Software Specification
Rev. 2.1b

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1 Revision history

Rev.	Date	Author	Description
0.0		MV	Initial revision
1.1	06/11/2019	GD	Added Working time ranges (COLMAR)
1.2	05/12/2019	GD	Added flag in B000 to set timeout of B0D2 in seconds
1.3	30/03/2020	GD	Added B0DE property to write properties in the Opanel
1.4	07/04/2020	GD	Added F826 status code for HDI menu item selected Fixed error in B0DE property examples
1.5	29/05/2020	GD	Added properties and events for Path record and play
1.6	17/06/2020	GD	Updated Working Ranges property number
1.7	24/06/2020	GD	Added F838 for working time ranges authentication revoked Changed behavior of working time ranges (COLMAR)
1.8	30/09/20	MV	Added status code F011 at high priority with log of ntp update. Updated property F141 to support GPS SNR. Updated property f142 from 1 to 3 bit to contains up to 7 can channel.
1.8a	27/10/20	GD	Updated property B0DA to enable HDI auto configuration script. Updated documentation about GPS reset in F124 property
1.8b	04/11/20	MV	Updated documentation for motion event using time property F710 Added property F0FD to execute command
1.8c	10/12/20	GD	Updated property B200 for path play event configurations Updated status codes table
1.8c_1	05/01/21	GD	Fixed Priority of event FD14 in event table
1.8d	14/01/21	MV-GD	Fixed commands for 1-wire devices increased to 8 max devices
1.8e	18/01/21	MV GD	Added support for serial telemetry Increased max number of 1-wire devices to 16
1.8f	20/01/21	MV-GD	Removed single LF from serial telemetry buffer
1.8f_1	27/01/21	GD	Updated Status code table for FD16 and FD17. Updated F312 and F313 properties description.
1.8g	10/02/21	MV	Property B02D Authorized phone number now accept number as prefix if the property is not set any number are accepted.
1.8h	03/03/21	GD	Added flag 4000 to B066 property to enable deep low power.
1.8r	24/05/21	GD	Added path ID to Start rec. F8B0 and End rec. F8B1 events Added menu item description to Menu item selected event F826
1.8t	10/06/21	GD	Added Automatic CAN bus periodic message sender
1.8u	16/06/21	GD	Updated documentation for F910-F91F properties

Rev.	Date	Author	Description
1.8v	06/07/21	GD	Added VS5, VC1, ANS1 messages, changed some max and min values in TeleLst
1.8w	16/07/21	GD	Added CANMONITOR and B240 property for Multiple CANBUS Write
1.8y	27/09/21	GD	Added COP1 to TeleLST Added Geozone as in Freetracker Fixed Varstat in Telemetry
1.9	22/10/21	GD	Added min and max discard values in B240 for CANMONITOR Restored telemetry calculated variables Improved RTC sync after wake up from low power
1.9e	16/11/21	GD	Updated Can Monitor behaviour and properties Added B23F Property for geozone check in Can Monitor Added F104 Property for getting Application name
1.9f	10/12/21	GD	Updated Can Monitor behaviour and properties to send one CAN message when all values return in range.
1.9g	04/02/22	GD	Fixed LastValue in TeleLST
1.9h	10/02/22	GD	Updated TeleLST Configuration Updated documentation for Geozone
1.9j	11/03/22	GD	Changed stop timer configuration for Can Monitor using RTC
1.9k	16/03/22	GD	Added PulseOut command to F0FD
1.9l	24/03/22	GD	Added F552 for geozone command management Added B031 for autoset outputs at epoch and added some flags in F930-F93F
1.9m	29/03/22	GD	Added PulseOutLock command to F0FD
1.9n	07/04/22	GD	Added ignore policy for GS1 and FA1 messages based on some PM1 signals.
1.9o	19/04/22	GD	CanMonitor: Fixed message id for stop timer elapsed event
1.9p	26/04/22	GD	TeleLst: Added MOV1 packets and Data[0] mux management
1.9q	06/05/22	GD	Added resed code 6D for segmentetion fault simulation Added ignore delay policy for CAN messages in TeleLST. Added ignore policies also for CanMon.
1.9r	20/05/22	GD	Updated Ignore Policies for TeleLst and CanMon Added Property B032 for reset and format by Button
1.9s	20/06/22	GD	Updated B0DA property for DWIN Display Added Properties B300-B307 for inputs visualization on display Added Properties B310-B312 for outputs visualization on display
1.9u	27/09/22	GD	Updated Dwin display management Updated telelst configuration Added Next Deep Low power after wakeup from timer
1.9v	20/10/22	GD	Added Property B206 (Read Dwin Display info) Added Data mask for TeleLST status packets

Rev.	Date	Author	Description
			Added DM1 status packet Changed led timing when entering PIN Added ignored packets field to C000
1.9w	04/11/22	GD	Added Property B207 (Show message in DWIN display) Improved battery discharge management. Added 22s pause before starting gsmMgr.
1.9x	08/11/22	GD	Added first version of path to DWIN display
1.9y	17/03/2023	GD	Added F109 property for power manager FW revision in NVT3 devices. Fixed sum of squares in TeleLst. Added Property F3F3 for OpenDMTP last connection time. Added DWIN Display Serial number to B206 property. Added TP Protocol in LST telemetry Added Property B208 for setting logo in DWIN Display
1.9z	26/04/23	GD	Removed TP2_PGN and BC1 filters Added pulse to buffered commands Changed maxvalue of ES3 to 0xFA
2.0	29/05/23	GD	Added E003 App packets timer to C950 property Fixed Can channel in C950 property Added Buffer override in set output commands
2.0a	20/06/23	GD	Added Event Data bytes to F011 property Fixed wave input
2.0b	09/08/23	GD	Added Level event send mask for outputs to F930 – F93F Added F108 property for ImgRev Added Thread WD refresh in OpenDMTP every 8 event sent
2.0e	27/06/24	GD	
2.0f	24/06/25	GD	Added FD2E Status code for Shutdown event Set APN in /etc/gprs-apn imediately when setting F3A6 Changed type from uint16 to int16 for ADC multipliers of display. Added 50ms delay after FlashRW in display Wait event queue to empty before GSM off (or 30s timeout)
2.0g	08/08/25	GD	Updates in telelst configuration
2.0h	28/08/25	GD	Updates in telelst configuration
2.1	20/04/26	GD	Updated CAN Ignore message policies Disabled modem switch off during warm reset Added COP1 data[4]=0 accept for CONFIG packets
2.1a	18/05/26	GD	Fixed Modem not restarted after exit from suspend
2.1b	16/06/26	GD	Fixed SMS loss when receiving SMS rapid sequence Added new status code FD2D for warm reset (sybok restart) Update Command Pulse and Pulse lock documentation about Output buffering.

2 Required technical background

“There are 10 types of people in this world, those who understand binary and those who don’t.”

3 Fact sheet

- ✔ Full support of OpenDMTP protocol with optional AES encryption
- ✔ Multi threading real time operating system.
- ✔ Software upgrade over serial port or GPRS.
- ✔ All features can be configured from GPRS or SMS
- ✔ Buffer for 8000 events stored in non volatile memory
- ✔ Up to 200 GeoZone stored in non volatile memory
- ✔ Internal temperature sensor
- ✔ All configured properties stored in non volatile memory
- ✔ Support for optional Remote Human Interface (LCD display, keyboard, magnetic stripe reader)
- ✔ Hardware watchdog
- ✔ Hi level software watchdog
- ✔ Configurable low power management

3.1

4 Hardware configuration

4.1 Digital input

Input #	Mask	Description
0	00000001	DIG0
1	00000002	DIG1
2	00000004	DIG2
3	00000008	DIG3
4	00000010	DIG4
5	00000020	DIG5
6	00000040	DIG6
7	00000080	DIG7
15	00008000	FREQ Digital input frequency present.

Table 1: Digital inputs

4.2 Digital output

Output#		Description
0	00000001	RELAY0
1	00000002	
2	00000004	HS0
3	00000008	HS1
4	00000010	LS0
5	00000020	LS1
6	00000040	LS2
7	00000080	LS3
14	00004000	Power supply. Writing 1 to this output the power supply is powered off.

Table 2: Digital outputs

4.3 Diagnostic

One optional LED will show the current status of the device

4.3.1 Led Off

The device is not powered.

4.3.2 Fast blinking without pause

Firmware download

4.3.3 One single blink every 30 seconds.

The device is operative and all peripherals work correctly. This operative mode can be changed to slow blinking (every 200ms) with the property : Device flags.

4.3.4 Fast blinking with pause

The led will show one or more error codes when one or more peripherals do not work correctly.

Mask	Description
01	GSM network not connected.
02	GPS not acquired.
04	Telemetry not received.

For example if the led blinks 3 times and than have a pause the GPS and the GSM are not working properly..

4.3.5

5 Software configuration

5.1 Factory default

The tracker at factory default will connect to the manufacturing server and it will receive the initial customer configuration. If all data are erased thru a reset command (see Device reset.) the tracker will be again set as factory default.

6 OpenDMTP supported packets

For more information about OpenDMTP packet and packet flow see the original protocol documentation.

6.1 Data types

Data types used in the communications protocol. All data are always sent/received in the big endian format aka Motorola conventions , most significative byte first. For details see : https://en.wikipedia.org/wiki/Endianness

Type	Size in bit	Desciption
BYTE	8	8 bit unsigned number
WORD	16	16 bit unsigned number, big endian.
DWORD	32	32 bit unsigned number, big endian.
QWORD	64	64 bit unsigned number, big endian.
FLOAT	32	IEE754 float value.
DOUBLE	64	IEE754 double value.

6.1.1 IEE754 Conversion in JAVA

To convert a buffer with a DOUBLE value using the Java language use a function like this :

```
public static double bytesToDouble(byte buffer[])
{
    return bytesToDouble(buffer,0);
}

public static double bytesToDouble(byte buffer[],int start)
{
    long value = 0;
    long tmp;

    int i;

    for (i = 0 ; i < 8 ; i ++)
    {
        tmp =  (long)buffer[i] & 0xFF;
        value |= tmp  << (8*i);
    }

    return Double.longBitsToDouble(value);
}
```

6.2 Packet sent by the client

Packet type (E0xx)	Description
00	End of block no more data.
01	End of block I have more data.
11	Client ID.
30	Standard GPS information.

Packet type (E0xx)	Description
31	High resolution GPS information.
70	Standard GPS information with defined telemetry.
71	Standard GPS information with complete telemetry.
72	Standard GPS information with 4 byte of GeoZone id.
73	Standard GPS information with 1-Wire device address.
77	Standard GPS information with variable data used for experimental function.
B0	Reply to the server get property.
E0	Error sent to the server.
CF	Template definition.

6.3 Packet handled from server.

Packet type (E0xx)	Description
00	Talk. When this packet is received the device sent all event.
A0	Acknowledge of sent events.
B0	Get property.
B1	Set property.
FF	Close the connection.

7 Client property definition

7.1 How to set properties.

The properties are read from the software only at start up so when any properties is changed the device must be restarted. The property can be changed always from the server or from one SMS.

7.2 Communications.

7.2.1	SIM ICCID
Property key	B02F
Description	SIM ICCID Read/Only
Attributes	ASCIIZ
0:X	Return the current SIM ICCID.

7.2.2	CELL ID Phone number
Property key	F3D6
ASCIIZ	Phone number to receive cell id update when set in the property B000.

7.2.3	Authorized phone number.
Property key	B02D
Description	Authorized phone number
Attributes	ASCIIZ
0:X	When a voice call is received from this phone number automatically the event F040 is queued at high priority and a connection to the server is requested.the incoming phone number is compared only with the initial part of the phone number and prefix of + is ignored both on incoming and in the propererty phone number since the prefix + is ignored it is advisable not to use it Example setting this property to the value 393 all numbers of the Italian mobile network will be accepted

7.2.4	Communications f3ab password
Property key	F3A9
Description	GPRS password setting. Currently not used.
Attributes	ASCIIZ
0:X	Password

7.2.5	Communications APN user name
Property key	F3A8
Description	GPRS user setting. Currently not used.
Attributes	ASCIIZ
0:X	User

7.2.6	Communications APN
Property key	F3A6
Description	GPRS APN setting. As default the default APN of the SIM is used.
Attributes	ASCIIZ
0:X	APN

7.2.7	GPRS Mode
Property key	F3AC
Description	GPRS Mode
Attributes	BYTE
0:X	

Mask	*Description*
01	Roaming disabled.
80	GPRS Disabled.

7.2.8	Firmware update server.
Property key	F3A7
Description	This property identify the server used for firmware download.
Attributes	ASCIIZ
0:X	Server ip or name.

7.2.9	Firmware update port.
Property key	F3B2
Description	Server update port.
Attributes	UINT16
0:2	Server port.

7.2.10	Default protocol server.
Property key	F3B3
Description	This property identify the server used for the protocol.
Attributes	ASCIIZ
0:X	Server ip or name.

7.2.11	Default protocol port

Property key	F3B4
Description	Server update port.
Attributes	UINT16
0:2	Server port.

7.2.12 RF2217 server

7.2.12.1 RFC2217 server mode

Property key	F3C0
Description	RFC2217 server mode
Attributes	UINT16
0:2	

Mask	Description
8000	If set the initial negotiation is not sent.
00FF	

Mask	Description
00	Disabled
01	Act as TCP server
02	Act as TCP client
03	Act as TCP client with id

7.2.12.2 RFC2217 server name

Property key	F3C1
Description	RFC2217 server name
Attributes	STRING
0:x	Server name or ip address used only in mode 0002 or 0003

7.2.12.3 RFC2217 server port

Property key	F3C2
Description	RFC2217 server port
Attributes	UINT16
0:2	TCP port for RFC2217 client or server.

