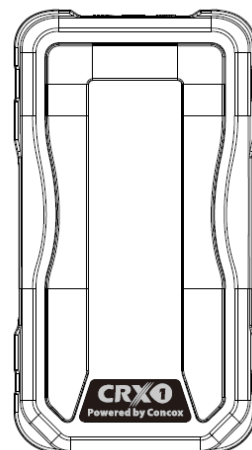CRX1 Concox
Track & Achieve

Version：V3.0.0

Level：Confidential

Concox Information Technology

GPS Tracker
Communication Protocol
CRX1 NEW

CRX1

Important Revision History

Writer	Date	Version	Audit	Approval	Description
CRX3.0.0	2017-01-07	3.0.0			First edition (Protocol format modification)

Content

i.Protocol Packet Format

Format	Length (Byte)	Description
Start Bit	2	0x780x78（packet length : 1bit）or 0x790x79（packet length 2 bits）
Packet Length	1(2)	Length = Protocol Number + Information Content + Information Serial Number + Error Check
Protocol Number	1	Transmission packet type（see the following diagram for details）
Information Content	N	Content is defined by specific application and protocol number
Information Serial Number	2	Serial number of data sent later at each time will be automatically added '1'.
Error Check	2	Serial Number (including"Packet Length"and"Information Serial Number"), are values of CRC-ITU. CRC error occur when the received information is calculated, the receiver will ignore and discard the data packet. (See Appendix 1)
Stop Bit	2	Fixed value:0x0D0x0A

1.1 Protocol Number

Login Information	0x01
Positioning Data（UTC）	0x12
Status Information (Heartbeat Packet	0x13
Alarm Data（UTC）	0x16
GPS Address Query Packet	0x1A
LBS Address Query Packet	0x17
LBS Multiple Base Station Extended Information Packet	0x18
Demand Information Sent to Terminal by Server	0x80
Online command response	0x15
Time Calibration Packet	0x8A
Information Transmission Packet	0x94

ii. Protocol Packet

2. Login packet

Description：

- Login packet is the information packet connecting the terminal and platform, it can send terminal information to platform.
- If a GPRS connection is established successfully, the terminal will send a first login message packet to the server and, within five seconds, if the terminal receives a data packet responded by the server, the connection is considered to be a normal connection; if not, the terminal will send login packet again.
- If no packet returned by server within 5 seconds, then the response of login packet is timeout.
- Terminal reboot automatically after 3 timeouts.

2.1. Login Message Packet

1.		Length	Description
Start Bit		2	0x78 0x78
Packet Length		1	Length = Protocol Number + Information Content + Information Serial Number + Error Check
Protocol Number		1	0x01
Information Content	Terminal ID	8	Example：IMEI number is 123456789123456，terminal ID is：0x01 0x23 0x45 0x67 0x89 0x120x34 0x56
Information Serial Number		2	Serial number of data sent later at each time will be automatically added '1'.
Error Check		2	Serial Number (including "Packet Length" and "Information Serial Number"), are values of CRC-ITU. CRC error occur when the received information is calculated, the receiver will ignore and discard the data packet. (See Appendix 1)
Stop Bit		2	Fixed value:0x0D 0x0A

Example：78 78 0D 01 03 53 41 90 33 41 28 36 00 0D 33 51 0D 0A

2.2. Login packet response（server response）

2.	Length	Description
Start Bit	2	0x78 0x78
Packet Length	1	Length = Protocol Number + Information Content + Information Serial Number + Error Check
Protocol Number	1	0x01
Information Serial Number	2	Serial number of data sent later at each time will be automatically added '1'.
Error Check	2	Serial Number (including "Packet Length" and "Information Serial Number") , are values of CRC-ITU. CRC error occur when the received information is calculated, the receiver will ignore and discard the data packet. (See Appendix 1)

Stop Bit	2	Fixed value:0x0D 0x0A

Example：78 78 05 01 00 05 9F F8 0D 0A

3. Heartbeat Packet

Description：

- Heartbeat packet is a data packet to maintain the connection between the terminal and the server.
- If a GPRS connection is established successfully, the terminal will send a first login message packet to the server and, within five seconds, if the terminal receives a data packet responded by the server, the connection is considered to be a normal connection; if not, the terminal will send login packet again.
- If no packet returned by server within 5 seconds, then the response of heartbeat packet is timeout.
- Terminal reboot automatically after 3 timeouts.

