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1 Introduction and functional overview

This specification specifies the functionality, API and the configuration of the AUTOSAR Basic Software module J1939 Request Manager.

1.1 Request Management according to SAE J1939

J1939 defines a special parameter group (PG) called Request (RQST, PGN = 0x0EA00), which may be used to request transmission of any other parameter group. The Request parameter group just contains the PGN of the requested parameter group.
Depending on the destination address used by the Request PG, the response must be sent directly to the requesting ECU, or to all ECU. For short parameter groups with PDU1 format, the destination address is set accordingly[1], for large parameter groups the suitable transport protocol mode (BAM or CMDT, see [9] and [18]) is used.
Depending on the requested parameter group and the destination address of the Request PG, ECUs answer either with the requested parameter group, with the special Acknowledgement parameter group (ACKM, PGN = 0x0E800), or not at all.
Finally, J1939 defines that the response to a Request will be expected within 1.25s after the Request was sent. The responding node is required to answer within 200ms.

1.2 J1939 Request Manager BSW Module

The J1939 Request Manager (J1939Rm) handles received and transmitted Request and Acknowledgement PGs. It natively supports handling of incoming requests for address claim and is configurable to support incoming requests for diagnostic and other J1939 PGNs. Unknown incoming requests are answered with a negative Acknowledgement PG if they address a specific destination address.
The J1939Rm also supports transmission of RQST and timeout supervision for the resulting PG or ACKM.

1.3 J1939 Terminology

The terminology of J1939 differs noticeably from the usual AUTOSAR terminology. For consistency reasons, this introduction used the terms of the J1939 specification, while the remainder of this specification will use terms that are more common within AUTOSAR:

- ‘I-PDU’ replaces ‘parameter group’

[1] Short parameter groups with PDU2 format have no destination address, they are broadcast PGs by nature.

2 Acronyms and abbreviations

Abbreviation / Acronym:	*Description:*
AC	J1939 AddressClaimed PG (PGN = 0x0EE00)
ACK	J1939 Acknowledgement PG (ACKM) with control byte set to 0
ACKM	J1939 Acknowledgement PG (PGN = 0x0E800)
BSW	Basic Software (module)
CA	Controller Application, role of an ECU tied to one address
DET	Development Error Tracer
DP	Data Page, the most significant bit (MSB) of the 18 bit PGN
EDP	Extended Data Page, the second bit (after MSB) of the 18 bit PGN
NACK	J1939 Acknowledgement PG (ACKM) with control byte set to 1
PDUF	PDU Format, the middle byte of the 18 bit PGN
PDUS	PDU Specific, the lower byte of the 18 bit PGN
PG	Parameter Group
PGN	Parameter Group Number (18 bits, contains EDP, DP, PDUF, PDUS)
RQST	J1939 Request PG (PGN = 0x0EA00)
RQST2	J1939 Request2 PG (PGN = 0x0C900)
RTE	AUTOSAR Runtime Environment
SW-C	AUTOSAR Software Component (of the Application)
XFER	J1939 Transfer PG (PGN = 0x0CA00)

3 Related documentation

3.1 Input documents

[1] List of Basic Software Modules
AUTOSAR_TR_BSWModuleList.pdf

[2] Layered Software Architecture
AUTOSAR_EXP_LayeredSoftwareArchitecture.pdf

[3] General Requirements on Basic Software Modules
AUTOSAR_SRS_BSWGeneral.pdf

[4] General Specification of Basic Software Modules
AUTOSAR_SWS_BSWGeneral.pdf

[5] Requirements on BSW Modules for SAE J1939
AUTOSAR_SRS_J1939.pdf

[6] Specification of Communication Stack Types
AUTOSAR_SWS_CommunicationStackTypes.pdf

[7] System Template
AUTOSAR_TPS_SystemTemplate.pdf

[8] Specification of CAN Interface
AUTOSAR_SWS_CANInterface.pdf

[9] Specification of a Transport Layer for SAE J1939
AUTOSAR_SWS_SAEJ1939TransportLayer.pdf

[10] Specification of PDU Router
AUTOSAR_SWS_PDURouter.pdf

[11] Specification of Communication
AUTOSAR_SWS_COM.pdf

[12] Specification of Network Management for SAE J1939
AUTOSAR_SWS_SAEJ1939NetworkManagement.pdf

[13] Specification of a Diagnostic Communication Manager for SAE J1939
AUTOSAR_SWS_SAEJ1939DiagnosticCommunicationManager.pdf

[14] Specification of Development Error Tracer
AUTOSAR_SWS_DevelopmentErrorTracer.pdf

[15] Specification of BSW Scheduler
AUTOSAR_SWS_BSWScheduler.pdf

[16] Specification of ECU Configuration
AUTOSAR_TPS_ECUConfiguration.pdf

[17] Specification of Memory Mapping
AUTOSAR_SWS_MemoryMapping.pdf

3.2 Related standards and norms

[18] J1939-21 DEC2010, Data Link Layer

3.3 Related specification

AUTOSAR provides a General Specification on Basic Software modules [4] (SWS BSW General), which is also valid for the SAE J1939 Request Manager.

Thus, the specification SWS BSW General shall be considered as additional and required specification for SAE J1939 Transport Layer.

4 Constraints and assumptions

4.1 Limitations

The J1939 Request Manager only implements Request and Acknowledgement PGs. It does not provide support for the Request2 and Transfer PGs.

4.2 Applicability to car domains

J1939 is developed by the SAE as a standard for heavy-duty on-highway, farming, and construction vehicles. It is not applicable to passenger cars or light trucks. The J1939 Request Manager will for now only be used in heavy-duty on-highway vehicles, because other domains are currently excluded by AUTOSAR.

5 Dependencies to other modules

The J1939 Request Manager (J1939Rm) has interfaces towards the PDU Router (PduR, upper and lower), the CAN Interface (CanIf), the J1939 Network Management module (J1939Nm), the J1939 Diagnostic Communication Management module (J1939Dcm), the Development Error Tracer (DET), and application software components (SW-Cs) via the AUTOSAR Runtime Environment (RTE). It also supports Complex Drivers (CDD).

The J1939 Request Manager just includes header files of the PDU Router, the CAN Interface, the Development Error Tracer, COM, and the RTE. The other interfaces are provided via generated header files.

5.1 File structure

5.1.1 Code file structure

For details, refer to the section 5.1.6 "Code file structure" of the SWS BSW General [4].

5.1.2 Header file structure

Besides the files defined in section 5.1.7 “Header file structure” of the SWS BSW General [4], the J1939 Request Manager needs to include the files defined below.

[SWS_J1939Rm_00001] ⌈The implementation and callback header files (J1939Rm.h and J1939Rm_Cbk.h) shall include the file J1939Rm_Types.h.⌋ (SRS_BSW_00415)

[SWS_J1939Rm_00032] ⌈The header file J1939Rm_Types.h shall include the file ComStack_Types.h.⌋ (SRS_BSW_00415)

[SWS_J1939Rm_00111] ⌈J1939Rm shall include the header file J1939Nm_Cbk.h if J1939RmUserType is J1939RM_USER_J1939NM for any configured user.⌋ ()

[SWS_J1939Rm_00112] ⌈J1939Rm shall include the header file J1939Dcm_Cbk.h if J1939RmUserType is J1939RM_USER_J1939DCM for any configured user.⌋ ()

[SWS_J1939Rm_00113] ⌈J1939Rm shall include a header file named <apiServicePrefix>_Cbk.h if J1939RmUserType is J1939RM_USER_CDD for any configured user.⌋ ()

Please note: Complex driver (CDD) APIs use the module prefix configured by the apiServicePrefix of the CDD’s module description file.

[SWS_J1939Rm_00110] ⌈J1939Rm shall include the header file Rte_J1939Rm.h if J1939RmUserType is J1939RM_USER_RTE for any configured user.⌋ ()

The following picture shows the include hierarchy of the J1939 Request Manager.

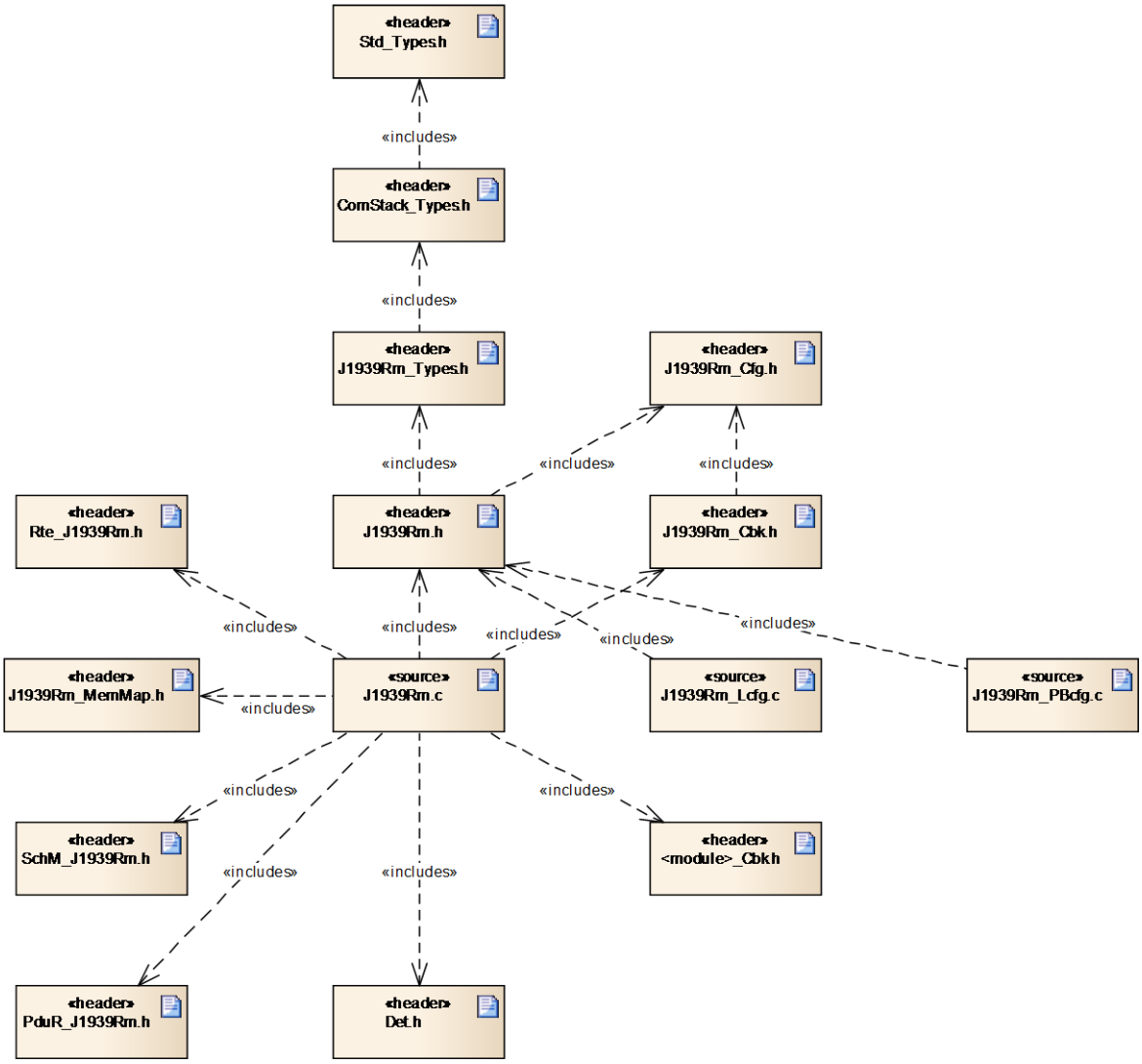

Figure 1: Include hierarchy of J1939Rm

6 Requirements traceability

Requirement	Description	Satisfied by
-	-	SWS_J1939Rm_00005
-	-	SWS_J1939Rm_00006
-	-	SWS_J1939Rm_00010
-	-	SWS_J1939Rm_00011
-	-	SWS_J1939Rm_00014
-	-	SWS_J1939Rm_00015
-	-	SWS_J1939Rm_00031
-	-	SWS_J1939Rm_00033
-	-	SWS_J1939Rm_00034
-	-	SWS_J1939Rm_00035
-	-	SWS_J1939Rm_00036
-	-	SWS_J1939Rm_00040
-	-	SWS_J1939Rm_00041
-	-	SWS_J1939Rm_00042
-	-	SWS_J1939Rm_00043
-	-	SWS_J1939Rm_00044
-	-	SWS_J1939Rm_00045
-	-	SWS_J1939Rm_00046
-	-	SWS_J1939Rm_00047
-	-	SWS_J1939Rm_00048
-	-	SWS_J1939Rm_00049
-	-	SWS_J1939Rm_00050
-	-	SWS_J1939Rm_00051
-	-	SWS_J1939Rm_00052
-	-	SWS_J1939Rm_00053
-	-	SWS_J1939Rm_00057
-	-	SWS_J1939Rm_00058
-	-	SWS_J1939Rm_00059
-	-	SWS_J1939Rm_00060
-	-	SWS_J1939Rm_00061
-	-	SWS_J1939Rm_00062
-	-	SWS_J1939Rm_00067
-	-	SWS_J1939Rm_00068
-	-	SWS_J1939Rm_00069
-	-	SWS_J1939Rm_00070
-	-	SWS_J1939Rm_00071

-	-	SWS_J1939Rm_00072
-	-	SWS_J1939Rm_00074
-	-	SWS_J1939Rm_00075
-	-	SWS_J1939Rm_00076
-	-	SWS_J1939Rm_00077
-	-	SWS_J1939Rm_00078
-	-	SWS_J1939Rm_00079
-	-	SWS_J1939Rm_00080
-	-	SWS_J1939Rm_00081
-	-	SWS_J1939Rm_00082
-	-	SWS_J1939Rm_00083
-	-	SWS_J1939Rm_00084
-	-	SWS_J1939Rm_00085
-	-	SWS_J1939Rm_00086
-	-	SWS_J1939Rm_00087
-	-	SWS_J1939Rm_00096
-	-	SWS_J1939Rm_00109
-	-	SWS_J1939Rm_00110
-	-	SWS_J1939Rm_00111
-	-	SWS_J1939Rm_00112
-	-	SWS_J1939Rm_00113
SRS_BSW_00407	Each BSW module shall provide a function to read out the version information of a dedicated module implementation	SWS_J1939Rm_00039
SRS_BSW_00415	Interfaces which are provided exclusively for one module shall be separated into a dedicated header file	SWS_J1939Rm_00001, SWS_J1939Rm_00032
SRS_J1939_00012	The J1939 Request Manager shall provide an interface for module initialization	SWS_J1939Rm_00012, SWS_J1939Rm_00037, SWS_J1939Rm_00073
SRS_J1939_00013	The J1939 Request Manager shall provide an interface for module shutdown	SWS_J1939Rm_00013, SWS_J1939Rm_00038
SRS_J1939_00014	The J1939 Request Manager shall forward incoming requests to configured destinations	SWS_J1939Rm_00002, SWS_J1939Rm_00003, SWS_J1939Rm_00004, SWS_J1939Rm_00007, SWS_J1939Rm_00008, SWS_J1939Rm_00063, SWS_J1939Rm_00100, SWS_J1939Rm_00107
SRS_J1939_00015	The J1939 Request Manager shall forward incoming acknowledgements to configured destinations	SWS_J1939Rm_00026, SWS_J1939Rm_00027, SWS_J1939Rm_00028, SWS_J1939Rm_00064, SWS_J1939Rm_00066, SWS_J1939Rm_00101, SWS_J1939Rm_00106
SRS_J1939_00016	The J1939 Request Manager shall provide an interface for	SWS_J1939Rm_00016, SWS_J1939Rm_00021, SWS_J1939Rm_00022, SWS_J1939Rm_00023,

	transmission of request messages	SWS_J1939Rm_00025, SWS_J1939Rm_00054, SWS_J1939Rm_00097, SWS_J1939Rm_00104
SRS_J1939_00017	The J1939 Request Manager shall provide an interface for transmission of acknowledgement messages	SWS_J1939Rm_00008, SWS_J1939Rm_00009, SWS_J1939Rm_00018, SWS_J1939Rm_00019, SWS_J1939Rm_00020, SWS_J1939Rm_00056, SWS_J1939Rm_00098, SWS_J1939Rm_00103
SRS_J1939_00026	The J1939 Request Manager shall support timeout supervision for outgoing requests	SWS_J1939Rm_00017, SWS_J1939Rm_00024, SWS_J1939Rm_00029, SWS_J1939Rm_00030, SWS_J1939Rm_00055, SWS_J1939Rm_00065, SWS_J1939Rm_00099, SWS_J1939Rm_00102, SWS_J1939Rm_00105, SWS_J1939Rm_00108

7 Functional specification

This chapter defines the behavior of the J1939 Request Manager. The API of the module is defined in chapter 8, while the configuration is defined in chapter 10.

