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Document Change History			
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## 1 Introduction and functional overview

This specification specifies the functionality, API and the configuration of the AUTOSAR Basic Software module XCP

XCP is a protocol description (ASAM standard) between a master (tool) and a slave (device), which provides the following basic features:

- Synchronous data acquisition (measurement)
- Synchronous data stimulation (for rapid prototyping)
- Online memory calibration (read / write access)
- Calibration data page initialization and switching
- Flash Programming for ECU development purposes
- Every feature is optional and the access can be restricted
- Various communications busses are supported

XCP was designed according to the following principles:

- Minimal Slave resource consumption (RAM, ROM, runtime)
- Efficient communication
- Simple Slave implementation

## 2 Acronyms and abbreviations

Acronym:	Description:
AUTOSAR	<b>AUT</b> omotive <b>O</b> pen <b>S</b> ystem <b>AR</b> chitecture
A2L	File Extension for an ASAM 2MC Language File
ASAM	<b>A</b> ssociation for <b>S</b> tandardization of <b>A</b> utomation and <b>M</b> easuring Systems
BSW	<b>B</b> asic <b>S</b> oftware
CAN	<b>C</b> ontroller <b>A</b> rea <b>N</b> etwork
CanIf	<b>CAN</b> Interface
CTO	<b>C</b> ommand <b>T</b> ransfer <b>O</b> bject
DAQ	<b>D</b> ata <b>A</b> c <b>Q</b> uisition, Data Ac <b>Q</b> uisition Packet
DTO	<b>D</b> ata <b>T</b> ransfer <b>O</b> bject
ECU	<b>E</b> lectronic <b>C</b> ontrol <b>U</b> nit
FrIf	<b>F</b> lex <b>R</b> ay Interface
LPDU	Data Link Layer PDU
MCD	<b>M</b> easurement <b>C</b> alibration and <b>D</b> iagnostics
MISRA	<b>M</b> otor <b>I</b> ndustry <b>S</b> oftware <b>R</b> eliability <b>A</b> ssociation
ODT	<b>O</b> bject <b>D</b> escriptor <b>T</b> able
PDU	<b>P</b> rotocol <b>D</b> ata <b>U</b> nit
RAM	<b>R</b> andom <b>A</b> ccess <b>M</b> emory
ROM	<b>R</b> ead <b>O</b> nly <b>M</b> emory
SchM	<b>S</b> chedule <b>M</b> anager
SVN	<b>S</b> ubversion
SRS	<b>S</b> oftware <b>R</b> equirements <b>S</b> pecification
STIM	Data <b>S</b> timulation packet
SW	<b>S</b> oftware
SWS	<b>S</b> oftware <b>S</b> pecification
TCP/IP	<b>T</b> ransfer <b>C</b> ontrol <b>P</b> rotocol / <b>I</b> nternet <b>P</b> rotocol
TS	<b>T</b> ime <b>S</b> tamp
UDP/IP	<b>U</b> ser <b>D</b> atagram <b>P</b> rotocol / <b>I</b> nternet <b>P</b> rotocol
URL	<b>U</b> niform <b>R</b> esource <b>L</b> ocator
XCP	<b>U</b> niversal <b>C</b> alibration <b>P</b> rotocol
XML	<b>E</b> xtensible <b>M</b> arkup <b>L</b> anguage
ISR	<b>I</b> nterrupt <b>S</b> ervice <b>R</b> outine
DET	<b>D</b> efault <b>E</b> rror <b>T</b> racer (AUTOSAR BSW module)

### 3 Related documentation

#### 3.1 Input documents

- [0] Basic Software Module Description Template  
AUTOSAR\_TPS\_BSWModuleDescriptionTemplate.pdf
- [1] List of Basic Software Modules  
AUTOSAR\_TR\_BSWModuleList.pdf
- [2] AUTOSAR Layered Software Architecture  
AUTOSAR\_EXP\_LayeredSoftwareArchitecture.pdf
- [3] General Requirements on Basic Software Modules  
AUTOSAR\_SRS\_BSWGeneral.pdf
- [4] Specification of RTE (BSW Scheduler)  
AUTOSAR\_SWS\_RTE.pdf
- [5] Specification of ECU Configuration  
AUTOSAR\_TPS\_ECUConfiguration
- [6] Specification of Memory Mapping  
AUTOSAR\_SWS\_MemoryMapping.pdf
- [7] Specification of FlexRay Interface  
AUTOSAR\_SWS\_FlexRayInterface.pdf
- [8] Specification of CAN Interface  
AUTOSAR\_SWS\_CANInterface
- [9] Specification of Socket Adaptor  
AUTOSAR\_SWS\_SocketAdaptor
- [10] Requirements on XCP Module  
AUTOSAR\_SRS\_XCP.pdf
- [11] AUTOSAR OS Specification  
AUTOSAR\_SWS\_OS
- [12] General Specification of Basic Software Modules  
AUTOSAR\_SWS\_BSWGeneral.pdf

##### 3.1.1 Related standards and norms

- [13] ASAM XCP – The Universal Measurement and Calibration Protocol:  
ASAM\_XCP\_Part1-Overview - Version 1.1



- [14] ASAM XCP – Transport Layer Specification XCP on CAN:  
ASAM\_XCP\_Part3 Transport-Layer-Specification\_XCPonCAN - Version 1.2
- [15] ASAM XCP – Transport Layer Specification XCP on Ethernet:  
ASAM\_XCP\_Part3-Transport-Layer-Specification\_XCPonEthernet  
(TCP\_IP&UDP\_IP) – Version 1.1
- [16] ASAM XCP – Transport Layer Specification XCP on FlexRay:  
ASAM\_XCP\_Part3-Transport-Layer-Specification\_XCPonFlexRay-Version 1.1

### **3.2 Related specification**

AUTOSAR provides a General Specification on Basic Software modules [12] (SWS BSW General), which is also valid for XCP.

Thus, the specification SWS BSW General shall be considered as additional and required specification for XCP.

## 4 Constraints and assumptions

### 4.1 Limitations

The following XCP features are currently out of scope:

- The SET\_DAQ\_ID command according to the XCP CAN Transport Layer Specification is not part of the AUTOSAE XCP module”
- Currently, the AUTOSAR RTE does not offer APIs for direct communication with XCP
- For further details concerning the supported feature set, please refer to [13]
- NAX is only configurable through the ASAM configuration file A2L.

Please note:

For the communications bus LIN, no ASAM XCP is specified.

### 4.2 Applicability to car domains

n/a

## **5 Dependencies to other modules**

This section describes the relations to other modules and files within the AUTOSAR basic software architecture. It contains brief descriptions of configuration information and services, which are required by the XCP module from other modules.

### **5.1 AUTOSAR RTE (BSW Scheduler)**

The BSW Scheduler calls the main functions of the Xcp, which are necessary for the cyclic processes of the Xcp.

### **5.2 AUTOSAR FlexRay Interface**

The FlexRay Interface is used to transmit and receive XCP PDUs via FlexRay.

### **5.3 AUTOSAR CAN Interface**

The CAN Interface is used to transmit and receive XCP PDUs via CAN.

### **5.4 AUTOSAR SocketAdaptor**

The SocketAdaptor is used to transmit and receive XCP PDUs via Ethernet.

### **5.5 AUTOSAR RTE**

The RTE is used for copying calibration parameters from ROM/FLASH to RAM and to use the double pointered method

### **5.6 AUTOSAR OS**

In order to be able to use the time stamped feature of XCP, an AUTOSAR OS Counter is used.

### **5.7 AUTOSAR Diagnostic Event Manager**

In order to be able to report production errors, the XCP has to have access to the Diagnostic Event Manager.

## 5.8 AUTOSAR Default Error Tracer

In order to be able to report default errors, the XCP has to have access to the error hook of the Default Error Tracer.

## 5.9 File structure

### 5.9.1 Code file structure

#### [SWS\_Xcp\_00501]

「The code file structure shall not be defined within this specification completely. At this point it shall be pointed out that the code-file structure shall include the following files named:

- Xcp.c – general source code file of the module XCP
- Xcp\_Cfg.c – for pre-compile time configurable parameters
- Xcp\_Lcfg.c – for link time configurable parameters and
- Xcp\_PBcfg.c – for post build time configurable parameters. 」  
(SRS\_BSW\_00419, SRS\_BSW\_00383, SRS\_BSW\_00346,  
SRS\_BSW\_00158)

These files shall contain all link time and post-build time configurable parameters.

## 6 Requirements traceability

Requirement	Description	Satisfied by
SRS_BSW_00003	All software modules shall provide version and identification information	SWS_Xcp_00807
SRS_BSW_00005	Modules of the $\mu$ C Abstraction Layer (MCAL) may not have hard coded horizontal interfaces	SWS_Xcp_00999
SRS_BSW_00006	The source code of software modules above the $\mu$ C Abstraction Layer (MCAL) shall not be processor and compiler dependent.	SWS_Xcp_00999
SRS_BSW_00009	All Basic SW Modules shall be documented according to a common standard.	SWS_Xcp_00999
SRS_BSW_00010	The memory consumption of all Basic SW Modules shall be documented for a defined configuration for all supported platforms.	SWS_Xcp_00999
SRS_BSW_00101	The Basic Software Module shall be able to initialize variables and hardware in a separate initialization function	SWS_Xcp_00803
SRS_BSW_00158	-	SWS_Xcp_00501
SRS_BSW_00159	All modules of the AUTOSAR Basic Software shall support a tool based configuration	SWS_Xcp_00102
SRS_BSW_00161	The AUTOSAR Basic Software shall provide a microcontroller abstraction layer which provides a standardized interface to higher software layers	SWS_Xcp_00999
SRS_BSW_00162	The AUTOSAR Basic Software shall provide a hardware abstraction layer	SWS_Xcp_00999
SRS_BSW_00164	The Implementation of interrupt service routines shall be done by the Operating System, complex drivers or modules	SWS_Xcp_00999
SRS_BSW_00167	All AUTOSAR Basic Software Modules shall provide configuration rules and constraints to enable plausibility checks	SWS_Xcp_00103, SWS_Xcp_00104, SWS_Xcp_00105
SRS_BSW_00168	SW components shall be tested by a function defined in a common API in the Basis-SW	SWS_Xcp_00999
SRS_BSW_00170	The AUTOSAR SW Components shall provide information about their dependency from faults, signal qualities, driver demands	SWS_Xcp_00999
SRS_BSW_00171	Optional functionality of a Basic-SW component that is not required in the ECU shall be configurable at pre-compile-time	SWS_Xcp_00999
SRS_BSW_00172	The scheduling strategy that is built inside the Basic Software Modules shall be compatible with the strategy used in the system	SWS_Xcp_00999
SRS_BSW_00306	AUTOSAR Basic Software Modules shall be compiler and platform independent	SWS_Xcp_00999
SRS_BSW_00309	All AUTOSAR Basic Software Modules shall indicate all global data with read-only purposes by explicitly assigning the const keyword	SWS_Xcp_00999

SRS_BSW_00312	Shared code shall be reentrant	SWS_Xcp_00999
SRS_BSW_00314	All internal driver modules shall separate the interrupt frame definition from the service routine	SWS_Xcp_00999
SRS_BSW_00318	Each AUTOSAR Basic Software Module file shall provide version numbers in the header file	SWS_Xcp_00807
SRS_BSW_00321	The version numbers of AUTOSAR Basic Software Modules shall be enumerated according specific rules	SWS_Xcp_00999
SRS_BSW_00325	The runtime of interrupt service routines and functions that are running in interrupt context shall be kept short	SWS_Xcp_00999
SRS_BSW_00327	Error values naming convention	SWS_Xcp_00763
SRS_BSW_00328	All AUTOSAR Basic Software Modules shall avoid the duplication of code	SWS_Xcp_00999
SRS_BSW_00330	It shall be allowed to use macros instead of functions where source code is used and runtime is critical	SWS_Xcp_00999
SRS_BSW_00331	All Basic Software Modules shall strictly separate error and status information	SWS_Xcp_00999
SRS_BSW_00333	For each callback function it shall be specified if it is called from interrupt context or not	SWS_Xcp_00999
SRS_BSW_00335	Status values naming convention	SWS_Xcp_00999
SRS_BSW_00336	Basic SW module shall be able to shutdown	SWS_Xcp_00999
SRS_BSW_00341	Module documentation shall contains all needed informations	SWS_Xcp_00999
SRS_BSW_00344	BSW Modules shall support link-time configuration	SWS_Xcp_00741
SRS_BSW_00345	BSW Modules shall support pre-compile configuration	SWS_Xcp_00742
SRS_BSW_00346	All AUTOSAR Basic Software Modules shall provide at least a basic set of module files	SWS_Xcp_00501
SRS_BSW_00347	A Naming seperation of different instances of BSW drivers shall be in place	SWS_Xcp_00999
SRS_BSW_00358	The return type of init() functions implemented by AUTOSAR Basic Software Modules shall be void	SWS_Xcp_00803
SRS_BSW_00360	AUTOSAR Basic Software Modules callback functions are allowed to have parameters	SWS_Xcp_00999
SRS_BSW_00371	-	SWS_Xcp_00999
SRS_BSW_00373	The main processing function of each AUTOSAR Basic Software Module shall be named according the defined convention	SWS_Xcp_00823
SRS_BSW_00374	All Basic Software Modules shall provide a readable module vendor identification	SWS_Xcp_00807
SRS_BSW_00375	Basic Software Modules shall report wake-up reasons	SWS_Xcp_00999
SRS_BSW_00377	A Basic Software Module can return a module specific types	SWS_Xcp_00999

