

Lot 3 - Développements

MNGT to FAC-CM Interface

Version 7

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Generic Information

- For all the packets defined herein,
 - Byte-order is Big Endian
 - Packet exchange is done through a UDP socket
 - Unless stated otherwise there is padding for variable-size fields to make entire packet's size multiples of DWORD
 - Reserved fields should be zeroed
 - Given values are hexadecimal for Event Type and Sub-types

Socket Interface

- MGMT listens to the port number 1402 (by default) for incoming UDP data
- This port number may be altered through the configuration file of MGMT (see SCOREF-MGMT_Configuration.pdf)
- FAC shall bind() to a certain port throughout the data exchange, i.e. all the packets should be sent from the same port number

Message Header

- Bit 0: *vendor specific or extended message* flag (E)
 - Used to indicate that a custom message format is used
 - For vendor specific extension capabilities
- Bit 1: Validity flag (used to indicate of non-existent data)
- Version information (4 bits)
- Priority (Optional, 3 bits)
- Event Type (8 bits)
- Event Subtype (8 bits)

0								1								2								3							
0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
E	V	R	R	Version				Priority			R	R	R	R	R	Event Type								Event Subtype							

Message type & subtype

Event Type (ET)	Event Sub-type (EST)	Direction	Encoding	Description
ANY			0	Unspecified
	UNSPECIFIED	Unspecified	0	Unspecified
LOCATION UPDATE			1	Location Event
	LOCATION_UPDATE	FAC-CM→MGMT	10	Update EGO Location Position Vector
CONFIGURATION			3	Configuration Event
	CONFIGURATION_UPDATE_AVAILABLE	FAC-CM←MGMT	0	Indication: New configuration available
	CONFIGURATION_REQ	FAC-CM→MGMT	11	Configuration Request
	CONFIGURATION_RES_CONT	FAC-CM←MGMT	12	Configuration Request Continuous mode
	CONFIGURATION_RES_BULK	FAC-CM←MGMT	13	Configuration Request Bulk mode
	CONFIGURATION_NOTIFICATION	FAC-CM→MGMT	14	Configuration Notification
COMMUNICATION PROFILE			3	Communication Profile Event
	COMM_PROF_REQ	FAC-CM→MGMT	15	Communication Profile Table Request
	COMM_PROF_REP	FAC-CM←MGMT	16	Communication Profile Table Response
	COMM_PROF_SELECTION_REQ	FAC-CM→MGMT	17	Communication Profile Selection Request
	COMM_PROF_SELECTION_RES	FAC-CM←MGMT	18	Communication Profile Selection Response

Location Update

Location Update

- Location Update is sent from FACilities to MGMT
- Carries position vector
- All position vector fields are described in **102 636-4-1**
 - $\text{Timestamp (ms)} = \text{Timestamp(UT)} \bmod 2^{32}$

0								1								2								3											
0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7				
E	V	R	R	Version				Priority		R	R	R	R	R	Event Type								Event Subtype												
Timestamp																																			
Latitude																																			
Longitude																																			
Speed																Heading																			
Altitude																TAcc				PodAcc				SAcc				Hacc				AltAcc			

Configuration

Configuration Available Event

- Is used to notify clients of MGMT of
 - available configurations
 - configuration changes
- Key count indicates the number of configuration keys available/changed relevant to the recipient

0								1								2								3							
0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
E	V	R	R	Version				Priority		R	R	R	R	R	Event Type								Event Subtype								
Reserved																Key count															

Configuration Request

- Is used to request MGMT to initiate transmission of the configuration
 - Request single key: continuous transmission mode and conf-id
 - Request all configuration groups: **0xFFFF** as conf-id
 - Request NET layer configuration group: **0xAAAA** as conf-id
 - Request FAC layer configuration group: **0xBBBB** as conf-id
- Transmission mode flag:
 - 0 for continuous transmission mode (default): each key is wrapped in its own message
 - 1 for bulk mode: all-in-1 data blob (a single big message containing all keys)

0								1								2								3							
0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
E	V	R	R	Version				Priority		R	R	R	R	R	Event Type								Event Subtype								
Conf ID																Trasmission Mode															

Configuration Response Continuous

- Is used to declare configuration parameters
- ConfID is mapped to name of configuration parameter
- Encoding of ConfValue determined by Conf-ID
- Size of ConfValue is indicated in Length
 - Field: Length (bytes 6+7) -> is mandatory. Length indicates DWORD-length of „Conf Value“, e.g. Length=2 means ConfValue is actually 8 bytes long