7.1 Overview

On one side, the J1939 Request Manager is responsible for routing incoming requests to the correct destination, and to provide an infrastructure for sending responding ACKM PGs.

On the other side, the J1939 Request Manager also provides an infrastructure to send RQST PGs, and to supervise timeout of the response(s), including but not limited to ACKM.

7.2 Module Handling

This section contains description of auxiliary functionality of the J1939 Request Manager.

7.2.1 Initialization

The J1939 Request Manager is initialized via J1939Rm_Init, and de-initialized via J1939Rm_DeInit. Except for J1939Rm_GetVersionInfo and J1939Rm_Init, the API functions of the J1939 Request Manager may only be called after the module has been properly initialized.

[SWS_J1939Rm_00012] ⌈A call to J1939Rm_Init initializes all internal variables and sets the J1939 Request Manager to the initialized state.⌋ (SRS_J1939_00012)

[SWS_J1939Rm_00013] ⌈A call to J1939Rm_DeInit sets the J1939 Request Manager back to the uninitialized state.⌋ (SRS_J1939_00013)

[SWS_J1939Rm_00010] ⌈If DET reporting is enabled via J1939RmDevErrorDetect, the J1939 Request Manager shall call Det_ReportError with the error code J1939RM_E_UNINIT when any API other than J1939Rm_Init or J1939Rm_GetVersionInfo is called in uninitialized state.⌋ ()

[SWS_J1939Rm_00011] ⌈When J1939Rm_Init is called in initialized state, the J1939 Request Manager shall not re-initialize its internal variables. It shall instead call Det_ReportError with the error code J1939RM_E_REINIT if DET reporting is enabled (see J1939RmDevErrorDetect).⌋ ()

7.2.2 Timing Related Functionality

To be able to measure times, the J1939 Request Manager is triggered cyclically via the J1939Rm_MainFunction.

[SWS_J1939Rm_00072] ⌈The J1939 Request Manager shall use the J1939Rm_MainFunction for timing related purposes.⌋ ()

7.3 Communication State Handling

In general, request handling is only active when the ECU is online (see [12] for details). The exceptions to this rule are received and transmitted requests for the AddressClaimed PG, which must be possible in all cases. The J1939 Request Manager provides an API that is used by the BSW Mode Manager (BswM) to notify the J1939 communication state.

[SWS_J1939Rm_00073] ⌈During initialization via J1939Rm_Init, the J1939 Request Manager assumes the offline state for all nodes on all channels.⌋ (SRS_J1939_00012)

[SWS_J1939Rm_00014] ⌈A call to J1939Rm_SetState sets the state of a node's channel to online or offline.⌋ ()

[SWS_J1939Rm_00015] ⌈In the offline state, the J1939 Request Manager only processes requests for the AddressClaimed PG, while timeout supervision and acknowledgement handling are completely disabled.⌋ ()

7.4 Reception of Requests

The J1939 Request Manager receives Request PGs (RQST) via J1939Rm_RxIndication from the CAN Interface. The corresponding I-PDU must have a MetaDataLength of 4 to be able to identify the sender, the destination address, and the priority of the request.

[SWS_J1939Rm_00007] ⌈The J1939 Request Manager shall only accept requests addressed to the whole network (global DA), or to one of the configured addresses of the ECU (see J1939RmNmNodeRef).⌋ (SRS_J1939_00014)

Requests for the AddressClaimed PG (AC, PGN = 0x0EE00) always go to the J1939 Network Management module, and requests for the DMx PGs (DM1 to DM52) to the J1939 Diagnostic Communication Manager. The destination of these and other PGNs is configured via J1939RmUserPGN.

Besides forwarding to the J1939 Network Management module, the J1939 Diagnostic Communication Manager, and CDDs, the J1939 Request Manager can also forward requests to SW-Cs, and trigger COM to send requested PGs.

7.4.1 Request Forwarding

Forwarding to other BSW modules is done via the generic callout function <User>_RequestIndication (see section 8.6.3.1). Forwarding to SW-C uses a dedicated service port function with the same signature as the <User>_RequestIndication.

[SWS_J1939Rm_00002] [When J1939Rm_RxIndication is called by the PDU Router to indicate reception of a request, and the requested PGN is configured via J1939RmUserPGN to trigger either the J1939 Network Management module, the J1939 Diagnostic Communication Manager, or a CDD, the J1939 Request Manager shall call the corresponding <User>_RequestIndication.] (SRS_J1939_00014)

[SWS_J1939Rm_00003] [When J1939Rm_RxIndication is called by the PDU Router to indicate reception of a request, and the requested PGN is configured via J1939RmUserPGN to be forwarded to the RTE, the J1939 Request Manager shall call the corresponding service port function.] (SRS_J1939_00014)

7.4.2 Request Handling via COM

If COM is configured as destination for the request of a certain PGN, the behavior of the J1939 Request Manager depends on the type (PDU1 format or PDU2 format) and size of the PGN (up to 8 bytes or larger).

For short PGs with PGN of type PDU2, the J1939 Request Manager will call Com_TriggerIPDUSend() for the corresponding I-PDU to send the PG directly via the CAN Interface.

[SWS_J1939Rm_00004] [When J1939Rm_RxIndication is called by the PDU Router to indicate reception of a request, and the requested PGN is configured via J1939RmUserPGN to be handled via COM, the J1939 Request Manager shall call Com_TriggerIPDUSend with the PduId of the transmitted COM I-PDU referenced by J1939RmUpperComIPdu.] (SRS_J1939_00014)

For all large PGs and for short PGs of type PDU1, the J1939 Request Manager needs to have control over the destination address of the PG. This is achieved by introducing the J1939 Request Manager in the routing path of the PG, as shown in the sequence diagram in Figure 4. The J1939 Request Manager will trigger the transmission via Com_TriggerIPDUSend, but the corresponding COM-I-PDU is then routed via the PDU Router to the J1939 Request Manager, which in turn transmits the PG with adapted destination address via PDU Router and CAN Interface (for short PGs) or J1939 Transport Layer (for large PGs) using another I-PDU with MetaDataLength >= 2.

[SWS_J1939Rm_00005] [If the requested PGN is configured for handling via COM for a node, the J1939 Request Manager shall store the source address and request type (specific/global) received via the MetaData of received requests in the queue configured via J1939RmUserComIPduRequestQueueSize.] ()

[SWS_J1939Rm_00006] [When J1939Rm_Transmit is called by the PDU Router, the J1939 Request Manager shall set the destination address according to the saved source address and request type, the source address according to the node, and forward the PG to PduR_J1939RmTransmit, using the PduId of the PduR source I-PDU referenced by J1939RmLowerComIPdu.] ()

The priority of these PGs is assumed to be fixed by the configuration of CanIfTxPduCanId in the CAN Interface.

When a large PG is transmitted by the J1939 Request Manager, it must route the calls to J1939Rm_CopyTxData and J1939Rm_TpTxConfirmation.

[SWS_J1939Rm_00051] ⌈When J1939Rm_CopyTxData is called by the PDU Router, the J1939 Request Manager shall forward the call to PduR_J1939RmCopyTxData.⌋ ()

[SWS_J1939Rm_00052] ⌈When J1939Rm_TpTxConfirmation is called by the PDU Router, the J1939 Request Manager shall forward the call to PduR_J1939RmTpTxConfirmation.⌋ ()

In some cases, COM requires also a TxConfirmation for small PGs. To support this use case, the J1939 Request Manager must also be able to forward IF TxConfirmations from the PduR to the PduR.

[SWS_J1939Rm_00050] ⌈When J1939Rm_TxConfirmation is called by the PDU Router for a PDU that is triggered via J1939Rm_Transmit, the J1939 Request Manager shall forward the call to PduR_J1939RmTxConfirmation.⌋ ()

7.4.3 Request of Unknown PGNs

The J1939 Request Manager shall respond to requests for unknown PGNs with a NACK, but only when the request was sent to a specific destination address.

[SWS_J1939Rm_00008] ⌈When J1939Rm_RxIndication is called by the PDU Router to indicate reception of a request, and the requested PGN is not configured, and the destination address is not the broadcast address, the J1939 Request Manager shall call PduR_J1939RmTransmit to send a negative acknowledgement (NACK).⌋ (SRS_J1939_00014, SRS_J1939_00017)

7.5 Transmission of Acknowledgements

For unknown PGNs, the J1939 Request Manager transmits a negative acknowledgement by itself (see section 7.4.3 above). Modules that receive requests from the J1939 Request Manager may use the API J1939Rm_SendAck to transmit the acknowledgement variants defined by the J1939 standard (see section 5.4.4 in [18] and description of the API J1939Rm_SendAck in section 8.3.8).

The Acknowledgement PG is supposed to have a fixed destination address (FF_{16}), configured via CanIfTxPduCanId in the CAN Interface. The MetaDataLength shall be 4 so that the J1939 Request Manager can modify the priority and source address.

[SWS_J1939Rm_00009] ⌈When a BSW module, a CDD, or an SW-C (via service port and RTE) calls J1939Rm_SendAck, the J1939 Request Manager shall call PduR_J1939RmTransmit to send the required acknowledgement.⌋ (SRS_J1939_00017)

There is only one I-PDU available to send Acknowledgement PGs. Still, it must be ensured, that no Acknowledgement PG is lost, even when a new transmission is initiated while this I-PDU is already occupied by another transmission. To achieve this, the J1939 Request Manager needs to queue Acknowledgement PGs.

[SWS_J1939Rm_00018] ⌈Transmission requests for the Acknowledgement PG shall be queued when a previous transmission of this PG is still pending. The size of this queue is determined by J1939RmAckQueueSize.⌋ (SRS_J1939_00017)

[SWS_J1939Rm_00019] ⌈The J1939 Request Manager shall use the J1939Rm_TxConfirmation of the associated I-PDU to trigger transmission of pending Acknowledgement PGs.⌋ (SRS_J1939_00017)

[SWS_J1939Rm_00020] ⌈If the J1939Rm_TxConfirmation is not called within J1939RmTxConfirmationTimeout seconds, the J1939 Request Manager shall flush the Acknowledgement PG queue.⌋ (SRS_J1939_00017)

The acknowledgement type (Control byte) and the Address parameter of the Acknowledgement PG are set according to the arguments of the J1939Rm_SendAck function, as described in section 8.3.8. The destination address is always the global address, as defined in [18].

7.6 Transmission of Requests

As stated in section 7.1, the J1939 Request Manager also supports transmission of requests, reception of responding acknowledgements, and timeout supervision for the responses.

To trigger the transmission of a request, the J1939 Request Manager provides the API J1939Rm_SendRequest.

The I-PDU used for the Request PG must have a MetaDataLength of 4 to be able to set the priority, the source and the destination address freely. The CAN Interface must be configured such that the PDUF and data page bits are fixed, while the remaining bits of the CAN ID are variable.

[SWS_J1939Rm_00016] ⌈When a BSW module, a CDD, or an SW-C (via service port and RTE) calls J1939Rm_SendRequest, the J1939 Request Manager shall call PduR_J1939RmTransmit to send the request.⌋ (SRS_J1939_00016)

There is only one I-PDU available to send Request PGs. Still, it must be ensured that no Request PG is lost, even when a new transmission is initiated while this I-PDU is already occupied by another transmission. To achieve this, the J1939 Request Manager needs to queue Request PGs.

[SWS_J1939Rm_00021] ⌈Transmission requests for the Request PG shall be queued when a previous transmission of this PG is still pending. The size of this queue is determined by J1939RmRequestQueueSize.⌋ (SRS_J1939_00016)

[SWS_J1939Rm_00022] ⌈The J1939 Request Manager shall use the J1939Rm_TxConfirmation of the associated I-PDU to trigger transmission of pending Request PGs.⌋ (SRS_J1939_00016)

[SWS_J1939Rm_00023] ⌈If the J1939Rm_TxConfirmation is not called within J1939RmTxConfirmationTimeout seconds, the J1939 Request Manager shall flush the Request PG queue.⌋ (SRS_J1939_00016)

To be able to do timeout supervision, the J1939 Request Manager needs to remember the initiator, the destination address and the PGN of the request.

[SWS_J1939Rm_00024] ⌈When J1939Rm_SendRequest is called with the parameter checkTimeout set to TRUE and a destination address that is not the broadcast address (0xff), and timeout handling is enabled for the caller via J1939RmUserTimeoutSupervision: The J1939 Request Manager shall store (separately for each node) the calling module's user ID, the PGN, the source address, and the destination address of the request.⌋ (SRS_J1939_00026)

Finally, requests to the global address must also be handled internally as described in section 7.4.

[SWS_J1939Rm_00025] ⌈When a request is sent with the global destination address, it shall also be handled internally as if it was received via J1939Rm_RxIndication.⌋ (SRS_J1939_00016)

7.7 Reception of Acknowledgements

The J1939 Request Manager receives Acknowledgement PGs (ACKM) via J1939Rm_RxIndication from the CAN Interface. The corresponding I-PDU must have a MetaDataLength of 4 to be able to identify the priority and the sender of the request.

[SWS_J1939Rm_00026] ⌈The J1939 Request Manager shall only accept acknowledgements where the AddressAcknowledged is set to one of the configured addresses of the ECU (see J1939RmNmNodeRef).⌋ (SRS_J1939_00015)

The scheduling of received Acknowledgement PGs is configured similarly to the Request PG, see section 7.4.1, but the destinations are restricted to CDD and Application, because the J1939Nm and the J1939Dcm currently do not need to request any information from other ECUs.

[SWS_J1939Rm_00066] ⌈When J1939Rm_RxIndication is called by the PDU Router to indicate reception of an acknowledgement which matches a pending request (acknowledged PGN, source address, acknowledged address), the J1939 Request Manager shall call the <User>_AckIndication or the service port function corresponding to the stored user ID.⌋ (SRS_J1939_00015)

[SWS_J1939Rm_00027] [When J1939Rm_RxIndication is called by the PDU Router to indicate reception of an acknowledgement which does not match a pending request, and the acknowledged PGN is configured via J1939RmUserPGN to trigger a CDD, the J1939 Request Manager shall call the corresponding <User>_AckIndication.] (SRS_J1939_00015)

[SWS_J1939Rm_00028] [When J1939Rm_RxIndication is called by the PDU Router to indicate reception of an acknowledgement which does not match a pending request, and the acknowledged PGN is configured via J1939RmUserPGN to be forwarded to the RTE, the J1939 Request Manager shall call the corresponding service port function.] (SRS_J1939_00015)

7.8 Timeout Supervision

The SAE J1939 specification [18] defines a maximum delay of 200ms for the answer to a request. This delay is not supervised by the J1939 Request Manager. On the other hand, the timeout of 1.25s for the reception of the answer to a request will be supervised by the J1939 Request Manager, if configured accordingly via J1939RmUserTimeoutSupervision. In that case, when the request is transmitted, the timer is started and the request data is stored as described in [SWS_J1939Rm_00024].

