

# CipherLab Reference Manual

8400 GPRS Cradle

For 8400 Series Mobile Computers

Version 1.00a



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# IMPORTANT NOTICES

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## FOR USA

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

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

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

## FOR CANADA

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 Industry Canada.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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 l'Industrie.

## SAFETY PRECAUTIONS

### **RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS.**

- ▶ The use of any batteries or charging devices, which are not originally sold or manufactured by CipherLab, will void your warranty and may cause damage to human body or the product itself.
- ▶ DO NOT disassemble, incinerate or short circuit the battery.
- ▶ DO NOT expose the scanner or the battery to any flammable sources.
- ▶ For green-environment issue, it's important that batteries should be recycled in a proper way.
- ▶ Under no circumstances, internal components are self-serviceable.
- ▶ The charging and communication cradle uses an AC power adaptor. A socket outlet shall be installed near the equipment and shall be easily accessible. Make sure there is stable power supply for the mobile computer or its peripherals to operate properly.

## CARE & MAINTENANCE

- ▶ This cradle is intended for indoor use only. It may do damage to the cradle when being exposed to extreme temperatures or soaked wet.
- ▶ When the body of the cradle gets dirty, use a clean and wet cloth to wipe off the dust. DO NOT use/mix any bleach or cleaner. Always keep the cradle dry.
- ▶ If you shall find the cradle malfunctioning, write down the specific scenario and consult your local sales representative.

# RELEASE NOTES

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Version	Date	Notes
1.00a	Sep. 01, 2009	Initial release



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# INTRODUCTION

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Capable of charging the battery, the 8400 GPRS Cradle is specifically designed for 8400 Series Mobile Computers to connect to WWAN via GPRS or GSM data services.

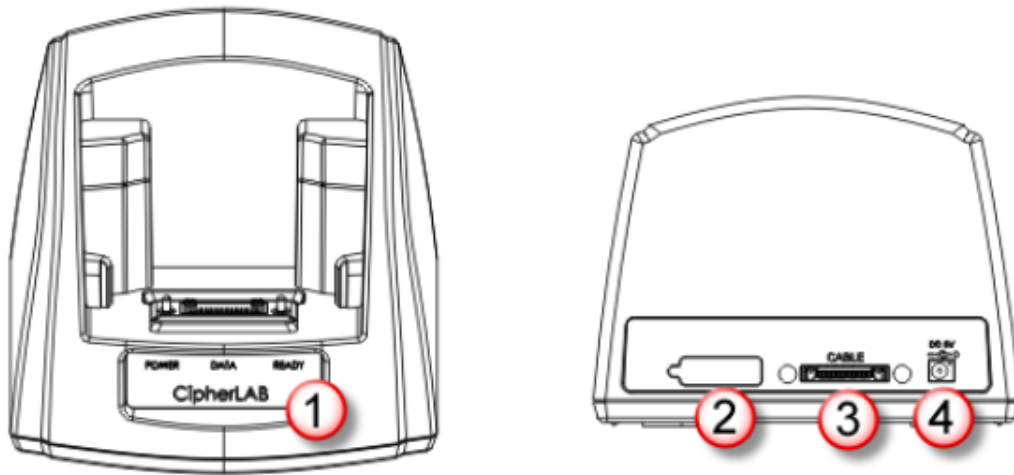
This manual serves to guide you through how to install, configure, and operate the 8400 GPRS Cradle. We recommend you to keep one copy of the manual at hand for quick reference or maintenance purposes. To avoid any improper disposal or operation, please read the manual thoroughly before use.

Thank you for choosing CipherLab products!

## OVERVIEW

The cradle provides three LED indicators on the front panel to indicate connection status. Refer to the [flow chart](#) for information on the initialization stages after powering on the cradle.

### GPRS/GSM Cradle (EDGE/Quad-band)



No.	Description	No.	Description
1	LED Indicators (POWER, DATA, READY)	2	SIM Card Slot
3	Cable Connector (USB or RS-232)	4	Power Jack

Front Panel LEDs	Tasks	Indication of Connection Status	
LED 1	Power status	Solid red	Power ON
		Off	Power OFF
LED 2	Tx / Rx status	Flashing green	Transmitting or receiving data
		Off	No activity
LED 3	Link status	Flashing green	Dialing out
		Solid green	Connected
		Off	Disconnected

## INSTALLATION

- 1) Screw the antenna to the cradle.
- 2) Remove the rubber cover at the back of the cradle.
- 3) Insert your SIM card and replace the rubber cover.
- 4) Seat the mobile computer in the cradle.
- 5) Connect the power supply cord to a suitable power outlet, and the cradle's LED will become red (see LED 1). The cradle is ready for charging the mobile computer.

## INSERTING SIM CARD

The SIM card orientation is as shown in the illustration above, with contacts facing down. Refer to Chapter 2 [Configuring the 8400 GPRS Cradle](#).

## REMOVING SIM CARD

You will need pliers to take out your SIM card when it is not desired in use. Always disconnect the power supply cord before removing the SIM card.

## FEATURES

- ▶ Quad-band EGSM 850/900 MHz and GSM 1800/1900 MHz
- ▶ GPRS multi-slot Class 10
- ▶ Full PBCCH support
- ▶ Comply with GSM phase 2/2+
- ▶ Output power — Class 4 (2W) for EGSM 850/900; Class 1 (1W) for GSM 1800/1900
- ▶ Power consumption — GSM connection: Typical 900 mA (while charging battery)  
GPRS connection: Typical 1200 mA (while charging battery)

## INSIDE THE PACKAGE

The following items are included in the package. Save the box and packaging material for future use in case you need to store or ship the cradle.

- ▶ 8400 GPRS Cradle, complete set including power adaptor and supply cord
- ▶ Antenna
- ▶ Quick Installation Guide

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Note: This manual is included on Product CD shipped with CipherLab 8400 Series Mobile Computers.

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## USING THE 8400 GPRS CRADLE

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The 8400 GPRS Cradle is a charging & communication cradle that is specifically designed for connecting CipherLab 8400 Series Mobile Computers to WWAN via GPRS or GSM data services. Refer to Chapter 4 [Programming Your Mobile Computer](#).

