AUTOSAR Can Transport Layer (CanTp)

KPIT

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Introduction to Can Transport Layer (CanTp)

• AUTOSAR CanTp is the module between PDU Router and Can Interface Module

•AUTOSAR CanTp is fully based on international standard ISO 15765 - 4 and 15765 - 2

• AUTOSAR CanTp Supports data Transmission/Reception up to 4095 bytes

• AUTOSAR CanTp Provides services for
  - Segmentation of data in transmit direction
  - Reassembling of data in receive direction
  - Control of data flow
  - Detection of errors in segmentation sessions.
  - Transmit cancellation, Receive cancellation

Use cases of CanTp and example scenarios

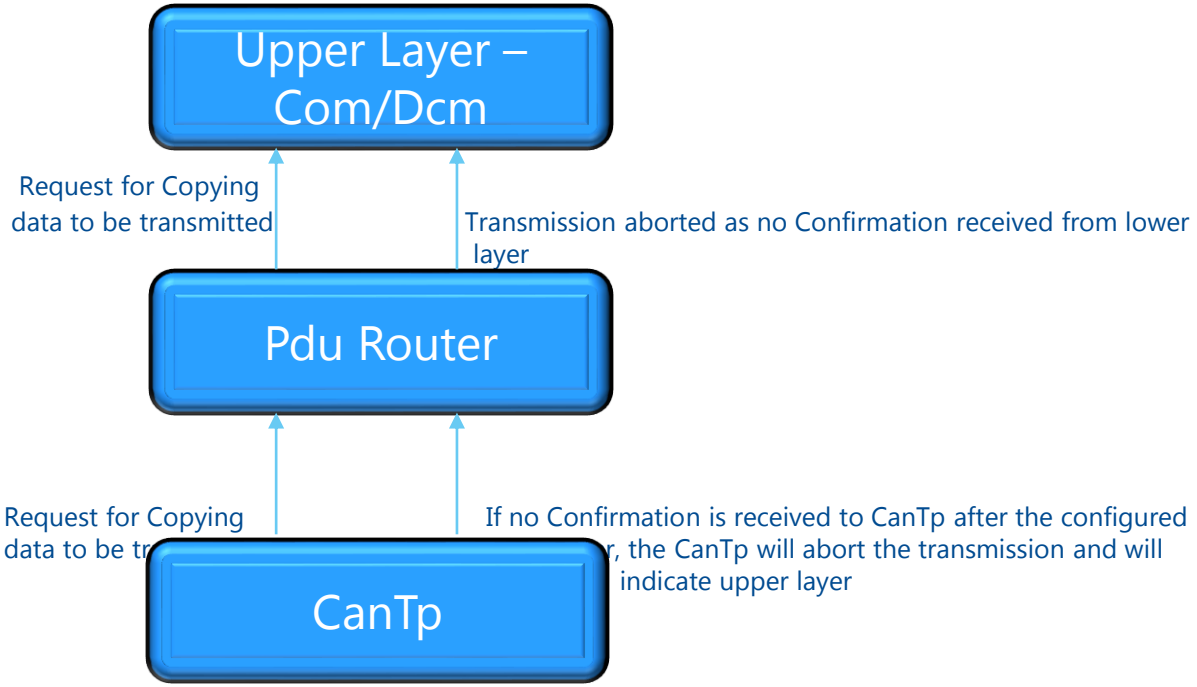
•CanTp is used majorly for Diagnostics purpose and large data transmission/reception for AUTOSAR Communication Module

• Provision of Extended Addressing format, through which Source address and Target address can be specified in the data itself.
Ex : If 7DF CAN ID is used to send a messages to all the CAN Nodes, through the Target address(TA) and Source address(SA) it can be determined to which Source and target respectively.

- 7DF - F1 06 01 02 03 04 05 06
- 7DF - F2 05 01 02 03 04 05

Use cases of CanTp and example scenarios - Contd

•Efficient timer handling through which problems of buffer locking/Resource locking any be avoided.