[SWS_J1939Rm_00017] [If timeout supervision is enabled for the caller of J1939Rm_SendRequest via J1939RmUserTimeoutSupervision, and the parameter checkTimeout is TRUE, and the destination address is not the broadcast address (0xff): The J1939 Request Manager shall start timeout supervision.] (SRS_J1939_00026)

[SWS_J1939Rm_00029] [When an acknowledgement matching the request is received, when a configured COM RxIPduCallout is triggered which matches the request, or when a CDD or an application SW-C calls J1939Rm_CancelRequestTimeout, the timeout supervision of the request is stopped.] (SRS_J1939_00026)

[SWS_J1939Rm_00030] [If the timeout supervision for a request reaches 1.25s, the J1939 Request Manager shall call the <User>_RequestTimeoutIndication corresponding to the userId parameter of the initial J1939Rm_SendRequest.] (SRS_J1939_00026)

7.9 Error classification

The J1939 Request Manager does not support reporting of production errors. The supported development errors are defined in the following table. Development error values are of type uint8.

[SWS_J1939Rm_00031] [
Table of development errors used by the J1939 Request Manager:

Type or error	*Relevance*	*Related error code*	*Value [hex]*
An API was called while the module was uninitialized	Development	J1939RM_E_UNINIT	0x01
The Init API was called twice	Development	J1939RM_E_REINIT	0x02
An API service was called with a NULL pointer	Development	J1939RM_E_PARAM_POINTER	0x03
An API service was called with a wrong ID	Development	J1939RM_E_INVALID_PDU_SDU_ID	0x04
An API service was called with wrong network handle	Development	J1939RM_E_INVALID_NETWORK_ID	0x05
The API J1939Rm_SetState was called with a wrong state	Development	J1939RM_E_INVALID_STATE	0x06
An API was called with an illegal user ID	Development	J1939RM_E_INVALID_USER	0x07
An API was called with an unknown or illegal PGN	Development	J1939RM_E_INVALID_PGN	0x08
An API was called with an illegal priority	Development	J1939RM_E_INVALID_PRIO	0x09
An API was called with an illegal node address	Development	J1939RM_E_INVALID_ADDRESS	0x0a
An API was called with an illegal Boolean option	Development	J1939RM_E_INVALID_OPTION	0x0b
An API was called with an illegal AckCode	Development	J1939RM_E_INVALID_ACK_CODE	0x0c
An API was called with an illegal node ID	Development	J1939RM_E_INVALID_NODE	0x0d

] ()

7.10 Error detection

The detection of development errors is configurable (see section 10.2, J1939RmDevErrorDetect).

7.11 Error notification

The J1939 Request Manager checks the initialization state when one of its API functions is called, and reports the DET errors J1939RM_E_UNINIT and J1939RM_E_REINIT in this case. See also [SWS_J1939Rm_00010] and [SWS_J1939Rm_00011].

Besides this, the J1939 Request Manager performs parameter checks for all called APIs. It reports the DET error J1939NM_E_PARAM_POINTER when a call provides a NULL pointer, J1939RM_E_INVALID_PDU_SDU_ID when a check of a PDU/SDU ID fails, and J1939RM_E_INVALID_NETWORK_ID when a check of a network handle fails.

[SWS_J1939Rm_00033] ⌈If DET reporting is enabled via J1939RmDevErrorDetect, the J1939 Request Manager shall check PduIdType parameters (SDU/PDU IDs) of its API functions against the configured IDs, and shall report the DET error J1939RM_E_INVALID_PDU_SDU_ID when an unknown ID is provided by the call.⌋ ()

[SWS_J1939Rm_00034] ⌈If DET reporting is enabled via J1939RmDevErrorDetect, the J1939 Request Manager shall check pointer parameters of its API functions, and shall report the DET error J1939RM_E_PARAM_POINTER when a NULL pointer is provided by the call.⌋ ()

[SWS_J1939Rm_00041] ⌈If DET reporting is enabled via J1939RmDevErrorDetect, the J1939 Request Manager shall check NetworkHandleType parameters (network handles) of its API functions against the referenced network handles of ComM, and shall report the DET error J1939RM_E_INVALID_NETWORK_ID when an unknown handle is provided by the call.⌋ ()

[SWS_J1939Rm_00096] ⌈If DET reporting is enabled via J1939RmDevErrorDetect, the J1939 Request Manager shall check node handle parameters of its API functions against the node handles of J1939Nm referenced via J1939RmNmNodeRef, and shall report the DET error J1939RM_E_INVALID_NODE_ID when an unknown handle is provided by the call.⌋ ()

8 API specification

8.1 Imported types

In this section, all types used by the J1939 Request Manager are listed together with the defining module:

[SWS_J1939Rm_00035] ⌈

Module	*Imported Type*
ComStack_Types	BufReq_ReturnType
	NetworkHandleType
	PduIdType
	PduLengthType
	RetryInfoType
	PduInfoType
Std_Types	Std_ReturnType
	Std_VersionInfoType

⌋ ()

8.2 Type definitions

8.2.1 J1939Rm_ConfigType

[SWS_J1939Rm_00036] ⌈

Name:	`J1939Rm_ConfigType`	
Type:	`Structure`	
Range:	`implementation specific`	--
Description:	This is the base type for the configuration of the J1939 Request Manager. A pointer to an instance of this structure will be used in the initialization of the J1939 Request Manager. The content of this structure is defined in chapter 10 Configuration specification.	

⌋ ()

8.2.2 J1939Rm_StateType

[SWS_J1939Rm_00049] ⌈

Name:	`J1939Rm_StateType`	
Type:	`Enumeration`	
Range:	`J1939RM_STATE_ONLINE`	Normal communication (0)
	`J1939RM_STATE_OFFLINE`	Only Request for AC (1)
Description:	This type represents the communication state of the J1939 Request Manager.	

] ()

8.2.3 J1939Rm_AckCode

[SWS_J1939Rm_00057] [

Name:	J1939Rm_AckCode	
Type:	Enumeration	
Range:	J1939RM_ACK_POSITIVE	Positive Acknowledgement (0)
	J1939RM_ACK_NEGATIVE	Negative Acknowledgement (1)
	J1939RM_ACK_ACCESS_DENIED	Access Denied (2)
	J1939RM_ACK_CANNOT_RESPOND	Cannot Respond (3)
Description:	This type represents the available kinds of acknowledgements.	

] ()

8.3 Function definitions

This is a list of functions provided for upper layer modules.

8.3.1 J1939Rm_Init

[SWS_J1939Rm_00037] [

Service name:	J1939Rm_Init	
Syntax:	void J1939Rm_Init(const J1939Rm_ConfigType* configPtr)	
Service ID[hex]:	0x01	
Sync/Async:	Synchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	configPtr	Pointer to selected configuration structure
Parameters (inout):	None	
Parameters (out):	None	
Return value:	None	
Description:	This function initializes the J1939 Request Manager.	

] (SRS_J1939_00012)

See section 7.2.1 for details.

See section 7.11 for error handling.

8.3.2 J1939Rm_DeInit

[SWS_J1939Rm_00038] [

Service name:	J1939Rm_DeInit
Syntax:	void J1939Rm_DeInit(void)

Service ID[hex]:	0x02
Sync/Async:	Synchronous
Reentrancy:	Non Reentrant
Parameters (in):	None
Parameters (inout):	None
Parameters (out):	None
Return value:	None
Description:	This function resets the J1939 Request Manager to the uninitialized state.

] (SRS_J1939_00013)

See section 7.2.1 for details.

8.3.3 J1939Rm_GetVersionInfo

[SWS_J1939Rm_00039] [

Service name:	J1939Rm_GetVersionInfo

Syntax:	`void J1939Rm_GetVersionInfo(`
	`  Std_VersionInfoType* versionInfo`
	`)`

Service ID[hex]:	0x03
Sync/Async:	Synchronous
Reentrancy:	Non Reentrant
Parameters (in):	None
Parameters (inout):	None
Parameters (out):	versionInfo | Pointer to where to store the version information of this module.
Return value:	None
Description:	Returns the version information of this module.

] (SRS_BSW_00407)

See section 8.3.4 “Get Version Information” of [4] for details.

See section 7.11 for error handling.

8.3.4 J1939Rm_SetState

[SWS_J1939Rm_00048] [

Service name:	J1939Rm_SetState	

Syntax:	`Std_ReturnType J1939Rm_SetState(`
	`  NetworkHandleType channel,`
	`  uint8 node,`
	`  J1939Rm_StateType newState`
	`)`	

Service ID[hex]:	0x05	
Sync/Async:	Synchronous	
Reentrancy:	Reentrant	
Parameters (in):	channel	Channel for which the state shall be changed.
	node	Node for which the state shall be changed.
	newState	New state the J1939Rm shall enter, see definition of

		J1939Rm_StateType for available states.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	E_OK: New communication state was set E_NOT_OK: Communication state was not changed due to wrong value in NewState or wrong initialization state of the module.
Description:	Changes the communication state of J1939Rm to offline (only Request for AC supported) or online.	

] ()

[SWS_J1939Rm_00040] [The J1939 Request Manager shall reject the state change by returning E_NOT_OK when the 'newState' is not in the valid range. If DET is enabled via J1939RmDevErrorDetect, the DET error J1939RM_E_INVALID_STATE (see section 7.9) shall be reported.] ()

See sections 7.2.1 and 7.11 for error handling.

8.3.5 J1939Rm_Transmit

[SWS_J1939Rm_00053] [

Service name:	J1939Rm_Transmit	

Syntax:	`Std_ReturnType J1939Rm_Transmit(`
	`  PduIdType id,`
	`  const PduInfoType* info`
	`)`	

Service ID[hex]:	0x06	
Sync/Async:	Synchronous	
Reentrancy:	Reentrant	
Parameters (in):	id	Identification of the I-PDU.
	info	Length and pointer to the buffer of the I-PDU.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	E_OK: Transmission request is accepted E_NOT_OK: Transmission request is not accepted
Description:	Requests transmission of an I-PDU.	

] ()

[SWS_J1939Rm_00047] [The J1939Rm_Transmit API function shall only be available if a user with J1939RmUserType J1939RM_USER_COM is configured.] ()

See section 7.4.2 for details.

See sections 7.2.1 and 7.11 for error handling.

8.3.6 J1939Rm_SendRequest

[SWS_J1939Rm_00054] [

Service name:	J1939Rm_SendRequest	

Syntax:	`Std_ReturnType J1939Rm_SendRequest(`
	`  uint8 userId,`
	`  NetworkHandleType channel,`
	`  uint32 requestedPgn,`
	`  uint8 destAddress,`
	`  uint8 priority,`
	`  boolean checkTimeout`
	`)`	

Service ID[hex]:	0x07	
Sync/Async:	Synchronous	
Reentrancy:	Reentrant	
Parameters (in):	userId	Identification of the calling module.
	channel	Channel on which the request shall be sent.
	requestedPgn	PGN of the requested PG.
	destAddress	Address of the destination node or 0xFF for broadcast.
	priority	Priority of the Request PG.
	checkTimeout	TRUE: Timeout supervision will be performed FALSE: No timeout supervision will be started
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	E_OK: Transmission request is accepted E_NOT_OK: Transmission request is not accepted
Description:	Requests transmission of a Request PG.	

] (SRS_J1939_00016)

[SWS_J1939Rm_00074] [The J1939Rm_SendRequest API function shall only be available if J1939RmUserSendRequest is set for at least one user.] ()

See section 7.6 for details.

[SWS_J1939Rm_00067] [The J1939 Request Manager shall reject transmission of a request by returning E_NOT_OK when the ‘requestedPGN’, the ‘destAddress’, or the ‘priority’ are not in the valid range, or when the ‘userId’ is not one of the configured user IDs (see J1939RmUserId), or when ‘checkTimeout’ is true but timeout handling is disabled for the calling module (see J1939RmUserTimeoutSupervision). If DET is enabled via J1939RmDevErrorDetect, the corresponding DET error (see section 7.9) shall be reported: J1939RM_E_INVALID_USER for ‘userId’, J1939RM_E_INVALID_PGN for ‘requestedPGN’, J1939RM_E_INVALID_PRIO for ‘priority’, J1939RM_E_INVALID_ADDRESS for ‘destAddress’ or ‘sourceAddress’, and J1939RM_E_INVALID_OPTION for ‘checkTimeout’.] ()

[SWS_J1939Rm_00068] [The J1939 Request Manager shall reject transmission of a request by returning E_NOT_OK when another request is pending and the request queue is full.] ()

See sections 7.2.1 and 7.11 for further error handling.

8.3.7 J1939Rm_CancelRequestTimeout

[SWS_J1939Rm_00055] [

Service name:	J1939Rm_CancelRequestTimeout	
Syntax:	`void J1939Rm_CancelRequestTimeout( uint8 userId, NetworkHandleType channel, uint32 requestedPgn, uint8 destAddress )`	
Service ID[hex]:	0x08	
Sync/Async:	Synchronous	
Reentrancy:	Reentrant	
Parameters (in):	userId	Identification of the calling module.
	channel	Channel on which the request was sent.
	requestedPgn	PGN of the requested PG.
	destAddress	Address of the destination node or 0xFF for broadcast.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	None	
Description:	Cancels timeout monitoring of a Request. If the request is not active, or timeout monitoring was not requested, this call has no effect.	

] (SRS_J1939_00026)

[SWS_J1939Rm_00075] [The J1939Rm_CancelRequestTimeout API function shall only be available if J1939RmUserTimeoutSupervision is set for at least one user.] ()

See section 7.8 for details.

[SWS_J1939Rm_00069] [The J1939 Request Manager shall ignore the timeout cancellation request when the ‘requestedPGN’ or the ‘destAddress’ are not in the valid range, or when the ‘userId’ is not one of the configured user IDs (see J1939RmUserId), or if no suitable entry can be found in the list of pending requests. If DET is enabled via J1939RmDevErrorDetect, the corresponding DET error (see section 7.9) shall be reported: J1939RM_E_INVALID_USER for ‘userId’, J1939RM_E_INVALID_PGN for ‘requestedPGN’, and J1939RM_E_INVALID_ADDRESS for ‘destAddress’ or ‘sourceAddress’.] ()

See sections 7.2.1 and 7.11 for further error handling.

8.3.8 J1939Rm_SendAck

[SWS_J1939Rm_00056] [

Service name:	J1939Rm_SendAck
Syntax:	`Std_ReturnType J1939Rm_SendAck( uint8 userId, NetworkHandleType channel, uint32 ackPgn, J1939Rm_AckCode ackCode, uint8 ackAddress, uint8 priority )`
Service ID[hex]:	0x09

Sync/Async:	Synchronous	
Reentrancy:	Reentrant	
Parameters (in):	userId	Identification of the calling module.
	channel	Channel on which the acknowledgement shall be sent.
	ackPgn	Acknowledged PGN.
	ackCode	Type of acknowledgement, see definition of J1939Rm_AckCode for available codes.
	ackAddress	Address of the node that sent the request.
	priority	Priority of the Acknowledgement PG.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	E_OK: Transmission request is accepted E_NOT_OK: Transmission request is not accepted
Description:	Requests transmission of an Acknowledgement PG.	

] (SRS_J1939_00017)

[SWS_J1939Rm_00076] [The J1939Rm_SendAck API function shall only be available if J1939RmUserSendAck is set for at least one user.] ()

See section 7.5 for details.

[SWS_J1939Rm_00070] [The J1939 Request Manager shall reject transmission of an acknowledgement by returning E_NOT_OK when the 'ackPgn', the 'ackAddress', or the 'priority' are not in the valid range, or when the 'userId' is not one of the configured user IDs (see J1939RmUserId). If DET is enabled via J1939RmDevErrorDetect, the corresponding DET error (see section 7.9) shall be reported: J1939RM_E_INVALID_PGN for 'ackPgn', J1939RM_E_INVALID_ACK_CODE for 'ackCode', J1939RM_E_INVALID_ADDRESS for 'destAddress' or 'sourceAddress', and J1939RM_E_INVALID_PRIO for 'priority'.] ()

[SWS_J1939Rm_00071] [The J1939 Request Manager shall reject transmission of an acknowledgement by returning E_NOT_OK when another acknowledgement is pending and the acknowledgement queue is full.] ()

See sections 7.2.1 and 7.11 for further error handling.

