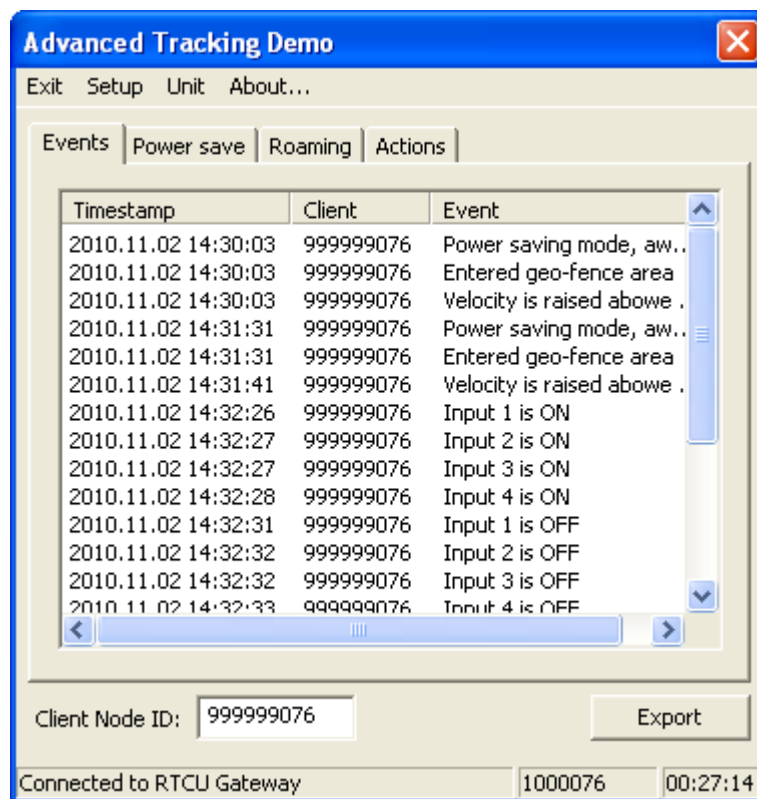


The Logic IO

Advanced Tracking demo

Version 2.11



The screenshot shows the 'Advanced Tracking Demo' application window. It features a menu bar with 'Exit', 'Setup', 'Unit', and 'About...'. Below the menu is a tabbed interface with 'Events', 'Power save', 'Roaming', and 'Actions' tabs. The 'Events' tab is active, displaying a table of event logs. The table has three columns: 'Timestamp', 'Client', and 'Event'. The data shows a sequence of events for client 999999076, including power saving mode, geo-fence area entries, velocity alerts, and input status changes (ON/OFF) for inputs 1 through 4. At the bottom of the window, there is a 'Client Node ID' field containing '999999076' and an 'Export' button. The status bar at the very bottom indicates 'Connected to RTCU Gateway', the ID '1000076', and a time of '00:27:14'.

Timestamp	Client	Event
2010.11.02 14:30:03	999999076	Power saving mode, aw..
2010.11.02 14:30:03	999999076	Entered geo-fence area
2010.11.02 14:30:03	999999076	Velocity is raised above .
2010.11.02 14:31:31	999999076	Power saving mode, aw..
2010.11.02 14:31:31	999999076	Entered geo-fence area
2010.11.02 14:31:41	999999076	Velocity is raised above .
2010.11.02 14:32:26	999999076	Input 1 is ON
2010.11.02 14:32:27	999999076	Input 2 is ON
2010.11.02 14:32:27	999999076	Input 3 is ON
2010.11.02 14:32:28	999999076	Input 4 is ON
2010.11.02 14:32:31	999999076	Input 1 is OFF
2010.11.02 14:32:32	999999076	Input 2 is OFF
2010.11.02 14:32:32	999999076	Input 3 is OFF
2010.11.02 14:32:33	999999076	Input 4 is OFF

Client Node ID:

Connected to RTCU Gateway 1000076 00:27:14

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Introduction

This document describes the details of a complete vehicle tracking system. A practical GPRS demo application, based on the RTCU products from Logic IO, the RTCU Gateway, and an MS Windows sample application.

If you follow this document, you will be able to install and test the demo application, and see for yourself, that the deployment of GPRS technology easy, when using Logic IO GPRS Technology!

The package contains both a RTCU application and a simple PC application. The RTCU application runs on one of the TCP/IP enabled RTCU products, and the PC application runs on a standard Windows 98/NT/2000/XP/Vista/Win7 PC.

