CellTrack

App for Android and iOS platforms that allows the tracking and location of the user of a smartphone through their positioning via GPS and / or GSM network, reporting by GPRS to a server.

Requirements

1. Server and Database

1.1   the App will report to a remote server via GPRS, with a UDP protocol, and with a format that will be specified. The server will validate and store the data in a SQLServer database.

2. Configuration parameters

*This document refers to a series of variables or parameters (**phone_admin**, **device_name**, **cfg_n**, etc.) which were given a name only as a reference and intend to make the description of the project clearer. These names are not mandatory and may be modified.*

2.1 General

2.1.1 **Admin Phone**: phone that can configure the device by SMS, receive the SOS, etc..
phone_admin

2.1.2 **Device Name**: for identification in the SMS responses (more friendly to the user than the IMEI)
device_name

2.2 Reports (sending data) by GPRS to the server

2.2.1 **GPRS Report**: Enables or disables the GPRS report to the server (**cfg_n.bit0**)

2.2.2 **Reporting time for moving device**: in seconds. (**repmov_time**)

2.2.3 **Distance traveled for report in movement**: in meters (**repmov_dist**)

2.2.4 **Reporting time for device at rest**: in seconds. (**represt_time**)

2.2.5 **Time range in which the tracking will be enabled**

`from Hour: hh:mm` (**rephour_ini:repmin_ini**)

`to   Hour: hh:mm` (**rephour_end:repmin_end**)

2.2.6 **Days of the week in which the tracking will be enabled**:

`Sun Mon Tue Wed Thu Fri Sat`   (**repday**)

2.3 SOS Report

2.3.1 **Sending an SOS Message**: Enables or disables sending an SOS message (**cfg_n.bit1**)

2.3.2 **SOS message by GPRS**: enable or not the sending of SOS message by GPRS (**cfg_n.bit2**)

2.3.3 **SOS message by SMS**: enable or not the sending of SOS message by SMS. (**cfg_n.bit3**)

2.3.4 **SOS call**: enable or disable the SOS call to the preset phone (**cfg_n.bit4**)

2.3.5 **SOS phone**: phone number to receive SOS call or message (**sos_phone**)
(If this field is empty and 2.3.3 enables SOS sending by SMS, then the admin telephone defined in 2.1.1 will be used as the recipient)

2.3.6 **SOS message text**: defines the text to be sent in the SOS message by SMS (**sos_text**)

2.4 Precision in location vs power saving

2.4.1 **Highest accuracy in location**: Enables or disables maximum location accuracy (**cfg_n.bit5**)
* In this option the user should be made aware that the higher the accuracy, the higher the battery consumption.
* Maximum precision enablement involves activation and use of GPS
* Disabling of maximum precision involves deactivation of GPS and positioning only by GSM network.

2.5 Advanced

2.5.1 **Auto-start**: Enable or not to start the app automatically when the phone is switched on (**cfg_a.bit0**)

2.5.2 **url for internet reports** (**rep_url**)

2.5.3 **port for internet reports** (**rep_port**)

2.5.4 **Protocol**: defines the format of reports by GPRS (**device_prot**)

- for now you will consider only one value: **9**
- **in a next version could be extended the variety of protocols**

2.6 Remote disabling of all the reports of the App (**cfg_z.bit0**)

- *parameter hidden to the users. Can not be modified from the App*

- This command would be used in case the customer terminates the service contract
- This command will not be available to the admin user (which can configure the rest of the parameters) and therefore will not be visible in the App Settings window.
- This command will not be informed to customers and users.

3 App operation

3.1 Main window

See: **CellTrack Scratch IS.pdf**

3.2 Reporting or sending data

- Reports or transmissions of data by GPRS will be sent by UDP by opening a connection to the url and port corresponding to configuration parameters 2.5.2 (**rep_url**) and 2.5.3 (**rep_port**).

  The format of the messages is defined by parameter 2.5.4 (**device_prot**), as detailed in section **4-Format of Reports and Commands**

- Periodic reports by GPRS:
  - On the move: according to parameters 2.2.2 (**repmov_time**) and 2.2.3 (**repmov_dist**), whichever occurs first
  - At rest: according to parameter 2.2.4 (**represt_time**)
  - These reports will be enabled only on the days and times defined in parameters 2.2.5 (**rephour_ini: repmin_ini, rephour_end: repmin_end**) and 2.2.6 (**repday**)
  - Estos reportes estarán habilitados únicamente si está activado el parámetro 2.2.1 (**cfg_n.**bit**0**)
  - These reports are enabled only if parameter 2.2.1 (**cfg_n.**bit**0**) is enabled.