0								1								2								3							
0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
E	V	R	R	Version				Priority		R	R	R	R	R	Event Type								Event Subtype								
Conf ID																Length															
Conf Value (of size 'Length')																															

Configuration Response Bulk

- Bulk transfer message incorporates „Key Count“ indicating the number of configuration items

0								1								2								3							
0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
E	V	R	R	Version				Priority		R	R	R	R	R	R	Event Type								Event Subtype							
reserved																Key count															
Conf ID																Length (optional)															
Conf Value																															
Conf ID																Length (optional)															
Conf Value																															
... (continues up to „key count“)																															

Configuration Notification

- Configuration Notification is used to keep MGMT up to date in case of a configuration change
- There is no continuous version of this message, a single message is going to be sent for every change
- 'Length' field denotes number of bytes (not *DWORDS* as in Configuration Response Continuous message)
- String values are not NULL-terminated, 'Length' field should help to parse it properly

Configuration Notification

- Data type of the payload will be extracted from ITS key ID, so Configuration Notification packets carrying unknown/unrecognized ITS key IDs will be discarded

0								1								2								3							
0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
E	V	R	R	Version				Priority		R	R	R	R	R	Event Type								Event Subtype								
Conf ID																Length															
Conf Value (of size 'Length')																															

FAC Group Configuration Keys

ITS KEY NAME	CONF ID	DESCRIPTION / VALUES
itsStationType	0	See PREDRIVE VehicleType list for info (default: 1=CAR, or 30=RSU)
itsStationSubType	1	0=public, 1=private
itsVehicleWidth	2	scale 0,1m, max 63
itsVehicleLength	3	scale 0,1m, max 1023
CAM BTP Port	3010	Unsigned integer 0 - 65535
DENM BTP Port	3011	Unsigned integer 0 - 65535
LDM Garbage Collection Interval	3020	Unsigned integer [ms]

Communication Profile

Communication Profile Request

- This packet allows sender to ask either all or a subset of the communication profile table by setting all filter fields to 0xff, or by setting relevant bitmap fields to 1, respectively
- See next page for the indexes of Transport, Network, Access, and Channel bitmap fields

0								1								2								3							
0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
E	V	R	R	Version				Priority		R	R	R	R	R	Event Type								Event Subtype								
Transport								Network								Access								Channel							
Sequence Number								Reserved																							

Communication Profile Indexes

- Indexes of profiles are given below for Transport, Network, Access, and Channel fields, respectively
- These index numbers are common for Communication Profile Request and Communication Profile Response packets

	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
Transport	BTP_A	BTP_B	TCP	UDP	RTP	STCP	<i>Reserved</i>	<i>Reserved</i>
Network	GN	IPv6_GN	IPv6	IPv4	IPv4/v6	DSMIPv4/v6	<i>Reserved</i>	<i>Reserved</i>
Access	ITSG5	3G	11n	Ethernet	<i>Reserved</i>	<i>Reserved</i>	<i>Reserved</i>	<i>Reserved</i>
Channel	CCH	SCH1	SCH2	SCH3	SCH4	<i>Reserved</i>	<i>Reserved</i>	<i>Reserved</i>

Communication Profile Response

- This packet contains those communication profiles asked through sending a Communication Profile Request
- Sequence number here is merely the value parsed from the corresponding Communication Profile Request, MGMT does not verify this value as it does not have a windowing mechanism

0								1								2								3							
0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
E	V	R	R	Version				Priority		R	R	R	R	R	Event Type								Event Subtype								
CP Count																Sequence Number								Reserved							
Communication Profile ID																															
Transport								Network								Access								Channel							
... (continues up to „CP Count“)																															

Communication Profile Selection Request

- This packet allows MGMT client to ask for a suitable communication profile according to its requirements expressed in,
- Latency
- Relevance
- Reliability

0								1								2								3							
0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
E	V	R	R	Version				Priority		R	R	R	R	R	Event Type								Event Subtype								
Latency								Relevance								Reliability								Sequence Number							

Communication Profile Selection Response

- The response allows MGMT to offer a communication profile based on the criteria given by client
- Request parameters *latency*, *relevance*, and *reliability* are the same with those received
- Sequence number here is merely the value parsed from the corresponding Communication Profile Selection Request, MGMT does not verify this value as it does not have a windowing mechanism

0								1								2								3							
0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
E	V	R	R	Version				Priority		R	R	R	R	R	Event Type						Event Subtype										
Latency								Relevance								Reliability								Sequence Number							
Communication Profile ID																															