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Disclaimer

Contents

1 Introduction and functional overview

This specification specifies the functionality, API and the configuration of the AUTOSAR Basic Software module SOME/IP TP.

The task of the SOME/IP TP module is to segment SOME/IP packets, which do not fit into one single UDP packet. On the reception side, it re-assembles the received SOME/IP segments.

2 Acronyms and Abbreviations

The glossary below includes acronyms and abbreviations relevant to the SOME/IP Transport Protocol module that are not included in the [1, AUTOSAR glossary].

Abbreviation / Acronym:	Description:
SOME/IP	Scalable service-Oriented MiddlewarE over IP

3 Related documentation

3.1 Input documents & related standards and norms

[1] Glossary
AUTOSAR_FO_TR_Glossary

[2] General Specification of Basic Software Modules
AUTOSAR_CP_SWS_BSWGeneral

[3] General Requirements on Basic Software Modules
AUTOSAR_CP_RS_BSWGeneral

[4] Layered Software Architecture
AUTOSAR_CP_EXP_LayeredSoftwareArchitecture

[5] Requirements on SOME/IP Protocol
AUTOSAR_FO_RS_SOMEIPProtocol

[6] SOME/IP Protocol Specification
AUTOSAR_FO_PRS_SOMEIPProtocol

[7] Specification of PDU Router
AUTOSAR_CP_SWS_PDURouter

3.2 Related specification

AUTOSAR provides a General Specification on Basic Software modules [2, SWS BSW General], which is also valid for SOME/IP Transport Protocol.

Thus, the specification SWS BSW General shall be considered as additional and required specification for SOME/IP Transport Protocol.

[1, AUTOSAR glossary] [2, SWS BSW General] [3, SRS General] [4, EXP Layered Software Architecture] [5, RS SOME/IP Protocol] [6, PRS SOME/IP Protocol] [7, SWS PDU Router]

4 Constraints and assumptions

4.1 Limitations

The SOME/IP TP is a simple protocol to segment SOME/IP messages. It does not implement retry mechanism nor does it reordering of received SOME/IP segments.

These limitations are intended to spare runtime and memory resources on receiver side. Nonetheless, this is a deviation from the AUTOSAR SOME/IP Protocol Specification (PRS_SOMEIP_00747 to PRS_SOMEIP_00754).

The rational for these limitations is the typical use-case which is "streaming" of large SOME/IP messages.

4.2 Applicability to car domains

This module is applicable for SOME/IP communication.

5 Dependencies to other modules

5.1 AUTOSAR PDU Router

The SOME/IP TP module uses the PduR for both directions, the transmission path, and the reception path.

5.2 AUTOSAR Default Error Tracer

In order to be able to report development errors, the SOME/IP TP module has to have access to the error hook of the Default Error Tracer.

6 Requirements Tracing

The following tables reference the requirements specified in [5] and links to the fulfillment of these. Please note that if column “Satisfied by” is empty for a specific requirement this means that this requirement is not fulfilled by this document.

Requirement	Description	Satisfied by
[RS_SOMEIP_00010]	SOME/IP protocol shall support different transport protocols underneath	[SWS_SomeIpTp_00001] [SWS_SomeIpTp_00002] [SWS_SomeIpTp_00004] [SWS_SomeIpTp_00005] [SWS_SomeIpTp_00006] [SWS_SomeIpTp_00007] [SWS_SomeIpTp_00008] [SWS_SomeIpTp_00010] [SWS_SomeIpTp_00011] [SWS_SomeIpTp_00012] [SWS_SomeIpTp_00013] [SWS_SomeIpTp_00014] [SWS_SomeIpTp_00015] [SWS_SomeIpTp_00016] [SWS_SomeIpTp_00017] [SWS_SomeIpTp_00018] [SWS_SomeIpTp_00019] [SWS_SomeIpTp_00020] [SWS_SomeIpTp_00021] [SWS_SomeIpTp_00022] [SWS_SomeIpTp_00023] [SWS_SomeIpTp_00024] [SWS_SomeIpTp_00025] [SWS_SomeIpTp_00026] [SWS_SomeIpTp_00027] [SWS_SomeIpTp_00028] [SWS_SomeIpTp_00029] [SWS_SomeIpTp_00030] [SWS_SomeIpTp_00031] [SWS_SomeIpTp_00032] [SWS_SomeIpTp_00033] [SWS_SomeIpTp_00034] [SWS_SomeIpTp_00035] [SWS_SomeIpTp_00036] [SWS_SomeIpTp_00037] [SWS_SomeIpTp_00038] [SWS_SomeIpTp_00039] [SWS_SomeIpTp_00040] [SWS_SomeIpTp_00041] [SWS_SomeIpTp_00042] [SWS_SomeIpTp_00045] [SWS_SomeIpTp_00048] [SWS_SomeIpTp_00049] [SWS_SomeIpTp_00050] [SWS_SomeIpTp_00051] [SWS_SomeIpTp_00054] [SWS_SomeIpTp_00062] [SWS_SomeIpTp_00063] [SWS_SomeIpTp_00064] [SWS_SomeIpTp_00071] [SWS_SomeIpTp_00077] [SWS_SomeIpTp_00078] [SWS_SomeIpTp_00079] [SWS_SomeIpTp_00080] [SWS_SomeIpTp_00082]
[RS_SOMEIP_00011]	SOME/IP protocol shall support messages of different lengths	[SWS_SomeIpTp_00001] [SWS_SomeIpTp_00002] [SWS_SomeIpTp_00003] [SWS_SomeIpTp_00004] [SWS_SomeIpTp_00005] [SWS_SomeIpTp_00006]
[RS_SOMEIP_00027]	SOME/IP protocol shall define the header layout of messages	[SWS_SomeIpTp_00006] [SWS_SomeIpTp_00009] [SWS_SomeIpTp_00010] [SWS_SomeIpTp_00011] [SWS_SomeIpTp_00012] [SWS_SomeIpTp_00013] [SWS_SomeIpTp_00014] [SWS_SomeIpTp_00015] [SWS_SomeIpTp_00026] [SWS_SomeIpTp_00077]
[RS_SOMEIP_00040]	SOME/IP protocol shall support providing the length of a serialized data element in the payload	[SWS_SomeIpTp_00055]
[RS_SOMEIP_00051]	SOME/IP protocol shall provide support for segmented transmission of large data	[SWS_SomeIpTp_00002] [SWS_SomeIpTp_00004] [SWS_SomeIpTp_00005] [SWS_SomeIpTp_00009] [SWS_SomeIpTp_00012] [SWS_SomeIpTp_00019] [SWS_SomeIpTp_00023] [SWS_SomeIpTp_00024] [SWS_SomeIpTp_00025] [SWS_SomeIpTp_00030] [SWS_SomeIpTp_00031] [SWS_SomeIpTp_00035] [SWS_SomeIpTp_00041] [SWS_SomeIpTp_00042] [SWS_SomeIpTp_00048] [SWS_SomeIpTp_00050] [SWS_SomeIpTp_00051] [SWS_SomeIpTp_00063] [SWS_SomeIpTp_00064] [SWS_SomeIpTp_00071] [SWS_SomeIpTp_00078]
[SRS_BSW_00301]	All AUTOSAR Basic Software Modules shall only import the necessary information	[SWS_SomeIpTp_00043]

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Requirement	Description	Satisfied by
[SRS_BSW_00337]	Classification of development errors	[SWS_SomeIpTp_00066] [SWS_SomeIpTp_00074] [SWS_SomeIpTp_00075]
[SRS_BSW_00357]	For success/failure of an API call a standard return type shall be defined	[SWS_SomeIpTp_00055]
[SRS_BSW_00369]	All AUTOSAR Basic Software Modules shall not return specific development error codes via the API	[SWS_SomeIpTp_00074]
[SRS_BSW_00373]	The main processing function of each AUTOSAR Basic Software Module shall be named according the defined convention	[SWS_SomeIpTp_00058] [SWS_SomeIpTp_00069]
[SRS_BSW_00384]	The Basic Software Module specifications shall specify at least in the description which other modules they require	[SWS_SomeIpTp_00060] [SWS_SomeIpTp_00061]
[SRS_BSW_00406]	API handling in uninitialized state	[SWS_SomeIpTp_00057] [SWS_SomeIpTp_00067] [SWS_SomeIpTp_00072] [SWS_SomeIpTp_00073] [SWS_SomeIpTp_00076]
[SRS_BSW_00407]	Each BSW module shall provide a function to read out the version information of a dedicated module implementation	[SWS_SomeIpTp_00044] [SWS_SomeIpTp_00046]
[SRS_BSW_00411]	All AUTOSAR Basic Software Modules shall apply a naming rule for enabling/disabling the existence of the API	[SWS_SomeIpTp_00044] [SWS_SomeIpTp_00046]
[SRS_BSW_00425]	The BSW module description template shall provide means to model the defined trigger conditions of schedulable objects	[SWS_SomeIpTp_00058] [SWS_SomeIpTp_00059] [SWS_SomeIpTp_00069] [SWS_SomeIpTp_00070]
[SRS_BSW_00480]	Null pointer errors shall follow a naming rule	[SWS_SomeIpTp_00066] [SWS_SomeIpTp_00075]
[SRS_BSW_00481]	Invalid configuration set selection errors shall follow a naming rule	[SWS_SomeIpTp_00052]
[SRS_BSW_00487]	Errors for module initialization shall follow a naming rule	[SWS_SomeIpTp_00057] [SWS_SomeIpTp_00067] [SWS_SomeIpTp_00072] [SWS_SomeIpTp_00073]

Table 6.1: Requirements Tracing

7 Functional specification

The task of the SOME/IP TP module is to segment SOME/IP packets, which do not fit into one single UDP packet. On the reception side, it assembles the received SOME/IP segments.

The SOME/IP TP module interacts with the PDU Router for both directions, the transmission and the reception path.