This chapter explains how it works and the three working modes supported by the 8400 GPRS Cradle. Please contact your Internet service provider (ISP) or network operator for information on GPRS related settings, such as

- ▶ APN (name of access point that connects the mobile network to the Internet)
- ▶ IP address (DHCP or static)
- ▶ User name and password (may be optional, depending on Challenge-Handshake Authentication Protocol)

For quick deployment, we provide a utility (.SHX) that can be downloaded to your mobile computer and used to configure, test, and upgrade firmware of as many cradles as you have. Refer to Chapter 2 [Configuring the 8400 GPRS Cradle](#) and Chapter 3 [Upgrading Firmware](#).

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**Warning:** It is recommended that the charging devices be operated at room temperature (18°C to 25°C) for optimal performance. The charging devices will not charge the battery when the temperature exceeds 40°C.

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## 1.1 HOW IT WORKS

Referring to the flow chart on the next page, LED 2 and LED 3 are used to indicate a specific stage of initialization, data connection, as well as firmware download. They are explained below (by number).

### 1) Initializing

After powering on, the LEDs of Tx/Rx and Link will flash by turns at the time interval of 0.25 seconds for about 30 seconds, indicating the cradle is in initialization process.

### 2) Initialization OK

If initialization is done successfully, the LED of Link will flash at the time interval of 1 second, waiting for AT commands.

### 3) Initialization NG

If initialization fails, the LED of Tx/Rx will flash at the time interval of 0.5 seconds, indicating an error occurs. For example, it might fail to pass PIN authentication, the signal strength is weak for the GSM network, the Access Point name is incorrect, etc. For details on the specific initialization error, use "[AT+ERR?](#)" to get the error code. Although initialization fails, the cradle can still accept AT commands. In case of the "[ATDT](#)" command, it will re-initialize before dialing out.

### 4) Dialing out

When in Dial mode ([ATDT](#)), the LED of Link will flash at the time interval of 0.3 seconds for about 20 seconds.

### 5) Connected

When in Dial mode ([ATDT](#)), the LED of Link will be green after successfully establishing a connection.

### 6) Data Transmission

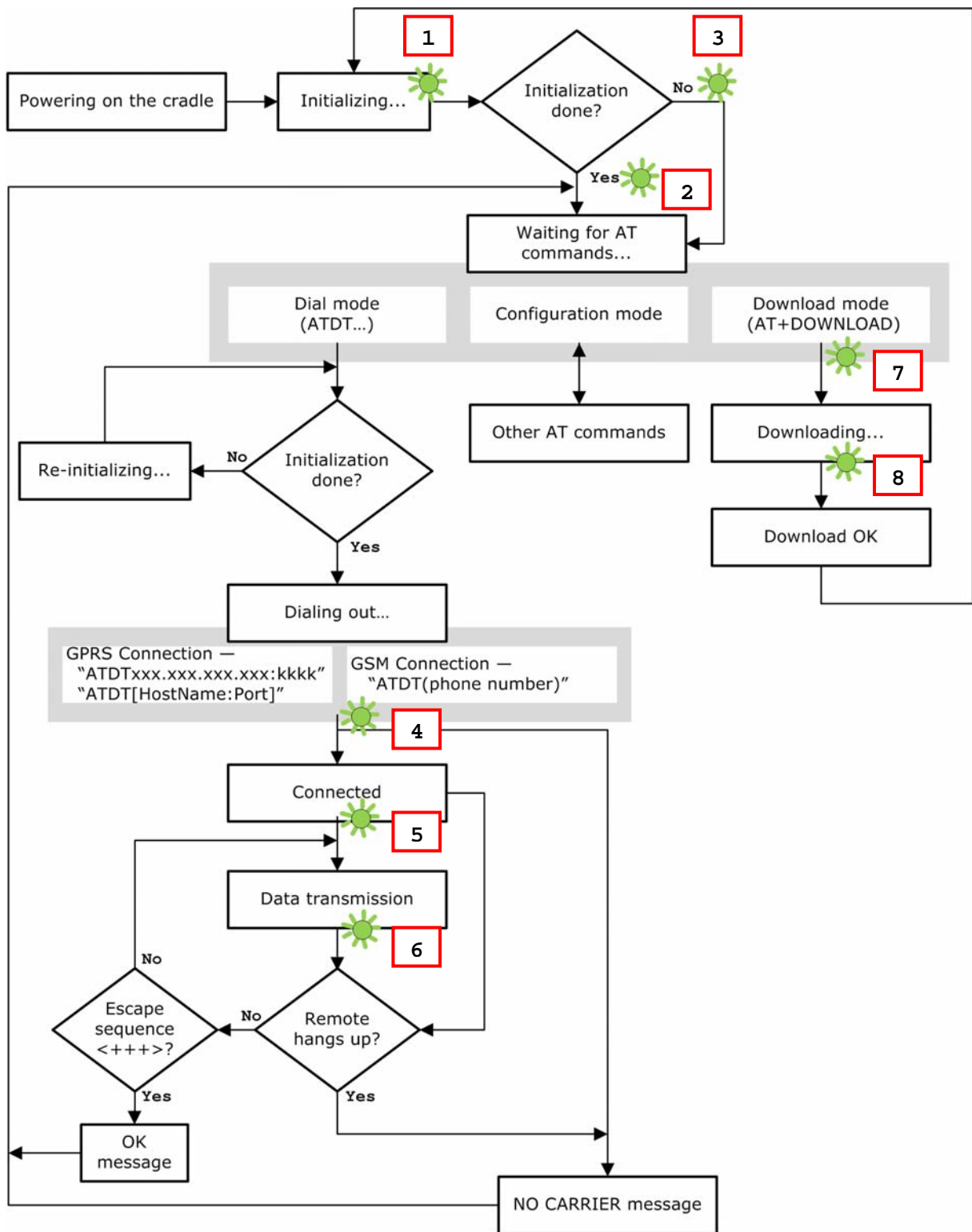
When in Dial mode ([ATDT](#)), the LED of Tx/Rx will flash as long as data transmission occurs.

### 7) Download Ready

When in Download mode ([AT+DOWNLOAD](#)), the LEDs of Tx/Rx and Link will flash by turns to indicate the cradle is ready.

### 8) Downloading

When in Download mode ([AT+DOWNLOAD](#)), the LEDs of Tx/Rx and Link will flash simultaneously to indicate downloading is in progress.



