



**Flexible, Powerful, Industrial Cellular
Data Modem solutions for CDMA**



CTM-110/120 Installation & Operation Manual

Revision 3.2

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1 Safety & regulatory notices

Due to the nature of wireless communication the reception of data can never be guaranteed. Data may be delayed, corrupted or never received. Although such conditions are rare with well-constructed and configured wireless networks when used in conjunction with devices such as the CTM-110/120 wireless data modem, such systems should not be used in situations where the reception of data is critical to personal safety or property integrity. Cypress Solutions Inc. accepts no responsibility for damages of any kind including but not limited to personal injury, death, or loss of property due to the delay or loss of data resulting from the use of the CTM-110/120 wireless data modem.

1.1 Operation in hazardous environments

For the CTM110 only:

THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS I DIVISION 2 GROUPS A,B,C AND D OR NON HAZARDOUS LOCATIONS ONLY

Wireless transmitters can cause interference with some critical operation equipment. For this reason it is required that the CTM-110/120 wireless data modem be turned off when in the vicinity of blasting operations, medical equipment, life support equipment, or any other equipment that is susceptible to radio interference.

1.2 Operation in or around aircraft

The CTM-110/120 wireless data modem must be turned off when on-board or in the vicinity of any aircraft. The FAA prohibits the use of wireless transmitter equipment at any time during aircraft flight.

1.3 Regulatory restrictions

CAUTION: Any modifications to the CTM-110/120 wireless data modem not expressly authorized by Cypress Solutions Inc. may cause its regulatory approval status to become invalidated, thereby voiding your authority to use the product.

The CTM-110/120 wireless data modems are approved under FCC CFR 47 part 2.1091 and Industry Canada RSS-102 rules for operation as a mobile or fixed device with an antenna of no more than 9dBi gain and from which a separation distance of at least 20cm (8") must be maintained from all persons at all times and during all modes of operation. Nor must the antenna used be co-located or operated in conjunction with any other antenna or transmitter. These rules are in place to prevent any possible hazard due to personal exposure to electromagnetic radiation.

FCC ID: N7NSB555
Industry Canada ID: IC: 2417C-SB555

1.4 Electromagnetic Interference (EMI) – United States FCC Information

This equipment has been tested and found to comply with 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 or commercial 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 communication. However, there is no guarantee that harmful 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.

1.5 Electromagnetic Interference (EMI) – Canada Information

This digital apparatus does not exceed the class B limits for radio noise emissions from digital apparatus as set out in the interference causing equipment standard entitled “Digital Apparatus”, ICES-003 of the Department of Communications.

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe B prescrites dans la norme sur le matériel brouilleur: “Appareils Numériques”, NMB-003 édictée par le Ministre des Communications.

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Trademarks

All brand or product names, trademarks, logos, etc. used in this manual are owned by their respective companies.

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3**CDMA Overview**

The first CDMA networks (now called CDMAone) were commercially launched in 1995, and provided roughly 10 times more capacity than analog networks - far more than TDMA or GSM. Since then, CDMA has become the fastest-growing of all wireless technologies. In addition to supporting more traffic, CDMA brings many other benefits to carriers and consumers, including broader coverage and stronger security.

Just as the second generation of wireless technology improved upon earlier systems, the industry looked to a third generation of technology for more advances. Although wireless was used almost exclusively for voice communication, the ability to deliver data over the air was also very promising, especially as Internet users and content proliferated.

In 1999, the International Telecommunication Union adopted an industry standard for third-generation (3G) wireless systems that can deliver high-speed data and other new features. Because CDMA2000 is evolved directly from the previous generation of proven CDMA systems, it provides the fastest, easiest, most cost-effective path to 3G services. While all 3G technologies (CDMA2000, WCDMA and TD-SCDMA) may be viable, CDMA2000 is much further ahead in terms of product development, commercial deployment and market acceptance.

The first commercial CDMA2000 networks were launched in South Korea in early 2001. A large and growing range of CDMA2000 chipsets, terminals and network infrastructure systems are now in volume production and gaining economies of scale, as many more North American, Latin American and Japanese carriers plan to roll out CDMA2000 services in 2002 and 2003

CDMA2000 1X technology supports both voice and data services over a standard (1X) CDMA channel, and provides many performance advantages over other technologies. First, it provides up to twice the capacity of earlier CDMA systems, helping to accommodate the continuing growth of voice services as well as new wireless Internet services. Second, it provides peak data rates of up to 153 kbps (and up to 307 kbps in the future), without sacrificing voice capacity for data capabilities. And because it's backwards-compatible with earlier CDMA technology, CDMA2000 1X provides an easy and affordable upgrade path for both carriers and consumers.