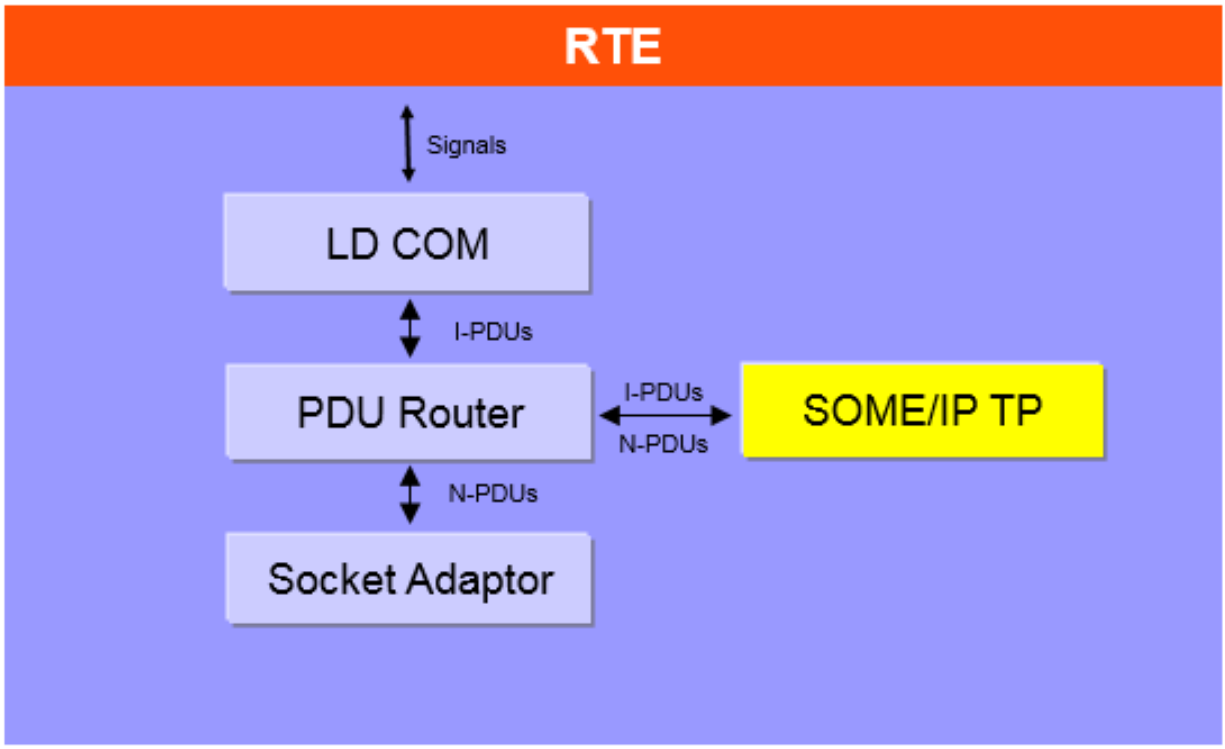

Figure 7.1: Location of the SOME/IP TP module

7.1 Overview of the SOME/IP header

This chapter describe the relevant parts of the SOME/IP header for the segmentation of SOME/IP messages.

The Message Type field of the SOME/IP header contains a bit, which marks the SOME/IP PDU as a segment of an original SOME/IP message. Every segmented SOME/IP message adds SOME/IP TP specific fields to the SOME/IP header.

These fields contain control information for the segmentation and the reassembly of original, large SOME/IP messages. How they are used is described in the following chapters.

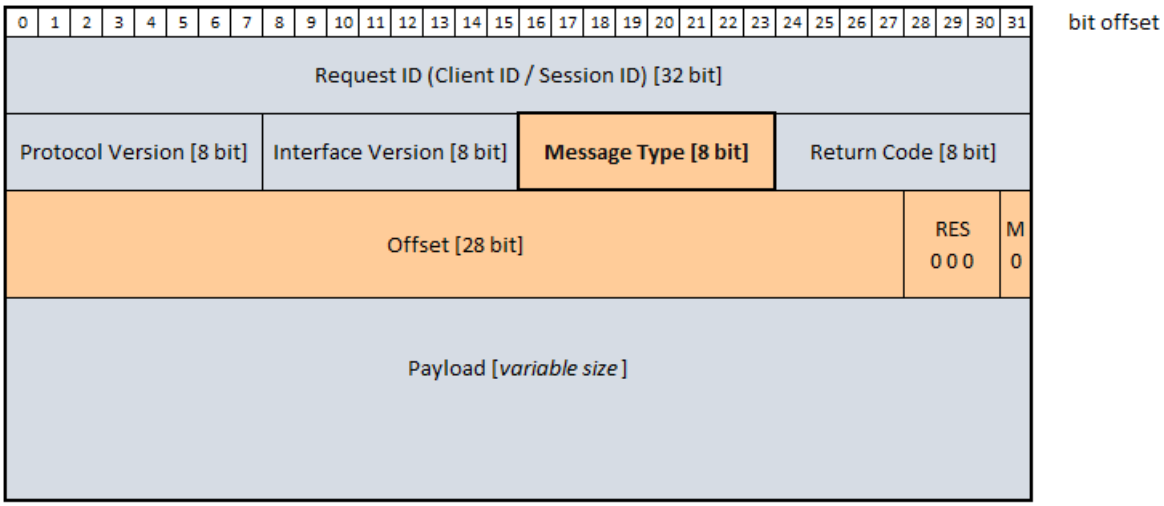

Figure 7.2: SOME/IP TP header

Note: The Offset Field, the Reserved bits and the More Segment Flag are only present if the TP-Flag is set to '1'.

7.1.1 Message Type Field

The Message Type Field contains the TP-Flag, which marks this SOME/IP message as a SOME/IP segment of an original SOME/IP message.

	Message Type [8 bit]							
bit offset	16	17	18	19	20	21	22	23
Value	x	x	0/1	x	x	x	x	x
Name	ignore	ignore	TP-Flag	ignore	ignore	ignore	ignore	ignore

Table 7.1: Location of the TP-Flag

7.1.2 Offset Field

The Offset Field [28 bits] is located right after the Return Code field. It starts at bit offset 0, and ends at bit offset 27. The contained value increases after every transmitted/ received segment according to the payload length of the previous transmitted/received SOME/IP segment.

The **Offset Field** contains the **Offset Value** in units of 16 bytes. (E.g.: If the Offset Field is set to 92, 1472 Payload bytes have been transmitted so far.) These two different terms are used in the remainder of this document.

Note: The payload length provided in the Offset Field does not include the bytes which are needed for the SOME/IP header.

7.1.3 Reserved Field

The Reserved Field [3 bits] follows the Offset Field. It starts at bit offset 28 and ends at bit offset 30. These three bits are reserved and set to 0.

7.1.4 More Segments Flag

The More Segments Flag [1 bit] indicates whether another segmented SOME/IP PDU will follow.

7.1.5 Example

An original SOME/IP message of 5880 bytes payload has to be transmitted.

The Length field of this original SOME/IP message is set to 8 + 5880 bytes.

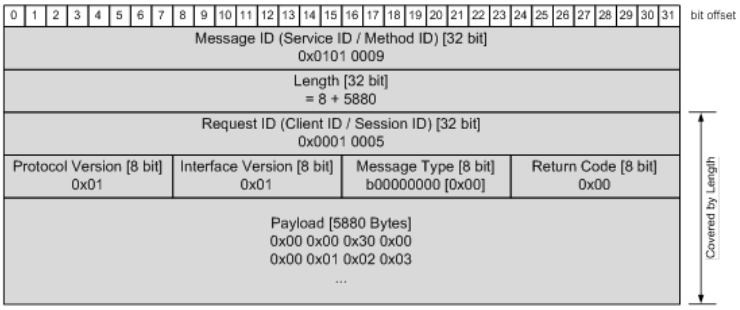

Figure 7.3: Example: Header of Original SOME/IP message

This original SOME/IP message will now be segmented into 5 consecutive SOME/IP segments. Every payload of these segments carries at most 1392 bytes in this example.

For these segments, the SOME/IP TP module adds additional TP fields (marked red). The Length field of the SOME/IP carries the overall length of the SOME/IP segment including 8 bytes for the Request ID, Protocol Version, Interface Version, Message Type and Return Code. Because of the added TP fields (4 bytes), this Length information is extended by 4 additional SOME/IP TP bytes.

The following table provides an overview of the relevant SOME/IP header settings for every SOME/IP segment:

	Length (Bytes)	Message Type [TP-Flag]	Offset Value	More Segment Flag
1st segment	8 + 4 + 1392 = 1404	TP-Flag = '1'	0	1
2nd segment	8 + 4 + 1392 = 1404	TP-Flag = '1'	87	1
3rd segment	8 + 4 + 1392 = 1404	TP-Flag = '1'	174	1

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4th segment	8 + 4 + 1392 = 1404	TP-Flag = ’1’	261	1
5th segment	8 + 4 + 312 = 324	TP-Flag = ’1’	348	0

Table 7.2: Example: Overview of relevant SOME/IP TP headers

Note: Please be aware that the value provided within the Offset Field is given in units of 16 bytes, i.e.: The Offset Value of 87 correspond to 1392 bytes Payload.

The complete SOME/IP headers of the SOME/IP segments message will look like this in detail:

- The first 4 segments contain 1392 Payload bytes each with "More Segments Flag" set to ’1’:

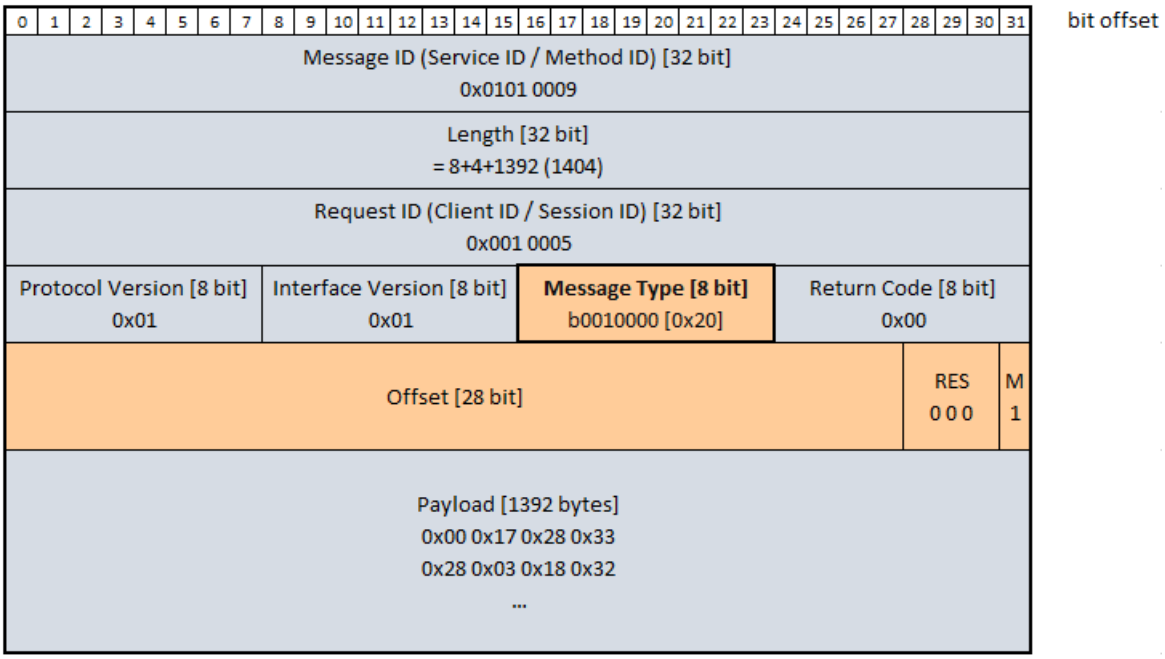

Figure 7.4: Example: Header of the SOME/IP segments

- The last segment (i.e. #5) contains the remaining 312 Payload bytes of the original 5880 bytes payload. This last segment is marked with "More Segments Flag" set to ’0’.

