

CipherLab Reference Manual

GPRS Cradle

For 8400 Series Mobile Computers

Version 1.03



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IMPORTANT NOTICES

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.

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

Version	Date	Notes
1.03	Jul. 09, 2010	<ul style="list-style-type: none">▶ Modified: Introduction — Installation drawings updated▶ Modified: 2.2.1 General Settings — add AT+CGSN for getting IMEI Information▶ Modified: 3.4 Testing — update screenshots▶ Modified: Appendix II AT Commands — escape sequence description▶ Modified: Appendix II AT Commands — add AT+CGSN for getting IMEI Information
1.02	May 14, 2010	<ul style="list-style-type: none">▶ Modified: Introduction — Installation drawings updated
1.01	Jan. 20, 2010	<ul style="list-style-type: none">▶ Supports Transparent Mode
1.00	Nov. 19, 2009	Initial release

CONTENTS

IMPORTANT NOTICES	- 3 -
For USA	- 3 -
For Canada	- 3 -
Safety Precautions	- 4 -
Care & Maintenance	- 4 -
RELEASE NOTES	- 5 -
INTRODUCTION	1
8400 GPRS Cradle	2
Installation	3
Features	4
Inside the Package	4
USING GPRS CRADLE	5
1.1 Working Modes	6
1.1.1 Transparent Mode	6
1.1.2 Modem Mode	7
1.2 Understanding Status Indicators	8
HOW IT WORKS IN MODEM MODE	9
2.1 Dialing Out	11
2.1.1 GSM Connection	11
2.1.2 GPRS Connection	11
2.2 Configuring the Cradle	12
2.2.1 General Settings	12
2.2.2 Connection Settings	12
USING 8400 TO CONFIGURE GPRS CRADLE	15
3.1 View the Settings	19
3.1.1 Preview the New Settings	19
3.1.2 View the Current Cradle Settings	21
3.2 Configure Settings	23
3.2.1 Authentication	23
3.2.2 PIN Code	24
3.2.3 GPRS Settings	25
3.3 Download Settings	26
3.3.1 Download OK	26
3.3.2 Download Fail – Incorrect PIN	28
3.3.3 Download Fail – PUK Required	29
3.3.4 Reset to Defaults	30
3.4 Testing	31
3.4.1 GPRS Test	31
3.4.2 GSM Test	33

UPGRADING FIRMWARE	35
SPECIFICATIONS	37
PROGRAMMING SUPPORT	39
Transparent Mode.....	39
Modem Mode	39
AT COMMANDS	41
AT Command Syntax.....	43
AT	44
ATDT	45
ATF	47
ATW	48
AT+APN	49
AT+CHAP.....	50
AT+CLCK=SC	51
AT+CPIN	52
AT+CPWD=SC.....	53
AT+DHCP	54
AT+DLMT	55
AT+DOWNLOAD	56
AT+ERR	57
AT+IP	58
AT+KVER.....	59
AT+PSW	60
AT+SN	61
AT+USER.....	62
AT+VER	63
AT+CGSN	64
Error Code.....	65

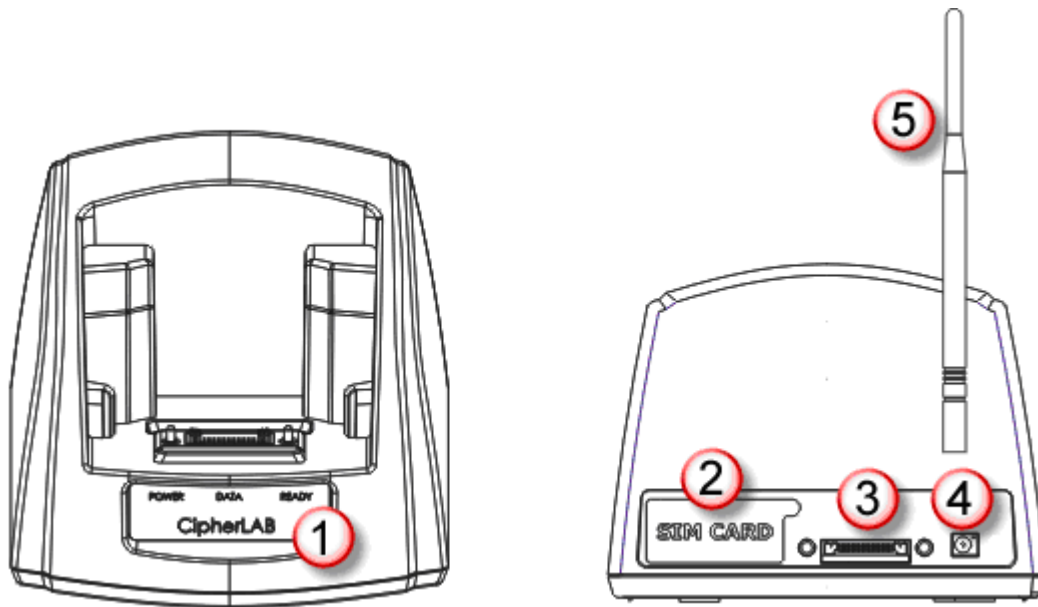
INTRODUCTION

Capable of charging battery inside the mobile computer, the 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!

8400 GPRS CRADLE



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

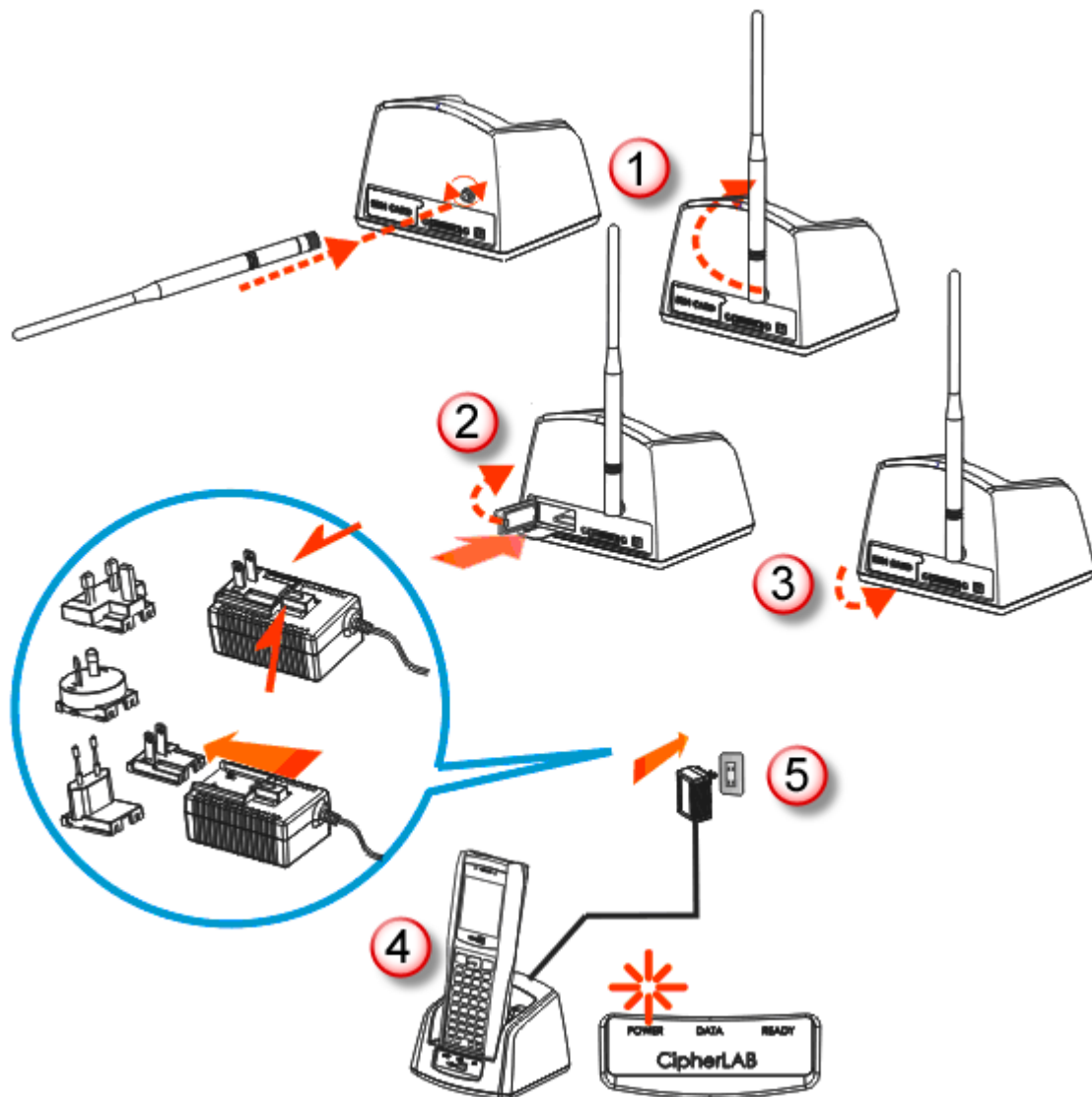
Note: It is recommended that the charging devices be operated at room temperature (18°C to 25°C) for optimal performance. The charging devices will not charge the battery when the temperature drops below 0°C or exceeds 40°C.

INSTALLATION

- 1) Secure the antenna to the cradle.
- 2) Open the rubber cover at the back of the cradle.
- 3) Insert your SIM card and replace the rubber cover.

Refer to Chapter 3 [Using 8400 to Configure GPRS Cradle](#).

- 4) Seat the mobile computer in the cradle.
- 5) Connect the power supply cord to a suitable power outlet, and the cradle's POWER indicator will become red after flashing for a few seconds. The cradle is ready for charging the mobile computer.



Note: 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+
- ▶ Supports two working modes
- ▶ Output power — Class 4 (2W) for EGSM 850/900; Class 1 (1W) for GSM 1800/1900
- ▶ Power consumption —
 - GSM connection:
 - ▶ 850/900 MHz: approx. 1000 mA (while charging battery)
 - ▶ 1800/1900 MHz: approx. 950 mA (while charging battery)
 - GPRS connection: Typical 900 mA (while charging battery)

Note: Power consumption depends on network coverage in the real world.

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

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

USING GPRS CRADLE

The 8400 GPRS Cradle is a charging & communication cradle, specifically designed for connecting CipherLab 8400 Series Mobile Computers to WWAN via GPRS or GSM data services. Refer to Appendix I [Programming Support](#).

