

# INSTALLATION AND OPERATION MANUAL



**CYPRSS**  
SOLUTIONS



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Model: **CTM-130 /**  
**CTM-132**





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## I 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-130/132 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-130/132 wireless data modem.

### I.1 Operation in hazardous environments

**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-130/132 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.

### I.2 Operation in or around aircraft

The CTM-130/132 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.

### I.3 Regulatory restrictions

CAUTION: Any modifications to the CTM-130/132 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-130/132 wireless data modem is approved under FCC CFR 47 part 2.1091 and Industry Canada RSS-102 rules for operation as a mobile or fixed device with its specified antenna 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. The antenna used must not 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: OVFKWC-M200  
Industry Canada ID: IC:3572A-M200





## 1.4 Electromagnetic Interference (EMI) - United States FCC Information

This equipment has been tested and found to comply with limits for a class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a 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 A 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 A prescrites dans la norme sur le matériel brouilleur: "Appareils Numériques", NMB-003 édictée par le Ministre des Communications.



## 2 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-130/132 Product

### 5.1 CTM-130 Product



#### CTM-130 Modem

The CTM-130 modem is a CDMA 1x wireless data modem with advanced features including auto connect, UDP/TCP PAD, and user I/O. The modem is pre-configured for a specific wireless carrier's network and cannot be activated on another network except through a roaming agreement. The labels on the modem top provide the modem's Electronic Serial Number (ESN), and Class I Division 2 hazardous location information. Regulatory information is located on the modem's base.

The modem comes with a shock absorbing elastomeric mounting bracket that is used to install the modem. All connections to the modem are made on the front panel.

#### Power cable

A standard 4m (12') length Cable is provided with the modem. Different lengths are available – contact your dealer or Cypress Solutions Inc.

### 5.2 CTM-132 Product



#### CTM-132 Modem

The CTM-132 modem is a CDMA 1x wireless data modem with advanced features including GPS, auto connect, UDP/TCP PAD, and user I/O. The modem is pre-configured for a specific wireless carrier's network and cannot be activated on another network except through a roaming agreement. The labels on the modem top provide the modem's Electronic Serial Number (ESN), and Class I Division 2 hazardous location information. Regulatory information is located on the modem's base.

The modem comes with a shock absorbing elastomeric mounting bracket that is used to install the modem. All connections to the modem are made on the front panel.



### Power cable

A standard 4m (12') length Cable is provided with the modem. Different lengths are available – contact your dealer or Cypress Solutions Inc.

## 5.3 CTM-130/132 Accessories



### Serial data cable

A serial data cable is required to connect the modem to your computer or other host device. A standard DB9 male (modem end) to DB9 Female (PC end), of length 2m (6') is available - contact your dealer or Cypress Solutions Inc.

### Cell Antenna

A dual band (800MHz and 1900MHz bands) magnetic mount 3dBi whip antenna with 3m (10') cable fitted with SMA connector is available. Other mounting options and types are available - contact your dealer or Cypress Solutions Inc.

### I/O Connector

The CTM-130/132 offers Input monitoring and Output control of external devices. Connection to these is via a 3.81mm pitch 14 position industrial connector. These can be provided by Cypress Solutions or are available from many component suppliers. Part numbers of suitable connectors are:

Phoenix Contact	part # MC 1.5/14-ST-3.81 (available form Digi-Key)
Wieland	part # 25.620.4453.0
Digikey (OST)	part # ED1971-ND

### AC/DC power supply

A 120VAC, 60Hz to 12VDC 500mA power supply to power the Chameleon modem when it is not powered directly from a 12 or 24 volt source can be purchased - contact your dealer or Cypress Solutions Inc.

### GPS antenna

A magnetic mount low profile antenna with 5 metre (16') coax cable and MCX connector is available for direct connection to the CTM-132 modem. The antenna must be an active type suitable for 3.3VDC bias GPS receivers. Other mounting options and types are available - contact your dealer or Cypress Solutions Inc.



## CD-ROM

This contains the Windows® driver for the modem along with this installation and operation manual, and additional technical information.

Check the Cypress Solutions web site for updates to the manual and for application notes applicable to the CTM-130/132 modem.

[www.cypress.bc.ca](http://www.cypress.bc.ca)

## 6 Windows Installation

### 6.1 Installing the Windows .inf file

For installations where the CTM-130/132 is to be operated with computers running a Windows® 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. This .inf file is on the CD available for the modem – alternatively it may be downloaded from the Cypress Solutions web-site at [www.cypress.bc.ca](http://www.cypress.bc.ca). The procedure for each Windows® operating system is slightly different – for Windows® XP, 2000, and 98 the procedure is provided here.

#### 6.1.1 For Windows 98 Operating Systems

- Select **Start > Settings > Control Panel**
- Double click on the **Modems** icon. This will open the modem properties window.
- Click on **Add**.
- Select **Other** and click **Next**.
- Select **don't detect my modem; I will select if from the list** box and click **Next**.
- Click on **Have Disk**.
- **Browse** to the CD and select **mdmcs130.inf** - **Open** this file.
- Click **OK**, click **OK**, click on **Next**.
- Select the communications port on the computer that the modem is attached to. Click on **Next**.
- Click on **Finish**.
- Close the **Modem Properties** window and close the **Control Panel** window.

The Chameleon CTM-130 CDMA modem driver is now installed and ready for use by Windows® 98 programs.

#### 6.1.2 For Windows 2000 Operating Systems

- Select **Start > Settings > Control Panel**
- Double click on **Phone and Modem Options**. This will open the Phone And Modem Options 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**.
- Click on **Have Disk**.



- **Browse** to the CD and select *mdmcs130.inf* - **Open** this file.
- Click **OK**, then 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**.
- Close the **Phone and Modem Options** window and close the **Control Panel** window.

The Chameleon CTM-130 CDMA modem driver is now installed and ready for use by Windows® 2000 programs.

### 6.1.3 For Windows XP operating systems

- Select **Start > Settings > Control Panel**
- Double click on **Phone and Modem Options**. This will open the phone and modem options 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**.
- Click on **Have Disk**.
- **Browse** to the CD and select *mdmcs130.inf* - **Open** this file.
- Click **OK**, then 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 **Phone & Modem Options** window and then close the **Control Panel** window.