8.4 Call-back notifications

This is a list of functions provided for other modules. The function prototypes of the callback functions shall be provided in the file J1939Rm_Cbk.h

8.4.1 J1939Rm_RxIndication

[SWS_J1939Rm_00058] [

Service name:	J1939Rm_RxIndication
Syntax:	`void J1939Rm_RxIndication(` `  PduIdType RxPduId,`

	const PduInfoType* PduInfoPtr)
Service ID[hex]:	0x42
Sync/Async:	Synchronous
Reentrancy:	Reentrant for different PduIds. Non reentrant for the same PduId.
Parameters (in):	RxPduId: ID of the received I-PDU. PduInfoPtr: Contains the length (SduLength) of the received I-PDU and a pointer to a buffer (SduDataPtr) containing the I-PDU.
Parameters (inout):	None
Parameters (out):	None
Return value:	None
Description:	Indication of a received I-PDU from a lower layer communication interface module.

] ()

[SWS_J1939Rm_00080] [The J1939Rm_RxIndication call back function shall only be available if J1939RmUserAckIndication or J1939RmUserRequestIndication is set for at least one user.] ()

See sections 7.4 and 7.7 for details.

See sections 7.2.1 and 7.11 for error handling.

8.4.2 J1939Rm_TxConfirmation

[SWS_J1939Rm_00059] [

Service name:	J1939Rm_TxConfirmation
Syntax:	void J1939Rm_TxConfirmation(PduIdType TxPduId)
Service ID[hex]:	0x40
Sync/Async:	Synchronous
Reentrancy:	Reentrant for different PduIds. Non reentrant for the same PduId.
Parameters (in):	TxPduId: ID of the I-PDU that has been transmitted.
Parameters (inout):	None
Parameters (out):	None
Return value:	None
Description:	The lower layer communication interface module confirms the transmission of an I-PDU.

] ()

[SWS_J1939Rm_00081] [The J1939Rm_TxConfirmation call back function shall only be available if J1939RmUserSendAck or J1939RmUserSendRequest is set for at least one user.] ()

See sections 7.5 and 7.6 for details.

See sections 7.2.1 and 7.11 for error handling.

8.4.3 J1939Rm_CopyTxData

[SWS_J1939Rm_00060] [

Service name:	J1939Rm_CopyTxData	

Syntax:	`BufReq_ReturnType J1939Rm_CopyTxData(`
	`  PduIdType id,`
	`  const PduInfoType* info,`
	`  RetryInfoType* retry,`
	`  PduLengthType* availableDataPtr`
	`)`	

Service ID[hex]:	0x43	
Sync/Async:	Synchronous	
Reentrancy:	Reentrant	
Parameters (in):	id	Identification of the transmitted I-PDU.
	info	Provides the destination buffer and the number of bytes to be copied. If not enough transmit data is available, no data is copied. The transport protocol module may retry. A copy size of 0 can be used to indicate state changes in the retry parameter or to query currently available data.
	retry	This parameter is used to acknowledge transmitted data or to retransmit data after transmission problems. If the retry parameter is a NULL_PTR, it indicates that the transmit data can be removed from the buffer immediately after it has been copied. Otherwise, the retry parameter must point to a valid RetryInfoType element. If TpDataState indicates TP_CONFPENDING, the previously copied data must remain in the TP buffer to be available for error recovery. TP_DATACONF indicates that all data that has been copied before this call is confirmed and can be removed from the TP buffer. Data copied by this API call is excluded and will be confirmed later. TP_DATARETRY indicates that this API call shall copy previously copied data in order to recover from an error. In this case TxTpDataCnt specifies the offset in bytes from the current data copy position.
Parameters (inout):	None	
Parameters (out):	availableDataPtr	Indicates the remaining number of bytes that are available in the upper layer module's Tx buffer. availableDataPtr can be used by TP modules that support dynamic payload lengths (e.g. FrIsoTp) to determine the size of the following CFs.
Return value:	BufReq_ReturnType	BUFREQ_OK: Data has been copied to the transmit buffer completely as requested. BUFREQ_E_BUSY: Request could not be fulfilled, because the required amount of Tx data is not available. The lower layer module may retry this call later on. No data has been copied. BUFREQ_E_NOT_OK: Data has not been copied. Request failed.
Description:	This function is called to acquire the transmit data of an I-PDU segment (N-PDU). Each call to this function provides the next part of the I-PDU data unless retry->TpDataState is TP_DATARETRY. In this case the function restarts to copy the data beginning at the offset from the current position indicated by retry-	

	>TxTpDataCnt. The size of the remaining data is written to the position indicated by availableDataPtr.

] ()

[SWS_J1939Rm_00077] [The J1939Rm_CopyTxData call back function shall only be available if a user with J1939RmUserType J1939RM_USER_COM is configured.] ()

See section 7.4.2 for details.

See sections 7.2.1 and 7.11 for error handling.

8.4.4 J1939Rm_TpTxConfirmation

[SWS_J1939Rm_00061] [

Service name:	J1939Rm_TpTxConfirmation	

Syntax:	`void J1939Rm_TpTxConfirmation(`
	`  PduIdType id,`
	`  Std_ReturnType result`
	`)`	

Service ID[hex]:	0x37	
Sync/Async:	Synchronous	
Reentrancy:	Reentrant	
Parameters (in):	id	Identification of the transmitted I-PDU.
	result	Result of the transmission of the I-PDU.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	None	
Description:	This function is called after the I-PDU has been transmitted on its network, the result indicates whether the transmission was successful or not.	

] ()

[SWS_J1939Rm_00078] [The J1939Rm_TpTxConfirmation call back function shall only be available if a user with J1939RmUserType J1939RM_USER_COM is configured.] ()

See section 7.4.2 for details.

See sections 7.2.1 and 7.11 for error handling.

8.4.5 J1939Rm_ComRxIpduCallout

[SWS_J1939Rm_00062] [

Service name:	J1939Rm_ComRxIpduCallout

Syntax:	`boolean J1939Rm_ComRxIpduCallout(`
	`  PduIdType PduId,`
	`  const PduInfoType* PduInfoPtr`
	`)`

Service ID[hex]:	0x28	
Sync/Async:	Synchronous	
Reentrancy:	don't care	
Parameters (in):	PduId	ID of the received I-PDU.
	PduInfoPtr	Contains the length (SduLength) of the received I-PDU and a pointer to the data of the I-PDU (SduDataPtr).
Parameters (inout):	None	
Parameters (out):	None	
Return value:	boolean	true: I-PDU will be processed normal false: I-PDU will not be processed any further
Description:	The I-PDU callout on receiver side can be configured to implement user-defined receive filtering mechanisms.	

] ()

[SWS_J1939Rm_00079] [The J1939Rm_ComRxIpduCallout call back function shall only be available if a user with J1939RmUserType J1939RM_USER_COM is configured.] ()

See section 7.8 for details.

See sections 7.2.1 and 7.11 for error handling.

8.5 Scheduled functions

This function is directly called by Basic Software Scheduler (SchM).

8.5.1 J1939Rm_MainFunction

[SWS_J1939Rm_00042] [

Service name:	J1939Rm_MainFunction

Syntax:	`void J1939Rm_MainFunction(`
	`  void`
	`)`

Service ID[hex]:	0x04
Description:	Main function of the J1939 Request Manager. Used for scheduling purposes and timeout supervision.

] ()

[SWS_J1939Rm_00043] [The frequency of invocations of J1939Rm_MainFunction is determined by the configuration parameter J1939RmMainFunctionPeriod.] ()

8.6 Expected Interfaces

In this section, all interfaces required from other modules are listed.

8.6.1 Mandatory Interfaces

This section defines all interfaces that are required to fulfill the core functionality of the module.

[SWS_J1939Rm_00044][⌈

API function	*Description*
PduR_J1939RmTransmit	Requests transmission of an I-PDU.

⌋ ()

8.6.2 Optional Interfaces

This section defines all interfaces that are required to fulfill an optional functionality of the module.

[SWS_J1939Rm_00045] ⌈

API function	*Description*
Com_TriggerIPDUSend	By a call to Com_TriggerIPDUSend the I-PDU with the given ID is triggered for transmission.
Det_ReportError	Service to report development errors.
J1939Dcm_RequestIndication	Indicates reception of a Request PG.
J1939Nm_RequestIndication	Indicates reception of a Request PG.
PduR_J1939RmCopyTxData	This function is called to acquire the transmit data of an I-PDU segment (N-PDU). Each call to this function provides the next part of the I-PDU data unless retry->TpDataState is TP_DATARETRY. In this case the function restarts to copy the data beginning at the offset from the current position indicated by retry->TxTpDataCnt. The size of the remaining data is written to the position indicated by availableDataPtr.
PduR_J1939RmTpTxConfirmation	This function is called after the I-PDU has been transmitted on its network, the result indicates whether the transmission was successful or not.
PduR_J1939RmTxConfirmation	The lower layer communication interface module confirms the transmission of an I-PDU.

⌋ ()

[SWS_J1939Rm_00082] ⌈The Com_TriggerIPDUSend, PduR_J1939RmCopyTxData, PduR_J1939RmTpTxConfirmation, and PduR_J1939RmTxConfirmation functions are only required if a user with J1939RmUserType J1939RM_USER_COM is configured.⌋ ()

[SWS_J1939Rm_00083] ⌈The J1939Dcm_RequestIndication function is only required if a user with J1939RmUserType J1939RM_USER_J1939DCM is configured.⌋ ()

[SWS_J1939Rm_00084] ⌈The J1939Nm_RequestIndication function is only required if a user with J1939RmUserType J1939RM_USER_J1939NM is configured.⌋ ()

8.6.3 Configurable interfaces

In this section, all interfaces are listed where the target function could be configured. The target function is usually a call-back function. The name of this kind of interfaces is not fixed because they are configurable.

8.6.3.1 <User>_RequestIndication

[SWS_J1939Rm_00063] [

Service name:	< User >_RequestIndication	

Syntax:	`void < User >_RequestIndication(`
	`  uint8 node,`
	`  NetworkHandleType channel,`
	`  uint32 requestedPgn,`
	`  uint8 sourceAddress,`
	`  uint8 destAddress,`
	`  uint8 priority`
	`)`	

Sync/Async:	Synchronous	
Reentrancy:	Reentrant	
Parameters (in):	node	Node by which the request was received.
	channel	Channel on which the request was received.
	requestedPgn	PGN of the requested PG.
	sourceAddress	Address of the node that sent the Request PG.
	destAddress	Address of this node or 0xFF for broadcast.
	priority	Priority of the Request PG.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	None	
Description:	Indicates reception of a Request PG.	

] (SRS_J1939_00014)

[SWS_J1939Rm_00085] [The configured <User>_RequestIndication function shall be available for each user that has J1939RmUserRequestIndication enabled.] ()

See section 7.4 for details.

8.6.3.2 <User>_AckIndication

[SWS_J1939Rm_00064] [

Service name:	< User >_AckIndication

Syntax:	`void < User >_AckIndication(`
	`  uint8 node,`
	`  NetworkHandleType channel,`
	`  uint32 ackPgn,`
	`  J1939Rm_AckCode ackCode,`
	`  uint8 ackAddress,`
	`  uint8 sourceAddress,`
	`  uint8 priority`
	`)`

Sync/Async:	Synchronous

Reentrancy:	Reentrant	
Parameters (in):	node	Node by which the acknowledgement was received.
	channel	Channel on which the acknowledgement was received.
	ackPgn	Acknowledged PGN.
	ackCode	Type of acknowledgement, see definition of J1939Rm_AckCode for available codes.
	ackAddress	Address of this node.
	sourceAddress	Address of the node that sent the Acknowledgement PG.
	priority	Priority of the Acknowledgement PG.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	None	
Description:	Indicates reception of an Acknowledgement PG.	

] (SRS_J1939_00015)

[SWS_J1939Rm_00086] [The configured <User>_AckIndication function shall be available for each user that has J1939RmUserAckIndication enabled.] ()

See section 7.7 for details.

8.6.3.3 <User>_RequestTimeoutIndication

[SWS_J1939Rm_00065] [

Service name:	< User >_RequestTimeoutIndication	
Syntax:	`void < User >_RequestTimeoutIndication( uint8 node, NetworkHandleType channel, uint32 requestedPgn, uint8 destAddress )`	
Sync/Async:	Synchronous	
Reentrancy:	Reentrant	
Parameters (in):	node	Node by which the request was sent.
	channel	Channel on which the request was sent.
	requestedPgn	PGN of the requested PG.
	destAddress	Address of the destination node or 0xFF for broadcast.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	None	
Description:	Indicates timeout of a request triggered with the same parameters.	

] (SRS_J1939_00026)

[SWS_J1939Rm_00087] [The configured <User>_RequestTimeoutIndication function shall be available for each user that has J1939RmUserTimeoutSupervision enabled.] ()

See section 7.8 for details.

8.7 Service Port Descriptions

This section defines the client server interfaces and the derived service ports used by J1939Rm to communicate with application software components (SWCs).

8.7.1 Provided Service Ports

These service ports provide API functions of the J1939Rm to the application SWCs.

Please note: All three ports use a port defined argument value to provide the userId argument of the corresponding BSW interfaces.

8.7.1.1 J1939Rm_SendAck

[SWS_J1939Rm_00098] [

Name	J1939Rm_SendAck_{user}		
Kind	ProvidedPort	Interface	AppSendAck
Description	--		
Variation	user = {ecuc(J1939Rm/J1939RmConfigSet/J1939RmNode/J1939RmUser.SHORTNAME)} {ecuc(J1939Rm/J1939RmGeneral.J1939RmSupportAckTransmission)} == true		

] (SRS_J1939_00017)

8.7.1.2 J1939Rm_SendRequest

[SWS_J1939Rm_00097] [

Name	J1939Rm_SendRequest_{user}		
Kind	ProvidedPort	Interface	AppSendRequest
Description	--		
Variation	user = {ecuc(J1939Rm/J1939RmConfigSet/J1939RmNode/J1939RmUser.SHORTNAME)} {ecuc(J1939Rm/J1939RmGeneral.J1939RmSupportRequestTransmission)} == true		

] (SRS_J1939_00016)

8.7.1.3 J1939Rm_CancelRequestTimeout

[SWS_J1939Rm_00099] [

Name	J1939Rm_CancelRequestTimeout_{user}		
Kind	ProvidedPort	Interface	AppCancelRequestTimeout
Description	--		
Variation	user = {ecuc(J1939Rm/J1939RmConfigSet/J1939RmNode/J1939RmUser.SHORTNAME)} {ecuc(J1939Rm/J1939RmGeneral.J1939RmSupportTimeoutSupervision)} == true		

] (SRS_J1939_00026)

8.7.2 Required Service Ports

These service ports provide call back functions of the J1939Rm to the application SWCs.

8.7.2.1 J1939Rm_AckIndication

[SWS_J1939Rm_00101] [

Name	J1939Rm_AckIndication		
Kind	RequiredPort	Interface	AppAckIndication
Description	--		
Variation	{ecuc(J1939Rm/J1939RmGeneral.J1939RmSupportAckIndication)} == true		

] (SRS_J1939_00015)

8.7.2.2 J1939Rm_RequestIndication

[SWS_J1939Rm_00100] [

Name	J1939Rm_RequestIndication		
Kind	RequiredPort	Interface	AppRequestIndication
Description	--		
Variation	{ecuc(J1939Rm/J1939RmGeneral.J1939RmSupportRequestIndication)} == true		

] (SRS_J1939_00014)

8.7.2.3 J1939Rm_RequestTimeoutIndication

[SWS_J1939Rm_00102] [

Name	J1939Rm_RequestTimeoutIndication		
Kind	RequiredPort	Interface	AppRequestTimeoutIndication
Description	--		
Variation	{ecuc(J1939Rm/J1939RmGeneral.J1939RmSupportTimeoutSupervision)} == true		

] (SRS_J1939_00026)

8.7.3 Client-Server Interfaces

This section lists the client-server interfaces used by the ports provided and required by the J1939 Request Manager.