- SOS Report
  - In general: only if parameter 2.3.1 is enabled (**cfg_n.**bit**1**)
  - By GPRS: only if parameter 2.3.2 is enabled (**cfg_n.**bit**2**)
  - By SMS:
    - ➢ only if parameter 2.3.3 (**cfg_n.**bit**3**) is enabled
    - ➢ the recipient will be:
      - o SOS phone: if parameter 2.3.4 (**sos_phone**) is not empty
      - o Admin phone: if parameter 2.1.1 (**phone admin**) is not empty
      - o NO message will be sent if both phone numbers are empty
    - ➢ the text of the SMS message will be the one defined in parameter 2.3.5 (**sos_text**) and also add a link to Google Maps with the position of the device so that it can be seen on that map

- App launch report by GPRS
  - Reports when App starts (CMD 11)
  - These reports will be enabled only on the days and times defined in parameters 2.2.5 (**rephour_ini: repmin_ini, rephour_end: repmin_end**) and 2.2.6 (**repday**)
  - This report is enabled only if parameter 2.2.1 (**cfg_n.**bit**0**) is enabled

- Report due to GPRS re-connection
  - Reports when, once the connection is lost, a GPRS re-connection (CMD 18) is achieved
  - These reports will be enabled only on the days and times defined in parameters 2.2.5 (**rephour_ini: repmin_ini, rephour_end: repmin_end**) and 2.2.6 (**repday**)
  - This report is enabled only if parameter 2.2.1 (**cfg_n.**bit**0**) is enabled

3.3 Configuration window

- See: **CellTrack Scratch IS.pdf**
- When the 'Configuration' button is pressed in the main window and before opening the Configuration window, the user (email address) and password must be requested to allow access to it. These data will be validated through a web service (**Appendix A - Web Services - Login API**).

3.4 Power saving criteria

- Special attention should be given and all possible effort in saving the battery consumption of the phone where the App runs
- If the device is at rest it maintains the last valid GPS position, it temporarily deactivates GPS, and reports less frequently, according to parameter 2.2.4 (**represt_time**)
- If the device is kept within the zone of influence of the same WiFi router, previous ditto (see **3.6** below)

3.5 Remote commands

The App must be able to receive commands both from the server (GPRS) and from another phone (SMS).

Note:

*Commands sent by SMS will be received as valid from any phone if the administrator phone (parameter 2.1.1 - **phone_admin**) is empty.*
*Conversely, if the admin phone (parameter 2.1.1 - **phone_admin**) has a number loaded then the app will only receive as valid SMS commands sent from that phone*

Commands, whose message format are defined in **4.3 Receiving Commands**, include:
- **Remote disabling of all App reports**
  - ➢ *this command would be used in case the customer terminated the service contract*
  - ➢ *this command will not be available to the admin user (which can configure the rest of the parameters). It will be a command that will not be informed to customers and users.*

- **Modification and query of configuration parameters (remotely)**
  - ➢ *Allows the same modifications and queries as the admin user can make in the App, but remotely*

- **Requirement of location on demand**
  - ➢ *When the App receives this command, it must report its location.*
  - ➢ *In case the order is made by SMS the response must include a link to Google Maps*

3.6 Question

- Is it possible to get the location (latitude and longitude) of the device via WiFi ?
- Is it possible to detect the WiFi signal, identify the router, and evaluate the strength of the signal to know when it is in its zone of influence or not ?

4 Formato de reportes y comandos

4.1 Reports by GPRS

4.1.1 How to send the GPRS report

The GPRS report will be sent by UDP by opening a connection to the url and port corresponding to the configuration parameters 2.5.2 (**rep_url**) and 2.5.3 (**rep_port**)

4.1.2 Report Format by GPRS

The format of the report depends on the value of configuration parameter 2.5.4, Protocol (**device_prot**).