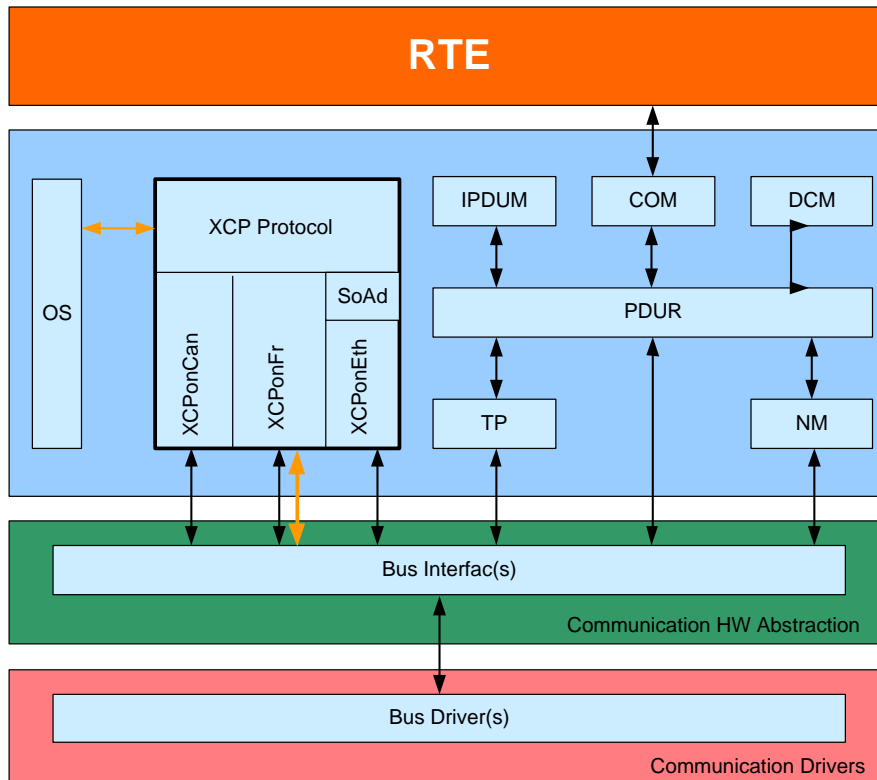
SRS_BSW_00379	All software modules shall provide a module identifier in the header file and in the module XML description file.	SWS_Xcp_00807
SRS_BSW_00383	The Basic Software Module specifications shall specify which other configuration files from other modules they use at least in the description	SWS_Xcp_00501
SRS_BSW_00401	Documentation of multiple instances of configuration parameters shall be available	SWS_Xcp_00999
SRS_BSW_00402	Each module shall provide version information	SWS_Xcp_00807
SRS_BSW_00404	BSW Modules shall support post-build configuration	SWS_Xcp_00742
SRS_BSW_00405	BSW Modules shall support multiple configuration sets	SWS_Xcp_00803
SRS_BSW_00407	Each BSW module shall provide a function to read out the version information of a dedicated module implementation	SWS_Xcp_00807
SRS_BSW_00410	Compiler switches shall have defined values	SWS_Xcp_00999
SRS_BSW_00411	All AUTOSAR Basic Software Modules shall apply a naming rule for enabling/disabling the existence of the API	SWS_Xcp_00807
SRS_BSW_00413	An index-based accessing of the instances of BSW modules shall be done	SWS_Xcp_00999
SRS_BSW_00414	Init functions shall have a pointer to a configuration structure as single parameter	SWS_Xcp_00803
SRS_BSW_00415	Interfaces which are provided exclusively for one module shall be separated into a dedicated header file	SWS_Xcp_00999
SRS_BSW_00416	The sequence of modules to be initialized shall be configurable	SWS_Xcp_00999
SRS_BSW_00417	Software which is not part of the SW-C shall report error events only after the DEM is fully operational.	SWS_Xcp_00999
SRS_BSW_00419	If a pre-compile time configuration parameter is implemented as "const" it should be placed into a separate c-file	SWS_Xcp_00501
SRS_BSW_00423	BSW modules with AUTOSAR interfaces shall be describable with the means of the SW-C Template	SWS_Xcp_00999
SRS_BSW_00424	BSW module main processing functions shall not be allowed to enter a wait state	SWS_Xcp_00823
SRS_BSW_00425	The BSW module description template shall provide means to model the defined trigger conditions of schedulable objects	SWS_Xcp_00999
SRS_BSW_00426	BSW Modules shall ensure data consistency of data which is shared between BSW modules	SWS_Xcp_00999
SRS_BSW_00427	ISR functions shall be defined and documented in the BSW module description template	SWS_Xcp_00999
SRS_BSW_00428	A BSW module shall state if its main processing function(s) has to be executed in a specific order	SWS_Xcp_00999

	or sequence	
SRS_BSW_00432	Modules should have separate main processing functions for read/receive and write/transmit data path	SWS_Xcp_00999
SRS_BSW_00433	Main processing functions are only allowed to be called from task bodies provided by the BSW Scheduler	SWS_Xcp_00823
SRS_Xcp_29001	The AUTOSAR XCP module shall be located above the bus interfaces / Socket Adaptor	SWS_Xcp_00701
SRS_Xcp_29002	The AUTOSAR XCP shall make use of the data transmit- and receive APIs of the Bus Interfaces	SWS_Xcp_00712, SWS_Xcp_00714, SWS_Xcp_00720, SWS_Xcp_00734
SRS_Xcp_29003	The AUTOSAR XCP messages shall be identified by unique PDU-IDs	SWS_Xcp_00702
SRS_Xcp_29004	The XCP Specification Version 1.1 shall be used	SWS_Xcp_00703
SRS_Xcp_29005	XCP on CAN shall be supported	SWS_Xcp_00713
SRS_Xcp_29006	XCP on FlexRay shall be supported	SWS_Xcp_00719
SRS_Xcp_29007	XCP on Ethernet shall be supported	SWS_Xcp_00733
SRS_Xcp_29008	The code generator of the XCP Module shall generate the A2L IF_DATA section	SWS_Xcp_00853, SWS_Xcp_00999
SRS_Xcp_29009	The slave shall transfer the contents of the elements defined in each ODT of the DAQ-list to the master	SWS_Xcp_00705
SRS_Xcp_29010	Synchronous Data Stimulation shall be the inverse mode of Synchronous Data Acquisition	SWS_Xcp_00707
SRS_Xcp_29012	The XCP master shall already send the next request before having received the response on the previous request	SWS_Xcp_00710
SRS_Xcp_29013	It shall be possible to configure the DAQ Lists dynamically	SWS_Xcp_00706
SRS_Xcp_29014	It shall be possible to transmit a timestamp within the XCP packet	SWS_Xcp_00709
SRS_Xcp_29015	It shall be possible to bypass data by making use of Synchronous Data Acquisition and Synchronous Data Stimulation simultaneously	SWS_Xcp_00761
SRS_Xcp_29016	The feature "Seed&Key" shall be used for protection handling purpose	SWS_Xcp_00766
SRS_Xcp_29017	The AUTOSAR XCP module shall implement an interface for initialization.	SWS_Xcp_00803
SRS_Xcp_29018	Page switching shall be supported	SWS_Xcp_00852
SRS_Xcp_29019	DAQ configuration storing with power-up data transfer (RESUME mode) shall be supported	SWS_Xcp_00854
SRS_Xcp_29020	Flash Programming for ECU development purposes	SWS_Xcp_00855, SWS_Xcp_00856



## 7 Functional specification

The specification of the module XCP shall define all parameters and interfaces, which are required to use the ASAM XCP protocol specification within an AUTOSAR environment.



**Figure 1: Description**

Black arrows: Data Path (Signals/Pdus)  
Orange arrows: Control Path (FlexRay Interface)

[SWS\_Xcp\_00701]⌈

The AUTOSAR XCP Module be located above the bus specific Interfaces in case of FlexRay and Can. In case of Ethernet, the AUTOSAR XCP module shall be located above the Socket Adaptor.⌋(SRS\_Xcp\_29001)

[SWS\_Xcp\_00702]⌈

For transmitting and receiving of XCP messages, unique PDU-IDs shall be used. ⌋  
(SRS\_Xcp\_29003)

[SWS\_Xcp\_00703]⌈

The AUTOSAR XCP Module shall support the ASAM XCP Specification Version 1.1, except for XCP on CAN where ASAM XCP Specification Version 1.2 shall be supported.⌋(SRS\_Xcp\_29004)

[SWS\_Xcp\_00705]⌈

The AUTOSAR XCP Module shall support the basic feature “Synchronous data acquisition (measurement) “. Please refer to [\[13\]](#)⌋(SRS\_Xcp\_29009)

[SWS\_Xcp\_00706]⌈

The AUTOSAR XCP Module shall support the feature “Dynamic DAQ Configuration”. according to [\[13\]](#)⌋(SRS\_Xcp\_29013)

[SWS\_Xcp\_00707]

「The AUTOSAR XCP Module shall support the basic feature “Synchronous data stimulation” according to [\[13\]](#)」(SRS\_Xcp\_29010)

[SWS\_Xcp\_00708]

「The AUTOSAR XCP Module shall support the basic feature “Online memory calibration (read / write access) “, according to [\[13\]](#)」()

[SWS\_Xcp\_00709]

「The AUTOSAR XCP Module shall support the feature “Timestamped Data Transfer“, according to [\[13\]](#)」(SRS\_Xcp\_29014)

[SWS\_Xcp\_00768]

「The ECU local time shall be derived from the AUTOSAR OS.」()

[SWS\_Xcp\_00711]

「The AUTOSAR XCP Module shall support the feature “Block communication mode“, according to [\[13\]](#)」()

[SWS\_Xcp\_00761]

「The AUTOSAR XCP Module shall support the feature “Bypassing“, according to [\[13\]](#)」(SRS\_Xcp\_29015)

[SWS\_Xcp\_00766]

「The AUTOSAR XCP Module shall support the feature “Seed & Key” according to [\[13\]](#)」(SRS\_Xcp\_29016)

[SWS\_Xcp\_00712]

「For sending and receiving of calibration data, the sending and receiving APIs specified within the AUTOSAR BSW Bus Interfaces (FlexRay Interface, CAN Interface, TCP/IP Socket Adaptor) shall be used. Please refer to chapter 7.1, 7.2 and 7.3.」(SRS\_Xcp\_29002)

[SWS\_Xcp\_00852]「The AUTOSAR XCP Module shall support the feature “Page switching“, according to [\[13\]](#)」(SRS\_Xcp\_29018)

[SWS\_Xcp\_00853]「The code generator of the XCP Module shall generate the A2L IF\_DATA section, based on the configuration of XCP」(SRS\_Xcp\_29008)

[SWS\_Xcp\_00854]「The AUTOSAR XCP Module shall support the feature “Power-Up data transfer (RESUME MODE)“, according to [\[13\]](#)」(SRS\_Xcp\_29019)

[SWS\_Xcp\_00855] ⌈ The AUTOSAR XCP Module shall support the flash programming (PGM) according to [13]⌋( SRS\_Xcp\_29020)

[SWS\_Xcp\_00856]⌈ Indication the end of a programming sequence is supported using the optional command "PROGRAM\_RESET", where the slave will go to disconnected state but without forcing a device reset ⌋(SRS\_Xcp\_29020)

[SWS\_Xcp\_00859]⌈ The XCP module shall wait for the Xcp\_<Lo>TxConfirmation (positive or negative) after each call to <Lo>\_Transmit to avoid overwriting previously transmitted data ⌋()

## 7.1 XCP on CAN

[SWS\_Xcp\_00713]⌈ The AUTOSAR XCP Module shall support the CAN communications bus according to [14]⌋(SRS\_Xcp\_29005)

[SWS\_Xcp\_00714]  
⌈ XCP data sent and received via CAN, the PDUs have to be transmitted and received using the transmitting and receive APIs provided by the AUTOSAR CAN Interface, according to [8]⌋(SRS\_Xcp\_29002)

[SWS\_Xcp\_00715]⌈ For sending and receiving XCP data via CAN, at least two different CAN identifiers have to be configured to be used by XCP.⌋()

[SWS\_Xcp\_00716]⌈ Performance information shall be exchanged between the XCP master and XCP slave using the parameters according to [14]⌋()

[SWS\_Xcp\_00718]⌈ The XCP Module shall support the GET\_SLAVE\_ID command according to [14]⌋()

## 7.2 XCP on FlexRay

[SWS\_Xcp\_00719]⌈

The AUTOSAR XCP Module shall support the FlexRay communications bus according to [\[16\]](#) (SRS\_Xcp\_29006)

[SWS\_Xcp\_00720]⌈

XCP data sent and received via FlexRay, the PDUs have to be transmitted and received using the transmit and receive APIs provided by the AUTOSAR FlexRay Interface according to [\[7\]](#). (SRS\_Xcp\_29002)

[SWS\_Xcp\_00721]⌈

All XCP on FlexRay LPDUs always are event driven. Please refer to Chapter 1.1.2 “FlexRay Frame Type” of [\[16\]](#) ()

[SWS\_Xcp\_00722]⌈

The hardware buffers (of the FlexRay Communication Controller) XCP uses for data transmission and reception are assigned exclusively to the XCP module. ( )

**Note:**

This restriction prevents disturbances of ongoing FlexRay communication.

