ACP 245 – Application Communication Protocol

Prepared by

DENATRAN – Departamento Nacional de Trânsito

(National Traffic Department)

DENATRAN: ACP 245 V 1.2.2 – 2010-11-23 - Protocol Specification

Revision History

Revision	Date	Author	Description
1.2	17/02/2009	DENATRAN	Item 2.1 Rules is added.
1.2	17/02/2009	DENATRAN	A note is added under the table 1 of Item 2.5
1.2	17/02/2009	DENATRAN	Value 32 is added in Item 3.1.2
1.2	17/02/2009	DENATRAN	Value 135 is added in Item 3.1.3
1.2	17/02/2009	DENATRAN	Auth. Key field is included in the structure of Item 3.4
1.2	17/02/2009	DENATRAN	Table from Item 3.4.1 is updated
1.2	17/02/2009	DENATRAN	Table from Item 3.5.1 is updated
1.2	17/02/2009	DENATRAN	A comment for value = 0 is added in item 3.8.5
1.2	17/02/2009	DENATRAN	Table from Item 3.8.10 is updated
1.2	17/02/2009	DENATRAN	A comment is added under structure of Item 3.9 and third flag in Item 3.9.1 is modified.
1.2	17/02/2009	DENATRAN	A comment is added in item 4.1.2 Private Flag
1.2	17/02/2009	DENATRAN	Message Type table is added in Item 5.1
1.2	17/02/2009	DENATRAN	Grace Time is added to structure of Item 5.2 and Item 5.2.1.6
1.2	17/02/2009	DENATRAN	Comments are added to Items 5.2.1.4 and 5.2.1.5
1.2	17/02/2009	DENATRAN	Message Type table is added in Item 6.1
1.2	17/02/2009	DENATRAN	Text is updated in Item 7.
1.2	17/02/2009	DENATRAN	Message Type table is added in Item 7.1
1.2	17/02/2009	DENATRAN	The structure of Item 7.3 is updated according ACP v. 3.1.0.2
1.2	17/02/2009	DENATRAN	Message Type table is added in Item 8.1
1.2	17/02/2009	DENATRAN	Text is updated in Bit 1 of Item 8.4.1.3.1
1.2	17/02/2009	DENATRAN	Message Type table is added in Item 9.1
1.2	17/02/2009	DENATRAN	Mandatory parameters are defined in Appendix I.
1.2	19/02/2009	DENATRAN	Removed "Raw Data" table from Item 3.7.2.
1.2	19/02/2009	DENATRAN	Keep Alive Timer in Item 12.1.5 is changed to 180 seconds.
1.2	19/02/2009	DENATRAN	The "Type" of APN, Login and Password is merged to max. 90 Bytes in Item 12.1.6
1.2	19/02/2009	DENATRAN	Example 1, 2 and 3 in Appendix II are revised.
1.2	06/03/2009	DENATRAN	Added new Data Type to TCU Service Activation/ Deactivation
1.2	06/03/2009	DENATRAN	Changed all the Auth key sizes from 8 bytes to undefined
1.2	06/03/2009	DENATRAN	Item 3.8 – Inserted the location element structure according to ACP 3.1.0.2
1.2	06/03/2009	DENATRAN	Item 2.1 – Removed "optional" word
1.2	06/03/2009	DENATRAN	Item 3.4 – "Simcard ID" and "Auth key" order changed
1.2	06/03/2009	DENATRAN	Item 3.6.1 - Removed "vehicle blocking" and vehicle unblocking". Added "Anti theft blocking (ACP245)"
1.2	06/03/2009	DENATRAN	Item 5.2.1.3.1 – Added target Application ID as 0 to mandatory configuration parameters
1.2	06/03/2009	DENATRAN	Item 9.4 – Added vehicle descriptor element to the message structure
1.2	06/03/2009	DENATRAN	Item 12.1.1 – Changed default values to 300
1.2	06/03/2009	DENATRAN	Item 12.1.5 – Changed type index 0x0051 type to unsigned int/2 bytes. Added definition for value 0

1.2	06/03/2009	DENATRAN	Item 12.1.6 – fixed data type indexes from 0x0061 to 0x0063 type to "Max 91 bytes (sum)"
1.2	06/03/2009	DENATRAN	Changed server ports types to 2 bytes
1.2	06/03/2009	DENATRAN	Item 13.2.1, 13.2.2, 13.3.1 - Fixed example
1.2	23/03/2009	DENATRAN	Values from 33 to 61 are added in Item 3.1.2
1.2	09/04/2009	DENATRAN	Values from 61 to 63 are added in Item 3.1.2
1.2	09/04/2009	DENATRAN	Added remarks in Itens 4.1.7, 5.1, 6.1, 7.1, 8.1, 8.4, 9.3, 9.6
1.2	09/04/2009	DENATRAN	Fixed Figure 2 in Item 6
1.2	09/04/2009	DENATRAN	Item 12.1.1 – Default unit from Data type 0x0012 changed to "Minutes"
1.2	09/04/2009	DENATRAN	Fixed message structure in item 6.3 adding "Reserved" element
1.2	09/04/2009	DENATRAN	Figure 4.1 is added in item 8
1.2.1	17/04/2009	DENATRAN	Item 3.6.1 – Added remark regarding Entity ID = 17.
1.2.1	17/04/2009	DENATRAN	Itens 3.8.8 and 3.8.9 – Added remark about 2's complement.
1.2.1	17/04/2009	DENATRAN	Item 4 – Added "optional" in octet 4
1.2.1	17/04/2009	DENATRAN	Item 4.1.6 – Added remark.
1.2.1	17/04/2009	DENATRAN	Itens 5.2, 6.2, 6.5, 7.2 – "(bit 3=1)" is added in Message Control Flag.
1.2.1	17/04/2009	DENATRAN	Itens 5.2.1.1, 6.2.1.1, 6.5.1.1 and 7.2.1.1 – Added remark regarding Message Control Flag.
1.2.1	17/04/2009	DENATRAN	Item 5.2.1.3.1 – Fixed value for Target Application ID in messages Appl= 2 Message type=8.
1.2.1	17/04/2009	DENATRAN	Item 6.2.1.3 – Added remark regarding Target Application ID = 0
1.2.1	17/04/2009	DENATRAN	Item 8.2, Message type =1 is removed.
1.2.1	17/04/2009	DENATRAN	Item 8.4.1.3 – Defined default values.
1.2.1	17/04/2009	DENATRAN	Item 9 – Figure 5 is updated.
1.2.1	17/04/2009	DENATRAN	Item 9.2 – Added remark.
1.2.1	17/04/2009	DENATRAN	Item 9.4 is changed. "Vehicle Position Message" is added.
1.2.1	17/04/2009	DENATRAN	Item 9.6 – Added remark.
1.2.1	17/04/2009	DENATRAN	Item 12.1.1 – Fixed default value for "Tracking Timer" parameter.
1.2.1	17/04/2009	DENATRAN	Item 12.1.10 – Added custom parameters
1.2.1	17/04/2009	DENATRAN	Item 13.3.1 – Added position coordinates in degrees, minutes, seconds
1.2.1	17/04/2009	DENATRAN	Item 13.4 – Added example to convert position coordinates
1.2.1	22/04/2009	DENATRAN	Item 6.2 – Fixed text "Message Fields" element in structure.
1.2.1	22/04/2009	DENATRAN	Item 13.2.2 – Fixed order of elements in message structure.
1.2.1	23/04/2009	DENATRAN	Item 13.2.1 – Fixed value in message string.
1.2.1	30/04/2009	DENATRAN	Item 14 – Added Appendix III
1.2.1	30/04/2009	DENATRAN	Item 3.1.3 – Added new TCU manufacturer
1.2.1	06/05/2009	DENATRAN	Added the mapping of bits – item 4.1.7
1.2.1	06/05/2009	DENATRAN	Added the mapping of bits – item 5.2.1.3.3 e item 5.2.1.3.4
1.2.1	06/05/2009	DENATRAN	Added the mapping of bits – item 8.4.1.3.1 e item 8.4.1.3.3
1.2.2	05/08/2009	DENATRAN	Added data type 0x0047 on item 12.1.4
1.2.2	05/08/2009	DENATRAN	Updated items 14.6, 14.8 on Appendix III
1.2.2	05/08/2009	DENATRAN	Added remark on item 6.5.1.4.5

1.2.2	05/08/2009	DENATRAN	Added remark in item 12.1.1 (data type 0x0011)
1.2.2	05/08/2009	DENATRAN	Added remark in item 3.8
1.2.2	05/08/2009	DENATRAN	Updated title in item 14.11.2
1.2.2	07/08/2009	DENATRAN	Added item 14.9, 14.10, 14.11 on Appendix III
1.2.2	07/08/2009	DENATRAN	Item 13 – Appendix II was revised.
1.2.2	07/08/2009	DENATRAN	Added remark in item 2.1.
1.2.2	07/08/2009	DENATRAN	Added remark in items 3.7.1, 3.9.1, 3.9.3.
1.2.2	07/08/2009	DENATRAN	Value 99 and 127 are added in Item 3.1.2
1.2.2	18/08/2009	DENATRAN	Value 65 is added in Item 3.1.2
1.2.2	27/08/2009	DENATRAN	Added new table and Description in item 4.1.6 to represent the Versions of ACP245
1.2.2	27/08/2009	DENATRAN	Added Item 4.1.11, new extended Version Number of ACP 245
1.2.2	27/08/2009	DENATRAN	Added example of Extended Version Number of ACP245 in Item 13.7.1.6
1.2.2	18/08/2009	DENATRAN	Value 66 is added in Item 3.1.2
1.2.2	08/11/2010	DENATRAN	Protocol documentation last date revision is added to the header
1.2.2	08/11/2010	DENATRAN	SMS Format specification is added as Appendix IV
1.2.2	08/11/2010	DENATRAN	Item II into 14.8 is added
1.2.2	08/11/2010	DENATRAN	SMS Deactivation possibility is removed from Item 10.2
1.2.2	08/11/2010	DENATRAN	Items 13.4.4.3 and 13.4.4.4 are removed
1.2.2	08/11/2010	DENATRAN	Car Manufacturer ID table is updated
1.2.2	08/11/2010	DENATRAN	Message structure description from Items 7.2 and 7.3 are updated
1.2.2	23/11/2010	DENATRAN	Message structure description from Items 7.3.1.4 and 3.7 are updated
1.2.2	23/11/2010	DENATRAN	Example description from Items 14.13.2, 14.13.3 and 14.13.4 are updated
1.2.2	23/11/2010	DENATRAN	Removed Branded SIMCard description from Item 14.13.7.2

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New Features

Feature	Date	Author	Description
1.2	17/02/2009	DENATRAN	Entity Id = 17 is added in the table of Item 3.6.1
1.2	17/02/2009	DENATRAN	Added HDOP value in Item 3.8.9 to represent position uncertainty estimate.
1.2	17/02/2009	DENATRAN	It is added the possibility of sending status of breakdown source using breakdown data in Item 3.9.2 (Bit 7) & Item 3.9.3
1.2	17/02/2009	DENATRAN	TCU data element modified to allow multiple configuration parameters
1.2	17/02/2009	DENATRAN	Added TCU data error element in item 3.12 to allow reply multiple configuration parameters
1.2	17/02/2009	DENATRAN	Added new message types ID=8 e 9 to allow multiple configurations and ID=10 for SMS message in item 6.1
1.2	17/02/2009	DENATRAN	Added new configuration reply message #2 ACP 245 ID=9 in Item 6.4
1.2	17/02/2009	DENATRAN	Added new message types ID=4 e 5 to allow keep alive messages in items 9.4 and 9.5
1.2	19/02/2009	DENATRAN	Added Auth.Key field in Item 3.4 Vehicle Descriptor Element
1.2	19/02/2009	DENATRAN	Added new error element 27, 28 and 29 in Item 3.5.1
1.2	19/02/2009	DENATRAN	Section 10 is added.

Table of Contents

ACRONYMS

The following acronyms apply to this document.

Acronym	Definition
ACP	Application Communications Protocol
DENATRAN	National Traffic Department
FOTA	Firmware Over The Air
GMT	Greenwich Mean Time
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communication
IE	Information Element
IMEI	International Mobile Equipment Identity
LSB	Least Significant Bit
MSB	Most Significant Bit
SIM CARD	Subscriber Identity Module
SO	Service Operator
TCP	Transmission Control Protocol
TCU	Telematics Control Unit
UDP	User Datagram Protocol
UTC	Coordinate Universal Time

1 INTRODUCTION

This document was based on Application Communication Protocol (ACP), developed by Motorola Inc. (version 3.1.0.2 / November, 2000 and made public in the year of 2002) and describes the basic ACP services to use in tracking tracing systems, in agreement with DENATRAN regulation. It suggests the flow messages on each ACP service as well correspondent composition and minimal message structure elements. Tracking device and Service Operator are responsible for exchange messages and keeping available services.

1.1 Telematic Applications

The Basic telematics services IDs.Table 1 presents the basic, but not limited, telematic applications in accordance with DENATRAN regulation. They have the purpose to group different messages, originating the idea of services and context.

Application ID	Definition	Brief description
1	Provisioning	Basic messages whereby the TCU establishes and manages configurations for applications required for activation.
2	Configuration	Application configurations that are not handled by the generic provisioning service.
6	Remote Vehicle Function	This application allows control functions to occur within the vehicle. Examples are remote door unlock.
10	Vehicle Tracking	This application provides the ability to track a vehicle, usually due to theft.
11	Alarm	This application provides the ability to recognize unauthorized starting or movement of a vehicle.

Table 1. Basic telematics services IDs.

This document describes in section 2 brief rules about the data used in each information element into the messages. It follows with a description of elements and data structures that will composite an ACP message.

2 Data Description

This section describes the data format used in ACP Protocol for message exchange between TCU and SO. The information bellow was extracted from the ACP Specification [1].

2.1 Rules

This section describes the message formats used in the exchange of data between a TCU and the SO. Message formats consist of information elements as needed to create a meaningful message. This standard defines the minimal set of messages necessary to support the telematics functions. Undefined and non-supported messages and information elements can be skipped. The intent is to allow for the addition of messages information elements without affecting existing applications of current customers. This rule is intended to promote robustness and is not intended to encourage sending useless information between TCU and SO.

The basic unit of data is an information element. Information elements can be combined to form message types, the unit used for the transfer of data by the transport level. A number of message types are defined in this standard along with their use.

The information element is position dependent in the message structure. Elements that do not contain data must still be included. Elements may not be included in one of three ways:

1. The length field and More Flag of the element is zero,
2. A control flag is used to indicate the presence or absence of an element,
3. The length field of the parent element does not include the element.

The Header Element is not the parent element of the whole message.

2.2 Bit Order

Bits in an octet are numbered from 0 to 7 from most significant bit (MSB) to least significant bit (LSB). Multi-octet fields have the most significant octet in the in the first octet of the field.

2.3 More Flag

This value identifies if the last information in the octet was not finished and will be continue in the next octet. The value 0 means no more information, while the value 1 means more data.

Octet / Bit	0	1	2	3	4	5	6	7
1	IE Identifier		More Flag=1	Length$_0$ = 2				
2	More Flag=0	Length$_1$ = 4						

Table 2. More flag sample

In this example, presented by table 2, the field Length in the first octet continues in the second octet because More Flag is set with the value 1. It means Length is composed by Length$_0$ (MSB) and Length$_1$ (LSB).

2.4 Additional Flag

This concept is the same of More Flag. The additional flag (Addl Flag) is used to indicate when an element of like kind is repeated in the following octet. An example would be status flags pertaining to GPS status in Field$_0$ would have additional status flags pertaining to GPS in Field$_2$ and Field$_4$.as showed in table 3.

Octet / Bit	0	1	2	3	4	5	6	7
1	Addl Flag=1	Field$_0$			Field$_1$			
2	Addl Flag=1	Field$_2$			Field$_3$			
3	Addl Flag=0	Field$_4$			Flield$_5$			

Table 3. More Flag sample

2.5 Element Definition

The information element identifies a block of data. The initial octet has three fields, respectively: Identification Element (IE) – 2 bit, More Flag – 1 bit and Length (data size of block). The more flag is related with the Length field. If the length field value exceeds 32 octets of data (0..31 - 5 bits) then more flag must be set 1 and another Length field follows. The final value is composed by Length$_0$ (5 bits) and Length$_1$ (7 bits) – 12 bits; as in the example bellow.

Octet / Bit	0	1	2	3	4	5	6	7
1	IE Identifier = a		More Flag = 1	Length$_0$ = x				
2	More Flag=0	Length$_1$ = y						

The valid values for IE are:

Value	Definition	
0	Transparent data (binary)	Number of 8 bit octets
1	Text (ISO 8859-1) / 8bits per character	Number of 8 bit octets
2	Packed decimal	Number of 8 bit octets
3	Extended	Extended definition

Table 1 - Default IE (Identification Element) values.

Example: a = 0, x = 2 and y = 4 - __Binary__ data with **__Length__** = 000010 (Length$_0$) 0000100 (Length$_1$) = 0000100000100_2 = 260.

The ACP 245 must be fully implemented by the SO's. The TCU's will use the option IE values that are for alphanumeric data = 1 (Text (ISO 8859-1) / 8bits per character) and for numeric field = 2 (Packed decimal/BCD)

If IE value is *Extended,* the initial structure of the element will be changed. The first bit of *Length$_0$* field starts at the next information octet.

Octet \ bit	0	1	2	3	4	5	6	7
1	IE = 3 (Extended string definition)		More Flag = 1	Extended IE identifier (0..31) = a				
2	More Flag = 0	$Length_0$ (number of octets that follow) (0..127) = x						
3...n-1	Data = b							

The valid values for Extended IE are:

Value (Decimal)	Definition
0	Transparent data (binary)
1	Text (ISO 8859-1) / 8bits per character
2	Packed decimal
3	Reserved
4	UNICODE
5	UTF-8
6	Shift JIS
7..30	Reserved
31 *	Extended Private Identifier

Table 2 - Extended IE (Identification Element) values.

* The value of 31 indicates that the element is not defined in this document and is considered proprietary or private.

Example: a = 1, x = 20, b = "Test of ACP Protocol" **- Text** data with **Length** = 00010100_2 = 20.

3 Message Elements

All the messages are composed by elements -information units. Find bellow examples of common elements.

3.1 Version Element

Define information about manufacturers of the vehicle and TCU.

Structure:

Octet / Bit	0	1	2	3	4	5	6	7
Version Element	IE Identifier = 0		More Flag		Length			
	Car Manufacturer ID							
	TCU Manufacturer							
	Major hardware release							
	Major software release							

3.1.1 IE Identifier

Transparent Data. See definitions at section 2.5.

3.1.2 Car Manufacturer ID

Identifies the vehicle in which the hardware/software product is resident. This informative to the receiver of the message who should act upon this information if it is a version it cannot handle.

Value	Description	Value	Description
0	Mercedes-Benz	115	J.A Castro de Melo
1	Renault	116	Sermag
2	Chevrolet	117	Jardinox
3	Porsche	118	JHV Implementos
4	Ford	119	Justari
5	PSA	120	Kronorte
6	Jaguar	121	Kroville
7	Fiat	122	L.M. Hoffgen
8	Volkswagen	123	Labor
9	Mitsubishi	124	Langendorf
10	Honda	125	Lencois
11	Toyota / Lexus	126	Librelato
12	Nissan	127	Lider
13	Ford Trucks	128	Linshalm
14	Volkswagen Trucks	129	Loranda
15	Yamaha Motorcycles	130	Lunar
16	Scania	131	M. Gandolfo

17	Volvo Brasil	132	M. Gonçalves
18	Iveco	133	Manos
19	Hyundai	134	Martins Tanques
20	Kia Motors	135	Matran
21	Subaru	136	Maxfort
22	Chrysler	137	Metalesp
23	BMW	138	Metalurgica Triangulo
24	Audi	139	Metso
25	Harley-Davidson	140	Modessa
26	Honda Motorcycles	141	Moraes
27	Suzuki Motorcycles	142	Moreno
28	Dafra	143	Morumbi
29	Kasinski	144	Multiforca
30	Sundown Motorcycles	145	Nego Ind.
31	Traxx	146	Niju
32	Effa Motors	147	Nitrovet
33	Volvo Car	148	Nobreteck
34	Land Rover	149	Noma
35	Alfa Romeo	150	Nortsul
36	Suzuki Veículos do Brasil	151	Orion
37	Troller	152	Palmeira
38	TAC	153	Paradiso
39	Smart	154	Parnaiba
40	Sangyong	155	Pastre
41	SEAT	156	Petrofab
42	Agrale	157	Posto de Molas Fabrini
43	Chana	158	PPL
44	Mazda	159	Qualitec - Ixon
45	Mahindra	160	Randon
46	Daewoo	161	Real
47	Mini	162	Recrusul
48	Daihatsu	163	Reimpler
49	Aston Martin	164	RF COM Sistemas
50	Ferrari	165	Rhodoss
51	Bugati	166	Rodoalves
52	Lamborghini	167	Rodoceg
53	Maseratti	168	Rodoclara
54	MV Agusta Motorcycles	169	Rodoeixo

55	Piaggio Motorcycles	170	Rodofort
56	Triumph Motorcycles	171	Rodokinho
57	Husqvarna Motorcycles	172	Rodolinea
58	FYM Motorcycles	173	Rodotec
59	Ducati Motorcycles	174	Rodotecnica
60	Buell Motorcycles	175	Rodotic
61	Aprila Motorcycles	176	Rodovale
62	Skoda	177	Rodovan
63	Bentley	178	Rodovia
64	Others	179	Rossetti
65	Bramont	180	San Marino
66	International	181	Sandvik Mining
67	Marcopolo	182	Santa Izabel
68	Kawasaki	183	São João
69	Agromerica	184	São Pedro
70	America	185	Sapema
71	Amsted Maxion	186	Scheuerle
72	Araca	187	Schiffer
73	Becker	188	Sergomel
74	Bercamp	189	Serpeças
75	Bertolini	190	Serrana
76	Boreal	191	Sidersul
77	Bras Techno	192	Sidervan
78	Brasil Equip.	193	Siepierki
79	Brucal	194	Simplex
80	Busa	195	Tankspar
81	Cdl	196	Tanques São José
82	Cerama	197	Tecnoceg
83	Chassi Laser	198	Tenge
84	Ciber	199	Terex Cifali
85	Colon	200	Terra Ind.
86	Criogen	201	Thermo Sara
87	Dambroz	202	Thermosul
88	Egsa	203	Ticel
89	Elshaddai	204	Tratortec
90	Empretec	205	Tres Eixos
91	Facchini	206	Triel HT
92	Fertilance	207	Truck Art

93	Fibrasil	208	Unicarr
94	Florestal	209	Unitécnica
95	Folle	210	Urso
96	Furgobento	211	Usicamp
97	Galego	212	Vertrucks
98	Garcia Monteiro	213	Vilacos
99	**Reservado SIMRAVID**	214	Vital Marrara
100	GF	215	White Martins
101	Gotti	216	Ziemann-Liess
102	Goydo	217	Chery
103	Grimaldi	218	CNC
104	Grupioni	219	Dodge
105	Guerra	220	Edra
106	Hse	221	Flexmoto
107	Hzm	222	JAC
108	Ibipora	223	JCB
109	Imavi	224	Jeep
110	Imperial	225	Jinbei
111	Implanor	226	Leopard
112	Indumix	227	Lifan
113	Inox Fantasia	228	MVK
114	J. Capacle	229	Putzmeister

Table 3 – Version Element: Car Manufacturer IDs.

3.1.3 TCU Manufacturer ID

This just identifies the source of the hardware/software product. It is informational. This informative to the receiver of the message who should act upon this information if it is a version it can not handle.

Value	Definition
0	Reserved
1	Motorola
2	Nokia
3	Becker
4	Clarion
5-127	Not currently used
128	Continental
129	Delphi
130	Johnson Controls
131	Kostal
132	Magneti Marelli
133	PST
134	Visteon
135	Quanta
136	Compsis
137	Maxtrack

138	Trackware
139	Cellocator
140	Aritronix
141	Ituran
142	Others
143	Aspock
144	Actia
145-255	Reserved

Table 4 – Version Element: TCU Manufacturer IDs.

3.1.4   **Major Hardware Release**

This is a binary number that identifies the current revision of the hardware. This informative to the receiver of the message who should act upon this information if it is a version it cannot handle.

3.1.5   **Major Software Release**

This is a binary number that identifies the current revision of the software release. This informative to the receiver of the message who should act upon this information if it is a version it cannot handle.

Example:

Octet / Bit	0	1	2	3	4	5	6	7
Version Element	IE Identifier = 0		More Flag = 0	Length = 4				
	Car Manufacturer ID = 8							
	TCU Manufacturer ID = 131							
	Major hardware release = 1							
	Major software release= 3							

5 octet message binary data – Car manufacturer = Volkswagen, TCU manufacturer = Kostal, Hardware release = 1 and Software release = 3 → 00000100 00001000 1000011 00000001 00000011

3.2   **Timestamp Element**

This element specifies the date and time information.

Structure:

Octet \ bit	0	1	2	3	4	5	6	7
1	Year(00=1990, 01=1991 ranges up to 62=2052)						Month of year range (1…12)	
2	Month of year		Day of month, range (1…31)				Hour of day	

3	Hour of day, range (0…23)	Minutes, range (0…59)
4	Minutes	Seconds, range (0…59)

3.2.1 Year

This specifies the year beginning in 1990. The field allows for a year of up to 2052. The value of 63 is reserved for future expansion if needed. (6 bits)

3.2.2 Month

This field represents the month of the year which ranges from 1 to 12 where 1 is January and 12 is December. (4 bits)

3.2.3 Day

This field represents the day of the month and ranges from 1 to 31. (5 bits)

3.2.4 Hour

This field represents the hour of the day and ranges 0 to 23. (5 bits)

3.2.5 Minute

This field represents the minute of the hour and ranges from 0 to 59. (6 bits)

3.2.6 Seconds

This field represents the seconds of the minute and ranges from 0 to 59.(6 bits)

Example: March 14th, 2008 – 3:48:56 pm

Year = 2008	→ 18	→ 010010	(6 bits)
Month = March	→ 3	→ 0011	(4 bits)
Day = 14	→ 14	→ 01110	(5 bits)
Hour = 15	→ 15	→ 01111	(5 bits)
Minute = 48	→ 48	→ 110000	(6 bits)
Second = 56	→ 56	→ 111000	(6 bits)

Message: 01001000 11011100 11111100 00111000

3.3 TCU Descriptor Element

Structure:

Octet \ bit	0	1	2	3	4	5	6	7
TCU Descriptor Element	IE Identifier		More Flag	Length				
	Reserved							
	IE Identifier		More Flag	Length				
	Device ID							
	IE Identifier		More Flag	Length				
	Version ID							

3.3.1   **Device ID**

This describes the device for which we want the version number.

Value	Definition
1	TCU hardware version number
2	TCU hardware manufacturer number
3	TCU software version number
4	TCU CAN version number
5	ACP transport layer version number
6	ACP application layer version number
7-255	Reserved

Table 5 - TCU Descriptor Element: Device IDs

3.3.2   **Version ID**

This specifies the version information for the specified device. The version number can be a number and taken from the following version table, or it can be a character string for version not in the table. The currently defined decimal versions are

Value	Version
1	1
2	2
3	3
4	4
5	5
:	:
n-255	

3.4   Vehicle Descriptor Element

The intent of this information element is to define the vehicle to the service operator.

Structure:

Octet \ bit	0	1	2	3	4	5	6	7
1	IE Identifier = 0		More flag	Length				
2	Vehicle Descriptor Flag1							
3	Vehicle Descriptor Flag2							
4	Language							
5	Model year							
6..p-1	VIN							
p..n-1	TCU serial #							
n..m-1	License Plate							
m..k-1	Vehicle Color							
k..j-1	Vehicle Model							
J…I-1	IMEI							
l…h-1	SIM Card ID (ICCID)							
H…i-1	Auth. Key							

Octet \ bit	0	1	2	3	4	5	6	7
Vehicle Descriptor Element	IE Identifier=0		More Flag	Length				
	Addl Flag=1	Language	VIN	TCU Serial	Vehicle Color	Vehicle Model	License Plate	IMEI
	Addl Flag=0	Model Year	SIMCard ID	Auth. Key	0	0	0	0
	IE Identifier=1		More Flag	Length				
	Text Format (VIN Number)							
	IE Identifier		More Flag	Length				
	(TCU Serial Number)							
	IE Identifier=2		More Flag	Length				
	BCD Format (IMEI Number)							
	IE Identifier=2		More Flag	Length				
	BCD Format (SIM Card ID)							
	IE Identifier=0		More Flag	Length				
	Binary Format (Auth. Key)							

3.4.1 **Flags**

In the above table, a bit value of 0 indicates the element is absent while a bit value of 1 indicates the element is present. If the bit indicates the element is present, but the length of its element is 0, then the field has no data following it. If the length is not 0, then the element specifies the new value. If all bits are 0, then no elements are present, and only 1 octet of storage is used.

Field Names	Description
VIN	Vehicle Number Identification (optional)
TCU Serial	Serial number (optional)
IMEI	IMEI identification number (optional)
SIM Card	SIM Card number - ICCID (mandatory)
Vehicle Color	Vehicle color (optional)
Vehicle Model	Vehicle model (optional)
License Plate	License plate (optional)
Language	Language (optional)
Model Year	Model year (optional)
Auth. Key	Auth.Key (mandatory only on Telematic Service Activation/Deactivation message)

Table 6 - Vehicle Descriptor Element: Fields

3.5 Error Element

This element represents error information.