For this first version of the App the only valid value for this parameter is **9**

4.1.3 Report format for Protocol **9**:

Report examples: from Device to Server

Example of internal event report WITH position data
`[RIDD123456789012345|CMDA0C|IOD00FFF0|ALR0010|GPS$GPRMC,195854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n`

Example of internal event report WITHOUT position data
`[RIDD123456789012345|CMDA0C|IOD00FFF0|ALR0010|GPS$GPRMC,195854.000,V,,,,,0.00,0.00,071016,,,A*47]\r\n`

Example of report by response to received command (S**MCF**00**3F**)
`[RIDD123456789012345|CMD00C|IOD00FFF0|ALR0010|MCF003F|GPS$GPRMC,195854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n`

Blue: tag, invariable
Red: tag data, variable
Black: Text invariable
`|MCF003F`*: inserted, only when the corresponding command is received*

Table 4.1.3.a - Examples of GPRS reporting

ACK example: from Server to Device

After each report is transmitted to the server, the device will receive an ACK-type message from the server, recognizing that the report was successfully sent to the server.
The format of the ACK is as follows:

`[SACK]\r\n`

Blue: tag, invariable

Detail of report by GPRS

Tag	Data	Size	Description
[		1	'[´ message start, 0x5B, 91
R		1	'R' report from device to server
IDD	dddddddddddddd	3 + 15	'IDD' IMEI, device ID
|		1	'|' data type separator, 0x7C, 124

CMD	Hh	3 + 2	'CMD'
			 Event that originates the message, in hexadecimal:
			 00 → response to received command
			     In the message will be inserted the command tag and the parameters sent.
			     [… |xxxyy … yy|…]
			 11 → App start, first GPRS connection
			 15 → SOS (see also ALR.hexa1)
			 18 → re-conection GPRS
			 A0 → report in motion (periodic or distance traveled)
			 A1 → report at rest

C		1	'C' device type
IOD	hhhhhh	3 + 6	'IOD' '00FFF0'

ALR	hhhh	3 + 4	'ALR'
			 hexa1: '0' without SOS
			     '4' with SOS (corresponds to [...|CMD15C|...])
			 hexa2: '0'
			 hexa3: '0' device at rest
			     '1' device in motion
			 Hexa4: '0'

xxx	Yy … yy	3 + var	xxx Tag corresponding to command received, are only present when the **CMD** data is **00** yy … yy → Same data that accompanied the tag (xxx) in the received command
GPS	Datos GNSS (ver **tabla 1.c**)	3+var	'GPS' $GPRMC … A*hh → RMC line of the NMEA standard (see **table 4.1.3.c – Detail of GNSS data**)
]\r\n		3	']\r\n' end of message, 0x5D 0x0D 0x0A, 93 13 10

Tabla 4.1.3.b - Detail of data sent in reports by GPRS

Detail of GNSS data

Data	Size	Description
		Example [R**IDD**123456789012345|**CMD**A0C|**IOD**00FFF0|**ALR**0010|**GPS**$GPRMC,195854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n
GPS	3	'GPS'
$GPRMC	6	'$GPRMC'
,	1	Comma, GNSS data field separator
195854.000	10	UTC/GMT Time (zero meridian): 19:58:54 = 19 hour 58 minutes 54 seconds UTC
,	1	
A	1	Validity of the data GNSS 'A' → valid

		´V´→ invalid
,	1	

3437.8627	9	Latitude in degrees minutes + tenths of a minute: **ggmm.dddd**
		gg.dddddd → ggmm.dddd
		`34.631045 gg.dddddd = 34*100 + (0.63145*60) = 3437.8627 ggmm.dddddd`
		
		ggmm.dddd → gg.dddddd
		`3437.8627 ggmm.dddd = 34 + (37.8627)/60 = 34.631045 gg.dddddd`

,	1	
S	1	'S' = south (latitude < 0) 'N' = north (latitude >= 0)
,	1	

05825.6648	10	Longitude in degrees minutes + tenths of a minute: **gggmm.dddd**
		ggg.dddddd → gggmm.dddd
		`58.427747 ggg.dddddd = 58*100 + (0.427747*60) = 5825.6648 gggmm.dddddd`
		
		gggmm.dddd → ggg.dddddd
		`05825.6648 gggmm.dddd = 58 + (25.6648)/60 = 58.427747 ggg.dddddd`