For more information about CDMA visit the CDMA Development Group (CDG) at <http://cdg.org/> The CDG is an industry consortium of companies who have come together to develop the products and services necessary to lead the adoption of CDMA wireless systems around the world.

4**GPS Overview**

The Global Positioning System (GPS) is a worldwide radio-navigation system operated by the US Department of Defence (DoD) and formed from a constellation of 24 satellites orbiting at an altitude of 10,900 nautical miles and with an orbital period of 12 hours.

GPS uses these satellites as reference points to calculate positions accurate to a matter of metres. This is achieved by measuring the time it takes for a radio signal to travel from each satellite to the receive unit. Multiple measurements are then used to accurately triangulate the receiver location.

The signals received from the orbiting satellites are based on pseudo random codes. The code for each satellite is unique so that the receiver can determine which satellite it is receiving from. Additionally, these pseudo random codes are extremely complex in order to minimize the possibility of incorrectly picking up another signal or background noise with the same code. The receiver is able to generate the same pseudo random code for every satellite it is tracking. The difference in time between the locally generated code and the code received from the satellite is used to calculate the distance from the satellite to the receiver. The receiver keeps track of the exact location of every satellite by using an almanac stored in its local memory. In this way the receiver is able to triangulate its location by calculating the distance from at least three satellites. But this calculation assumes that the receiver generates its pseudo random code starting at exactly the same time as the satellites, which would require extremely accurate (and expensive) atomic clocks in every receiver! The receiver overcomes the need for such an accurate clock by triangulating its position from at least four satellites instead of only three. The additional satellite allows the receiver to calculate its own clock error and to apply this correction to all calculated distances.

There are a number of error sources that can introduce inaccuracies into the position calculation. Understanding these error sources can be helpful in applying the position information provided by the GPS receiver.

- Although the satellites are in extremely accurate orbits they can be influenced by solar “winds” of cosmic radiation and also by gravitational forces from the sun and moon. These errors are called “ephemeris” errors”. The satellites position is regularly monitored by the US DoD and then passed to the satellite for passing on to the receivers as part of the pseudo random code information. The receiver is then able to account for these ephemeris errors. However, between these position updates there may be a slight error in the calculated signal.
- As a GPS signal passes through the charged particles of the ionosphere and then through the water vapour in the troposphere it gets slowed down, and this creates a timing measurement error which may be different for each satellite and so cannot be taken into account.
- Close to the ground the signal may bounce off various local obstructions before it reaches the receiver. This is called multipath error and is similar to the ghosting on a TV.
- There are often more satellites available than a receiver needs to fix a position, so it will choose a few and ignore the rest. If it chooses satellites that are close together in the sky the intersecting circles that define a position will cross at very shallow angles. This increases the grey area or error margin around a position. If it chooses satellites that are widely separated then the circles intersect at almost right angles which minimizes the error region.

In general, all the above error sources combined may result in a position error of only a few metres overall.

5

CTM-110/120 Product

5.1 CTM-110 Telus bundle

CTM-110 Modem

The modem is pre-configured for Telus operation and cannot be activated on another network except through a roaming agreement. The label on the modem base provides carrier configuration, regulatory information and the modems Electronic Serial Number (ESN).

Power cable

A standard 4m (12') length Cable Is provided. Longer lengths are available – contact your dealer or Cypress Solutions Inc.



Serial data cable

DB9 male (modem end) to DB9 Female (PC end), 2m (6') length.

CD-ROM

This contains the Chameleon Controller Software application for configuration and control of the CTM-110. It also contains the Windows driver for the modem along with this installation and operation manual.

Check the Cypress Solutions web site for updates to the Chameleon Controller Software

www.cypress.bc.ca

Cell Antenna

Dual band (800MHz and 1900MHz bands) magnetic mount 3dBi whip antenna with 3m (10') cable fitted with SMA connector.

AC/DC power supply

120VAC, 50/60Hz to 12VDC power supply to power the Chameleon modem when not powered directly from a 12 or 24 volt source.



5.2 CTM-120 Telus bundle

CTM-120 Modem

The modem is pre-configured for Telus operation and cannot be activated on another network except through a roaming agreement. The label on the modem base provides carrier configuration, regulatory information and the modems Electronic Serial Number (ESN).

Power cable

A standard 4m (12') length Cable Is provided. Longer lengths are available – contact your dealer or Cypress Solutions Inc.



Serial data cable

DB9 male (modem end) to DB9 Female (PC end), 2m (6') length.

CD-ROM

This contains the Chameleon Controller Software application for configuration and control of the CTM-120. It also contains the Windows driver for the modem along with this installation and operation manual.

Check the Cypress Solutions web site for updates to the Chameleon Controller Software

www.cypress.bc.ca

Cell Antenna

Dual band (800MHz and 1900MHz bands) magnetic mount 3dBi whip antenna with 3m (10') cable fitted with SMA connector.