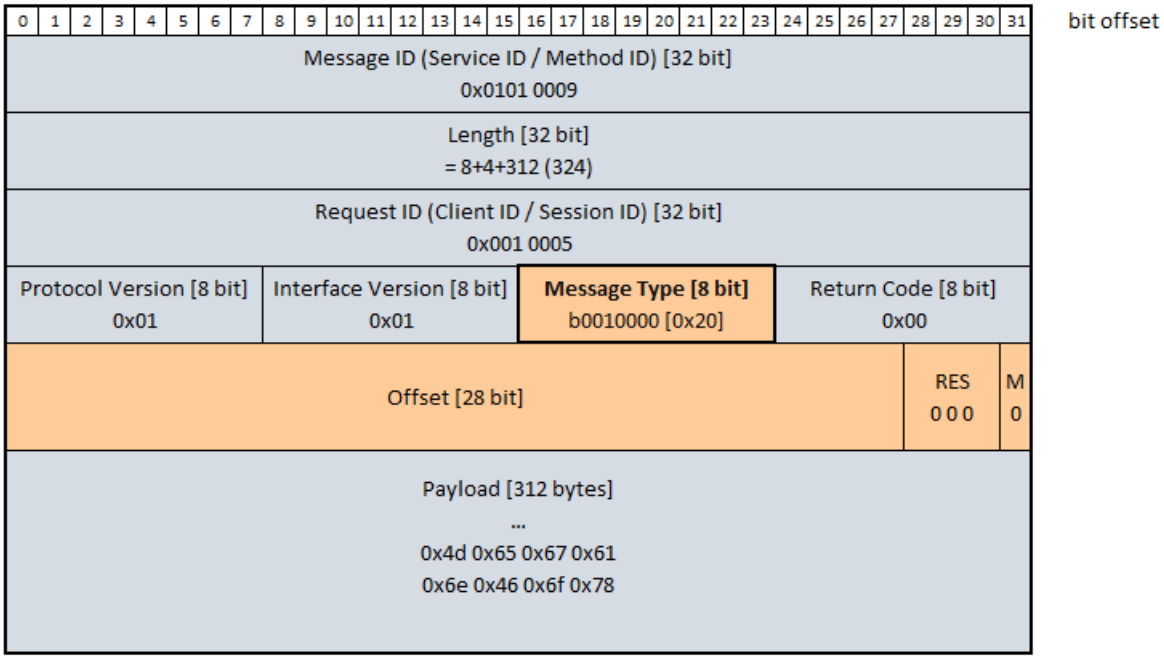

Figure 7.5: Example: Header of the last SOME/IP segment

7.2 Segmentation of SOME/IP messages (TX Path)

The following chapter describe the necessary activities of the SOME/IP TP module to segment SOME/IP messages.

7.2.1 Size of SOME/IP segments

[SWS_SomeIpTp_00001]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00011

⌈The SOME/IP TP module shall remember the PDU length separately for every PDU ID which is passed by the PduInfoPtr parameter of the SomeIpTp_Transmit() call.⌋

Note:

The SOME/IP TP module needs this information to calculate the payload size, the Offset Value, and the More Segments Flag for the SOME/IP segments which are going to be transmitted.

[SWS_SomeIpTp_00002]

Upstream requirements: RS_SOMEIP_00011, RS_SOMEIP_00010, RS_SOMEIP_00051

⌈The amount of generated SOME/IP segments shall be as little as possible.⌋

Note: This means that the SOME/IP TP module shall try to always use the maximum allowed segmentation size.

[SWS_SomeIpTp_00003]

Upstream requirements: RS_SOMEIP_00011

⌈The size of every segmented SOME/IP message shall consist of the sum of 12 bytes of SOME/IP header, and the Payload bytes itself.⌋

[SWS_SomeIpTp_00004]

Upstream requirements: RS_SOMEIP_00011, RS_SOMEIP_00010, RS_SOMEIP_00051

⌈The SOME/IP TP module shall derive the maximum possible size of the segmented SOME/IP PDUs using the parameter SomeIpTpTxNPduRef.⌋

[SWS_SomeIpTp_00005]

Upstream requirements: RS_SOMEIP_00011, RS_SOMEIP_00010, RS_SOMEIP_00051

⌈The SOME/IP TP module shall generate segmented SOME/IP PDUs not larger than the size derived from the parameter SomeIpTpTxNPduRef.⌋

[SWS_SomeIpTp_00006]

Upstream requirements: RS_SOMEIP_00011, RS_SOMEIP_00010, RS_SOMEIP_00027

⌈Every payload of a segmented SOME/IP message except the last one has to be a multiple of 16 bytes.⌋

Note:

The last segment may consist of an odd payload or a payload which is not dividable by 16. The amount of the contained payload bytes are written into the Length field of the SOME/IP header.

[SWS_SomeIpTp_00007]

Upstream requirements: RS_SOMEIP_00010

⌈The SOME/IP TP module shall buffer the pointer to the Meta-data for every PDU ID separately which is passed by the PduInfoPtr parameter of the API SomeIpTp_Transmit(), and forward this information when PduR_SomeIpTpTransmit() is called for each segment.⌋

7.2.2 Header of SOME/IP segments

Every generated SOME/IP header for each SOME/IP segment is set to the following values:

The following fields are based on the received PDU of the upper layer:

- Request ID [32 bit] -direct copy, see SWS_SomeIpTp_00007
- Protocol Version [8 bit] - direct copy, see SWS_SomeIpTp_00007
- Interface Version [8 bit] - direct copy, see SWS_SomeIpTp_00007
- Message Type [8 bit] - calculated value, see SWS_SomeIpTp_00008
- Return Code [8 bit] - direct copy, see SWS_SomeIpTp_00007

The following fields are added by the SOME/IP TP module:

- Offset [28 bit] - calculated value, see SWS_SomeIpTp_00011
- Reserved bits [3 bit] - statically set to '000', see SWS_SomeIpTp_00012
- More Segment Flag [1 bit] - calculated value, see SWS_SomeIpTp_00013

[SWS_SomeIpTp_00008]

Upstream requirements: RS_SOMEIP_00010

⌈The SOME/IP TP module shall store the Request ID, Protocol Version, Interface Version, Message Type, and the Return Code of the SOME/IP header for every PDU ID separately which is returned by the first call of PduR_SomeIpTpCopyTxData() triggered by the API call SomeIpTp_Transmit().⌋

Note:

The SOME/IP header is contained in the first 8 bytes of the total length of the original SOME/IP PDU. The total length is provided via the API call SomeIpTp_Transmit().

[SWS_SomeIpTp_00009]

Upstream requirements: RS_SOMEIP_00027, RS_SOMEIP_00051

⌈If the provided SDU fits into one single PDU, the provided SOME/IP header shall be used with no modification.

If the provided SDU does not fit into one single SOME/IP PDU, the SOME/IP TP module shall set the TP-Flag of the Message Type to '1' for every SOME/IP segment which is going to be sent on the bus via the PduR.

All the other bits contained in the Message Type field shall stay untouched.⌋

[SWS_SomeIpTp_00010]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00027

⌈The SOME/IP TP module shall create and attach the Offset Field, the Reserved bits, and the More Segment Flag to every SOME/IP segment which is going to be sent on the bus.⌋

[SWS_SomeIpTp_00011]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00027

⌈The Offset Field of the first SOME/IP segment shall be set to '0'.⌋

[SWS_SomeIpTp_00012]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00027, RS_SOMEIP_00051

⌈The SOME/IP TP module shall increase the value of the Offset Field for every successfully transmitted SOME/IP segment by the amount of bytes which have been transmitted by the previous SOME/IP segment divided by 16.⌋

[SWS_SomeIpTp_00013]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00027

⌈The SOME/IP TP module shall set the Reserved bits statically to '000' by the sender and shall be ignored by the receiver.⌋

[SWS_SomeIpTp_00014]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00027

⌈The SOME/IP TP module shall set the More Segment Flag to '1' except for the last SOME/IP segment.⌋

[SWS_SomeIpTp_00015]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00027

⌈The SOME/IP TP module shall set the More Segment Flag to '0' for the last SOME/IP segment.⌋

7.2.3 Sending of SOME/IP segments

[SWS_SomeIpTp_00016]

Upstream requirements: RS_SOMEIP_00010

⌈If the API SomeIpTp_Transmit() is called, the SOME/IP TP module shall check for an ongoing segmentation for the provided PDU ID.⌋

[SWS_SomeIpTp_00017]

Upstream requirements: RS_SOMEIP_00010

⌈If the API SomeIpTp_Transmit()is called while no segmentation is ongoing for this PDU ID, the SOME/IP TP module shall perform the following steps in the following order:

- Remember the provided PDU length (provided PduInfoPtr).
- Derive the PDU ID which shall be used for every segmented SOME/IP PDU (see SomeIpTpTxNPduRef).
- Calculate the size of the SOME/IP for the first segment (considering header and payload)
- Call the API PduR_SomeIpTpTransmit() from SomeIpTp_MainFunctionTx() using the derived PDU ID and the calculated PDU size and set the SduDataPtr to NULL_PTR.

⌋

Note:

No subsequent call to PduR_SomeIpTpTxConfirmation() shall take place since the transmission request is rejected before segmentation process started.

[SWS_SomeIpTp_00018]

Upstream requirements: RS_SOMEIP_00010

⌈When the API SomeIpTp_TriggerTransmit() is called, create the header for the SOME/IP segment and call the API PduR_SomeIpTpCopyTxData()using the calculated payload for this segment, and set the parameter retry to NULL_PTR.⌋

[SWS_SomeIpTp_00019]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00051

⌈The size for consecutive SOME/IP TP segments all but not the last, shall be derived by the maximum possible size of the segmented SOME/IP PDUs using the parameter SomeIpTpTxNPduRef.⌋

[SWS_SomeIpTp_00078]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00051

⌈The SOME/IP TP module shall verify that the available buffer returned by PduR_SomeIpTpCopyTxData() via availableDataPtr is larger (for all but the last segment) or equal (for the last segment) size of SOME/IP TP segments.⌋

[SWS_SomeIpTp_00020]

Upstream requirements: RS_SOMEIP_00010

⌈

The SOME/IP TP module shall debounce subsequent calls of the API PduR_SomeIpTpTransmit() for the same PDU ID,using the parameter SomeIpTpNPduSeparationTime.

It defines the time span between the call of SomeIpTp_TxConfirmation(), and the subsequent call of the API PduR_SomeIpTpTransmit(). If SomeIpTpTxBurstSize is configured to a value > 1 the SOME/IP TP module shall debounce for the same PDU ID only every SomeIpTpTxBurstSize segments.

⌋

[SWS_SomeIpTp_00021]

Upstream requirements: RS_SOMEIP_00010

⌈If the last SOME/IP segment of the original SOME/IP PDU has been transmitted successfully (i.e. the call of SomeIpTp_TxConfirmation()with parameter success equals TRUE occurred for the last call of PduR_SomeIpTpCopyTxData()), the SOME/IP TP module shall

- Call the API PduR_SomeIpTpTxConfirmation().

⌋

Note:

With the call of PduR_SomeIpTpTxConfirmation(), the segmentation process is finished.

7.2.4 Interruption of the disassembly process

[SWS_SomeIpTp_00022]

Upstream requirements: RS_SOMEIP_00010

⌈If the API SomeIpTp_Transmit() is called with a PDU ID which is currently used for an ongoing segmentation,

- E_NOT_OK shall be returned.
- The ongoing disassembly process for this PDU ID shall be canceled.
- The API PduR_SomeIpTpTxConfirmation()with result set to E_NOT_OK shall be called.
- The API Det_ReportRuntimeError() shall be called with the runtime error code SOMEIPTP_E_DISASSEMBLY_INTERRUPT.

⌋

[SWS_SomeIpTp_00082]

Upstream requirements: RS_SOMEIP_00010

⌈If PduR_SomeIpTpTransmit() returns something different than E_OK during the process of ongoing segmentation.