3.1. Heartbeat packet sent by terminal

Heartbeat Packet

		Length (Byte)	Description
Start Bit		2	0x780x78
Packet Length		1	Length = Protocol Number + Information Content + Information Serial Number + Error Check
Protocol Number		1	0x13
Information Content	Terminal Information Content	1	See the following diagram for details
	Voltage Level	1	0x00：No Power (shutdown) 0x01：Extremely Low Battery (not enough for calling or sending text messages, etc.) 0x02：Very Low Battery (Low Battery Alarm) 0x03：Low Battery (can be used normally) 0x04：Medium 0x05：High 0x06：Very High
	GSM Signal Strength	1	0x00: no signal; 0x01: extremely weak signal; 0x02: very weak signal; 0x03: good signal; 0x04: strong signal.
	Language/Extended Port Status	2	latter bit 0x01 Chinese 0x02 English
Serial Number		2	Serial number of data sent later at each time will be automatically added '1'.
Error Check		2	Serial Number (including "Packet Length" and "Information Serial Number") , are values of CRC-ITU. CRC error occur when the received information is calculated, the receiver will ignore and discard the data packet. (See Appendix 1)
Stop Bit		2	Fixed value: 0x0D0x0A

Example：78780A134004040001000FDCEE0D0A

Terminal Information

One byte is consumed defining for various status information of the mobile phone.

Bit		Code Meaning
BYTE	Bit7	1: Oil and electricity disconnected
		0: Oil and electricity connected
	Bit6	1: GPS tracking is on
		0: GPS tracking is off
	Bit3~Bit5	Extended Bit
	Bit2	1: Charge On
		0: Charge Off
	Bit1	1: ACC high
		0: ACC Low
	Bit0	1: Defense Activated
		0: Defense Deactivated

3.2. Server Responds The Heartbeat Packet

	Length (Byte)	Description
Start Bit	2	0x780x78
Packet Length	1	Length = Protocol Number + Information Content + Information Serial Number + Error Check
Protocol Number	1	0x13
Serial Number	2	Serial number of data sent later at each time will be automatically added '1'.
Error Check	2	Serial Number (including "Packet Length" and "Information Serial Number") , are values of CRC-ITU. CRC error occur when the received information is calculated, the receiver will ignore and discard the data packet. (See Appendix 1)
Stop Bit	2	Fixed value: 0x0D0x0A

Example ：78780513000F008F0D0A

4. GPS location packet

Description：

- Data packet used to transmit terminal location
- Upload locating data based on rule after successfully connected and positioned.
- Re-upload locating data after successfully connected.

4.1. Location packet sent by terminal

		Length	Description
Start Bit		2	0x78 0x78
Packet Length		1	Length = Protocol Number + Information Content + Information Serial Number + Error Check
Protocol Number		1	0x12 （device time zone and time ）
Information Content	Date Time	6	Year（1byte）Month（1byte）Day（1byte）Hour（1byte）Min（1byte）Second（1byte）（converted to a decimal）(Date Time)
	Quantity of GPS information satellites	1	The first character is GPS information length，The second character is positioning satellite number（converted to a decimal）
	Latitude	4	Convert to a decimal and divide 1800000
	Longitude	4	Convert to a decimal and divide 1800000
	Speed	1	Convert to a decimal
	Course, Status	2	Convert to binary number of 16 bits and calculate by bits (see the following diagram)
	MCC	2	Mobile Country Code(MCC) (converted to a decimal)
	MNC	1	Mobile Network Code(MNC)(converted to a decimal)
	LAC	2	Location Area Code (LAC) (converted to a decimal)
	Cell ID	3	Cell Tower ID(Cell ID)(converted to a decimal)
Serial Number		2	Serial number of data sent later at each time will be automatically added '1'.
Error Check		2	Serial Number (including "Packet Length" and "Information Serial Number") , are values of CRC-ITU. CRC error occur when the received information is calculated, the receiver will ignore and discard the data packet. (See Appendix 1)
Stop Bit		2	Fixed value:0x0D 0x0A

Example：78 78 1F 12 0F 0C 1D 0B 0F 34 C6 02 7A C7 4C 0C 46 58 10 00 14 D4 01 CC 00 28 7D 00 1F 71 00 26 23 09 0D 0A

i. Course & Status

Two bytes are consumed, defining the running direction of GPS. The value ranges from 0° to 360° measured clockwise from north of 0°.

