HYUNDAI AUTOEVER

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AUTOSAR CanTp User Manual

DOC. NO

SCOPE OF APPLICATION All Project/Engineering
Responsibility: Classic AUTOSAR Team

HYUNDAI
AutoEver

Document Change Histroy				
Date (YYYY-MM-DD)	Ver.	Editor	Chap	Description (before -> after revision)
2016-04-08	1.7.6	Jongsun Lim	All	• CanTp User Manual separated
2016-05-03	1.7.7	Jongsun Lim	4.2	• Module Version updated (1.7.7)
2016-05-31	1.7.8	Jongsun Lim	4.2	• Module Version updated (1.7.8)
2017-03-28	1.7.9	Jongsun Lim	4.2 5.1	• Module Version updated (1.7.9) • Det description added
2017-04-21	1.7.10	Jongsun Lim	4.2	• Module Version updated (1.7.10)
2018-01-08	1.7.11	Jongsun Lim	4.2 4.4.1 5.1 5.2	• Module Version updated (1.7.11) • Limitations content added • CanTp Padding Byte Category changed • CanTpMainfunction Period content changed
2018-03-21	1.8.0	Jongsun Lim	4.2 4.3 4.4.2 5.1 5.3 5.8	• Module Version updated (1.8.0) • Change Log was updated • Items added to the Deviations section • Content added for parameters supporting CAN-FD • Content added for TaType supporting CAN-FD • Content added for TaType supporting CAN-FD
2019-03-22	1.8.1	Saemi Kwon	4.2 4.3 5.3 5.8	• Module Version updated (1.8.1) • Change Log was updated • TxTaType attribute changed and description added • RxTaType attribute changed and description added
2019-08-07	1.9.0	Saemi Kwon	4.2 4.3 4.4.2 5.1	• Module Version updated (1.9.0) • Change Log was updated • Deviation items edited in relation to CAN-FD support • Parameters related to CAN-FD support removed
2019-09-27	1.10.0	Saemi Kwon	4.2 4.3 4.4.1 5.1 7.1	• Module Version updated (1.10.0) • Change Log was updated • Limitations removed for Read Parameter API and Change Parameter API support • Categories changed for CanTpChangeParameterApi and CanTpReadParameterApi configuration • Generator Option "-411" description added
2019-10-04	1.10.0.0	Saemi Kwon	4.3 5.1	• Change Log was updated • Category changed for CanTpDevErrorDetect configuration. Values and categories changed

				for the configuration of CanTpChangeParameterApi, CanTpReadParameterApi, and CanTpFlexibleDataRateSupport.
			5.2	• Values and category changed for CanTpMainFunctionPeriod function
			5.3	• Category changed for CanTpRxAddressingFormat
			5.8	• Values changed for CanTpTxNSduRef
2019-10-17	1.10.1.0	Saemi Kwon	4.2 / 4.3	• Module Version updated (1.10.1) • Change Log was updated
2020-11-03	1.10.2.0	Saemi Kwon	4.2 / 4.3	• Module Version updated (1.10.2) • Change Log was updated
2020-12-08	1.11.0.0	Saemi Kwon	4.2 / 4.3	• Module Version updated (1.11.0) • Change Log was updated
2021-01-06	1.11.0.1	Saemi Kwon	4.3 / 6.3 / 8.1	• Change Log was updated • Description added for CanTp_ChangeParameter and CanTp_ReadParameter API • Appendix added to Change/Read Parameter Guide
2021-01-13	1.11.1.0	Saemi Kwon	4.2 / 4.3	• Module Version updated (1.11.1) • Change Log was updated
2021-07-23	1.11.2.0	Saemi Kwon	4.2 / 4.3	• Module Version updated (1.11.2) • Change Log was updated
2021-12-27	1.11.3.0	Saemi Kwon	4.2 / 4.3 / 8	• Module Version updated (1.11.3) • Change Log was updated • Det error added
2022-01-28	1.12.0.0	Saemi Kwon	4.2 / 4.3 / 5.2	• Module Version updated (1.12.0) • Change Log was updated • CanTpChannelLowerLayer configuration added
2022-03-29	1.12.1.0	Seungjae Kim	4.2 / 4.3	• Module Version updated(1.12.1) • Change Log was updated
2022-08-24	1.12.2.0	Dongheon Choi	4.2 / 4.3	• Module Version updated(1.12.2) • Change Log was updated
2022-10-20	1.12.3.0	Hyoungtae Kim	4.2 / 4.3	• Module Version updated(1.12.3) • Change Log was updated
2023-08-11	1.12.4.0	Hyoungtae Kim	4.2 / 4.3 / 4.4.1 / 4.4.2 / 8	• Module Version updated(1.12.4) • Change Log was updated • Delete library related contents • Timeout Error Code Deviations 추가 • Det error added

Table of Contents

1 Overview

This document is created based on the AUTOSAR standard SRS/SWS. For more detailed functional description, please refer to the below reference documents.

The following terms on configuration category mean:
- Changeable (C): Items that can be configured by users
- Fixed (F): Items that cannot be changed by users
- NotSupported (N): Unavailable items

2 Reference

Sl. No.	Title	Version
1	AUTOSAR_SWS_CanTransportLayer.pdf	4.0.0

3 AUTOSAR System

3.1 CanTp Module

CanTp is a module to enable high-capacity communication using Can frames.
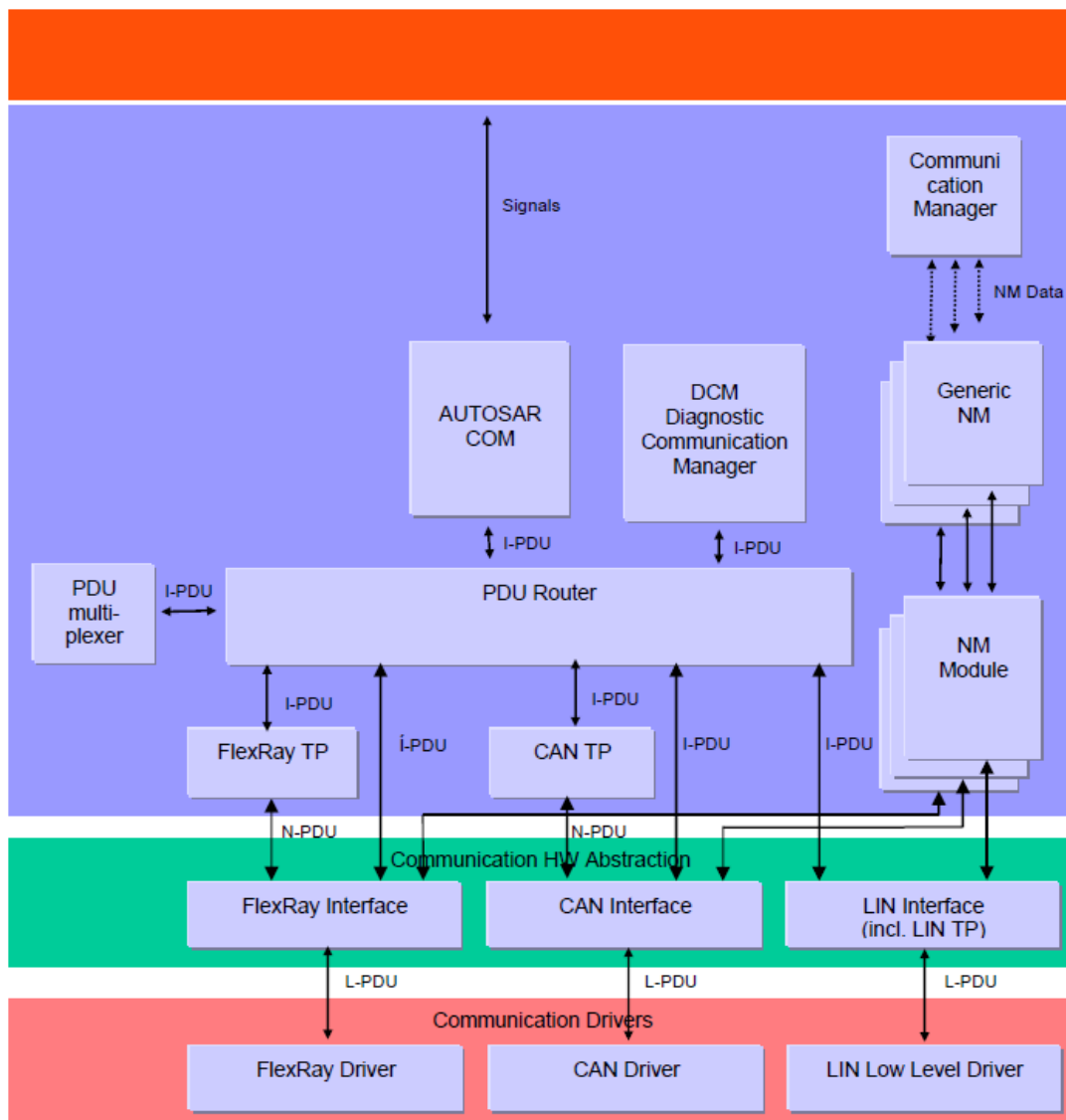
4 Product Release Notes

4.1 Overview

This chapter provides the release information of Hyundai AutoEver CanTp modules, describing the features and restrictions of different versions of CanTp Software product.

4.2 Scope of the Release

All content in this document applies only to the following Hyundai AutoEver CanTp modules.

Module name	AUTOSAR version	SWS version	Module version
CanTp	4.0.3	4.0.0	1.12.4

※ The module version refers to the SW version in the BswModule Description (Bswmd) file of each module.