- The ongoing disassembly process for this PDU ID shall be canceled.
- The API PduR_SomeIpTpTxConfirmation() with result set to E_NOT_OK shall be called.
- The API Det_ReportRuntimeError() shall be called with the runtime error code SOMEIPTP_E_DISASSEMBLY_INTERRUPT.

⌋

[SWS_SomeIpTp_00023]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00051

⌈If the API SomeIpTp_TxConfirmation() is called with parameter success set to FALSE,

- The disassembly process for this PDU ID shall be canceled.
- The API PduR_SomeIpTpTxConfirmation()with result set to E_NOT_OK shall be called.
- The API Det_ReportRuntimeError() shall be called with the runtime error code SOMEIPTP_E_DISASSEMBLY_INTERRUPT.

⌋

[SWS_SomeIpTp_00024]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00051

⌈

In case the available buffer returned by PduR_SomeIpTpCopyTxData() via availableDataPtr does not satisfied the following conditions

- larger or equal to 16 bytes,
- larger (for all but the last segment) or equal (for the last segment) size of SOME/IP TP segments,

the SOME/IP TP module shall:

- Cancel the disassembly process for this PDU ID .
- Call the API PduR_SomeIpTpTxConfirmation() with result set to E_NOT_OK.
- Call the API Det_ReportRuntimeError() with the runtime error code SOMEIPTP_E_DISASSEMBLY_INTERRUPT.

⌋

[SWS_SomeIpTp_00025]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00051

⌈If an API PduR_SomeIpTpCopyTxData()returns something else than BUFREQ_OK,

- The disassembly process for this PDU ID shall be canceled.
- The API PduR_SomeIpTpTxConfirmation()with result set to E_NOT_OK shall be called.
- The API Det_ReportRuntimeError() shall be called with the runtime error code SOMEIPTP_E_DISASSEMBLY_INTERRUPT.

⌋

7.3 Assembly of received SOME/IP messages (RX path)

[SWS_SomeIpTp_00031]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00051

⌈If SomeIpTp_RxIndication() is called with TP Flag set to '0', SOME/IP TP shall call PduR_SomeIpTpStartOfReception, PduR_SomeIpTpCopyRxData(), and PduR_SomeIpTpRxIndication(), directly after each other providing the received indication.⌋

[SWS_SomeIpTp_00071]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00051

⌈If SomeIpTp_RxIndication() is called with

- TP Flag set to '1',
- Offset Field set to '0', and
- More Segment Flag set to '0',

SOME/IP TP shall call PduR_SomeIpTpStartOfReception(), PduR_SomeIpTpCopyRxData(), and SomeIpTp_RxIndication(), directly after each other providing the received indication.⌋

[SWS_SomeIpTp_00026]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00027

⌈If the API SomeIpTp_RxIndication() is called, the SOME/IP TP module shall derive the following SOME/IP header information from the first 12 bytes of the received PDU:

- Request ID [32 bit]
- Protocol Version [8 bit]

- Interface Version [8 bit]
- Message Type [8 bit]
- Return Code [8 bit]
- Offset [28 bit]
- Reserved bits [3 bit]
- More Segment Flag [1 bit]

⌋

[SWS_SomeIpTp_00077]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00027

⌈If the TP flag is not set and no assembly session is active, only the following parameters shall be extracted :

- Request ID [32 bit]
- Protocol Version [8 bit]
- Interface Version [8 bit]
- Message Type [8 bit]
- Return Code [8 bit]

⌋

[SWS_SomeIpTp_00027]

Upstream requirements: RS_SOMEIP_00010

⌈The SOME/IP TP module shall be able to store the value of the Offset Field for every PDU ID separately.⌋

[SWS_SomeIpTp_00028]

Upstream requirements: RS_SOMEIP_00010

⌈The SOME/IP TP module shall be able to store the number of Payload bytes for every PDU ID separately which has been passed by a call of SomeIpTp_RxIndication().⌋

[SWS_SomeIpTp_00029]

Upstream requirements: RS_SOMEIP_00010

⌈The SOME/IP TP module shall store the status of the More Segment Flag for every PDU ID separately which is passed by a call of SomeIpTP_RxIndication().⌋

[SWS_SomeIpTp_00030]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00051

⌈The SOME/IP TP module shall buffer the pointer to the Meta-data for every PDU ID separately which is passed by the PduInfoPtr parameter of the API SomeIpTp_RxIndication(), and forward this information when PduR_SomeIpTpStartOfReception is called.⌋

7.3.1 SOME/IP segment received with Offset 0

[SWS_SomeIpTp_00032]

Upstream requirements: RS_SOMEIP_00010

⌈If a SOME/IP segment is successfully received with Offset Field set to 0, the SOME/IP TP module shall store the values of the received SOME/IP header for each PDU ID separately.These values shall be used as reference values for the (expected) following consecutive receiving SOME/IP segments (i.e. with Offset Field set to > 0).⌋

[SWS_SomeIpTp_00033]

Upstream requirements: RS_SOMEIP_00010

⌈If a SOME/IP segment is successfully received with Offset Field set to 0, the SOME/IP TP module shall

- Start the Rx timeout time defined by SomeIpTpRxTimeoutTime.
- Call the API PduR_SomeIpTpStartOfReception() with the PDU ID derived from the parameter SomeIpTpRxSduRef and the TpSduLength set to ’0’.

⌋

Note:

TpSduLength set to ’0’ indicates "unknown message length" to the upper layers.

[SWS_SomeIpTp_00034]

Upstream requirements: RS_SOMEIP_00010

⌈

If a SOME/IP segment is successfully received with Offset Field set to 0 and after the SOME/IP TP module has called the API PduR_SomeIpTpStartOfReception(), the SOME/IP TP module shall check the size returned via bufferSizePtr.

If the returned size is greater or equal to the sum of the received payload and the added SOME/IP header, the SOME/IP TP module shall call the API PduR_SomeIpTpCopyRxData() to pass the SOME/IP header (excluding the SOME/IP TP header) of

the assembled SOME/IP message to the SOME/IP TP's upper layer. This shall include the following content:

- Request ID [32 bit]
- Protocol Version [8 bit]
- Interface Version [8 bit]
- Message Type [8 bit] - see [SWS_SomeIpTp_00028]
- Return Code [8 bit]

⌋

[SWS_SomeIpTp_00079]

Upstream requirements: RS_SOMEIP_00010

⌈

After calling PduR_SomeIpTpCopyRxData() to pass the SOME/IP header (excluding the SOME/IP TP header) of the assembled SOME/IP message to the SOME/IP TP's upper layer (see [SWS_SomeIpTp_00034]), the SOME/IP TP module shall call the API PduR_SomeIpTpCopyRxData() again, to provide the payload of the assembled SOME/IP message.

⌋

Note: Sequential calls of PduR_SomeIpTpCopyRxData() avoid storing of the SOME/IP TP segment in the SOME/IP TP module and support a proper handling to strip off the SOME/IP TP header by skipping 4 bytes that include the Offset field, Reserved Field and the more Segment flag

[SWS_SomeIpTp_00035]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00051

⌈The SOME/IP TP module shall set the TP-Flag contained in the Message Type back to '0' before the assembled SOME/IP header is passed to the upper layer.⌋

[SWS_SomeIpTp_00036]

Upstream requirements: RS_SOMEIP_00010

⌈The SOME/IP TP module shall store the number of Payload bytes for every PDU ID separately which has been passed to the upper layer.⌋

Note:

This information will be used to verify the Offset Value of the consecutive SOME/IP segments.

7.3.2 SOME/IP segment received with Offset> 0

[SWS_SomeIpTp_00037]

Upstream requirements: RS_SOMEIP_00010

⌈If a SOME/IP segment is successfully received with Offset Field> 0, the SOME/IP TP module shall compare the received SOME/IP header fields with the values of the stored SOME/IP header fields which has been received with the first segment (i.e. Offset was set to 0):

- Request ID [32 bit]
- Protocol Version [8 bit]
- Interface Version [8 bit]
- Message Type [8 bit]
- Return Code [8 bit]

If these values match restart the SomeIpTpRxTimeoutTime and continue with the assembly process.⌋

[SWS_SomeIpTp_00038]

Upstream requirements: RS_SOMEIP_00010

⌈The SOME/IP TP module shall store the number of Payload bytes for every PDU ID separately which has been passed to the upper layer.⌋

[SWS_SomeIpTp_00039]

Upstream requirements: RS_SOMEIP_00010

⌈The SOME/IP TP module shall compare the value of the Offset Field with the sum divided by 16 of copied Payload bytes since the first received SOME/IP segment (i.e. with Offset Field set to '0').

If this sum divided by 16 matches with the current Offset Value and if the bufferSize Ptr provided by the previous call of the API PduR_SomeIpTpCopyRxData()is greater or equal to the received payload, call the API PduR_SomeIpTpCopyRxData()with Sdu Length set to the received Payload bytes.⌋

Note:

In case of Offset Field value > 0, only the Payload bytes are provided to the upper layer (without any SOME/IP header fields)

[SWS_SomeIpTp_00040]

Upstream requirements: RS_SOMEIP_00010

⌈If a SOME/IP segment is successfully received with the More Segment Flag set to '0', the SOME/IP TP module shall

- Cancel the Rx timeout time defined by SomeIpTpRxTimeoutTime.
- Call the API PduR_SomeIpTpRxIndication() after it has copied the remaining received Payload bytes to the upper layer(as defined in SWS_SomeIpTp_00033).

⌋

7.3.3 Interruption of the assembly process

[SWS_SomeIpTp_00041]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00051

⌈If the Rx timeout time defined by SomeIpTpRxTimeoutTime expires,

- The current assembly process shall be interrupted as defined by SWS_SomeIp Tp_00054.
- The API Det_ReportRuntimeError() shall be called with the runtime error code SOMEIPTP_E_ASSEMBLY_INTERRUPT.

⌋

[SWS_SomeIpTp_00042]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00051

⌈If the API SomeIpTp_RxIndication() is called with the Offset Value is > 0 but no session is currently running,

- The received PDU shall be ignored
- The API Det_ReportRuntimeError() shall be called with the runtime error code SOMEIPTP_E_INCONSISTENT_SEQUENCE.

⌋

Note: This check identifies that at least the first segment has not been received.

[SWS_SomeIpTp_00054]

Upstream requirements: RS_SOMEIP_00010

⌈If the SOME/IP TP module interrupts the assembly process because of a detected error, the SOME/IP TP module shall

- Call the API PduR_SomeIpTpRxIndication()for this PDU ID with E_NOT_OK.
- The Rx timeout time defined by SomeIpTpRxTimeoutTime shall be canceled (if still running) for this PDU ID.

⌋

Note: The possible reasons for interruptions are listed below.

[SWS_SomeIpTp_00062]

Upstream requirements: RS_SOMEIP_00010

⌈If the SOME/IP TP module detects an inconsistency of the received SOME/IP TP headers (i.e.: Request ID, Protocol Version, Interface Version, Message Type or Return Code are not equal for all received segments),

- The current assembly process shall be interrupted as defined by SWS_SomeIp Tp_00054.
- The API Det_ReportRuntimeError() shall be called with the runtime error code SOMEIPTP_E_INCONSISTENT_HEADER.