,	1	
W	1	'W' = West (longitude < 0) 'E' = East (longitude >= 0)
,	1	

0.55	<= 6	Speed in knots
		knots → km/h
		`0.55 knots = (0.55 * 1.852) km/h = 1.0186 km/h`
		
		km/h → knots
		`1.0186 km/h = (1.0186 / 1.852) knots = 0.55 knots`

,	1	

79.02	<= 6	Heading / direction / azimuth, angle measured from north to east
		`0.0  a 359.99`
		
		`79.02 grados`

,	1	
,	6	UTC/GMT Date (zero meridian): 071016 = 07/10/2016 = october 7, 2016
,	1	
,	1	
,	1	
A*	2	'A*'
56	2	Checksum of RMC line in GPS NMEA standard, in hexadecimal: 56 → 0x56 Example: **$G**PRMC,195854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,**A*56** **56** = **XOr** of all ASCII codes of characters, excluding '$' (starts at 'G') and excluding '*' (ends at 'A') The data is printable ASCII characters: 0 = '0' = 0x30 = 48

Table 4.1.3.c - Detail of GNSS data sent in reports by GPRS

4.2 GPRS event reports

Note:
This section refers to a series of event numbers (which accompany the CMD token), such as **A0** *,* **A1**, **15**, **18**, **11**,
*which indicate how the accompanying data should be interpreted: **these event numbers should NOT be modified***

4.2.1   GPRS moving position report

CMD = A0

Example:

```
[RIDD123456789012345|CMDA0C|IOD00FFF0|ALR0010|GPS$GPRMC,195854.000,A,34
37.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n
```

4.2.2   Periodic report of position at rest GPRS

CMD = A1

Example:

```
[RIDD123456789012345|CMDA1C|IOD00FFF0|ALR0010|GPS$GPRMC,195854.000,A,34
37.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n
```

4.2.3   SOS report by GPRS

CMD = 15

Example:

```
[RIDD123456789012345|CMD15C|IOD00FFF0|ALR0010|GPS$GPRMC,195854.000,A,34
37.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n
```

4.2.4   GPRS re-connection report

CMD = 18

Example:

```
[RIDD123456789012345|CMD18C|IOD00FFF0|ALR0010|GPS$GPRMC,195854.000,A,34
37.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n
```

4.2.5   App start report, firts GPRS connection

CMD = 11

Example:

```
[RIDD123456789012345|CMD11C|IOD00FFF0|ALR0010|GPS$GPRMC,195854.000,A,34
37.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n
```

4.3   Event reporst by SMS

4.3.1   SOS report by SMS

Ejemplo	SOS_Text → Device_name IMEI: 123456789012345 Lat: -26.81004 long: -65.30701 vel: 000.1 T: 31/07/2017 18:24 http://maps.google.com/maps?q=loc:-26.81004,-65.30701
Detalle	Device_name: device name (parameter 2.1.2) 123456789012345: device IMEI -26.81004: latitude in degrees + tenths of degrees -65.30701: longitude in degrees + tenths of degrees 000.1: speed in km/h 31/07/2017 18:24: date/time **LOCAL** http://maps...: link a Google Maps

4.4   Reception of commands by GPRS or SMS, and ACK

Note 1:

Commands sent by SMS will be received as valid from any phone if the administrator phone (parameter 2.1.1 – p hone_admin) is empty.

Conversely, if the admin phone (parameter 2.1.1 - phone_admin) has a number loaded then the app will only receive as valid SMS commands sent from that phone

Note 2:

This document mentions a series of tags ((MCF, MCA, MTA, etc.) that indicate how the data that accompanies them must be interpreted: these tags should NOT be modified.

4.4.1   ACK

Parámetro: --			
Tipo	**Formato**	**Descripción**	**Parámetro**
ACK	`[SACK]\r\n`	'[SACK]\r\n'	In a **next version** of the App this ACK will be used for the device to store in non-volatile internal memory the reports that did not receive ACK, to re-send them later
Device response by GPRS	--		

4.4.2   Command format

GPRS or SMS command format

`(ABBBcc … cc)` *Example: (SMCF003F)*			
Tag	**Data**	**Size**	**Description**
(		1	'(´ message start, 0x28, 40
A	'S'/'Q'	1	Command type: 'S' set parameter 'Q' parameter query
BBB	'MCF' 'MCA' 'TEA' 'DEN' ...	3	Command tag
cc …cc	(datos, según Etiqueta)	Var	New parameter **(Only valid for Command Type 'S')**
)		1	')' end of message, 0x29, 41

