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Document Change History			
Date	**Release**	**Changed by**	**Change Description**
2013-10-31	4.1.2	AUTOSAR Release Management	• Added control functions for ARP • Clarifications and corrections of requirements • Editorial changes • Removed chapter(s) on change documentation
2013-03-15	4.1.1	AUTOSAR Administration	• Initial Release

Table of Contents

1 Introduction and functional overview

The AUTOSAR TCP/IP module offers functionality to send and receive Internet Protocol data.

The TCP/IP Stack (TCPIP) is located between the Socket Adaptor (SoAd) and the Ethernet Interface (EthIf) modules.

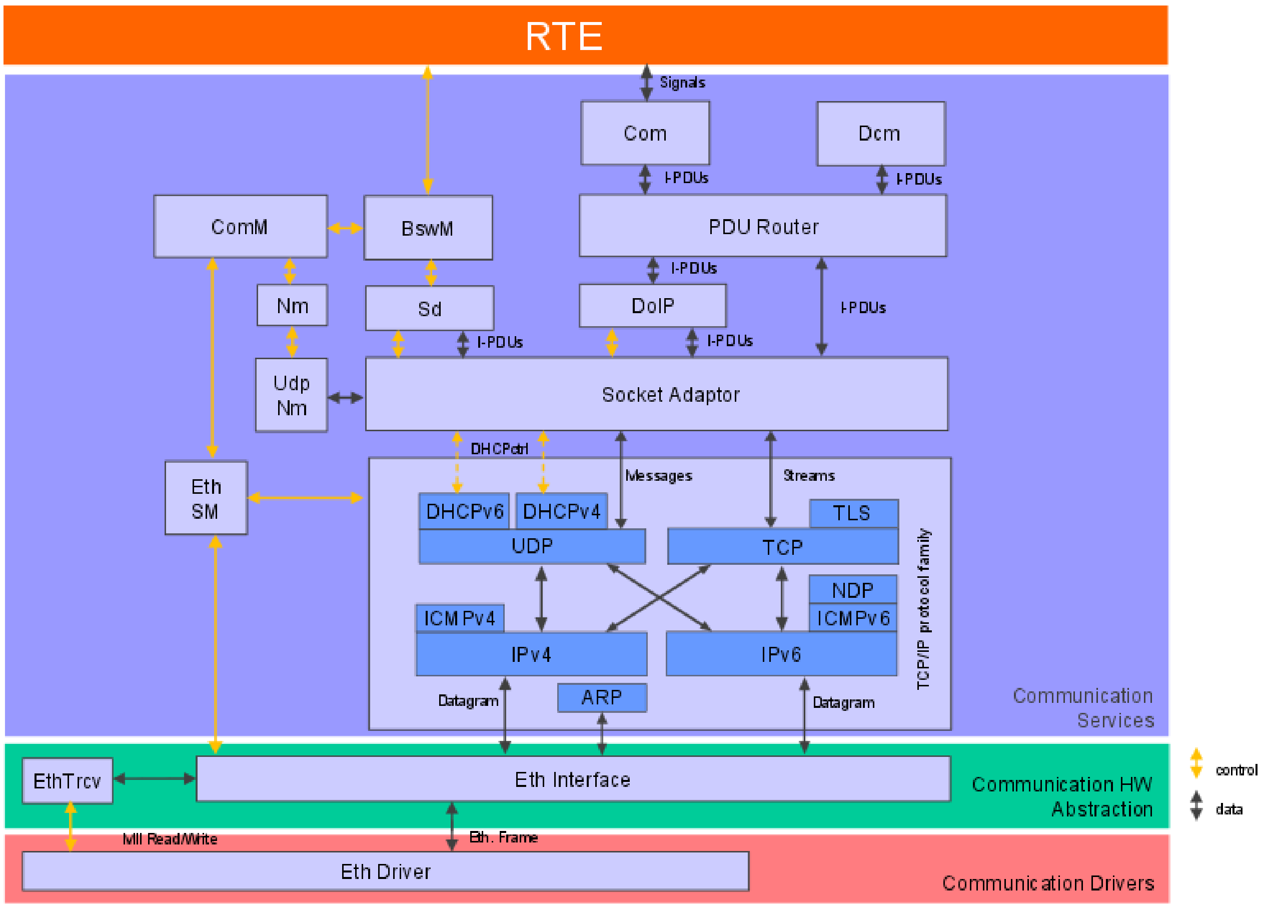


Figure 1: Extended AUTOSAR Communication Stack.

2 Acronyms and abbreviations

Abbreviation / Acronym:	***Description:***
ARP	Address Resolution Protocol
DAD	Duplicate Address Detection
DEM	Diagnostic Event Manager
DET	Default Error Tracer
DHCP	Dynamic Host Configuration Protocol
DHCPv4	Dynamic Host Configuration Protocol for Internet Protocol Version 4
DHCPv6	Dynamic Host Configuration Protocol for Internet Protocol Version 6
ECC	Elliptic Curve Cryptography
ECU	Electronic Control Unit
EthIf	Ethernet Interface
EthSM	Ethernet State Manager
HTTP	HyperText Transfer Protocol
IANA	Internet Assigned Numbers Authority
ICMP	Internet Control Message Protocol
ICMPv4	Internet Control Message Protocol for Internet Protocol Version 4
ICMPv6	Internet Control Message Protocol for Internet Protocol Version 6
IETF	Internet Engineering Task Force
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
MTU	Maximum Transmission Unit
NDP	Neighbor Discovery Protocol
PKI	Public Key Infrastructure
RSA	Rivest-Shamir-Adleman. A method using public and private key for data encryption and decryption.
SNI	Server Name Identification
SoAd	Socket Adaptor
TCP	Transmission Control Protocol
TCP/IP	A family of communication protocols used in computer networks
TLS	Transport Layer Security
TP	Transport Protocol
UDP	User Datagram Protocol

3 Related documentation

3.1 Input documents

[1] AUTOSAR Layered Software Architecture
AUTOSAR_EXP_LayeredSoftwareArchitecture.pdf

[2] AUTOSAR Basis Software Mode Manager
AUTOSAR_SWS_BSWModeManager.pdf

[3] AUTOSAR Socket Adaptor
AUTOSAR_SWS_SocketAdaptor.pdf

[4] AUTOSAR SRS BSW General
AUTOSAR_SRS_BSWGeneral.pdf

[5] AUTOSAR SRS Ethernet
AUTOSAR_SRS_Ethernet.pdf

[6] AUTOSAR General Specification for Basic Software Modules
AUTOSAR_SWS_BSWGeneral.pdf

[7] Specification of ECU Configuration
AUTOSAR_TPS_ECUConfiguration.pdf

[8] List of Basic Software Modules
AUTOSAR_TR_BSWModuleList.pdf

[9] Specification of Crypto Service Manager
AUTOSAR_SWS_CryptoServiceManager.pdf

[10] Specification of Key Manager
AUTOSAR_SWS_KeyManager.pdf

3.2 Related standards and norms

[11] IETF RFC 3927
http://tools.ietf.org/html/rfc3927

[12] IETF RFC 1122
http://tools.ietf.org/html/rfc1122

[13] IETF RFC 826
http://tools.ietf.org/html/rfc826

[14] IETF RFC 894
http://tools.ietf.org/html/rfc894

[15] IETF RFC 791
http://tools.ietf.org/html/rfc791

[16] IETF RFC 815
http://tools.ietf.org/html/rfc815

[17] IETF RFC 4632
http://tools.ietf.org/html/rfc4632

[18] IETF RFC 1112
http://tools.ietf.org/html/rfc1112

[19] IETF RFC 792
http://tools.ietf.org/html/rfc792

[20] IETF RFC 1191
http://tools.ietf.org/html/rfc1191

[21] IETF RFC 2131
http://tools.ietf.org/html/rfc2131

[22] IETF RFC 768
http://tools.ietf.org/html/rfc768

[23] IETF RFC 793
http://tools.ietf.org/html/rfc793

[24] IETF RFC 813
http://tools.ietf.org/html/rfc813

[25] IETF RFC 896
http://tools.ietf.org/html/rfc896

[26] IETF RFC 5681
http://tools.ietf.org/html/rfc5681

[27] IETF RFC 2460
http://tools.ietf.org/html/rfc2460

[28] IETF RFC 4291
http://tools.ietf.org/html/rfc4291

[29] IETF RFC 2464
http://tools.ietf.org/html/rfc2464

[30] IETF RFC 6724

http://tools.ietf.org/html/rfc6724

[31] IETF RFC 5722
http://tools.ietf.org/html/rfc5722

[32] IETF RFC 5095
http://tools.ietf.org/html/rfc5095

[33] IETF RFC 4862
http://tools.ietf.org/html/rfc4862

[34] IETF RFC 1981
http://tools.ietf.org/html/rfc1981

[35] IETF RFC 4429
http://tools.ietf.org/html/rfc4429

[36] IETF RFC 4443
http://tools.ietf.org/html/rfc4443

[37] IETF RFC 4861
http://tools.ietf.org/html/rfc4861

[38] IETF RFC 3315
http://tools.ietf.org/html/rfc3315

[39] IETF RFC 4702
http://tools.ietf.org/html/rfc4702

[40] IETF RFC 4704
http://tools.ietf.org/html/rfc4704

[41] IETF RFC 6582
http://tools.ietf.org/html/rfc6582

[42] IETF RFC 2132
http://tools.ietf.org/html/rfc2132

[43] IETF RFC 5942
https://tools.ietf.org/html/rfc5942

[44] IETF RFC 6437
https://tools.ietf.org/html/rfc6437

[45] IETF RFC 2474
https://tools.ietf.org/html/rfc2474

[46] IETF RFC 5246
https://tools.ietf.org/html/rfc5246

[47] IETF RFC 4492
https://tools.ietf.org/html/rfc4492

[48] IETF RFC 7919
https://tools.ietf.org/html/rfc7919

[49] IETF RFC 5280
https://tools.ietf.org/html/rfc5280

[50] IETF RFC 6066
https://tools.ietf.org/html/rfc6066

[51] IETF RFC 7525
https://tools.ietf.org/html/rfc7525

[52] IETF RFC 4279
https://tools.ietf.org/html/rfc4279

[53] IETF RFC 7366
https://tools.ietf.org/html/rfc7366

[54] IETF RFC 8446
https://tools.ietf.org/html/rfc8446

[55] IETF RFC 8449
https://tools.ietf.org/html/rfc8449

4 Constraints and assumptions

4.1 Limitations

This document does not cover the assignment of UDP or TCP port numbers. There is no reserved space within the IANA assigned number range. Each implementer is responsible for managing the used port numbers.

This document does not cover the management of IP addresses. This might be done dynamically, e.g. by using DHCP, or statically. It is the implementer's responsibility to prevent address conflicts and achieve compliance with IANA address assignments.

This specification does not prescribe a certain physical layer or data rate.

Although a CDD interface is specified, allowing additional upper layer modules, a fan-out of one socket to multiple upper layer modules is not intended to be supported.

The AUTOSAR TLS implementation has the following limitations:

- A TLS implementation shall not support data compression or decompression.
- Session renegotiation shall not be supported.
- No support for secure connection over UDP (e.g. for DTLS)
- No support of FQDN
- No client Hello padding extension IETF RFC7685
- No session hash and extended master secret IETF RFC 7627
- No support for TLS versions lower than 1.2.
- No support for dynamic “downgrading” of a TCP connection with an established TLS connection to a plain TCP connection (without TLS)
- Static TLS connection assignment is bound to the port configuration of the server. Thus, using different TLS settings for different connections (possibly originating from different clients) to the same server port is not possible.

Please be aware that all specification items related to TLS are marked as ‘DRAFT’, as their verification is still pending and might be subject to change within the next releases.

4.2 Applicability to car domains

No restrictions.

5 Dependencies to other modules

5.1 EthIf

The Ethernet Interface is the lower layer module of the TcpIp module.

5.2 EthSM

The Ethernet State Manager controls the communication mode of the TcpIp module by requesting communication modes from the TcpIp module. TcpIp notifies the EthSM about communication mode changes.

5.3 Socket Adaptor

The Socket Adaptor is the upper layer module of the TcpIp module.

5.4 KeyM

The Key Manager module provides operations for certificate handling for the TLS sub module.

5.5 CSM

The crypto service manager allows to perform crypto job and key operations used by the TLS sub module.

5.6 File structure

5.6.1 Code file structure

For details refer to the chapter 5.1.6 “Code file structure” in *SWS_BSWGeneral.*

5.7 Version check

For details refer to the chapter 5.1.8 “Version Check” in *SWS_BSWGeneral.*

6 Requirements traceability

Requirement	Description	Satisfied by
SRS_BSW_00323	All AUTOSAR Basic Software Modules shall check passed API parameters for validity	SWS_TCPIP_00147
SRS_BSW_00452	Classification of runtime errors	SWS_TCPIP_00282, SWS_TCPIP_00283
SRS_Eth_00016	ICMPv4 shall be implemented according to IETF RFC 792	SWS_TCPIP_00277, SWS_TCPIP_00297
SRS_Eth_00019	TCP and UDP related requirement specified in IETF RFC 1122 shall be implemented	SWS_TCPIP_00279, SWS_TCPIP_00280
SRS_Eth_00045	TCPIP automatic IP address assignment	SWS_TCPIP_00254
SRS_Eth_00065	An API shall be available to fill DHCP field	SWS_TCPIP_00020, SWS_TCPIP_00190, SWS_TCPIP_00243, SWS_TCPIP_00244, SWS_TCPIP_00245, SWS_TCPIP_00246, SWS_TCPIP_00247, SWS_TCPIP_00248, SWS_TCPIP_00249, SWS_TCPIP_00250, SWS_TCPIP_00251, SWS_TCPIP_00252
SRS_Eth_00066	An API shall be available to read any received DHCP field	SWS_TCPIP_00040, SWS_TCPIP_00189, SWS_TCPIP_00233, SWS_TCPIP_00234, SWS_TCPIP_00235, SWS_TCPIP_00236, SWS_TCPIP_00237, SWS_TCPIP_00238, SWS_TCPIP_00239, SWS_TCPIP_00240, SWS_TCPIP_00241, SWS_TCPIP_00242
SRS_Eth_00087	Semi-Static Auto-Configuration	SWS_TCPIP_00058, SWS_TCPIP_00201, SWS_TCPIP_00216, SWS_TCPIP_00217, SWS_TCPIP_00218, SWS_TCPIP_00219
SRS_Eth_00088	DHCP Server	SWS_TCPIP_00058, SWS_TCPIP_00200
SRS_Eth_00090	The Neighbor Discovery Protocol shall be implemented according to IETF RFC 4861	SWS_TCPIP_00164, SWS_TCPIP_00263, SWS_TCPIP_00264, SWS_TCPIP_00281
SRS_Eth_00091	The Optimistic Duplicate Address Detection (DAD) for IPv6 shall be implemented according to IETF RFC 4429	SWS_TCPIP_00282, SWS_TCPIP_00283
SRS_Eth_00092	The IPv6 Addressing Architecture shall be implemented according to IETF RFC 4291	SWS_TCPIP_00162, SWS_TCPIP_00269
SRS_Eth_00097	The Path MTU Discovery for IPv6 shall be implemented according to	SWS_TCPIP_00267, SWS_TCPIP_00268

	IETF RFC 1981	
SRS_Eth_00098	ICMPv6 shall be implemented according to IETF RFC 4443	SWS_TCPIP_00278, SWS_TCPIP_00298
SRS_Eth_00103	TcpIp shall support generic upper layers	SWS_TCPIP_00018, SWS_TCPIP_00220, SWS_TCPIP_00221, SWS_TCPIP_00222, SWS_TCPIP_00223, SWS_TCPIP_00224, SWS_TCPIP_00225, SWS_TCPIP_00226, SWS_TCPIP_00227, SWS_TCPIP_00228, SWS_TCPIP_00229
SRS_Eth_00109	TCP shall support the Nagle algorithm according to IETF RFC 896	SWS_TCPIP_00063
SRS_Eth_00110	The Relationship between Links and Subnet Prefixes shall be considered according to IETF RFC 5942	SWS_TCPIP_00265
SRS_Eth_00111	Robustness against unexpected communication patterns	SWS_TCPIP_00260, SWS_TCPIP_00261, SWS_TCPIP_00262, SWS_TCPIP_00266
SRS_Eth_00112	Ethernet-related BSW modules shall report relevant runtime errors from the used protocols	SWS_TCPIP_00255, SWS_TCPIP_00256, SWS_TCPIP_00257, SWS_TCPIP_00258, SWS_TCPIP_00259
SRS_Eth_00129	The TCPIP shall support access to measurement counter values	SWS_TCPIP_00284, SWS_TCPIP_00285, SWS_TCPIP_00286, SWS_TCPIP_00287, SWS_TCPIP_00288, SWS_TCPIP_00289, SWS_TCPIP_00290, SWS_TCPIP_00291, SWS_TCPIP_00292, SWS_TCPIP_00293, SWS_TCPIP_00294, SWS_TCPIP_00295, SWS_TCPIP_00296
SRS_Eth_00135	-	SWS_TCPIP_00326
SRS_Eth_00136	-	SWS_TCPIP_00327
SRS_Eth_00137	-	SWS_TCPIP_91013, SWS_TCPIP_91014, SWS_TCPIP_91015
SRS_ETH_00138	-	SWS_TCPIP_00300, SWS_TCPIP_00302
SRS_ETH_00139	-	SWS_TCPIP_00304
SRS_ETH_00140	-	SWS_TCPIP_00300
SRS_Eth_00140	-	SWS_TCPIP_00329
SRS_Eth_00141	-	SWS_TCPIP_00325
SRS_Eth_134	-	SWS_TCPIP_00311
SRS_Eth_137	-	SWS_TCPIP_00325

7 Functional specification

Figure 2 provides an architecture overview of the AUTOSAR TCP/IP stack. The TCP/IP stack consists of the sub modules within the red box. Furthermore the interaction with other AUTOSAR modules (beside Dem and Det) is shown.

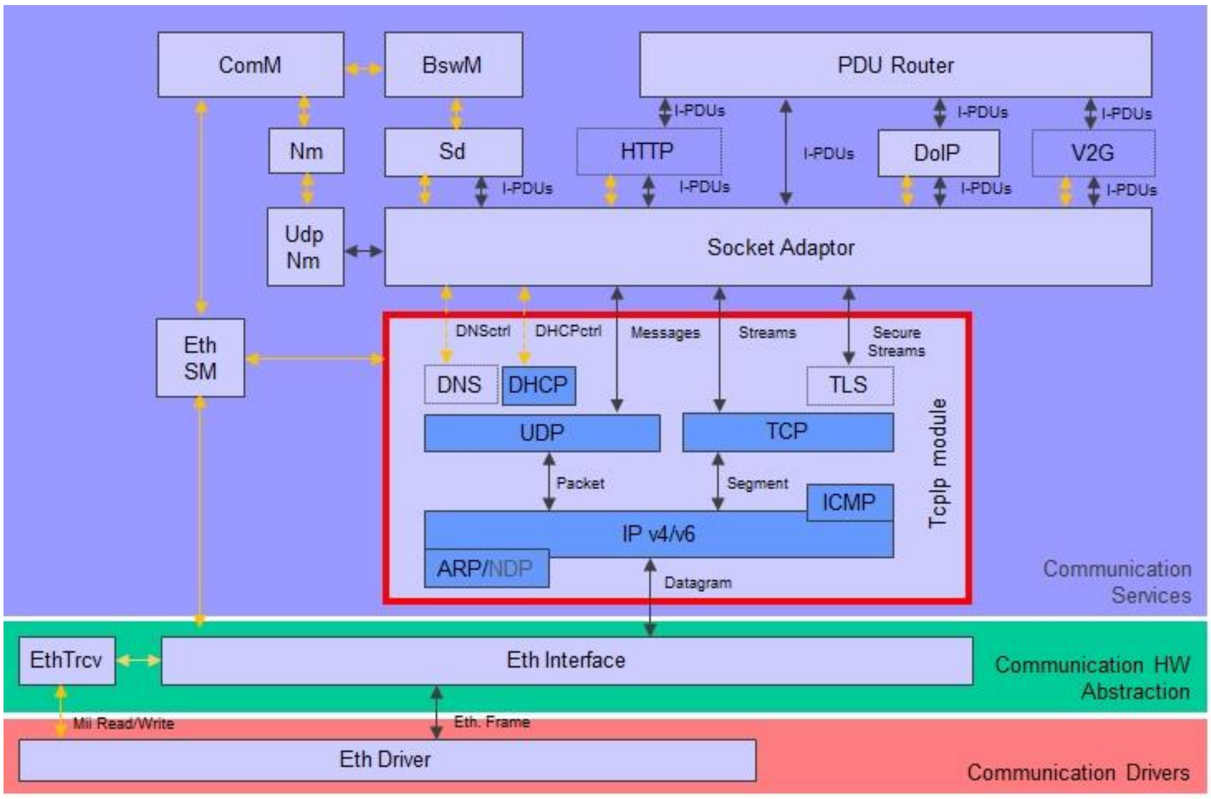


Figure 2: TCP/IP Architecture Overview

[SWS_TCPIP_00052]⌈ The TCP/IP stack shall consist of sub modules implementing specific functionalities defined in the subchapters below. ⌋ ()

7.1 System Scalability

7.1.1 Background & Rationale

The TcpIp module supports a variety of different use case, not all of them are required by each user. In order to achieve a scalable TcpIp Stack the protocols shall be grouped according to the following scalability classes:

Scalability Class 1: IPv4 – In-Vehicle and Diagnostic Communication
Scalability Class 2: IPv6 – In-Vehicle and Diagnostic Communication
Scalability Class 3: IPv4 and IPv6 (Dual Stack) – In-Vehicle and Diagnostic Communication

The following protocols shall be available in the respective Scalability Class:

Feature	Scalability Class 1	Scalability Class 2	Scalability Class 3
IPv4	✓		✓
ARP	✓		✓
ICMPv4	✓		✓
DHCPv4	✓		✓
Auto-IP	✓		✓
UDP	✓	✓	✓
TCP	✓	✓	✓
IPv6		✓	✓
NDP		✓	✓
ICMPv6		✓	✓
DHCPv6		✓	✓

Figure 3: TcpIp Scalability Classes

In addition to the scalability classes, the following Feature Groups allow a more fine-grained selection of optional features to address the specific needs of certain ECUs.

IPv4-Global Communication Feature Group:
The following features are available for Scalability Classes 1 and 3.
- Path MTU Discovery

IPv6-Global Communication Feature Group:
The following features are available for Scalability Classes 2 and 3.
- Path MTU Discovery
- IPv6 Anycasts Addresses
- NDP Redirect Messages

Special Features Group:
The following features are available for Scalability Classes 1, 2 and 3.
- DHCP Server

Security Features Group:
The following features are available for Scalability Classes 1, 2 and 3.
- TLS

7.1.2 Requirements

[SWS_TCPIP_00148]⌈ The TcpIp module for IPv4 – In-Vehicle and Diagnostic Communication (Scalability class 1) shall support the features listed in Figure 3: TcpIp Scalability Classes, column Scalability Class 1.⌋ ()

[SWS_TCPIP_00149]⌈ The TcpIp module for IPv6 – In-Vehicle and Diagnostic Communication (Scalability class 2) shall support the features listed in Figure 3: TcpIp Scalability Classes, column Scalability Class 2.⌋ ()

[SWS_TCPIP_00150]⌈ The TcpIp module for IPv4 and IPv6 (Dual Stack) – In-Vehicle and Diagnostic Communication (Scalability class 3) shall support the features listed in Figure 3: TcpIp Scalability Classes, column Scalability Class 3.⌋ ()

7.2 Internet Protocol Version 4

7.2.1 Internet Protocol (IPv4)

The Internet Protocol (IP) is the main protocol of the TCP/IP stack and is responsible for delivering datagrams from a source host identified by the source address to one or multiple destination hosts identified by the destination address. IP hides the underlying physical network interface, is an unreliable, best-effort, and connectionless packet delivery protocol.

[SWS_TCPIP_00053]⌈ The TcpIp shall implement the Internet Protocol as defined in IETF RFC 791 (Internet Protocol of version 4).⌋ ()

[SWS_TCPIP_00095]⌈ The TcpIp shall encapsulate IP packets in Ethernet frames according to IETF RFC 894.⌋ ()

[SWS_TCPIP_00096]⌈ The TcpIp shall support the identification of the network an IP address belongs to, by using a network mask (prefix) in addition to the IP address according to IETF RFC 4632, section 3.1.⌋ ()

[SWS_TCPIP_00102]⌈ The TcpIp shall fulfill the Internet Protocol related requirements specified by IETF RFC 1122, section 3.2.1.1 (Version number), 3.2.1.2 (Checksum), 3.2.1.3 (Addressing), 3.2.1.7 (TTL), and 3.3.2 (Reassembly).⌋ ()

[SWS_TCPIP_00097]⌈ The TcpIp shall be able to transmit IP datagrams to a group of hosts identified by a single IP destination address (multicast address) according to IETF RFC 1112, section 4, 6.2, and 6.4.⌋ ()

[SWS_TCPIP_00098]⌈ The TcpIp shall be able to receive multicast IP datagrams identified by a single IP destination address (multicast address) according to IETF RFC 1112, section 4 and 7.2 (excluding the requirement for IGMP).⌋ ()

[SWS_TCPIP_00054]⌈ The TcpIp shall be able to reassemble incoming datagrams that are fragmented according to IETF RFC 815 (IP Datagram Reassembly Algorithms).⌋ ()

[SWS_TCPIP_00231]⌈ The TcpIp shall fragment oversized IPv4 frames before transmission according to the description in IETF 791 Section Fragmentation and Reassembly.⌋ ()

[SWS_TCPIP_00055]⌈ The TcpIp shall discover the maximum transmission unit (MTU) for a path as defined in IETF RFC 1191 (Path MTU Discovery).⌋ ()

7.2.2 Address Resolution Protocol (ARP)

[SWS_TCPIP_00056]⌈ The TcpIp shall implement the Address Resolution Protocol (ARP) as defined in IETF RFC 826.⌋ ()

[SWS_TCPIP_00090]⌈ The TcpIp shall limit the number of ARP table (address resolution cache) entries to the number specified by the configuration parameter TcpIpArpTableSizeMax.⌋ ()

[SWS_TCPIP_00091]⌈ The TcpIp shall remove entries of the ARP table if they are not used for the timeout specified by the configuration parameter TcpIpArpTableEntryTimeout.⌋ ()

[SWS_TCPIP_00092]⌈ The TcpIp shall use the information from each received IP packet to update the ARP table in addition to received ARP packets.⌋ ()

[SWS_TCPIP_00142]⌈ The TcpIp shall call <Up_PhysAddrTableChg>() directly after each ARP table change:
(a) If TcpIp adds a new entry or updates an existing one, the parameter valid shall be set to TRUE and the parameters IpAddrPtr and PhysAddrPtr shall be set according to the new or updated entry.
(b) In case TcpIp removes an entry, valid shall be set to FALSE and the parameters IpAddrPtr and PhysAddrPtr shall be set according to the removed entry.⌋ ()

[SWS_TCPIP_00350]⌈ After the transmission of an ARP request the TcpIp shall skip the transmission of any further ARP requests to the same destination within a duration of TcpIpArpRequestTimeout seconds, according to the mechanism to prevent ARP flooding described in IETF RFC 1122, section 2.3.2.1 ARP Cache Validation.⌋ ()

[SWS_TCPIP_00351]⌈ The TcpIp shall process received ARP packets either directly within the context of the TcpIp_RxIndication or the first subsequent TcpIp_MainFunction.⌋ ()

[SWS_TCPIP_00093]⌈ On assignment of a new IP address the TcpIp shall send a configurable number (TcpIpArpNumGratuitousARPonStartup) of gratuitous ARP replies according to IETF RFC 2002, section 4.6, second indent. These announcements shall be timed according to IETF RFC 5227 section 2.3. Announcing an Address.⌋ ()

7.2.3 Dynamic Configuration of IPv4 Link-Local Addresses (Auto-IP)

[SWS_TCPIP_00057]⌈ The TcpIp shall support the dynamic configuration of IPv4 Link Local addresses as defined in IETF RFC 3927 (Dynamic Configuration of IPv4 Link-Local Addresses).⌋ ()

7.2.4 Internet Control Message Protocol (ICMPv4)

[SWS_TCPIP_00059]⌈ The TcpIp shall support the transmission and reception of Internet Control Message Protocol (ICMPv4) messages as defined in IETF RFC 792 (Internet Control Message Protocol in version 4).⌋ ()

[SWS_TCPIP_00277]⌈ The TcpIp shall only reply to ICMPv4 Echo Request Messages if they are valid and TcpIpIcmpEchoReplyEnabled is set to TRUE.⌋ (SRS_Eth_00016)

[SWS_TCPIP_00297]⌈ If a TcpIpIcmpMsgHandler is configured, the TcpIp shall call the respective <Up>_IcmpMsgHandler() if an ICMPv4 message is received and not handled by the TcpIp directly.⌋ (SRS_Eth_00016)

Note: For example, if the TcpIp replies to an ICMP echo request <Up>_IcmpMsgHandler() is not called for this message.

7.3 Internet Protocol Version 6

[SWS_TCPIP_00153]⌈ The TcpIp shall support the frame format for transmission of IPv6 packets and the method of forming IPv6 link-local addresses and statelessly autoconfigured addresses on Ethernet networks as defined in IETF RFC 2464 (Transmission of IPv6 Packets over Ethernet Networks).⌋ ()

[SWS_TCPIP_00154]⌈ The TcpIp shall support the source address selection algorithm as defined in IETF RFC 6724 (Default Address Selection for Internet Protocol Version 6 (IPv6)). Only section 5 Source Address Selection shall be supported.⌋ ()

[SWS_TCPIP_00156]⌈ The TcpIp shall support the IETF RFC 5095 (Deprecation of Type 0 Routing Headers in IPv6). The functionality provided by IPv6's Type 0 Routing Header can be exploited in order to achieve traffic amplification over a remote path for the purposes of generating denial-of-service traffic. This document updates the IPv6 specification to deprecate the use of IPv6 Type 0 Routing Headers, in light of this security concern.⌋ ()

[SWS_TCPIP_00157]⌈ The TcpIp shall support the section 5.1. Node Configuration Variables, section 5.3. Creation of Link-Local Addresses, section 5.4, Duplicate Address Detection, section 5.5 Creation of Global Addresses and section 5.6 Configuration Consistency of the IETF RFC 4862 (IPv6 Stateless Address Autoconfiguration).⌋ ()

[SWS_TCPIP_00158]⌈ The TcpIp shall support the Path MTU Discovery for IPv6 as defined in IETF RFC 1981 (Path MTU Discovery for IP version 6). If the max. MTU is used, the Path MTU Discovery shall not try to increase the value.⌋ ()

[SWS_TCPIP_00159]⌈ The TcpIp shall support the Duplicate Address Detection as defined in IETF RFC 4429 (Optimistic Duplicate Address Detection (DAD) for IPv6). ⌋ ()

7.3.1 Internet Protocol (IPv6)

[SWS_TCPIP_00160]⌈ The TcpIp shall support the basic IPv6 header and the initially defined IPv6 extension headers and options as defined in IETF RFC 2460 (Internet Protocol, Version 6 (IPv6) Specification).⌋ ()

[SWS_TCPIP_00161]⌈ The TcpIp shall support the reception and reassembly of fragmented IPv6 frames according to IETF 2460 Section 4.5 Fragment Header.⌋ ()

[SWS_TCPIP_00155]⌈ The TcpIp shall support the section 4, first paragraph of the IETF RFC 5722 (Handling of Overlapping IPv6 Fragments). The IETF RFC 5722 demonstrates the security issues associated with allowing overlapping fragments and updates the IPv6 specification to explicitly forbid overlapping fragments (transmission and reception).⌋ ()

[SWS_TCPIP_00232]⌈ The TcpIp shall fragment oversized IPv6 frames before transmission according to IETF 2460 Section 4.5 Fragment Header.⌋ ()

[SWS_TCPIP_00162]⌈ The TcpIp shall support the section 2, IPv6 Addressing of IETF RFC 4291 (IP Version 6 Addressing Architecture) excluding Section 2.6. Anycast Addresses. Section 2.8 A Node's Required Addresses shall be limited to the node requirements for host only.⌋ (SRS_Eth_00092)

[SWS_TCPIP_00269]⌈ The TcpIp shall support the Section 2.6. Anycast Addresses of IETF RFC 4291 (IP Version 6 Addressing Architecture).⌋ (SRS_Eth_00092)

7.3.2 Internet Control Message Protocol (ICMPv6)

[SWS_TCPIP_00163]⌈ The TcpIp shall support the Internet Control Message Protocol Version 6 as defined in IETF RFC 4443 (Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification).⌋ ()

[SWS_TCPIP_00278]⌈ The TcpIp shall only reply to ICMPv6 Echo Request Messages if they are valid and TcpIpIcmpV6EchoReplyEnabled is set to TRUE.⌋ (SRS_Eth_00098)

[SWS_TCPIP_00298]⌈ If a TcpIpIcmpV6MsgHandler is configured, the TcpIp shall call the respective <Up>_IcmpMsgHandler() if an ICMPv6 message is received and not handled by the TcpIp directly.⌋ (SRS_Eth_00098)

Note: For example, if the TcpIp replies to an ICMPv6 echo request <Up>_IcmpMsgHandler() is not called for this message.

7.3.3 Neighbor Discovery Protocol (NDP)

[SWS_TCPIP_00164]⌈ The TcpIp shall support the Neighbor Discovery protocol for IP Version 6 as defined in IETF RFC 4861 (Neighbor Discovery for IP version 6 (IPv6)) except the sections 4.5 Redirect Message Format, 6.2. Router Specification, 7.2.8. Proxy Neighbor Advertisements and 8. Redirect Function.⌋ (SRS_Eth_00090)

[SWS_TCPIP_00281]⌈ The TcpIp shall support the handling of redirect messages as defined in IETF RFC 4861 (Neighbor Discovery for IP version 6 (IPv6)) Section 8.3. Host Specification.⌋ (SRS_Eth_00090)

[SWS_TCPIP_00261]⌈ If TcpIpNdpDefensiveProcessing is set to TRUE, the NDP shall silently discard all received Neighbor Advertisements that have not been requested by a previously transmitted Neighbor Solicitation. ⌋ *(SRS_Eth_00111)*

[SWS_TCPIP_00262]⌈ If TcpIpNdpDefensiveProcessing is set to TRUE, the NDP shall skip the update of the Neighbor Cache upon processing received Neighbor Solicitations.⌋ *(SRS_Eth_00111)*

[SWS_TCPIP_00263]⌈ The TcpIp shall limit the number of neighbor cache entries to the number specified by the configuration parameter TcpIpNdpMaxNeighborCacheSize ([**ECUC_TcpIp_00129 :**])⌋ *(SRS_Eth_00090)*

[SWS_TCPIP_00264]⌈ In case the neighbor cache is full and a new entry shall be added, the TcpIp shall drop the oldest entry to be able to add the new entry⌋ *(SRS_Eth_00090)*

[SWS_TCPIP_00265]⌈ The TcpIp shall adhere to the rules defined in IETF RFC 5942 - Section 4 “Host Rules” and shall use the updated definition of “on-link” according to IETF RFC 5942 - Section 6 “Updates to RFC 4861”.⌋ *(SRS_Eth_00110)*

[SWS_TCPIP_00165]⌈ If a packet shall be transmitted to a remote host and the link layer address does not exist in the Neighbor Cache, the TcpIp shall queue this packet according to IETF RFC 4861, section 7.2.2. Sending Neighbor Solicitations, 5th paragraph and transmit the packet when the address has been resolved.⌋ ()

7.4 IP Based Protocols

7.4.1 Local Address Table

[SWS_TCPIP_00099]⌈ The TcpIp shall maintain a table of local IP addresses, which can be assigned to an EthIf controller during runtime according to the configuration container TcpIpLocalAddr (including its subcontainers).⌋ ()

Note: Each entry of the local IP address table is uniquely identified by the configuration parameter TcpIpAddrId.

[SWS_TCPIP_00100]⌈ In case no TcpIpStaticAddressConfig is provided, the TcpIp shall enable to specify a multicast IP address during runtime via TcpIp_RequestIpAddrAssignment(). ⌋ ()

[SWS_TCPIP_00130]⌈ The Local IP address used for a socket is specified via TcpIp_Bind().⌋ ()

[SWS_TCPIP_00219]⌈ If a TcpIpAddrAssignment configured with TCPIP_STORE is started, TcpIp shall check the NvMBlock (*see* **ECUC_TcpIp_00184 :**) for a valid IP address. If a valid address is present, TcpIp shall assign this address as if it was a static address. If no valid address is present, TcpIp shall start the respective IP address assignment method related to the TcpIpAddrAssignment. Once the procedure is complete, TcpIp shall store the new address in the NvMBlock.⌋ (*SRS_Eth_00087*)

7.4.2 User Datagram Protocol (UDP)

[SWS_TCPIP_00060]⌈ The TcpIp shall implement the User Datagram Protocol (UDP) as defined in IETF RFC 768 (User Datagram Protocol).⌋ ()

[SWS_TCPIP_00103]⌈ The TcpIp shall fulfill the UDP related requirements specified by IETF RFC 1122, section 4.1.3.1 (Ports), 4.1.3.4 (UDP Checksums), and 4.1.3.6 (Invalid Addresses).⌋ ()

7.4.3 Transmission Control Protocol (TCP)

[SWS_TCPIP_00061]⌈ The TcpIp shall implement the Transmission Control Protocol (TCP) as defined in IETF RFC 793 (Transmission Control Protocol)⌋ ()

[SWS_TCPIP_00104]⌈ The TcpIp shall fulfill the TCP related requirements specified by IETF RFC 1122, section 4.2.2.3 (Window Size), 4.2.2.5 (TCP Options), 4.2.2.6 (MSS), 4.2.2.7 (Checksum), 4.2.2.9 (Initial sequence number selection), 4.2.2.10 (Simultaneous Open Attempts), 4.2.2.11 (Recovery from Old Duplicate SYN), 4.2.2.13 (Closing a Connection, excluding “half-duplex close”), 4.2.2.15 (Retransmission Timeout), 4.2.2.16 (Managing the Window), 4.2.2.17 (Probing Zero Windows), 4.2.2.18 (Passive OPEN Calls), 4.2.2.19 (TTL), 4.2.3.2 (delayed ACK), 4.2.3.6 (TCP Keep Alive), and 4.2.3.10 (Remote Address Validation).⌋ ()

[SWS_TCPIP_00062]⌈ The TcpIp shall support the Window and Acknowledgment Strategy in TCP as defined in IETF RFC 813.⌋ ()

[SWS_TCPIP_00063]⌈ The TcpIp shall implement the Nagle Algorithm as defined in IETF RFC 896 (Congestion Control in IP/TCP Internetworks).⌋ *(SRS_Eth_00109)*

[SWS_TCPIP_00064]⌈ The TcpIp shall implement the congestion control strategies slow-start, congestion avoidance, fast retransmit and fast recovery as defined in IETF RFC 5681.⌋ ()

[SWS_TCPIP_00168]⌈ The TcpIp shall support the specific algorithm for responding to partial acknowledgments as defined in IETF RFC 6582 (The NewReno Modification to TCP's Fast Recovery Algorithm).The modification shall only be used if the Fast Recovery strategy of IETF RFC 5681 is enabled.⌋ ()

7.4.4 Transport Layer Security (TLS)

[SWS_TCPIP_00300] **DRAFT** ⌈ TcpIp shall support the Transport Layer Security for TCP communication according to IETF RFC5246, at least chapters 7 and 8.⌋ (SRS_ETH_00138, SRS_ETH_00140)

At least those parts from IETF RFC5246 need to be implemented that are required for a basic and compatible interoperability with other nodes without any optional extensions.

[SWS_TCPIP_00301] **DRAFT** ⌈ Further recommendation according to IETF RFC 7525 for a secure TLS implementation shall be considered.⌋ ()

[SWS_TCPIP_00302] **DRAFT** ⌈ TLS connection requests with TLS version lower than 1.2 (IETF RFC5246) shall be disregarded respectively rejected with an alert. Thus, no backward compatibility handling to TLS versions lower than TLS 1.2 as described in IETF RFC5246, App. E shall be implemented or supported.⌋ (SRS_ETH_00138)

[SWS_TCPIP_00346] **DRAFT** ⌈

If the TLS connection references TlsCiphersuiteDefinition of type TLS_VERSION_V13, then TLS V1.3 shall be the preferred protocol version. Only if this fails and ciphersuites for TLS V1.2 are also assigned to the TLS connection, then a downgrade operation to TLS V1.2 shall be allowed.
⌋

Info: If the TLS connection does not contain ciphersuites for TLS V1.3, then the handshake shall be initiated indicating TLS V1.2 protocol.

[SWS_TCPIP_00303] **DRAFT** ⌈ Session renegotiation shall be discarded by AUTOSAR TLS implementation.
⌋ ()

The KeyExchange algorithms as described in section 7.4.7 and section 8 of IETF RFC5246 depend on the ciphersuites. The necessary CSM jobs for key exchange are therefore referenced in the ciphersuite configuration.

[SWS_TCPIP_00304] **DRAFT** ⌈ If ciphersuites for TLS include support for elliptic curves then mandatory parts of IETF RFC 4492 shall be supported accordingly.
⌋ (SRS_ETH_00139)

At least, the corresponding Key Exchange algorithms according to section 2 of IETF RFC 4492 have to be implemented such as ECDHE. Extensions according to section 5 only have to be supported if certificates with respective elliptic curve parameters are expected to be used.

[SWS_TCPIP_00329] **DRAFT** ⌈
The TLS implementation must support at least one ciphersuite that corresponds to the DoIP specification ISO13400-2 so that an upper layer is able to connect such a socket to a diagnostic communication.
⌋ (SRS_Eth_00140)

[SWS_TCPIP_00305] **DRAFT** ⌈ The TLS connection shall have a configuration parameter that defines if the socket is used for TLS client or TLS server communication from the node’s perspective.⌋ ()

[SWS_TCPIP_00306] **DRAFT** ⌈ A TLS connection that is used for TLS server requires a reference to a local certificate with its private key.
⌋ ()

In the configuration, TLS connections can be collected in TlsConnectionGroups. If one Tls connection in a group is already active, another TLS connection of the same group shall not be activated. In other words, only one TLS connection of a group shall be active at the same time. This allows to define exclusive resources for a TLS connection group and resources for TLS connections in the same group can be shared.

[SWS_TCPIP_00315] **DRAFT** ⌈ A TLS Server shall request client authentication if the selected TLS connection is configured accordingly (i.e. the config parameter *TcpIpTlsUseClientAuthenticationRequest* is set to TRUE). In this case, a local certificate with its private key is also required for a TLS client and shall be provided to the server on demand during the TLS handshake.
⌋ ()

[SWS_TCPIP_00349] **DRAFT** ⌈
If *TcpIpTlsUseSecurityExtensionRecordSizeLimit* is set to TRUE then the record_size_limit extension shall be used to negotiate the max. fragment length between TLS server and client according to IETF RFC 8449, chapter 4.1.
⌋()

The assignment of TLS connections to TCP sockets is either based on static configuration (static TLS connection assignment) or done dynamically by means of an API call (dynamic TLS connection assignment).

[SWS_TCPIP_00307] **DRAFT** ⌈ In dynamic TLS connection assignment a TLS connection shall be assigned to a TCP socket through a function call to TcpIp_ChangeParameter() with the ParameterId TCPIP_PARAMID_TLS_CONNECTION_ASSIGNMENT. The ParameterValue of the function provides a reference to a TLS connection for this socket.
⌋ ()

Note: A typical approach to dynamically assign a TLS connection to a socket is during the channel set-up before a socket connection has been established. However, it shall also be possible to perform this operation after the socket connection has been established. This might be useful starting with plain text communication and later on switching to TLS encrypted communication to accomplish for e.g. a STARTTLS operation.

[SWS_TCPIP_00337] **DRAFT** ⌈
For dynamic TLS connection assignment via TcpIp_ChangeParameter(), the call to TcpIp_ChangeParameter() shall initiate the TLS handshake as follows:
- a TLS Server shall wait for a ClientHello as the next message on this socket.
- a TLS Client shall start sending a ClientHello message.
- after that TcpIp shall no longer pass on plain messages to upper or lower layer but pass it on to TLS.

⌋()

The successful completion of the TLS handshake is signaled according to SWS_TCPIP_00345.

[SWS_TCPIP_00308] **DRAFT** ⌈ For static TLS connection assignment a port and optionally an address is defined for at least one TLS connection, TCP shall check during TCP SYN (either reception or transmission of SYN) if a port assignment is available for any TLS connection and if this TLS connection is not in use. If so, the

TCP shall check the ports and automatically assign this TLS connection to the socket if a port matches.
⌋ ()

[SWS_TCPIP_00343] **DRAFT** ⌈
For static TLS connection assignment the TCP client shall check its remote port configuration when the SYN frame will be transmitted. If the TLS port configuration maches it shall assign the corresponding TLS connection to the socket.
⌋ ()

Note: This approach rules out use cases where one client uses different TLS settings (including not using TLS at all) for different local sockets when connecting to the same remote listening socket. However, having one client connecting to the same remote listening socket via different local sockets using different TLS settings is deemed an exotic use case and is thus deliberately not supported.