4.3 Change Log

4.3.1 Version 1.12.4.0

➢ Bug

■ CanTp can not process new SF or FF before transmission of FC while sgmented reception(multi frame reception) is proceeding.
It inccurs that Test Cases of ES95486-12 DIAG_NETWORK_REQ_010 / DIAG_NETWORK_REQ_011 are failed.

Cause	CanTp Can not consider new SF or FF reception before transmission of FC
Operation effect	None
Setting effect	None
ASW Action	None

➢ Bug

■ CanTp generate duplicated Macro of header file.

Cause	CanTp Generator logic fault
Operation effect	None
Setting effect	None
ASW Action	None

➢ Bug

■ Compile error occurs when CanTp DET is Off.

Cause	CanTp pre-compile logic fault
Operation effect	None
Setting effect	CanTp DET off is not recommended
ASW Action	None

➢ Improvement

■ Improve DET Error logic in detail regarding of timer.

Cause	CanTp DET logic can not distinguish specific timeout error

Operation effect	None
Setting effect	None
ASW Action	None

4.3.2 Version 1.12.3.0

➢ Defects

■ CanTp transmission is stopped because N_Bs Timer is not initialized when Flow Control is received in a specific section

Cause	Critical Section doesn't exist where Global Timer value is copied to Local Timer Value in CanTp_TimeoutProcessing API
Operation effect	None
Setting effect	None
ASW Action	None

4.3.3 Version 1.12.2.0

➢ Improvements

■ Further Fix UNECE Cyber Security violations

Cause	UNECE Cyber Security Registration needs Additional Improvements
Operation effect	None
Setting effect	None
ASW Action	None

4.3.4 Version 1.12.1.0

➢ Improvements

■ Remove macro duplication when generated header file
■ Improve DET Error logic in detail, especially regarding of timer

Cause	- It was necessary to remove multiple macro with the same name -
Operation effect	None
Setting effect	None
ASW Action	None

4.3.5 Version 1.12.0.0

➢ Features

■ Stops the message transmission and sends a FC with overflow status when the FF_DL value exceeds 4095.

Cause	The ES95486-12 specifications has a test case where a flow control with overflow status needs to be transmitted when receiving a FF_DL whose value is over 4096 bytes.
Operation effect	No
Setting effect	No
ASW Action	No

➢ Features

■ Support CDD Router for CanTp Lower Layer

Cause	Supporting TP logic on the platform was necessary to provide RXSWIN.
Operation effect	No
Setting effect	Need to set the lower layer of CanTpChannel. Add Ecud_CDD_Router to the Input File List of /AUTRON/SCons/RTSW/Generation/CanTp. Need to use CDD Router 2.3.0.0 or higher and CanIf 3.0.2.0 or higher.
ASW Action	No

➢ Improvements

■ Compile Warning improved

Cause	It was necessary to enhance the code quality by improving Compile Warning.
Operation effect	No
Setting effect	No
ASW Action	No

➢ Improvements

■ Fixed incorrect allocation of memory sections

Cause	VAR variables were allocated to an unintended .bss address as they were assigned to the memory section for CONST variables.
Operation effect	No
Setting effect	No
ASW Action	No

4.3.6 Version 1.11.3.0

- ➤ Improvements

  - ■ Made code improvements to comply with the UNECE Cyber Security

Cause	It was necessary to make code improvements to comply with the UNECE Cyber Security regulations
Operation effect	No
Setting effect	No
ASW Action	No

- ➤ Improvements

  - ■ Add Det error description to User Manual

Cause	Need to understand the error and related functions when Det errors occur.
Operation effect	No
Setting effect	No
ASW Action	No

4.3.7 Version 1.11.2.0

- ➤ Improvements
  - ■ Fix codes that violate MISRA-C 2012 Rule and Run Time Error items

Cause	Among codes whose violation of MISRA-C 2012 Rule and Run Time Error is justified, those that can be fixed were reviewed and corrected accordingly.
Operation effect	No
Setting effect	No
ASW Action	No

4.3.8 Version 1.11.1.0

- ➤ Improvement
  - ■ Justified MISRA-C 2012 RTE items

Cause	Needed to justify MISRA-C 2012 RTE items
Operation effect	No
Setting effect	No
ASW Action	No

4.3.9 Version 1.11.0.1

- ➤ Improvements
  - ■ Added Change/Read Parameter Guide to the User Manual

Cause	Configuration Guide and User Manual were created to help users use Change/Read parameters.
Operation effect	No
Setting effect	No
ASW Action	No

4.3.10 Version 1.11.0.0

➢ Features
 ■ Developed a CanTp feature to support DCM's multi diagnostics functionality

Cause	As some functions needed to be upgraded for AUTOSAR 4.1 to support DCM's multi diagnostics, the feature was developed as a build option whose application to AUTOSAR 4.1 was to be decided later.
Operation effect	No
Setting effect	When the feature is enabled, 411 should be added to CanTp Generate option. (/AUTRON/SCons/Build/Generation/Module/CanTp/BswDefines)
ASW Action	No

➢ Improvements
 ■ Fixed the issue of sending a flow control while receiving a consecutive frame when BS is 0.

Cause	When BS is 0, the next flow control should not be sent until all consecutive frames are received after transmitting a flow control.
Operation effect	No
Setting effect	No
ASW Action	No

4.3.11 Version 1.10.2.0

➢ Improvements
 ■ Improvements were made to send valid data to the parent module when a Single Frame or a First Frame is received while the number of RX buffers of the parent module is not enough.

Cause	When the number of RX buffers of the parent module is not enough or when they are already in use, sometimes invalid data was sent by the received Single Frame or First Frame.
Operation effect	No
Setting effect	No
ASW Action	No

➢ Improvements
 ■ Compile Warning improved

Cause	Fixed code to prevent compile warnings
Operation effect	No
Setting effect	No

ASW Action	No

> Improvements
  ■ Applied MISRA-C 2012

Cause	Corrected MISRA-C 2012 violations
Operation effect	No
Setting effect	No
ASW Action	No

4.3.12 Version 1.10.1.0

> Improvements
  ■ Modifications were made to support 8 bytes in multiple frames when the TP channel is set to CAN-FD.

Cause	Needed to support 8 bytes in multiple frames when the TP channel is set to CAN-FD.
Operation effect	No
Setting effect	No
ASW Action	No

> Improvements
  ■ Change was made to decide RX_DL based on the frame size of the First Frame.

Cause	The module change was necessary to receive multiple frames and check errors by deciding RX_DL based on the frame size of the First Frame, not the length defined in DB.
Operation effect	No
Setting effect	No
ASW Action	No

4.3.13 Version 1.10.0.0

> Improvements
  ■ Changed the attributes of configuration items for code disclosure

Cause	Needed to change the attributes of configuration items for code disclosure
Operation effect	No
Setting effect	No
ASW Action	No

> Improvements
  ■ Improvements were made to ensure that CAN FD support 8 bytes in a single frame.

Cause	8-byte messages in a single CAN FD frame were not received.
Operation effect	No
Setting effect	No

ASW Action	No

4.3.14 Version 1.10.0

➤ Features
  ■ Read Parameter API and Change Parameter API functionalities

Cause	It was necessary to introduce Read Parameter API that can read BS and STmin values during the runtime as well as Change Parameter API for making changes.
Operation effect	No
Setting effect	No
ASW Action	No

➤ Improvements
  ■ Improvements were made to ensure that CAN FD support 8 bytes in a single frame.

Cause	8-byte messages in a single CAN FD frame were not received.
Operation effect	No
Setting effect	No
ASW Action	No

4.3.15 Version 1.9.0

➤ Features
  ■ Developed a new feature so that CAN-FD can transmit up to 64-byte messages.

Cause	Needed to support up to 64 bytes per frame for CAN-FD.
Operation effect	No
Setting effect	No
ASW Action	No

➤ Features
  ■ Developed a CanTp feature to process DCM protocol priorities

Cause	As some functions needed to be upgraded for AUTOSAR 4.1 to enable DCM to process protocol priorities, the feature was developed as a build option whose application to AUTOSAR 4.1 was to be decided later.
Operation effect	No
Setting effect	When the feature is enabled, 411 should be added to CanTp Generate option.
ASW Action	No

4.3.16 Version 1.8.1

➤ Improvements
  ■ Removed the library impact caused by CanTp's number of channels.

Cause	Resolved the issue of library impact which used to occur when

	the number of channels was adjusted after distribution.
Operation effect	No
Setting effect	Yes
ASW Action	No

➢ Improvements
  ■ Changed the attributes of Rx/Tx Tatype to support additional CAN-FD features

Cause	Modifications were necessary to allow the user to change Rx/Tx Tatype settings.
Operation effect	No
Setting effect	Yes
ASW Action	No

4.3.17 Version 1.8.0

➢ Features
  ■ Added CAN-FD features.

Cause	It was necessary to add features for large-capacity data transmission using CAN-FD.
Operation effect	No
Setting effect	Yes
ASW Action	No

4.3.18 Version 1.7.11

➢ Improvements
  ■ Changes were made so that the library is not impacted in relation to CanTp channels.

Cause	Needed to make changes so that the library is not impacted in relation to CanTp channels.
Operation effect	No
Setting effect	No
ASW Action	No

  ■ Changes were made so that the library is not impacted in relation to CanTp parameters.

Cause	Needed to make changes so that the library is not impacted in relation to CanTp parameters.
Operation effect	No
Setting effect	No
ASW Action	No

  ■ Updated the MainFunction period settings section of the User Manual

Cause	It was necessary to add the content related to CanTpMainfunction period settings.