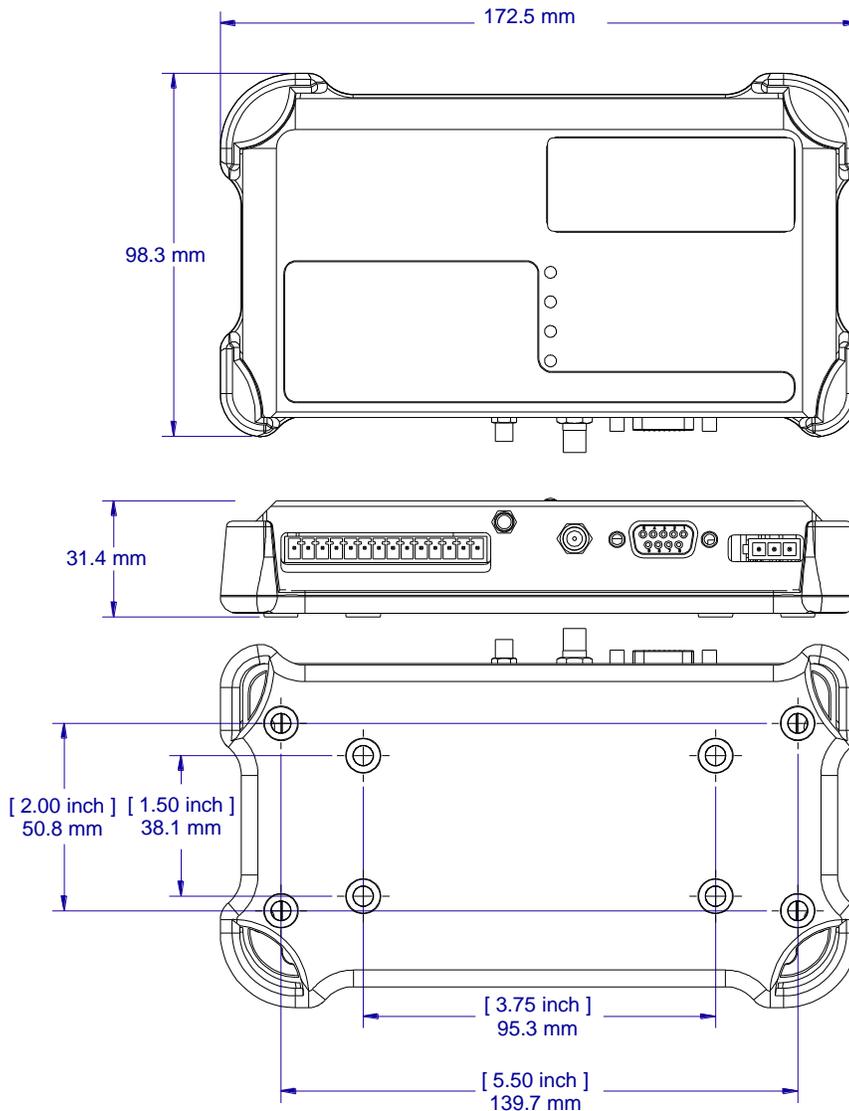
The Chameleon CTM-130 CDMA modem driver is now installed and ready for use by Windows® XP programs.



## 7 Physical Installation

### 7.1 Mounting the CTM-130/132

The CTM-130/132 is provided with a thermo-plastic elastomer (TPE) base that has eight 5mm  $\varnothing$  mounting holes suitable for #10 screws. These may be used to screw or bolt the device to a suitable surface – take care not to over-tighten these screws and damage the elastomer base. Once this has been installed in the required location it is simply a matter of inserting the modem into its base. 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.





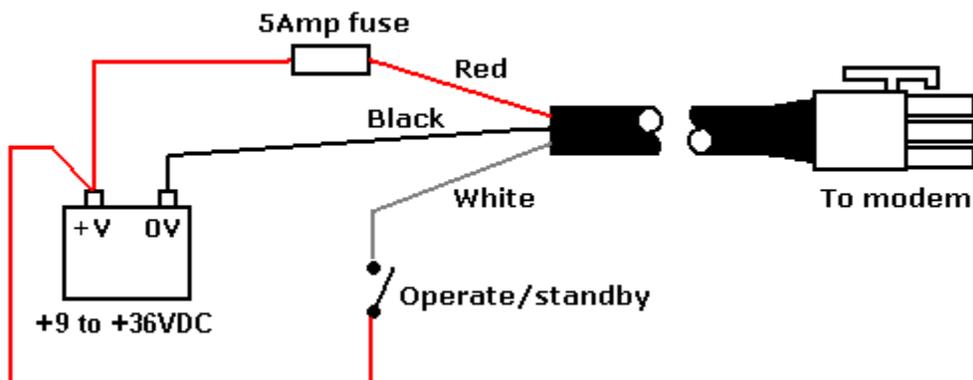
Installing the modem in its base.

## 7.2 Connecting the power cable

The power cable has three wires:

Red	+V supply (+9 to +36VDC)
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. In order to minimize the acquisition time of the GPS module in the CTM-132 at power on it is recommended to keep the +V supply connected as per the above diagram – this will provide the “keep-alive” power required by the GPS module to maintain its internal almanac. Refer to the operation notes for details of operation/shutdown modes.

### 7.3 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. A standard serial data cable will allow for 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.

### 7.4 Mounting and attaching the cell antenna

The antenna used with the CTM-130/132 must be a dual band type suitable for operation on both the 800MHz Cellular and 1900MHz PCS bands.

In order to comply with FCC regulations the antenna used with the CTM-130/132 must be an approved model such as the MaxRad model MDBM 800/1900 – contact Cypress Solutions for other suitable models. 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. The CTM-130/132 can be provided with alternate antenna connector types – contact Cypress Solutions for details.





## 7.5 Mounting and attaching the GPS antenna

The GPS antenna used with the CTM-132 must be an active type with gain of at least 26dB and compatible with a 3.3 volt dc supply provided directly by the modem 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.

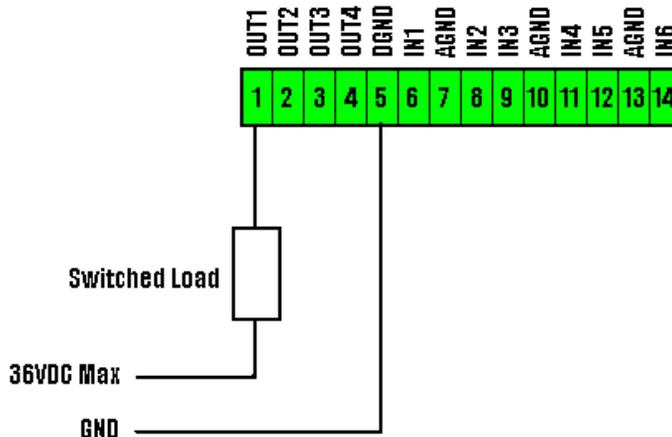
The GPS antenna connector is a standard MCX type that requires the GPS antenna cable to use a MCX plug connector. The CTM-132 can be provided with alternate antenna connector types – contact Cypress Solutions for details.

## 7.6 Connecting to the I/O Port

The I/O port provides for the control of 4 external devices and for monitoring 6 external sensors. Connections are made via the 14 position connector.

### Output Connection

The 4 outputs are configured as “open drain” which means that they can be directly connected to energize external relays, lamps or other DC devices. Maximum supply voltage is 36 volts, with a maximum load current of 500mA. Maximum wire gauge for use with the connector is 16AWG. Connections can be made as shown:

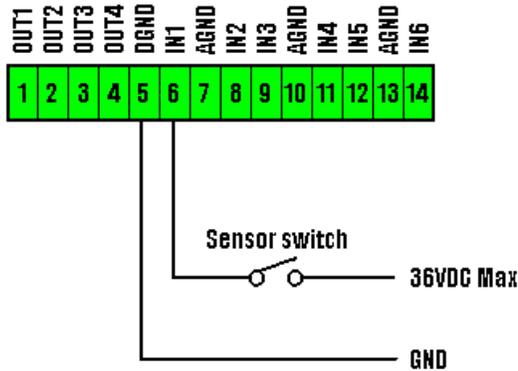


Note that the DGND connection is referenced to the modem’s supply ground.