4.4.3 Configuration command

Parameter: cfg_n			
Type	**Format**	**Description**	**Parameter**
Set command (GPRS o SMS)	(S**MCF**00**hh**)	'(SMCF00' **hh** 2 hexadecimal ')'	**cfg_n** **default**: **27** Bit0 GPRS report enabled (2.2.1) Bit1 SOS report SOS enabled (2.3.1) Bit2 SOS report by GPRS enabled (2.3.2) Bit3 SOS report by SMS enabled (2.3.3) Bit4 SOS call enabled (2.3.4) Bit5 maximum accuracy in location (2.4.1) Bit6 -- Bit7 --
Query command (GPRS o SMS)	(Q**MCF**00)	'(QMCF00)'	
Device response by GPRS	[R**IDD**123456789012345|**CMD**00C|**IOD**00FFF0|**ALR**0010|**MCF00hh**|**GPS**$GPRMC,195854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n		
Device responde by SMS	**device_name** (IMEI: 123456789012345) MCF: **hh**		

Parameter: cfg_a			
Type	**Format**	**Description**	**Parameter**
Set command (GPRS o SMS)	(S**MCA**00**hh**)	'(SMCA00' **hh** 2 hexadecimal ')'	**cfg_a** **default**: **01** Bit0 Auto-start enable (2.5.1) Bit1 -- Bit2 -- Bit3 -- Bit4 -- Bit5 -- Bit6 -- Bit7 --
Query command (GPRS o SMS)	(Q**MCA**00)	'(QMCA00)'	
Device response by GPRS	[R**IDD**123456789012345|**CMD**00C|**IOD**00FFF0|**ALR**0010|**MCA00hh**|**GPS**$GPRMC,195854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n		
Device responde by SMS	**device_name** (IMEI: 123456789012345) MCA: **hh**		

Parameter: **cfg_z**			
Type	**Format**	**Description**	**Parameter**
Set command (GPRS o SMS)	(SM--00**hh**)	'(SM--00' **hh** 2 hexadecimal ')'	**cfg_z** **default**: **00** Bit0 App disable (2.6) Bit1 -- Bit2 -- Bit3 -- Bit4 -- Bit5 -- Bit6 -- Bit7 --
Query command (GPRS o SMS)	(Q**MCA**00)	'(QMCA00)'	
Device response by GPRS	[R**IDD**123456789012345|**CMD**00C|**IOD**00FFF0|**ALR**0010|**M-- 00hh**|**GPS**$GPRMC,195854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,, A*56]\r\n		
Device responde by SMS	**device_name** (IMEI: 123456789012345) MCA: **hh**		

Parameter: **phone_admin**			
Type	**Format**	**Description**	**Parameter**

Set command (GPRS o SMS)	(S**MTAphone_admin_number**)	'(SMTA'
		 phone_admin_number 20
		  ASCII digit
		  '1' = 0x31 = 49
		  Etc.
		
		 ')'
			phone_admin (2.1.1)
			 default: **empty**

Query command (GPRS o SMS)	(Q**MTA**)	'(QMTA)'	
Device response by GPRS	[R**IDD**123456789012345|**CMD**00C|**IOD**00FFF0|**ALR**0010|**MTAphone_admin_number**| **GPS**$GPRMC,195854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\ r\n		
Device responde by SMS	**device_name** (IMEI: 123456789012345) MTA: **phone_admin_number**		

Parameter: device_name			
Type	**Format**	**Description**	**Parameter**
Set command (GPRS o SMS)	(S**MDN**dev_name)	'(SMDN' **dev_name** 20 text ')'	**device_name** (2.1.2) **default: empty**
Query command (GPRS o SMS)	(Q**MDN**)	'(QMDN)'	
Device response by GPRS	[RIDD123456789012345|CMD00C|IOD00FFF0|ALR0010|**MDN**dev_name|GPS$GPRMC,195854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n		
Device responde by SMS	**device_name** (IMEI: 123456789012345) MDN: **dev_name**		