Operation effect	No
Setting effect	No
ASW Action	No

4.3.19 Version 1.7.10

➢ Improvements
  ■ Compile Warning improved

Cause	Needed to secure reliability by verifying compile warnings.
Operation effect	No
Setting effect	No
ASW Action	No

  ■ Handled Functional Type Channel exceptions (in relation to FC Frame)

Cause	If the Physical Channel is waiting for a FC frame and the Function Channel receives it, this affects the Physical Channel.
Operation effect	No
Setting effect	No
ASW Action	No

4.3.20 Version 1.7.9

➢ Improvements
  ■ Modified Generator Log output

Cause	There was a request to change CanTp Generator Log format.
Operation effect	No
Setting effect	No
ASW Action	No

  ■ Added DET-related description to the User Manual

Cause	It was necessary to add DET-related description to the User Manual.
Operation effect	No
Setting effect	No
ASW Action	No

  ■ Created Change Log item in CanTp User Manual.

Cause	Needed to create Change Log item due to the User Manual format change.
Operation effect	No
Setting effect	No
ASW Action	No

  ■ Put together compile warnings

Cause	Warnings occurred while building a module.
Operation effect	No
Setting effect	No
ASW Action	No

4.4 Module Release Notes

4.4.1 Limitations

➢ Full Duplex Mode is not supported in Channel Mode
There are two types of channel mode: Half Duplex Mode and Full Duplex Mode. Half Duplex Mode is a basic communication method in use where one cannot take the next action until data transmission or reception is complete. On the other hand, in Full Duplex Mode, both nodes can perform two-way communication (Tx/Rx) at the same time.

➢ Mixed AddressingFormat unavailable
There are three addressing formats: Standard, Extended, and Mixed. Standard Format uses a 11-bit CAN identifier for communication. Extended Format is used for high-capacity communication, using messages with an extended 29-bit identifier. Mixed Format uses a message with both a 11-bit CAN identifier and a 29-bit one.
CANTP_EXTENDED : Uses an extended 29-bit address mode
CANTP_MIXED : Uses a mixed 11-bit and 29-bit address mode

➢ Transmit cancellation unavailable
Transmit cancellation is available only for diagnostics OBD.
The user can use the feature to stop the transmission of the existing message and send a diagnostics message with a higher priority.

➢ Addressing Format does not support CANTP_MIXED
Mixed Format is not available.

➢ Full Duplex Mode is not supported in Channel Mode.
There are two types of channel mode: Full Duplex Mode for two-way communication and Half Duplex Mode for one-way communication. Currently, CanTp supports Half Duplex Mode (Tx or Rx) only.

4.4.2 Deviations

➢ Large data transmission using CAN and CAN-FD can carry up to 4095 bytes of payload.

➢ When a Timeout-related error occurs, It was difficult to determine what kind of Timeout Error using Error codes of the Autosar specification which are CANTP_E_RX_COM, CANTP_E_TX_COM. Therefore, by specifying them to new Timeout Error Codes CANTP_E_RX_AR, CANTP_E_RX_CR, CANTP_E_WFT_OVRN, CANTP_E_TX_AS, CANTP_E_TX_BS. (Atuosar CanTp SWS CANTP229)

5 Configuration Guide

The CanTp configuration for the AUTOSAR platform distributed by Hyundai AutoEver reflects the policy of Hyundai AutoEver and therefore any changes require consultation with Hyundai AutoEver.

5.1 CanTpGeneral configuration

Parameter Name	Value	Category
CanTpDevErrorDetect	True	C
CanTpChangeParameterApi	True	C
CanTpVersionInfoApi	False	F
CanTpPaddingByte	0xAA	C
CanTpReadParameterApi	False	C
CanTpFlexibleDataRateSupport	–	C

1) CanTpDevErrorDetect

    - Enables or disables DET.

2) CanTpChangeParameterApi

    - Changes the value of STmin or BS during communication.

3) CanTpVersionInfoApi

    - Provides the API to read the version information.

4) CanTpPaddingByte

    - Pads unused bytes with certain values when the data length being transmitted is less than 8 bytes.

5) CanTpReadParameterApi

    - Reads STmin or BS values during communication.

6) CanTpFlexibleDataRateSupport

    - Supports CAN-FD (when the CAN-FD protocol is desired for large data transmission)

5.2 CanTpChannel configuration

Parameter Name	Value	Category
CanTpMainFunctionPeriod	0.005	C
CanTpChannelMode	CANTP_MODE_HALF_DUPLEX	F
CanTpChannelLowerLayer	CANIF	C

1) CanTpMainFunctionPeriod

    - The parameter sets the cycle time (in seconds) of the periodic function. It is set to 5 ms by default; when optimization is required due to the use of gateway functionality by the platform, it may be set to 10 ms. When making such changes, the settings related to running the given MainFunction should be changed too.

- The CanTp module and DCM module should be mapped to the same OS task as their operation is interrelated.

2) CanTpChannelMode

- CANTP_MODE_HALF_DUPLEX : Concurrently supports one-way communication
  CANTP_MODE_FULL_DUPLEX : Concurrently supports two-way communication (not available)

3) CanTpChannelLowerLayer

- Sets the submodules of CanTp
- CANIF: Sets CanIf as the submodule of CanTp
- CDD_ROUTER: Sets CDD_ROUTER as the submodule of CanTp

5.3 CanTpConfig-CanTpRxNSdu configuration

Parameter Name	Value	Category
CanTpBs	0	C
CanTpNar	1	C
CanTpNbr	0	C
CanTpNcr	1	C
CanTpRxAddressingFormat	CANTP_STANDARD	C
CanTpRxDl	Automated	F
CanTpRxNSduId	Automated	F
CanTpRxPaddingActivation	CANTP_ON	F
CanTpRxTaType	Automated	C
CanTpRxWftMax	0	C
CanTpSTmin	0.005	C
CanTpRxNSduRef	Automated	F

1) CanTpBs

- Sets the number of blocks that can be consecutively received after sending a Flow Control Message (unit: numbers)
- Default Value Standard: ES95400-30E

2) CanTpNar

- The value of the timeout for transmission completion of the Flow Control Frame (unit: seconds)
- Default Value Standard: ISO15765-2

3) CanTpNbr

- The timeout value for the reception buffer request (unit: seconds)
- Default Value Standard: ISO15765-2

4) CanTpNcr

- The value of the timeout between incoming consecutive frames (unit: seconds)

- Default Value Standard: ISO15765-2

5) CanTpRxAddressingFormat

- CANTP_STANDARD : Uses a normal addressing format.

- CANTP_EXTENDED : Uses an extended addressing format.

- CANTP_MIXED : Uses a mixed addressing format. The parameter should not be set to this value as the format is not supported.

6) CanTpRxDl

- Minimum data length

7) CanTpRxNSduId

- RxNsdu ID

8) CanTpRxPaddingActivation

- Uses padding bytes

9) CanTpRxTaType

- The parameter needs to be manually enabled by referring to the following because it is not automated for CAN-FD.

- CANTP_PHYSICAL : 1-to-1 CAN/CAN-FD communication where CAN_DL values are less than or equal to 8 bytes

- CANTP_ FUNCTIONAL : 1-to-n CAN/CAN-FD communication where CAN_DL values are less than or equal to 8 bytes

- CANTP_CANFD_PHYSICAL : 1-to-1 CAN-FD communication where CAN_DL values are great than 8 bytes

- CANTP_CANFD_FUNCTIONAL : 1-to-n CAN-FD communication where CAN_DL values are great than 8 bytes

  % CAN_DL : the size of CAN Frame that is transmitted at a time

10) CanTpRxWftMax

- The parameter indicates the maximum number of Wait Flow Control Frame transmission. Communication stops when the maximum number is reached. (unit: numbers)

- Default Value Standard: ES95400-30E

11) CanTpSTmin

- Sets the time between the consecutive frames sending the request (unit: seconds)

- Default Value Standard: ES95400-30E

12) CanTpRxNSduRef

- Sdu Reference

5.4 CanTpConfig-CanTpRxNSdu-CanTpTxFcNPdu configuration

Parameter Name	Value	
CanTpTxFcNPduConfirmationPduId	Automated	F
CanTpTxFcNPduRef	Automated	F

1) CanTpTxFcNPduConfirmationPduId

   - ID to be used by the CanIf for confirmation

2) CanTpTxFcNPduRef

   - Reference Pdu

5.5 CanTpConfig-CanTpRxNSdu-CanTpRxNPdu configuration

Parameter Name	Value	
CanTpRxNPduId	Automated	F
CanTpRxNPduRef	Automated	F

1) CanTpRxNPduId

   - Pdu Id

2) CanTpRxNPdu

   - Ref Reference Pdu

5.6 CanTpConfig-CanTpRxNSdu-CanTpNSa configuration

Parameter Name	Value	
CanTpNSa	–	N

1) CanTpNSa

   - A source address used by an extended addressing format

5.7 CanTpConfig-CanTpRxNSdu-CanTpNTa configuration

Parameter Name	Value	
CanTpNTa	–	N

1) CanTpNTa

   - A target address used by an extended addressing format

5.8 CanTpConfig-CanTpTxNSdu configuration

Parameter Name	Value	Category
CanTpNas	1	C
CanTpNbs	1	C
CanTpNcs	0	C
CanTpTc	True	F
CanTpTxAddressingFormat	CANTP_STANDARD	F
CanTpTxDl	Automated	F
CanTpTxNSduId	Automated	F
CanTpTxPaddingActivation	CANTP_ON	F
CanTpTxTaType	Automated	C
CanTpTxNSduRef	Automated	F

1) CanTpNas

   - The timeout value for transmission completion (unit: seconds)

   - Default Value Standard: ISO15765-2

2) CanTpNbs

   - The value of the timeout for the completion of Flow Control Frame reception (unit: seconds)

   - Default Value Standard: ISO15765-2

3) CanTpNcs

   - The value of the timeout between transmitting consecutive frames (unit: seconds)

   - Default Value Standard: ISO15765-2

4) CanTpTc

   - Enables transmit cancellation

5) CanTpTxAddressingFormat

   - CANTP_STANDARD : Uses a normal addressing format.