## 1.2 DIAL MODES

When the mobile computer is seated in the cradle, it can send the collected data back to a remote server, as well as download lookup files, via GSM or GPRS.

When dialing out ([ATDT](#)), the LED of Link will flash at the time interval of 0.3 seconds for about 20 seconds. When connected, the LED of Link will be green after successfully establishing a connection. The LED of Tx/Rx will flash as long as data transmission occurs.

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Note: It is suggested to issue the command "[AT](#)" every five seconds for best practice, in order to check whether the mobile computer is seated in the cradle.  
The escape sequence, consisting of three characters "[+++](#)", is used to terminate the data connection.

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### 1.2.1 GSM CONNECTION

When initialization is done, issue [ATDT](#)(phone number) to establish data connection via GSM.

### 1.2.2 GPRS CONNECTION

When initialization is done, issue [ATDT](#)xxx.xxx.xxx.xxx:kkkk or [ATDT](#)[HostName:Port] to establish data connection via GPRS. The buffer size of the cradle is 1460 bytes, and data packet will be sent out as long as it satisfies any of the following requirements:

- ▶ buffer is full (= maximum packet size is 1460 bytes)
- ▶ delimiter character is encountered
- ▶ end of transmission timeout (= no transmission for 5 milliseconds)

Due to the limited memory size, the cradle cannot send three packets at the same time, and therefore, the third packet will be discarded. We suggest you enable the Challenge-Handshake Authentication Protocol (CHAP) setting for best practice.



## 1.3 CONFIGURATION MODE

Regardless of the result of initialization, you can issue AT commands to configure the cradle, such as

- ▶ Perform the echo test between the mobile computer and the cradle.
- ▶ Write the current settings to flash or load factory defaults.
- ▶ Get the hardware version (Serial Number) or firmware version of the cradle.
- ▶ Set PIN authentication, enable or disable.
- ▶ Change PIN code of SIM card.
- ▶ Send delimiter during data transmission.
- ▶ For GPRS connection — Change Access Point name, apply Challenge-Handshake Authentication Protocol (CHAP), and so on.

### 1.3.1 GENERAL SETTINGS

AT Commands	Description	GSM	GPRS
<a href="#">AT</a>	Get echo from the cradle.	√	√
<a href="#">ATE</a>	Load factory defaults.	√	√
<a href="#">ATW</a>	Write the current settings to flash.	√	√
<a href="#">AT+KVER?</a>	Get the firmware version of the cradle kernel program.	√	√
<a href="#">AT+SN?</a>	Get the serial number of the cradle.	√	√
<a href="#">AT+VER?</a>	Get the firmware version of the cradle user program.	√	√

### 1.3.2 CONNECTION SETTINGS

AT Commands	Description	GSM	GPRS
<a href="#">AT+CLCK=SC, 2</a>	Get the information about whether PIN authentication is applied to the facility lock of SIM card.	√	√
<a href="#">AT+CLCK=SC, &lt;Parameter&gt;, &lt;PIN&gt;</a>	Set PIN authentication, enable or disable.	√	√
<a href="#">AT+CPIN?</a>	Get the information about whether PIN or PUK code is required.	√	√
<a href="#">AT+CPIN=</a>	Set PIN code for authentication.	√	√
<a href="#">AT+CPWD=SC</a>	Change PIN code of SIM card.	√	√
<a href="#">AT+DLMT?</a>	Get the delimiter check status, as well as the delimiter character if in use.	√	√
<a href="#">AT+DLMT=</a>	Set the delimiter check, enable or disable.	√	√
<a href="#">AT+APN?</a>	Get the Access Point Name (APN) currently in use.		√

<a href="#">AT+APN=</a>	Set the Access Point Name (APN) you want to connect to.		✓
<a href="#">AT+CHAP?</a>	Get the Challenge-Handshake Authentication Protocol (CHAP) setting.		✓
<a href="#">AT+CHAP=</a>	Set the Challenge-Handshake Authentication Protocol (CHAP) setting, enable or disable.		✓
<a href="#">AT+DHCP?</a>	Get the Dynamic Host Configuration Protocol (DHCP) setting.		✓
<a href="#">AT+DHCP=</a>	Set the Dynamic Host Configuration Protocol (DHCP) setting, enable or disable.		✓
<a href="#">AT+IP?</a>	Get the fixed IP address of the cradle.		✓
<a href="#">AT+IP=</a>	Set the fixed IP address of the cradle.		✓
<a href="#">AT+PSW?</a>	Get the password for Challenge-Handshake Authentication Protocol (CHAP).		✓
<a href="#">AT+PSW=</a>	Set the password for Challenge-Handshake Authentication Protocol (CHAP).		✓
<a href="#">AT+USER?</a>	Get the user name for Challenge-Handshake Authentication Protocol (CHAP).		✓
<a href="#">AT+USER=</a>	Set the user name for Challenge-Handshake Authentication Protocol (CHAP).		✓

## CONFIGURING THE 8400 GPRS CRADLE

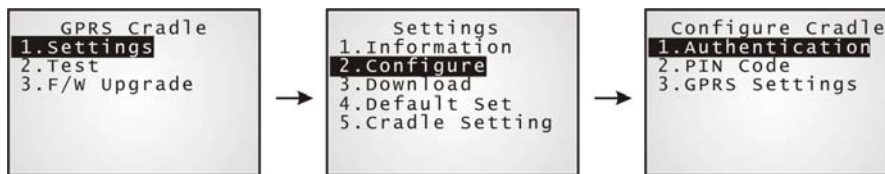
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For deployment engineers, you can download the utility "8400DeployGPRS.shx" to your mobile computer, and then use it to deploy a set of standard settings to the cradles, as well as perform light functionality testing.

- 1) Run one of the CipherLab download utilities on your desktop computer, for example, "ProgLoad.exe". Choose the correct interface, COM port, baud rate, file type, and browse the file system to locate the utility "8400DeployGPRS.shx".
- 2) Press [8]+[Power] on the mobile computer to turn it on and access the Program Manager menu.

You may download the program directly to the active memory sector "AC", or to an empty sector and activate the program later. Choose the correct interface and baud rate that match the settings on your desktop computer.