This chapter explains the working modes supported by the 8400 GPRS Cradle. 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 3 [Using 8400 to Configure GPRS Cradle](#) and Chapter 4 [Upgrading Firmware](#).

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)

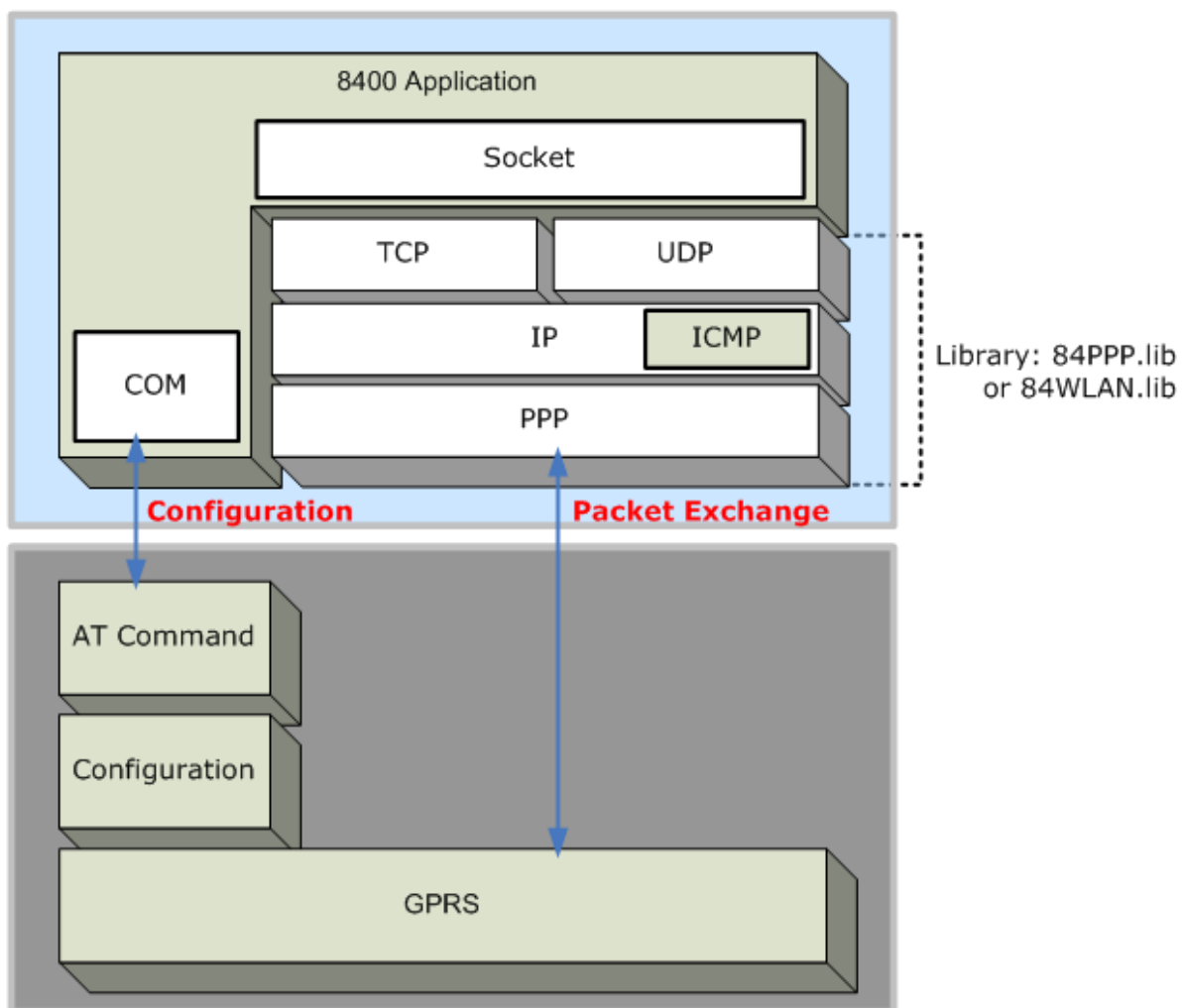
Note: It is recommended that the charging devices be operated at room temperature (18°C to 25°C) for optimal performance. The charging devices will not charge the battery when the temperature drops below 0°C or exceeds 40°C.

1.1 WORKING MODES

1.1.1 TRANSPARENT MODE

In this mode, the cradle acts as a physical layer bridge, and therefore, the mobile computer can work in any protocol behind TCP/UDP by using socket function calls. All it requires is use AT commands to configure PIN code and GPRS AP name first, and then follow the C or BASIC programming flow of WLAN Example (802.11b/g). For details, please refer to a separate programming guide.

- ▶ If CHAP is enabled, you must configure the settings from the mobile computer.
- ▶ It fails to initialize a connection in the following conditions: (1) PIN code and GPRS AP name are not configured correctly via AT commands, and (2) CHAP settings are not configured correctly on 8400.

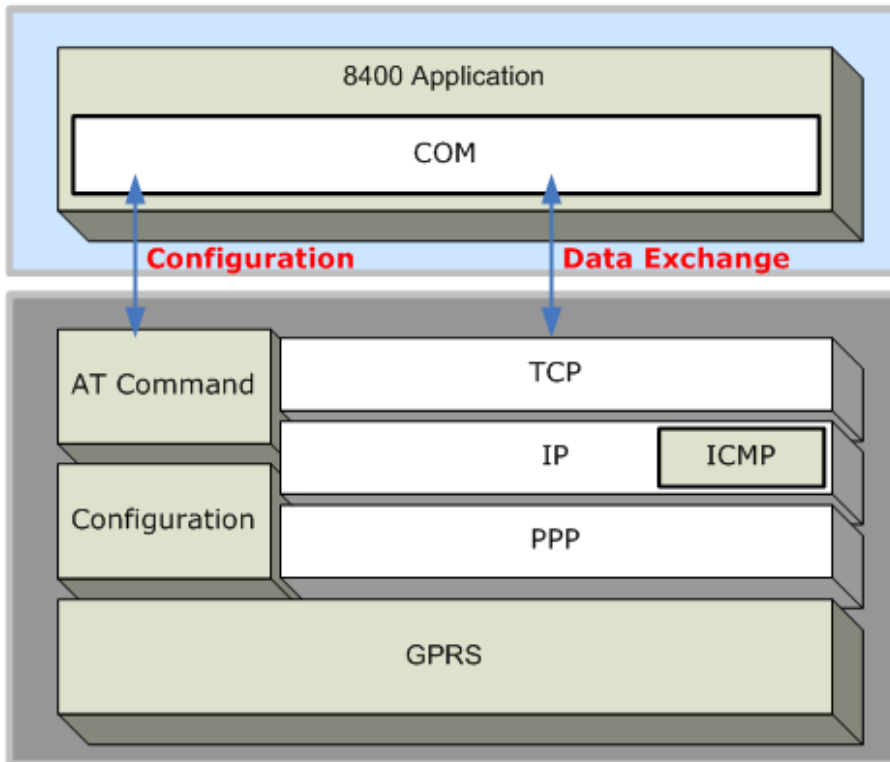


Note: Cradle firmware must be version 1.01 or later.

For C programming, make sure to download one of the following external libraries to the mobile computer: (1) 84PPP.lib version 1.03 or later (2) 84WLAN.lib version 1.04 or later.

1.1.2 MODEM MODE

It works as a GPRS modem. Refer to Chapter 2 [How It Works in Modem Mode](#)



1.2 UNDERSTANDING STATUS INDICATORS

The cradle provides three red LED indicators on the front panel to indicate connection status. Refer to Chapter 2 [How It Works in Modem Mode](#) for information on the initialization stages after powering on the cradle.

Normally, when the power cord is good and properly connected, the POWER indicator shall start to flash shortly and become solid finally.

- ▶ When the POWER indicator does not start to flash for a while, hardware error may have occurred.
- ▶ When the POWER indicator keeps flashing, you may need to check if the SIM card is properly inserted and PIN code is provided correctly.

Front Panel LED	Tasks	Indication	
POWER	Local status	Solid	Connection ready
		Flashing	Attempting to register to the GSM network operator and attach it to the GPRS service
		Off	Hardware initializing or no power
DATA	Transmission status	Flashing	Data transmission
		Off	No activity
READY	Remote status	Solid	Connection established
		Flashing	Dialing out
		Off	Disconnected

HOW IT WORKS IN MODEM MODE

Referring to the flow chart on the next page, the LED indicators 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 POWER indicator will start to flash in a few seconds, indicating the cradle is in initialization process.

2) Initialization OK

If initialization is done successfully, the POWER indicator will become solid, waiting for AT commands.

3) Initialization NG

If initialization fails, the POWER indicator will keep flashing. 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 READY indicator will start to flash.