The PC application uses the VSMSGW Library for sending/receiving information from the RTCU Unit. More info on this library can be found in the GPRS Deployment Package documentation.

This demo transfers a position to the PC application when a user-defined event occurs or if the user requests one. In addition to the basic setup available in the Tracking demo (parameters for PC to RTCU Gateway connection and PC node id for RTCU unit) it is possible to configure GPRS connection (on both provider and gateway level), event triggers and power down functionality.

All the communication is transferred with the help of the RTCU Gateway, which simplifies the implementation dramatically! Messages between the PC application and the RTCU unit, is transferred using VSMS (Virtual SMS) messages. VSMS messages can be routed either by normal SMS messages, GPRS, datacall (CSD) or via a cable connection to the RTCU unit.

Features

This includes

- Send position on user request
- Automatically send positions
 - at user defined intervals
 - Enter-/Exiting a Geo fence
 - Changes on analog or digital inputs
 - Power up/down
 - Speed changes
- Configure GPRS access parameters for 5 providers to be set with a VSMS.
The table has predefined parameters for 3 Danish providers:
 - TDC
 - Telenor
 - Telia.
- If the RTCU app detects a new SIM card during startup, a table lookup is performed and the parameters, if found, are used to configure the GPRS connection.
- The RCU Gateway parameters can be changed with a VSMS
- GPRS roaming list can be set/retrieved by a VSMS.
- When roaming the highest priority operator is selected.
- Power management (can be Set/Retrieved by a VSMS):
 - 3 Time intervals for automatic power save.
 - Length of time without GPS movement before entering power save mode.
 - Power save when ignition is lost (only accessible on some units), can be Enabled/Disabled
 - Length of time to stay in power save mode.

Contents of package

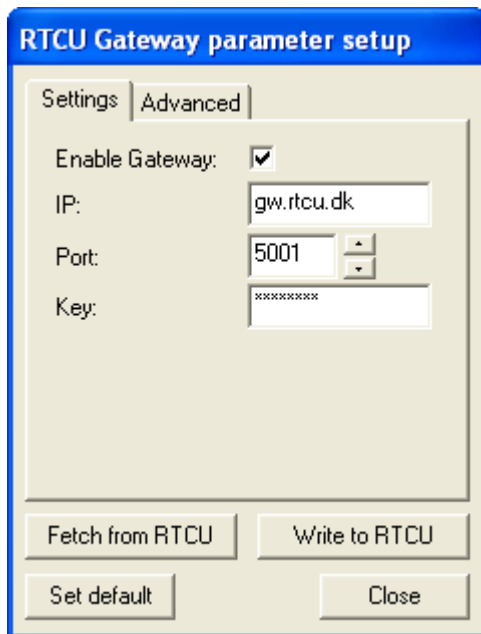
The package this document is part of, contains the following:

"\Advanced Tracking Demo.pdf"	This document
"\PC App\"	The complete PC application
"\RTCU App\"	The complete RTCU application
"\VSMSGW\"	The .H, .LIB and .DLL files for the VSMSGW library

How to install and run the Demo

Below, you will find a step-by-step instruction how to install and make the demo application run:

- 1) Unpack the contents of the “Advanced Tracking Package.ZIP” file.
- 2) Start the RTCU-IDE program, and connect to a GPRS enabled RTCU Unit
- 3) Configure the TCP/IP settings for the RTCU Unit with the correct settings for the actual GPRS enabled SIM card you have installed in the unit.
- 4) Configure the Gateway settings for the RTCU Unit with the following parameters:



- 5) Using these parameters, the unit will connect to the test RTCU Gateway that is running at Logic IO. This removes the need for you to install the RTCU Gateway yourself, and just use the RTCU Gateway installed at Logic IO. If you decide to install the RTCU Gateway at your own place, it can be downloaded for free from www.rtcu.dk. You must then adjust the parameters above to the correct ones, which is set in the RTCU Gateway setup window (primarily the IP, Port and Key)
- 6) Load the “RTCU App” project in the RTCU-IDE
- 7) Upload the project to the RTCU Unit
- 8) After some tenths of seconds, it should connect itself to the RTCU Gateway.

