WF502 data protocol

1 Data communication

1. Set WF502 RTC time ：

After a connection is established between the device and the server, the device sends a data message to the server. The server sends the following information to the device to change the RTC time. It is recommended that the server set the RTC time each time when the device connects to the server.
Set the RTC time Format：@UTC,yyyy-MM-dd HH:mm:ss#
For example：@UTC,2021-11-24 02:56:43#
*please note the time setting should be UTC +0 time,the RTC time is set first, and then the ACK reply is set.

C# code：

```
byte[] utcBytes = System.Text.Encoding.Default.GetBytes(string.Format("@UTC,{0}#",
System.DateTime.UtcNow.ToString("yyyy-MM-dd HH:mm:ss")));

_NetStream.Write(utcBytes, 0, utcBytes.Length);
```

2. Set ACK reply：

After a connection is established between the device and the server,each time the machine sends a piece of data to the server, the server must reply with an ACK message to the machine, otherwise the machine will continue to send duplicate data。
Reply ACK Format：@ACK,Packet index (Hex converted into decimal)#
For example：@ACK,0035#

C# code：

```
byte[] ackBytes = System.Text.Encoding.Default.GetBytes(string.Format("@ACK,{0}#",
serial));

_NetStream.Write(ackBytes, 0, ackBytes.Length);
```

2   Data parsing

WF502 data is in hex format.

The format of   hex code:

Start bits(2byte) + Packet length(2byte) + Protocol number(2byte) + Hardware type(2byte) + Firmware version(4byte) + IMEI(8byte) + RTC data time(6byte) + State data length(2byte) + Alarm type(1byte) + Terminal information(1byte) + WiFi signal strength(1byte) +WiFi state(1byte) +Battery voltage(2byte) + Temperature(2byte) + humidity(2byte)   + Extension bits(B) + Extension bits(C) + packet index(2byte) + CRC(2byte) + Stop bits(2byte)

Here below is a table which informs more detailed information about the protocol.

Data block	Number of bytes	Data Content	Meaning
Start bits	2	'T' 'Z'	Tzone company identifier. This is the header of every packet
Packet length	2	Variable	The bytes length from the start at protocol number to the end at the CRC.
Protocol number	2	'$$'	Normal data
Hardware type	2	0x05 0x01	The hardware is WF502
Firmware version	4	Variable	0xFF 0xFF0xFF0xFF = 255.255.255.255
IMEI	8	Variable	BCD format, i.e. 0x05 0x00 0x12 0x10 0x00 0x00 0x00 0x05 =500121000000005
RCT time date	6	Variable	The time and date when packet the data. The sequence is Year Month Day Hour Minute Second i.e. 15H 0AH 0BH 03H 05H 23H means time :2021/10/11 15:05:35
Status data length	2	Variable	The status data length excluding "Status data length" itself. If this part is 0, there is no status data.
Alarm type	1	Variable	0xAA Interval data 0x10 Low battery Alarm 0xA0 Temperature/Humidity over threshold alarm 0xA1 Temperature/Humidity sensor abnormal alarm 0x61 External power disconnection alarm
Terminal information	1	Variable	Bit 7-5 Reserved Bit4: 1 press the button 0 Have not press the button Bit3: 1 The temperature/Humidity sensor is

			abnormal

			0 The temperature/Humidity sensor is normal
			Bit2: 1 The temperature/Humidity is over threshold
			      0 The temperature/Humidity is normal
			Bit1: 1 The battery low voltage
			      0 The battery is normal
			Bit0: 1 The machine is charging
			      0 The machine is not charging

WiFi signal strength	1	Variable	Hex code, Unit: -dbm

WiFi status	1	Variable	Bit 7: has no definition yet
			bit 6: has no definition yet
			Bit 5: has no definition yet
			Bit4: 1 Connect to TCP
			      0 Have not connect TCP
			      1 Connect the AP
			      0 Have not connect AP
			Bit2: 1 Initialization complete
			      0 Initialization is not complete
			Bit1: 1 Module boot
			      0 Module not have boot
			Bit0: 1 Power-on
			      0 Power-off

Battery voltage	2	Variable	Unit:10mv, for example: 0185H=373(DEC), 389*10mV=3.89V.

Temperature	2	Variable	Unit:0.1℃，hex code,convert to binary first,
			Bit15: 0 the temperature/humidity sensor is normal
			      1 the temperature/humidity sensor is abnormal
			Bit14：0 the temperature is positive.
			      1 the temperature is negative.
			Bit0-13:the temperature value, convert to HEX first , and multiply 0.1℃.
			for example:01 10=27.2℃ , 41 23= - 29.1℃
			80 00= not connect temperature/humidity sensor

humidity	2	Variable	Unit:0.1%, Hex code,convert to binary first, Bit15: 0 the temperature/humidity sensor is normal 1 the temperature/humidity sensor is abnormal Bit0-14:the humidity value, convert to HEX first , for example: 02 55=59.7% 80 00= not connect temperature/humidity sensor or no humidity
Extension bits	B=0		For future use, currently, this part has nothing, does not have any byte
Extension bits	C=0		For future use, currently, this part has nothing, does not

			have any byte
Packet index	2	Variable	The value range of this part is between 1 and 9999
CRC	2	Variable	The checked content is from the "protocol number" to the end at "CRC", including "protocol number", excluding "CRC".
Stop bits	2	0x0D 0x0A	Indicate that this packet is finished

For example:

54 5A 00 26 24 24 05 02 01 07 00 00 05 02 00 00 00 00 00 02 16 04 1B 08 17 3A 00 0A AA 00 27

1F 01 63 01 07 02 B8 01 65 2C CB 0D 0A

Start symbol: 54 5A—'TZ';
Packet length: 00 26—38bytes;
Protocol type: 24 24—'$$';
Hardware type: 05 02;
Firmware version: 01 07 00 00—1.07;
IMEI: 05 00 12 00 00 00 00 02—0500120000000002;
RTC time: 16 04 1B 08 17 3A—2022\04\27 08:23:58;
State data length: 00 0A—10 bytes;
Alarm type: AA;
Terminal information: 00— 0000 0000;
WIFI signal: 27— -39dbm;
WIFI state: 1F—0001 1111;
Battery voltage: 01 63—3.55V;
Temperature:01 07—26.3℃;
Humidty:02 B8—69.6%;
Packet index: 01 65—0357;
Check code : 2C CB;
Stop symbol: 0D 0A;