⌋

[SWS_SomeIpTp_00045]

Upstream requirements: RS_SOMEIP_00010

⌈If the API SomeIpTp_RxIndication() is called and a session is currently active, the SOME/IP TP module shall check if the TP-Flag of the Message Type is set to '1'. If the TP-Flag is not set to '1',

- The current assembly process shall be interrupted as defined by SWS_SomeIp Tp_00054.
- The API Det_ReportRuntimeError() shall be called with the runtime error code SOMEIPTP_E_MESSAGE_TYPE.

⌋

[SWS_SomeIpTp_00080] Header Inconsistency check before TP-Flag check

Upstream requirements: RS_SOMEIP_00010

⌈

Before checking the TP-Flag of the Message, as a condition to interrupt the assembly process, (see [SWS_SomeIpTp_00045]), the SOME/IP TP module shall check for inconsistencies of the received SOME/IP TP headers according to [SWS_SomeIpTp_00062].⌋

[SWS_SomeIpTp_00063]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00051

⌈If the API SomeIpTp_RxIndication() is called, the SOME/IP TP module shall check whether the received payload bytes are dividable by16 in case the More Segment Flag is set to '1'.

If the received payload bytes are not dividable by 16 in this case,

- The current assembly process shall be interrupted as defined by SWS_SomeIp Tp_00054.
- The API Det_ReportRuntimeError() shall be called with the runtime error code SOMEIPTP_E_ASSEMBLY_INTERRUPT.

⌋

[SWS_SomeIpTp_00064]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00051

⌈If the API SomeIpTp_RxIndication() is called, the SOME/IP TP module shall check the value of the Offset Field. If the Offset Value in units of 16 bytes does not match to the sum of the received Payload bytes of the previous SOME/IP segments,

- The current assembly process shall be interrupted as defined by SWS_SomeIp Tp_00054.
- The API Det_ReportRuntimeError() shall be called with the runtime error code SOMEIPTP_E_INCONSISTENT_SEQUENCE.

⌋

[SWS_SomeIpTp_00048]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00051

⌈If the API SomeIpTp_RxIndication() is called, the SOME/IP TP module shall check the value of the Offset Field. If the received Offset Value equals '0' while the received Payload bytes of the previous SOME/IP segments is greater than '0', the SOME/IP TP module shall perform the following steps in the following order:

- The current assembly process shall be interrupted as defined by SWS_SomeIp Tp_00054.
- The API Det_ReportRuntimeError() shall be called with the runtime error code SOMEIPTP_E_INCONSISTENT_SEQUENCE.
- Start the assembly process according to chapter 7.3.1 SOME/IP segment received with Offset 0

⌋

[SWS_SomeIpTp_00049]

Upstream requirements: RS_SOMEIP_00010

⌈If the bufferSizePtr provided by the API PduR_SomeIpTpStartOfReception()or PduR_SomeIpTpCopyRxData()is smaller than the sum of the received and the added SOME/IP header (in case of the first segment) or the received payload (in case of any subsequent segment),

- The current assembly process shall be interrupted as defined by SWS_SomeIpTp_00054.
- The API Det_ReportRuntimeError()shall be called with the runtime error code SOMEIPTP_E_ASSEMBLY_INTERRUPT.

⌋

[SWS_SomeIpTp_00050]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00051

⌈If the API PduR_SomeIpTpCopyRxData()returns something else than BUFREQ_OK,

- The assembly process for this PDU ID shall be interrupted as defined by SWS_SomeIpTp_00054.
- .
- The API Det_ReportRuntimeError() shall be called with the runtime error code SOMEIPTP_E_ASSEMBLY_INTERRUPT.

⌋

[SWS_SomeIpTp_00051]

Upstream requirements: RS_SOMEIP_00010, RS_SOMEIP_00051

⌈If the API PduR_SomeIpTpStartOfReception() returns something else than BUFREQ_OK,

- The assembly process for this PDU ID shall be stopped.
- The API Det_ReportRuntimeError() shall be called with the runtime error code SOMEIPTP_E_ASSEMBLY_INTERRUPT.

⌋

7.4 Error Classification

Section 7.2 "Error Handling" of the document "General Specification of Basic Software Modules" [2, SWS BSW General] describes the error handling of the Basic Software

in detail. Above all, it constitutes a classification scheme consisting of five error types which may occur in BSW modules.

Based on this foundation, the following section specifies particular errors arranged in the respective subsections below.

7.4.1 Development Errors

[SWS_SomeIpTp_00052] Definiton of development errors in module SomeIpTp

Upstream requirements: SRS_BSW_00481

⌈

Type of error	*Related error code*	*Error value*
SOME/IP TP module not initialized	SOMEIPTP_E_UNINIT	0x01
Null pointer has been passed as an argument	SOMEIPTP_E_PARAM_POINTER	0x02
Unknown parameter has been passed	SOMEIPTP_E_PARAM	0x03
Invalid configuration set selection	SOMEIPTP_E_INIT_FAILED	0x04

⌋

7.4.2 Runtime Errors

[SWS_SomeIpTp_00065] Definiton of runtime errors in module SomeIpTp ⌈

Type of error	*Related error code*	*Error value*
The TP-Flag (of Message Type) was set to '0'	SOMEIPTP_E_MESSAGE_TYPE	0x04
Inconsistent subsequent segment received	SOMEIPTP_E_INCONSISTENT_SEQUENCE	0x05
Inconsistent header received	SOMEIPTP_E_INCONSISTENT_HEADER	0x06
Disassembly Interrupt due to the upper layer	SOMEIPTP_E_DISASSEMBLY_INTERRUPT	0x07
Assembly Interrupt due to the upper layer	SOMEIPTP_E_ASSEMBLY_INTERRUPT	0x08

⌋

Note :- In reference to run-time error "SOMEIPTP_E_MESSAGE_TYPE" no DET will be reported for unsegmented message and is passed to the upper layer without further handling.

7.4.3 Production Errors

There are no production errors.

7.4.4 Extended Production Errors

There are no extended production errors.

8 API specification

8.1 Imported types

In this chapter all types included from the following modules are listed:

[SWS_SomeIpTp_00043] Definition of imported datatypes of module SomeIpTp

Upstream requirements: SRS_BSW_00301

⌈

Module	*Header File*	*Imported Type*
Comtype	ComStack_Types.h	BufReq_ReturnType
	ComStack_Types.h	PduIdType
	ComStack_Types.h	PduInfoType
	ComStack_Types.h	PduLengthType
	ComStack_Types.h	RetryInfoType
	ComStack_Types.h	TpDataStateType
Std	Std_Types.h	Std_ReturnType
	Std_Types.h	Std_VersionInfoType

⌋

8.2 Type definitions

[SWS_SomeIpTp_91002] Definition of datatype SomeIpTp_ConfigType ⌈

Name	SomeIpTp_ConfigType	
Kind	Structure	
Elements	implementation specific	
	Type	–
	Comment	–
Description	This type shall contain at least all parameters that are post-build able according to chapter 10.	
Available via	SomeIpTp.h	

⌋

8.3 Function definitions

8.3.1 SomeIpTp_GetVersionInfo

[SWS_SomeIpTp_00044] Definition of API function SomeIpTp_GetVersionInfo

Upstream requirements: SRS_BSW_00407, SRS_BSW_00411

⌈

Service Name	SomeIpTp_GetVersionInfo	
Syntax	`void SomeIpTp_GetVersionInfo ( Std_VersionInfoType* VersionInfo )`	
Service ID [hex]	0x01	
Sync/Async	Synchronous	
Reentrancy	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.	
Available via	SomeIpTp.h	

⌋

[SWS_SomeIpTp_00066]

Upstream requirements: SRS_BSW_00337, SRS_BSW_00480

⌈If the parameter SomeIpTp_VersionInfoPtr of the API SomeIpTp_GetVersionInfo() equals NULL_PTR and if development error detection is enabled (i.e. SomeIpTpDev ErrorDetect is set to TRUE), the function SomeIpTp_GetVersionInfo, the API Det_ReportError()shall be called with the development error code SOMEIPTP_E_PARAM_POINTER.⌋

8.3.2 SomeIpTp_Init

[SWS_SomeIpTp_00046] Definition of API function SomeIpTp_Init

Upstream requirements: SRS_BSW_00407, SRS_BSW_00411

⌈

Service Name	SomeIpTp_Init	

Syntax	`void SomeIpTp_Init (`
	`  const SomeIpTp_ConfigType* config`
	`)`	

Service ID [hex]	0x02	
Sync/Async	Synchronous	
Reentrancy	Non Reentrant	
Parameters (in)	config	Base pointer to the configuration structure of the SOME/IP TP module.
Parameters (inout)	None	
Parameters (out)	None	
Return value	None	
Description	Initializes the SOME/IP TP module.	
Available via	SomeIpTp.h	

⌋

Note:

The AUTOSAR ECU StateManager calls this SOME/IP TP API service with the address of the static configuration structure of the module in parameter SomeIpTp_Config Ptr.

8.3.3 SomeIpTp_Transmit

[SWS_SomeIpTp_00047] Definition of API function SomeIpTp_Transmit ⌈

Service Name	SomeIpTp_Transmit	

Syntax	`Std_ReturnType SomeIpTp_Transmit (`
	`  PduIdType TxPduId,`
	`  const PduInfoType* PduInfoPtr`
	`)`	

Service ID [hex]	0x49	
Sync/Async	Synchronous	
Reentrancy	Reentrant for different PduIds. Non reentrant for the same PduId.	
Parameters (in)	TxPduId	Identifier of the PDU to be transmitted
	PduInfoPtr	Length of and pointer to the PDU data and pointer to MetaData.
Parameters (inout)	None	
Parameters (out)	None	

▽

△

Return value	Std_ReturnType	`E_OK`: Transmit request has been accepted. `E_NOT_OK`: Transmit request has not been accepted.
Description	Requests transmission of a PDU.	
Available via	SomeIpTp.h	

⌋

[SWS_SomeIpTp_00076]

Upstream requirements: SRS_BSW_00406

⌈If SomeIpTp_Transmit()is called before the SOME/IP TP module has been initialized with a call of SomeIpTp_Init(), the AP shall return with E_NOT_OK and stop the new session.⌋

[SWS_SomeIpTp_00073]

Upstream requirements: SRS_BSW_00406, SRS_BSW_00487

⌈If development error detection is enabled: SomeIpTp_Transmit() shall check that the service SomeIpTp_Init() was previously called. If the check fails, SomeIpTp_Transmit()shall raise the development error SOMEIPTP_E_UNINIT.⌋

[SWS_SomeIpTp_00074]

Upstream requirements: SRS_BSW_00337, SRS_BSW_00369

⌈If parameter TxPduId of SomeIpTp_Transmit() has an invalid value and if development error detection is enabled (i.e. SomeIpTpDevErrorDetect is set to TRUE), the API Det_ReportError() shall be called with the development error code SOMEIPTP_E_PARAM.⌋

[SWS_SomeIpTp_00075]

Upstream requirements: SRS_BSW_00337, SRS_BSW_00480

⌈If parameter PduInfoPtr of SomeIpTp_Transmit() equals NULL_PTR and if development error detection is enabled (i.e. SomeIpTpDevErrorDetect is set to TRUE), the API Det_ReportError() shall be called with the development error code SOMEIPTP_E_PARAM_POINTER.⌋