- 3) Upon completion of the download process, you will have to activate the program if it is downloaded to an empty sector.
- 4) The utility "8400DeployGPRS.shx" will start itself in a few seconds.
- 5) Go to **1. Settings > 2. Configure** to configure GPRS settings, such as PIN code, name of access point, etc.

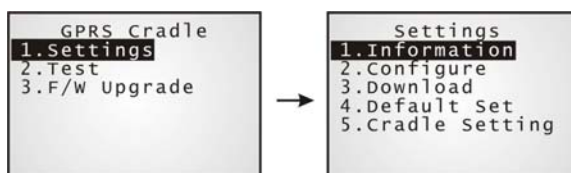


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Note: You must input the correct PIN code even though authentication is disabled!

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You can check all these settings via **1. Settings > 1. Information**.



Go through the following steps on each cradle.

- 6) Screw the antenna to the cradle.
- 7) Connect the power supply cord to a suitable power outlet.

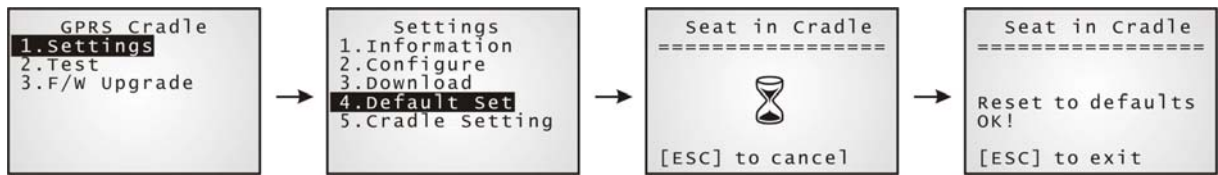
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Note: The cradle's LED will be red (see LED 1). The LEDs of Tx/Rx and Link will flash by turns at the time interval of 0.25 seconds for about 30 seconds, indicating the cradle is in initialization process. Then, the LED of Tx/Rx will flash, indicating initialization failed due to lack of SIM card. Ignore it.

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- 8) Seat the mobile computer in the cradle.
-

Go to **1. Settings > 4. Default Set** to reset the cradle.

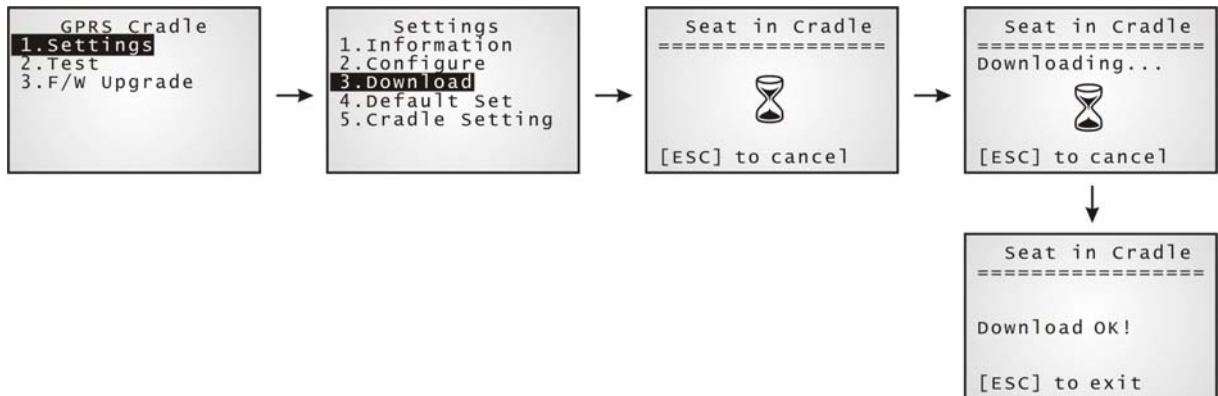


- 9) Disconnect the power supply cord.
  - 10) Re-connect the power supply cord.
- 

Note: The cradle’s LED will be red (see LED 1). The LEDs of Tx/Rx and Link will flash by turns at the time interval of 0.25 seconds for about 30 seconds, indicating the cradle is in initialization process. Then, two conditions are encountered: (1) If the LED of Tx/Rx flashes, it means initialization fails due to incorrect PIN; (2) If the LED of Link flashes, it means initialization is done successfully – correct PIN or PIN not required.

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11) Go to **1. Settings > 3. Download** to download your settings to the cradles.



- 12) Disconnect the power supply cord.
  - 13) Re-connect the power supply cord.
- 

Note: The cradle’s LED will be red (see LED 1). The LEDs of Tx/Rx and Link will flash by turns at the time interval of 0.25 seconds for about 30 seconds, indicating the cradle is in initialization process. Then, two conditions are encountered: (1) If the LED of Tx/Rx flashes, it means initialization fails due to incorrect PIN; (2) If the LED of Link flashes, it means initialization is done successfully – correct PIN or PIN not required.

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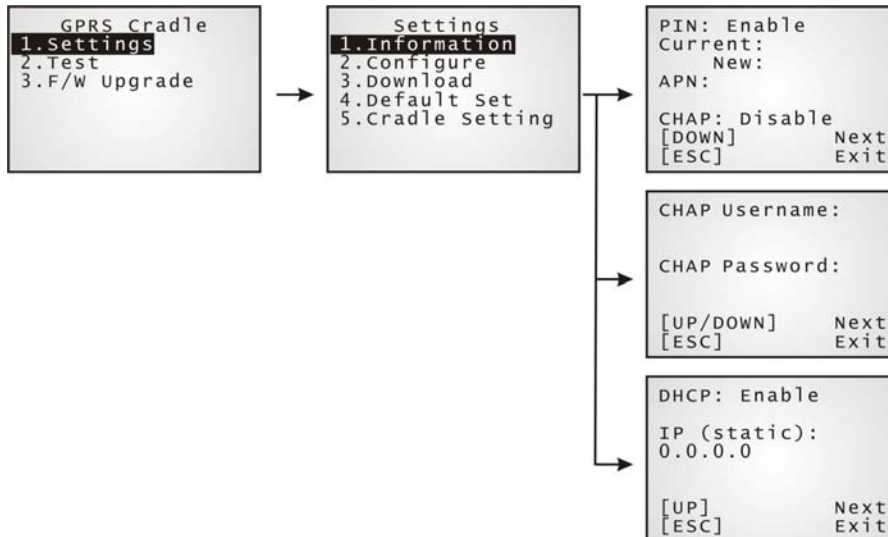
14) Perform echo tests if necessary.