Parameter: repmov_time			
Type	**Format**	**Description**	**Parameter**
Set command (GPRS o SMS)	(S**MTR01**rmove_tm)	'(SMTR01' **rmove_tm** segundos, 0 a 65535 ASCII digit: '1' = 0x31 = 49 Etc. ')'	**repmov_time** (2.2.2) **default: 60**
Query command (GPRS o SMS)	(Q**MTR01**)	'(QMTR01)'	
Device response by GPRS	[RIDD123456789012345|CMD00C|IOD00FFF0|ALR0010|**MTR01**rmove_tm|GPS$GPRMC,195854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n		
Device responde by SMS	**device_name** (IMEI: 123456789012345) MTR01: **rmove_tm**		

Parameter: repmov_dist			
Type	**Format**	**Description**	**Parameter**
Set command (GPRS o SMS)	(S**MDS**rmove_ds)	'(SMDS' **rmove_ds** metros, 0 a 65535 ASCII digit: '1' = 0x31 = 49 Etc. ')'	**repmov_dist** (2.2.3) **default: 200**
Query command (GPRS o SMS)	(Q**MDS**)	'(QMDS)'	
Device response by GPRS	[RIDD123456789012345|CMD00C|IOD00FFF0|ALR0010|**MDS**rmove_ds|GPS$GPRMC,195854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n		
Device responde by SMS	**device_name** (IMEI: 123456789012345) MDS: **rmove_ds**		

Parameter: represt_time			
Type	**Format**	**Description**	**Parameter**
Set command (GPRS o SMS)	(S**MTR02rrest_tm**)	'(SMTR02' **rrest_tm** segundos, 0 a 65535 ASCII digit: '1' = 0x31 = 49 Etc. ')'	**represt_time** (2.2.4) **default**: **3600**
Query command (GPRS o SMS)	(Q**MTR02**)	'(QMTR02)'	
Device response by GPRS	[R**IDD**123456789012345|**CMD**00C|**IOD**00FFF0|**ALR**0010|**MTR02rrest_tm**|**GPS**$GPRMC ,195854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n		
Device responde by SMS	**device_name** (IMEI: 123456789012345) MTR02: **rrest_tm**		

Parameter: rephour_ini, repmin_ini			
Type	**Format**	**Description**	**Parameter**
Set command (GPRS o SMS)	(S**MHIrhi:rmi**)	'(SMHI' **rhi** 2, hour 0 a 23 '**:**' **rmi** 2, min 0 a 59 *ASCII digit: '1' = 0x31 = 49* *Etc.* ')'	**rephour_ini** (2.2.5) **repmin_ini** **default**: **00:00**
Query command (GPRS o SMS)	(Q**MHI**)	'(QMHI)'	
Device response by GPRS	[R**IDD**123456789012345|**CMD**00C|**IOD**00FFF0|**ALR**0010|**MHIrhi:rmi**|**GPS**$GPRMC,195 854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n		
Device responde by SMS	**device_name** (IMEI: 123456789012345) MHI: **rhi:rmi**		

Parameter: **rephour_end**, **repmin_end**			
Type	**Format**	**Description**	**Parameter**

Set command (GPRS o SMS)	(S**MHFrhe:rme**)	'(SMHF'
		
		rhe 2, hour 0 a 23
		':'
		
		rme 2, min 0 a 59
		    ASCII digit: '1' = 0x31 = 49
		    Etc.
		
		')'
			rephour_end (2.2.5)
			repmin_end
			default: **23:59**

Query command (GPRS o SMS)	(Q**MHF**)	'(QMHF)'	
Device response by GPRS	[R**IDD**123456789012345|**CMD**00C|**IOD**00FFF0|**ALR**0010|**MHFrhe:rme**|**GPS**$GPRMC,195 854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n		
Device responde by SMS	**device_name** (IMEI: 123456789012345) MHI: **rhi:rmi**		

Parameter: **repday**			
Type	**Format**	**Description**	**Parameter**
Set command (GPRS o SMS)	(S**MRD**00**hh**)	'(SMRD00' **hh** 2 *hexadecimal* ')'	**repday** (2.2.6) **default**: **7F** Bit0 sunday Bit1 monday Bit2 tuesday Bit3 wednesday Bit4 thursday Bit5 friday Bit6 saturday Bit7 --
Query command (GPRS o SMS)	(Q**MRD**00)	'(QMRD00)'	
Device response by GPRS	[R**IDD**123456789012345|**CMD**00C|**IOD**00FFF0|**ALR**0010|**MRD00hh**|**GPS**$GPRMC,195854 .000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n		
Device responde by SMS	**device_name** (IMEI: 123456789012345) MRD: **hh**		