### Input Connection

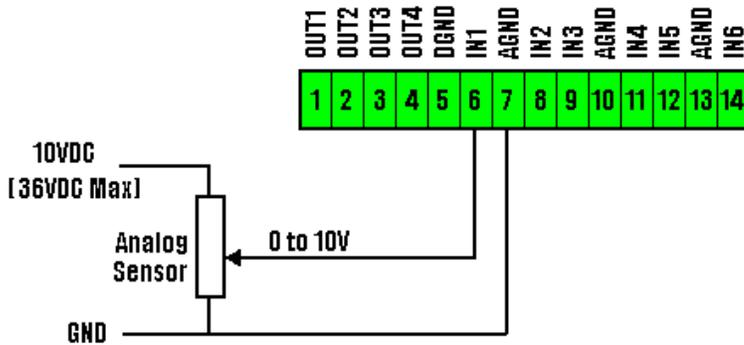
The 6 inputs may be configured in the modem for monitoring a digital DC voltage state or an analog DC voltage.

For digital state monitoring the minimum input voltage is 0 volts while the maximum is 36 volts. The threshold detection voltage is 2.5 volts with 1 volt of hysteresis. Connections can be made as shown:



Note that the DGND connection is referenced to the modem's supply ground.

For analog voltage monitoring the measurement range is 0 to +10 volts with 10mV resolution. The input can withstand up to 36 volts. Connections can be made as shown:



Note that the AGND connection is referenced to the modem's supply ground.



## 8 Modem Configuration

The Chameleon CTM-130 and CTM-132 modems can be configured for use by using either the modem's unique embedded web server or by using its extensive AT command set. The majority of modem configuration requirements can be done using the embedded web pages. For more advanced configurations the AT commands will be required.

A new modem needs to be activated on the wireless network that it has been provisioned for - once this has been done the modem is ready to be configured with the user account information provided by the wireless network. The modem can then be configured to suit the end application with regard to its host interface, communications protocol, and GPS and input triggered reporting.

The embedded web pages can be accessed both from a local host PC connected to the modem, and remotely over the internet once the network activation has been completed.

The AT commands can be entered directly from a terminal application connected directly to the modem, and remotely over the internet using a telnet session once the network activation has been completed.

### 8.1 Embedded Web Page

To access the modem's embedded web page it is necessary to setup a PPP connection to the modem. On any Windows® PC configure a Dial-Up Networking (DUN) connection to the modem using \*555 as the number to dial (no username or password is required).

#### 8.1.1 Making a Dial-up Connection

##### Windows® 98 Operating Systems

From **Start/Settings/Control Panel** select **Network Options** and go to the **Connections** tab to **Add** a new DUN connection:

- Give this connection the name **CTM130 Configure** and select the **Cypress Solutions CTM130 CDMA** modem from the drop-down list. Click **Next**.
- Enter **\*555** as the telephone number to dial. Click **Next**.
- Click **Finish**.

This will now have added a DUN connection called **CTM130 Configure** in the Dial-Up network connection list.

(it may be necessary to change the properties of this new connection to disable the use of area code and dialing properties in order to have the connection use the \* character in the dialing string – to do this right click on the connection name and select **Properties**, then deselect the **Use area code and dialing properties** flag and click **OK**.)

##### Windows® 2000 Operating Systems

From **Start/Settings/Control Panel** select **Network and Dial-up Connections**. Double click on **Make New Connection**. This will bring up the **New Connection Wizard**, click **Next** to continue.

- Select **Dial-up to the Internet**, and click **Next**.
- Select **I want to setup my Internet Connection Manually**, and click **Next**.



- Select **I Connect through a phone line and a Modem**, and click **Next**.
- Select the **Cypress Solutions CTM130 CDMA** modem. Click **Next**.
- Enter **\*555** as the telephone number to dial. Deselect **Use area code and dialing rules**, then click **Next**.
- No User Name or Password is required for this connection. Click **Next**, then click **Yes**.
- Use **CTM130 Configure** as the connection name, and click **Next**.
- Select **No** to setting up an internet mail account. Click **Next**, then **Finish**.

This will now have added a new connection called **CTM130 Configure** in the Dial-Up network connection list.

### Windows® XP Operating Systems

From **Start/Settings/Control Panel** select **Network Connections**. This will bring up the **New Connection Wizard**, click **Next** to continue.

- Select **Connect to the Internet**, and click **Next**.
- Select **Setup my Connection Manually**, and click **Next**.
- Select **Connect using a Dial-up Modem**, and click **Next**.
- Select the **Cypress Solutions CTM130 CDMA** modem. Click **Next** (this screen will only appear if your Computer has more than one modem installed).
- Use **CTM130 Configure** as the ISP name, and click **Next**.
- Enter **\*555** as the telephone number to dial. Click **Next**.
- Select **My Use Only**, and click **Next**.
- No User Name or Password is required for this connection. Deselect **Make this the default Internet connection**, Click **Next**.

This will now have added a Dial-up connection called **CTM130 Configure** in the Dial-Up network connection list. Click **Dial** to connect now or **Cancel** to connect later.

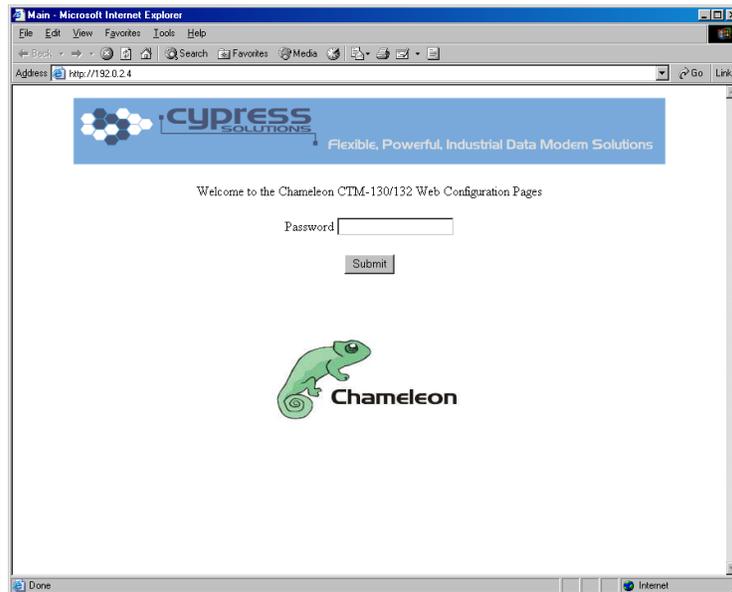
### 8.1.2 Connecting to the Embedded Web Page

From the list of Dial-up connections initiate the connection to the embedded web page by double clicking on the **CTM130 Configure** connection and then clicking on **Connect**. The connection progress will be displayed:

**Dialing >> Verifying User Name and Password >> Connecting To Network >> Connected**

A new network connection icon will appear in the **System Tray** at the bottom right of your desktop.

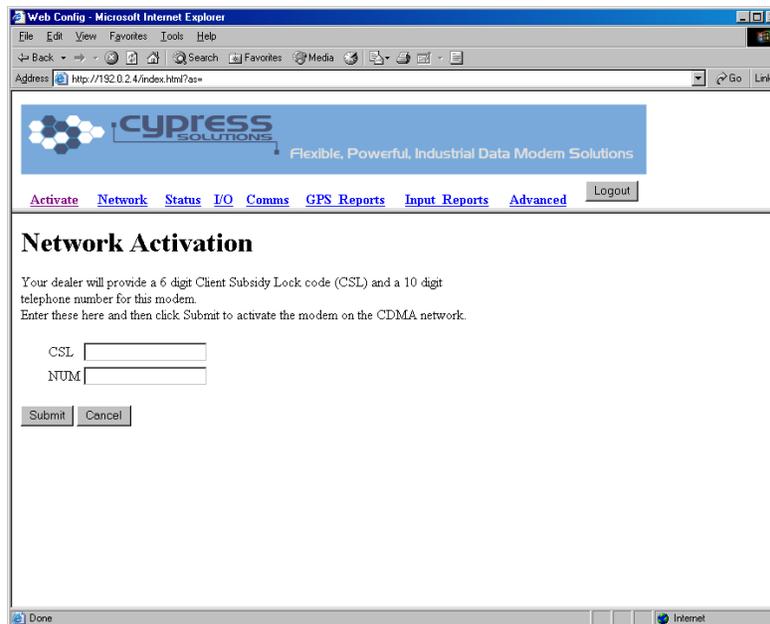
Now start your standard web browser application (eg Internet Explorer) and surf to location **http://192.0.2.4** - this will bring up the modem's embedded web page. Note that if you have a LAN connection active on your PC it may need to be disabled so that all IP communications will be processed through the modem.