BYTE_1	Bit7	0
	Bit6	0
	Bit5	GPS real-time/differential positioning
	Bit4	GPS having been positioning or not
	Bit3	East Longitude, West Longitude
	Bit2	South Latitude, North Latitude
	Bit1	
	Bit0	
BYTE_2	Bit7	
	Bit6	
	Bit5	Course
	Bit4	
	Bit3	
	Bit2	
	Bit1	
	Bit0	

For example: the value is 0x15 0x4C, the corresponding binary is 00010101 01001100,

BYTE_1 Bit7	0
BYTE_1 Bit6	0
BYTE_1 Bit5	0 (real time GPS)
BYTE_1 Bit4	1 (GPS has been positioned)
BYTE_1 Bit3	0 (East Longitude)
BYTE_1 Bit2	1 (North Latitude)
BYTE_1 Bit1	0
BYTE_1 Bit0	1
BYTE_2 Bit7	0
BYTE_2 Bit6	1
BYTE_2 Bit5	0 → Course 332° (0101001100 in Binary, or 332 in decimal)
BYTE_2 Bit4	0
BYTE_2 Bit3	1
BYTE_2 Bit2	1
BYTE_2 Bit1	0
BYTE_2 Bit0	0

which means GPS tracking is on, real time GPS, location at north latitude, east longitude and the course is 332°.

a) Mileage location data packet （transmit mileage fields after function is turned on）

Format			Length	Description
Information Content	Start Bit		2	0x78 0x78
	Packet Length		1	Length = Protocol Number + Information Content + Information Serial Number + Error Check
	Protocol Number		1	0x12（device time zone and time ）
	Information Content	Date Time	6	Year（1byte）Month（1byte）Day（1byte）Hour（1byte）Min（1byte）Second（1byte）（converted to a decimal）(Date Time)
		Quantity of GPS information satellites	1	Convert to a decimal and divide 1800000
		Latitude	4	Convert to a decimal and divide 1800000
		Longitude	4	Convert to a decimal and divide 1800000
		Speed	1	Convert to a decimal
		Course, Status	2	Convert to binary number of 16 bits and calculate by bits (see the following diagram)
	LBS Information	MCC	2	Mobile Country Code(MCC) (converted to a decimal)
		MNC	1	Mobile Network Code(MNC)(converted to a decimal)
		LAC	2	Location Area Code (LAC) (converted to a decimal)
		Cell ID	3	Cell Tower ID(Cell ID)(converted to a decimal)
		Mileage	4	Mileage, mileage statistics (hexadecimal)
	Serial Number		2	Serial number of data sent later at each time will be automatically added '1'.
Error Check			2	Serial Number (including "Packet Length" and "Information Serial Number") , are values of CRC-ITU. CRC error occur when the received information is calculated, the receiver will ignore and discard the data packet. (See Appendix 1)
Stop Bit			2	Fixed value: 0x0D 0x0A

Example: 78 78 23 12 10 03 1D 0F 17 12 C7 02 6B 6E 38 0C 39 71 00 0B 15 0E 01 CC 00 24 95 00 13 93 00 02 3D 7C 01 09 27 35 0D 0A

4.2. Server location packet response

Location packet server no need to response

5. Alarm Packet

Description：

- Transmit alarm content defined by terminal
- Server response and parse longitude and latitude into address and re-upload to terminal after receiving the alarm content
- Terminal send address to pre-set SOS number of device.