[SWS\_Xcp\_00723]⌈

The usage of FlexRay Communication Controller’s hardware buffers shall be configured by the corresponding parameters according to [\[16\]](#) ( )

[SWS\_Xcp\_00724]⌈

The FlexRay PDU length used by the AUTOSAR XCP module shall be set using the corresponding parameters according to [\[16\]](#) ( )

[SWS\_Xcp\_00725]⌈

LPDU\_IDs which shall be routed to the AUTOSAR XCP module (using the AUTOSAR Bus Interface) have to be defined by the system designer. ( )

[SWS\_Xcp\_00726]⌈

The ASAM MCD 2MC description file (i.e. A2L file) describes to which extent the XCP-dedicated buffers of a specific slave can be configured for XCP communication. ( )

[SWS\_Xcp\_00728]⌈

The XCP master gets the information about the XCP dedicated FlexRay Communication Controller buffers from the ASAM MCD 2MC description file. ( )

[SWS\_Xcp\_00729]⌈

Limitations due to the usage of multiple XCP slaves on the FlexRay communications bus shall be taken into consideration by the system designer. Please refer to [\[16\]](#).」()

[SWS\_Xcp\_00730]「

Depending upon the requirements on sequencing correctness, alignment and net data throughput, different header types are possible. Please refer to Chapter 1.4.1 "Header" of [\[16\]](#).」()

[SWS\_Xcp\_00731]

「For XCP on FlexRay, the Tail consists of a Control Field containing optional FILL bytes according to [\[16\]](#).」()

[SWS\_Xcp\_00732]「

The AUTOSAR XCP module shall be able to pack multiple XCP messages into one FlexRay Frame according to [\[16\]](#).」()

### 7.3 XCP on Ethernet

[SWS\_Xcp\_00733]⌈

The AUTOSAR XCP Module shall support the Ethernet communications bus according to [\[15\]](#)⌋(SRS\_Xcp\_29007)

[SWS\_Xcp\_00734]⌈

XCP data sent and received via Ethernet, the PDUs have to be transmitted and received using the transmitting and receive APIs provided by the AUTOSAR Socket Adaptor according to [\[9\]](#)⌋(SRS\_Xcp\_29002)

[SWS\_Xcp\_00735]⌈

The AUTOSAR XCP slave connected by Ethernet and TCP/IP or UDP/IP is addressed by its IP Address and Port number.⌋()

[SWS\_Xcp\_00736]⌈

The AUTOSAR XCP slave only accepts one connection at the time. ⌋()

[SWS\_Xcp\_00737]⌈

If the socket is closed while in XCP connected state, the slave device will perform an XCP disconnect, which means that all data acquisition will be stopped.⌋()

[SWS\_Xcp\_00738]⌈

The addressing scheme is defined according to [\[15\]](#)⌋()

.

[SWS\_Xcp\_00739]⌈

The header and tail of an XCP on Ethernet message have to be set according to [\[15\]](#)⌋()

[SWS\_Xcp\_00740]⌈

The upper performance limit depends on the protocol stack of the host system. The corresponding parameters defined according to [\[15\]](#) have to be set.⌋()

[SWS\_Xcp\_00710]⌈

The AUTOSAR XCP Module shall support the feature “Interleaved communication mode”, according to [\[13\]](#)⌋(SRS\_Xcp\_29012)

## 7.4 General Requirements

[SWS\_Xcp\_00741]⌈

Link-time and post-build-time configuration data shall be implemented as read-only data structures. Link-time configuration data shall be immediately referenced by the implementation, the start-address of post-build-time configuration data shall be passed during module initialization.⌋(SRS\_BSW\_00344)

[SWS\_Xcp\_00742]

⌈ The XCP module shall support pre-compile time, link-time and post-build-time configuration.⌋(SRS\_BSW\_00404, SRS\_BSW\_00345)

## 7.5 Error classification

[SWS\_Xcp\_00763]

⌈ The error values and EventIds are named in capital letters according to the scheme XCP\_E\_<NAME>, where NAME describes the error/EventId and may consist of several words separated by underscores.⌋(SRS\_BSW\_00327)

### 7.5.1 Development Errors

[SWS\_Xcp\_00857]⌈

<i>Type of error</i>	<i>Related error code</i>	<i>Error value</i>
Module not initialized	XCP_E_UNINIT	0x02
API call with wrong PDU ID	CP_E_INVALID_PDUID	0x03
Initialization of XCP failed	XCP_E_INIT_FAILED	0x04
Null pointer has been passed as an argument	XCP_E_PARAM_POINTER	0x12

⌋()

### 7.5.2 Runtime Errors

There are no runtime errors.



### **7.5.3 Transient Faults**

There are no transient faults.

### **7.5.4 Production Errors**

There are no production errors.

### **7.5.5 Extended Production Errors**

There are no extended production errors.

## **7.6 Version checking**

For details refer to the chapter 5.1.8 “Version Check” in *SWS\_BSWGeneral*.

## 8 API specification

### 8.1 Imported types

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

[SWS\_Xcp\_00801]

<i>Module</i>	<i>Header File</i>	<i>Imported Type</i>
ComStack_Types	ComStack_Types.h	NetworkHandleType
	ComStack_Types.h	PduIdType
	ComStack_Types.h	PduInfoType
	ComStack_Types.h	PduLengthType
Fr	Fr_GeneralTypes.h	Fr_ChannelType
Os	Os.h	StatusType
	Os.h	TickRefType
	Os.h	TickType
	Rte_Os_Type.h	CounterType
Std	Std_Types.h	Std_ReturnType
	Std_Types.h	Std_VersionInfoType

l()

### 8.2 Type definitions

#### 8.2.1 Xcp\_ConfigType

[SWS\_Xcp\_00845]

<b>Name</b>	Xcp_ConfigType	
<b>Kind</b>	Structure	
<b>Elements</b>	implementation specific	
	<b>Type</b>	--
	<b>Comment</b>	The content of the initialization data structure is implementation specific
<b>Description</b>	This is the type of the data structure containing the initialization data for XCP.	

<b>Available via</b>	Xcp.h
----------------------	-------

]()

### 8.2.2 Xcp\_Transmission Mode Type

[SWS\_Xcp\_00846][

<b>Name</b>	Xcp_TransmissionModeType		
<b>Kind</b>	Enumeration		
<b>Range</b>	XCP_TX_OFF	0x00	Transmission Disabled
	XCP_TX_ON	0x01	Transmission Enabled
<b>Description</b>	Handles the enabling and disabling of the transmission mode		
<b>Available via</b>	Xcp.h		

]()

## 8.3 Function definitions

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

### 8.3.1 Xcp\_Init

[SWS\_Xcp\_00803]

<b>Service Name</b>	Xcp_Init	
<b>Syntax</b>	<pre>void Xcp_Init (     const Xcp_ConfigType* Xcp_ConfigPtr )</pre>	
<b>Service ID [hex]</b>	0x00	
<b>Sync/Async</b>	Synchronous	
<b>Reentrancy</b>	Non Reentrant	
<b>Parameters (in)</b>	Xcp_ConfigPtr	Pointer to a selected configuration structure
<b>Parameters (inout)</b>	None	
<b>Parameters (out)</b>	None	
<b>Return value</b>	void	--
<b>Description</b>	This service initializes interfaces and variables of the AUTOSAR XCP layer.	
<b>Available via</b>	Xcp.h	

|(SRS\_BSW\_00405, SRS\_BSW\_00101, SRS\_BSW\_00358, SRS\_BSW\_00414, SRS\_Xcp\_29017)

[SWS\_Xcp\_00802] |The function Xcp\_Init shall internally store the configuration address to enable subsequent API calls to access the configuration|()

### 8.3.2 Xcp\_GetVersionInfo

[SWS\_Xcp\_00807]

<b>Service Name</b>	Xcp_GetVersionInfo	
<b>Syntax</b>	<pre>void Xcp_GetVersionInfo (     Std_VersionInfoType* versioninfo )</pre>	
<b>Service ID [hex]</b>	0x01	
<b>Sync/Async</b>	Synchronous	
<b>Reentrancy</b>	Reentrant	

<b>Parameters (in)</b>	None	
<b>Parameters (inout)</b>	None	
<b>Parameters (out)</b>	versioninfo	Pointer to where to store the version information of this module.
<b>Return value</b>	void	--
<b>Description</b>	Returns the version information of this module.	
<b>Available via</b>	Xcp.h	

⌋(SRS\_BSW\_00402, SRS\_BSW\_00407, SRS\_BSW\_00411, SRS\_BSW\_00374, SRS\_BSW\_00379, SRS\_BSW\_00003, SRS\_BSW\_00318)

### [SWS\_Xcp\_00825] ⌈

If development error detection for the Xcp module is enabled, then the function `Xcp_GetVersionInfo` shall check whether the parameter `VersioninfoPtr` is a NULL pointer (`NULL_PTR`). If `VersioninfoPtr` is a NULL pointer, then the function `Xcp_GetVersionInfo` shall raise the development error `XCP_E_PARAM_POINTER` and return. ⌋()

## 8.3.3 Xcp\_SetTransmissionMode

### [SWS\_Xcp\_00844]⌈

<b>Service Name</b>	Xcp_SetTransmissionMode	
<b>Syntax</b>	<pre>void Xcp_SetTransmissionMode (     NetworkHandleType Channel,     Xcp_TransmissionModeType Mode )</pre>	
<b>Service ID [hex]</b>	0x05	
<b>Sync/Async</b>	Synchronous	
<b>Reentrancy</b>	Non Reentrant	
<b>Parameters (in)</b>	Channel	The Network channel for the used bus communication
	Mode	Enabled or disabled Transmission mode Parameters
<b>Parameters (inout)</b>	None	
<b>Parameters (out)</b>	None	
<b>Return value</b>	None	
<b>Description</b>	This API is used to turn on and off of the TX capabilities of used communication bus channel in XCP module.	

<b>Available via</b>	Xcp.h
----------------------	-------

]()

[SWS\_Xcp\_00848] ⌈

The XCP module shall provide this service only if `XCP_SUPPRESS_TX_SUPPORT` (see [ECUC Xcp\\_00169](#)) equals `TRUE`. ]()

[SWS\_Xcp\_00849] ⌈

If `Xcp_SetTransmissionMode(Channel, Mode)` is called and parameter `Mode` equals `XCP_TX_OFF`, all TxPDUs which are assigned to `Channel` shall not be transmitted. ]()

Note: It could be derived from <Bus>If configuration and the global PDU parameter, to which specific communication channel the PDU is assigned to.

[SWS\_Xcp\_00850] ⌈

If `Xcp_SetTransmissionMode(Channel, Mode)` is called and parameter `Mode` equals `XCP_TX_ON`, all TxPDUs which are assigned to `Channel` shall be able to be transmitted. ]()

## 8.4 Call-back notifications

[SWS\_Xcp\_00836] ⌈

This is a list of functions provided for other modules. ⌋()

### 8.4.1 Xcp\_<Lo>RxIndication

[SWS\_Xcp\_00813]⌈

<b>Service Name</b>	Xcp_<Lo>RxIndication	
<b>Syntax</b>	<pre>void Xcp_&lt;Lo&gt;RxIndication (     PduIdType RxPduId,     const PduInfoType* PduInfoPtr )</pre>	
<b>Service ID [hex]</b>	0x42	
<b>Sync/Async</b>	Synchronous	
<b>Reentrancy</b>	Reentrant for different PduIds. Non reentrant for the same PduId.	
<b>Parameters (in)</b>	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.
<b>Parameters (inout)</b>	None	
<b>Parameters (out)</b>	None	
<b>Return value</b>	None	
<b>Description</b>	Indication of a received PDU from a lower layer communication interface module.	
<b>Available via</b>	Xcp.h	

⌋()

The callback function `Xcp_<Lo>RxIndication` is called by the Bus Interfaces, Ethernet Socket Adaptor or CDD and is implemented by the Xcp module.

[SWS\_Xcp\_00847] ⌈

The callback function `Xcp_<Lo>RxIndication` shall inform the DET, if development error detection is enabled (`xcp_dev_error_detect` is set to TRUE) and if function call has failed because of the following reasons:

- Xcp was not initialized (XCP\_E\_UNINIT)
- PduInfoPtr equals NULL\_PTR (XCP\_E\_PARAM\_POINTER)
- Invalid PDUID (XCP\_E\_INVALID\_PDUID)>()

The function Xcp\_<Lo>RxIndication shall be called by the Xcp module's environment in an interrupt context.