Please note: The availability of these interfaces depends on the configuration of the J1939 Request Manager. The relevant parameters of the J1939 Request Manager configuration are listed as “Variation” of the operations.

8.7.3.1 AppSendAck

[SWS_J1939Rm_00103] [

Name	AppSendAck	
Comment	--	
IsService	true	
Variation	{ecuc(J1939Rm/J1939RmGeneral.J1939RmSupportAckTransmission)} == true	
Possible Errors	0	E_OK
	1	E_NOT_OK

Operations

SendAck		
Comments	Requests transmission of an Acknowledgement PG.	
Variation	--	
Parameters	channel	
	Comment	Channel on which the acknowledgement shall be sent.
	Type	NetworkHandleType
	Variation	--
	Direction	IN
	ackPgn	
	Comment	Acknowledged PGN.
	Type	uint32
	Variation	--
	Direction	IN
	ackCode	
	Comment	Type of acknowledgement, see definition of J1939Rm_AckCode for available codes.
	Type	J1939Rm_AckCode
	Variation	--

	Direction	IN
	ackAddress	
	Comment	Address of the node that sent the request.
	Type	uint8
	Variation	--
	Direction	IN
	priority	
	Comment	Priority of the Acknowledgement PG.
	Type	uint8
	Variation	--
	Direction	IN
Possible Errors	E_OK	Operation successful
	E_NOT_OK	--

] (SRS_J1939_00017)

8.7.3.2 AppSendRequest

[SWS_J1939Rm_00104] [

Name	AppSendRequest	
Comment	--	
IsService	true	
Variation	{ecuc(J1939Rm/J1939RmGeneral.J1939RmSupportRequestTransmission)} == true	
Possible Errors	0	E_OK
	1	E_NOT_OK

Operations

SendRequest		
Comments	Requests transmission of a Request PG.	
Variation	--	
Parameters	channel	
	Comment	Channel on which the request shall be sent.

	Type	NetworkHandleType
	Variation	--
	Direction	IN
	requestedPgn	
	Comment	PGN of the requested PG.
	Type	uint32
	Variation	--
	Direction	IN
	destAddress	
	Comment	Address of the destination node or 0xFF for broadcast.
	Type	uint8
	Variation	--
	Direction	IN
	priority	
	Comment	Priority of the Request PG.
	Type	uint8
	Variation	--
	Direction	IN
	checkTimeout	
	Comment	TRUE: Timeout supervision will be performed FALSE: No timeout supervision will be started
	Type	boolean
	Variation	--
	Direction	IN
Possible Errors	E_OK	Operation successful
	E_NOT_OK	--

] (SRS_J1939_00016)

8.7.3.3 AppCancelRequestTimeout

[SWS_J1939Rm_00105] [

Name	AppCancelRequestTimeout	
Comment	--	
IsService	true	
Variation	{ecuc(J1939Rm/J1939RmGeneral.J1939RmSupportTimeoutSupervision)} == true	
Possible Errors	0	E_OK
	1	E_NOT_OK

Operations

CancelRequestTimeout		
Comments	Cancels timeout monitoring of a Request. If the request is not active, or timeout monitoring was not requested, this call has no effect.	
Variation	--	
Parameters	channel	
	Comment	Channel on which the request was sent.
	Type	NetworkHandleType
	Variation	--
	Direction	IN
	requestedPgn	
	Comment	PGN of the requested PG.
	Type	uint32
	Variation	--
	Direction	IN
	destAddress	
	Comment	Address of the destination node or 0xFF for broadcast.
	Type	uint8
	Variation	--
	Direction	IN
Possible Errors	E_OK	Operation successful
	E_NOT_OK	--

] (SRS_J1939_00026)

8.7.3.4 AppAckIndication

[SWS_J1939Rm_00106] [

Name	AppAckIndication	
Comment	--	
IsService	true	
Variation	{ecuc(J1939Rm/J1939RmGeneral.J1939RmSupportAckIndication)} == true	
Possible Errors	0	E_OK
	1	E_NOT_OK

Operations

AckIndication		
Comments	Indicates reception of an Acknowledgement PG.	
Variation	--	
Parameters	channel	
	Comment	Channel on which the acknowledgement was received.
	Type	NetworkHandleType
	Variation	--
	Direction	IN
	ackPgn	
	Comment	Acknowledged PGN.
	Type	uint32
	Variation	--
	Direction	IN
	ackCode	
	Comment	Type of acknowledgement, see definition of J1939Rm_AckCode for available codes.
	Type	J1939Rm_AckCode
	Variation	--
	Direction	IN
	ackAddress	

	Comment	Address of this node.
	Type	uint8
	Variation	--
	Direction	IN
	sourceAddress	
	Comment	Address of the node that sent the Acknowledgement PG.
	Type	uint8
	Variation	--
	Direction	IN
	priority	
	Comment	Priority of the Acknowledgement PG.
	Type	uint8
	Variation	--
	Direction	IN
Possible Errors	E_OK	Operation successful
	E_NOT_OK	--

] (SRS_J1939_00015)

8.7.3.5 AppRequestIndication

[SWS_J1939Rm_00107] [

Name	AppRequestIndication	
Comment	--	
IsService	true	
Variation	{ecuc(J1939Rm/J1939RmGeneral.J1939RmSupportRequestIndication)} == true	
Possible Errors	0	E_OK
	1	E_NOT_OK

Operations

RequestIndication	
Comments	Indicates reception of a Request PG.

Variation	--	
Parameters	channel	
	Comment	Channel on which the request was received.
	Type	NetworkHandleType
	Variation	--
	Direction	IN
	requestedPgn	
	Comment	PGN of the requested PG.
	Type	uint32
	Variation	--
	Direction	IN
	sourceAddress	
	Comment	Address of the node that sent the Request PG.
	Type	uint8
	Variation	--
	Direction	IN
	destAddress	
	Comment	Address of this node or 0xFF for broadcast.
	Type	uint8
	Variation	--
	Direction	IN
	priority	
	Comment	Priority of the Request PG.
	Type	uint8
	Variation	--
	Direction	IN
Possible Errors	E_OK	Operation successful
	E_NOT_OK	--

] (SRS_J1939_00014)

8.7.3.6 AppRequestTimeoutIndication

[SWS_J1939Rm_00108] [

Name	AppRequestTimeoutIndication	
Comment	--	
IsService	true	
Variation	{ecuc(J1939Rm/J1939RmGeneral.J1939RmSupportTimeoutSupervision)} == true	
Possible Errors	0	E_OK
	1	E_NOT_OK

Operations

RequestTimeoutIndication		
Comments	Indicates timeout of a request triggered with the same parameters.	
Variation	--	
Parameters	channel	
	Comment	Channel on which the request was sent.
	Type	NetworkHandleType
	Variation	--
	Direction	IN
	requestedPgn	
	Comment	PGN of the requested PG.
	Type	uint32
	Variation	--
	Direction	IN
	destAddress	
	Comment	Address of the destination node or 0xFF for broadcast.
	Type	uint8
	Variation	--
	Direction	IN
Possible Errors	E_OK	Operation successful

	E_NOT_OK	--

] (SRS_J1939_00026)

8.7.4 Implementation Data Types

In this section, the implementation data types used by the client-server interfaces of the J1939 Request Manager are listed.

Please note: It is essential that the implementation of the J1939 Request Manager does not define these data types twice, by including them both from the RTE generated header and the own types header.

8.7.4.1 J1939Rm_AckCode

[SWS_J1939Rm_00109]] [

Name	J1939Rm_AckCode		
Kind	Enumeration		
Range	J1939RM_ACK_POSITIVE	0	Positive Acknowledgement (0)
	J1939RM_ACK_NEGATIVE	1	Negative Acknowledgement (1)
	J1939RM_ACK_ACCESS_DENIED	2	Access Denied (2)
	J1939RM_ACK_CANNOT_RESPOND	3	Cannot Respond (3)
Description	This type represents the available kinds of acknowledgements.		
Variation	--		

] ()

9 Sequence diagrams

The following sequence diagrams shall give an impression of the way the J1939 Request Manager shall behave and interoperate with other BSW modules. They are not complete and not binding for the implementation.

9.1 Reception of Request PG

The following diagram shows the interaction with PduR and a J1939Rm User when a Request PG is received.

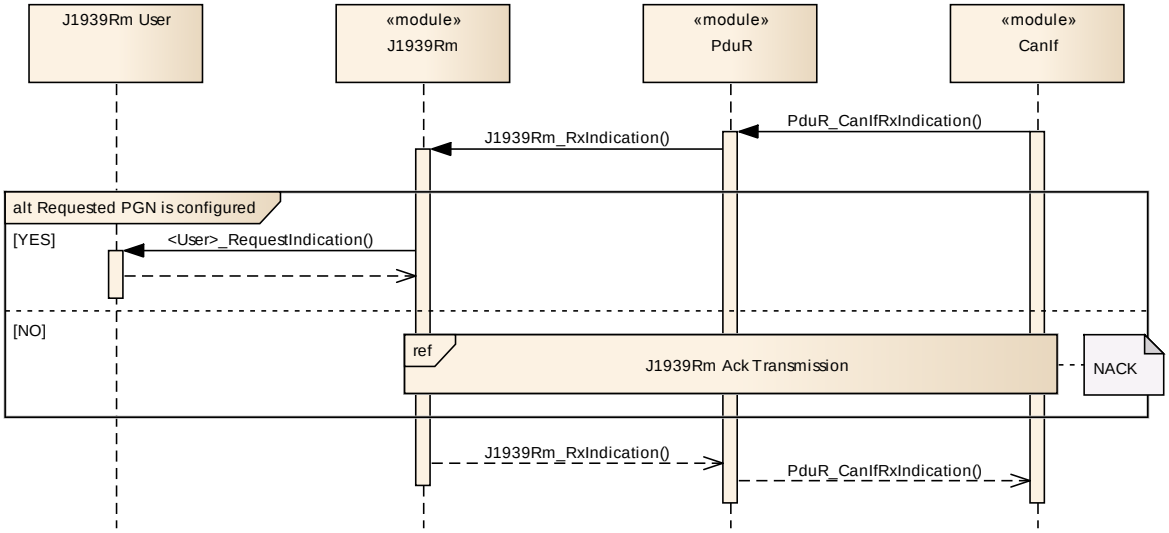

Figure 2: Reception of Request PG

9.2 Transmission of Acknowledgement PG

The following diagram shows the interaction with a J1939Rm User and PduR when an Acknowledgement PG is transmitted.

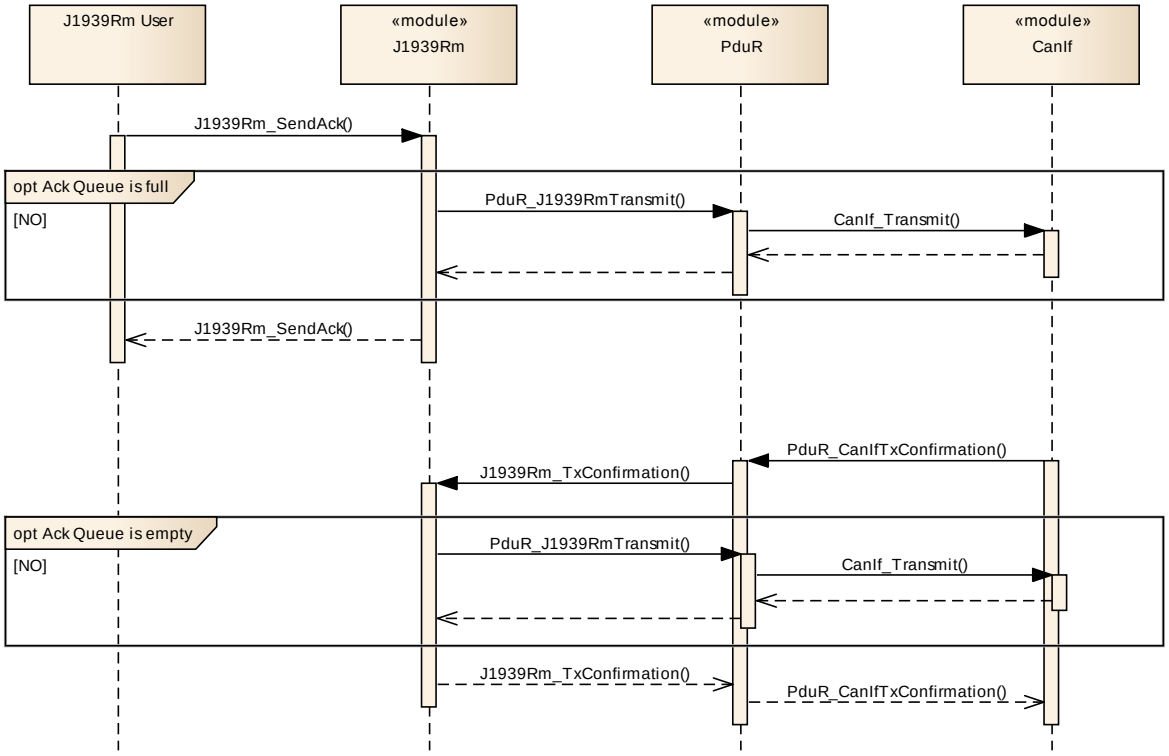

Figure 3: Transmission of Acknowledgement PG

9.3 Handling of Request for a COM Pdu

The following diagram shows the interaction with PduR and COM when the J1939 Request Manager receives a Request for a PG of PDU1 format that is transmitted as COM Pdu.

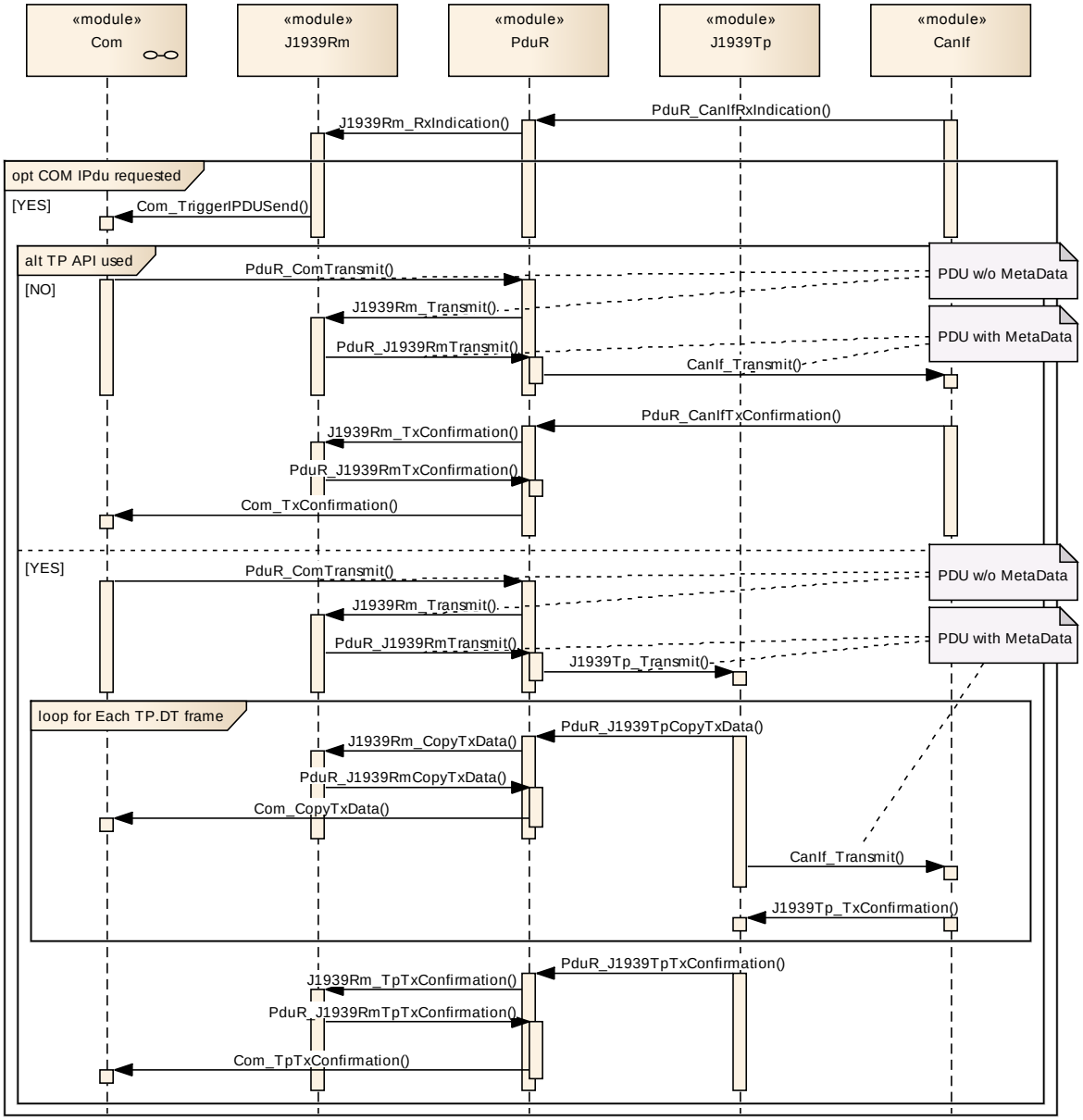

Figure 4: Handling of Request for a COM Pdu with PDU1 format

9.4 Handling of Request for a Diagnostic Pdu

The following diagram shows the interaction with PduR and J1939Dcm when a Request for a diagnostic PG is received.