Ex : CanTp N_As Timer waits for confirmation of the transmitted message. If not arrived within the specified time, transmission will be aborted and upper layer will be notified, so the buffer will be unlocked

Different types of NPDUs

- Four types of NPDUs – First Frame(FF), Flow Control(FC), Consecutive Frame(CF) and Single Frame(SF)

- First Frame – Initiation of the Segmented transmission.
  - Contains information on the Length that will be sent during the segmented transfer and 6/5 bytes of in case of Standard and Extended Addressing format

1XXX DD DD DD DD DD DD DD

1 – represents that the received frame is a First Frame

XXX – length of the segmented transfer – 000 – FFF

DD – Actual data

Different types of NPDUs - Continued

Flow Control – Response from the Receiver for First Frame that how Sender need to send the data

3X BS ST

3 – Indicates its a Flow Control Frame

X – Lower nibble of the first byte indicating the status
- 0 - Clear to send(CTS -Sender can start to send the data)
- 1 - Wait (Sender need to wait till a CTS)
- 2 – Buffer Overflow (Receiver don't have enough buffer for the data sender is about to send)

BS – Block Size - The maximum number of N_PDUs the receiver allows the sender to send, before waiting for an authorisation to continue transmission of the following N_PDUs

Different types of NPDUs - Continued

00 – Sender can send data without any flow control in the segmented transfer,

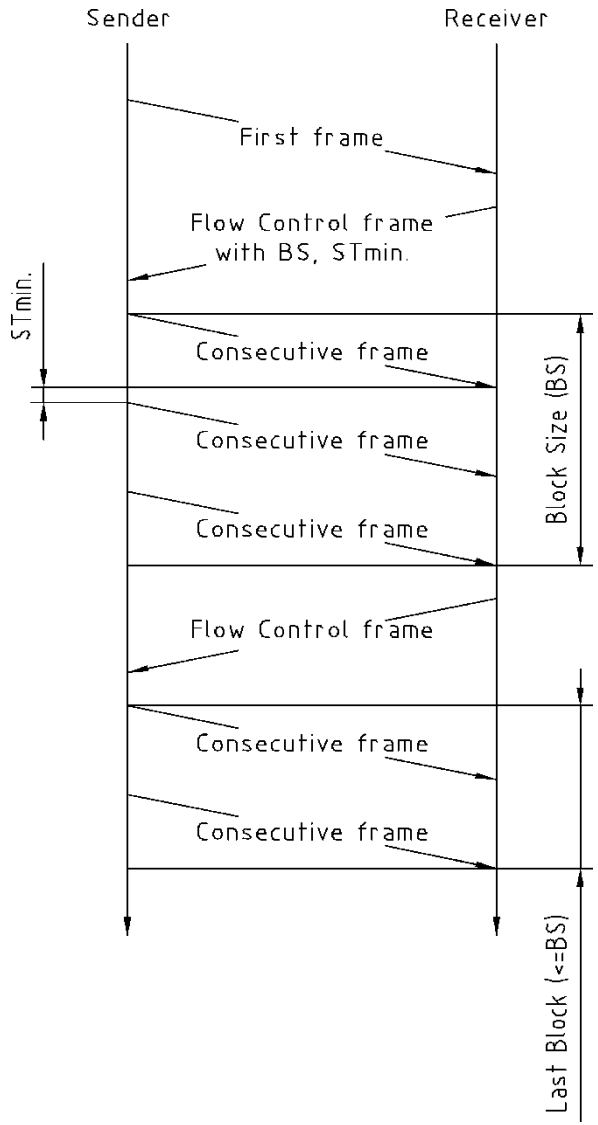
01-FF – Sender need to send the mentioned bytes and wait for next flow control to send data