5) Connected

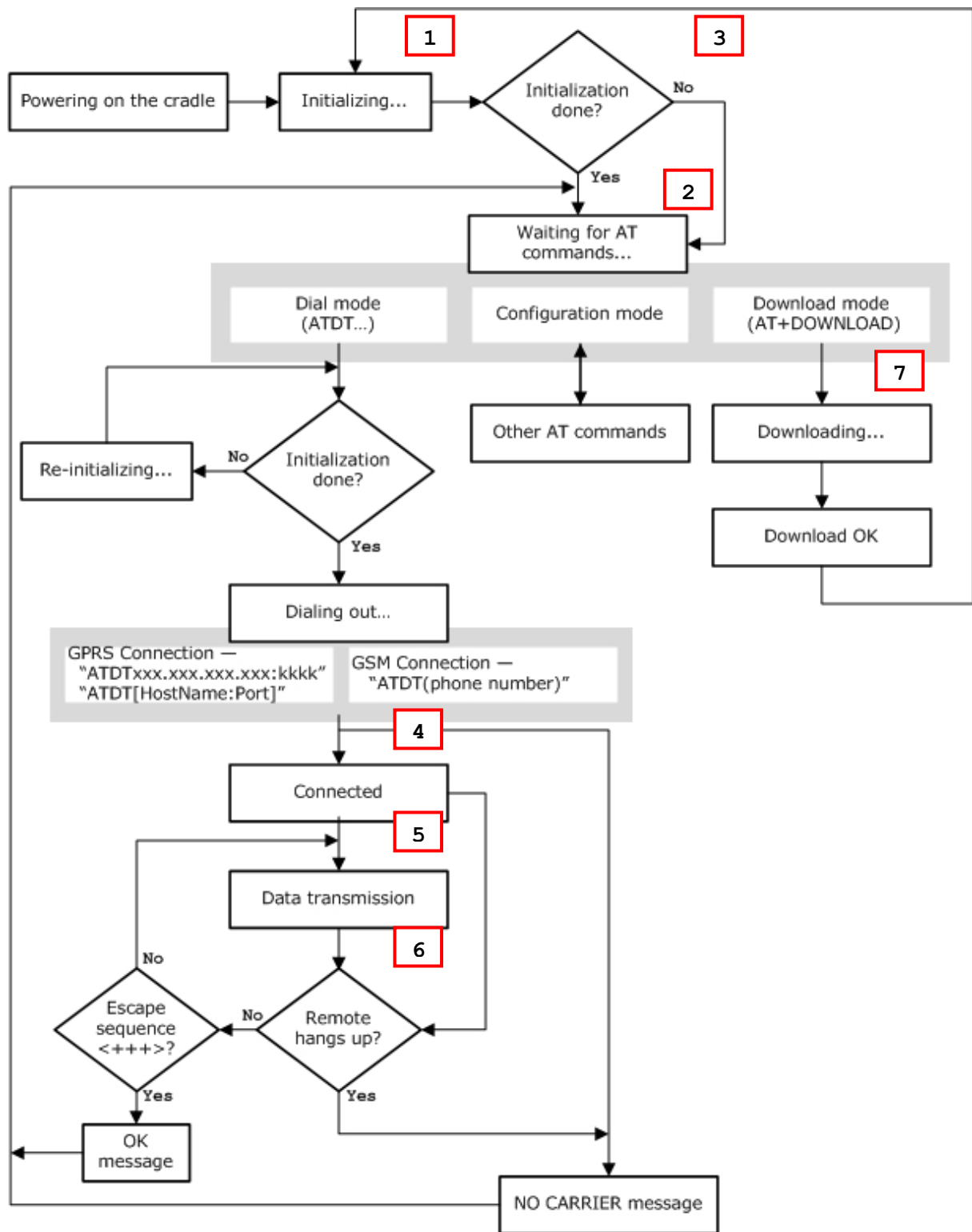
When in Dial mode ([ATDT](#)), the READY indicator will become solid after successfully establishing a connection.

6) Data Transmission

When in Dial mode ([ATDT](#)), the DATA indicator will flash as long as data transmission occurs.

7) Download Ready/Downloading

When in Download mode ([AT+DOWNLOAD](#)), the POWER and DATA indicators will be flashing by turns to indicate the cradle is ready or downloading is in progress.



2.1 DIALING OUT

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 READY indicator will be flashing and become solid after successfully establishing a connection. The DATA indicator will flash as long as data transmission occurs.

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.

2.1.1 GSM CONNECTION

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

2.1.2 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)

2.2 CONFIGURING THE CRADLE

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.

2.2.1 GENERAL SETTINGS

AT Commands	Description	GSM	GPRS
AT	Get echo from the cradle.	√	√
ATE	Load factory defaults.	√	√
ATW	Write the current settings to flash.	√	√
AT+KVER?	Get the firmware version of the cradle kernel program.	√	√
AT+SN?	Get the serial number of the cradle.	√	√
AT+VER?	Get the firmware version of the cradle user program.	√	√
AT+CGSN?	Get the IMEI number.	√	√

2.2.2 CONNECTION SETTINGS

AT Commands	Description	GSM	GPRS
AT+CLCK=SC, 2	Get the information about whether PIN authentication is applied to the facility lock of SIM card.	√	√
AT+CLCK=SC, <Parameter>, <PIN>	Set PIN authentication, enable or disable.	√	√
AT+CPIN?	Get the information about whether PIN or PUK code is required.	√	√
AT+CPIN=	Set PIN code for authentication.	√	√
AT+CPWD=SC	Change PIN code of SIM card.	√	√
AT+DLMT?	Get the delimiter check status, as well as the delimiter character if in use.	√	√
AT+DLMT=	Set the delimiter check, enable or disable.	√	√

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

USING 8400 TO CONFIGURE GPRS CRADLE

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

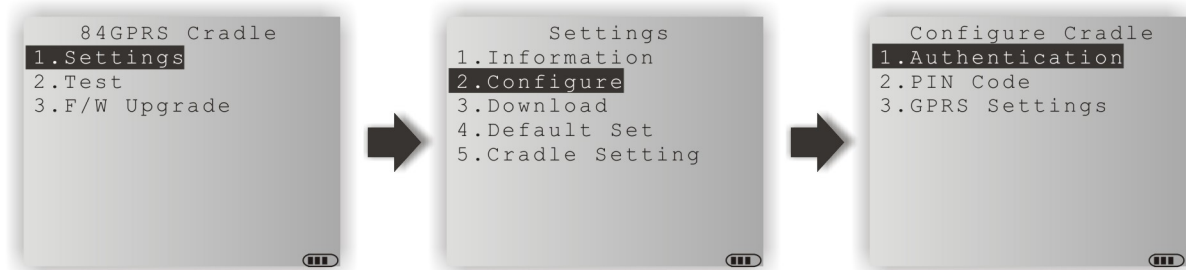
- 1) Run one of the CipherLab download utilities on your desktop computer, for example, "ProgLoad.exe". Choose the correct interface, COM port, baud rate, file type, and browse the file system to locate the utility "8400DeployGPRS.shx".

Note: If you are using USB Virtual COM for the first time, you must install its driver from the CD-ROM. Driver version 5.3 or later is required. Please remove older versions! The virtual COM port will not be assigned until the USB port is in use.

- 2) Press [8]+[Power] on the mobile computer to turn it on and access the Program Manager menu.

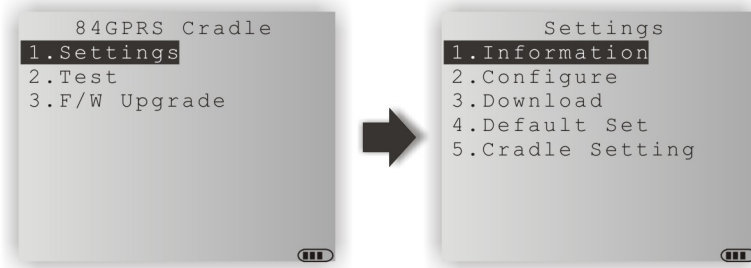
You may download the program directly to the active memory sector "AC", or to an empty sector and activate the program later. Choose the correct interface and baud rate that match the settings on your desktop computer.

- 3) Upon completion of the download process, you will have to activate the program if it is downloaded to an empty sector.
- 4) The program "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.



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

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



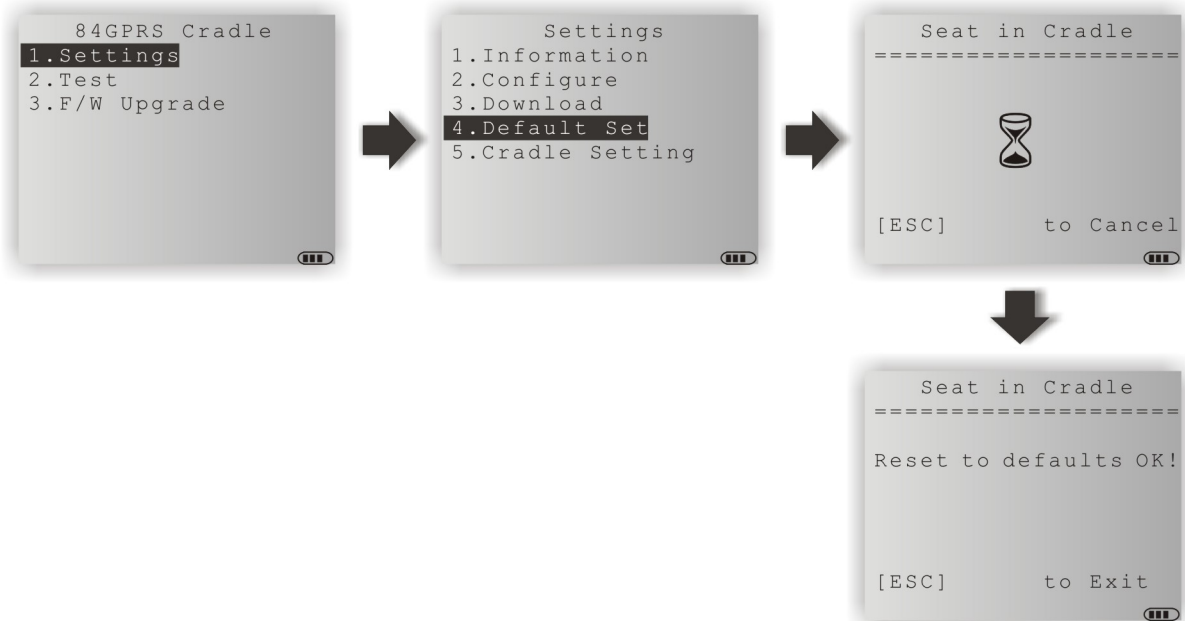
Go through the following steps with each cradle:

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

Note: After powering on, the POWER indicator will start to flash in a few seconds, indicating the cradle is in initialization process. Then, it will keep on flashing, indicating a failure in initialization due to lack of SIM card. Ignore it!

- 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) Insert SIM card to the cradle.
- 11) Re-connect the power supply cord.

Note: After powering on, the POWER indicator will start to flash in a few seconds, indicating the cradle is in initialization process. Then, two conditions are encountered: (1) If the indicator keeps on flashing, it means initialization fails due to incorrect PIN; (2) If the indicator becomes solid, it means initialization is done successfully, either with correct PIN or PIN not required at all.

- 12) Go to **1. Settings | 3. Download** to download your settings to the cradle.