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## 2.1 VIEW THE SETTINGS

### 2.1.1 PREVIEW THE NEW SETTINGS

In order to double-check the GSM/GPRS configuration you are working on, information of the new settings can be previewed here. Press the Up or Down key to turn pages.



#### PIN (for authentication)

When enabled, it means you need to provide PIN code for authentication while connecting the cradle to a GSM or GPRS network. If the current and new PIN codes listed below this entry are blank, you will have to input them via the Configure menu.

When disabled, it means authentication is disabled; however, you still have to input the correct PIN code as the current one in use.

#### APN

Name of access point that connects the mobile network to the Internet — For establishing a GPRS connection, you will have to provide the access point name.

#### CHAP

Challenge-Handshake Authentication Protocol — When enabled, user name and password are required.

#### DHCP

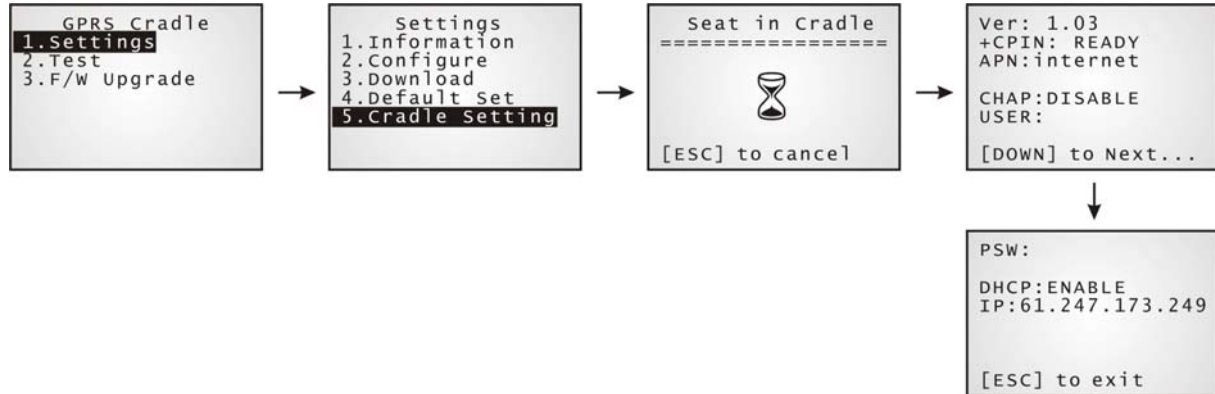
When enabled, DHCP server is in use.

When disabled, you will have to specify a static IP address for the cradle.

**Note:** You must input the PIN code even though authentication is disabled!  
The default PIN, APN, CHAP, as well as IP settings should be obtained from your Internet service provider (ISP) or network operator.

### 2.1.2 VIEW THE CURRENT CRADLE SETTINGS

You may like to find out the current cradle settings, before or after configuring the cradle. Such information is especially helpful when you fail to configure the cradle.



When it fails to collect information on the current settings of the cradle, the LED of Tx/Rx will flash to indicate the cradle is not ready. A warning message is displayed along with the error code, as shown below.



**Ver: (version number)**

The current firmware version of the cradle.

**+CPIN: (status)**

The current PIN code status.

**APN: (access point name of ISP)**

The current access point you are connecting to.

**CHAP: (status), USER & PSW**

The current status of Challenge-Handshake Authentication Protocol (CHAP). When CHAP is enabled, user name and password are required.

**DHCP & IP**

The current status of DHCP server.

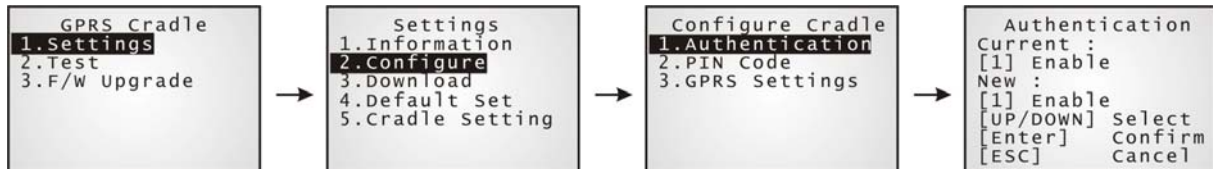
IP address assigned to the cradle is displayed in the second line:

- ▶ dynamic IP address when DHCP server is enabled
- ▶ static IP address when DHCP server is disabled

## 2.2 CONFIGURE SETTINGS

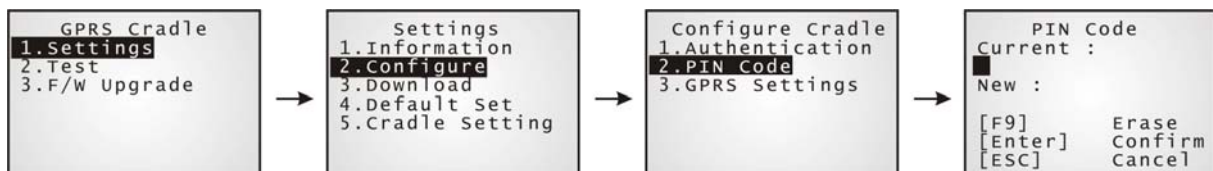
### 2.2.1 AUTHENTICATION

Set or modify the security setting of your SIM card. When enabled, PIN code is required.



### 2.2.2 PIN CODE

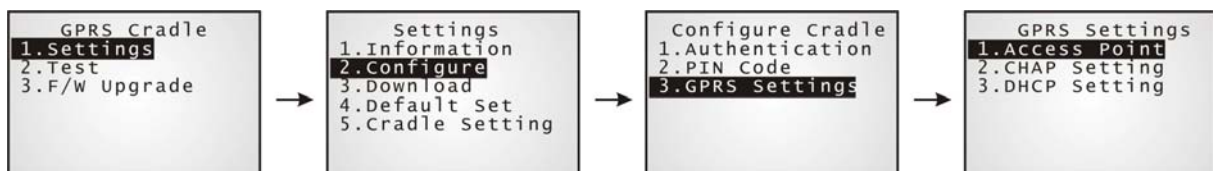
Set or change the PIN code used for authentication.