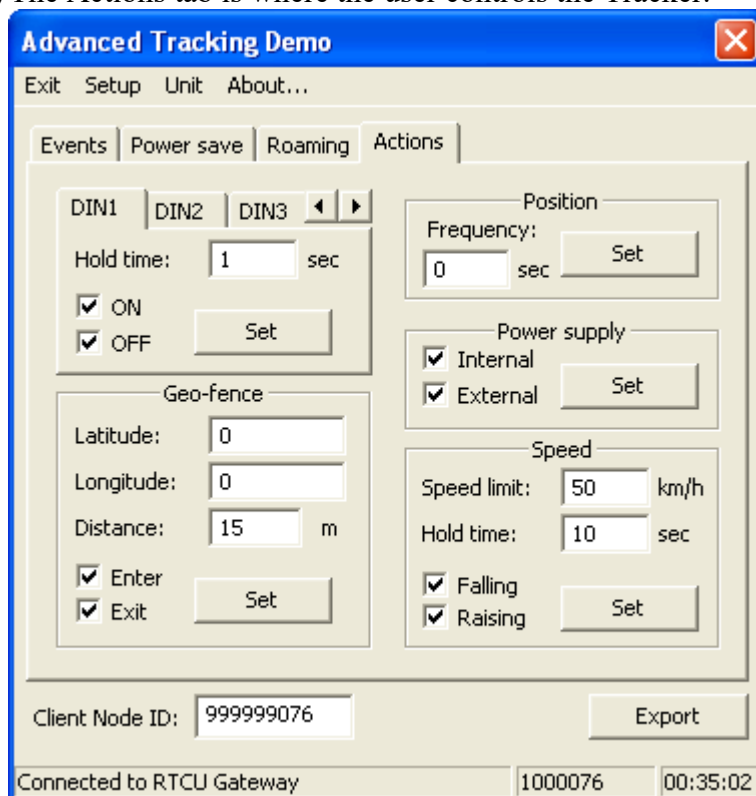
- 9) Then start the PC Application located in the “PC App\Release” directory.
- 10) The first thing to do is to open the “Setup” dialog and change the RTCU Gateway parameters. If the RTCU Gateway at Logic IO is used no further changes are needed, however should you decide to install and run your own RTCU Gateway, then you will have to change the parameters. Factory default for the parameters is:



- | | |
|-------------|--|
| Gateway IP: | The IP address of the RTCU Gateway. |
| Port: | The Port of the RTCU Gateway. |
| Keyword: | The “Password” to gain access to the RTCU Gateway. |
| Node ID: | The PC app’s ID number at the RTCU Gateway. |

- 11) The next thing to do is change the RTCU Node IP parameter at the bottom of the application window. Note that the RTCU units always use their serial number as Node ID.
- 12) When the PC application is connected to the Gateway, set your Node Id in the RTCU by selecting the “Set Host NodeID” menu item in the “Unit” menu group. This is necessary for the RTCU to send data to the PC application.

13) The Actions tab is where the user controls the Tracker.



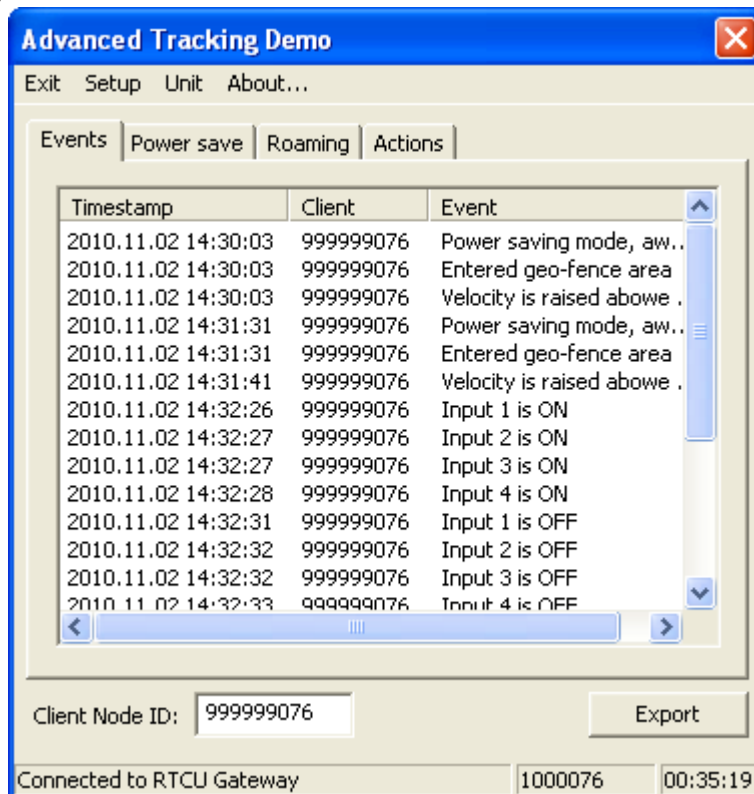
The Position group sets the max frequency of GPS positions. (in seconds between positions).
 The Power supply group allows the user to receive an event when the RTCU switches from internal supply to external supply (and back).