Structure:

Octet \ bit	0	1	2	3	4	5	6	7
Error Element	IE Identifier = 0		More Flag		Length			
	Error Code							

3.5.1 Valid Error Codes

Code	Description
0	Everything OK, no mistake
1	Service currently not available
2	Incorrect application
3	Unknown version
4	Unknown message type
5	Unknown data in message
6	Unknown transport version
7	Data error in transport frame
8	Security violation
9	No access; no customer
10	No access; service not available
11	Not access; authentication failure
12	No access; other reasons
13	Invalid session ID
14	Reserved
15	Language not supported
16	Descriptor in *Provision Update Message* does not match data in the TCU

17	SIM identifier in the TCU is not the provisioned SIM
18	Provisioning layer received, but unable to process
19	General non-specific error
20	No access to protected phonebook on SIM card
21	Unable to write to EEPROM
22	Invalid phone number
23	VIN does not match
24	Vehicle type does not mat
25	Provisioning request not processed. Too many target applications specified. Provision with a smaller group.
26	Missing phone number
27	Invalid TCU Service Activation
28	Invalid TCU Service Deactivation
29	Buffer Overflow
30…255	Available

Table 7 - Error Element: Error Codes.

3.6   Control Function Element

This element represents the remote vehicle entity to control.

Structure

Octet \ bit	0	1	2	3	4	5	6	7
Control Function	IE Identifier=0		More Flag	Length				
	Entity ID							
	Reserved				Transmit Units			
	Transmit Interval							

3.6.1   **Entity ID**

Controlled Entity

ID	Description
0	Door Locks
1	Vehicle Tracking
2	Covert Mode
3	Microphone
4	Reserved
5	Transmit Interval
6	Reserved
7	Vehicle Tracking with commit
8	Commit to Vehicle Tracking
9	Vehicle anti theft alarm facilities (lights, horn)
10	Immobilize vehicle (*)
11	Remote door locks function

12	Primary antenna
13	Call Service Operator for provisioning using pre-programmed phone numbers
14	Call Service Operator on data bearer.
15	Fuel Pump Blocking
16	Siren
17	Vehicle position history (#)
18…127	Reserved
128	Anti-theft Blocking (ACP245)
129…255	Reserved

Table 8 - Control Function Element: Entities IDs

(*) Auto immobilizer device

(#) Only used if TCU doesn't send the vehicle position history automatically after receiving a "Configuration TCU Service Activation Message ACP 245" (when the SO is contracted). Futher details see Appendix III.

3.6.2 **Transmit Units**

It specifies the unit of interval at which a message is sent on a regular period.

Value	Command Definition
0	Second
1	Minute
2	Hour
3	Send message one more time
4	Send only one message

3.6.3 **Transmit Interval**

It specifies the interval at which a message is sent to SO.

3.7 Function Command or Status Element

This element represents the action required or report the status of the tracking device (tracking entity).

Structure:

Octet \ bit	0	1	2	3	4	5	6	7
Function Command	IE Identifier=0		More Flag		Length			
	Function Command or Status							
	Raw Data							

3.7.1 **Function Command or Status**

Value	Command Definition	Status Definition
0	Permit	Permitted
1	Reject	Rejected
2	Enable (Start)	Enabled (Started)
3	Disable (Stop)	Disabled (Stopped)
4 (*)	Request	Completed

Table 9 - Function Command Element: Available actions or status.

(*) Request means ask for status and is optional and dependent of the TCU manufacturer implementation.

3.7.2   Raw Data

It is used to transmit any raw data between the TCU and SO.

Octet \ bit	0	1	2	3	4	5	6	7
	IE Identifier=0		More Flag	Length				
	Raw Data							

3.8   Location Element

This group defines the position history of the vehicle.
(*) If data type 0x0047 = false then Location Element has length = "0"

Octet \ bit	0	1	2	3	4	5	6	7
	IE Identifier=0		More Flag	Length				
Location	Current GPSRawData (3.8.1)							
	Prior GPSRawData (3.8.1)							
	Current Dead Reckoning Data (3.8.16)							
	Array of Area Location Delta Coding (3.8.17)							

The current GPSRawData and prior GPSRawData are only needed when the GPS is co-located with the TCU and, therefore, is optional.

3.8.1   GPSRawData Element

The GPS raw data location. If no data available the field length must be set to 0 and follow octet is next element.

Octet \ bit	0	1	2	3	4	5	6	7
	IE Identifier=0		More Flag	Length				
GPSRawData Element	Area Location Coding (3.8.2)							
	Number of Satellites (0 .. n)				Reserved			
	Satellite ID (0)							
	Satellite ID (n)							

3.8.2   Area Location Coding

Octet \ bit	0	1	2	3	4	5	6	7
	IE Identifier=0		More Flag	Length				
Area Location Coding	More Flag	AreaLocationStatusFlag1						
	More Flag	AreaLocationStatusFlag2						
	Area Type			LocationTypeCoding			Reserved	
	More Flag	Time Difference						
	Longitude (byte 0)							
	Longitude (byte 1)							

	Longitude *(byte 2)*			
	Longitude *(byte 3)*			
	Latitude *(byte 0)*			
	Latitude *(byte 1)*			
	Latitude *(byte 2)*			
	Latitude *(byte 3)*			
	Altitude *(byte0)*			
	Altitude *(byte 1)*			
	Position Uncertainty Estimate			K/ HDOP
	Heading Uncertainty Estimate		Heading	
	Reserved set to 0		Distance Flag	Time Flag
	Velocity			

3.8.3   **AreaLocationStatusFlag1**

Bit	Definition
1	Reserved and set to 0
2	1=No 3D fix available 0=Is using 3D fix
3	1=No 2D fix available 0=Is using 2D fix
4	1=Position data is not valid 0=Position data is valid
5	1=Differential GPS is being used 0=Differential GPS not being used
6	1=Heading data is not valid 0=Heading data is valid
7	1=Almanac is bad 0=Almanac is good

3.8.4   **Area Location Status Flag 2**

Bit	Definition
1	Reserved, set to 0
2	0=old GPS data used from satellites 1=new GPS data from satellites
3	Reserved, set to 0
4	Reserved, set to 0
5..7	0=North 1=North East 2=East 3=South East 4=South 5=South West 6=West 7=North West

3.8.5 Area Type

Area Type Definitions for Location and Deltas.

Value	Definition
0	Point (latitude, longitude, altitude) in milliarcseconds increments
1	Point (latitude, longitude, altitude) in 100 milliarcseconds increments
2-7	Reserved

3.8.6 LocationTypeCoding

The element *location type coding* defines the coordinate system used to define the location of the TCU.

Value	Definition
0	WGS 84
1-7	Reserved

3.8.7 Time Difference

The time difference is the time that has elapsed between a prior GPS reading and the current GPS reading or the time difference between the current GPS reading and the actual cause for transmission. The default value is in seconds unless defined by Time Flag. The value = 0 means that this field is NULL or not calculated.

3.8.8 Longitude

The longitude may vary from -180° to +180°. The number 0° corresponds to the Greenwich meridian. The value may range from –648,000,000 to +648,000,000. The units are in millisarcseconds and allow for the range from – 648,000,000 to +648,000,000. One unit corresponds to approximately .03 meter. Positive values are East of the Greenwich median and negative values are West. Negative numbers are expressed in 2's complement.

3.8.9 Latitude

The latitude may vary from -90° to +90°. The number corresponds to the equator. The units are in milliarcseconds and allow for the range from –324,000,000 to +324,000,000. One unit corresponds to approximately .03 meter. Positive values are North and negative values are South. Negative numbers are expressed in 2's complement.

3.8.10 Altitude

The altitude may vary from –1000m to 18,000 meters. The number 0 corresponds to sea level. One unit corresponds to 1 meter.

3.8.11 Position Uncertainty Estimate

In the Position Uncertainty Estimate field there are 7 bits for data and 1 bit to select between K or HDOP:

bit value (K/HDOP)	Description
0	K
1	HDOP

3.8.11.1 Position Uncertainty Estimate using K value

The *position uncertainty estimate using K value* is defined by a variation on the Binomial expansion. The uncertainty, expressed in meters, is mapped to a number K, with the following formula $R = C((1+x)^K - 1)$.

Value of K	Uncertainty
0	0 m
1	1 m
2	2,1 m
...	
20	57,3 m
...	
40	443 m
...	
60	3 km
...	
127	1800 km

3.8.11.2   **Position Uncertainty Estimate using HDOP value**

The *position uncertainty estimate using HDOP value* is defined according table below that is calculated by GPS module.

HDOP Value	Rating	Description
1	Ideal	This is the highest possible confidence level to be used for applications demanding the highest possible precision at all times
2-3	Excellent	At this confidence level, positional measurements are considered accurate enough to meet all but the most sensitive applications
4-6	Good	Represents a level that marks the minimum appropriate for making business decisions. Positional measurements could be used to make reliable in-route navigation suggestions to the user
7-8	Moderate	Positional measurements could be used for calculations, but the fix quality could still be improved. A more open view of the sky is recommended
9-20	Fair	Represents a low confidence level. Positional measurements should be discarded or used only to indicate a very rough estimate of the current location
21-50	Poor	At this level, measurements are inaccurate by as much as 300 metres with a 6 meter accurate device (50 dop * 6 meters) and should be discarded
>50-127	No Signal/ Discard	At this level, measurements are inaccurate-discard

3.8.12 **Heading Uncertainty Estimate**

The *heading* is defined as the azimuth that means the angle between the horizontal plan and an element. The heading *uncertainty estimate* is defined in the following table.

Value	Heading Uncertainty
0	≤ 6°
1	≤ 9°
2	≤ 12°
3	≤ 15°
4	≤ 20°
5	≤ 25°
6	≤ 30°
7	> 30° or NULL

3.8.13 **Heading**

The heading has multiples of 15 degrees. For example, a heading value of 3 is 45 degrees or North East.

3.8.14 **Distance Flag**

Value	Definition
0	Units are not defined
1	Kilometers
2	Miles

3.8.15 **Time Flag**

Value	Definition
0	Seconds
1	Minutes
2	Hours
3	Reserved

3.8.16 **Current Dead Reckoning Data**

The Dead Reckoning Data follows the WGS4 format. The specific format for Dead Reckoning is extracted from the WGS84 reference ellipsoid. It is the current position including the dead reckoning data. If no data available the field length must be set to 0 and follow octet is next element.

Octet \ bit	0	1	2	3	4	5	6	7
Current Dead Reckoning Data	IE Identifier=0		More Flag	Length				
	Latitude							
	Longitude							

3.8.17 **Array of Area Location Delta Coding**

This element defines a more compact form for specifying the position history of a vehicle. If no data available the field length must be set to 0 and follow octet is next element.

Octet \ bit	0	1	2	3	4	5	6	7
Area Location Delta Coding	IE Identifier=0		More Flag	Length				
	More Flag	Delta Longitude 1						
	More Flag	Delta Latitude 1						
	...	...						
	More Flag	Delta Longitude n						
	More Flag	Delta Latitude n						

This 1 octet fields allow for a value range of −64 to +63 milliarcseconds or 100 milliarcseconds increments as defined by Area Type in section 17.16. This provides for 3.1 meter resolution which is an acceptable compromise for standard maps having 5 meter resolution. This also reduces the computational requirements of the TCU. Since the range for

milliarcseconds is ±63 (100s) milliarcseconds, this equates to a distance of ±195 meters at the equator and gets smaller as the north/south pole is approached.

The deltas are always paired as a Longitude and Latitude. The first delta location (Delta 1) is relative to the Prior GPS Raw Data location. The second delta location is relative to the first delta location. Delta N location is first location recorded and is relative to Delta N-1. Positive deltas indicate a direction in the north and east directions.

3.9 Breakdown Status Element

This group defines the nature of the breakdown.

Structure:

Octet \ bit	0	1	2	3	4	5	6	7
Breakdown Status Element	IE Identifier=0		More Flag		Length			
	More Flag=1	Breakdown Source (*First flag*)						
	More Flag=1	Breakdown Source (*Second flag*)						
	More Flag (*)	Breakdown Source (*Third flag*)						
	More Flag	Breakdown Sensor						
	IE Identifier		More Flag		Length			
	Breakdown Data							

(*) More Flag default = 0 – Defines the use of first, second and third flag only. More flag = 1 means that there is additional breakdown sources flags defined by TCU suppliers.

3.9.1 Breakdown Source

This octets flags fields define the cause for the breakdown. Breakdown Source is activated only when an Event or Alarm occurs.

First Flag

Bit	Breakdown Definition
0	Additional flag
1	Manually activated
2	Vehicle rolled
3	Air bag activated
4	Crash sensor activated
5	Floating car data input
6	Tow truck needed
7	Vehicle initiated theft tracking (Theft alarm triggered)

Second Flag

Bit	Breakdown Definition
0	Additional flag
1	Vehicle is started (ignition on)
2	Vehicle is turned off (ignition off)
3	Vehicle is moved
4	Other sensor activated
5	Re-send location (TCU button pressed)
6	Re-send location (SO sent message)
7	Unauthorized vehicle movement as defined by Theft Alarm

Third Flag

Bit	Breakdown Definition
0	Additional flag
1	1=Siren off
2	1=Siren on
3	1=Main battery is reconnected
4	1=Main battery is disconnected
5	0=Panic button is off 1=Panic button is on
6	1=Blocking is on
7	1=Blocking is off

3.9.2 Breakdown Sensor

For automatically detected emergencies, this byte defines the sensor within the class *Breakdown source* that initiated the emergency request.

Bit	Crash sensors definition
0	Additional flag
1	Rollover sensor activated
2	Front sensor
3	Rear sensor
4	Side sensor
5	Vehicle Alarm activated
6	Reserved
7	Breakdown data = 1 (Status)

3.9.3 Breakdown Data

When Breakdown sensor bit 7 is set to 1, the format of breakdown data field is the same as described in item 3.9.1 and represents breakdown source status.

3.10 Information Type Element

Structure:

Octet \ bit	0	1	2	3	4	5	6	7
Information Type Element	IE Identifier=0		More Flag	Length				
	Addl Flag	Information Type						
	IE Identifier		More Flag	Length				
	Raw Data							

3.10.1 Information Type

This flag defines the type of proprietary information packed as raw data.

Value	Definition
0	Reserved
1	Verbal Information
2	Stock Information
3	Travel Route Information

4	Hotel Information
5	Traffic information requested (verbal)
6	Traffic information requested (automated)
7	ASCII Text String
8	Point of Interest
9	Cargo
10	Private
11	Environmental Data
12	Timestamp
13	Mobile country code
14	Menu button
15..127	Reserved

Table 10 - Information Type Element: Valid information types.

3.10.2 **Raw Data**

Raw data transmitted in information type element.

3.11 TCU Data Element

Structure:

Octet \ bit	0	1	2	3	4	5	6	7
TCU Data Element	IE Identifier =0		More Flag	Length				
	Data Type MSB (0)							
	Data Type LSB (0)							
	Length Data Type (0)							
	Configuration Data (0)							
	…							
	Data Type MSB (n)							
	Data Type LSB (n)							
	Length Data Type (n)							
	Configuration Data (n)							

3.11.1 **Data Type**

This element describes the configuration parameter index to be changed. See definitions at appendix I (Available Configuration Parameters Indexes).

3.11.2 **Length Data Type**

This element means the length of the parameters data.

3.11.3 **Configuration Data**

This defines the new configuration parameter value to be changed.

3.12 TCU Data Error Element

Structure:

Octet \ bit	0	1	2	3	4	5	6	7
TCU Data Error Element	IE Identifier =0		More Flag	Length				
	Data Type MSB (0)							
	Data Type LSB (0)							
	Length Data Type (0)							
	Configuration Data (0)							
	Error Element (0)							
	…							
	Data Type MSB (n)							
	Data Type LSB (n)							
	Length Data Type (n)							
	Configuration Data (n)							
	Error Element (n)							

3.12.1 **Data Type**

This element describes the configuration parameter index to be changed. See definitions at appendix I (Available Configuration Parameters Indexes).

3.12.2 **Length Data Type**

This element means the length of the parameters data.

3.12.3 **Configuration Data**

This defines the new configuration parameter value to be changed.

3.12.4 **Error Element**

This field is previously defined in item 3.5.

4 HEADER DESCRIPTION

Octet / Bit	0	1	2	3	4	5	6	7
1	Reserved Set to 0	Private flag	Application ID					
2	Reserved Set to 0	Private flag	Test Flag	Message Type				
3	Version Flag	Version			Message Control Flag			
4 (optional)	More flag	Reserved Set to 0					Message Priority flag	
5, 6	Message Length							

Table 11 - Header Structure (Binary)

.

4.1 Message Elements Definition

4.1.1 Private flag

ACP Protocol reserved field. The default value is 0 and is used for standard ACP 245 messages. Value = 1 is used for private messages.

4.1.2 Application ID

See section 1.1.

4.1.3 Test Flag

If the value is 0, then this message is release message. If the value is 1, then this message is a test message and its implementation is not finished.

4.1.4 Message Type

This field defines the message type. It is unique for a specific message. If a message is constructed with a unique combination of message elements then that message will have a unique message type. If the *Test Flag* bit is set, then this is a test message.

4.1.5 Version Flag

This is intended to allow for extended control information in the header that is common among many applications. If the value is 0, then this is the last byte of the header before next field data. If the value is 1, then another version control octet of information follows this octet.

4.1.6 Version

This is the version of the application. This version number allows the application to be revised and identified independent of the overall ACP version number. The value follows as identified in the table below:

Value	ACP 245 Version
0	V 1.2
1	V 1.2.1
2	V 1.2.2
3-6	Available
7	Reserved

In case of the Version Value reach Seven in the table (7 – Reserved), then the representation of the Version Value will continue in the Extended Version Number Field. See example in the Appendix II 13.7.1.6

4.1.7   Message Control Flag

These bit definitions define various actions that are common over many applications.

Bit Number	Definition
0	Reserved, set to 0
1	0 = Use TLV (Type, Length, Value / Variable)
2	0 = The message length field is 8 bits 1 = The message length field is 16 bits
3	0 = Application level response is not expected 1 = Application level response is expected

Message Control Flag			
BIT 0	BIT 1	BIT 2	BIT 3

4.1.8   Message Priority Flag

This flag defines the behavior of sender. This field requires version flag with the value 1.

Value	Definition
0	Reserved
1	**Abort:** the sender wants to abort the connection. The message length must be 0. Otherwise, the *error element* follows.
2	**Pause:** the sender wants to pause the communication.
3	**Resume:** the sender wants to resume the communication.

4.1.9   Message Length

The message length is the total number of octets in the message including the header.

4.1.10   More Flag

See section 2.3.

4.1.11   Reserved (Used to Extended Version Number of ACP245).

The 1st bit to 5th bit of 4th octet in the Header Element is defined as Reserved. It will be used to represents the Extended Version Number after Version 6th of the Protocol ACP245.

Value	ACP 245 Version
7 - 32	Available

5 PROVISIONING SERVICE (APPLICATION ID = 1)

These are messages that allow the service operator SO and the TCU in the vehicle to provision applications. This allows for the establishment of features and services by application. Parameter updates are usually done within an application. This can include subscription information depending on the business model of the SO. It can cover the means whereby the TCU customer pays (e.g. on a usage basis or for a fixed period basis or some other combination). If the service operator wants to sign up a customer when the service is 1st used, then more information must be supplied as part of the application, and information the customer may not readily have at time of use. [1]
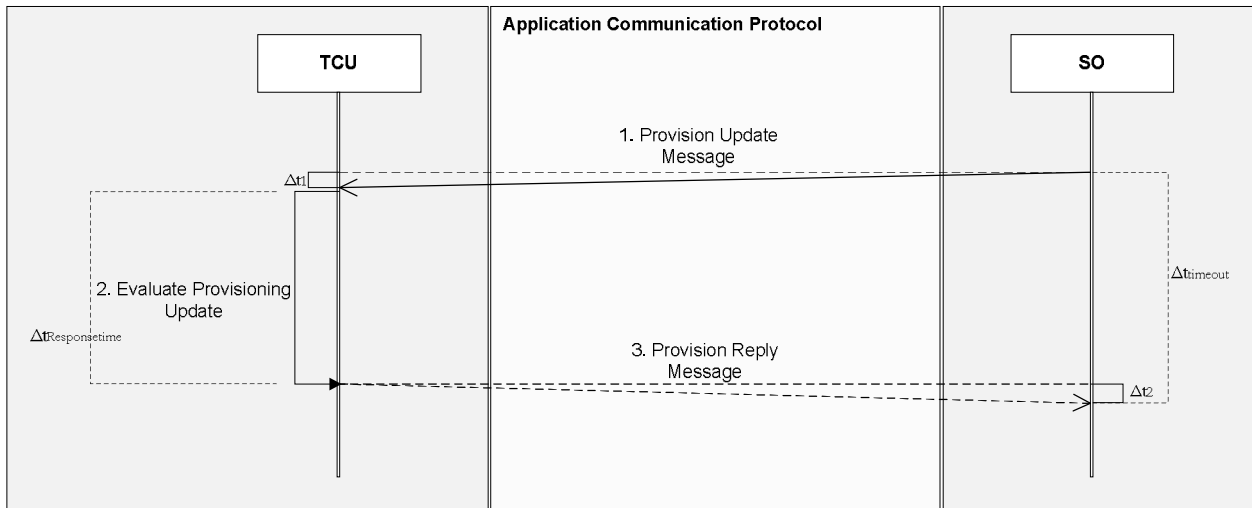
Figure 1- Provisioning Application Message Flow.

5.1   Provisioning Message Set

Message Type Id	Message Type
01	Provision Update Message #1
02	Optional Provision Update Commit Message (*)
03	Provision Reply Message #1
04	Optional Provision Reply Commit Message #2 (*)
05	Provision Request Message (*)
06	Provision Status Message (*)
07	Provision Update Message #2 (*)
08	Provision Reply Message # 2 (*)

Remarks:

1. (*)Only for ACP 3.1.0.2.

2. The DENATRAN Decret n°129/2008 requires as mandatory the ACP Applications 1, 2, 6, 10 and 11. It is mandatory to TCU manufacturer to implement the above mentioned applications and there is no need to the SO to "provision" them. Any attempt to deactivate them must be rejected.

3. Message types 01 and 03 are required for ACP 245.

5.2 Provision Update Message #1 (From SO to TCU)

General Message Format:

Octet / Bit	0	1	2	3	4	5	6	7
MESSAGE COMPOSITION	Header Element							
	Version Element							
	More Flag	Target Application ID						
	ApplFlag1		ControlFlag1					
	ControlFlag2							
	Start Time (Timestamp Element)							
	End Time (Timestamp Element)							
	Grace Time (Timestamp Element)							
	TCU Descriptor Element							
	Vehicle Descriptor Element							

Table 12 - Provision Update Message: elements.

Message Structure:

Octet / Bit	0	1	2	3	4	5	6	7
Header	Reserved Set to 0	Non Standard	Application ID (default=0x01)					
	Reserved Set to 0	Non Standard Flag	Test Flag	Message Type (default=0x01)				
	Version Flag	Application Version		Message Control Flag (bit 3=1)			
	Message Length							

Version Element	IE Identifier =0		More Flag	Length				
	Car Manufacturer ID							
	TCU Manufacturer ID							
	Major hardware release							
	Major software release							

Message Fields	More Flag	Target Application ID						
	ApplFlag1		ControlFlag1					
	ControlFlag2							

Start Time (Timestamp)	Year (00=1990, 01=1991 ranges up to 62=2052)						Month of year range (1…12)	
	Month of year		Day of month, range (1…31)				Hour of day
	Hour of day, range (0…23)				Minutes, range (0…59)		
	Minutes		Seconds, range (0…59)					

End Time (Timestamp)	Year (00=1990, 01=1991 ranges up to 62=2052)					Month of year range (1…12)	
	Month of year	Day of month, range (1…31)				Hour of day	
	Hour of day, range (0…23)			Minutes, range (0…59)			
	Minutes	Seconds, range (0…59)					

TCU Descriptor Element	IE Identifier	More Flag	Length				
	Reserved						
	IE Identifier	More Flag	Length				
	Device ID						
	IE Identifier	More Flag	Length				
	Version ID						

Vehicle Descriptor Element	IE Identifier=0	More Flag	Length				
	Addl Flag=1	Language	VIN	TCU Serial	Vehicle Color	Vehicle Model	License Plate	IMEI
	Addl Flag=0	Model Year	SIMCard ID	Auth. Key	0	0	0	0
	IE Identifier=1	More Flag	Length				
	Text Format (VIN Number)						
	IE Identifier	More Flag	Length				
	(TCU Serial Number)						
	IE Identifier=2	More Flag	Length				
	BCD Format (IMEI Number)						
	IE Identifier=2	More Flag	Length				
	BCD Format (SIM Card ID)						
	IE Identifier=0	More Flag	Length				
	Binary Format (Auth. Key)						

5.2.1 Message Elements Definition

5.2.1.1 Header Element

See definitions at section 4.1. In Message Control Flag, bit 3 is always set to "1".

5.2.1.2 Version Element

See definitions at section 3.1.

5.2.1.3 Message Fields

5.2.1.3.1 Target Application ID

It is used to identify the application that is to be provisioned. The Additional Flag is used to provide a list of Application Ids to be provisioned with the same data. The Provisioning and Configuring target Applications Ids should not be used in the Provision update message. In Application=2, Message Type=8 it must be used Target Application ID=0.

5.2.1.3.2 ApplFlag1

This table defines the provisioning to perform.

Value	Definition
0	No change to application
1	Activate application
2	Deactivate application
3	Change for this application

The value 0 (zero) is used to realize a consult or a request about the currently configuration status of a specific target application identified by the field target application id.

The value 1 (one) will activate (provisioning) the target application, while the vale 2 (two) will deactivate (not provisioning) the currently target application identified by the field target application id.

The 3 (three) value will request a change or update of the target application pointed by the field target application id.

5.2.1.3.3 Control Flag 1

This is defined as a 6 bit field with bit 0 on the left and bit 5 on the right. Remember that this field does not begin on a byte boundary.

Bit Number	Definition
0	1=A 2nd byte ControlFlag2 exists 0=This is the last Control Flag
1	1=Grace Time is present 0=Grace Time is absent
2	1=Start Time field is present 0=Start Time field is absent
3	1=End Time or Expiration Time field is present 0=End Time or Expiration Time field is absent
4	1=Vehicle Descriptor element is present 0=Vehicle Descriptor element is absent
5	1=Provisioning uses *provision update commit message* 0=Provisioning does not use *provision update commit message*

Control Flag 1					
BIT 0	BIT 1	BIT 2	BIT 3	BIT 4	BIT 5

5.2.1.3.4   *Control Flag 2*

Bit Number	Definition
0	Additional Flag
1..3	0=Use the profile method of collection 1=Use the sample method of collection 2..7=Reserved
4	0=Number of samples is not present 1=Number of samples is present
5..7	0=No sample unit 1=Sample units are in minutes 2=Sample units are in kilometers

Control Flag 2							
BIT 0	*BIT 1*	*BIT 2*	*BIT 3*	*BIT 4*	*BIT 5*	*BIT 6*	*BIT 7*

5.2.1.4   Start Time (Timestamp Element)

This is the time at which service is to start. If it is absent, then it is the current time or another predefined time. See definitions at section 3.2.

5.2.1.5   End Time (Timestamp Element)

This is the time at which service is to end. If it is absent, then it no end time is defined. This field is only required when activating a service and establishing the ending time. If a service is to be deactivated and this element is not present, then the deactivation is immediate. If this element is present for a service deactivation, then it specifies the date where the service ends. See definitions at section 3.2.

5.2.1.6   Grace Time (Timestamp Element)

If supported in the TCU, this is the time after end time whereby service for the application is still supported. See definitions at section 3.2

5.2.1.7   TCU Descriptor Element

See definitions at section 3.3.

5.2.1.8   Vehicle Descriptor Element

See definitions at section 3.4.

5.3 Provision Reply Message #1 (From TCU to SO)

Message Definition:

Octet / Bit	0	1	2	3	4	5	6	7
MESSAGE COMPOSITION *Message fields*	Header Element							
	Version Element							
	More Flag		*Target Application ID*					
	ApplFlag1			ControlFlag1				
	Status Flag1		TCU Response Flag		Reserved 0)			
	Error Element							
	Vehicle Descriptor Element							

Message Structure:

Octet / Bit	0	1	2	3	4	5	6	7
Header	Reserved Set to 0	Non Standard Flag	Application ID (default=0x01)					
	Reserved Set to 0	Non Standard Flag	Test Flag	Message Type (default=0x03)				
	Version Flag	Application Version			Message Control Flag			
	Message Length							

Version Element	IE Identifier =0	More Flag	Length	
	Car Manufacturer ID			
	TCU Manufacturer ID			
	Major hardware release			
	Major software release			

Message Fields	More Flag	*Target Application ID*	
	ApplFlag1	ControlFlag1 (default=2)	
	Status Flag1	TCU Response Flag	Reserved (default=0)

Error Element	IE Identifier =0	More Flag	Length
	Error Code		

	IE Identifier=0		More Flag	Length				
Vehicle Descriptor Element	Addl Flag=1	Language	VIN	TCU Serial	Vehicle Color	Vehicle Model	License Plate	IMEI
	Addl Flag=0	Model Year	SIMCard ID	Auth. Key	0	0	0	0
	IE Identifier=1		More Flag	Length				
	Text Format (VIN Number)							
	IE Identifier		More Flag	Length				
	(TCU Serial Number)							
	IE Identifier=2		More Flag	Length				
	BCD Format (IMEI Number)							
	IE Identifier=2		More Flag	Length				
	BCD Format (SIM Card ID)							
	IE Identifier=0		More Flag	Length				
	Binary Format (Auth. Key)							

5.3.1 Message Elements Definition

5.3.1.1 Header Element

See definitions at section 4.1.