[SWS_TCPIP_00344] **DRAFT** ⌈
For static TLS connection assignment the TCP server shall check its local port configuration when the SYN frame is received. if the TLS port configuration matches it shall assign the corresponding TLS connection to the socket.
⌋ ()

Note: This approach rules out use cases where one server uses different TLS settings (including not using TLS at all) for different remote sockets but the same local listening socket. However, having one server using different TLS settings for different clients with the same listening socket is deemed an exotic use case and is thus deliberately not supported.

[SWS_TCPIP_00336] **DRAFT** ⌈
For static TLS connection assignment the TCP client shall initiate the TLS handshake if a TLS connection is assigned to the socket after the SYN ACK has been transmitted successfully.
⌋ ()

[SWS_TCPIP_00309] **DRAFT** ⌈ For static TLS connection assignment at the TCP client the interface <Up_TcpConnected> shall not be called after sending the ACK of the SYN to the server. Instead, this function shall be called after the TLS handshake has been finished successfully.
⌋ ()

[SWS_TCPIP_00328] **DRAFT** ⌈ For static TLS connection the TCP server shall expect a TLS handshake after the ACK for the SYN has been received. All incoming messages for this socket shall further be passed on to TLS.
⌋ ()

[SWS_TCPIP_00310] **DRAFT** ⌈ For static TLS connection assignment at the TCP server side the interface <Up_TcpAccepted> shall not be called after the ACK has

been received. Instead, this function shall be called after the TLS handshake has been finished successfully.
⌋ ()

[SWS_TCPIP_00345] **DRAFT** ⌈ For both dynamic and static TLS connection assignment, the socket owner shall be informed with <Up_TcpIpEvent> and the event type TCPIP_TLS_HANDSHAKE_SUCCEEDED if an event callback is defined for a socket owner and the TLS handshake has been finished successfully. For static TLS connection assignment the call to <Up_TcpIpEvent> and the event type TCPIP_TLS_HANDSHAKE_SUCCEEDED shall take place after the call to <Up_TcpAccepted>/<Up_TcpConnected>.
⌋ ()

[SWS_TCPIP_00311] **DRAFT** ⌈ A TLS server shall select the locally assigned ciphersuite with the highest priority that matches with one of the received ciphersuites. The local certificate that was assigned to this combination of TLS connection and TLS ciphersuite shall be provided during the handshake.
⌋ (SRS_Eth_134)

[SWS_TCPIP_00316] **DRAFT** ⌈
The TLS SERVER shall provide the certificate referenced by TcpIpTlsConnection/ TcpIpTlsCipherKeyMLocalCertificate through the server_certificate message. The certificate shall be requested from the Key Manager with the function KeyM_GetCertificate().
⌋ ()

[SWS_TCPIP_00338] **DRAFT** ⌈
If a certificate is received with the certificate or certificateVerify handshake message of TLS it shall be provided to the Key Manager using the function KeyM_SetCertificate with the reference *TcpIpTlsCipherKeyMRemoteCertificate* of *TcpIpTlsConnection*. Afterwards, the certificate is verified using the function KeyM_VerifyCertificate() or, if more than one certificate has been received with the handshake message, with the function KeyM_VerifyCertificateChain(). This function also uses the *TcpIpTlsCipherKeyMRemoteCertificate* reference.
⌋ ()

The TLS module uses CSM jobs that are assigned to the ciphersuite to perform the cryptographic operations. The key material will be negotiated and loaded during the handshake.

Note:
CSM jobs can run synchronously or asynchronously. If a job shall run in asynchronous or synchronous mode depends on its configuration. For asynchronous jobs a callback is needed which are not defined in this document. They are vendor specific and shall be configured accordingly in the CSM as documented.

[SWS_TCPIP_00339] **DRAFT** ⌈

TLS shall use the CSM job referenced by TcpIpTlsCsmRandomGenerateJobRef referenced by TcpIpTlsHandshake and referenced in the TcpIpTlsConnection to generate random values. The system outside the TLS is responsible to collect entropy to seed the RNG if needed.
⌋ ()

[SWS_TCPIP_00340] **DRAFT** ⌈
After selection of the ciphersuite the assigned *TcpIpTlsHandshake* of the TLS connection will provide all necessary references to CSM jobs and keys necessary to accomplish the key exchange algorithms.
⌋ ()

Info: Not all CSM jobs referenced in the *TcpIpTlsHandshake* container are required. Which of the jobs and keys configured for a TLS handshake are needed for operation mainly depends on the ciphersuite and its associated certificate. They must be pre-configured and assigned accordingly. It also depends on the TLS type if it is a TLS Server or a TLS Client, which ciphersuites are assigned to the TLS connections and which public key type is contained in the certificate, i.e. if it is an ECC or RSA public key.

The following table provides an overview of jobs and keys for CSM that needs to be configured for the handshake operation:

Job type	**RSA**	**ECC**
TcpIpTlsCsmPrfMac[Job|Key]Ref	C/S	C/S
TcpIpTlsCsmHashVerifyJobRef	C/S	C/S
TcpIpTlsCsmMasterSecretKeyRef	C/S	C/S
TcpIpTlsCsmKeyExchangeCalcPubValJobRef	-	C/S^1
TcpIpTlsCsmKeyExchangeKeyRef	-	C/S^2
TcpIpTlsCsmKeyExchangeCalcSecretJobRef	-	C/S^1
TcpIpTlsCsmKeyExchangeSignatureGenerate[Job|Key]Ref	-	S/B
TcpIpTlsCsmKeyExchangeSignatureVerify[Job|Key]Ref		C/B
TcpIpTlsCsmKeyExchangeEncrypt[Job|Key]Ref	C/B	-
TcpIpTlsCsmKeyExchangeDecrypt[Job|Key]Ref	S/B	-

C: TLS Client implementation
S: TLS Server implementation
B: Additionally required if client authentication is activated.

^{1} Reference is used for asynchronous DH(E) operation.
^{2} Reference is used for synchronous DH(E) operation.

The following examples can be used as a guideline.

Example #1: A ciphersuite that references RSA provides *TcpIpTlsCsmKeyExchangeEncryptJobRef* for the TLS client to encrypt the pre-master secret. First, the TLS client verifies the received certificate, will take the public key and copy it into the CSM key location referenced by *TcpIpTlsCsmKeyExchangeEncryptKeyRef.* Then encrypts the pre-master secret and send it to the TLS server. The Server uses *TcpIpTlsCsmKeyExchangeDecryptJobRef* to decrypt the pre-master secret. The job either references statically the private key or, if *TcpIpTlsConnection/ TcpIpTlsCipherKeyMLocalCertificate/ KeyMCertPrivateKeyStorageCryptoKeyRef/ KeyMCryptoKeyCsmKeyTargetRef* is available, copy this key into *TcpIpTlsCsmKeyExchangeDecryptKeyRef*.

Example #2: A ciphersuite references ECDHE_ECDSA and the used certificate contains appropriate ECC keys, ECDSA capable in this case. The server generates DH-parameter using the crypto job Csm_KeyExchangeCalcPubVal() using the reference to *TcpIpTlsCsmKeyExchangeKeyRef* and signs the result using *TcpIpTlsHandshake/ TcpIpTlsCsmKeyExchangeSignatureGenerate* holding a reference to the certificate private key. If the key is not statically assigned to the job it must be copied accordingly (see example #1). The resulting data is sent to the TLS client, who verifies the certificate and uses the key of the certificate to verify the provided ECDSA signature from the server using *TcpIpTlsHandshake/ TcpIpTlsCsmKeyExchangeSignatureVerify*. Afterwards, if successful, calculates its own DH parameter and provides this to the server. Both, TLS client and server will then calculate the pre-master secret using Csm_KeyExchangeCalcSecret().

Example #3: The selected ciphersuite defines a pre-shared key according to IETF RFC 4279. The server provides the psk_identity_hint in the ServerKeyExchange message. This can either be derived from the *TcpIpTlsPskIdentity/ TcpIpTlsPresharedKeyIdentityHint* or, if not specified, it can be queried from the user callback *TcpIpTlsPskGetKeyIdentyHintFunc*. The TLS client uses the hint to select a pre-shared key that is known by both the TLS Client and this TLS Server. If one key can uniquely be identified with the identity hint, then the TcpIpTlsPskIdentity configuration can be used as an alternative to the callback functions. In this case, the selected key can be determined by *TcpIpTlsPresharedKeyIdentityHint* and the *TcpIpTlsPresharedKeyIdentity* with *TcpIpTlsPresharedKeyCsmKeyRef* can be used further. A more flexible solution provides the usage of the callback *TcpIpTlsPskGetClientKeyIdentityFunc* that allows the selection of a key with its identity at runtime. After the key and its identity has been selected on the client side, the psk_identity will be provided back to the TLS server through the ClientKeyExchange message. On the TLS server side, the corresponding key can be identified in the same way, either through the static configuration of *TcpIpTlsPskIdentity/ TcpIpTlsPresharedKeyIdentity* or can be queried through a callback function determined by *TcpIpTlsPskGetServerKeyIdentityFunc* on server side. After the key has been selected, the master secret can be determined with the corresponding CSM jobs that are allocated in the *TcpIpTlsHandshake* container.

[SWS_TCPIP_00341] **DRAFT** ⌈
TLS shall use *TcpIpTlsHandshake /TcpIpTlsCsmHashVerifyJobRef* to calculate the hash over the handshake messages which is provided with the finish handshake message.
⌋()

[SWS_TCPIP_00347] **DRAFT** ⌈TLS shall use *TcpIpTlsCsmPrfMacJobRef* to calculate the master secret. The configuration item *TcpIpTlsCsmPRFSupportType* shall specify how the CSM job supports the generation of the master secret.
⌋()

If *TcpIpTlsCsmPRFSupportType* is set to TLS_PRF_CSM_NO_SUPPORT then *TcpIpTlsCsmPrfMacJobRef* references a job for MAC generation. If it is set to TLS_PRF_CSM_INOUT_REDIRECT_SUPPORT, then the re-direction support mentioned below shall be used. If the configuration is set to TLS_PRF_CSM_FULL_SUPPORT then the CSM job will generate the master secret completely on its own. The TLS just need to call the job and the master secret will be available in the element ID #1 of *TcpIpTlsCsmMasterSecretKeyRef*. A key distribution to the worker jobs must be done in any case.

It is recommended to use input and output re-direction for the *TcpIpTlsCsmPrfMacJobRef*, that was introduced in CSM with AUTOSAR V4.4. This allows to leave the master secret and intermediate results of the calculation within the crypto driver (e.g. in HSM). The key elements of *TcpIpTlsCsmPrfMacKeyRef* is used for input and TcpIpTlsCsmMasterSecretKeyRef as output reference for this job. Csm_KeyElementSet() is used for initial value settings, Csm_KeyCopy() and Csm_KeyCopyPartial() are used to set-up the input values for the job operation. Csm_KeyCopyPartial() is finally used to distribute the master secret results to the *TcpIpTlsWorker* key references that are used by the worker jobs during application data transmission.

[SWS_TCPIP_00312] **DRAFT** ⌈If *TcpIpTlsServerNameIdentification* is configured for a TLS connection the configured name shall be added to the Client Hello message as the server name identification (SNI).
⌋()

[SWS_TCPIP_00313] **DRAFT** ⌈If a TLS server receives a ClientHello message that contains a server name identification with length greater than 0 the server shall search in TcpIpTlsCertificateIdentity for a matching identity reference and shall provide the certificate that is located in this container during the handshake.
⌋()

[SWS_TCPIP_00314] **DRAFT** ⌈The time stamp information that is contained in the ClientHello message shall be provided through the configured *TcpIpTlsConnectionGetTimeFunc* callout function.
⌋()

[SWS_TCPIP_00325] **DRAFT** ⌈If a ciphersuite is used for pre-shared keys and *TcpIpTlsUsePresharedKeys* is set to TRUE, callback functions shall provide the necessary information on the TLS client and the TLS server side to select the pre-shared keys according to IETF RFC 4279. The callbacks are used to provide the identity hint and eventually the key identification during the handshake. The callback functions are used to select the CSM key that is used for further processing. Alternatively, if callback functions are not configured, the static parameter configuration from *TcpIpTlsPskIdentity* can be used.
⌋(SRS_Eth_00141, SRS_Eth_137)

[SWS_TCPIP_00326] **DRAFT** ⌈TLS shall be able to open and maintain a maximum number of connections as defined in *TcpIpTlsMaxConnections*.
⌋(SRS_Eth_00135)

[SWS_TCPIP_00327] **DRAFT** ⌈TCP data streams shall be segmented by TLS into fragments. The maximum size of a fragment shall be used as configured in *TcpIpTlsMaxFragmentLength*. A TCP socket must be able to transmit at least such a fragment within one segment.
⌋(SRS_Eth_00136)

[SWS_TCPIP_00348] **DRAFT** ⌈On reception of a TLS “close_notify” message the TLS connection shall be closed and all security related resources shall be destroyed. It shall not be possible to perform further plain text communication through TCP on this socket after the TLS connection was closed. Thus, it is recommended to close the TCP socket, too.
⌋()

7.4.5 Dynamic Host Configuration Protocol

[SWS_TCPIP_00200]⌈ The server part of the Dynamic Host Configuration Protocol shall be pre compile time configurable ON/OFF by the configuration parameter TcpIpDhcpServerEnabled (*see* **ECUC_TcpIp_00183 :**)⌋ (*SRS_Eth_00088*)

[SWS_TCPIP_00201]⌈ The server part of the Dynamic Host Configuration Protocol shall respond to client requests by assigning an available IP address according to the DHCP server configuration for the related TcpIpCtrl.⌋ (*SRS_Eth_00087*)

[SWS_TCPIP_00218]⌈ If the configuration contains TcpIpDhcpAddressAssignments that refer to specific ports of an Ethernet Switch, DHCP server shall identify the port the request was received from, by calling EthIf_GetPortMacAddr() with the MAC address of the DHCP client and choose an available IP address of the TcpIpDhcpAddressAssignment related to the same port.⌋ (*SRS_Eth_00087*)

7.4.5.1 Dynamic Host Configuration Protocol (DHCPv4)

[SWS_TCPIP_00058] ⌈ The TcpIp shall implement the client and the server part of the Dynamic Host Configuration Protocol (DHCPv4) for the dynamic configuration of IPv4 addresses as defined in IETF RFC 2131 (Dynamic Host Configuration Protocol).
⌋ (*SRS_Eth_00087, SRS_Eth_00088*)

[SWS_TCPIP_00152]⌈ The TcpIp shall support the Fully Qualified Domain Name Option for Dynamic Host Configuration Protocol for IPv4 Client requirements as defined in IETF RFC 4702 (The Dynamic Host Configuration Protocol for IPv4 (DHCPv4) Client Fully Qualified Domain Name (FQDN) Option). No DNS shall be supported. Only section 2 The Client FQDN Option and section 3 DHCP Client Behavior shall be supported. Sub-Section 3.2, 3.3, 3.5 shall not be supported.⌋ ()

7.4.5.2 Dynamic Host Configuration Protocol (DHCPv6)

[SWS_TCPIP_00166]⌈ The TcpIp shall support the client part of the Dynamic Host Configuration Protocol for IPv6 (DHCPv6) which enables DHCP servers to pass configuration parameters such as IPv6 network addresses to IPv6 nodes as defined in IETF RFC 3315 (Dynamic Host Configuration Protocol for IPv6 (DHCPv6)).Due to the fact that only the client functionality shall be supported, the following sections shall not be supported:

- Relay Agent Behavior
- Server Behavior
- Section 12. Management of Temporary Addresses
- Section 21. Authentication of DHCP Messages
- Section 22.5. Identity Association for Temporary Addresses Option
- Section 22.11. Authentication Option
- Section 22.14. Rapid Commit Option

⌋ ()

[SWS_TCPIP_00167]⌈ The TcpIp shall support the Fully Qualified Domain Name Option for Dynamic Host Configuration Protocol for IPv6 Client requirements as defined in IETF RFC 4704 (The Dynamic Host Configuration Protocol for IPv6 (DHCPv6) Client Fully Qualified Domain Name (FQDN) Option). No DNS shall be supported. Only section 4 DHCPv6 Client FQDN Option and section 5 DHCPv6 Client Behavior shall be supported. Sub-Section 5.1, 5.2, 5.4 shall not be supported.
⌋ ()

7.5 Message Reception

[SWS_TCPIP_00169]⌈ The TcpIp IP-layer shall map received IP datagrams to an entry in the local address table (TcpIpAddrId).
The local address table mapping is successfully if ALL of the following conditions are fulfilled:

a) The receiving interface matches the interface assigned to the local address table entry (EthIfCtrl).

b) The destination IP address contained in the IP header matches the currently assigned IP address of the local address table entry.

All IP datagrams which cannot be mapped to an entry in the local address table shall be silently discarded.
All successfully mapped IP datagrams shall be forwarded to the upper layer protocol.
⌋ ()

[SWS_TCPIP_00260]⌈ All IP datagrams mapped to an IPv6 entry in the local address table, configured with the optional TcpIpLocalAddrIPv6ExtHeaderFilterRef (**ECUC_TcpIp_00200 :**), that contains at least one IPv6 extension header not listed in the referenced TcpIpIpV6ConfigExtHeaderFilter (**ECUC_TcpIp_00198 :**) shall be silently discarded. If the Ipv6 entry in the local address table is not configured with the optional TcpIpLocalAddrIPv6ExtHeaderFilterRef, then this frame shall be processed. ⌋ *(SRS_Eth_00111)*

[SWS_TCPIP_00170]⌈ The TcpIp UDP-layer shall map received UDP datagrams to sockets based on the destination port as contained in the UDP protocol header and the local address (TcpIpAddrId). The local address (TcpIpAddrId) matches if ANY of the following conditions is fulfilled:

a) The socket is bound to the local address (TcpIpAddrId)

b) The socket local address uses the wildcard "ANY" AND the socket EthIfCtrl is identical to the EthIfCtrl used in the local address (TcpIpAddrId)

c) The socket is bound to TCPIP_LOCALADDRID_ANY

The socket is bound to a local address and the EthIfCtrl is identical to the EthIfCtrl used in the local address (TcpIpAddrId) and the received local address (TcpIpAddrId) is a broadcast address.⌋ ()

[SWS_TCPIP_00171]⌈ For received UDP datagrams where the local address (TcpIpAddrId) is a broadcast or multicast address, all matching sockets shall receive the incoming message.⌋ ()

Note: A socket may either be explicitly bound to a local IP address by using TcpIp_Bind() or implicitly as part of TcpIp_UdpTransmit() (if it is called without a previous call of TcpIp_Bind()).

[SWS_TCPIP_00172]⌈ The TcpIp TCP-layer shall map received TCP datagrams to sockets based on the destination port as contained in the TCP protocol header and the local address (TcpIpAddrId). The local address (TcpIpAddrId) matches if ANY of the following conditions is fulfilled:

a) The socket is bound to a unicast local address (TcpIpAddrId)

b) The socket local address uses the wildcard "ANY" AND the socket EthIfCtrl is identical to the EthIfCtrl used in the local address (TcpIpAddrId)

c) The socket is bound to TCPIP_LOCALADDRID_ANY

⌋ ()

[SWS_TCPIP_00173]⌈ Sockets with established TCP connections shall match source port, source IP address, destination port and destination IP address as contained in the protocol headers additionally to the generic TCP mapping criteria described in [SWS_TCPIP_00172].⌋ ()

[SWS_TCPIP_00174]⌈ Received TCP datagrams where the local address (TcpIpAddrId) is a broadcast or multicast address, shall be silently discarded.⌋ ()

[SWS_TCPIP_00266]⌈ If the filtering of TCP options has been enabled on a socket via TcpIp_ChangeParameter(), the TcpIp shall check received segments against the allowed list of options (**ECUC_TcpIp_00202 :** TcpIpTcpConfigOptionFilter) and if it contains at least one TCP option not listed the segment shall be silently discarded.⌋ (SRS_Eth_00111)

[SWS_TCPIP_00203]⌈ For receptions the TcpIp Module shall ignore the protocol checksum fields of frames with respect to the configuration
of the Ethernet Controller according to the following list:

a) for IPv4 frames if IPv4 checksum verification in hardware is enabled, i.e. EthCtrlEnableOffloadChecksumIPv4 is set to TRUE
b) for ICMP frames if ICMP checksum verification in hardware is enabled, i.e. EthCtrlEnableOffloadChecksumICMP is set to TRUE
c) for TCP frames if TCP checksum verification in hardware is enabled, i.e. EthCtrlEnableOffloadChecksumTCP is set to TRUE
d) for UDP frames if UDP checksum verification in hardware is enabled, i.e. EthCtrlEnableOffloadChecksumUDP is set to TRUE.

In all other cases, the TcpIp module shall treat frames with mismatching checksums according the related protocol specification.⌋ ()

[SWS_TCPIP_00279]⌈ For receptions the TcpIp Module shall accept UDP datagrams containing a zero checksum only on sockets that have been configured accordingly (i.e. TcpIp_ChangeParameter() has been called with TCPIP_PARAMID_UDP_CHECKSUM set to FALSE).⌋ (SRS_Eth_00019)

[SWS_TCPIP_00296] ⌈ If the measurement data is enabled (see TcpIpGetAndResetMeasurementDataApi), TcpIp shall increment the corresponding measurement data whenever a received datagram is discarded.⌋ (SRS_Eth_00129)

The following guidelines are recommended for TLS data handling:

- If a TCP datagram is accepted and the socket is assigned to a TLS connection, TCP should pass the data to TLS for further processing.

- If a received TLS application message was successfully processed and verified, the data contents should be passed back to TCP to further provide it to the configured upper layer. This provides full transparency of data reception to the upper layer.

- If message reception is passed on to TLS but cannot be processed, because a TLS connection has not yet been established or the message cannot be authenticated and/or decrypted correctly, the message should be dropped.

- After TLS has processed a message and all data has been consumed completey, TCP should be notified to release all related resources for this message, regardless if the message was processed successfully or not.

7.6 Message Transmission

[SWS_TCPIP_00175]⌈ If data is transmitted using a socket which is bound to an IPv4 Unicast local address (TcpIpAddrId) the TcpIp shall use the IP address assigned to the local address (TcpIpAddrId) as source IP address in the IP datagram header. The IP datagram shall be transmitted using the EthIfCtrl the local address (TcpIpAddrId) is mapped to.⌋ ()

[SWS_TCPIP_00176]⌈ If data is transmitted using an IPv4 socket which is bound to a local address (TcpIpAddrId) using the wildcard “ANY”, then the TcpIp shall use the IP address of the configured local address (TcpIpAddrId), which is of type IPv4 Unicast and assigned to the same EthIfCtrl, as the bound local address (TcpIpAddrId) as source IP address in the IP datagram header.⌋ ()

[SWS_TCPIP_00177]⌈ If data is transmitted using an IPv4 socket which is bound to TCPIP_LOCALADDRID_ANY, then the TcpIp shall use the IP address of the configured local address (TcpIpAddrId), which is of type IPv4 Unicast and assigned to the EthIfCtrl in the same subnet as the destination IPv4 address as source IP address in the IP datagram header. If no matching subnet is found the IPv4 Unicast local address (TcpIpAddrId) of EthIfCtrl = 0 is selected.⌋ ()

[SWS_TCPIP_00178]⌈ If data is transmitted using an IPv4 UDP socket which is bound to a local address (TcpIpAddrId) of type Multicast, then the TcpIp shall use the IP address of the configured local address (TcpIpAddrId), which is of type IPv4 Unicast and assigned to the same EthIfCtrl, as the bound local address (TcpIpAddrId) as source IP address in the IP datagram header.⌋ ()

[SWS_TCPIP_00179]⌈ If data is transmitted using an IPv4 UDP socket which is bound to a local address (TcpIpAddrId) of type Broadcast, then the TcpIp shall use the IP address of the configured local address (TcpIpAddrId), which is of type IPv4 Unicast and assigned to the same EthIfCtrl, as the bound local address (TcpIpAddrId) as source IP address in the IP datagram header.⌋ ()

[SWS_TCPIP_00180]⌈ If data is transmitted using an IPv4 UDP socket which is not bound, then the TcpIp uses the IP address of the configured local address (TcpIpAddrId), which is of type IPv4 Unicast and assigned to the EthIfCtrl in the same subnet as the destination IPv4 address as source IP address in the IP datagram header. If no matching subnet is found the IPv4 Unicast local address (TcpIpAddrId) of EthIfCtrl = 0 is selected.⌋ ()

[SWS_TCPIP_00181]⌈ If data is transmitted using a socket which is bound to an IPv6 Unicast local address (TcpIpAddrId) the TcpIp shall use the IP address assigned to local address (TcpIpAddrId) as source IP address in the IP datagram header. The IP datagram shall be transmitted using the EthIfCtrl the local address (TcpIpAddrId) is mapped to.⌋ ()

[SWS_TCPIP_00182]⌈ If data is transmitted using an IPv6 socket which is bound to a local address (TcpIpAddrId) using the wildcard “ANY”, the TcpIp shall select the source IP address of the IPv6 header according to the source address selection algorithm specified in section 5 of IETF RFC 6724 (Default Address Selection for IPv6). The selection shall be limited to the configured local addresses (TcpIpAddrId) on the same EthIfCtrl as the bound local address (TcpIpAddrId) only.⌋ ()

[SWS_TCPIP_00183]⌈ If data is transmitted using an IPv6 socket which is bound to TCPIP_LOCALADDRID_ANY, the TcpIp shall select the interface that has a local address (TcpIpAddrId) which uses the same network prefix as the destination address. If no matching interface is found EthIfCtrl = 0 is selected. The TcpIp shall select the source IP address of the IPv6 header according to the source address selection algorithm specified in section 5 of IETF RFC 6724 (Default Address Selection for IPv6).⌋ ()

[SWS_TCPIP_00184]⌈ If data is transmitted using an IPv6 UDP socket which is bound to a local address (TcpIpAddrId) of type Multicast, the TcpIp - shall select the source IP address of the IPv6 header according to the source address selection algorithm specified in section 5 of IETF RFC 6724 (Default Address Selection for IPv6). The selection shall be limited to the configured local addresses (TcpIpAddrId) on the same EthIfCtrl as the bound local address (TcpIpAddrId) only.⌋ ()

[SWS_TCPIP_00185]⌈ If data is transmitted using an IPv6 UDP socket which is not bound, the TcpIp shall select the interface that has a local address (TcpIpAddrId) which uses the same network prefix as the destination address. If no matching interface is found EthIfCtrl = 0 is selected. The TcpIp shall select the source IP address of the IPv6 header according to the source address selection algorithm specified in section 5 of IETF RFC 6724 (Default Address Selection for IPv6).⌋ ()

[SWS_TCPIP_00101]⌈ The TcpIp shall choose the correct next hop for each datagram it sends according to IETF RFC 1122, section 3.3.1.1. (IPv4) and IETF RFC4861 section 5.2. Conceptual Sending Algorithm (IPv6).⌋ ()

[SWS_TCPIP_00131]⌈ TcpIp shall always call `EthIf_Transmit()` with parameter TxConfirmation set to FALSE.⌋ ()

[SWS_TCPIP_00191]⌈ If the parameter TcpIpArpPacketQueueEnabled is set to TRUE and an IPv4 packet shall be transmitted to a remote host but the related link layer address does not exist in the ARP table, the TcpIp shall start the address resolution and queue this packet according to IETF RFC 1122, section 2.3.2.2.⌋ ()

[SWS_TCPIP_00192]⌈ If the parameter TcpIpArpPacketQueueEnabled is set to FALSE and an IPv4 packet shall be transmitted to a remote host but the related link layer address does not exist in the ARP table, the TcpIp shall start the address resolution but reject the transmission request with E_NOT_OK.⌋ ()

[SWS_TCPIP_00193]⌈ If the parameter TcpIpNdpPacketQueueEnabled is set to TRUE and an IPv6 packet shall be transmitted to a remote host but the related link layer address does not exist in the Neighbor Cache, the TcpIp shall start the address resolution and queue this packet according to IETF RFC 4861, section 7.2.2.⌋ ()

[SWS_TCPIP_00194]⌈ If the parameter TcpIpNdpPacketQueueEnabled is set to FALSE and an IPv6 packet shall be transmitted to a remote host but the related link layer address does not exist in the Neighbor Cache, the TcpIp shall start the address resolution but reject the transmission request with E_NOT_OK.⌋ ()

[SWS_TCPIP_00202]⌈ After the maximum retries configured via ECUC_TcpIp_00069 are transmitted, the timer according to TcpIpTcpRetransmissionTimeout shall be restarted the last time before the TCP connection is closed.⌋ ()

[SWS_TCPIP_00204]⌈ For transmissions the TcpIp Module shall skip the calculation of the protocol checksums and fill the field with the value 0 for frames with respect to the configuration of the Ethernet Controller according the following list:

a) for IPv4 frames if IPv4 checksum calculation in hardware is enabled, i.e. EthCtrlEnableOffloadChecksumIPv4 is set to TRUE
b) for not fragmented ICMP frames if ICMP checksum calculation in hardware is enabled, EthCtrlEnableOffloadChecksumICMP is set to TRUE
c) for TCP frames if TCP checksum calculation in hardware is enabled, EthCtrlEnableOffloadChecksumTCP is set to TRUE
d) for not fragmented UDP frames if UDP checksum calculation in hardware is enabled, EthCtrlEnableOffloadChecksumUDP is set to TRUE.

In all other cases, the TcpIp module shall calculate the checksum according the related protocol specification.⌋ ()

[SWS_TCPIP_00280]⌈ For transmissions the TcpIp Module shall skip the calculation of the UDP protocol checksum and use the value zero instead, on sockets that have been configured accordingly (i.e. TcpIp_ChangeParameter() has been called with TCPIP_PARAMID_UDP_CHECKSUM set to FALSE).⌋ (SRS_Eth_00019)

[SWS_TCPIP_00267]⌈ Per default or if TcpIp_ChangeParameter() with ParameterId set to TCPIP_PARAMID_PATHMTU_ENABLE and the value set to TRUE has been called for a socket, the maximum size for outbound datagrams from this socket shall be determined by the Path MTU discovery.⌋ (SRS_Eth_00097)

[SWS_TCPIP_00268]⌈ If TcpIp_ChangeParameter() with ParameterId set to TCPIP_PARAMID_PATHMTU_ENABLE and the value set to FALSE has been called for a socket, the maximum size for outbound datagrams from this socket is be determined by the static configuration.⌋ (SRS_Eth_00097)

[SWS_TCPIP_00320] **DRAFT** ⌈ If transmission is requested from upper layer to TCP and the connection is configured for TLS but the handshake has not yet been started or completed, the message transmission request shall return E_NOT_OK.
⌋ ()

7.7 TCP/IP Stack state handling

[SWS_TCPIP_00083]⌈ The TcpIp module shall maintain a separate state for each EthIf controller used by the TcpIp module, store the latest state request and distinguish at least the following states: TCPIP_STATE_OFFLINE, TCPIP_STATE_STARTUP, TCPIP_STATE_ONLINE, TCPIP_STATE_ONHOLD, and TCPIP_STATE_SHUTDOWN.⌋ ()

[SWS_TCPIP_00136]⌈ The TcpIp module shall initiate according actions to achieve the requested state if the stored state request is not the active state.⌋ ()

[SWS_TCPIP_00084]⌈ After each transition the TcpIp module shall report the new state to EthSM via `EthSM_TcpIpModeIndication()`.⌋ ()

[SWS_TCPIP_00075]⌈ If TCPIP_STATE_ONLINE is requested for an EthIf controller and the current state is TCPIP_STATE_OFFLINE for that EthIf controller, the TcpIp module shall

(a) enable all IP address assignments according to the configured assignment methods (TcpIpAssignmentMethod) and triggers (TcpIpAssignmentTrigger) for that EthIf controller. (Note: If the assignment trigger is configured to TCPIP_MANUAL no assignment is actually performed but initiation by the upper layer enabled) and
(b) enter the state TCPIP_STATE_STARTUP for the EthIf controller.⌋ ()

[SWS_TCPIP_00127]⌈ In case multiple IP address assignment methods are configured and a new address from an assignment method with a higher priority (1 is highest) becomes available, TcpIp shall use the new IP address and release the IP address previously assigned by an assignment method with a lower priority.⌋ ()

[SWS_TCPIP_00088]⌈ If TCPIP_STATE_OFFLINE is requested for an EthIf controller and the current state is TCPIP_STATE_STARTUP for that EthIf controller, the TcpIp module shall

(a) abort all ongoing IP address assignment actions appropriate and
(b) enter the state TCPIP_STATE_OFFLINE for the EthIf controller.⌋ ()

[SWS_TCPIP_00085]⌈ If at least one IP address has been successfully assigned to an EthIf controller and the current state is TCPIP_STATE_STARTUP for that EthIf controller, the TcpIp module shall enter the state TCPIP_STATE_ONLINE for the EthIf controller.⌋ ()

Note: After successfully assignment of an IP address to the EthIf controller the upper layer module will be notified via `Up_LocalIpAddrAssignmentChg()` with State TCPIP_IPADDR_STATE_ASSIGNED.

[SWS_TCPIP_00076]⌈ If TCPIP_STATE_ONHOLD is requested for an EthIf controller and the current state is TCPIP_STATE_ONLINE for that EthIf controller, the TcpIp module shall

(a) notify the upper layer via `Up_LocalIpAddrAssignmentChg()` with State TCPIP_IPADDR_STATE_ONHOLD for all assigned IP addresses of the related EthIf controller, and
(b) deactivate the communication within the TcpIp module for the related EthIf controller, and

(c) enter the state TCPIP_STATE_ONHOLD for the EthIf controller.⌋ ()

[SWS_TCPIP_00086]⌈ If TCPIP_STATE_ONLINE is requested for an EthIf controller and the current state is TCPIP_STATE_ONHOLD for that EthIf controller, the TcpIp module shall

(a) reactivate the communication within the TcpIp module for the related EthIf controller,
(b) call `Up_LocalIpAddrAssignmentChg()` with State TCPIP_IPADDR_STATE_ASSIGNED for all assigned IP addresses of the related EthIf controller, and
(c) enter the state TCPIP_STATE_ONLINE for the EthIf controller.⌋ ()

[SWS_TCPIP_00077]⌈ If TCPIP_STATE_OFFLINE is requested or all assigned IP address have been released for an EthIf controller and the current state is TCPIP_STATE_ONLINE or TCPIP_STATE_ONHOLD for that EthIf controller, the TcpIp module shall

(a) call `Up_LocalIpAddrAssignmentChg()` with State TCPIP_IPADDR_STATE_UNASSIGNED for all assigned IP addresses of the related EthIf controller,
(b) deactivate the communication within the TcpIp module for the related EthIf controller,
(c) release related resources, i.e. any socket using the EthIf controller shall be closed and thereafter any IP address assigned to the EthIf controller shall be unassigned,
(d) in case the no EthIf controller is assigned any more, all unbound sockets shall be released as well, and
(e) enter the state TCPIP_STATE_SHUTDOWN for the EthIf controller.⌋ ()

[SWS_TCPIP_00087]⌈ If the current state of an EthIf controller is TCPIP_STATE_SHUTDOWN and all related resources have been released, the TcpIp module shall enter the state TCPIP_STATE_OFFLINE for the EthIf controller.
⌋ ()

[SWS_TCPIP_00094]⌈ The TcpIp module shall only accept new TCP connections if the related EthIf controller is in state TCPIP_STATE_ONLINE.⌋ ()

[SWS_TCPIP_00144]⌈ The TcpIp module shall indicate events related to sockets to the upper layer module by using the Up_TcpIpEvent API and the following events: TCPIP_TCP_RESET, TCPIP_TCP_CLOSED, TCPIP_TCP_FIN_RECEIVED and TCPIP_UDP_CLOSED.⌋ ()

7.8 Error classification

This section describes how the TcpIp module has to manage the error classes that may occur during the life cycle of this basic software.

7.8.1 Development Errors

[SWS_TCPIP_00042]⌈ The following table lists development errors that shall be distinguished by the TcpIp module:

Type or error	*Relevance*	*Related error code*	*Value [hex]*
API service called before initializing the module	Development	TCPIP_E_UNINIT	0x01
API service called with NULL pointer	Development	TCPIP_E_PARAM_POINTER	0x02
Invalid argument	Development	TCPIP_E_INV_ARG	0x03
No buffer space available	Development	TCPIP_E_NOBUFS	0x04
Message too long	Development	TCPIP_E_MSGSIZE	0x07
Protocol wrong type for socket	Development	TCPIP_E_PROTOTYPE	0x08
Address already in use	Development	TCPIP_E_ADDRINUSE	0x09
Can't assign requested address	Development	TCPIP_E_ADDRNOTAVAIL	0x0A
Socket is already connected	Development	TCPIP_E_ISCONN	0x0B
Socket is not connected	Development	TCPIP_E_NOTCONN	0x0C
Protocol not available	Development	TCPIP_E_NOPROTOOPT	0x0D
Address family not supported by protocol family	Development	TCPIP_E_AFNOSUPPORT	0x0E
Invalid configuration set selection	Development	TCPIP_E_INIT_FAILED	0x0F

⌋ *()*

7.8.2 Runtime Errors

[SWS_TCPIP_00255]⌈

Type of error	*Related error code*	*Value [hex]*
Operation timed out	TCPIP_E_TIMEDOUT	0x01
Connection refused	TCPIP_E_CONNREFUSED	0x02
No route to host	TCPIP_E_HOSTUNREACH	0x03
Path does not support frame size	TCPIP_E_PACKETTOBIG	0x04
Duplicate IP Address detected	TCPIP_E_DADCONFLICT	0x05

⌋ *(SRS_Eth_00112)*

[SWS_TCPIP_00256]⌈ The TcpIp shall report the runtime error by calling *Det_ReportRuntimeError(TCPIP_E_TIMEDOUT)* if one of the following conditions applies:

(a) TcpIp module has sent a SYN to establish a connection but did not receive any response.

(b) An established idle TCP connection is closed because the peer is no longer present, i.e. keep-alive timer runs out and peer does not respond to keep-alive probes according to IETF RFC 1122 chapter 4.2.3.6 TCP Keep-Alives.
(c) An established TCP connection is closed because the peer does not respond, i.e. the maximum number of retransmissions has been sent without acknowledgement, according to [SWS_TCPIP_00202].⌋ *(SRS_Eth_00112)*

[SWS_TCPIP_00257]⌈ The TcpIp shall report the runtime error by calling *Det_ReportRuntimeError(TCPIP_E_CONNREFUSED)* if one of the following conditions applies:

a) An ICMP message Destination Unreachable/Protocol Unreachable is received because the peer doesn't provide a service at the requested protocol.
b) An ICMP message Destination Unreachable/Port Unreachable is received because the peer doesn't provide a service at the requested port.⌋ *(SRS_Eth_00112)*

[SWS_TCPIP_00258]⌈ The TcpIp shall report the runtime error by calling *Det_ReportRuntimeError(TCPIP_E_HOSTUNREACH)* if one of the following conditions applies:

a) An ICMP message Destination Unreachable is received because the network or host is unreachable or there is no route to the destination.⌋ *(SRS_Eth_00112)*

[SWS_TCPIP_00259]⌈ The TcpIp shall report the runtime error by calling *Det_ReportRuntimeError(TCPIP_E_PACKETTOBIG)* if one of the following conditions applies:

a) An ICMP message Destination Unreachable/ Fragmentation needed but DF bit set is received because the network can't forward an oversized frame since the DF (don't fragment) Flag is set.⌋ *(SRS_Eth_00112)*

[SWS_TCPIP_00282]⌈ The TcpIp shall report the runtime error by calling *Det_ReportRuntimeError(TCPIP_E_DADCONFLICT)* if one of the following conditions applies:

a) A duplicate IP address was found by the Duplicate Address Detection (DAD) algorithm.⌋ (SRS_Eth_00091, SRS_BSW_00452)

7.8.3 Transient Faults

There are no transient faults.

7.8.4 Production Errors

There are no production errors.

7.8.5 Extended Production Errors

There are no extended production errors.