   - CANTP_EXTENDED : Uses an extended addressing format.

   - CANTP_MIXED : Uses a mixed addressing format (not available)

6) CanTpTxDl

   - Minimum data length

7) CanTpTxNSduId

   - TxNsdu ID

8) CanTpTxPaddingActivation

   - Uses padding bytes

9) CanTpTxTaType

   - The parameter needs to be manually enabled by referring to the following because it is not automated for CAN-FD.

   - CANTP_PHYSICAL : 1-to-1 CAN/CAN-FD communication where CAN_DL values are less than or

equal to 8 bytes

- CANTP_ FUNCTIONAL : 1-to-n CAN/CAN-FD communication where CAN_DL values are less than or equal to 8 bytes

- CANTP_CANFD_PHYSICAL : 1-to-1 CAN-FD communication where CAN_DL values are great than 8 bytes

- CANTP_CANFD_FUNCTIONAL : 1-to-n CAN-FD communication where CAN_DL values are great than 8 bytes

    % CAN_DL : the size of CAN Frame that is transmitted at a time

10) CanTpTxNSduRef

- Sdu Reference

5.9 CanTpConfig-CanTpTxNSdu-CanTpRxFcNPdu configuration

Parameter Name	Value	Category
CanTpTxFcNPduConfirmationPduId	Automated	F
CanTpTxFcNPduRef	Automated	F

1) CanTpRxFcNPduConfirmationPduId

- ID to be used by the CanIf for confirmation

2) CanTpRxFcNPduRef

- Reference Pdu

5.10 CanTpConfig-CanTpTxNSdu-CanTpTxNPdu configuration

Parameter Name	Value	Category
CanTpTxNPduId	Automated	F
CanTpTxNPduRef	Automated	F

1) CanTpTxNPduId

- Pdu Id

2) CanTpTxNPdu

- Ref Reference Pdu

6   Application Programming Interface (API)

6.1 Type Definitions

None

6.2 Macro Constants

None

6.3 Functions

6.3.1 CanTp_ChangeParameter

Function Name	CanTp_ChangeParameter	
Syntax	Std_ReturnType CanTp_ChangeParameter(PduIdType id, TPParameterType parameter, uint16 value)	
Service ID	0x0a	
Sync/Async	Synchronous	
Reentrancy	Non Reentrant	
Parameters (In)	Id	Identifier of the received N-SDU on which the reception parameter has to be changed.
	Parameter	Specify the parameter to which the value has to be changed (BS or STmin).
	value	The new value of the parameter.
Parameters (Inout)	None	
Parameters (Out)	None	
Return Value	Std_ReturnType	E_OK: request is accepted.
		E_NOT_OK: request is not accepted.
Descsription	This service is used to request the change of reception parameters BS and STmin for a specified N-SDU.	
Preconditions	CanTp shall be initialized.	
Configuration Dependency	None	
In Communication with Application SW-C	Rte_Call_<Port Name>_ChangeParameter	

6.3.2 CanTp_ReadParameter

Function Name	CanTp_ReadParameter	
Syntax	Std_ReturnType CanTp_ReadParameter(PduIdType id, TPParameterType parameter, uint16* value)	
Service ID	0x0b	
Sync/Async	Synchronous	
Reentrancy	Non Reentrant	
Parameters (In)	Id	Identifier of the received N-SDU on which the reception parameter are read.
	Parameter	Specify the parameter to which the value has to be read (BS or STmin).
Parameters (Inout)	None	
Parameters (Out)	value	Pointer where the parameter value will be provided.
Return Value	Std_ReturnType	E_OK: request is accepted.
		E_NOT_OK: request is not accepted.

Desscription	This service is used to read the current value of reception parameters BS and STmin for a specified N-SDU.
Preconditions	CanTp shall be initialized.
Configuration Dependency	None
In Communication with Application SW-C	Rte_Call_<Port Name>_ReadParameter

7   Generator

7.1 Generator Option

Options	Description
-H/-Help	To display help regarding usage of the tool.
-O/-Output	To generate the output files in the specified directory location.
-V/-Version	To display the copyright information and the tool version.
-L/-Log	To generate "$BswConfig::Lis_File_Name" file.
-D/-DryRun	To execute in validation mode.
-I/-Info	To disable an Information Message(s).
-W/-Warn	To disable Warning Message(s).
-411	To Support AUTOSAR version 4.1 for PduR_StartOfReception() function

7.2 Generator Error Message

This section helps to analyze the errors or warnings displayed during the execution of the tool. It ensures conformance of input file(s) with syntax and semantics.

The Generation Tool displays errors or warnings or information when the user has configured incorrect inputs. The format of Error/Warning/Information message is as shown below:

- ERR/WRN/INF<mid><xxx>: < Error/Warning/Information Message>
  Where,
  <mid>: 035 – CanTp Module Id (035) for user configuration checks.
            000 – for command line checks.
  <xxx>: 051 – 999 – Message ID.
- File Name : Name of the file in which the error has occurred
- Path : Absolute path of the container in which the parameter is present

'File Name' and 'Path' are optional.

Below section provides the list of module specific error, warning and information messages.

7.2.1 Error Messages

ERR035001: Unexpected Error Found. Please contact AUTRON AUTOSAR Support System.

This is an Unexpected Error. On the occurrence of this error contact AUTRON AUTOSAR Support System.

ERR035002: Unexpected Error Found. This error may be due to the incorrect configuration of the element(s) <Parameter Name/ Container Name>. If the error is not resolved, then please contact AUTRON AUTOSAR Support System.

This error may occur due to incorrect configuration of the Parameter Name/ Container Name provided in the error message. If the error is not resolved, then contact AUTRON AUTOSAR Support System.

ERR035003: 'Component Name' Component is not present in the input file(s).

This error occurs, if any of the component CanTp or PduR or CanIf is(are) not present in any of the input ECU Configuration Description File(s).

ERR035004: The reference path is empty for the parameter 'Parameter Name' in the container 'Container Name', having short name 'Container Short Name'.

This error occurs, if reference path is not configured for the below mentioned parameters.

Parameter Name	Container Name
CanTpRxNSduRef	CanTpRxNSdu
CanTpTxNPduRef	CanTpTxNPdu
CanTpTxNSduRef	CanTpTxNSdu

ERR035005: The parameter 'Parameter Name' in the container 'Container Name' should be configured.

This error occurs, if value of any of the mandatory parameters mentioned in the below table are not configured.

Parameter Name	Container Name
CanTpDevErrorDetect	CanTpGeneral
CanTpVersionInfoApi	
CanTpChangeParameterRequestApi	
CanTpPaddingByte	
CanTpReadParameterApi	
CanTpChannelMode	CanTpChannel
CanTpMainFunctionPeriod	CanTpConfig

Parameter Name	Container Name
CanTpRxAddressingFormat	CanTpRxNSdu
CanTpRxPaddingActivation	
CanTpRxTaType	
CanTpNbr	
CanTpRxDl	
CanTpTxAddressingFormat	CanTpTxNSdu
CanTpTxPaddingActivation	
CanTpTxTaType	
CanTpNas	
CanTpTxDl	
CanTpTxNSduId	
CanTpTc	
CanTpRxNPduId	CanTpRxNPdu
CanTpTxNPduConfirmationPduId	CanTpTxNPdu

ERR035006: The value configured for the parameter 'AR-RELEASE-VERSION' in the container 'BSW-IMPLEMENTATION' should follow the pattern: <4.[0-9]+.[0-9]+>.

This error occurs, when AR-RELEASE-VERSION in BSW-IMPLEMENTATION does not follow the pattern: <4.[0-9]+.[0-9]+>)

ERR035008: Value of the parameter 'Original Parameter Name' in the container 'Original Container Name' should not be configured as <Original Value>, since value of the parameter 'Dependent Parameter' in the container 'Dependent Container Name' is configured as <Dependent Value>.

This error occurs, if value of any of the parameters mentioned in the below table are configured as original value when, value of the dependent parameters are configured as dependent value.

Original Parameter Name	Original Value	Original Container Name	Dependent Parameter	Dependent Value	Dependent Container Name

CanTpTx TaType	CANTP_FU NCTIONA L	CanTpTxNSdu	CanTpTc	true/1	CanTpTxNSdu

ERR035020: The value ⟨Value⟩ of the structure element 'Structure Element Name' in structure 'Structure Name' is not within the range. The value ⟨Value⟩ should be within the range of ⟨Min Value⟩ – ⟨Max Value⟩, as its data type is ⟨Type⟩.

This error occurs, if value of the structure element is less than Min value or value of the structure element greater than Max value.

ERR035024: Calculated number of ticks = INT (Parameter Name / CanTpMainFunctionPeriod) should not be zero.

This error occurs, if calculated number of ticks for any of the below parameters divided by CanTpMainFunctionPeriod results a value of zero.

Parameter Name	Container Name
CanTpNar	
CanTpNbr	CanTpRxNSdu
CanTpNcr	
CanTpNas	
CanTpNbs	CanTpTxNSdu
CanTpNcs	

ERR035051: The container 'Dependent Container Name' should be configured when the corresponding 'Container Name' is configured for the physical request type.

This error occurs, if container CanTpRxNSdu or CanTpTxNSdu is configured for CANTP_PHYSICAL then container CanTpTxFcNPdu or CanTpRxFcNPdu is (are) not configured.

Dependent Container Name	Container Name
CanTpTxFcNPdu	CanTpRxNSdu
CanTpRxFcNPdu	CanTpTxNSdu

ERR035052: The value of the reference parameter 'Parameter Name' in the N-SDU ⟨Container Short Name⟩ does not have an equivalent N-SDU in the upper layer ⟨PduR⟩.