5.3.1.2 Version Element

See definitions at section 3.1.

5.3.1.3 Message Fields Element

Initial definitions are at section 5.2.1.3.

5.3.1.3.1 StatusFlag1

This indicates the current provisioning status of the application.

Value	Definition
0	Application already provisioned
1	Application not already provisioned
2	See Error element for more details at 3.5
3	Reserved

5.3.1.3.2   TCU Response Flag

This indicates the reason for this reply message.

Value	Definition
0	Reserved
1	TCU initialize mode
2	TCU response to *provision update message*
3	TCU response to *provision commit message*

5.3.1.4   **Error Element**

See definitions at section 3.5.

5.3.1.5   **Vehicle Descriptor Element**

See definitions at section 3.4.

6 CONFIGURATION (APPLICATION ID = 2)

These are messages that allow the service operator (SO) and the TCU in the vehicle to configure applications. This allows for the establishment of features and services by application. [1]
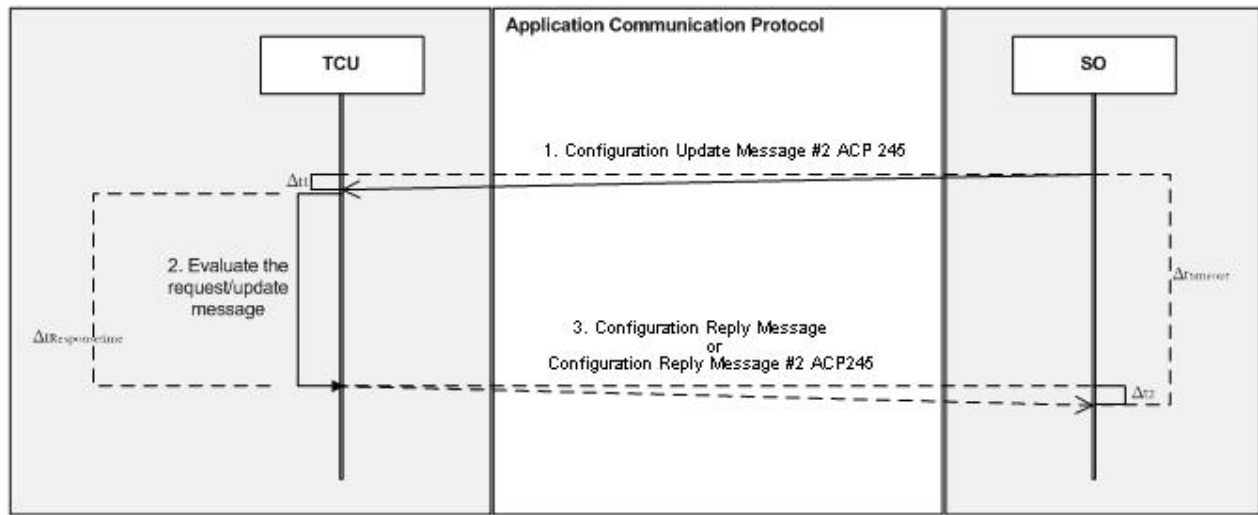
Figure 2 - Configuration Message Flow.

6.1 Configuration Message Set

Message Type Id	Message Type
01	Configuration Update Message (*)
02	Optional Configuration Update Commit Message (*)
03	Configuration Reply Message
04	Optional Configuration Reply Commit Message (*)
05	Configuration Request Message (*)
06	Configuration Status Message (*)
07	Configuration Edit Message (*)
08	Configuration Update Message #2 ACP 245
09	Configuration Reply Message #2 ACP 245
10	Configuration TCU Service Activation/Deactivation Message ACP 245

Remarks:

1. (*)Only for ACP 3.1.0.2.
2. Message types 03, 08, 09 and 10 are required for ACP 245.

6.2 Configuration Update Message #2 ACP 245 (From SO to TCU)

Message Definition:

Octet / Bit	0	1	2	3	4	5	6	7
MESSAGE COMPOSITION *Message Fields*	Header Element							
	Version Element							
	More Flag		*Target Application ID*					
	ApplFlag1			ControlFlag1				
	ControlFlag2							
	Reserved							
	Start Time (Timestamp Element)							
	End Time (Timestamp Element)							
	Grace Time (Timestamp Element)							
	Vehicle Descriptor Element							
	TCU Descriptor Element							
	TCU Data Element							

Message Structure:

Octet / Bit	0	1	2	3	4	5	6	7
Header Element	Reserved Set to 0	Non Standard Flag	Application ID (default=0x02)					
	Reserved Set to 0	Non Standard Flag	Test Flag	Message Type (default=0x08)				
	Version Flag	Application Version			Message Control Flag (bit 3=1)			
	Message Length							

Version Element	IE Identifier =0		More Flag	Length				
	Car Manufacturer ID							
	TCU Manufacturer ID							
	Major hardware release							
	Major software release							

Message Fields	More Flag		*Target Application ID = 0*					
	ApplFlag1			ControlFlag1				
	ControlFlag2							
	Reserved							

Start Time (Timestamp)	Year (00=1990, 01=1991 ranges up to 62=2052)						Month of year range (1…12)	
	Month of year		Day of month, range (1…31)					Hour of day
	Hour of day, range (0…23)				Minutes, range (0…59)			
	Minutes		Seconds, range (0…59)					

End Time (Timestamp)

Year (00=1990, 01=1991 ranges up to 62=2052)			Month of year range (1…12)
Month of year	Day of month, range (1…31)		Hour of day
Hour of day, range (0…23)		Minutes, range (0…59)	
Minutes	Seconds, range (0…59)		

Vehicle Descriptor Element

IE Identifier=0	More Flag	Length					
Addl Flag=1	Language	VIN	TCU Serial	Vehicle Color	Vehicle Model	License Plate	IMEI
Addl Flag=0	Model Year	SIM Card ID	Auth. Key	0	0	0	0
IE Identifier=1	More Flag	Length					
Text Format (VIN Number)							
IE Identifier	More Flag	Length					
(TCU Serial Number)							
IE Identifier=2	More Flag	Length					
BCD Format (IMEI Number)							
IE Identifier=2	More Flag	Length					
BCD Format (SIM Card ID)							
IE Identifier=0	More Flag	Length					
Binary Format (Auth. Key)							

TCU Descriptor Element

IE Identifier	More Flag	Length
Reserved		
IE Identifier	More Flag	Length
Device ID		
IE Identifier	More Flag	Length
Version ID		

TCU Data Element

IE Identifier	More Flag	Length
Data Type MSB (0)		
Data Type LSB (0)		
Length Data Type (0)		
Configuration Data (0)		
…		
Data Type MSB (n)		
Data Type LSB (n)		
Length Data Type (n)		
Configuration Data (n)		

6.2.1 **Message Elements Definition**

6.2.1.1 **Header Element**

See definitions at section 4.1. In Message Control Flag, bit 3 is always set to "1".

6.2.1.2 **Version Element**

See definitions at section 3.1.

6.2.1.3   **Message Fields Element**

See definitions at section 5.2.1.3. Target Application ID is always set to "0".

6.2.1.4   **Start Time (Timestamp Element)**

This is the time at which service is to start. If it is absent, then it is the current time or another predefined time. See definitions at section 3.2.

6.2.1.5   **End Time (Timestamp Element)**

This is the time at which service is to end. If it is absent, then it no end time is defined. This field is only required when activating a service and establishing the ending time. If a service is to be deactivated and this element is not present, then the deactivation is immediate. If this element is present for a service deactivation, then it specifies the date where the service ends. See definitions at section 3.2.

6.2.1.6   **Grace Time (Timestamp Element)**

If supported in the TCU, this is the time after end time whereby service for the application is still supported. See definitions at section 3.2.

6.2.1.7   **Vehicle Descriptor Element**

See definitions at section 3.4.

6.2.1.8   **TCU Descriptor Element**

See definitions at section 3.3.

6.2.1.9   **TCU Data Element**

See definitions at section 3.11.

6.3   **Configuration Reply Message (From TCU to SO)**

Used for a single error element response.

Message Definition:

Octet / Bit	0	1	2	3	4	5	6	7
MESSAGE COMPOSITION / *Message Fields*	Header Element							
	Version Element							
	Reserved							
	More Flag	*Target Application ID*						
	ApplFlag1		ControlFlag1 (default=2)					
	Status Flag1		TCU Response Flag		Reserved			
	Error Element							
	Vehicle Descriptor Element							

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Message Structure:

Octet / Bit	0	1	2	3	4	5	6	7
Header	Reserved Set to 0	Non Standard Flag	Application ID (default=0x02)					
	Reserved Set to 0	Non Standard Flag	Test Flag	Message Type (default=0x03)				
	Version Flag	Application Version			Message Control Flag			
	Message Length							

Version Element	IE Identifier =0		More Flag	Length			
	Car Manufacturer ID						
	TCU Manufacturer ID						
	Major hardware release						
	Major software release						

Reserved

Message Fields	More Flag		*Target Application ID*				
	ApplFlag1		ControlFlag1 (default=2)				
	Status Flag1		TCU Response Flag		Reserved		

Error Element	IE Identifier =0		More Flag	Length			
	Error Code						

Vehicle Descriptor Element	IE Identifier=0		More Flag	Length				
	Addl Flag=1	Language	VIN	TCU Serial	Vehicle Color	Vehicle Model	License Plate	IMEI
	Addl Flag=0	Model Year	SIMCard ID	Auth. Key	0	0	0	0
	IE Identifier=1		More Flag	Length				
	Text Format (VIN Number)							
	IE Identifier		More Flag	Length				
	(TCU Serial Number)							
	IE Identifier=2		More Flag	Length				
	BCD Format (IMEI Number)							
	IE Identifier=2		More Flag	Length				
	BCD Format (SIM Card ID)							
	IE Identifier=0		More Flag	Length				
	Binary Format (Auth. Key)							

6.3.1 **Message Elements Definition**

6.3.1.1 **Header Element**

See definitions at section 4.1.

6.3.1.2 **Version Element**

See definitions at section 3.1.

6.3.1.3 **Message Fields Element**

See definitions at section 5.2.1.3.

6.3.1.4 **Error Element**

See definitions at section 3.5.

6.3.1.5 **Vehicle Descriptor Element**

See definitions at section 3.4.

6.4 **Configuration Reply Message #2 ACP 245 (From TCU to SO)**

Used for a multiple error element response.

Message Definition:

Octet / Bit	0	1	2	3	4	5	6	7
MESSAGE COMPOSITION *Message Fields*	Header Element							
	Version Element							
	More Flag	*Target Application ID*						
	ApplFlag1		ControlFlag1 (default=2)					
	Status Flag1		TCU Response Flag		Reserved			
	TCU Data Error Element							
	Vehicle Descriptor Element							

Message Structure:

Octet / Bit	0	1	2	3	4	5	6	7
Header	Reserved Set to 0	Non Standard Flag	Application ID (default=0x02)					
	Reserved Set to 0	Non Standard Flag	Test Flag	Message Type (default=0x09)				
	Version Flag	Application Version			Message Control Flag			
	Message Length							

Version Element	IE Identifier =0	More Flag	Length		
	Car Manufacturer ID				
	TCU Manufacturer ID				
	Major hardware release				
	Major software release				

Message Fields	More Flag	Target Application ID	
	ApplFlag1	ControlFlag1 (default=2)	
	Status Flag1	TCU Response Flag	Reserved

TCU Data Error Element	IE Identifier	More Flag	Length
	Data Type MSB (0)		
	Data Type LSB (0)		
	Length Data Type (0)		
	Configuration Data (0)		
	Error Element (0)		
	…		
	Data Type MSB (n)		
	Data Type LSB (n)		
	Length Data Type (n)		
	Configuration Data (n)		
	Error Element (n)		

Vehicle Descriptor Element	IE Identifier=0		More Flag	Length				
	Addl Flag=1	Language	VIN	TCU Serial	Vehicle Color	Vehicle Model	License Plate	IMEI
	Addl Flag=0	Model Year	SIMCard ID	Auth. Key	0	0	0	0
	IE Identifier=1		More Flag	Length				
	Text Format (VIN Number)							
	IE Identifier		More Flag	Length				
	(TCU Serial Number)							
	IE Identifier=2		More Flag	Length				
	BCD Format (IMEI Number)							
	IE Identifier=2		More Flag	Length				
	BCD Format (SIM Card ID)							
	IE Identifier=0		More Flag	Length				
	Binary Format (Auth. Key)							

6.4.1 Message Elements Definition

6.4.1.1 Header Element

See definitions at section 4.1.

6.4.1.2 Version Element

See definitions at section 3.1.

6.4.1.3   **Message Fields Element**

See definitions at section 5.2.1.3.

6.4.1.4   **TCU Data Error Element**

See definitions at section 3.12.

6.4.1.5   **Vehicle Descriptor Element**

See definitions at section 3.4.

6.5 Configuration TCU Service Activation/ Deactivation Message ACP 245 (From SO to TCU)

Used to TCU Service Activation and Deactivation. This process is better described at section 10.

Octet / Bit	0	1	2	3	4	5	6	7
MESSAGE COMPOSITION *Message Fields*	Header Element							
	APN Configuration Element							
	Server Configuration Element							
	Control Byte1							
	Vehicle Descriptor Element (ICCID and Auth.Key)							

6.5.1   Message Elements Definition

6.5.1.1   Header Element

See definitions at section 4.1. In Message Control Flag, bit 3 is always set to "1".

6.5.1.2   APN Configuration Element

Octet \ bit	0	1	2	3	4	5	6	7
1	IE Identifier = 0		More flag	Length				
2..p-1	APN Address Element							
p..q-1	APN Login Element							
q..r-1	APN Password Element							

6.5.1.2.1   APN Address Element

Octet \ bit	0	1	2	3	4	5	6	7
1	IE Identifier = 1		More flag	Length				
2..p-1	APN Address (Text Format)							

6.5.1.2.2   APN Login Element

Octet \ bit	0	1	2	3	4	5	6	7
1	IE Identifier = 1		More flag	Length				
2..p-1	APN Login (Text Format)							

6.5.1.2.3   APN Password Element

Octet \ bit	0	1	2	3	4	5	6	7
1	IE Identifier = 1		More flag	Length				
2..p-1	APN Password (Text Format)							

6.5.1.3   **Server Configuration Element**

Octet \ bit	0	1	2	3	4	5	6	7
1	IE Identifier = 0		More flag	Length = 13				
2..5	First Server IP (4 bytes)							
6..7	First Server Port (2 bytes)							
8..11	Second Server IP (4 bytes)							
12..13	Second Server Port (2 bytes)							
14	Protocol ID							

6.5.1.3.4   Protocol ID

Values	Definition
0	ACP 245
1..31	Reserved
32..255	Defined by TCU Manufacturer

6.5.1.4   **Control Byte**

Octet \ bit	0	1	2	3	4	5	6	7
1	More flag	Control Value	Reserved					

6.5.1.4.5   Control Value

Bit	Definition
0	More Flag bit, set as 0
1	0= Deactivation (reset all configuration to factory defaults) 1= Activation (*)
2..7	Reserved

(*) This only activates Remote Blocking Function, not the Vehicle Location Function (See data type 0x0047).

6.5.1.5   **Vehicle Descriptor Element**

See definitions at section 3.4.

7 REMOTE VEHICLE FUNCTION SERVICE (APPLICATION ID = 6)

The remote vehicle function application allows vehicle functions to be controlled remotely by the SO. These functions may include devices such as door lock motors, window motors, trunk release, or modes such as tracking mode, covert mode, etc. In general, a request is made to the SO by either the TCU or the driver for a specific remote vehicle function to be performed. The SO then initiates the remote vehicle function, assuming a successful authentication. [1]
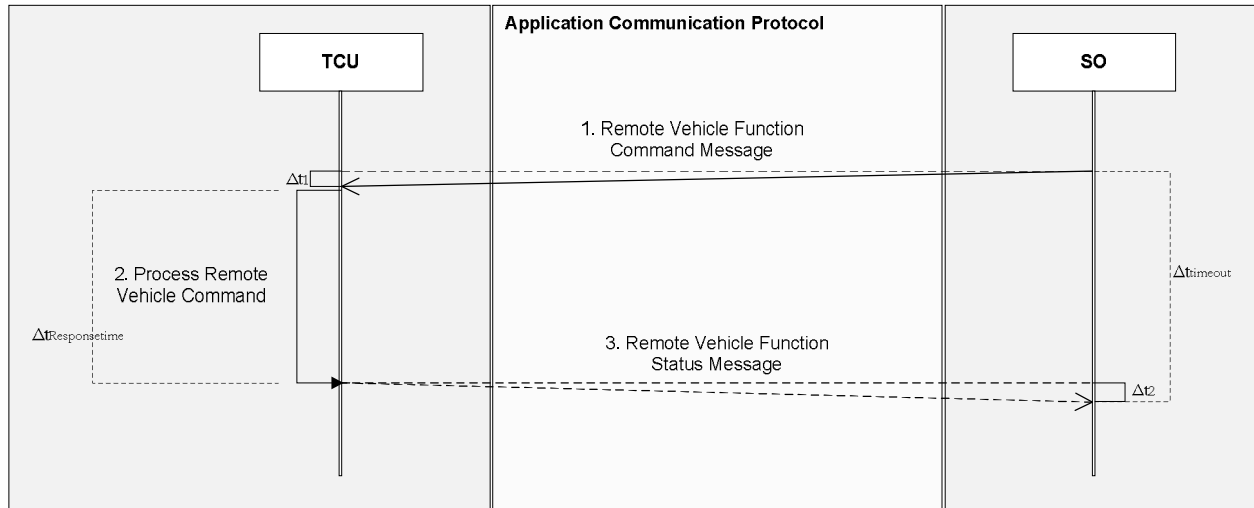
Figure 3 – Remote Vehicle Function Message Flow.

7.1 Remote Vehicle Function Message Set

Message Type Id	Message Type
01	Remote Vehicle Function Request (*)
02	Remote Vehicle Function Command
03	Remote Vehicle Function Status

Remarks:

1. (*)Only for ACP 3.1.0.2.

2. Message types 02 and 03 are required for ACP 245.

7.2 Vehicle Function Command (From SO to TCU)

Message Definition:

Octet / Bit	0	1	2	3	4	5	6	7
MESSAGE COMPOSITION *Message Fields*	Header							
	Version Element							
	Control Function Element							
	Function Command Element							
	Vehicle Descriptor Element							

Message Structure:

Octet / Bit	0	1	2	3	4	5	6	7
Header	Reserved Set to 0	Non Standard Flag	Application ID (default=0x06)					
	Reserved Set to 0	Non Standard Flag	Test Flag	Message Type (default=0x02)				
	Version Flag	Application Version			Message Control Flag (bit 3 =1)			
	Message Length							

	0	1	2	3	4	5	6	7
Version Element	IE Identifier =0	More Flag	Length					
	Car Manufacturer ID							
	TCU Manufacturer ID							
	Major hardware release							
	Major software release							

	0	1	2	3	4	5	6	7
Control Function	IE Identifier	More Flag	Length					
	Entity ID							
	Reserved				Transmit Units			
	Transmit Interval							

	0	1	2	3	4	5	6	7
Function Command	IE Identifier	More Flag	Length					
	Function Command or Status							
	IE Identifier	More Flag	Length					
	Raw Data							

	0	1	2	3	4	5	6	7
Vehicle Descriptor Element	IE Identifier=0	More Flag	Length					
	Addl Flag=1	Language	VIN	TCU Serial	Vehicle Color	Vehicle Model	License Plate	IMEI
	Addl Flag=0	Model Year	SIMCard ID	Auth. Key	0	0	0	0
	IE Identifier=1	More Flag	Length					
	Text Format (VIN Number)							
	IE Identifier	More Flag	Length					
	(TCU Serial Number)							
	IE Identifier=2	More Flag	Length					
	BCD Format (IMEI Number)							
	IE Identifier=2	More Flag	Length					
	BCD Format (SIM Card ID)							
	IE Identifier=0	More Flag	Length					
	Binary Format (Auth. Key)							

7.2.1 **Message Elements Description**

7.2.1.1 **Header Element**

See definitions at section 4.1. In Message Control Flag, bit 3 is always set to "1".

7.2.1.2 **Version Element**

See definitions at section 3.1.

7.2.1.3 **Control Function Element**

See definitions at section 3.6.

7.2.1.4 **Function Command Element**

See definitions at section 3.7.

7.2.1.5 **Vehicle Descriptor Element**

See definitions at section 3.4.

7.3 **Vehicle Function Status (From TCU to SO)**

Message Definition:

Octet / Bit	0	1	2	3	4	5	6	7
MESSAGE COMPOSITION *Message Fields*	Header							
	Version Element							
	Control Function Element							
	Function Status Element							
	Error Element							
	Vehicle Descriptor Element							

Message Structure:

Octet / Bit	0	1	2	3	4	5	6	7
Header	Reserved Set to 0	Non Standard Flag	Application ID (default=0x06)					
	Reserved Set to 0	Non Standard Flag	Test Flag	Message Type (default = 0x03)				
	Version Flag	Application Version		Message Control Flag (default=2)				
	Message Length							

	0	1	2	3	4	5	6	7
Version Element	IE Identifier=0	More Flag	Length					
	Car Manufacturer ID							
	TCU Manufacturer ID							
	Major hardware release							
	Major software release							

	0	1	2	3	4	5	6	7
Control Function	IE Identifier	More Flag	Length					
	Entity ID							
	Reserved				Transmit Units			
	Transmit Interval							

Function Status	IE Identifier	More Flag	Length				
	Function Command or Status						
	IE Identifier	More Flag	Length				
	Raw Data						

Error Element	IE Identifier=0	More Flag	Length				
	Error Code						

Vehicle Descriptor Element	IE Identifier=0	More Flag	Length				
	Addl Flag=1	Language	VIN	TCU Serial	Vehicle Color	Vehicle Model	License Plate	IMEI
	Addl Flag=0	Model Year	SIMCard ID	Auth. Key	0	0	0	0
	IE Identifier=1	More Flag	Length				
	Text Format (VIN Number)						
	IE Identifier	More Flag	Length				
	(TCU Serial Number)						
	IE Identifier=2	More Flag	Length				
	BCD Format (IMEI Number)						
	IE Identifier=2	More Flag	Length				
	BCD Format (SIM Card ID)						
	IE Identifier=0	More Flag	Length				
	Binary Format (Auth. Key)						

7.3.1 Message Elements Description

7.3.1.1 Header Element

See definitions at section 4.1

7.3.1.2 Version Element

See definitions at section 3.1.

7.3.1.3 Control Function Element

See definitions at section 3.6.

7.3.1.4 Function Status Element

See definitions at section 3.7.

7.3.1.5 Vehicle Descriptor Element

See definitions at section 3.4.

7.3.1.6 Error Element

See definitions at section 3.5.

8 VEHICLE TRACKING SERVICE (APPLICATION ID = 10)

The vehicle tracking application sends vehicle location information to the SO on a periodic basis. This enables the SO to track the vehicle in the event that a vehicle was reported missing. Tracking may automatically be enabled in a SO response of another application. However, in the event a vehicle owner reports the vehicle missing, the SO must enable the vehicle tracking manually. In general, the SO is notified of a missing vehicle by the vehicle owner. The SO then sends a vehicle tracking command message to the TCU to enable vehicle tracking. Periodic messages are sent by the TCU to the SO with location information used in the tracking of the vehicle. A vehicle tracking command message can be sent from the SO to the TCU to disable tracking when it is determined that it is no longer needed. [1]
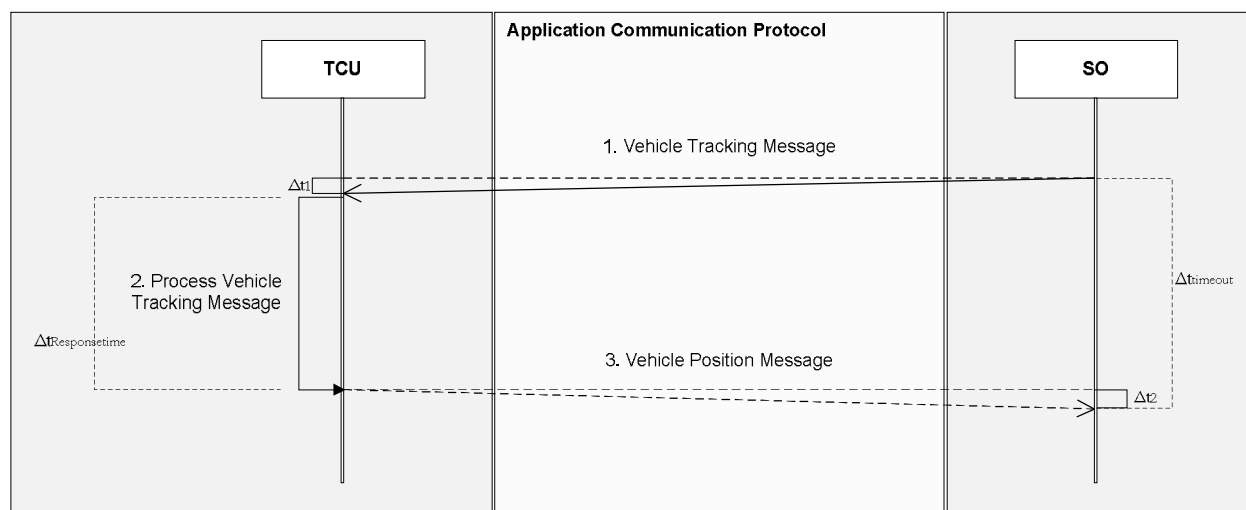
Figure 4 - Vehicle Tracking Message Flow.
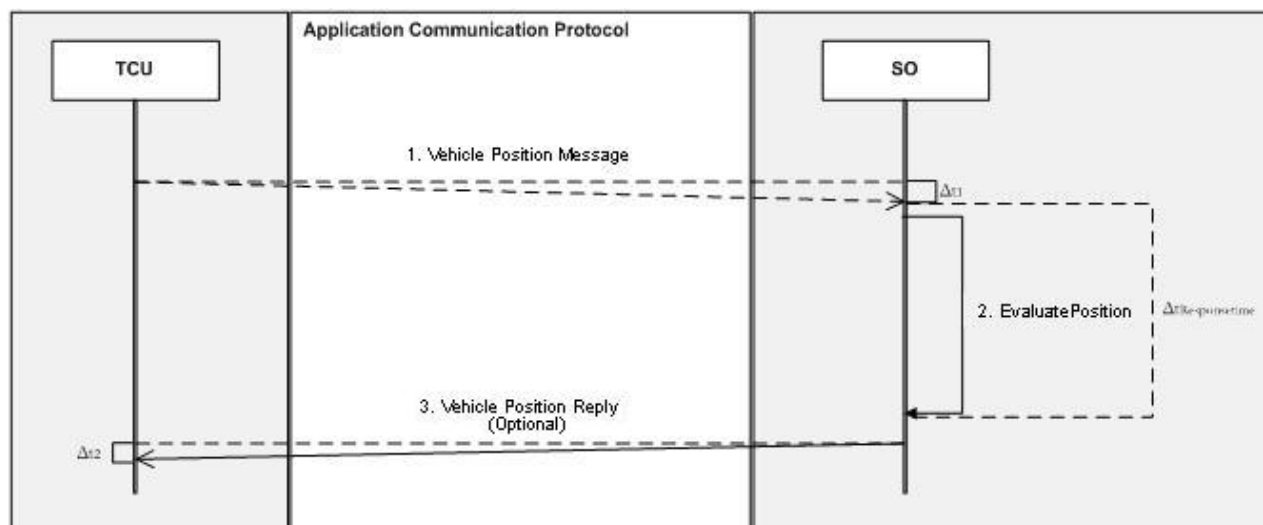
Figure 4.1 – Optional Vehicle Tracking Message Flow.

8.1 Vehicle Tracking Message Set

Message Type Id	Message Type
01	Vehicle Tracking Command (*)
02	Vehicle Position Message
03	Vehicle Position Reply
04	Vehicle Tracking Command with Commit (*)
05	Commit to Vehicle Tracking Command (*)

Remarks:

1. (*)Only for ACP 3.1.0.2.

2. Message types 02 and 03 are required for ACP 245.

8.2 Vehicle Tracking Command (From SO to TCU)

Not used in ACP 245. In ACP 245 use "Remote Vehicle Function Command" (Application=6, Message Type=2) for Start/Stop Tracking.