7.2.13 Telnet server server

7.2.13.1	***Telnet server mode***
Property key	F3C8
Description	Telnet server mode
Attributes	UINT16
0:2	For detail see : 7.2.11.1

7.2.13.2	***Telnet server name***
Property key	F3C9
Description	Telnet server name
Attributes	STRING
0:x	Server name or ip address used only in mode 0001 or 0002

7.2.13.3	***Telnet server port***
Property key	F3CA
Description	Telnet server port
Attributes	UINT16
0:2	TCP port for telnet client or server.

7.2.13.4	***UDP server configuration.***
Property key	F3CB
Description	Udp server configuration
Attributes	UINT16
0:2	***Mask*** / ***Description***
	0001 / Enable the server udp/

7.2.14 SMS inbound access PIN

Property key	F3AF
Description	PIN for commands received from SMS.
Attributes	ASCIIZ

0:X	PIN (default 123456)

7.2.15	SMS URL for locator.
Property key	B020
Description	SMS URL for locator.
Attributes	ASCIIZ
0:X	If defined the SMS command used to locate the tracker sends one string human readable and a link to this URL with latitude and longitude as parameter.

7.2.16	GPRS Serial port name.
Property key	EF11
Description	Serial port where the GPRS modem is attached.
Attributes	ASCIIZ
0:X	The serial port number 0-9.

7.2.17	GPRS Minimum signal strength.
Property key	F3AD
Description	Minimum signal strength required to establish connection.
Attributes	UINT8
0:1	Minimum signal level 0-31

7.2.18	UNIQUE device ID
Property key	F112
Description	Unique device ID. This property is READ ONLY.
Attributes	String max 20 characters.
0:X	Unique device ID. Taken from : ✔ GSM IMEI if installed ✔ String constant. ✔ Ethernet MAC address if installed.

7.2.19	Time to wait between connection failure.
Property key	F309
Description	Amount of time to wait between connection failure in seconds.

Attributes	2 x UINT32
0:4	Minimum time to wait after connection failure in seconds.
4:4	Maximum time to wait between connection failure in seconds.

7.2.20 Minimum transmit delay for critical events.

Property key	F312
Description	Minimum time in seconds between connections to send critical events.
Attributes	UINT16
0:2	Minimum transmit delay in seconds. The recommended value is 0.

7.2.21 Minimum transmit delay for non critical events.

Property key	F313
Description	Minimum time in seconds between connections to send non critical events.
Attributes	UINT16
0:2	Minimum transmit delay in seconds. The recommended value is 300.

7.2.22 Communications flags

Property key	F314
Description	Communication flags
Attributes	UINT8

0:1

Mask	*Description*
01	Disable nagle on TCP
02	Enable log of sent and received protocol data
04	Disable log message on event F828
80	Enable auto connect on default interface ip change.

7.2.23 Number of event per block.

Property key	F317
Description	Maximum number of event sent per block. Default value is 8.
Attributes	UINT8
0:1	Number of event per block.

7.2.24	Remote server host
Property key	F3A1
Description	Name or IP address of the communication server.
Attributes	ASCIIZ
0:X	Remote host.

7.2.25	Remote server port
Property key	F3A2
Description	UDP or TCP port of the communication server.
Attributes	UINT16
0:2	Port number.

7.2.26	Network shell
Property key	F3A3
Description	Network shell
Attributes	UINT32
0:4	If not 0 the network shell on TCP port 2023 will be enabled.

7.2.27	Device Name
Property key	F113
Description	Name of the device. Used as account name by the L+ protocool.
Attributes	ASCIIZ
0:X	Device name.

7.2.28	Account ID
Property key	F114
Description	Account ID on the server. This property is volatile and is not stored in flash memory.
Attributes	ASCIIZ
0:X	Account id.

7.3 Network configuration

7.3.1	Default network interface channel.
Property key	F3A0
Description	Default communication channel, this is the only channel used for DNS and internet connection.
Attributes	UINT16
0:2	

Value	*Description*
0000	The default communication channel will be the first wireless modem. (default value).
0001	The default communication channel will be the Ethernet interface.
0002	The default communication channel will be the wifi in client mode.
0003	The default communication channel will be the wifi in access point mode.

7.3.2	Primary DNS
Property key	F3A4
Description	Ffirst DNS server.
Attributes	ASCIIZ
0:X	DNS IP address.

7.3.3	Secondary DNS
Property key	F3A5
Description	Second DNS server.
Attributes	ASCIIZ
0:X	DNS IP address.

7.3.4 Ethernet configuration

7.3.4.1	*Ethernet Mac Address*
Property key	F400
Description	MAC address.
Attributes	ASCIIZ READ ONLY
0:X	MAC address.

7.3.4.2	Ethernet ip address
Property key	F401
Description	IP address or DHCP for automatic address assignment.
Attributes	ASCIIZ
0:X	IP address.

7.4

7.4.1.1	Ethernet ip address mask
Property key	F402
Description	IP address mask.
Attributes	ASCIIZ
0:X	Address mask.

7.4.1.2	Ethernet default gateway
Property key	F403
Description	Default gateway.
Attributes	ASCIIZ
0:X	Default gateway.

7.4.1.3	Ethernet DHCP server start address
Property key	F404
Description	First address assigned by the DHCP server.
Attributes	ASCIIZ
0:X	IP address.

7.4.1.4	Ethernet current ip address.
Property key	F405
Description	Ethernet current ip address. (Read Only)
Attributes	ASCIIZ
0:X	IP address.

7.4.2 Wifi client mode (STA) configuration

7.4.2.1	Wifi STA Mac Address
Property key	F410
Description	MAC address.
Attributes	ASCIIZ READ ONLY
0:X	MAC address.

7.5

7.5.1.1	Wifi STA ip address
Property key	F411
Description	IP address or DHCP for automatic address assignment.
Attributes	ASCIIZ
0:X	IP address.

7.6

7.6.1.1	Wifi STA default gateway
Property key	F413
Description	Default gateway.
Attributes	ASCIIZ
0:X	Default gateway.

7.7

7.7.1.1	Wifi STA DHCP server start address
Property key	F414
Description	First address assigned by the DHCP server.
Attributes	ASCIIZ
0:X	IP address.

7.7.1.2	Wifi STA current ip address
Property key	F415
Description	Wifi STA current ip addresss. (Read Oly)
Attributes	ASCIIZ
0:X	IP address.

7.7.1.3	Wifi STA security type.
Property key	F41D
Description	Security type.
Attributes	BYTE
0:X	Type: 0 = Open; 1 = WEP (Deprecated); 2 = WPA2

7.7.1.4	Wifi STA password.
Property key	F41E
Description	Password.
Attributes	ASCIIZ
0:X	Password

7.8

7.8.1.1	Wifi STA SSID
Property key	F41F
Description	SSID
Attributes	ASCIIZ
0:X	SSID

Wifi access point mode (AP) configuration

7.8.1.2	Wifi AP Mac Address
Property key	F420
Description	MAC address.
Attributes	ASCIIZ READ ONLY
0:X	MAC address.

7.9

7.9.1.1	Wifi AP ip address

Property key	F421
Description	IP address or DHCP for automatic address assignment.
Attributes	ASCIIZ
0:X	IP address.

7.10

7.10.1.1	***Wifi AP default gateway***
Property key	F422
Description	Default gateway.
Attributes	ASCIIZ
0:X	Default gateway.

7.11

7.11.1.1	***Wifi AP DHCP server start address***
Property key	F424
Description	First address assigned by the DHCP server.
Attributes	ASCIIZ
0:X	IP address.

7.11.1.2	***Wifi AP channel***
Property key	F42C
Description	Wifi access point channel.
Attributes	BYTE
0:X	Access point channel.

7.11.1.3	***Wifi AP security type.***
Property key	F42D
Description	Security type.
Attributes	BYTE
0:X	

Type	*Description*
0	Open
1	WEP (Deprecated)
2	WPA2

7.11.1.4	***Wifi AP password.***

Property key	F42E
Description	Password.
Attributes	ASCIIZ
0:X	Password

7.12

7.12.1.1	***Wifi AP SSID***
Property key	F42F
Description	SSID
Attributes	ASCIIZ
0:X	SSID

7.13 GPS Configuration

7.13.1	**GPS Serial port name.**
Property key	EF21
Description	Serial port where the GPS is attached.
Attributes	ASCIIZ
0:X	The serial port number 0-9.

7.13.2	**GPS Serial port speed.**
Property key	EF22
Description	Serial port speed.
Attributes	UINT32
0:4	Serial port speed.

7.13.3	**GPS Sample rate**
Property key	F511
Description	Number of seconds between GPS samples.
Attributes	UINT16
0:2	Number of seconds between GPS samples. Typical value 5-30.

7.13.4	**GPS Expiration time.**
Property key	F513
Description	GPS expiration time in seconds.

Attributes	UINT16
0:2	Number of seconds after the GPS is expired.

7.13.5	GPS Accuracy
Property key	F521
Description	If set GPS point with HDOP * 10 greater than specified value are discarded.
Attributes	UINT16
0:2	Maximum acceptable GPS HDOP / 10 any GPS fix with HDOP grater than specified value / 10 will be rejected. A good value can be 20.

7.14 Movment event controlled by time	
Property key	F710
Description	Time between event in seconds
Attributes	3 x UINT16
	With this property at repeated interval one event is generated
0:2	Enable the event at time
	Mask: 0001 — Description: Enable the event at time
2:2	Time in second between event F0F1 when motion event are disabled
4:2	Time in second between event F0F2 when motion event are enabled

7.14.1

7.14.2	GPS Minimum distance delta.
Property key	F531
Description	GPS minimum distance delta in meters.
Attributes	UINT32
0:4	Minimum distance between 2 GPS point. If the distance is less than configured the new gps point is ignored.

7.15 Motion definition

7.15.1	Motion start type.
Property key	F711
Description	This property determine as the motion is detected.
Attributes	UINT8

0:1	<table><tr><th>Mask</th><th>Description</th></tr><tr><td>0</td><td>The property F712 specify the minimum speed in KPH to detect start motion.</td></tr><tr><td>1</td><td>The property F712 specify the minimum delta between two GPS point in meters to detect start motion.</td></tr><tr><td>2</td><td>The vesicle is considered always in motion.</td></tr></table>

7.15.2	Motion start definition.
Property key	F712
Description	This property determine the threshold of motion start.
Attributes	UINT16
0:2	Threshold of motion start.

7.15.3	In motion interval.
Property key	F713
Description	In motion periodic event interval.
Attributes	UINT16
0:2	Number of seconds between in motion events.

7.15.4	Motion stop definition.
Property key	F714
Description	Motion stop definition.
Attributes	UINT16
0:2	Number of seconds after the device is considerate stopped..

7.15.5	Dormant interval.
Property key	F716
Description	Dormant periodic event interval.
Attributes	UINT32
0:4	Number of seconds between dormant event..

7.15.6	Dormant count.
Property key	F717

Description	Maximum number of consecutive dormant event.
Attributes	UINT16
0:2	Maximum number of consecutive dormant event. 0 no limit.

7.15.7 Maximum speed.

Property key	F721
Description	If set and the speed exceed the specified value an event is generated at low priority.
Attributes	UINT16
0:2	Maximum speed in KPH 0.1

7.15.8 In motion maximum distance

Property key	F718
Description	Maximum distance in meter between motion event.
Attributes	UINT16
0:2	Distance in meter.

7.16

7.16.1 In motion event priority

Property key	F719
Description	Priority for in motion event . If not specified a default value of 0 is used.
Attributes	UINT8
0:1	In motion event priority 0 .. 2

7.17 Digital input / output

7.17.1 Digital output configuration

Property key	F930 – F93F to configure up to 16 digital output.
Description	Digital output configuration.
Attributes	2 x UINT32 , UINT16
0:4	

Mask	*Description*
00000010	Trigger event when state change to ON.
00000020	Trigger event when state change to OFF.
00000080	Trigger event at high priority.
00000100	Auto reset the output at epoch defined by B031 property (see notes)
00000200	Auto set the output at epoch defined by B031 property (see notes)
00008000	Trigger OFF level event at startup if output is OFF after init
08000000	If set the led blink periodically when the output is set.
10000000	Auto reset the output when moving events are disabled. (see notes)
20000000	Auto set the output when moving events are disabled. (see notes)

	<table><tr><th>Mask</th><th>Description</th></tr><tr><td>40000000</td><td>Buffer the output when moving events are enabled.</td></tr><tr><td>80000000</td><td>Ignore output when ignore moving events. Not defined in OpenDMTP.</td></tr></table>
4:4	Default output duration in milliseconds.
8:2	Four digit decimal pin. Enabled only if the property Input used to enter PIN is set. When the pin is entered using the configured input the state of the output is changed. The default pin 0000 is not a valid value and it is better use pin without the digit 0.
Notes	If Autoreset at epoch is enabled, autoreset when moving events are disabled is ignored. If Autoset at epoch is enabled, autoset when moving events are disabled is ignored. When Autoset or autoreset at epoch is executed, buffered command is cleared.

7.17.1.1	***Buffered output timeout***
Property key	B0D2
Description	Timeout used for buffered outputs in minutes. Minimal value 1 minute (or second) max value 255 minutes (or seconds).
Attributes	BYTE
0:1	Timeout for buffered output in minutes or seconds. If Flag 00004000 is set in property B000 timeout is in seconds.

7.17.1.2	***Output Autoset (Autoreset) Epoch***
Property key	B031
Description	Epoch value used to autoset or autoreset output (see also F930-F93F)
Attributes	DWORD
0:4	Epoch value

7.17.2	**Led configuration**
Property key	B02E
Description	Output used as LED (default to 15)
Attributes	BYTE
0:4	Output used as led.