ST – Separation Time Min

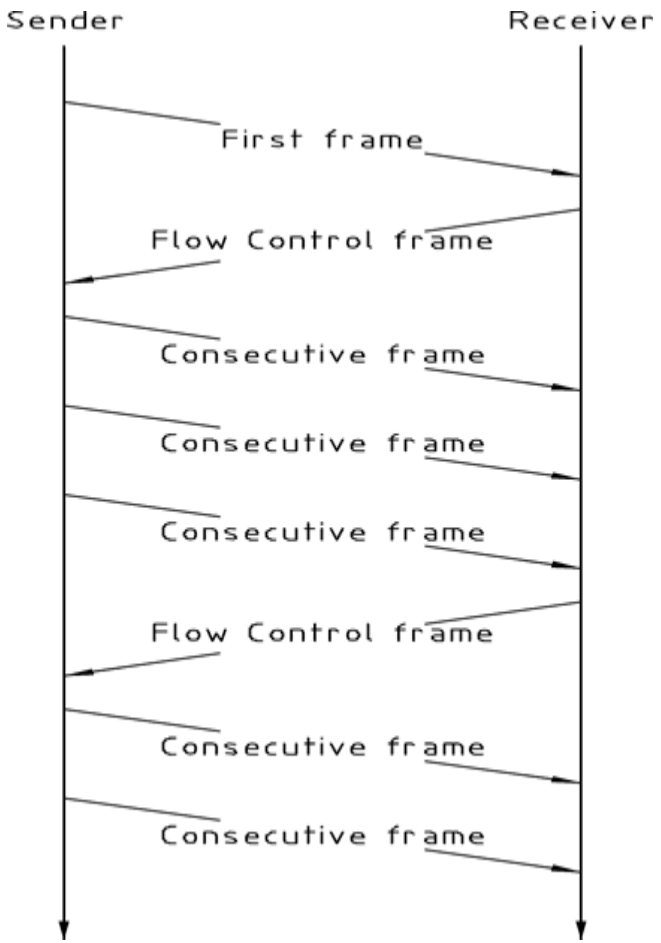
STmin is the minimum time that sender shall wait between 2 consecutive frames

Hex value	Description
00 – 7F	SeparationTime (STmin) Range: 0 ms – 127 ms
	The units of STmin in the range 00 hex – 7F hex are absolute milliseconds (ms).
80 – F0	Reserved
F1 – F9	SeparationTime (STmin) Range: 100 µs – 900 µs
	The units of STmin in the range F1 hex – F9 hex are even 100 microseconds (µs), where parameter value F1 hex represents 100 µs and parameter value F9 hex represents 900 µs.
FA - FF	Reserved

Different types of NPDUs - Continued



Sample Sequence with data of a Segmented Tx/Rx



Sender - 10 27 00 01 02 03 04 05 06

Receiver – 30 03 02

Sender - 21 07 08 09 10 11 12 13
Sender - 22 14 15 16 17 18 19 20
Sender - 23 21 22 23 24 25 26 27

Receiver - 30 02 02

Sender - 24 28 29 30 31 32 33 34
Sender - 25 35 36 37 38 39

Network target address Types – Physical and Functional

Physical addressing - (1 to 1 communication) shall be supported for all types of network layer messages.

Functional addressing - (1 to n communication) shall only be supported for Single Frame communication.

Configuration parameter – CanTpRxTaType parameter in CanTpRxNSdu container and CanTpTxTaType paremeter in CanTpTxNSdu container.