8.4 Callback notifications

8.4.1 SomeIpTp_TriggerTransmit

[SWS_SomeIpTp_00053] Definition of callback function SomeIpTp_TriggerTransmit ⌈

Service Name	SomeIpTp_TriggerTransmit	
Syntax	`Std_ReturnType SomeIpTp_TriggerTransmit ( PduIdType TxPduId, PduInfoType* PduInfoPtr )`	
Service ID [hex]	0x41	
Sync/Async	Synchronous	
Reentrancy	Reentrant for different PduIds. Non reentrant for the same PduId.	
Parameters (in)	TxPduId	ID of the SDU that is requested to be transmitted.
Parameters (inout)	PduInfoPtr	Contains a pointer to a buffer (SduDataPtr) to where the SDU data shall be copied, and the available buffer size in SduLengh. On return, the service will indicate the length of the copied SDU data in SduLength.
Parameters (out)	None	
Return value	Std_ReturnType	`E_OK`: SDU has been copied and SduLength indicates the number of copied bytes. `E_NOT_OK`: No SDU data has been copied. PduInfoPtr must not be used since it may contain a NULL pointer or point to invalid data.
Description	Within this API, the upper layer module (called module) shall check whether the available data fits into the buffer size reported by PduInfoPtr->SduLength. If it fits, it shall copy its data into the buffer provided by PduInfoPtr->SduDataPtr and update the length of the actual copied data in PduInfoPtr->SduLength. If not, it returns E_NOT_OK without changing PduInfoPtr.	
Available via	SomeIpTp.h	

⌋

[SWS_SomeIpTp_00072]

Upstream requirements: SRS_BSW_00406, SRS_BSW_00487

⌈If development error detection is enabled: SomeIpTp_TriggerTransmit() shall check that the service SomeIpTp_Init() was previously called. If the check fails,

SomeIpTp_TriggerTransmit()shall raise the development error SOMEIPTP_E_UNINIT.⌋

[SWS_SomeIpTp_00055]

Upstream requirements: SRS_BSW_00357, RS_SOMEIP_00040

⌈In case the given PduInfoPtr->SduLength is smaller than the computed size of the SOME/IP-TP segment (considering header and payload), SomeIpTp_TriggerTransmit() shall not copy any data and return E_NOT_OK.⌋

8.4.2 SomeIpTp_RxIndication

[SWS_SomeIpTp_00056] Definition of callback function SomeIpTp_RxIndication ⌈

Service Name	SomeIpTp_RxIndication	

Syntax	`void SomeIpTp_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 PDU.
	PduInfoPtr	Contains the length (SduLength) of the received PDU, a pointer to a buffer (SduDataPtr) containing the PDU, and the MetaData related to this PDU.
Parameters (inout)	None	
Parameters (out)	None	
Return value	None	
Description	Indication of a received PDU from a lower layer communication interface module.	
Available via	SomeIpTp.h	

⌋

[SWS_SomeIpTp_00057]

Upstream requirements: SRS_BSW_00406, SRS_BSW_00487

⌈If development error detection is enabled: SomeIpTp_RxIndication() shall check that the service SomeIpTp_Init() was previously called. If the check fails, SomeIpTp_Rx Indication()shall raise the development error SOMEIPTP_E_UNINIT.⌋

8.4.3 SomeIpTp_TxConfirmation

[SWS_SomeIpTp_91001] Definition of callback function SomeIpTp_TxConfirmation ⌈

Service Name	SomeIpTp_TxConfirmation

Syntax	`void SomeIpTp_TxConfirmation (`
	`  PduIdType TxPduId,`
	`  Std_ReturnType result`
	`)`

Service ID [hex]	0x40
Sync/Async	Synchronous
Reentrancy	Reentrant for different PduIds. Non reentrant for the same PduId.

▽

△

Parameters (in)	TxPduId	ID of the PDU that has been transmitted.
	result	E_OK: The PDU was transmitted. E_NOT_OK: Transmission of the PDU failed.
Parameters (inout)	None	
Parameters (out)	None	
Return value	None	
Description	The lower layer communication interface module confirms the transmission of a PDU, or the failure to transmit a PDU.	
Available via	SomeIpTp.h	

⌋

[SWS_SomeIpTp_00067]

Upstream requirements: SRS_BSW_00406, SRS_BSW_00487

⌈If development error detection is enabled: SomeIpTp_TxConfirmation() shall check that the service SomeIpTp_Init() was previously called. If the check fails, SomeIpTp_TxConfirmation()shall raise the development error SOMEIPTP_E_UNINIT.⌋

8.5 Scheduled functions

8.5.1 SomeIpTp_MainFunctionTx

[SWS_SomeIpTp_00058] Definition of scheduled function SomeIpTp_MainFunctionTx

Upstream requirements: SRS_BSW_00373, SRS_BSW_00425

⌈

Service Name	SomeIpTp_MainFunctionTx

Syntax	`void SomeIpTp_MainFunctionTx (`
	`  void`
	`)`

Service ID [hex]	0x03
Description	This function performs the processing of the AUTOSAR SOME/IP TP module's transmission activities.
Available via	SchM_SomeIpTp.h

⌋

[SWS_SomeIpTp_00059]

Upstream requirements: SRS_BSW_00425

⌈A call to SomeIpTp_MainFunctionTx() shall simply return if the AUTOSAR SOME/IP TP module was not previously initialized with a call to SomeIpTp_Init().⌋

8.5.2 SomeIpTp_MainFunctionRx

[SWS_SomeIpTp_00069] Definition of scheduled function SomeIpTp_MainFunctionRx

Upstream requirements: SRS_BSW_00373, SRS_BSW_00425

⌈

Service Name	SomeIpTp_MainFunctionRx
Syntax	`void SomeIpTp_MainFunctionRx ( void )`
Service ID [hex]	0x04
Description	This function performs the processing of the AUTOSAR SOME/IP TP module's reception activities.
Available via	SchM_SomeIpTp.h

⌋

[SWS_SomeIpTp_00070]

Upstream requirements: SRS_BSW_00425

⌈A call to SomeIpTp_MainFunctionRx() shall simply return if the AUTOSAR SOME/IP TP module was not previously initialized with a call to SomeIpTp_Init().⌋

8.6 Expected interfaces

In this chapter all external interfaces required from other modules are listed.

8.6.1 Mandatory Interfaces

This chapter defines all external interfaces which are required to fulfill the core functionality of the module.

[SWS_SomeIpTp_00060] Definition of mandatory interfaces required by module SomeIpTp

Upstream requirements: SRS_BSW_00384

⌈

API Function	Header File	Description
Det_ReportRuntimeError	Det.h	Service to report runtime errors. If a callout has been configured then this callout shall be called.
PduR_SomeIpTpCopyRxData	PduR_SomeIpTp.h	This function is called to provide the received data of an I-PDU segment (N-PDU) to the upper layer. Each call to this function provides the next part of the I-PDU data. The size of the remaining buffer is written to the position indicated by bufferSizePtr.
PduR_SomeIpTpCopyTxData	PduR_SomeIpTp.h	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_SomeIpTpRxIndication	PduR_SomeIpTp.h	Called after an I-PDU has been received via the TP API, the result indicates whether the transmission was successful or not.
PduR_SomeIpTpStartOfReception	PduR_SomeIpTp.h	This function is called at the start of receiving an N-SDU. The N-SDU might be fragmented into multiple N-PDUs (FF with one or more following CFs) or might consist of a single N-PDU (SF). The service shall provide the currently available maximum buffer size when invoked with TpSdu Length equal to 0.
PduR_SomeIpTpTransmit	PduR_SomeIpTp.h	Requests transmission of a PDU.
PduR_SomeIpTpTxConfirmation	PduR_SomeIpTp.h	This function is called after the I-PDU has been transmitted on its network, the result indicates whether the transmission was successful or not.

⌋

8.6.2 Optional Interfaces

This chapter defines all external interfaces which are required to fulfill an optional functionality of the module.

[SWS_SomeIpTp_00061] Definition of optional interfaces requested by module SomeIpTp

Upstream requirements: SRS_BSW_00384

⌈

API Function	Header File	Description
Det_ReportError	Det.h	Service to report development errors.

⌋

8.6.3 Configurable interfaces

N/A

9 Sequence diagrams

9.1 Reception

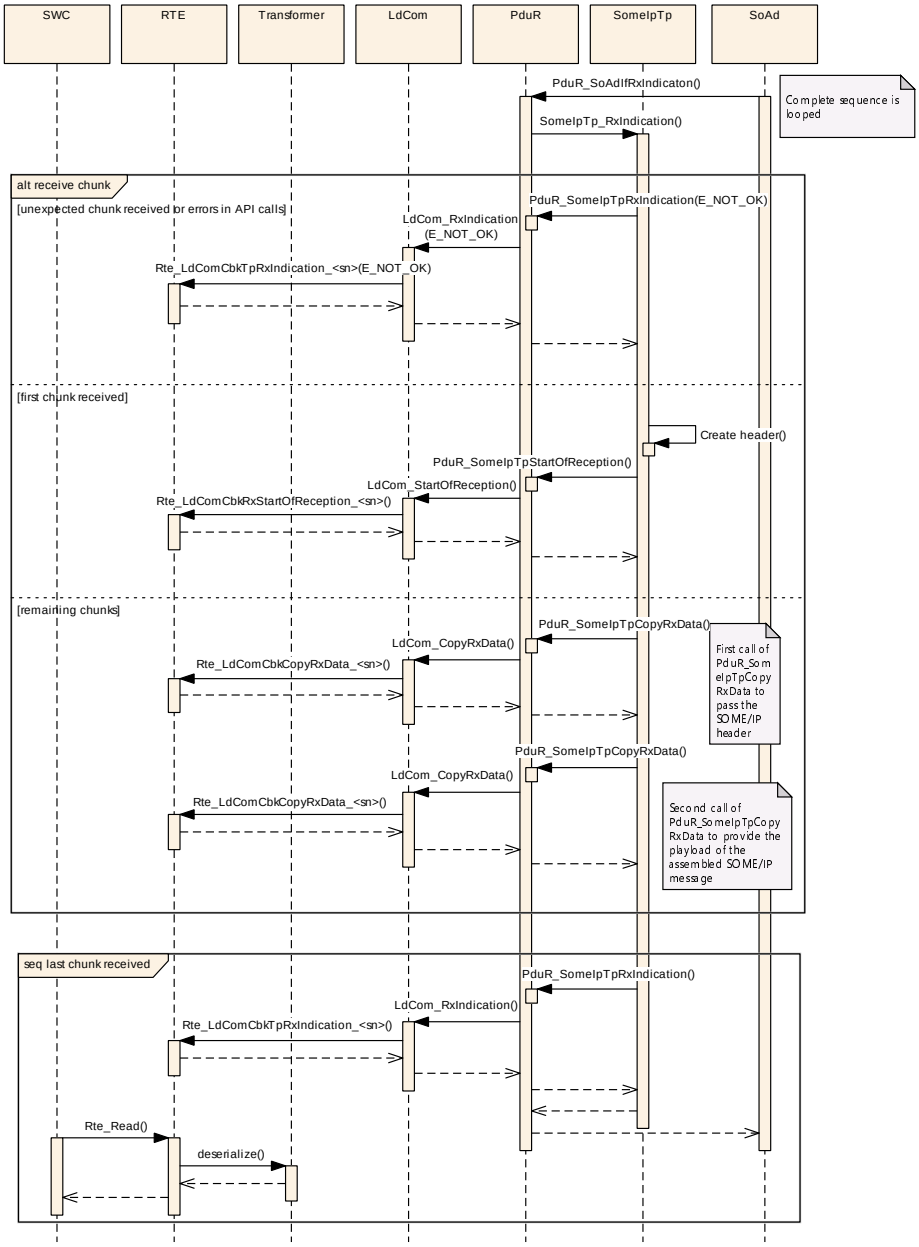

Figure 9.1: Reception of SOME/IP segments

9.2 Transmission

Sequence 9.2 depicts a sequence where the call to PduR_SomeIpTpTransmit() for the first segment according to SWS_SomeIpTp_00017 is deferred to the SomeIpTp_MainFunction().