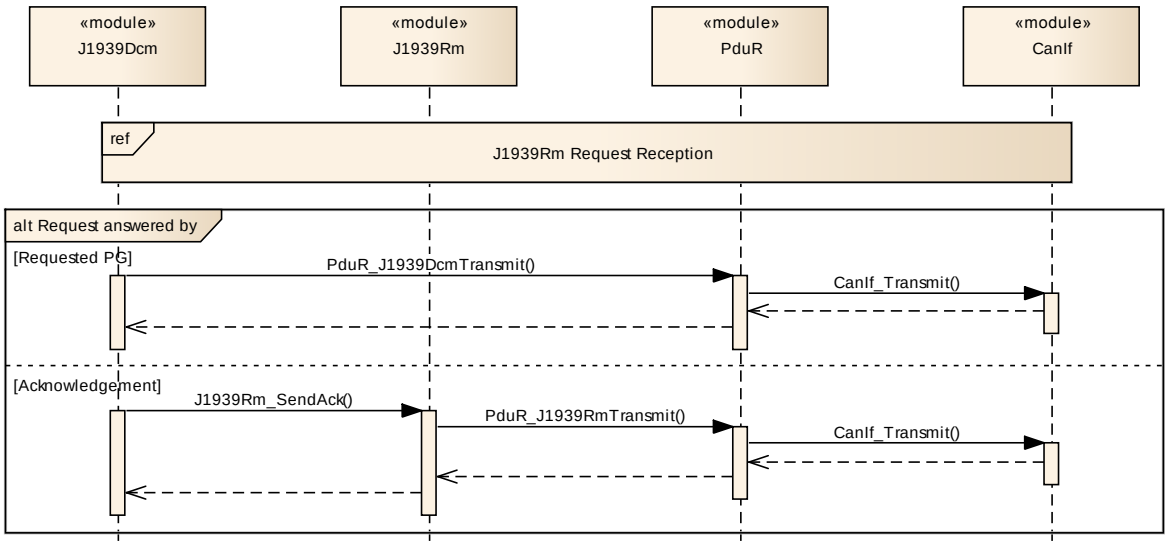

Figure 5: Handling of Request for a Diagnostic Pdu

9.5 Transmission of Request PG

The following diagram shows the interaction with a J1939Rm User and PduR when a Request PG is transmitted.

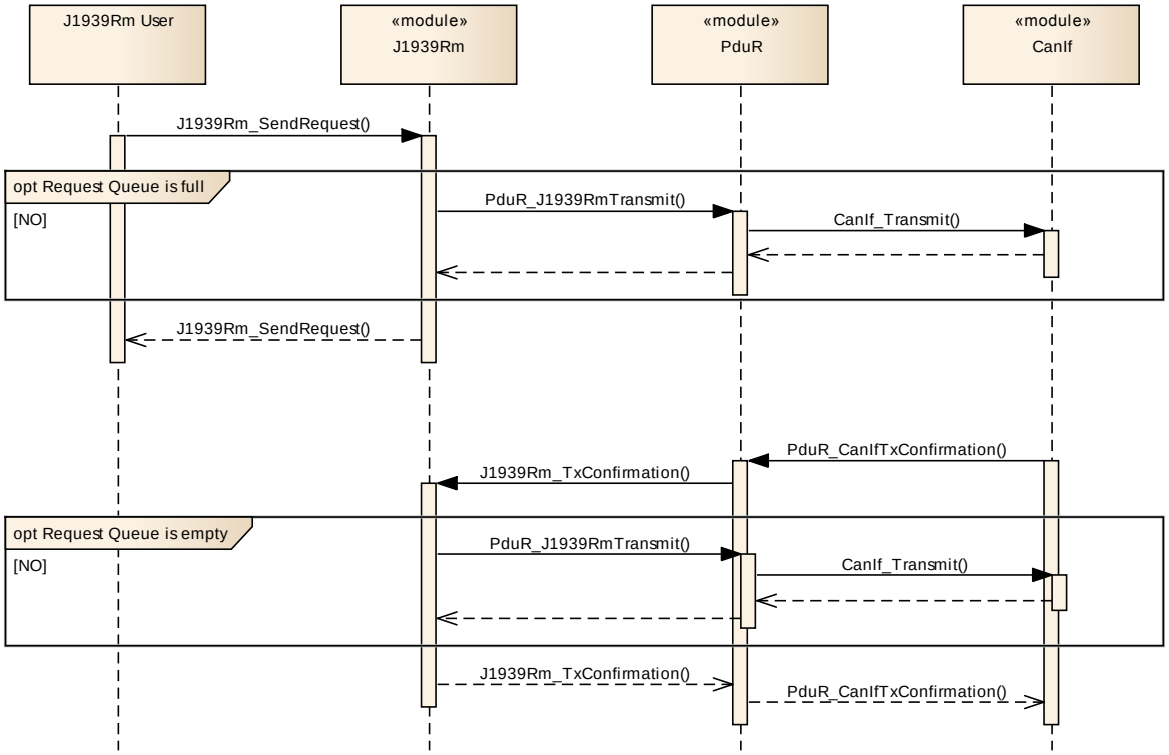

Figure 6: Transmission of Request PG

9.6 Reception of Acknowledgement PG

The following diagram shows the interaction with PduR and a J1939Rm User when an Acknowledgement PG is received.

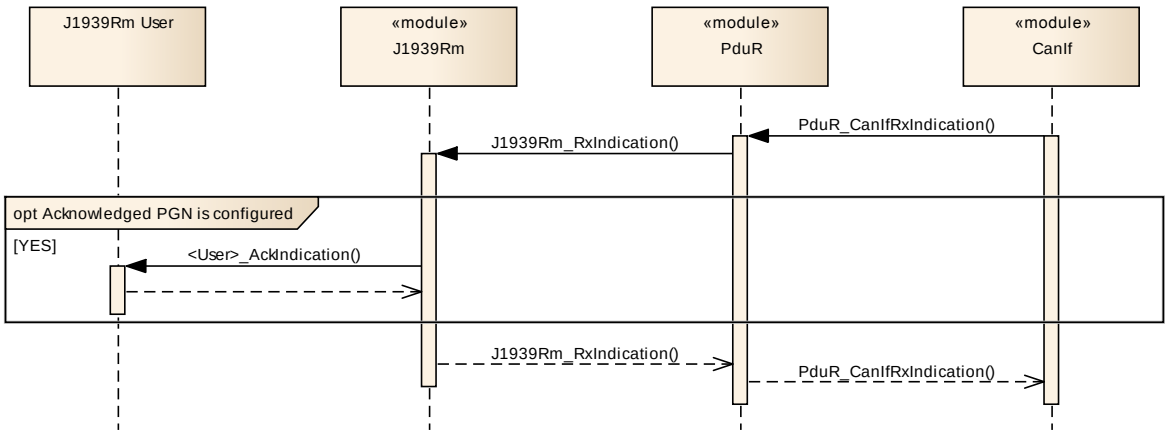

Figure 7: Transmission of Acknowledgement PG

9.7 Monitoring of Request Timeout

The following diagram shows the interaction with a J1939Rm User and PduR when the J1939Rm monitors timeout of a transmitted Request PG.

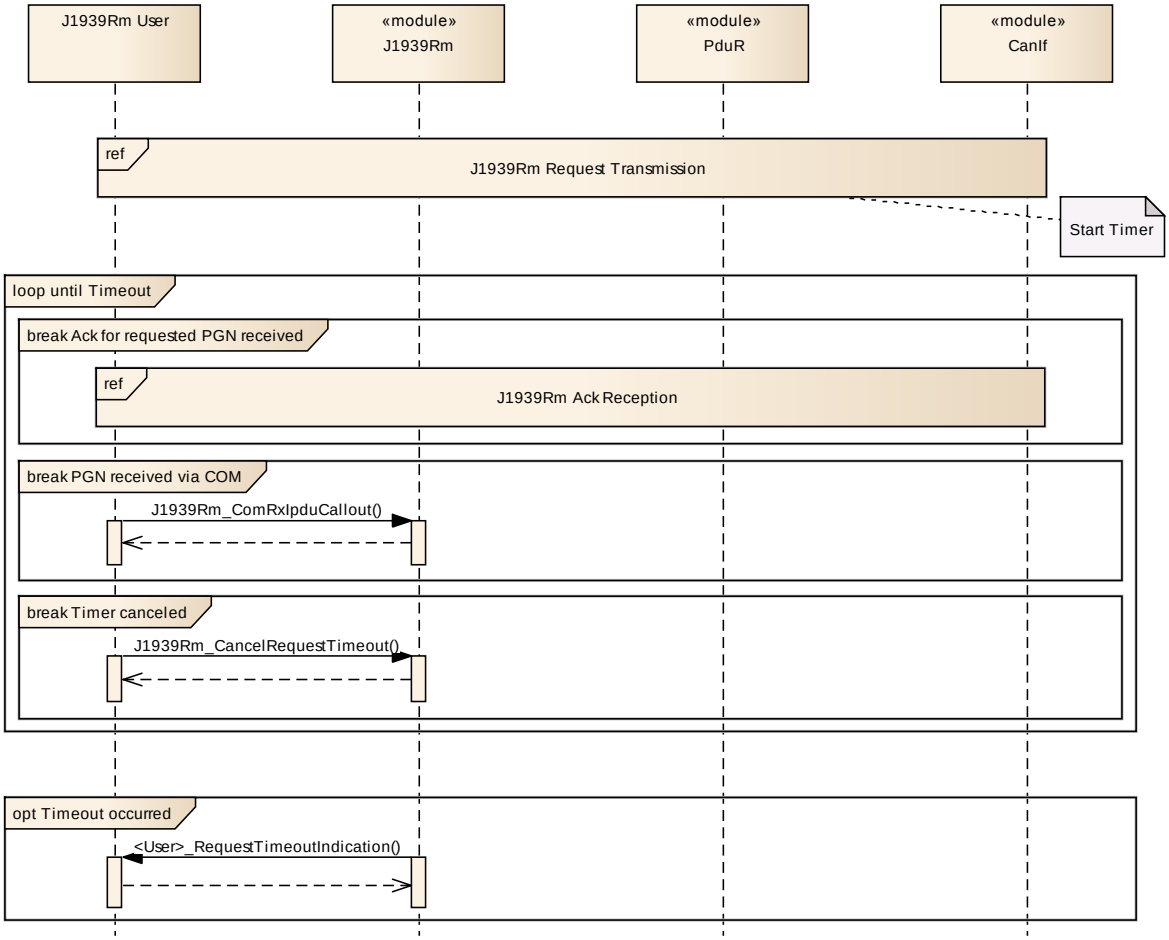

Figure 8: Monitoring of Request Timeout

10 Configuration specification

In general, this chapter defines configuration parameters and their clustering into containers. In order to support the specification section 10.1 describes fundamentals. It also specifies a template (table) you shall use for the parameter specification. We intend to leave section 10.1 in the specification to guarantee comprehension.

Section 10.2 specifies the structure (containers) and the parameters of the J1939 Request Manager.

Section 10.3 specifies published information of the J1939 Request Manager.

10.1 How to read this chapter

For details, refer to the chapter 10.1 “Introduction to configuration specification” in the SWS BSW General [4].

10.2 Containers and configuration parameters

The following sections summarize all configuration parameters of the J1939 Request Manager. The detailed meaning of the parameters is described in chapters 7 and 8.

The following pictures show an overview of the configuration parameters available for J1939Rm:

