COMMUNICATION PROTOCOL

1. GPR setting
   RO GPRS FUNCTION.

   1.1 APN
   APN (Access Point Name), it's decided by the provider of communication network.
   Set APN
   \texttt{apn+password+space+ APN content}
   example \texttt{apn123456 internet}
   If there is user name and password for the APN, they have to be set up also
   \texttt{Apnuser+password+space+ APN USER NAME}
   Example \texttt{apnuser123456 internet}
   \texttt{Apnpasswd+password+space+APN PASSWORD}
   Example \texttt{apnpasswd123456 internet}

2 IP and port setting

   Every gprs server has a ip and port, IP can be in numbers such as 191.62.35.2..3
   P.S IP can be DNS for ARM CPU products.
   \texttt{Adminip+password+IP adress+port}
   Example \texttt{adminip123456 191.62.35.2..3 9001}

3 GPRS format

   The following is the gprs data for STC products (TK102, TK103)

   **GPRS SETTING**

   Our GPS tracker supports TCP protocol, so please confirm whether your server supports TCP protocol also. If your server supports UDP protocol, please tell us in advance so that we can do some change in our tracker’s software to make it UDP protocol.

   It is GPRMC format for our GPRS data, the following is some data from our tracker
   \begin{verbatim}
   0711011831,+8613145826126,GPRMC,103148.000,A,2234.0239,N,11403.0765,E,0.00,,011107,,,A*75,F,imei:352022008228783,101\x8D
   0711011832,+8613145826126,GPRMC,103226.000,A,2234.0239,N,11403.0765,E,0.00,,011107,,,A*7E,F,imei:352022008228783,101j
   0711011833,+8613145826126,GPRMC,103307.000,A,2234.0239,N,11403.0765,E,0.00,,011107,,,A*7C,F,imei:352022008228783,101\xC1
   \end{verbatim}
### GPRMC data

The following example:

```
$GPRMC,053740.000,A,2503.6319,N,12136.0099,E,2.69,79.65,100106,,,A*53
```

<table>
<thead>
<tr>
<th>Name</th>
<th>Example</th>
<th>Units</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message ID</td>
<td>SGPRMC</td>
<td></td>
<td>RMC protocol header</td>
</tr>
<tr>
<td>UTC Time</td>
<td>053740.000</td>
<td></td>
<td>hhmmss.sss</td>
</tr>
<tr>
<td>Status</td>
<td>A</td>
<td></td>
<td>A=data valid or V=data not valid</td>
</tr>
<tr>
<td>Latitude</td>
<td>2503.6319</td>
<td>ddmm.mmmm</td>
<td></td>
</tr>
<tr>
<td>N/S Indicator</td>
<td>N</td>
<td></td>
<td>N=north or S=south</td>
</tr>
<tr>
<td>Longitude</td>
<td>12136.0099</td>
<td>dddmm.mmmm</td>
<td></td>
</tr>
<tr>
<td>E/W Indicator</td>
<td>E</td>
<td></td>
<td>E=east or W=west</td>
</tr>
<tr>
<td>Speed over ground</td>
<td>2.69</td>
<td>knots</td>
<td>True</td>
</tr>
<tr>
<td>Course over ground</td>
<td>79.65</td>
<td>degrees</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>100106</td>
<td></td>
<td>ddmmyy</td>
</tr>
<tr>
<td>Magnetic variation</td>
<td></td>
<td>degrees</td>
<td></td>
</tr>
<tr>
<td>Variation sense</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mode</td>
<td>A</td>
<td></td>
<td>A=autonomous, D=DGPS, E=DR</td>
</tr>
<tr>
<td>Checksum</td>
<td>*53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;CR&gt; &lt;LF&gt; termination</td>
<td></td>
<td></td>
<td>End of message</td>
</tr>
</tbody>
</table>

The following is the gprs data for ARM CPU products(tk102-2,tk103-2, tk202, tk201-2,xt007,xt008) etc

```
090805215127,+22663173122,GPRMC,215127.083,A,4717.3044,N,01135.0005,E,0.39,217.95,050809,,,,A*6D,F,, imei:354776030393299,05,552.4,F:4.06V,0,141,54982,232,01,1A30,0949
```

090805215127=2009, 5th,Aug. 21:51:27

+22663173122= admin number, it is the mobile number which you use to set up apn,ip,port

215127.083 = time( 21:51:27:083) the time in your place

A ==GPS module can get gps signal before, has no meaning in this gprs data, it will be always
4717.3044,N, 01135.0005,E== coordinate , the coordinate is got from GMS module directly
Such as the following is the gprs data you got from the tracker
0711151725,07740700975,GPRMC,172553.807,A,5320.6735,N,00129.0141,W,0.00,,151107,,,A*
64,F,imei:352022008205401,98
It is counted like this: the last 6 digitals divided by 60,then plus the first two digitals.
5320.6735,N-------20.6735/60+53=0.3445583+53=53.344558N
00129.0141,W------29.014/60+001=0.4835683+001=001.4835683W
When you get the SMS,the last 6 digitals has been divided by 60 and plus the first two digitals.
0.39 ==speed   it is NAUTICAL MILES
217.95 ==angle  it is direction of travel, but not accurate, so please ignore this part
050809 ==date   it is from GSM module directly, we can not change it

A*6D ==CRC16 correction for GPRMC it is standard GPRS format, hexadecimal number, it is the correction for the GPRMC format
F == valid GPS signal
05 == can get signal from 5 satellites the tracker can get satellites for this data
552.4 ===== the height it is horizen level, not accurate
F:4.06V == power left in the battery , it is 4.2V-3.7V
0 === no charging state if the usb connector on the tracker is connected with power , it is 1, otherwise 0
141= the byte in this data it is the total bytes before 141, count them and will be 141

54982 ==CRC16 correction for the whole gprs data, decimal system
232======== MCC Mobile Country Code
01====== MNC Mobile Network Code
1A30== LAC Location area code
0949 == cell ID

232,01,1A30,0949 is GSM ID, pls ask your GSM network for this information. Generally speaking ,the gsm operator will not give this information to others. When the tracker is lost, you can offer this data to the police and they can ask GSM operator to help by this data.
unsigned int CRC_16(unsigned char *buf, unsigned int datalen) {
    unsigned int i;
    unsigned char j;
    unsigned char c, treat, bcrc;
    unsigned int crc = 0;

    for (i = 0; i < datalen; i++)
    {
        c = buf[i];
        for (j = 0; j < 8; j++)
        {
            treat = c & 0x80;
            c <<= 1;
            bcrc = (crc >> 8);
            bcrc &= 0x80;
            crc <<= 1;
            if (treat != bcrc)
                crc ^= 0x1021;
        }
    }
    return crc & 0xffff;
}