### 8.4.2 Xcp\_<Lo>TxConfirmation

#### [SWS\_Xcp\_00814]

<b>Service Name</b>	Xcp_<Lo>TxConfirmation	
<b>Syntax</b>	<pre>void Xcp_&lt;Lo&gt;TxConfirmation (     PduIdType TxPduId,     Std_ReturnType result )</pre>	
<b>Service ID [hex]</b>	0x40	
<b>Sync/Async</b>	Synchronous	
<b>Reentrancy</b>	Reentrant for different PduIds. Non reentrant for the same PduId.	
<b>Parameters (in)</b>	TxPduId	ID of the PDU that has been transmitted.
	result	E_OK: The PDU was transmitted. E_NOT_OK: Transmission of the PDU failed.
<b>Parameters (inout)</b>	None	
<b>Parameters (out)</b>	None	
<b>Return value</b>	None	
<b>Description</b>	The lower layer communication interface module confirms the transmission of a PDU, or the failure to transmit a PDU.	
<b>Available via</b>	Xcp.h	

()

#### Note:

The callback function Xcp\_<Lo>TxConfirmation is called by the Bus Interfaces, Ethernet Socket Adaptor or CDD and is implemented by the Xcp module.

#### [SWS\_Xcp\_00840]

If development error detection for the XCP module is enabled: if the function Xcp\_<Lo>TxConfirmation is called before the XCP was initialized successfully,



the function `Xcp_<Lo>TxConfirmation` shall raise the development error `XCP_E_UNINIT` and return. `]()`

**[SWS\_Xcp\_00841]** `⌈`

Caveats of `Xcp_<Lo>TxConfirmation`:

- The call context is either on interrupt level (interrupt mode) or on task level
- The Xcp module is initialized correctly.

`]()`

### 8.4.3 `Xcp_<Lo>TriggerTransmit`

**[SWS\_Xcp\_00835]** `⌈`

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

`]()`

**Note:**

The callback function `Xcp_<Lo>TriggerTransmit` is called by the Bus Interfaces, Ethernet Socket Adaptor or CDD and is implemented by the Xcp module.

**[SWS\_Xcp\_00842]** ¶

If development error detection for the XCP module is enabled: if the function `Xcp_<Lo>TriggerTransmit` is called before the XCP was initialized successfully, the function `Xcp_<Lo>TriggerTransmit` shall raise the development error `XCP_E_UNINIT` and return `E_NOT_OK.()`

**[SWS\_Xcp\_00843]** ¶

Caveats of `Xcp_<Lo>TriggerTransmit`:

- The call context is either on interrupt level (interrupt mode) or on task level
- The Xcp module is initialized correctly. `()`

## 8.5 Scheduled functions

The functions are called directly by Basic Software Scheduler. The following functions shall have no return value and no parameter. All functions shall be non reentrant.

### 8.5.1 Xcp\_MainFunction

**[SWS\_Xcp\_00823]**¶

<b>Service Name</b>	Xcp_MainFunction
<b>Syntax</b>	<code>void Xcp_MainFunction ( void )</code>
<b>Service ID [hex]</b>	0x04
<b>Description</b>	Scheduled function of the XCP module
<b>Available via</b>	SchM_Xcp.h

|(SRS\_BSW\_00424, SRS\_BSW\_00433, SRS\_BSW\_00373)

**[SWS\_Xcp\_00824]** ¶

The XCP Main Function shall be called cyclically. `()`

## 8.6 Expected Interfaces

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

### 8.6.1 Mandatory Interfaces

#### [SWS\_Xcp\_91001]

<i>API Function</i>	<i>Header File</i>	<i>Description</i>
There are no mandatory interfaces.		

()

### 8.6.2 Optional Interfaces

#### [SWS\_Xcp\_00832]

<i>API Function</i>	<i>Header File</i>	<i>Description</i>
CanIf_- Transmit	CanIf.h	Requests transmission of a PDU.
Det_Report- Error	Det.h	Service to report development errors.
Frlf_Disable- LPdu	Frlf.h	Wraps the FlexRay Driver Function Fr_DisableLPdu. It disables the hardware resource of an LPdu for transmission/reception.
Frlf_- ReconfigL- Pdu	Frlf.h	Calls the FlexRay Driver's API Fr_ReconfigLPdu. The enum value "FR_CHANNEL_AB" shall not be used.
Frlf_- Transmit	Frlf.h	Requests transmission of a PDU.
GetCounter- Value	Os.h	This service reads the current count value of a counter (returning either the hardware timer ticks if counter is driven by hardware or the software ticks when user drives counter).
GetElapsed- Value	Os.h	This service gets the number of ticks between the current tick value and a previously read tick value.
SoAd_If- Transmit	SoAd.h	Requests transmission of a PDU.

()

### 8.6.3 Configurable interfaces

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

The XCP module offers configurable interfaces to be used by Complex Driver(s).

## 9 Sequence diagrams

### 9.1 XCP on FlexRay

#### 9.1.1 Xcp on FlexRay Transmit

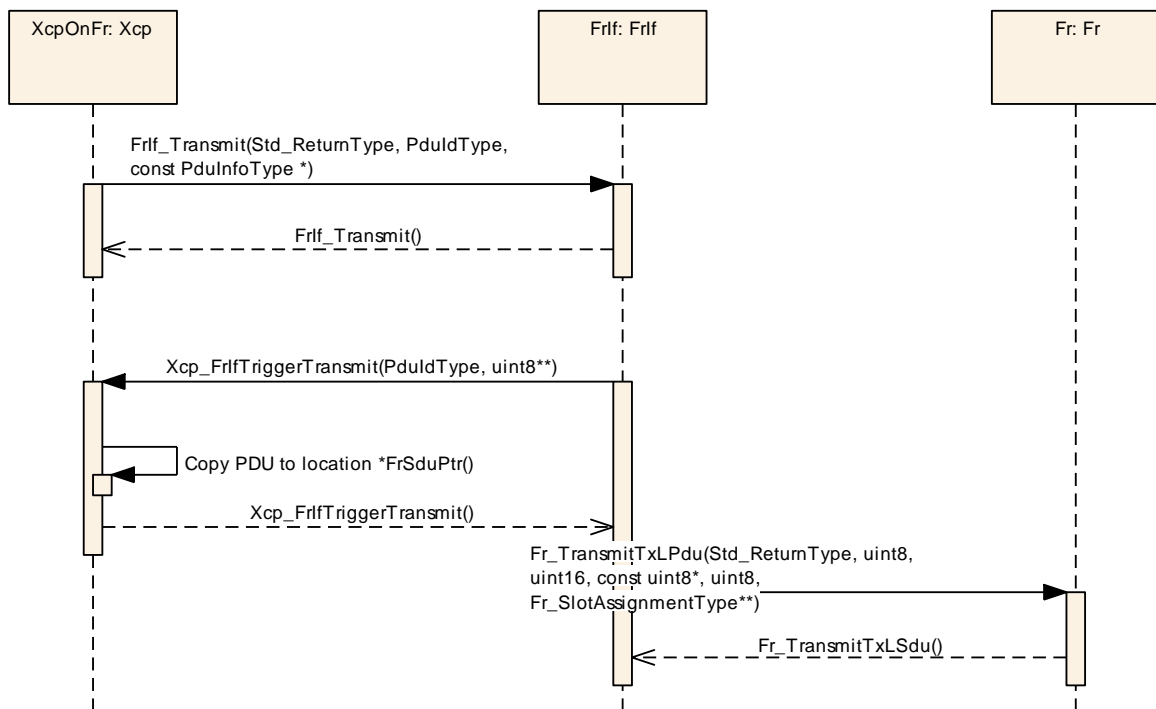


Figure 2: Xcp On FlexRay Transmit

#### 9.1.2 Xcp on FlexRay Receive Indication

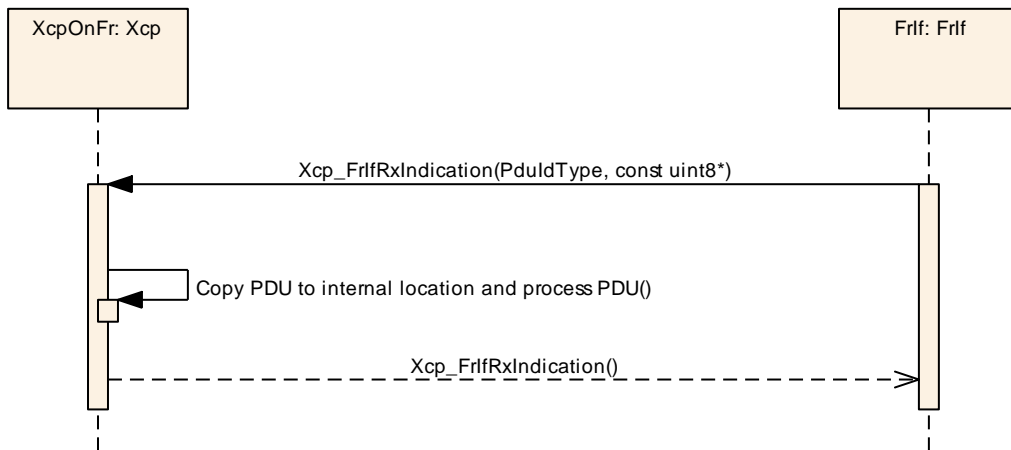


Figure 3: Xcp on FlexRay Receive Indication

## 9.2 XCP on CAN

### 9.2.1 Xcp on CAN Transmit

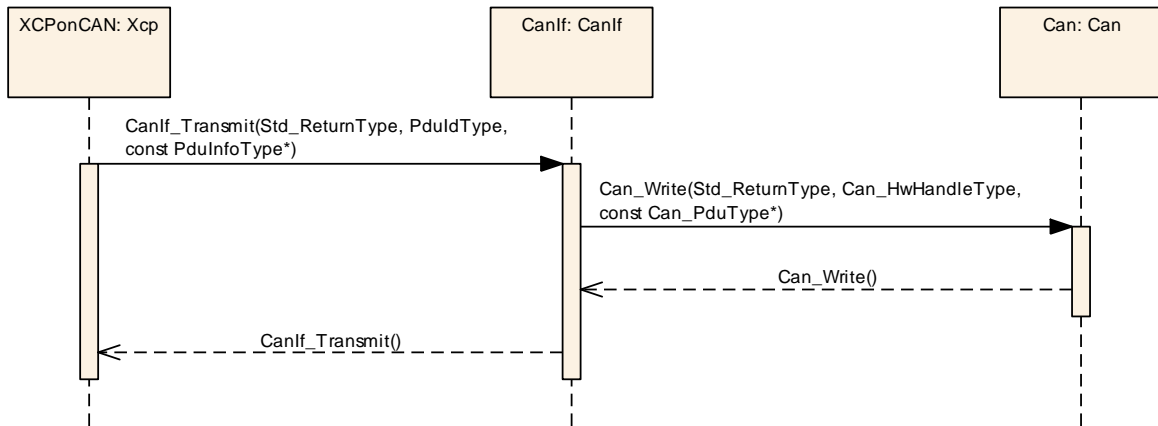
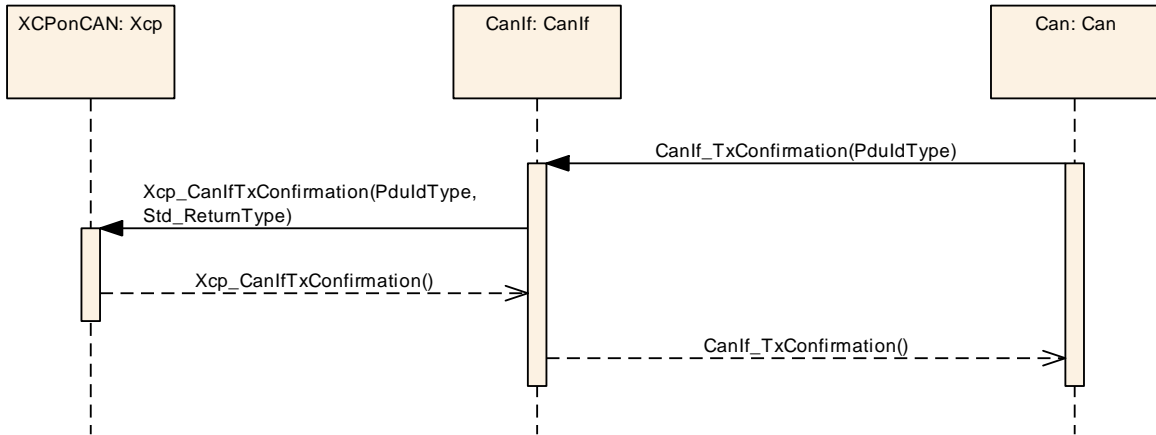