5.1. Alarm packet sent by terminal

Alarm packet

ii.		Length	Description
Start Bit		2	0x78 0x78
Packet Length		1	Length = Protocol Number + Information Content + Information Serial Number + Error Check
Protocol Number		1	0x16
Information Content	Date Time	6	Year（1byte）Month（1byte）Day（1byte）Hour（1byte）Min（1byte）Second（1byte）（converted to a decimal）(Date Time)
	Quantity of GPS information satellites	1	The first character is GPS information length，The second character is positioning satellite number（converted to a decimal）
	Latitude	4	Convert to a decimal and divide 1800000
	Longitude	4	Convert to a decimal and divide 1800000
	Speed	1	Convert to a decimal
	Course, Status	2	Convert to binary number of 16 bits and calculate by bits (see the following diagram)（same as GPS packet, see GPS packet for details）
	LBS Length	1	Total length of LBS information (Its length+MCC+MNC+CELLID)
	MCC	2	Mobile Country Code(MCC) (converted to a decimal)
	MNC	1	Mobile Network Code(MNC)(converted to a decimal)
	LAC	2	Location Area Code (LAC) (converted to a decimal)
	Cell ID	3	Cell Tower ID(Cell ID)(converted to a decimal)
	Terminal Information	1	See the following diagram
	Voltage Level	1	0x00：No Power (shutdown) 0x01：Extremely Low Battery (not enough for calling or sending text messages, etc.) 0x02：Very Low Battery (Low Battery Alarm) 0x03：Low Battery (can be used normally) 0x04：Medium 0x05：High 0x06：Very High

	GSM Signal Strength	1	0x00: no signal; 0x01: extremely weak signal; 0x02: very weak signal; 0x03: good signal; 0x04: strong signal.
	Alarm/Language	2	See the following diagram
Serial Number		2	Serial number of data sent later at each time will be automatically added '1'.
Error Check		2	Serial Number (including "Packet Length" and "Information Serial Number") , are values of CRC-ITU. CRC error occur when the received information is calculated, the receiver will ignore and discard the data packet. (See Appendix 1)
Stop Bit		2	Fixed value:0x0D 0x0A

Example：78 78 25 16 0F 0C 1D 0A 2B 21 C8 02 7A C8 04 0C 46 58 10 00 14 6F 09 01 CC 00 28 7D 00 1F 71 48 04 04 03 01 00 1C 84 CF 0D 0A

i.   Terminal Information

Bit		Code Meaning
BYTE	Bit7	1:Oil and electricity disconnected
		0: Oil and electricity connected
	Bit6	1: GPS tracking is on
		0: GPS tracking is off
	Bit3～Bit5	100: SOS
		011: Low Battery Alarm
		010: Power Cut Alarm
		001:Vibration Alarm
		000: Normal
	Bit2	1: Charging
		0: Not Charge
	Bit1	1: ACC high
		0: ACC Low
	Bit0	1: Defense Activated
		0: Defense Deactivated

i.   Alarm language

	0x00：normal
	0x01：SOS
	0x02：Power cut alarm
	0x03: Vibration alarm
	0x04:Enter fence alarm
	0x05:Exit fence alarm

	0x06 Over speed alarm
	0x09 Displacement alarm
	0x0A Enter GPS dead zone alarm
	0x0B Exit GPS dead zone alarm
	0x0C Power on alarm
	0x0D GPS First fix notice
	0x0E Low battery alarm
	0x0F Low battery protection alarm
	0x10SIM change notice
	0x11Power off alarm
	0x12Airplane mode alarm
	0x13Disassemble alarm
	0x14 Door alarm
	0XFE ACC On alarm
	0XFF ACC Off alarm
Byte 2	0x01Chinese
	0x02 English

5.2. Alarm packet response of server

	Length	Description
Start Bit	2	0x78 0x78
Packet Length	1	Length = Protocol Number + Information Content + Information Serial Number + Error Check
Protocol Number	1	0x16
Information Serial Number	2	Serial number of data sent later at each time will be automatically added '1'.
Error Check	2	Serial Number (including "Packet Length" and "Information Serial Number") , are values of CRC-ITU. CRC error occur when the received information is calculated, the receiver will ignore and discard the data packet. (See Appendix 1)
Stop Bit	2	Fixed value:0x0D 0x0A

Example：78 78 05 16 00 1C 1B 28 0D 0A

6. Online command

Description：

- Use server online command to control terminal to execute task.
- Terminal response results to server.