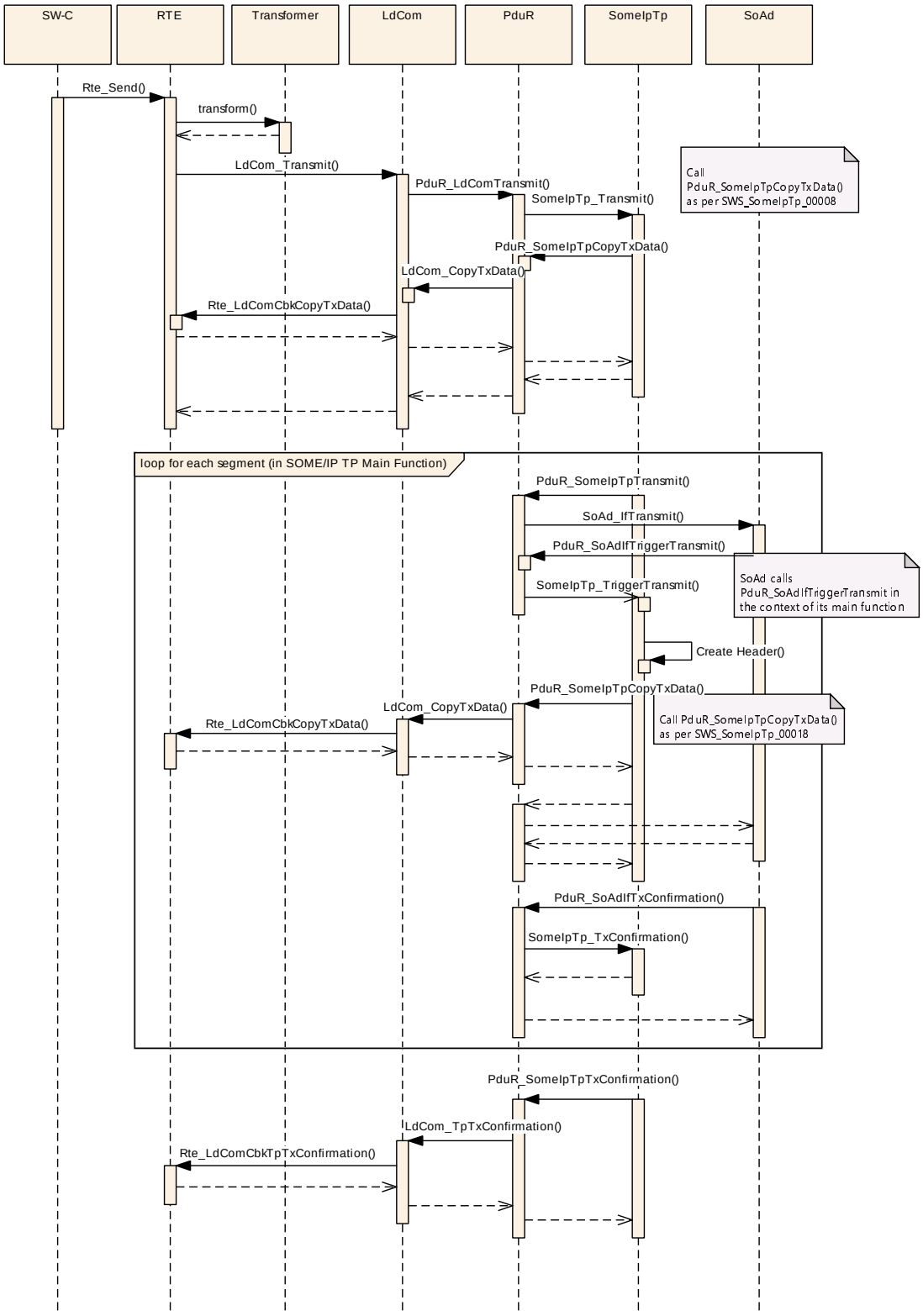

Figure 9.2: Transmission of SOME/IP segments

10 Configuration specification

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

Chapter 10.2 specifies the structure (containers) and the parameters of the module SOME/IP TP.

Chapter 10.3 specifies published information of the module SOME/IP TP.

10.1 How to read this chapter

For details refer to the chapter 10.1 “Introduction to configuration specification” in SWS_BSWGeneral.

10.2 Containers and configuration parameters

The following chapters summarize all configuration parameters. The detailed meanings of the parameters describe Chapter 7 and Chapter 8.

10.2.1 SomeIpTp

[ECUC_SomeIpTp_00001] Definition of EcucModuleDef SomeIpTp ⌈

Module Name	SomeIpTp
Description	Configuration of the SomeIpTp module.
Post-Build Variant Support	true
Supported Config Variants	VARIANT-LINK-TIME, VARIANT-POST-BUILD, VARIANT-PRE-COMPILE

Included Containers		
Container Name	**Multiplicity**	**Scope / Dependency**
SomeIpTpChannel	1..*	This container contains the configuration parameters of the SomeIpTp channel.
SomeIpTpGeneral	1	This container contains the general configuration parameters of the SomeIpTp module.

⌋

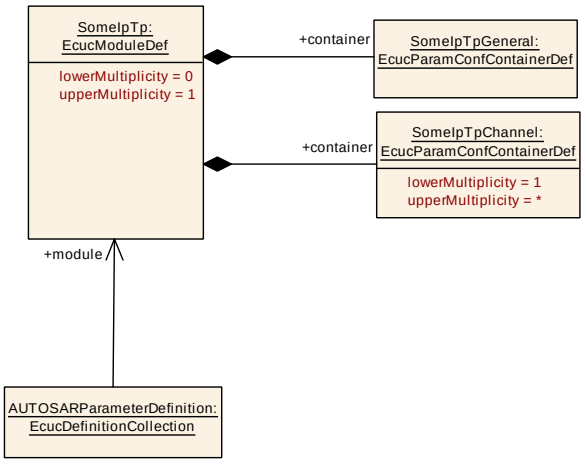

Figure 10.1

10.2.2 SomeIpTpGeneral

[ECUC_SomeIpTp_00002] Definition of EcucParamConfContainerDef SomeIpTp General ⌈

Container Name	SomeIpTpGeneral
Parent Container	SomeIpTp
Description	This container contains the general configuration parameters of the SomeIpTp module.
Configuration Parameters	

Included Parameters		
Parameter Name	**Multiplicity**	**ECUC ID**
SomeIpTpDevErrorDetect	1	[ECUC_SomeIpTp_00004]
SomeIpTpRxMainFunctionPeriod	1	[ECUC_SomeIpTp_00021]
SomeIpTpTxMainFunctionPeriod	1	[ECUC_SomeIpTp_00005]
SomeIpTpVersionInfoApi	1	[ECUC_SomeIpTp_00019]

No Included Containers

⌋

[ECUC_SomeIpTp_00004] Definition of EcucBooleanParamDef SomeIpTpDevErrorDetect ⌈

Parameter Name	SomeIpTpDevErrorDetect
Parent Container	SomeIpTpGeneral
Description	Switches the Development Error Detection and Notification ON or OFF.
Multiplicity	1

▽

△

Type	EcucBooleanParamDef		
Default value	–		
Post-Build Variant Value	false		
Value Configuration Class	**Pre-compile time**	X	All Variants
	Link time	–	
	Post-build time	–	
Scope / Dependency	scope: local		

⌋

[ECUC_SomeIpTp_00021] Definition of EcucFloatParamDef SomeIpTpRxMainFunctionPeriod ⌈

Parameter Name	SomeIpTpRxMainFunctionPeriod		
Parent Container	SomeIpTpGeneral		
Description	This parameter defines the cycle time in seconds of the periodic call of the SomeIpTp_MainFunctionRx.		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	]0 .. INF[		
Default value	–		
Post-Build Variant Value	false		
Value Configuration Class	**Pre-compile time**	X	All Variants
	Link time	–	
	Post-build time	–	
Scope / Dependency	scope: local		

⌋

[ECUC_SomeIpTp_00005] Definition of EcucFloatParamDef SomeIpTpTxMainFunctionPeriod ⌈

Parameter Name	SomeIpTpTxMainFunctionPeriod		
Parent Container	SomeIpTpGeneral		
Description	This parameter defines the cycle time in seconds of the periodic call of the SomeIpTp_MainFunctionTx.		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	]0 .. INF[		
Default value	–		
Post-Build Variant Value	false		
Value Configuration Class	**Pre-compile time**	X	All Variants
	Link time	–	
	Post-build time	–	
Scope / Dependency	scope: local		

⌋

[ECUC_SomeIpTp_00019] Definition of EcucBooleanParamDef SomeIpTpVersionInfoApi ⌈

Parameter Name	SomeIpTpVersionInfoApi		
Parent Container	SomeIpTpGeneral		
Description	Activates the SomeIpTp_GetVersionInfo() API. TRUE: Enables the SomeIpTp_GetVersionInfo() API. FALSE: SomeIpTp_GetVersionInfo() API is not included.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	false		
Post-Build Variant Value	false		
Value Configuration Class	**Pre-compile time**	X	All Variants
	Link time	–	
	Post-build time	–	
Scope / Dependency	scope: local		

⌋

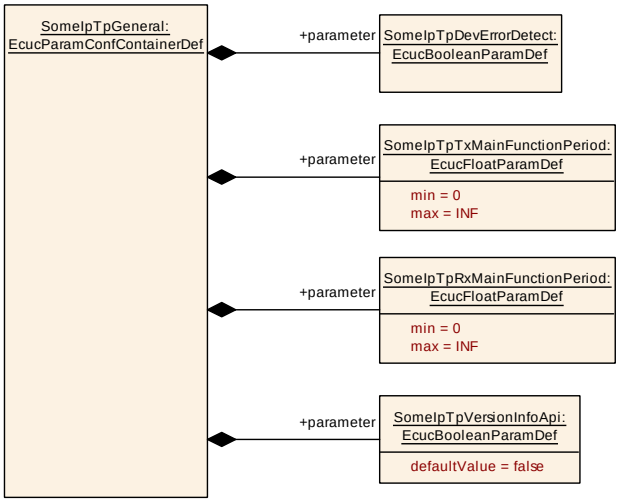

Figure 10.2

10.2.3 SomeIpTpChannel

[ECUC_SomeIpTp_00003] Definition of EcucParamConfContainerDef SomeIpTpChannel ⌈

Container Name	SomeIpTpChannel
Parent Container	SomeIpTp
Description	This container contains the configuration parameters of the SomeIpTp channel.
Post-Build Variant Multiplicity	true

▽

△

Multiplicity Configuration Class	Pre-compile time	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Configuration Parameters			

Included Parameters		
Parameter Name	**Multiplicity**	**ECUC ID**
SomeIpTpNPduSeparationTime	1	[ECUC_SomeIpTp_00006]
SomeIpTpRxTimeoutTime	1	[ECUC_SomeIpTp_00023]
SomeIpTpTxBurstSize	0..1	[ECUC_SomeIpTp_00024]

Included Containers		
Container Name	**Multiplicity**	**Scope / Dependency**
SomeIpTpRxNSdu	0..*	The following parameters needs to be configured for each N-SDU which has to be passed as one assembled RxPdu to the upper layer.
SomeIpTpTxNSdu	0..*	The following parameters needs to be configured for each N-SDU that the SomeIpTp module transmits via the SomeIpTp Channel.