AC/DC power supply

120VAC, 50/60Hz to 12VDC power supply to power the Chameleon modem when not powered directly from a 12 or 24 volt source.

GPS antenna

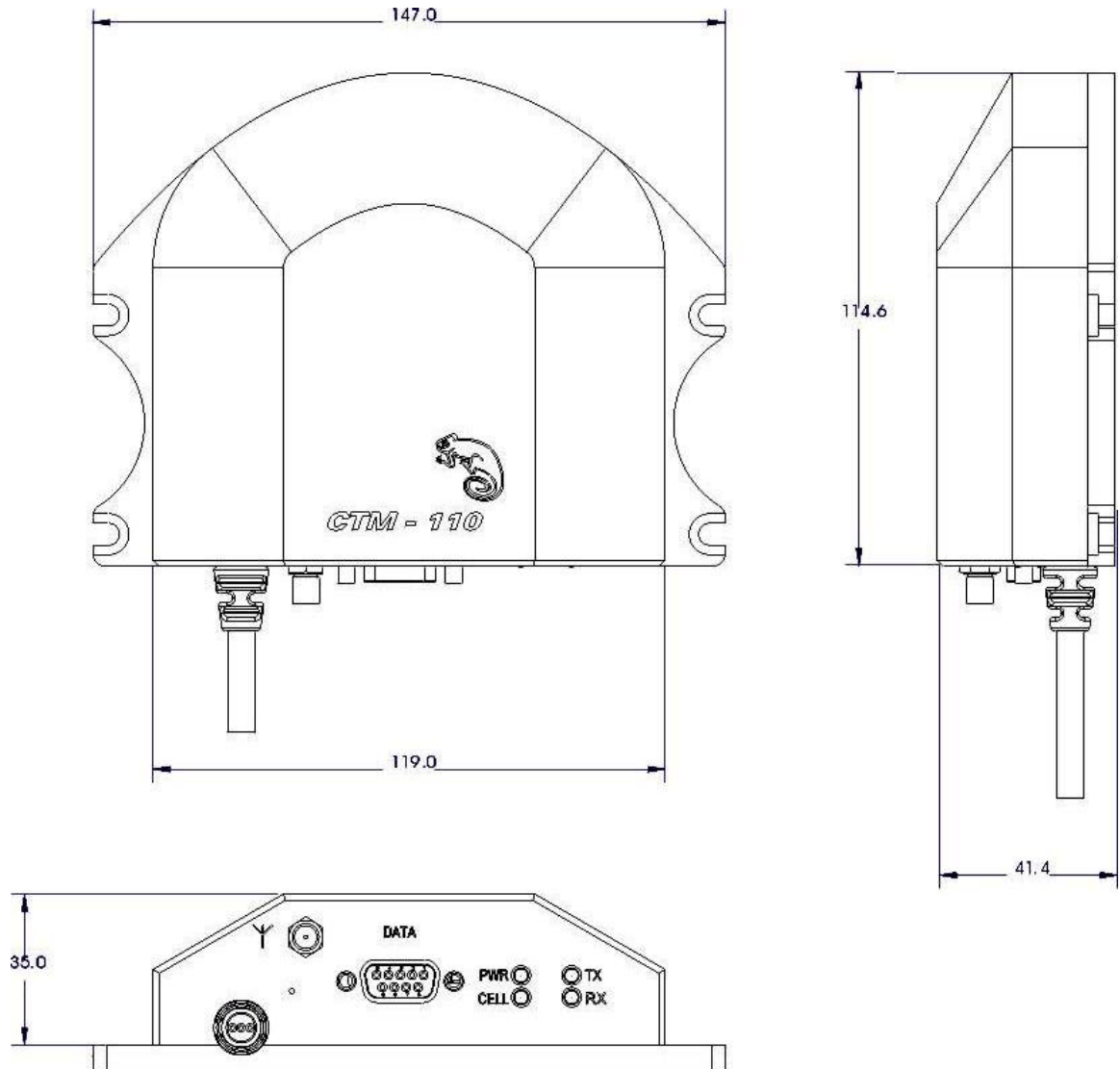
A magnetic mount low profile antenna with 5 metre (16') coax cable and MCX connector for direct connection to the CTM-120 modem.