7.9 Version checking

For details refer to the chapter 5.1.8 “Version Check” in *SWS_BSWGeneral.*

8 API specification

8.1 Imported types

The following types shall be imported by the TcpIp from the modules given:

[SWS_TCPIP_00008] ⌈

Module	*Header File*	*Imported Type*
ComStack_Types	ComStackTypes.h	BufReq_ReturnType
Csm	<none>	Crypto_VerifyResultType
	Rte_Csm_Type.h	Crypto_OperationModeType
Dem	Rte_Dem_Type.h	Dem_EventIdType
	Rte_Dem_Type.h	Dem_EventStatusType
Eth_GeneralTypes	Eth_GeneralTypes.h	Eth_BufIdxType
	Eth_GeneralTypes.h	Eth_FilterActionType
	Eth_GeneralTypes.h	Eth_FrameType
KeyM	KeyM.h	KeyM_CertDataType
	Rte_KeyM_Type.h	KeyM_CertificateIdType
Std_Types	StandardTypes.h	Std_ReturnType
	StandardTypes.h	Std_VersionInfoType

⌋ ()

8.2 Type definitions

[SWS_TCPIP_00067] ⌈

Name:	TcpIp_ConfigType	
Type:	Structure	
Range:	implementation specific	The content of the configuration data structure is implementation specific.
Description:	Configuration data structure of the TcpIp module.	
Available via:	TcpIp.h	

⌋ ()

[SWS_TCPIP_00009] ⌈

Name:	TcpIp_DomainType		
Type:	uint16		
Range:	TCPIP_AF_INET	0x02	Use IPv4
	TCPIP_AF_INET6	0x1c	Use IPv6
Description:	TcpIp address families.		
Available via:	TcpIp.h		

⌋ ()

[SWS_TCPIP_00010] ⌈

Name:	TcpIp_ProtocolType		
Type:	Enumeration		
Range:	TCPIP_IPPROTO_TCP	0x06	Use TCP
	TCPIP_IPPROTO_UDP	0x11	Use UDP
Description:	Protocol type used by a socket.		
Available via:	TcpIp.h		

⌋ ()

[SWS_TCPIP_00012] ⌈

Name:	`TcpIp_SockAddrType`		
Type:	`Structure`		
Element:	`TcpIp_DomainType`	`domain`	This is the code for the address format of this address
Description:	Generic structure used by APIs to specify an IP address. (A specific address type can be derived from this structure via a cast to the specific struct type.)		
Available via:	`TcpIp.h`		

⌋ ()

[SWS_TCPIP_00013] ⌈

Name:	`TcpIp_SockAddrInetType`		
Type:	`Structure`		
Element:	`TcpIp_DomainType`	`domain`	This is the code for the address format of this address
	`uint16`	`port`	port number
	`uint32[1]`	`addr`	IPv4 address in network byte order
Description:	This structure defines an IPv4 address type which can be derived from the generic address structure via cast.		
Available via:	`TcpIp.h`		

⌋ ()

[SWS_TCPIP_00014] ⌈

Name:	`TcpIp_SockAddrInet6Type`		
Type:	`Structure`		
Element:	`TcpIp_DomainType`	`domain`	This is the code for the address format of this address
	`uint16`	`port`	port number
	`uint32[4]`	`addr`	IPv6 address in network byte order
Description:	This structure defines a IPv6 address type which can be derived from the generic address structure via cast.		
Available via:	`TcpIp.h`		

⌋ ()

[SWS_TCPIP_00030] ⌈

Name:	`TcpIp_LocalAddrIdType`
Type:	`uint8`
Description:	Address identification type for unique identification of a local IP address and EthIf Controller configured in the TcpIp module.
Available via:	`TcpIp.h`

⌋ ()

[SWS_TCPIP_00038] ⌈

Name:	`TcpIp_SocketIdType`
Type:	`uint8, uint16`
Description:	Socket identifier type for unique identification of a TcpIp stack socket. TCPIP_SOCKETID_INVALID shall specify an invalid socket handle.
Available via:	`TcpIp.h`

⌋ ()

[SWS_TCPIP_00073] ⌈

Name:	`TcpIp_StateType`		
Type:	`Enumeration`		
Range:	`TCPIP_STATE_ONLINE`	--	TCP/IP stack state for a specific EthIf controller is ONLINE, i.e. communication via at least one IP address is possible.
	`TCPIP_STATE_ONHOLD`	--	TCP/IP stack state for a specific EthIf controller is ONHOLD, i.e. no communication is currently possible (e.g. link down).
	`TCPIP_STATE_OFFLINE`	--	TCP/IP stack state for a specific EthIf controller is OFFLINE, i.e. no communication is possible.
	`TCPIP_STATE_STARTUP`	--	TCP/IP stack state for a specific EthIf controller is STARTUP, i.e. IP address assignment in progress or ready for manual start, communication is currently not possible.
	`TCPIP_STATE_SHUTDOWN`	--	TCP/IP stack state for a specific EthIf controller is SHUTDOWN, i.e. release of resources using the EthIf controller, release of IP address assignment.
Description:	Specifies the TcpIp state for a specific EthIf controller.		
Available via:	`TcpIp.h`		

⌋ ()

[SWS_TCPIP_00082] ⌈

Name:	`TcpIp_IpAddrStateType`		
Type:	`Enumeration`		
Range:	`TCPIP_IPADDR_STATE_ASSIGNED`	--	local IP address is assigned
	`TCPIP_IPADDR_STATE_ONHOLD`	--	local IP address is assigned, but cannot be used as the network is not active
	`TCPIP_IPADDR_STATE_UNASSIGNED`	--	local IP address is unassigned
Description:	Specifies the state of local IP address assignment		
Available via:	`TcpIp.h`		

⌋ ()

[SWS_TCPIP_00031] ⌈

Name:	`TcpIp_EventType`		
Type:	`Enumeration`		
Range:	`TCPIP_TCP_RESET`	0x01	TCP connection was reset, TCP socket and all related resources have been released.
	`TCPIP_TCP_CLOSED`	0x02	TCP connection was closed successfully, TCP socket and all related resources have been released.
	`TCPIP_TCP_FIN_RECEIVED`	0x03	A FIN signal was received on the TCP connection, TCP socket is still valid.
	`TCPIP_UDP_CLOSED`	0x04	UDP socket and all related resources have been released.
	`TCPIP_TLS_HANDSHAKE_SUCCEEDED`	0x05	TLS handshake successfully established, TLS connection available.
Description:	Events reported by TcpIp.		
Available via:	`TcpIp.h`		

⌋ ()

[SWS_TCPIP_00065] ⌈

Name:	`TcpIp_IpAddrAssignmentType`

Type:	Enumeration		
Range:	TCPIP_IPADDR_ASSIGNMENT_STATIC	--	Static configured IPv4/IPv6 address.
	TCPIP_IPADDR_ASSIGNMENT_LINKLOCAL_DOIP	--	Linklocal IPv4/IPv6 address assignment using DoIP parameters.
	TCPIP_IPADDR_ASSIGNMENT_DHCP	--	Dynamic configured IPv4/IPv6 address by DHCP.
	TCPIP_IPADDR_ASSIGNMENT_LINKLOCAL	--	Linklocal IPv4/IPv6 address assignment.
	TCPIP_IPADDR_ASSIGNMENT_IPV6_ROUTER	--	Dynamic configured IPv4/IPv6 address by Router Advertisement.
	TCPIP_IPADDR_ASSIGNMENT_ALL	--	All configured TcpIp-AssignmentMethods with TcpIpAssignmentTrigger set to TCPIP_MANUAL
Description:	Specification of IPv4/IPv6 address assignment policy.		
Available via:	TcpIp.h		

⌋ ()

[SWS_TCPIP_00066] ⌈

Name:	TcpIp_ReturnType		
Type:	Enumeration		
Range:	TCPIP_E_OK	--	operation completed successfully.
	TCPIP_E_NOT_OK	--	operation failed.
	TCPIP_E_PHYS_ADDR_MISS	--	operation failed because of an ARP/NDP cache miss.
Description:	TcpIp specific return type.		
Available via:	TcpIp.h		

⌋ ()

[SWS_TCPIP_00126] ⌈

Name:	TcpIp_ParamIdType		
Type:	uint8		
Range:	TCPIP_PARAMID_TCP_RXWND_MAX	0x00	Specifies the maximum TCP receive window for the socket. [uint16]
	TCPIP_PARAMID_FRAMEPRIO	0x01	Specifies the frame priority for outgoing frames on the socket. [uint8]
	TCPIP_PARAMID_TCP_NAGLE	0x02	Specifies if the Nagle Algorithm according to IETF RFC 896 is enabled or not. [boolean]
	TCPIP_PARAMID_TCP_KEEPALIVE	0x03	Specifies if TCP Keep Alive Probes are sent on the socket connection. [boolean]
	TCPIP_PARAMID_TTL	0x04	Specifies the time to live value for

			outgoing frames on the socket. For IPv6 this parameter specifies the value of the HopLimit field used in the IPv6 header. [uint8]
	TCPIP_PARAMID_TCP_KEEPALIVE_TIME	0x05	Specifies the time in [s] between the last data packet sent (simple ACKs are not considered data) and the first keepalive probe. [uint32]
	TCPIP_PARAMID_TCP_KEEPALIVE_PROBES_MAX	0x06	Specifies the maximum number of times that a keepalive probe is retransmitted. [uint16]
	TCPIP_PARAMID_TCP_KEEPALIVE_INTERVAL	0x07	Specifies the interval in [s] between subsequent keepalive probes. [uint32]
	TCPIP_PARAMID_TCP_OPTIONFILTER	0x08	Specifies which TCP option filter shall be applied on the related socket. [uint8]
	TCPIP_PARAMID_PATHMTU_ENABLE	0x09	Specifies if the Path MTU Discovery shall be performed on the related socket. [boolean]
	TCPIP_PARAMID_FLOWLABEL	0x0a	The 20-bit Flow Label according to IETF RFC 6437. [uint32]
	TCPIP_PARAMID_DSCP	0x0b	The 6-bit Differentiated Service Code Point according to IETF RFC 2474. [uint8]
	TCPIP_PARAMID_UDP_CHECKSUM	0x0c	0x0c Specifies if UDP checksum handling shall be enabled (TRUE) or skipped (FALSE) on the related socket. [boolean]
	TCPIP_PARAMID_TLS_CONNECTION_ASSIGNMENT	0x0d	0x0d is used to assign a TLS connection reference to a TCP socket.
	TCPIP_PARAMID_VENDOR_SPECIFIC	0x80	Start of vendor specific range of

			parameter IDs. [vendor specific]
Description:	Type for the specification of all supported Parameter IDs and their data types.		
Available via:	TcpIp.h		

⌋ ()

[SWS_TCPIP_00133] ⌈

Name:	TcpIpIpAddrWildcardType		
Type:	uint32		
Range:	TCPIP_IPADDR_ANY	implementation specific	defines the value used as wildcard
Description:	IP address wildcard.		
Available via:	TcpIp.h		

⌋ ()

[SWS_TCPIP_00132] ⌈

Name:	TcpIpIp6AddrWildcardType		
Type:	uint32		
Range:	TCPIP_IP6ADDR_ANY	implementation specific	defines the value used as wildcard for all IP6 address parts
Description:	IP6 address wildcard.		
Available via:	TcpIp.h		

⌋ ()

[SWS_TCPIP_00134] ⌈

Name:	TcpIpPortWildcardType		
Type:	uint16		
Range:	TCPIP_PORT_ANY	implementation specific	defines the value used as wildcard
Description:	Port wildcard.		
Available via:	TcpIp.h		

⌋ ()

[SWS_TCPIP_00135] ⌈

Name:	TcpIpLocalAddrIdWildcardType		
Type:	TcpIp_LocalAddrIdType		
Range:	TCPIP_LOCALADDRID_ANY	implementation specific	defines the value used as wildcard
Description:	LocalAddrId wildcard.		
Available via:	TcpIp.h		

⌋ ()

[SWS_TCPIP_91004] ⌈

Name:	TcpIp_ArpCacheEntryType		
Type:	Structure		
Element:	uint32[1]	InetAddr	IPv4 address in network byte order
	uint8[6]	PhysAddr	physical address in network byte order
	uint8	State	state of the address entry (TCPIP_ARP_ENTRY_STATIC, TCPIP_ARP_ENTRY_VALID, TCPIP_ARP_ENTRY_STALE)
Description:	TcpIp_ArpCacheEntries elements type		

Available via:	`TcpIp.h`

⌋ ()

[SWS_TCPIP_91003] ⌈

Name:	`TcpIp_NdpCacheEntryType`		
Type:	`Structure`		
Element:	`uint32[4]`	`Inet6Addr`	IPv6 address in network byte order
	`uint8[6]`	`PhysAddr`	physical address in network byte order
	`uint8`	`State`	state of the address entry (TCPIP_NDP_ENTRY_STATIC, TCPIP_NDP_ENTRY_VALID, TCPIP_NDP_ENTRY_STALE)
Description:	TcpIp_NdpCacheEntries elements type		
Available via:	`TcpIp.h`		

⌋ ()

[SWS_TCPIP_91010] ⌈

Name:	`TcpIp_MeasurementIdxType`		
Type:	`uint8`		
Range:	`TCPIP_MEAS_DROP_TCP`	`0x01`	Measurement index of dropped PDUs caused by invalid destination TCP-Port
	`TCPIP_MEAS_DROP_UDP`	`0x02`	Measurement index of dropped PDUs caused by invalid destination UDP-Port
	`TCPIP_MEAS_DROP_IPV4`	`0x03`	Measurement index of dropped datagrams caused by invalid IPv4 address
	`TCPIP_MEAS_DROP_IPV6`	`0x04`	Measurement index of dropped datagrams caused by invalid IPv6 address
	`TCPIP_MEAS_RESERVED_1`	`0x05-0x7F`	reserved by AUTOSAR
	`TCPIP_MEAS_RESERVED_2`	`0x80-0xEF`	Vendor specific range
	`TCPIP_MEAS_RESERVED_3`	`0xF0-0xFE`	reserved by AUTOSAR (future use)
	`TCPIP_MEAS_ALL`	`0xFF`	represents all measurement indexes
Description:	Index to select specific measurement data		
Available via:	`TcpIp.h`		

⌋ ()

[SWS_TCPIP_91011] ⌈

Name:	`TcpIp_TlsConnectionIdType`
Type:	`uint8, uint16`
Description:	TLS connection identifier type for unique identification of a TLS connection. TCPIP_TLSCONNECTIONID_INVALID shall specify an invalid TLS connection handle.
Available via:	`TcpIp.h`

⌋ ()

8.3 Function definitions

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

8.3.1 General

8.3.1.1 TcpIp_Init

[SWS_TCPIP_00002] ⌈

Service name:	TcpIp_Init	
Syntax:	`void TcpIp_Init( const TcpIp_ConfigType* ConfigPtr )`	
Service ID[hex]:	0x01	
Sync/Async:	Synchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	ConfigPtr	Pointer to the configuration data of the TcpIp module
Parameters (inout):	None	
Parameters (out):	None	
Return value:	void	None
Description:	This service initializes the TCP/IP Stack. TcpIp_Init may not block the start-up process for an indefinite amount of time. Caveats: The call of this service is mandatory before using the TcpIp instance for further processing.	
Available via:	`TcpIp.h`	

⌋ ()

8.3.1.2 TcpIp_GetVersionInfo

[SWS_TCPIP_00004] ⌈

Service name:	TcpIp_GetVersionInfo	
Syntax:	`void TcpIp_GetVersionInfo( Std_VersionInfoType* versioninfo )`	
Service ID[hex]:	0x02	
Sync/Async:	Synchronous	
Reentrancy:	Reentrant	
Parameters (in):	None	
Parameters (inout):	None	
Parameters (out):	versioninfo	Pointer to where to store the version information of this module.
Return value:	None	
Description:	Returns the version information.	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00005]⌈ The function TcpIp_GetVersionInfo shall return the version information of this module. The version information includes:
- Module Id
- Vendor Id
- Vendor specific version numbers (BSW00407).

⌋ ()

[SWS_TCPIP_00006]⌈ The function TcpIp_GetVersionInfo shall be pre compile time configurable On/Off by the configuration parameter: TCPIP_VERSION_INFO_API⌋ ()

8.3.2 Core Communication Control

8.3.2.1 TcpIp_Close

[SWS_TCPIP_00017] ⌈

Service name:	TcpIp_Close	
Syntax:	`Std_ReturnType TcpIp_Close( TcpIp_SocketIdType SocketId, boolean Abort )`	
Service ID[hex]:	0x04	
Sync/Async:	Asynchronous	
Reentrancy:	Reentrant for different SocketIds. Non reentrant for the same SocketId.	
Parameters (in):	SocketId	Socket handle identifying the local socket resource.
	Abort	TRUE: connection will immediately be terminated by sending a RST-Segment and releasing all related resources. FALSE: connection will be terminated after performing a regular connection termination handshake and releasing all related resources.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	E_OK: The request has been accepted E_NOT_OK: The request has not been accepted.
Description:	By this API service the TCP/IP stack is requested to close the socket and release all related resources.	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00109]⌈ The service TcpIp_Close() shall perform the following actions for the socket specified by SocketId in case it is a TCP socket:
(a) if the connection is active and
(a1) abort = FALSE: the connection shall be terminated after performing a regular connection termination handshake and releasing all related resources.
(a2) abort = TRUE: connection shall immediately be terminated by sending a RST-Segment and releasing all related resources.
(b) if the socket is in the Listen state, the Listen state shall be left immediately and related resources shall be released.⌋ ()

[SWS_TCPIP_00110]⌈ The service TcpIp_Close() shall release all related resources immediately for the socket specified by SocketId in case it is a UDP socket .⌋ ()

Note: The upper layer will be notified via Up_TcpIpEvent(TCPIP_TCP_CLOSED, TCPIP_TCP_RESET or TCPIP_UDP_CLOSED) after the socket and all related resources have been released. After this call the SocketId is invalid until allocated again with TcpIp_GetSocket().

8.3.2.2 TcpIp_Bind

[SWS_TCPIP_00015] ⌈

Service name:	TcpIp_Bind
Syntax:	`Std_ReturnType TcpIp_Bind(`

	`TcpIp_SocketIdType SocketId,`
	`TcpIp_LocalAddrIdType LocalAddrId,`
	`uint16* PortPtr`
	`)`	

Service ID[hex]:	0x05	
Sync/Async:	Synchronous	
Reentrancy:	Reentrant for different SocketIds. Non reentrant for the same SocketId.	
Parameters (in):	SocketId	Socket identifier of the related local socket resource.
	LocalAddrId	IP address identifier representing the local IP address and EthIf controller to bind the socket to. Note: to listen to all EthIf controller, TCPIP_LOCALADDRID_ANY has to be specified as LocalAddrId. Note: to listen on any IP addresss of a EthIf controller, the configuration parameter TcpIpStaticIpAddress referenced by LocalAddrId must be set to "ANY". The remote IP address of an incoming packet has no effect then. In case the socket shall be used as client socket, the IP address and EthIf controller represented by LocalAddrId is used for transmission. Note: for an automatic selection of the Local IP address and EthIf Controller, TCPIP_LOCALADDRID_ANY has to be specified as LocalAddrId.
Parameters (inout):	PortPtr	Pointer to memory where the local port to which the socket shall be bound is specified. In case the parameter is specified as TCPIP_PORT_ANY, the TCP/IP stack shall choose the local port automatically from the range 49152 to 65535 and shall update the parameter to the chosen value.
Parameters (out):	None	
Return value:	Std_ReturnType	Result of operation E_OK The request has been accepted E_NOT_OK The request has not been accepted (e.g. address in use)
Description:	By this API service the TCP/IP stack is requested to bind a UDP or TCP socket to a local resource.	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00111]⌈ The service TcpIp_Bind() shall bind the socket specified by parameter SocketId to the local resource specified by parameters LocalAddrId and PortPtr.⌋ ()

Note: Sockets that shall be switched in a listening state later on must be bound to a local resource. Optionally this API can be used to specify the local IP address and port used by later calls of TcpIp_TcpConnect() or TcpIp_UdpTransmit().

[SWS_TCPIP_00146]⌈ `TcpIp_Bind`() shall check if there is another socket already bound to the same port, protocol and local address and if that is the case refuse the request and return E_NOT_OK. If development error detection is enabled, the service `TcpIp_Bind`() shall also raise the development error code TCPIP_E_ADDRINUSE.⌋ ()

[SWS_TCPIP_00147]⌈ If development error detection is enabled: `TcpIp_Bind()` shall check if the parameter `LocalAddrId` is valid. If the check fails, `TcpIp_Bind()` shall refuse the request and raise the development error code TCPIP_E_ADDRNOTAVAIL instead.⌋ (SRS_BSW_00323)

[SWS_TCPIP_00254]⌈ TcpIp_Bind() shall check if the local address specified by LocalAddrId is assigned and if that is not the case refuse the request and return E_NOT_OK⌋ (SRS_Eth_00045)

8.3.2.3 TcpIp_TcpConnect

[SWS_TCPIP_00022] ⌈

Service name:	TcpIp_TcpConnect	

Syntax:	`Std_ReturnType TcpIp_TcpConnect(`
	`    TcpIp_SocketIdType SocketId,`
	`    const TcpIp_SockAddrType* RemoteAddrPtr`
	`)`	

Service ID[hex]:	0x06	
Sync/Async:	Asynchronous	
Reentrancy:	Reentrant for different SocketIds. Non reentrant for the same SocketId.	
Parameters (in):	SocketId	Socket identifier of the related local socket resource.
	RemoteAddrPtr	IP address and port of the remote host to connect to.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	E_OK: The request has been accepted E_NOT_OK: The request has not been accepted, e.g. connection is already established or no route to destination specified by remoteAddrPtr found.
Description:	By this API service the TCP/IP stack is requested to establish a TCP connection to the configured peer.	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00112]⌈ The service TcpIp_TcpConnect() shall establish a TCP connection between the local socket specified by parameter SocketId and the remote socket specified with parameter RemoteAddrPtr.⌋ ()

[SWS_TCPIP_00129]⌈ ⌈If development error detection is enabled and the parameter RemoteAddrPtr equals NULL_PTR, the TcpIp_TcpConnect function shall raise the development error code TCPIP_E_PARAM_POINTER.⌋ ()

8.3.2.4 TcpIp_TcpListen

[SWS_TCPIP_00023] ⌈

Service name:	TcpIp_TcpListen	

Syntax:	`Std_ReturnType TcpIp_TcpListen(`
	`    TcpIp_SocketIdType SocketId,`
	`    uint16 MaxChannels`
	`)`	

Service ID[hex]:	0x07	
Sync/Async:	Asynchronous	
Reentrancy:	Reentrant for different SocketIds. Non reentrant for the same SocketId.	
Parameters (in):	SocketId	Socket identifier of the related local socket resource.

	MaxChannels	Maximum number of new parallel connections established on this listen connection.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	E_OK: The request has been accepted E_NOT_OK: The request has not been accepted, the socket is not configured to be a server socket.
Description:	By this API service the TCP/IP stack is requested to listen on the TCP socket specified by the socket identifier.	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00113]⌈ The service TcpIp_TcpListen() shall put the socket specified by SocketId to the listen state (i.e. local socket is listening for incoming connections). ⌋ ()

[SWS_TCPIP_00114]⌈ TcpIp shall derive a separate socket from the listen socket to establish a new connection from an incoming connection request on the listen socket and limit the number of new parallel connections to the value specified by MaxChannels.⌋ ()

8.3.2.5 TcpIp_TcpReceived

[SWS_TCPIP_00024] ⌈

Service name:	TcpIp_TcpReceived	

Syntax:	`Std_ReturnType TcpIp_TcpReceived(`
	`    TcpIp_SocketIdType SocketId,`
	`    uint32 Length`
	`)`	

Service ID[hex]:	0x08	
Sync/Async:	Asynchronous	
Reentrancy:	Reentrant for different SocketIds. Non reentrant for the same SocketId.	
Parameters (in):	SocketId	Socket identifier of the related local socket resource.
	Length	Number of bytes finally consumed by the upper layer.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	E_OK: The request has been accepted E_NOT_OK: The request has not been accepted
Description:	By this API service the reception of socket data is confirmed to the TCP/IP stack.	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00115]⌈ The service TcpIp_TcpReceived() shall increase the TCP receive window of the socket specified by SocketId considering the number of finally consumed bytes specified by Length.⌋ ()

8.3.2.6 TcpIp_RequestComMode

[SWS_TCPIP_00070] ⌈

Service name:	TcpIp_RequestComMode
Syntax:	`Std_ReturnType TcpIp_RequestComMode(`

	`    uint8 CtrlIdx,`
	`    TcpIp_StateType State`
	`)`	

Service ID[hex]:	0x09	
Sync/Async:	Asynchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	CtrlIdx	EthIf controller index to identify the communication network where the TcpIp state is requested.
	State	Requested TcpIp state.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	E_OK: Service accepted E_NOT_OK: Service denied
Description:	By this API service the TCP/IP stack is requested to change the TcpIp state of the communication network identified by EthIf controller index.	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00071]⌈ If TCPIP_STATE_ONLINE is requested, the TcpIp module shall initiate activation of the TcpIp communication on the related EthIf controller (e.g. start IP-Address assignment according to the configured IP address assignment policy for the EthIf controller).⌋ ()

[SWS_TCPIP_00072]⌈ If TCPIP_STATE_OFFLINE is requested, the TcpIp module shall initiate deactivation of the TcpIp communication on the related EthIf controller (e.g. close all sockets using the specified EthIf controller).⌋ ()

[SWS_TCPIP_00074]⌈ If TCPIP_STATE_ONHOLD is requested, the TcpIp module shall set the TcpIp communication to on hold, i.e. new transmit requests shall not be accepted, but sockets and assigned IP addresses shall be kept.⌋ ()

[SWS_TCPIP_00089]⌈ If TCPIP_STATE_STARTUP or TCPIP_STATE_SHUTDOWN is requested as state the function TcpIp_RequestComMode shall abort with E_NOT_OK and report TCPIP_E_INV_ARG if development error detection is enabled.⌋ ()

Note: According to [SWS_TCPIP_00075] and [SWS_TCPIP_00077] TCPIP_STATE_STARTUP or TCPIP_STATE_SHUTDOWN are intermediate states arising from requesting TCPIP_STATE_OFFLINE or TCPIP_STATE_ONLINE. Requesting these intermediate states is not useful.

8.3.3 Extended Communication Control and Information

8.3.3.1 TcpIp_RequestIpAddrAssignment

[SWS_TCPIP_00037] ⌈

Service name:	TcpIp_RequestIpAddrAssignment

Syntax:	`Std_ReturnType TcpIp_RequestIpAddrAssignment(`
	`    TcpIp_LocalAddrIdType LocalAddrId,`
	`    TcpIp_IpAddrAssignmentType Type,`
	`    const TcpIp_SockAddrType* LocalIpAddrPtr,`

	`uint8 Netmask,`
	`const TcpIp_SockAddrType* DefaultRouterPtr`
	`)`	

Service ID[hex]:	0x0A	
Sync/Async:	Asynchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	LocalAddrId	IP address index specifying the IP address for which an assignment shall be initiated.
	Type	Type of IP address assignment which shall be initiated
	LocalIpAddrPtr	Pointer to structure containing the IP address which shall be assigned to the EthIf controller indirectly specified via LocalAddrId. Note: This parameter is only used in case the parameter Type is set to TCPIP_IPADDR_ASSIGNMENT_STATIC, can be set to NULL_PTR otherwise.
	Netmask	Network mask of IPv4 address or address prefix of IPv6 address in CIDR Notation. Note: This parameter is only used in case the parameter Type is set to TCPIP_IPADDR_ASSIGNMENT_STATIC.
	DefaultRouterPtr	Pointer to structure containing the IP address of the default router (gateway) which shall be assigned. Note: This parameter is only used in case the parameter Type is set to TCPIP_IPADDR_ASSIGNMENT_STATIC, can be set to NULL_PTR otherwise.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	E_OK: The request has been accepted E_NOT_OK: The request has not been accepted
Description:	By this API service the local IP address assignment for the IP address specified by LocalAddrId shall be initiated.	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00116]⌈ The service `TcpIp_RequestIpAddrAssignment()` shall initiate the local IP address assignment according to the IP address table entry specified by LocalAddId using the method specified by Type.⌋ ()

[SWS_TCPIP_00079]⌈ In case TcpIp_RequestIpAddrAssignment() is called with parameter Type set to TCPIP_IPADDR_ASSIGNMENT_STATIC and no TcpIpStaticIpAddressConfig container is configured for the LocalAddr specified by parameter LocalAddrId, TcpIp shall assign the IP address, netmask and default router specified by parameter LocalIpAddrPtr, Netmask and DefaultRouterPtr as soon as TCPIP_STATE_ONLINE is requested or immediately if already requested.⌋ ()

[SWS_TCPIP_00080]⌈ In case a multicast address is assigned, TcpIp shall derive the related physical address from the multicast IP address and add the derived address to the Eth MAC address filter by calling `EthIf_UpdatePhys-AddrFilter()` with action set to ETH_ADD_TO_FILTER.⌋ ()

[SWS_TCPIP_00299]⌈ In case `TcpIp_RequestIpAddrAssignment()` is called with parameter Type set to TCPIP_IPADDR_ASSIGNMENT_ALL, the IP address assignment for the IP address table entry specified by LocalAddId shall be initiated for all configured TcpIpAssignmentMethods with TcpIpAssignmentTrigger set to TCPIP_MANUAL.⌋ ()

[SWS_TCPIP_00195]⌈ If TcpIp_RequestIpAddrAssignment is called for a LocalAddrId configured with TcpIpAssignmentTrigger set to TCPIP_MANUAL, TcpIp shall consider the related assignment as available.⌋ ()

[SWS_TCPIP_00196]⌈ If TcpIp_ ReleaseIpAddrAssignment is called for a LocalAddrId configured with TcpIpAssignmentTrigger set to TCPIP_MANUAL, TcpIp shall consider the related assignment as unavailable.⌋ ()

[SWS_TCPIP_00197]⌈ TcpIpAddrAssignments configured with TcpIpAssignmentTrigger set to TCPIP_AUTOMATIC shall always be available.⌋ ()

[SWS_TCPIP_00198]⌈ If TcpIp_RequestIpAddrAssignment is called for a LocalAddrId configured with TcpIpAssignmentTrigger set to TCPIP_AUTOMATIC, TcpIp shall reject the request and return E_NOT_OK.⌋ ()

[SWS_TCPIP_00199]⌈ If TcpIp_ReleaseIpAddrAssignment is called for a LocalAddrId configured with TcpIpAssignmentTrigger set to TCPIP_AUTOMATIC, TcpIp shall reject the request and return E_NOT_OK.⌋ ()

8.3.3.2 TcpIp_ReleaseIpAddrAssignment

[SWS_TCPIP_00078] ⌈

Service name:	TcpIp_ReleaseIpAddrAssignment	

Syntax:	`Std_ReturnType TcpIp_ReleaseIpAddrAssignment(`
	`    TcpIp_LocalAddrIdType LocalAddrId`
	`)`	

Service ID[hex]:	0x0B	
Sync/Async:	Asynchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	LocalAddrId	IP address index specifying the IP address for which an assignment shall be released.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	E_OK: The request has been accepted E_NOT_OK: The request has not been accepted
Description:	By this API service the local IP address assignment for the IP address specified by LocalAddrId shall be released.	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00117]⌈ The service `TcpIp_ReleasepAddrAssignment()` shall release the local IP address assignment related to the IP address table entry specified by LocalAddId.⌋ ()

8.3.3.3 TcpIp_ResetIpAssignment

[SWS_TCPIP_00215] ⌈

Service name:	TcpIp_ResetIpAssignment	

Syntax:	`Std_ReturnType TcpIp_ResetIpAssignment(`
	`    void`
	`)`	

Service ID[hex]:	0x1b	
Sync/Async:	Synchronous /Asynchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	None	
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	E_OK: success E_NOT_OK: switch port could not be initialized
Description:	Resets all learned IP-addresses to invalid values.	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00216]⌈ The service TcpIp_ResetIpAssignment() shall reset all persistently stored IP addresses in the NvMBlock (see **ECUC_TcpIp_00184 :** *)* to invalid values (e.g. to 0.0.0.0 for IPv4 addresses).⌋ (*SRS_Eth_00087*)

Note: The next time the TcpIpAddrAssignments configured with TCPIP_STORE are started, the related address assignment method are started to obtain new IP addresses.

[SWS_TCPIP_00217]⌈ The service `TcpIp_ResetIpAssignment()` shall be pre compile time configurable On/Off by the configuration parameter: `TcpIpResetIPAssignmentApi` (see **ECUC_TcpIp_00182 :**).⌋ (*SRS_Eth_00087*)

8.3.3.4 TcpIp_IcmpTransmit

[SWS_TCPIP_00039] ⌈

Service name:	TcpIp_IcmpTransmit	

Syntax:	`Std_ReturnType TcpIp_IcmpTransmit(`
	`    TcpIp_LocalAddrIdType LocalIpAddrId,`
	`    const TcpIp_SockAddrType* RemoteAddrPtr,`
	`    uint8 Ttl,`
	`    uint8 Type,`
	`    uint8 Code,`
	`    uint16 DataLength,`
	`    const uint8* DataPtr`
	`)`	

Service ID[hex]:	0x0C	
Sync/Async:	Synchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	LocalIpAddrId	IP address identifier representing the local IP address and EthIf controller which shall be used for transmission of the ICMP message.
	RemoteAddrPtr	pointer to struct representing the remote address
	Ttl	Time to live value to be used for the ICMP message. If 0 is specified the default value shall be used.
	Type	type field value to be used in the ICMP message (Note: the value of the type field determines the format of the remaining ICMP message data)
	Code	code field value to be used in the ICMP message
	DataLength	length of ICMP message

	DataPtr	Pointer to data which shall be sent as ICMP message data
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	Result of operation E_OK The ICMP message has been sent successfully E_NOT_OK The ICMP message was not sent.
Description:	By this API service the TCP/IP stack sends an ICMP message according to the specified parameters.	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00118]⌈ The service `TcpIp_IcmpTransmit()` shall (a) construct an ICMP message according to the parameters Type, Code, DataLength and DataPtr and (b) transmit the ICMP message using the local IP address and EthIf controller specified by LocalIpAddrId to the destination specified by RemoteAddrPtr using a time to live value according to the parameter Ttl.⌋ ()

8.3.3.5 TcpIp_IcmpV6Transmit

[SWS_TCPIP_00187] ⌈

Service name:	TcpIp_IcmpV6Transmit	

Syntax:	`Std_ReturnType TcpIp_IcmpV6Transmit(`
	`    TcpIp_LocalAddrIdType LocalIpAddrId,`
	`    const TcpIp_SockAddrType* RemoteAddrPtr,`
	`    uint8 HopLimit,`
	`    uint8 Type,`
	`    uint8 Code,`
	`    uint16 DataLength,`
	`    const uint8* DataPtr`
	`)`	

Service ID[hex]:	0x18	
Sync/Async:	Synchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	LocalIpAddrId	IP address identifier representing the local IP address and EthIf controller which shall be used for transmission of the ICMPv6 message.
	RemoteAddrPtr	pointer to struct representing the remote address
	HopLimit	Hop Limit value to be used for the ICMPv6 message. If 0 is specified the default value shall be used.
	Type	type field value to be used in the ICMPv6 message. (Note: the value of the type field determines the format of the remaining ICMPv6 message data)
	Code	code field value to be used in the ICMPv6 message
	DataLength	length of ICMPv6 message
	DataPtr	Pointer to data which shall be sent as ICMPv6 message data
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	Result of operation E_OK: The ICMPv6 message has been sent successfully E_NOT_OK: The ICMPv6 message was not sent.
Description:	By this API service the TCP/IP stack sends an ICMPv6 message according to the specified parameters.	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00230] ⌈ The service TcpIp_IcmpV6Transmit() shall (a) construct an ICMPv6 message according to the parameters Type, Code, DataLength and DataPtr and (b) transmit the ICMPv6 message using the local IP address and EthIf controller specified by LocalIpAddrId to the destination specified by RemoteAddrPtr using a Hop Limit value according to the parameter HopLimit.⌋ ()

8.3.3.6 TcpIp_DhcpReadOption

[SWS_TCPIP_00040] ⌈

Service name:	TcpIp_DhcpReadOption	

Syntax:	`Std_ReturnType TcpIp_DhcpReadOption(`
	`    TcpIp_LocalAddrIdType LocalIpAddrId,`
	`    uint8 Option,`
	`    uint8* DataLength,`
	`    uint8* DataPtr`
	`)`	

Service ID[hex]:	0x0D	
Sync/Async:	Synchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	LocalIpAddrId	IP address identifier representing the local IP address and EthIf controller for which the DHCP option shall be read.
	Option	DHCP option according to IEFT RfC 2132, e.g. hostname
Parameters (inout):	DataLength	As input parameter, contains the length of the provided data buffer. Will be overwritten with the length of the actual data.
Parameters (out):	DataPtr	Pointer to memory containing DHCP option data
Return value:	Std_ReturnType	Result of operation E_OK requested data retrieved successfully. E_NOT_OK requested data could not be retrieved.
Description:	By this API service the TCP/IP stack retrieves DHCP option data identified by parameter option for already received DHCP options.	
Available via:	`TcpIp.h`	

⌋ (SRS_Eth_00066)

[SWS_TCPIP_00233]⌈ If development error detection is enabled: TcpIp_DhcpReadOption() shall check if the parameter LocalIpAddrId is valid. If the check fails, TcpIp_DhcpReadOption() shall raise the development error TCPIP_E_INV_ARG. ⌋ (*SRS_Eth_00066*)

[SWS_TCPIP_00234]⌈ If development error detection is enabled: TcpIp_DhcpReadOption() shall check if the parameter Option is valid. If the check fails, TcpIp_DhcpReadOption() shall raise the development error TCPIP_E_INV_ARG. ⌋ (*SRS_Eth_00066*)

[SWS_TCPIP_00235]⌈ If development error detection is enabled: TcpIp_DhcpReadOption() shall check if the parameter DataLength is valid (i.e. the buffer is large enough for the requested option). If the check fails, TcpIp_DhcpReadOption() shall raise the development error TCPIP_E_INV_ARG.⌋ (*SRS_Eth_00066*)

[SWS_TCPIP_00236]⌈ If the requested option has been set for the address specified by LocalIpAddrId, TcpIp_DhcpReadOption() shall copy this option into the buffer provided by DataPtr, set the parameter DataLength to the length of the option and return E_OK.⌋ (*SRS_Eth_00066*)

[SWS_TCPIP_00237]⌈ If the requested option has not been set for the address specified by LocalIpAddrId, TcpIp_DhcpReadOption() shall set the parameter DataLength to zero, leave the buffer provided by DataPtr unchanged and return E_OK.⌋ (*SRS_Eth_00066*)

8.3.3.7 TcpIp_DhcpV6ReadOption

[SWS_TCPIP_00189] ⌈

Service name:	TcpIp_DhcpV6ReadOption	

Syntax:	`Std_ReturnType TcpIp_DhcpV6ReadOption(`
	`    TcpIp_LocalAddrIdType LocalIpAddrId,`
	`    uint16 Option,`
	`    uint16* DataLength,`
	`    uint8* DataPtr`
	`)`	

Service ID[hex]:	0x19	
Sync/Async:	Synchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	LocalIpAddrId	IP address identifier representing the local IP address and EthIf controller for which the DHCPv6 option shall be read.
	Option	DHCP option according to IEFT RfC 3315, e.g. hostname
Parameters (inout):	DataLength	As input parameter, contains the length of the provided data buffer. Will be overwritten with the length of the actual data.
Parameters (out):	DataPtr	Pointer to memory containing DHCPv6 option data
Return value:	Std_ReturnType	Result of operation E_OK: requested data retrieved successfully. E_NOT_OK: requested data could not be retrieved.
Description:	By this API service the TCP/IP stack retrieves DHCPv6 option data identified by parameter option for already received DHCPv6 options.	
Available via:	`TcpIp.h`	

⌋ (SRS_Eth_00066)

[SWS_TCPIP_00238]⌈ If development error detection is enabled: TcpIp_DhcpV6ReadOption() shall check if the parameter LocalIpAddrId is valid. If the check fails, TcpIp_DhcpV6ReadOption() shall raise the development error TCPIP_E_INV_ARG.⌋ (*SRS_Eth_00066*)

[SWS_TCPIP_00239]⌈ If development error detection is enabled: TcpIp_DhcpV6ReadOption() shall check if the parameter Option is valid. If the check fails, TcpIp_DhcpV6ReadOption() shall raise the development error TCPIP_E_INV_ARG. ⌋ (*SRS_Eth_00066*)

[SWS_TCPIP_00240]⌈ If development error detection is enabled: TcpIp_DhcpV6ReadOption() shall check if the parameter DataLength is valid (i.e. the buffer is large enough for the requested option). If the check fails, TcpIp_DhcpV6ReadOption() shall raise the development error TCPIP_E_INV_ARG. ⌋ (*SRS_Eth_00066*)

[SWS_TCPIP_00241]⌈ If the requested option has been set for the address specified by LocalIpAddrId, TcpIp_DhcpV6ReadOption() shall copy this option into the buffer provided by DataPtr, set the parameter DataLength to the length of the option and return E_OK.⌋ (*SRS_Eth_00066*)

[SWS_TCPIP_00242]⌈ If the requested option has not been set for the address specified by LocalIpAddrId, TcpIp_DhcpV6ReadOption() shall set the parameter DataLength to zero, leave the buffer provided by DataPtr unchanged and return E_OK.⌋ (*SRS_Eth_00066*)

8.3.3.8 TcpIp_DhcpWriteOption

[SWS_TCPIP_00020] ⌈

Service name:	TcpIp_DhcpWriteOption	
Syntax:	`Std_ReturnType TcpIp_DhcpWriteOption( TcpIp_LocalAddrIdType LocalIpAddrId, uint8 Option, uint8 DataLength, const uint8* DataPtr )`	
Service ID[hex]:	0x0E	
Sync/Async:	Synchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	LocalIpAddrId	IP address identifier representing the local IP address and EthIf controller for which the DHCP option shall be written.
	Option	DHCP option according to IEFT RfC 2132, e.g. hostname
	DataLength	length of DHCP option data
	DataPtr	Pointer to memory containing DHCP option data
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	Result of operation E_OK no error occured. E_NOT_OK DHCP option data could not be written.
Description:	By this API service the TCP/IP stack writes the DHCP option data identified by parameter option.	
Available via:	`TcpIp.h`	

⌋ (SRS_Eth_00065)

[SWS_TCPIP_00243]⌈ If development error detection is enabled: TcpIp_DhcpWriteOption() shall check if the parameter LocalIpAddrId is valid. If the check fails, TcpIp_DhcpWriteOption() shall raise the development error TCPIP_E_INV_ARG. ⌋ (*SRS_Eth_00065*)

[SWS_TCPIP_00244]⌈ If development error detection is enabled: TcpIp_DhcpWriteOption() shall check if the parameter Option is valid. If the check fails, TcpIp_DhcpWriteOption() shall raise the development error TCPIP_E_INV_ARG. ⌋ (*SRS_Eth_00065*)

[SWS_TCPIP_00245]⌈ If development error detection is enabled: TcpIp_DhcpWriteOption() shall check if the parameter DataLength is valid (i.e. the length of the provided option is not larger than supported by the protocol). If the check fails, TcpIp_DhcpWriteOption() shall raise the development error TCPIP_E_INV_ARG.⌋ (*SRS_Eth_00065*)

[SWS_TCPIP_00246]⌈ If the length indicated by DataLength is larger than zero TcpIp_DhcpWriteOption() shall set the option identified by Option to the value provided by DataPtr internally for the address specified by LocalIpAddrId and return E_OK.⌋ (*SRS_Eth_00065*)

[SWS_TCPIP_00247]⌈ If the length indicated by DataLength is equal to zero TcpIp_DhcpWriteOption() shall unset the option identified by Option for the address specified by LocalIpAddrId and return E_OK.⌋ (*SRS_Eth_00065*)

8.3.3.9 TcpIp_DhcpV6WriteOption

[SWS_TCPIP_00190] ⌈

Service name:	TcpIp_DhcpV6WriteOption	

Syntax:	`Std_ReturnType TcpIp_DhcpV6WriteOption(`
	`    TcpIp_LocalAddrIdType LocalIpAddrId,`
	`    uint16 Option,`
	`    uint16 DataLength,`
	`    const uint8* DataPtr`
	`)`	

Service ID[hex]:	0x1a	
Sync/Async:	Synchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	LocalIpAddrId	IP address identifier representing the local IP address and EthIf controller for which the DHCPv6 option shall be written.
	Option	DHCP option according to IEFT RfC 3315, e.g. hostname
	DataLength	length of DHCPv6 option data
	DataPtr	Pointer to memory containing DHCPv6 option data
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	Result of operation E_OK: no error occured. E_NOT_OK: DHCPv6 option data could not be written.
Description:	By this API service the TCP/IP stack writes the DHCPv6 option data identified by parameter option.	
Available via:	`TcpIp.h`	

⌋ (SRS_Eth_00065)

[SWS_TCPIP_00248]⌈ If development error detection is enabled: TcpIp_DhcpV6WriteOption() shall check if the parameter LocalIpAddrId is valid. If the check fails, TcpIp_DhcpV6WriteOption() shall raise the development error TCPIP_E_INV_ARG. ⌋ (*SRS_Eth_00065*)

[SWS_TCPIP_00249]⌈ If development error detection is enabled: TcpIp_DhcpV6WriteOption() shall check if the parameter Option is valid. If the check fails, TcpIp_DhcpV6WriteOption() shall raise the development error TCPIP_E_INV_ARG. ⌋ (*SRS_Eth_00065*)

[SWS_TCPIP_00250]⌈ If development error detection is enabled: TcpIp_DhcpV6WriteOption() shall check if the parameter DataLength is valid (i.e. the length of the provided option is not larger than supported by the protocol). If the check fails, TcpIp_DhcpV6WriteOption() shall raise the development error TCPIP_E_INV_ARG.⌋ (*SRS_Eth_00065*)

[SWS_TCPIP_00251]⌈ If the length indicated by DataLength is larger than zero TcpIp_DhcpV6WriteOption() shall set the option identified by Option to the value provided by DataPtr internally for the address specified by LocalIpAddrId and return E_OK.⌋ (*SRS_Eth_00065*)

[SWS_TCPIP_00252]⌈ If the length indicated by DataLength is equal to zero TcpIp_DhcpV6WriteOption() shall unset the option identified by Option for the address specified by LocalIpAddrId and return E_OK.⌋ (*SRS_Eth_00065*)

8.3.3.10 TcpIp_ChangeParameter

[SWS_TCPIP_00016] ⌈

Service name:	TcpIp_ChangeParameter	
Syntax:	`Std_ReturnType TcpIp_ChangeParameter( TcpIp_SocketIdType SocketId, TcpIp_ParamIdType ParameterId, const uint8* ParameterValue )`	
Service ID[hex]:	0x0F	
Sync/Async:	Synchronous	
Reentrancy:	Reentrant for different SocketIds. Non reentrant for the same SocketId.	
Parameters (in):	SocketId	Socket identifier of the related local socket resource.
	ParameterId	Identifier of the parameter to be changed
	ParameterValue	Pointer to memory containing the new parameter value
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	E_OK: The parameter has been changed successfully. E_NOT_OK: The parameter could not be changed.
Description:	By this API service the TCP/IP stack is requested to change a parameter of a socket. E.g. the Nagle algorithm may be controlled by this API.	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00119]⌈ The service `TcpIp_ChangeParameter()` shall change the parameter specified by ParameterId with the value (casted to the respective data type) specified by ParameterValue for the SocketId.⌋ ()

8.3.3.11 TcpIp_GetIpAddr

[SWS_TCPIP_00032] ⌈

Service name:	TcpIp_GetIpAddr
Syntax:	`Std_ReturnType TcpIp_GetIpAddr( TcpIp_LocalAddrIdType LocalAddrId, TcpIp_SockAddrType* IpAddrPtr, uint8* NetmaskPtr,`

	`TcpIp_SockAddrType* DefaultRouterPtr`
	`)`	

Service ID[hex]:	0x10	
Sync/Async:	Synchronous	
Reentrancy:	Reentrant	
Parameters (in):	LocalAddrId	Local address identifier referring to the local IP address which shall be obtained.
Parameters (inout):	IpAddrPtr	Pointer to a struct where the IP address shall be stored. The struct member domain shall be set to the desired TcpIp_DomainType and it shall be ensured that the struct is large enough to store an address of the selected type (INET or INET6). Struct members not related to the IP address are of arbitrary value and shall not be used.
	DefaultRouterPtr	Pointer to struct where the IP address of the default router (gateway) is stored (struct member "port" is not used and of arbitrary value). The struct must be of the same type and size as IpAddrPtr.
Parameters (out):	NetmaskPtr	Pointer to memory where Network mask of IPv4 address or address prefix of IPv6 address in CIDR Notation is stored
Return value:	Std_ReturnType	Result of operation E_OK: The request was successful E_NOT_OK: The request was not successful, e.g. domain in IpAddrPtr and the local domain type do not match
Description:	Obtains the local IP address actually used by LocalAddrId, the netmask and default router	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00205]⌈ `TcpIp_GetIpAddr()` shall refuse the request if the domain set in `IpAddrPtr` does not match the `TcpIp_DomainType` of the selected local address and return E_NOT_OK. If development error detection is enabled, the service `TcpIp_GetIpAddr()` shall also raise the development error `TCPIP_E_INV_ARG`.⌋ ()

[SWS_TCPIP_00206]⌈ `TcpIp_GetIpAddr()` shall refuse the request if the domain set in `IpAddrPtr` does not match the domain set in `DefaultRouterPtr` and return E_NOT_OK. If development error detection is enabled, the service `TcpIp_GetIpAddr()` shall also raise the development error `TCPIP_E_INV_ARG`.⌋ ()

8.3.3.12 TcpIp_GetPhysAddr

[SWS_TCPIP_00033] ⌈

Service name:	TcpIp_GetPhysAddr	

Syntax:	`Std_ReturnType TcpIp_GetPhysAddr(`
	`TcpIp_LocalAddrIdType LocalAddrId,`
	`uint8* PhysAddrPtr`
	`)`	

Service ID[hex]:	0x11	
Sync/Async:	Synchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	LocalAddrId	Local address identifier implicitely specifing the EthIf controller for which the physical address shall be obtained.
Parameters (inout):	None	
Parameters (out):	PhysAddrPtr	Pointer to the memory where the physical source address (MAC

		address) in network byte order is stored
Return value:	Std_ReturnType	Result of operation E_OK The request was successful E_NOT_OK The request was not successful, e.g. no unique Ctrl specified via IpAddrId.
Description:	Obtains the physical source address used by the EthIf controller implicitly specified via LocalAddrId.	
Available via:	`TcpIp.h`	

⌋ ()