7.17.3	**Input state**
Property key	F901
Description	Digital input state
Attributes	UINT32 (READ/ONLY)
0:4	Current input state (least significant bit is input #0)

7.17.4 Digital input configuration

Property key	F910 – F91F to configure up to 16 digital input.
Description	Digital input configuration.
Attributes	12 BYTE

0:4

Mask	Description
0000000F	Debounce interval in seconds.
00000010	Trigger event when state change to ON.
00000020	Trigger event when state change to OFF.
00000040	Count in the specified odometer the time of input on in seconds.
00000080	Trigger event at high priority. Have the same effect to set the mask 100 and 200.
00000100	Trigger event at high priority when became ON.
00000200	Trigger event at high priority when became OFF.
00000400	The input is not acquired from the field.
00000800	The input is used to acquire wave. This configuration implicitly include the bit mask 00000400. (*)
00001000	Trigger output when state change to on.
00002000	Trigger output when state change to off.
00004000	If set the debounce interval is specified in milliseconds in the next UINT32 where XXXX0000 is the debounce interval for the on event and 0000XXXX is the debounce interval for the off event. This option automatically turn off the option 00001000 and 00002000. Since 1.2.3
00008000	If set the input is checked at startup for level changes. i.e. If the input is configured to sent event when became off and at startup is off an event is generated.
000F0000	Odometer number where count the on time.
00F00000	Odometer number to aquire wave.
0X000000	Input to be checked.
20000000	If set this input is checked only if the input 0X000000 is set.
40000000	Ignore moving event when off.
80000000	Ignore input when ignore moving event.

4:4

XXXXFFFF – Output configuration when cycle change to on or debounce on interval in milliseconds.
FFFFXXXX – Output configuration when cycle change to off or debounce off interval in milliseconds.

Detail of output configuration

Mask	Description
001F	Output number 00 .. 1F
00E0	Output mode.

<table>
<tr><td></td><td>
<table>
<tr><th>Mask</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><th>Mask</th><th>Description</th></tr>
<tr><td>00</td><td>Set the output to off.</td></tr>
<tr><td>20</td><td>Set the output to on.</td></tr>
<tr><td>40</td><td>Change the state of the output.</td></tr>
<tr><td>60</td><td>Pulse the output off.</td></tr>
<tr><td>80</td><td>Pulse output on.</td></tr>
<tr><td>A0</td><td>Pulse change state.</td></tr>
<tr><td>C0</td><td>Reserved.</td></tr>
<tr><td>E0</td><td>Reserved</td></tr>
</table>
</td></tr>
<tr><td>FF00</td><td>Pulse duration in seconds. If 0 is taken from the output configuration.</td></tr>
</table>
</td></tr>
<tr><td>8:2</td><td>When the input is configured as wave reader this properties specify the minimum time to detect a wave change. The time is in unit of 20 us. (*)</td></tr>
<tr><td>10:2</td><td>Timeout of wave when input wave is enabled in milliseconds (*).</td></tr>
<tr><td colspan="2">(*) Available only in NVT2 with Freetracker firmware.

NOTES for NVT2 with Sarek firmware.
To acquire wave only INPUT3 (Spare) can be used and wave counter is automatically routed to virtual INPUT15.
You have to configure F91F (INPUT15 configuration) as wave reader.
Mask 20000000 (this input is checked only if the input 0X000000 is set) is not supported.
Please configure F913 for INPUT3 with 00000400 mask (input not acquired from the field) to suppress input changed message on console.
Configuration example for acquiring wave:
F91F: 00120CF000000000000F03E8
F913: 00000400000000000000000
Odometer 1 will contain pulse count
Odometer 2 will contain time in seconds of wave presence</td></tr>
</table>

7.17.5 Input used to enter PIN

Property key	B021
Description	Input number 0 .. 31 used to enter PIN.
Attributes	UINT8 (READ/WRITE)
0:1	Input number used to enter the PIN. When set the input is monitored and when go on the led is set to ON and the system wait for 4 digit pin. With any pressing / release the digit is incremented and with one pause of 500 ms the system wait for the next digit. When all 4 digit are entered if any output is configured with the selected pin the state of the output is changed. Than the led return to the normal operation.

7.18

7.18.1 Output state

Property key	F902
Description	Digital output state
Attributes	UINT32 (READ/ONLY)
0:4	Current output state (least significant bit is output #0)

7.19 Miscellaneous

7.19.1 Device flags

Property key	B000
Description	Device flags. Not a OpenDMTP standard property.
Attributes	UINT32
0:4	

Mask	Description
00000001	If set the event are discarded.
00000002	If set enable the cell id when CHANGE WILL UPDATE THE RELATIVE PROPERTY F3D5 and generate one event if specified.
00000004	If set event are sent in high resolution mode.
00000008	If set during the normal work mode the led blink fast otherwise will blink one time every 30 seconds.
00000010	If set the protocol is disabled in roaming.
00000020	If set the protocol is disabled.
00000040	If set the GPS expired event is not sent when motion event are disabled.
00000080	If set enable the anonymous tracking. In this mode all event have the same position and all input are always off and the accelerometer is not checked. Since 1.2.2
00000100	If set the error code are not showed on the diagnostic led. Since 1.2.2
00000200	If set all accelerometer data are logged as event. Since 1.2.2 This flag create a lot of events so must be used only for debug purpose.
00000400	If set the GPS data are sent on the serial # 3. Only for debug purpose.
00000800	If set when the GPS position is not available the device send a fixed position lat=1,lon=1 speed=0
00001000	Log at 115200 BPS
00002000	If set the connection to the server is never closed.
00004000	If set the timeout in B0D2 is in seconds
00008000	If set generate one event F115 when the cell id change.

7.19.2

7.19.3 Device hardware flags

Property key	B001
Description	Hardware specific configuration
Attributes	DWORD
0:4	Hardware flags

7.19.4 Device reset and format by button.

Property key	B032
Description	Input used for reset/format.
Attributes	UINT8
0:1	Input number used for reset/format. If configured enable reset and format by button. At startup input must remain deactivated for 1 second. During first 15 seconds from startup if the input is activated continuously for 30s a format will be performed (= reset with code 5A). After 15s from startup if the input is activated continuously for 10s an immediate restart is performed (= reload from console).

7.19.5 Device auto reset.

Property key	EE01
Description	Device auto reset interval.
Attributes	UINT32
0:4	Device auto reset time in seconds. If configured at start up one timer is started and cleared when a valid packet is received from the server. If the timer expire the device will perform a reset operation/

7.19.6 Serial ports speed

Property key	EF32,EF42,EF52,EF62 (Relative to port 0,1,2,3)
Description	Serial port speed.
Attributes	UINT32
0:4	Serial port speed.

7.20 Command

This type of properties are write only and are used for send command to the device.

7.20.1 Device command

Property key	F0F8
Description	Device command
Attributes	STRING
0:X	Execute the specified command, multiple command must be separated by ;

7.20.2 Device reset.

Property key	F0FF
Description	Device reset.
Attributes	BYTE
0:1	

Value	Description
00	Cold reset.
01	Warm reset.
5A	Reset and restore default. When this command is executed the tracker will reset at Software configuration
5B	Reset and firmware upgrade.
5C	Reset and restore default than firmware upgrade.
5D	Reset simulating an application error.
6D	Throws a Segmentation fault (In Sybok)
5E	The device will enter in low power mode.
5F	All the event are cleared.

7.21

7.21.1 Set output.

Property key	F031
Description	Set output.
Attributes	2 x BYTE 1 x UINT32
0:1	Index of digital output
1:1	

Value	Description
00	Set the output to off
01	Set the output to on
02	Change the state of the output
03	Do nothing
04	Set the output to off but if the ignore event state is not removed will be automatically set to on .
05	Set the output to on but if the ignore event state is not removed will be automatically set to off.

2:4	Duration in ms (optional).

7.21.2 Delete property.

Property key	F0FE
Description	Delete one property.
Attributes	WORD

0:2	Code of the property to be deleted.

7.22

7.22.1 Generate event.

Property key	F011
Description	Generate and queue the an event with the specified status code. The event is always generated at normal priority.
Attributes	WORD + up to 62 Hex Byte
0:2	Status code
2:X	Optional Data (up to 62 HexByte)

7.22.2 CANBUS BAUDRATE

Property key	B0B6-B0B7 configure baud rate for canbus #0 and #1
Description	Write configure baud rate for canbus #0 and #1
Attributes	1 x WORD

Data rate	*Decimal value*	*Hex word value*
125 Kbit	125	007D
250 Kbit	250 default settinga	00FA
500 Kbit	500	01F4
1 Mbit	1000	03E8

7.22.3 CANBUS write

Property key	B0D8
Description	Writes CAN message.
Attributes	4 x BYTE up to 8 x BYTE
0:4	CAN Id message.
4:8	Optional up to 8 byte of can data.

7.22.4 CANBUS write multi

Property key	B240
Description	Writes CAN message several times
Attributes	4 x BYTE 1 x WORD 1 x WORD up to 8 x BYTE
0:2	Message write count
2:2	Time between messages in ms

4:4	CAN Id message.
8:8	Optional up to 8 byte of can data.

7.22.5	CANBUS read
Property key	B0D9
Description	Read message from CAN bus. If no data are available an empty response is returned.
Attributes	4 x BYTE CAN bus ID 8 x BYTE CAN bus data
0:4	CAN id message
4:8	Optional up to 8 byte of can data.

7.22.6	CANBUS select for successive B0D8 and B0D9
Property key	B0D7
Description	Select the can bus channel
Attributes	1 BYTE
0:1	CAN BUS channel

7.23

7.23.1	CANBUS periodic sender
Property key	B220
Description	Enable CANBUS periodic message sender engine
Attributes	2 x DWORD
0:2	***Mask*** / ***Description*** 00000001 – If set the CANBUS message sender is enabled
4:2	Time in ms before start sending CAN messages after ignition signal change. (Only valid for messages flagged to be sent only with ignition).

7.23.2	CANBUS periodic messages
Property key	B221 – B228 Configure up to 8 CAN messages to be sent periodically
Description	Configure message data and period
Attributes	1 x BYTE 1 x WORD 1 x UINT32 1 x WORD 4 x BYTES 0 to 8 BYTES
0:1	CAN Channel

1:2	<table><tr><th>Mask</th><th>Description</th></tr><tr><td>0001</td><td>If set the message is not sent without ignition</td></tr></table>
3:4	Sending period in ms
7:4	Count (0 = continuous send, Counter reset occurs on ignition status change)
9:4	Message ID
13:8	Optional up to 8 byte of CAN message data

7.23.3	CANBUS Monitor Config
Property key	B230
Description	Enable CANBUS monitor engine. Up to 8 values are monitored. When all values are received and when out of threshold a CANBUS message is generated. Statistics sent to server by Events.
Attributes	3 x BYTE 2 x WORD 1 x DWORD 1 x WORD up to 8 x BYTE
0:1	<table><tr><th>Mask</th><th>Description</th></tr><tr><td>01</td><td>If set the CANBUS message sender is enabled</td></tr></table>
1:1	CAN interface for message reading
2:1	CAN interface for message writing
3:2	Message minimum write count
5:2	Time between sent messages (ms)
7:4	ID of message to send
11:2	Timeout in ms waiting all values (configured by B231-B238) to be received
13:8	Up to 6 data bytes for message to be sent when all values returned in ranges. Not configured byte will be set to 0. If no byte is set, the message is disabled.

7.23.4	CANBUS Monitor messages
Property key	B231 – B238 Configure up to 8 CAN messages containing values to read
Description	Configure Message ID to read, value location, thresholds and timeout
Attributes	4 x BYTE 1 x BYTE 1 x BYTE 5 x WORD 1 x DWORD up to 8 BYTE
1:4	Message ID
5:1	Value first bit

6:1	Value length (number of bits) Maximum 16
7:2	Minimum value
9:2	Maximum value
11:2	Minimum value for discard message
13:2	Maximum value for discard message
15:2	Hysteresis
17:4	Stop time (in Linux Epoch format). When the time is reached the message is discarded. If set to 0 Stop timer is disabled.
21:8	Message Write Data (up to 8 bytes). See notes.

Notes:

When the value is out of thresholds and then returns in normal range (with hysteresis) an event at normal priority with status code F8B7 will be generated. Event data will contain the index of message from 0 to 7 (1 x Byte), the time in ms during which the value was over the thresholds (1 x Uint32).

If value is smaller than “Minimum for discard” or greater than “Maximum for discard”, the received CAN message is discarded.

When the value is out of range the data bytes of CAN message to be sent (message ID defined by B230) will be bitwise OR-ed with configured data bytes of all other out of range values.
When all configured value messages are received or receiving timeout is expired, if the data byte are different from last sent message a new message sequence is sent.

When stop time is reached an event at high priority with status code F4AF will be generated. Event data will contain the index of message (WORD).

7.24

7.24.1 CANBUS Monitor Geozone Message

Property key	B23F
Description	Set data bytes to be OR-ed when the device is out of Geofence.
Attributes	1 x BYTE 1 x DWORD Up to 8 BYTE
0:1	Geozone ID
1:4	Stop time (in Linux Epoch format). When the time is reached geozone check is ignored. If set to 0 Stop timer is disabled.
5:8	Message Write Data (up to 8 bytes)

Notes:

When stop time is reached an event at high priority with status code F4AF will be generated. Event data will contain 0x0009.

7.25

7.26 Sensor configuration

7.26.1 Power supply under voltage limit.

Property key	FB01

Description	Power supply under voltage limit in mV when the the limit is set and the power supply go under this limit send the high priority event FD14
Attributes	UINT32
0:4	Under voltage limit in mV

7.26.2 Low battery threshold.

Property key	FB02
Description	Low battery threshold.
Attributes	UINT32
0:4	Under voltage limit in mV. When the device is battery powered and the battery is under this threshold and event FD10 will be generated.