6.1. Online command sent by server

		Length	Description
Start Bit		2	0x78 0x78
Length of data bit		1	Length = Protocol Number + Information Content + Information Serial Number + Error Check
Protocol Number		1	0x80
Information Content	Length of Command	1	Server flag bit + command content length
	Server Flag Bit	4	Leave for server identification. Terminal receives the original data in Binary in response packet
	Command Content	M	Character string replied in ASCII coding. Command content is compatible with SMS command.
Information Serial Number		2	Serial number of data sent later at each time will be automatically added '1'.
Check Bit		2	Serial Number (including "Packet Length" and "Information Serial Number") , are values of CRC-ITU. CRC error occur when the received information is calculated, the receiver will ignore and discard the data packet. (See Appendix 1)
Stop Bit		2	Fixed value:0x0D 0x0A

Example ：78 78 0E 80 08 00 00 00 00 73 6F 73 23 00 01 6D 6A 0D 0A

6.2. Online command replied by terminal

Terminal reply（general command）

		Length	Description
Start Bit		2	0x78 0x78
Length of data bit		1	Length = Protocol Number + Information Content + Information Serial Number + Error Check
Protocol Number		1	0x15
Information Content	Length of Command	1	Server flag bit + command content length
	Server Flag Bit	4	Leave for server identification. Terminal receives the original data in Binary in response packet
	Command Content	M	Character string replied in ASCII coding.
	Language	2	Chinese:0x00 0x01 English:0x00 0x02
Information Serial Number		2	Serial number of data sent later at each time will be automatically added '1'.

Check Bit	2	Serial Number (including "Packet Length" and "Information Serial Number") , are values of CRC-ITU. CRC error occur when the received information is calculated, the receiver will ignore and discard the data packet. (See Appendix 1)
Stop Bit	2	Fixed value:0x0D 0x0A

Example：78 78 28 15 20 00 00 00 00 53 4F 53 31 3A 31 33 34 32 31 36 33 32 36 39 39 20 53 4F 53 32 3A 20 53 4F 53 33 3A 00 01 00 2A C3 9C 0D 0A

7. Information transmission packet

Description：

● Terminal transmits all types of non-position data.

7.1. Information transmission packet sent by terminal

	Length	Description
Start Bit	2	0x790x79
Length of data bit	2	Length = Protocol Number + Information Content + Information Serial Number + Error Check
Protocol Number	1	0x94
Information Content · Information Type（Sub-protocol Number）	1	00 External power voltage 01~03（defined by customer） 04 terminal status synchronization 05door status ……to add
Information Content · Data Content	N	Different information type results in different transmission content. See the following for details.
Information Serial Number	2	Serial number of data sent later at each time will be automatically added '1'.
Check Bit	2	Serial Number (including "Packet Length" and "Information Serial Number") , are values of CRC-ITU. CRC error occur when the received information is calculated, the receiver will ignore and discard the data packet. (See Appendix 1)
Stop Bit	2	Fixed value:0x0D0x0A

Example   :
7979007F9404414C4D313D43343B414C4D323D43433B414C4D333D34433B535441313D43303B4459443D30313B534F533D2C2C3B43454E5445523D3B46454E43453D46656E63652C4F4E2C302C32332E31313138 30392C3131342E3430393236342C3430302C494E206F72204F55542C303B4D4946493D4D4946492C4F4646 000A061E0D0A

Transmitted information content

When type is 00，the bit transmit external battery. This bit is two-digit hexadecimal value. Hexadecimal value converted to decimal value and divide 100

Example：0X04,0X9F, 049F converted to decimal is 101183，then divide 100 is 11.83, which means external voltage is 11.83V

When type is 04, the bit transmits information of terminal status synchronization. The bit length extended. Transmission is ASCII code.