The Speed group allows the user to receive an event when the speed of the RTCU exceeds a limit.

The Geo-fence group allows the user to receive an event when the RTCU exits an area around a position.

The tabs allow the user to receive an event when a Digital input changes state.

14) The Events tab is where the user monitors the tracker.



Clicking the ‘Export’ button allows exporting all events for all clients to a single comma-separated text file, or all events regarding the current client to a keyhole markup language file (KML) supported by Google Earth.

Double clicking on the event shows the details of the event:

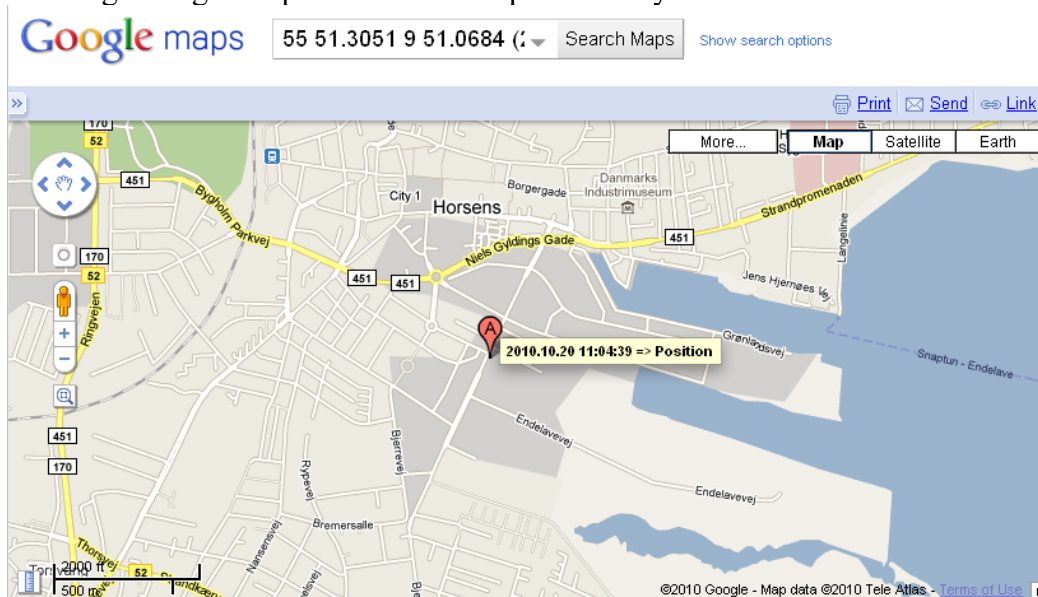
Show event

Entered geo-fence area

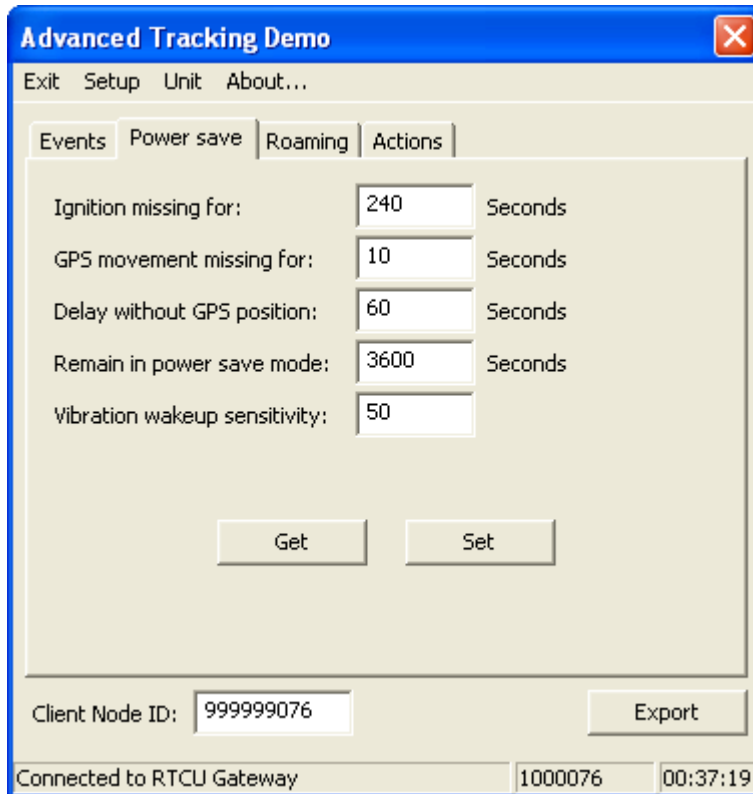
Unit serial number:	999999076
Time (UTC):	2010.11.02 14:31:29
GPS mode:	3D Fix
Latitude:	55513075
Longitude:	9510547
Speed:	65.0 km/h
Direction:	0.0
Supply voltage:	24.0 V