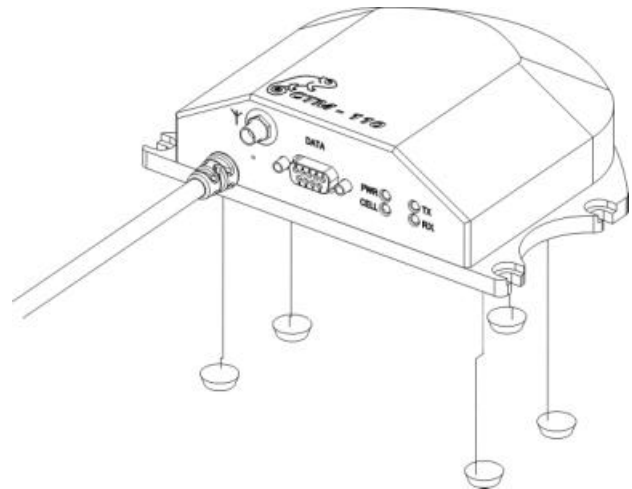
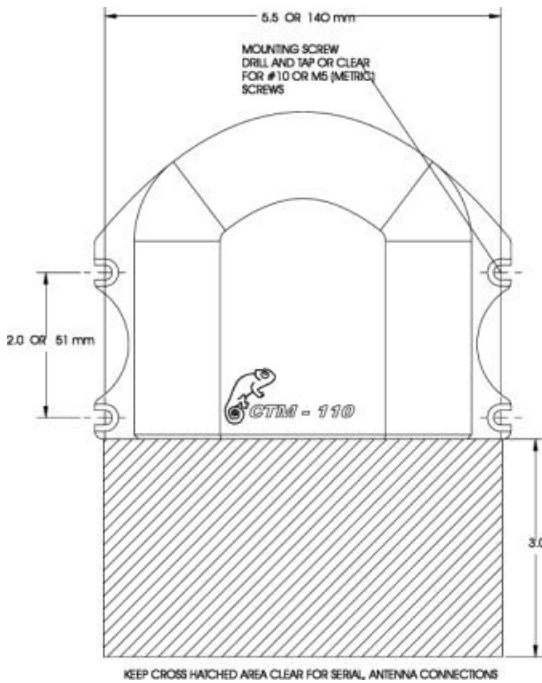
6 Physical Installation

6.1 Mounting the CTM-110/120

The CTM-110/120 is provided with four mounting locations in its base. These may be used to screw or bolt the device to a suitable surface. If the installation location is subject to shock or vibration forces in excess of the modem's specification then suitable mounting must be arranged to alleviate these forces. The modem ships with 5 adhesive backed rubber feet installed on the bottom mounting plate.



6.1.1 Mounting Area and Keep out region.

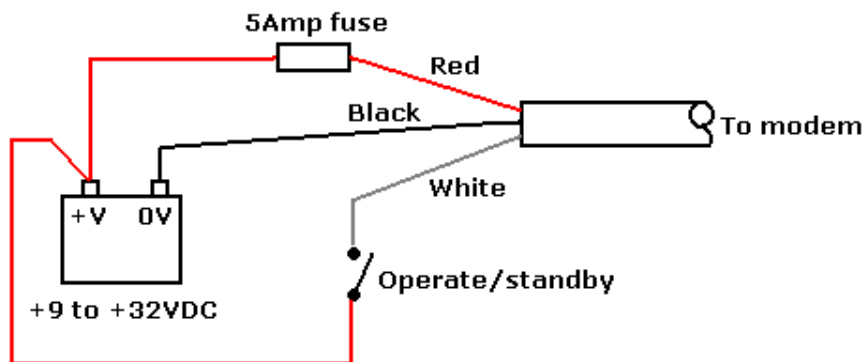


6.2 Connecting the power cable

The power cable has three wires:

- Red +V supply (+9 to +32VDC)
- Black 0V return
- White Standby (+V for operation, 0V or floating for standby)

A 5Amp “slow-blow” fuse is recommended in the +V supply line.



The operate/standby switch may, for example, be the accessory position on a vehicle ignition switch.

Refer to the operation notes for details of operation/standby modes.

6.3 Connecting the serial data cable

The modem serial data port is a standard DB9 female connector configured as Data Communication Equipment (DCE) and is wired as per the table below.

DB9 Pin	Signal	Name	Direction
1	DCD	Data Carrier Detect	Modem → PC
2	RxD	Received Data (by DTE)	Modem → PC
3	TxD	Transmitted Data (by DTE)	PC → Modem
4	DTR	Data Terminal Ready	PC → Modem
5	GND	Signal Ground	
6	DSR	Data Set Ready	Modem → PC
7	RTS	Request To Send	PC → Modem
8	CTS	Clear To Send	Modem → PC
9	RI	Ring Indicator	Modem → PC

The DTR signal (pin 4) is used for modem operation/standby control - refer to the operation notes for details.

Serial data ports on most computer equipment are configured as Data Terminal Equipment (DTE) with a DB9 male connector. The serial data cable supplied with the CTM-110/120 will allow direct connection of the modem to most computer and terminal equipment. In some cases it may be necessary to insert a “null modem” or “gender changer” in the serial data line in order to correctly connect between the devices.