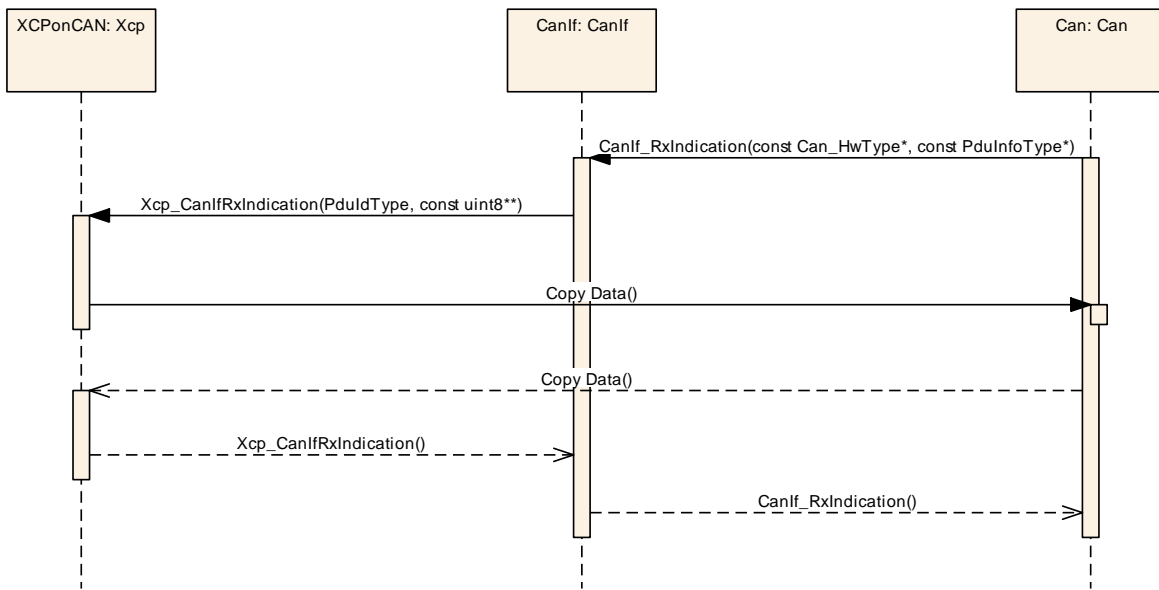
Figure 4: Xcp on Can Transmit

**9.2.2 Xcp on CAN Transmit Confirmation**



**Figure 5: Xcp on CAN Transmit Confirmation**

**9.2.3 Xcp on CAN Receive Indication**



**Figure 6: Xcp on CAN Receive Indication**

## 9.3 XCP on Ethernet

### 9.3.1 Xcp on Ethernet Receive Indication

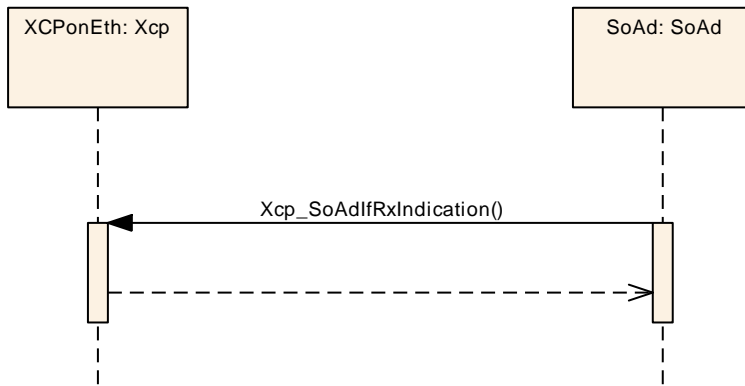


Figure 7: Xcp on Ethernet Receive Indication

## 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 XCP.

Chapter 10.3 specifies published information of the module XCP.

### 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 Chapters 7 and Chapter 8.

#### [SWS\_Xcp\_00102] ¶

The listed configuration items can be derived from a network description database, which is based on the EcuConfigurationTemplate. The configuration tool shall extract all information to configure the XCP. (SRS\_BSW\_00159)

#### [SWS\_XCP\_00103] ¶

The configuration tool must check the consistency of the configuration at configuration time. (SRS\_BSW\_00167)

#### [SWS\_Xcp\_00104] ¶

Configuration rules and constraints for plausibility checks shall be performed during configuration time, wherever possible. (SRS\_BSW\_00167)

#### [SWS\_Xcp\_00105] ¶

These dependencies between FlexRay Interface and FlexRay Driver configuration must be provided at configuration time by the configuration tools. (SRS\_BSW\_00167)



### 10.2.1 Xcp

<b>SWS Item</b>	<b>ECUC_Xcp_00182 :</b>
<b>Module Name</b>	Xcp
<b>Module Description</b>	Configuration of the XCP module
<b>Post-Build Variant Support</b>	true
<b>Supported Config Variants</b>	VARIANT-POST-BUILD, VARIANT-PRE-COMPILE

<b>Included Containers</b>		
<b>Container Name</b>	<b>Multiplicity</b>	<b>Scope / Dependency</b>
XcpConfig	1	This container contains the configuration parameters and sub containers of the AUTOSAR Xcp module.
XcpGeneral	1	This container contains the general configuration parameters of the XCP.

### 10.2.2 XcpGeneral

<b>SWS Item</b>	<b>ECUC_Xcp_00001 :</b>
<b>Container Name</b>	XcpGeneral
<b>Parent Container</b>	Xcp
<b>Description</b>	This container contains the general configuration parameters of the XCP.
<b>Configuration Parameters</b>	

<b>SWS Item</b>	<b>ECUC_Xcp_00164 :</b>		
<b>Name</b>	XcpDaqConfigType		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	Sets the DAQ_CONFIG_TYPE bit within the DAQ_PROPERTIES parameter to "static" or to "dynamic". If DAQ_STATIC is selected, the DAQ_CONFIG_TYPE bit is set to "0". If DAQ_DYNAMIC is selected, the DAQ_CONFIG_TYPE bit is set to "1".		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucEnumerationParamDef		
<b>Range</b>	DAQ_DYNAMIC	If DAQ_DYNAMIC is selected, the DAQ_CONFIG_TYPE bit is set to '1'	
	DAQ_STATIC	If DAQ_STATIC is selected, the DAQ_CONFIG_TYPE bit is set to '0'	
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU dependency: If DAQ_CONFIG_TYPE = dynamic, MAX_DAQ equals MIN_DAQ+DAQ_COUNT.		

<b>SWS Item</b>	<b>ECUC_Xcp_00012 :</b>	
<b>Name</b>	XcpDaqCount	
<b>Parent Container</b>	XcpGeneral	
<b>Description</b>	Indicates the number of DAQ lists for dynamic configuration.	
<b>Multiplicity</b>	1	
<b>Type</b>	EcucIntegerParamDef	
<b>Range</b>	0 .. 65535	

<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	VARIANT-PRE-COMPILE
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU dependency: This parameter is available only if XcpDaqConfigType is set to "1" i.e DAQ_DYNAMIC		

<b>SWS Item</b>	<b>ECUC_Xcp_0003 :</b>		
<b>Name</b>	XcpDevErrorDetect		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	Switches the development error detection and notification on or off. <ul style="list-style-type: none"> <li>• true: detection and notification is enabled.</li> <li>• false: detection and notification is disabled.</li> </ul>		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucBooleanParamDef		
<b>Default value</b>	false		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC_Xcp_00181 :</b>		
<b>Name</b>	XcpFlashProgrammingEnabled		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	Enabling of XCP Flash programming functionality		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucBooleanParamDef		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC_Xcp_00170 :</b>		
<b>Name</b>	XcpIdentificationFieldType		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	Type of Identification Field the slave will use when transferring DAQ Packets to the master. The master has to use the same Type of Identification Field when transferring STIM Packets to the slave.		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucEnumerationParamDef		
<b>Range</b>	ABSOLUTE	Absolute ODT number	
	RELATIVE_BYTE	Relative ODT number, absolute DAQ list number (BYTE)	
	RELATIVE_WORD	Relative ODT number, absolute DAQ list number (WORD)	
	RELATIVE_WORD_ALIGNED	Relative ODT number, absolute DAQ list number (WORD, aligned).	
<b>Post-Build Variant Value</b>	false		

<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC_Xcp_00014 :</b>		
<b>Name</b>	XcpMainFunctionPeriod		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	The XCP does not require this information but the BSW scheduler, which invokes the main function, needs it in order to plan its tasks.		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucFloatParamDef		
<b>Range</b>	]0 .. INF[		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC_Xcp_00004 :</b>		
<b>Name</b>	XcpMaxCto		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	MAX_CTO shows the maximum length of a CTO packet in bytes.		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucIntegerParamDef		
<b>Range</b>	8 .. 255		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC_Xcp_00005 :</b>		
<b>Name</b>	XcpMaxDto		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	MAX_DTO shows the maximum length of a DTO packet in bytes.		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucIntegerParamDef		
<b>Range</b>	8 .. 65535		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC_Xcp_00011 :</b>		
<b>Name</b>	XcpMaxEventChannel		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	--		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucIntegerParamDef		
<b>Range</b>	0 .. 65535		

<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

<b>SWS Item</b>	<b>ECUC_Xcp_00013 :</b>		
<b>Name</b>	XcpMinDaq		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	Indicates the number of predefined, read only DAQ lists on the XCP slave.		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucIntegerParamDef		
<b>Range</b>	0 .. 255		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

<b>SWS Item</b>	<b>ECUC_Xcp_00054 :</b>		
<b>Name</b>	XcpOdtCount		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	This parameter indicates the amount of ODTs of a DAQ list using dynamic DAQ list configuration.		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucIntegerParamDef		
<b>Range</b>	0 .. 252		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU dependency: This parameter is available only if XcpDaqConfigType is set to "1" i.e DAQ_DYNAMIC		

<b>SWS Item</b>	<b>ECUC_Xcp_00059 :</b>		
<b>Name</b>	XcpOdtEntriesCount		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	Indicates the amount of entries into an ODT using dynamic DAQ list configuration.		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucIntegerParamDef		
<b>Range</b>	0 .. 255		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU dependency: This parameter is available only if XcpDaqConfigType is set to "1" i.e DAQ_DYNAMIC		

<b>SWS Item</b>	<b>ECUC_Xcp_00177 :</b>		
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<b>Name</b>	XcpOdtEntrySizeDaq		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	Indicates the size of an element described by an ODT entry to the DaqListType for a DAQ.		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucIntegerParamDef		
<b>Range</b>	0 .. 255		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

<b>SWS Item</b>	<b>ECUC_Xcp_00178 :</b>		
<b>Name</b>	XcpOdtEntrySizeStim		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	Indicates the size of an element described by an ODT entry to the DaqListType for a stim.		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucIntegerParamDef		
<b>Range</b>	0 .. 255		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

<b>SWS Item</b>	<b>ECUC_Xcp_00006 :</b>		
<b>Name</b>	XcpOnCanEnabled		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	Enabling of XCPonCAN functionality		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucBooleanParamDef		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC_Xcp_00009 :</b>		
<b>Name</b>	XcpOnCddEnabled		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	Enabling of XCPonCdd functionality		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucBooleanParamDef		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC_Xcp_00008 :</b>		
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<b>Name</b>	XcpOnEthernetEnabled		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	Enabling of XCPonEthernet functionality		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucBooleanParamDef		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC_Xcp_00007 :</b>		
<b>Name</b>	XcpOnFlexRayEnabled		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	Enabling of XCPonFlexRay functionality		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucBooleanParamDef		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC_Xcp_00169 :</b>		
<b>Name</b>	XcpPrescalerSupported		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	This parameter enables and disables the support for Prescaler support. True is Enabled, False is disabled		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucBooleanParamDef		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC_Xcp_00176 :</b>		
<b>Name</b>	XcpSuppressTxSupport		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	Switches the support of suppressing transmission of PDUs per communication channel on or off. TRUE: Suppressing of TxPDUs supported FALSE: Suppressing of TxPDUs not supported		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucBooleanParamDef		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC_Xcp_00167 :</b>		
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<b>Name</b>	XcpTimestampTicks		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	This parameter defines the timestamp that will increment based TIMESTAMP_TICKS per unit and wrap around if an overflow occurs.		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucIntegerParamDef		
<b>Range</b>	0 .. 65535		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC Xcp_00166 :</b>		
<b>Name</b>	XcpTimestampType		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	This parameter indicates the number of bytes used for the timestamp field. In case No_TIME_STAMP is selected the timestamp field is not available.		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucEnumerationParamDef		
<b>Range</b>	FOUR_BYTE		timestamp field has the size of four byte.
	NO_TIME_STAMP		timestamp field is not available.
	ONE_BYTE		timestamp field has the size of one byte.
	TWO_BYTE		timestamp field has the size of two byte.
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC Xcp_00168 :</b>		
<b>Name</b>	XcpTimestampUnit		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	This parameter indicates the resolution of the data acquisition clock of the slave when transferring data to master.		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucEnumerationParamDef		
<b>Range</b>	TIMESTAMP_UNIT_100MS		Unit is 100 millisecond.
	TIMESTAMP_UNIT_100NS		Unit is 100 nanosecond.
	TIMESTAMP_UNIT_100PS		Unit is 100 picosecond.
	TIMESTAMP_UNIT_100US		Unit is 100 microsecond.
	TIMESTAMP_UNIT_10MS		Unit is 10 millisecond.
	TIMESTAMP_UNIT_10NS		Unit is 10 nanosecond.
	TIMESTAMP_UNIT_10PS		Unit is 10 picosecond.
	TIMESTAMP_UNIT_10US		Unit is 10 microsecond.
	TIMESTAMP_UNIT_1MS		Unit is 1 millisecond.
	TIMESTAMP_UNIT_1NS		Unit is 1 nonasecond.
	TIMESTAMP_UNIT_1PS		Unit is 1 picosecond.
	TIMESTAMP_UNIT_1S		Unit is 1 second.
	TIMESTAMP_UNIT_1US		Unit is 1 microsecond.
	<b>Post-Build Variant Value</b>	false	
<b>Value</b>	<b>Pre-compile time</b>	X	All Variants