- GPS mode: The type of position received, “No Fix” = no position data available
“2D Fix” / ”3D Fix” = position is valid.
- Latitude: The north / south portion of the position.
- Longitude: The east / west portion of the position.
- Speed: How fast the RTCU is moving.
- Direction: The direction the RTCU is moving. 0 (zero) = North.
Clockwise resolution.
- Supply voltage: The voltage of the external supply connected to the RTCU.

Clicking ‘Google Maps’ will show the position in your default browser

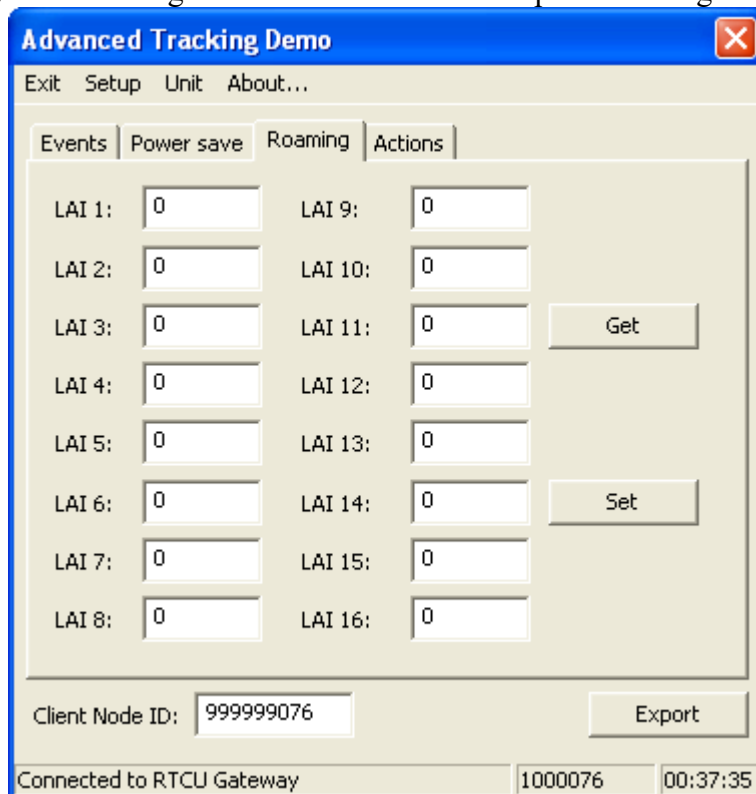


- 15) The Power down tab is where the user controls the RTCU Power saving behavior. The setting is not transferred to the RTCU before the “Set” button is pressed.