The default password is **Chameleon**. If the incorrect password is entered it will still be possible to view the web pages but no configuration changes will be possible - you will be advised to re-enter your password. Click the **Logout** button to return to this password entry page at any time.

### 8.1.3 Activating the Modem

If the modem has not been activated on the CDMA network this needs to be done first. On the **Activate** page enter the 6 digit Client Subsidy Lock code (**CSL**) and the modems allocated telephone number (**NUM**) as provided by the CDMA network carrier for this specific modem. Click **Submit**.



If the incorrect CSL code is entered then you will be advised to check your CSL code and try again.



### 8.1.4 Configuring the Network Connection

Next it is necessary to load the CDMA network connection information into the modem. This is done from the **Network** page:

Web Config - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Search Favorites Media Print Mail

Address http://192.0.2.4/index.html?as= Go Links

Flexible, Powerful, Industrial Data Modem Solutions

Activate Network Status I/O Comms GPS Reports Input Reports Advanced Logout

### Network Setup

To setup the modem for connecting to the CDMA network enter the User Name, Password, and Connection Number provided for this modem.

User Name

Password

Dial Number

Network IP Negotiation

Simple IP Only

Mobile IP Preferred

Submit Cancel

Enter the user name and password provided by the CDMA network carrier for this specific modem.

For a CDMA 1x connection the **User Name** is often of the form “number@1x.telusmobility.com” (where number is the telephone number allocated to this modem), and the **Password** is often the Electronic Serial Number (ESN) of this modem in decimal format (don’t forget any leading zeroes if these are part of the ESN). For a 1x connection the **Dial Number** is often **#777**.

For a Quick Net Connect (qnc) connection the **User Name** is usually **qnc** and the **Password** is also **qnc**. The **Dial Number** is often **#888**.

Select the network negotiation method: **Simple IP only** or **Mobile IP preferred** – this information will have been provided to you with the account information.

Click **Submit**.

The modem has now been configured to enable it to connect to the CDMA network. You may continue to configure the modem for your application or you may close this web browser session, shut-down the embedded web page DUN connection (by right clicking on the connection icon in the **System Tray** and select **Disconnect**) and go to the **Modem Operation** section to see how to start a **CDMA network connection**.



## 8.1.5 Configure the Communications Protocol

Available communication modes include:

**Manual Connect** – connection and disconnection to the CDMA network is initiated by the user. This is the standard mode of operation for using the modem in a mobile office situation.

**Auto Connect** – this provides a mechanism where the modem will automatically connect to the CDMA network whenever it is powered up. This mode is used for AVL applications where the modem is required to continuously transmit GPS position information. It is also used to connect to the CDMA network in cases where there is no person available to initiate the network connection.

**Auto Connect PAD** – this mode is often used for enabling communications between industrial control equipment. It effectively sets up a transparent communication pipe between two separate devices. Both UDP and TCP connections can be configured.

The **Host Interface** can also be configured on this page.

For common applications such as web surfing and email the default **PPP** connection will be used.

Some legacy equipment or custom devices may require the use of a **SLIP** connection – you will need to allocate a host IP address for this selection.

If **Auto Connect PAD** was selected as the connection mode above then **PAD** will need to be selected for the Host Interface. The use of TCP PAD or UDP PAD will also be required along with a remote IP address and Port number. There are additional parameters that may be configured for PAD mode - refer to the AT Command reference document for details.

The default host connection baud rate is 115,200. This can be changed to any of the standard settings down to 1,200 baud – Caution: all host applications will need to use this new setting.



### 8.1.6 Configure the I/O Operation

The CTM-130/132 modem has 6 user inputs and 4 user outputs. The inputs may be configured for either digital or analog monitoring – configuration of this and their use to trigger reporting can be set on the I/O page.

In order to use an input as a report trigger it is necessary to configure it for the desired operation:

- First select if the input is a **Digital** or **Analog** type - digital inputs are simple On or Off decisions based on a voltage threshold of 2.5V +/- 0.5 V, while analog inputs have a range of 0 to 10V.
- Next select if the input logic is **Positive** or **Negative**: for positive logic an analog input voltage greater than the set threshold or a digital input of greater than 3.0V will be deciphered as On for report triggering; for negative logic an analog input voltage less than the set threshold or a digital input of less than 2.0V will be deciphered as On for report triggering.
- For analog inputs set the **Threshold** voltage at which you wish the report to be triggered.
- Lastly set the reporting trigger – **On**, **Off**, or **Change**: On will trigger continuous reports while the input is in the On state; Off will trigger continuous reports while the input is in the Off state; Change will trigger a single report whenever the input changes state from On to Off, or Off to On.

The 4 digital outputs may be controlled from this page: each output may be set as **On** or **Off** to control equipment that is connected to the CTM-130/132 modem.

Input Setup	Input #1	Input #2	Input #3	Input #4	Input #5	Input #6
Current values	0.00V 0					
Input type	Analog	Analog	Analog	Analog	Analog	Analog
Trigger Logic	Negative	Negative	Negative	Negative	Negative	Negative
Analog threshold (0.0 to 9.9Volts)	0.0	0.0	0.0	0.0	0.0	0.0
Report trigger	Off	Off	Off	Off	Off	Off

Output Control	Output #1	Output #2	Output #3	Output #4
	Off	Off	Off	Off



## 8.1.7 Setup GPS Reporting

	Report #0	Report #1	Report #2	Report #3
Local Reporting	Off	Off	Off	Off
Local Port #	0	0	0	0
Remote Reporting	Off	Off	Off	Off
Remote IP	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0
Remote Port #	0	0	0	0
Repeat timer (secs)	300 Off	300 Off	300 Off	300 Off
Distance trigger (meters)	0 Off	0 Off	0 Off	0 Off
Messages	GPS GGA None None None	GPS GGA None None None	GPS GGA None None None	GPS GGA None None None

GPS reports may be triggered by GPS events and may be sent to a remote location over the wireless connection and over the local serial connection to the host computer. Up to 4 GPS reports may be independently configured using the embedded web pages. These reports may be triggered by a combination of time AND/OR distance.

A further 4 GPS reports may be configured using AT Commands as well as more complex report triggering sequences for all 8 reports – refer to the AT Command reference for details.

Each report may be configured to include up to 4 independent messages. These messages come in either NMEA, ULCP, or TAIP format. Refer to the AT Command reference document for details of the message formats.

There is a Store and Forward function available for GPS reports. This enables the modem to store up to 2000 reports in its internal memory during periods of no CDMA network coverage, and send these once network coverage is restored. This feature is configured using AT Commands.