<b>Configuration Class</b>	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC_Xcp_00002 :</b>		
<b>Name</b>	XcpVersionInfoApi		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	Enables/disables the existence of the XCP_GetVersionInfo() API service. TRUE: XCP_GetVersionInfo() API service exists FALSE: XCP_GetVersionInfo() API service does not exist		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucBooleanParamDef		
<b>Default value</b>	false		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC_Xcp_00162 :</b>		
<b>Name</b>	XcpCounterRef		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	This parameter contains a reference to the counter, which is used by XCP.		
<b>Multiplicity</b>	1		
<b>Type</b>	Reference to [ OsCounter ]		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC_Xcp_00180 :</b>		
<b>Name</b>	XcpNvRamBlockIdRef		
<b>Parent Container</b>	XcpGeneral		
<b>Description</b>	This reference contains the link to a non-volatile memory block to be used in the feature "RESUME MODE" so this information has to be stored non volatile to be available directly after start-up of the ECU.		
<b>Multiplicity</b>	0..1		
<b>Type</b>	Symbolic name reference to [ NvMBlockDescriptor ]		
<b>Post-Build Variant Multiplicity</b>	true		
<b>Post-Build Variant Value</b>	true		
<b>Multiplicity Configuration Class</b>	<b>Pre-compile time</b>	X	VARIANT-PRE-COMPILE
	<b>Link time</b>	--	
	<b>Post-build time</b>	X	VARIANT-POST-BUILD
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	VARIANT-PRE-COMPILE
	<b>Link time</b>	--	
	<b>Post-build time</b>	X	VARIANT-POST-BUILD
<b>Scope / Dependency</b>	scope: local		

<b>No Included Containers</b>
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### 10.2.3 XcpConfig

<b>SWS Item</b>	<b>ECUC_Xcp_00020 :</b>
<b>Container Name</b>	XcpConfig
<b>Parent Container</b>	Xcp
<b>Description</b>	This container contains the configuration parameters and sub containers of the AUTOSAR Xcp module.
<b>Configuration Parameters</b>	

<b>Included Containers</b>		
<b>Container Name</b>	<b>Multiplicity</b>	<b>Scope / Dependency</b>
XcpCommunicationChannel	0..*	This container represents the configuration of the communication channel of XCP.
XcpDaqList	1..*	This container contains the configuration of the DAQs.
XcpEventChannel	1..*	This container contains the configuration of event channels on the XCP slave.
XcpPageSwitching	0..1	This container represents configuration of the page switching feature.
XcpPdu	1..*	Contains PDU information. A PDU may be either a transmission PDU or a reception PDU.

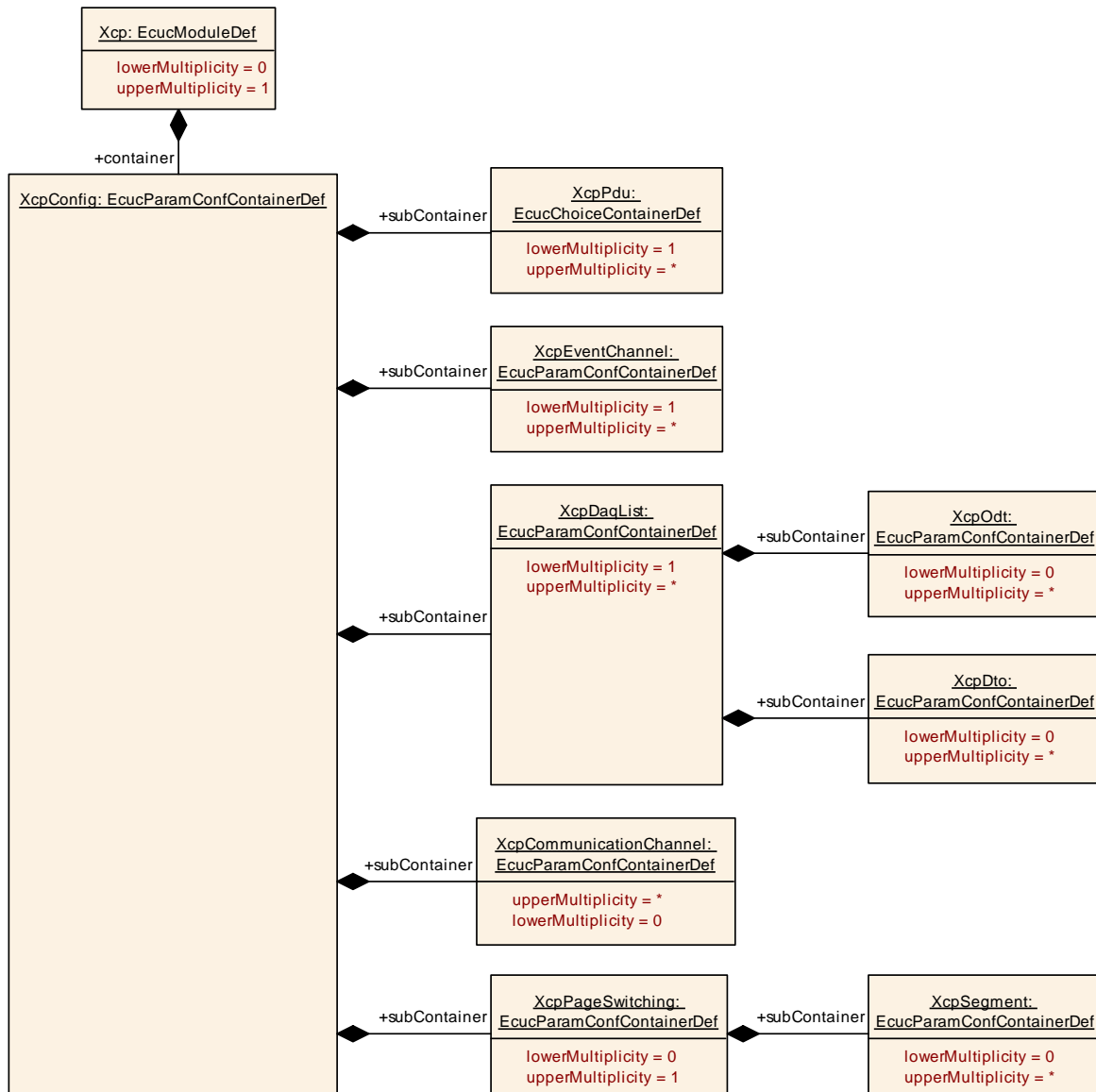


Figure 8: Diagram XcpConfig

### 10.2.4 XcpDaqList

<b>SWS Item</b>	<b>ECUC_Xcp_00050 :</b>
<b>Container Name</b>	XcpDaqList
<b>Parent Container</b>	XcpConfig
<b>Description</b>	This container contains the configuration of the DAQs.
<b>Configuration Parameters</b>	

<b>SWS Item</b>	<b>ECUC_Xcp_00051 :</b>
<b>Name</b>	XcpDaqListNumber
<b>Parent Container</b>	XcpDaqList
<b>Description</b>	Index number of the DAQ list
<b>Multiplicity</b>	1
<b>Type</b>	EcucIntegerParamDef (Symbolic Name generated for this parameter)

<b>Range</b>	0 .. 65534		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

<b>SWS Item</b>	<b>ECUC_Xcp_00052 :</b>		
<b>Name</b>	XcpDaqListType		
<b>Parent Container</b>	XcpDaqList		
<b>Description</b>	This indicates whether this DAQ list represents a DAQ or a STIM.		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucEnumerationParamDef		
<b>Range</b>	DAQ	This DAQ list is a DAQ.	
	DAQ_STIM	This DAQ list can be DAQ or STIM.	
	STIM	This DAQ list is a STIM.	
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

<b>SWS Item</b>	<b>ECUC_Xcp_00053 :</b>		
<b>Name</b>	XcpMaxOdt		
<b>Parent Container</b>	XcpDaqList		
<b>Description</b>	MAX_ODT indicates the maximum amount of ODTs in this DAQ list (STATIC configuration)		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucIntegerParamDef		
<b>Range</b>	0 .. 252		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU dependency: only available if XcpDaqConfigType is "DAQ_STATIC" (bit set to '0')		

<b>SWS Item</b>	<b>ECUC_Xcp_00058 :</b>		
<b>Name</b>	XcpMaxOdtEntries		
<b>Parent Container</b>	XcpDaqList		
<b>Description</b>	This parameter indicates the maximum amount of entries in an ODT of this DAQ list (STATIC configuration).		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucIntegerParamDef		
<b>Range</b>	0 .. 255		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

	dependency: only available if XcpDaqConfigType is "DAQ_STATIC" (bit set to '0')
--	---------------------------------------------------------------------------------

<b>Included Containers</b>		
<b>Container Name</b>	<b>Multiplicity</b>	<b>Scope / Dependency</b>
XcpDto	0..*	This container collects data transfer object specific parameters for the DAQ list.
XcpOdt	0..*	This container contains ODT-specific parameter for the DAQ list.

## 10.2.5 XcpDto

<b>SWS Item</b>	<b>ECUC_Xcp_00065 :</b>		
<b>Container Name</b>	XcpDto		
<b>Parent Container</b>	XcpDaqList		
<b>Description</b>	This container collects data transfer object specific parameters for the DAQ list.		
<b>Configuration Parameters</b>			

<b>SWS Item</b>	<b>ECUC_Xcp_00066 :</b>		
<b>Name</b>	XcpDtoPid		
<b>Parent Container</b>	XcpDto		
<b>Description</b>	Packet identifier (PID) of the DTO that identifies the ODT the content of the DTO.		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucIntegerParamDef (Symbolic Name generated for this parameter)		
<b>Range</b>	0 .. 251		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

<b>SWS Item</b>	<b>ECUC_Xcp_00067 :</b>		
<b>Name</b>	XcpDto2PduMapping		
<b>Parent Container</b>	XcpDto		
<b>Description</b>	This reference specifies the mapping of the DTO to the PDUs from the lower-layer interfaces (CanIf, Frlf, SoAd and Cdd). A reference to a XcpRxPdu is only feasible if the the DaqListType is DAQ_STIM. A reference to a XcpTxPdu is only feasible if the DaqListType is DAQ.		
<b>Multiplicity</b>	1		
<b>Type</b>	Choice reference to [ XcpRxPdu , XcpTxPdu ]		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

<b>No Included Containers</b>
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## 10.2.6 XcpOdt

<b>SWS Item</b>	<b>ECUC_Xcp_00055 :</b>		
<b>Container Name</b>	XcpOdt		
<b>Parent Container</b>	XcpDaqList		
<b>Description</b>	This container contains ODT-specific parameter for the DAQ list.		
<b>Configuration Parameters</b>			

<b>SWS Item</b>	<b>ECUC_Xcp_00060 :</b>		
<b>Name</b>	XcpOdtEntryMaxSize		
<b>Parent Container</b>	XcpOdt		
<b>Description</b>	This parameter indicates the upper limit for the size of the element described by an ODT entry. Depending on the DaqListType this ODT belongs to it describes the limit for a DAQ (MAX_ODT_ENTRY_SIZE_DAQ) or a STIM (MAX_ODT_ENTRY_SIZE_STIM).		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucIntegerParamDef		
<b>Range</b>	0 .. 254		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

<b>SWS Item</b>	<b>ECUC_Xcp_00057 :</b>		
<b>Name</b>	XcpOdtNumber		
<b>Parent Container</b>	XcpOdt		
<b>Description</b>	Index number of this ODT within the DAQ list.		
<b>Multiplicity</b>	0..1		
<b>Type</b>	EcucIntegerParamDef (Symbolic Name generated for this parameter)		
<b>Range</b>	0 .. 251		
<b>Default value</b>	--		
<b>Post-Build Variant Multiplicity</b>	false		
<b>Post-Build Variant Value</b>	false		
<b>Multiplicity Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

<b>SWS Item</b>	<b>ECUC_Xcp_00056 :</b>		
<b>Name</b>	XcpOdt2DtoMapping		
<b>Parent Container</b>	XcpOdt		
<b>Description</b>	This reference maps the ODT to the according DTO in which it will be transmitted.		
<b>Multiplicity</b>	0..1		
<b>Type</b>	Reference to [ XcpDto ]		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	

<b>Scope / Dependency</b>	scope: ECU
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<b>Included Containers</b>		
<b>Container Name</b>	<b>Multiplicity</b>	<b>Scope / Dependency</b>
XcpOdtEntry	1..*	This container collects all configuration parameters that comprise an ODT entry.