8.3 Vehicle Position Message (From TCU to SO)

Message Definition:

Octet / Bit	0	1	2	3	4	5	6	7
MESSAGE COMPOSITION *Message Fields*	Header							
	Version Element							
	Timestamp Element							
	Location Element							
	Vehicle Descriptor Element							
	Breakdown Status Element							
	Information Type							

Message Structure:

Octet / Bit	0	1	2	3	4	5	6	7
Header	Reserved Set to 0	Non Standard Flag	Application ID (default=0x0A)					
	Reserved Set to 0	Non Standard Flag	Test Flag	Message Type(default=0x02)				
	Version Flag	Application Version			Message Control Flag (default=2)			
	Message Length							

Version Element	IE Identifier=0		More Flag	Length				
	Car Manufacturer ID							
	TCU Manufacturer ID							
	Major hardware release							
	Major software release							

Timestamp			
Year (00=1990, 01=1991 ranges up to 62=2052)			Month of year range (1…12)
Month of year	Day of month, range (1…31)		Hour of day
Hour of day, range (0…23)		Minutes, range (0…59)	
Minutes	Seconds, range (0…59)		

Location Element		
IE Identifier=0	More Flag	Length
Current GPSRawData (3.8.1)		
Prior GPSRawData (3.8.1)		
Current Dead Reckoning Data (3.8.16)		
Array of Area Location Delta Coding (3.8.17)		

Vehicle Descriptor Element							
IE Identifier=0		More Flag	Length				
Addl Flag=1	Language	VIN	TCU Serial	Vehicle Color	Vehicle Model	License Plate	IMEI
Addl Flag=0	Model Year	SIMCard ID	Auth. Key	0	0	0	0
IE Identifier=1		More Flag	Length				
Text Format (VIN Number)							
IE Identifier		More Flag	Length				
(TCU Serial Number)							
IE Identifier=2		More Flag	Length				
BCD Format (IMEI Number)							
IE Identifier=2		More Flag	Length				
BCD Format (SIM Card ID)							
IE Identifier=0		More Flag	Length				
Binary Format (Auth. Key)							

Breakdown Status Element		
IE Identifier	More Flag	Length
More Flag =1	Breakdown Source (*First flag*)	
More Flag =1	Breakdown Source (*Second flag*)	
More Flag	Breakdown Source (*Third flag*)	
More Flag	Breakdown Sensor	
IE Identifier	More Flag	Length
Breakdown Data		

Information Type Element		
IE Identifier=0	More Flag	Length
Add Flag	Information Type	
IE Identifier	More Flag	Length
Raw Data		

Example: See appendix II at section **Erro! Fonte de referência não encontrada.**.

8.3.1 **Message Elements Definition**

8.3.1.1 **Header Element**

See definitions at section 4.1.

8.3.1.2 **Version Element**

See definitions at section 3.1.

8.3.1.3 **Location Element**

See definitions at section 3.8.

8.3.1.4 **Vehicle Descriptor Element**

See definitions at section 3.4.

8.3.1.5 **Breakdown Status Element**

See definitions at section 3.9.

8.3.1.6 **Information Type Element**

See definitions at section 3.10.

8.4 **Vehicle Position Reply Message (From SO to TCU)**

This message is sent by SO when a request is done by TCU (see item 4.1.7)

Message Definition:

Octet / Bit	0	1	2	3	4	5	6	7
MESSAGE COMPOSITION *Message Fields*	Header							
	Version Element							
	Confirmation				Transmit Units			
	Ecall ControlFlag2							
	Error Element							

Message Structure:

Octet / Bit	0	1	2	3	4	5	6	7
Header	Reserved Set to 0	Non Standard Flag	Application ID (default=0x0A)					
	Reserved Set to 0	Non Standard Flag	Test Flag	Message Type (default=0x03)				
	Version Flag	Application Version			Message Control Flag (default=2)			
	Message Length							

	IE Identifier=0	More Flag	Length
Version Element	Car Manufacturer ID		
	TCU Manufacturer ID		
	Major hardware release		
	Major software release		

	Confirmation	Transmit Units
Message Fields	Ecall ControlFlag2	

	IE Identifier =0	More Flag	Length
Error Element	Error Code		

8.4.1 **Message Elements Definition**

8.4.1.1 **Header Element**

See definitions at section 4.1.

8.4.1.2 **Version Element**

See definitions at section 3.1.

8.4.1.3 **Message Fields Element**

8.4.1.3.1 Confirmation

This element represents the confirmation status of an assistance reply message.
Default values for ACP 245 – eCall Application not implemented = 0 1 0 1

Bit	Confirmation Definitions
0	Additional Flag
1	1=Assistance notification accepted and processing continues **(default)** 0=Assistance notification rejected.
2	1=Turn Speaker On 0=Turn Speaker Off **(default)**
3	1=Processing [tracking] should start or continue **(default)** 0=Processing [tracking] should stop

Confirmation			
BIT 0	BIT 1	BIT 2	BIT 3

8.4.1.3.2 *Transmit Units*

The value in this element is only valid if the *Confirmation* element indicates tracking should start or continue.

Value	Transmit Units
0	Second **(default)**
1	Minute
2	Hour
3	Send emergency call message one more time
4	Send only one message

8.4.1.3.3 *EcallControlFlag2*

This element defines additional control functions in the ecall message.

Bit	Confirmation Definitions
0	Additional Flag
1	1=Cancel the alarm 0=No alarm related action **(default)**
2	1=Re-send the Ecall request 0=No re-send requested **(default)**
3	1=Do not allow voice call or drop current voice call **(default)** 0=Allow voice call (default if EcallControl Flag 2 not present)
4-7	Reserved

eCall Control Flag 2						
BIT 0	BIT 1	BIT 2	BIT 3	Reserved	Reserved	Reserved	Reserved

8.4.1.4 **Error Element**

See definitions at section 3.5

9 THEFT ALARM (APPLICATION ID = 11)

The theft alarm application informs the SO that a vehicle event has been triggered. The vehicle manufacturer defines the set of conditions that define a condition event. [1]
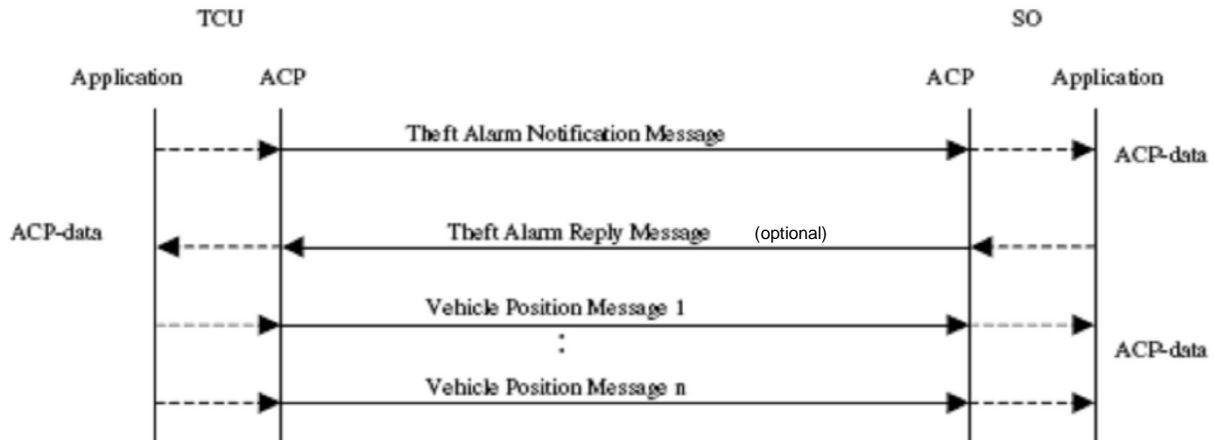
Figure 5 - Theft Alarm Message Flow.

9.1 Theft Alarm Message Set

Message Type Id	Message Type
01	Theft Alarm Notification
02	Theft Alarm Reply
03	Vehicle Position Message
04	Keep Alive
05	Keep Alive Reply

9.2 Theft Alarm Notification (From TCU to SO)

This message is used to inform that an event has occurred and the proper Breakdown Source Flag must be set.

Message Definition:

Octet / Bit	0	1	2	3	4	5	6	7
MESSAGE COMPOSITION *Message Fields*	Header Element							
	Version Element							
	Timestamp Element							
	Location Element							
	Vehicle Descriptor Element							
	Breakdown Status Element							
	Information Type Element							

Message Structure:

Octet / Bit	0	1	2	3	4	5	6	7
Header	Reserved Set to 0	Non Standard Flag	Application ID (default=0x0B)					
	Reserved Set to 0	Non Standard Flag	Test Flag	Message Type (default=0x01)				
	Version Flag	Application Version			Message Control Flag (default=2)			
	Message Length							

Version Element	IE Identifier=0		More Flag	Length				
	Car Manufacturer ID							
	TCU Manufacturer ID							
	Major hardware release							
	Major software release							

Timestamp	Year (00=1990, 01=1991 ranges up to 62=2052)						Month of year range (1…12)	
	Month of year		Day of month, range (1…31)				Hour of day	
	Hour of day, range (0…23)				Minutes, range (0…59)			
	Minutes		Seconds, range (0…59)					

Location Element	IE Identifier=0		More Flag	Length				
	Current GPSRawData (3.8.1)							
	Prior GPSRawData (3.8.1)							
	Current Dead Reckoning Data (3.8.16)							
	Array of Area Location Delta Coding (3.8.17)							

Vehicle Descriptor Element	IE Identifier=0		More Flag	Length				
	Addl Flag=1	Language	VIN	TCU Serial	Vehicle Color	Vehicle Model	License Plate	IMEI
	Addl Flag=0	Model Year	SIMCard ID	Auth. Key	0	0	0	0
	IE Identifier=1		More Flag	Length				
	Text Format (VIN Number)							
	IE Identifier		More Flag	Length				
	(TCU Serial Number)							
	IE Identifier=2		More Flag	Length				
	BCD Format (IMEI Number)							
	IE Identifier=2		More Flag	Length				
	BCD Format (SIM Card ID)							
	IE Identifier=0		More Flag	Length				
	Binary Format (Auth. Key)							

Breakdown Status Element	IE Identifier=0		More Flag	Length
	More Flag =1	Breakdown Source (*First flag*)		
	More Flag =1	Breakdown Source (*Second flag*)		
	More Flag	Breakdown Source (*Third flag*)		
	More Flag	Breakdown Sensor		
	IE Identifier		More Flag	Length
	Breakdown Data			

Information Type Element	IE Identifier=0		More Flag	Length
	Add Flag	Information Type		
	IE Identifier		More Flag	Length
	Raw Data			

9.2.1 **Message Elements Definition**

9.2.1.1 **Header Element**

See definitions at section 4.1.

9.2.1.2 **Version Element**

See definitions at section 3.1.

9.2.1.3 **Timestamp Element**

See definitions at section 3.2.

9.2.1.4 **Location Element**

See definitions at section 3.8.

9.2.1.5 **Vehicle Descriptor Element**

See definitions at section 3.4.

9.2.1.6 **Breakdown Status Element**

See definitions at section 3.9.

9.2.1.7 **Information Type Element**

See definitions at section 3.10.

9.3 Theft Alarm Reply (From SO to TCU)

This message is sent by SO when a request is done by TCU (see item 4.1.7)

Message Definition:

Octet / Bit	0	1	2	3	4	5	6	7
MESSAGE COMPOSITION	Header Element							
	Version Element							
	Confirmation				Transmit Units			
	Ecall ControlFlag2							
	Error Element							

Message Structure:

Octet / Bit	0	1	2	3	4	5	6	7
Header	Reserved Set to 0	Non Standard Flag	Application ID (default=0x0B)					
	Reserved Set to 0	Non Standard Flag	Test Flag	Message Type				
	Version Flag	Application Version			Message Control Flag			
	Message Length							

	0	1	2	3	4	5	6	7
Version Element	IE Identifier =0	More Flag (default=0)	Length					
	Car Manufacturer ID							
	TCU Manufacturer ID							
	Major hardware release							
	Major software release							

	0	1	2	3	4	5	6	7
Message Fields	Confirmation				Transmit Units			
	EcallControlFlag2							

	0	1	2	3	4	5	6	7
Error Element	IE Identifier =0	More Flag (default=0)	Length					
	Error Code							

9.3.1 Message Elements Definition

9.3.1.1 Header Element

See definitions at section 4.1.

9.3.1.2 Version Element

See definitions at section 3.1.

9.3.1.3 **Message Fields Element**

See definitions at section 8.4.1.

9.3.1.4 **Error Element**

See definitions at section 3.5.

9.4 Vehicle Position Message (TCU to SO)

See definitions at section 8.3

9.5 Message Keep Alive (TCU to SO)

Message Definition:

Octet / Bit	0	1	2	3	4	5	6	7
MESSAGE COMPOSITION *Message Fields*	Header Element							
	Vehicle Descriptor Element							

Message Structure:

Octet / Bit	0	1	2	3	4	5	6	7
Header Element	Reserved Set to 0	Private Flag	Application ID (default = 0x0B)					
	Reserved Set to 0	Private Flag	Test Flag	Message Type (default = 0x04)				
	Version Flag	Version			Message Control Flag			
	Message Length							

Vehicle Descriptor Element	IE Identifier=0		More Flag	Length				
	Addl Flag=1	Language	VIN	TCU Serial	Vehicle Color	Vehicle Model	License Plate	IMEI
	Addl Flag=0	Model Year	SIMCard ID	Auth. Key	0	0	0	0
	IE Identifier=1		More Flag	Length				
	Text Format (VIN Number)							
	IE Identifier		More Flag	Length				
	(TCU Serial Number)							
	IE Identifier=2		More Flag	Length				
	BCD Format (IMEI Number)							
	IE Identifier=2		More Flag	Length				
	BCD Format (SIM Card ID)							
	IE Identifier=0		More Flag	Length				
	Binary Format (Auth. Key)							

9.5.1   **Header Element**

See definitions at section 4.1.

9.5.2   **Vehicle Descriptor Element**

See definitions at section 3.4.

9.6 Message Keep Alive Reply (SO to TCU)

This message is sent by SO when a request is done by TCU (see item 4.1.7)

Message Definition:

Octet / Bit	0	1	2	3	4	5	6	7
MESSAGE COMPOSITION *Message Fields*	Header Element							
	Vehicle Descriptor Element								

Message Structure:

Octet / Bit	0	1	2	3	4	5	6	7
Header Element	Reserved Set to 0	Private Flag	Application ID (default = 0x0B)					
	Reserved Set to 0	Private Flag	Test Flag	Message Type (default = 0x05)				
	Version Flag	Version		Message Control Flag			
	Message Length							

Vehicle Descriptor Element	IE Identifier=0		More Flag	Length				
	Addl Flag=1	Language	VIN	TCU Serial	Vehicle Color	Vehicle Model	License Plate	IMEI
	Addl Flag=0	Model Year	SIMCard ID	Auth. Key	0	0	0	0
	IE Identifier=1		More Flag	Length				
	Text Format (VIN Number)							
	IE Identifier		More Flag	Length				
	(TCU Serial Number)							
	IE Identifier=2		More Flag	Length				
	BCD Format (IMEI Number)							
	IE Identifier=2		More Flag	Length				
	BCD Format (SIM Card ID)							
	IE Identifier=0		More Flag	Length				
	Binary Format (Auth. Key)							

9.6.1   **Header Element**

See definitions at section 4.1.

9.6.2   **Vehicle Descriptor Element**

See definitions at section 3.4.

10 TCU Service Activation/ Deactivation

10.1 Activation process

This picture below shows the message flow between SO and TCU in TCU Service Activation process.
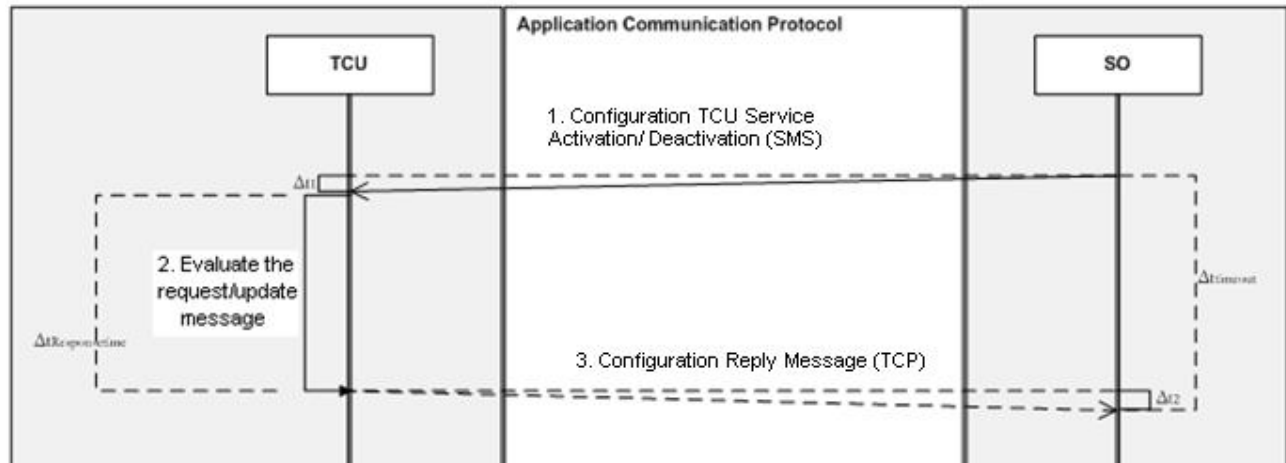
10.2 Deactivation process

This picture below shows the message flow between SO and TCU in the deactivation process.
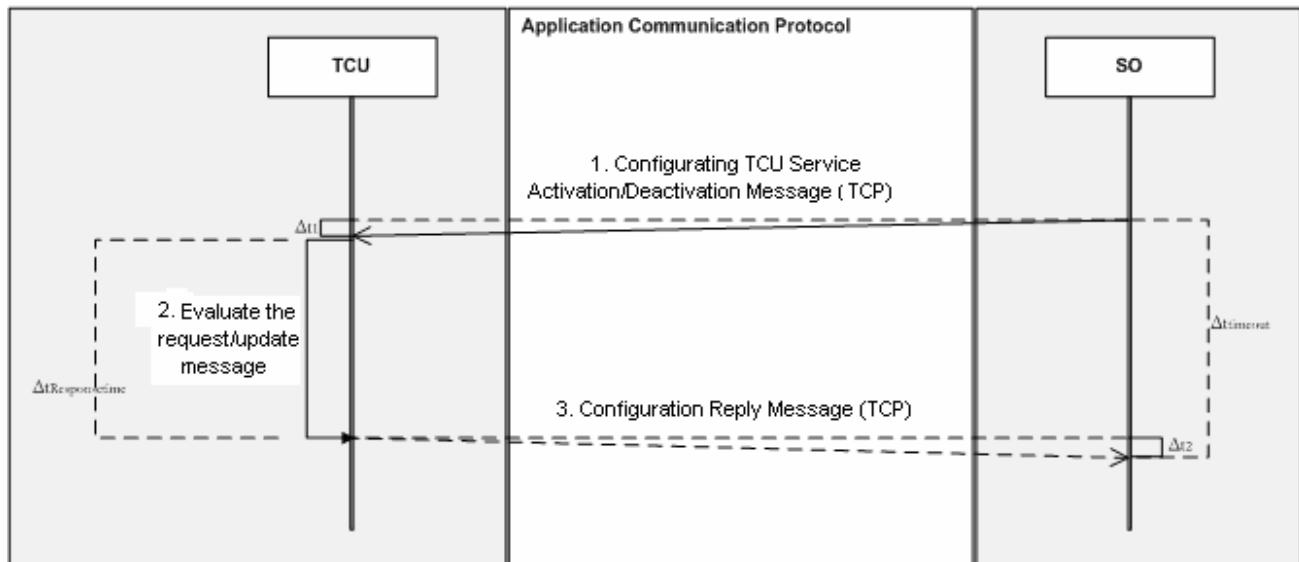
11 REFERENCES

[1] *Application Communication Protocol. Application Layer Message Set Definition.* Version 3.1.0.2. Motorola, Inc.November 2000.

[2] *DENATRAN Resolution* n°245/2007. July 27, 2007.

12 Appendix I

12.1 Available Configuration Parameter Indexes

The table below

12.1.1 Tracking Service

Available indexes to change configuration parameters of tracking service.

Index below marked with * must be configurable in TCU (mandatory).

Data Type Index	Parameter	Description	Type/Size	Default Unit	Default Value
* 0x0011	Tracking Timer	Transmission interval used to send periodically the Vehicle's position. (value 0 – disables tracking)	unsigned integer/ 2 Bytes	Seconds	420
0x0012	Tracking Timer at Sleep Mode	Transmission interval used to send periodically the Vehicle's position, now in Sleep Mode.	unsigned integer/ 2 Bytes	Minutes	1440
0x0013	Type of GPS Quality	Consists of the type of GPS Signal Indication: **BIT 0** = Digital indication (0=bad, 1=good) **BIT 1** = DOP (Dilution of Precision) in upper nibble and # of satellites in lower nibble of state table.	unsigned char/1 Byte	Enumeration Type	1
0x0014	Direction Change Threshold	Limit used by GPS to detect a direction change	unsigned char/ 1 Byte	degrees	45
0x0015	Direction Change Speed Threshold	Limit used by GPS to alarm detect a direction change	unsigned char/ 1 Byte	Km/h	250
0x0016	Maximum Speed	Maximum Speed to monitoring	unsigned char/ 1 Byte	Km/h	250
0x0017	Odometer Limit	Limit used to count a maximum odometer's values	unsigned long/ 4 Bytes	Km	0 (Unlimited)
0x0018	Odometer Save Threshold	Value used to consider to the odometer counting	unsigned integer/ 2 Bytes	Km	10
0x0019	Tracking Timer at Event Mode	Transmission interval used to send periodically the Vehicle's position, now in Event Mode	unsigned integer/ 2 Bytes	Seconds	300

12.1.2 *Immobilizer Service*

Available indexes to change configuration parameters of immobilizer service.

Data Type Index	Parameter	Description	Type	Default Unit	Default Value
0x0021	Immobilizer Timer	Necessary timer used to activate the immobilizer device after turn off the car's ignition.	unsigned integer/ 2 Bytes	Seconds	300

12.1.3 *Anti-Theft Service*

Available indexes to change configuration parameters of anti-theft service.

Data Type Index	Parameter	Description	Type	Default Unit	Default Value
0x0031	Anti-Theft Timer	Necessary timer used to activate the anti-theft system after ignition is turn off.	unsigned integer/ 2 bytes	Seconds	30
0x0032	Enable/Disable Anti-Theft	Enable/disable the Anti-Theft system.	Boolean/ 1 bit	-	True

12.1.4 *System Service*

Available indexes to change configuration parameters of system service.

Data Type Index	Parameter	Description	Type	Default Unit	Default Value
0x0041	Sleep Timer	Necessary timer used to put the system in Sleep Mode after the ignition key is turn off.	unsigned integer/ 2 bytes	Seconds	60
0x0042	Enable Panic Button Configuration	Enable a system's input to work like panic button or anti-theft.	Boolean/1 bit	-	False (Anti-Theft is enabled)
0x0043	Enable Transportation Flag.	If this flag is enabled the system will be stay in Transportation Mode.	Boolean/1 bit	-	True
0x0044	Enable Contract Flag.	Flag used to enable/disable the contract with the SO. Initially and currently only using a SMS message it's possible to enable this flag. After enabled is possible disable it through a GSM/GPRS connection.	Boolean/1 bit	-	False

0x0045	Auth. Key	Authentication key used for SMS validation.	unsigned integer/8 bytes		
*0x0046	TCU Service Activation/ Deactivation	Enable/ Disable the SMS to TCU Service Activation/ Deactivation	Boolean/1 bit	-	True
*0x0047	Vehicle Location Data	Enable/ Disable TCU to send Vehicle Location Data (Location Element with Length "0")	Boolean/1 bit	-	False

12.1.5 Network Service

Available indexes to change configuration parameters of network service.

Data Type Index	Parameter	Description	Type	Default Unit	Default Value
0x0051	Keep Alive Timer	Necessary timer to send a small message to verify the connection status between the TCU and the SO. (value 0 – disables)	unsigned int / 2 byte	Seconds	180
0x0052	Default Transport Protocol	Default transport protocol used to establish connection between the TCU and the SO.	unsigned char/ 1 byte	-	0 (TCP)

12.1.6 Connectivity Service

Available indexes to change configuration parameters of connectivity service.

Data Type Index	Parameter	Description	Type	Default Unit	Default Value
* 0x0061	APN (Access Point Name)	Access point used to start or to establish a connection.	Max. 91 Bytes (Sum)	-	-
* 0x0062	Login	Login or user name used to access the services provided by SO (Service Operator)		-	-
* 0x0063	Password	Password used to access the services provided by SO (Service Operator)		-	-
* 0x0064	Server's IP # 1	First IP used to establish a connection in the SO network.	4 Bytes	-	0.0.0.0
* 0x0065	Server's Port # 1	First port number used to establish data transmission between client/server in the SO network.	unsigned integer /2 Bytes	-	0
0x0066	Server's Transport Protocol Type # 1	Type of the transport protocol used (currently: TCP = 0, or UDP =1)	unsigned char/ 1 Byte	-	0 (TCP)
0x0067	Server's IP # 2	Second IP used to establish a connection in the SO network.	4 Bytes	-	0.0.0.0
0x0068	Server's Port # 2	Second port number used to	unsigned	-	0

		establish data transmission between client/server in the SO network.	integer /2 Bytes		
0x0069	Server's Transport Protocol Type # 2	Type of the transport protocol used (currently: TCP = 0, or UDP =1)	unsigned char/ 1 Byte	-	0 (TCP)
0x006A	Server's IP # 3	Third IP used to establish a connection in the SO network.	4 Bytes	-	0.0.0.0
0x006B	Server's Port # 3	Third port number used to establish data transmission between client/server in the SO network.	unsigned integer /2 Bytes	-	0
0x006C	Server's Transport Protocol Type # 3	Type of the transport protocol used (currently: TCP = 0, or UDP =1)	unsigned char/ 1 Byte	-	0 (TCP)
0x006D	Server's IP # 4	Fourth IP used to establish a connection in the SO network.	4 Bytes	-	0.0.0.0
0x006E	Server's Port # 4	Fourth port number used to establish data transmission between client/server in the SO network.	unsigned integer /2 Bytes	-	0
0x006F	Server's Transport Protocol Type # 4	Type of the transport protocol used (currently: TCP = 0, or UDP =1)	unsigned char/ 1 Byte	-	0 (TCP)
0x0070	Server's IP # 5	Fifth IP used to establish a connection in the SO network.	4 bytes	-	0.0.0.0
0x0071	Server's Port # 5	Fifth port number used to establish data transmission between client/server in the SO network.	unsigned integer /2 Bytes	-	0
0x0072	Server's Transport Protocol Type # 5	Type of the transport protocol used (currently: TCP = 0, or UDP =1)	unsigned char/ 1 Byte	-	0 (TCP)
0x0073	Server's IP # 6	Sixth IP used to establish a connection in the SO network.	4 bytes	-	0.0.0.0
0x0074	Server's Port # 6	Sixth port number used to establish data transmission between client/server in the SO network.	unsigned integer /2 Bytes	-	0
0x0075	Server's Transport Protocol Type # 6	Type of the transport protocol used (currently: TCP = 0, or UDP =1)	unsigned char/ 1 Byte	-	0 (TCP)

12.1.7 Power Service

Available indexes to change configuration parameters of power service.

Data Type Index	Parameter	Description	Type	Default Unit	Default Value
0x0081	Minimal Voltage for the Main Battery.	Minimal voltage value allowed to operate the system with Main Battery	unsigned integer/ 2 Bytes	-	109
0x0082	Maximum Voltage for the Main Battery	Maximum voltage value allowed to operate the system with Main Battery	unsigned integer/ 2 Bytes	-	727
0x0083	Hysteresis value for the Main Battery's voltage	Hysteresis value used to calculate the Main Battery's voltage.	unsigned integer/ 2 Bytes	-	5
0x0084	Minimal Voltage for the Backup Battery.	Minimal voltage value allowed to operate the system with Backup Battery	unsigned integer/ 2 Bytes	-	750
0x0085	Recharge Voltage for the Backup Battery	Voltage value used to start the backup battery's recharge process when in active or inactive mode.	unsigned integer/ 2 Bytes	-	970
0x0086	Charged Voltage for the Backup Battery's	Voltage value used to stop the backup battery's recharge process when in active or inactive mode.	unsigned integer/ 2 Bytes	-	995
0x0087	Hysteresis value for the Backup Battery's voltage	Hysteresis value used to calculate the Backup Battery's voltage.	unsigned integer/ 2 Bytes	-	20
0x0088	Backup Battery's Minimal Temperature	Minimal temperature value used to start/continue the backup battery's recharge process.	unsigned integer/ 2 Bytes	-	697
0x0089	Backup Battery's Maximum Temperature	Maximum temperature value used to start/continue the backup battery's recharge process.	unsigned integer/ 2 Bytes	-	444
0x008A	Hysteresis value for the Backup Battery's temperature	Hysteresis value used to calculate the Backup Battery's temperature.	unsigned integer/ 2 Bytes	-	111
0x008B	Backup Battery's Safety Timer 1	Consist of the first safety timer used to check and validate the recharge process.	unsigned integer/ 2 Bytes	Seconds	90
0x008C	Backup Battery's Safety Timer 2	Consist of the second safety timer used to check and validate the recharge process. This value also establish the maximum backup battery's recharge time.	unsigned integer/ 2 Bytes	Seconds	3300
0x008D	Maximum Backup Battery's Fail Counter	Maximum number to allow a fail during the recharge process. That fail occur if even reached the Safety Timer 2, the backup battery's voltage still below of its charged value.	unsigned char/ 1 Byte	-	3

| 0x008E | Backup Battery's Validity Year | Value used to establish the validity year of the backup battery

• start year = 2000 = 00 | unsigned char/ 1 Byte | - | 12 (2012) |
| 0x008F | Backup Battery's Validity Month | Value used to establish the validity month of the backup battery

• range: 01 – 31 | unsigned char/ 1 Byte | - | 01 (January) |

12.1.8 Alarm Service

Available indexes to change configuration parameters of alarm service.