6.4 Mounting and attaching the cell antenna

The antenna used with the CTM-110/120 must be a dual band type suitable for operation on both the 800MHz Cellular and 1900MHz PCS bands. For regulatory purposes the antenna must have a gain rating of less than 9dBi on each band. 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”).

The modem antenna connector is a standard SMA female type that requires the antenna cable to use a male SMA connector.

6.5 Mounting and attaching the GPS antenna

The antenna used with the CTM-120 must be an active type with gain of at least 26dB and requiring a 3.3 volt dc supply provided directly by the modem over the coax cable. The antenna provided is a magnetic mount type for installation typically on an upper horizontal surface of a vehicle with a clear 360 degree view of the sky.

The GPS antenna connector is a standard MCX type that requires the GPS antenna cable to use a MCX plug connector.

7

Software Installation

7.1 STEP 1 - Installing the Chameleon Controller Software

The Chameleon Controller Software is designed for operation with Windows XP, and 2000. It provides tools to configure the CTM-110/120 modem and to setup connections to the cellular network. For the CTM-120 modem with GPS it also provides an application to enable the GPS data to be routed to a virtual serial COM port on the local computer so that the position data is available to a mapping application.

To install the Chameleon Controller Software run the file CDstartup.exe from the CD-ROM. This will invoke the installation wizard:



Select **English** or **French** as the preferred language.

Follow the installation instructions that appear on the screen.

At the end of the installation you will be prompted to install the Cypress Solutions Chameleon modem by following the instructions below for your specific Windows operating system.

7.2 STEP 2 - Installing the Windows® .inf file

For installations where the CTM-110/120 is to be operated with computers running a Windows XP or 2000 release operating system it is necessary to install an information file (.inf) in order that the operating system can successfully find and interface with the modem. The procedure for each of these operating systems is slightly different.

7.2.1.1 For Windows XP operating systems

- Select **Start > Settings > Control Panel**
- Double click on **Phone and Modem Options**. This will open the phone and modems properties window.
- Select the **Modems** tab and click on **Add**.
- Select ***don't detect my modem: I will select it from a list***, and click on **Next**.
- Select **Cypress Solutions Inc** from the **Manufactures** list and select **Cypress Solutions Chameleon Modem** in the **Models** dialogue box. Click on **Next**.
- Select **Selected Ports** and highlight the communications port on the computer that the modem is attached to. Click on **Next**.
- The **Digital Signature Not Found** dialogue box will then appear warning you that you are about to install a driver that does not contain a Microsoft digital signature. Click on **Continue Anyway** if you wish to continue.
- Click on **Finish**.
- Click on **OK** to close the **Modems** window and then close the **Control Panel** window.

The Chameleon CDMA modem driver is now installed and ready for use by Windows XP programs including the Cypress Solutions Chameleon Controller.

7.2.1.2 For Windows 2000 Operating Systems

- Select **Start > Settings > Control Panel**
- Double click on **Phone and Modem Options**. This will open the modems properties window.
- Select the **Modems** tab from top of window and click on **Add**.
- The **Add/Remove Hardware Wizard** will appear.
- Select ***don't detect my modem; I will select if from the list***, box and click **Next**.
- Select ***Cypress Solutions Inc*** from the **Manufactures** list and select ***Cypress Solutions Chameleon Modem*** in the **Models** dialogue box. Click on **Next**.
- Select the communications port on the computer that the modem is attached to. Click on **Next**.
- Click on **Finish**.
- Close the **Phone and Modem Options** window and close the **Control Panel** window.

The Chameleon CDMA modem driver is now installed and ready for use by Windows 2000 programs including the Cypress Solutions Chameleon Controller.

8

Operation

8.1 Automatic power control

The CTM-110 Chameleon modem has a low power mode that shuts down all unnecessary circuits when the modem is not in use but will automatically power up when it detects user action.

The supply voltage must be at least 8VDC for the CTM-110 to operate. Below this level the modem will enter low power standby mode.

Operation mode is entered when the modem detects that the RS232 port is active (DTR going active is used for this)

AND

the standby signal is greater than 9VDC.

With these two conditions met the CTM-110 modem will enter operating mode in 10 seconds. In operating mode the power LED will be on solid.