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

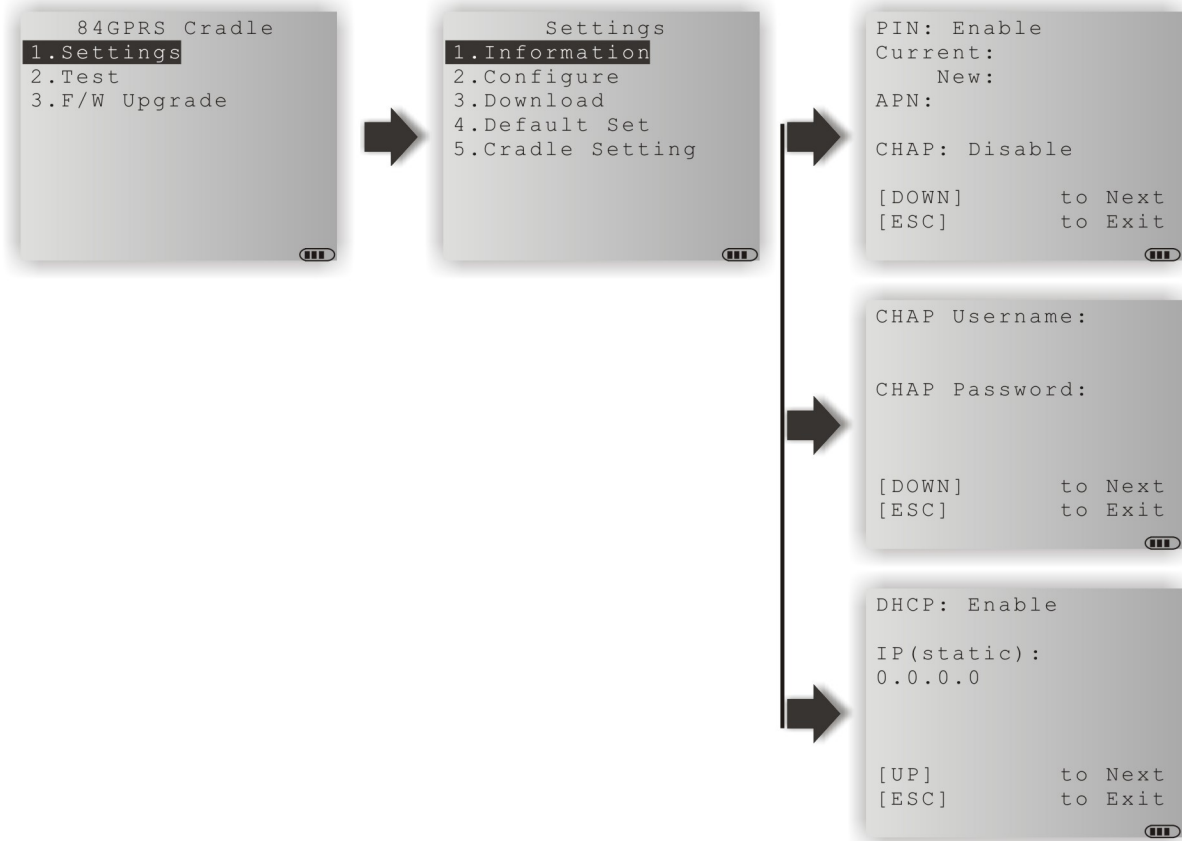
Note: After powering on, the POWER indicator will start to flash in a few seconds, indicating the cradle is in initialization process. Then, two conditions are encountered: (1) If the indicator keeps on flashing, it means initialization fails due to incorrect PIN; (2) If the indicator becomes solid, it means initialization is done successfully, either with correct PIN or PIN not required at all.

- 15) Perform echo tests if necessary.

3.1 VIEW THE SETTINGS

3.1.1 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

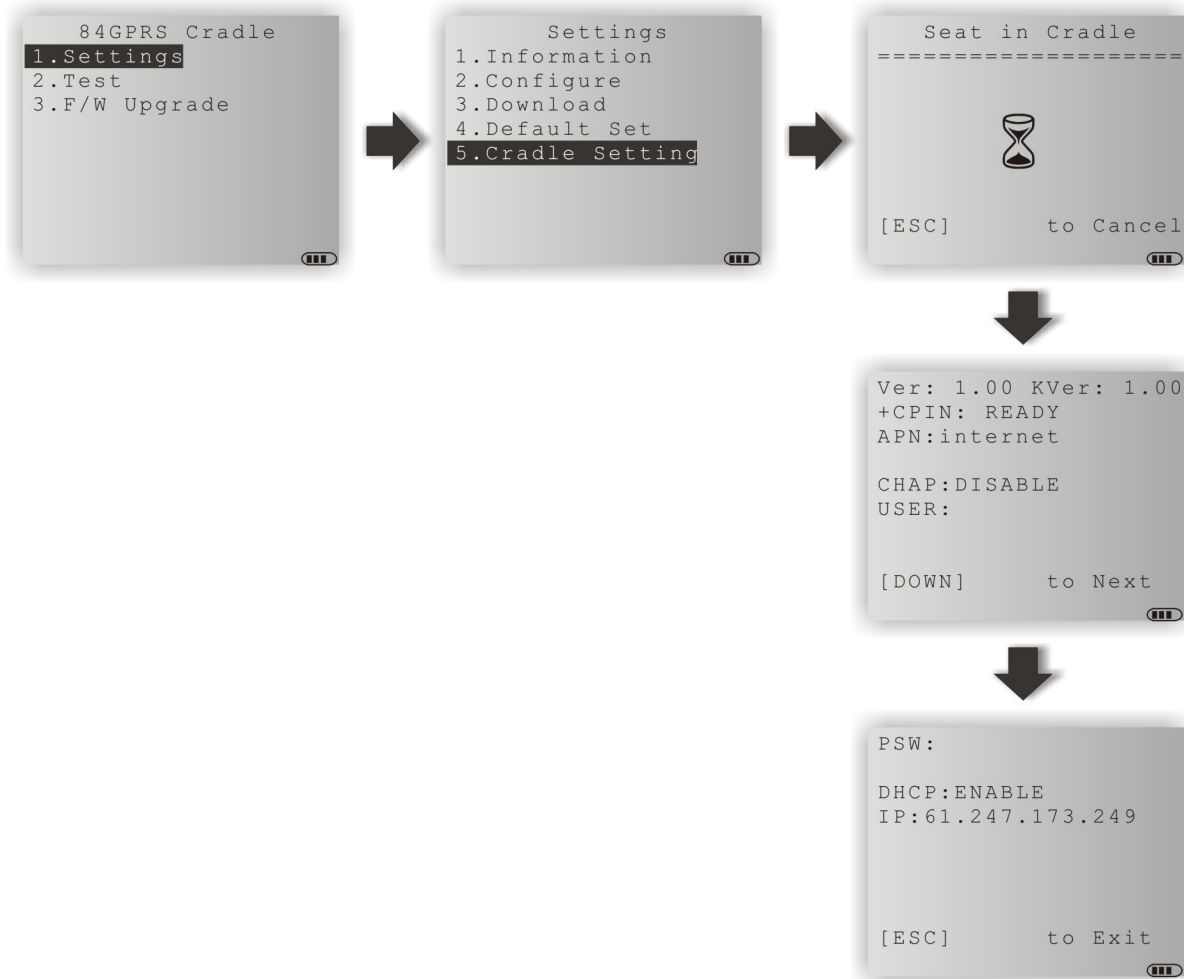
When enabled, DHCP server is in use.

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.

3.1.2 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.



Ver: (version number)

The current firmware version of user program and cradle kernel program. Refer to [AT+VER](#) and [AT+KVER](#).

+CPIN: (status)

The current PIN code status. Refer to [AT+CPIN](#).

APN: (access point name of ISP)

The current access point you are connecting to. Refer to [AT+APN](#).

CHAP: (status), USER & PSW

The current status of Challenge-Handshake Authentication Protocol (CHAP). Refer to [AT+CHAP](#). When CHAP is enabled, user name and password are required.

DHCP & IP

The current status of DHCP server. Refer to [AT+DHCP](#).

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

When it fails to collect information on the current settings of the cradle, the POWER indicator will flash to indicate the cradle is not ready. A warning message is displayed along with the error code, as shown below. Refer to [Error Code](#).



3.2 CONFIGURE SETTINGS

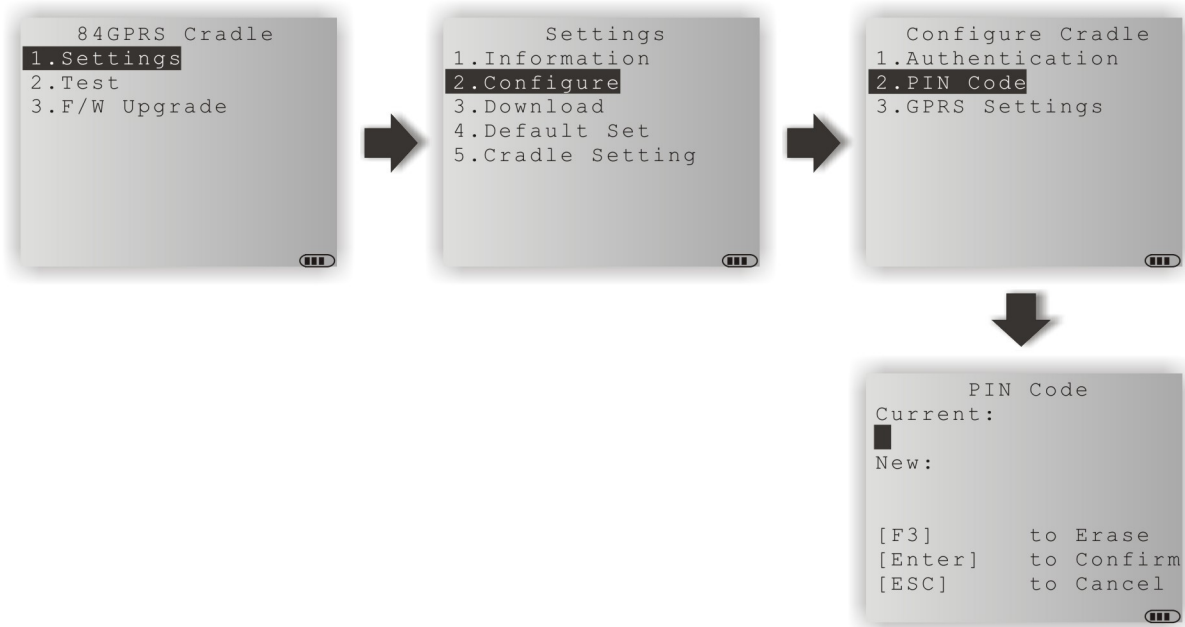
3.2.1 AUTHENTICATION

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



3.2.2 PIN CODE

Set or change the PIN code used for authentication.



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

3.2.3 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.



3.3 DOWNLOAD SETTINGS

3.3.1 DOWNLOAD OK

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.

3.3.2 DOWNLOAD FAIL – INCORRECT PIN

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



3.3.3 DOWNLOAD FAIL – PUK REQUIRED

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.



3.3.4 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.