Parameter: sos_phone

Type	Format	Description		Parameter
Set command (GPRS o SMS)	(SMTSsos_phone _number)	'(SMTS' sos_phone_number 20	ASCII digit '1' = 0x31 = 49 Etc. ')'	sos_phone (2.3.5) default: empty
Query command (GPRS o SMS)	(QMTS)	'(QMTS)'		
Device response by GPRS	[RIDD123456789012345|CMD00C|IOD00FFF0|ALR0010|MTSsos_phone_number|GPS $GPRMC,195854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n			
Device responde by SMS	device_name (IMEI: 123456789012345) MTS: sos_phone_number			

Parameter: sos_text

Type	Format	Description		Parameter
Set command (GPRS o SMS)	(SMSXsos_tx)	'(SMSX' sos_tx 30 text ')'		sos_text (2.3.6) default: Alerta SOS! (translate: SOS Alert!)
Query command (GPRS o SMS)	(QMSX)	'(QMSX)'		
Device response by GPRS	[RIDD123456789012345|CMD00C|IOD00FFF0|ALR0010|MSXsos_tx|GPS$GPRMC,195854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n			
Device responde by SMS	device_name (IMEI: 123456789012345) MSX: sos_tx			

Parameter: rep_url

Type	Format	Description		Parameter
Set command (GPRS o SMS)	(SMURr_url)	'(SMUR' R_url 60 text ')'		rep_url (2.5.2) default: http://uqar.ubicargps.com
Query command (GPRS o SMS)	(QMUR)	'(QMUR)'		
Device response by GPRS	[RIDD123456789012345|CMD00C|IOD00FFF0|ALR0010|MURr_url|GPS$GPRMC,195854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n			
Device responde by SMS	device_name (IMEI: 123456789012345) MUR: r_url			

Parameter: rep_port			
Type	**Format**	**Description**	**Parameter**
Set command (GPRS o SMS)	(S**MPUr_port**)	'(SMPU' **r_port** 5 ASCII digit '1' = 0x31 = 49 Etc. ')'	**r_port** (2.5.3) **default**: **16500**
Query command (GPRS o SMS)	(Q**MPU**)	'(QMPU)'	
Device response by GPRS	[RIDD123456789012345|CMD00C|IOD00FFF0|ALR0010|**MPUr_port**|GPS$GPRMC,195854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n		
Device responde by SMS	**device_name** (IMEI: 123456789012345) MPU: **r_port**		

Parameter: device_prot			
En esta primera versión sólo se implementará el protocolo **9**			
Type	**Format**	**Description**	**Parameter**
Set command (GPRS o SMS)	(S**MDPd_prot**)	'(SMDP' **d_prot** 3 ASCII digit '1' = 0x31 = 49 Etc. ')'	**device_prot** (2.5.4) **default**: **9**
Query command (GPRS o SMS)	(Q**MDP**)	'(QMDP)'	
Device response by GPRS	[RIDD123456789012345|CMD00C|IOD00FFF0|ALR0010|**MDPd_prot**|GPS$GPRMC,195854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n		
Device responde by SMS	**device_name** (IMEI: 123456789012345) MDP: **d_prot**		

4.4.4   Requerimiento de localización

Type	Format	Description	Parameter
Set command (GPRS o SMS)	– –	--	--
Query command (GPRS o SMS)	(QMLO)	'(QMLO)'	
Device response by GPRS	[RIDD123456789012345|CMD00C|IOD00FFF0|ALR0010|MLO|GPS$GPRMC,195854.000,A,3437.8627,S,05825.6648,W,0.55,79.02,071016,,,A*56]\r\n		
Device responde by SMS	device_name (IMEI: 123456789012345) MLO: Lat: -34.631045 long: -58.427747 vel: 000.5 T: 07/10/2016 19:58 http://maps.google.com/maps?q=loc:-26.81004,-65.30701		

Appendix A
Web Services

Login API	
http://www.ubicargps.com/WS/Panel.asmx	
Method	**GetUsuario**
Description	Gets the user identification number and hash code
Parameters	**usuario**: user email **contrasena**: password
Result OK	**XML** **id**: identification number **Hash**: hash code
Result Error	**XML** **exception**: error message