Data Type Index	Parameter	Description	Type	Default Unit	Default Value
0x0092	Ignition Event – Activation time	Time necessary to activate any output after the ignition event to be considered stable and ready to transmit.	unsigned char/1 Byte	0,1 Seconds	0x0000 – Event not allowed to transmit (Event Disable).
0x0095	Panic Button Event – Activation time	Time necessary to activate any output after the panic button event to be considered stable and ready to transmit.	unsigned char/1 Byte	0,1 Seconds	0x0000 – Event not allowed to transmit (Event Disable).
0x0098	GPS Malfunctioning Event – Activation time	Time necessary to activate any output after the GPS Malfunctioning event to be considered stable and ready to transmit.	unsigned char/1 Byte	0,1 Seconds	0x0000 – Event not allowed to transmit (Event Disable).
0x009B	Main Battery Low Event – Activation time	Time necessary to activate any output after the Main Battery Low event to be considered stable and ready to transmit.	unsigned char/1 Byte	0,1 Seconds	0x0000 – Event not allowed to transmit (Event Disable).
0x009E	Backup Battery Temperature Event – Activation time	Time necessary to activate any output after the Backup Battery's Temperature event to be considered stable and ready to transmit.	unsigned char/1 Byte	0,1 Seconds	0x0000 – Event not allowed to transmit (Event Disable).
0x00A2	Anti-Theft Violation Event – Activation time	Time necessary to activate any output after the Anti-Theft Violation event to be considered stable and ready to transmit.	unsigned char/1 Byte	0,1 Seconds	0x01
0x00A5	Sleep Event – Activation time	Time necessary to activate any output after the Sleep event to be considered stable and ready to transmit.	unsigned char/1 Byte	0,1 Seconds	0x0000 – Event not allowed to transmit (Event Disable).

0x00A8	Position Violation Event – Activation time	Time necessary to activate any output after the Position Violation event to be considered stable and ready to transmit.	unsigned char/1 Byte	0,1 Seconds	0x0000 – Event not allowed to transmit (Event Disable).
0x00AB	Weak GSM Signal Event – Activation time	Time necessary to activate any output after the Weak GSM Signal event to be considered stable and ready to transmit.	unsigned char/1 Byte	0,1 Seconds	0x0000 – Event not allowed to transmit (Event Disable).
0x00AE	Backup Battery Low Event – Activation time	Time necessary to activate any output after the Backup Battery Low event to be considered stable and ready to transmit.	unsigned char/1 Byte	0,1 Seconds	0x0000 – Event not allowed to transmit (Event Disable).
0x00B2	Backup Battery Fail Event – Activation time	Time necessary to activate any output after the Backup Battery Fail event to be considered stable and ready to transmit.	unsigned char/1 Byte	0,1 Seconds	0x0000 – Event not allowed to transmit (Event Disable).
0x00B5	Backup Battery End of Life Event – Activation time	Time necessary to activate any output after the Backup Battery End of Life event to be considered stable and ready to transmit.	unsigned char/1 Byte	0,1 Seconds	0x0000 – Event not allowed to transmit (Event Disable).
0x00B8	Output Short Circuit Event – Activation time	Time necessary to activate any output after the Output Short Circuit event to be considered stable and ready to transmit.	unsigned char/1 Byte	0,1 Seconds	0x0000 – Event not allowed to transmit (Event Disable).
0x00BB	Maximum Speed Event – Activation time	Time necessary to activate any output after the Maximum Speed event to be considered stable and ready to transmit.	unsigned char/1 Byte	0,1 Seconds	0x0000 – Event not allowed to transmit (Event Disable).
0x00BE	Course Change Event – Activation time	Time necessary to activate any output after the Course Change event to be considered stable and ready to transmit.	unsigned char/1 Byte	0,1 Seconds	0x0000 – Event not allowed to transmit (Event Disable).
0x00C2	Number GPS of sattelite drop Event – Activation time	Time necessary to activate any output after the Number GPS of sattelite drop event to be considered stable and ready to transmit.	unsigned char/1 Byte	0,1 Seconds	0x0000 – Event not allowed to transmit (Event Disable).
0x00C5	GSM Antenna Cutoff Event – Activation time	Time necessary to activate any output after the GSM Antenna Cutoff event to be considered stable and ready to transmit.	unsigned char/1 Byte	0,1 Seconds	0x0000 – Event not allowed to transmit (Event

					Disable).
0x00C6	Enable/Disable Alarm Services	Enable or disable the notification of alarms and/or events.	Boolean/1 bit	-	True

12.1.9 FOTA Service

Data Type Index	Parameter	Description	Type	Default Unit	Default Value
0x00D1	Enable/Disable FOTA Service	Enable or disable the service used to Firmware Update Over The Air.	Boolean/1 bit	-	True

12.1.10 Custom parameters

Data Type Index	Parameter	Description	Type	Default Unit	Default Value
0x0100 to 0x01FF	Reserved	Reserved for custom application	NA	NA	NA

13 Appendix II – Telematics Operation – Minimum Message Set Guideline

The Appendix II was created to establish a minimum common set of messages to be used in Telematics applications using ACP v1.2.2.

13.1 General Information

1) In the examples of messages sent from TCU to SO, the Version Element is included because it's required in the process of connections and recconections (see Appendix III – Item 14.3).

2) In the examples of messages sent from SO to TCU, the Version Element is not included because it's not required.

13.2 Example: Converting Position Coordinates

Longitude

Example: F5E61D8D = - 169468531 milliarcseconds = - 47.074592 degrees

(F5E61D8D) 2's comp hexadecimal milliarcsec

(1111 0101 1110 0110 0001 1101 1000 1101) 2's comp binary milliarcsec

- (0000 1010 0001 1001 1110 0010 0111 0011) binary milliarcsec

- (169468531) milliarcsec

- (169468.531) seconds

- (2824.475516666666667) minutes

- (47.07459194444444444) degrees

-47.074592

Latitude

Example: FB19EDCB = - 82186805 milliarcseconds = - 22.829668 degrees

(FB19EDCB) 2's comp hexadecimal milliarcsec

(1111 1011 0001 1001 1110 1101 1100 1011) 2's comp binary milliarcsec

- (0000 0100 1110 0110 0001 0010 0011 0101) binary milliarcsec

- (82186805) milliarcsec

- (82186.805) seconds

- (1369.780083333333333) minutes

- (22.82966805555555556) degrees

-22.829668

13.3 PROVISIONING

13.3.1 Activation attempt without version element

13.3.1.1 Provision Update Message #1 (From SO to TCU)

Provision Update Message #1 (Activation attempt)
Raw Message (Hexadecimal Format)
01011116000B42000D80208A12345678901234567890

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	Header Element	0x01	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x01* (*Provisioning*)
2		0x01	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x01*(Provisioning Update Msg. #1*)
3		0x11	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x01*
4		0x16	**Message Length** = *0x16* (**22**)
5	Version Element	0x00	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*
6	Message Fields	0x0B	**More Flag** = *0x00*; **Target Application Id** =*0x0B* (Theft Alarm);
7		0x42	**AppFlag1** = *0x01* (Activate); **Control Flag1** = *0x02* (Vehicle Descriptor is Present)
8	TCU descriptor Element	0x00	**IE Element** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*
9	Vehicle Descriptor Element	0x0D	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
10		0x80	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
11		0x20	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
12		0x8A	**IE Identifier** = *0x02* (*BCD Coding*); **More Flag** = *0x00*; **Length** = *0x0A*
13		0x12	0x12
14		0x34	0x34
15		0x56	0x56
16		0x78	0x78
17		0x90	0x90
18		0x12	0x12
19		0x34	0x34
20		0x56	0x56
21		0x78	0x78
22		0x90	0x90

13.3.1.2 Provision Reply Message #1 (From TCU to SO)

Provision Reply Message #1
Raw Message (Hexadecimal Format)
0103101C04YYZZ01020B422001000D80208A12345678901234567890

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	**Header Element**	*0x01*	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x01* (Provisioning*)*
2		*0x03*	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x03 (*Provisioning reply Msg. #1*)*
3		*0x10*	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x00*
4		*0x1C*	**Message Length** = *0x1C* (**28**)
5	**Version Element**	*0x04*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x04*
6		*0xYY*	**Car Manufacturer ID =** 0xYY (0xYY is defined in the Table 3 – Version Element: Car Manufacturer IDs.**)**
7		*0xZZ*	**TCU Manufacturer ID** = *0xZZ* (0xZZ is defined in the Table 4 – Version Element: TCU Manufacturer IDs.)
8		*0x01*	**Major Hardware Release** = *0x01*
9		*0x02*	**Major Software Release** = *0x02*
10	**Message Fields**	*0x0B*	**More Flag** = *0x00*; **Target Application Id** =*0x0B* (Theft Alarm);
11		*0x42*	**AppFlag1** = *0x01*(Activate); **Control Flag1** = *0x02* (Vehicle Descriptor is Present)
12		*0x20*	**StatusFlag1** = *0x00* (Application already provisioned); **TCU Response Flag** = *0x02*; **Reserved** = *0x00*
13	**Error Element**	*0x01*	**IE Element** = *0x00*; **More Flag** = *0x00*; **Length** = *0x01*
14		*0x00*	**Error Code** = *0x00* (OK)
15	**Vehicle Descriptor Element**	*0x0D*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
16		*0x80*	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
17		*0x20*	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
18		*0x8A*	**IE Identifier** = *0x02* (BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
19		*0x12*	*0x12*
20		*0x34*	*0x34*
21		*0x56*	*0x56*
22		*0x78*	*0x78*
23		*0x90*	*0x90*
24		*0x12*	*0x12*
25		*0x34*	*0x34*
26		*0x56*	*0x56*
27		*0x78*	*0x78*
28		*0x90*	*0x90*

13.3.2 Consult request: no Version Element

13.3.2.1 Provision Update Message #1 (From SO to TCU)

Provision Update Message #1			
Raw Message (Hexadecimal Format)			
01011116000B02000D80208A12345678901234567890			

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	**Header Element**	*0x01*	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x01* (Provisioning)
2		*0x01*	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x01*(Provisioning Update Msg. #1)
3		*0x11*	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x01*
4		*0x16*	**Message Length** = *0x16* (**22**)
5	**Version Element**	*0x00*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*
6	**Message Fields**	*0x0B*	**More Flag** = *0x00*; **Target Application Id** =*0x0B* (Theft Alarm);
7		*0x02*	**AppFlag1** = *0x00* (No change); **Control Flag1** = *0x02* (Vehicle Descriptor is Present)
8	**TCU descriptor Element**	*0x00*	**IE Element** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*
9	**Vehicle Descriptor Element**	*0x0D*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
10		*0x80*	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
11		*0x20*	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
12		*0x8A*	**IE Identifier** = *0x02* (BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
13		*0x12*	*0x12*
14		*0x34*	*0x34*
15		*0x56*	*0x56*
16		*0x78*	*0x78*
17		*0x90*	*0x90*
18		*0x12*	*0x12*
19		*0x34*	*0x34*
20		*0x56*	*0x56*
21		*0x78*	*0x78*
22		*0x90*	*0x90*

13.3.2.2 Provision Reply Message #1 (From TCU to SO)

Provision Reply Message #1
Raw Message (Hexadecimal Format)
01031018000B022001000D80208A12345678901234567890

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	Header Element	0x01	**Reserved** = 0x00; **Non Standard Flag** = 0x00; **App Id** = 0x01 (Provisioning)
2		0x03	**Reserved** = 0x00; **Private Flag** = 0x00; **Test Flag** = 0x00; **Message Type** = 0x03 (Provisioning reply Msg. #1)
3		0x10	**Version Flag** = 0x00; **Version** = 0x01; **Message Control Flag** = 0x00
4		0x18	**Message Length** = 0x18 (24)
5	Version Element	0x00	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x00
6	Message Fields	0x0B	**More Flag** = 0x00; **Target Application Id** =0x0B (Theft Alarm);
7		0x02	**AppFlag1** = 0x00 (No change); **Control Flag1** = 0x02 (Vehicle Descriptor is Present)
8		0x20	**StatusFlag1** = 0x00 (Application already provisioned); **TCU Response Flag** = 0x02; **Reserved** = 0x00
9	Error Element	0x01	**IE Element** = 0x00; **More Flag** = 0x00; **Length** = 0x01
10		0x00	**Error Code** = 0x00 (OK)
11	Vehicle Descriptor Element	0x0D	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x0D
12		0x80	**Vehicle Descriptor Flag 1** = 0x80 (has more Flag)
13		0x20	**Vehicle Descriptor Flag 2** = 0x20 (SIM Card ID is Present)
14		0x8A	**IE Identifier** = 0x02 (BCD Coding); **More Flag** = 0x00; **Length** = 0x0A
15		0x12	0x12
16		0x34	0x34
17		0x56	0x56
18		0x78	0x78
19		0x90	0x90
20		0x12	0x12
21		0x34	0x34
22		0x56	0x56
23		0x78	0x78
24		0x90	0x90

13.3.3 **Deactivation attempt (invalid): no Version Element, "Tracking" deactivation**

13.3.3.1 Provision Update Message #1 (From SO to TCU)

Provision Update Message #1

Raw Message (Hexadecimal Format)
01011116000A82000D80208A12345678901234567890

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	**Header Element**	*0x01*	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x01* (Provisioning)
2		*0x01*	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x01*(Provisioning Update Msg. #1)
3		*0x11*	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x01*
4		*0x16*	**Message Length** = *0x16* (**22**)
5	**Version Element**	*0x00*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*
6	**Message Fields**	*0x0A*	**More Flag** = *0x00*; **Target Application Id** =*0x0A* (Tracking);
7		*0x82*	**AppFlag1** = *0x02* (Deactivate); **Control Flag1** = *0x02* (Vehicle Descriptor is Present)
8	**TCU descriptor Element**	*0x00*	**IE Element** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*
9	**Vehicle Descriptor Element**	*0x0D*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
10		*0x80*	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
11		*0x20*	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
12		*0x8A*	**IE Identifier** = *0x02* (BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
13		*0x12*	*0x12*
14		*0x34*	*0x34*
15		*0x56*	*0x56*
16		*0x78*	*0x78*
17		*0x90*	*0x90*
18		*0x12*	*0x12*
19		*0x34*	*0x34*
20		*0x56*	*0x56*
21		*0x78*	*0x78*
22		*0x90*	*0x90*

13.3.3.2 Provision Reply Message #1 (From TCU to SO)

Provision Reply Message #1
Raw Message (Hexadecimal Format)
01031018000A02A001130D80208A12345678901234567890

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	**Header Element**	0x01	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x01* (Provisioning)
2		0x03	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x03* (Provisioning reply Msg. #1)
3		0x10	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x00*
4		0x18	**Message Length** = *0x18* (24)
5	**Version Element**	0x00	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*
6	**Message Fields**	0x0A	**More Flag** = *0x00*; **Target Application Id** = *0x0A* (Tracking);
7		0x02	**AppFlag1** = *0x00* (No change); **Control Flag1** = *0x02* (Vehicle Descriptor is Present)
8		0xA0	**StatusFlag1** = *0x02* (See Error Element); **TCU Response Flag** = *0x02*; **Reserved** = *0x00*
9	**Error Element**	0x01	**IE Element** = *0x00*; **More Flag** = *0x00*; **Length** = *0x01*
10		0x13	**Error Code** = *0x13* (19-General non-specific error)
11	**Vehicle Descriptor Element**	0x0D	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
12		0x80	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
13		0x20	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
14		0x8A	**IE Identifier** = *0x02* (BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
15		0x12	*0x12*
16		0x34	*0x34*
17		0x56	*0x56*
18		0x78	*0x78*
19		0x90	*0x90*
20		0x12	*0x12*
21		0x34	*0x34*
22		0x56	*0x56*
23		0x78	*0x78*
24		0x90	*0x90*

13.4 CONFIGURATION FOR TELEMATICS SERVICES

13.4.1 Updating Tracking Timer without version element

13.4.1.1 Configuration Update Message #2 ACP 245 (From SO to TCU)

Configuration Update Message #2 (Updating Tracking Timer)

Raw Message (Hexadecimal Format)
0208111D0000C2000D80208A12345678901234567890000 5001102003C

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	**Header Element**	*0x02*	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x02 (*Configuration*)*
2		*0x08*	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x08 (*Configuration Update Msg. #2*)*
3		*0x11*	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x01*
4		*0x1D*	**Message Length** = *0x1D* (**29**)
5	**Version Element**	*0x00*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*
6	**Message Fields**	*0x00*	**More Flag** = *0x00*; **Target Application Id** =*0x00*;
7		*0xC2*	**AppFlag1** = *0x03* (Change for this Application); **Control Flag1** = *0x02* (Vehicle Descriptor is Present)
8		*0x00*	**Reserved** = *0x00*
9	**Vehicle Descriptor Element**	*0x0D*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
10		*0x80*	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
11		*0x20*	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
12		*0x8A*	**IE Identifier** = *0x02*(BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
13		*0x12*	*0x12*
14		*0x34*	*0x34*
15		*0x56*	*0x56*
16		*0x78*	*0x78*
17		*0x90*	*0x90*
18		*0x12*	*0x12*
19		*0x34*	*0x34*
20		*0x56*	*0x56*
21		*0x78*	*0x78*
22		*0x90*	*0x90*
23	**TCU Descriptor Element**	*0x00*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*

24	TCU Data Element	0x05	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x05*
25		0x00	**Data Type (MSB)** = *0x00*
26		0x11	**Data Type (LSB)** = *0x11 (Tracking Timer)*
27		0x02	**Length Data Type** = *0x02*
28		0x00	**Configuration Data [0]** = *0x00*
29		0x3C	**Configuration Data [1]** = *0x3C (60 Seconds)*

13.4.1.2 Configuration Reply Message #2 ACP 245 (From TCU to SO)

Configuration Reply Message #2
Raw Message (Hexadecimal Format)
0209102204YYZZ010200C20X07001102003C01000D80208A12345678901234567890

Message Detail (Message Elements)			
Octet	Element	Value	Detail
1	**Header Element**	0x02	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x02 (*Configuration*)*
2		0x09	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x09 (*Configuration Reply Msg. #2*)*
3		0x10	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x00*
4		0x22	**Message Length** = *0x22* (**34**)
5	**Version Element**	0x04	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x04*
6		0xYY	**Car Manufacturer ID =** 0xYY (0xYY is defined in the Table 3 – Version Element: Car Manufacturer IDs.)
7		0xZZ	**TCU Manufacturer ID** = *0xZZ* (0xZZ is defined in the Table 4 – Version Element: TCU Manufacturer IDs.)
8		0x01	**Major Hardware Release** = *0x01*
9		0x02	**Major Software Release** = *0x02*
10	**Message Fields**	0x00	**More Flag** = *0x00*; **Target Application Id** =*0x00*;
11		0xC2	**AppFlag1** = *0x03* (Change for this Application); **Control Flag1** = *0x02* (Vehicle Descriptor is Present)
12		0x0X	**Status Flag1 =** *0x0X(Accepted values = 0,2,3)*;**TCU Response Flag** = *0x00*; **Reserved** = *0x00*
13	**TCU Data Error Element**	0x07	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x07*
14		0x00	**Data Type (MSB)** = *0x00*
15		0x11	**Data Type (LSB)** = *0x11 (Tracking Timer)*
16		0x02	**Length Data Type** = *0x02*
17		0x00	**Configuration Data [0]** = *0x00*
18		0x3c	**Configuration Data [1]** = *0x3C (60 Seconds)*
19		0x01	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x01*
20		0x00	**Error Code** = *0x00 (Ok)*

Octet	Element	Value	Detail
21	Vehicle Descriptor Element	0x0D	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
22		0x80	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
23		0x20	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
24		0x8A	**IE Identifier** = *0x02* (BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
25		0x12	0x12
26		0x34	0x34
27		0x56	0x56
28		0x78	0x78
29		0x90	0x90
30		0x12	0x12
31		0x34	0x34
32		0x56	0x56
33		0x78	0x78
34		0x90	0x90

13.4.2 Updating Multiple Parameters without version element

Parameters: Tracking timer, Tracking timer at event mode, Keep alive timer.

13.4.2.1 Configuration Update Message #2 ACP 245 (From SO to TCU)

Configuration Update Message #2
Raw Message (Hexadecimal Format)
020811270000C2000D80208A123456789012345678900000F001102003C001902001E0051020096

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**

Octet	Element	Value	Detail
1	Header Element	0x02	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x02* (Configuration)
2		0x08	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x08* (Configuration Update Msg. #2)
3		0x11	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x01*
4		0x27	**Message Length** = *0x27* (39)
5	Version Element	0x00	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*
6	Message Fields	0x00	**More Flag** = *0x00*; **Target Application Id** =*0x00*;
7		0xC2	**AppFlag1** = *0x03*(Change for this Application); **Control Flag1** = *0x02* (Vehicle Descriptor is Present)
8		0x00	**Reserved** = *0x00*
9	Vehicle Descriptor Element	0x0D	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
10		0x80	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
11		0x20	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is

Octet	Element	Value	Detail
			Present)
12		*0x8A*	**IE Identifier** = *0x02* (BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
13		*0x12*	*0x12*
14		*0x34*	*0x34*
15		*0x56*	*0x56*
16		*0x78*	*0x78*
17		*0x90*	*0x90*
18		*0x12*	*0x12*
19		*0x34*	*0x34*
20		*0x56*	*0x56*
21		*0x78*	*0x78*
22		*0x90*	*0x90*
23	**TCU Descriptor Element**	*0x00*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*
24	**TCU Data Element**	*0x0F*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0F*
25		*0x00*	**Data Type (MSB)** = *0x00*
26		*0x11*	**Data Type (LSB)** = *0x11 (Tracking Timer)*
27		*0x02*	**Length Data Type** = *0x02*
28		*0x00*	**Configuration Data [0]** = *0x00*
29		*0x3C*	**Configuration Data [1]** = *0x3C (60 Seconds)*
30		*0x00*	**Data Type (MSB)** = *0x00*
31		*0x19*	**Data Type (LSB)** = *0x19 (Tracking Timer at Event Mode)*
32		*0x02*	**Length Data Type** = *0x02*
33		*0x00*	**Configuration Data [0]** = *0x00*
34		*0x1E*	**Configuration Data [1]** = *0x1E (30 Seconds)*
35		*0x00*	**Data Type (MSB)** = *0x00*
36		*0x51*	**Data Type (LSB)** = *0x51 (Keep Alive Timer)*
37		*0x02*	**Length Data Type** = *0x02*
38		*0x00*	**Configuration Data [0]** = *0x00*
39		*0x96*	**Configuration Data [1]** = *0x96 (150 Seconds)*

13.4.2.2 Configuration Reply Message #2 ACP 245 (From TCU to SO)

Configuration Reply Message #2
Raw Message (Hexadecimal Format)
0209103004YYZZ010200C20X15001102003C0100001902001E010000510 2009601000D80208A123456789012345 67890

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**

1	**Header Element**	*0x02*	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x02 (Configuration)*
2		*0x09*	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x09 (Configuration Reply Msg. #2)*
3		*0x10*	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x00*
4		*0x30*	**Message Length** = *0x30* (**48**)
5	**Version Element**	*0x04*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x04*
6		*0xYY*	**Car Manufacturer ID** = 0xYY (0xYY is defined in the Table 3 – Version Element: Car Manufacturer IDs.)
7		*0xZZ*	**TCU Manufacturer ID** = *0xZZ* (0xZZ is defined in the Table 4 – Version Element: TCU Manufacturer IDs.)
8		*0x01*	**Major Hardware Release** = *0x01*
9		*0x02*	**Major Software Release** = *0x02*
10	**Message Fields**	*0x00*	**More Flag** = *0x00*; **Target Application Id** =*0x00*;
11		*0xC2*	**AppFlag1** = *0x03* (Change for this Application); **Control Flag1** = *0x02* (Vehicle Descriptor is Present)
12		*0x0X*	**Status Flag1 =** *0x0X(Accepted values = 0,2,3)*;**TCU Response Flag** = *0x00*; **Reserved** = *0x00*
13	**TCU Data Error Element**	*0x15*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x15*
14		*0x00*	**Data Type (MSB)** = *0x00*
15		*0x11*	**Data Type (LSB)** = *0x11 (Tracking Timer)*
16		*0x02*	**Length Data Type** = *0x02*
17		*0x00*	**Configuration Data [0]** = *0x00*
18		*0x3C*	**Configuration Data [1]** = *0x3C (60 Seconds)*
19		*0x01*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x01*
20		*0x00*	**Error Code =** *0x00*
21		*0x00*	**Data Type (MSB)** = *0x00*
22		*0x19*	**Data Type (LSB)** = *0x19 (Tracking Timer at Event Mode)*
23		*0x02*	**Length Data Type** = *0x02*
24		*0x00*	**Configuration Data [0]** = *0x00*
25		*0x1E*	**Configuration Data [1]** = *0x1E (30 Seconds)*
26		*0x01*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x01*
27		*0x00*	**Error Code =** *0x00*
28		*0x00*	**Data Type (MSB)** = *0x00*
29		*0x51*	**Data Type (LSB)** = *0x51 (Keep Alive Timer)*
30		*0x02*	**Length Data Type** = *0x02*
31		*0x00*	**Configuration Data [0]** = *0x00*
32		*0x96*	**Configuration Data [1]** = *0x96 (150 Seconds)*
33		*0x01*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** =

		0x01	
34		*0x00*	**Error Code = ** *0x00*
35		*0x0D*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
36		*0x80*	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
37		*0x20*	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
38		*0x8A*	**IE Identifier** = *0x02* (BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
39	**Vehicle Descriptor Element**	*0x12*	*0x12*
40		*0x34*	*0x34*
41		*0x56*	*0x56*
42		*0x78*	*0x78*
43		*0x90*	*0x90*
44		*0x12*	*0x12*
45		*0x34*	*0x34*
46		*0x56*	*0x56*
47		*0x78*	*0x78*
48		*0x90*	*0x90*

13.4.3 Consulting Single Parameter: no version element

Parameter: Tracking timer

13.4.3.1 Configuration Update Message #2 ACP 245 (From SO to TCU)

Configuration Update Message #2
Raw Message (Hexadecimal Format)
0208111B000002000D80208A1234567890123456789000003001100

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	**Header Element**	*0x02*	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x02* (Configuration*)*
2		*0x08*	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x08 (*Configuration Update Msg. #2*)*
3		*0x11*	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x01*
4		*0x1B*	**Message Length** = *0x1B* (**27**)
5	**Version Element**	*0x00*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*
6	**Message Fields**	*0x00*	**More Flag** = *0x00*; **Target Application Id** =*0x00*;
7		*0x02*	**AppFlag1** = *0x00* (No Change); **Control Flag1** = *0x02* (Vehicle Descriptor is Present)

8		*0x00*	**Reserved** = *0x00*
9	**Vehicle Descriptor Element**	*0x0D*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
10		*0x80*	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
11		*0x20*	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
12		*0x8A*	**IE Identifier** = *0x02*(BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
13		*0x12*	*0x12*
14		*0x34*	*0x34*
15		*0x56*	*0x56*
16		*0x78*	*0x78*
17		*0x90*	*0x90*
18		*0x12*	*0x12*
19		*0x34*	*0x34*
20		*0x56*	*0x56*
21		*0x78*	*0x78*
22		*0x90*	*0x90*
23	**TCU Descriptor Element**	*0x00*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*
24	**TCU Data Element**	*0x03*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x03*
25		*0x00*	**Data Type (MSB)** = *0x00*
26		*0x11*	**Data Type (LSB)** = *0x11 (Tracking Timer)*
27		*0x00*	**Length Data Type** = *0x00*

13.4.3.2 Configuration Reply Message #2 ACP 245 (From TCU to SO)

Configuration Reply Message #2
Raw Message (Hexadecimal Format)
0209102204YYZZ01020002000700110200**3C**01000D80208A12345678901234567890

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	**Header Element**	*0x02*	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x02 (*Configuration*)*
2		*0x09*	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x09 (*Configuration Reply Msg. #2*)*
3		*0x10*	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x00*
4		*0x22*	**Message Length** = *0x22* (**34**)
5	**Version Element**	*0x04*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x04*
6		*0xYY*	**Car Manufacturer ID** = 0xYY (0xYY is defined in the Table 3 – Version Element: Car Manufacturer IDs.)

7		*0xZZ*	**TCU Manufacturer ID** = *0xZZ* (0xZZ is defined in the Table 4 – Version Element: TCU Manufacturer IDs.)
8		*0x01*	**Major Hardware Release** = *0x01*
9		*0x02*	**Major Software Release** = *0x02*
10	**Message Fields**	*0x00*	**More Flag** = *0x00*; **Target Application Id** =*0x00*;
11		*0x02*	**AppFlag1** = *0x00* (No change to Application); **Control Flag1** = *0x02* (Vehicle Descriptor is Present)
12		*0x00*	**Status Flag1 =** *0x00*;**TCU Response Flag** = *0x00*; **Reserved** = *0x00*
13	**TCU Data Error Element**	*0x07*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x07*
14		*0x00*	**Data Type (MSB)** = *0x00*
15		*0x11*	**Data Type (LSB)** = *0x11 (Tracking Timer)*
16		*0x02*	**Length Data Type** = *0x02*
17		*0x00*	**Configuration Data [0]** = *0x00*
18		*0x3C*	**Configuration Data [1]** = *0x3C (60 Seconds)*
19		*0x01*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x01*
20		*0x00*	**Error Code** = *0x00*
21		*0x0D*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
22		*0x80*	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
23		*0x20*	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
24		*0x8A*	**IE Identifier** = *0x02* (BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
25		*0x12*	*0x12*
26		*0x34*	*0x34*
27	**Vehicle Descriptor Element**	*0x56*	*0x56*
28		*0x78*	*0x78*
29		*0x90*	*0x90*
30		*0x12*	*0x12*
31		*0x34*	*0x34*
32		*0x56*	*0x56*
33		*0x78*	*0x78*
34		*0x90*	*0x90*

13.4.4 Consulting Multiple Parameters: no version element

Parameters: Tracking timer, Tracking timer at event mode, Keep alive timer.