7.26.3 Critical battery threshold.

Property key	FB03
Description	Critical battery threshold.
Attributes	UINT32
0:4	Under voltage limit in mV. When the device is battery powered and the battery is under this threshold and event FD11 will be generated and the system will shutdown .

7.27 Accelerometer

7.27.1 Accelerometer value

Property key	B030
Description	Current accelerometer value.
Attributes	3 x INT32 Read Only
0:4	Acceleration on axis X
4:4	Acceleration on axis Y
8:4	Acceleration on axis Z

7.27.2 Accelerometer threshold.

Property key	B010 .. B01F Up to 16 accelerometer threshold.
Description	Up to 16 accelerometer threshold.
Attributes	3 x UINT16
0:2	Threshold of absolute module deviation from 1G in G/1000
2:2	

Mask	Description
8000	The value is checked when moving event are ignored.
4000	Event will be generated at high priority.
2000	If set when the event are not generated but the input specified by the mask X00 is set according with the threshold.

	<table><tr><th>Mask</th><th>Description</th></tr><tr><td>1000</td><td>If set, the corresponding threshold is also configured into the accelerometer as wake-up threshold. Only one property from B010 to B01F can have this bit set.</td></tr><tr><td>0F00</td><td>Input set automatically when accelerometer is over the specified threshold.</td></tr></table>
4:2	Minimum delay between event in minutes. If not set the default will be 1 minute.

7.28 Odometer

7.28.1	Number of meter that the device has moved.
Property key	F770-F77F
Description	Odometer in meters. The first one odometer is reported in km in each event.
Attributes	UINT32
0:4	Number of meters.

7.29

7.29.1	Odometer limit
Property key	F780-F78F
Description	Device odometer triggered alarm point in meters.
Attributes	1 x UINT32
0:4	If set when the correspondent odometer reach the limit one event F140+x where x is the odometer number is generated. If the device is restarted and the limit was reached the event is triggered again. Since 1.2.3

7.29.2	Odometer configuration
Property key	B0C0-B0CF
Description	Configure the scale of odometer.
Attributes	2 x UINT16
0:2	If present the odometer will be multiplied by this value.
2:2	If present the odometer will be divided by this value.

7.29.3	Odometer raw values
Property key	B0F0-B0FF
Description	Return the raw values of each odometer.
Attributes	1 x DOUBLE (READ/WRITE)
0:8	Current odometer value as IEE754 double value.

7.29.4 State / Version

7.29.5	Number of bytes read by client.
Property key	F3F1
Description	Number of bytes read by client since last reset.
Attributes	UINT32 (READ/ONLY)
0:4	Number of bytes.

7.29.6	Number of bytes written by client.
Property key	F3F2
Description	Number of bytes written by client since last reset.
Attributes	UINT32 (READ/ONLY)
0:4	Number of bytes.

7.29.7	OpenDMTP last connection time.
Property key	F3F3
Description	OpenDMTP last successful connection time (in local time).
Attributes	String (READ/ONLY)
0:X	Connection time in local time format

7.29.8	Device diagnostic information.
Property key	F141
Description	Device diagnostic.
Attributes	UINT32 x 5(READ/ONLY)
0:4	Current device reset count.
4:4	Current supply voltage in mV.
8:4	Current device restart count.
12:4	**7.29.9 Extended status code** ***7.29.9.1.1.1 the last 3 bit are the same of the status code***

Mask	*Description*
00000001	GSM network not connected.
00000002	GPS not fixed.
00000004	Telemetry timeout

7.29.9 Extended status code

7.29.9.1.1.1 the last 3 bit are the same of the status code

00000008	Power not present.
00000010	Charge status 1
00000020	Charge status 2
00000100	Board version bit 0
00000200	Board version bit 1
00000400	Board version bit 2
00000800	Board version bit 3
FF000000	Last GPS SNR

Charge status 1	*Charge status 2*	*Description*
1	1	Charging error.
1	0	Charge done.
0	1	Charging.
0	0	Pre charging.

16:4 Battery level in mV only valid when the main power is not connected.

7.29.10 Device hardware configuration.

Property key	F142
Description	Device hardware configuration.
Attributes	UINT32 x 1(READ/ONLY)

0:4

Mask	*Description*
00000007	Number of CAN bus channel installed 0 to 7

7.29.11 Protocol version.

Property key	F100
Description	Version of OpenDMTP protocol.
Attributes	BYTE Array.
0:1	Major version. Currently 0

1:1	Minor version. Currently 2
2:1	Minor revision. Currently 4

7.30

7.30.1	Firmware revision.
Property key	F101
Description	Firmware revision.
Attributes	ASCIIZ
0:X	Firmware revision.

7.31

7.31.1	Application name.
Property key	F104
Description	Application name.
Attributes	ASCIIZ
0:X	Application name.

7.32

7.32.1	Bootloader revision.
Property key	F102
Description	Bootloader revision.
Attributes	ASCIIZ
0:X	Bootloader revision.

7.32.2	Device serial number
Property key	F110
Description	Serial number
Attributes	ASCIIZ
0:X	Serial number

7.32.3	Power Manager Firmware revision
Property key	F109
Description	Firmware revision of power manager MCU
Attributes	ASCIIZ
0:X	Firmware revision
Notes	Only available in NVT3 (sybok) devices

7.32.4	Operating system Image revision
Property key	F108
Description	Operating system Image revision
Attributes	ASCIIZ
0:X	OS Image revision
Notes	Only available in NVT3 (sybok) devices

7.32.5	Current GPS fix
Property key	F123
Description	Current GPS fix
Attributes	UINT32 6 x BYTE
0-4	GPS fix time or 0 if not fixed.
4-3	Standard-resolution encoded latitude.
7-3	Standard-resolution encoded longitude.

7.32.6	Event count.
Property key	F131
Description	Event count.
Attributes	2 x UINT32
0:4	Number of queued, unacknowledged events.
4:4	Total number of event generated since last reset.

7.33

7.33.1	User time
Property key	F118
Description	User time.
Attributes	2 x UINT32 R/O
0:4	Total running time in seconds.
4:4	Total running time in seconds with motion event enable.

7.33.2	Code of flash memory schema
Property key	B027
Description	Code of flash memory schema **please change carefully** ***Code*** / ***Description*** 00000000 – Standard flash schema 00000001 – Standard flash schema + data logger and path tracking

Attributes	UINT32 (READ/ONLY)
0:4	Code of flash memory schema

7.33.3 User properties

Property key	B070 .. B07F
Description	General purpose user definable properties.
Attributes	STRING (READ/WRITE)
0:X	Any value.

7.33.4 RTC constants

Property key	B0B0 .. B0B1
Description	The RTC calibration constant used with the low power RTC * 10000. During the low power the RTC is used to count the elapsed time and the time it is added to the current value of RTC when wake-up. This constant normally is auto calculated using the GPS time and compensate the error of the RTC oscillator. The first WORD is the last saved value and the second is the current value. When the system is restarted the current value is saved as last.
Attributes	1 x UINT16 READ/WRITE
0:2	RTC constant. Since 1.2.2

7.33.4.1 RTC value

Property key	B0B2
Description	Current RTC in seconds from 01/01/70 00:00:00
Attributes	1 X DWORD READ/WRITE
0:4	Current RTC value. Normally this value is update automatically from GPS and is not necessary to set it.

7.33.5 GPS Diagnostic.

Property key	F124

Description	GPS Diagnostic information.
Attributes	5 x UINT32
0:4	Last GPS sample time.
4:4	Last GPS valid fix.
8:4	Number of valid fix from reboot.
12:4	Number of not valid fix from reboot.
16:4	Number of GPS reset from reboot. GPS reset occours if GPS stops sending NMEA sentences.

7.33.6	GSM Operator name
Property key	B0D0
Description	GSM Operator name
Attributes	ASCIIZ Read/Only
0:X	GSM operator name

7.34

7.34.1	GSM Signal quality
Property key	B0D1
Description	GSM Signal quality 00-31
Attributes	BYTE Read Only
0:1	Signal quality.

7.35 GeoZone

Up to 16 GeoZone can be defined.

7.35.1	GeoZone arrive delay.
Property key	F54A
Description	Delay in seconds before the arrive in one GeoZone is detected.
Attributes	WORD (READ/WRITE)
0:2	Number of seconds before the arrive in one GeoZone is detected.

7.35.2	GeoZone depart delay.
Property key	F54D
Description	Delay in seconds before the depart in one GeoZone is detected.
Attributes	WORD (READ/WRITE)
0:2	Number of seconds before the depart in one GeoZone is detected.

7.35.3	GeoZone count.
Property key	F547
Description	Number of GeoZone configured.
Attributes	WORD (READ ONLY)
0:2	Number of GeoZone configured.

7.35.4	GeoZone current.
Property key	F551
Description	ID of the current GeoZone or 0 if no geozone is detected.
Attributes	DWORD (READ ONLY)
0:4	Current GeoZone ID.

7.35.5	GeoZone admin command.
Property key	F542
Description	GeoZone administrative command.
Attributes	Command (WRITE ONLY)
0:1	**0x10 Add GeoZone with 6 byte encoding.**
1:2	Zone ID
3:2	Mask E000 GeoZone type (0XXX Point with radius, 2XXX Rectangular area) Mask 1FFF For type 0XXX is the radius in meters.
5:6	6 Byte Latitude / Longitude # 1 (NW corner if Rectangular area)
11:6	6 Byte Latitude / Longitude # 2 (SE corner if Rectangular area)
	The above template can be repeated up to 15 times for packet.
0:1	**0x11 Add GeoZone with 8 byte encoding.**
1:2	Zone ID
3:2	Mask E000 GeoZone type (0XXX Point with radius, 2XXX Rectangular area) Mask 1FFF For type 0XXX is the radius in meters.
5:8	8 Byte Latitude / Longitude # 1 (NW corner if Rectangular area)
13:8	8 Byte Latitude / Longitude # 2 (SE corner if Rectangular area)
	The above template can be repeated up to 11 times for packet.
0:1	**0x20 Remove GeoZone**
1:5	Zone ID
0:1	**0x30 Save Changes. Save to non volatile memory the GeoZone configuration, if this command is not sent and the device is restarted all change are lost.**

7.35.6	Automatic Geo zone.
Property key	F550
Description	Automatic geozone.
Attributes	WORD (READ/WRITE)
0:2	Radius of the automatic Geo zone in meters. When the motion event are disabled if this property is set an automatic geo zone with the current location and the specified radius will be created.

7.35.7	Geo zone Command
Property key	F552
Description	Geozone Command.
Attributes	1 x WORD + 2 x DWORD (READ/WRITE)
0:2	Geozone ID
3:4	Command for geozone OUT
7:4	Command for geozone IN
Notes	When gps fix is present if current geozone is different from configured zone command OUT is executed, in other cases IN command is executed. For command syntax see Commands

7.36 Timezone

7.36.1	Start daylight saving time. Default value 00350200
Property key	B040
Description	Define the start of daylight saving time.
Attributes	String (READ/WRITE)
0:1	Day of the week. (0 = Sunday)
1:2	Month 01-12
3:1	Number of week (1 First …. 5 – Last)
4:2	Hour
6:2	Minute

7.36.2	End daylight saving time. Default value 01050300
Property key	B041
Description	Define the start of daylight saving time.
Attributes	String (READ/WRITE)

0:1	Day of the week. (0 = Sunday)
1:2	Month 01-12
3:1	Number of week (1 First …. 5 – Last)
4:2	Hour
6:2	Minute

7.36.3	Timezone offset from UTC in seconds. Default -3600
Property key	B042
Description	Timezone offset in seconds.
Attributes	DWORD (READ/WRITE)
0:4	Timezone offset in seconds.

7.36.4	Daylight saving time offset in seconds. Default 3600
Property key	B043
Description	Daylight saving time offset in seconds.
Attributes	DWORD (READ/WRITE)
0:4	Timezone offset in seconds.

7.37 Working time

This properties are checked only when motion event are enabled. Tipically when the engine start.

If the engine start outside of the defined time an event F11C will be generated.

7.37.1	Working time
Property key	B050 - B05F
Description	Working time.
Attributes	5 x BYTE
0:1	Day of the week (0 Sunday … , 7 Mon-Fri, 8 Sat-Sun, 9 Every day)
1:1	Start hour in local time.
2:1	Start minute in local time.
3:1	End hour in local time.
4:1	End minute in local time.

7.38 SMS event manager

This set of property are used to receive events via SMS.

7.38.1	SMS Event
Property key	B060
Description	SMS event filter.
Attributes	1 .. 16 WORD (READ/WRITE)
0:2	Code of the event that must be sent via SMS or FFFF to receive all events.
X:2	The code can be repeated up to 16 times.

7.38.2	SMS Phone number
Property key	B061 .. B063
Description	SMS Phone number
Attributes	STRING(READ/WRITE)
0:X	Phone number that receive the event.

7.38.3	SMS CODE
Property key	B0E0 .. B0EF
Description	Text description for SMS. For each ode sent by SMS (see property B060) it is possible associate a text that will be automatically sent with the SMS. The property B0E0 is for the first SMS code in property B060 and so on.
Attributes	STRING(READ/WRITE)
0:X	CODE description.

7.39 Low power management

7.39.1	Low power timer without external power.
Property key	B064
Description	Timeout in minute to enter low power when the external power supply is not present.
Attributes	1 WORD (READ/WRITE)
0:2	Timeout in minutes.

7.39.2	Low power timer without motion events.
Property key	B065

Description	Timeout in minute to enter low power when motion events are disabled.
Attributes	1 WORD (READ/WRITE)
0:2	Timeout in minutes.