Standby mode is entered when the modem detects that the RS232 port is inactive (DTR going inactive is used for this)

AND

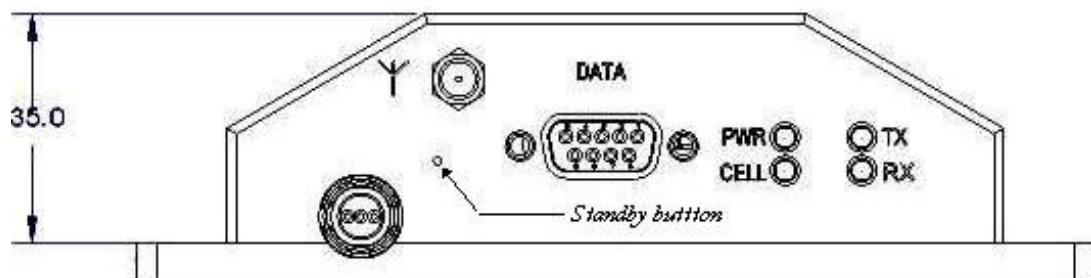
the standby signal is less than 9VDC (connected to 0V or disconnected).

With these two conditions met the CTM-110 modem will enter standby mode in 5 seconds. In standby mode the power LED will flash slowly.

8.2 Manual power control

The CTM110 modem can be manually put into low power standby mode at any time by pressing and holding for at least one second the *standby button* which is located inside the front panel (use a straightened paper clip to access it through the hole).

Pressing and holding the standby button when the CTM-110 modem is in low power standby mode will put it into operating mode – but note that if either the RS232 port is inactive OR the standby signal is less than 9VDC, then the CTM-110 will automatically enter low power standby mode again after 5 seconds!



8.3 Panel LED Indicators

There are four LED indicators on the CTM-110 and CTM-120 panel. These are used to show the status and operation of the modem.

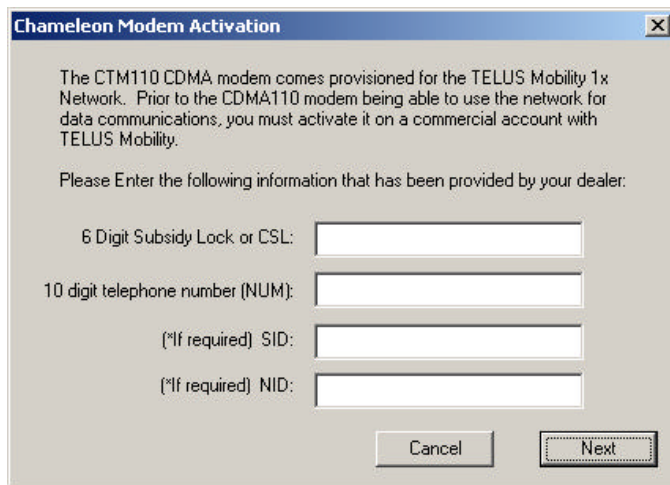
PWR	This LED shows the power status of the modem: On solid = the modem is on and able to connect Flash quickly = the modem is shutting down Flash slowly = the modem is in standby mode Off = the modem has no power connected
CELL	This LED shows the status of the modem on the CDMA network: Flashing = the modem is attempting to register on the network On solid = the modem has registered on the network
TX	This LED shows that data is being transmitted: Off = no data is being transmitted On or flashing = data is being transmitted (Combined with RX on the CTM-120)
RX	This LED shows that data is being received: Off = no data is being received On or flashing = data is being received
GPS	(CTM-120 only) This LED shows the status of the GPS module: Flashing = the GPS module is obtaining a position fix On solid = the GPS module has obtained a valid position

8.4 Carrier Activation Wizard

The first time the Chameleon Controller Software is run with a new CTM-110/120 modem it will invoke the Activation Wizard. Prior to running the software it is necessary to obtain an account from Telus Mobility or your dealer – you will be provided with a 6 digit “lock code” along with the modems telephone number.

Run the Chameleon Controller Software by double clicking on the Chameleon Icon that was placed on the desktop during the software installation. Select the serial COM port that the modem is connected to - this question may be suppressed in future by checking the box **don't tell me about this again**.

The Modem Activation Wizard will start:



Enter the **6 digit lock code** and the **10 digit telephone number** as provided by Telus. Click **Next** and follow the instructions to complete the modem activation.