13.4.4.1 Configuration Update Message #2 ACP 245 (From SO to TCU)

Configuration Update Message #2			
Raw Message (Hexadecimal Format)			
02081121000002000D80208A123456789012345678900000900110000190000 5100			

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	**Header Element**	*0x02*	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x02 (*Configuration*)*
2		*0x08*	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x08 (*Configuration Update Msg. #2*)*
3		*0x11*	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x01*
4		*0x21*	**Message Length** = *0x21* (**33**)
5	**Version Element**	*0x00*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*
6	**Message Fields**	*0x00*	**More Flag** = *0x00*; **Target Application Id** =*0x00*;
7		*0x02*	**AppFlag1** = *0x00* (No Change) **Control Flag1** = *0x02* (Vehicle Descriptor is Present)
8		*0x00*	**Reserved** = *0x00*
9	**Vehicle Descriptor Element**	*0x0D*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
10		*0x80*	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
11		*0x20*	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
12		*0x8A*	**IE Identifier** = *0x02*(BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
13		*0x12*	*0x12*
14		*0x34*	*0x34*
15		*0x56*	*0x56*
16		*0x78*	*0x78*
17		*0x90*	*0x90*
18		*0x12*	*0x12*
19		*0x34*	*0x34*
20		*0x56*	*0x56*
21		*0x78*	*0x78*
22		*0x90*	*0x90*
23	**TCU Descriptor Element**	*0x00*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*

24	TCU Data Element	0x09	IE Identifier = 0x00; More Flag = 0x00; Length = 0x09
25		0x00	Data Type (MSB) = 0x00
26		0x11	Data Type (LSB) = 0x11 (Tracking Timer)
27		0x00	Length Data Type = 0x00
28		0x00	Data Type (MSB) = 0x00
29		0x19	Data Type (LSB) = 0x19 (Tracking Timer at Event Mode)
30		0x00	Length Data Type = 0x00
31		0x00	Data Type (MSB) = 0x00
32		0x51	Data Type (LSB) = 0x51 (Keep Alive Timer)
33		0x00	Length Data Type = 0x00

13.4.4.2 Configuration Reply Message #2 ACP 245 (From TCU to SO)

Configuration Reply Message #2
Raw Message (Hexadecimal Format)
0209103004YYZZ010200020X15001102003C0100001902001E0100005102009601000D80208A1234567890123456 7890

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	Header Element	0x02	**Reserved** = 0x00; **Non Standard Flag** = 0x00; **App Id** = 0x02 (Configuration)
2		0x09	**Reserved** = 0x00; **Private Flag** = 0x00; **Test Flag** = 0x00; **Message Type** = 0x09 (Configuration Reply Msg. #2)
3		0x10	**Version Flag** = 0x00; **Version** = 0x01; **Message Control Flag** = 0x00
4		0x30	**Message Length** = 0x30 (**48**)
5	Version Element	0x04	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x04
6		0xYY	**Car Manufacturer ID** = 0xYY (0xYY is defined in the Table 3 – Version Element: Car Manufacturer IDs.)
7		0xZZ	**TCU Manufacturer ID** = 0xZZ (0xZZ is defined in the Table 4 – Version Element: TCU Manufacturer IDs.)
8		0x01	**Major Hardware Release** = 0x01
9		0x02	**Major Software Release** = 0x02
10	Message Fields	0x00	**More Flag** = 0x00; **Target Application Id** =0x00;
11		0x02	**AppFlag1** = 0x00 (No change to Application); **Control Flag1** = 0x02 (Vehicle Descriptor is Present)
12		0x0X	**Status Flag1 =** 0x0X(Accepted values = 0,2,3);**TCU Response Flag** = 0x00; **Reserved** = 0x00
13	TCU Data Error Element	0x15	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x15
14		0x00	**Data Type (MSB)** = 0x00
15		0x11	**Data Type (LSB)** = 0x11 (Tracking Timer)

16		0x02	**Length Data Type** = *0x02*
17		0x00	**Configuration Data [0]** = *0x00*
18		0x3C	**Configuration Data [1]** = *0x3C (60 Seconds)*
19		0x01	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x01*
20		0x00	**Error Code** = *0x00*
21		0x00	**Data Type (MSB)** = *0x00*
22		0x19	**Data Type (LSB)** = *0x19 (Tracking Timer at Event Mode)*
23		0x02	**Length Data Type** = *0x02*
24		0x00	**Configuration Data [0]** = *0x00*
25		0x1E	**Configuration Data [1]** = *0x1E (30 Seconds)*
26		0x01	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x01*
27		0x00	**Error Code** = *0x00*
28		0x00	**Data Type (MSB)** = *0x00*
29		0x51	**Data Type (LSB)** = *0x51 (Keep Alive Timer)*
30		0x02	**Length Data Type** = *0x02*
31		0x00	**Configuration Data [0]** = *0x00*
32		0x96	**Configuration Data [1]** = *0x96 (150 Seconds)*
33		0x01	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x01*
34		0x00	**Error Code** = *0x00*
35		0x0D	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
36		0x80	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
37		0x20	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
38		0x8A	**IE Identifier** = *0x02* (BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
39		0x12	*0x12*
40		0x34	*0x34*
41	**Vehicle Descriptor Element**	0x56	*0x56*
42		0x78	*0x78*
43		0x90	*0x90*
44		0x12	*0x12*
45		0x34	*0x34*
46		0x56	*0x56*
47		0x78	*0x78*
48		0x90	*0x90*

13.4.5 Configuration TCU Service Activation/ Deactivation Message ACP 245

13.4.5.1 Configuration TCU Service Activation/ Deactivation Message ACP 245 (From SO to TCU) (Activation)

Configuration TCU Service Activation/ Deactivation Message ACP 245 (Activation)
Raw Message (Hexadecimal Format)
020A113A0F4674696D2E62724374696D4374696D0DBD4F22F015B3BD4F22F115BE00401680308A
123456789012345678900B XXXXXXXXXXXXXXXX

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	**Header Element**	*0x02*	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x02 (*Configuration*)*
2		*0x0A*	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x0A (*Activation/Deactivation Message*)*
3		*0x11*	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x01(Response is expected)*
4		*0x3A*	**Message Length** = *0x3A* (**58**)
5	**APN Configuration Element**	*0x0F*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0F (15)*
6		*0x46*	**IE Identifier** = *0x01(Text)*; **More Flag** = *0x00*; **Length** = *0x06 (06)* - **(APN Address Element – Start)**
7		0x74	*0x74 ('t')*
8		0x69	*0x69 ('i')*
9		0x6D	*0x6D ('m')*
10		0x2E	*0x2E ('.')*
11		0x62	*0x62 ('b')*
12		0x72	*0x72 ('r')*
13		*0x43*	**IE Identifier** = *0x01 (Text)*; **More Flag** = *0x00*; **Length** = *0x03 (03)* - **(APN Login Element – Start)**
14		0x74	*0x74 ('t')*
15		0x69	*0x69 ('i')*
16		0x6D	*0x6D ('m')*
17		*0x43*	**IE Identifier** = *0x01 (Text)*; **More Flag** = *0x00*; **Length** = *0x03 (03)* - **(APN Password Element – Start)**
18		0x74	*0x74 ('t')*
19		0x69	*0x69 ('i')*
20		0x6D	*0x6D ('m')*
21	**Server Configuration Element**	0x0D	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D (13)*
22		0xBD	*0xBD* (1st byte – First Server's IP)
23		0x4F	*0x4F* (2nd byte - First Server's IP)
24		0x22	*0x22* (3rd byte - First Server's IP)
25		0XF0	*0XF0* (4th byte - First Server's IP)
26		0x15	*0x15* (1st byte - First Server's Port)
27		0xB3	*0xB3* (2nd byte – First Server's Port)
28		0xBD	*0xBD* (1st byte - Second Server's IP)

29		0x4F	*0x4F* (2nd byte - Second Server's IP)
30		0x22	*0x22* (3rd byte - Second Server's IP)
31		0XF1	*0XF1* (4th byte - Second Server's IP)
32		0x15	*0x15* (1st byte - Second Server's Port)
33		0xBE	*0xBE* (2nd byte - Second Server's Port)
34		0x00	**Protocol ID** = *0x00 (ACP)*
35	**Control Byte**	*0x40*	**More Flag** = *0x00*; (*Activation*) = *0x01(Contracted)*; **Reserved** = *0x00 (bits 2-7)*
36	**Vehicle Descriptor Element**	*0x16*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x16 (22)*
37		*0x80*	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
38		*0x30*	**Vehicle Descriptor Flag 2** = *0x30* (SIM Card ID and Auth. Key are Presents)
39		*0x8A*	**IE Identifier** = *0x02* (BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
40		*0x12*	*0x12*
41		*0x34*	*0x34*
42		*0x56*	*0x56*
43		*0x78*	*0x78*
44		*0x90*	*0x90*
45		*0x12*	*0x12*
46		*0x34*	*0x34*
47		*0x56*	*0x56*
48		*0x78*	*0x78*
49		*0x90*	*0x90*
50		*0x08*	**IE Identifier** = *0x00* (Binary); **More Flag** = *0x00*; **Length** = *0x08*
51		*0xXX*	*0xXX -> Auth Key*
52		*0xXX*	*0xXX -> Auth Key*
53		*0xXX*	*0xXX -> Auth Key*
54		*0xXX*	*0xXX -> Auth Key*
55		*0xXX*	*0xXX -> Auth Key*
56		*0xXX*	*0xXX -> Auth Key*
57		*0xXX*	*0xXX -> Auth Key*
58		*0xXX*	*0xXX -> Auth Key*

13.4.5.2 Configuration Reply Message (From TCU to SO) (Reply for Activation).

Configuration Reply Message (Reply for Activation/Deactivation Message)
Raw Message (Hexadecimal Format)
0203101D04YYZZ01020000420X01000D80208A12345678901234567890

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**

1	**Header Element**	*0x02*	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x02 (*Configuration*)*
2		*0x03*	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x03 (*Configuration Reply Msg. #2*)*
3		*0x10*	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x00*
4		*0x1D*	**Message Length** = *0x1D* (**29**)
5	**Version Element**	*0x04*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x04*
6		*0xYY*	**Car Manufacturer ID** = 0xYY (0xYY is defined in the Table 3 – Version Element: Car Manufacturer IDs.)
7		*0xZZ*	**TCU Manufacturer ID** = *0xZZ* (0xZZ is defined in the Table 4 – Version Element: TCU Manufacturer IDs.)
8		*0x01*	**Major Hardware Release** = *0x01*
9		*0x02*	**Major Software Release** = *0x02*
10	**Message Fields**	*0x00*	**Reserved** = *0x00*
11		*0x00*	**More Flag** = *0x00*; **Target Application Id** =*0x00*
12		*0x42*	**AppFlag1** = *0x01* (Activate application); **Control Flag1** = *0x02* (Vehicle Descriptor is Present)
13		*0x0X*	**Status Flag1** = *0x0X(Accepted values = 0,2,3)*;**TCU Response Flag** = *0x00*; **Reserved** = *0x00*
14	**Error Element**	*0x01*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x01*
15		*0x00*	**Error Code** = *0x00 (OK)*
16	**Vehicle Descriptor Element**	*0x0D*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
17		*0x80*	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
18		*0x20*	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
19		*0x8A*	**IE Identifier** = *0x02* (BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
20		*0x12*	*0x12*
21		*0x34*	*0x34*
22		*0x56*	*0x56*
23		*0x78*	*0x78*
24		*0x90*	*0x90*
25		*0x12*	*0x12*
26		*0x34*	*0x34*
27		*0x56*	*0x56*
28		*0x78*	*0x78*
29		*0x90*	*0x90*

13.4.5.3 Configuration TCU Service Activation/ Deactivation Message ACP 245 (From SO to TCU) (Deactivation)

Configuration TCU Service Activation/ Deactivation Message ACP 245 (Deactivation)
Raw Message (Hexadecimal Format)
020A11150000000D80208A12345678901234567890

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	**Header Element**	*0x02*	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x02 (*Configuration*)*
2		*0x0A*	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x0A* (Activation/Deactivation Message*)*
3		*0x11*	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x01(Response is expected)*
4		*0x15*	**Message Length** = *0x15* (**21**)
5	**APN Configuration Element**	*0x00*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00 (00)*
6	**Server Configuration Element**	0x00	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00 (00)*
7	**Control Byte**	*0x00*	**More Flag** = *0x00*; **Activation** = *0x00 (Uncontracted)*; **Reserved** = *0x00 (bits 2-7)*
8	**Vehicle Descriptor Element**	*0x0D*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
9		*0x80*	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
10		*0x20*	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
11		*0x8A*	**IE Identifier** = *0x02* (BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
12		*0x12*	*0x12*
13		*0x34*	*0x34*
14		*0x56*	*0x56*
15		*0x78*	*0x78*
16		*0x90*	*0x90*
17		*0x12*	*0x12*
18		*0x34*	*0x34*
19		*0x56*	*0x56*
20		*0x78*	*0x78*
21		*0x90*	*0x90*

13.4.5.4 Configuration Reply Message (From TCU to SO) (Reply for Deactivation)

Configuration Reply Message (Reply for Deactivation Message)
Raw Message (Hexadecimal Format)
0203101D04YYZZ01020000820X01000D80208A12345678901234567890

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	**Header Element**	*0x02*	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x02 (*Configuration*)*
2		*0x03*	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*;

			Message Type = *0x03* (Configuration Reply Msg. #2)
3		*0x10*	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x00*
4		*0x1D*	**Message Length** = *0x1D* (**29**)
5	**Version Element**	*0x04*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x04*
6		*0xYY*	**Car Manufacturer ID =** 0xYY (0xYY is defined in the Table 3 – Version Element: Car Manufacturer IDs.)
7		*0xZZ*	**TCU Manufacturer ID** = *0xZZ* (0xZZ is defined in the Table 4 – Version Element: TCU Manufacturer IDs.)
8		*0x01*	**Major Hardware Release** = *0x01*
9		*0x02*	**Major Software Release** = *0x02*
10	**Message Fields**	*0x00*	**Reserved =** *0x00*
11		*0x00*	**More Flag** = *0x00*; **Target Application Id** =*0x00*
12		*0x82*	**AppFlag1** = *0x02* (Deactivate Application); **Control Flag1** = *0x02* (Vehicle Descriptor is Present)
13		*0x0X*	**Status Flag1 =** *0x0X(Accepted values = 0,2,3)*;**TCU Response Flag** = *0x00*; **Reserved** = *0x00*
14	**Error Element**	*0x01*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x01*
15		*0x00*	**Error Code** = *0x00 (OK)*
16	**Vehicle Descriptor Element**	*0x0D*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
17		*0x80*	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
18		*0x20*	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
19		*0x8A*	**IE Identifier** = *0x02*(BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
20		*0x12*	*0x12*
21		*0x34*	*0x34*
22		*0x56*	*0x56*
23		*0x78*	*0x78*
24		*0x90*	*0x90*
25		*0x12*	*0x12*
26		*0x34*	*0x34*
27		*0x56*	*0x56*
28		*0x78*	*0x78*
29		*0x90*	*0x90*

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13.5 REMOTE VEHICLE FUNCTION

13.5.1 **Blocking request: no version element (shortest message)**

13.5.1.1 Remote Vehicle Function Command (From SO to TCU)

Remote Vehicle Function Command
Raw Message (Hexadecimal Format)
0602111700018001020D80208A12345678901234567890

Message Detail (Message Elements)			
Octet	**Element**	**Vale**	**Detail**
1	**Header Element**	*0x06*	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x06 (*Remote Vehicle Function*)*
2		*0x02*	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x02 (*Remote Vehicle Function Command*)*
3		*0x11*	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x01*
4		*0x17*	**Message Length** = *0x17* (**23**)
5	**Version Element**	*0x00*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*
6	**Control Function Element**	*0x01*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x01*
7		*0x80*	**Entity ID** = *0x80* (128-Blocking)
8	**Function Command Element**	*0x01*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x01*
9		*0x02*	**Function Command or Status** = *0x02 (Start)*
10	**Vehicle Descriptor Element**	*0x0D*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
11		*0x80*	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
12		*0x20*	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
13		*0x8A*	**IE Identifier** = *0x02* (BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
14		*0x12*	*0x12*
15		*0x34*	*0x34*
16		*0x56*	*0x56*
17		*0x78*	*0x78*
18		*0x90*	*0x90*
19		*0x12*	*0x12*
20		*0x34*	*0x34*
21		*0x56*	*0x56*
22		*0x78*	*0x78*
23		*0x90*	*0x90*

If vehicle is not remotely blocked then TCU must, first, send a reply through "Remote Vehicle Function Status" and when blocking has occurred send a "Theft Alarm Notification" message.

If vehicle is already remotely blocked, TCU just sends a reply thru "Remote Vehicle Function Status".

13.5.1.2 Remote Vehicle Function Status (From TCU to SO)

Remote Vehicle Function Status			
Raw Message (Hexadecimal Format)			
0603101D04YYZZ01020180010201000D80208A12345678901234567890			

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	**Header Element**	0x06	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x06 (*Remote Vehicle Function*)*
2		0x03	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x03 (*Remote Vehicle function Status*)*
3		0x10	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x00*
4		0x1D	**Message Length** = *0x1D* (**29**)
5	**Version Element**	*0x04*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x04*
6		*0xYY*	**Car Manufacturer ID** = 0xYY (0xYY is defined in the Table 3 – Version Element: Car Manufacturer IDs.)
7		*0xZZ*	**TCU Manufacturer ID** = *0xZZ* (0xZZ is defined in the Table 4 – Version Element: TCU Manufacturer IDs.)
8		*0x01*	**Major Hardware Release** = *0x01*
9		*0x02*	**Major Software Release** = *0x02*
10	**Control Function Element**	*0x01*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x01*
11		*0x80*	**Entity ID** = *0x80* (128-Blocking)
12	**Function Command Element**	*0x01*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x01*
13		*0x02*	**Function Command or Status** = *0x02 (Started)*
14	**Error Element**	*0x01*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x01*
15		*0x00*	**Error Code** = *0x00 (OK)*
16	**Vehicle Descriptor Element**	*0x0D*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
17		*0x80*	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
18		*0x20*	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
19		*0x8A*	**IE Identifier** = *0x02*(BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
20		*0x12*	*0x12*
21		*0x34*	*0x34*
22		*0x56*	*0x56*
23		*0x78*	*0x78*
24		*0x90*	*0x90*
25		*0x12*	*0x12*
26		*0x34*	*0x34*

		0x56	0x56
27			
28		0x78	0x78
29		0x90	0x90

13.5.2 Unblocking request: no version element (shortest message)

13.5.2.1 Remote Vehicle Function Command (From SO to TCU)

Remote Vehicle Function Command
Raw Message (Hexadecimal Format)
0602111700018001030D80208A12345678901234567890

Message Detail (Message Elements)			
Octet	**Element**	**Vale**	**Detail**
1	Header Element	0x06	**Reserved** = 0x00; **Non Standard Flag** = 0x00; **App Id** = 0x06 (Remote Vehicle Function)
2		0x02	**Reserved** = 0x00; **Private Flag** = 0x00; **Test Flag** = 0x00; **Message Type** = 0x02 (Remote Vehicle Function Command)
3		0x11	**Version Flag** = 0x00; **Version** = 0x01; **Message Control Flag** = 0x01
4		0x17	**Message Length** = 0x17 (**23**)
5	Version Element	0x00	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x00
6	Control Function Element	0x01	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x01
7		0x80	**Entity ID** = 0x80 (128-Blocking)
8	Function Command Element	0x01	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x01
9		0x03	**Function Command or Status** = 0x03 (Stop/Disable)
10	Vehicle Descriptor Element	0x0D	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x0D
11		0x80	**Vehicle Descriptor Flag 1** = 0x80 (has more Flag)
12		0x20	**Vehicle Descriptor Flag 2** = 0x20 (SIM Card ID is Present)
13		0x8A	**IE Identifier** = 0x02 (BCD Coding); **More Flag** = 0x00; **Length** = 0x0A
14		0x12	0x12
15		0x34	0x34
16		0x56	0x56
17		0x78	0x78
18		0x90	0x90
19		0x12	0x12
20		0x34	0x34
21		0x56	0x56
22		0x78	0x78
23		0x90	0x90

13.5.2.2 Remote Vehicle Function Status (From TCU to SO)

Remote Vehicle Function Status

Raw Message (Hexadecimal Format)
0603101D04YYZZ01020180010301000D80208A12345678901234567890

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	**Header Element**	0x06	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x06 (*Remote Vehicle Function*)*
2		0x03	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x03 (*Remote Vehicle function Status*)*
3		0x10	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x00*
4		0x1D	**Message Length** = *0x1D* (**29**)
5	**Version Element**	*0x04*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x04*
6		*0xYY*	**Car Manufacturer ID** = 0xYY (0xYY is defined in the Table 3 – Version Element: Car Manufacturer IDs.)
7		*0xZZ*	**TCU Manufacturer ID** = *0xZZ* (0xZZ is defined in the Table 4 – Version Element: TCU Manufacturer IDs.)
8		*0x01*	**Major Hardware Release** = *0x01*
9		*0x02*	**Major Software Release** = *0x02*
10	**Control Function Element**	*0x01*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x01*
11		*0x80*	**Entity ID** = *0x80* (128-Blocking)
12	**Function Command Element**	*0x01*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x01*
13		*0x03*	**Function Command or Status** = *0x03 (Disabled)*
14	**Error Element**	*0x01*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x01*
15		*0x00*	**Error Code** = *0x00 (OK)*
16	**Vehicle Descriptor Element**	*0x0D*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
17		*0x80*	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
18		*0x20*	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
19		*0x8A*	**IE Identifier** = *0x02* (BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
20		*0x12*	*0x12*
21		*0x34*	*0x34*
22		*0x56*	*0x56*
23		*0x78*	*0x78*
24		*0x90*	*0x90*
25		*0x12*	*0x12*
26		*0x34*	*0x34*
27		*0x56*	*0x56*
28		*0x78*	*0x78*
29		*0x90*	*0x90*

13.6 VEHICLE TRACKING SERVICE

13.6.1.1 Vehicle Position Message (From TCU to SO) with Vehicle Location Data (Data type 0x0047 = True)

Vehicle Position Message			
Raw Message (Hexadecimal Format)			
0A02103A04YYZZ01014D6D22F8141311300000F6F2BED0FAF5BA2802E4096F0678800D80208A1234567890 1234567890088080000010380C01100			

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	Header Element	0x0A	**Reserved** = 0x00; **Non Standard Flag** = 0x00; **App Id** = 0x0A (Vehicle Tracking)
2		0x02	**Reserved** = 0x00; **Private Flag** = 0x00; **Test Flag** = 0x00; **Message Type** = 0x02 (Vehicle Position)
3		0x10	**Version Flag** = 0x00; **Version** = 0x01; **Message Control Flag** = 0x00
4		0x3A	**Message Length** = 0x3A (**58**)
5	Version Element	0x04	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x04
6		0x08	**Car Manufacturer ID** = 0xYY (0xYY is defined in the Table 3 – Version Element: Car Manufacturer IDs.)
7		0xZZ	**TCU Manufacturer ID** = 0xZZ (0xZZ is defined in the Table 4 – Version Element: TCU Manufacturer IDs.)
8		0x01	**Major Hardware Release** = 0x01
9		0x01	**Major Software Release** = 0x01
10	Time Stamp Element	0x4D	**Year** = 0x13 (19 + **1990** = 2009); **Month of Year** = 0x01
11		0x6D	**Month of Year** = 0x01 (0101 = 5 = May); **Day of Month** = 0x16 (10110 = 22 = Day); **Hour of Day** = 0x01;
12		0x22	**Hour of Day** = 0x02 (10010 = 18h) ; **Minutes** = 0x02
13		0xF8	**Minutes** = 0x03 (001011 = 11 min); **Seconds** = 0x38 (111000 = 56 sec)
14	Location Element	0x14	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x14 (20)
15		0x13	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x13 (19) (Current GPS Raw Data Element - **Start**)
16		0x11	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x11 (17) (Area Location Code Element - **Start**)
17		0x30	**More Flag** = 0x00; **AreaLocationStatusFlag1** = 0x30 (011000)
18		0x00	**Area Type** = 0x00; **Location Type Coding** = 0x00; **Reserved** = 0x00
19		0x00	**More Flag** = 0x00; **Time Difference** = 0x00
20		0xF6	**Longitude** = 0xF6 (Byte1)
21		0xF2	**Longitude** = 0x02 (Byte2)

22		0xBE	**Longitude** = 0xBE (Byte3)
23		0xD0	**Longitude** = 0xD0 (Byte4)
24		0xFA	**Latitude** = 0xFA (Byte1)
25		0xF5	**Latitude** = 0xF5 (Byte2)
26		0xBA	**Latitude** = 0xBA (Byte3)
27		0x28	**Latitude** = 0x28 (Byte4)
28		0x02	**Altitude** = 0x02 (Byte1)
29		0xE4	**Altitude** = 0xE4 (Byte2)
30		0x09	**Position Uncertainty Estimate** = 0x04; **K/HDOP** = 0x01
31		0x6F	**Heading Uncertainty Estimate** = 0x03; **Heading** = 0x0F
32		0x06	**Reserved** = 0x00; **Distance Flag** = 0x01; **Time Flag** = 0x02
33		0x78	**Velocity** = 0x78 (120 km/h) (Area Location Code Element - **End**)
34		0x80	**Number of Satellites** = 0x08; **Reserved** = 0x00
35	**Vehicle Descriptor Element**	0x0D	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x0D
36		0x80	**Vehicle Descriptor Flag 1** = 0x80 (has more Flag)
37		0x20	**Vehicle Descriptor Flag 2** = 0x20 (SIM Card ID is Present)
38		0x8A	**IE Identifier** = 0x02 (BCD Coding); **More Flag** = 0x00; **Length** = 0x0A
39		0x12	0x12
40		0x34	0x34
41		0x56	0x56
42		0x78	0x78
43		0x90	0x90
44		0x12	0x12
45		0x34	0x34
46		0x56	0x56
47		0x78	0x78
48		0x90	0x90
49	**Break Down Status Element**	0x08	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x08
50		0x80	**More Flag** = 0x01; **Break Down Source** = 0x00 (First Flag)
51		0x80	**More Flag** = 0x01; **Break Down Source** = 0x00 (Second Flag)
52		0x00	**More Flag** = 0x00; **Break Down Source** = 0x00 (Third Flag)
53		0x01	**More Flag** = 0x00; **Break Down Sensor** = 0x01 (Enable Break Down Data to Show Status)
54		0x03	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x03
55		0x80	**Break Down Data** = 0x80
56		0xC0	**Break Down Data** = 0xC0 (Ignition On)

		0x11	**Break Down Data** = 0x11 (Main battery reconnected and Block off)
57			
58	**Information Type Element**	0x00	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x00

13.6.1.2 Vehicle Position Message (From TCU to SO) without Vehicle Location Data (Data type 0x0047 = False)

Vehicle Position Message
Raw Message (Hexadecimal Format)
0A02102604YYZZ01014D6D22F8000D80208A1234567890123456789008808000010380C01100

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	**Header Element**	0x0A	**Reserved** = 0x00; **Non Standard Flag** = 0x00; **App Id** = 0x0A(Vehicle Tracking)
2		0x02	**Reserved** = 0x00; **Private Flag** = 0x00; **Test Flag** = 0x00; **Message Type** = 0x02 (Vehicle Position)
3		0x10	**Version Flag** = 0x00; **Version** = 0x01; **Message Control Flag** = 0x00
4		0x26	**Message Length** = 0x26 (38)
5	**Version Element**	0x04	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x04
6		0xYY	**Car Manufacturer ID** = 0xYY (0xYY is defined in the Table 3 – Version Element: Car Manufacturer IDs.)
7		0xZZ	**TCU Manufacturer ID** = 0xZZ (0xZZ is defined in the Table 4 – Version Element: TCU Manufacturer IDs.)
8		0x01	**Major Hardware Release** = 0x01
9		0x01	**Major Software Release** = 0x01
10	**Time Stamp Element**	0x4D	**Year** = 0x13 (19 + **1990** = 2009); **Month of Year** = 0x01
11		0x6D	**Month of Year** = 0x01 (0101 = 5 = May); **Day of Month** = 0x16 (10110 = 22 = Day); **Hour of Day** = 0x01;
12		0x22	**Hour of Day** = 0x02 (10010 = 18h) ; **Minutes** = 0x02
13		0xF8	**Minutes** = 0x03 (001011 = 11 min); **Seconds** = 0x38 (111000 = 56 sec)
14	**Location Element**	0x00	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x00
15	**Vehicle Descriptor Element**	0x0D	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x0D
16		0x80	**Vehicle Descriptor Flag 1** = 0x80 (has more Flag)
17		0x20	**Vehicle Descriptor Flag 2** = 0x20 (SIM Card ID is Present)
18		0x8A	**IE Identifier** = 0x02 (BCD Coding); **More Flag** = 0x00; **Length** = 0x0A
19		0x12	0x12
20		0x34	0x34
21		0x56	0x56
22		0x78	0x78
23		0x90	0x90