## 10.2.7 XcpOdtEntry

<b>SWS Item</b>	<b>ECUC_Xcp_00061 :</b>
<b>Container Name</b>	XcpOdtEntry
<b>Parent Container</b>	XcpOdt
<b>Description</b>	This container collects all configuration parameters that comprise an ODT entry.
<b>Configuration Parameters</b>	

<b>SWS Item</b>	<b>ECUC_Xcp_00063 :</b>		
<b>Name</b>	XcpOdtEntryAddress		
<b>Parent Container</b>	XcpOdtEntry		
<b>Description</b>	Memory address that the ODT entry is referencing to.		
<b>Multiplicity</b>	0..1		
<b>Type</b>	EcucLinkerSymbolDef		
<b>Default value</b>	--		
<b>maxLength</b>	--		
<b>minLength</b>	--		
<b>regularExpression</b>	--		
<b>Post-Build Variant Multiplicity</b>	false		
<b>Post-Build Variant Value</b>	false		
<b>Multiplicity Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

<b>SWS Item</b>	<b>ECUC_Xcp_00179 :</b>		
<b>Name</b>	XcpOdtEntryBitOffset		
<b>Parent Container</b>	XcpOdtEntry		
<b>Description</b>	Represent the bit offset in case of the element represents status bit.		
<b>Multiplicity</b>	0..1		
<b>Type</b>	EcucIntegerParamDef		
<b>Range</b>	0 .. 31		
<b>Default value</b>	--		
<b>Post-Build Variant Multiplicity</b>	false		
<b>Post-Build Variant Value</b>	false		
<b>Multiplicity Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants

	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

<b>SWS Item</b>	<b>ECUC_Xcp_00064 :</b>		
<b>Name</b>	XcpOdtEntryLength		
<b>Parent Container</b>	XcpOdtEntry		
<b>Description</b>	Length of the referenced memory area that is referenced by the ODT entry.		
<b>Multiplicity</b>	0..1		
<b>Type</b>	EcucIntegerParamDef		
<b>Range</b>	0 .. 255		
<b>Default value</b>	--		
<b>Post-Build Variant Multiplicity</b>	false		
<b>Post-Build Variant Value</b>	false		
<b>Multiplicity Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

<b>SWS Item</b>	<b>ECUC_Xcp_00062 :</b>		
<b>Name</b>	XcpOdtEntryNumber		
<b>Parent Container</b>	XcpOdtEntry		
<b>Description</b>	Index number of the ODT entry		
<b>Multiplicity</b>	0..1		
<b>Type</b>	EcucIntegerParamDef		
<b>Range</b>	0 .. 254		
<b>Default value</b>	--		
<b>Post-Build Variant Multiplicity</b>	false		
<b>Post-Build Variant Value</b>	false		
<b>Multiplicity Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

<b>No Included Containers</b>
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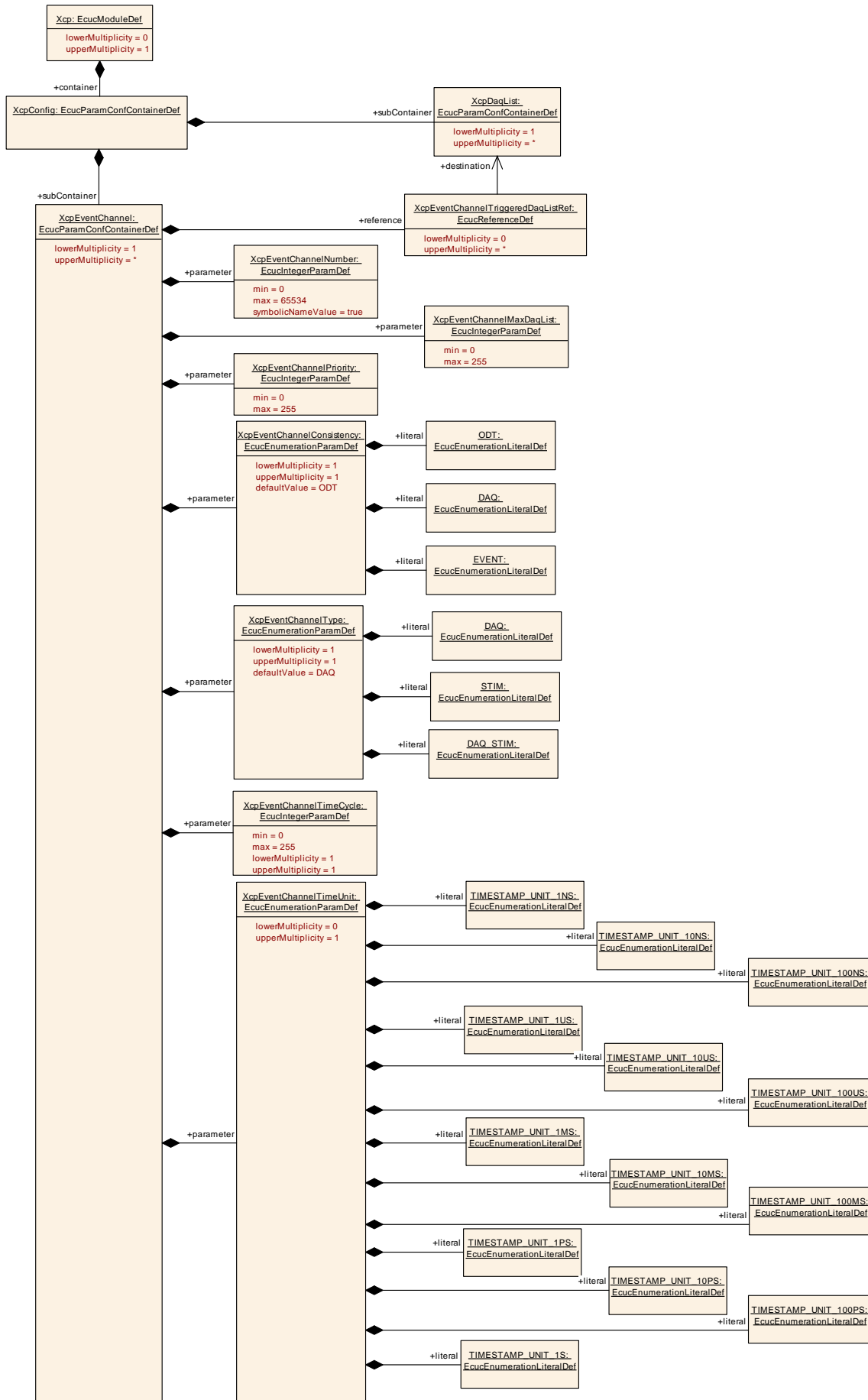




Figure 9: Diagram XcpOdtEntry

### 10.2.8 XcpEventChannel

<b>SWS Item</b>	<b>ECUC_Xcp_00150 :</b>		
<b>Container Name</b>	XcpEventChannel		
<b>Parent Container</b>	XcpConfig		
<b>Description</b>	This container contains the configuration of event channels on the XCP slave.		
<b>Configuration Parameters</b>			

<b>SWS Item</b>	<b>ECUC_Xcp_00171 :</b>		
<b>Name</b>	XcpEventChannelConsistency		
<b>Parent Container</b>	XcpEventChannel		
<b>Description</b>	Type of consistency used by event channel		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucEnumerationParamDef		
<b>Range</b>	DAQ	Consistency on DAQ list level	
	EVENT	Consistency on Event Channel Level	
	ODT	Consistency on ODT level (default value).	
<b>Default value</b>	ODT		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC_Xcp_00153 :</b>		
<b>Name</b>	XcpEventChannelMaxDaqList		
<b>Parent Container</b>	XcpEventChannel		
<b>Description</b>	Maximum amount of DAQ lists that are handled by this event channel.		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucIntegerParamDef		
<b>Range</b>	0 .. 255		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

<b>SWS Item</b>	<b>ECUC_Xcp_00152 :</b>		
<b>Name</b>	XcpEventChannelNumber		
<b>Parent Container</b>	XcpEventChannel		
<b>Description</b>	Index number of the event channel.		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucIntegerParamDef (Symbolic Name generated for this parameter)		
<b>Range</b>	0 .. 65534		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	

	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

<b>SWS Item</b>	<b>ECUC_Xcp_00154 :</b>		
<b>Name</b>	XcpEventChannelPriority		
<b>Parent Container</b>	XcpEventChannel		
<b>Description</b>	Priority of the event channel		
<b>Multiplicity</b>	1		
<b>Type</b>	EcuIntegerParamDef		
<b>Range</b>	0 .. 255		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

<b>SWS Item</b>	<b>ECUC_Xcp_00173 :</b>		
<b>Name</b>	XcpEventChannelTimeCycle		
<b>Parent Container</b>	XcpEventChannel		
<b>Description</b>	The event channel time cycle indicates which sampling period is used to process this event channel. A value of 0 means 'Not cyclic'.		
<b>Multiplicity</b>	1		
<b>Type</b>	EcuIntegerParamDef		
<b>Range</b>	0 .. 255		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC_Xcp_00174 :</b>		
<b>Name</b>	XcpEventChannelTimeUnit		
<b>Parent Container</b>	XcpEventChannel		
<b>Description</b>	This configuration parameter indicates the unit of the event channel time cycle.		
<b>Multiplicity</b>	0..1		
<b>Type</b>	EcuEnumerationParamDef		
<b>Range</b>	TIMESTAMP_UNIT_100MS		Unit is 100 millisecond.
	TIMESTAMP_UNIT_100NS		Unit is 100 nanosecond.
	TIMESTAMP_UNIT_100PS		Unit is 100 picosecond.
	TIMESTAMP_UNIT_100US		Unit is 100 microsecond.
	TIMESTAMP_UNIT_10MS		Unit is 10 millisecond.
	TIMESTAMP_UNIT_10NS		Unit is 10 nanosecond.
	TIMESTAMP_UNIT_10PS		Unit is 10 picosecond.
	TIMESTAMP_UNIT_10US		Unit is 10 microsecond.
	TIMESTAMP_UNIT_1MS		Unit is 1 millisecond.
	TIMESTAMP_UNIT_1NS		Unit is 1 nanosecond.
	TIMESTAMP_UNIT_1PS		Unit is 1 picosecond.
	TIMESTAMP_UNIT_1S		Unit is 1 second.
	TIMESTAMP_UNIT_1US		Unit is 1 microsecond.
<b>Post-Build Variant Multiplicity</b>	false		
<b>Post-Build Variant Value</b>	false		
<b>Multiplicity</b>	<b>Pre-compile time</b>	X	All Variants

<b>Configuration Class</b>	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local dependency: Dependent on the Parameter EventChannelTimeCycle. When this parameter is set to 0, the entire event channel time unit parameter shall be ignored.		

<b>SWS Item</b>	<b>ECUC_Xcp_00172 :</b>		
<b>Name</b>	XcpEventChannelType		
<b>Parent Container</b>	XcpEventChannel		
<b>Description</b>	This configuration parameter indicates what kind of DAQ list can be allocated to this event channel.		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucEnumerationParamDef		
<b>Range</b>	DAQ	only DAQ supported (default value).	
	DAQ_STIM	Both DAQ and STIM supported (Simultaneously).	
	STIM	only STIM supported	
<b>Default value</b>	DAQ		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: local		

<b>SWS Item</b>	<b>ECUC_Xcp_00151 :</b>		
<b>Name</b>	XcpEventChannelTriggeredDaqListRef		
<b>Parent Container</b>	XcpEventChannel		
<b>Description</b>	References all DAQ lists that are triggered by this event channel.		
<b>Multiplicity</b>	0..*		
<b>Type</b>	Reference to [ XcpDaqList ]		
<b>Post-Build Variant Multiplicity</b>	false		
<b>Post-Build Variant Value</b>	false		
<b>Multiplicity Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

**No Included Containers**

## 10.2.9 XcpPdu

<b>SWS Item</b>	<b>ECUC_Xcp_00100 :</b>		
<b>Choice container Name</b>	XcpPdu		
<b>Parent Container</b>	XcpConfig		

<b>Description</b>	Contains PDU information. A PDU may be either a transmission PDU or a reception PDU.
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<b>Container Choices</b>		
<b>Container Name</b>	<b>Multiplicity</b>	<b>Scope / Dependency</b>
XcpRxPdu	0..1	This container specifies received PDUs.
XcpTxPdu	0..1	This container specifies transmission PDUs.