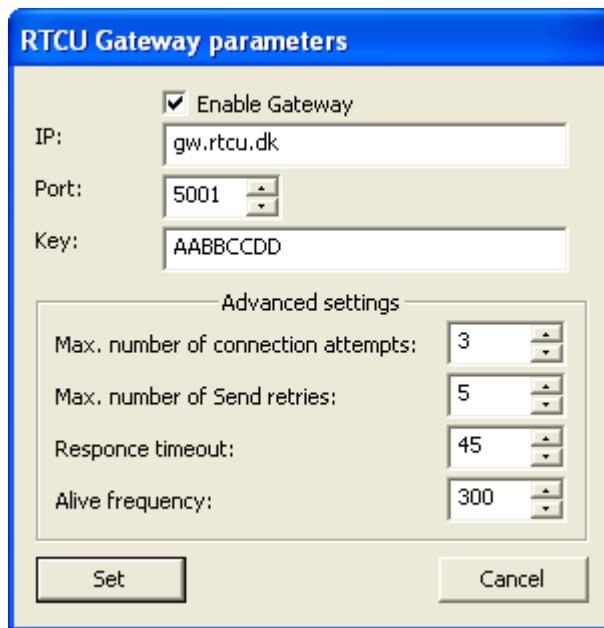
Ignition missing for:	The number of seconds that the Ignition input must remain off before the RTCU enters power saving mode.
GPS movement missing for:	The number of seconds without changes in the GPS position before the RTCU enters power saving mode.
Delay without GPS position:	The number of seconds the RTCU waits for a GPS position before sending Event for power save mode.
Remain in power save mode:	The number of seconds the RTCU will remain in power saving mode without external wakeup.
Vibration wakeup sensitivity:	The sensitivity of the vibration sensor for waking the RTCU from power saving mode.
Timer 1-3:	3 intervals in the day where the RTCU always enter power saving mode. An interval from 00:00 to 00:00 disables the timer.
Any value of 0 (zero) will disable the feature.	

16) The Roaming tab is where the user sets up the roaming Providers.



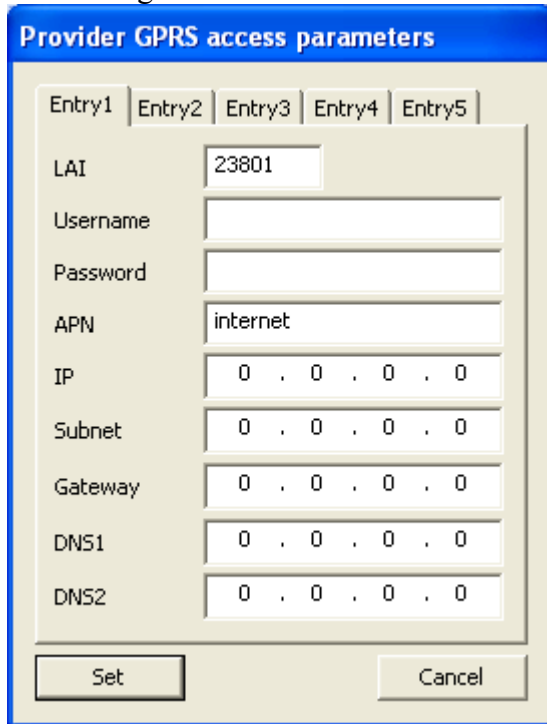
The providers are given by their LAI (Location Area Identifier).
The list is prioritized with LAI 1 having a higher priority than LAI 2 and so forth.

17) To change the RTCU Gateway access parameters in the RTCU unit press the Setup Gateway access button. The dialog shown below lets the user change the necessary parameters for the new gateway. The default values are for the Logic IO RTCU Gateway.



- | | |
|-------------------|--|
| IP: | The IP address of the RTCU Gateway. |
| Port: | The IP port of the RTCU Gateway. |
| Key: | The password needed to access RTCU Gateway. |
| Response Timeout: | The length of time, in seconds, to wait on response until giving up. |
| Alive frequency: | The length of time, in seconds, between “I am still alive” packages is send to RTCU Gateway. |

18) The dialog shown below visualizes the GPRS provider parameters table



in the RTCU unit, used to configure the GPRS connection with the provider. The parameters of 3 providers (TDC, Telenor, Telia) are inserted as default in the first 4 entries.

- LAI: The LAI of the Provider.
- Username: The username used to connect to the provider network.
- Password: The password used to connect to the provider network.
- APN: The provider APN.
- IP: The IP address.
- Subnet: The Subnet-mask.
- Gateway: The IP address of the provider GPRS/Internet Gateway.
- DNS1: The IP address of the primary DNS server.
- DNS2: The IP address of the secondary DNS server.

Description of RTCU communication (PDU format)

A short overview of the commands and replies from the RTCU unit will be found here.

The entries follow this format:

Package Name

Package ID	Type	Description of package function
Parameter	Type	Description of parameter
...	...	Repetition of previous until all parameters are described

Total size

The types are defined as follows:

INT8 is an 8-bit number.

INT16 is a 16-bit number.

INT32 is a 32-bit number.