24		*0x12*	*0x12*
25		*0x34*	*0x34*
26		*0x56*	*0x56*
27		*0x78*	*0x78*
28		*0x90*	*0x90*
29	**Break Down Status Element**	*0x08*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x08*
30		*0x80*	**More Flag** = *0x01*; **Break Down Source** = *0x00 (*First Flag*)*
31		*0x80*	**More Flag** = *0x01*; **Break Down Source** = *0x00* (Second Flag*)*
32		*0x00*	**More Flag** = *0x00*; **Break Down Source** = *0x00 (*Third Flag*)*
33		*0x01*	**More Flag** = *0x00*; **Break Down Sensor** = *0x01* (Enable Break Down Data to Show Status*)*
34		*0x03*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x03*
35		*0x80*	**Break Down Data** = *0x80*
36		*0xC0*	**Break Down Data** = *0xC0 (Ignition On)*
37		*0x11*	**Break Down Data** = *0x11 (Main battery reconnected and Block off)*
38	**Information Type Element**	*0x00*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*

13.7 THEFT ALARM

13.7.1.1 Keep Alive (from TCU to SO)

Keep Alive Message		
Raw Message (Hexadecimal Format)		
0B0410120D80208A12345678901234567890		

Message Detail (Message Elements)		
Octet	**Element**	**Detail**
1	**Header Element**	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x0B* (Theft Alarm*)*
2		**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x04 (*Keep Alive*)*
3		**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x00*
4		**Message Length** = *0x12* (**18**)
5	**Vehicle Descriptor Element**	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
6		**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
7		**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
8		**IE Identifier** = *0x02* (BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
9		*0x12*
10		*0x34*
11		*0x56*
12		*0x78*
13		*0x90*
14		*0x12*
15		*0x34*
16		*0x56*
17		*0x78*
18		*0x90*

13.7.1.2 Theft Alarm Notification (From TCU to SO) of "Ignition ON" with Vehicle Location Data (Data type 0x0047 = True)

Vehicle Position Message			
Raw Message (Hexadecimal Format)			
0B01103A04YYZZ01014D6D22F8141311300000F6F2BED0FAF5BA2802E4096F0678800D80208A1234567890 12345678900880C000010380C01100			

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	**Header Element**	*0x0B*	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id**

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			= *0x0B(*Theft Alarm*)*
2		*0x01*	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x01 (Theft Alarm Notification)*
3		*0x10*	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x00*
4		*0x3A*	**Message Length** = *0x3A* (58)
5	**Version Element**	*0x04*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x04*
6		*0xYY*	**Car Manufacturer ID** = 0xYY (0xYY is defined in the Table 3 – Version Element: Car Manufacturer IDs.)
7		*0xZZ*	**TCU Manufacturer ID** = *0xZZ* (0xZZ is defined in the Table 4 – Version Element: TCU Manufacturer IDs.)
8		*0x01*	**Major Hardware Release** = *0x01*
9		*0x01*	**Major Software Release** = *0x01*
10	**Time Stamp Element**	*0x4D*	**Year** = *0x13 (*19 + **1990** = 2009*)*; **Month of Year** = *0x01*
11		*0x6D*	**Month of Year** = *0x01 (*0101 = 5 = May*)*; **Day of Month** = *0x16 (*10110 = 22 = Day*)*; **Hour of Day** = *0x01;*
12		*0x22*	**Hour of Day** = *0x02 (*10010 = 18h*)* ; **Minutes** = *0x02*
13		*0xF8*	**Minutes** = *0x03 (*001011 = 11 min*)*; **Seconds** = *0x38 (*111000 = 56 sec*)*
14	**Location Element**	*0x14*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x14 (*20*)*
15		*0x13*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x13 (*19*) (*Current GPS Raw Data Element - **Start***)*
16		*0x11*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x11 (*17*) (*Area Location Code Element - **Start***)*
17		*0x30*	**More Flag** = *0x00*; **AreaLocationStatusFlag1** = *0x30 (*011000*)*
18		*0x00*	**Area Type** = *0x00*; **Location Type Coding** = *0x00*; **Reserved** = *0x00*
19		*0x00*	**More Flag** = *0x00*; **Time Difference** = *0x00*
20		*0xF6*	**Longitude** = *0xF6* (Byte1)
21		*0xF2*	**Longitude** = *0x02* (Byte2)
22		*0xBE*	**Longitude** = *0xBE* (Byte3)
23		*0xD0*	**Longitude** = *0xD0* (Byte4)
24		*0xFA*	**Latitude** = *0xFA* (Byte1)
25		*0xF5*	**Latitude** = *0xF5* (Byte2)
26		*0xBA*	**Latitude** = *0xBA* (Byte3)
27		*0x28*	**Latitude** = *0x28* (Byte4)
28		*0x02*	**Altitude** = *0x02* (Byte1)
29		*0xE4*	**Altitude** = *0xE4* (Byte2)
30		*0x09*	**Position Uncertainty Estimate** = *0x04*; **K/HDOP** = *0x01*
31		*0x6F*	**Heading Uncertainty Estimate** = *0x03*; **Heading** = *0x0F*
32		*0x06*	**Reserved** = *0x00*; **Distance Flag** = *0x01*; **Time Flag** = *0x02*

Octet	Element	Value	Detail
33		*0x78*	**Velocity** = *0x78 (120 km/h) (*Area Location Code Element - **End***)*
34		*0x80*	**Number of Satellites** = *0x08*; **Reserved** = *0x00*
35	**Vehicle Descriptor Element**	*0x0D*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
36		*0x80*	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
37		*0x20*	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
38		*0x8A*	**IE Identifier** = *0x02* (BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
39		*0x12*	*0x12*
40		*0x34*	*0x34*
41		*0x56*	*0x56*
42		*0x78*	*0x78*
43		*0x90*	*0x90*
44		*0x12*	*0x12*
45		*0x34*	*0x34*
46		*0x56*	*0x56*
47		*0x78*	*0x78*
48		*0x90*	*0x90*
49		*0x08*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x08*
50		*0x80*	**More Flag** = *0x01*; **Break Down Source** = *0x00 (*First Flag*) (More Flag=1)*
51		*0xC0*	**More Flag** = *0x01*; **Break Down Source** = 1000000 *(*Second Flag*) (More Flag=1,Igniton ON=1)*
52		*0x00*	**More Flag** = *0x00*; **Break Down Source** = *0x00 (*Third Flag*)*
53	**Break Down Status Element**	*0x01*	**More Flag** = *0x00*; **Break Down Sensor** = *0x01 (*Enable Break Down Data to Show Status*)*
54		*0x03*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x03*
55		*0x80*	**Break Down Data** = *0x80*
56		*0xC0*	**Break Down Data** = *0xC0 (Ignition On)*
57		*0x11*	**Break Down Data** = *0x11 (Main battery reconnected and Block off)*
58	**Information Type Element**	*0x00*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*

13.7.1.3 Theft Alarm Notification (From TCU to SO) of "Ignition ON" without Vehicle Location Data (Data type 0x0047 = False).

Vehicle Position Message
Raw Message (Hexadecimal Format)
0B01102604YYZZ01014D6D22F8000D80208A12345678901234567890088 0C000010380C01100

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**

1	Header Element	0x0B	Reserved = 0x00; Non Standard Flag = 0x00; App Id = 0x0B(Theft Alarm)
2		0x01	Reserved = 0x00; Private Flag = 0x00; Test Flag = 0x00; Message Type = 0x01 (Theft Alarm Notification)
3		0x10	Version Flag = 0x00; Version = 0x01; Message Control Flag = 0x00
4		0x26	Message Length = 0x26 (38)
5	Version Element	0x04	IE Identifier = 0x00; More Flag = 0x00; Length = 0x04
6		0xYY	Car Manufacturer ID = 0xYY (0xYY is defined in the Table 3 – Version Element: Car Manufacturer IDs.)
7		0xZZ	TCU Manufacturer ID = 0xZZ (0xZZ is defined in the Table 4 – Version Element: TCU Manufacturer IDs.)
8		0x01	Major Hardware Release = 0x01
9		0x01	Major Software Release = 0x01
10	Time Stamp Element	0x4D	Year = 0x13 (19 + **1990** = 2009); Month of Year = 0x01
11		0x6D	Month of Year = 0x01 (0101 = 5 = May); Day of Month = 0x16 (10110 = 22 = Day); Hour of Day = 0x01;
12		0x22	Hour of Day = 0x02 (10010 = 18h) ; Minutes = 0x02
13		0xF8	Minutes = 0x03 (001011 = 11 min); Seconds = 0x38 (111000 = 56 sec)
14	Location Element	0x00	IE Identifier = 0x00; More Flag = 0x00; Length = 0x00
15	Vehicle Descriptor Element	0x0D	IE Identifier = 0x00; More Flag = 0x00; Length = 0x0D
16		0x80	Vehicle Descriptor Flag 1 = 0x80 (has more Flag)
17		0x20	Vehicle Descriptor Flag 2 = 0x20 (SIM Card ID is Present)
18		0x8A	IE Identifier = 0x02(BCD Coding); More Flag = 0x00; Length = 0x0A
19		0x12	0x12
20		0x34	0x34
21		0x56	0x56
22		0x78	0x78
23		0x90	0x90
24		0x12	0x12
25		0x34	0x34
26		0x56	0x56
27		0x78	0x78
28		0x90	0x90
29	Break Down Status Element	0x08	IE Identifier = 0x00; More Flag = 0x00; Length = 0x08
30		0x80	More Flag = 0x01; Break Down Source = 0x00 (First Flag)
31		0xC0	More Flag = 0x01; Break Down Source = 1000000 (Second Flag) (More Flag=1,Ignition ON=1)
32		0x00	More Flag = 0x00; Break Down Source = 0x00 (Third Flag)

Octet	Element	Value	Detail
33		*0x01*	**More Flag** = *0x00*; **Break Down Sensor** = *0x01* (*Enable Break Down Data to Show Status*)
34		*0x03*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x03*
35		*0x80*	**Break Down Data** = *0x80*
36		*0xC0*	**Break Down Data** = *0xC0 (Ignition On)*
37		*0x11*	**Break Down Data** = *0x11 (Main battery reconnected and Block off)*
38	**Information Type Element**	*0x00*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*

13.7.1.4 Theft Alarm in event mode Vehicle Position Message (From TCU to SO) with Vehicle Location Data (Data type 0x0047 = True)

Vehicle Position Message
Raw Message (Hexadecimal Format)
0B03103A04YYZZ01014D6D22F8141311300000F6F2BED0FAF5BA2802E4096F0678800D80208A1234567890 123456789008808000010380C01100

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**

Octet	Element	Value	Detail
1	**Header Element**	*0x0B*	**Reserved** = *0x00*; **Non Standard Flag** = *0x00*; **App Id** = *0x0B(Theft Alarm)*
2		*0x03*	**Reserved** = *0x00*; **Private Flag** = *0x00*; **Test Flag** = *0x00*; **Message Type** = *0x03 (Theft Alarm in event mode)*
3		*0x10*	**Version Flag** = *0x00*; **Version** = *0x01*; **Message Control Flag** = *0x00*
4		*0x3A*	**Message Length** = *0x3A* (**58**)
5	**Version Element**	*0x04*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x04*
6		*0xYY*	**Car Manufacturer ID** = 0xYY (0xYY is defined in the Table 3 – Version Element: Car Manufacturer IDs.)
7		*0xZZ*	**TCU Manufacturer ID** = *0xZZ* (0xZZ is defined in the Table 4 – Version Element: TCU Manufacturer IDs.)
8		*0x01*	**Major Hardware Release** = *0x01*
9		*0x01*	**Major Software Release** = *0x01*
10	**Time Stamp Element**	*0x4D*	**Year** = *0x13 (19 + **1990** = 2009)*; **Month of Year** = *0x01*
11		*0x6D*	**Month of Year** = *0x01 (0101 = 5 = May)*; **Day of Month** = *0x16 (10110 = 22 = Day)*; **Hour of Day** = *0x01;*
12		*0x22*	**Hour of Day** = *0x02 (10010 = 18h)* ; **Minutes** = *0x02*
13		*0xF8*	**Minutes** = *0x03 (001011 = 11 min)*; **Seconds** = *0x38 (111000 = 56 sec)*
14	**Location Element**	*0x14*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x14 (20)*
15		*0x13*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x13 (19) (Current GPS Raw Data Element - **Start**)*
16		*0x11*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x11*

			*(17) (Area Location Code Element - **Start**)*
17		*0x30*	**More Flag** = *0x00*; **AreaLocationStatusFlag1** = *0x30* *(011000)*
18		*0x00*	**Area Type** = *0x00*; **Location Type Coding** = *0x00*; **Reserved** = *0x00*
19		*0x00*	**More Flag** = *0x00*; **Time Difference** = *0x00*
20		*0xF6*	**Longitude** = *0xF6* (Byte1)
21		*0xF2*	**Longitude** = *0x02* (Byte2)
22		*0xBE*	**Longitude** = *0xBE* (Byte3)
23		*0xD0*	**Longitude** = *0xD0* (Byte4)
24		*0xFA*	**Latitude** = *0xFA* (Byte1)
25		*0xF5*	**Latitude** = *0xF5* (Byte2)
26		*0xBA*	**Latitude** = *0xBA* (Byte3)
27		*0x28*	**Latitude** = *0x28* (Byte4)
28		*0x02*	**Altitude** = *0x02* (Byte1)
29		*0xE4*	**Altitude** = *0xE4* (Byte2)
30		*0x09*	**Position Uncertainty Estimate** = *0x04*; **K/HDOP** = *0x01*
31		*0x6F*	**Heading Uncertainty Estimate** = *0x03*; **Heading** = *0x0F*
32		*0x06*	**Reserved** = *0x00*; **Distance Flag** = *0x01*; **Time Flag** = *0x02*
33		*0x78*	**Velocity** = *0x78 (120 km/h)* (Area Location Code Element - **End**)
34		*0x80*	**Number of Satellites** = *0x08*; **Reserved** = *0x00*
35	**Vehicle Descriptor Element**	*0x0D*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x0D*
36		*0x80*	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
37		*0x20*	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
38		*0x8A*	**IE Identifier** = *0x02* (BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
39		*0x12*	*0x12*
40		*0x34*	*0x34*
41		*0x56*	*0x56*
42		*0x78*	*0x78*
43		*0x90*	*0x90*
44		*0x12*	*0x12*
45		*0x34*	*0x34*
46		*0x56*	*0x56*
47		*0x78*	*0x78*
48		*0x90*	*0x90*
49	**Break Down Status Element**	*0x08*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x08*
50		*0x80*	**More Flag** = *0x01*; **Break Down Source** = *0x00* (First Flag)

Octet	Element	Value	Detail
51		0x80	**More Flag** = 0x01; **Break Down Source** = 0x00 (Second Flag)
52		0x00	**More Flag** = 0x00; **Break Down Source** = 0x00 (Third Flag)
53		0x01	**More Flag** = 0x00; **Break Down Sensor** = 0x01 (Enable Break Down Data to Show Status)
54		0x03	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x03
55		0x80	**Break Down Data** = 0x80
56		0xC0	**Break Down Data** = 0xC0 (Ignition On)
57		0x11	**Break Down Data** = 0x11 (Main battery reconnected and Block off)
58	**Information Type Element**	0x00	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x00

13.7.1.5 Theft Alarm in event mode Vehicle Position Message (From TCU to SO) without Vehicle Location Data (Data type 0x0047 = False)

Vehicle Position Message
Raw Message (Hexadecimal Format)
0B03102604YYZZ01014D6D22F8000D80208A123456789012345678900880800001 0380C01100

Message Detail (Message Elements)			
Octet	**Element**	**Value**	**Detail**
1	**Header Element**	0x0B	**Reserved** = 0x00; **Non Standard Flag** = 0x00; **App Id** = 0x0B(Theft Alarm)
2		0x03	**Reserved** = 0x00; **Private Flag** = 0x00; **Test Flag** = 0x00; **Message Type** = 0x03 (Theft Alarm in event mode)
3		0x10	**Version Flag** = 0x00; **Version** = 0x01; **Message Control Flag** = 0x00
4		0x26	**Message Length** = 0x26 (38)
5	**Version Element**	0x04	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x04
6		0xYY	**Car Manufacturer ID** = 0xYY (0xYY is defined in the Table 3 – Version Element: Car Manufacturer IDs.)
7		0xZZ	**TCU Manufacturer ID** = 0xZZ (0xZZ is defined in the Table 4 – Version Element: TCU Manufacturer IDs.)
8		0x01	**Major Hardware Release** = 0x01
9		0x01	**Major Software Release** = 0x01
10	**Time Stamp Element**	0x4D	**Year** = 0x13 (19 + **1990** = 2009); **Month of Year** = 0x01
11		0x6D	**Month of Year** = 0x01 (0101 = 5 = May); **Day of Month** = 0x16 (10110 = 22 = Day); **Hour of Day** = 0x01;
12		0x22	**Hour of Day** = 0x02 (10010 = 18h) ; **Minutes** = 0x02
13		0xF8	**Minutes** = 0x03 (001011 = 11 min); **Seconds** = 0x38 (111000 = 56 sec)
14	**Location Element**	0x00	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x00
15	**Vehicle Descriptor**	0x0D	**IE Identifier** = 0x00; **More Flag** = 0x00; **Length** = 0x0D

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16	**Element**	*0x80*	**Vehicle Descriptor Flag 1** = *0x80* (has more Flag)
17		*0x20*	**Vehicle Descriptor Flag 2** = *0x20* (SIM Card ID is Present)
18		*0x8A*	**IE Identifier** = *0x02* (BCD Coding); **More Flag** = *0x00*; **Length** = *0x0A*
19		*0x12*	*0x12*
20		*0x34*	*0x34*
21		*0x56*	*0x56*
22		*0x78*	*0x78*
23		*0x90*	*0x90*
24		*0x12*	*0x12*
25		*0x34*	*0x34*
26		*0x56*	*0x56*
27		*0x78*	*0x78*
28		*0x90*	*0x90*
29	**Break Down Status Element**	*0x08*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x08*
30		*0x80*	**More Flag** = *0x01*; **Break Down Source** = *0x00* (First Flag)
31		*0x80*	**More Flag** = *0x01*; **Break Down Source** = *0x00* (Second Flag)
32		*0x00*	**More Flag** = *0x00*; **Break Down Source** = *0x00* (Third Flag)
33		*0x01*	**More Flag** = *0x00*; **Break Down Sensor** = *0x01* (Enable Break Down Data to Show Status)
34		*0x03*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x03*
35		*0x80*	**Break Down Data** = *0x80*
36		*0xC0*	**Break Down Data** = *0xC0 (Ignition On)*
37		*0x11*	**Break Down Data** = *0x11 (Main battery reconnected and Block off)*
38	**Information Type Element**	*0x00*	**IE Identifier** = *0x00*; **More Flag** = *0x00*; **Length** = *0x00*

13.7.1.6 Extended Version Example.

HEADER DESCRIPTION

Octet / Bit	0	1	2	3	4	5	6	7
1	Reserved Set to 0	Private flag	Application ID					
2	Reserved Set to 0	Private flag	Test Flag	Message Type				
3	Version Flag = 1	Version = 7			Message Control Flag			
4	More flag	Extended Version = 7					Message Priority flag = 0	
5, 6	Message Length							

14 Appendix III – Communication Flow – Use Rules

This attachment has been created to define the mandatory conditions of ACP 245 operations by a standard communication flow between SO (Service Operator) and TCU. All implementation of ACP 245 must proceed with these rules described below.

14.1 ACP 245 Message Replies

14.1.1 Defined messages in ACP 245

Reply messages must have the same "Application ID" from the original message with the proper error code in "Error Element", according to Application ID used.

The "Bit 3" of "Message Control Flag" if set to "1", it will always request a reply from the receiver.

If the SO is expecting a reply message, is mandatory that the SO receive it or wait for time expiration (timeout) before sending a new message.

Start Message	Reply Message *(always if required)*	Flow
Provision Update Message #1	Provision Reply Message #1	SO -> TCU
Configuration Update Message #2 ACP 245	Configuration Reply Message	SO -> TCU
	Configuration Reply Message #2 ACP 245	SO -> TCU
Configuration TCU Service Activation/Deactivation Message ACP 245	Configuration Reply Message	SO -> TCU
Remote Vehicle Function Command	Remote Vehicle Function Status	SO -> TCU
Tracking - Vehicle Position Message	Vehicle Position Reply	TCU -> SO
Theft Alarm Notification	Theft Alarm Reply	TCU -> SO
Theft Alarm - Vehicle Position Message	Theft Alarm Reply	TCU -> SO

14.1.2 Messages present in the ACP 3.1.0.2 and not defined in ACP 245

There are only two options allowed:

a. Ignore it and do not send a reply message with error code;
OR
b. Follow the ACP 3.1.0.2 procedures.

14.1.3 Invalid Messages

Ignore it and do not send a reply message with error code.

14.2 The transport layer defined for ACP 245 is the TCP - IP.

14.3 Opening a Connection

14.3.1 Every connection always started by TCU.

14.3.2 The following elements must be present in the first message from TCU:

1)"Vehicle Descriptor Element" with ICCID;
2) Full "Version Element";

14.4 All messages from the TCU and from the SO must contain the *Vehicle Descriptor Element* with ICCID.

14.5 In the message Keep Alive is optional to include *Vehicle Descriptor Element* with ICCID.

14.6 In the messages Provision Update Message#1 and Configuration Update Message #2 ACP 245 the fields *ControlFlag2, Start Time, End Time* and *Grace Time* are optional and dependent of the TCU manufacturer implementation. The default values of *ControlFlag1* must show these fields as absent (Bit 0=0, Bit 1=0, Bit 2=0 and Bit 3=0).

14.7 When Vehicle Location Function is not active (Data type 0x0047 = false):

   i.   Location Element in any message must have length set to 0 (zero).

14.8 At the time of activating the SO service:

   i.   In the case of TCU does not send automatically the position history stored, the SO must request it through the message "**Remote Vehicle Function Command**" (*Application*=6, *Message type* = 2) with *Entity ID* =17 and *Function command* =2 (Enable/Start).

   ii. The parameter 0x0047 is read-only via ACP Configuration Messages. This Parameter reflects the TCU Service Activation type (Remote Blocking Only or Remote Blocking and Location). The complete information of this Data Type is available into Dynamic Authentication key Specification provided by DENATRAN.

14.9 When Vehicle Location Function is active (Data type 0x0047 = true):

   i.   With the ignition status "ON", the TCU must record at least-one position as configured by SO with parameter 0x0011 and sent it to the SO as soon as a TCP connection is available or every 24 hours minimum.

   ii. One position must be stored at the every new ignition cycle and sent to the SO as soon as a TCP connection is available or every 24 hours minimum.

   iii. With the ignition status OFF, the TCU must connect with SO, at least once every 24 hours and send the recorded positions that have not been sent and the current position with *timestamp*.

14.10 TCU doesn't accept to STOP tracking with "Function command or Status"=3 (Disable or Stop) and "Entity ID"=1 (Vehicle Tracking). In this case, TCU replies with a "Remote Vehicle Function Status" message with "Error Code=19". To STOP Tracking, SO must use Data type 0x0011 (Tracking timer) set to 0 (zero).

14.11 When Vehicle Tracking Function is active, Data type 0x0011 (Tracking timer) must be greater than 0 (zero). In this case, TCU sends vehicle position message periodically.

14.12 In the case of SO utilizes "Entity ID"=1 (Vehicle Tracking) and "Transmit Units" assigned to values = 0, 1 or 2, the data type 0x0011 (Tracking timer) is updated with the content of "transmit interval" field up to the limit of 65.535 seconds.

14.13 **Messages Flow in ACP 245**

14.13.1 TCU Reconnection
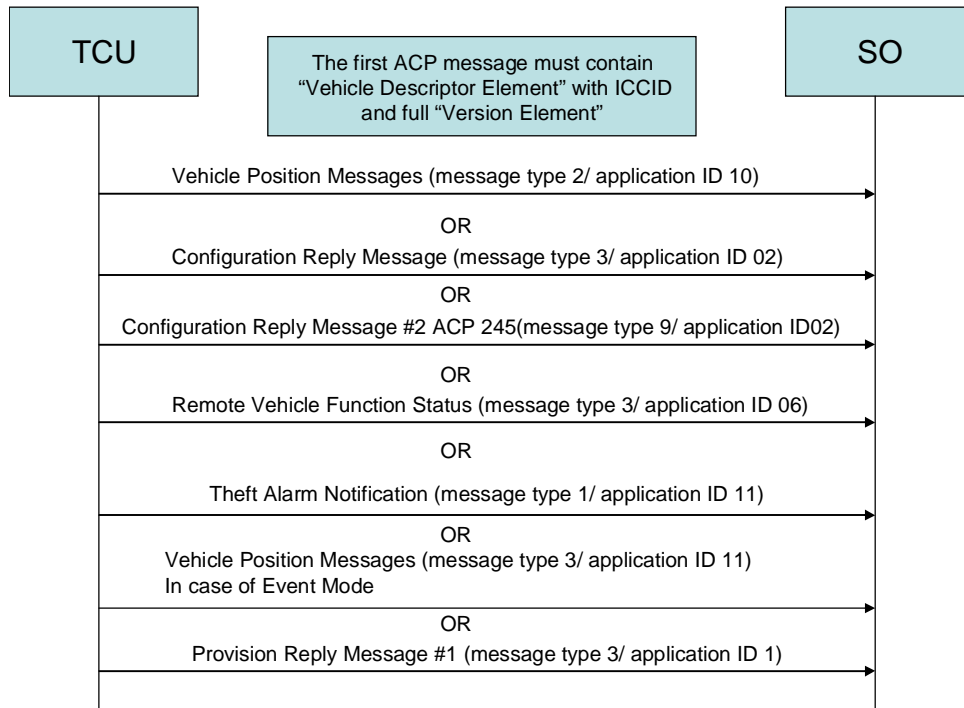
14.13.2 TCU Remote Blocking and Location Service Activation

