified.

Contact Cypress Solutions for help in selecting an antenna right for your application.

2.1 RF or Cellular Connection

This connection is an SMA JACK or TNC JACK, depending on what form factor was purchased. You will need a matching SMA PLUG or TNC PLUG to connect the antenna. The antenna should be an antenna designed to match the type of RF card or module installed in the CTM-200.

For example a "dual band" antenna supporting both 800 MHz frequencies and 1900 MHz frequencies is required for a cellular wireless connection when a CDMA/EV-DO RF card or module is used.

Below is a table of frequency bands typically supported by RF cards or modules and their wireless carrier networks:

Wireless Technology	**Frequency Band**
North America LTE – 700 MHz	777 MHz – 787 MHz (Mobile transmit) 746 MHz – 756 MHz (Mobile receive)
North America LTE – 1700 MHz	1710 MHz – 1755 MHz (Mobile transmit) 2110 MHz – 2155 MHz (Mobile receive)
UMTS/WCDMA/HSPA – 850 MHz GSM/GPRMS/EDGE – 850 MHz CDMA 1xRTT/EV-DO Rev. A – 800 MHz	824 MHz – 849 MHz (Mobile transmit) 869 MHz – 894 MHz (Mobile receive)
UMTS/WCDMA/HSPA – 1900 MHz GSM/GPRMS/EDGE – 1900 MHz CDMA 1xRTT/EV-DO Rev. A – 1900 MHz	1850 MHz – 1910 MHz (Mobile transmit) 1930 MHz – 1990 MHz (Mobile receive)

2.2 GPS Antenna

This connection is an SMA JACK. You will need a matching SMA PLUG to connect the antenna. To use GPS antennas with an MCX PLUG, a SMA to MCX adapter is required. The GPS antenna should be an active 3.3 V LNR antenna.

2.3 Wi-Fi Antenna

This connection is a RP-SMA JACK. A Wi-Fi antenna should support the ISM 2.4 GHz band for 802.11b/g/n.

2.4 Internal WPAN Gateway Antenna

This connection is a RP-SMA JACK. An 802.15.4 antenna should support the ISM 2.4 GHz band.

3 Mounting the Cell Antenna

For optimum performance the antenna should be mounted in a vertical orientation as high up as possible and with clear line of sight in all directions. For regulatory purposes it must be mounted in such a position as to maintain a separation distance from any person of at least 20cm (8”).

4 Mounting the GPS Antenna

The GPS antenna used with the CTM-200 must be an active type with gain of at least 26dB and compatible with a 3.3 volt dc supply provided directly by the CTM-200 over the coax cable. The antenna installation should typically be on an upper horizontal surface of a vehicle with a clear 360 degree view of the sky. Some small footprint, patch GPS antennas can be installed on the vehicle’s dashboard.

5 RF Interference Sources

In vehicles, potential sources of RF interference include Citizens’ Band (CB) radio transmitters, onboard electronic equipment, and electrical wiring with insufficient RF shielding.

For any devices operating in the same band as cellular, GPS, or Wi-Fi signals, ensure that the antenna separation distance is as large as possible, at least 1 m.

6 Technical Support

Cypress Solutions Service Support Group
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