## 8.1.8 Setup Input Reporting

The screenshot shows a web browser window titled 'Web Config - Microsoft Internet Explorer' with the address 'http://192.0.2.4/index.html?as='. The page header includes the Cypress Solutions logo and the tagline 'Flexible, Powerful, Industrial Data Modem Solutions'. A navigation menu contains links for 'Activate', 'Network', 'Status', 'I/O', 'Comms', 'GPS Reports', 'Input Reports', and 'Advanced', along with a 'Logout' button. The main content area is titled 'Input Triggered Reports' and includes a note: 'For advanced reporting features please see the AT command reference manual'. Below this is a configuration table for four reports (Report #0 to Report #3).

	Report #0	Report #1	Report #2	Report #3
Local Reporting	Off	Off	Off	Off
Local Port #	0	0	0	0
Remote Reporting	Off	Off	Off	Off
Remote IP	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0
Remote Port #	0	0	0	0
Repeat timer (secs)	300	300	300	300
Input #	0	0	0	0
Messages	GPS GGA	GPS GGA	GPS GGA	GPS GGA
	None	None	None	None
	None	None	None	None
	None	None	None	None

Buttons: Submit, Cancel

Input reports may be triggered by Input events and may be sent to a remote location over the wireless connection and over the local serial connection to the host computer. Up to 4 Input triggered reports may be independently configured using the embedded web pages. These reports may be triggered by a combination of time AND/OR Input event.

A further 4 Input reports may be configured using AT Commands as well as more complex report triggering sequences for all 8 reports – refer to the AT Command reference for details.

Each report may be configured to include up to 4 independent messages. These messages come in either NMEA, ULCP, or TAIP format. Refer to the AT Command reference document for details of the message formats.



## 8.1.9 Advanced Configuration Options

The Advanced Configuration page provides access to a number of modem configuration options. This is where the configuration options for these web pages can be changed. Be careful when enabling remote access to these web pages if the modem is not on a closed IP network since this will enable anyone on the Internet to gain access to the modem's configuration (if they can break the access password).

The modem can be given an ID which can be used in one of the messages sent with GPS or Input reports. This allows you to identify the modem easily – for instance “**Site\_123**”.

If you wish to reset all the modem's configurable parameters back to their original factory settings then check the box called **Restore Factory Defaults**. After clicking **Submit** to save this change you will need to reconfigure the modem for your new application requirements.



## 8.2 AT Commands

The Chameleon CTM-130/132 modem can be fully set-up and configured using AT commands. Please refer to the AT Command reference manual for a complete listing and description of available commands.

The minimum configuration required to use the modem on the CDMA network is to activate it and then load the network connection parameters. Implementing this with AT Commands is detailed below:

To activate the modem on the CDMA Network use the following sequence of commands:

```
AT$KWMODE=1
AT$KWSPC=nnnnnn (where nnnnnn is the modem's 6 digit lock code)
AT$KWDIR=pppppppppp (where pppppppppp is the modems 10 digit telephone number)
AT$KWMODE=2
```

To configure the modem for connection to the CDMA network use the following commands:

```
AT^USER=<user name> (provided by the CDMA network carrier for this modem)
AT^PSWD=<password> (often the modem's ESN)
AT^NUM=nnnn (often #777 for a CDMA 1x connection, or #888 for a qnc connection)
```

The modem can now be used with a Windows® Dial-Up connection to access the Internet.

The CTM-130/132 modem provides the ability to configure the modem remotely “over the air” using a Telnet session into the modem (the modem must be connected to the CDMA network on a packet connection and have a known IP address). Refer to the AT Command Reference document for setting up Telnet AT command access.



## 9 Modem Operation

### 9.1 Automatic Power Control

The supply voltage must be at least 9VDC for the modem to operate. With the power applied the modem will power-up in its operating mode and will then follow the settings applied for power management.

The CTM-130/132 Chameleon modem has three power modes that can be set with the ability to have an external event change this mode (refer to the modem's AT Command reference manual for details).

Mode	Description	Mode change event
Operation	In this mode the modem is fully powered up and ready to receive or make network connections	The modem can be configured to go back into either standby or shutdown mode after a defined period.
Standby	Only the CDMA module and modem's power management circuits are operating.	An incoming circuit switched call can be used to wake the modem up and put it in full operation mode. An input event can be used to wake the modem up and put it in full operation mode. A timer can be set to wake the modem after a fixed period.
Shutdown	Only the modem's power management circuits are operating.	An input event can be used to wake the modem up and put it in full operation mode. A timer can be set to wake the modem after a fixed period.

The CTM-130/132 also has the ability to be automatically put into shutdown mode depending on the state of the power standby signal (the white power wire), and the RS232 port. A programmable timer can also be configured (refer to the modem's AT Command reference manual for details).

The default setting (modem firmware release 1.2.1) is for the modem to go into shutdown immediately upon detecting that the power standby signal is off. It will then power back up into full operation mode when the power standby signal is switched back on.

Other possible configurations include:

- Ignore both the power standby and RS232 port status and remain in full operation mode.
- Go into shutdown only after both the power standby and RS232 port have been switched off, and after a delay of 1 hour – this may be useful to allow the modem to keep reporting its position for one hour after the vehicle has been shutdown. Power back on into full operation mode when both the power standby signal and the RS232 port are switched on again (note – no delay when returning to operation mode).



## 9.2 Panel LED Indicators

There are four LED indicators on the CTM-130 and CTM-132 top. These are used to show the status and operation of the modem.

<b>PWR</b>	This LED shows the power status of the modem: On solid = the modem is on and able to connect Flash slowly = the modem is in shutdown mode Off = the modem has no power connected
<b>CELL</b>	This LED shows the status of the modem on the CDMA network: Off = the modem is not detecting a valid CDMA signal Flashing = the modem is receiving a signal less than $-95\text{dBm}$ On solid = the modem is receiving a signal greater than $-95\text{dBm}$
<b>TX/RX</b>	This LED shows that data is being transmitted or received: Off = no data is being transmitted or received On or flashing = data is being transmitted or received
<b>GPS</b>	(CTM-132 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

## 9.3 GPS Operation

The GPS module in the modem will continuously track the units position whenever power is applied to the modem and there is a clear view of the sky to the GPS antenna. The time taken for the modem to achieve a valid positional fix is determined by the previous state of the unit:

- For a “cold” start (after all power is applied to the modem) the acquisition time will be a few minutes – typically less than 2 minutes.
- For a “warm” start (standby power is maintained to the modem) the acquisition time will typically be less than 45 seconds.
- For reacquisition (after the GPS module has temporarily lost signal) the time to acquire a valid position fix is typically less than 2 seconds.

The GPS information can be sent by the modem as a message in any of the configured reports or can be viewed directly on the status page of the embedded web server.

The GPS receiver uses the WGS-84 datum.



## 9.4 Making a CDMA Network Connection

Connecting to the CDMA network requires setting up a Dial-up connection on your computer. Setup a Dial-up connection following the same procedure as used to setup the embedded web page connection in section 8.1.1 above. Use the following Dialed number:

For a CDMA 1x connection the telephone number is usually **#777**.

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

The **user name** and **password** will be the same as that configured in the modem in section 8.1.4 above:

- For a CDMA 1x connection the user name will often be in the format: **Phone\_number@1x.telusmobility.com**, and the password will be the ESN as given on the top of the modem: **nnnnnnnnnnn**.
- For a qnc connection the user name will often 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.