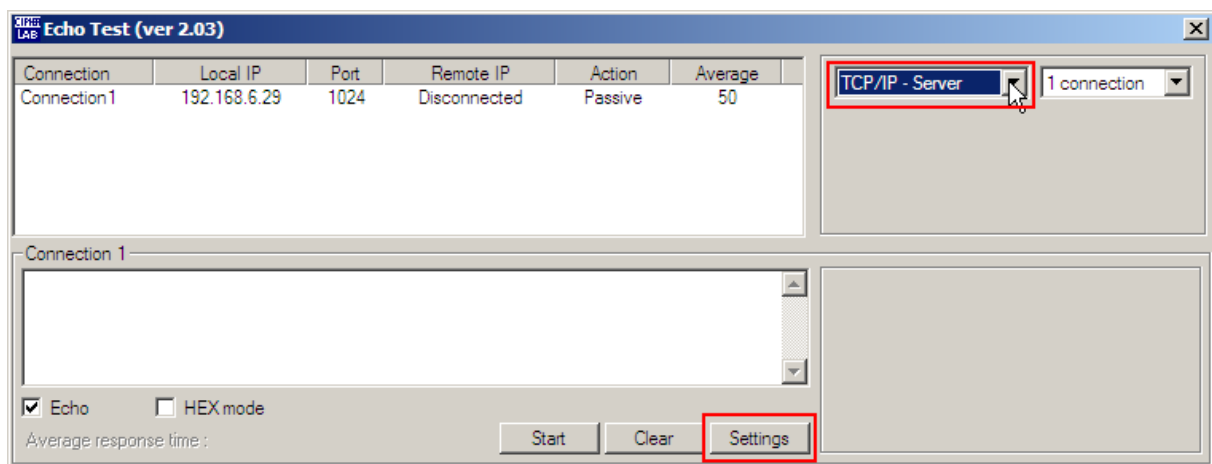
3.4 TESTING

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.

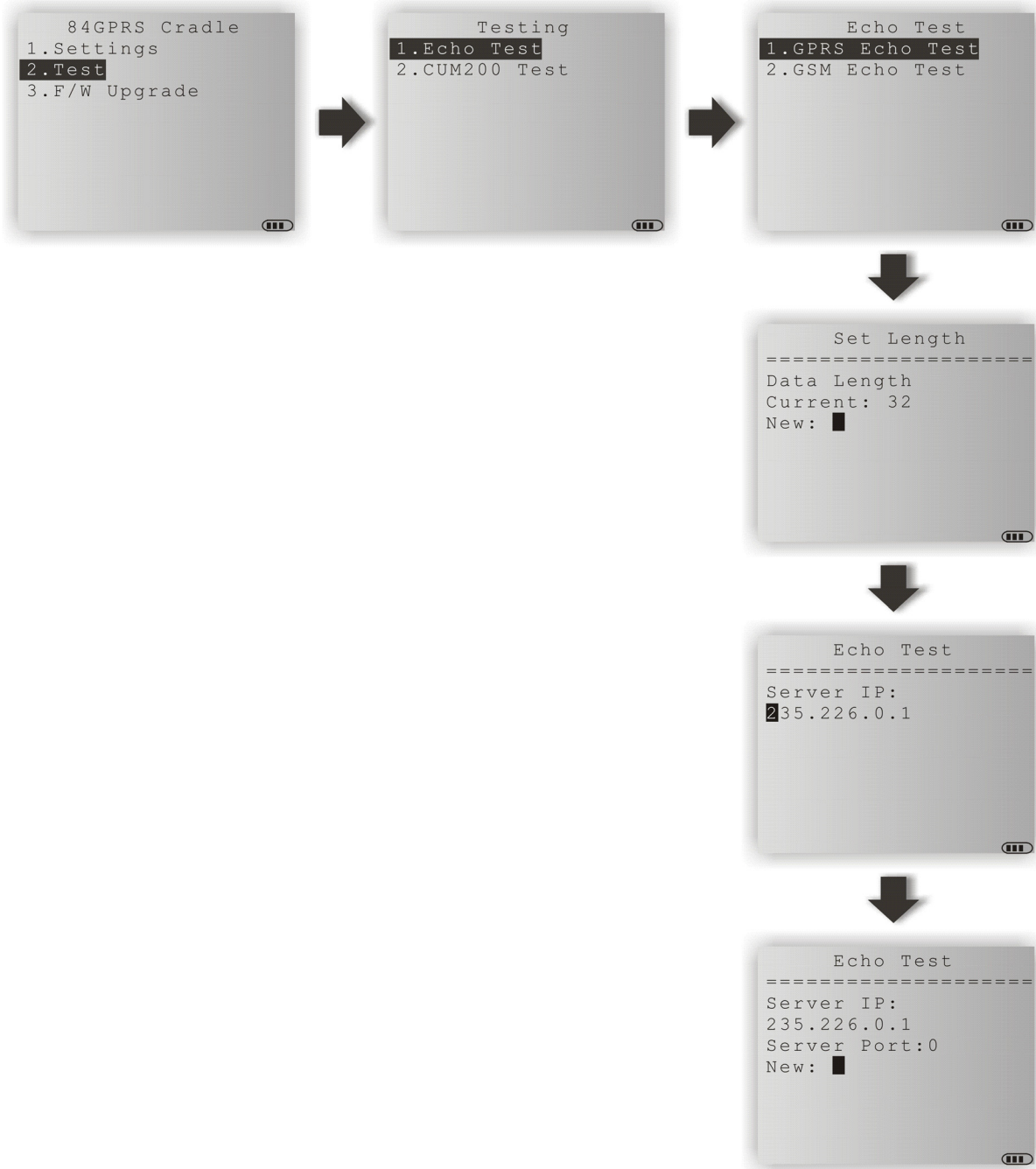
Note: (1) Echo Test – Dial Test and Dial GPRS are for internal testing.
(2) CMU200 Test is for manufacturing use.

3.4.1 GPRS TEST

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

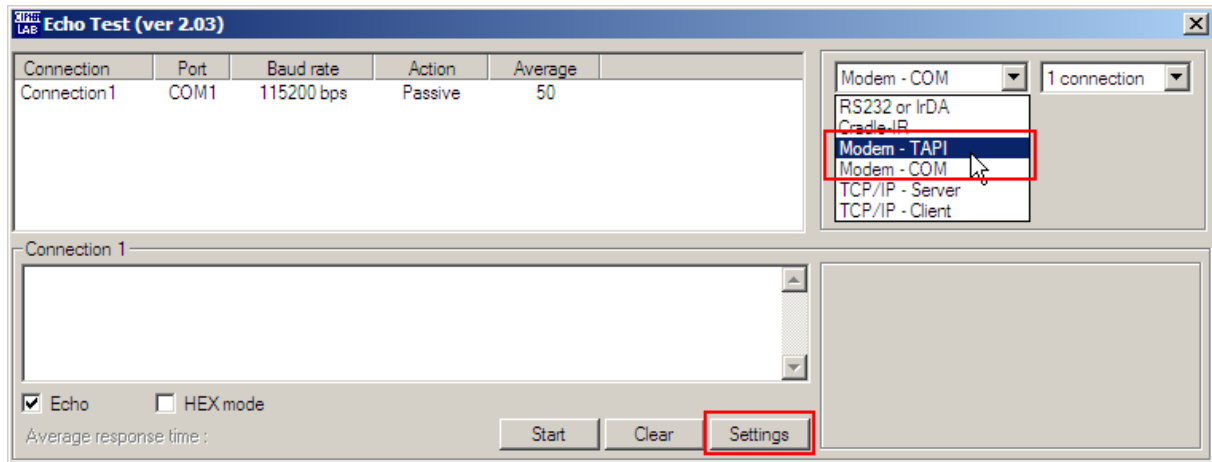


On your mobile computer, go to **Test | Echo Test | GPRS Echo Test**.

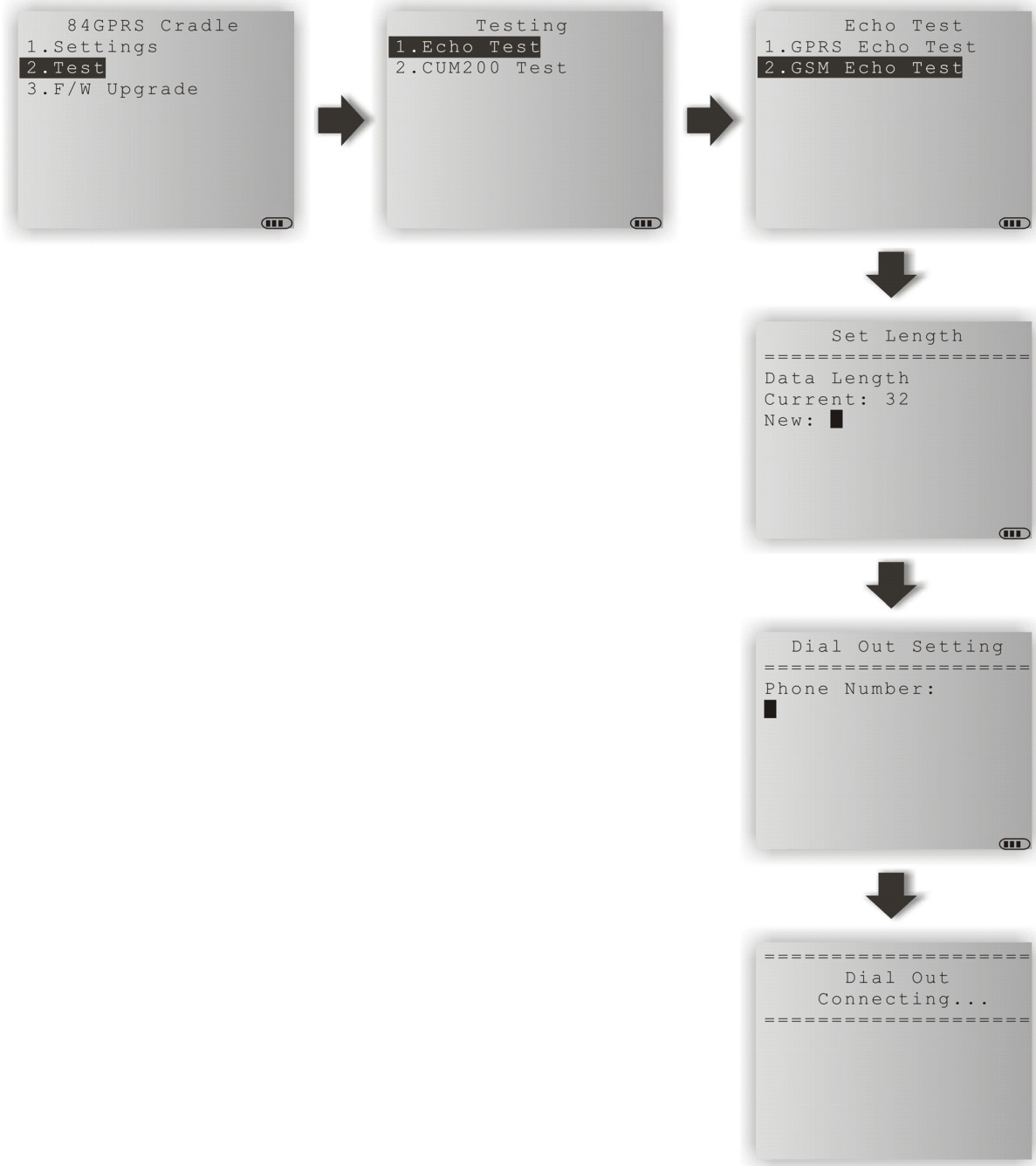


3.4.2 GSM TEST

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**.