⌋

[ECUC_SomeIpTp_00006] Definition of EcucFloatParamDef SomeIpTpNPduSeparationTime ⌈

Parameter Name	SomeIpTpNPduSeparationTime		
Parent Container	SomeIpTpChannel		
Description	Sets the duration of the minimum time in seconds the SomeIpTp module shall wait between the transmissions of N-PDUs.		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	]0 .. INF[		
Default value	–		
Post-Build Variant Value	true		
Value Configuration Class	Pre-compile time	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

⌋

[ECUC_SomeIpTp_00023] Definition of EcucFloatParamDef SomeIpTpRxTimeoutTime ⌈

Parameter Name	SomeIpTpRxTimeoutTime		
Parent Container	SomeIpTpChannel		
Description	Timer to monitor the successful reception (see FO_PRS_SOMEIP_00378). It is started when the first NPdu is received, restarted after reception of intermediate NPdus, and is stopped when the last NPdu has been received. The value shall be calculated as follows: (SomeIpTpRxTimeoutTime = SomeIpTpNPduSeparationTime + budget), where the time budget compensates intermediary hops and jitters within the ECU implementation.		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	]0 .. INF[		
Default value	–		
Post-Build Variant Value	true		
Value Configuration Class	**Pre-compile time**	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

⌋

[ECUC_SomeIpTp_00024] Definition of EcucIntegerParamDef SomeIpTpTxBurstSize ⌈

Parameter Name	SomeIpTpTxBurstSize		
Parent Container	SomeIpTpChannel		
Description	Specifies the number of segments SomeIpTp shall transmit without applying the SomeIpTpNPduSeparationTime.		
Multiplicity	0..1		
Type	EcucIntegerParamDef		
Range	1 .. 18446744073709551615		
Default value	1		
Post-Build Variant Multiplicity	true		
Post-Build Variant Value	true		
Value Configuration Class	**Pre-compile time**	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

⌋

10.2.4 SomeIpTpRxNSdu

[ECUC_SomeIpTp_00008] Definition of EcucParamConfContainerDef SomeIpTpRxNSdu ⌈

Container Name	SomeIpTpRxNSdu		
Parent Container	SomeIpTpChannel		
Description	The following parameters needs to be configured for each N-SDU which has to be passed as one assembled RxPdu to the upper layer.		
Post-Build Variant Multiplicity	true		
Multiplicity Configuration Class	**Pre-compile time**	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Configuration Parameters			

Included Parameters		
Parameter Name	**Multiplicity**	**ECUC ID**
SomeIpTpRxSduRef	1	[ECUC_SomeIpTp_00010]

Included Containers		
Container Name	**Multiplicity**	**Scope / Dependency**
SomeIpTpRxNPdu	1	This container contains the configuration parameters of the NPdu that is received from a lower layer

⌋

[ECUC_SomeIpTp_00010] Definition of EcucReferenceDef SomeIpTpRxSduRef ⌈

Parameter Name	SomeIpTpRxSduRef		
Parent Container	SomeIpTpRxNSdu		
Description	Reference to a Pdu in the COM-Stack that represents the assembled RxPdu which is passed via the PduR to the upper layer.		
Multiplicity	1		
Type	Reference to Pdu		
Post-Build Variant Value	true		
Value Configuration Class	**Pre-compile time**	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency			

⌋

10.2.5 SomeIpTpRxNPdu

[ECUC_SomeIpTp_00011] Definition of EcucParamConfContainerDef SomeIpTp RxNPdu ⌈

Container Name	SomeIpTpRxNPdu
Parent Container	SomeIpTpRxNSdu
Description	This container contains the configuration parameters of the NPdu that is received from a lower layer
Configuration Parameters	

Included Parameters		
Parameter Name	**Multiplicity**	**ECUC ID**
SomeIpTpRxNPduHandleId	1	[ECUC_SomeIpTp_00013]
SomeIpTpRxNPduRef	1	[ECUC_SomeIpTp_00012]

No Included Containers

⌋

[ECUC_SomeIpTp_00013] Definition of EcucIntegerParamDef SomeIpTpRxNPduHandleId ⌈

Parameter Name	SomeIpTpRxNPduHandleId		
Parent Container	SomeIpTpRxNPdu		
Description	This parameter defines the handle ID that is used by the PduR when calling SomeIp Tp_RxIndication.		
Multiplicity	1		
Type	EcucIntegerParamDef (Symbolic Name generated for this parameter)		
Range	0 .. 65535		
Default value	–		
Post-Build Variant Value	false		
Value Configuration Class	**Pre-compile time**	X	All Variants
	Link time	–	
	Post-build time	–	
Scope / Dependency	scope: ECU withAuto = true		

⌋

[ECUC_SomeIpTp_00012] Definition of EcucReferenceDef SomeIpTpRxNPduRef ⌈

Parameter Name	SomeIpTpRxNPduRef		
Parent Container	SomeIpTpRxNPdu		
Description	Reference to a global Pdu that is used to harmonize HandleIDs in the COM-Stack.		
Multiplicity	1		
Type	Reference to Pdu		
Post-Build Variant Value	true		
Value Configuration Class	**Pre-compile time**	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME

▽

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	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency			

⌋

10.2.6 SomeIpTpTxNSdu

[ECUC_SomeIpTp_00009] Definition of EcucParamConfContainerDef SomeIpTpTxNSdu ⌈

Container Name	SomeIpTpTxNSdu		
Parent Container	SomeIpTpChannel		
Description	The following parameters needs to be configured for each N-SDU that the SomeIpTp module transmits via the SomeIpTpChannel.		
Post-Build Variant Multiplicity	true		
Multiplicity Configuration Class	**Pre-compile time**	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Configuration Parameters			

Included Parameters		
Parameter Name	**Multiplicity**	**ECUC ID**
SomeIpTpTxNSduHandleId	1	[ECUC_SomeIpTp_00020]
SomeIpTpTxNSduRef	1	[ECUC_SomeIpTp_00015]

Included Containers		
Container Name	**Multiplicity**	**Scope / Dependency**
SomeIpTpTxNPdu	1	This container contains the configuration parameters of the segmented Tx NPdus that are transmitted to a lower layer.

⌋

[ECUC_SomeIpTp_00020] Definition of EcucIntegerParamDef SomeIpTpTxNSduHandleId ⌈

Parameter Name	SomeIpTpTxNSduHandleId	
Parent Container	SomeIpTpTxNSdu	
Description	This parameter defines the handle ID of the NSdu that represents the original TxSdu which is segmented and passed via the PduR to the lower layer. This handle ID is used by PduR when calling SomeIpTp_Transmit.	
Multiplicity	1	
Type	EcucIntegerParamDef (Symbolic Name generated for this parameter)	
Range	0 .. 65535	

▽

△

Default value	–		
Post-Build Variant Value	false		
Value Configuration Class	**Pre-compile time**	X	All Variants
	Link time	–	
	Post-build time	–	
Scope / Dependency	scope: ECU withAuto = true		

⌋

[ECUC_SomeIpTp_00015] Definition of EcucReferenceDef SomeIpTpTxNSduRef ⌈

Parameter Name	SomeIpTpTxNSduRef		
Parent Container	SomeIpTpTxNSdu		
Description	Reference to a global Pdu in the COM-Stack that represents the original TxSdu which is segmented and passed via the PduR to the lower layer.		
Multiplicity	1		
Type	Reference to Pdu		
Post-Build Variant Value	true		
Value Configuration Class	**Pre-compile time**	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency			

⌋

10.2.7 SomeIpTpTxNPdu

[ECUC_SomeIpTp_00016] Definition of EcucParamConfContainerDef SomeIpTpTxNPdu ⌈

Container Name	SomeIpTpTxNPdu
Parent Container	SomeIpTpTxNSdu
Description	This container contains the configuration parameters of the segmented Tx NPdus that are transmitted to a lower layer.
Configuration Parameters	

Included Parameters		
Parameter Name	**Multiplicity**	**ECUC ID**
SomeIpTpTxNPduHandleId	1	[ECUC_SomeIpTp_00017]
SomeIpTpTxNPduRef	1	[ECUC_SomeIpTp_00018]

No Included Containers

⌋

[ECUC_SomeIpTp_00017] Definition of EcucIntegerParamDef SomeIpTpTxNPduHandleId ⌈

Parameter Name	SomeIpTpTxNPduHandleId		
Parent Container	SomeIpTpTxNPdu		
Description	This parameter defines the handle ID that is used by PduR when calling SomeIpTp_TriggerTransmit.		
Multiplicity	1		
Type	EcucIntegerParamDef (Symbolic Name generated for this parameter)		
Range	0 .. 65535		
Default value	–		
Post-Build Variant Value	false		
Value Configuration Class	**Pre-compile time**	X	All Variants
	Link time	–	
	Post-build time	–	
Scope / Dependency	scope: ECU withAuto = true		

⌋

[ECUC_SomeIpTp_00018] Definition of EcucReferenceDef SomeIpTpTxNPduRef ⌈

Parameter Name	SomeIpTpTxNPduRef		
Parent Container	SomeIpTpTxNPdu		
Description	Reference to a global Pdu that is used to harmonize HandleIDs in the COM-Stack.		
Multiplicity	1		
Type	Reference to Pdu		
Post-Build Variant Value	true		
Value Configuration Class	**Pre-compile time**	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency			

⌋

10.3 Published Information

For details refer to the chapter 10.3 “Published Information” in SWS_BSWGeneral.

A Change history of AUTOSAR traceable items

Please note that the lists in this chapter also include traceable items that have been removed from the specification in a later version. These items do not appear as hyperlinks in the document.

A.1 Traceable item history of this document according to AUTOSAR Release R24-11

A.1.1 Added Specification Items in R24-11

none

A.1.2 Changed Specification Items in R24-11

[ECUC_SomeIpTp_00023] [SWS_SomeIpTp_00007] [SWS_SomeIpTp_00030] [SWS_SomeIpTp_00031] [SWS_SomeIpTp_00043] [SWS_SomeIpTp_00055] [SWS_SomeIpTp_00057] [SWS_SomeIpTp_00066] [SWS_SomeIpTp_00067] [SWS_SomeIpTp_00071] [SWS_SomeIpTp_00072] [SWS_SomeIpTp_00073] [SWS_SomeIpTp_00074] [SWS_SomeIpTp_00075] [SWS_SomeIpTp_00076]

A.1.3 Deleted Specification Items in R24-11

[SWS_SomeIpTp_00081]