Note: You must input the correct PIN code even though authentication is disabled!

### 2.2.3 GPRS SETTINGS

The access point name, CHAP, and IP settings should be the same as obtained from your Internet service provider (ISP) or network operator.

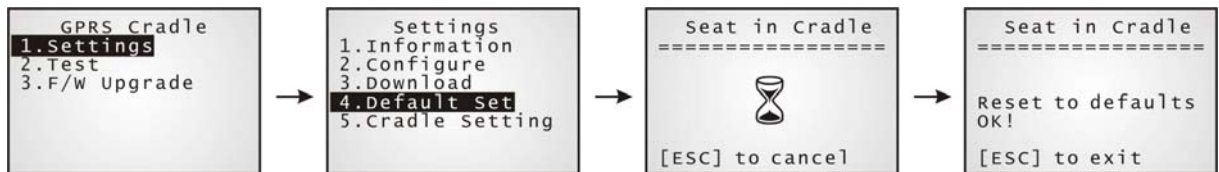


## 2.3 DOWNLOAD SETTINGS

### 2.3.1 DOWNLOAD SETTINGS

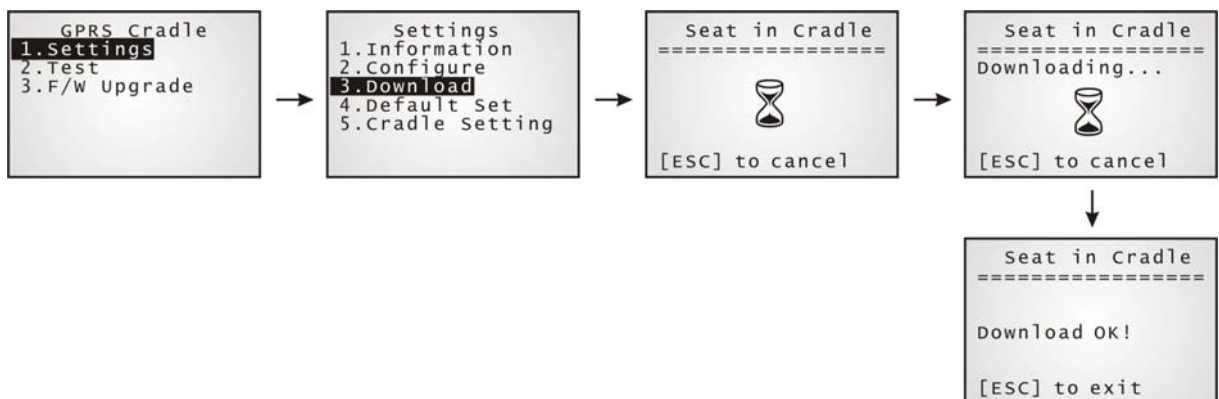
After configuring settings, download new connection settings to the cradle, or the cradles one by one.

- 1) On your mobile computer, go to **Settings > Default Set**.
- 2) Seat your mobile computer in the cradle.



Note: For initial downloading, you are advised to load the default settings to the cradle first.

- 3) Disconnect the power supply cord.
- 4) Re-connect the power supply cord.
- 5) On your mobile computer, go to **Settings > Download**.
- 6) Seat your mobile computer in the cradle.

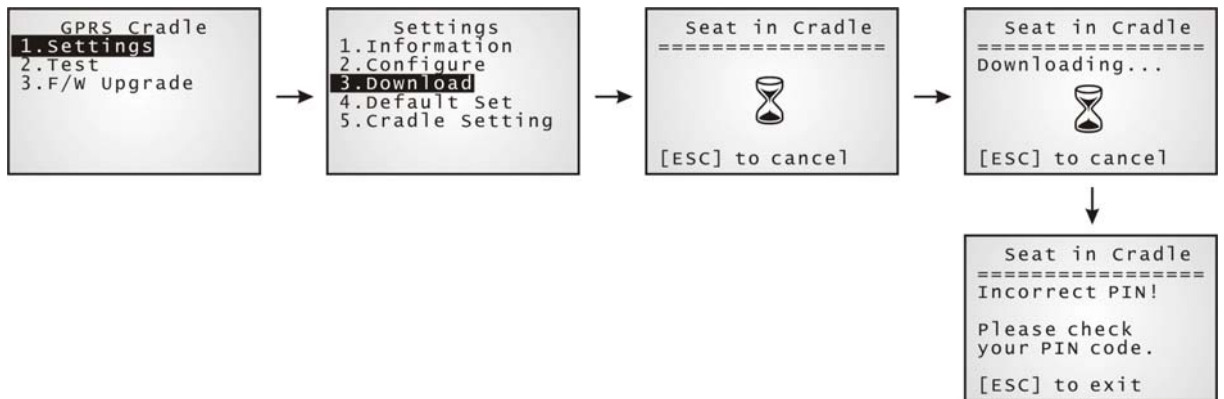


- 7) Disconnect the power supply cord.
- 8) Re-connect the power supply cord.

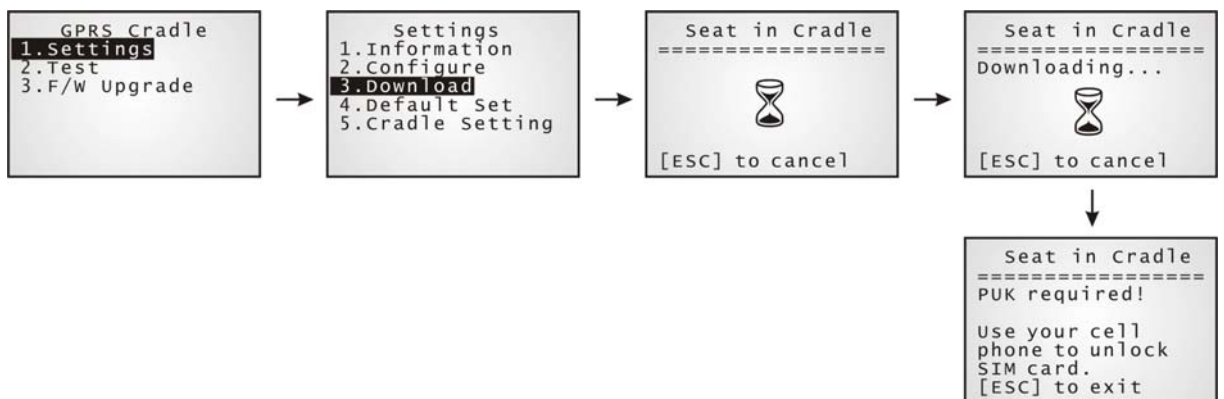
Below are two common errors when it fails to download.