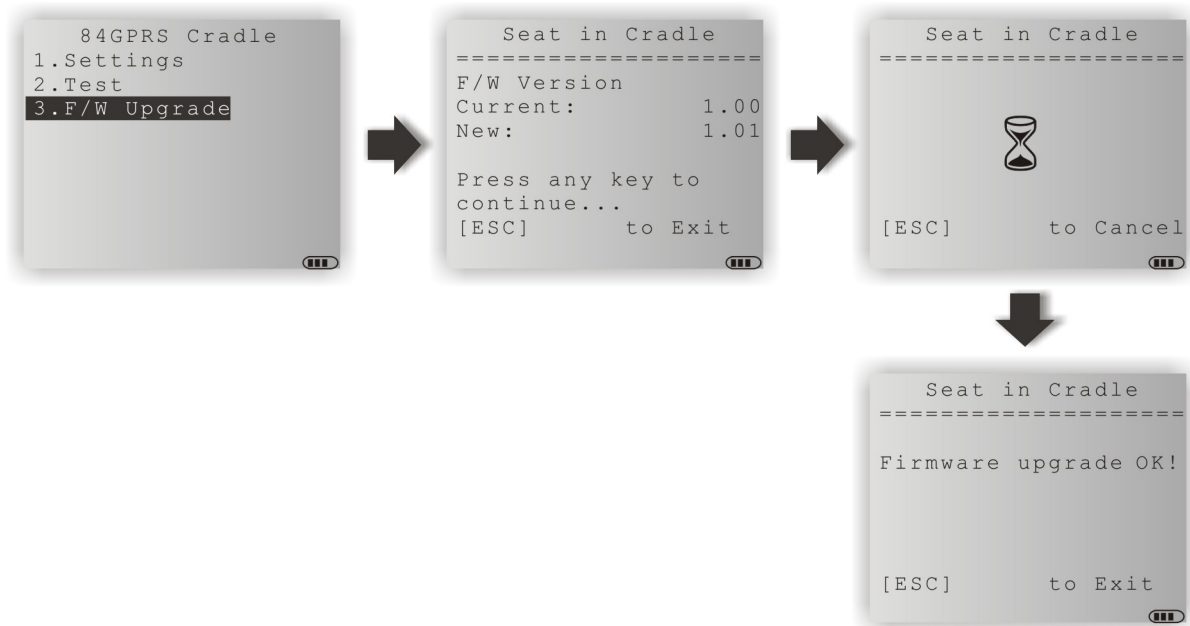
UPGRADING FIRMWARE

The 8400 GPRS Cradle allows for firmware upgrade via the mobile computer. When firmware upgrade is available, download the utility "8400DeployGPRS.shx" to your mobile computer.

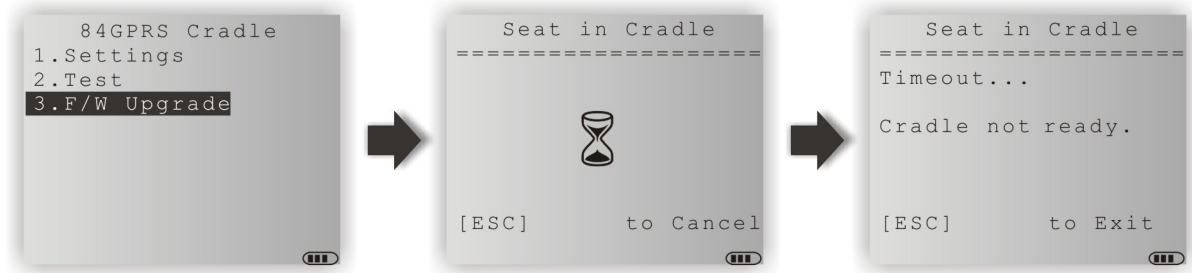
Warning: DO NOT upgrade firmware unless the version of new firmware is greater than that of your cradle. For information of the current firmware version, check AT commands.

- 1) Download the utility "8400DeployGPRS.shx" to your mobile computer.
The mobile computer will display a selection menu.
- 2) On your mobile computer, select **F/W Upgrade**.
- 3) Seat the mobile computer in the cradle.

While upgrading firmware, the POWER and DATA indicators on the cradle will be flashing by turns.



You may see this error message when the mobile computer is not properly seated in the cradle. Please try again!



Warning: Before the download process is completed, do not disconnect the power to the cradle or remove the mobile computer from the cradle!

SPECIFICATIONS

Processor & Memory	
CPU	16-bit CMOS, low power consumption
Memory	Firmware upgradeable
Power Adapter	
Input	AC 100~240 V, 50/60 Hz
Output	5V DC
Power Consumption	
Standby	200 mW : 40 mA for cradle only
	280 mW : 56 mA when battery is charged to full
	3700 mW : 740 mA while charging
	4000 mW : 800 mA while charging with backlight on
Operating (dial-out transmission) &	1100 mW : 220 mA when battery is charged to full
	4500 mW : 900 mA while charging
	4800 mW : 960 mA while charging with backlight on
Peak	10000 mW : 2000 mA, 577 μ s
Enclosures	
Materials	ABS plastic
Dimensions	110 mm (L) × 100 mm (W) × 60 mm (H)
Weight	Approx. 220g
Notifications	
Status Indicators	3 LEDs for connection status
Communications	
Data Call via GSM	<ul style="list-style-type: none"> ▶ Frequency bands — EGSM 850/900 MHz; (Quad-band) GSM 1800/1900 MHz ▶ Compliant to GSM Phase 2/2+
IP Packet via GPRS	<ul style="list-style-type: none"> ▶ GPRS multi-slot Class 10 ▶ GPRS mobile station Class B ▶ Transmit power — Class 4 (2W) at EGSM 850/900; Class 1 (1W) at GSM 1800/1900

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

PROGRAMMING SUPPORT

You may write your own code for the mobile computer to communication with the 8400 GPRS Cradle via the terminal port (I/O pins). Refer to a separate programming guide.

TRANSPARENT MODE

Use AT commands to configure PIN code and GPRS AP name. Then, follow the programming flow of WLAN Example (802.11b/g) using **NetInit(7L)** in C or **START TCPIP(7)** in BASIC.

MODEM MODE

An example is provided below.

```
char c;

SetCommType(1,COMM_DOCKING);          /*Set COM1 for terminal port (I/O pins)*/

open_com(1,BAUD_57600|DATA_BIT8|PARITY_NONE|HANDSHAKE_NONE);

...

clear_com(1);

write_com(1," AT\r" );                /* Send string or char to COM1*/

while (!com_eot(1));

while (1) {

    if (read_com(1,(void*)&c) )

        /*read COM1 buffer data and save it in the C*/

        {

            ...

        }

    ...

}

...
```

Note: If you are programming in BASIC language, make sure the default delimiter 0x0d (CR) is in use; otherwise, call COM_DELIMITER().

AT COMMANDS

The table below lists the AT commands supported for establishing a connection via GSM or GPRS separately. You may click the desired command to view details.

AT Commands	Description	GSM Mode	GPRS Mode
AT	Get echo from the cradle.	√	√
ATDT	Dial out to establish a data connection via GSM or GPRS.	√	√
ATE	Load factory defaults.	√	√
ATW	Write the current settings to flash.	√	√
AT+APN?	Get the Access Point Name (APN) currently in use.		√
AT+APN=	Set the Access Point Name (APN) you want to connect to.		√
AT+CGSN?	Get the 15-digit IMEI number.	√	√
AT+CHAP?	Get the Challenge-Handshake Authentication Protocol (CHAP) setting.		√
AT+CHAP=	Set the Challenge-Handshake Authentication Protocol (CHAP) setting, enable or disable.		√
AT+CLCK=SC, 2	Get the information about whether PIN authentication is applied to the facility lock of SIM card.	√	√
AT+CLCK=SC, <Parameter>, <PIN>	Set PIN authentication, enable or disable.	√	√
AT+CPIN?	Get the information about whether PIN or PUK code is required.	√	√
AT+CPIN=	Set PIN code for authentication.	√	√
AT+CPWD=SC	Change PIN code of SIM card.	√	√
AT+DHCP?	Get the Dynamic Host Configuration Protocol (DHCP) setting.		√
AT+DHCP=	Set the Dynamic Host Configuration Protocol (DHCP) setting, enable or disable.		√
AT+DLMT?	Get the delimiter check status, as well as the delimiter character if in use.	√	√
AT+DLMT=	Set the delimiter check, enable or disable.	√	√
AT+DOWNLOAD	Download firmware to the cradle.	√	√
AT+ERR?	Get the last 4 digits of error code for the initialization procedure.	√	√

AT+IP?	Get the fixed IP address of the cradle.		✓
AT+IP=	Set the fixed IP address of the cradle.		✓
AT+KVER?	Get the firmware version of the cradle kernel program.	✓	✓
AT+PSW?	Get the password for Challenge-Handshake Authentication Protocol (CHAP).		✓
AT+PSW=	Set the password for Challenge-Handshake Authentication Protocol (CHAP).		✓
AT+SN?	Get the serial number of the cradle.	✓	✓
AT+USER?	Get the user name for Challenge-Handshake Authentication Protocol (CHAP).		✓
AT+USER=	Set the user name for Challenge-Handshake Authentication Protocol (CHAP).		✓
AT+VER?	Get the firmware version of the cradle user program.	✓	✓
"+++"	The escape sequence, consisting of three characters "+++", is used to terminate the data connection. The time interval between each character should be less than one second, and the guard time periods before (leading) and after (trailing) should be longer than one second separately.	✓	✓

AT COMMAND SYNTAX

The "AT" or "at" prefix must be set at the beginning of each command line. To terminate a command line, enter <CR>. Commands are usually followed by a response that includes "<CR><LF><response><CR><LF>".