Definition of content identifier

Definition	Identifier

Alarm Bit1	ALM1
Alarm Bit 2	ALM2
Alarm Bit 3	ALM3
Status Bit 1	STA1
SOS Number	SOS
Centre Number	CENTER
Fence	FENCE
Fuel/Electricity Cutoff Status	DYD
Mode	MODE

✧ **ALM1 Definition (Status）**

Bit	Definition	Mark
bit7	Vibration Alarm	1 ON 0 OFF
bit6	Network Alarm	1 ON 0 OFF
bit5	Phone Alarm	1 ON 0 OFF
bit4	SMS Alarm	1 ON 0 OFF
bit3	Displacement Alarm	1 ON 0 OFF
bit2	Network Alarm	1 ON 0 OFF
bit1	Phone Alarm	1 ON 0 OFF
bit0	SMS Alarm	1 ON 0 OFF

✧ ALM2 Definition (Status）

Bit	Definition	Mark
bit7	Low Battery Alarm	1 ON 0 OFF
bit6	Network Alarm	1 ON 0 OFF
bit5	Phone Alarm	1 ON 0 OFF
bit4	SMS Alarm	1 ON 0 OFF
bit3	Low Battery Alarm	1 ON 0 OFF
bit2	Network Alarm	1 ON 0 OFF
bit1	Phone Alarm	1 ON 0 OFF
bit0	SMS Alarm	1 ON 0 OFF

✧ **ALM3 Definition (Status）**

Bit	Definition	Mark
bit7	Overspeed Alarm	1 ON 0 OFF
bit6	Network Alarm	1 ON 0 OFF
bit5	Phone Alarm	1 ON 0 OFF
bit4	SMS Alarm	1 ON 0 OFF
bit3	Power Off Alarm	1 ON 0 OFF
bit2	Network Alarm	1 ON 0 OFF
bit1	Phone Alarm	1 ON 0 OFF
bit0	SMS Alarm	1 ON 0 OFF

✧ **STA1 Definition (Status）**

Bit	**Definition**	Mark
bit7	Arm Status	1 Arm0 Disarm

bit6	Automatically Arm	1 ON 0 OFF
bit5	Manually Arm	1 ON 0 OFF
bit4	Remotely Disarm	1 ON 0 OFF
bit3	To Be Defined	
bit2	To Be Defined	
bit1	Disassembly OFF	1 ON 0 OFF
bit0	Disassembly Alarm Status	1 ON 0 OFF

✧ **Fuel/Electricity Status Definition**

Bit	Definition	Mark
bit7	Undefined	
bit6	Undefined	
bit5	Undefined	
bit4	Undefined	
bit3	Deferred execution caused by overspeed	1Valid bit 0 Invalid bit
bit2	Deferred execution caused by GPS un located	1Valid bit 0 Invalid bit
bit1	Oil/Electricity cutoff	1Valid bit 0 Invalid bit
bit0	Oil/Electricity connection	1Valid bit 0 Invalid bit

✧ SOS definition：adopt ASCII to transmit（use "," to separate if multiple SOS numbers）

✧ Center number definition：adopt ASCII to transmit

✧ Fence definition：adopt ASCII to transmit

✧ Mode：adopt ASCII to transmit(separate parameters by "，")

Example ： ALM1=FF;ALM2=FF;ALM3=FF;STA1=CO ； DYD=01 ； SOS=12345 ， 2345 ， 5678 ； CENTER=987654;FENCE=FENCE,ON,0,-22.277120,-113.516763,5,IN,1；MODE=MODE,1,20,500

Notice：Not all contents are transmitted and please parse based on bits. Different products upload different contents.

When type is 05，this bit transmit external IO detection(door checking). Transmission is hexadecimal.