8.5 Chameleon Controller Software Features

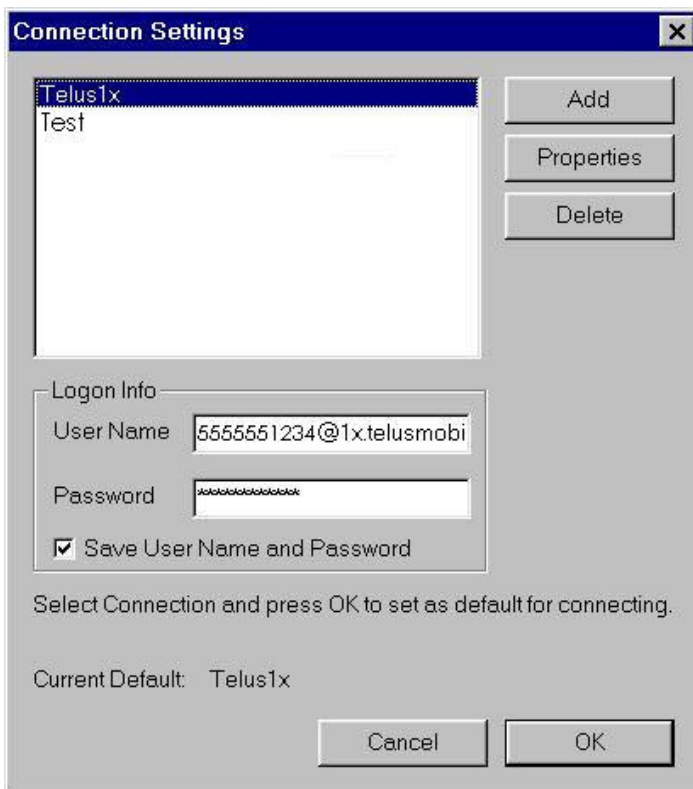
The Chameleon Controller Software provides a number of features to configure the modem and the Windows operating system ready for connecting to the Internet using the Telus 1x network. It also provides utilities to assist with modem operating configuration and diagnostics.

These features are all accessed from the Chameleon Controller Software application.



8.5.1 Make a new network connection

From the Tools menu select **Connection Settings**.



Click on **Add** and follow the instructions to make a new network connection:

For a TELUS Mobility 1x connection the telephone number is **#777**.

For a TELUS Mobility qnc connection the telephone number is **#888**.

When the new connection has been setup, enter the **user name** and **password** for this modem and connection:

For a 1x connection the user name will be

Phone number@1x.telusmobility.com and the password will be the ESN as given on the base of the modem:

099xxxxxxxx

For a qnc connection the user name will be **qnc** and the password will be **qnc**.

Select **Save User Name and Password** if you wish these to be remembered by the software for future use.

To make this your current connection make sure it is selected from the list if there are more than one connection. Save the connection settings by clicking on **OK**.

To connect to the current default connection simply click **Connect** on the Chameleon Controller application.

Hint – holding the cursor over the **Connect** button will tell you which is the current default connection.

The connection progress will be displayed:

Dialing >> Verifying User Name and Password >> Connected

During the network connection the modem icon will be present in the bottom right system tray of your desktop. Selecting this icon will show the transmitted and received bytes for this session.

8.5.2 Configure GPS Operation (CTM120 only)

The operation of the internal GPS feature may be configured from the Chameleon Controller Software application.

From the **Tools** menu select **GPS Configuration**:

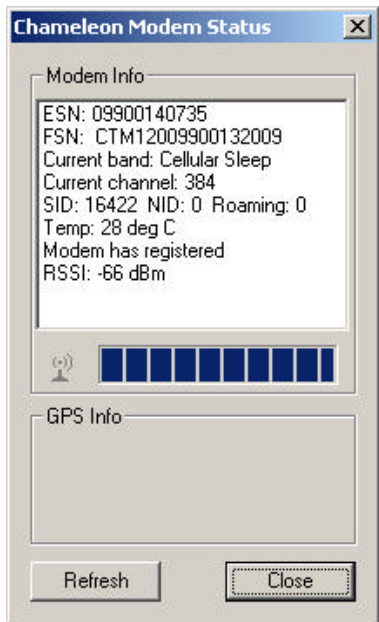
The GPS position information may be sent to a remote location over the wireless connection and over the local serial connection to the host computer. Each of these connections may be independently configured. Data is sent as a \$GPGLL NMEA 0183 sentence.

The local GPS reporting may be enabled either for this session only or for this and all future sessions. The GPS update rate may be set to a value from once per second, to once per 3600 seconds. GPS data is sent as a UDP packet to port 5005 of the local host PC. The Chameleon Controller Software application provides an automatic utility which makes this data available on a virtual COM port in the computer which may be accessed by standard mapping software applications.

When the remote connection is enabled it must have a remote IP address and port number configured. This will be the remote server that will accept this GPS data and allow tracking of the vehicle or equipment in which the modem is installed. The GPS update rate may be set to a value from once per second, to once per 3600 seconds.

8.5.3 Checking the modem Status

Prior to initiating a connection to the network the Chameleon Modem status may be checked. From the **Tools** menu select **Modem Status**:



The **Modem Info** box shows the modems Electronic Serial Number (ESN) and factory serial Number (FSN). The current status of the local CDMA network which the modem is seeing is reported.

The RSSI value is the modems received signal strength.

The **GPS Info** box is not used in this release of the Chameleon Controller Software.