Configuration Parameters

- Base containers – CanTpConfig and CanTpGeneral

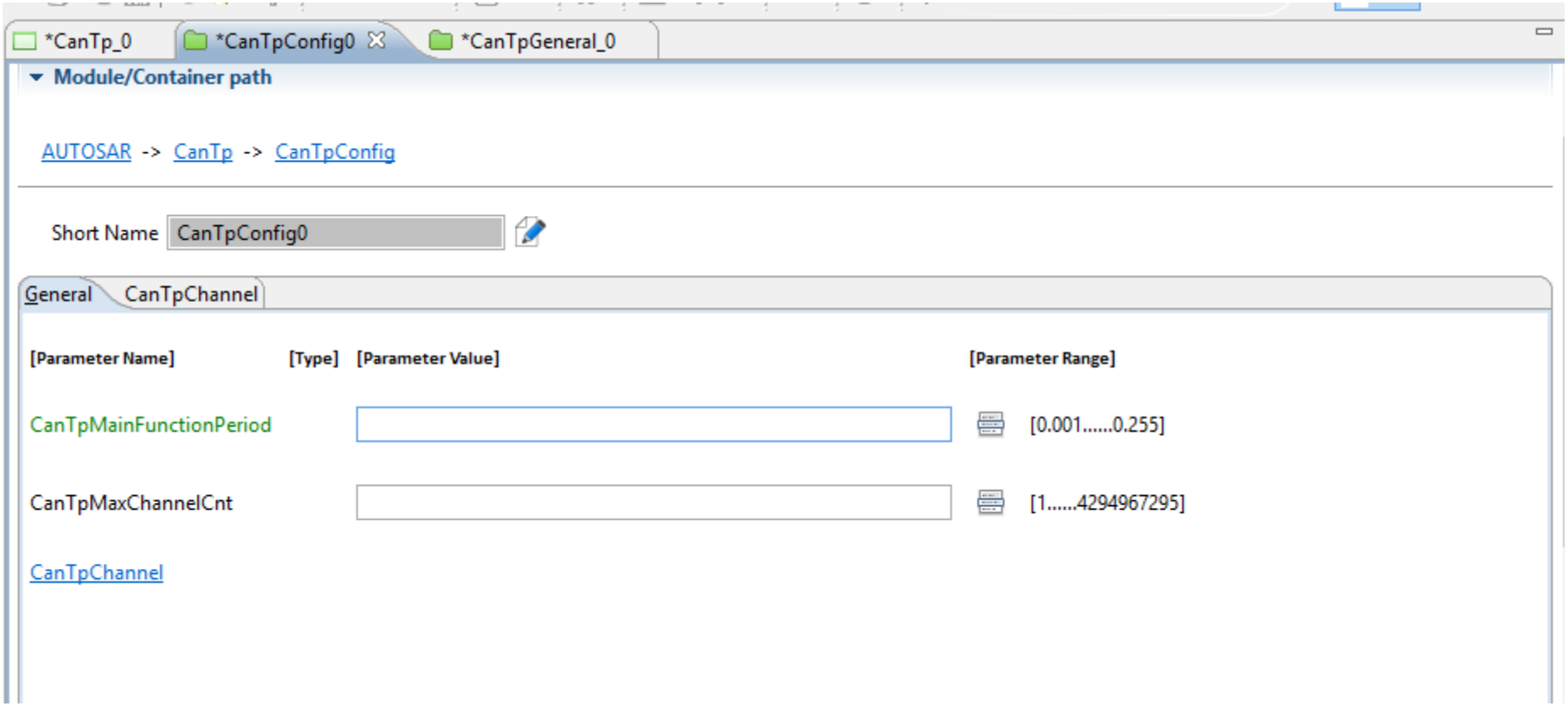
CanTpConfig – MultipleConfigurationContainer, contains the configuration parameters sub containers of CanTp.
Contains CanTpChannel through which Logical channels can be configured for Transmission and reception