8.3.3.13 TcpIp_GetRemotePhysAddr

[SWS_TCPIP_00137] ⌈

Service name:	TcpIp_GetRemotePhysAddr	

Syntax:	`TcpIp_ReturnType TcpIp_GetRemotePhysAddr(`
	`    uint8 CtrlIdx,`
	`    const TcpIp_SockAddrType* IpAddrPtr,`
	`    uint8* PhysAddrPtr,`
	`    boolean initRes`
	`)`	

Service ID[hex]:	0x16	
Sync/Async:	Synchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	CtrlIdx	EthIf controller index to identify the related ARP/NDP table.
	IpAddrPtr	specifies the IP address for which the physical address shall be retrieved
	initRes	specifies if the address resolution shall be initiated (TRUE) or not (FALSE) in case the physical address related to the specified IP address is currently unknown.
Parameters (inout):	None	
Parameters (out):	PhysAddrPtr	Pointer to the memory where the physical address (MAC address) related to the specified IP address is stored in network byte order.
Return value:	TcpIp_ReturnType	TCPIP_E_OK: specified IP address resolved, physical address provided via PhysAddrPtr TCPIP_E_PHYS_ADDR_MISS: physical address currently unknown (address resolution initiated if initRes set to TRUE)
Description:	TcpIp_GetRemotePhysAddr queries the IP/physical address translation table specified by CtrlIdx and returns the physical address related to the IP address specified by IpAddrPtr. In case no physical address can be retrieved and parameter initRes is TRUE, address resolution for the specified IP address is initiated on the local network.	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00138]⌈ TcpIp_GetRemotePhysAddr shall lookup the physical address for the IP address specified by IpAddrPtr at the IP/physical address translation table related to the controller identified by CtrlIdx.
(1) If the physical address is already known, PhysAddrPtr shall be set to the related physical address and the function shall return with TCPIP_E_OK.
(2) Otherwise it shall (a) initiate an address resolution if parameter initRes is set to TRUE and (b) return with TCPIP_E_PHYS_ADDR_MISS. PhysAddrPtr is not updated in this case.⌋ ()

[SWS_TCPIP_00139]⌈ TcpIp_GetRemotePhysAddr shall immediately return with TCPIP_E_NOT_OK if it is called with an IP address that is not part of the same sub network as the local address currently assigned to the controller identified by CtrlIdx.
⌋ ()

8.3.3.14 TcpIp_GetCtrlIdx

[SWS_TCPIP_00140] ⌈

Service name:	TcpIp_GetCtrlIdx	

Syntax:	`Std_ReturnType TcpIp_GetCtrlIdx(`
	`    TcpIp_LocalAddrIdType LocalAddrId,`
	`    uint8* CtrlIdxPtr`
	`)`	

Service ID[hex]:	0x17	
Sync/Async:	Synchronous	
Reentrancy:	Reentrant	
Parameters (in):	LocalAddrId	Local address identifier implicitely specifing the EthIf controller that shall be returned.
Parameters (inout):	None	
Parameters (out):	CtrlIdxPtr	Pointer to the memory where the index of the controller related to LocalAddrId is stored
Return value:	Std_ReturnType	Result of operation E_OK the request was successful E_NOT_OK the request was not successful.
Description:	TcpIp_GetCtrlIdx returns the index of the controller related to LocalAddrId.	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00141]⌈ TcpIp_GetCtrlIdx shall return the index of the controller related to LocalAddrId.⌋ ()

8.3.3.15 TcpIp_GetArpCacheEntries

[SWS_TCPIP_91002] ⌈

Service name:	TcpIp_GetArpCacheEntries	

Syntax:	`Std_ReturnType TcpIp_GetArpCacheEntries(`
	`    uint8 ctrlIdx,`
	`    uint32* numberOfElements,`
	`    TcpIp_ArpCacheEntryType* entryListPtr`
	`)`	

Service ID[hex]:	0x1d	
Sync/Async:	Synchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	ctrlIdx	EthIf controller index to identify the related ARP table.
Parameters (inout):	numberOfElements	In: Maximum number of entries that can be stored in output entryListPtr. Out: Number of entries written to output entryListPtr (Number of all entries in the cache if input value is 0).
Parameters (out):	entryListPtr	Pointer to memory where the list of cache entries shall be stored.
Return value:	Std_ReturnType	E_OK: physical address cache could be read. E_NOT_OK: physical address cache could not be read (i.e. no IPv4 instance active on this controller)
Description:	Copies entries from the physical address cache of the IPv4 instance that is active on the EthIf controller specified by ctrlIdx into a user provided buffer. The function	

	will copy all or numberOfElements into the output list. If input value of numberOfElements is 0 the function will not copy any data but only return the number of valid entries in the cache. EntryListPtr may be NULL_PTR in this case.
Available via:	`TcpIp.h`

⌋ ()

[SWS_TCPIP_00271]⌈ TcpIp_GetArpCacheEntries() shall only consider entryListPtr set to NULL_PTR as valid if numberOfElements is set to zero.⌋ ()

[SWS_TCPIP_00272]⌈ If TcpIp_GetArpCacheEntries() is called with numberOfElements set to zero, TcpIp shall set the parameter numberOfElements to the number of valid entries in the physical address cache related to ctrlIdx, leave the buffer provided by entryListPtr unchanged and return E_OK.⌋ ()

[SWS_TCPIP_00273]⌈ If the numberOfElements is greater zero, TcpIp_GetArpCacheEntries() shall copy up to that number of valid entries from the physical address cache related to ctrlIdx into the buffer provided by entryListPtr, set the parameter numberOfElements to the number of copied elements and return E_OK.⌋ ()

8.3.3.16 TcpIp_GetNdpCacheEntries

[SWS_TCPIP_91001] ⌈

Service name:	TcpIp_GetNdpCacheEntries	

Syntax:	`Std_ReturnType TcpIp_GetNdpCacheEntries(`
	`    uint8 ctrlIdx,`
	`    uint32* numberOfElements,`
	`    TcpIp_NdpCacheEntryType* entryListPtr`
	`)`	

Service ID[hex]:	0x1c	
Sync/Async:	Synchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	ctrlIdx	EthIf controller index to identify the related NDP table.
Parameters (inout):	numberOfElements	In: Maximum number of entries that can be stored in output entryListPtr. Out: Number of entries written to output entryListPtr (Number of all entries in the cache if input value is 0).
Parameters (out):	entryListPtr	Pointer to memory where the list of cache entries shall be stored.
Return value:	Std_ReturnType	E_OK: physical address cache could be read. E_NOT_OK: physical address cache could not be read (i.e. no IPv6 instance active on this controller)
Description:	Copies entries from the physical address cache of the IPv6 instance that is active on the EthIf controller specified by ctrlIdx into a user provided buffer. The function will copy all or numberOfElements into the output list. If input value of numberOfElements is 0 the function will not copy any data but only return the number of valid entries in the cache. EntryListPtr may be NULL_PTR in this case.	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00274]⌈ TcpIp_GetNdpCacheEntries() shall only consider entryListPtr set to NULL_PTR as valid if numberOfElements is set to zero.⌋ ()

[SWS_TCPIP_00275]⌈ If TcpIp_GetNdpCacheEntries() is called with numberOfElements set to zero, TcpIp shall set the parameter numberOfElements to the number of valid entries in the physical address cache related to ctrlIdx, leave the buffer provided by entryListPtr unchanged and return E_OK.⌋ ()

[SWS_TCPIP_00276]⌈ If the numberOfElements is greater zero, TcpIp_GetNdpCacheEntries() shall copy up to that number of valid entries from the physical address cache related to ctrlIdx into the buffer provided by entryListPtr, set the parameter numberOfElements to the number of copied elements and return E_OK.⌋ ()

8.3.3.17 TcpIp_GetAndResetMeasurementData

[SWS_TCPIP_91006] ⌈

Service name:	TcpIp_GetAndResetMeasurementData	

Syntax:	`Std_ReturnType TcpIp_GetAndResetMeasurementData(`
	`    TcpIp_MeasurementIdxType MeasurementIdx,`
	`    boolean MeasurementResetNeeded,`
	`    uint32* MeasurementDataPtr`
	`)`	

Service ID[hex]:	0x45	
Sync/Async:	Synchronous	
Reentrancy:	Reentrant	
Parameters (in):	MeasurementIdx	Data index of measurement data
	MeasurementResetNeeded	Flag to trigger a reset of the measurement data
Parameters (inout):	None	
Parameters (out):	MeasurementDataPtr	Reference to data buffer, where to copy measurement data
Return value:	Std_ReturnType	E_OK: successful E_NOT_OK: failed
Description:	Allows to read and reset detailed measurement data for diagnostic purposes. Get all MeasurementIdx's at once is not supported. TCPIP_MEAS_ALL shall only be used to reset all MeasurementIdx's at once. A NULL_PTR shall be provided for MeasurementDataPtr in this case.	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00284] ⌈ The function TcpIp_GetAndResetMeasurementData shall be pre compile time configurable On/Off by the configuration parameter: TcpIpGetAndResetMeasurementDataApi.⌋ (SRS_Eth_00129)

[SWS_TCPIP_00285] ⌈ If development error detection is enabled: TcpIp_GetAndResetMeasurementData () shall check that the service TcpIp_Init () was previously called. If the check fails, TcpIp_GetAndResetMeasurementData () shall raise the development error TCPIP_E_UNINIT.⌋ (SRS_Eth_00129)

[SWS_TCPIP_00295] ⌈ TcpIp_GetAndResetMeasurementData () shall accept MeasurementDataPtr set to NULL_PTR. In this case the measurement data shall not be copied.⌋ (SRS_Eth_00129)

[SWS_TCPIP_00286] ⌈ TcpIp_GetAndResetMeasurementData ()shall return measurement data for selected measurement index.⌋ (SRS_Eth_00129)

[SWS_TCPIP_00287] ⌈ For measurement index TCPIP_MEAS_DROP_TCP TcpIp_GetAndResetMeasurementData () shall return the number of all TCP datagrams which cannot be mapped to a valid local IP/Port.⌋ (SRS_Eth_00129)

[SWS_TCPIP_00288] ⌈ For measurement index TCPIP_MEAS_DROP_UDP TcpIp_GetAndResetMeasurementData () shall return the number of all UDP datagrams which cannot be mapped to a valid local IP/Port.⌋ (SRS_Eth_00129)

[SWS_TCPIP_00289] ⌈ For measurement index TCPIP_MEAS_DROP_IPV4 TcpIp_GetAndResetMeasurementData () shall return the number of all dropped IPv4 datagrams, caused by invalid IP address.⌋ (SRS_Eth_00129)

[SWS_TCPIP_00290] ⌈ For measurement index TCPIP_MEAS_DROP_IPV6 TcpIp_GetAndResetMeasurementData () shall return the number of all dropped IPv6 datagrams, caused by invalid IP address.⌋ (SRS_Eth_00129)

[SWS_TCPIP_00291] ⌈ TcpIp_GetAndResetMeasurementData () shall return E_NOT_OK if the requested measurement index is not supported.⌋ (SRS_Eth_00129)

[SWS_TCPIP_00292] ⌈ TcpIp_GetAndResetMeasurementData () shall additionally reset the measurement data to 0 if the MeasurementResetNeeded is true. The reset shall be applied after measurement data has been read.⌋ (SRS_Eth_00129)

[SWS_TCPIP_00293] ⌈ TcpIp_GetAndResetMeasurementData () shall reset all existing measurement data to 0, if MeasurementResetNeeded is true and measurement index is set to TCPIP_MEAS_ALL.⌋ (SRS_Eth_00129)

[SWS_TCPIP_00294] ⌈ All measurement data which counts data shall not overrun.
⌋ (SRS_Eth_00129)

8.3.4 Transmission

8.3.4.1 TcpIp_UdpTransmit

[SWS_TCPIP_00025] ⌈

Service name:	TcpIp_UdpTransmit

Syntax:	`Std_ReturnType TcpIp_UdpTransmit(`
	`    TcpIp_SocketIdType SocketId,`
	`    const uint8* DataPtr,`
	`    const TcpIp_SockAddrType* RemoteAddrPtr,`

	`uint16 TotalLength`
	`)`	

Service ID[hex]:	0x12	
Sync/Async:	Synchronous	
Reentrancy:	Reentrant for different SocketIds. Non reentrant for the same SocketId.	
Parameters (in):	SocketId	Socket identifier of the related local socket resource.
	DataPtr	Pointer to a linear buffer of TotalLength bytes containing the data to be transmitted. In case DataPtr is a NULL_PTR, TcpIp shall retrieve data from upper layer via callback <Up>_CopyTxData().
	RemoteAddrPtr	IP address and port of the remote host to transmit to.
	TotalLength	indicates the payload size of the UDP datagram.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	E_OK: UDP message has been forwarded to EthIf for transmission. E_NOT_OK: UDP message could not be sent because of a permanent error, e.g. message is too long.
Description:	This service transmits data via UDP to a remote node. The transmission of the data is immediately performed with this function call by forwarding it to EthIf.	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00120]⌈ The service `TcpIp_UdpTransmit()` shall immediately transmit TotalLength data bytes via UDP and the socket specified by SocketId to a remote socket specified by RemoteAddrPtr according to the sequence diagram specified in section 9.5.⌋ ()

[SWS_TCPIP_00121]⌈ DataPtr shall either point to a linear buffer of TotalLength bytes containing the data for transmission or be a NULL_PTR. For data transmission the service `TcpIp_UdpTransmit()` shall either use all data from the linear buffer if DataPtr is not a NULL_PTR, or retrieve TotalLength data bytes from the upper layer by calling `Up_CopyTxData()` one or multiple times in the context of this service otherwise.⌋ ()

[SWS_TCPIP_00122]⌈ The service `TcpIp_UdpTransmit()` shall select the local IP address and port for transmission if the socket specified by SocketId has not been bound to a local resource via a previous call to `TcpIp_Bind()`.⌋ ()

8.3.4.2 TcpIp_TcpTransmit

[SWS_TCPIP_00050] ⌈

Service name:	TcpIp_TcpTransmit	

Syntax:	`Std_ReturnType TcpIp_TcpTransmit(`
	`    TcpIp_SocketIdType SocketId,`
	`    const uint8* DataPtr,`
	`    uint32 AvailableLength,`
	`    boolean ForceRetrieve`
	`)`	

Service ID[hex]:	0x13	
Sync/Async:	Asynchronous	
Reentrancy:	Reentrant for different SocketIds. Non reentrant for the same SocketId.	
Parameters (in):	SocketId	Socket identifier of the related local socket resource.

	DataPtr	Pointer to a linear buffer of AvailableLength bytes containing the data to be transmitted. In case DataPtr is a NULL_PTR, TcpIp shall retrieve data from upper layer via callback <Up>_CopyTxData().
	AvailableLength	Available data for transmission in bytes.
	ForceRetrieve	This parameter is only valid if DataPtr is a NULL_PTR. Indicates how the TCP/IP stack retrieves data from upper layer if DataPtr is a NULL_PTR. TRUE: the whole data indicated by availableLength shall be retrieved from the upper layer via one or multiple <Up>_CopyTxData() calls within the context of this transmit function. FALSE: The TCP/IP stack may retrieve up to availableLength data from the upper layer. It is allowed to retrieve less than availableLength bytes. Note: Not retrieved data will be provided by upper layer with the next call to TcpIp_TcpTransmit (along with new data if available).
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	E_OK: The request has been accepted E_NOT_OK: The request has not been accepted, e.g. due to a lack of buffer space or the socket is not connected.
Description:	This service requests transmission of data via TCP to a remote node. The transmission of the data is decoupled. Note: The TCP segment(s) are sent dependent on runtime factors (e.g. receive window) and configuration parameter (e.g. Nagle algorithm) .	
Available via:	`TcpIp.h`	

⌋ ()

[SWS_TCPIP_00123]⌈ The service `TcpIp_TcpTransmit()` shall transmit data via TCP and the socket specified by SocketId to the connected remote socket according to the sequence diagram specified in section 9.4.⌋ ()

[SWS_TCPIP_00124]⌈ DataPtr shall either point to a linear buffer of AvailableLength bytes containing the data for transmission or be a NULL_PTR. For data transmission the service `TcpIp_TcpTransmit()` shall either use all data from the linear buffer if DataPtr is not a NULL_PTR, or retrieve up to AvailableLength data bytes from the upper layer by calling Up_CopyTxData() one or multiple times in the context of this service otherwise.⌋ ()

[SWS_TCPIP_00125]⌈ The service `TcpIp_TcpTransmit()` shall retrieve exactly AvailableLength bytes from the upper layer if the parameter DataPtr is a NULL_PTR and ForceRetrieve is TRUE. (If DataPtr is a NULL_PTR and ForceRetrieve is FALSE, TcpIp may retrieve less data then available).⌋ ()

Note: The TCP segment(s) are sent dependent on runtime factors (e.g. receive window) and configuration parameter (e.g. Nagle algorithm).

8.4 Call-back notifications

This is a list of functions provided for other modules.

8.4.1 TcpIp_RxIndication

[SWS_TCPIP_00029] ⌈

Service name:	TcpIp_RxIndication	
Syntax:	`void TcpIp_RxIndication( uint8 CtrlIdx, Eth_FrameType FrameType, boolean IsBroadcast, const uint8* PhysAddrPtr, const uint8* DataPtr, uint16 LenByte )`	
Service ID[hex]:	0x14	
Sync/Async:	Synchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	CtrlIdx	Index of the EthIf controller.
	FrameType	frame type of received Ethernet frame
	IsBroadcast	parameter to indicate a broadcast frame
	PhysAddrPtr	pointer to Physical source address (MAC address in network byte order) of received Ethernet frame
	DataPtr	Pointer to payload of the received Ethernet frame (i.e. Ethernet header is not provided).
	LenByte	Length of received data.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	None	
Description:	By this API service the TCP/IP stack gets an indication and the data of a received frame.	
Available via:	`TcpIp.h`	

⌋ ()

8.5 Scheduled functions

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

8.5.1 Terms and definitions

For details refer to the chapter 8.5 “Scheduled functions” in *SWS_BSWGeneral.*

8.5.2 TcpIp_MainFunction

[SWS_TCPIP_00026] ⌈

Service name:	TcpIp_MainFunction
Syntax:	`void TcpIp_MainFunction( void )`
Service ID[hex]:	0x15
Description:	Schedules the TCP/IP stack. (Entry point for scheduling)
Available via:	`SchM_TcpIp.h`

⌋ ()

8.6 Expected Interfaces

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

8.6.1 Mandatory Interfaces

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

[SWS_TCPIP_00027] ⌈

API function	***Header File***	***Description***
Dem_SetEventStatus	Dem.h	Called by SW-Cs or BSW modules to report monitor status information to the Dem. BSW modules calling Dem_SetEventStatus can safely ignore the return value.
Det_ReportRuntimeError	Det.h	Service to report runtime errors. If a callout has been configured then this callout shall be called.
EthIf_GetPhysAddr	EthIf.h	Obtains the physical source address used by the indexed controller
EthIf_ProvideTxBuffer	EthIf.h	Provides access to a transmit buffer of the specified Ethernet controller.
EthIf_SetPhysAddr	EthIf.h	Sets the physical source address used by the indexed controller.
EthIf_Transmit	EthIf.h	Triggers transmission of a previously filled transmit buffer
EthSM_TcpIpModeIndication	EthSM_TcpIp.h	This service is called by the TcpIp to report the actual TcpIp state (e.g. online, offline).

⌋ ()

8.6.2 Optional Interfaces

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

[SWS_TCPIP_00028] ⌈

API function	***Header File***	***Description***
Csm_Decrypt	Csm.h	Decrypts the given encrypted data and store the decrypted plaintext in the memory location pointed by the result pointer.
Csm_Encrypt	Csm.h	Encrypts the given data and store the ciphertext in the memory location pointed by the result pointer.
Csm_Hash	Csm.h	Uses the given data to perform the hash calculation and stores the hash.
Csm_KeyElementCopy	Csm.h	This function shall copy a key elements from one key to a target key.
Csm_KeyElementCopyPartial	Csm.h	Copies a key element to another key element in the same crypto driver. The keyElementSourceOffset and keyElementCopyLength allows to copy just a part of the source key element into the destination. The offset into the target key is also specified with this function.
Csm_KeyExchangeCalcPubVal	Csm.h	Calculates the public value of the current user for the key

		exchange and stores the public key in the memory location pointed by the public value pointer.
Csm_KeyExchangeCalcSecret	Csm.h	Calculates the shared secret key for the key exchange with the key material of the key identified by the keyId and the partner public key. The shared secret key is stored as a key element in the same key.
Csm_MacGenerate	Csm.h	Uses the given data to perform a MAC generation and stores the MAC in the memory location pointed to by the MAC pointer.
Csm_MacVerify	Csm.h	Verifies the given MAC by comparing if the MAC is generated with the given data.
Csm_RandomGenerate	Csm.h	Generate a random number and stores it in the memory location pointed by the result pointer.
Csm_SignatureGenerate	Csm.h	Uses the given data to perform the signature calculation and stores the signature in the memory location pointed by the result pointer.
Csm_SignatureVerify	Csm.h	Verifies the given MAC by comparing if the signature is generated with the given data.
Det_ReportError	Det.h	Service to report development errors.
EthIf_UpdatePhysAddrFilter	EthIf.h	Update the physical source address to/from the indexed controller filter. If the Ethernet Controller is not capable to do the filtering, the software has to do this.
KeyM_GetCertificate	KeyM.h	This function provides the certificate data
KeyM_SetCertificate	KeyM.h	This function provides the certificate data to the key management module to temporarily store the certificate.
KeyM_VerifyCertificate	KeyM.h	This function verifies a certificate that was previously provided with KeyM_SetCertificate() against already stored and provided certificates stored with other certificate IDs.
KeyM_VerifyCertificateChain	KeyM.h	This function performs a certificate verification against a list of certificates. It is a pre-requisite that the certificate that shall be checked has already been written with KeyM_SetCertificate() and that the root certificate is either in the list or is already assigned to one of the other certificates.

⌋ ()

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 ServiceID of the functions defined in this chapter are specified at the upper layer module implementing the functions.

8.6.3.1 TcpIp_<Up>GetSocket

[SWS_TCPIP_00018] ⌈

Service name:	TcpIp_<Up><Up_TlsServerGetPskIdentity>

Syntax:	`Std_ReturnType TcpIp_<Up><Up_TlsServerGetPskIdentity>(`
	`    TcpIp_DomainType Domain,`
	`    TcpIp_ProtocolType Protocol,`
	`    TcpIp_SocketIdType* SocketIdPtr`

	)	
Service ID[hex]:	0x03	
Sync/Async:	Synchronous	
Reentrancy:	Reentrant	
Parameters (in):	Domain	IP address family.
	Protocol	Socket protocol as sub-family of parameter type.
Parameters (inout):	None	
Parameters (out):	SocketIdPtr	Pointer to socket identifier representing the requested socket. This socket identifier must be provided for all further API calls which requires a SocketId. Note: SocketIdPtr is only valid if return value is E_OK.
Return value:	Std_ReturnType	Result of operation E_OK The request has been accepted E_NOT_OK The request has not been accepted: no free socket
Description:	By this API service the TCP/IP stack is requested to allocate a new socket. Note: Each accepted incoming TCP connection also allocates a socket resource.	
Available via:	`TcpIp.h`	

⌋ (SRS_Eth_00103)

[SWS_TCPIP_00128]⌈ If development error detection is enabled, the service `TcpIp_<Up>GetSocket()` shall check the parameter Domain for being valid and raise the development error TCPIP_E_AFNOSUPPORT if it is invalid.⌋ ()

[SWS_TCPIP_00222]⌈ For each configured TcpIpSocketOwner TcpIp shall provide a separate TcpIp_<Up>GetSocket API by replacing the tag <Up> with the short name of the TcpIpSocketOwner container. Sockets allocated by a dedicated TcpIp_<Up>GetSocket API shall be assigned exclusively to the respective upper layer.⌋ (*SRS_Eth_00103*)

8.6.3.2 <Up_PhysAddrTableChg>

[SWS_TCPIP_00143] ⌈

Service name:	<Up_PhysAddrTableChg>	

Syntax:	`void <Up_PhysAddrTableChg>(`
	`    uint8 CtrlIdx,`
	`    const TcpIp_SockAddrType* IpAddrPtr,`
	`    const uint8* PhysAddrPtr,`
	`    boolean valid`
	`)`	

Sync/Async:	Synchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	CtrlIdx	EthIf controller index of the related ARP/NDP table.
	IpAddrPtr	specifies the IP address of the changed ARP/NDP table entry
	PhysAddrPtr	specifies the physical address of the changed ARP/NDP table entry
	valid	specifies if the ARP/NDP table entry is added or changed (TRUE) or has been removed (FALSE)
Parameters (inout):	None	
Parameters (out):	None	
Return value:	None	
Description:	This API is called by TcpIp in case of a change in the ARP/NDP table related to the controller specified by CtrlIdx.	
Available via:	`TcpIp_Externals.h`	

⌋ ()

8.6.3.3 SocketOwner functions

[SWS_TCPIP_00220]⌈ For sockets related to a TcpIpSocketOwner with TcpIpSocketOwnerUpperLayerType set to 'SOAD', TcpIp shall replace the tag <Up> with 'SoAd' for each of the following configurable interfaces.⌋ (*SRS_Eth_00103*)

[SWS_TCPIP_00221]⌈ For sockets related to a TcpIpSocketOwner with TcpIpSocketOwnerUpperLayerType set to 'CDD', TcpIp shall use the configured API names for each of the following configurable interfaces.⌋ (*SRS_Eth_00103*)

8.6.3.3.1 <Up_RxIndication>

[SWS_TCPIP_00223] ⌈

Service name:	<Up_RxIndication>	
Syntax:	`void <Up_RxIndication>( TcpIp_SocketIdType SocketId, const TcpIp_SockAddrType* RemoteAddrPtr, const uint8* BufPtr, uint16 Length )`	
Sync/Async:	Synchronous	
Reentrancy:	Reentrant for different SocketIds. Non reentrant for the same SocketId.	
Parameters (in):	SocketId	Socket identifier of the related local socket resource.
	RemoteAddrPtr	Pointer to memory containing IP address and port of the remote host which sent the data.
	BufPtr	Pointer to the received data.
	Length	Data length of the received TCP segment or UDP datagram.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	None	
Description:	The TCP/IP stack calls this primitive after the reception of data on a socket. The socket identifier along with configuration information determines which module is to be called.	
Available via:	`configurable`	

⌋ (SRS_Eth_00103)

8.6.3.3.2 <Up_TcpIpEvent>

[SWS_TCPIP_00224] ⌈

Service name:	<Up_TcpIpEvent>	
Syntax:	`void <Up_TcpIpEvent>( TcpIp_SocketIdType SocketId, TcpIp_EventType Event )`	
Sync/Async:	Synchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	SocketId	Socket identifier of the related local socket resource.
	Event	This parameter contains a description of the event just encountered.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	None	
Description:	This service gets called if the stack encounters a condition described by the values in Event.	

Available via:	`configurable`

⌋ (SRS_Eth_00103)

8.6.3.3.3 <Up_TxConfirmation>

[SWS_TCPIP_00225] ⌈

Service name:	<Up_TxConfirmation>	
Syntax:	`void <Up_TxConfirmation>( TcpIp_SocketIdType SocketId, uint16 Length )`	
Sync/Async:	Synchronous	
Reentrancy:	Reentrant for different SocketIds. Non reentrant for the same SocketId.	
Parameters (in):	SocketId	Socket identifier of the related local socket resource.
	Length	Number of transmitted data bytes.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	None	
Description:	The TCP/IP stack calls this function after the data has been acknowledged by the peer for TCP. Caveats: The upper layer might not be able to determine exactly which data bytes have been confirmed.	
Available via:	`configurable`	

⌋ (SRS_Eth_00103)

8.6.3.3.4 <Up_TcpAccepted>

[SWS_TCPIP_00226] ⌈

Service name:	<Up_TcpAccepted>	
Syntax:	`Std_ReturnType <Up_TcpAccepted>( TcpIp_SocketIdType SocketId, TcpIp_SocketIdType SocketIdConnected, const TcpIp_SockAddrType* RemoteAddrPtr )`	
Sync/Async:	Synchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	SocketId	Socket identifier of the related local socket resource which has been used at TcpIp_Bind()
	SocketIdConnected	Socket identifier of the local socket resource used for the established connection.
	RemoteAddrPtr	IP address and port of the remote host.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	Std_ReturnType	Result of operation E_OK upper layer accepts the established connection E_NOT_OK upper layer refuses the established connection, TcpIp stack shall close the connection.
Description:	This service gets called if the stack put a socket into the listen mode before (as server) and a peer connected to it (as client). In detail: The TCP/IP stack calls this function after a socket was set into the listen state with TcpIp_TcpListen() and a TCP connection is requested by the peer.	
Available via:	`configurable`	

⌋ (SRS_Eth_00103)

8.6.3.3.5 <Up_TcpConnected>

[SWS_TCPIP_00227] ⌈

Service name:	<Up_TcpConnected>	

Syntax:	`void <Up_TcpConnected>(`
	`    TcpIp_SocketIdType SocketId`
	`)`	

Sync/Async:	Synchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	SocketId	Socket identifier of the related local socket resource.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	None	
Description:	This service gets called if the stack initiated a TCP connection before (as client) and the peer (the server) acknowledged the connection set up. In detail: The TCP/IP stack calls this function after a socket was requested to connect with TcpIp_TcpConnect() and a TCP connection is confirmed by the peer. The parameter value of SocketId equals the SocketId value of the preceeding TcpIp_TcpConnect() call.	
Available via:	`configurable`	

⌋ (SRS_Eth_00103)

8.6.3.3.6 <Up_CopyTxData>

[SWS_TCPIP_00228] ⌈

Service name:	<Up_CopyTxData>	

Syntax:	`BufReq_ReturnType <Up_CopyTxData>(`
	`    TcpIp_SocketIdType SocketId,`
	`    uint8* BufPtr,`
	`    uint16 BufLength`
	`)`	

Sync/Async:	Synchronous	
Reentrancy:	Reentrant for different SocketIds. Non reentrant for the same SocketId.	
Parameters (in):	SocketId	Socket identifier of the related local socket resource.
	BufLength	Length of provided data buffer.
Parameters (inout):	None	
Parameters (out):	BufPtr	Pointer to buffer for transmission data.
Return value:	BufReq_ReturnType	BUFREQ_OK: Data has been copied to the transmit buffer completely as requested. BUFREQ_E_NOT_OK: Data has not been copied. Request failed. (No further action for TcpIp required. Later the upper layer might either close the socket or retry the transmit request)
Description:	This service requests to copy data for transmission to the buffer indicated. This call is triggered by TcpIp_Transmit(). Note: The call to <Up>_CopyTxData() may happen in the context of TcpIp_Transmit().	
Available via:	`configurable`	

⌋ (SRS_Eth_00103)

8.6.3.3.7 <Up_LocalIpAddrAssignmentChg>

[SWS_TCPIP_00229] ⌈

Service name:	<Up_LocalIpAddrAssignmentChg>

Syntax:	`void <Up_LocalIpAddrAssignmentChg>(`
	`    TcpIp_LocalAddrIdType IpAddrId,`

	`    TcpIp_IpAddrStateType State`
	`)`

Sync/Async:	Synchronous
Reentrancy:	Non Reentrant
Parameters (in):	IpAddrId — IP address Identifier, representing an IP address specified in the TcpIp module configuraiton (e.g. static IPv4 address on EthIf controller 0).
	State — state of IP address assignment
Parameters (inout):	None
Parameters (out):	None
Return value:	None
Description:	This service gets called by the TCP/IP stack if an IP address assignment changes (i.e. new address assigned or assigned address becomes invalid).
Available via:	`configurable`

⌋ (SRS_Eth_00103)

8.6.3.4 < Up_IcmpMsgHandler>

[SWS_TCPIP_00270] ⌈

Service name:	<Up_IcmpMsgHandler>	

Syntax:	`void <Up_IcmpMsgHandler>(`
	`    TcpIp_LocalAddrIdType LocalAddrId,`
	`    const TcpIp_SockAddrType* RemoteAddrPtr,`
	`    uint8 Ttl,`
	`    uint8 Type,`
	`    uint8 Code,`
	`    uint16 DataLength,`
	`    uint8* DataPtr`
	`)`	

Sync/Async:	Synchronous	
Reentrancy:	Non Reentrant	
Parameters (in):	LocalAddrId	Local address identifier representing the local IP address and EthIf controller where the ICMP message has been received.
	RemoteAddrPtr	pointer to struct representing the address of the ICMP sender
	Ttl	Time to live value of the received ICMPv4 message or Hop Limit value of the received ICMPv6 message.
	Type	type field value of the reveived ICMP message (Note: the value of the type field determines the format of the remaining ICMP message data)
	Code	code field value of the received ICMP message
	DataLength	length of ICMP message
	DataPtr	Pointer to the received ICMP message
Parameters (inout):	None	
Parameters (out):	None	
Return value:	None	
Description:	By this API service the configured ICMP message handler function is called by the TCP/IP stack on reception of a ICMP message which is not handled by the TCP/IP stack.	
Available via:	`TcpIp_Externals.h`	

⌋ ()

8.6.3.5 <Up_DADAddressConflict>

[SWS_TCPIP_91005] ⌈

Service name:	<Up_DADAddressConflict>
Syntax:	`void <Up_DADAddressConflict>(`

	`TcpIp_LocalAddrIdType IpAddrId,`
	`const TcpIp_SockAddrType* IpAddrPtr,`
	`const uint8* LocalPhysAddrPtr,`
	`const uint8* RemotePhysAddrPtr`
	`)`	

Service ID[hex]:	0x1e	
Sync/Async:	Synchronous	
Reentrancy:	Reentrant	
Parameters (in):	IpAddrId	IP address Identifier, representing an IP address specified in the TcpIp module configuration.
	IpAddrPtr	Pointer to a struct where the conflicted IP address is stored.
	LocalPhysAddrPtr	Pointer to the memory where the local physical address (MAC address) related to the specified IP address is stored in network byte order.
	RemotePhysAddrPtr	Pointer to the memory where the remote physical address (MAC address) related to the specified IP address is stored in network byte order.
Parameters (inout):	None	
Parameters (out):	None	
Return value:	void	--
Description:	This API is called by TcpIp in case the Duplicate Address Detection (DAD) is enabled and detecting a duplicate IP Address.	
Available via:	`TcpIp_Externals.h`	

⌋ ()

[SWS_TCPIP_00283]⌈ If the optional TcpIpDuplicateAddressDetectionConfig is defined and a duplicate IP address was found by the Duplicate Address Detection (DAD) algorithm, the TcpIp shall call the callout function specified by TcpIpDuplicateAddressDetectionCalloutName.⌋ (SRS_Eth_00091, SRS_BSW_00452)

8.6.3.6 <Up_TlsGetCurrentTimeStamp>

[SWS_TCPIP_91012] ⌈

Service name:	<Up_TlsGetCurrentTime>	

Syntax:	`Std_ReturnType <Up_TlsGetCurrentTime>(`
	`uint32* CurrentTimeUtc`
	`)`	

Sync/Async:	Synchronous	
Reentrancy:	Reentrant	
Parameters (in):	None	
Parameters (inout):	None	
Parameters (out):	CurrentTimeUtc	Pointer to uint32 to provide the GMT Unix time value.
Return value:	Std_ReturnType	E_OK: Time stamp successfully provided. E_NOT_OK: Time stamp can currently not be provided. Data in CurrentTimeUtc not valid.
Description:	This function queries the current time. This information will be requested when assembling the client hello message.	
Available via:	`TcpIp_Externals.h`	

⌋ ()

[SWS_TCPIP_00330] **DRAFT** ⌈ If the optional parameter *TcpIpTlsConnectionGetTimeFunc* is defined the TLS_CLIENT shall call the

configured function to query the current time. The value 0 indicates that no time is available. The value 0 is also transmitted if the function returns E_NOT_OK.
⌋ ()

[SWS_TCPIP_00332] **DRAFT** ⌈ The function <Up_TlsGetCurrentTime>() shall provide the current UTC time. It is used to assemble the ClientHello handshake message. The time is provided in big endian format and follows either the GMT Unix time format or can be 0 (See IETF RFC 5246, section 7.4.1.2, gmt_unix_time for details).
⌋ ()

8.6.3.7 <Up_TlsServerGetPskIdentityHint>

[SWS_TCPIP_91013] ⌈

Service name:	<Up_TlsServerGetPskIdentityHint>	

Syntax:	`Std_ReturnType <Up_TlsServerGetPskIdentityHint>(`
	`    TcpIp_SocketIdType SocketId,`
	`    TcpIp_TlsConnectionIdType TlsConnectionId,`
	`    uint16* IdentityHintLengthPtr,`
	`    uint8* IdentityHintPtr`
	`)`	

Sync/Async:	Synchronous	
Reentrancy:	Reentrant	
Parameters (in):	SocketId	Socket identifier of the related local socket resource.
	TlsConnectionId	Provides the TLS connection identifier.
Parameters (inout):	IdentityHintLengthPtr	In: Provides the number of bytes available where identityHintPtr links to. Out: Provides the number of bytes that has been overwritten in identityHintPtr.
Parameters (out):	IdentityHintPtr	Ptr to buffer that is used to store the IdentityHint information.
Return value:	Std_ReturnType	E_OK: IdentityHint successfully provided E_NOT_OK: IdentityHint could not be provided. Data in the pointer is invalid and shall not be used.
Description:	Queries the Identity hint for a pre-shared key ciphersuite. This information is transmitted by the TLS Server to provide its identification to the TLS client.	
Available via:	`TcpIp_Externals.h`	

⌋ (SRS_Eth_00137)

[SWS_TCPIP_00333] **DRAFT** ⌈ If the TLS_SERVER selects a PSK ciphersuite from the offered ciphersuite list and *TcpIpTlsPresharedKeyIdentityHint* is not defined but *TcpIpTlsPskGetKeyIdentyHintFunc* is defined, then this function shall be called when the TLS_SERVER assembles the ServerKeyExchange message (according to RFC4279, Sect. 2) during the handshake to query the psk_identity_hint.
⌋ ()

8.6.3.8 <Up_TlsClientGetPskIdentity >

[SWS_TCPIP_91014] ⌈

Service name:	<Up_TlsClientGetPskIdentity>

Syntax:	`Std_ReturnType <Up_TlsClientGetPskIdentity>(`
	`    TcpIp_SocketIdType SocketId,`
	`    TcpIp_TlsConnectionIdType TlsConnectionId,`
	`    uint16 PskIdentityHintLength,`

	`const uint8* PskIdentityHintPtr,`
	`uint16* PskKeyIdentityLengthPtr,`
	`uint8* PskKeyIdentityPtr,`
	`uint32* CsmKeyId`
	`)`	

Sync/Async:	Synchronous	
Reentrancy:	Reentrant	
Parameters (in):	SocketId	Socket identifier of the related local socket resource.
	TlsConnectionId	Provides the TLS connection identifier.
	PskIdentityHintLength	Provides the number of bytes available in identityHintPtr.
	PskIdentityHintPtr	Pointer to the identity hint information from the server.
Parameters (inout):	PskKeyIdentityLengthPtr	In: Provides the number of bytes available in PskKeyIdentityPtr. Out: Provides the actual number of bytes that has been written to PskKeyIdentityPtr.
Parameters (out):	PskKeyIdentityPtr	Buffer that is used to store the pre-shared key identification.
	CsmKeyId	Provides the identifier of a CSM key.
Return value:	Std_ReturnType	E_OK: Pre-Shared key selected properly. All output values are valid. E_NOT_OK: Pre-Shared key could not be selected. Key selection failed.
Description:	This function is called on the TLS client side. It provides the key identification based on the identity hint provided by the TLS server. The TLS client selects the pre-shared key and returns the key identification name and the CSM key reference.	
Available via:	`TcpIp_Externals.h`	

⌋ (SRS_Eth_00137)

[SWS_TCPIP_00334] **DRAFT** ⌈ If the TLS_CLIENT receives a selected PSK ciphersuite and *TcpIpTlsPresharedKeyIdentityHint* or *TcpIpTlsPresharedKeyIdentity* or *TcpIpTlsPresharedKeyCsmKeyRef* is not defined but *TcpIpTlsPskGetClientKeyIdentityFunc* is defined, then this function shall be called when the TLS_CLIENT assembles the ClientKeyExchange message (according to RFC4279, Sect. 2). The function provides the pre-shared key and the psk_identity which is provided in the ClientKeyExchange message.
⌋ ()

8.6.3.9 <Up_TlsServerGetPskIdentity>

[SWS_TCPIP_91015] ⌈

Service name:	<Up_TlsServerGetPskIdentity>

Syntax:	`Std_ReturnType <Up_TlsServerGetPskIdentity>(`
	`TcpIp_SocketIdType SocketId,`
	`TcpIp_TlsConnectionIdType TlsConnectionId,`
	`uint16 PskKeyIdentityLength,`
	`const uint8* PskKeyIdentityPtr,`
	`uint32* CsmKeyId`
	`)`

Sync/Async:	Synchronous
Reentrancy:	Reentrant

Parameters (in):	SocketId	Socket identifier of the related local socket resource.
	TlsConnectionId	Provides the TLS connection identifier.
	PskKeyIdentityLength	Provides the number of bytes available in PskKeyIdentityPtr.
	PskKeyIdentityPtr	Pointer to a buffer that provides the PSK key identification information.
Parameters (inout):	None	
Parameters (out):	CsmKeyId	Provides the identifier of a CSM key.
Return value:	Std_ReturnType	E_OK: PSK key was identified and CsmKey reference provided properly. E_NOT_OK: Key identification or PSK key could not be identified.
Description:	This callback is used for the TLS server to provide the CSM key name according to the key identification that was selected by the TLS client. The TLS server must provide a CsmKey reference to a key that matches this key identification name.	
Available via:	`TcpIp_Externals.h`	

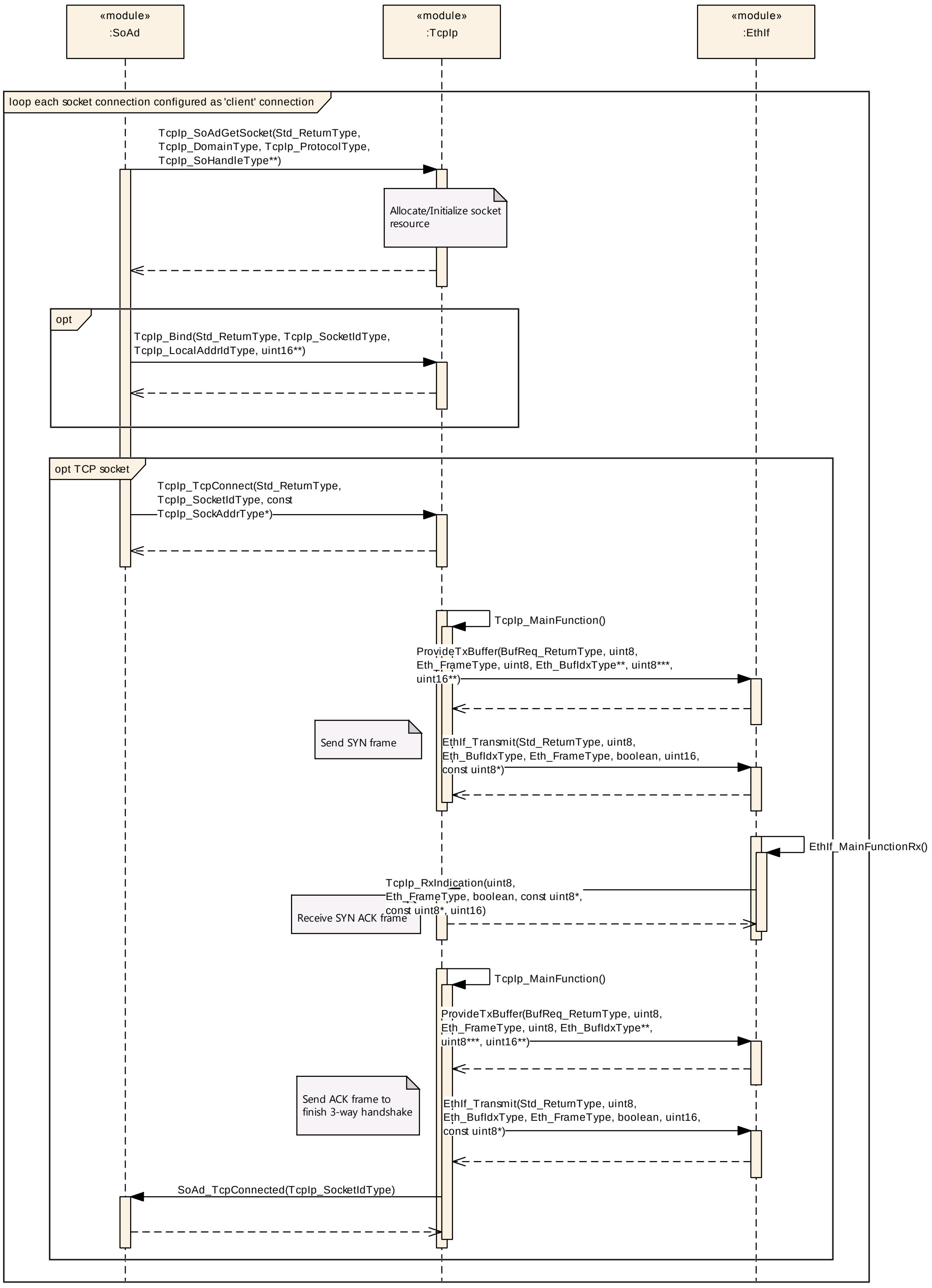
⌋ (SRS_Eth_00137)

[SWS_TCPIP_00335] **DRAFT** ⌈ If the TLS_SERVER receives the ClientKeyExchange message during the handshake and *TcpIpTlsPresharedKeyIdentity* or *TcpIpTlsPresharedKeyCsmKeyRef* is not defined but *TcpIpTlsPskGetServerKeyIdentityFunc* is defined, then this function shall be called when the TLS_CLIENT assembles the ClientKeyExchange message (according to RFC4279, Sect. 2). The function provides the pre-shared key and the psk_identity which is provided in the ClientKeyExchange message.
⌋ ()

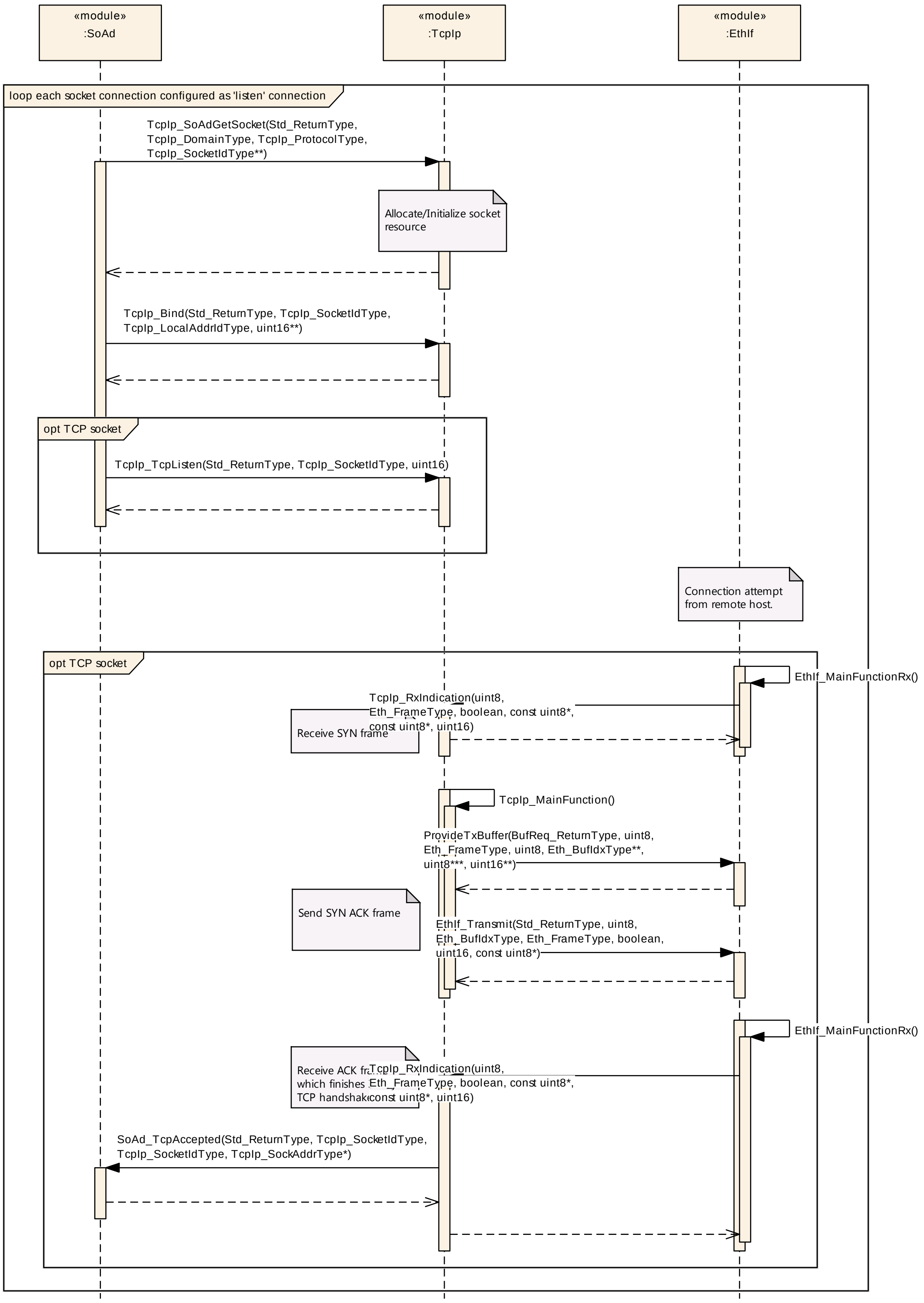
9 Sequence diagrams

Note: The following sequence charts showcase SoAd as upper layer of TcpIp. They shall be understood as example for any other configurable upper layer module.