Click **Connect** to initiate the connection. The connection progress will be displayed:

**Dialing >> Verifying User Name and Password >> Connecting To Network >> Connected**

During the network connection the network 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.

With the network connection active you may now open Windows® applications that will make use of this connection – this includes email, web browsers, and VPN connections.

To close the connection right click on the connection icon in the **System Tray** and select **Disconnect**.



### 9.4.1 Accessing the Embedded Web Pages

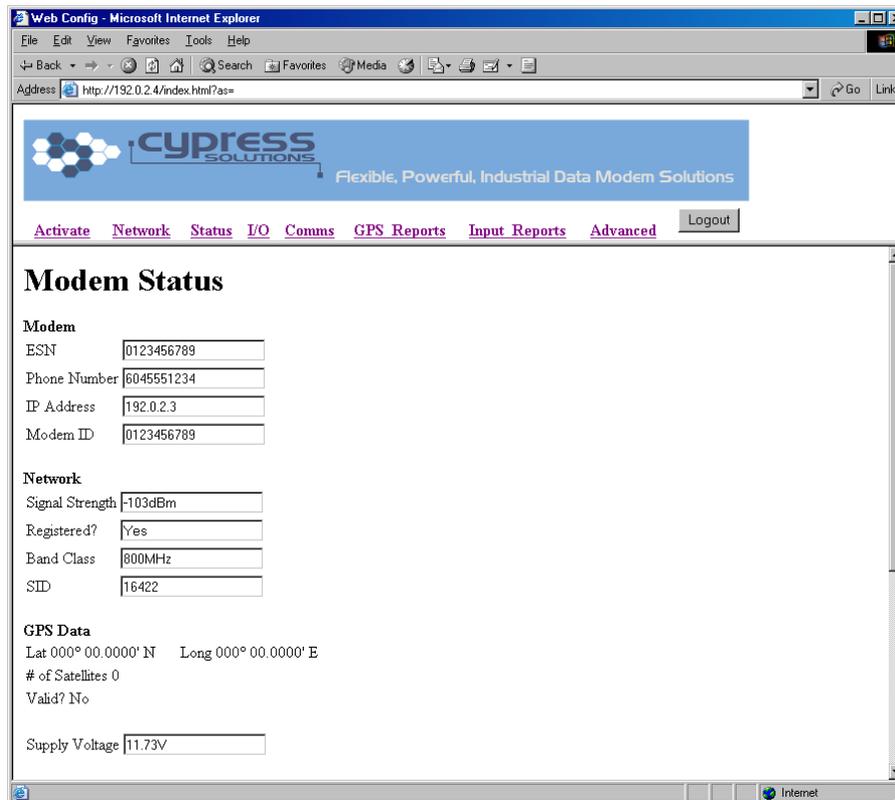
While connected on the CDMA network it is possible to access the modem's embedded web pages either from a PC connected directly to the modem or remotely over the CDMA network. This enables changing of configuration parameters and to viewing of the modem's settings and status.

From an attached PC use your standard Web browser application and go to IP address **http://192.0.2.4** and enter the web page password (factory default password is **Chameleon**).

From a remote location surf to the modem's IP address - you will need to know this and have configured the modem to allow remote access to its web pages. Again, enter the web page password and you will have access to the configuration pages.

**Caution** – some configuration changes will cause this connection to close and require use of the AT commands to return to this mode.

The modem's current status may be viewed using the **Status** page.



The modems ESN, configured telephone number and currently allocated IP address can be viewed (the IP address will be 192.0.2.3 if the modem is not connected to the CDMA network).

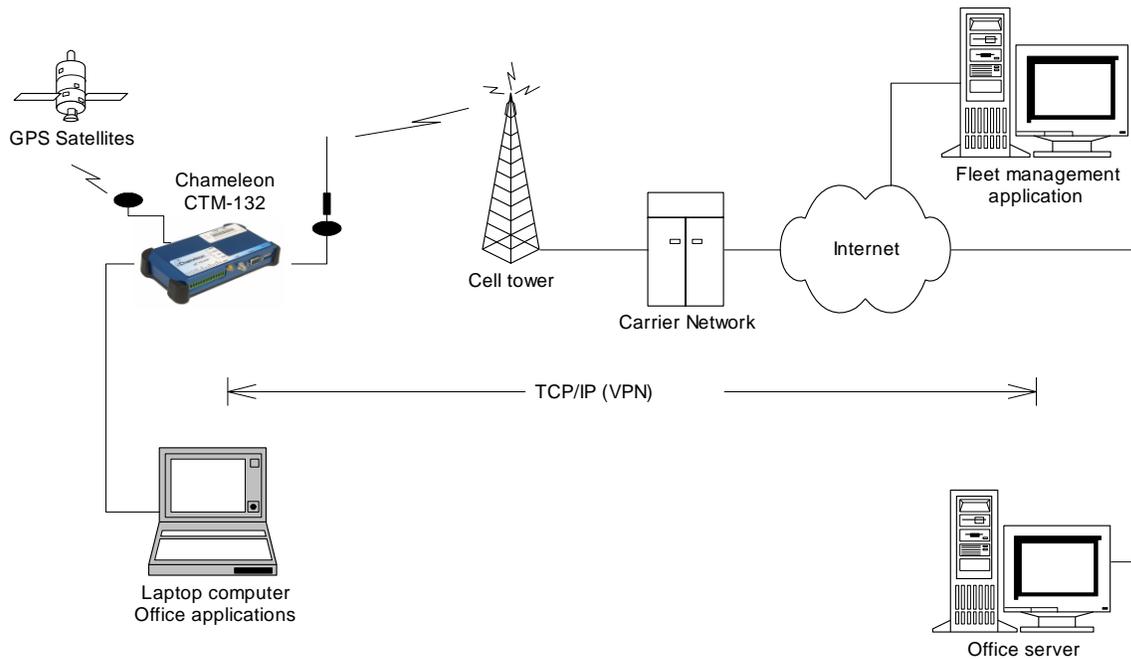
The CDMA network status including current signal strength as seen by the modem is given in dBm.

For the CTM-132 with GPS the current GPS data will be displayed if a valid position fix is available.



## 9.5 Vehicle Dispatch Operation

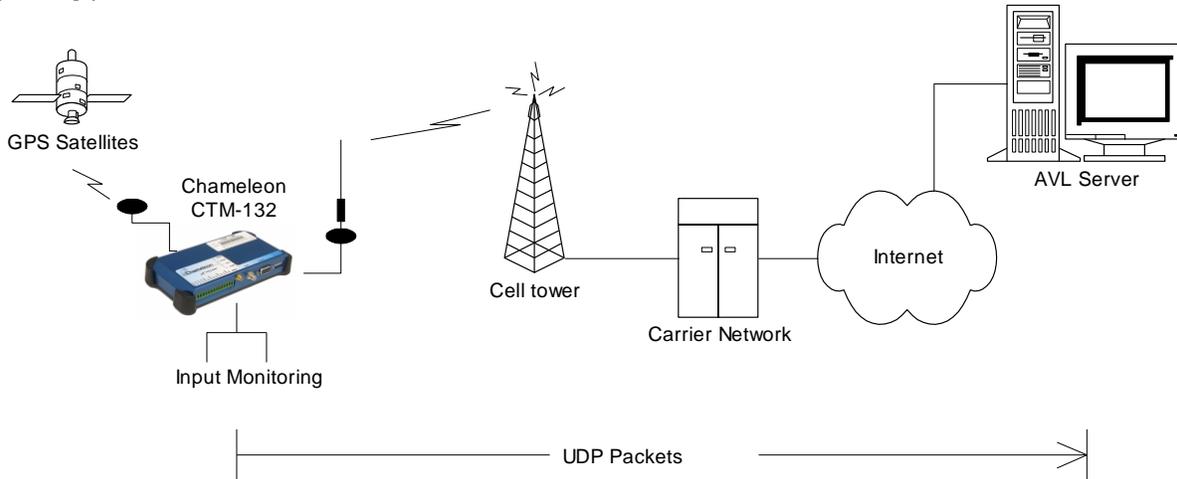
The CTM-132 modem is an ideal device for vehicle dispatch operations. Its embedded GPS receiver and CDMA network Auto Connect capability mean that the vehicles position is always known by central dispatch while the modems communication capabilities provide a data path for sending and receiving reports and instructions. It is not necessary for a computer or terminal device to be present for the GPS reporting function to be active thereby allowing the vehicle operator to remove the host device for operations away from the vehicle without disrupting this position reporting.