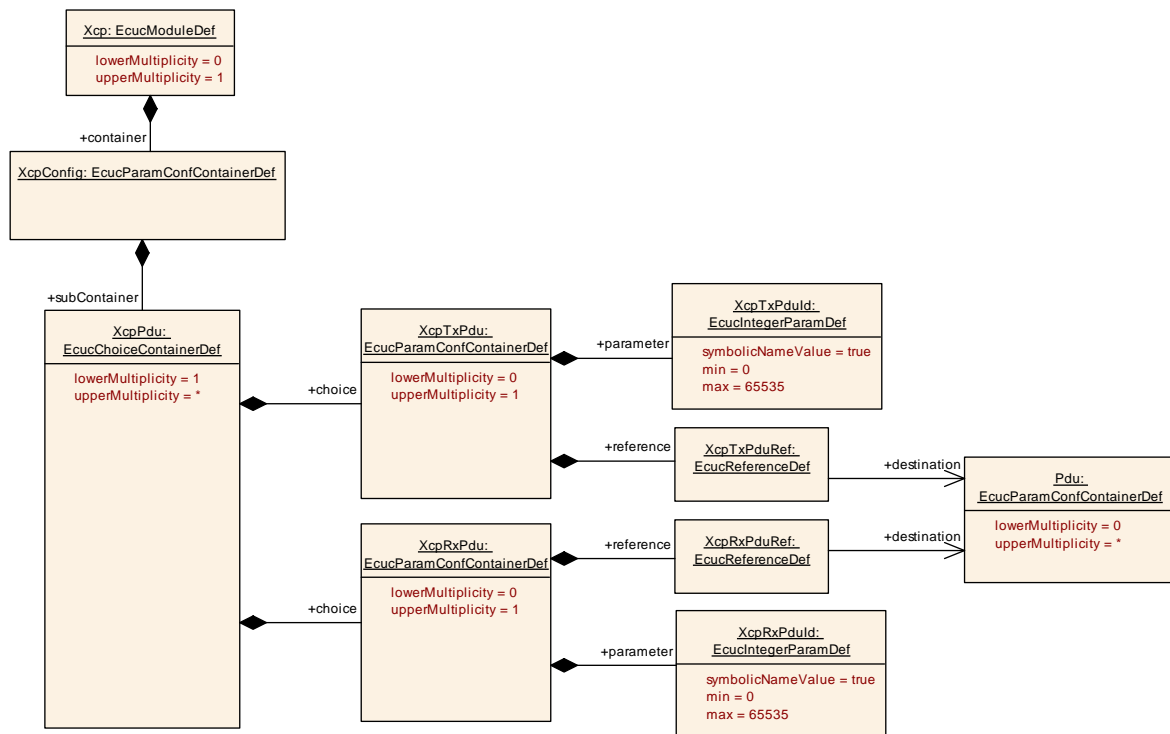


Figure 10: Diagram XcpPdu

### 10.2.10 XcpRxPdu

<b>SWS Item</b>	ECUC_Xcp_00105 :
<b>Container Name</b>	XcpRxPdu
<b>Parent Container</b>	XcpPdu
<b>Description</b>	This container specifies received PDUs.
<b>Configuration Parameters</b>	

<b>SWS Item</b>	ECUC_Xcp_00106 :
<b>Name</b>	XcpRxPdul
<b>Parent Container</b>	XcpRxPdu
<b>Description</b>	ID of the PDU that will be received via a Xcp_<module>RxIndication.
<b>Multiplicity</b>	1
<b>Type</b>	EcucIntegerParamDef (Symbolic Name generated for this parameter)
<b>Range</b>	0 .. 65535
<b>Default value</b>	--
<b>Post-Build Variant Value</b>	false

<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

<b>SWS Item</b>	<b>ECUC_Xcp_00107 :</b>		
<b>Name</b>	XcpRxPduRef		
<b>Parent Container</b>	XcpRxPdu		
<b>Description</b>	--		
<b>Multiplicity</b>	1		
<b>Type</b>	Reference to [ Pdu ]		
<b>Post-Build Variant Value</b>	true		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	VARIANT-PRE-COMPILE
	<b>Link time</b>	--	
	<b>Post-build time</b>	X	VARIANT-POST-BUILD
<b>Scope / Dependency</b>	scope: ECU		

**No Included Containers**

### 10.2.11 XcpTxPdu

<b>SWS Item</b>	<b>ECUC_Xcp_00101 :</b>		
<b>Container Name</b>	XcpTxPdu		
<b>Parent Container</b>	XcpPdu		
<b>Description</b>	This container specifies transmission PDUs.		
<b>Configuration Parameters</b>			

<b>SWS Item</b>	<b>ECUC_Xcp_00103 :</b>		
<b>Name</b>	XcpTxPduId		
<b>Parent Container</b>	XcpTxPdu		
<b>Description</b>	The PDU identifier, which has to be used by the lower layer BSW module for TxConfirmations or TriggerTransmits.		
<b>Multiplicity</b>	1		
<b>Type</b>	EcucIntegerParamDef (Symbolic Name generated for this parameter)		
<b>Range</b>	0 .. 65535		
<b>Default value</b>	--		
<b>Post-Build Variant Value</b>	false		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	All Variants
	<b>Link time</b>	--	
	<b>Post-build time</b>	--	
<b>Scope / Dependency</b>	scope: ECU		

<b>SWS Item</b>	<b>ECUC_Xcp_00104 :</b>		
<b>Name</b>	XcpTxPduRef		
<b>Parent Container</b>	XcpTxPdu		
<b>Description</b>	Reference to the external PDU definition.		
<b>Multiplicity</b>	1		
<b>Type</b>	Reference to [ Pdu ]		
<b>Post-Build Variant Value</b>	true		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	VARIANT-PRE-COMPILE
	<b>Link time</b>	--	
	<b>Post-build time</b>	X	VARIANT-POST-BUILD

<b>Scope / Dependency</b>	scope: ECU
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<b>No Included Containers</b>
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## 10.2.12 XcpCommunicationChannel

<b>SWS Item</b>	<b>ECUC_Xcp_00183 :</b>		
<b>Container Name</b>	XcpCommunicationChannel		
<b>Parent Container</b>	XcpConfig		
<b>Description</b>	This container represents the configuration of the communication channel of XCP.		
<b>Configuration Parameters</b>			

<b>SWS Item</b>	<b>ECUC_Xcp_00185 :</b>		
<b>Name</b>	XcpChannelRxPduRef		
<b>Parent Container</b>	XcpCommunicationChannel		
<b>Description</b>	Optional reference to the XCP Rx PDU.		
<b>Multiplicity</b>	0..1		
<b>Type</b>	Reference to [ XcpRxPdu ]		
<b>Post-Build Variant Value</b>	true		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	VARIANT-PRE-COMPILE
	<b>Link time</b>	--	
	<b>Post-build time</b>	X	VARIANT-POST-BUILD
<b>Scope / Dependency</b>	scope: ECU		

<b>SWS Item</b>	<b>ECUC_Xcp_00184 :</b>		
<b>Name</b>	XcpChannelTxPduRef		
<b>Parent Container</b>	XcpCommunicationChannel		
<b>Description</b>	Reference to the XCP Tx PDU.		
<b>Multiplicity</b>	1		
<b>Type</b>	Reference to [ XcpTxPdu ]		
<b>Post-Build Variant Value</b>	true		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	VARIANT-PRE-COMPILE
	<b>Link time</b>	--	
	<b>Post-build time</b>	X	VARIANT-POST-BUILD
<b>Scope / Dependency</b>	scope: ECU		

<b>SWS Item</b>	<b>ECUC_Xcp_00186 :</b>		
<b>Name</b>	XcpComMChannelRef		
<b>Parent Container</b>	XcpCommunicationChannel		
<b>Description</b>	Reference to the ComM channel the PDUs belong to.		
<b>Multiplicity</b>	1		
<b>Type</b>	Reference to [ ComMChannel ]		
<b>Post-Build Variant Value</b>	true		
<b>Value Configuration Class</b>	<b>Pre-compile time</b>	X	VARIANT-PRE-COMPILE
	<b>Link time</b>	--	
	<b>Post-build time</b>	X	VARIANT-POST-BUILD
<b>Scope / Dependency</b>	scope: ECU		

<b>No Included Containers</b>
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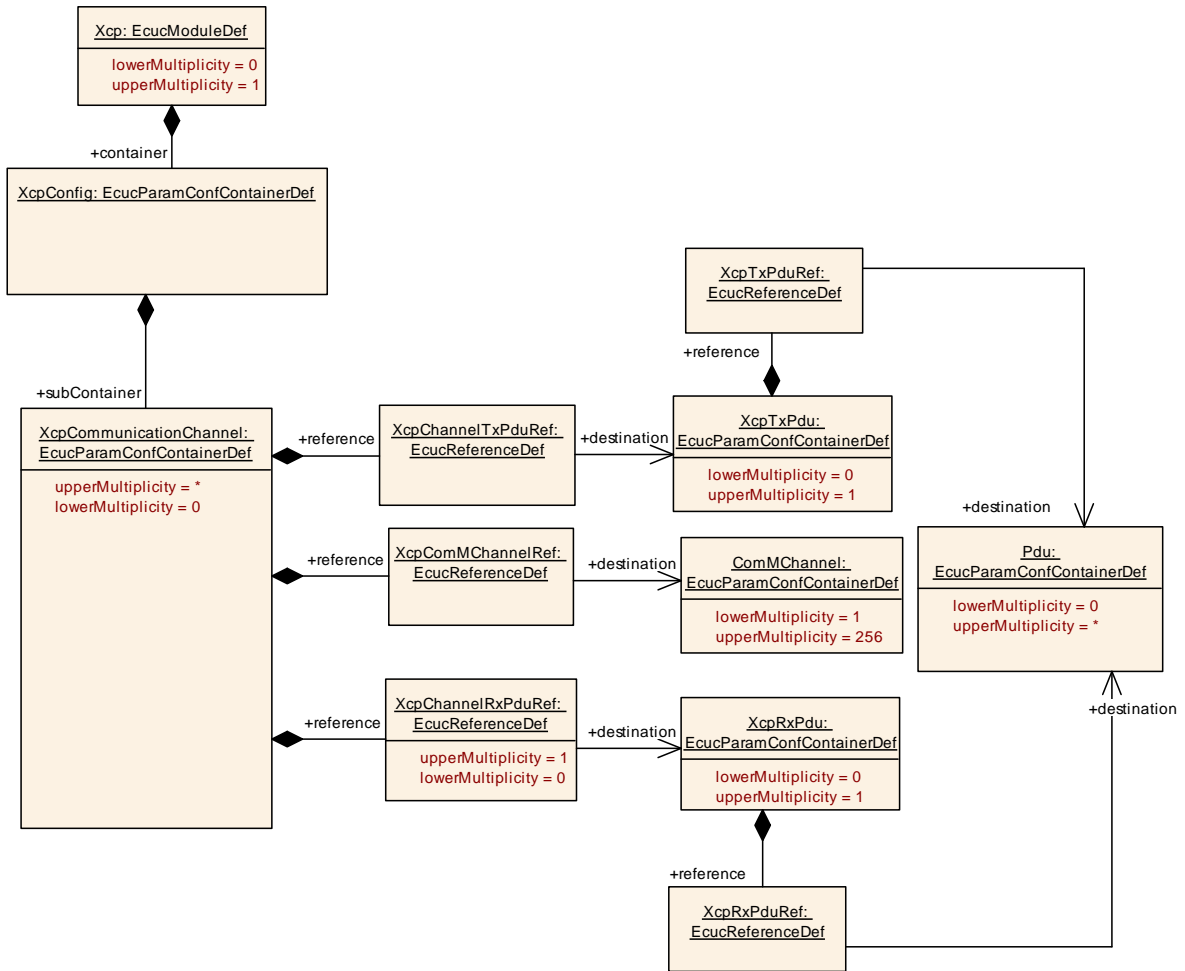


Figure 11: Diagram XcpCommunicationChannel

### 10.3 Published Information

For details refer to the chapter 10.3 “Published Information” in *SWS\_BSWGeneral*.



## 11 Not applicable requirements

**[SWS\_Xcp\_00999]** 「 These requirements are not applicable to this specification. 」

(SRS\_BSW\_00171, SRS\_BSW\_00170, SRS\_BSW\_00375, SRS\_BSW\_00416,  
SRS\_BSW\_00168, SRS\_BSW\_00423, SRS\_BSW\_00425, SRS\_BSW\_00426,  
SRS\_BSW\_00427, SRS\_BSW\_00428, SRS\_BSW\_00432, SRS\_BSW\_00336,  
SRS\_BSW\_00417, SRS\_BSW\_00161, SRS\_BSW\_00162, SRS\_BSW\_00005,  
SRS\_BSW\_00415, SRS\_BSW\_00164, SRS\_BSW\_00325, SRS\_BSW\_00413,  
SRS\_BSW\_00347, SRS\_BSW\_00335, SRS\_BSW\_00410, SRS\_BSW\_00314,  
SRS\_BSW\_00328, SRS\_BSW\_00312, SRS\_BSW\_00006, SRS\_BSW\_00377,  
SRS\_BSW\_00306, SRS\_BSW\_00309, SRS\_BSW\_00371, SRS\_BSW\_00360,  
SRS\_BSW\_00330, SRS\_BSW\_00331, SRS\_BSW\_00009, SRS\_BSW\_00401,  
SRS\_BSW\_00172, SRS\_BSW\_00010, SRS\_BSW\_00333, SRS\_BSW\_00321,  
SRS\_BSW\_00341, SRS\_Xcp\_29008)