Bit	Definition	Mark
bit7	To Be Defined	
bit6	To Be Defined	
bit5	To Be Defined	
bit4	To Be Defined	
bit3	To Be Defined	
bit2	IO Status	1 High 0 Low
bit1	Triggering Status	1High triggering 0 Low triggering
bit0	Door Status	1ON0OFF

7.2. Server Response Information Transmission Packet
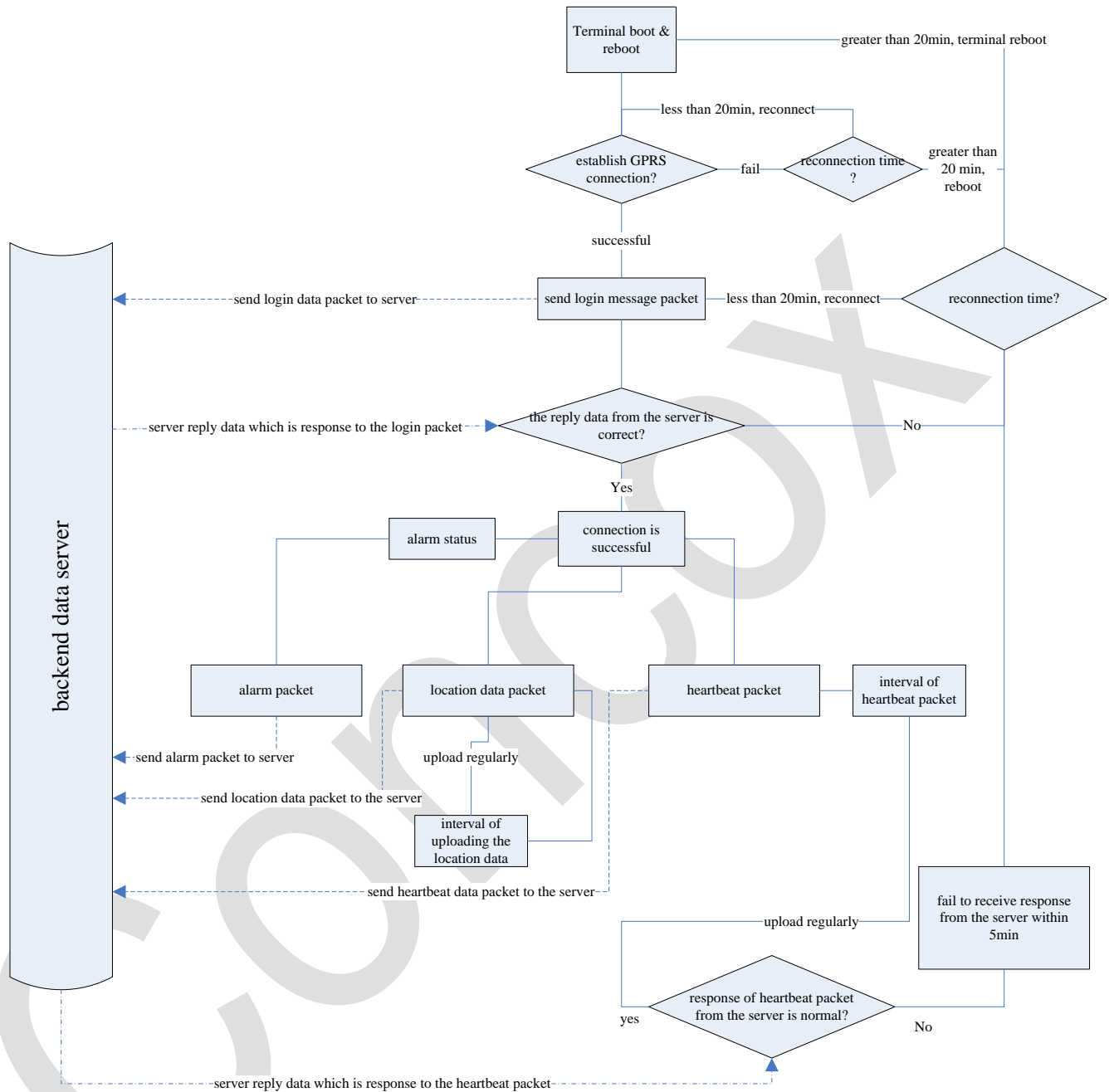
Server no Response

iii.Appendix

1. code fragment of the CRC-ITU lookup table algorithm implemented based on C language