- ▶ This error message is displayed due to the incorrect PIN. You are required to provide the correct one while re-configuring settings.





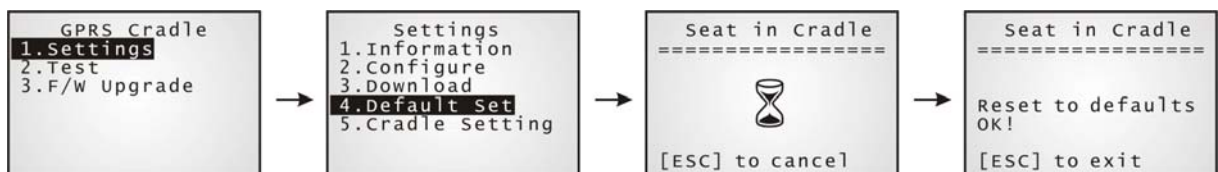
- ▶ This error message is displayed due to PUK issue. You are required to use your cellular phone to unlock the SIM card, with the PUK code provided by the network operator.



### 2.3.2 RESET TO DEFAULTS

For initial downloading, or in case the cradle is malfunctioning, you are advised to load the default settings to the cradle first.

- 1) On your mobile computer, go to **Settings > Default Set**.
- 2) Seat your mobile computer in the cradle.



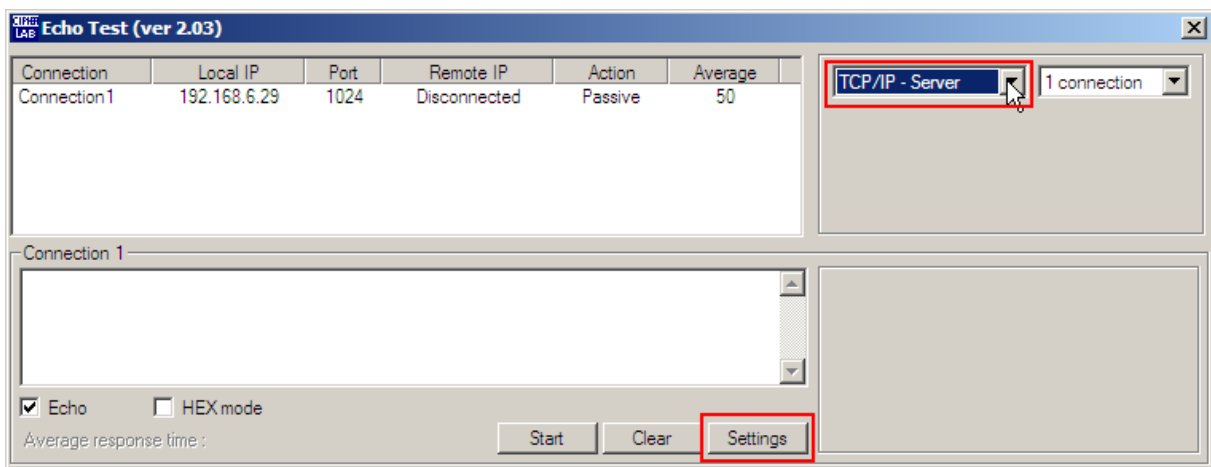
## 2.4 TEST

You may find it necessary to test the basic functionalities of the cradle. Seat your mobile computer in the cradle and run the Echo Test utility on your desktop computer.

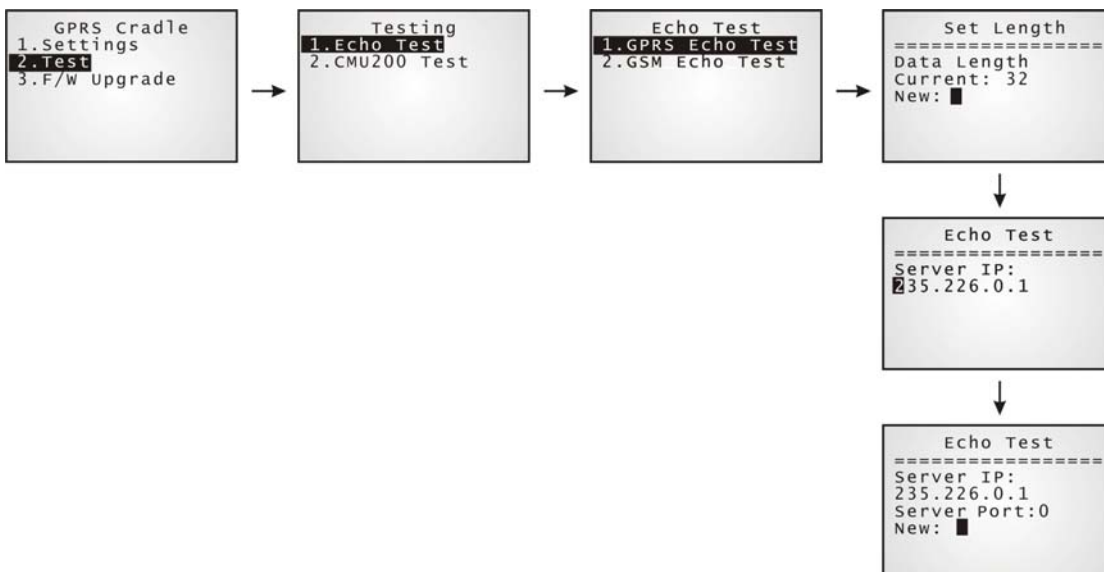
Note: (1) Echo Test – Dial Test and Dial GPRS are for internal testing.  
 (2) CMU200 Test is for manufacturing use.