This error occurs, if value of the below mentioned reference parameters does not have an equivalent N-SDU in the upper layer 'PduR'.

Parameter Name	Container Name
CanTpRxNSduRef	CanTpRxNSdu
CanTpTxNSduRef	CanTpTxNSdu

ERR035053: The value of the reference parameter 'Parameter Name' in the N-PDU <Container Short Name> does not have an equivalent N-PDU in the lower layer <CanIf>.

This error occurs, if value of the below mentioned reference parameters does not have an equivalent N-PDU in the lower layer 'CanIf'.

Parameter Name	Container Name
CanTpTxFcNPduRef	CanTpTxFcNPdu
CanTpTxNPduRef	CanTpTxNPdu

ERR035054: The container 'Dependent Container Name' should be configured when the 'Parameter Name' is configured as <Addressing Mode> in the container 'Container Name1'.

This error occurs, if any of the below mentioned dependent containers are not configured when the parameter is configured with addressing modes given below.

Parameter Name	Dependent Container Name	Container Name1	Addressing Mode
CanTpRxAddressingFormat	CanTpNSa	CanTpRxNSdu	CANTP_EXTENDED
CanTpTxAddressingFormat	CanTpNSa	CanTpTxNSdu	CANTP_EXTENDED
CanTpRxAddressingFormat	CanTpNAe	CanTpRxNSdu	CANTP_MIXED
CanTpTxAddressingFormat	CanTpNAe	CanTpTxNSdu	CANTP_MIXED
CanTpRxAddressingFormat	CanTpNTa	CanTpRxNSdu	CANTP_EXTENDED/ CANTP_MIXED
CanTpTxAddressingFormat	CanTpNTa	CanTpTxNSdu	CANTP_EXTENDED/ CANTP_MIXED

ERR035055: Parameters 'Parameter Name' should be configured in container 'CanTpRxNSdu' since the container 'CanTpTxFcNPdu' is configured.

Parameter Name
CanTpSTmin
CanTpRxWftMax

This error occurs, if the parameters CanTpSTmin and CanTpRxWftMax are not configured, when container CanTpTxFcNPdu is configured.

ERR035057: The value of the parameter 'Dependent Parameter Name' is not configured when container 'Dependent Container Name' is configured and 'Parameter Name' is configured as <Addressing Mode> in the container 'Container Name1'.

This error occurs, if any of the below dependent parameters are not configured when the dependent containers are configured and the parameters are configured with the addressing modes given below.

Dependent Parameter Name	Parameter Name	Dependent Container Name	Container Name1	Addressing Mode
CanTpNSa	CanTpRxAddressingFormat	CanTpNSa	CanTpRxNSdu	CANTP_EXTENDED
CanTpNSa	CanTpTxAddressingFormat	CanTpNSa	CanTpTxNSdu	CANTP_EXTENDED
CanTpNAe	CanTpRxAddressingFormat	CanTpNAe	CanTpRxNSdu	CANTP_MIXED
CanTpNAe	CanTpTxAddressingFormat	CanTpNAe	CanTpTxNSdu	CANTP_MIXED
CanTpNTa	CanTpRxAddressingFormat	CanTpNTa	CanTpRxNSdu	CANTP_EXTENDED/ CANTP_MIXED
CanTpNTa	CanTpTxAddressingFormat	CanTpNTa	CanTpTxNSdu	CANTP_EXTENDED/ CANTP_MIXED

ERR035058: The containers 'CanTpRxFcNPdu' and 'CanTpRxNPdu' should have the same addressing format as they have same Pdu Ids. CanTpRxNPdu: <RxNPdu Short Name> CanTpRxFcNPdu: <RxFcNPdu Short Name>

This error occurs, if containers CanTpRxFcNPdu and CanTpRxNPdu have same Pdu Ids when they have configured for different addressing format.

ERR035059: The value of the parameter 'Parameter Name' is not unique for the same values of the parameter 'CanTpRxNPduId' when the addressing format is configured as <value of the parameter CanTpRxAddressingFormat> in the container 'CanTpRxNSdu'.

This error occurs, if the value of the parameter CanTpNSa is not unique for the same CanTpRxNPduId values if the addressing format is CANTP_EXTENDED in the container CanTpRxNSdu. This error also occurs if the value of the parameter CanTpNAe is not unique for the same CanTpRxNPduId values if the addressing format is CANTP_MIXED in the container CanTpRxNSdu.

Parameter Name	CanTpRxAddressingFormat
CanTpNSa	CANTP_EXTENDED
CanTpNAe	CANTP_MIXED

ERR035060: At least 'CanTpTxNSdu' or 'CanTpRxNSdu' container should be configured, since channel mode is configured as <CANTP_MODE_HALF_DUPLEX> in the container 'CanTpChannel'.

This error occurs, if at least CanTpTxNSdu or CanTpRxNSdu container is not configured when channel mode is configured as CANTP_MODE_HALF_DUPLEX in the container CanTpChannel.

ERR035061: Both 'CanTpTxNSdu' and 'CanTpRxNSdu' containers should be configured, since

channel mode is configured as <CANTP_MODE_FULL_DUPLEX> in the container 'CanTpChannel'.

This error occurs, if both CanTpTxNSdu and CanTpRxNSdu container are not configured when channel mode is configured as CANTP_MODE_FULL_DUPLEX in the container CanTpChannel.

ERR035062: Value of the parameter 'Parameter Name' <Parameter id value> is repeated in the container 'Container Name'. 'Parameter Name' should be unique.

This error occurs, if the value of parameters of the container is not unique within each config set.

Please refer below table for list of parameters and its container

Parameter Name	Container Name
CanTpRxNSduId	CanTpRxNSdu
CanTpTxNSduId	CanTpTxNSdu
CanTpTxNPduConfirmationPduId	CanTpTxNPdu
CanTpTxFcNPduConfirmationPduId	CanTpTxFcNPdu

ERR035063: Value of the parameter 'Parameter Name' in the container 'Container Name' should start with <0>.

This error occurs, if value of the parameter does not start with 0 within the configuration set

Parameter Name	Container Name
CanTpRxNSduId	CanTpRxNSdu
CanTpTxNSduId	CanTpTxNSdu
Parameter Name	Container Name
CanTpTxNPduConfirmationPduId	CanTpTxNPdu
CanTpTxFcNPduConfirmationPduId	CanTpTxFcNPdu

ERR035064: The value of the parameter 'CanTpRxNPduId' in the container 'CanTpRxNPdu' is not unique as the addressing format is <CANTP_STANDARD> in the container 'CanTpRxNSdu'.

This error occurs, if values of the parameter CanTpRxNPduId in the container CanTpRxNPdu are not

unique when addressing format is configured as CANTP_STANDARD.

ERR035066: The container 'Container Name 1' should not be configured when the corresponding 'Container Name 1' is configured for the functional request type.

This error occurs, if container CanTpRxNSdu or CanTpTxNSdu is configured for CANTP_FUNCTIONAL then container CanTpTxFcNPdu or CanTpRxFcNPdu should not be configured respectively.

Container Name 1	Container Name 2
CanTpTxFcNPdu	CanTpRxNSdu
CanTpRxFcNPdu	CanTpTxNSdu

ERR035067: Value configured for the parameter 'Parameter Name' in the container 'Container Name' should be sequential.

This error occurs, if value of the parameter is not sequential.

Parameter Name	Container Name
CanTpRxNSduId	CanTpRxNSdu
CanTpTxNSduId	CanTpTxNSdu
CanTpTxNPduConfirmationPduId	CanTpTxNPdu
CanTpTxFcNPduConfirmationPduId	CanTpTxFcNPdu

ERR035068: Value(s) of the parameter 'CanTpRxNPduId' has to be configured sequential for all instances and should start from <0> in the container 'CanTpRxNPdu'.

This error occurs, if value of the parameter CanTpRxNPduId is not sequential and does not start from 0 in the container CanTpRxNPdu.

7.2.2 Warning Messages

None

7.2.3 Information Messages

INF063015: AUTOSAR Release version 'AR-RELEASE-VERSION' configured for the parameter 'AR-RELEASE-VERSION' in provided MDT file is not correct. AUTOSAR Release version should be one of the following: 4.0.3.

This information occurs, if AR-RELEASE-VERSION in BSW-IMPLEMENTATION is not configured as 4.0.3

8 Det Error

Detected development errors shall be reported to the Det_ReportError(uint8 InstanceId, uint8 ApiId, uint8 ErrorId) service of the Development Error Tracer (DET) if the pre-processor switch CanTpDevErrorDetect is set "on".