String is a string of ASCII characters (Without zero-terminator)

Note that the number types follow the little endian coding scheme with the least significant Byte first.

Set position event

16#01	INT8	This will set the time in seconds between position reports is sent
Interval	INT16	Maximum period between position message in seconds 0 disables sending

3 Bytes

Will ensure that an 'Event info' (event id = 1, event data = 0) is generated with a maximum interval.

Request position

16#02	INT8	This will initiate a transmission of the position event
-------	------	---

1 Byte

Request an 'Event info' (event id = 2, event data = 0) to be sent.

Set digital Input event

16#03	INT8	Will generate a event info message
Input	INT8	Digital input id 1 to 5
Duration	INT16	How many seconds condition must be true before the event is valid.
Low	INT8	Send when going below value
High	INT8	Send when exceeding threshold

Set digital Input event

6 Byte

Send an 'Event info' (event id =3, event data = +<input> when high and -<input> when low) when defined condition for a digital input is true.

Set geo-fence event

16#04	INT8	Will generate a event info message
Latitude	INT32	Latitude of coded as follows degrees * 1000000 + minutes * 10000 + decimal minutes
Longitude	INT32	Longitude of coded as follows degrees * 1000000 + minutes * 10000 + decimal minutes
Distance	INT32	Distance from above position, defining the radius of the area.
Enter	INT8	Send when entering geo-fence
Exit	INT8	Send when exiting geo-fence

15 Byte

Send an 'Event info' (event id =4, event data = +1 when entering and -1 when exiting) when entering or exiting a geographical area, defined by a center position and a radius, if center position is latitude = 0 and longitude = 0 then last good position will be used.

Set speed event

16#05	INT8	Will generate a event info message
Threshold	INT16	Compare speed received from GPS with this value expressed in KM/H (multiplied by 10).
Duration	INT16	How long should condition be valid.
Above	INT8	Send when above threshold
Below	INT8	Send when below threshold

7 Byte

Send an 'Event info' (event id =5, event data = +1 when below and -1 when above) when the speed has been above/below for a defined period.

Set battery event

16#06	INT8	Will generate a event info message
External	INT8	Send when running on external power
Battery	INT8	Send when running on battery

3 Byte

Send an 'Event info' (event id =6, event data = +1 when on external and -1 when on battery) when external power is applied or removed.

Set power saving parameters

16#07	INT8	This will set the way the board handles power saving
-------	------	--

Set power saving parameters

Ignition	INT8	Number of seconds without ignition before entering power save mode. Note this is only accessible on some boards.
Timeout	INT8	Number of seconds waiting for a valid GPS position before sending data.
GPS Time	INT16	Number of seconds without movement on the GPS before Power down
Vibration	INT8	Vibration sensor sensitivity for exiting power save mode. 0 = disabled.
Length	INT16	Number of seconds to stay in power save mode. If 0 then stay in power save mode until other condition is met

8 Bytes

Controls how the RTCU unite will save power, an 'Event info' (event id =7, event data = +<id> on power up and -<id> power down) is always generated when entering and exiting power save mode.

The unit will try to send any pending data before entering power save mode.

Request power saving parameters

16#08	INT8	This will initiate a transmission of the power save settings
-------	------	--

1 Byte

Unit will reply by sending a 'Set power saving parameters' package.

Event info

16#09	INT8	A position record
Event ID	INT8	Id of set command, which generated the telegram (Page ID of set, e.g. 1 = position update, 2 = pos request)
Event Data	INT8	More info of source e.g. Event : Digital 1 On = +1 Event : Digital 1 Off = -1
Mode	INT8	0=No info available, 1=no fix, 2=2D, 3=3D fix
GPS date	INT32	Bit 31..16 is Year, bit 15..8 is Month, bit 7..0 is Day
GPS time	INT32	bit 23..16 is Hour, bit 15..8 is Minutes, bit 7..0 is Seconds
Latitude	INT32	Latitude coded as follows degrees * 1000000 + minutes * 10000 + decimal minutes
Longitude	INT32	Longitude coded as follows degrees * 1000000 + minutes * 10000 + decimal minutes
Direction	INT16	Direction in Degrees (multiplied by 10)
Speed	INT32	Speed in KM/H (multiplied by 10)
Supply	INT16	Board supply voltage

