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Document History

<table>
<thead>
<tr>
<th>Version</th>
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<th>Author</th>
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</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>
# Contents

Document History .................................................................................................................. 3  
1 GPRS Package Format ......................................................................................................... 5  
2 Applied Models ................................................................................................................ 6  
3 GPS Position/Alarm Data Format – A03 ........................................................................ 7  
4 Server Response to A03 ..................................................................................................... 10  
5 GPRS Heartbeat Data Format – A10 ............................................................................. 12  
6 Server Response to A10 ..................................................................................................... 13  
Appendix A - Alarm Code and Alarm Parameter ............................................................... 14  

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1 GPRS Package Format

GPRS uplink (i.e.: Data is sent from tracker to platform) command format:
$$<\text{pack-len}>,<\text{ID}>,<\text{work-no}>,<\text{cmd-code}>,<\text{cmd-para}>*<\text{checksum}>\text{\textbackslash n}\text{\textbackslash n}$$

GPRS downlink (i.e.: Data is sent from platform to tracker) command format:
##<\text{pack-len}>,<\text{ID}>,<\text{work-no}>,<\text{cmd-code}>,<\text{cmd-para}>*<\text{checksum}>\text{\textbackslash n}\text{\textbackslash n}$$

Remarks:
- Comma (,) is used to separate data fields, and it is necessary. There is no space before or after comma.
- pack-len: Package Length, decimal string format, the field of pack-len is 
  \{<\text{ID}>,<\text{work-no}>,<\text{cmd-code}>,<\text{cmd-para}>,\}, be careful, comma(,) in front of ID included.
- ID: Tracker ID, default IMEI.
- work-no: working number, hexadecimal string format, cyclic accumulation from 1 to 0xFFFF.
- cmd-code: Command code, or specification of data type.
- cmd-para: parameter or description of cmd-code, which is described in the following chapters.
- checksum: checksum of package, 2 bytes hexadecimal string format, XOR of 
  \{<\text{pack-len}>,<\text{ID}>,<\text{work-no}>,<\text{cmd-code}>,<\text{cmd-para}>\}.
- \text{\textbackslash n}: End of package, i.e. <CR><LF>.
- Without specification, multi-byte binary data in cmd-para uses big endian format, i.e. Most Significant Byte first.
2 Applied Models

The document describes the format of position/alarm GPRS data, and it is applied for the following models:

- Q2
3 GPS Position/Alarm Data Format – A03

$$<\text{pack-len}>,<\text{ID}>,<\text{work-no}>,A03,<\text{alm-code}|\text{alm-para}>,<\text{date-time}>,\text{MCC}|\text{MNC}|\text{LAC}|\text{CI},<\text{bat-v}>,<\text{bat-level}>,<\text{status}>,<\text{loc-type}>,<\text{gps-info}|<\text{wifi-info}>*<\text{checksum}>\backslash r\backslash n$$

Descriptions of position/alarm data:

Example:
A03 supports two types of position data, GPS and wifi, which is defined by loc-type field. Each position data type has similar format, but different gps-info or wifi-info field after loc-type.

When loc-type==0, there is gps-info field in the position package, and field definition:

$$<\text{pack-len}>,<\text{ID}>,<\text{work-no}>,A03,<\text{alm-code}|\text{alm-para}>,<\text{date-time}>,\text{MCC}|\text{MNC}|\text{LAC}|\text{CI},<\text{bat-v}>,<\text{bat-level}>,<\text{status}>,0,<\text{fix-flag}>,<\text{speed}>,<\text{salt-num}>,<\text{lat}>,<\text{lon}>*<\text{checksum}>\backslash r\backslash n$$

Example as below:

```
95,866104023192332,1,A03,,210414055249,460|0|25FC|104C,4.18,100,000F,0,A,2,9,22.643175,1
14.018150*75\r\n```

When loc-type==1, there is wifi-info in the position package, and field definition:

$$<\text{pack-len}>,<\text{ID}>,<\text{work-no}>,A03,<\text{alm-code}|\text{alm-para}>,<\text{date-time}>,\text{MCC}|\text{MNC}|\text{LAC}|\text{CI},<\text{bat-v}>,<\text{bat-level}>,<\text{status}>,1,<\text{wifi-ap1}|<\text{wifi-ap2}...|<\text{wifi-apN}>*<\text{checksum}>\backslash r\backslash n$$

Example as below:

```
136,866104023192332,1,A03,,210414055249,460|0|25FC|104C,4.18,100,000F,1,94D9B377EB53:-60|EC6C9FA4CAD8:-55|CA50E9206252:-61|54E061260A89:-51*3E\r\n```

Field | Description |
------|-------------|
pack-len | decimal string format, the field of pack-len is {,<\text{ID}>,<\text{work-no}>,A03,<\text{alm-code}|\text{alm-para}>,<\text{date-time}>,\text{MCC}|\text{MNC}|\text{LAC}|\text{CI},<\text{bat-v}>,<\text{bat-percentage}>,<\text{status}>,<\text{loc-type}>,<\text{gps-info}|<\text{wifi-info}>}, be careful, comma(,) in front of ID included. |

Example
95: the length of 
```
"866104023192332,1,A03,,210414055249,460|0|25FC|104C,4.18,100,000F,0,A,2,9,22.643175,114.018150"
```
136: the length of 
```
"866104023192332,1,A03,,210414055249,460|0|25FC|104C,4.18,100,000F,1,94D9B377EB53:-60|EC6C9FA4CAD8:-55|CA50E9206252:-61|54E061260A89:-51"
```

Field | Description |
------|-------------|
ID | Tracker ID, default IMEI, ASCII string |

Example
866104023192332 |

Field | Description |
------|-------------|
work-no | working number, hexadecimal string format, cyclic accumulation from 1 to 0xFFFF |

Example
1, indicates that the value of work-no is 0x0001 |

Field | A03 |
------|-----|
### Description
Data type specification, which is used to define position/alarm package format.

#### Example

<table>
<thead>
<tr>
<th>Field</th>
<th>alm-code</th>
<th>alm-para</th>
</tr>
</thead>
</table>

**Description**
Alarm code and alarm parameter, refer to Appendix A; For normal position data, this field is empty.

**Example**
Empty, the package is a normal position one.

<table>
<thead>
<tr>
<th>Field</th>
<th>date-time</th>
</tr>
</thead>
</table>

**Description**
GMT0 date & time, in format: YYMMDDHHmmss
- 01 YY: year, value(year – 2000), 2 characters
- 02 MM: month, value range 1--12, 2 characters
- 03 DD: day, value range 1--31, 2 characters
- 04 HH: hour, value range 0--23, 2 characters
- 05 mm: minute, value range 0-59, 2 characters
- 06 ss: second, value range 0--59, 2 characters

**Example**
210414055249, means 2021-4-14 05:52:49 (@GMT0)

<table>
<thead>
<tr>
<th>Field</th>
<th>MCC</th>
<th>MNC</th>
<th>LAC</th>
<th>CI</th>
</tr>
</thead>
</table>

**Description**
Mobil base station information. ‘|’ is used to separate each data.
MCC, MNC: decimal string format
LAC, CI: hexadecimal string format

**Example**
460|0|25FC|104C:
Value of MCC is 460;
Value of MNC is 0;
Value of LAC is 0x25FC;
Value of CI is 0x104C;

<table>
<thead>
<tr>
<th>Field</th>
<th>bat-v</th>
</tr>
</thead>
</table>

**Description**
Battery voltage, unit V

**Example**
4.18, means battery voltage 4.18V

<table>
<thead>
<tr>
<th>Field</th>
<th>bat-level</th>
</tr>
</thead>
</table>

**Description**
Battery level, unit %, 0--100%

**Example**
100, means battery level 100%

<table>
<thead>
<tr>
<th>Field</th>
<th>status</th>
</tr>
</thead>
</table>

**Description**
Alarm status or vehicle status, hexadecimal string format, as the following table:

<table>
<thead>
<tr>
<th>bit</th>
<th>definition</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0--4</td>
<td>CSQ</td>
<td>GSM signal strength, range [0,31]</td>
</tr>
<tr>
<td>5</td>
<td>Charging</td>
<td>Clear when charging cable plug out</td>
</tr>
<tr>
<td>6</td>
<td>Battery low</td>
<td>Clear when battery normal, or charging cable plug in</td>
</tr>
<tr>
<td>7--15</td>
<td>Reserve</td>
<td>Reserved for future use</td>
</tr>
</tbody>
</table>

**Example**
000F, means CSQ=15

<table>
<thead>
<tr>
<th>Field</th>
<th>loc-type</th>
</tr>
</thead>
</table>

**Description**
Position type, it defines GPS or WIFI position data type
loc-type==0: GPS type, and gps-info define as 
\(<fix\-flag>,<speed>,<salt\-num>,<lat>,<lon>\)