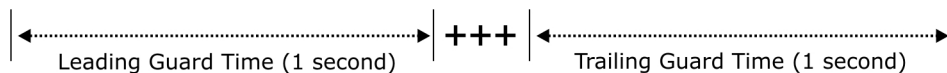
- ▶ Parameter [...]
Specify user-definable parameter values, which may be <text> or <number>.
- ▶ (ERR_STR)
If a connection fails, the response may include a string after the message "NO CARRIER", providing further information on the connection error.
- ▶ [ERR_CODE]
If a connection fails, the response will always include a 6-digit hexadecimal number (always starting with "0x"). Refer to the Error Code table for detailed information.

Note: If you are programming in BASIC language, the delimiter 0x0d (CR) is in use by default. Refer to COM_DELIMITER().

The escape sequence consists of three characters "+++". Once a connection has been established, type the escape sequence to return to command state. When entering the next command after an escape sequence, always wait to receive "\r\nOK\r\n". The escape sequence only works after dialing out and the connection is established.

Note: The escape sequence will break the connection.

There are equal guard time periods before (leading) and after (trailing), as illustrated below.



If the escape sequence is not followed by another command within 1 second (trailing guard time), the cradle will hang up immediately. Normally, the mobile computer will receive the message "OK" unless the line is abnormally busy.

Note: The Guard Time is 1 second and cannot be changed.

AT

Execution Command

AT<CR>

Response

<CR><LF>OK<CR><LF>

Example

AT

OK

Remarks

This command is to do the echo test between the mobile computer and the cradle. 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.

See Also

[Back to the Supported AT Commands.](#)

ATDT

Execution Command – GSM

ATDT[Phone_Number]<CR>

Response

<CR><LF>CONNECT(INFO)<CR><LF>

<CR><LF>NO CARRIER<CR><LF>(ERR_STR)

<CR><LF>[ERR_CODE]<CR><LF>

Execution Command – GPRS

ATDT[IP:Port]<CR>

ATDT[HostName:Port]<CR>

Response

<CR><LF>CONNECT(INFO)<CR><LF>

<CR><LF>NO CARRIER<CR><LF>(ERR_STR)

<CR><LF>[ERR_CODE]<CR><LF>

Example

ATDT0286471166

NO CARRIER

[0x0b01]

- ▶ Make a GSM data call but the remote party hangs up.

ATDT0286471166

CONNECT 9600

- ▶ Make a GSM data call and the remote party answers the call.

ATDT192.168.2.1:1024

CONNECT

- ▶ Connect to a remote host successfully, via the GPRS access point.

ATDT192.168.6.176:21

NO CARRIER

[0x8005]

- ▶ Cannot connect to a remote host via GPRS access point.

ATDTgprs.Cipherlab.com.tw:20009

CONNECT

- ▶ Connect to a remote host by host name successfully, via the GPRS access point.

ATDTdynamicIP.xyznet.org.tw:20000

NO CARRIER

[0x9011]

- ▶ Cannot connect to a remote host by host name via GPRS access point.

Remarks

This command is to dial out for a data connection via GSM or GPRS (see examples above).

- ▶ If successful, the response may include a string after the message "CONNECT", providing more information on the connection, such as baud rate, and so on.
- ▶ If a connection fails, the response may include a string after the message "NO CARRIER",

providing further information on the connection error, and it will always include a 6-digit error code. Refer to the Error Code table for detailed information.

See Also

AT+DLMT (GSM) AT+APN, AT+CHAP, AT+DHCP, AT+DLMT (GPRS), Escape Sequence <+++>

[Back to the Supported AT Commands.](#)

ATF

Execution Command

ATF<CR>

Response

<CR><LF>OK<CR><LF>

Example

ATF

OK

Remarks

This command is to load factory defaults, as shown below.

Parameters	Defaults	Description
unsigned char PINCode[9]	'0000'	PIN (Personal Identity Number) of SIM card; an access code of 4~8 digits
unsigned char GPRSAccessPoint[21]	internet	AP name for GPRS
GPRS_FLAG Flag		See GPRS_FLAG structure below.
unsigned int Reserved:14	---	---
unsigned int DelimEnable:1	0	Enable checking the delimiter character 0:Disable 1:Enable
unsigned int CHAPEnable:1	0	Challenge Handshake Authentication Protocol 0:Disable 1:Enable
char CHAPPassword[33]	Null	Password for Challenge Handshake Authentication Protocol (CHAP)
char CHAPUserName[33]	Null	User name for Challenge Handshake Authentication Protocol (CHAP)
char DelimiterChar	0x0d	Delimiter Character
int DhcpEnable	1	0: Disable DHCP 1: Enable DHCP
unsigned char IpAddr[4]	0,0,0,0	Static IP address for the cradle

See Also

ATW

[Back to the Supported AT Commands.](#)

ATW

Execution Command

ATW<CR>

Response

<CR><LF>OK<CR><LF>

Example

ATW

OK

Remarks

This command is to write the current settings to flash.

See Also

ATF

[Back to the Supported AT Commands.](#)

AT+APN**Read Command**

`AT+APN?<CR>`**Response**

`<CR><LF>[AP_Name]<CR><LF>`**Example**

`AT+APN?
internet`

▶ GPRS Access Point "internet" is in use.

Write Command

`AT+APN=[AP_Name]<CR>`**Response**

`<CR><LF>OK<CR><LF>`**Example**

`AT+APN=emome
OK`

▶ Change to Access Point "emome".

Remarks

The Read command is to get the Access Point Name (APN) currently in use.

The Write command is to set the Access Point Name (APN) you want to connect to.

[AP_Name] is a string for the name of a GPRS access point, maximum 128 characters.

See Also

ATDT, AT+CHAP, AT+DHCP, AT+DLMT (GPRS)

[Back to the Supported AT Commands.](#)

AT+CHAP

Read Command

AT+CHAP?<CR>

Response

<CR><LF>DISABLE<CR><LF>

<CR><LF>ENABLE<CR><LF>

Example

AT+CHAP?

DISABLE

▶ CHAP is currently disabled.

Write Command

AT+CHAP=[Parameter]<CR>

Response

<CR><LF>OK<CR><LF>

<CR><LF>ERROR<CR><LF>

Example

AT+CHAP=1

OK

▶ Enable CHAP successfully.

Remarks

The Read command is to get the Challenge-Handshake Authentication Protocol (CHAP) setting.

The Write command is to set the Challenge-Handshake Authentication Protocol (CHAP) setting, enable or disable.

[Parameter] is a character that determines whether CHAP is enabled —

- ▶ Parameter =0: Disable CHAP
- ▶ Parameter =1: Enable CHAP

See Also

ATDT, AT+APN, AT+DHCP, AT+DLMT, **AT+PSW**, **AT+USER** (GPRS)

[Back to the Supported AT Commands.](#)

AT+CLCK=SC**Read Command**

```
AT+CLCK=SC,2<CR>
```

Response

```
<CR><LF>+CLCK:[Parameter]<CR><LF>
```

Example

```
AT+CLCK=SC, 2
+CLCK: 0
```

- ▶ PIN authentication is disabled.

Write Command

```
AT+CLCK=SC,[Parameter],[PIN]<CR>
```

Response

```
<CR><LF>OK<CR><LF>
```

```
<CR><LF>+CME ERROR<CR><LF>
```

Example

```
AT+CLCK=SC, 1, 0000
OK
```

- ▶ Enable PIN authentication, using PIN code "0000"

```
AT+CLCK=SC, 2,
+CME ERROR
```

- ▶ Command syntax is incorrect!

Remarks

The Read command is to get the information about whether PIN authentication is applied to the facility lock of SIM card.

The Write command is to set PIN authentication, enable or disable.

[Parameter] is a character that determines whether PIN authentication is enabled —

- ▶ Parameter =0: Disable PIN authentication
- ▶ Parameter =1: Enable PIN authentication

[PIN] is a string for the PIN code.

- ▶ PIN (Personal Identity Number) is a 4~8 digit access code which can be used to secure your SIM card from use. If the wrong PIN is entered in more than three times, the SIM card will be locked.

See Also

```
AT+CPIN, AT+CPWD=SC
```

[Back to the Supported AT Commands.](#)

AT+CPIN

Read Command

AT+CPIN?<CR>

Response

<CR><LF>+CPIN:READY<CR><LF>
 <CR><LF>+CPIN:SIM PIN<CR><LF>
 <CR><LF>+CPIN:SIM PUK<CR><LF>

Write Command

AT+CPIN =[PIN]<CR>

AT+CPIN =[PUK],[New_PIN]<CR>

Response

<CR><LF>OK<CR><LF>
 <CR><LF>ERROR<CR><LF>

Example

AT+CPIN?

+CPIN: READY

AT+CPIN=0000

ERROR

- ▶ PIN code has already been entered successfully, or the PIN authentication is disabled.

AT+CPIN?

+CPIN: SIM PIN

AT+CPIN=0000

OK

- ▶ PIN code is required.
- ▶ Enter PIN code "0000".

AT+CPIN?

+CPIN: SIM PUK

AT+CPIN=12345678,1111

OK

- ▶ PUK code is required.

Remarks

The Read command is to get the information about whether PIN or PUK code is required.

The Write command is to set the PIN code for authentication.

[PIN] is a string for the PIN code, [New_PIN] is a string for the new PIN code, and [PUK] is a string for the PUK code.

- ▶ PIN (Personal Identity Number) is a 4~8 digit access code which can be used to secure your SIM card from use. If the wrong PIN is entered in more than three times, the SIM card will be locked.
- ▶ PUK (Personal Unblocking Key) is an 8-digit code used to unlock the PIN code if your SIM card is blocked. Contact your service provider for PUK. If the wrong PUK is entered ten times in a row, the device will become permanently blocked and unrecoverable, requiring a new SIM card.

See Also

AT+CLCK=SC, AT+CPWD=SC

[Back to the Supported AT Commands.](#)

AT+CPWD=SC**Write Command**

`AT+CPWD=SC,[Old_PIN],[New_PIN]<CR>`**Response**

`<CR><LF>OK<CR><LF>``<CR><LF>ERROR<CR><LF>`**Example**

`AT+CPWD=SC,0000,2008``OK`

- ▶ Change PIN code "0000" to "2008"

`AT+CPWD=SC,2008``ERROR`

- ▶ Command syntax is incorrect!