Reception - CanTpConfig->CanTpChannel->CanTpRxNSdu

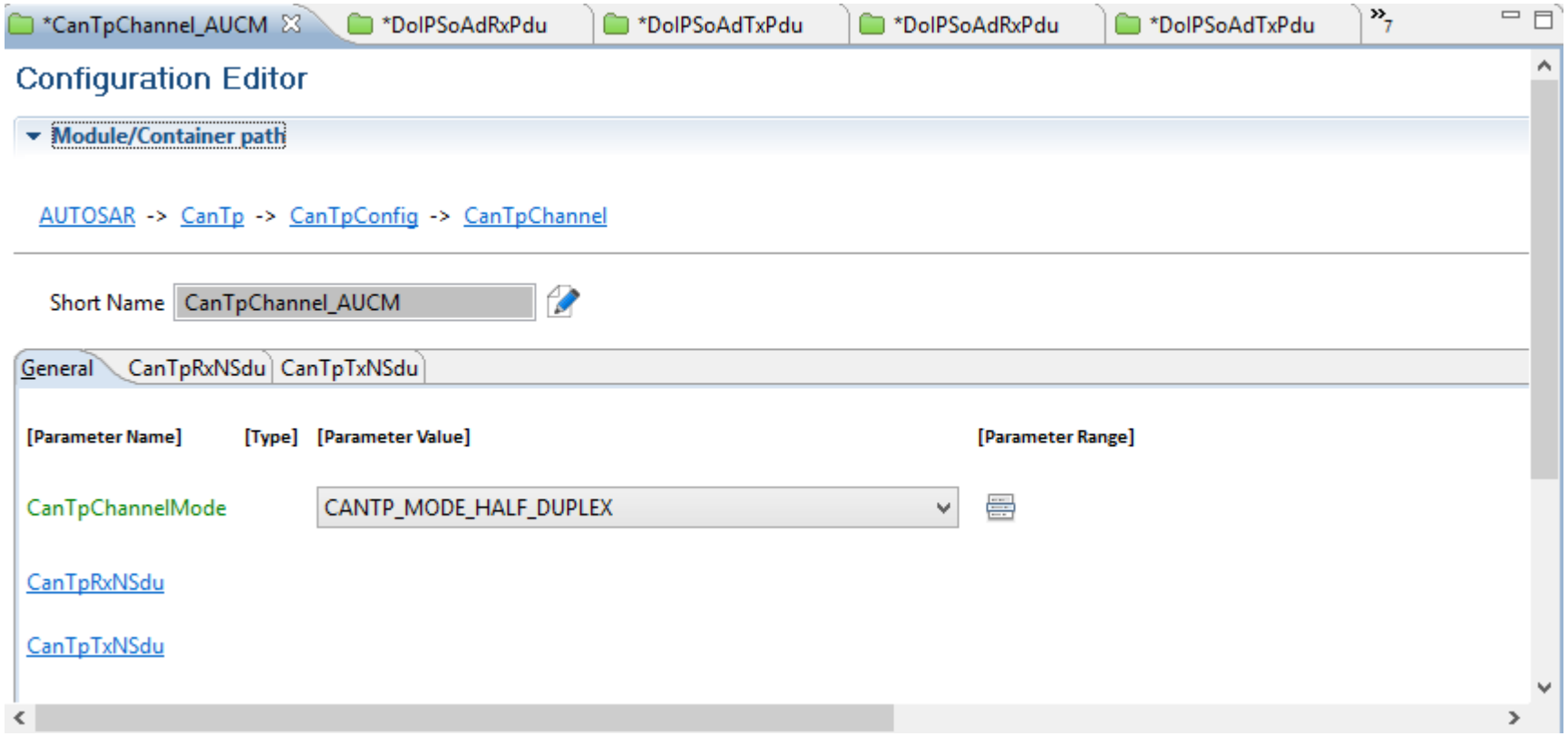
Transmission - CanTpConfig->CanTpChannel->CanTpTxNSdu

CanTpGeneral – Contains the general configuration parameters like deverrordetect, versioninfo, CanTpPaddingByte