staticconstU16crctab16[]=

```
{
0X0000,0X1189,0X2312,0X329B,0X4624,0X57AD,0X6536,0X74BF,
0X8C48,0X9DC1,0XAF5A,0XBED3,0XCA6C,0XDBE5,0XE97E,0XF8F7,
0X1081,0X0108,0X3393,0X221A,0X56A5,0X472C,0X75B7,0X643E,
0X9CC9,0X8D40,0XBFDB,0XAE52,0XDAED,0XCB64,0XF9FF,0XE876,
0X2102,0X308B,0X0210,0X1399,0X6726,0X76AF,0X4434,0X55BD,
0XAD4A,0XBCC3,0X8E58,0X9FD1,0XEB6E,0XFAE7,0XC87C,0XD9F5,
0X3183,0X200A,0X1291,0X0318,0X77A7,0X662E,0X54B5,0X453C,
0XBDCB,0XAC42,0X9ED9,0X8F50,0XFBEF,0XEA66,0XD8FD,0XC974,
0X4204,0X538D,0X6116,0X709F,0X0420,0X15A9,0X2732,0X36BB,
0XCE4C,0XDFC5,0XED5E,0XFCD7,0X8868,0X99E1,0XAB7A,0XBAF3,
0X5285,0X430C,0X7197,0X601E,0X14A1,0X0528,0X37B3,0X263A,
0XDECD,0XCF44,0XFDDF,0XEC56,0X98E9,0X8960,0XBBFB,0XAA72,
0X6306,0X728F,0X4014,0X519D,0X2522,0X34AB,0X0630,0X17B9,
0XEF4E,0XFEC7,0XCC5C,0XDDD5,0XA96A,0XB8E3,0X8A78,0X9BF1,
0X7387,0X620E,0X5095,0X411C,0X35A3,0X242A,0X16B1,0X0738,
0XFFCF,0XEE46,0XDCDD,0XCD54,0XB9EB,0XA862,0X9AF9,0X8B70,
0X8408,0X9581,0XA71A,0XB693,0XC22C,0XD3A5,0XE13E,0XF0B7,
0X0840,0X19C9,0X2B52,0X3ADB,0X4E64,0X5FED,0X6D76,0X7CFF,
0X9489,0X8500,0XB79B,0XA612,0XD2AD,0XC324,0XF1BF,0XE036,
0X18C1,0X0948,0X3BD3,0X2A5A,0X5EE5,0X4F6C,0X7DF7,0X6C7E,
0XA50A,0XB483,0X8618,0X9791,0XE32E,0XF2A7,0XC03C,0XD1B5,
0X2942,0X38CB,0X0A50,0X1BD9,0X6F66,0X7EEF,0X4C74,0X5DFD,
0XB58B,0XA402,0X9699,0X8710,0XF3AF,0XE226,0XD0BD,0XC134,
0X39C3,0X284A,0X1AD1,0X0B58,0X7FE7,0X6E6E,0X5CF5,0X4D7C,
0XC60C,0XD785,0XE51E,0XF497,0X8028,0X91A1,0XA33A,0XB2B3,
0X4A44,0X5BCD,0X6956,0X78DF,0X0C60,0X1DE9,0X2F72,0X3EFB,
0XD68D,0XC704,0XF59F,0XE416,0X90A9,0X8120,0XB3BB,0XA232,
0X5AC5,0X4B4C,0X79D7,0X685E,0X1CE1,0X0D68,0X3FF3,0X2E7A,
0XE70E,0XF687,0XC41C,0XD595,0XA12A,0XB0A3,0X8238,0X93B1,
0X6B46,0X7ACF,0X4854,0X59DD,0X2D62,0X3CEB,0X0E70,0X1FF9,
0XF78F,0XE606,0XD49D,0XC514,0XB1AB,0XA022,0X92B9,0X8330,
0X7BC7,0X6A4E,0X58D5,0X495C,0X3DE3,0X2C6A,0X1EF1,0X0F78,
};

//calculate the 16-bit CRC of data with predetermined length.
U16GetCrc16(constU8*pData,intnLength)
{
U16fcs=0xffff;//initialization
while(nLength>0){
fcs=(fcs>>8)^crctab16[(fcs^*pData)&0xff];
nLength--;
pData++;
}
return~fcs;//negated
}
```

2. Data Flow Diagram