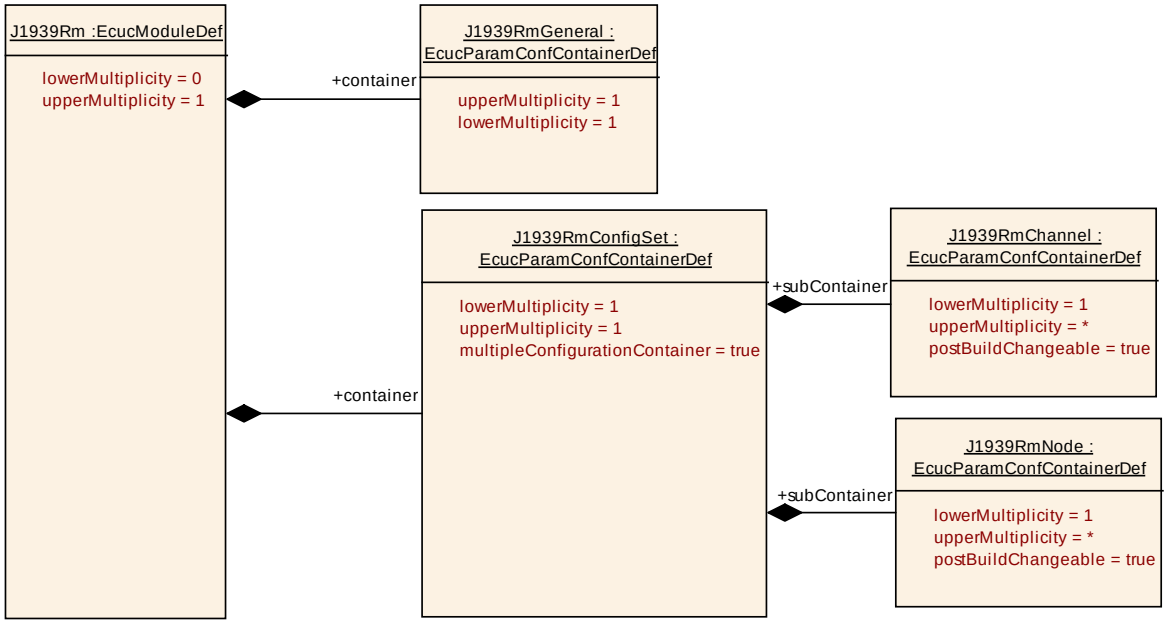

Figure 9: Configuration container J1939Rm with subcontainer J1939RmConfigSet

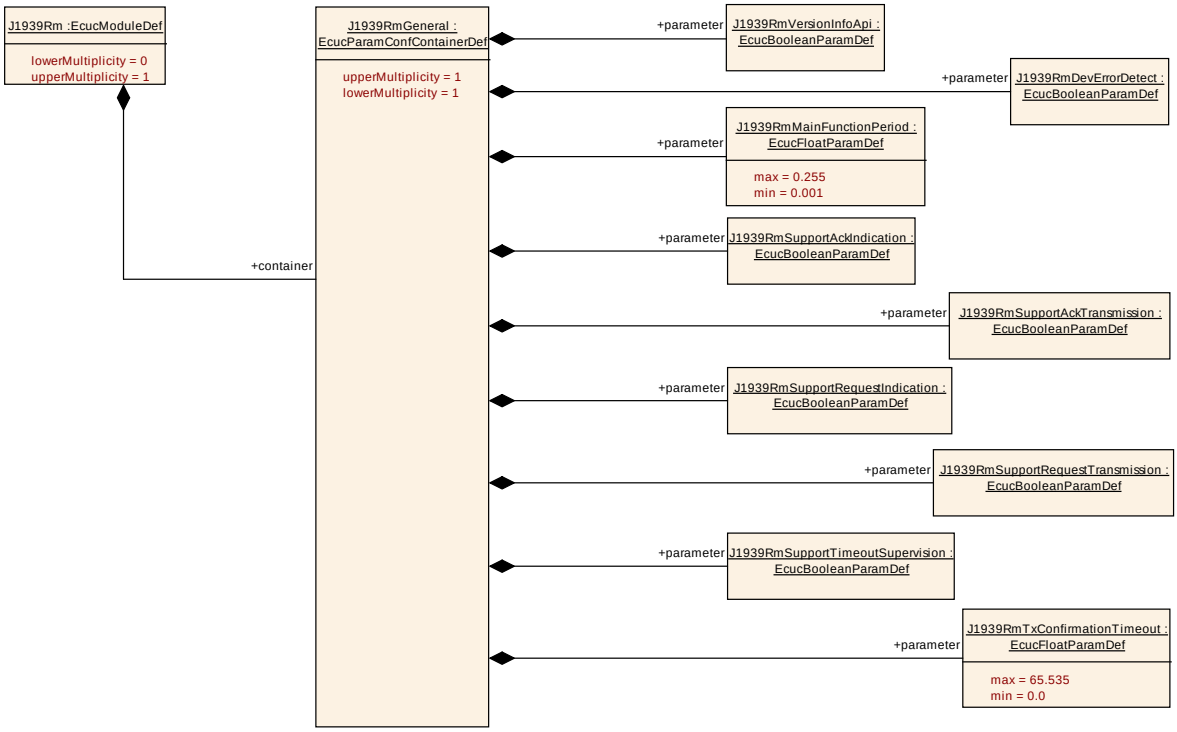

Figure 10: Configuration container J1939RmGeneral

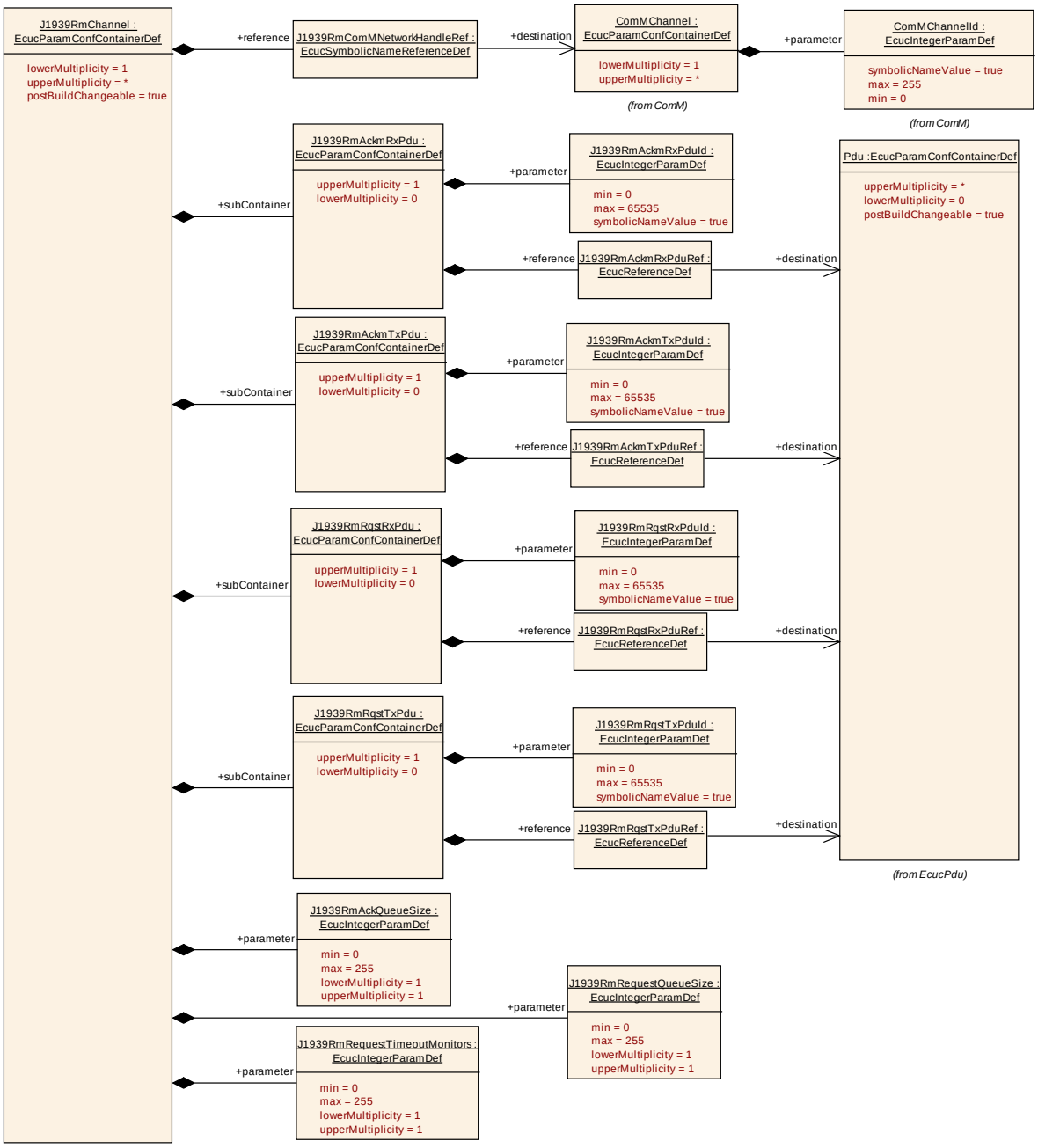

Figure 11: Configuration container J1939RmChannel

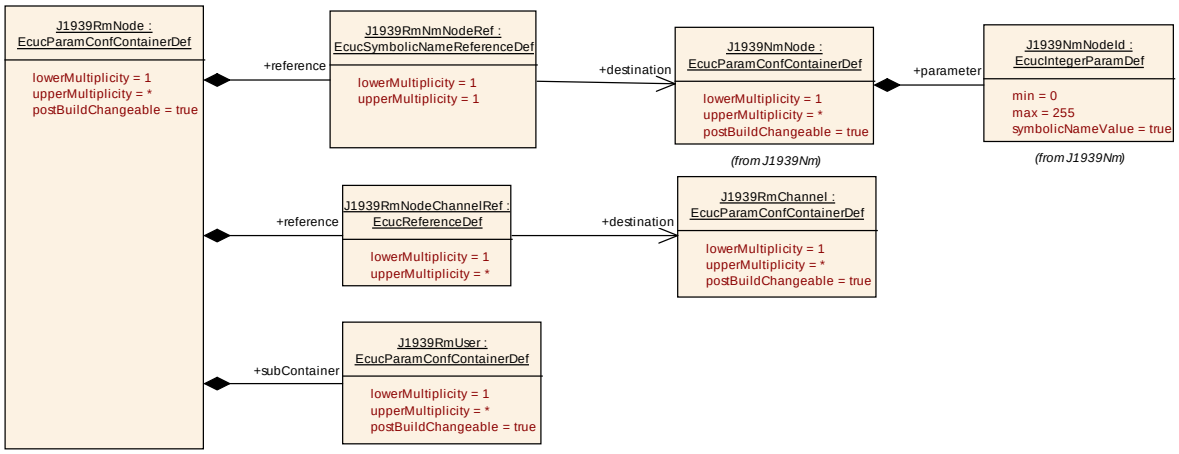

Figure 12: Configuration container J1939RmNode

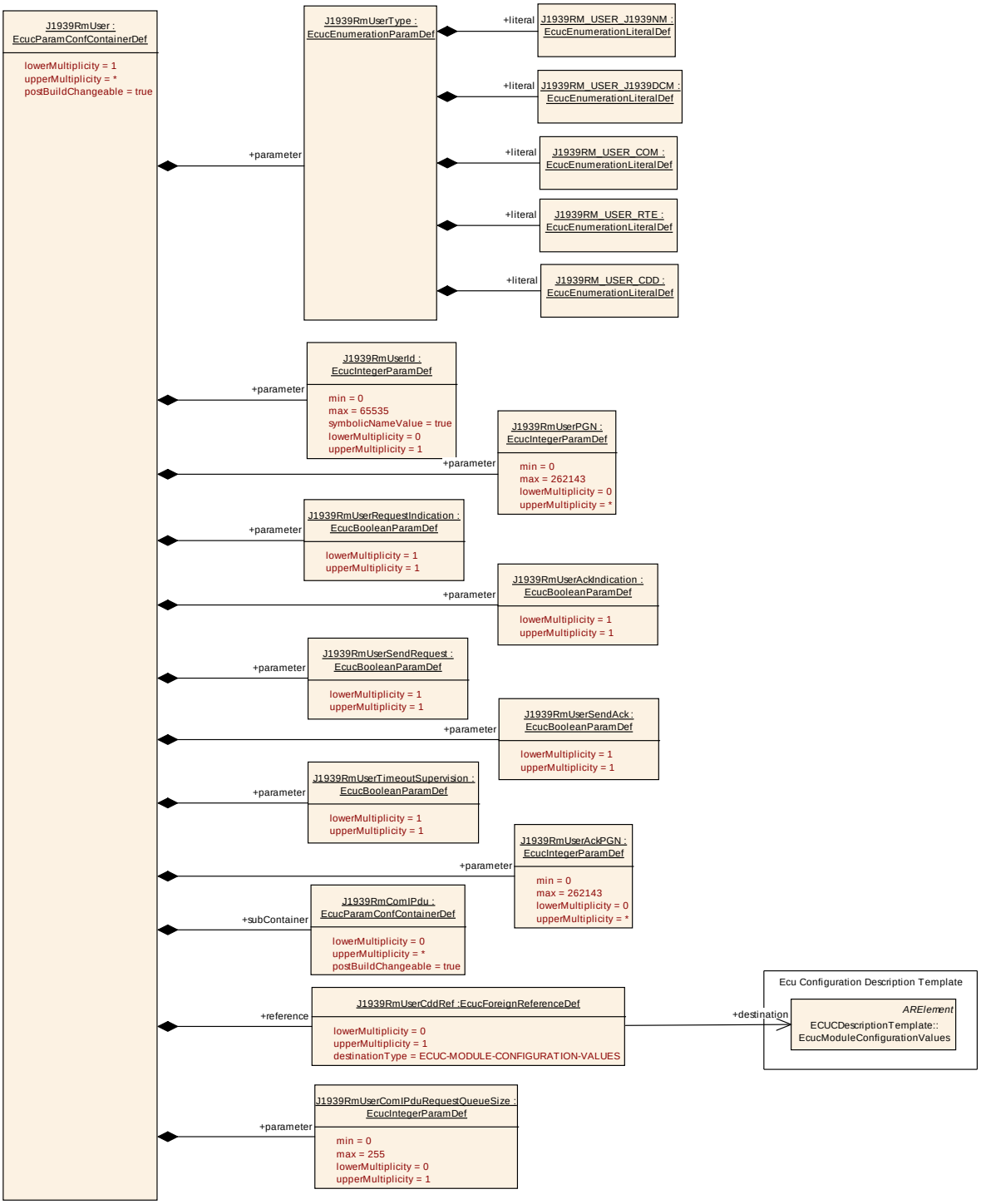

Figure 13: Configuration container J1939RmUser

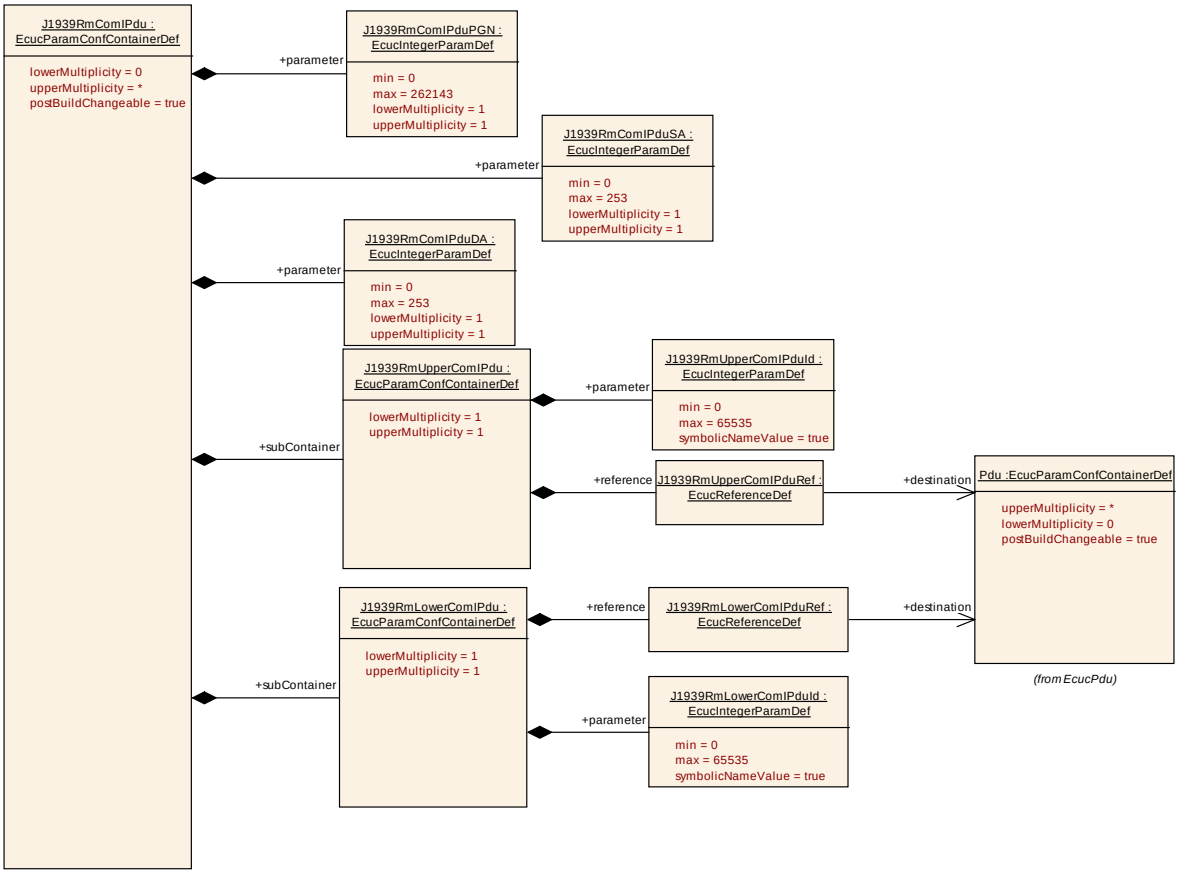

Figure 14: Configuration container J1939RmComIPdu

10.2.1 Variants

[SWS_J1939Rm_00046] [The J1939 Request Manager shall support the configuration variants VARIANT-PRE-COMPILE, VARIANT-LINK-TIME, and VARIANT-POST-BUILD.] ()

10.2.2 J1939Rm

SWS Item	**ECUC_J1939Rm_00043 :**
Module Name	*J1939Rm*
Module Description	Configuration of the J1939 Request Manager.