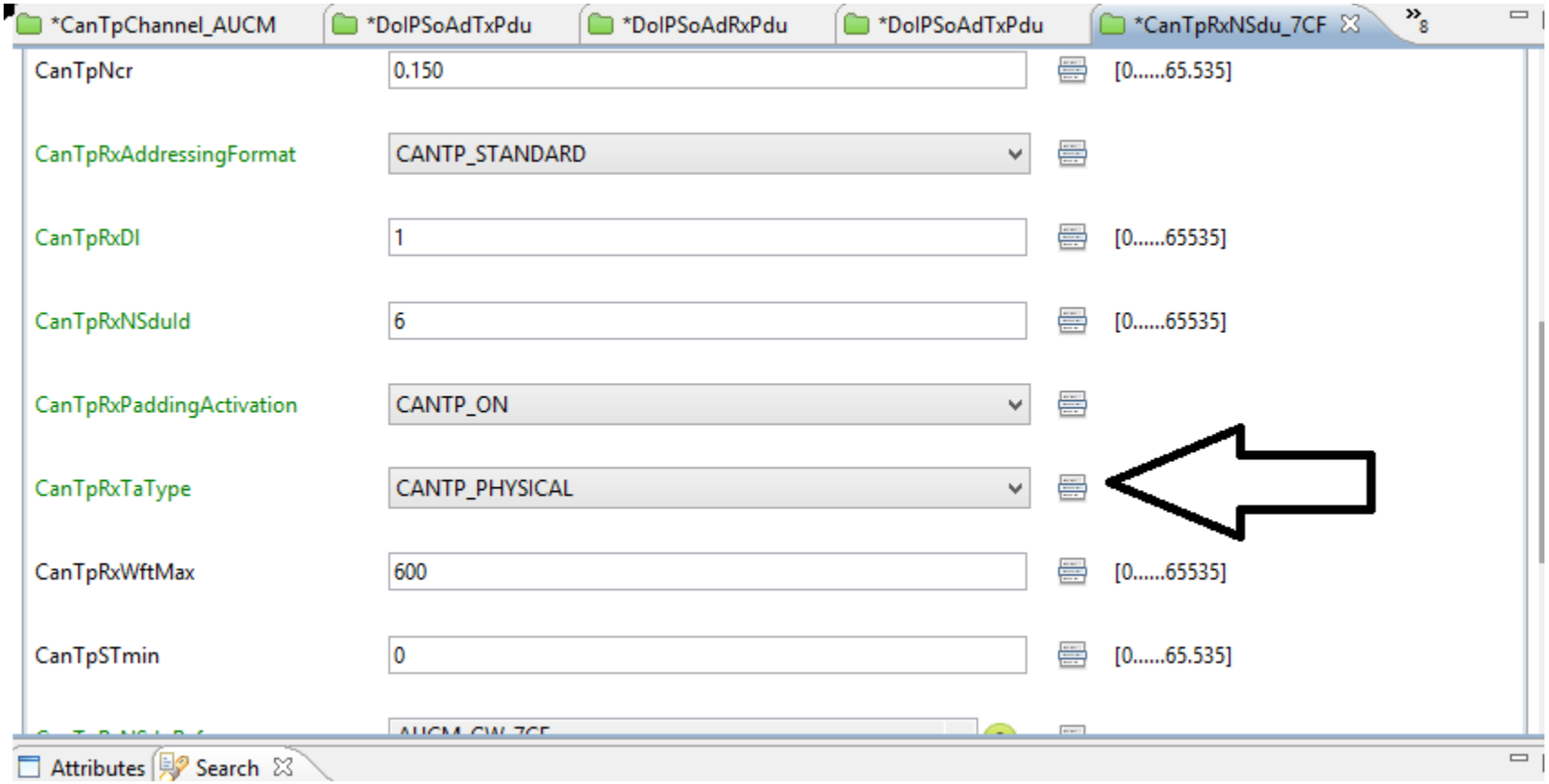
Configuration Parameters - ScreenShots



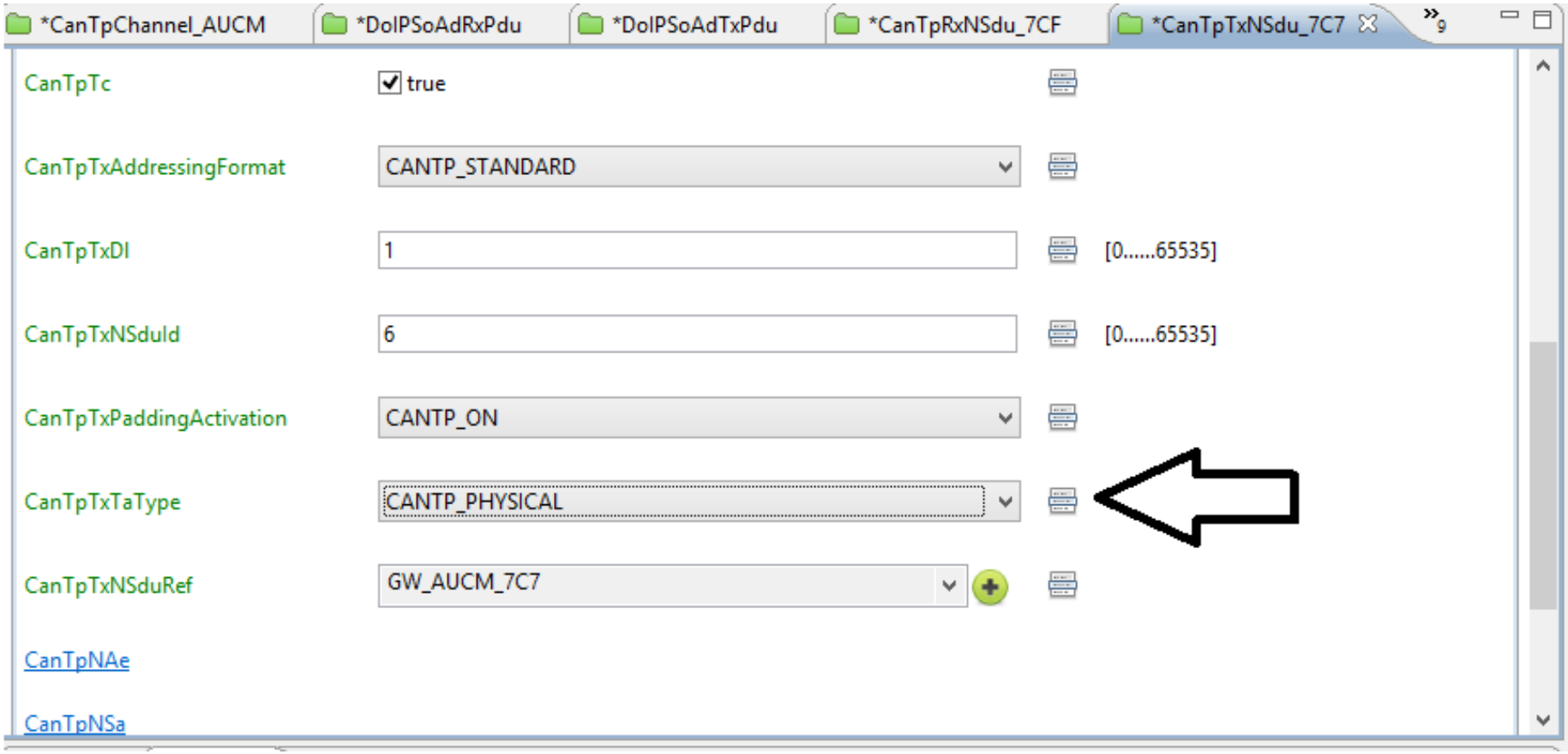
Configuration Parameters - ScreenShots



Configuration Parameters - ScreenShots



Configuration Parameters - ScreenShots



Thank you

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