Remarks

The Write command is to change PIN code of SIM card.

[Old_PIN] is a string for the current PIN code, and [New_PIN] is a string for the new PIN code.

- ▶ PIN (Personal Identity Number) is a 4~8 digit access code which can be used to secure your SIM card from use. If the wrong PIN is entered in more than three times, the SIM card will be locked.

See Also

`AT+CLCK=SC, AT+CPIN`

[Back to the Supported AT Commands.](#)

AT+DHCP

Read Command

AT+DHCP?<CR>

Response

<CR><LF>ENABLE<CR><LF>
<CR><LF>DISABLE<CR><LF>

Example

AT+DHCP?
ENABLE

▶ DHCP is currently enabled.

Write Command

AT+DHCP=[Parameter]<CR>

Response

<CR><LF>OK<CR><LF>
<CR><LF>ERROR<CR><LF>

Example

AT+DHCP=0
OK

▶ Disable DHCP successfully.

Remarks

The Read command is to get the Dynamic Host Configuration Protocol (DHCP) setting.

The Write command is to set the Dynamic Host Configuration Protocol (DHCP) setting, enable or disable. [Parameter] is a character that determines whether DHCP is enabled —

- ▶ Parameter =0: Disable DHCP
- ▶ Parameter =1: Enable DHCP

See Also

ATDT, AT+APN, AT+CHAP, AT+DLMT, **AT+IP** (GPRS)

[Back to the Supported AT Commands.](#)

AT+DLMT

Read Command

AT+DLMT?<CR>

Response

<CR><LF>ENABLE:[HEX]<CR><LF>

<CR><LF>DISABLE<CR><LF>

Example

AT+DLMT?

ENABLE:0x0d

- ▶ Delimiter check is applied, and the character "0x0d" is currently in use.

AT+DLMT?

DISABLE

- ▶ No delimiter check.

Write Command

AT+DLMT=[Parameter](,HEX)<CR>

Response

<CR><LF>OK<CR><LF>

<CR><LF>ERROR<CR><LF>

Example

AT+DLMT=1,0x0a

OK

- ▶ Enable delimiter check successfully, and the character "0x0a" is in use.

AT+DLMT=1

ERROR

- ▶ Command syntax is incorrect!

AT+DLMT=0

OK

- ▶ Disable delimiter check successfully.

Remarks

The Read command is to get the delimiter check status. [HEX] is a character in hexadecimal, with the prefix "0x".

The Write command is to set the delimiter check, enable or disable. [Parameter] is a character that determines whether a delimiter character is applied —

- ▶ Parameter =0: Disable delimiter
- ▶ Parameter =1: Enable delimiter

When Parameter =1, [HEX] is a character in hexadecimal, with the prefix "0x". For example, "0x0d" for Carriage Return (CR).

See Also

ATDT

[Back to the Supported AT Commands.](#)

AT+DOWNLOAD

Execution Command

AT+DOWNLOAD<CR>

Response

<CR><LF>OK<CR><LF>

Example

AT+DOWNLOAD

OK

Remarks

This command is to upgrade firmware, either downloading a user program or kernel program to the cradle. After replying with the message "OK", the cradle will enter the Download Mode.

The POWER and DATA indicators will flash by turns to indicate the cradle is ready, and will flash simultaneously while downloading.

See Also

AT+KVER, AT+VER

[Back to the Supported AT Commands.](#)

AT+ERR**Read Command**

AT+ERR?<CR>

Response

<CR><LF>[dddd]<CR><LF>

Example

AT+ERR?

0b00

Remarks

This Read command is to get the error code for the initialization procedure.

[dddd] is the last 4 digits of the error code, which is a hexadecimal number starting with "0x". Refer to the Error Code table for detailed information.

See Also

AT+KVER, AT+VER

[Back to the Supported AT Commands.](#)

AT+IP

Read Command

AT+IP?<CR>

Response

<CR><LF>[IP]<CR><LF>

Example

AT+IP?
192.168.1.2

- ▶ The fixed IP assigned to the cradle is 192.168.1.2

Write Command

AT+IP=[IP]<CR>

Response

<CR><LF>OK<CR><LF>
<CR><LF>ERROR<CR><LF>

Example

AT+IP=192.168.2.100
OK

- ▶ Assign 192.168.2.100 to the cradle successfully.

AT+IP=192.168.8
ERROR

- ▶ The dotted-decimal notation is incorrect!

Remarks

The Read command is to get the fixed IP address of the cradle.
The Write command is to set the fixed IP address of the cradle.
[IP] is a string in dot-decimal for IP address xxx.xxx.xxx.xxx

See Also

AT+DHCP (GPRS)

[Back to the Supported AT Commands.](#)

AT+KVER**Read Command**

AT+KVER?<CR>

Response

<CR><LF>[Kernel_Version]<CR><LF>

Example

AT+KVER?

KVer: 1.00

Remarks

This Read command is to get the firmware version of the cradle kernel program.

[Kernel_Version] is a string that identifies the kernel; it will be updated after having downloaded a different kernel program to the cradle.

See Also

AT+DOWNLOAD, AT+VER

[Back to the Supported AT Commands.](#)

AT+PSW**Read Command**

`AT+PSW?<CR>`**Response**

`<CR><LF>[Password]<CR><LF>`**Example**

`AT+PSW?
123456`

- ▶ The current CHAP password is "123456".

Write Command

`AT+PSW=[Password]<CR>`**Response**

`<CR><LF>OK<CR><LF>`**Example**

`AT+PSW=123456
OK`

- ▶ Set "123456" for CHAP password.

Remarks

The Read command is to get the password for Challenge-Handshake Authentication Protocol (CHAP).

The Write command is to set the password for Challenge-Handshake Authentication Protocol (CHAP).

[Password] is a string for the CHAP password, maximum 64 characters.

See Also

`AT+CHAP, AT+USER (GPRS)`

[Back to the Supported AT Commands.](#)

AT+SN**Read Command**

`AT+SN?<CR>`**Response**

`<CR><LF>[Serial_Number]<CR><LF>`**Example**

`AT+SN?``EK8001024`**Remarks**

This Read command is to get the serial number of the cradle.

[Serial_Number] is a read-only string that identifies the hardware.

See Also

`AT+KVER, AT+VER`

[Back to the Supported AT Commands.](#)

AT+USER**Read Command**

`AT+USER?<CR>`**Response**

`<CR><LF>[UserName]<CR><LF>`**Example**

`AT+USER?
Vodafone`

- ▶ The current CHAP user name is "Vodafone".

Write Command

`AT+USER=[UserName]<CR>`**Response**

`<CR><LF>OK<CR><LF>`**Example**

`AT+USER=Vodafone
OK`

- ▶ Set "Vodafone" for CHAP user name.

Remarks

The Read command is to get the user name for Challenge-Handshake Authentication Protocol (CHAP).

The Write command is to set the user name for Challenge-Handshake Authentication Protocol (CHAP).

[UserName] is a string for the CHAP user name, maximum 64 characters.

See Also

`AT+CHAP, AT+PSW (GPRS)`

[Back to the Supported AT Commands.](#)

AT+VER**Read Command**

`AT+VER?<CR>`**Response**

`<CR><LF>[UserProgram_Version]<CR><LF>`**Example**

`AT+VER?``Ver: 1.00`**Remarks**

This Read command is to get the firmware version of user program.

[UserProgram_Version] is a string that identifies the firmware; it will be updated after having downloaded a different user program to the cradle.

See Also

`AT+DOWNLOAD, AT+KVER`

[Back to the Supported AT Commands.](#)

AT+CGSN

Read Command

AT+CGSN?<CR>

Response

<CR><LF>[ddddddddddddddd]<CR><LF>

Example

AT+CGSN?

357249015466586

Remarks

This Read command is to get IMEI information.

[ddddddddddddddd] is the 15-digit IMEI number.

See Also

[Back to the Supported AT Commands.](#)

ERROR CODE

The provision of error code is to assist engineers debugging the firmware. Please contact your sales representative to submit your request for interpretation of an error code.

An error code is a 6-digit hexadecimal number (always starting with "0x"). Refer to the Error Code table for detailed information.

Error Code		Description
0x	0101	GSM/GPRS module failure
0x	0201	Hardware error
0x	0301	Disable network registration information error
0x	0401	Get PIN/PUK authentication state timeout
0x	0402	Get PIN/PUK authentication State error
0x	0404	PUK code required to unblock the SIM card
0x	0405	SIM card error or no SIM card inserted
0x	0501	Get the number of remaining PIN attempts timeout
0x	0502	Get the number of remaining PIN attempts error
0x	050a	Initialization procedure broken due to invalid remaining PIN attempts
0x	0601	Set PIN for authentication timeout
0x	0602	Set PIN for authentication failed
0x	0701	Disable new message indication timeout
0x	0702	Disable new message indication failure
0x	0801	Automatically register to the home operator timeout
0x	0802	Automatically register to the home operator failure
0x	0901	Specify Packet Data Protocol Context timeout
0x	0902	Specify Packet Data Protocol Context failure
0x	0a01	Attach GPRS timeout
0x	0a02	Attach GPRS failure
0x	0b01	Dialing out timeout
0x	0b02	Dialing out failure
0x	0c01	Read International Mobile Equipment Identity timeout
0x	0c02	Invalid International Mobile Equipment Identity
0x	0e0b	Fatal error as disconnecting the existing call/connection
0x	0f01	Query the SIM security lock state timeout
0x	0f02	Query the SIM security lock state error
0x	8003	Negotiation with the GPRS network timeout
0x	8011	No buffer space for link control packets
0x	8012	Unable to transmit link control packets

0x	8021	No buffer space for password authentication packets
0x	8022	Unable to transmit password authentication packets
0x	8031	No buffer space for IP control packets
0x	8032	Unable to transmit IP control packets
0x	8074	Connection terminated during link control negotiation
0x	8084	Connection terminated during IP control negotiation
0x	8095	CHAP authentication failure
0x	9001	Connect to the remote IP timeout
0x	9004	Connection terminated while connecting to the remote IP
0x	9010	Host name is too long.
0x	9011	DNS server is no response.
0x	9012	There is no IP information in the response message of DNS.
0x	9013	The resource type is not correct.
0x	9014	The resource class is not correct.
0x	a002	Connection terminated by the GPRS network
0x	a003	TCP/IP Connection error
0x	--ff	Disconnected by DCD line pulled high