7.39.3 Low power timer without any event.

Property key	B067
Description	Timeout in minute to enter low power when no events are generated.
Attributes	1 WORD (READ/WRITE)
0:2	Timeout in minutes.

7.39.4 Low power real time clock timeout.

Property key	B080
Description	Timeout in minutes to exit low power if no other sources are triggered.
Attributes	1 WORD (READ/WRITE)
0:2	Timeout in minutes.

7.39.5 Low power real time clock timeout for deep low power after normal low power.

Property key	B082
Description	If NextDeepLowpower is enabled (B066 mask 0x2000), after normal low power and wakeup for Timer (time set in B080) when the system goes to deep low power the time in minutes will be set from B082
Attributes	1 WORD (READ/WRITE)
0:2	Timeout in minutes to wake from deep low power after wakeup by timer from normal low power.
Notes	Only available in Sybok (NVT3). If not set, deep low power timer will be set using the value of B080.

7.39.6 Exit low power sources.

Property key	B066
Description	Sources used to exit low power.
Attributes	1 WORD (READ/WRITE)
0:2	Configured sources to exit low power

Mask	***Description***
0x0001	Change on external power status
0x0002	Alarm from accelerometer
0x0004	Change on digital input #0
0x0008	Ring indicator from the modem

	0x0010 | Real time clock 0x0020 | Change on digital input #3 0x0040 | Change on digital input #1 0x0080 | Change on digital input #2 0x0100 | Activity on CAN #0 0x4000 | If set enables deep low power (if supported by device) 0x2000 | If set the next low power will be deep low power if last wake up from normal low power was triggered by timer. 0x8000 | If set the enter/exit low power event are sent at high priority *Table 3: Wakeup source*
Notes:	Deep low power mode 0x2000 and 0x4000 is only supported by NVT3 devices. For NVT3 in normal low power please note that: • Digital input 1 (switch) must be active for 500ms to wake the device. • Wakeup from modem will be active after 30s from entering low power mode.

7.40 Temperature sensor

All temperature sensor value are represented using 16 bit signed number in Celsius / 10.

Temperature channel #	*Description*
0	Internal GSM modem temperature.
1	CPU internal temperature.
2	Not available.
3	Not available.

7.40.1	Temperature sensor configuration
Property key	FB80 .. FB83
Description	When the temperature is out of range an event is triggered.
Attributes	4 WORD (READ/WRITE)
0:2	Minimum temperature.
2:2	Maximum temperature.
4:2	Interval time in seconds between event of temperature sent to the server.
6:2	Digital inputs to be checked if the relative input change one temperature event is triggered.

7.40.2	Temperature value
Property key	FB90 .. FB93
Description	Current value of the temperature.
Attributes	1 WORD (READ ONLY)
0:2	Temperature.

7.41

7.42 Analog sensor

7.42.1

7.42.2	Analog sensor scale
Property key	FB10 .. FB1F
Description	Analog sensor scale configuration.
Attributes	2 x WORD
0:2	If set the value of the analog sensor will be multiplied by this value.
2:2	If set the value of the analog sensor will be divided by this value.

7.42.3 Analog sensor configuration

Property key	FB20 .. FB2F
Description	Analog sensor configuration. The DWORD 4 / 5 define an interval for automatic sensor reading if set when the timer expire an event F600 is triggered with the sensor value.
Attributes	5 x DWORD
0:4	Analog sensor low limit. If set when the sensor is below this limit an event F620 will be triggered. The event always will contain the value of the analog sensor.
4:4	Analog sensor high limit. If set when the sensor is over this limit and event F630 will be triggered. The event always contain the value of the analog sensor.
8:4	

Mask	Description
80000000	Sensor range checked only when the motion event are enabled.
40000000	Sensor low limit at high priority.
20000000	Sensor high limit at high priority.
10000000	Sensor value event at high priority.
04000000	If set the sensor operate as raw value.
08000000	If set operate as digital input the digital input set with mask 00F00000 will be set to 1 when over the high sensor limit and to 0 when below low sensor limit.
00F00000	Virtual digital input number.
0000FFFF	Digital input trigger. For each digital input (0 .. 15) if the relative bit is set the value of the analog sensor is sent as event when the digital input change.

12:4	Automatic read interval of sensor in seconds when motion are enabled.
16:4	Automatic read interval of sensor in seconds when motion event are not enabled.

7.42.4 Analog sensor sample

Property key	FB30
Description	Analog sensor sample.
Attributes	1 x WORD + 2 x 3 x WORD
0:2	

Mask	Description
0001	Analog sensor sample enabled

2:2	Event code used when motion event are enabled.
4:2	Sample time in seconds when motion event are enabled.
6:2	Analog input to be sampled LSB bit first analog input.

8:2	Event code user when motion event are disabled.
10:2	Sample time in seconds when motion event are disabled.
12:2	Analog input to be sample LSB bit first analog input.

7.42.5	Analog sensor values
Property key	FB50 .. FB5F
Description	Analog sensor values.
Attributes	1 x DWORD READ ONLY
0:4	Analog sensor value.

7.43 Remote human interface.

Optionally the tracker can be connected to one remote human interface with an LCD display , 6 keys capacitive keyboard and a RFID reader.

7.43.1 HDI Enable

Property key	B0DA
Description	HDI interface mode
Attributes	DWORD
0:4	

Mask	Description
00000001	If set the HDI interface is enabled.
00000002	If set the DWIN Display is enabled. (Only for sybok – NVT3 devices).
00000010	If set the Log is not disabled on HDI COM port (use only for debug).
10000000	If set script “defaultopanel” is executed at startup to configure HDI, than serial number of tracker is written in HDI property F110. If HDI property F110 value is the same as tracker property F110 the script is not executed.

7.43.2 HDI Firmware

Property key	B0DB
Description	Upgrade the firmware.
Attributes	STRING
0:X	On read return the current HDI firmware version on write force a firmware upgrade. If the argument is BOOT the boot loader is upgraded .

7.43.3 HDI Config

Property key	B0DC
Description	HDI configuration
Attributes	DWORD
0:4	HDI device configuration

Mask	Description
00000001	Enable the leds.
00000002	Enable the buzzer.
00000004	Enable the display.

7.43.4 HDI security timeout

Property key	B0DD

Description	Security timeout
Attributes	DWORD
0:4	Security timeout in milliseconds.

7.43.5	HDI Property
Property key	B0DE
Description	Write/Read one property in the HDI
Attributes	ASCIIZ
0:2	HID Property code
3:X	Value
Examples	To Set HDI mode to 2 you can set B0DE property to “800002” (where 8000 is mode property in HDI and 02 the value). To clear menu in HDI you can set B0DE property to “8001FF” (where 8001 is menu config property of HDI and value FF is clear menu command. To add a menu item “Rifiuti” you can set B0DE property to “80010000010001Rifiuti”.
Notes	To set HDI Properties HDI must be enabled by (B0DA = 1), connected and operating.

7.43.6	Display Set Logo
Property key	B208
Description	Set Logo id in DWIN Display
Attributes	1 Byte
0:1	Logo ID
Notes	Available only in sybok (NVT3)

7.43.7	Display Get Serial Number
Property key	B208
Description	Read serial number from display
Attributes	16 ASCIIZ Read only
0:16	Serial number string
Notes	Available only in sybok (NVT3)

7.43.8	Display Get Info
Property key	B206
Description	Read info from display
Attributes	32 ASCIIZ Read only

0:16	Revision string
16:16	Serial Number
Notes	Available only in sybok (NVT3)

7.43.9	Display Set Task status
Property key	B204
Description	Set task status on display
Attributes	2 x BYTE, 2 X WORD up to 24 ASCII Bytes
0:1	% Completed
1:1	Progress Bar
2:2	Elapsed hours
4:2	Total hours
5:X	Name of the task (max 24 chars in ASCII Byte Format)
Notes	Available only in sybok (NVT3)

7.43.10	Display Show Message
Property key	B207
Description	Set task status on display
Attributes	1 x DWORD up to 60 ASCII Bytes
0:4	Visualization time in ms
5:X	Message text (max 60 chars in ASCII Byte Format)
Notes	Available only in sybok (NVT3)

7.43.11	Display New Task Accept
Property key	B205
Description	Show new task acceptance page
Attributes	2 X DWORD, 1 X WORD 3 X DWORD up to 24 ASCII Bytes
0:4	Start date in epoch format
4:4	End Date in epoch format
8:2	Expected duration (hours)
10:4	Latitude
14:4	Longitude
18:4	Radius
22:4	Page visualization time [ms] (if 0 wait until user click on OK)
26:X	Name of the task (max 24 chars in ASCII Bytes Format)
Notes	Available only in sybok (NVT3)

7.43.12	Display Input status visualization configuration
Property key	B300-B307
Description	Configure 8 input status visualization on the display
Attributes	3 x BYTE up to 16 ASCIIZ
0:1	Position on the display (0..7)
1:1	Color code for ON status
2:1	Color code for OFF status
3:X	Name of the input (max 16 chars)
Color codes	0: Black 1: Yellow 2: Red 3: Green
Notes	Available only in sybok (NVT3)

7.43.13	Display Output status visualization configuration
Property key	B310-B312
Description	Configure 3 output status visualization on the display
Attributes	3 x BYTE up to 16 ASCIIZ
0:1	Position on the display (0..7)
1:1	Color code for ON status
2:1	Color code for OFF status
3:X	Name of the output (max 16 chars)
Color codes	0: Black 1: Yellow 2: Red 3: Green
Notes	Available only in sybok (NVT3)

7.43.14	Display CAN Values visualization
Property key	B210-B217
Description	Configure up to 8 values read from CAN bus
Attributes	1 BYTE,1 WORD, 1 DWORD, 2 BYTE, 2 WORD, 1 INT32
0:1	Position on the display (0..7)
1:2	Visualization timer (ms) minimum 100ms
3:4	Message ID
7:1	Start bit
8:1	Length
9:2	Multiplier

11:2	Divider
13:4	Offset
Notes	Available only in sybok (NVT3)

7.43.15	Display Obstacle Labels Configuration
Property key	B320-B327
Description	Configure up to 8 labels for Obstacle
Attributes	1 WORD,Up to 30 ASCIIZ
0:2	Label ID
2:30	Label text
Notes	Available only in sybok (NVT3)

7.43.16	Display Anomaly Labels Configuration
Property key	B330-B337
Description	Configure up to 8 labels for Anomaly
Attributes	1WORD, Up to 30 ASCIIZ
0:2	Label ID
2:30	Label text
Notes	Available only in sybok (NVT3)

7.43.17	Display Activity Labels Configuration
Property key	B340-B347
Description	Configure up to 8 labels for Activity
Attributes	1WORD, Up to 32 ASCIIZ
0:2	Label ID
2:30	Label text
Notes	Available only in sybok (NVT3)

7.43.18	Display User PIN Configuration
Property key	B350-B357
Description	Configure up to 8 user PIN
Attributes	1WORD
0:2	PIN (max 0x270F)
Notes	Available only in sybok (NVT3)

7.43.19	Display Analog values visualization
Property key	B360-B363
Description	Configure up to 4 analog value
Attributes	1 x BYTE, 2 x UINT16, 1 x INT32
0:1	Position on the display (0..2)
1:2	Multiplier
3:2	Divider
5:4	Offset
Notes	Please note that ADC value is in mV format. Available only in sybok (NVT3)

7.44 Path Recording and playing

This feature requires that the HDI is connected to tracker device.

7.44.1	Path Enable
Property key	B200
Description	Path recording and playing enable
Attributes	DWORD
0:4	

Mask	*Description*
00000001	If set path features are enabled
00000010	Enable sending StartPlay event
00000020	Start Play event is sent in high priority
00000100	Enable sending PathCompleted event
00000200	PathCompleted event is sent in high priority
00001000	Enable sending PoiReached event
00002000	PoiReached event is sent in high priority
00010000	Enable sending PoiSkipped event
00020000	PoiSkipped event is sent in high priority
00100000	Enable sending PathAborted event
00200000	PathAborted event is sent in high priority

7.44.2	Path Create
Property key	B201
Description	Create a new path, add POIS, save path in flash memory
Attributes	2 BYTE or 1 BYTE + 2 DWORD or 1 BYTE

0:N

Command	Description
FFDD	New Path, DD is the path ID from 00 to 07
00XXXXXXXXYYYYYYYY	Add POI, XXXXXXXX is latitude and YYYYYYYY is longitude. Coordinates must be encoded to 32 bit integer format according to OpenDMTP standard
02	Save path in flash memory

Note: Before creating a path using B201 property you must ensure that there is not a local path recording, checking events with status codes F8B0 and F8B1.

7.44.3	POI reached tolerance
Property key	B202
Description	Tolerance in mm for POI reached during play path
Attributes	DWORD
0:4	Tolerance [mm]

7.44.4	POI reached message duration
Property key	B203
Description	Duration in seconds for POI reached message during play path
Attributes	DWORD
0:4	Duration [s]

7.45 Working time ranges (COLMAR)

Output 0 will change status if:

1. CAN message with ID 7A1 is received and
2. There is a range defined for user id in the CAN message (First byte of data) and
3. The value of realtime clock is within start and end time.

If the user id in the CAN message is 0 the output will change status ignoring time ranges.

A high priority event with statuscode F837 containing all bytes of the CAN message will be sent to server every time a user id is authorized by checking time ranges (or user id = 0)

User authorization is revoked when:

1. output 0 status returns to initial status or
2. CAN message with ID 7A1 is received and userid is 0xFF

When authorization is revoked by CAN message with user id = 0xFF a high priority event with statuscode F838 is sent to server.