8.1 Error Classification

Type of error	Relevance	Related error code	Value
API service called with wrong parameter(s): When CanTp_Transmit is called for a none configured PDU identifier or with an identifier for a received PDU.	Development	CANTP_E_PARAM_CONFIG	0x01
API service called with wrong parameter(s): When CanTp_Transmit is called for a none configured PDU identifier or with an identifier for a received PDU.	Development	CANTP_E_PARAM_ID	0x02
API service called with a NULL pointer. In case of this error, the API service shall return immediately without any further action, besides reporting this development error.	Development	CANTP_E_PARAM_POINTER	0x03
Module initialization has failed, e.g. CanTp_Init() called with an invalid pointer in postbuild.	Development	CANTP_E_INIT_FAILED	0x04
API service used without module initialization : On any API call except CanTp_Init(), CanTp_GetVersionInfo() and CanTp_MainFunction() if CanTp is in state CANTP_OFF	Development	CANTP_E_UNINIT	0x20
Invalid Transmit PDU identifier (e.g. a service is called with an inexistent Tx PDU identifier)	Development	CANTP_E_INVALID_TX_ID	0x30
Invalid Receive PDU identifier (e.g. a service is called with an inexistent Rx PDU identifier)	Development	CANTP_E_INVALID_RX_ID	0x40
Invalid Transmit buffer address (e.g. the Tx buffer address is inaccessible or NULL)	Development	CANTP_E_INVALID_TX_BUFFER	0x50
Invalid Receive buffer address (e.g. the Rx buffer address is inaccessible or NULL)	Development	CANTP_E_INVALID_RX_BUFFER	0x60
Invalid data length of the transmit PDU (e.g. a transmit N-SDU has a length equal to zero)	Development	CANTP_E_INVALID_TX_LENGTH	0x70

Invalid data length of the receive PDU (e.g. a transmit N-SDU has a length equal to zero)	Development	CANTP_E_INVALID_RX_LENGTH	0x80
CanTp_Transmit() is called for a configured Tx I-Pdu with functional addressing and the length parameter indicates, that the message can not be sent with a SF	Development	CANTP_E_INVALID_TATYPE	0x90
Requested operation is not supported – a cancel transmission/reception request for an N-SDU that it is not on transmission/reception process	Development	CANTP_E_OPER_NOT_SUPPORTED	0xA0
Another error occurred during a reception or a transmission: any protocol timeout error or implementation specific error	Development	CANTP_E_COM	0xB0
Event reported on completion of a reception operation	Development	CANTP_E_RX_COM	0xC0
Event reported on completion of a transmission operation	Development	CANTP_E_TX_COM	0xD0
Event reported in case of a protocol timeout error when transmission of a CAN frame (any N-PDU) on the part of the sender	Development	CANTP_E_TX_AS	0xD1
Event reported in case of a protocol timeout error when transmission until reception of the next Flow Control N_PDU	Development	CANTP_E_TX_BS	0xD2
Event reported in case of a protocol timeout error when transmission a CAN frame (any N_PDU) on the receiver side	Development	CANTP_E_RX_AR	0xC1
Event reported in case of a protocol timeout error when reception of the next Consecutive Frame N_PDU	Development	CANTP_E_RX_CR	0xC2
Event reported in case of CanTpRxTftMax equeal to 0	Development	CANTP_E_WFT_OVRN	0xC3

8.1.1 Service ID

CanSM function name	Service ID[hex]
CanTp_Init	0x01
CanTp_Shutdown	0x02
CanTp_Transmit	0x03
CanTp_CancelTransmit	0x08
CanTp_CancelReceive	0x09

CanTp_ChangeParameter	0x0a
CanTp_GetVersionInfo	0x07
CanTp_ReadParameter	0x0b
CanTp_MainFunction	0x06
CanTp_RxIndication	0x42
CanTp_TxConfirmation	0x40

9 Appendix

9.1 Change/Read Parameters Guide

9.1.1 Configuration Guide

9.1.1.1 How to add service components

If you go to Configuration > System > Swcd_Bsw and find out that Swcd_CanTp.arxml is added, you can skip the following process, assuming it is already completed.

1) Add Swcd_CanTp.arxml
: Request the person in charge of distribution to share Swcd_CanTp.arxml file. Then, go to Configuration > System > Swcd_Bsw to which you copy the file.

2) Setting SCons
: Go to SCons > RTSW >Generation > Rte and add "Swcd_CanTp" to the Input File List.
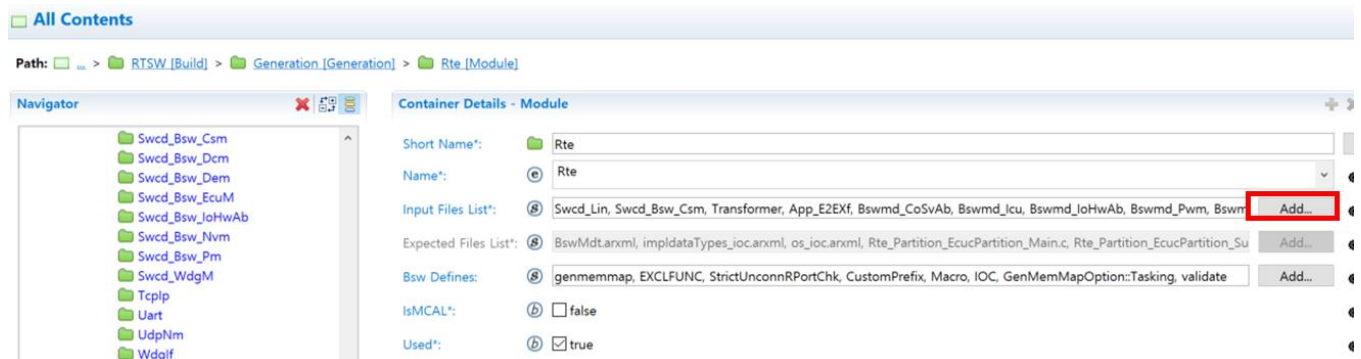
3) Add Components to EcuComposition
: Go to System > Composition > EcuExtract > EcuComposition and Select Components and Ports tab to open the window and click "+" button. Then, check CanTp module in the pop-up and click OK to add the component.
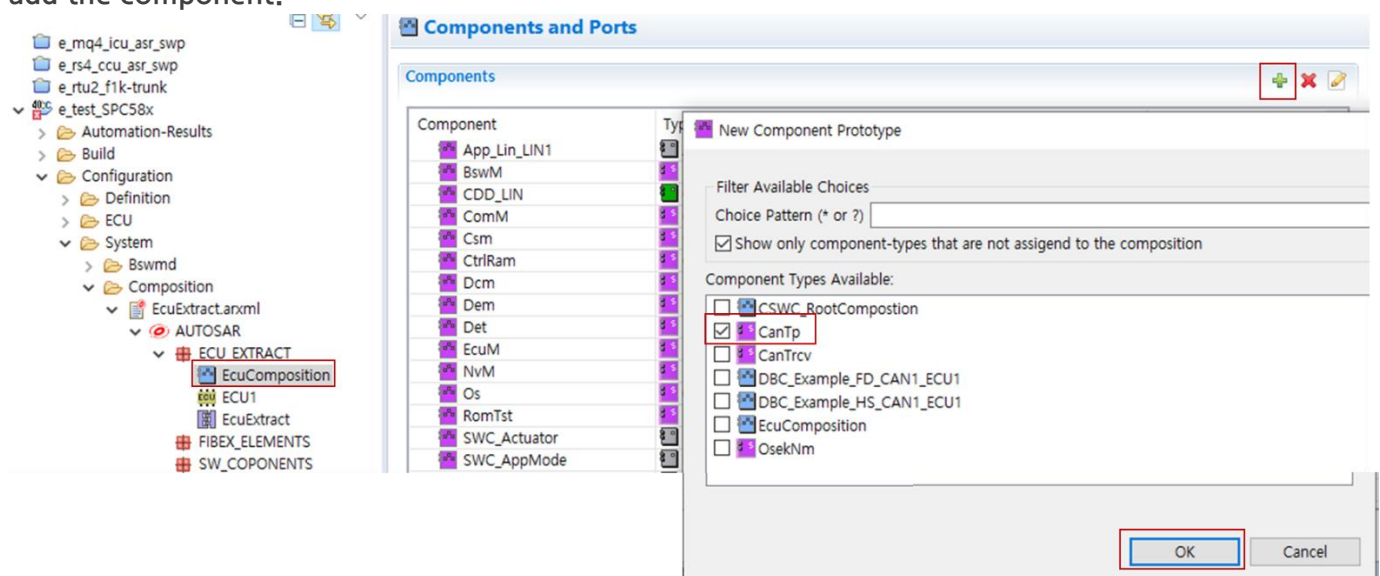
4) Setting EcuC Partition

: If you can't go to EcuC 〉 EcuCPartitionCollection as the path does not exists, skip this step. If it exists, go to EcuC 〉 EcuCPartitionCollection 〉 EcuCPartition to add Swcd_CanTp to Software Component Instance Ref.
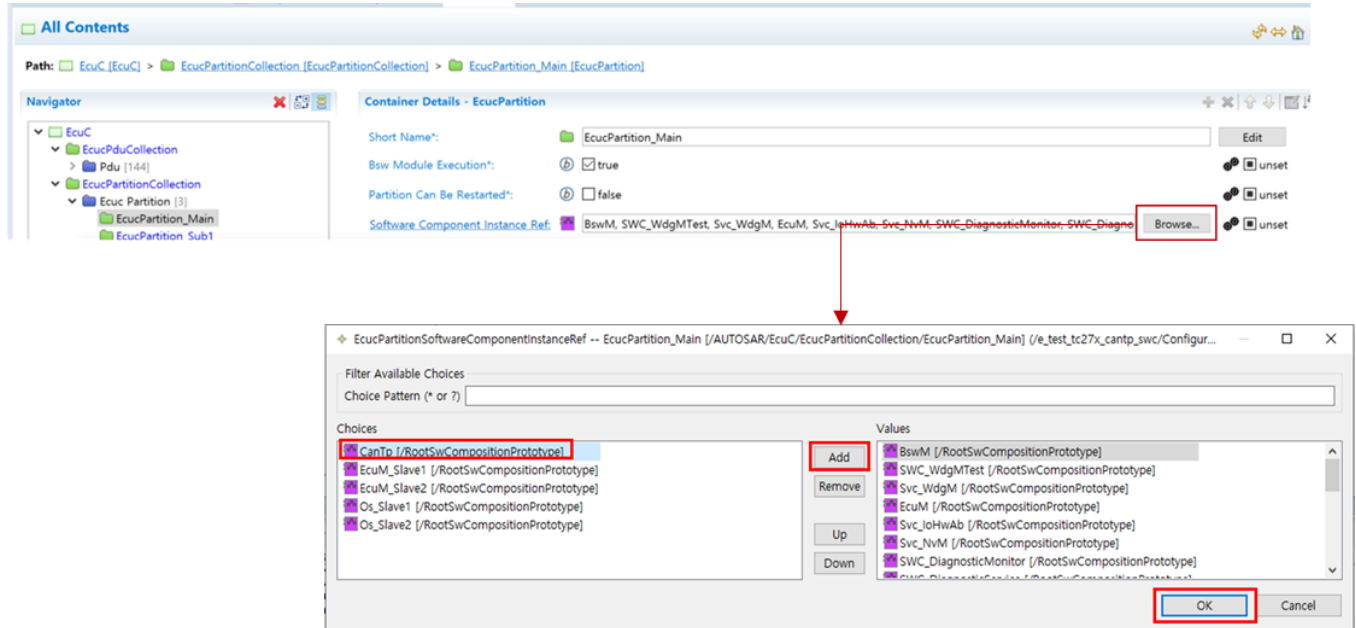
5) Setting Swc Bsw Mapping