8.5.4 The Terminal Services Window

The Chameleon Controller Software provides the ability to send and receive AT commands directly to the modem. From the **Tools** menu select **Terminal**. Type the required AT command in the command line window and click on **Send**. The modem's response will be displayed in the response window. The AT command session may be logged to a text file if required.

8.6 Using AT commands to control the CTM-110/120

The CTM-110/120 CDMA modem supports the full AT command set for wireless data modems. This command set can be used to configure, control, and troubleshoot the modem.

The Chameleon Controller Software Terminal tool may be used to send AT commands to the modem and display responses. Alternatively, most terminal emulation programs such as Windows HyperTerminal can be used to access the CTM-110/120 with AT commands. Terminal configuration parameters are:

Data rate	115,200 baud
Data bits	8
Parity	None
Stop bits	1
Flow control	Hardware

The set of AT commands available for the CTM-110/120 CDMA modem can be found in the Sierra Wireless CDMA AT command reference document available at: <http://www.sierrawireless.com/ProductsOrdering/documents/2130184.pdf>

9**Trouble shooting**

Situation The power LED is flashing slowly and I can't communicate with the modem.

Solution: The modem is in low power standby mode. Make sure that the standby signal is connected to greater than 9VDC AND the RS232 port is active.

Situation: The USB to serial converter isn't working.

Solution: Make sure that the CTM-110/120 modem has been installed in Windows to use the same comms. port as that used by the USB to serial converter.

Situation: DUN makes a connection but no Internet applications work.

Solution: Make sure that any firewall clients running on your computer have been disabled (especially if you use your computer in an office LAN environment).

Situation: How do I check to see if my modem is registered on the network?

Solution: Use the Chameleon Controller software and from the **Tools** menu select **Modem Status**. This provides the following information:

- Current band (PCS or CDMA)
- Current channel
- SID
- NID
- Modem temperature in degrees Celsius
- Pilot acquired (or not)
- Modem registered (or not)

Alternatively, from the **Tools** menu select **Terminal** and enter the command AT!STATUS

Situation: I need to find the ESN of the modem but I can't access the label on its base.

Solution: Use the Chameleon Controller software and from the **Tools** menu select **Modem Status**. This will return the modems ESN in an 11 digit decimal format.

Alternatively, from the **Tools** menu select **Terminal** and enter the command AT+GSN. This will return the modems ESN in an 8 digit hexadecimal format. Convert this to decimal format by separating the hex number into two parts prior to performing the conversion:

hh-hhhhhh

Situation: How do I find out the CDMA signal strength seen by the modem.
Solution: Use the Chameleon Controller software and from the **Tools** menu select **Modem Status**. This will return information including the current received signal strength in dBm as seen by the modem:

-137	= no signal!
<-90	= very poor
-90 to -86	= poor
-85 to -81	= fair
-80 to -76	= good
>-75	= excellent

Alternatively, from the **Tools** menu select **Terminal** and enter the command AT!RSSI?. This will report the current received signal strength in dBm

For additional service and help with CTM-110/120 CDMA modem installation and operations please contact:

Cypress Solutions Inc.
Service support group

Phone:
1.877.985.2878
604.985.2878

9.00am to 5.00pm PST
support@cypress.bc.ca

10 Technical Specifications

The Chameleon range of wireless data modems are subject to regular feature enhancement. Cellular wireless networks are constantly changing and enhancing their capabilities. In order to meet these changing needs, Cypress Solutions Inc. reserves the right to modify these product specifications without notice.

Approvals

EMC	FCC part 15 Class B; ICES-003 Class B
Mobile device	FCC CFR 47 part 2.1091; Industry Canada RSS-102
Hazardous Location	Class 1 Division 2 Zones A, B, C, D, Temperature rating T4 (-30 to +60C)

Temperature

Operating	MIL-STD 810F Method 502-II, -30 to +65 Celsius
Storage	SAE 1455 4.2.3, -40 to +75 Celsius

Humidity

5 to 95%RH	SAE 1455 4.2.3, 85-95% RH for five 48hr cycles
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Vibration

5 to 500Hz	MIL-STD 810F Method 514.5C
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Shock

40G, 11msec	MIL-STD 810F Method 516-I
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Sealing

IP53	Protection against dust and spray water
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Power Supply

Voltage	9 to 32 VDC
Current	1mA standby, 550mA peak at 12VDC
Projection	SAE J1455

Serial port

Connector	DB9, RS232C, DCE configuration
Protocol	AT commands & PPP

RF

800MHz & 1,900MHz bands	SMA 50ohm connector +23.5dBm max
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Size

Width	147mm
Depth	115mm (excluding cabling)
Height	41mm

Weight

700 grams