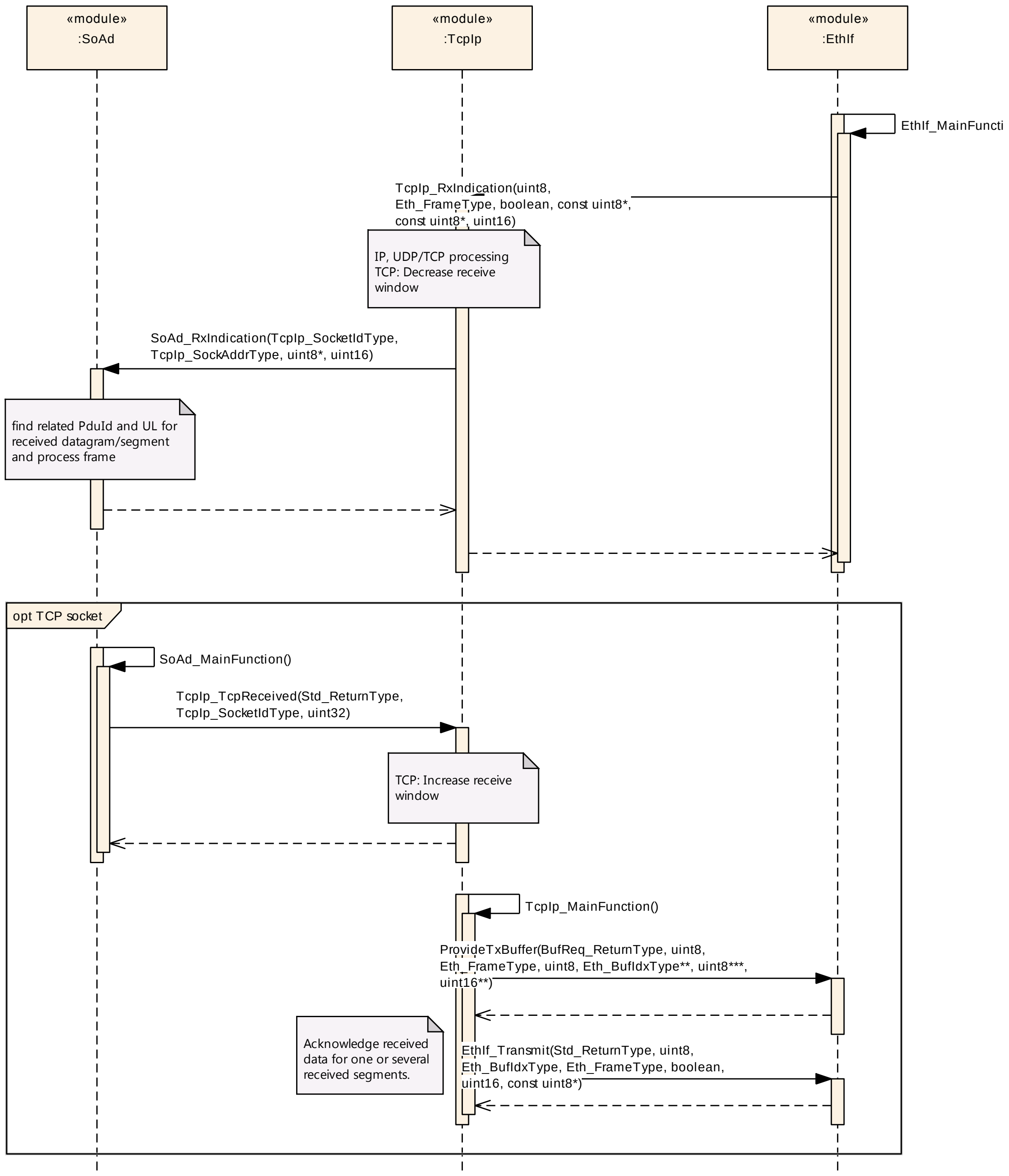
9.1 TCP Connection Setup – Client


«module» :SoAd
«module» :TcpIp
«module» :EthIf
loop each socket connection configured as 'client' connection
TcpIp_SoAdGetSocket(Std_ReturnType, TcpIp_DomainType, TcpIp_ProtocolType, TcpIp_SoHandleType**)
Allocate/Initialize socket resource
opt
TcpIp_Bind(Std_ReturnType, TcpIp_SocketIdType, TcpIp_LocalAddrIdType, uint16**)
opt TCP socket
TcpIp_TcpConnect(Std_ReturnType, TcpIp_SocketIdType, const TcpIp_SockAddrType*)
TcpIp_MainFunction()
ProvideTxBuffer(BufReq_ReturnType, uint8, Eth_FrameType, uint8, Eth_BufIdxType**, uint8***, uint16**)
Send SYN frame
EthIf_Transmit(Std_ReturnType, uint8, Eth_BufIdxType, Eth_FrameType, boolean, uint16, const uint8*)
EthIf_MainFunctionRx()
TcpIp_RxIndication(uint8, Eth_FrameType, boolean, const uint8*, const uint8*, uint16)
Receive SYN ACK frame
TcpIp_MainFunction()
ProvideTxBuffer(BufReq_ReturnType, uint8, Eth_FrameType, uint8, Eth_BufIdxType**, uint8***, uint16**)
Send ACK frame to finish 3-way handshake
EthIf_Transmit(Std_ReturnType, uint8, Eth_BufIdxType, Eth_FrameType, boolean, uint16, const uint8*)
SoAd_TcpConnected(TcpIp_SocketIdType)

9.2 TCP Connection Setup – Server

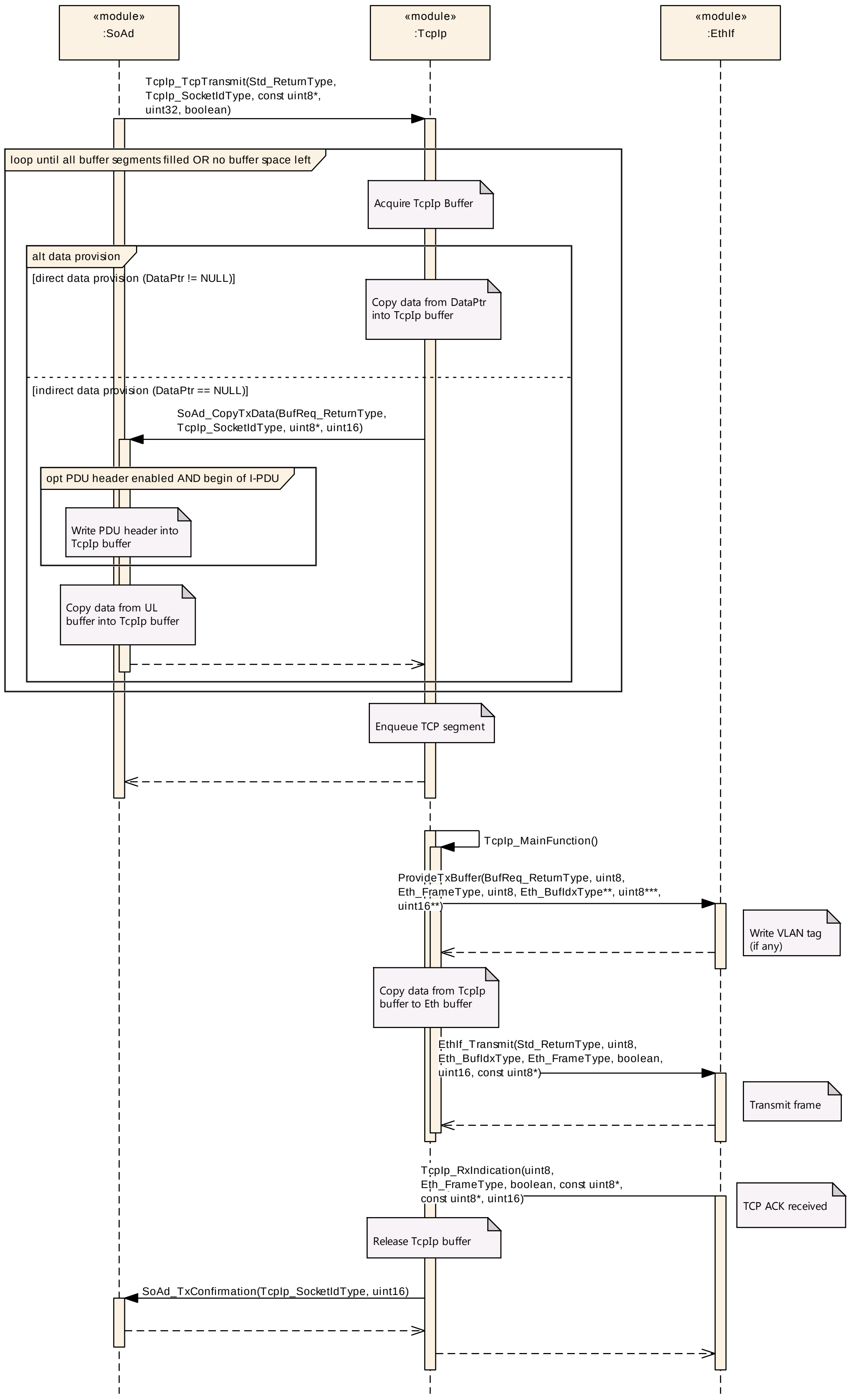

«module» :SoAd
«module» :TcpIp
«module» :EthIf
loop each socket connection configured as 'listen' connection
TcpIp_SoAdGetSocket(Std_ReturnType, TcpIp_DomainType, TcpIp_ProtocolType, TcpIp_SocketIdType**)
Allocate/Initialize socket resource
TcpIp_Bind(Std_ReturnType, TcpIp_SocketIdType, TcpIp_LocalAddrIdType, uint16**)
opt TCP socket
TcpIp_TcpListen(Std_ReturnType, TcpIp_SocketIdType, uint16)
Connection attempt from remote host.
opt TCP socket
EthIf_MainFunctionRx()
TcpIp_RxIndication(uint8, Eth_FrameType, boolean, const uint8*, const uint8*, uint16)
Receive SYN frame
TcpIp_MainFunction()
ProvideTxBuffer(BufReq_ReturnType, uint8, Eth_FrameType, uint8, Eth_BufIdxType**, uint8***, uint16**)
Send SYN ACK frame
EthIf_Transmit(Std_ReturnType, uint8, Eth_BufIdxType, Eth_FrameType, boolean, uint16, const uint8*)
EthIf_MainFunctionRx()
Receive ACK frame which finishes TCP handshake
TcpIp_RxIndication(uint8, Eth_FrameType, boolean, const uint8*, const uint8*, uint16)
SoAd_TcpAccepted(Std_ReturnType, TcpIp_SocketIdType, TcpIp_SocketIdType, TcpIp_SockAddrType*)

9.3 Reception

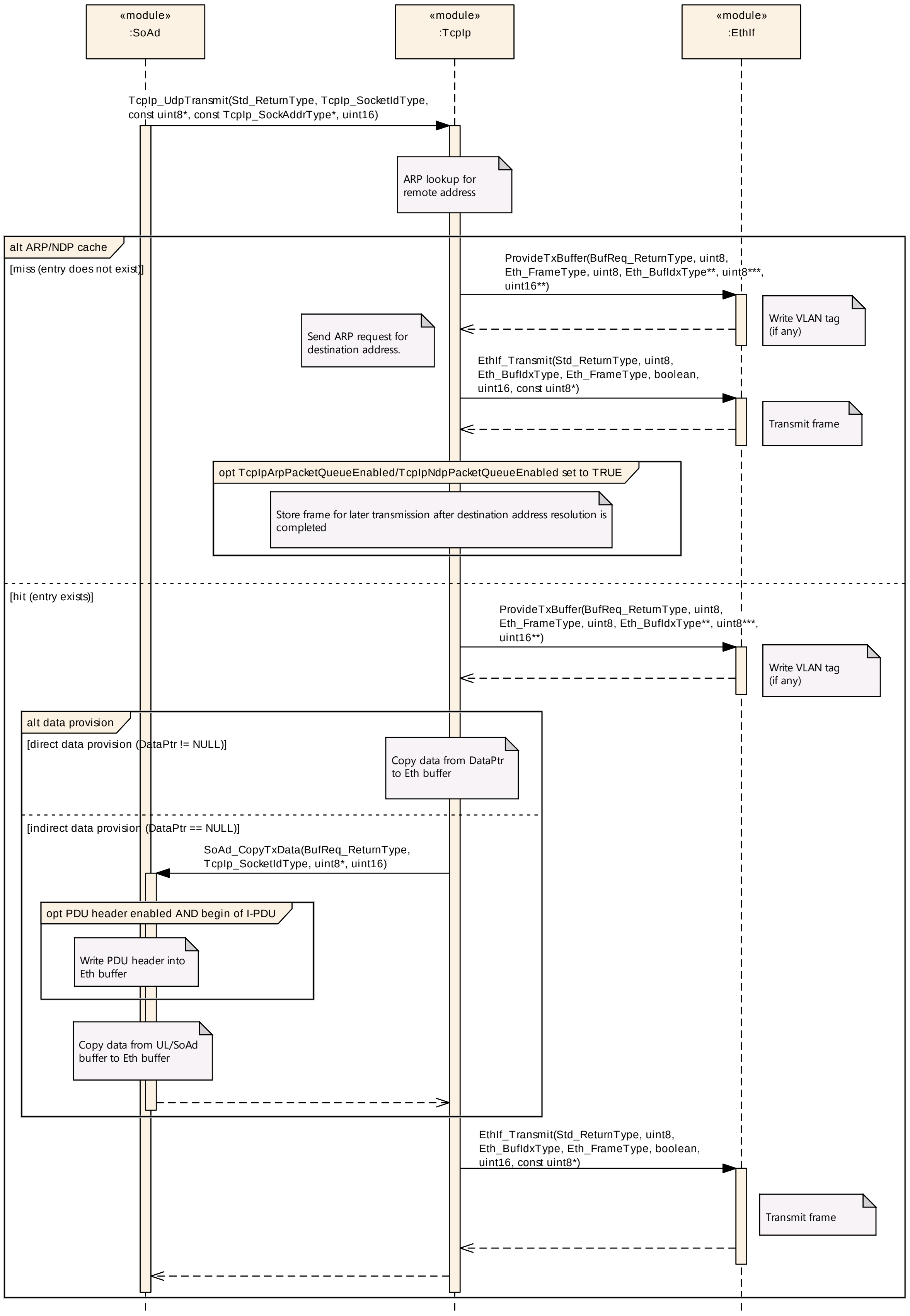

«module»
:SoAd
«module»
:TcpIp
«module»
:EthIf
EthIf_MainFuncti
TcpIp_RxIndication(uint8,
Eth_FrameType, boolean, const uint8*,
const uint8*, uint16)
IP, UDP/TCP processing
TCP: Decrease receive
window
SoAd_RxIndication(TcpIp_SocketIdType,
TcpIp_SockAddrType, uint8*, uint16)
find related PduId and UL for
received datagram/segment
and process frame
opt TCP socket
SoAd_MainFunction()
TcpIp_TcpReceived(Std_ReturnType,
TcpIp_SocketIdType, uint32)
TCP: Increase receive
window
TcpIp_MainFunction()
ProvideTxBuffer(BufReq_ReturnType, uint8,
Eth_FrameType, uint8, Eth_BufIdxType**, uint8***,
uint16**)
Acknowledge received
data for one or several
received segments.
EthIf_Transmit(Std_ReturnType, uint8,
Eth_BufIdxType, Eth_FrameType, boolean,
uint16, const uint8*)

Note: Even it is not shown in the sequence diagram of section 9.3, TcpIp may decouple the data reception if required. E.g. for reassembling of incoming IP datagrams that are fragmented, TcpIp shall copy the received data to a TcpIp buffer and decouple TcpIp_RxIndication() from SoAd_RxIndication().

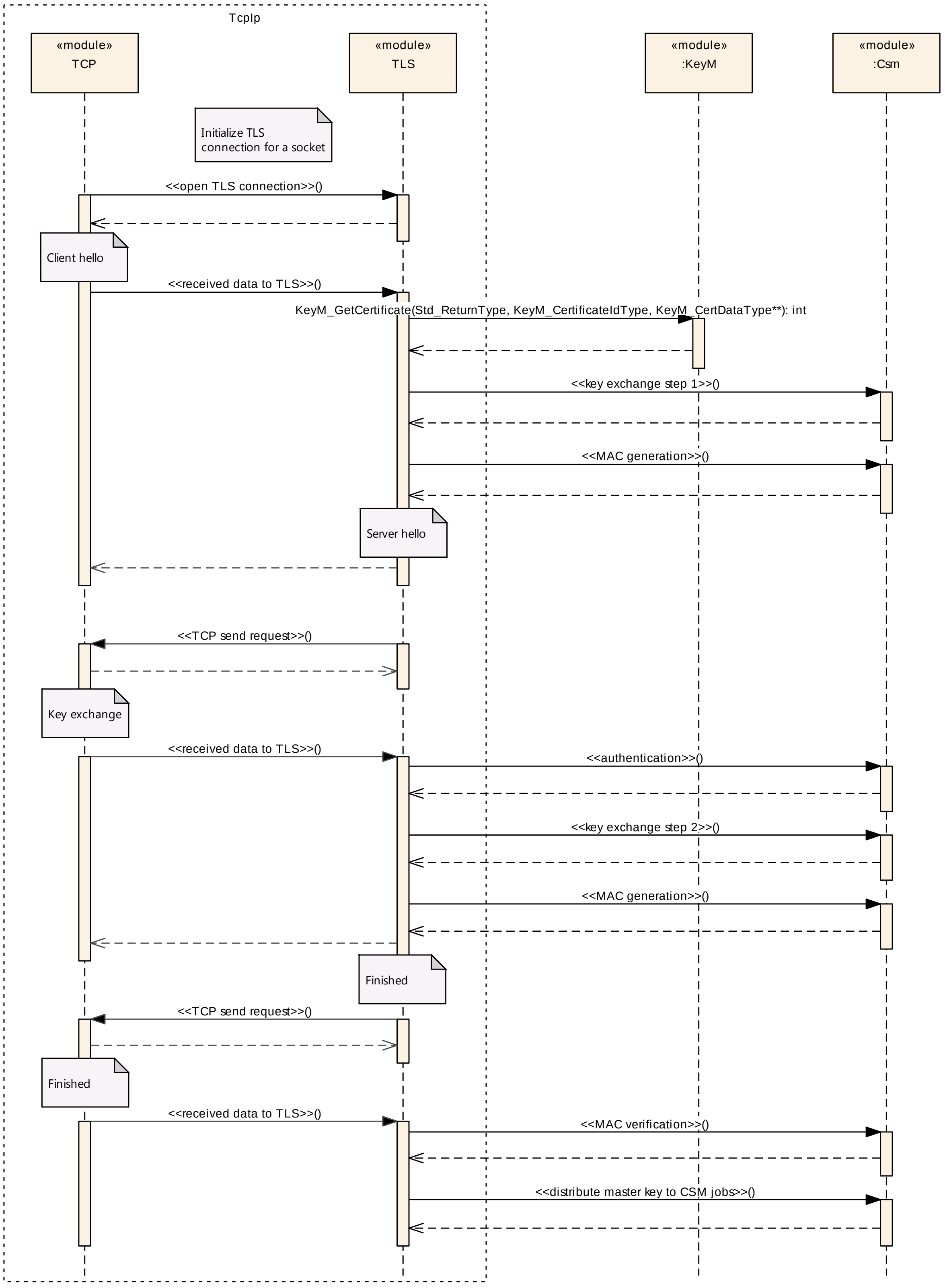
9.4 Transmission TCP


«module» :SoAd
«module» :TcpIp
«module» :EthIf
TcpIp_TcpTransmit(Std_ReturnType, TcpIp_SocketIdType, const uint8*, uint32, boolean)
loop until all buffer segments filled OR no buffer space left
Acquire TcpIp Buffer
alt data provision
[direct data provision (DataPtr != NULL)]
Copy data from DataPtr into TcpIp buffer
[indirect data provision (DataPtr == NULL)]
SoAd_CopyTxData(BufReq_ReturnType, TcpIp_SocketIdType, uint8*, uint16)
opt PDU header enabled AND begin of I-PDU
Write PDU header into TcpIp buffer
Copy data from UL buffer into TcpIp buffer
Enqueue TCP segment
TcpIp_MainFunction()
ProvideTxBuffer(BufReq_ReturnType, uint8, Eth_FrameType, uint8, Eth_BufIdxType**, uint8***, uint16**)
Write VLAN tag (if any)
Copy data from TcpIp buffer to Eth buffer
EthIf_Transmit(Std_ReturnType, uint8, Eth_BufIdxType, Eth_FrameType, boolean, uint16, const uint8*)
Transmit frame
TcpIp_RxIndication(uint8, Eth_FrameType, boolean, const uint8*, const uint8*, uint16)
TCP ACK received
Release TcpIp buffer
SoAd_TxConfirmation(TcpIp_SocketIdType, uint16)

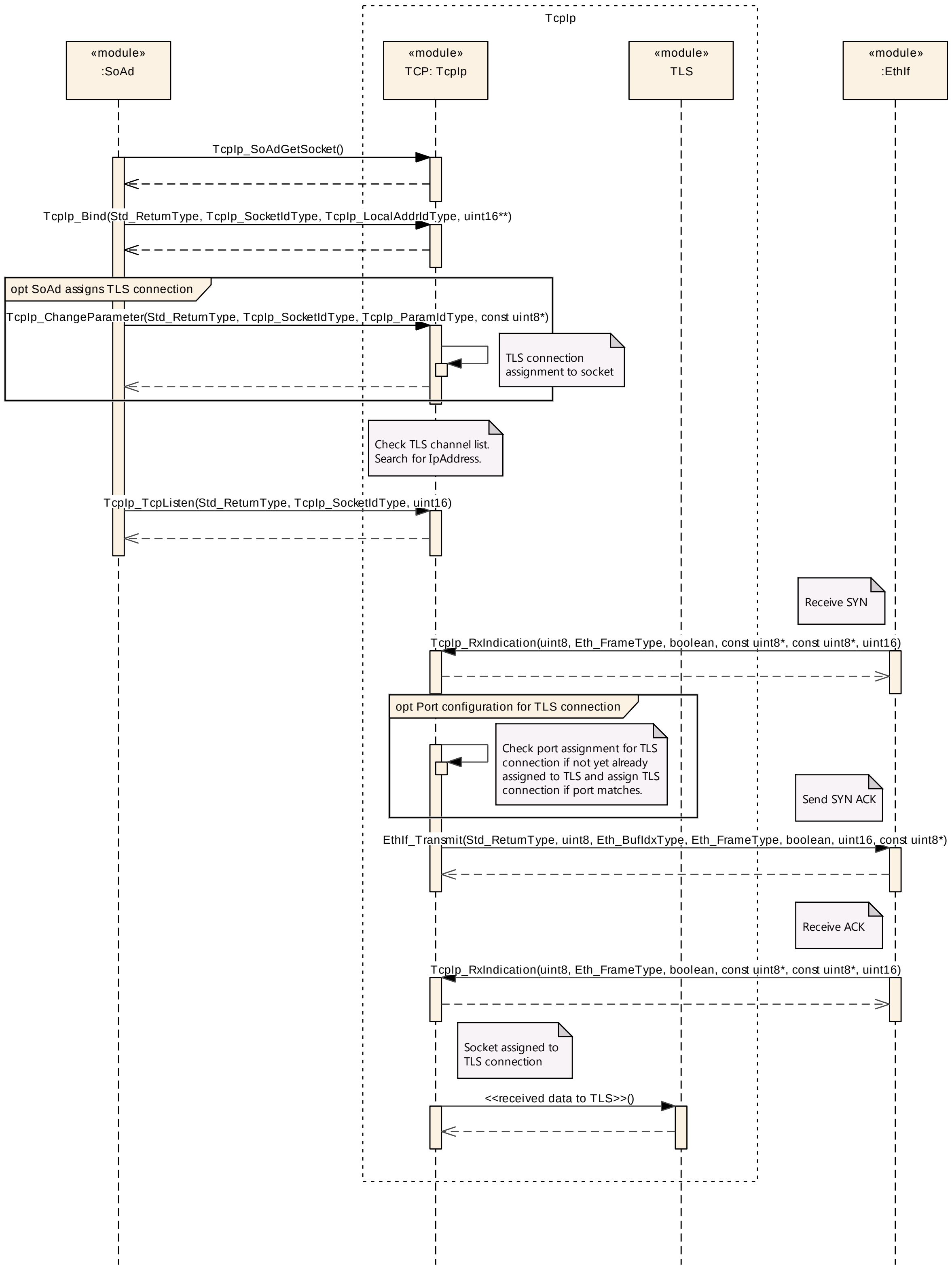
9.5 Transmission UDP


«module»
:SoAd
«module»
:TcpIp
«module»
:EthIf
TcpIp_UdpTransmit(Std_ReturnType, TcpIp_SocketIdType, const uint8*, const TcpIp_SockAddrType*, uint16)
ARP lookup for remote address
alt ARP/NDP cache
[miss (entry does not exist)]
ProvideTxBuffer(BufReq_ReturnType, uint8, Eth_FrameType, uint8, Eth_BufIdxType**, uint8***, uint16**)
Write VLAN tag (if any)
Send ARP request for destination address.
EthIf_Transmit(Std_ReturnType, uint8, Eth_BufIdxType, Eth_FrameType, boolean, uint16, const uint8*)
Transmit frame
opt TcpIpArpPacketQueueEnabled/TcpIpNdpPacketQueueEnabled set to TRUE
Store frame for later transmission after destination address resolution is completed
[hit (entry exists)]
ProvideTxBuffer(BufReq_ReturnType, uint8, Eth_FrameType, uint8, Eth_BufIdxType**, uint8***, uint16**)
Write VLAN tag (if any)
alt data provision
[direct data provision (DataPtr != NULL)]
Copy data from DataPtr to Eth buffer
[indirect data provision (DataPtr == NULL)]
SoAd_CopyTxData(BufReq_ReturnType, TcpIp_SocketIdType, uint8*, uint16)
opt PDU header enabled AND begin of I-PDU
Write PDU header into Eth buffer
Copy data from UL/SoAd buffer to Eth buffer
EthIf_Transmit(Std_ReturnType, uint8, Eth_BufIdxType, Eth_FrameType, boolean, uint16, const uint8*)
Transmit frame

9.6 Connection setup for a TLS server


TcpIp
«module» TCP
«module» TLS
«module» :KeyM
«module» :Csm
Initialize TLS connection for a socket
<<open TLS connection>>()
Client hello
<<received data to TLS>>()
KeyM_GetCertificate(Std_ReturnType, KeyM_CertificateIdType, KeyM_CertDataType**): int
<<key exchange step 1>>()
<<MAC generation>>()
Server hello
<<TCP send request>>()
Key exchange
<<received data to TLS>>()
<<authentication>>()
<<key exchange step 2>>()
<<MAC generation>>()
Finished
<<TCP send request>>()
Finished
<<received data to TLS>>()
<<MAC verification>>()
<<distribute master key to CSM jobs>>()

9.7 TLS connection assignment to socket


TcpIp
«module» :SoAd
«module» TCP: TcpIp
«module» TLS
«module» :EthIf
TcpIp_SoAdGetSocket()
TcpIp_Bind(Std_ReturnType, TcpIp_SocketIdType, TcpIp_LocalAddrIdType, uint16**)
opt SoAd assigns TLS connection
TcpIp_ChangeParameter(Std_ReturnType, TcpIp_SocketIdType, TcpIp_ParamIdType, const uint8*)
TLS connection assignment to socket
Check TLS channel list. Search for IpAddress.
TcpIp_TcpListen(Std_ReturnType, TcpIp_SocketIdType, uint16)
Receive SYN
TcpIp_RxIndication(uint8, Eth_FrameType, boolean, const uint8*, const uint8*, uint16)
opt Port configuration for TLS connection
Check port assignment for TLS connection if not yet already assigned to TLS and assign TLS connection if port matches.
Send SYN ACK
EthIf_Transmit(Std_ReturnType, uint8, Eth_BufIdxType, Eth_FrameType, boolean, uint16, const uint8*)
Receive ACK
TcpIp_RxIndication(uint8, Eth_FrameType, boolean, const uint8*, const uint8*, uint16)
Socket assigned to TLS connection
<<received data to TLS>>()

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 TcpIp.

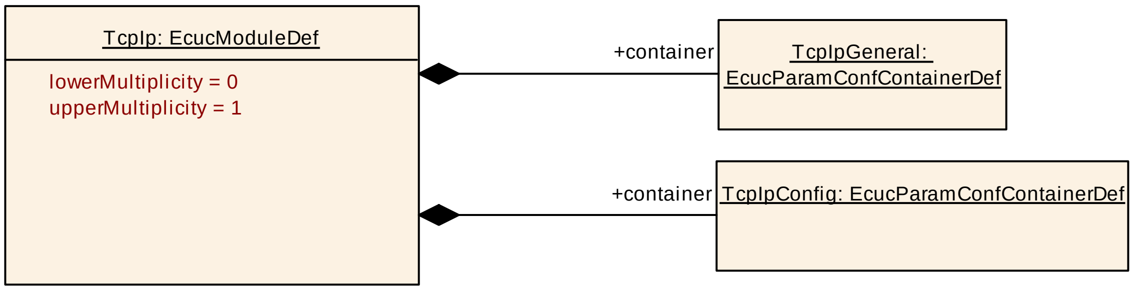
Chapter 10.3 specifies published information of the module TcpIp.

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

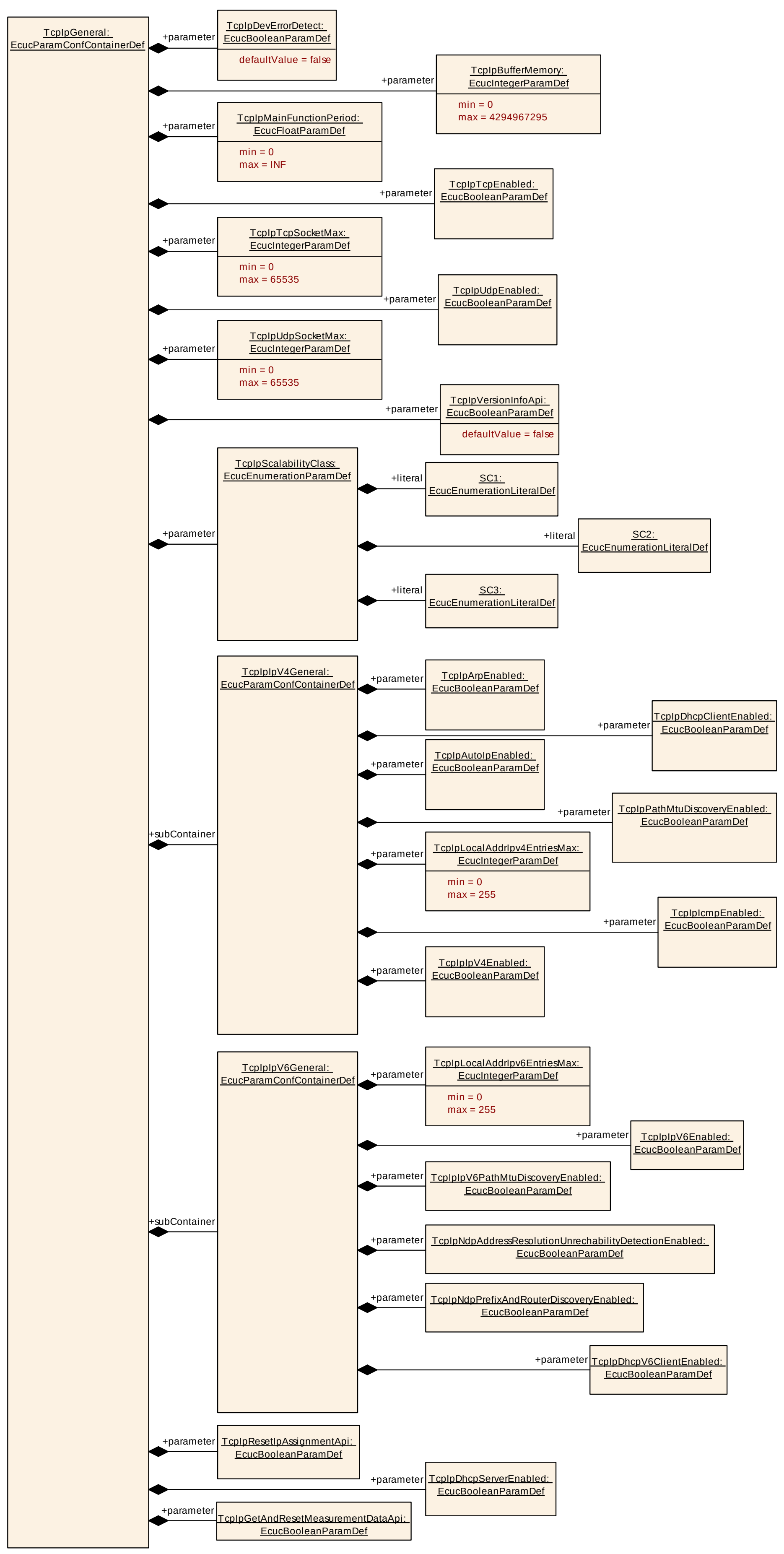
The following chapters summarize all configuration parameters. The detailed meanings of the parameters describe Chapters 7 and Chapter 8.



10.2.1 TcpIp

SWS Item	**ECUC_TcpIp_00001 :**
Module Name	*TcpIp*
Module Description	Configuration of the TcpIp (TCP/IP stack) module.
Post-Build Variant Support	true
Supported Config Variants	VARIANT-LINK-TIME, VARIANT-POST-BUILD, VARIANT-PRE-COMPILE

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
TcpIpConfig	1	This container contains the configuration parameters and sub containers of the AUTOSAR TcpIp module.
TcpIpGeneral	1	This container is a subcontainer of TcpIp and specifies the general configuration parameters of the TCP/IP stack.


TcpIpGeneral: EcucParamConfContainerDef
+parameter
TcpIpDevErrorDetect: EcucBooleanParamDef
defaultValue = false
+parameter
TcpIpBufferMemory: EcucIntegerParamDef
min = 0
max = 4294967295
+parameter
TcpIpMainFunctionPeriod: EcucFloatParamDef
min = 0
max = INF
+parameter
TcpIpTcpEnabled: EcucBooleanParamDef
+parameter
TcpIpTcpSocketMax: EcucIntegerParamDef
min = 0
max = 65535
+parameter
TcpIpUdpEnabled: EcucBooleanParamDef
+parameter
TcpIpUdpSocketMax: EcucIntegerParamDef
min = 0
max = 65535
+parameter
TcpIpVersionInfoApi: EcucBooleanParamDef
defaultValue = false
+parameter
TcpIpScalabilityClass: EcucEnumerationParamDef
+literal
SC1: EcucEnumerationLiteralDef
+literal
SC2: EcucEnumerationLiteralDef
+literal
SC3: EcucEnumerationLiteralDef
+subContainer
TcpIpIpV4General: EcucParamConfContainerDef
+parameter
TcpIpArpEnabled: EcucBooleanParamDef
+parameter
TcpIpDhcpClientEnabled: EcucBooleanParamDef
+parameter
TcpIpAutoIpEnabled: EcucBooleanParamDef
+parameter
TcpIpPathMtuDiscoveryEnabled: EcucBooleanParamDef
+parameter
TcpIpLocalAddrIpv4EntriesMax: EcucIntegerParamDef
min = 0
max = 255
+parameter
TcpIpIcmpEnabled: EcucBooleanParamDef
+parameter
TcpIpIpV4Enabled: EcucBooleanParamDef
+subContainer
TcpIpIpV6General: EcucParamConfContainerDef
+parameter
TcpIpLocalAddrIpv6EntriesMax: EcucIntegerParamDef
min = 0
max = 255
+parameter
TcpIpIpV6Enabled: EcucBooleanParamDef
+parameter
TcpIpIpV6PathMtuDiscoveryEnabled: EcucBooleanParamDef
+parameter
TcpIpNdpAddressResolutionUnrechabilityDetectionEnabled: EcucBooleanParamDef
+parameter
TcpIpNdpPrefixAndRouterDiscoveryEnabled: EcucBooleanParamDef
+parameter
TcpIpDhcpV6ClientEnabled: EcucBooleanParamDef
+parameter
TcpIpResetIpAssignmentApi: EcucBooleanParamDef
+parameter
TcpIpDhcpServerEnabled: EcucBooleanParamDef
+parameter
TcpIpGetAndResetMeasurementDataApi: EcucBooleanParamDef

10.2.2 TcpIpGeneral

SWS Item	**ECUC_TcpIp_00002 :**		
Container Name	TcpIpGeneral		
Description	This container is a subcontainer of TcpIp and specifies the general configuration parameters of the TCP/IP stack.		
Configuration Parameters			

SWS Item	**ECUC_TcpIp_00016 :**		
Name	TcpIpBufferMemory		
Parent Container	TcpIpGeneral		
Description	Memory size in bytes reserved for TCP/IP buffers.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 4294967295		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00004 :**		
Name	TcpIpDevErrorDetect		
Parent Container	TcpIpGeneral		
Description	Switches the development error detection and notification on or off. • true: detection and notification is enabled. • false: detection and notification is disabled.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	false		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00183 :**		
Name	TcpIpDhcpServerEnabled		
Parent Container	TcpIpGeneral		
Description	Enables (TRUE) or disables (FALSE) the DHCP (Dynamic Host Configuration Protocol) Server.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00217 :**
Name	TcpIpGetAndResetMeasurementDataApi

Parent Container	TcpIpGeneral		
Description	Enables / Disables the Get and Reset Measurement Data API		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00013 :**		
Name	TcpIpMainFunctionPeriod		
Parent Container	TcpIpGeneral		
Description	Period of TcpIp_MainFunction in [s].		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	]0 .. INF[		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00182 :**		
Name	TcpIpResetIpAssignmentApi		
Parent Container	TcpIpGeneral		
Description	Enables/disables the API TcpIp_ResetIpAssignment of a DHCP-client.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00169 :**		
Name	TcpIpScalabilityClass		
Parent Container	TcpIpGeneral		
Description	In order to customize the TcpIp Stack to the specific needs of the user it can be scaled according to the scalability classes.		
Multiplicity	1		
Type	EcucEnumerationParamDef		
Range	SC1	IPv4 - In-Vehicle and Diagnostic Communication	
	SC2	IPv6 - In-Vehicle and Diagnostic Communication	
	SC3	IPv4 and IPv6 (Dual Stack) - In-Vehicle and Diagnostic Communication	
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	

Scope / Dependency	scope: local

SWS Item	**ECUC_TcpIp_00008 :**		
Name	TcpIpTcpEnabled		
Parent Container	TcpIpGeneral		
Description	Enables (TRUE) or disabled (FALSE) support of TCP (Transmission Control Protocol).		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00014 :**		
Name	TcpIpTcpSocketMax		
Parent Container	TcpIpGeneral		
Description	Maximum number of TCP sockets		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 65535		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00009 :**		
Name	TcpIpUdpEnabled		
Parent Container	TcpIpGeneral		
Description	Enables (TRUE) or disabled (FALSE) support of UDP (User Datagram Protocol)		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00015 :**		
Name	TcpIpUdpSocketMax		
Parent Container	TcpIpGeneral		
Description	Maximum number of UDP sockets.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 65535		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE

	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00005 :**		
Name	TcpIpVersionInfoApi		
Parent Container	TcpIpGeneral		
Description	If true the TcpIp_GetVersionInfo API is available.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	false		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
TcpIpIpV4General	1	This container is a subcontainer of TcpIp and specifies the general configuration parameters of the TCP/IP stack for IPv4
TcpIpIpV6General	1	This container is a subcontainer of TcpIp and specifies the general configuration parameters of the TCP/IP stack for IPv6.