It is advised to set a buffering time to output 0 to avoid engine lock when ignition key is turned off and turned on after a short time.

7.45.1	Working time ranges enable
Property key	B1FF
Description	Working time ranges enable
Attributes	DWORD
0:4	00000001 = Enable

7.45.2	Working ranges definition
Property key	B100 - B10A
Description	Working ranges definition
Attributes	3 x DWORD
0:4	User ID (0 and FF are reserved)
5:4	Start of working time (UNIX epoch)
9:4	End of working time (UNIX epoch)

7.46 1-Wire bus

7.46.1	1-Wire bus configuration
Property key	B090
Description	1-Wire bus configuration.
Attributes	DWORD R/W
0:4	

Mask	Description
80000000	Enable the 1-Wire bus
40000000	One event will be generated when any 1-Wire device is on the bus.
20000000	One event will be generated when a configured device is on the bus.
10000000	One event will be generated when a not configured device is on the bus.
08000000	The 1-Wire bus is not checked when motion event are disabled.
00000003	Priority 0-2 for the generated event.

7.46.2	1-Wire installed devices
Property key	B091
Description	1-Wire number of installed devices.
Attributes	BYTE R/W
0:1	Number of installed 1-Wire devices.

7.46.3	1-Wire bus scan
Property key	B092
Description	When this properties is written a 1-Wire bus scan cycle is initiated and at the end the new configuration will be saved.
Attributes	4 x DWORD W/O
0:4	

Mask	Description
80000000	The current configuration is cleared.
40000000	The current configuration is rewritten.
0000000F	Maximum number of configurable devices.

4:4	Duration of the scan in milliseconds seconds.
8:4	Flag assigned to new devices. (Optional)
12:4	Command assigned to new devices. (Optional)
If the special value of FFFFFFFF is set to the command and to the SCAN timeout the 1-Wire bus is initialized. Use this special mode under direct control of factory support team.	

<table>
<tr><th colspan="2">7.46.4 1-Wire device configuration</th></tr>
<tr><td>Property key</td><td>B0A0-B0AF</td></tr>
<tr><td>Description</td><td>1-Wire device configuration</td></tr>
<tr><td>Attributes</td><td>8 BYTE + DWORD R/W +2 x WORD</td></tr>
<tr><td>0:8</td><td>ROM id of the device.</td></tr>
<tr><td>8:4</td><td><table>
<tr><th>Mask</th><th>Description</th></tr>
<tr><td>80000000</td><td>Generate one event when present on the bus.</td></tr>
<tr><td>00000020</td><td>Enable the SPU on the device.</td></tr>
<tr><td>00000010</td><td>Set the temperature</td></tr>
<tr><td>0000000F</td><td>Temperature channel number</td></tr>
</table></td></tr>
<tr><td>8:4</td><td>Command to be executed for detail about the available commands see : Supported commands This command can be execute with the property F0FD.</td></tr>
</table>

7.46.5	1-Wire last seen
Property key	B093
Description	1-Wire last scan result.
Attributes	1 DWORD + 8 BYTE READ ONY
0:4	Tick count of the last scan (or 0 if not device are found)
4:8	MAC address of the last 1-Wire device.

8 Telemetry

The telemetry use Custom property from C000 to C3FF and simple arithmetic expression.

8.1.1 Expression

8.1.1.1 Convention

- ✔ Expression are evaluated from left to right and all operator have the same priority for example 2+3*6 will be evaluate as 30.
- ✔ All operation are made using 32 bit signed integer.
- ✔ The parser is very simple so the syntax must be correct.
- ✔ Reference to undefined conditions/variables/etc. Can produce unexpected result.
- ✔ Brackets cannot be nested.

8.1.1.2 Operand

Operand	*Description*
A .. Z	Current value of one variable.
a..z	Previous value of one variable
Value	Any integer number.
#xx	Condition number xx

8.1.1.3 Operator

Operator	*Description*
=	Value equal.
!	Value not equal.
>	Value greater
<	Value less
&	Operator and
|	Operator or
^	Operator xor.
+	Plus
-	Minus
*	Times
/	Division
%	Modulo
@	Absolute delta between 2 value.

8.1.1.4 Brackets

Brackets can be used but cannot be nested. In other words in one expression it is possible to include 1 or more sub expression in brackets but only one at once. i.e. the expression 2*(4+4)*(5+3) is valid but 2*((4+4)*(5+3)) is not valid and must be avoided.

8.1.2 Protocol Type.

Property key	C000
Description	Telemetry protocol type.
Attributes	UINT16 UINT16

0:2

Telemetry protocol type

Value	*Description*
0000	Telemetry is disabled.
0001	Random packet of 64 bytes.
0002	Serial custom protocol #0.
0003	Temperature 1 Wire on serial port (Only under MQX operating system)
0004	Taxes on fuel.
0005	Serial telemetry receive any packet terminated by CR,LF or CRLF. Data received thru the property C008 are written to the serial port as is. The property C001 is used to configure the serial port in not set the console serial port is used. The baud rate is fixed at 9600 bps
0006	Can bus all packet. In this configuration all single configured packet are processed and the telemetry buffer will contain : 4 Byte packet id, 1 byte data length , 8 byte data. The frame can be filtered using the properties C010-C02F.
0007	Can bus with frame. In this configuration all configured packet are queued in one single telemetry buffer, the telemetry buffer will contains 8 byte data for each configured can message and the telemetry buffer will be updated only when all packet are received or the receive timeout expire(for detail see Note on Telemetry 0007 – Can bus multiple packet). If the packet have a data length less then 8 byte the missing data will be filled with 00. The frame can be configured using the properties C010-C02F.
0008	Can bus single frame multiplexed. In this configuration each frame is processed as separated telemetry buffer and each frame have a different set of variables. Also change the behavior of the user defined packet, only the first 32 bit of the bitmap stored in the properties C700:C71F are used and each bit is relative to data of one specific filter and not a byte. For example if the bitmap will be 03000000 only the data filtered with can bus filter 1 and 2 are sent as telemetry. Using properties C040-C05F it is possible specify bits field mask for each can filter if not set the default byte mask is used. Field with all bit set to 1 are ignoted and not processed.

2:2	<table><tr><th>Mask</th><th>Description</th></tr><tr><td>0001</td><td>If set telemetry is ignored without ignition.</td></tr></table>
4:2	Optional: Number of ignored frames at start. Default value is 3.

8.1.3 Serial port.

Property key	C001
Description	Telemetry serial port.
Attributes	ASCIIZ
0:X	Serial port.. Also used under Linux operating system for example with the name of the CAN interface.

8.1.4 Standard packet.

Property key	C002
Description	Telemetry standard packet definitions.
Attributes	BYTE Array
0:X	Offset in the received packet of the byte that must be sent as standard packet. For example if this property is set to 050A01 the byte at offset 5,10 and 1 are sent as standard packet for any telemetry event.

8.1.5 Telemetry timeout.

Property key	C003
Description	Telemetry timeout in seconds.
Attributes	UINT16
0:2	Number of seconds without telemetry before the device send an error. If 0 the check is disabled.

8.1.6 Telemetry event

Property key	C004
Description	Generate a complete event of telemetry.
Attributes	UINT16
0:2	Status code.

8.1.7 Telemetry buffer

Property key	C005

Description	This Read only property return the last telemetry packet.
Attributes	UINT8
0:X	Last telemetry buffer.

8.1.8 Telemetry configuration

Property key	C006
Description	This write only property configure the telemetry.
Attributes	UINT8
0:1	The value is ignored.

8.1.9 Telemetry Flags

Property key	C007
Description	Flags used for telemetry
Attributes	UINT16 x 2
0:2	Telemetry flags
2:2	Code used to generate event.

Telemetry flags

Mask	*Description*
0001	If set all frame received from the telemetry are sent to the server.
0002	If set all frame sent are at high priority.
0004	Disable the telemetry double buffer. Must be set for telemetry 0007 with can router.
8000	Enable the debug all packets are logged on the console. Use carefully because the console process the data very slowly.

8.1.10 Telemetry Command

Property key	C008
Description	Command for the telemetry driver. This write only property are passed as is to the telemetry driver.
Attributes	BYTE
0:X	Data for the driver.

8.1.11 Telemetry status code.

Property key	C009
Description	Status code sent when telemetry initialized or stopped by ignore event.
Attributes	2 x WORD
0:2	Status code when telemetry is initialized. A copy of the last available telemetry is sent with

	this status code.
2:2	Status code when telemetry is ignored because the device ignore event. A copy of the last available telemetry is sent with this status code.

8.1.12 Telemetry auto interval.

Property key	C00A
Description	Define the automatic send interval.
Attributes	2 x DWORD
0:4	Interval in milliseconds.
4:4	Repeat count.

8.1.13 Telemetry auto command.

Property key	C00B
Description	Data sent automatically.
Attributes	128 x BYTE
0:X	Data to be sent,

8.1.14 Telemetry auto event.

Property key	C00C
Description	Telemetry data sent automatically. Define the interval and the rules to sent telemetry buffer to the server.
Attributes	2 x DWORD 1 x WORD
0:4	Interval in milliseconds. (0 no event are sent)
4:4	Event flags

Mask	*Description*
8000000	If set the packet have high priority.

8:2	Status code of the event.

8.1.15 Telemetry can interfaces selection for telemetry.

Property key	C00D
Description	Select the can interface. If 0 automatically select only the interface # 0. Up to 4 interface can be selected depending of number installed cans.
Attributes	DWORD
0:4	

Mask	*Description*

Mask	***Description***
0x00000002	Can # 1
0x00000004	Can # 2
0x00000008	Can # 3
If 2 or more mask are ored all the can are selected for example setting the property to 5 che can#0 and can#2 are selected.	

8.1.16	Telemetry can bus filter.
Property key	C010-C02F
Description	Can bus filter. Define a filter for can bus telemetry one message is accepted when : id & mask == mask & value.
Attributes	3 x DWORD 2 x QWORD 1 x BYTE
0:4	Mask
4:4	Value
8:4	Optional timeout in milliseconds.
12:8	Optional data mask
20:8	Optional data value. Message are accepted when data & data mask == data mask & data value
28:1	Optional data value mask. Each bit set to 1 define that the relative data byte of the can message is processed. The default value of 00 is equivalent to FF that means that all data byte are processed.
29:4	Filter flags **Mask** / **Description** 00000001 – Invert data filter

8.1.16.1 Can bus data filter

It is possible filter packet not only with can id but also with the data usung the QWORD ad position 12 and 20

foor example to capture all data where the can id is 18FF1003 when the first byte of data is 05 set for example the property c010 for the first filter with :

```
C010 FFFFFFFF18FF100300000000FF0000000000000005000000000000FF
```

8.1.16.2 Telemetry can bus bit mask

This set of properties are used together with the can bus filter (properties C010-C02F) and define which bit must be copied in the telemetry packet. If a field contains all bit set to one is ignored.

Property key	C040-C05F
Description	Telemetry can bus bit mask
Attributes	24 x WORD
X:2	**Mask** / **Description** 3FXX – Bit start position (if not set is automatically calculated from the last value) XX1F – Number of bit - 1

8.1.17	Telemetry internal parameter.
Property key	C080-C08F
Description	This properties are used internally by the telemetry driver.
Attributes	BYTE up to 128
0:X	Internal value.

8.1.18	Telemetry internal parameter volatile.
Property key	C090-C09F
Description	This read only property are used internally by the telemetry driver. And are not stored in flash memory.
Attributes	UINT8
0:X	Internal value.

8.1.19 Volatile variable common to all telemetry type

Property key	*Type*	*Description*
C090	DWORD	Seconds from 01/01/1970 00:00:00 UTC of the last received telemetry packet.
C091-C097		Telemetry specific properties.
C09F	DWORD	Number of telemetry packet received.

8.1.20 Variable definition.

Property key	C100 – C119 – Up to 26 variable A to Z.
Description	Variable definition.
Attributes	UINT32 UINT16 UINT32 ASCIIZ
0:4	

Type	*Description*
00000000	Unsigned BYTE
00000001	Signed BYTE
00000002	Unsigned 16 bit big endian.
00000003	Signed 16 bit big endian.
00000004	Unsigned 32 bit big endian.
00000005	Signed 32 bit big endian.
00000006	Unsigned 16 bit little endian.
00000007	Signed 16 bit little endian.
00000008	Unsigned 32 bit little endian.
00000009	Unsigned 32 bit little endian.
000000F0	DWORD bits variable.

<table>
<tr><td></td><td></td></tr>
<tr><td>4:2</td><td>Position in the telemetry packet (0000-00FF) or FFFF if the variable is calculated.

For bit variable (type 000000F0) the low 5 bit are the number of bits and the high 11 are the position in the telemetry buffer.