The following should be done after completing 8.1.1.2 configuration. Go to Configuration 〉 System 〉 Swcd_Bsw 〉 Swcd_CanTp.arxml 〉 SwcImplementation_CanTp and configure SwcBswMapping_CanTp created in Swcd_Bsw Mapping after implementing 8.1.1.2 configuration.
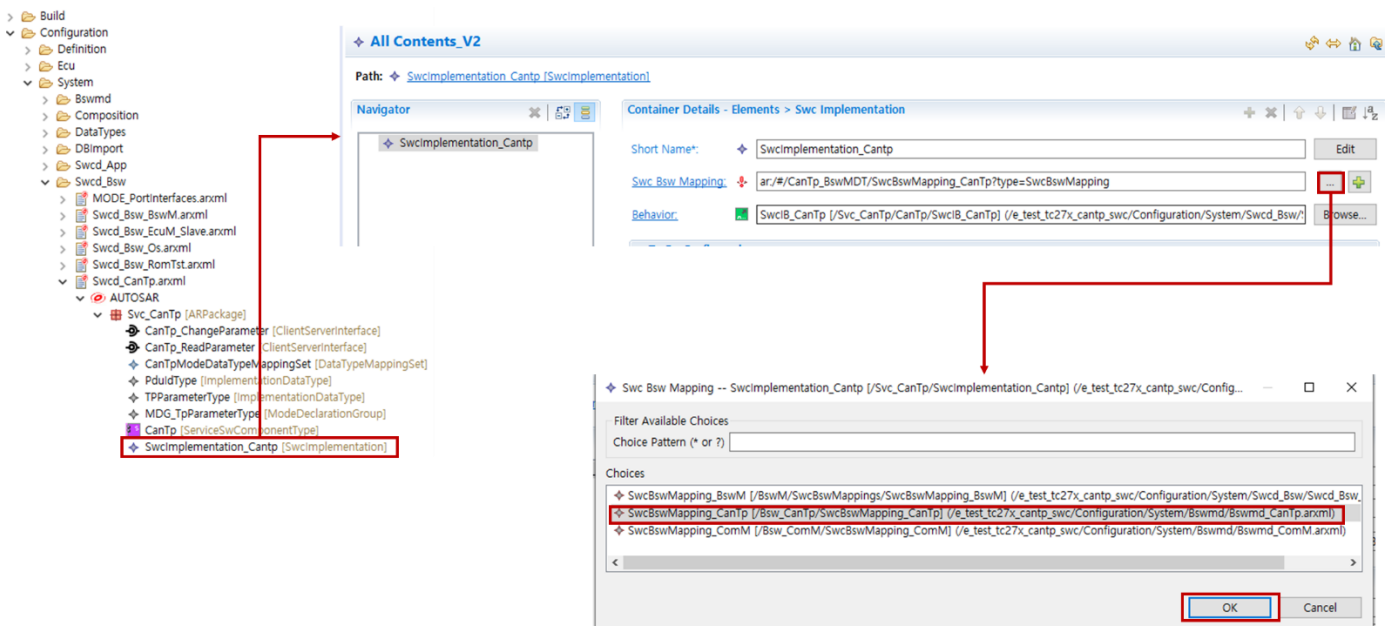
9.1.1.2 How to set Bswmd_CanTp

If you go to Configuration 〉 System 〉 Bswmd 〉 Bswmd_CanTp.arxml and find out that Bswmd_CanTp.arxml is added, you can skip the following process, assuming it is already completed.

1) Add SwcBswMapping

: Go to Configuration 〉 System 〉 Bswmd 〉 Bswmd_CanTp.arxml and right-click ARPackage (UI names might be different from the ones that appear in the screenshot). Then, click New 〉 Common Structure 〉 Bsw Swc Mapping to create SwcBswMapping.
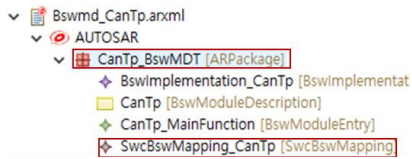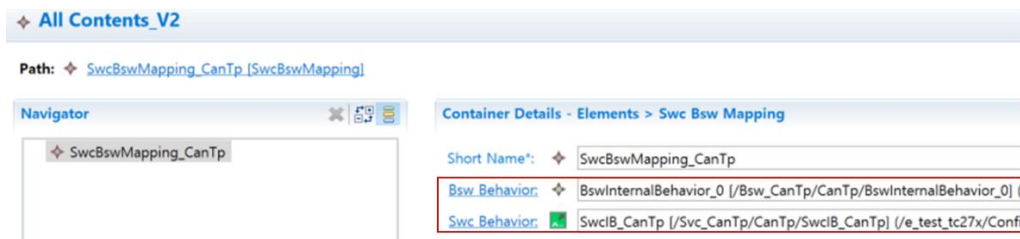

2) Add BswBehavior and SwcBehavior in SwcBswMapping

* Bsw Behavior
: Select Internal Behavior of CanTp [BswModuleDescription] in Bswmd_CanTp.arxml. (Click Browse button 〉
Search for CanTp)

* Swc Behavior
: Select Internal Behavior of the CanTp Service Component added (Click Browse button 〉 Search for CanTp)

3) Setting BswImplementation

: Go to BswImplementation and SwcBswMapping and set SwcBswMapping created in Step 2).

9.1.1.3 How to set Application SW Component

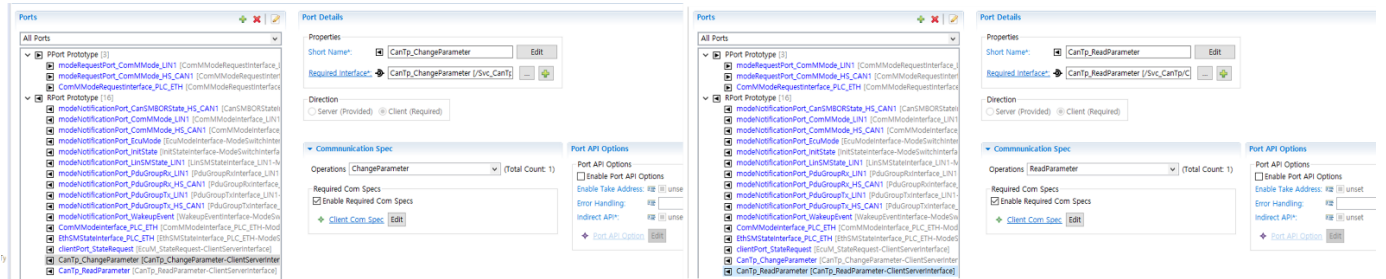Follow the below steps when you have completed 8.1.1.1 and 8.1.1.2.