10.2.3 TcpIpIpV4General

SWS Item	**ECUC_TcpIp_00163 :**
Container Name	TcpIpIpV4General
Description	This container is a subcontainer of TcpIp and specifies the general configuration parameters of the TCP/IP stack for IPv4
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00006 :**		
Name	TcpIpArpEnabled		
Parent Container	TcpIpIpV4General		
Description	Enables (TRUE) or disables (FALSE) support of ARP (Address Resolution Protocol).		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00011 :**
Name	TcpIpAutoIpEnabled
Parent Container	TcpIpIpV4General
Description	Enables (TRUE) or disables (FALSE) the Auto-IP (automatic private IP addressing) sub-module.
Multiplicity	1

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

SWS Item	**ECUC_TcpIp_00010 :**		
Name	TcpIpDhcpClientEnabled		
Parent Container	TcpIpIpV4General		
Description	Enables (TRUE) or disables (FALSE) the DHCP (Dynamic Host Configuration Protocol) Client.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00007 :**		
Name	TcpIpIcmpEnabled		
Parent Container	TcpIpIpV4General		
Description	Enables (TRUE) or disabled (FALSE) support of ICMP (Internet Control Message Protocol).		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00088 :**		
Name	TcpIpIpV4Enabled		
Parent Container	TcpIpIpV4General		
Description	Enables (TRUE) or disables (FALSE) support of IPv4 (Internet Protocol version 4).		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00018 :**
Name	TcpIpLocalAddrIpv4EntriesMax
Parent Container	TcpIpIpV4General
Description	Maximum number of LocalAddr table entries for IPv4.
Multiplicity	1
Type	EcucIntegerParamDef

Range	0 .. 255		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00012 :**		
Name	TcpIpPathMtuDiscoveryEnabled		
Parent Container	TcpIpIpV4General		
Description	Enables (TRUE) or disables (FALSE) the discovery of the maximum transmission unit on a path according to IETF RfC 1191.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers

10.2.4 TcpIpIpV6General

SWS Item	**ECUC_TcpIp_00164 :**
Container Name	TcpIpIpV6General
Description	This container is a subcontainer of TcpIp and specifies the general configuration parameters of the TCP/IP stack for IPv6.
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00093 :**		
Name	TcpIpDhcpV6ClientEnabled		
Parent Container	TcpIpIpV6General		
Description	Enables (TRUE) or disables (FALSE) the DHCPv6 (Dynamic Host Configuration Protocol for IPv6) Client.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00089 :**
Name	TcpIpIpV6Enabled
Parent Container	TcpIpIpV6General
Description	Enables (TRUE) or disables (FALSE) support of IPv6 (Internet Protocol version 6).
Multiplicity	1

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

SWS Item	**ECUC_TcpIp_00090 :**		
Name	TcpIpIpV6PathMtuDiscoveryEnabled		
Parent Container	TcpIpIpV6General		
Description	Enables (TRUE) or disables (FALSE) Path MTU Discovery support for IPv6 according to IETF RFC 1981.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

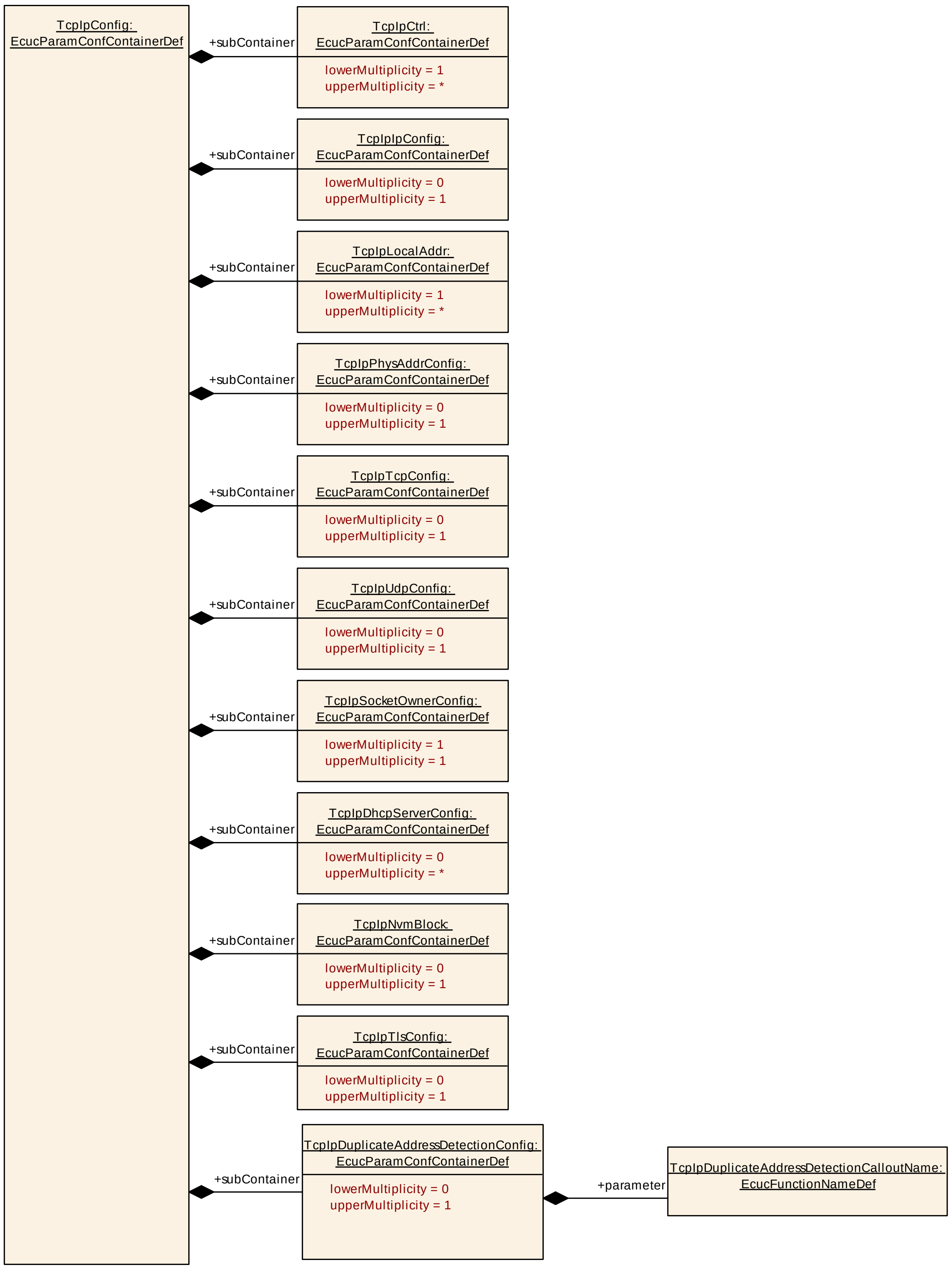
SWS Item	**ECUC_TcpIp_00017 :**		
Name	TcpIpLocalAddrIpv6EntriesMax		
Parent Container	TcpIpIpV6General		
Description	Maximum number of LocalAddr table entries for IPv6.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 255		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00091 :**		
Name	TcpIpNdpAddressResolutionUnrechabilityDetectionEnabled		
Parent Container	TcpIpIpV6General		
Description	Enables (TRUE) or disables (FALSE) support of Address Resoultion and Neighbor Unreachability Detetion via NDP.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00092 :**
Name	TcpIpNdpPrefixAndRouterDiscoveryEnabled
Parent Container	TcpIpIpV6General
Description	Enables (TRUE) or disables (FALSE) support of Prefix and Router Discovery via NDP.

Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers

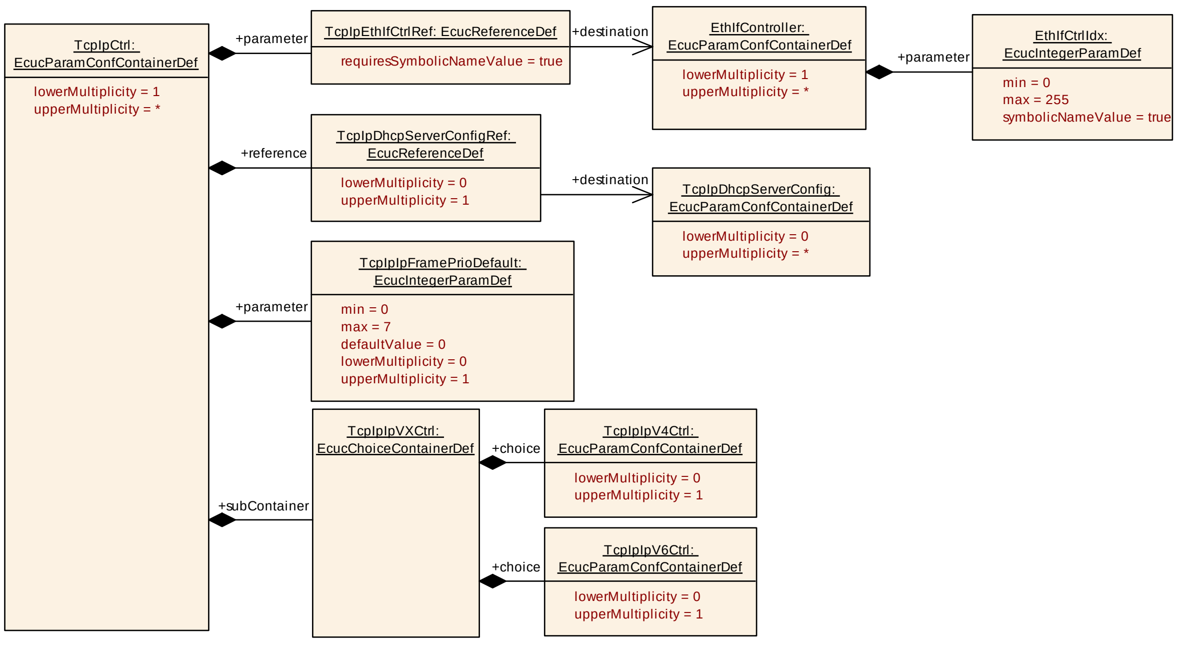

TcpIpConfig: EcucParamConfContainerDef
+subContainer
TcpIpCtrl: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
TcpIpIpConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
TcpIpLocalAddr: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
TcpIpPhysAddrConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
TcpIpTcpConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
TcpIpUdpConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
TcpIpSocketOwnerConfig: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = 1
TcpIpDhcpServerConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = *
TcpIpNvmBlock: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
TcpIpTlsConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
TcpIpDuplicateAddressDetectionConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpDuplicateAddressDetectionCalloutName: EcucFunctionNameDef

10.2.5 TcpIpConfig

SWS Item	**ECUC_TcpIp_00003 :**
Container Name	TcpIpConfig

Description	This container contains the configuration parameters and sub containers of the AUTOSAR TcpIp module.
Configuration Parameters	

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
TcpIpCtrl	1..*	Specifies the EthIf controller used for IP communication.
TcpIpDhcpServerConfig	0..*	Specifies the configuration parameters of the DHCP Server sub-module.
TcpIpDuplicateAddressDetectionConfig	0..1	Specifies the DAD callout function.
TcpIpIpConfig	0..1	Specifies the configuration parameters of the IP (Internet Protocol) sub-module
TcpIpLocalAddr	1..*	Specifies the local IP (Internet Protocol) addresses used for IP communication.
TcpIpNvmBlock	0..1	Configuration of optional usage of Nvm in case the TcpIp module requires non volatile memory in the Ecu to store information (e.g. IP Address received via DHCP and shall be stored).
TcpIpPhysAddrConfig	0..1	Specifies the physical address configuration.
TcpIpSocketOwnerConfig	1	Specifies the upper layer modules of TcpIp using the socket API.
TcpIpTcpConfig	0..1	Specifies the configuration parameters of the TCP (Transmission Control Protocol) sub-module.
TcpIpTlsConfig	0..1	Specifies the configuration parameters of the TLS (Transport Layer Security) sub module. **Tags:** atp.Status=draft
TcpIpUdpConfig	0..1	Specifies the configuration parameters of the UDP (User Datagram Protocol) sub-module



10.2.6 TcpIpCtrl

SWS Item	**ECUC_TcpIp_00021 :**
Container Name	TcpIpCtrl
Description	Specifies the EthIf controller used for IP communication.
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00081 :**		
Name	TcpIpIpFramePrioDefault		
Parent Container	TcpIpCtrl		
Description	Specifies the default value for the priority for all outgoing frames. Note: the value can be changed for each socket individually via TcpIp_ChangeParameter() service. If this optional parameter is not available, 0 is used as default priority.		
Multiplicity	0..1		
Type	EcucIntegerParamDef		
Range	0 .. 7		
Default value	0		
Post-Build Variant Multiplicity	true		
Post-Build Variant Value	true		
Multiplicity Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00195 :**		
Name	TcpIpDhcpServerConfigRef		
Parent Container	TcpIpCtrl		
Description	Reference to a TcpIpDhcpServerConfig which shall be used for this controller setting (VLAN).		
Multiplicity	0..1		
Type	Reference to [TcpIpDhcpServerConfig]		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00041 :**		
Name	TcpIpEthIfCtrlRef		
Parent Container	TcpIpCtrl		
Description	Reference to EthIf controller where the IP address shall be assigned.		
Multiplicity	1		
Type	Symbolic name reference to [EthIfController]		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

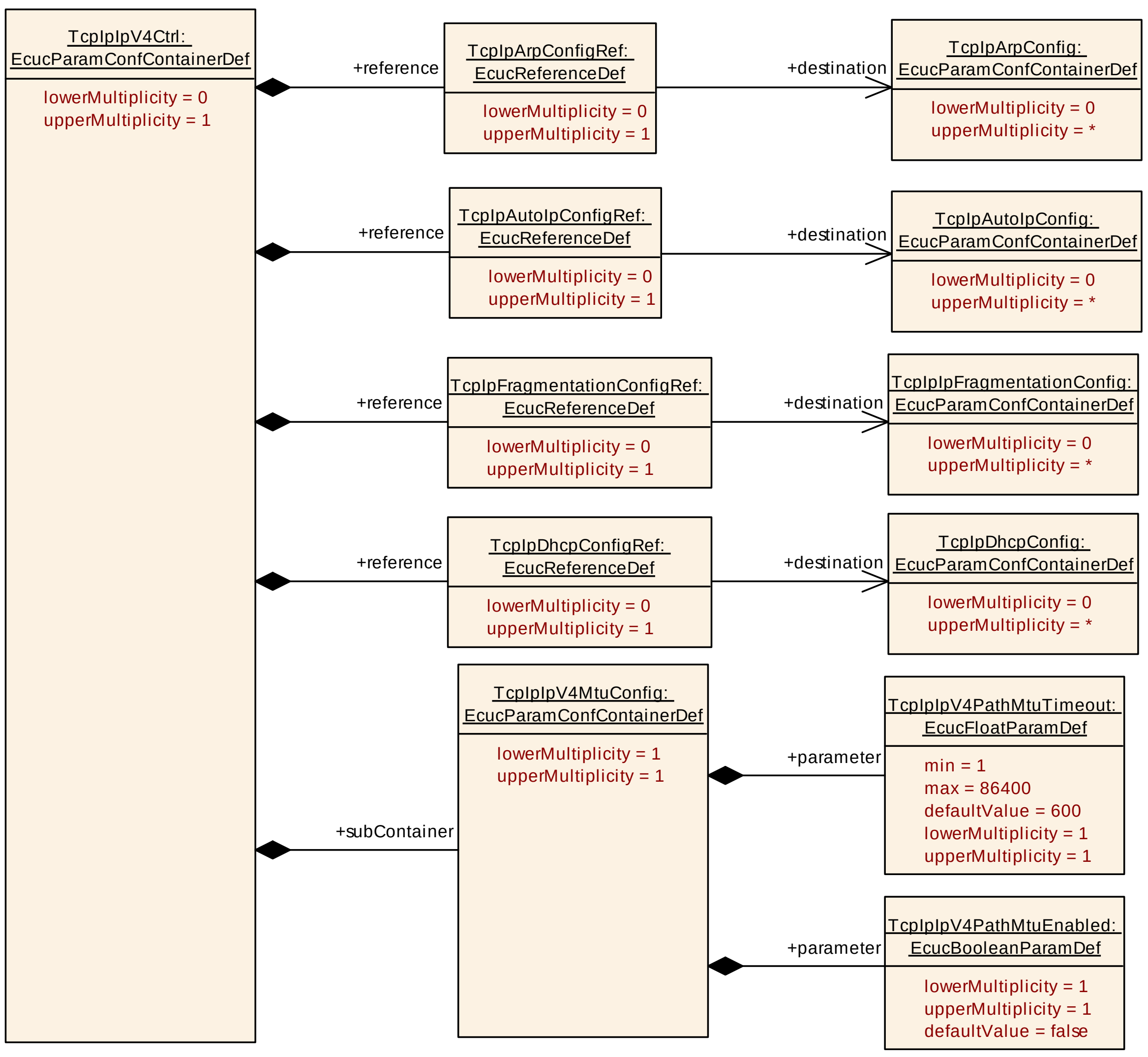
Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***

TcpIpIpVXCtrl	1	Specifies whether this controller is an Internet Protocol version 4 (IPv4) or Internet Protocol version 6 (IPv4) instance.

10.2.7 TcpIpIpVXCtrl

SWS Item	**ECUC_TcpIp_00094 :**
Choice container Name	TcpIpIpVXCtrl
Description	Specifies whether this controller is an Internet Protocol version 4 (IPv4) or Internet Protocol version 6 (IPv4) instance.

Container Choices		
Container Name	*Multiplicity*	*Scope / Dependency*
TcpIpIpV4Ctrl	0..1	Specifies an Internet Protocol version 4 (IPv4) instance.
TcpIpIpV6Ctrl	0..1	Specifies an Internet Protocol version 6 (IPv6) instance.



10.2.8 TcpIpIpV4Ctrl

SWS Item	**ECUC_TcpIp_00166 :**		
Container Name	TcpIpIpV4Ctrl		
Description	Specifies an Internet Protocol version 4 (IPv4) instance.		
Configuration Parameters			

SWS Item	**ECUC_TcpIp_00097 :**		
Name	TcpIpArpConfigRef		
Parent Container	TcpIpIpV4Ctrl		
Description	Reference to ARP configuration for this IPv4 instance. (Multiple IPv4 instances may use the same configuration container but will operate independently)		
Multiplicity	0..1		
Type	Reference to [TcpIpArpConfig]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

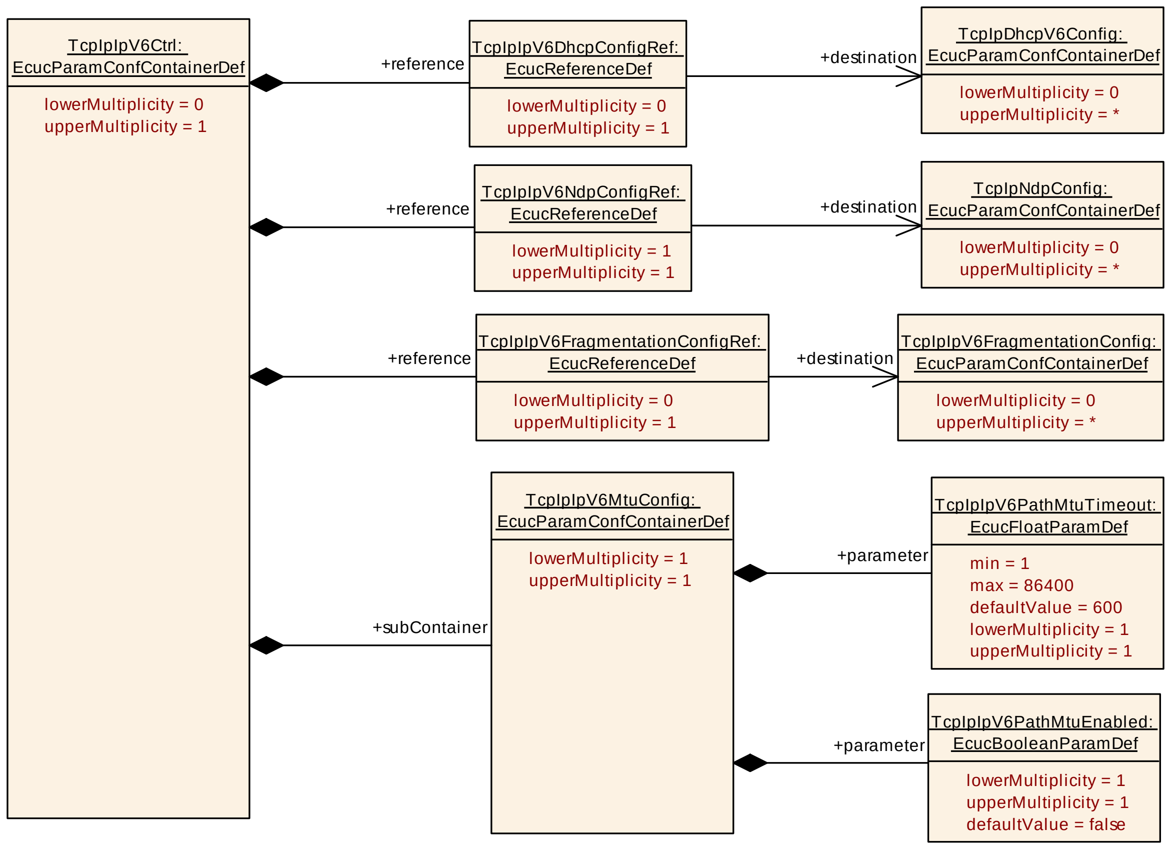
SWS Item	**ECUC_TcpIp_00098 :**		
Name	TcpIpAutoIpConfigRef		
Parent Container	TcpIpIpV4Ctrl		
Description	Reference to AutoIp configuration for this IPv4 instance. (Multiple IPv4 instances may use the same configuration container but will operate independently)		
Multiplicity	0..1		
Type	Reference to [TcpIpAutoIpConfig]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00100 :**		
Name	TcpIpDhcpConfigRef		
Parent Container	TcpIpIpV4Ctrl		
Description	Reference to DHCP configuration for this IPv4 instance. (Multiple IPv4 instances may use the same configuration container but will operate independently)		
Multiplicity	0..1		
Type	Reference to [TcpIpDhcpConfig]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	

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

SWS Item	**ECUC_TcpIp_00099 :**		
Name	TcpIpFragmentationConfigRef		
Parent Container	TcpIpIpV4Ctrl		
Description	Reference to Fragmentation configuration for this IPv4 instance. (Multiple IPv4 instances may use the same configuration container but will operate independently)		
Multiplicity	0..1		
Type	Reference to [TcpIpIpFragmentationConfig]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
TcpIpIpV4MtuConfig	1	This container specifies the Maximum Transmission Unit parameters for this IPv4 instance.



10.2.9 TcpIpIpV6Ctrl

SWS Item	**ECUC_TcpIp_00096 :**
Container Name	TcpIpIpV6Ctrl
Description	Specifies an Internet Protocol version 6 (IPv6) instance.
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00101 :**		
Name	TcpIpIpV6DhcpConfigRef		
Parent Container	TcpIpIpV6Ctrl		
Description	Reference to DHCPv6 configuration. (Multiple IPv6 instances may use the same configuration container but will operate independently)		
Multiplicity	0..1		
Type	Reference to [TcpIpDhcpV6Config]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00103 :**

Name	TcpIpIpV6FragmentationConfigRef		
Parent Container	TcpIpIpV6Ctrl		
Description	Reference to IPv6 Fragmentation Configuration. (Multiple IPv6 instances may use the same configuration container but will operate independently)		
Multiplicity	0..1		
Type	Reference to [TcpIpIpV6FragmentationConfig]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00102 :**		
Name	TcpIpIpV6NdpConfigRef		
Parent Container	TcpIpIpV6Ctrl		
Description	Reference to Neighbor Discovery Protocol Configuration. (Multiple IPv6 instances may use the same configuration container but will operate independently)		
Multiplicity	1		
Type	Reference to [TcpIpNdpConfig]		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
TcpIpIpV6MtuConfig	1	This container specifies the Maximum Transmission Unit parameters for this IPv6 instance.

10.2.10 TcpIpIpV6MtuConfig

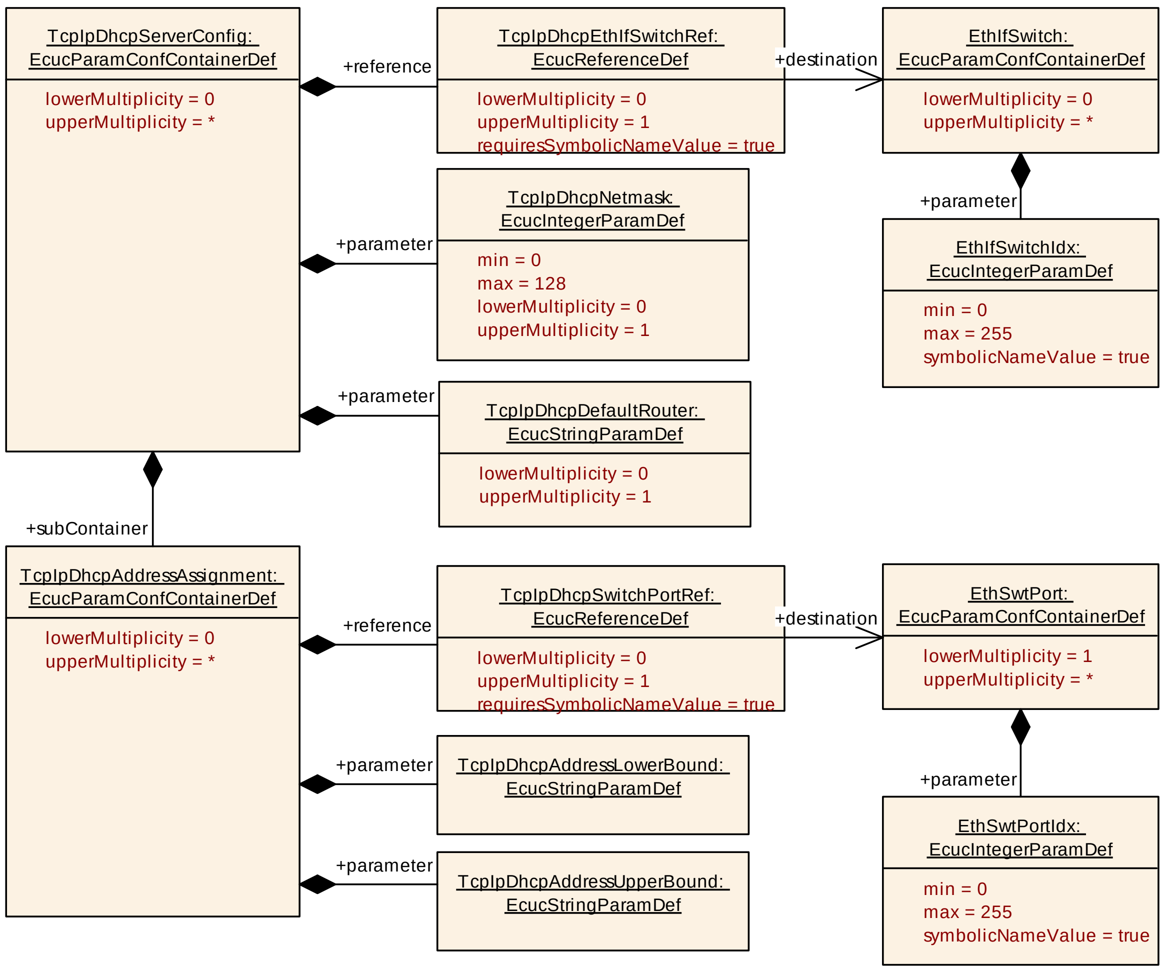
SWS Item	**ECUC_TcpIp_00104 :**
Container Name	TcpIpIpV6MtuConfig
Description	This container specifies the Maximum Transmission Unit parameters for this IPv6 instance.
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00107 :**
Name	TcpIpIpV6PathMtuEnabled
Parent Container	TcpIpIpV6MtuConfig
Description	If enabled the IPv6 processes incoming ICMPv6 "Packet Too Big" messages and stores a MTU value for each destination address. See RFC1981 "Path MTU Discovery for IP version 6" for details about PathMTU.
Multiplicity	1

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

SWS Item	**ECUC_TcpIp_00105 :**		
Name	TcpIpIpV6PathMtuTimeout		
Parent Container	TcpIpIpV6MtuConfig		
Description	If this value is >0 the IpV6 will reset the MTU value stored for each destination after n seconds. see [RFC1981 5.3. Purging stale PMTU information] Default: 600 seconds (10 minutes)		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	[1 .. 86400]		
Default value	600		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers


TcpIpDhcpServerConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = *
+reference
TcpIpDhcpEthIfSwitchRef: EcucReferenceDef
lowerMultiplicity = 0
upperMultiplicity = 1
requiresSymbolicNameValue = true
+destination
EthIfSwitch: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = *
+parameter
EthIfSwitchIdx: EcucIntegerParamDef
min = 0
max = 255
symbolicNameValue = true
+parameter
TcpIpDhcpNetmask: EcucIntegerParamDef
min = 0
max = 128
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpDhcpDefaultRouter: EcucStringParamDef
lowerMultiplicity = 0
upperMultiplicity = 1
+subContainer
TcpIpDhcpAddressAssignment: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = *
+reference
TcpIpDhcpSwitchPortRef: EcucReferenceDef
lowerMultiplicity = 0
upperMultiplicity = 1
requiresSymbolicNameValue = true
+destination
EthSwtPort: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
+parameter
EthSwtPortIdx: EcucIntegerParamDef
min = 0
max = 255
symbolicNameValue = true
+parameter
TcpIpDhcpAddressLowerBound: EcucStringParamDef
+parameter
TcpIpDhcpAddressUpperBound: EcucStringParamDef

10.2.11 TcpIpDhcpServerConfig

SWS Item	**ECUC_TcpIp_00187 :**		
Container Name	TcpIpDhcpServerConfig		
Description	Specifies the configuration parameters of the DHCP Server sub-module.		
Post-Build Variant Multiplicity	true		
Multiplicity Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Configuration Parameters			

SWS Item	**ECUC_TcpIp_00190 :**
Name	TcpIpDhcpDefaultRouter
Parent Container	TcpIpDhcpServerConfig
Description	IP address of default router (gateway).
Multiplicity	0..1
Type	EcucStringParamDef
Default value	--
maxLength	--
minLength	--
regularExpression	--
Post-Build Variant	true

Multiplicity			
Post-Build Variant Value	true		
Multiplicity Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00189 :**		
Name	TcpIpDhcpNetmask		
Parent Container	TcpIpDhcpServerConfig		
Description	Network mask of IPv4 address or address prefix of IPv6 address in CIDR Notation, i.e. decimal value between 0 and 32 (IPv4) or 0 and 128 (IPv6) that describes the number of significant bits defining the network number or prefix of an IP address.		
Multiplicity	0..1		
Type	EcucIntegerParamDef		
Range	0 .. 128		
Default value	--		
Post-Build Variant Multiplicity	true		
Post-Build Variant Value	true		
Multiplicity Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00188 :**		
Name	TcpIpDhcpEthIfSwitchRef		
Parent Container	TcpIpDhcpServerConfig		
Description	Reference to EthIfSwitch representation. Optional in case the Dhcp server is operating without an Ethernet switch.		
Multiplicity	0..1		
Type	Symbolic name reference to [EthIfSwitch]		
Post-Build Variant Multiplicity	true		
Post-Build Variant Value	true		
Multiplicity Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: ECU		

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
TcpIpDhcpAddressAssignment	0..*	Defines a Ethernet Switch port based IP address assignment.

10.2.12 TcpIpDhcpAddressAssignment

SWS Item	**ECUC_TcpIp_00191 :**		
Container Name	TcpIpDhcpAddressAssignment		
Description	Defines a Ethernet Switch port based IP address assignment.		
Post-Build Variant Multiplicity	true		
Multiplicity Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Configuration Parameters			

SWS Item	**ECUC_TcpIp_00193 :**		
Name	TcpIpDhcpAddressLowerBound		
Parent Container	TcpIpDhcpAddressAssignment		
Description	The lower bound IP address which shall be assigned. If lower bound and upper bound are identical exactly this IP address shall be assigned.		
Multiplicity	1		
Type	EcucStringParamDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00194 :**		
Name	TcpIpDhcpAddressUpperBound		
Parent Container	TcpIpDhcpAddressAssignment		
Description	The upper bound IP address which shall be assigned. If lower bound and upper bound are identical exactly this IP address shall be assigned.		
Multiplicity	1		
Type	EcucStringParamDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00192 :**
Name	TcpIpDhcpSwitchPortRef
Parent Container	TcpIpDhcpAddressAssignment
Description	Reference to Ethernet Switch port. Optional in case the Dhcp server is operating without an Ethernet switch.
Multiplicity	0..1
Type	Symbolic name reference to [EthSwtPort]
Post-Build Variant	true

Multiplicity			
Post-Build Variant Value	true		
Multiplicity Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: ECU		

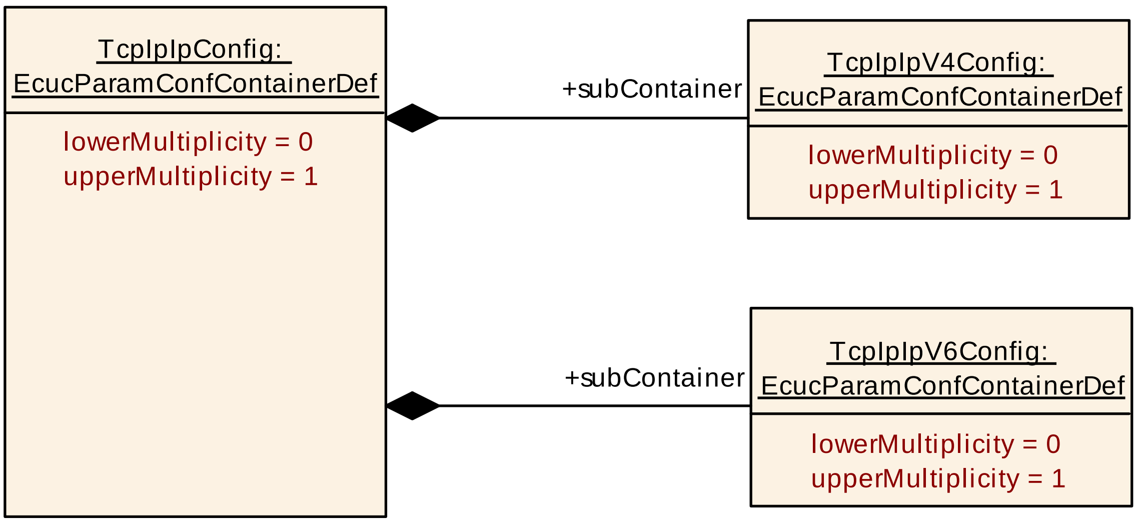
No Included Containers

10.2.13 TcpIpDuplicateAddressDetectionConfig

SWS Item	**ECUC_TcpIp_00214 :**
Container Name	TcpIpDuplicateAddressDetectionConfig
Description	Specifies the DAD callout function.
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00216 :**		
Name	TcpIpDuplicateAddressDetectionCalloutName		
Parent Container	TcpIpDuplicateAddressDetectionConfig		
Description	This parameter defines the name of the DAD callout function <Up_DADAddressConflict>.		
Multiplicity	1		
Type	EcucFunctionNameDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency			

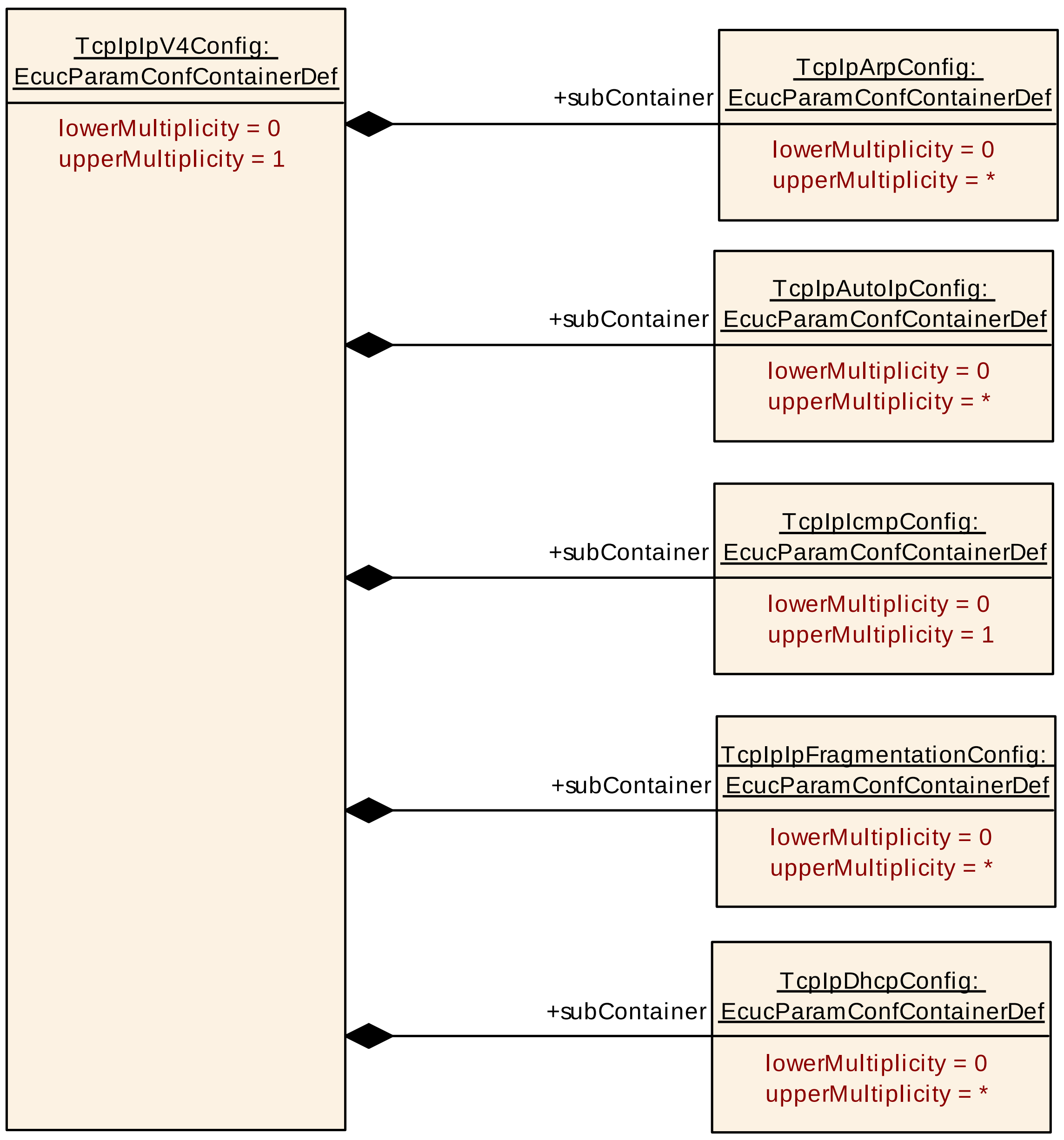
No Included Containers



10.2.14 TcpIpIpConfig

SWS Item	**ECUC_TcpIp_00022 :**
Container Name	TcpIpIpConfig
Description	Specifies the configuration parameters of the IP (Internet Protocol) sub-module
Configuration Parameters	

Included Containers		
Container Name	*Multiplicity*	*Scope / Dependency*
TcpIpIpV4Config	0..1	Specifies the configuration parameters of the IPv4 (Internet Protocol version 4) sub-module.
TcpIpIpV6Config	0..1	Specifies the configuration parameters of the IPv6 (Internet Protocol version 6) sub-module.

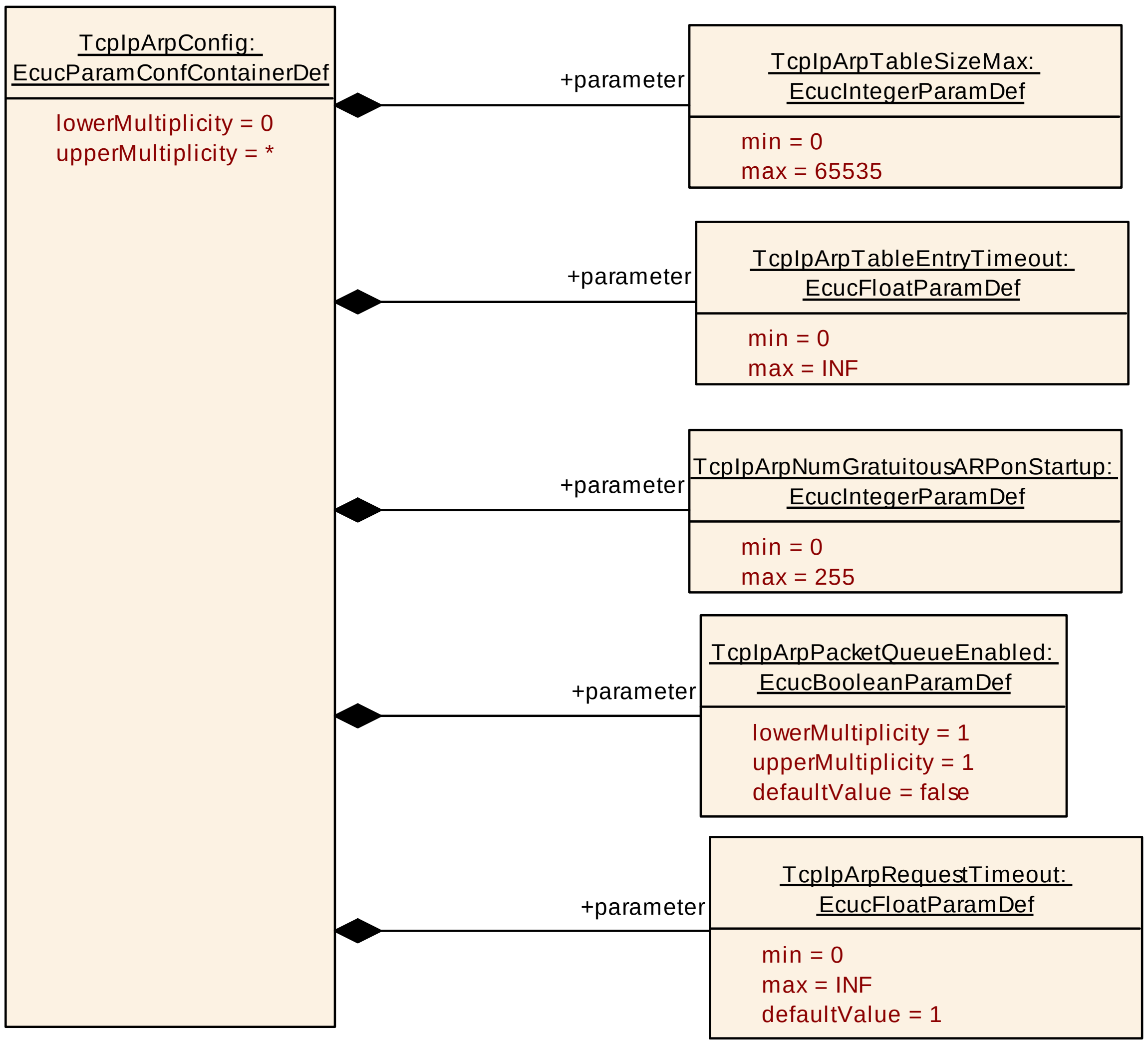


10.2.15 TcpIpIpV4Config

SWS Item	**ECUC_TcpIp_00095 :**
Container Name	TcpIpIpV4Config
Description	Specifies the configuration parameters of the IPv4 (Internet Protocol version 4) sub-module.
Configuration Parameters	

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
TcpIpArpConfig	0..*	Specifies the configuration parameters of the ARP (Address Resolution Protocol) sub-module.
TcpIpAutoIpConfig	0..*	Specifies the configuration parameters of the Auto-IP (automatic private IP addressing) sub-module.
TcpIpDhcpConfig	0..*	Specifies the configuration parameters of the DHCPv4.

		This container may be referenced by multiple IPv4 instances if they shall use the same configuration. This container may have multiple instances if different configurations are required for different IPv4 instances.
TcpIpIcmpConfig	0..1	Specifies the configuration parameters of the ICMP (Internet Control Message Protocol) sub-module.
TcpIpIpFragmentationConfig	0..*	Specifies the configuration parameters of IPv4 packet fragmentation/reassembly. This container may be referenced by multiple IPv4 instances if they shall use the same configuration. This container may have multiple instances if different configurations are required for different IPv4 instances.


TcpIpArpConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = *
+parameter
TcpIpArpTableSizeMax: EcucIntegerParamDef
min = 0
max = 65535
+parameter
TcpIpArpTableEntryTimeout: EcucFloatParamDef
min = 0
max = INF
+parameter
TcpIpArpNumGratuitousARPonStartup: EcucIntegerParamDef
min = 0
max = 255
+parameter
TcpIpArpPacketQueueEnabled: EcucBooleanParamDef
lowerMultiplicity = 1
upperMultiplicity = 1
defaultValue = false
+parameter
TcpIpArpRequestTimeout: EcucFloatParamDef
min = 0
max = INF
defaultValue = 1

10.2.16 TcpIpArpConfig

SWS Item	**ECUC_TcpIp_00023 :**
Container Name	TcpIpArpConfig
Description	Specifies the configuration parameters of the ARP (Address Resolution Protocol) sub-module.