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
J1939RmConfigSet	1	This container is a MultipleConfigurationContainer, i.e. this container and its sub-containers exist once per configuration set.
J1939RmGeneral	1	Contains the general configuration parameters of the module.

10.2.3 J1939RmGeneral

SWS Item	**ECUC_J1939Rm_00001 :**		
Container Name	J1939RmGeneral		
Description	Contains the general configuration parameters of the module.		
Configuration Parameters			

SWS Item	**ECUC_J1939Rm_00003 :**		
Name	J1939RmDevErrorDetect		
Description	Pre-processor switch for enabling development error detection support.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00004 :**		
Name	J1939RmMainFunctionPeriod		
Description	Execution cycle of J1939Rm_MainFunction in seconds.		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	0.001 .. 0.255		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: ECU		

SWS Item	**ECUC_J1939Rm_00054 :**		
Name	J1939RmSupportAckIndication		
Description	Pre-processor switch for enabling support of acknowledgement indications.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00055 :**		
Name	J1939RmSupportAckTransmission		
Description	Pre-processor switch for enabling support of acknowledgement transmission.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00056 :**

Name	J1939RmSupportRequestIndication		
Description	Pre-processor switch for enabling support of request indications.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00057 :**		
Name	J1939RmSupportRequestTransmission		
Description	Pre-processor switch for enabling support of request transmission.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00058 :**		
Name	J1939RmSupportTimeoutSupervision		
Description	Pre-processor switch for enabling support of request timeout supervision.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00059 :**		
Name	J1939RmTxConfirmationTimeout		
Description	Time in seconds to wait for a confirmation after transmission of a message. The behaviour when the time elapses depends on the transmitted message.		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	0 .. 65.535		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00002 :**		
Name	J1939RmVersionInfoApi		
Description	Pre-processor switch for enabling version info API support.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	

Scope / Dependency	scope: local

No Included Containers

10.2.4 J1939RmConfigSet

SWS Item	**ECUC_J1939Rm_00017 :**
Container Name	J1939RmConfigSet [Multi Config Container]
Description	This container is a MultipleConfigurationContainer, i.e. this container and its sub-containers exist once per configuration set.
Configuration Parameters	

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
J1939RmChannel	1..*	Contains the parameters for a CAN channel supported by the J1939 Request Manager.
J1939RmNode	1..*	Contains the parameters for the support of a logical J1939 node (identified by an ECU address).

10.2.5 J1939RmChannel

SWS Item	**ECUC_J1939Rm_00009 :**
Container Name	J1939RmChannel
Description	Contains the parameters for a CAN channel supported by the J1939 Request Manager. **Attributes:** postBuildChangeable=true
Configuration Parameters	

SWS Item	**ECUC_J1939Rm_00007 :**		
Name	J1939RmAckQueueSize		
Description	Number of transmitted acknowledgements that can be stored.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 255		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00006 :**	
Name	J1939RmRequestQueueSize	
Description	Number of transmitted requests that can be stored.	
Multiplicity	1	
Type	EcucIntegerParamDef	
Range	0 .. 255	
Default value	--	

ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00008 :**		
Name	J1939RmRequestTimeoutMonitors		
Description	Number of transmitted requests that can be monitored for timeout.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 255		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00051 :**		
Name	J1939RmComMNetworkHandleRef		
Description	Reference to the channel defined by the ComMChannel providing access to the unique channel index ComMChannelId.		
Multiplicity	1		
Type	Symbolic name reference to [ComMChannel]		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
J1939RmAckmRxPdu	0..1	Contains the configuration of the I-PDU used to receive the Acknowledgement PG.
J1939RmAckmTxPdu	0..1	Contains the configuration of the I-PDU used to transmit the Acknowledgement PG.
J1939RmRqstRxPdu	0..1	Contains the configuration of the I-PDU used to receive the Request PG.
J1939RmRqstTxPdu	0..1	Contains the configuration of the I-PDU used to transmit the Request PG.

10.2.6 J1939RmAckmRxPdu

SWS Item	**ECUC_J1939Rm_00011 :**
Container Name	J1939RmAckmRxPdu
Description	Contains the configuration of the I-PDU used to receive the Acknowledgement PG.
Configuration Parameters	

SWS Item	**ECUC_J1939Rm_00015 :**
Name	J1939RmAckmRxPduId
Description	The I-PDU identifier used for RxIndication from PduR.

Multiplicity	1		
Type	EcucIntegerParamDef (Symbolic Name generated for this parameter)		
Range	0 .. 65535		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: ECU		

SWS Item	**ECUC_J1939Rm_00016 :**		
Name	J1939RmAckmRxPduRef		
Description	Reference to the Pdu object representing the I-PDU.		
Multiplicity	1		
Type	Reference to [Pdu]		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers

10.2.7 J1939RmAckmTxPdu

SWS Item	**ECUC_J1939Rm_00012 :**
Container Name	J1939RmAckmTxPdu
Description	Contains the configuration of the I-PDU used to transmit the Acknowledgement PG.
Configuration Parameters	

SWS Item	**ECUC_J1939Rm_00018 :**		
Name	J1939RmAckmTxPduId		
Description	The I-PDU identifier used for TxConfirmation from PduR.		
Multiplicity	1		
Type	EcucIntegerParamDef (Symbolic Name generated for this parameter)		
Range	0 .. 65535		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: ECU		

SWS Item	**ECUC_J1939Rm_00019 :**		
Name	J1939RmAckmTxPduRef		
Description	Reference to the Pdu object representing the I-PDU.		
Multiplicity	1		
Type	Reference to [Pdu]		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	

Scope / Dependency	scope: local

No Included Containers

10.2.8 J1939RmRqstRxPdu

SWS Item	**ECUC_J1939Rm_00013 :**
Container Name	J1939RmRqstRxPdu
Description	Contains the configuration of the I-PDU used to receive the Request PG.
Configuration Parameters	

SWS Item	**ECUC_J1939Rm_00020 :**		
Name	J1939RmRqstRxPduId		
Description	The I-PDU identifier used for RxIndication from PduR.		
Multiplicity	1		
Type	EcucIntegerParamDef (Symbolic Name generated for this parameter)		
Range	0 .. 65535		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: ECU		

SWS Item	**ECUC_J1939Rm_00021 :**		
Name	J1939RmRqstRxPduRef		
Description	Reference to the Pdu object representing the I-PDU.		
Multiplicity	1		
Type	Reference to [Pdu]		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers

10.2.9 J1939RmRqstTxPdu

SWS Item	**ECUC_J1939Rm_00014 :**
Container Name	J1939RmRqstTxPdu
Description	Contains the configuration of the I-PDU used to transmit the Request PG.
Configuration Parameters	

SWS Item	**ECUC_J1939Rm_00022 :**	
Name	J1939RmRqstTxPduId	
Description	The I-PDU identifier used for TxConfirmation from PduR.	
Multiplicity	1	
Type	EcucIntegerParamDef (Symbolic Name generated for this parameter)	
Range	0 .. 65535	

Default value	--		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: ECU		

SWS Item	**ECUC_J1939Rm_00023 :**		
Name	J1939RmRqstTxPduRef		
Description	Reference to the Pdu object representing the I-PDU.		
Multiplicity	1		
Type	Reference to [Pdu]		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers

10.2.10 J1939RmNode

SWS Item	**ECUC_J1939Rm_00049 :**
Container Name	J1939RmNode
Description	Contains the parameters for the support of a logical J1939 node (identified by an ECU address). **Attributes:** postBuildChangeable=true
Configuration Parameters	

SWS Item	**ECUC_J1939Rm_00005 :**		
Name	J1939RmNmNodeRef		
Description	Reference to the corresponding J1939Nm node.		
Multiplicity	1		
Type	Symbolic name reference to [J1939NmNode]		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00052 :**		
Name	J1939RmNodeChannelRef		
Description	Reference to the channels this node has access to.		
Multiplicity	1..*		
Type	Reference to [J1939RmChannel]		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
J1939RmUser	1..*	Contains the configuration of a module that uses the request and acknowledgement interfaces of J1939Rm.

10.2.11 J1939RmUser

SWS Item	**ECUC_J1939Rm_00010 :**
Container Name	J1939RmUser
Description	Contains the configuration of a module that uses the request and acknowledgement interfaces of J1939Rm. **Attributes:** postBuildChangeable=true
Configuration Parameters	

SWS Item	**ECUC_J1939Rm_00028 :**		
Name	J1939RmUserAckIndication		
Description	Enable AckIndication for this module. In case of CDD, the name is <apiServicePrefix>_AckIndication. In case of RTE, the port is defined as J1939RmRPort<J1939RmUserId>, and the operation is called AckIndication. This parameter shall not be set for J1939RmUserType J1939RM_USER_J1939NM, J1939RM_USER_J1939DCM, or J1939RM_USER_COM.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00061 :**		
Name	J1939RmUserAckPGN		
Description	PGN supported to be acknowledged to this module. The PGNs supported by different modules should usually be disjunctive. This parameter shall not be set for J1939RmUserType J1939RM_USER_J1939NM, J1939RM_USER_J1939DCM, and J1939RM_USER_COM.		
Multiplicity	0..*		
Type	EcucIntegerParamDef		
Range	0 .. 262143		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00053 :**	
Name	J1939RmUserComIPduRequestQueueSize	
Description	Number of received requests that can be stored for COM I-PDUs of this user.	
Multiplicity	0..1	
Type	EcucIntegerParamDef	
Range	0 .. 255	

Default value	--		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00025 :**		
Name	J1939RmUserId		
Description	Identifier used by a module using J1939Rm. This parameter is only required when the module uses transmission of requests.		
Multiplicity	0..1		
Type	EcucIntegerParamDef (Symbolic Name generated for this parameter)		
Range	0 .. 65535		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: ECU		

SWS Item	**ECUC_J1939Rm_00026 :**		
Name	J1939RmUserPGN		
Description	PGN supported to be requested from this module. The PGNs supported by different modules should usually be disjunctive. This parameter is predefined to AC (0x0EE00) for J1939RmUserType J1939RM_USER_J1939NM and is derived from the J1939Dcm PDUs in the system description for J1939RmUserType J1939RM_USER_J1939DCM. It shall not be set for J1939RmUserType J1939RM_USER_COM.		
Multiplicity	0..*		
Type	EcucIntegerParamDef		
Range	0 .. 262143		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00027 :**		
Name	J1939RmUserRequestIndication		
Description	Enable RequestIndication for this module. In case of J1939Nm or J1939Dcm, the name is fixed. In case of CDD, the name is <apiServicePrefix>_RequestIndication. In case of RTE, the port is defined as J1939RmRPort<J1939RmUserId>, and the operation is called RequestIndication. This parameter shall not be set for J1939RmUserType J1939RM_USER_COM.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00030 :**
Name	J1939RmUserSendAck

Description	Enable the SendAck API for this module. In case of RTE, the port is defined as J1939RmPPort<J1939RmUserId>, and the operation is called SendAck. This parameter shall not be set for J1939RmUserType J1939RM_USER_J1939NM or J1939RM_USER_COM.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00029 :**		
Name	J1939RmUserSendRequest		
Description	Enable the SendRequest API for this module. In case of RTE, the port is defined as J1939RmPPort<J1939RmUserId>, and the operation is called SendRequest. This parameter shall not be set for J1939RmUserType J1939RM_USER_J1939NM, J1939RM_USER_J1939DCM, or J1939RM_USER_COM.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00031 :**		
Name	J1939RmUserTimeoutSupervision		
Description	Enable RequestTimeoutIndication and CancelRequestTimeout for this module. RequestTimeoutIndication: In case of CDD, the name is <apiServicePrefix>_RequestTimeoutIndication. In case of RTE, the port is defined as J1939RmRPort<J1939RmUserId>, and the operation is called RequestTimeoutIndication. CancelRequestTimeout: In case of RTE, the port is defined as J1939RmPPort<J1939RmUserId>, and the operation is called CancelRequestTimeout. This parameter shall not be set for J1939RmUserType J1939RM_USER_J1939NM, J1939RM_USER_J1939DCM, or J1939RM_USER_COM.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00024 :**	
Name	J1939RmUserType	
Description	Type of module using J1939Rm.	
Multiplicity	1	
Type	EcucEnumerationParamDef	
Range	J1939RM_USER_CDD	CDDs may use all APIs provided by J1939Rm.
	J1939RM_USER_COM	J1939Rm only supports requests for COM I-PDUs
	J1939RM_USER_J1939DCM	J1939Dcm uses only request

		indication and transmission of acknowledgement.	
	J1939RM_USER_J1939NM	J1939Nm uses only request indication.	
	J1939RM_USER_RTE	Application SW-Cs may use all APIs provided by J1939Rm.	
ConfigurationClass	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00042 :**		
Name	J1939RmUserCddRef		
Description	Reference to the CDD module description. This parameter is only required for J1939RmUserType J1939RM_USER_CDD.		
Multiplicity	0..1		
Type	Foreign reference to [ECUC-MODULE-CONFIGURATION-VALUES]		
ConfigurationClass	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
J1939RmComIPdu	0..*	Contains the configuration of an I-PDU that is to be transmitted on request by COM. This configuration container is only relevant for J1939RmUserType J1939RM_USER_COM.

10.2.12 J1939RmComIPdu

SWS Item	**ECUC_J1939Rm_00032 :**
Container Name	J1939RmComIPdu
Description	Contains the configuration of an I-PDU that is to be transmitted on request by COM. This configuration container is only relevant for J1939RmUserType J1939RM_USER_COM. **Attributes:** postBuildChangeable=true
Configuration Parameters	

SWS Item	**ECUC_J1939Rm_00035 :**		
Name	J1939RmComIPduDA		
Description	Destination address of the COM I-PDU.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 253		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00033 :**

Name	J1939RmComIPduPGN		
Description	PGN of the COM I-PDU.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 262143		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_J1939Rm_00034 :**		
Name	J1939RmComIPduSA		
Description	Source address of the COM I-PDU.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 253		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
J1939RmLowerComIPdu	1	Contains the configuration of the I-PDU that is sent from J1939Rm to CanIf or J1939Tp.
J1939RmUpperComIPdu	1	Contains the configuration of the I-PDU that is sent from COM to J1939Rm.

10.2.13 J1939RmUpperComIPdu

SWS Item	**ECUC_J1939Rm_00036 :**
Container Name	J1939RmUpperComIPdu
Description	Contains the configuration of the I-PDU that is sent from COM to J1939Rm.
Configuration Parameters	

SWS Item	**ECUC_J1939Rm_00038 :**		
Name	J1939RmUpperComIPduId		
Description	The I-PDU identifier used for communication with PduR.		
Multiplicity	1		
Type	EcucIntegerParamDef (Symbolic Name generated for this parameter)		
Range	0 .. 65535		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: ECU		

SWS Item	**ECUC_J1939Rm_00039 :**
Name	J1939RmUpperComIPduRef

Description	Reference to the Pdu object representing the I-PDU.		
Multiplicity	1		
Type	Reference to [Pdu]		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers

10.2.14 J1939RmLowerComIPdu

SWS Item	**ECUC_J1939Rm_00037 :**
Container Name	J1939RmLowerComIPdu
Description	Contains the configuration of the I-PDU that is sent from J1939Rm to CanIf or J1939Tp.
Configuration Parameters	

SWS Item	**ECUC_J1939Rm_00041 :**		
Name	J1939RmLowerComIPduId		
Description	The I-PDU identifier used for communication with PduR.		
Multiplicity	1		
Type	EcucIntegerParamDef (Symbolic Name generated for this parameter)		
Range	0 .. 65535		
Default value	--		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: ECU		

SWS Item	**ECUC_J1939Rm_00040 :**		
Name	J1939RmLowerComIPduRef		
Description	Reference to the Pdu object representing the I-PDU.		
Multiplicity	1		
Type	Reference to [Pdu]		
ConfigurationClass	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers

10.3 Published Information

For details, refer to the chapter 10.3 “Published Information” in the SWS BSW General [4].