1) Create RPorts
: Select Port Tab of Application SW Component and click "+" 〉 Client Server Interface 〉 Client. Then, create RPorts for CanTp_ChangeParameter and CanTp_ReadParameter, respectively, and set Enable Required Com Specs to "True."
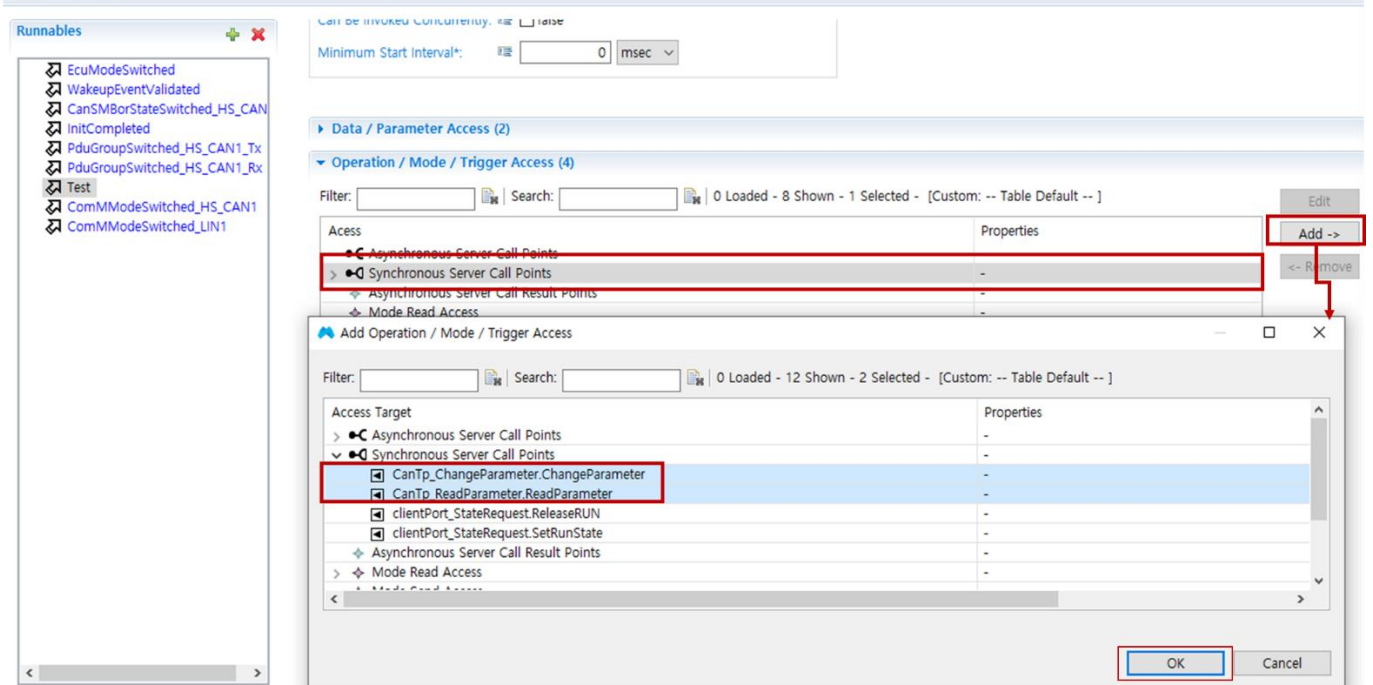[Creation]
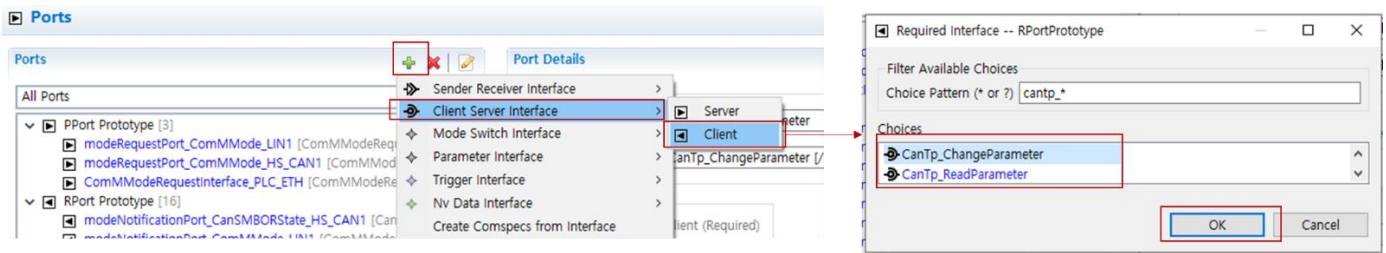
[Settings]

## 2) Add Synchronous Server Call Points

: For runnables that perform Change/Read parameters, select Operation / Mode / Trigger Access and Synchronous Server Call Points to click "Add ->" button. Here, you can select the Operation for the runnable to use and add Synchronous Server Call Points for Change/Read parameters.

3) Connect Service Component Port and App SW Component Port

: Go to EcucValueCollection > Service and I/O tab and select CanTp Component and click "+" button to connect with App SW Component Port.
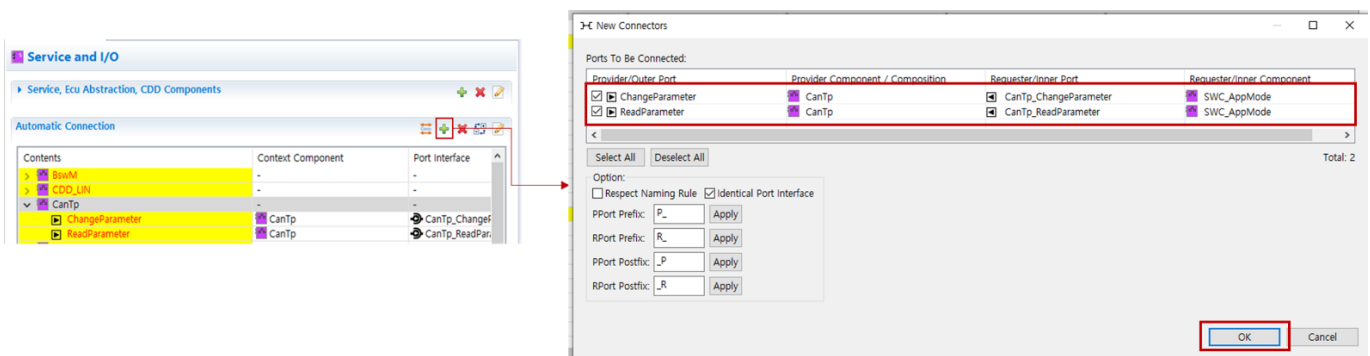
4) Harmonize the RTE

: Settings should be reflected to the RTE through RTE harmonization.

9.1.2 User Manual

9.1.2.1 API Description

1) Function Prototype

– Change Parameter

FUNC(Std_ReturnType, RTE_CODE) Rte_Call_⟨PortName⟩_ChangeParameter (IN PduIdType id, IN TPParameterType parameter, IN uint16 value)

– Read Parameter

FUNC(Std_ReturnType, RTE_CODE) Rte_Call_⟨PortName⟩_ReadParameter (IN PduIdType id, IN TPParameterType parameter, OUT P2VAR(uint16, AUTOMATIC, RTE_APPL_DATA) value)

2) Function factors

– id: ID of the target CanTpRxNPdu
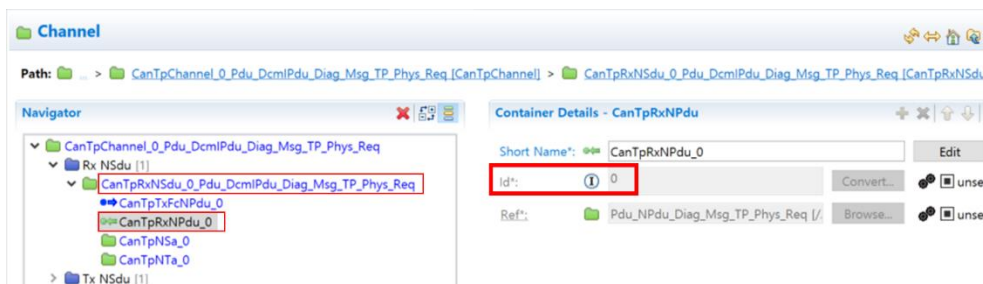
– parameter: Changes or reads the value (Block Size/STMin)

* Block Size: Allocates TP_BS

* STMin: Allocates TP_STMIN

– value: The value to be changed for Change parameter and the value to be read for Read parameter

* Block Size: from 0 to 255

* STMin: See the table below.

.9.6.5.4   **SeparationTime minimum (ST_min) parameter definition**

The ST_min parameter shall be encoded in byte #3 of the FC N_PCI.

This time is specified by the receiving entity. The ST_min parameter value specifies the minimum time gap allowed between the transmissions of two ConsecutiveFrame network protocol data units (CFs). See Table 20.

Table 20 — Definition of ST_min values

Value	Description
$00_{16} - 7F_{16}$	**SeparationTime minimum (ST_min) range: 0 ms – 127 ms**
	The units of ST_min in the range 00_{16} –$7F_{16}$ (0 – 127) are absolute milliseconds (ms).
$80_{16} - F0_{16}$	**Reserved**
	This range of values is reserved by this part of ISO 15765.
$F1_{16} - F9_{16}$	**SeparationTime minimum (ST_min) range: 100 µs – 900 µs**
	The units of ST_min in the range $F1_{16}$ –$F9_{16}$ are even multiples of 100 µs, where parameter value $F1_{16}$ represents 100 µs and parameter value $F9_{16}$ represents 900 µs.
$FA_{16} - FF_{16}$	**Reserved**
	This range of values is reserved by this part of ISO 15765.

9.1.2.2 Code examples

The code below was written when the port performing as a Read parameter is named CanTp_ReadParameter and the port serving as a Change parameter CanTp_ChangeParameter. They run Read and Change parameters for CanTpRxNPdu whose ID value is 0. The examples are designed to enhance the understanding of the user. The implementation and verification of the actual code should be done by the user himself.

[Read Parameter example]

```
CanTp_PduIdType LddRxNpduId;
CanTp_TPParameterType LddBsOrSTMin;
uint16 LusValue;
Std_ReturnType LddRetVal;

/* Read Block Size */
LddRxNpduId = 0;
LddBsOrSTMin = TP_BS;
LddRetVal = Rte_Call_CanTp_ReadParameter_ReadParameter(LddRxNpduId,LddBsOrSTMin,&LusValue);

/* Read STMin */
LddRxNpduId = 0;
LddBsOrSTMin = TP_STMIN;
LddRetVal = Rte_Call_CanTp_ReadParameter_ReadParameter(LddRxNpduId,LddBsOrSTMin,&LusValue);
```

[Change Parameter example]

```
CanTp_PduIdType LddRxNpduId;
CanTp_TPParameterType LddBsOrSTMin;
uint16 LusValue;
Std_ReturnType LddRetVal;

/* Change Block Size */
```

```
  LddRxNpduId = 0;
  LddBsOrSTMin = TP_BS;                          - 42 -
  LusValue = 0;
  LddRetVal = Rte_Call_CanTp_ChangeParameter_ChangeParameter(LddRxNpduId,LddBsOrSTMin,Lu
sValue);

  /* Change STMin */
  LddRxNpduId = 0;
  LddBsOrSTMin = TP_STMIN;
  LusValue = 0;
  LddRetVal = Rte_Call_CanTp_ChangeParameter_ChangeParameter(LddRxNpduId,LddBsOrSTMin,Lu
sValue);
```