<table>
<thead>
<tr>
<th>field</th>
<th>definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>fix-flag</td>
<td>A—GPS fixed; V—GPS not fixed</td>
</tr>
<tr>
<td>Speed</td>
<td>Speed, unit km/h</td>
</tr>
<tr>
<td>salt-num</td>
<td>satellite number, update from GPS module data</td>
</tr>
<tr>
<td>lat</td>
<td>Latitude, negative in southern hemisphere, decimal string format</td>
</tr>
<tr>
<td>lon</td>
<td>Longitude, negative in western hemisphere, decimal string format</td>
</tr>
</tbody>
</table>

loc-type==1: WIFI type, and wifi-info defines as 
\(<wifi\-ap1>|<wifi\-ap2>|...|<wifi\-apN>\)

five WIFI APs supported maximally; wifi-ap format AABBCCDDEEFF: rssi, means MAC AA:BB:CC:DD:EE:FF, Received Signal Strength Indicator rssi, using ’|’ to separate various wifi-ap field

**Example**

0: GPS type, “A,2,9,22.643175,114.018150” means GPS fixed, 2km/h, 9 satellites, position 22.643175゜,114.018150゜

1: WIFI type,

“94D9B377EB53:-60|EC6C9FA4CAD8:-55|CA50E9206252:-61|54E061260A89:-51”

means 4 WIFI APs searched, detail as below:

<table>
<thead>
<tr>
<th>WIFI AP</th>
<th>MAC</th>
<th>RSSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>94D9B377EB53:-60</td>
<td>94:D9:B3:77:EB:53</td>
<td>-60</td>
</tr>
<tr>
<td>54E061260A89:-51</td>
<td>54:E0:61:26:0A:89</td>
<td>-51</td>
</tr>
</tbody>
</table>

Field checksum

**Description**

checksum of package, 2 bytes hexadecimal string format, XOR of

\(<pack\-len>,<ID>,<work\-no>,A03,<alm\-code>|alm\-para>,<date\-time>,MCC|MNC|LAC|CI,<bat\-v>,<bat\-level>,<status>,<loc\-type>,<gps\-info>|<wifi\-info>\).

**Example**

75: XOR checksum of “95,866104023192332,1,A03,,210414055249,460|0|25FC|104C,4.18,100,000F,0,A,2,9,22.643175,114.018150”

3E: XOR checksum of “136,866104023192332,1,A03,,210414055249,460|0|25FC|104C,4.18,100,000F,1,94D9B377EB53:-60|EC6C9FA4CAD8:-55|CA50E9206252:-61|54E061260A89:-51”

Field \n
**Description**

End of package, i.e. <CR><LF>

**Example**

\n
4 Server Response to A03

After receives A03 package, server should sending response package to device. Device resends A03 package every 1min when no response received.

Format of response package: ##<pack-len>,<ID>,<work-no>,A03,<date-time>\n\n
Descriptions of position/alarm data:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>pack-len</td>
<td>decimal string format, the field of <code>pack-len</code> is <code>{,&lt;ID&gt;,&lt;work-no&gt;,A03,&lt;date-time&gt;}</code>, be careful, comma(,) in front of <code>ID</code> included.</td>
<td><code>37</code></td>
</tr>
<tr>
<td>ID</td>
<td>Tracker ID, default IMEI, ASCII string</td>
<td><code>866104023192332</code></td>
</tr>
<tr>
<td>work-no</td>
<td>working number, hexadecimal string format, cyclic accumulation from 1 to 0xFFFF; <code>work-no</code> in response package should be the same as uplink <code>A02</code> package; tracker should compare <code>work-no</code> in response and uplink package, and only deletes local <code>A02</code> package which has the same <code>work-no</code></td>
<td><code>29</code>, indicates that the value of <code>work-no</code> is 0x0029</td>
</tr>
</tbody>
</table>
| date-time  | GMT0 date & time, format: YYMMDDHHmmss
- 01 YY: year, value(year – 2000), 2 characters
- 02 MM: month, value range 1-12, 2 characters
- 03 DD: day, value range 1-31, 2 characters
- 04 HH: hour, value range 0-23, 2 characters
- 05 mm: minute, value range 0-59, 2 characters
- 06 ss: second, value range 0-59, 2 characters
Device can use the `date-time` to calibrate local date and time | `210414055250: 2021-04-14 05:52:50` |
<p>| checksum   | Checksum of package, 2 bytes hexadecimal string format, XOR of <code>{&lt;pack-len&gt;,&lt;ID&gt;,&lt;work-no&gt;,A03,&lt;date-time&gt;}</code>. | <code>5C</code> The XOR checksum is 0x5C |</p>
<table>
<thead>
<tr>
<th>Description</th>
<th>End of package, i.e. &lt;CR&gt;&lt;LF&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example</td>
<td>\r\n</td>
</tr>
</tbody>
</table>
5 GPRS Heartbeat Data Format – A10