14.13.3 TCU Service Activation/ Configuration

14.13.4 TCU Remote Blocking Only Service Activation/ Remote Blocking

14.13.5 Ignition On / TCU Tracking Normal Mode / Ignition Off

```
┌─────┐                                              ┌─────┐
│ TCU │   ┌──────────────────────────────────────┐  │ SO  │
└──┬──┘   │   When Ignition is ON, TCU establishes a│  └──┬──┘
   │      │ TCP connection with the SO. The first ACP message│  │
   │      │   must contain "Vehicle Descriptor Element"│  │
   │      │    with ICCID and full "Version Element"│  │
   │      └──────────────────────────────────────┘  │
   │                                                 │
   │  Theft Alarm Notification Message (message type 1/ application ID 11)  │──►  Ignition ON
   │                                                 │     Notification
   │  Vehicle Position Messages (message type 2/ application ID 10)  │──►
   │                          ●                      │
   │                          ●                      │
   │                          ●                      │
   │  Keep Alive without Vehicle Descriptor Element (message type 4/ application ID 11)  │──►
   │                                                 │
   │  Vehicle Position Messages (message type 2/ application ID 10)  │──►
   │                                                 │
   │      ┌──────────────────────────────────────┐  │
   │      │   When Ignition is OFF, TCU must send a│  │
   │      │ position with Event Ignition Off before shutdown│  │
   │      └──────────────────────────────────────┘  │
   │  Theft Alarm Notification Message (message type 1/ application ID 11)  │──►  Ignition OFF
   │                                                 │     Notification
```
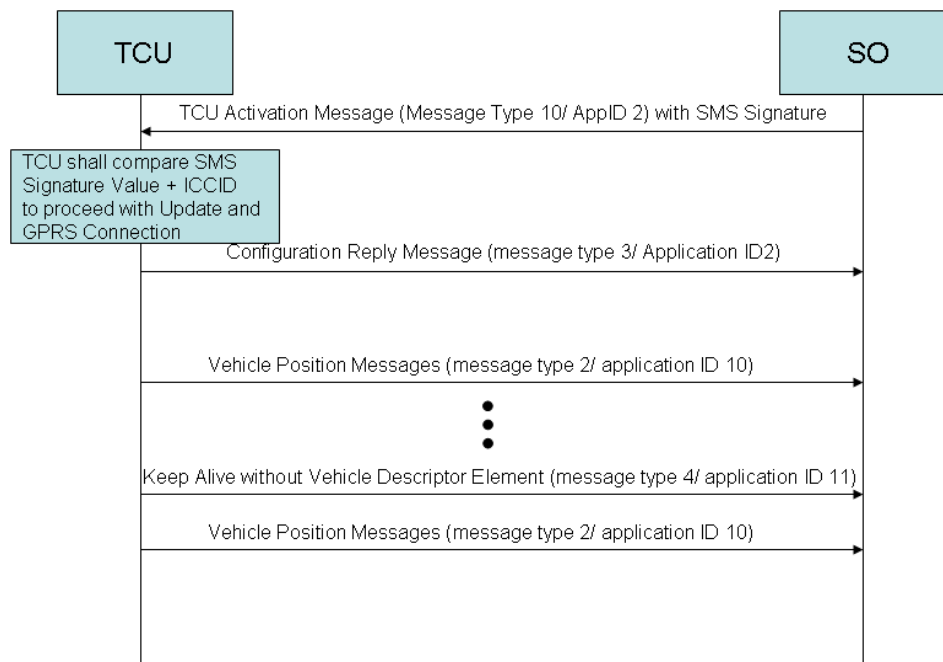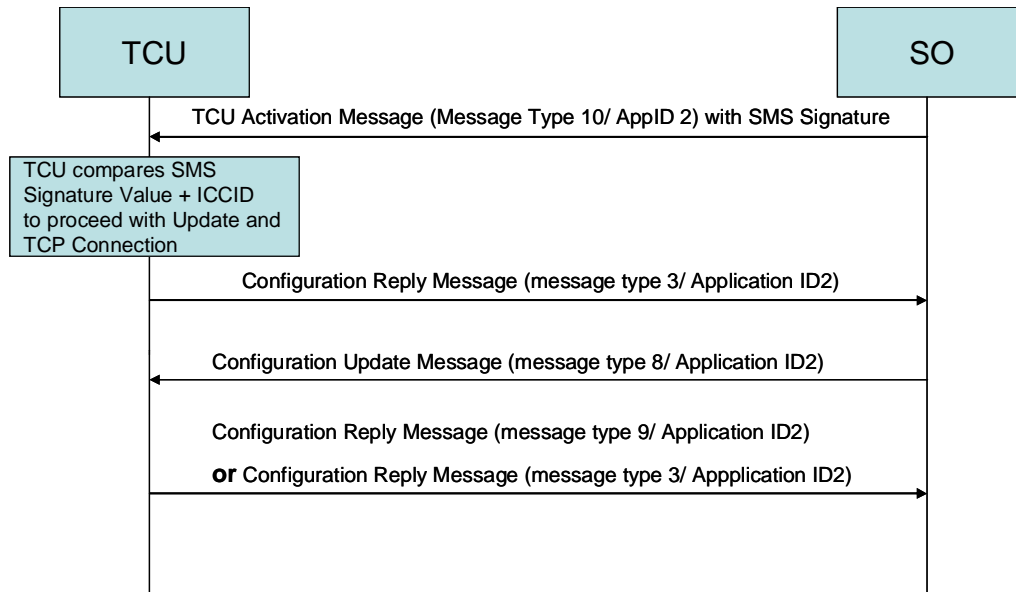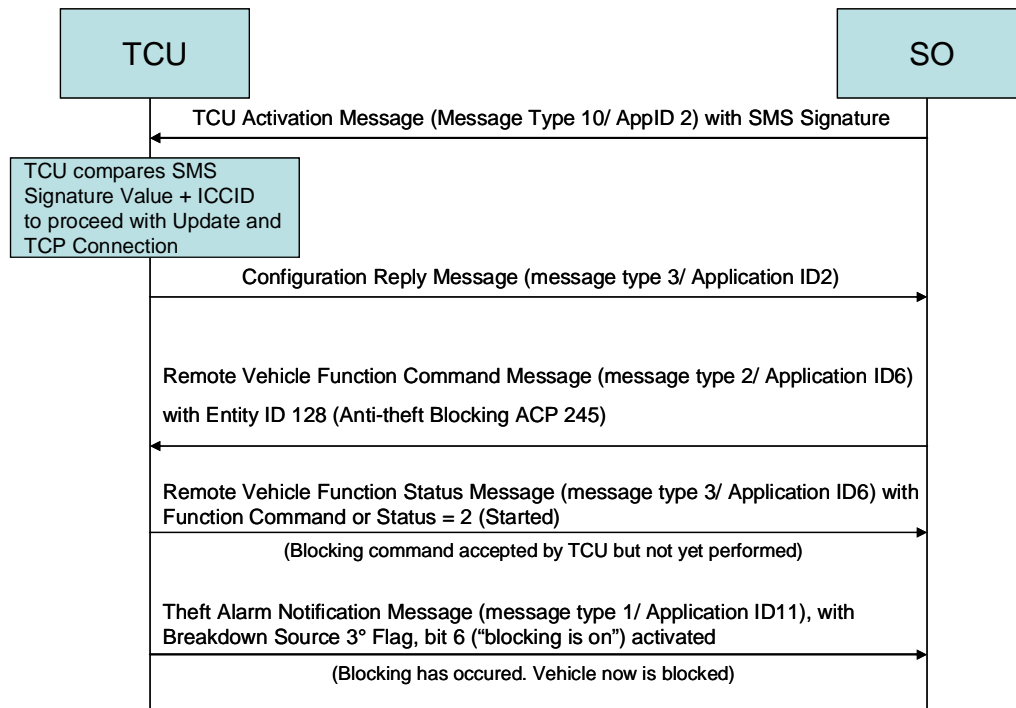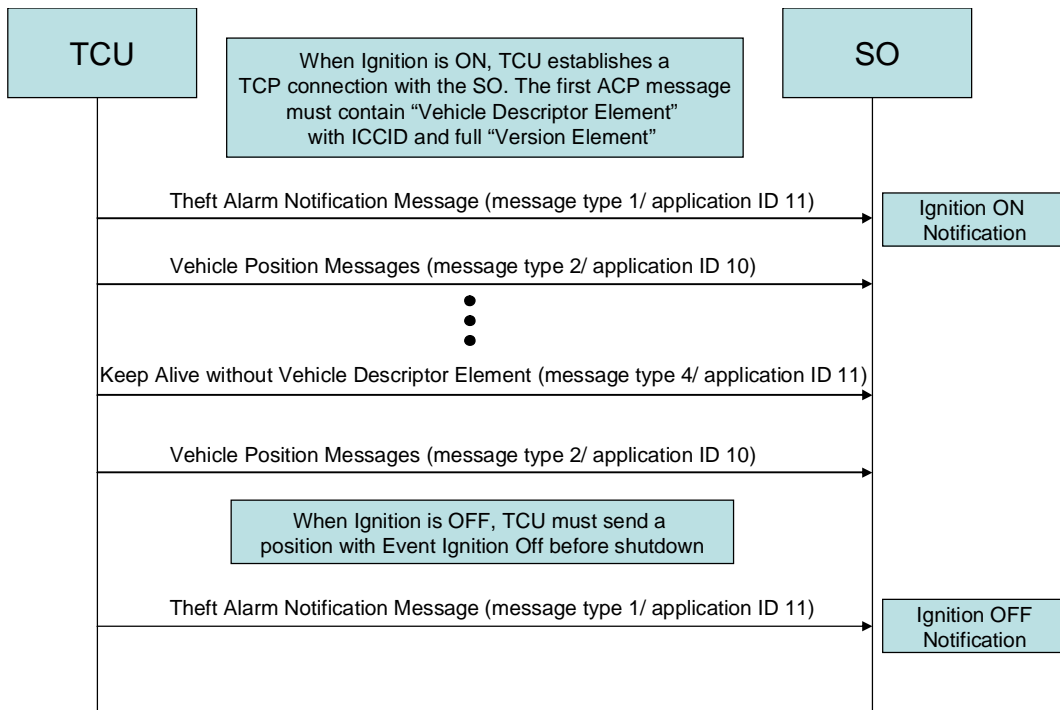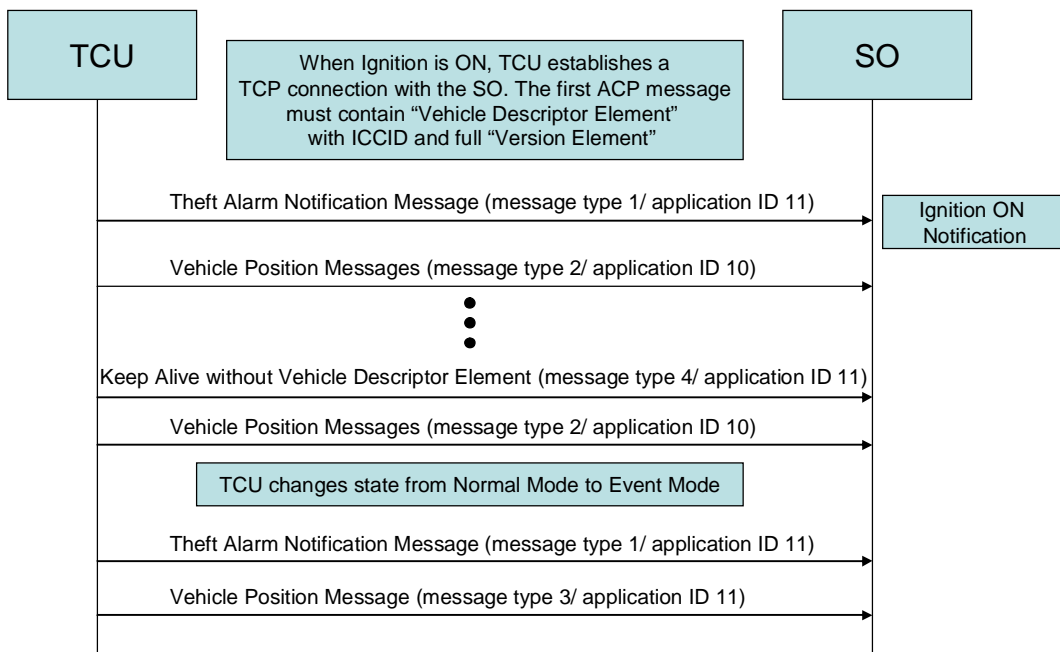
14.13.6 Ignition On / TCU Tracking Normal Mode / Event Mode

```
┌─────┐                                              ┌─────┐
│ TCU │   ┌──────────────────────────────────────┐  │ SO  │
└──┬──┘   │   When Ignition is ON, TCU establishes a│  └──┬──┘
   │      │ TCP connection with the SO. The first ACP message│  │
   │      │   must contain "Vehicle Descriptor Element"│  │
   │      │    with ICCID and full "Version Element"│  │
   │      └──────────────────────────────────────┘  │
   │  Theft Alarm Notification Message (message type 1/ application ID 11)  │──►  Ignition ON
   │                                                 │     Notification
   │  Vehicle Position Messages (message type 2/ application ID 10)  │──►
   │                          ●                      │
   │                          ●                      │
   │                          ●                      │
   │  Keep Alive without Vehicle Descriptor Element (message type 4/ application ID 11)  │──►
   │  Vehicle Position Messages (message type 2/ application ID 10)  │──►
   │      ┌──────────────────────────────────────┐  │
   │      │ TCU changes state from Normal Mode to Event Mode│  │
   │      └──────────────────────────────────────┘  │
   │  Theft Alarm Notification Message (message type 1/ application ID 11)  │──►
   │  Vehicle Position Message (message type 3/ application ID 11)  │──►
```
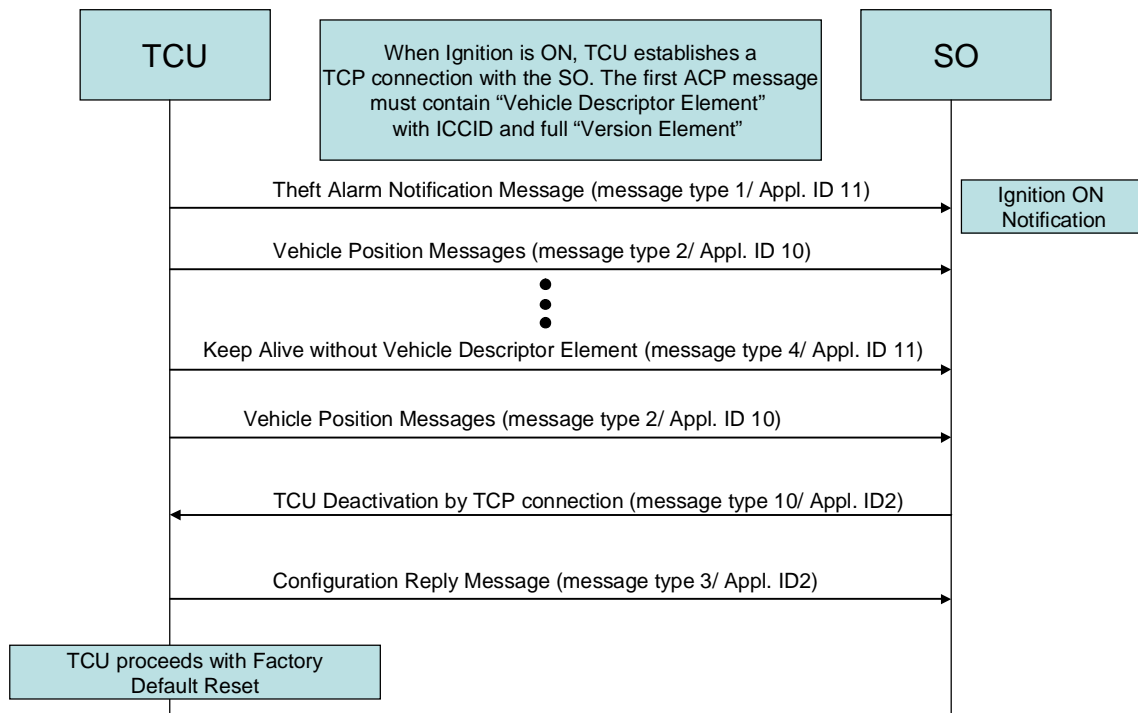
14.13.7 Ignition Start/ TCU Tracking/ Deactivation

14.13.7.1 Deactivation with SIM 245 Generic
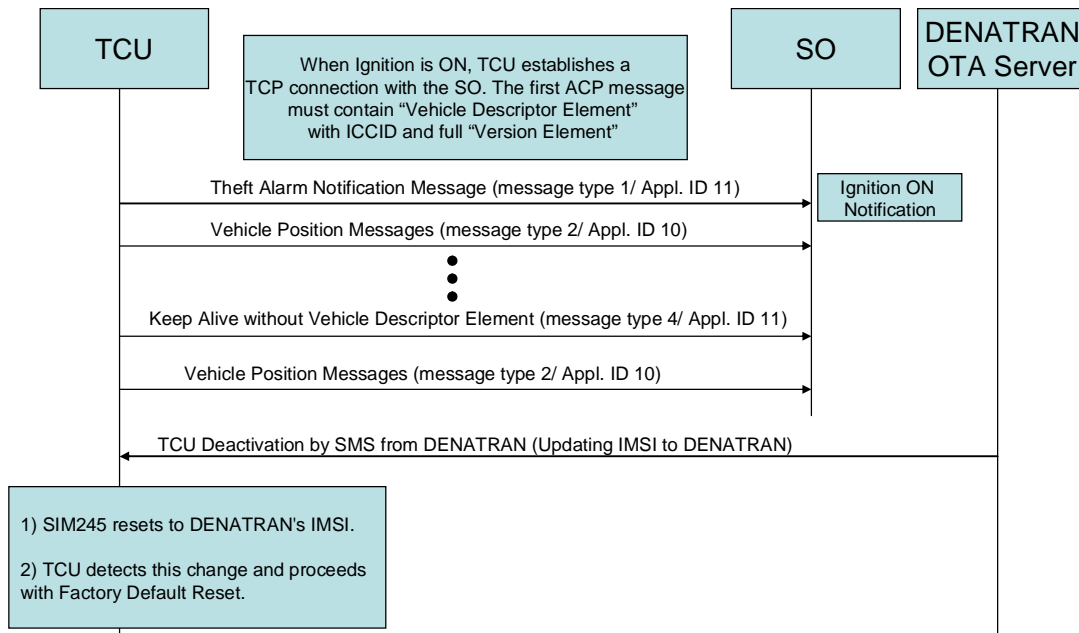
14.13.7.2 Deactivation with SIM 245 Pre Programmed

# 15 **Appendix IV** – TPDU SMS-SUBMIT Format Specification

This appendix provides the basic information on SMS format that TCU need receive to process the TCU Service Activation Message. Basically, the SMS must have in its TP-DCS the field group bits set to 1111, message coding set to 8 bits and message class 1 and in FIRST OCTET the bit field TP-UDHI is set to 0. For in-depth coverage, go directly to item 15.2.3 and the references in item 15.4.

15.1 Introduction

Short Message Service (SMS) is the resource to send and receive short messages to and from mobile terminals. For this application the SMS is used as a transport for binary payloads and the category Point-to-Point, that uses a dedicated link between the network and the MS (mobile station) allowing bidirectional messaging delivered by the SC (Service Center) or SMSC (Short Message Service Center) that is one store-and-forward switching center. Further details on these and other acronyms check the document 3GPP TR 21.905 - Vocabulary for 3GPP Specifications [1]

The reference points of figure support the short message transfer in the following way:

a) message transfer on reference point 1 is described in clause 5 in 3GPP TS 23.040 [15.4.5];

b) the operations performed on reference points 2 and 4 are described in 3GPP TS 29.002 [15.4.3];

c) Message transfer on reference point 3 is described in subclause 4.2 in 3GPP TS 23.040 [15.4.5];

d) Message transfer on reference point 5 is supported by the protocolo described in 3GPP TS 24.011 [15.4.2]
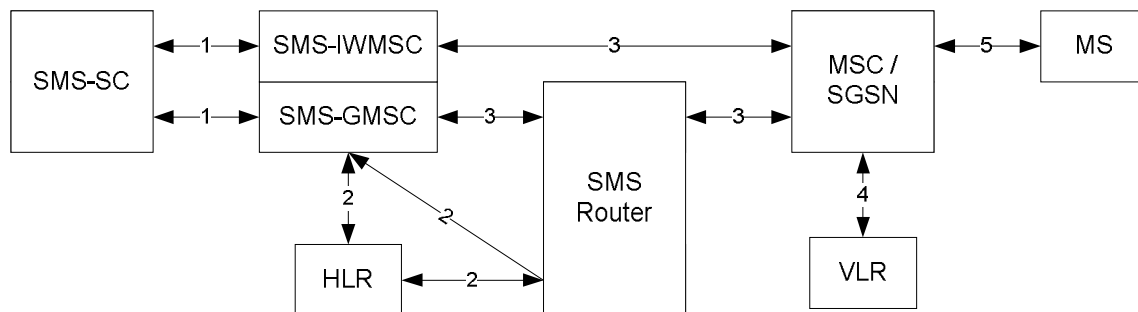
This category that have the following message types:

- **SMS-DELIVER:** sending a short message from SC to the MS.

- **SMS-DELIVER-REPORT:** replying with an error cause.

- **SMS-SUBMIT:** sending a short message from the MS to the SC.

- **SMS-SUBMIT-REPORT:** reply with an error cause.

- **SMS-STATUS-REPORT:** sending a status report from the SC to the MS.

- **SMS-COMMAND:** sending a command from the MS to the SC.

TIV	SMS-GMSC	HLR	SMS Router	MSC or SGSN	VLR	TCU

1a. Message Transfer

2a. SendRoutingInfo ForShortMsg

2a. SendRoutingInfo ForShortMsg

2. SendRoutingInfo ForShortMsg

2b. SendRoutingInfo ForShortMsg

4a. ForwardShortMsg (e.g. via SGSN)

4a. ForwardShortMsg (e.g. via SGSN)

5. SendInfoFor MT-SMS

4c. Failure Report

4c. Failure Report

4a. ForwardShortMsg (e.g. via MSC)

4a. ForwardShortMsg (e.g. via MSC)

5. SendInfoFor MT-SMS

6. Message Transfer

4b. Delivery Report

4b. Delivery Report

3. SM-Delivery ReportStatus

1b. Delivery Report

Legend:

→ Operation invocation or message transfer

←→ Successful operation invocation or message transfer including report
Error Report

- - - → Operation invocation or message transfer

← - - → Unsuccessful operation invocation or message transfer including report

This appendix has the focus to specify just the elementar PDU format in which the message transfer should be received by TCU, so the main fields of SMS-DELIVER that transports the TCU Service Activation Message.

15.1.1 **SMS-DELIVER**

The message received by the TCU is called SMS-DELIVER, in the TPDU format defined in 3GPP TS 23.040 [15.4.4] and its main fields is as follows:

Abbr.	Reference	P1)	R2)	Description
TP-MTI	TP-Message-Type-Indicator	M	2b	Parameter describing the message type.
TP-MMS	TP-More-Messages-to-Send	M	b	Parameter indicating whether or not there are more messages to send
TP-LP	TP-Loop-Prevention	O	b	Parameter indicating that SMS applications should inhibit forwarding or automatic message generation that could cause infinite looping.
TP-RP	TP-Reply-Path	M	b	Parameter indicating that Reply Path exists.
TP-UDHI	**TP-User-Data-Header-Indicator**	**O**	**b**	**Parameter indicating that the TP-UD field contains a Header**
TP-SRI	TP-Status-Report-Indication	O	b	Parameter indicating if the SME has requested a status report.
TP-OA	TP-Originating-Address	M	2-12o	Address of the originating SME.
TP-PID	TP-Protocol-Identifier	M	o	Parameter identifying the above layer protocol, if any.
TP-DCS	**TP-Data-Coding-Scheme**	**M**	**o**	**Parameter identifying the coding scheme within the TP-User-Data.**
TP-SCTS	TP-Service-Centre-Time-Stamp	M	7o	Parameter identifying time when the SC received the message.
TP-UDL	TP-User-Data-Length	M	I	Parameter indicating the length of the TP-User-Data field to follow.
TP-UD	TP-User-Data	O	3)	Data of AppId2/ Message Type 10

15.1.1.1) Provision: Mandatory (M) or Optional (O).

15.1.1.2) Representation: Integer (I), bit (b), 2 bits (2b), Octet (o), 7 octets (7o), 2-12 octets (2-12o).

15.1.1.3) Dependent on the TP-DCS.

15.2 Default Values of Elementary Fields

15.2.1 **TP-DCS: Data Code Scheme**

The TPDU-DCS Octet defines the SMS data format and message class, the value **0xF5** must me used, different value could compromise the TCU Activation Process, this value means:

Bit No.	Bit Value	Data Value	Field Description	Data Description
7	1			
6	1	0x0F	Coding Group	Data
5	1			
4	1			
3	0	0x01	Message Coding	8-bit data
2	1			
1	0	0x01	Message Class	ME-specific
0	1			

15.2.2 **FIRST OCTET:**

The first octet of TPDU is one sub-field that indicate type of TPDU and depending on the type of message are the bit fields that it has. For the SMS-DELIVER for transport one TCU Service Activation, of configurable fields in the submit, its important that the TP-UDHI is set to 0.

Field	Bit								Field	Reference	Description
	7	6	5	4	3	2	1	0			
1								0	TP-MTI	TP-Message-Type-Indicator	Message type indicator. Bits no 1 and 0 are both set to 0 to indicate that this PDU is an SMS-DELIVER
							0				
2						1			TP-MMS	TP-More-Messages-to-Send	Parameter indicating whether or not there are more messages to send
3					0				TP-LP	TP-Loop-Prevention	Parameter indicating that SMS applications should inhibit forwarding or automatic message generation that could cause infinite looping.
4				0						(unused)	(unused)
5			0						TP-RP	TP-Reply-Path	Parameter indicating that Reply Path exists.
6		0							**TP-UDHI**	**TP-User-Data-Header-Indicator**	**Parameter indicating that the TP-UD field contains a Header. This value must be set to 0**
7	0								TP-SRI	TP-Status-Report-Indication	Status report indication. This bit is set to 1 if a status report is going to be returned to the SME

15.3 Examples

SMS-DELIVER with TCU Service Activation Message
TPDU – Raw Message (Hexadecimal Format)
07915588160707070405882122F600F5010101807424883A020A213A0F4674696D2E62724374696D4374696D0DBD4F 22F015B3BD4F22F115BE00401680308A123456789012345678900 8F0D45E10C05E1055

Octet	7	6	5	4	3	2	1	0	Value	Field	Details
				Bit Field							
1	0	0	0	0	0	1	1	1	0x07	Length of SMSC	Length of Short Message Service Center Address. In this case is "7", one field for Type and 6 for Address.
2	1	0	0	1	0	0	0	1	0x91	SMSC ADDRESS TYPE	**AS0** — Reserved. **TON** — Type of Number, in this cases is "International" **NPI** — Numbering Plan Identification. In this case is "ISDN/telephone numbering plan (E.164/E.163)"
3	0	1	0	1	0	1	0	1	0x55	SMSC Address	SMSC Addres from this message. In this case the number is "558861707070"
4	1	0	0	0	1	0	0	0	0x88		
5	0	0	0	1	0	1	1	0	0x16		
6	0	0	0	0	0	1	1	1	0x07		
7	0	0	0	0	0	1	1	1	0x07		
8	0	0	0	0	0	1	1	1	0x07		
9	0	0	0	0	0	1	0	0	0x04	FIRST OCTET	**TP-MTI** — Message type indicator. Bits no 1 and 0 are both set to 0 to indicate that this PDU is an SMS-DELIVER. **TP-MMS** — Parameter indicating whether or not there are more messages to send **TP-LP** — Parameter indicating that SMS applications should inhibit forwarding or automatic message generation that could cause infinite looping. (unused) **TP-RP** — Parameter indicating that Reply Path exists. In this case is "False" **TP-UDHI** — **Parameter indicating that the TP-UD field contains a Header. This value must be set to 0** **TP-SRI** — Status report indication. Parameter indicating if the SME has requested a status report. In this case is "False".
10	0	0	0	0	0	1	0	1	0x05	TP-OA-Length	TP-Originating-Address. Address of the originating SME.
11	1	0	0	0	1	0	0	0	0x88	TP-OA ADDRESS TYPE	**AS0** — Reserved. **TON** — Type of Number, in this cases is "Unknown" **NPI** — Numbering Plan Identification. In this case is ISDN/telephone numbering plan (E.164/E.163)

Octet	7	6	5	4	3	2	1	0	Hex	Field		Description
12	0	0	1	0	0	0	0	1	0x21	TP-0A		TP Originating Address. This value is "12226".
13	0	0	1	0	0	0	1	0	0x22			
14	1	1	1	1	0	1	1	0	0xF6			
15	0	0	0	0	0	0	0	0	0x00	TP-PID		Protocol Identifier.

The TP-Data-Coding-Scheme field, defined in **3GPP TS 23.040 [15.4.4]** and **3GPP TS 23.038 [15.4.5]**. Indicates the data coding scheme of the TP-UD (User Data) field. For all TCU receive the ACP 245 Message with TCU Service Activation without problems with data format, this value must be 0xF5.

Octet	7	6	5	4	3	2	1	0	Hex	Field	Sub-field	Description
16	1	1	1	1					0xF5	TP-DCS	**Group Bits**	This value should be set to 0x0F (1111)
					0						**Reserved**	Bit 3 is reserved, set to 0.
						1					**Message Coding**	Define the TP-UD (User Data) coding message. Should be set to 1 that means 8-bit data.
							0	1			**Message Class**	Message Class. Should be set to 1, that means "ME-Specific", in this case the message inbox of modem from the TCU.

Octet	7	6	5	4	3	2	1	0	Hex	Field	Sub-field	Description
17	0	0	0	0	0	0	0	1	0x01	TP-SCTS	Year	
18	0	0	0	0	0	0	0	1	0x01		Month	
19	0	0	0	0	0	0	0	1	0x01		Day	TP Service Centre Time Stamp
20	1	0	0	0	0	0	0	0	0x80		Hour	
21	0	1	1	1	0	1	0	0	0x74		Minute	Parameter identifying time when the SC received the message. In this case the timestamp is 10/10/2010 07:42:47 timezone -2
22	0	0	1	0	0	1	0	0	0x24		Second	
23	1	0	0	0	1	0	0	0	0x88		Timezone	
24	0	0	1	1	1	0	1	0	0x3A	TP-UDL		User Data Length. In this case the ACP 245 Message this example use 58 octets.
25									0x02	TP-UD		
26									0x0A			
27									0x21			
28									0x3A			
29									0x0F			User Data. Message example from item 13.4.5.1
30									0x46			
31									0x74			
32									0x69			
33									0x6D			
34									0x2E			
35									0x62			
36									0x72			
37									0x43			
38									0x74			
39									0x69			
40									0x6D			
41									0x43			
42									0x74			
43									0x69			

44		0x6D	
45		0x0D	
46		0xBD	
47		0x4F	
48		0x22	
49		0xF0	
50		0x15	
51		0xB3	
52		0xBD	
53		0x4F	
54		0x22	
55		0xF1	
56		0x15	
57		0xBE	
58		0x00	
59		0x40	
60		0x16	
61		0x80	
62		0x30	
63		0x8A	
64		0x12	
65		0x34	
66		0x56	
67		0x78	
68		0x90	
69		0x12	
70		0x34	
71		0x56	
72		0x78	
73		0x90	
74		0x08	
75		0xF0	
76		0xD4	
77		0x5E	
78		0x10	
79		0xC0	
80		0x5E	
81		0x10	
82		0x55	

15.4 References

[15.4.1] 3GPP TR 21.905 - Vocabulary for 3GPP Specifications V8.4.0 (2008-03)
[15.4.2] 3GPP TS 24.011 - Point-to-Point (PP) Short Message Service (SMS) V3.6.0 (2001-03)
[15.4.3] 3GPP TS 29.002 - Mobile Application Part (MAP) specification V8.1.0 (2007-03)
[15.4.4] 3GPP TS 23.040 - Technical realization of the Short Message Service V6.8.1 (2006-10)
[15.4.5] 3GPP TS 23.038 - Alphabets and language-specific information V6.1.0 (2004-09)

And most importantly, see the manual of your SMS interface.