### 2.4.1 GPRS TEST

On your desktop computer, select [TCP/IP - Server] and change settings if necessary. Then, click [Start].

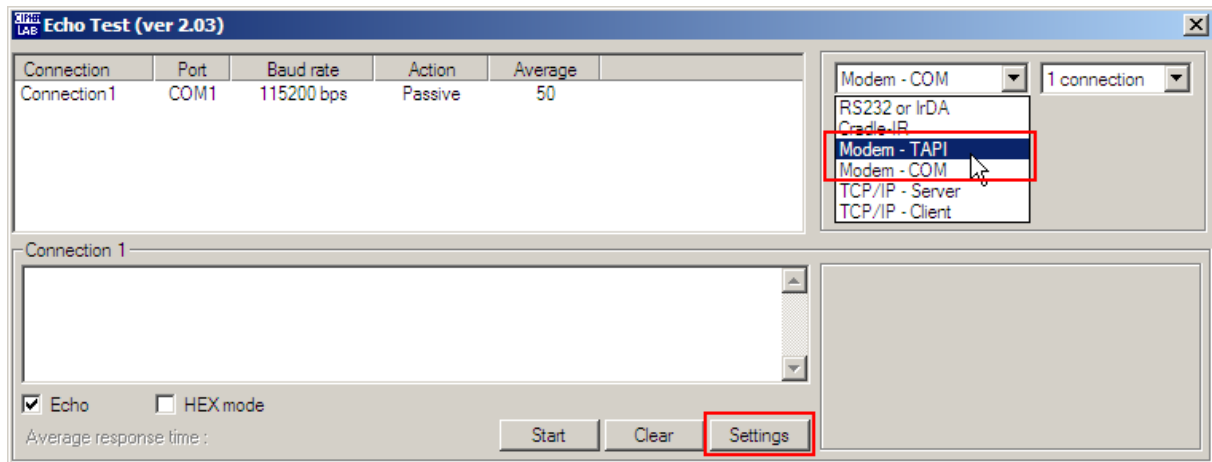


On your mobile computer, go to **Test > Echo Test > GPRS Echo Test**.

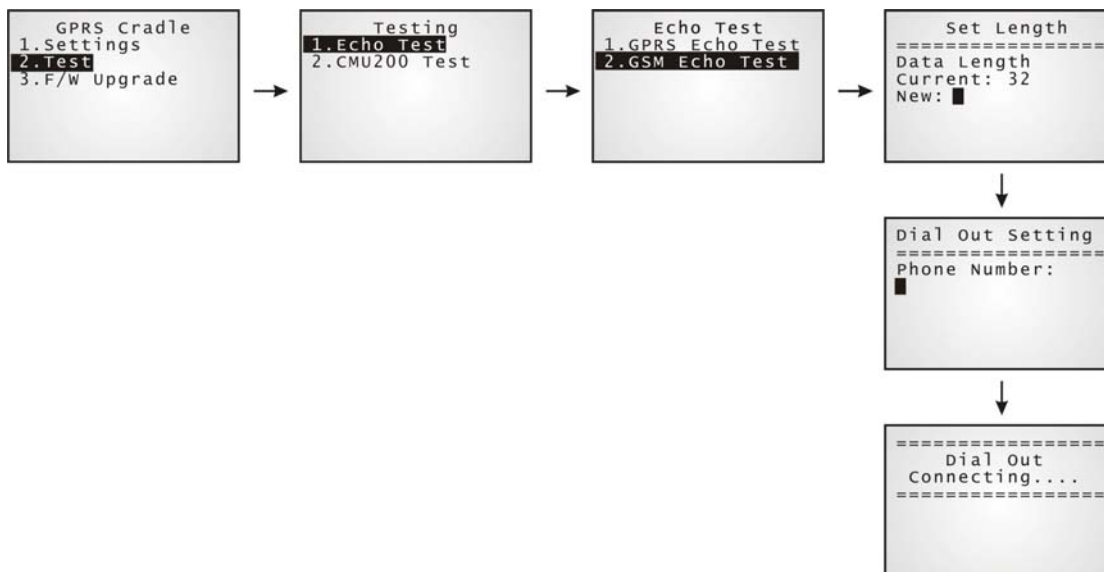


## 2.4.2 GSM TEST

On your desktop computer, select [Modem - TAPI] and change settings if necessary. For an external modem device, select [Modem - COM] and change settings if necessary. Then, click [Start].



On your mobile computer, go to **Test > Echo Test > GSM Echo Test**.





# SPECIFICATIONS

<b>Processor &amp; Memory</b>	
CPU	16-bit CMOS, low power consumption
Memory	Firmware upgradeable
<b>Power Adapter</b>	
Input	AC 100~240 V, 50/60 Hz
Output	5V DC
<b>Power Consumption</b>	
Standby	210 mW : 42 mA for cradle only
	275 mW : 55 mA when battery is charged to full
	3000 mW : 600 mA while charging
	3500 mW : 700 mA while charging with backlight on
Operating (dial-out transmission) &	2000 mW : 400 mA when battery is charged to full
	3500 mW : 700 mA while charging
	4000 mW : 800 mA while charging with backlight on
Peak	10000 mW : 2000 mA, 577 $\mu$ s
<b>Enclosures</b>	
Materials	ABS plastic
Dimensions	110 mm (L) × 100 mm (W) × 60 mm (H)
Weight	Approx. 220g
<b>Notifications</b>	
Status Indicators	3 LEDs for connection status
<b>Communications</b>	
Data Call via GSM	<ul style="list-style-type: none"> <li>▶ Frequency bands — EGSM 850/900 MHz; (Quad-band) GSM 1800/1900 MHz</li> <li>▶ Compliant to GSM Phase 2/2+</li> </ul>
IP Packet via GPRS	<ul style="list-style-type: none"> <li>▶ GPRS multi-slot Class 10</li> <li>▶ GPRS mobile station Class B</li> <li>▶ Transmit power — Class 4 (2W) at EGSM 850/900; Class 1 (1W) at GSM 1800/1900</li> </ul>

<b>Temperature</b>	
Operating	-10 °C to 55 °C
Storage	-20 °C to 70 °C
<b>Humidity</b>	
Operating	10% to 90%, non-condensing
Storage	5% to 95%, non-condensing