## 9.6 AVL Operation

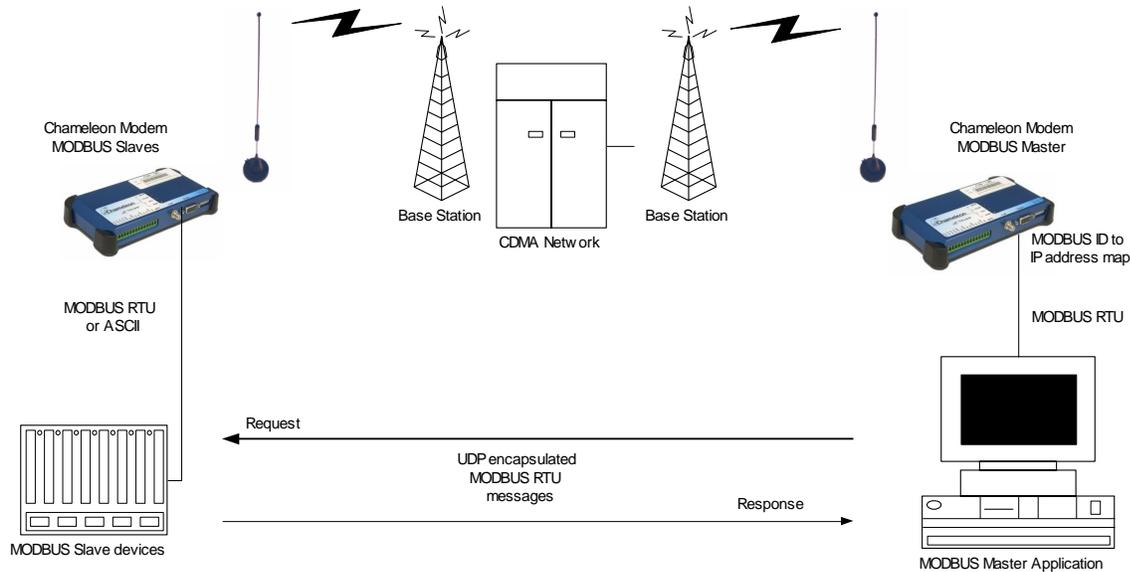
The stand-alone capabilities of the CTM-132 make it the device of choice for AVL operations on the CDMA network. Its input monitoring linked with its extensive reporting capabilities provide a powerful automated reporting device for high value asset tracking and critical mobile operation reporting. The modem's auto connect mechanism enables it to operate completely unattended while performing continuous position and input event reporting. The modem may also be remotely accessed to change its reporting parameters without the need for a site visit.



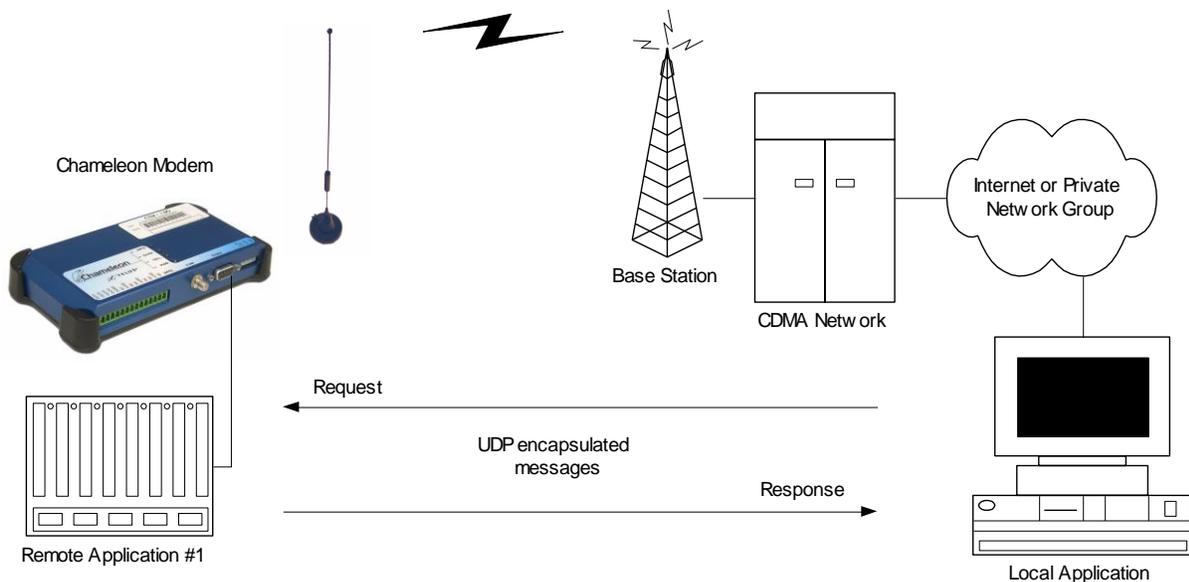


## 9.7 Industrial Monitoring Operation

The advanced communication capabilities of the CTM-130/132 modem are designed for enabling communications with remote industrial sites. These sites often operate equipment utilizing industrial communication protocols such as MODBUS RTU. The CTM-130/132 modem supports the MODBUS protocol and can be configured for either slave or master connection. In master connection the modem performs MODBUS ID to IP mapping.



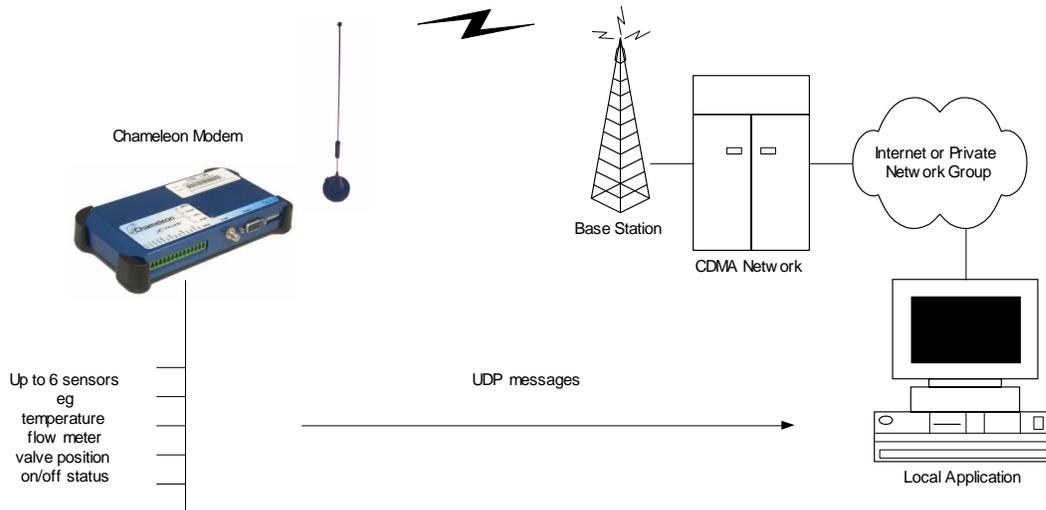
For other industrial protocols the PAD communication features of the modem can be configured to enable these to be implemented over the CDMA network.