The position is split in two fields with this mask :
<table>
<tr><th>Mask</th><th>Description</th></tr>
<tr><td>FFE0</td><td>Start position in bit in the telemetry buffer.</td></tr>
<tr><td>001F</td><td>Width of the fields in bit - 1</td></tr>
<tr><td></td><td></td></tr>
</table>
Bit are in MSB order, for example if the start position is 18 and the width is 9 the following bits are stored in the variable when the position is be set to : 0x0248 :
<table>
<tr><th>Bit</th><th>Offset in byte</th><th>Mask</th></tr>
<tr><td>8</td><td>2</td><td>0x04</td></tr>
<tr><td>7</td><td>2</td><td>0x02</td></tr>
<tr><td>6</td><td>2</td><td>0x01</td></tr>
<tr><td>5</td><td>3</td><td>0x80</td></tr>
<tr><td>4</td><td>3</td><td>0x40</td></tr>
<tr><td>3</td><td>3</td><td>0x20</td></tr>
<tr><td>2</td><td>3</td><td>0x10</td></tr>
<tr><td>1</td><td>3</td><td>0x08</td></tr>
<tr><td>0</td><td>3</td><td>0x04</td></tr>
</table></td></tr>
<tr><td>6:4</td><td>Mask.
If present, the value will be “anded” with the mask before usage. (value = value & mask)</td></tr>
<tr><td>10:X</td><td>Expression.</td></tr>
</table>

8.1.21 Variable statistics

Property key	C180-C199
Description	This set of property can be used to monitor the statistics value of one ore more variables. The property C180 is relative to the variable A, the property C181 the variable B and so on.
Attributes	2 x WORD 2 x DWORD
0:2	Status code (0 means disabled)
2:2	

<table>
<tr><td></td><td>
<table>
<tr><th>Mask</th><th>Description</th></tr>
<tr><td>XXX0</td><td>
<table>
<tr><th>Mode</th><th>Description</th></tr>
<tr><td>0</td><td>Create one event with attached the variable data statistics 1 if the expression is not 0.</td></tr>
<tr><td>1</td><td>Create one event with attached the variable data statistics 2 if the expression is not 0.</td></tr>
</table>
</td></tr>
</table>

Offset	Type	Description
0:2	UINT16	Variable number starting from 0.
2:4	INT32	Last value
6:4	INT32	Minimum value.
10:4	INT32	Maximum value.
14:4	INT32	Number of sample.
14:8	INT64	Sum of all values.
26:8	INT64	Sum of all square values.

Table 4: Variable statistics 1 attached to event.

Offset	Type	Description
0:2	UINT16	Variable number starting from 0.
2:4	UINT16	Elapsed time with the variable matched in milliseconds.

Table 5: Variable statistics 2 attached to event

</td></tr>
<tr><td>4:4</td><td>Timer in milliseconds between event.</td></tr>
<tr><td>8:4</td><td>Value parameter used for operation mode 1.</td></tr>
</table>

<table>
<tr><th colspan="2">8.1.22 Conditions definition.</th></tr>
<tr><td>Property key</td><td>C200-C21F</td></tr>
<tr><td>Description</td><td>Conditions definitions.</td></tr>
<tr><td>Attributes</td><td>UINT32 ASCIIZ</td></tr>
<tr><td>0:4</td><td><table>
<tr><th>Mask</th><th>Description</th></tr>
<tr><td>000000FF</td><td>Debounce interval in seconds.</td></tr>
<tr><td></td><td></td></tr>
</table></td></tr>
<tr><td>4:x</td><td>Expression. The condition will be true if the result of the expression is not 0.</td></tr>
</table>

8.1.23 Events definitions.

Property key	C300-C31F
Description	Events definitions.
Attributes	UINT16 UINT32 ASCIIZ
0:2	Status code. 16 bit status code 0000 to FFFF.
2:4	See table below
6:X	Expression. If the result is not zero the event is triggered.

Mask	Description
000000FF	Debounce interval in seconds.
C0000000	Packet included in the event.
20000000	Set if the event must have high priority.
10000000	If set event are threat as level sensitive. Means that event are generated till the expression became 0.
08000000	If set the expression is evaluate as counter and automatically generated the event after times cycle.
04000000	If set the expression is evaluate only after the seconds timer is expired. See below for seconds timer definition.
000FFF00	12 bit seconds timer.

Mask	Description
0	Only the status code is sent.
8	The standard telemetry packet is sent
4	The complete telemetry packet is sent.
C	The packet is created using the bitmap defined in the property C700+x where x is the event definition index. For example the event C302 will take the bitmap from the property C702.

8.1.24	Events bitmap.
Property key	C700-C71F
Description	Events bitmap definition.
Attributes	32 x BYTE. Not used byte can be omitted and are considered to be 0.
0:32	Bitmap definition on the complete telemetry packet. Each bit set to 1 send the correspondent byte in the complete telemetry packet.

8.2 Note on telemetry driver.

This chapter define properties used by all or by a single telemetry driver.

8.2.1 Note on all telemetry driver.

Property	*Type*	*Description*
C090	DWORD	Time stamp of the last received telemetry.

8.2.2 Note on Telemetry 0001 – Random Packet

None.

8.2.3 Note on Telemetry 0002 – Serial custom protocol #0

None

8.2.4 Note on Telemetry 0003 – Temperature over 1-Wire

Property	*Type*	*Description*
C080	BYTE	Number of configured devices.
C081..C08x	BINARY	Mac address of configured devices.

8.2.5 Note on Telemetry 0004 – Taxes on fuel

Property	*Type*	*Description*
C091	WORD	Serial number
C092	WORD	Number of hours.
C093	WORD	Number of minutes.
C094	WORD	MRPM
C095	WORD	KRPM
C096	WORD	RPM

Table 6: Tax on fuel telemetry volatile properties

8.2.6 Note on Telemetry 0005 – Serial interface

Command sent to the serial port are interpreted as C string so the following convention are used :

Character sequence	Description
\\	A single back space ASCII code 92
\n	Line feed ASCII code 10
\r	Carriage return ASCII code 13
\x[xx]	Where x is a decimal digit (0 .. 9) single char with ASCII code equals to the octal number x[xx] for example : \33 is the character escape ASCII code 27.

8.2.7 Note on Telemetry 0006 – Can bus any packet

Property	Type	Description
C091	DWORD	Number of sent CAN message.
C092	DWORD	Number of received CAN message.
C093	DWORD	Number of filtered CAN message.
C094	DWORD	Number of buffer overflow CAN message.

Table 7: Telemetry 0006/0007/0008 volatile properties

8.2.8 Note on Telemetry 0007 – Can bus multiple packet

All volatile properties of telemetry 0006, see : Table 7: Telemetry 0006/0007/0008 volatile properties

Property	Type	Description	
C080	2 x DWORD	0:4	Timeout in milliseconds for received can frames. If the timeout is set and one or more defined frames are received, when the timeout expires the frame is processed maintaining previous values or setting it to 0xFF for not received frames, according to invalidate timeout.
		4:4	Timeout in milliseconds for invalidate can frame data. If the timeout is set, missing frames will maintain their previous values for this time before being invalidated and set to 0xFF.
C081	BYTE	If not 0 the telemetry is sent at every can message received.	

Table 8: Telemetry 0007 specific properties

8.2.9 Note on Telemetry 0008 - Can bus single frame multiplexed.

All volatile properties of telemetry 0006, see : Table 7: Telemetry 0006/0007/0008 volatile properties

8.2.9.1	Multiplexer configuration
Property key	C081
Description	Multiplexer configuration
Attributes	1 x BYTE

0:1	When the telemetry start the first can id received form one filter is saved and named master. This parameter define of many times the muster can id must be received before the data are cleared.

Value	Description
00-01	The data are cleared after the master can id is received 1 times.
02-FE	The data are cleared after the master can id is received the number of times specified.
FF	The data are never cleared.

8.3 Telemetry CAN bus router

Telemetry CAN bus router can route data from telemetry packets to CAN bus.

8.3.1	CAN bus router configuration
Property key	C400
Description	Enable disable the CAN bus router
Attributes	DWORD
0:4	

Mask	Description
00000001	If set enable the CAN bus router.

8.3.2	CAN bus logger configuration.
Property key	C401
Description	Configure the canrouter logger.
Attributes	2 x WORD
0:2	Timer in seconds (0 logger disabled)
2:2	Event code.

8.3.3	CAN bus router message configuration
Property key	C500-C51F
Description	CAN bus router message configuration. Up to 32 CAN messages can be configured.
Attributes	3 x DWORD 1 x QWORD
0:4	CAN bus message ID (extended message flag is added automatically based on ID)
4:4	

Mask	Description
00000040	If set the message is not filled with the default data when sent.
00000020	If set the data are sent when event are not ignored.

	<table><tr><th>Mask</th><th>Description</th></tr><tr><td>0000000F</td><td>CAN message data length (0-8) DLC</td></tr></table>
8:4	Timeout in milliseconds. Must be set to a value greater than 9 ms.
12:8	Default CAN message data.

8.3.4 CAN bus data routing configuration

Property key	C600-C6FF
Description	Configure CAN bus data routing. You can define up to 255 data routing configurations. For each configuration you define: **SOURCE**: One or more consecutive bits in telemetry packet. **DESTINATION**: Position where to copy source data bits in destination CAN message.
Attributes	2 x DWORD + 1 XDWORD optional
0:4	<table><tr><th>Mask</th><th>Description</th></tr><tr><td>00FF0000</td><td>CAN bus router message index (0-31) [Defined in properties from C500 to C51F]</td></tr><tr><td>0000FF00</td><td>Starting bit position in destination CAN message (0-63)</td></tr><tr><td>000000FF</td><td>Number of bits - 1 (0-31)</td></tr></table>
4:4	<table><tr><th>Mask</th><th>Description</th></tr><tr><td>FF000000</td><td>Data type 8 bit</td></tr><tr><td>00000FFF</td><td>Parameter 1.</td></tr><tr><td>000FF000</td><td>Parameter 2.</td></tr></table> <table><tr><th>Type</th><th>Data description</th><th>Parameter 1</th><th>Parameter 2</th></tr><tr><td>00</td><td>Data from **telemetry**.</td><td>Starting data in source telemetry packet.</td><td>--</td></tr><tr><td>01</td><td>Digital input state</td><td>Right shift</td><td>--</td></tr><tr><td>02</td><td>Analog input</td><td>Analog input channel</td><td>--</td></tr><tr><td>03</td><td>GPS speed in km/h</td><td>Divide factor.</td><td>Multiply factor.</td></tr><tr><td>04</td><td>Odometer in meter.</td><td>Divide factor.</td><td>Multiply factor.</td></tr><tr><td>05</td><td>Running time in seconds.</td><td>Divide factor.</td><td>Multiply factor.</td></tr><tr><td>06</td><td>Running time with events in seconds.</td><td>Divide factor.</td><td>Multiply factor.</td></tr></table>

	<table><tr><th>Type</th><th>Data description</th><th>Parameter 1</th><th>Parameter 2</th></tr><tr><td>FE</td><td>Can packet</td><td>Starting data bit in specified can packet.</td><td>--</td></tr></table>
8:4	CAN id of the packet.

9 CAN Sequences

CAN sequences are sequences of CAN messages with the same CAN ID. The maximum number of CAN message for each sequence is 32 . Up to 8 different sequences can be configured.
When a complete sequence is received the device will generate one or more event with the configured status code with the following heading information :

9.1 CAN sequences event header

Offset	*Description*
0	Sequence type as configured.
1	Number of event in the sequence.
2	Total number of event in the sequence.
3 .. N	Collected data bytes.

9.1.1 CAN sequences configuration

Property key	C800
Description	CAN sequence flags
Attributes	DWORD
0:4	

Mask	*Description*
00000001	If set enable the can sequence
80000000	If set the sequence are only processed when motion event are enabled.

9.1.2 CAN sequences filters

Property key	C810-C817
Description	CAN sequence filter configuration.
Attributes	4 x DWORD
0:4	CAN message ID.
4:4	CAN message mask. Message are matched when an incoming message id & ID == ID & mask.
8:4	Sequence timeout in milliseconds. When set if the complete sequence is not received in the specified timeout the sequence are silent discarded.
12:4	Sequence type configuration. The first byte data byte of every sequence must be 00.

Mask	*Description*
000000FF	Sequence type

<table>
<tr><th>Mask</th><th>Description</th></tr>
<tr><td></td><td>
<table>
<tr><th>Code</th><th>Description</th></tr>
<tr><td>00 – 1F</td><td>Fixed length sequence – 1. For example if is configured the number 03 after a correct ID packet with data 00 03 XX XX XX XX XX XX is received the system will accept 4 CAN message to complete the sequence.</td></tr>
<tr><td>FE</td><td>Frame sequence with variable number of CAN messages, the second data byte contains the number of CAN message for the sequence. For example if the first received message start with 00 02 XX XX XX XX XX XX the system will accept 2 CAN message to complete the sequence.</td></tr>
<tr><td>FF</td><td>Error sequence with variable number of CAN messages, the number of expected CAN messages will be calculated with this expression (DATA1 + 4) / 5 where DATA1 is the second data byte. For example if the first received message starts with 00 14 XX XX XX XX XX XX the system will accept 4 CAN message to complete the sequence.</td></tr>
</table>
</td></tr>
<tr><td>0000FF00</td><td>Counter for sequences. An event will be created only after a minimum of sequences Is received - 1.</td></tr>
<tr><td>FFFF0000</td><td>Event code for generated packet.</td></tr>
</table>

9.2 J1939 DM1/DM2 diagnostic

9.2.1 DM1/DM2 flags

Property key	C900
Description	DM1/DM2 flags
Attributes	DWORD
0:4	

Mask	*Description*
00000001	If set enables the DM1/DM2 processor #0 (configured by property C910)
00000002	If set enables the DM1/DM2 processor #1 (configured by property C911)
00000004	If set enables the DM1/DM2 processor #2 (configured by property C912)
00000008	If set enables the DM1/DM2 processor #3 (configured by property C913)
80000000	If set the DM1/DM2 messages are only processed when motion events are enabled

9.2.2	DM1/DM2 configuration
Property key	C910-C913
Description	DM1/DM2 configuration
Attributes	6 x WORD 1 BYTE
0:2	DM1 status code (0000 disables DM1 processing)
2:2	DM1 max event
4:2	DM1 cycle time in seconds
6:2	DM2 status code (0000 disables DM2 processing)
8:2	DM2 max event
10:2	DM2 cycle time in seconds
12:1	J1939 source address

9.3 CAN Data generator

9.3.1	CAN Data generator
Property key	C920
Description	CAN Data generator flags
Attributes	DWORD
0:4	**Mask** / **Description** 00000001 – If set enable the CAN Data generator. 80000000 – If set the message sequence are only processed when motion event are enabled.