28 Bytes

Package send when a configured event is triggered or on manual request

Set roaming List

16#10	INT8	This will set the list of providers to be used when roaming
LAI 1	INT32	LAI of provider, Highest priority
LAI 2	INT32	LAI of provider
LAI 3	INT32	LAI of provider
LAI 4	INT32	LAI of provider
LAI 5	INT32	LAI of provider
LAI 6	INT32	LAI of provider
LAI 7	INT32	LAI of provider
LAI 8	INT32	LAI of provider
LAI 9	INT32	LAI of provider
LAI 10	INT32	LAI of provider
LAI 11	INT32	LAI of provider
LAI 12	INT32	LAI of provider
LAI 13	INT32	LAI of provider
LAI 14	INT32	LAI of provider
LAI 15	INT32	LAI of provider
LAI 16	INT32	LAI of provider, Lowest priority

65 Bytes

The will update the roaming list in the unit with the supplied data

Request roaming List

16#11	INT8	This will initiate a transmission of Roaming list
-------	------	---

1 Byte

Request a 'Set roaming List' package to be send containing the unit's configuration.

Set GPRS access parameters

16#12	INT8	This will set the GPRS access parameters of a provider
Index	INT8	Index in access parameters table (1-5)
LAI	INT32	LAI of provider
IP	INT32	IP adr.
Sub net	INT32	Subnet mask to be used
Gateway	INT32	IP adr. Of gateway
DNS1	INT32	IP adr. of primary DNS server
DNS2	INT32	IP adr. of secondary DNS server
Length	INT8	Length of username. Note that if the length is 0 the password parameter must not be included and the length can be no more than 33 characters.
Username	String	Username to access the provider gateway.
Length	INT8	Length of password. Note that if the length is 0 the password parameter must not be included and the length can be no more than 33 characters.

Set GPRS access parameters

Password	String	Password to access the provider gateway.
Length	INT8	Length of APN. Note that if the length is 0 the APN parameter must not be included and the length can be no more than 33 characters.
Password	String	APN IP address (dotted or symbolic).

Varies

Updates the GPRS configuration in the unit, these settings can also be changed through the RTCU IDE

Note: If the new setting fits better to the inserted SIM card, the unit will reboot with the new setting, loosing any unset data.

Set Host node ID

16#13	INT8	This will set the node id for the PC application (the Host), this is where the 'Event info' are sent to
Node ID	INT32	Node id of the Host 0 = sender of message, this means if not sent through the gateway, the senders phone number will be used to receive PDU messages.

5 Bytes

Will configure where replies are sent to if node id is zero the senders phone number/node id will be used.

Set RTCU Gateway parameters

16#14	INT8	This will set the RTCU Gateway access parameters. Note this is the software that routes VSMS between boards and users.
Enable	INT8	0=Disabled, 1=Enabled
Port	INT32	Port on which the gateway listens for connections
Max Con.	INT16	Number of attempts to connect before giving up
Send Req.	INT16	Number of times to request permission to send before giving up
Timeout	INT16	Number of seconds to wait for responds
Keep Alive	INT32	Number of seconds between 'keep alive' pulses is send to gateway.
Length	INT8	Length of IP address. Note that if the length is 0 the IP address parameter must not be included maximum length is 41 characters.
IP	String	IP address of Gateway. String
Length	INT8	Length of key. Note that if the length is 0 the key parameter must not be included maximum length is 8 characters.
Key	String	The key (Password) used to access the gateway. String

Varies

Will configure how the RTCU Unit connects to the RTCU Gateway

Note: When updated the unit will reboot losing any unsent events.

Description of RTCU communication (SMS format)

The following commands can be sent as SMS-messages to the unit, commands may be combined but must always contain the key ('#KEY=52544355') to be accepted.

#KEY=52544355

Key field must always be present in the message to be accepted.

#RESET=1

Will reset the unit

#CFM=1

Reply with a confirm message if message is accepted.

#GPRS=<APN>,<Auth.>

<APN> = The APN the unit should use in order to connect to the GPRS network

<Auth.> = The PPP authentication type

- 0 - None
- 1 - PAP
- 2 - CHAP
- 3 - PAP/CHAP

Set GPRS connection parameters, this will result in a reboot of the unit

#GW=<IP>,<Port>,<Key>

<IP> = Gateway address (dotted / symbolic) (max 41 chars)

<Port> = Gateway port (default 5001)

<Key> = Gateway key (max 8 chars)

Set the RTCU Gateway connection parameters, this will result in a reboot of the unit