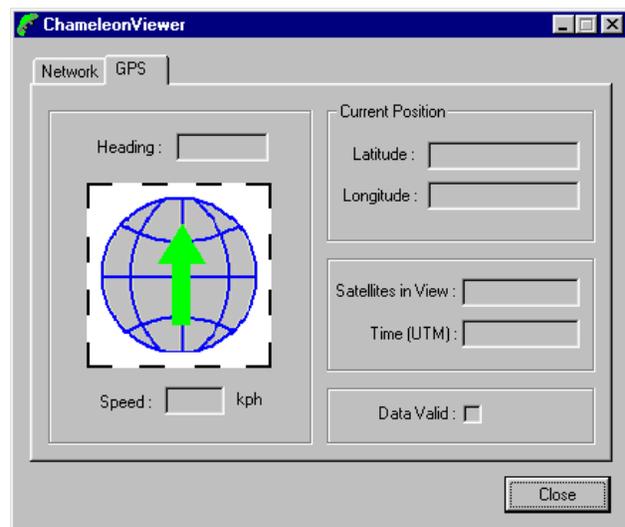
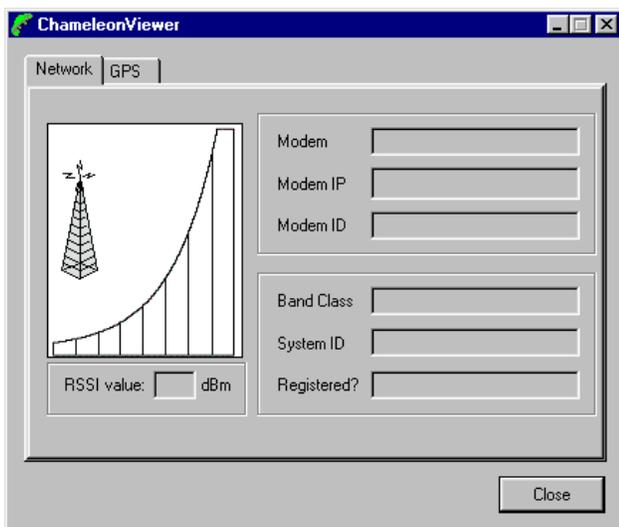
## 9.8 Remote Sensor Monitoring

The CTM-130/132 modem has the ability to directly monitor and report readings from sensors connected to the modem's input port. This provides a cost effective solution for temporary or remote location sites, and are often used as a backup to an existing monitoring system.



## 9.9 Using the Chameleon Viewer Windows® Software

The CTM-130/132 modem makes available to the host device a fixed format status report which may be viewed by the Chameleon Viewer Windows® application. The report is available anytime that the host computer has established a PPP session to the modem using a Dial-Up connection. For the CTM-132 modem equipped with a GPS receiver the current positional information is also available on the GPS tab.





The Chameleon Viewer application is an executable program – simply run it by double clicking on the file or from Start/Run and Browse to the file. This application may be run on a Windows® 98, 2000, or XP operating system.

It is also possible using the AT Commands to configure this status report to be sent over the CDMA network so that this application may be run on a remote computer to view the modem's status. Refer to the AT Command reference document for full details.

## I O Trouble shooting

- Situation:* The power LED is flashing slowly and I can't communicate with the modem.  
*Solution:* The modem is in shutdown mode. Make sure that the supply voltage is greater than 9VDC. Remember that the modem is designed to go into shutdown mode if the standby signal is off AND the RS232 port goes inactive.
- Situation:* I use a USB to serial converter but it isn't communicating with the modem.  
*Solution:* Make sure that the CTM-130/132 modem has been installed in Windows® to use the same COM 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 or configured appropriately.
- Situation:* DUN disconnects as soon as I try accessing a URL.  
*Solution:* You may have another network connection active that is causing the modem session to be disconnected. Try disabling the other connection while using the modem.
- Situation:* How do I check to see if my modem is registered on the network?  
*Solution:* Using the modems embedded web server go to the **Status** page, or use the AT command AT+CSS? The AT command provides the following information:
- Current band class (1 for 800MHz, 2 for 1900MHz)
  - Current band (A to F, or Z for not registered)
  - SID code (99999 if not registered)
- Situation:* I need to find the ESN of the modem but I can't access the label on its top.  
*Solution:* Using the modems embedded web server go to the **Status** page, or use the AT command AT+GSN. The AT command 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:* Using the modems embedded web server go to the **Status** page, or use the AT command AT^RSSI?. This will return the current received signal strength in dBm as seen by the modem:

-137	= no signal!
<-95	= very low
-95 to -86	= low
-85 to -81	= fair
-80 to -76	= good
>-75	= excellent

For additional service and help with CTM-130/132 CDMA modem installation and operations please contact the appropriate support group below.

For operations on the TELUS Mobility CDMA network contact:

**TELUS Mobility Data Support group**  
**1.866.771.7292**  
**[www.telusmobility.com](http://www.telusmobility.com)**

Have the modem 10 digit Telephone Number ready to enter on your phone keypad

For advanced technical support on Chameleon products contact:

**Cypress Solutions Service Support Group**  
**1.877.985.2878**  
**or 604.294.4465**  
**9.00am to 5.00pm PST**

[support@cypress.bc.ca](mailto:support@cypress.bc.ca)



## II 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.

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### Approvals

EMC Mobile device	FCC part 15 Class A; ICES-003 Class A FCC CFR 47 part 2.1091; Industry Canada RSS-102
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### Temperature

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

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### Humidity

5 to 95%RH	SAE 1455 4.2.3, 85-95% RH for two 24hr 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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### Material

Case	6061 High strength Aluminum
Base	Oil & Solvent resistant automotive grade Santoprene

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### Power Supply

Voltage	9 to 36 VDC
Current	Operation 200mA typical, 300mA max at 12VDC Standby 15mA typical at 12VDC <1mA shutdown mode
Protection	SAE J1455

---

### Serial port

Connector	DB9, RS232C, DCE configuration
Protocols	AT commands, PPP/SLIP, PAD, MODBUS RTU/ASCII, SMTP

---

### I/O

Outputs	4 Digital outputs, open drain configuration 500mA sink capability, overload protection
Inputs	6 Digital or Analog inputs 2.5V +/- 0.5V digital detection threshold, 36VDC withstand 0 to 10V analog range, 10mV resolution, +/- 50mV accuracy

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### RF

800MHz & 1,900MHz bands	SMA 50ohm connector +23.5dBm max
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### GPS (CTM-132)

Type	8 channel, continuous tracking
Accuracy	<6 metres typical
Acquisition	Cold start <2mins typ.; Warm start <45secs typ.; Reacquisition <2secs typ



**Size**

Width	172mm
Depth	98mm (excluding cabling)
Height	31mm

---

**Weight**

450 grams

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