Heartbeat package is used to keep device online, under that condition, GPRS setting command can be delivered.

```
$$<pack-len>,<ID>,<work-no>,A10,<status>,<bat-ad>*<checksum>\r\n```

Descriptions of position/alarm data:

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>pack-len</td>
<td>decimal string format, the field of pack-len is {&lt;ID&gt;,&lt;work-no&gt;,A10,&lt;status&gt;,&lt;bat-ad&gt;}, be careful, comma(,) in front of ID included.</td>
</tr>
<tr>
<td>ID</td>
<td>Tracker ID, default IMEI, ASCII string</td>
</tr>
<tr>
<td>work-no</td>
<td>working number, hexadecimal string format, cyclic accumulation from 1 to 0xFFFF</td>
</tr>
<tr>
<td>A10</td>
<td>Data type specification, which is used to define GPRS heartbeat package format.</td>
</tr>
<tr>
<td>status</td>
<td>Reserved field</td>
</tr>
<tr>
<td>bat-ad</td>
<td>bat-ad: Voltage of internal battery, unit 0.01V</td>
</tr>
<tr>
<td>checksum</td>
<td>Checksum of package, 2 bytes hexadecimal string format, XOR of {&lt;pack-len&gt;,&lt;ID&gt;,&lt;work-no&gt;,A10,&lt;status&gt;,&lt;bat-ad&gt;}.</td>
</tr>
<tr>
<td>\r\n</td>
<td>The XOR checksum is 0x5E</td>
</tr>
</tbody>
</table>

Example:

```
#29,866104023192332,36,A10,0,190*5E\r\n```

Example

- **Field**: pack-len
  - Description: decimal string format, the field of `pack-len` is `{<ID>,<work-no>,A10,<status>,<bat-ad>}`, be careful, comma(,) in front of ID included.

Example

- **Field**: ID
  - Description: Tracker ID, default IMEI, ASCII string
  - Example: `866104023192332`

Example

- **Field**: work-no
  - Description: working number, hexadecimal string format, cyclic accumulation from 1 to 0xFFFF
  - Example: `36`, indicates that the value of `work-no` is 0x0036

Example

- **Field**: A10
  - Description: Data type specification, which is used to define GPRS heartbeat package format.

Example

- **Field**: status
  - Description: Reserved field

Example

- **Field**: bat-ad
  - Description: bat-ad: Voltage of internal battery, unit 0.01V
  - Example: `190`
    - Voltage of battery is 0x01A0, i.e. 4.00V

Example

- **Field**: checksum
  - Description: Checksum of package, 2 bytes hexadecimal string format, XOR of `{<pack-len>,<ID>,<work-no>,A10,<status>,<bat-ad>}`.
  - Example: `5E`
    - The XOR checksum is 0x5E

Example

- **Field**: \r\n  - Description: End of package, i.e. <CR><LF>
  - Example: `\r\n`
6 Server Response to A10

There is no response package from server to device.
Appendix A - Alarm Code and Alarm Parameter

The following table describes the relationship of `alm-code` and `alm-para` in GPS Position/Alarm data:

<table>
<thead>
<tr>
<th>alm-code</th>
<th>alm-para</th>
<th>Description</th>
<th>SMS Head String</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>NULL</td>
<td>Input1 active</td>
<td>SOS</td>
</tr>
<tr>
<td>33</td>
<td>NULL</td>
<td>Exit Fence</td>
<td>Exit Fence</td>
</tr>
<tr>
<td>34</td>
<td>NULL</td>
<td>Enter Fence</td>
<td>Enter Fence</td>
</tr>
<tr>
<td>17</td>
<td>NULL</td>
<td>Internal battery low</td>
<td>Low Battery</td>
</tr>
</tbody>
</table>