9.3.2	CAN Data generator
Property key	C930-C94F
Description	CAN Data generator configuration
Attributes	1 x DWORD 2 x WORD 2 x DWORD
0:4	**Mask** / **Description** 00000001 – If set enable the CAN Data configuration.
4:2	Data type **Type** / **Description** 0000 – GPS data (latitude, longitude) 0001 – GPS data (heading, speed, altitude) 0002 – Diagnostic data (GPS SNR, GPS satellites, modem temperature, CPU temperature, GPRS state, GPRS CSQ)
6:2	CAN channel
8:4	Timeout in milliseconds.
12:4	CAN ID

9.4 Static CAN telemetry LST

ST = Localizzatore Satellitare con Telemetria

9.4.1	CAN LST Configuration
Property key	C950
Description	CAN LST Configuration.
Attributes	DWORD

Mask	Description
8XXXXXXX	If set enable the telemetry.
XFXXXXXX	Select the can channel. Up to 4 channel can be select. If not configured default can 1 is used.
XXFFXXXX	Time in seconds to send E003 packets. If 0 default 60s time will be used.

9.5

9.6 Data logger

9.6.1	Datalog Configuration
Property key	C960
Description	CAN Data logger Configuration.
Attributes	DWORD

Mask	Description
8XXXXXXX	If set enable the data logger
XFXXXXXX	Select the can channel. Up to 4 channel can be select . If not configured default can # 0 is used.
XXXXXXXF	Mask / Description: 00000000 – Log LST data each seconds; 00000001 – log all candata

9.7

9.7.1 Datalog counter to update the counter use datalog count command shell.		
Property key	C961	
Attribute	3 x DWORD	Read Only
Position	**Size**	**Description**
0	4	Number of filled page

9.7.1 Datalog counter to update the counter use datalog count command shell.		
4	4	UTC time of the last page
8	4	Last page number

9.8 CELL ID parameter

9.8.1	Last data relative to CELL ID	
Property key	F3D5	
Attribyte	4 x WORD	
Position	***Size***	***Description***
0	2	MCC
2	2	MNC
4	2	LAT
6	2	CELL id

9.9 ECO drive configuration

9.9.1	ECO drive configuration
Property key	B0DF
Description	Enable disable the ECO drive thread.
Attributes	DWORD
0:4	***Mask*** / ***Description*** 00000001 – If set enable the ECO drive.

9.9.2	ECO drive parameter 1
Property key	B0B3
Description	ECO drive parameter 1
Attributes	64 x BYTE
0:63	

9.9.3	ECO drive parameter 2
Property key	B0B4
Description	ECO drive parameter 2
Attributes	64 x BYTE
0:63	

10 Status codes of event

Event have 3 different priority :

0 – Low priority ,never generate one connection to the server.

1 – Normal priority generate one connection as defined see : Minimum transmit delay for non critical events.

2 – High priority generate one connection as defined see : Minimum transmit delay for critical events.

Code	P	Description
F010	0	Generated the first time a valid GPS signal is received.
F011	0	Generate each time the ntp update the rtc
F020	1	Generated when only the position is sent.
F060	1	Generated when a location is request via SMS.
F111	1	Start of motion.
F112	1	Device in motion.
F113	1	End of motion.
F114	1	Device dormant.
F115	0	Cell id update the additional data contain 4 WORD with MCC MNC LAT and ICCID.
F11A	0	Speed limit is exceeded.
F420 F42F	1-2	Sent when an input goes ON the priority will be 1 or 2 if high priority is specified in the configuration. See Digital input configuration
F440 F44F	1-2	Sent when an input goes OFF the priority will be 1 or 2 if high priority is specified in the configuration. See Digital input configuration
F460 F46F	1-2	Sent when an output is set to ON. The priority will be 1 or 2 if high priority is specified in the configuration. See Digital output configuration
F480 F48F	1-2	Sent when an output is set to OFF. The priority will be 1 or 2 if high priority is specified in the configuration. See Digital output configuration
F4AF	2	Sent when one timer of Can Monitor expires. Extra data contains message index, 9 for geozone.
F600 F60F	1-2	Analog sensor value.
F620 F62F	1-2	Analog sensor under limit.
F630 F63F	1-2	Analog sensor over limit.
F823	1	New code from the operator.
F824	2	HDI interface not working.
F825	1	HDI interface working.
F826	2	HDI menu item selected
F829	0	The additional data contains one text message with the last operation must can be disable in the property f314
F837	2	Working ranges: user authenticated by CAN message

Code	P	Description
F838	2	Working ranges: user authentication revoked by CAN message
F8B0	2	Local path recording started
F8B1	2	Local path recording ended
F8B2	1-2	Path play started
F8B3	1-2	Path play completed
F8B4	1-2	Path POI reached
F8B5	1-2	Path POI skipped
F8B6	1-2	Path play aborted
F8B7	1	CAN Monitor Out of threshold statistics
F8D0		Display Obstacle Event
F8D1		Display Anomaly Event
F930 F93F	1-2	Sent when a threshold of accelerometer is exceeded. See Accelerometer threshold.
FD10	2	Low battery.
FD11	2	Critical level of battery the device will shutdown.
FD14	2	Power supply under limit. Sent when the power supply go under the configured limit. See Power supply under voltage limit.
FD16	1-2	Enter Low Power.
FD17	1-2	Exit Low Power.
FD2E	1-2	Shutdown / Deep Low Power
FD15	1	Power restored.
FD13	1	Power failure. This event will have priority 2 on first detection and priority 1 on successive detection till the power is not stable.
FD21	0	GPS expired.
FD22	1	GPS failure.
F930 F93F	1 2	Accelerometer threshold violation.
FD18	1	Wake-up by external power change
FD19	1	Wake-up by accelerometer alarm
FD1A	1	Wake-up by input #0
FD1B	1	Wake-up by ring indicator
FD1C	1	Wake-up by RTC
FD1D	1	Wake-up by input #3
FD1E	1	Wake-up by input #1
FD1F	1	Wake-up by input #2
FD20	1	Wake-up by activity on CAN0
F140 F14F	1	Generated when the odometer limit is reached.

Code	P	Description
FD23	1	Engine on outside of working time.
FD24	1	Restart because the device is not talking with the server.
FD25	1	Restart because a thread is crashed.
FD26	1	Restart because the system is going down.
FD2F	1	Restart the system.

Table 9: Status code of events

10.1 Status codes sent from server

The following status code are sent by the server during firmware upgrade.

Code	Description
F811	Device authenticated.
F821	Begin download.
F822	Download completed successfully.
F812	Device disconnected.
F841	Begin configuration.
F842	Configuration completed successfully.

Table 10: Status code of boot loader

11 SMS

The device supports a set of command through SMS to set the configuration or check its current status.

11.1 General SMS format

PPPPPPXXXXR[AAAA]

Where :

PPPPPP Is the 6 byte PIN. See SMS inbound access PIN

XXXX 4 Digit command code.

R Is a single digit and if set to 1 a reply to the sender is sent.

AAAA Are the optional argument.

11.1.1 SMS Reply

The SMS sent as reply normally contains the same text received and only for command that inquiry for information (for example the command 0001) a different text is sent.

11.2 Supported SMS command code

Cmd	*Argument*	*Description*
0000		The tracker will initiate immediately a connection with the server.
0001		Return the current location. This command always reply to the sender with one string with the current GPS information.
0002	PPPP	Return the value of the specified property in binary format
0003	PPPPX	Set the specified property to the specified value X.
0004		This command reply with all configured properties in binary format.
0005	PPPP	Return the specified property in human readable form. The PPPP is the code of the property in hexadecimal format.
0006	PPPPtext	Write the specified property to the value specified by text. For single number property text is the value in decimal format. To specify the value in hexadecimal format the prefix 0x must be inserted. For numeric property of different types (ex. 1 DWORD and 1 WORD) the only supported form is to write ALL number with the correct size in hexadecimal format without separator.
0007		One or more SMS are returned with all the properties in human readable format.
0008	X	Change the log level.
0009	Xnnn. Where X is 0 the nnn geozone will be deleted. Where X is 1 the nnn geozone will be created with the current GPS position and Radius 300 m.	Insert / remove geozone.
000A		Send back the last saved log before restart.

Cmd	Argument	Description
000B		Send back the log flash buffer.
F0AD	NN Two digit reset type for more information see Device reset.	The tracker will reset.
FACC		One or more messages are sent to the sender with the status of the system.
FADD		Sent in human readable format all data about the telemetry.

Table 11: List of SMS command

11.3 Useful SMS

List of usefully SMS ready to be sent, we assume that the device is configured with the default password (123456) and a reply to the SMS is required.

SMS Text	Description
123456F0AD100	Reset the device the configuration and the firmware are left unchanged.
123456F0AD15A	Reset the device and restore the factory configuration from the manufacturing server.
123456F0AD15B	Reset the device and download the last available firmware from the manufacturing server.
123456F0AD15C	Reset the device , download the last firmware and restore the factory configuration from the manufacturing server.
12345600031F3A1www.google.com	Set the server to www.google.com, change the final part of the SMS to use different IP or server name.
12345600031F3A27918	Set the server port to hexadecimal 7918 (decimal 31000) .

Table 12: Useful SMS

12 Supported commands

This command can be execute with the property F0FD

Command are specified in one DWORD , the DWORD is divided in four byte the first one is the command code the other 3 argument specific of the command.

Mask	Description
FF000000	Command code (Code)
00FF0000	Argument 0 (ARG0)
0000FF00	Argument 1 (ARG1)
000000FF	Argument 2 (ARG2)

Code	Description
00	Do nothing.
01	Set out output the ARG0 is the output number ARG1 is the new state of the output. For detail see Set output.
02	Set input state the ARG0 is the input number and ARG1 is the new state of the input.
03	Pulse output: ARG0 is the output number, ARG1 is the new state of the output, ARG2 is the pulse time in seconds. If pulse time is 0 the pulse time is infinite. Please note that pulse command is executed according to buffering policies. For detail about state codes see Set output.
04	Pulse output Lock: ARG0 is the output number, ARG1 is the new state of the output, ARG2 is the pulse time in seconds. If motion events are enabled before or during the pulse time, the output status will no longer change, as if the pulse time were infinite. Please note that pulse command is executed according to buffering policies. For detail about state codes see Set output.
05	Set output buffer override. The same as code 02 but ignoring command buffering.

13 WIN32 Porting

The name of the serial port on windows must be a number from 0 to 8 for com1 to com9.

13.1 Function key

Key	Description
ESC	Terminate the application
A-J	Change the state of the digital input 0 .. 9
0-9	Change the debug level. 0 to 9.
CR	Force connection to the server

14 APPENDIX

14.1 Telemetry example.

In this example we have a packet of telemetry of 32 bytes and we want to monitor one variable (16 bit signed little endian) at position 5 that contains one temperature in the range from -40 to 70 degrees. We generate a status code F100 when the sensor may be is broken and F101 when the temperature is out of the working range from -20 to 20 degrees.

Property	*Value*	*Description*
C000	00020001	Enable the telemetry with ignition flag set.
C001	3	The telemetry is received on the serial port number 3.
C002	000102030405060710	Byte received as standard telemetry packet.
C003	120	If we do not receive the telemetry for 120 seconds generate one error.
C100	00000007 0005 00000000	Variable A is 16 bit signed little integer. Variable a start at position 5. No mask.
C101	00000005 FFFF 00000000 A@a	Variable B is 32 bit signed integer. The variable is calculated. No mask Absolute delta from last packet.
C200	00000008 A>70	Condition # 00 debounce interval. Triggered when temperature out of sensor..
C201	000000007 A<-40	Condition # 01 debounce interval. Triggered when temperature out of sensor.
C202	00000000 B>40	Condition # 02 Triggered when delta temperature > 40
C203	00000008 A<-20	Condition # 03 debounce interval. Triggered when temperature out of range.
C204	00000008 A>20	Condition # 04 debounce interval. Triggered when temperature out of range.
C300	F100 00000000 #00|#01|#02	Status code sensor broken. Only the status code is sent. Condition #00 or #01 or #02
C301	F101 80000000 #03|#04	Status code temperature out of range The packet will contain the standard telemetry. Condition #03 or # 04.

15 Configuration FAQ

In this chapter most usefully configuration are analyzed and described in details.

15.1 Using device as vehicle immobilizer

It is possible configure the device as a vehicle immobilizer, with this configuration one output is automatically set when the device start and the output can be reset using a PIN, writing one property or sending a command thru the 1-Wire devices. If this configuration we assume that the digital output # 0 inhibit the ignition of the vehicle and the digital input #0 is connected to the ignition key.

15.1.1 Relevant configuration for immobilizer

Property	*Value*	*Description*
F910	4XXXXXXXX	Digital input #0 configuration. When the ignition key is not inserted GPS event are not enabled.
F930	6XXXXXXXX	Digital output #0 configuration. 2XXXXXXXX – The output is automatically set at start-up and when the digital input #0 (ignition key) is not set. 4XXXXXXXX – Buffered output. Direct command as set/reset are executed only when GPS event are enabled (Ignition key inserted).
B0D2	04	Timeout in minutes (seconds if flag set in B000) for buffered output.

15.1.1.1 Disable the immobilizer

To disable the immobilizer it is necessary set the output #0 to 0 using for example the property F031 to 0000

16 Conventions

16.1 Data type conventions used in this manual.

If not specified all data are unsigned number, and when a sign is present we use the two complements conventions.

Name	Description	Number of bits
BYTE	Minimum data size.	8
WORD	2 BYTE	16
DWORD	2 WORD	32
QWORD	2 DWORD	64
ASCIIZ	String of char.	N/A

Table 13: Property types

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