Configuration Parameters

SWS Item	**ECUC_TcpIp_00054 :**		
Name	TcpIpArpNumGratuitousARPonStartup		
Parent Container	TcpIpArpConfig		
Description	Specifies the number of gratuitous ARP replies which shall be sent on assignment of a new IP address.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 255		
Default value	--		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00170 :**		
Name	TcpIpArpPacketQueueEnabled		
Parent Container	TcpIpArpConfig		
Description	Enables (TRUE) or disables (FALSE) support of the ARP Packet Queue according to IETF RFC 1122, section 2.3.2.2.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	false		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

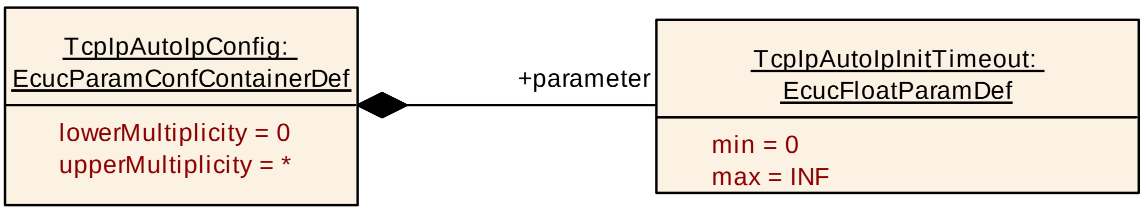
SWS Item	**ECUC_TcpIp_00218 :**		
Name	TcpIpArpRequestTimeout		
Parent Container	TcpIpArpConfig		
Description	Specifies a timeout in seconds for the validity of ARP requests. After the transmission of an ARP request the TcpIp shall skip the transmission of any further ARP requests to the same destination within a duration of TcpIpArpRequestTimeout seconds. (IETF RFC 1122, section 2.3.2.1) The value for this parameter shall be an integral multiple of TcpIpMainFunctionPeriod or 0. If this parameter set to 0 this features is disabled and no delay between ARP requests is enforced.		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	[0 .. INF[		
Default value	1		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00053 :**
Name	TcpIpArpTableEntryTimeout
Parent Container	TcpIpArpConfig
Description	Timeout in seconds after which an unused ARP entry is removed.
Multiplicity	1

Type	EcucFloatParamDef		
Range	[0 .. INF]		
Default value	--		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00052 :**		
Name	TcpIpArpTableSizeMax		
Parent Container	TcpIpArpConfig		
Description	Maximum number of entries in the ARP table.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 65535		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers


TcpIpAutoIpConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = *
+parameter
TcpIpAutoIpInitTimeout: EcucFloatParamDef
min = 0
max = INF

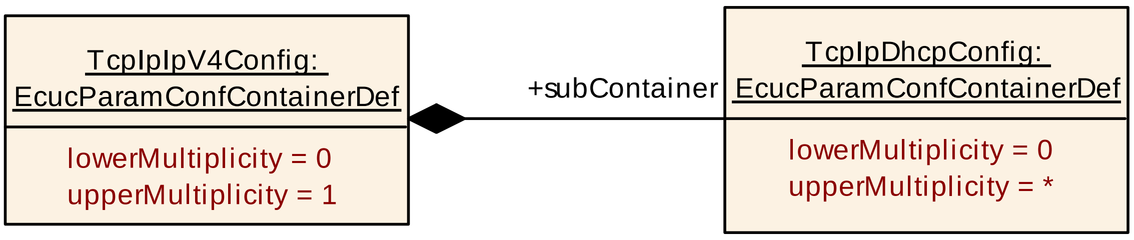
10.2.17 TcpIpAutoIpConfig

SWS Item	**ECUC_TcpIp_00028 :**
Container Name	TcpIpAutoIpConfig
Description	Specifies the configuration parameters of the Auto-IP (automatic private IP addressing) sub-module.
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00074 :**
Name	TcpIpAutoIpInitTimeout
Parent Container	TcpIpAutoIpConfig
Description	The time in seconds Auto-IP waits at startup, before beginning with ARP probing. This delay is used to give DHCP time to acquire a lease in case a DHCP server is present.
Multiplicity	1

Type	EcucFloatParamDef		
Range	[0 .. INF]		
Default value	--		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

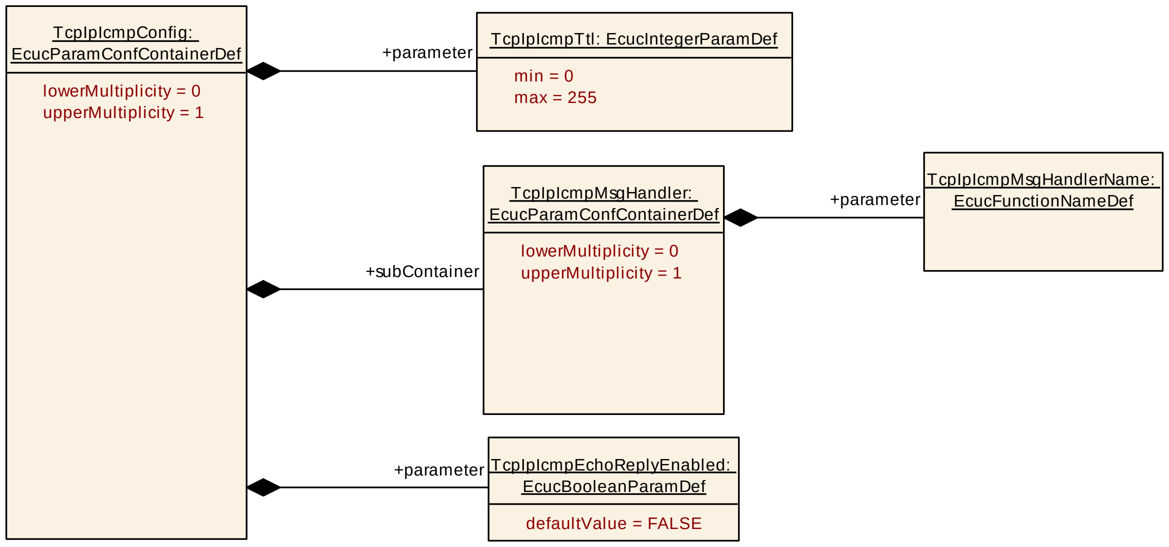
No Included Containers



10.2.18 TcpIpDhcpConfig

SWS Item	**ECUC_TcpIp_00167 :**
Container Name	TcpIpDhcpConfig
Description	Specifies the configuration parameters of the DHCPv4. This container may be referenced by multiple IPv4 instances if they shall use the same configuration. This container may have multiple instances if different configurations are required for different IPv4 instances.
Configuration Parameters	

No Included Containers


TcpIpIcmpConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpIcmpTtl: EcucIntegerParamDef
min = 0
max = 255
+subContainer
TcpIpIcmpMsgHandler: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpIcmpMsgHandlerName: EcucFunctionNameDef
+parameter
TcpIpIcmpEchoReplyEnabled: EcucBooleanParamDef
defaultValue = FALSE

10.2.19 TcpIpIcmpConfig

SWS Item	**ECUC_TcpIp_00024 :**
Container Name	TcpIpIcmpConfig
Description	Specifies the configuration parameters of the ICMP (Internet Control Message Protocol) sub-module.
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00213 :**		
Name	TcpIpIcmpEchoReplyEnabled		
Parent Container	TcpIpIcmpConfig		
Description	Enables or disables transmission of ICMP echo reply message in case of a ICMP echo reception.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	false		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00055 :**		
Name	TcpIpIcmpTtl		
Parent Container	TcpIpIcmpConfig		
Description	Default Time-to-live value of outgoing ICMP packets.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 255		
Default value	--		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

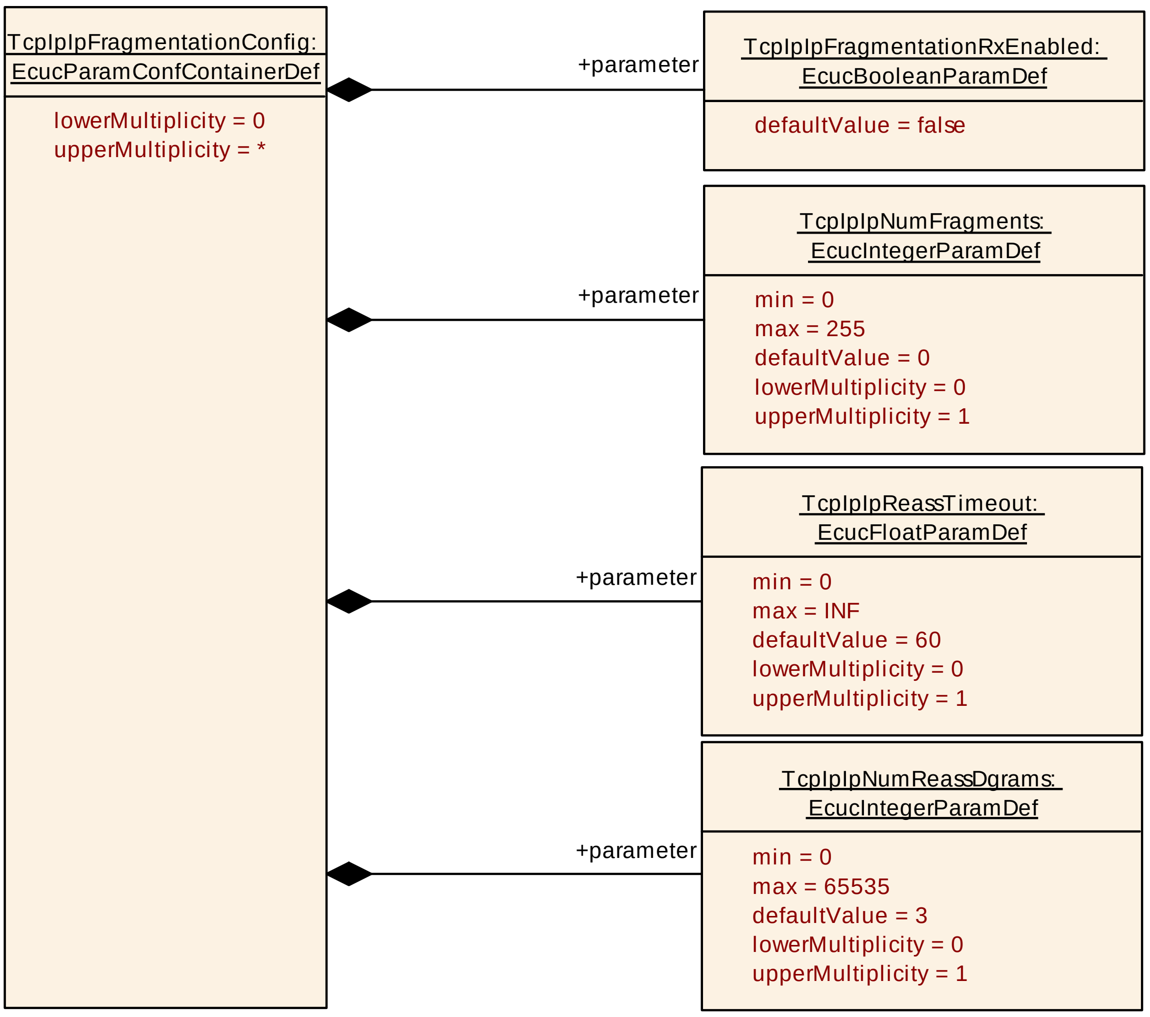
Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
TcpIpIcmpMsgHandler	0..1	This container is a subcontainer of TcpIpIcmpConfig and specifies the configuration parameters for the ICMP message handler.

10.2.20 TcpIpIcmpMsgHandler

SWS Item	**ECUC_TcpIp_00056 :**
Container Name	TcpIpIcmpMsgHandler
Description	This container is a subcontainer of TcpIpIcmpConfig and specifies the configuration parameters for the ICMP message handler.
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00057 :**		
Name	TcpIpIcmpMsgHandlerName		
Parent Container	TcpIpIcmpMsgHandler		
Description	This parameter defines the name of the ICMP message handler function <Up_IcmpMsgHandler>.		
Multiplicity	1		
Type	EcucFunctionNameDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers



10.2.21 TcpIpIpFragmentationConfig

SWS Item	**ECUC_TcpIp_00108 :**
Container Name	TcpIpIpFragmentationConfig
Description	Specifies the configuration parameters of IPv4 packet fragmentation/reassembly. This container may be referenced by multiple IPv4 instances if they shall use the same configuration. This container may have multiple instances if different configurations are required for different IPv4 instances.
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00077 :**
Name	TcpIpIpFragmentationRxEnabled
Parent Container	TcpIpIpFragmentationConfig
Description	Enables (TRUE) or disables (FALSE) support for reassembling of incoming datagrams that are fragmented according to IETF RFC 815 (IP Datagram Reassembly Algorithms).
Multiplicity	1
Type	EcucBooleanParamDef
Default value	false

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

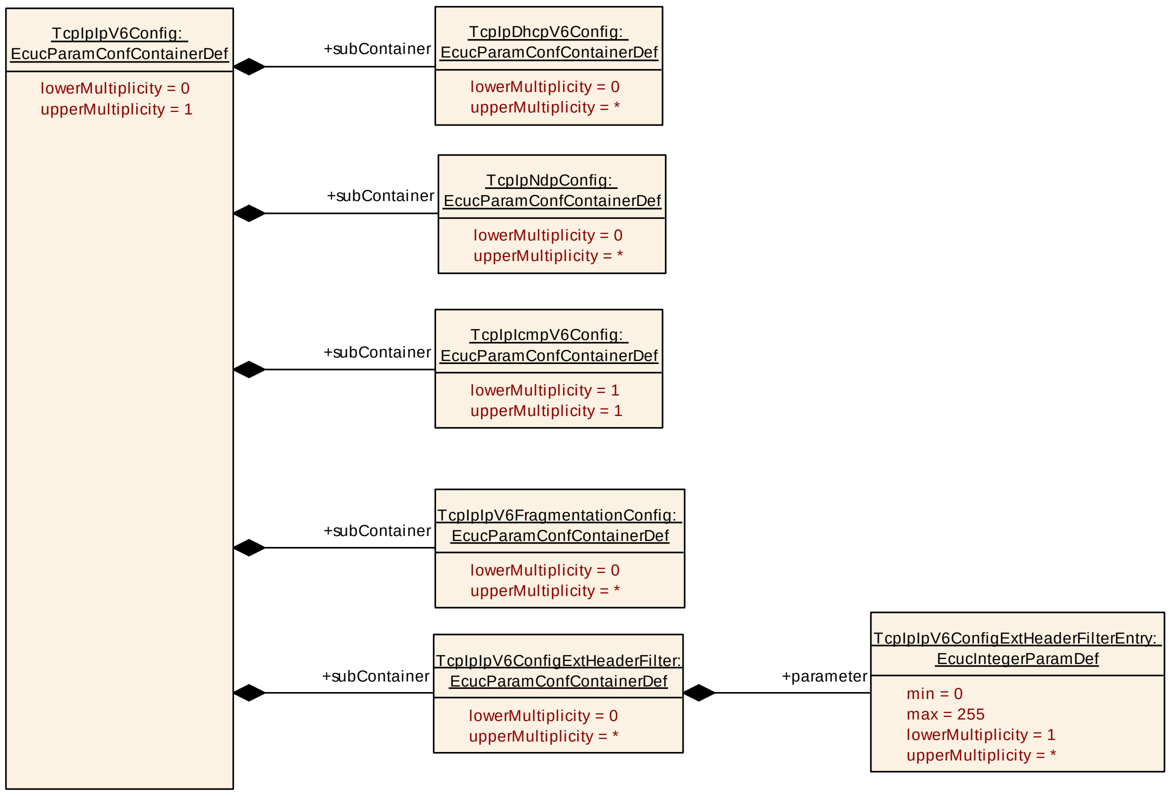
SWS Item	**ECUC_TcpIp_00078 :**		
Name	TcpIpIpNumFragments		
Parent Container	TcpIpIpFragmentationConfig		
Description	Specifies the maximum number of IP fragments per datagram. Note: this parameter is only relevant if TcpIpIpFragmentationRxEnabled is TRUE.		
Multiplicity	0..1		
Type	EcucIntegerParamDef		
Range	0 .. 255		
Default value	0		
Post-Build Variant Multiplicity	true		
Post-Build Variant Value	true		
Multiplicity Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local dependency: TcpIpIpFragmentationRxEnabled		

SWS Item	**ECUC_TcpIp_00080 :**		
Name	TcpIpIpNumReassDgrams		
Parent Container	TcpIpIpFragmentationConfig		
Description	Specifies the maximum number of fragmented IP datagrams that can be reassembled in parallel. Note: this parameter is only relevant if TcpIpIpFragmentationRxEnabled is TRUE.		
Multiplicity	0..1		
Type	EcucIntegerParamDef		
Range	0 .. 65535		
Default value	3		
Post-Build Variant Multiplicity	true		
Post-Build Variant Value	true		
Multiplicity Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local dependency: TcpIpIpFragmentationRxEnabled		

SWS Item	**ECUC_TcpIp_00079 :**
Name	TcpIpIpReassTimeout
Parent Container	TcpIpIpFragmentationConfig
Description	Specifies the timeout in [s] after which an incomplete datagram gets discarded.

	Note: this parameter is only relevant if TcpIpIpFragmentationRxEnabled is TRUE.		
Multiplicity	0..1		
Type	EcucFloatParamDef		
Range	[0 .. INF]		
Default value	60		
Post-Build Variant Multiplicity	true		
Post-Build Variant Value	true		
Multiplicity Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local dependency: TcpIpIpFragmentationRxEnabled		

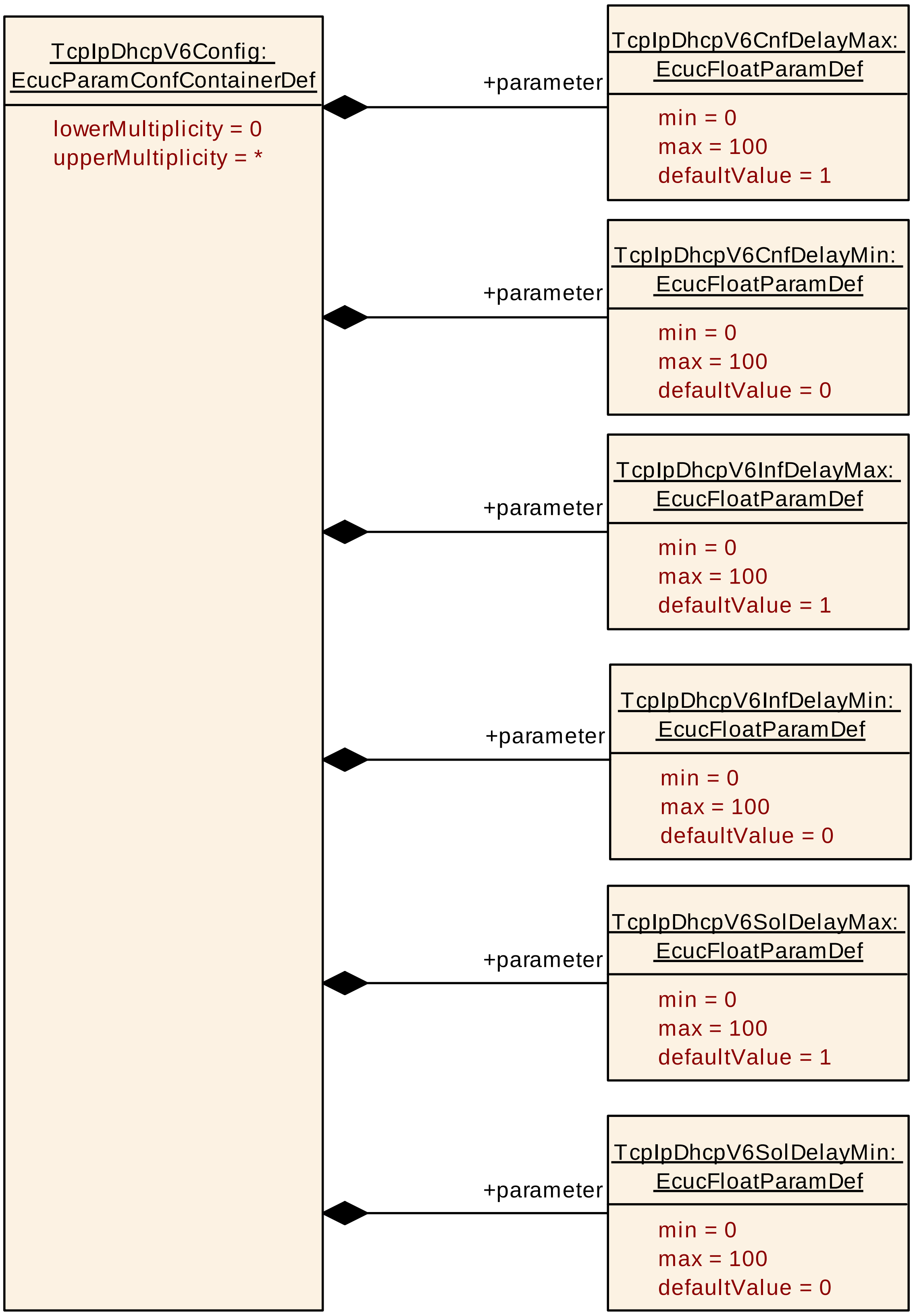
No Included Containers



10.2.22 TcpIpIpV6Config

SWS Item	**ECUC_TcpIp_00168 :**
Container Name	TcpIpIpV6Config
Description	Specifies the configuration parameters of the IPv6 (Internet Protocol version 6) sub-module.
Configuration Parameters	

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
TcpIpDhcpV6Config	0..*	Specifies the configuration parameters of the DHCPv6. This container may be referenced by multiple IPv6 instances if they shall use the same configuration. This container may have multiple instances if different configurations are required for different IPv6 instances.
TcpIpIcmpV6Config	1	Specifies the configuration parameters of the ICMPv6 (Internet Control Message Protocol for IPv6) sub-module.
TcpIpIpV6ConfigExtHeaderFilter	0..*	This container describes the white list for the filtering of IPv6 extension headers, i.e. frames containing IPv6 extension headers not listed here shall be silently dropped.
TcpIpIpV6FragmentationConfig	0..*	Specifies the configuration parameters of IPv6 packet fragmentation/reassembly. This container may be referenced by multiple IPv6 instances if they shall use the same configuration. This container may have multiple instances if different configurations are required for different IPv6 instances.
TcpIpNdpConfig	0..*	Specifies the configuration parameters of the Neighbor Discovery Protocol for IPv6 This container may be referenced by multiple IPv6 instances if they shall use the same configuration. This container may have multiple instances if different configurations are required for different IPv6 instances.



10.2.23 TcpIpDhcpV6Config

SWS Item	**ECUC_TcpIp_00110 :**		
Container Name	TcpIpDhcpV6Config		
Description	Specifies the configuration parameters of the DHCPv6. This container may be referenced by multiple IPv6 instances if they shall use the same configuration. This container may have multiple instances if different configurations are required for different IPv6 instances.		
Configuration Parameters			

SWS Item	**ECUC_TcpIp_00116 :**		
Name	TcpIpDhcpV6CnfDelayMax		
Parent Container	TcpIpDhcpV6Config		
Description	Maximum delay (s) before sending the first Confirm message. If this value is bigger than the previous minimum delay value a random delay will be chosen from the interval.		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	[0 .. 100]		
Default value	1		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00117 :**		
Name	TcpIpDhcpV6CnfDelayMin		
Parent Container	TcpIpDhcpV6Config		
Description	Minimum delay (s) before the first Confirm message will be sent.		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	[0 .. 100]		
Default value	0		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

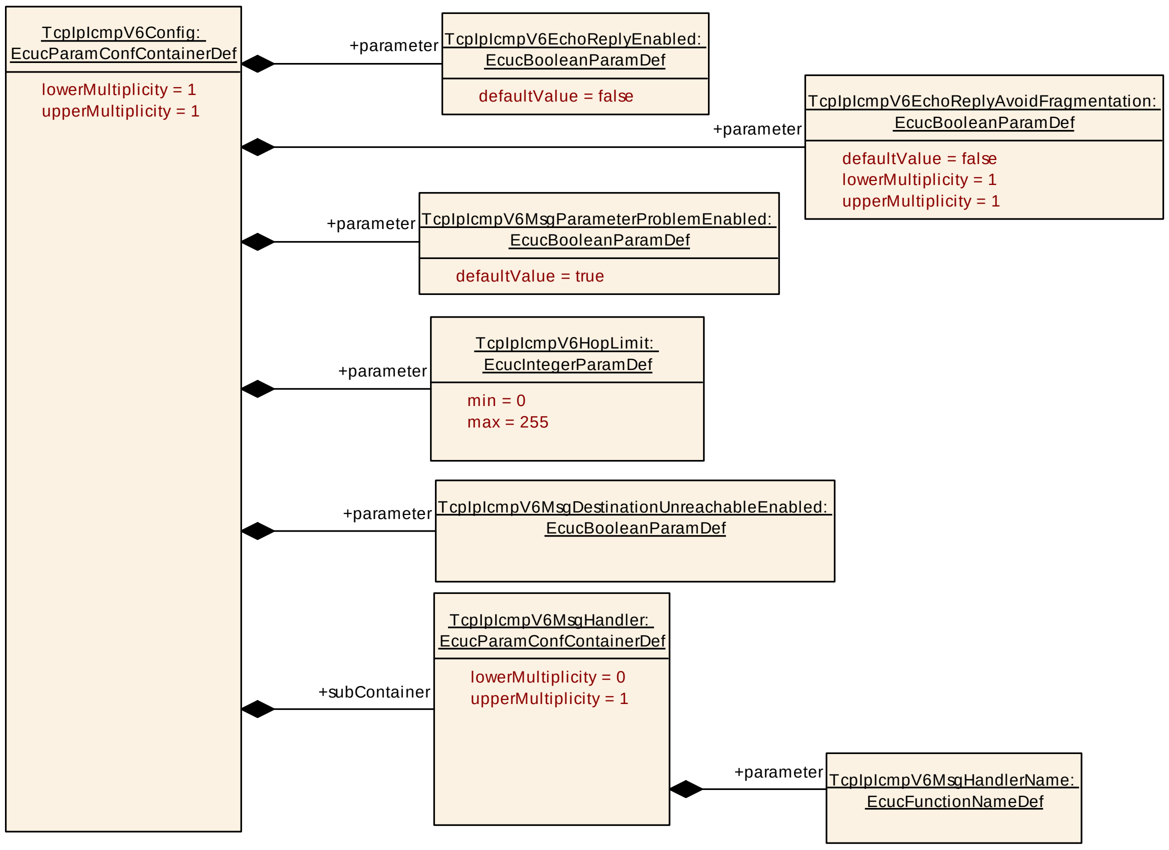
SWS Item	**ECUC_TcpIp_00118 :**		
Name	TcpIpDhcpV6InfDelayMax		
Parent Container	TcpIpDhcpV6Config		
Description	Maximum delay (s) before sending the first Information Request message. If this value is bigger than the previous minimum delay value a random delay will be chosen from the interval.		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	[0 .. 100]		
Default value	1		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00119 :**		
Name	TcpIpDhcpV6InfDelayMin		
Parent Container	TcpIpDhcpV6Config		
Description	Minimum delay (s) before the first Information Request message will be sent.		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	[0 .. 100]		
Default value	0		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00120 :**		
Name	TcpIpDhcpV6SolDelayMax		
Parent Container	TcpIpDhcpV6Config		
Description	Maximum delay (s) before sending the first Solicit message. If this value is bigger than the previous minimum delay value a random delay will be chosen from the interval.		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	[0 .. 100]		
Default value	1		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00121 :**		
Name	TcpIpDhcpV6SolDelayMin		
Parent Container	TcpIpDhcpV6Config		
Description	Minimum delay (s) before the first Solicit message will be sent.		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	[0 .. 100]		
Default value	0		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers


TcpIpIcmpV6Config: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = 1
+parameter
TcpIpIcmpV6EchoReplyEnabled: EcucBooleanParamDef
defaultValue = false
+parameter
TcpIpIcmpV6EchoReplyAvoidFragmentation: EcucBooleanParamDef
defaultValue = false
lowerMultiplicity = 1
upperMultiplicity = 1
+parameter
TcpIpIcmpV6MsgParameterProblemEnabled: EcucBooleanParamDef
defaultValue = true
+parameter
TcpIpIcmpV6HopLimit: EcucIntegerParamDef
min = 0
max = 255
+parameter
TcpIpIcmpV6MsgDestinationUnreachableEnabled: EcucBooleanParamDef
+subContainer
TcpIpIcmpV6MsgHandler: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpIcmpV6MsgHandlerName: EcucFunctionNameDef

10.2.24 TcpIpIcmpV6Config

SWS Item	**ECUC_TcpIp_00113 :**
Container Name	TcpIpIcmpV6Config
Description	Specifies the configuration parameters of the ICMPv6 (Internet Control Message Protocol for IPv6) sub-module.
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00212 :**		
Name	TcpIpIcmpV6EchoReplyAvoidFragmentation		
Parent Container	TcpIpIcmpV6Config		
Description	If enabled, the stack will respond only to incoming ICMPv6 Echo Requests (Pings) that fit the MTU of the respective interface, i.e. can be transmitted without IPv6 fragmentation. Only relevant if TcpIpIcmpV6EchoReplyEnabled is enabled.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	false		
Post-Build Variant Value	false		
Value Configuration Class	*Pre-compile time*	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local dependency: TcpIpIcmpV6EchoReplyEnabled		

SWS Item	**ECUC_TcpIp_00149 :**

Name	TcpIpIcmpV6EchoReplyEnabled		
Parent Container	TcpIpIcmpV6Config		
Description	If enabled, the stack will respond to incoming ICMPv6 Echo Requests (Pings).		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	false		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00152 :**		
Name	TcpIpIcmpV6HopLimit		
Parent Container	TcpIpIcmpV6Config		
Description	Default Hop-Limit value of outgoing ICMPv6 packets.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 255		
Default value	--		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00153 :**		
Name	TcpIpIcmpV6MsgDestinationUnreachableEnabled		
Parent Container	TcpIpIcmpV6Config		
Description	Dis/Enables transmission of Destination Unreachable Messages		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00151 :**		
Name	TcpIpIcmpV6MsgParameterProblemEnabled		
Parent Container	TcpIpIcmpV6Config		
Description	If enabled an ICMPv6 parameter problem message will be sent if a received packet has been dropped due to unknown options or headers that are found in the packet. [RFC2460 4. IPv6 Extension Headers]		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	true		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
TcpIpIcmpV6MsgHandler	0..1	This container is a subcontainer of TcpIpIcmpConfig and specifies the configuration parameters for the ICMPv6 message handler.

10.2.25 TcpIpIcmpV6MsgHandler

SWS Item	**ECUC_TcpIp_00154 :**
Container Name	TcpIpIcmpV6MsgHandler
Description	This container is a subcontainer of TcpIpIcmpConfig and specifies the configuration parameters for the ICMPv6 message handler.
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00156 :**		
Name	TcpIpIcmpV6MsgHandlerName		
Parent Container	TcpIpIcmpV6MsgHandler		
Description	This parameter defines the name of the ICMP message handler function <Up_IcmpMsgHandler>.		
Multiplicity	1		
Type	EcucFunctionNameDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers

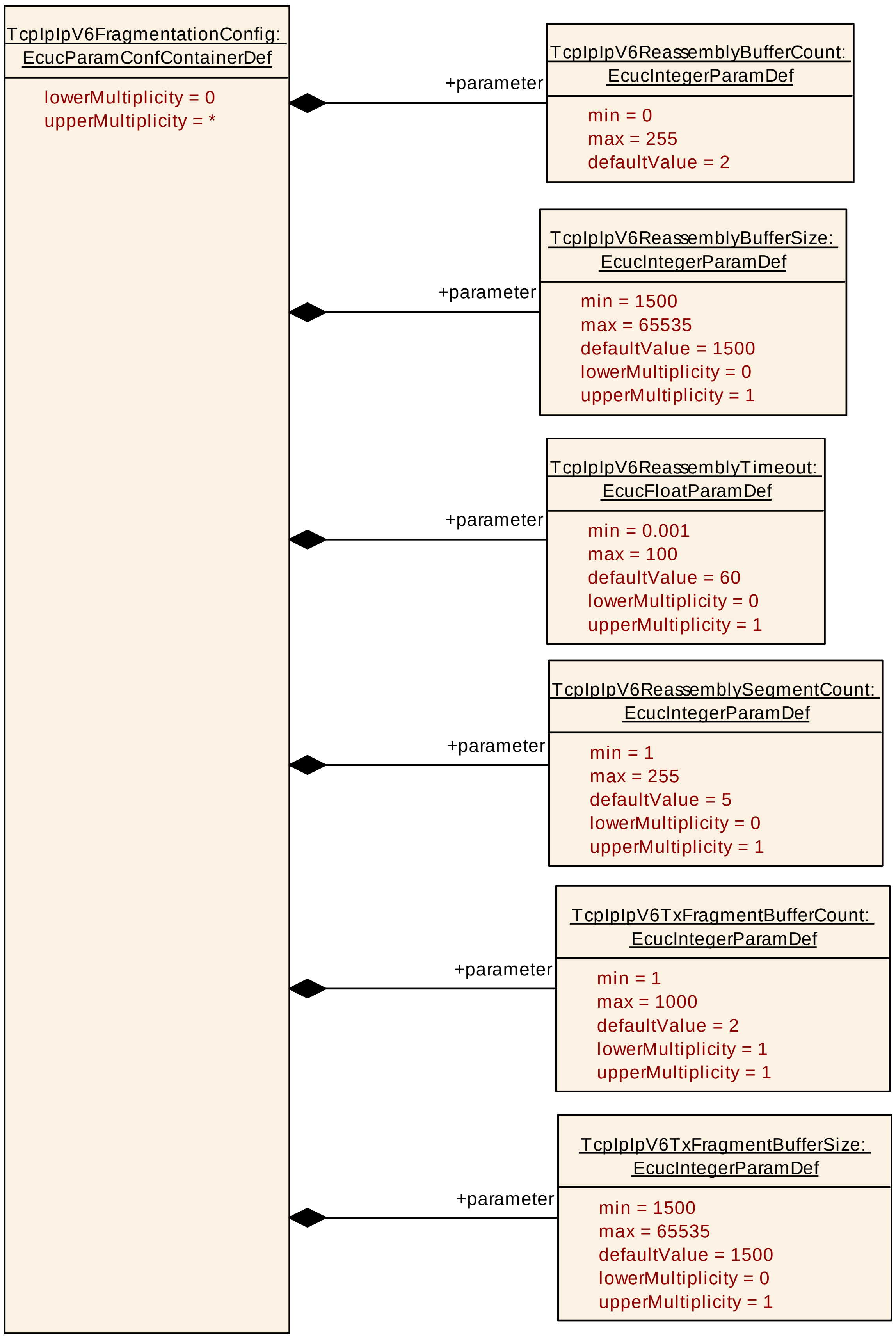
10.2.26 TcpIpIpV6ConfigExtHeaderFilter

SWS Item	**ECUC_TcpIp_00198 :**
Container Name	TcpIpIpV6ConfigExtHeaderFilter
Description	This container describes the white list for the filtering of IPv6 extension headers, i.e. frames containing IPv6 extension headers not listed here shall be silently dropped.
Post-Build Variant Multiplicity	false
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00199 :**
Name	TcpIpIpV6ConfigExtHeaderFilterEntry
Parent Container	TcpIpIpV6ConfigExtHeaderFilter

Description	IPv6 Extension Header type allowed by this filter.		
Multiplicity	1..*		
Type	EcucIntegerParamDef		
Range	0 .. 255		
Default value	--		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers


TcpIpIpV6FragmentationConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = *
+parameter
TcpIpIpV6ReassemblyBufferCount: EcucIntegerParamDef
min = 0
max = 255
defaultValue = 2
+parameter
TcpIpIpV6ReassemblyBufferSize: EcucIntegerParamDef
min = 1500
max = 65535
defaultValue = 1500
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpIpV6ReassemblyTimeout: EcucFloatParamDef
min = 0.001
max = 100
defaultValue = 60
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpIpV6ReassemblySegmentCount: EcucIntegerParamDef
min = 1
max = 255
defaultValue = 5
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpIpV6TxFragmentBufferCount: EcucIntegerParamDef
min = 1
max = 1000
defaultValue = 2
lowerMultiplicity = 1
upperMultiplicity = 1
+parameter
TcpIpIpV6TxFragmentBufferSize: EcucIntegerParamDef
min = 1500
max = 65535
defaultValue = 1500
lowerMultiplicity = 0
upperMultiplicity = 1

10.2.27 TcpIpIpV6FragmentationConfig

SWS Item	**ECUC_TcpIp_00114 :**		
Container Name	TcpIpIpV6FragmentationConfig		
Description	Specifies the configuration parameters of IPv6 packet fragmentation/reassembly. This container may be referenced by multiple IPv6 instances if they shall use the same configuration. This container may have multiple instances if different configurations are required for different IPv6 instances.		
Configuration Parameters			

SWS Item	**ECUC_TcpIp_00157 :**		
Name	TcpIpIpV6ReassemblyBufferCount		
Parent Container	TcpIpIpV6FragmentationConfig		
Description	Number of buffers that can be used for fragment reassembly. In case of a reassembly error or if not all fragments are received in time this buffer will be blocked until the specified "Fragment Reassembly Timeout" has been exceeded. A value of 0 disables fragment reassembly. [RFC2460 5. Packet Size Issues] "In order to send a packet larger than a path's MTU, a node may use the IPv6 Fragment header to fragment the packet at the source and have it reassembled at the destination(s). However, the use of such fragmentation is discouraged in any application that is able to adjust its packets to fit the measured path MTU (i.e., down to 1280 octets)."		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 255		
Default value	2		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency			

SWS Item	**ECUC_TcpIp_00158 :**		
Name	TcpIpIpV6ReassemblyBufferSize		
Parent Container	TcpIpIpV6FragmentationConfig		
Description	[RFC2460 5. Packet Size Issues] "A node must be able to accept a fragmented packet that, after reassembly, is as large as 1500 octets. A node is permitted to accept fragmented packets that reassemble to more than 1500 octets."the measured path MTU (i.e., down to 1280 octets)."		
Multiplicity	0..1		
Type	EcucIntegerParamDef		
Range	1500 .. 65535		
Default value	1500		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants

	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00160 :**		
Name	TcpIpIpV6ReassemblySegmentCount		
Parent Container	TcpIpIpV6FragmentationConfig		
Description	Specifies the maximum number of consecutive data segments that can be managed in each reassembly buffer. If all fragments are received in order, only one segment will be needed. To deal with fragments received out of order this value should be configured bigger than 1.		
Multiplicity	0..1		
Type	EcucIntegerParamDef		
Range	1 .. 255		
Default value	5		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

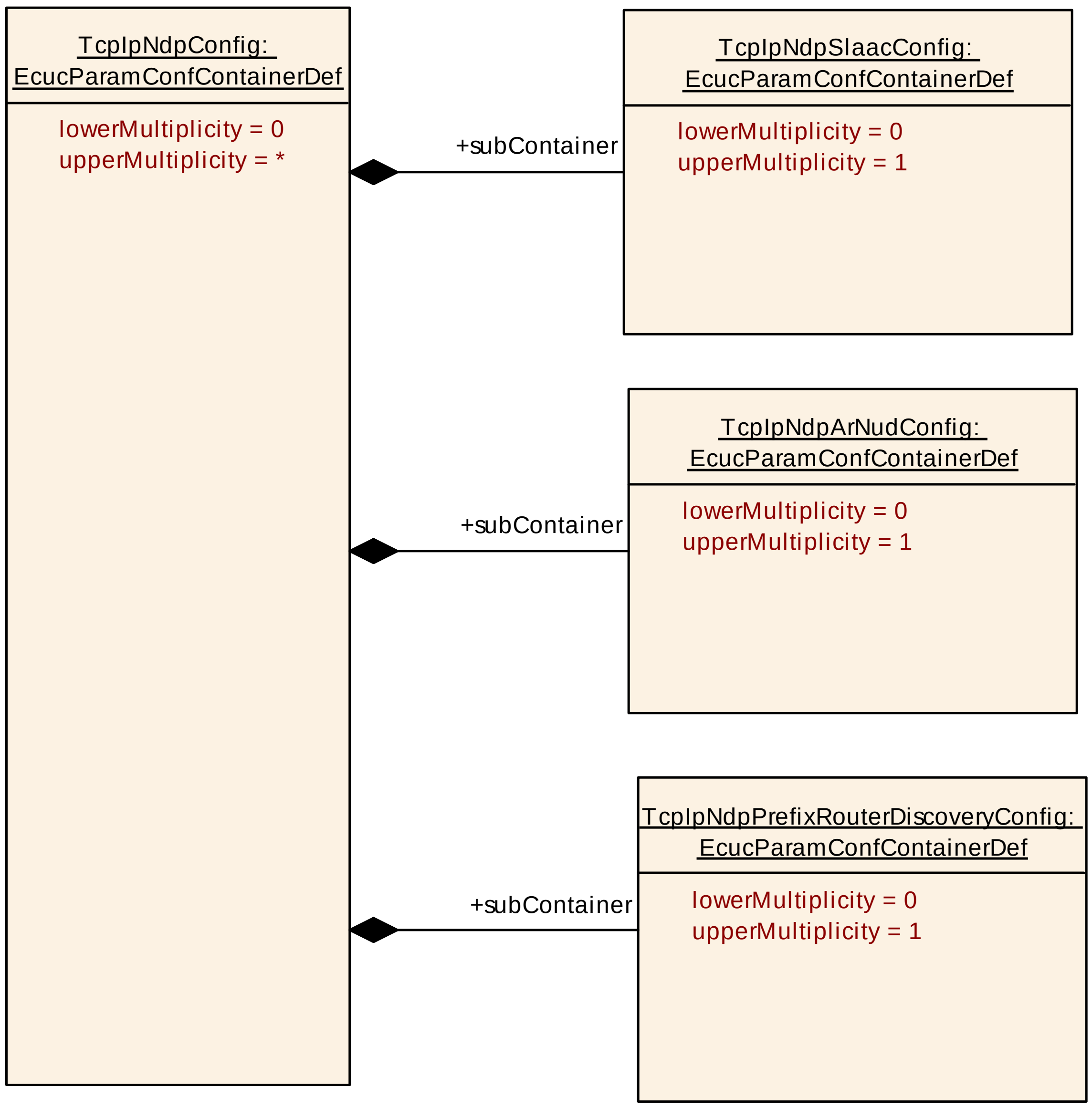
SWS Item	**ECUC_TcpIp_00159 :**		
Name	TcpIpIpV6ReassemblyTimeout		
Parent Container	TcpIpIpV6FragmentationConfig		
Description	[RFC2460 4.5 Fragment Header] Default: 60 seconds		
Multiplicity	0..1		
Type	EcucFloatParamDef		
Range	[0.001 .. 100]		
Default value	60		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00161 :**
Name	TcpIpIpV6TxFragmentBufferCount
Parent Container	TcpIpIpV6FragmentationConfig
Description	These buffers will be used if the IpV6 receives packets from the upper layer that do not fit into the MTU and thus must be fragmented. A value of 0 disables tx fragmentation. If the upper layer transmits packets that do not fit into the link or path MTU, the IpV6 will split-up the packet into fragments.

	see "Enable Fragment Reassembly"		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	1 .. 1000		
Default value	2		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00162 :**		
Name	TcpIpIpV6TxFragmentBufferSize		
Parent Container	TcpIpIpV6FragmentationConfig		
Description	Size of each fragment tx buffer in bytes		
Multiplicity	0..1		
Type	EcucIntegerParamDef		
Range	1500 .. 65535		
Default value	1500		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers

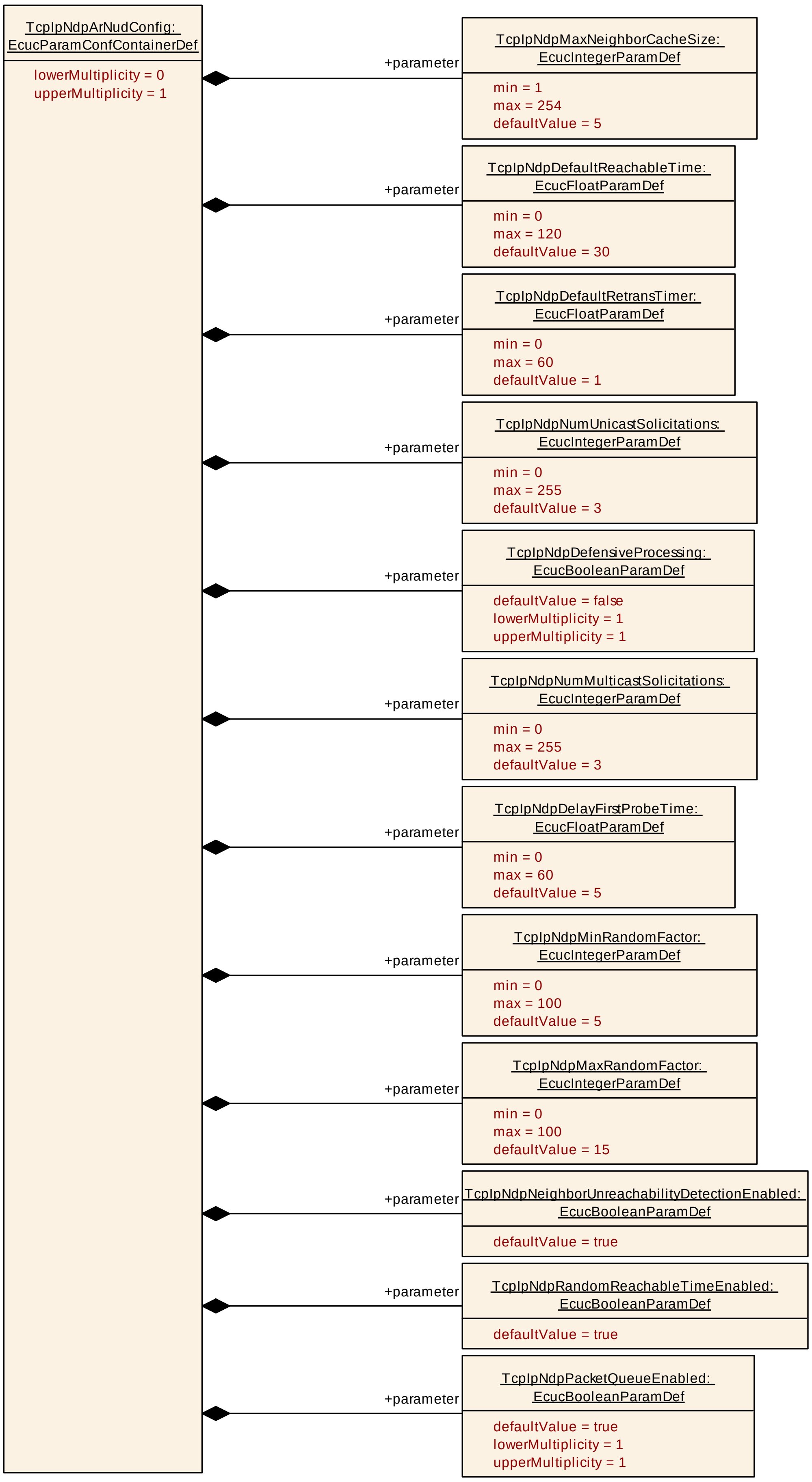


10.2.28 TcpIpNdpConfig

SWS Item	**ECUC_TcpIp_00112 :**
Container Name	TcpIpNdpConfig
Description	Specifies the configuration parameters of the Neighbor Discovery Protocol for IPv6 This container may be referenced by multiple IPv6 instances if they shall use the same configuration. This container may have multiple instances if different configurations are required for different IPv6 instances.
Configuration Parameters	

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
TcpIpNdpArNudConfig	0..1	Specifies the configuration parameters for NDP Address Resolution and Neighbor Unreachability

		Detection.
TcpIpNdpPrefixRouterDiscoveryConfig	0..1	Specifies the configuration parameters for NDP Prefix and Router Discovery.
TcpIpNdpSlaacConfig	0..1	Specifies the configuration parameters for StateLess Address AutoConfiguration.


TcpIpNdpArNudConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpNdpMaxNeighborCacheSize: EcucIntegerParamDef
min = 1
max = 254
defaultValue = 5
+parameter
TcpIpNdpDefaultReachableTime: EcucFloatParamDef
min = 0
max = 120
defaultValue = 30
+parameter
TcpIpNdpDefaultRetransTimer: EcucFloatParamDef
min = 0
max = 60
defaultValue = 1
+parameter
TcpIpNdpNumUnicastSolicitations: EcucIntegerParamDef
min = 0
max = 255
defaultValue = 3
+parameter
TcpIpNdpDefensiveProcessing: EcucBooleanParamDef
defaultValue = false
lowerMultiplicity = 1
upperMultiplicity = 1
+parameter
TcpIpNdpNumMulticastSolicitations: EcucIntegerParamDef
min = 0
max = 255
defaultValue = 3
+parameter
TcpIpNdpDelayFirstProbeTime: EcucFloatParamDef
min = 0
max = 60
defaultValue = 5
+parameter
TcpIpNdpMinRandomFactor: EcucIntegerParamDef
min = 0
max = 100
defaultValue = 5
+parameter
TcpIpNdpMaxRandomFactor: EcucIntegerParamDef
min = 0
max = 100
defaultValue = 15
+parameter
TcpIpNdpNeighborUnreachabilityDetectionEnabled: EcucBooleanParamDef
defaultValue = true
+parameter
TcpIpNdpRandomReachableTimeEnabled: EcucBooleanParamDef
defaultValue = true
+parameter
TcpIpNdpPacketQueueEnabled: EcucBooleanParamDef
defaultValue = true
lowerMultiplicity = 1
upperMultiplicity = 1

10.2.29 TcpIpNdpArNudConfig

SWS Item	**ECUC_TcpIp_00123 :**
Container Name	TcpIpNdpArNudConfig
Description	Specifies the configuration parameters for NDP Address Resolution and Neighbor Unreachability Detection.
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00130 :**		
Name	TcpIpNdpDefaultReachableTime		
Parent Container	TcpIpNdpArNudConfig		
Description	Configuration of the ReachableTime (s) specified in [RFC4861 6.3.2. Host Variables]. "The time a neighbor is considered reachable after receiving a reachability confirmation." If "TcpIpNdpDynamicReachableTimeEnabled" is checked, this value may be reconfigured based on received Router Advertisements. Default: REACHABLE_TIME = 30 seconds		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	[0 .. 120]		
Default value	30		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00165 :**		
Name	TcpIpNdpDefaultRetransTimer		
Parent Container	TcpIpNdpArNudConfig		
Description	Configures the default value (s) for the RetransTimer variable specified in [RFC4861 6.3.2. Host Variables]. "The time between retransmissions of Neighbor Solicitation messages to a neighbor when resolving the address or when probing the reachability of a neighbor." If "TcpIpNdpDynamicRetransTimeEnabled" is checked, this value may be reconfigured based on received Router Advertisements. Default: RETRANS_TIMER = 1 second		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	[0 .. 60]		
Default value	1		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00201 :**
Name	TcpIpNdpDefensiveProcessing
Parent Container	TcpIpNdpArNudConfig
Description	If enabled the NDP shall only process Neighbor Advertisements which are

	received in reaction to a previously transmitted Neighbor Solicitation as well as skipping updates to the Neighbor Cache based on received Neighbor Solicitations. If disabled all Neighbor Advertisements and Solicitations shall be processed as specified in RFC4861. [RFC4861 7.2.5. Receipt of Neighbor Advertisements]		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	false		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00133 :**		
Name	TcpIpNdpDelayFirstProbeTime		
Parent Container	TcpIpNdpArNudConfig		
Description	Delay before sending the first NUD probe in (s). [RFC4861 7.3.3. Node Behavior] Default: DELAY_FIRST_PROBE_TIME = 5 seconds		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	[0 .. 60]		
Default value	5		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00129 :**		
Name	TcpIpNdpMaxNeighborCacheSize		
Parent Container	TcpIpNdpArNudConfig		
Description	Maximum number of entries in the neighbor cache. [RFC4861 5.1. Conceptual Data Structures]		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	1 .. 254		
Default value	5		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00135 :**	
Name	TcpIpNdpMaxRandomFactor	
Parent Container	TcpIpNdpArNudConfig	
Description	Maximum random factor used for randomization [RFC4861 10. Protocol Constants] Default: 15 (MAX_RANDOM_FACTOR = 1.5)	
Multiplicity	1	
Type	EcucIntegerParamDef	
Range	0 .. 100	

Default value	15		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00134 :**		
Name	TcpIpNdpMinRandomFactor		
Parent Container	TcpIpNdpArNudConfig		
Description	Minimum random factor used for randomization [RFC4861 10. Protocol Constants] Default: 5 (MIN_RANDOM_FACTOR = 0.5)		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 100		
Default value	5		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00136 :**		
Name	TcpIpNdpNeighborUnreachabilityDetectionEnabled		
Parent Container	TcpIpNdpArNudConfig		
Description	Neighbor Unreachability Detection is used to remove unused entries from the neighbor cache. This feature is a basic feature of NDP and should be turned on.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	true		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

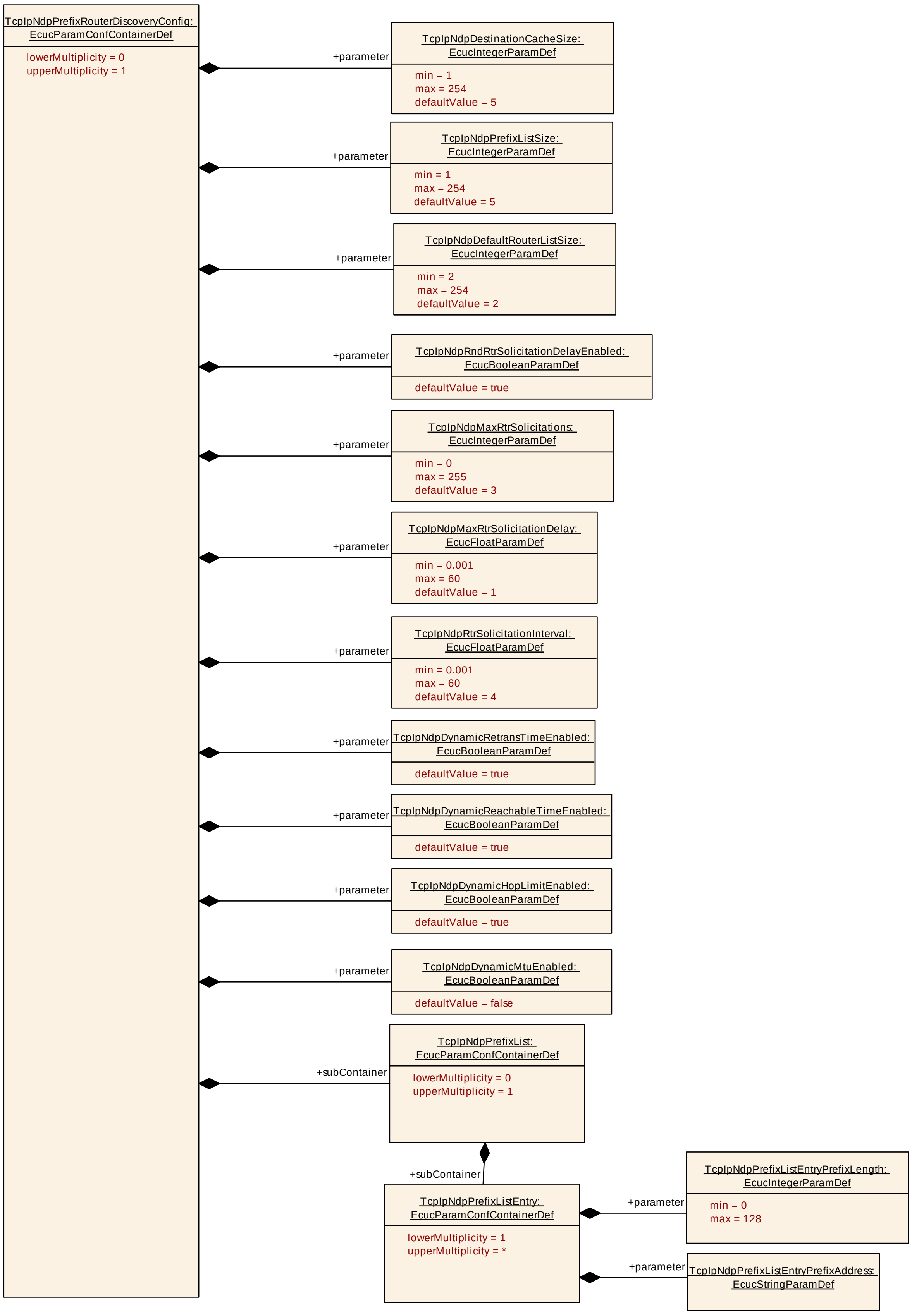
SWS Item	**ECUC_TcpIp_00132 :**		
Name	TcpIpNdpNumMulticastSolicitations		
Parent Container	TcpIpNdpArNudConfig		
Description	Maximum number of multicast solicitations that will be sent when performing address resolution. [RFC4861 7.2.2. Sending Neighbor Solicitations] Default: MAX_MULTICAST_SOLICIT = 3		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 255		
Default value	3		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00131 :**		
Name	TcpIpNdpNumUnicastSolicitations		
Parent Container	TcpIpNdpArNudConfig		
Description	Maximum number of unicast solicitations that will be sent when performig Neighbor Unreachability Detection. [RFC4861 7.3.3. Node Behavior] Default: MAX_UNICAST_SOLICIT = 3		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 255		
Default value	3		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00171 :**		
Name	TcpIpNdpPacketQueueEnabled		
Parent Container	TcpIpNdpArNudConfig		
Description	Enables (TRUE) or disables (FALSE) support of a NDP Packet Queue according to IETF RFC 4861, section 7.2.2.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	true		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00137 :**		
Name	TcpIpNdpRandomReachableTimeEnabled		
Parent Container	TcpIpNdpArNudConfig		
Description	If enabled the value of ReachableTime will be multiplied with a random value between MIN_RANDOM_FACTOR and MAX_RANDOM_FACTOR in order to prevent multiple nodes from transmitting at exactly the same time [RFC4861 6.3.2. Host Variables / ReachableTime]		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	true		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers


TcpIpNdpPrefixRouterDiscoveryConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpNdpDestinationCacheSize: EcucIntegerParamDef
min = 1
max = 254
defaultValue = 5
+parameter
TcpIpNdpPrefixListSize: EcucIntegerParamDef
min = 1
max = 254
defaultValue = 5
+parameter
TcpIpNdpDefaultRouterListSize: EcucIntegerParamDef
min = 2
max = 254
defaultValue = 2
+parameter
TcpIpNdpRndRtrSolicitationDelayEnabled: EcucBooleanParamDef
defaultValue = true
+parameter
TcpIpNdpMaxRtrSolicitations: EcucIntegerParamDef
min = 0
max = 255
defaultValue = 3
+parameter
TcpIpNdpMaxRtrSolicitationDelay: EcucFloatParamDef
min = 0.001
max = 60
defaultValue = 1
+parameter
TcpIpNdpRtrSolicitationInterval: EcucFloatParamDef
min = 0.001
max = 60
defaultValue = 4
+parameter
TcpIpNdpDynamicRetransTimeEnabled: EcucBooleanParamDef
defaultValue = true
+parameter
TcpIpNdpDynamicReachableTimeEnabled: EcucBooleanParamDef
defaultValue = true
+parameter
TcpIpNdpDynamicHopLimitEnabled: EcucBooleanParamDef
defaultValue = true
+parameter
TcpIpNdpDynamicMtuEnabled: EcucBooleanParamDef
defaultValue = false
+subContainer
TcpIpNdpPrefixList: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
+subContainer
TcpIpNdpPrefixListEntry: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
+parameter
TcpIpNdpPrefixListEntryPrefixLength: EcucIntegerParamDef
min = 0
max = 128
+parameter
TcpIpNdpPrefixListEntryPrefixAddress: EcucStringParamDef

10.2.30 TcpIpNdpPrefixRouterDiscoveryConfig

SWS Item	**ECUC_TcpIp_00124 :**
Container Name	TcpIpNdpPrefixRouterDiscoveryConfig
Description	Specifies the configuration parameters for NDP Prefix and Router Discovery.
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00139 :**		
Name	TcpIpNdpDefaultRouterListSize		
Parent Container	TcpIpNdpPrefixRouterDiscoveryConfig		
Description	Maximum number of default router entries. [RFC4861 5.1. Conceptual Data Structures]		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	2 .. 254		
Default value	2		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00138 :**		
Name	TcpIpNdpDestinationCacheSize		
Parent Container	TcpIpNdpPrefixRouterDiscoveryConfig		
Description	Maximum number of entries in the destination cache. [RFC4861 5.1. Conceptual Data Structures]		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	1 .. 254		
Default value	5		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00147 :**		
Name	TcpIpNdpDynamicHopLimitEnabled		
Parent Container	TcpIpNdpPrefixRouterDiscoveryConfig		
Description	If enabled the default hop limit may be reconfigured based on received Router Advertisements. [RFC4861 6.3.4. Processing Received Router Advertisements]		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	true		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00148 :**
Name	TcpIpNdpDynamicMtuEnabled
Parent Container	TcpIpNdpPrefixRouterDiscoveryConfig
Description	Allow dynamic reconfiguration of link MTU via Router Advertisements. [RFC4861 4.6.4. MTU]

Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	false		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00146 :**		
Name	TcpIpNdpDynamicReachableTimeEnabled		
Parent Container	TcpIpNdpPrefixRouterDiscoveryConfig		
Description	If enabled the default Reachable Time value may be reconfigured based on received Router Advertisements. [RFC4861 6.3.4. Processing Received Router Advertisements] Default: Enabled		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	true		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00145 :**		
Name	TcpIpNdpDynamicRetransTimeEnabled		
Parent Container	TcpIpNdpPrefixRouterDiscoveryConfig		
Description	If enabled the default Retransmit Timer value may be reconfigured based on received Router Advertisements. [RFC4861 6.3.4. Processing Received Router Advertisements] Default: Enabled		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	true		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00143 :**	
Name	TcpIpNdpMaxRtrSolicitationDelay	
Parent Container	TcpIpNdpPrefixRouterDiscoveryConfig	
Description	Maximum delay before the first Router Solicitation will be sent after interface initialization in (s). [RFC4861 6.3.7. Sending Router Solicitations] Default: MAX_RTR_SOLICITATION_DELAY = 1 second	
Multiplicity	1	
Type	EcucFloatParamDef	
Range	[0.001 .. 60]	
Default value	1	
Post-Build Variant Value	false	

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

SWS Item	**ECUC_TcpIp_00142 :**		
Name	TcpIpNdpMaxRtrSolicitations		
Parent Container	TcpIpNdpPrefixRouterDiscoveryConfig		
Description	Maximum number of Router Solicitations that will be sent before the first Router Advertisement has been received. 0 = No Router Solicitations will be sent. This has no impact on handling Router Advertisements. [RFC4861 6.3.7. Sending Router Solicitations] Default: MAX_RTR_SOLICITATIONS = 3 transmissions		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 255		
Default value	3		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00140 :**		
Name	TcpIpNdpPrefixListSize		
Parent Container	TcpIpNdpPrefixRouterDiscoveryConfig		
Description	Maximum number of entries in the on-link prefix list. [RFC4861 5.1. Conceptual Data Structures]		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	1 .. 254		
Default value	5		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00141 :**		
Name	TcpIpNdpRndRtrSolicitationDelayEnabled		
Parent Container	TcpIpNdpPrefixRouterDiscoveryConfig		
Description	If enabled the first router solicitation will be delayed randomly from [0...MAX_RTR_SOLICITATION_DELAY]. Otherwise the first router solicitation will be sent after exactly MAX_RTR_SOLICITATION_DELAY milliseconds. [RFC4861 6.3.7. Sending Router Solicitations] Default: Enabled		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	true		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants

	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00144 :**		
Name	TcpIpNdpRtrSolicitationInterval		
Parent Container	TcpIpNdpPrefixRouterDiscoveryConfig		
Description	Interval between consecutive Router Solicitations in (s). [RFC4861 6.3.7. Sending Router Solicitations] Default: RTR_SOLICITATION_INTERVAL = 4 seconds		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	[0.001 .. 60]		
Default value	4		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
TcpIpNdpPrefixList	0..1	Specifies a list of prefixes to be treated as "on-link" according to IETF RFC 4861 Section 5.1.

10.2.31 TcpIpNdpPrefixList

SWS Item	**ECUC_TcpIp_00205 :**
Container Name	TcpIpNdpPrefixList
Description	Specifies a list of prefixes to be treated as "on-link" according to IETF RFC 4861 Section 5.1.
Configuration Parameters	

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
TcpIpNdpPrefixListEntry	1..*	Single entry in the prefix list.

10.2.32 TcpIpNdpPrefixListEntry

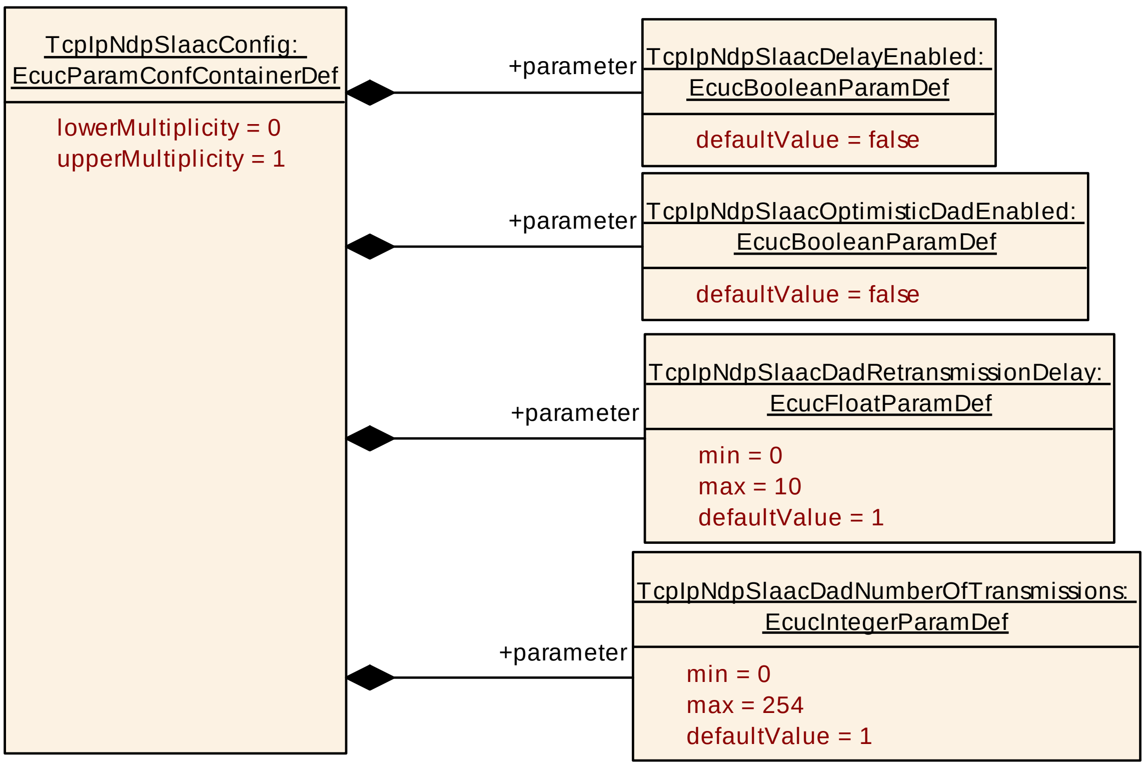
SWS Item	**ECUC_TcpIp_00206 :**
Container Name	TcpIpNdpPrefixListEntry
Description	Single entry in the prefix list.
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00208 :**
Name	TcpIpNdpPrefixListEntryPrefixAddress
Parent Container	TcpIpNdpPrefixListEntry

Description	The prefix of an IP address. This prefix can be used for on-link determination.		
Multiplicity	1		
Type	EcucStringParamDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00207 :**		
Name	TcpIpNdpPrefixListEntryPrefixLength		
Parent Container	TcpIpNdpPrefixListEntry		
Description	The number of leading bits in the Prefix that are valid.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 128		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers


TcpIpNdpSlaacConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpNdpSlaacDelayEnabled: EcucBooleanParamDef
defaultValue = false
+parameter
TcpIpNdpSlaacOptimisticDadEnabled: EcucBooleanParamDef
defaultValue = false
+parameter
TcpIpNdpSlaacDadRetransmissionDelay: EcucFloatParamDef
min = 0
max = 10
defaultValue = 1
+parameter
TcpIpNdpSlaacDadNumberOfTransmissions: EcucIntegerParamDef
min = 0
max = 254
defaultValue = 1

10.2.33 TcpIpNdpSlaacConfig

SWS Item	**ECUC_TcpIp_00122 :**		
Container Name	TcpIpNdpSlaacConfig		
Description	Specifies the configuration parameters for StateLess Address AutoConfiguration.		
Configuration Parameters			

SWS Item	**ECUC_TcpIp_00128 :**		
Name	TcpIpNdpSlaacDadNumberOfTransmissions		
Parent Container	TcpIpNdpSlaacConfig		
Description	Number of Neighbor Solicitations that have to be unanswered in order to set an autoconfigurated address to PREFERRED (usable) state. [RFC4861 5.1. Node Configuration Variables] Default: DupAddrDetectTransmits = 1 Setting this value to 0 turns off DAD.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 254		
Default value	1		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

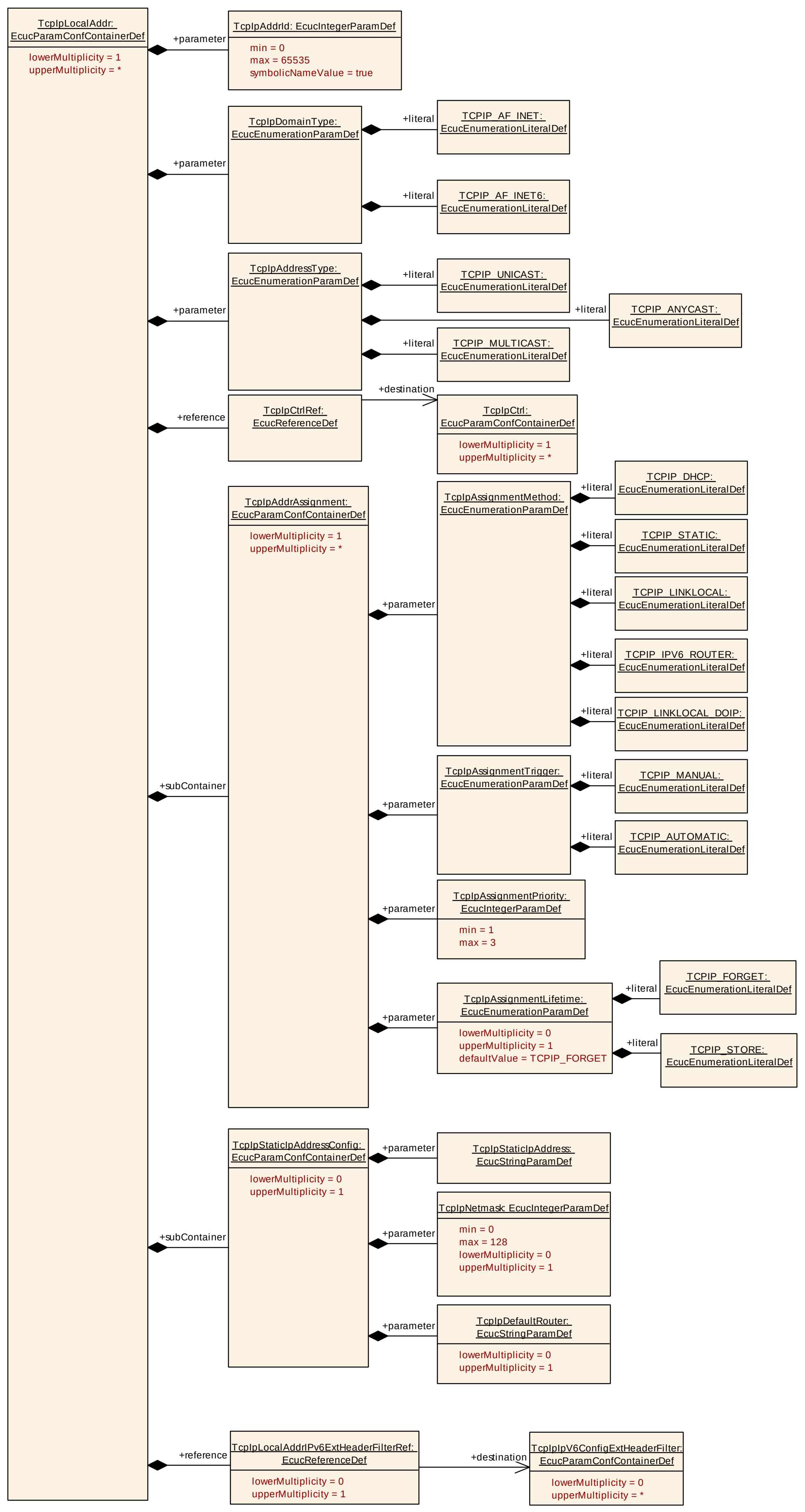
SWS Item	**ECUC_TcpIp_00127 :**		
Name	TcpIpNdpSlaacDadRetransmissionDelay		
Parent Container	TcpIpNdpSlaacConfig		
Description	Sets the maximum value for the address configuration delay (s). According to [RFC4861 5.4.2. Sending Neighbor Solicitation Messages] this value should be the same as MAX_RTR_SOLICITATION_DELAY. Default: MAX_RTR_SOLICITATION_DELAY = 1 second		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	[0 .. 10]		
Default value	1		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00125 :**
Name	TcpIpNdpSlaacDelayEnabled
Parent Container	TcpIpNdpSlaacConfig
Description	If enabled transmission of the first DAD Neighbor Solicitation will be delayed by a random value from [0...MAX_DAD_DELAY]. "This serves to alleviate congestion when many nodes start up on the link at the same time, such as after a power failure, and may help to avoid race conditions when more than one node is trying to solicit for the same address at the same time." "The delay will avoid similar congestion when multiple nodes are going to

	configure addresses by receiving the same single multicast router advertisement." [RFC4861 5.4.2. Sending Neighbor Solicitation Messages] Default: True		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	false		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00126 :**		
Name	TcpIpNdpSlaacOptimisticDadEnabled		
Parent Container	TcpIpNdpSlaacConfig		
Description	Enable Optimistic Duplicate Address Detection (DAD) according to RFC4429.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	false		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers


TcpIpLocalAddr: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
+parameter
TcpIpAddrId: EcucIntegerParamDef
min = 0
max = 65535
symbolicNameValue = true
+parameter
TcpIpDomainType: EcucEnumerationParamDef
+literal
TCPIP_AF_INET: EcucEnumerationLiteralDef
+literal
TCPIP_AF_INET6: EcucEnumerationLiteralDef
+parameter
TcpIpAddressType: EcucEnumerationParamDef
+literal
TCPIP_UNICAST: EcucEnumerationLiteralDef
+literal
TCPIP_ANYCAST: EcucEnumerationLiteralDef
+literal
TCPIP_MULTICAST: EcucEnumerationLiteralDef
+reference
TcpIpCtrlRef: EcucReferenceDef
+destination
TcpIpCtrl: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
+subContainer
TcpIpAddrAssignment: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
+parameter
TcpIpAssignmentMethod: EcucEnumerationParamDef
+literal
TCPIP_DHCP: EcucEnumerationLiteralDef
+literal
TCPIP_STATIC: EcucEnumerationLiteralDef
+literal
TCPIP_LINKLOCAL: EcucEnumerationLiteralDef
+literal
TCPIP_IPV6_ROUTER: EcucEnumerationLiteralDef
+literal
TCPIP_LINKLOCAL_DOIP: EcucEnumerationLiteralDef
+parameter
TcpIpAssignmentTrigger: EcucEnumerationParamDef
+literal
TCPIP_MANUAL: EcucEnumerationLiteralDef
+literal
TCPIP_AUTOMATIC: EcucEnumerationLiteralDef
+parameter
TcpIpAssignmentPriority: EcucIntegerParamDef
min = 1
max = 3
+parameter
TcpIpAssignmentLifetime: EcucEnumerationParamDef
lowerMultiplicity = 0
upperMultiplicity = 1
defaultValue = TCPIP_FORGET
+literal
TCPIP_FORGET: EcucEnumerationLiteralDef
+literal
TCPIP_STORE: EcucEnumerationLiteralDef
+subContainer
TcpIpStaticIpAddressConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpStaticIpAddress: EcucStringParamDef
+parameter
TcpIpNetmask: EcucIntegerParamDef
min = 0
max = 128
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpDefaultRouter: EcucStringParamDef
lowerMultiplicity = 0
upperMultiplicity = 1
+reference
TcpIpLocalAddrIPv6ExtHeaderFilterRef: EcucReferenceDef
lowerMultiplicity = 0
upperMultiplicity = 1
+destination
TcpIpIpV6ConfigExtHeaderFilter: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = *

10.2.34 TcpIpLocalAddr

SWS Item	**ECUC_TcpIp_00020 :**
Container Name	TcpIpLocalAddr
Description	Specifies the local IP (Internet Protocol) addresses used for IP communication.
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00031 :**		
Name	TcpIpAddressType		
Parent Container	TcpIpLocalAddr		
Description	Address type.		
Multiplicity	1		
Type	EcucEnumerationParamDef		
Range	TCPIP_ANYCAST	Anycast address	
	TCPIP_MULTICAST	Multicast address.	
	TCPIP_UNICAST	Unicast address	
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00029 :**		
Name	TcpIpAddrId		
Parent Container	TcpIpLocalAddr		
Description	IP address table identifier assigned by TCP/IP stack.		
Multiplicity	1		
Type	EcucIntegerParamDef (Symbolic Name generated for this parameter)		
Range	0 .. 65535		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: ECU		

SWS Item	**ECUC_TcpIp_00030 :**		
Name	TcpIpDomainType		
Parent Container	TcpIpLocalAddr		
Description	Address family.		
Multiplicity	1		
Type	EcucEnumerationParamDef		
Range	TCPIP_AF_INET	IPv4 address	
	TCPIP_AF_INET6	IPv6 address	
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00032 :**

Name	TcpIpCtrlRef		
Parent Container	TcpIpLocalAddr		
Description	Reference to a TcpIpCtrl specifying the EthIf Controller where the IP address shall be assigned.		
Multiplicity	1		
Type	Reference to [TcpIpCtrl]		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00200 :**		
Name	TcpIpLocalAddrIPv6ExtHeaderFilterRef		
Parent Container	TcpIpLocalAddr		
Description	Reference to a set of IPv6 Extension Headers which are allowed for this local IPv6 address. Note: this parameter is only relevant if the related TcpIpDomainType is TCPIP_AF_INET6.		
Multiplicity	0..1		
Type	Reference to [TcpIpIpV6ConfigExtHeaderFilter]		
Post-Build Variant Multiplicity	true		
Post-Build Variant Value	true		
Multiplicity Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	dependency: only relevant if TcpIpDomainType = TCPIP_AF_INET6		

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
TcpIpAddrAssignment	1..*	This container is a subcontainer of TcpIpLocalAddr and specifies the assignment policy for the IP address.
TcpIpStaticIpAddressConfig	0..1	This container is a subcontainer of TcpIpLocalAddr and specifies a static IP address including directly related parameters.

10.2.35 TcpIpAddrAssignment

SWS Item	**ECUC_TcpIp_00033 :**
Container Name	TcpIpAddrAssignment
Description	This container is a subcontainer of TcpIpLocalAddr and specifies the assignment policy for the IP address.
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00186 :**
Name	TcpIpAssignmentLifetime
Parent Container	TcpIpAddrAssignment
Description	Defines the lifetime of a dynamically fetched IP address. If TcpIpAssignmentMethod = TCPIP_STATIC then TcpIpAssignmentLifetime shall

	be omitted.		
Multiplicity	0..1		
Type	EcucEnumerationParamDef		
Range	TCPIP_FORGET	After a dynamic IP address has been assigned just use it for this link-up time.	
	TCPIP_STORE	After a dynamic IP address has been assigned store the address persistently.	
Default value	TCPIP_FORGET		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00035 :**		
Name	TcpIpAssignmentMethod		
Parent Container	TcpIpAddrAssignment		
Description	Method of address assignment		
Multiplicity	1		
Type	EcucEnumerationParamDef		
Range	TCPIP_DHCP	Dynamic Assigned IP Address using DHCP	
	TCPIP_IPV6_ROUTER	Dynamic Configured IPv6 Address by Router Advertisement	
	TCPIP_LINKLOCAL	Linklocal IPv4/IPv6 Address Assignment	
	TCPIP_LINKLOCAL_DOIP	Linklocal IPv4/IPv6 Address Assignment using DoIP Parameters	
	TCPIP_STATIC	Static Assigned IP Address	
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00037 :**		
Name	TcpIpAssignmentPriority		
Parent Container	TcpIpAddrAssignment		
Description	Priority of assignment (1 is highest). If a new address from an assignment method with a higher priority is available, it overwrites the IP address previously assigned by an assignment method with a lower priority.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	1 .. 3		
Default value	--		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00036 :**

Name	TcpIpAssignmentTrigger		
Parent Container	TcpIpAddrAssignment		
Description	Trigger of address assignment.		
Multiplicity	1		
Type	EcucEnumerationParamDef		
Range	TCPIP_AUTOMATIC	Assignment shall be initiated automatically by TCP/IP stack.	
	TCPIP_MANUAL	Assignment shall be initiated manually via TcpIp_RequestIpAddrAssignment().	
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

No Included Containers

10.2.36 TcpIpStaticIpAddressConfig

SWS Item	**ECUC_TcpIp_00034 :**
Container Name	TcpIpStaticIpAddressConfig
Description	This container is a subcontainer of TcpIpLocalAddr and specifies a static IP address including directly related parameters.
Configuration Parameters	

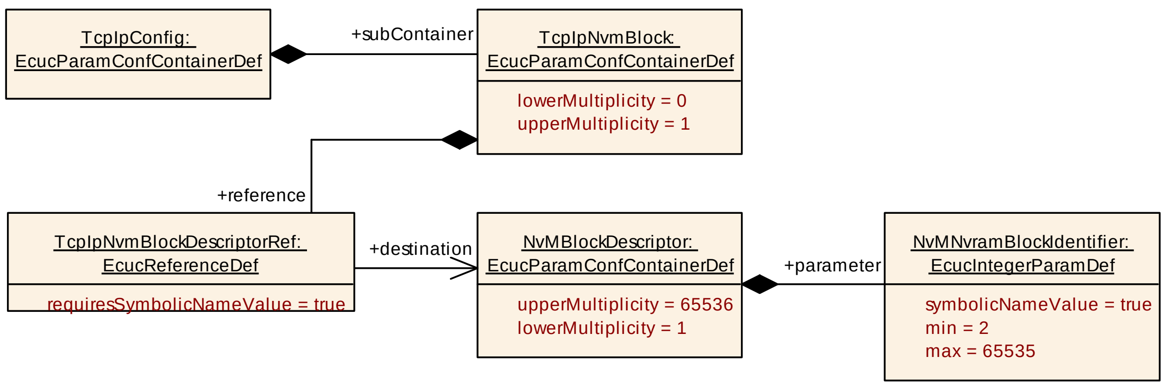
SWS Item	**ECUC_TcpIp_00040 :**		
Name	TcpIpDefaultRouter		
Parent Container	TcpIpStaticIpAddressConfig		
Description	IP address of default router (gateway)		
Multiplicity	0..1		
Type	EcucStringParamDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Multiplicity	true		
Post-Build Variant Value	true		
Multiplicity Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00039 :**
Name	TcpIpNetmask
Parent Container	TcpIpStaticIpAddressConfig
Description	Network mask of IPv4 address or address prefix of IPv6 address in CIDR Notation, i.e. decimal value between 0 and 32 (IPv4) or 0 and 128 (IPv6)

	that describes the number of significant bits defining the network number or prefix of an IP address.		
Multiplicity	0..1		
Type	EcucIntegerParamDef		
Range	0 .. 128		
Default value	--		
Post-Build Variant Multiplicity	true		
Post-Build Variant Value	true		
Multiplicity Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00038 :**		
Name	TcpIpStaticIpAddress		
Parent Container	TcpIpStaticIpAddressConfig		
Description	Static IP Address. To specify any IP address for a certain EthIfCtrl, "ANY" has to be set as wildcard. See TcpIp_Bind() for more details.		
Multiplicity	1		
Type	EcucStringParamDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

No Included Containers

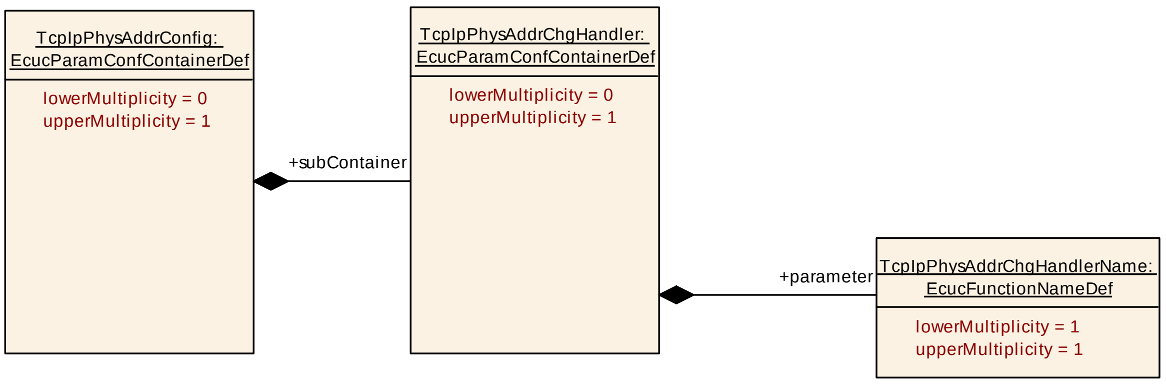

TcpIpConfig: EcucParamConfContainerDef
+subContainer
TcpIpNvmBlock: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
+reference
TcpIpNvmBlockDescriptorRef: EcucReferenceDef
requiresSymbolicNameValue = true
+destination
NvMBlockDescriptor: EcucParamConfContainerDef
upperMultiplicity = 65536
lowerMultiplicity = 1
+parameter
NvMNvramBlockIdentifier: EcucIntegerParamDef
symbolicNameValue = true
min = 2
max = 65535

10.2.37 TcpIpNvmBlock

SWS Item	**ECUC_TcpIp_00184 :**		
Container Name	TcpIpNvmBlock		
Description	Configuration of optional usage of Nvm in case the TcpIp module requires non volatile memory in the Ecu to store information (e.g. IP Address received via DHCP and shall be stored).		
Multiplicity Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Configuration Parameters			

SWS Item	**ECUC_TcpIp_00185 :**		
Name	TcpIpNvmBlockDescriptorRef		
Parent Container	TcpIpNvmBlock		
Description	Reference to the Nvm block description in the Nvm module configuration.		
Multiplicity	1		
Type	Symbolic name reference to [NvMBlockDescriptor]		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: ECU		

No Included Containers



10.2.38 TcpIpPhysAddrConfig

SWS Item	**ECUC_TcpIp_00083 :**
Container Name	TcpIpPhysAddrConfig
Description	Specifies the physical address configuration.
Configuration Parameters	

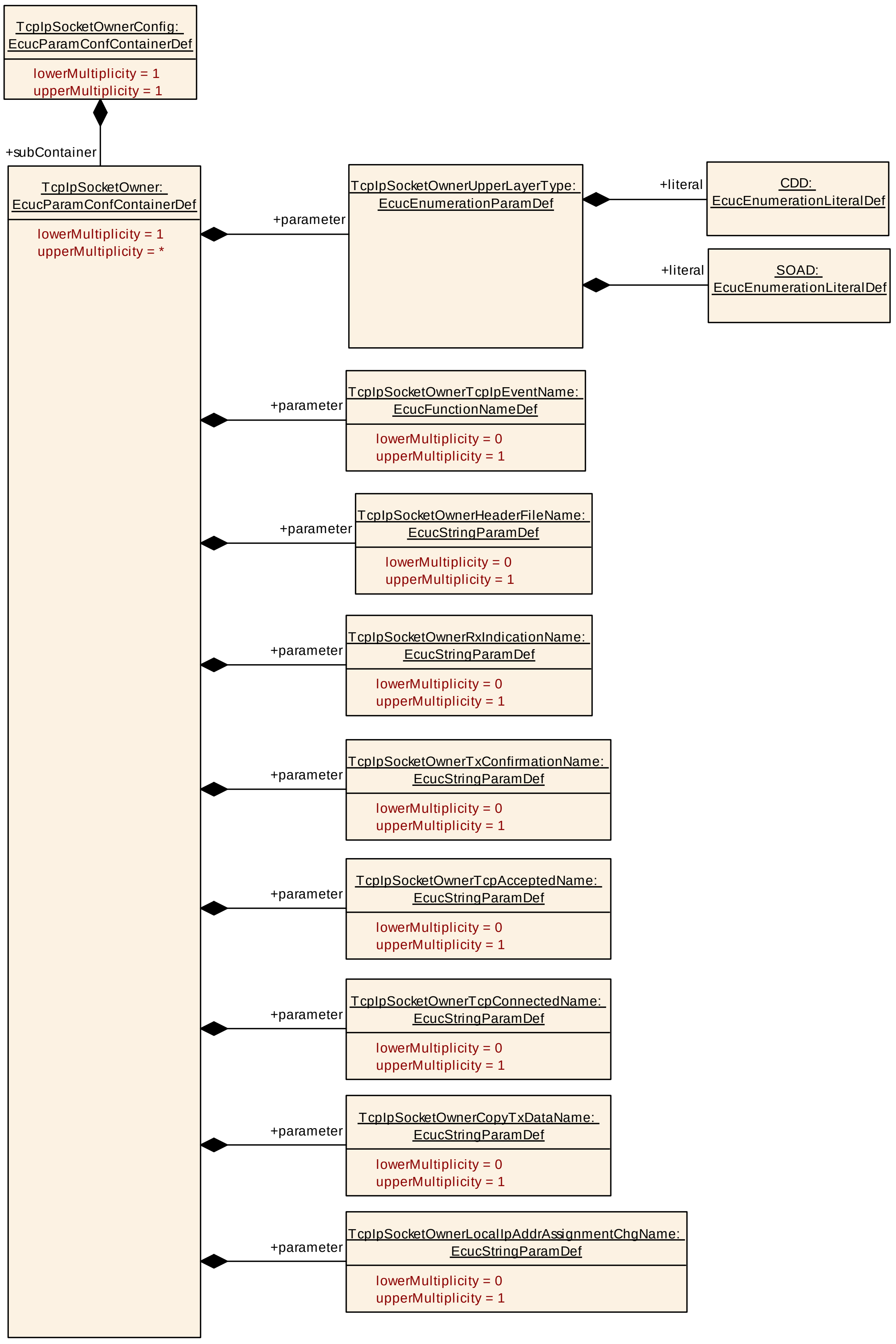
Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
TcpIpPhysAddrChgHandler	0..1	This container is a subcontainer of TcpIpPhysAddrConfig and specifies the configuration parameters for physical address change handler.

10.2.39 TcpIpPhysAddrChgHandler

SWS Item	**ECUC_TcpIp_00084 :**
Container Name	TcpIpPhysAddrChgHandler
Description	This container is a subcontainer of TcpIpPhysAddrConfig and specifies the configuration parameters for physical address change handler.
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00086 :**		
Name	TcpIpPhysAddrChgHandlerName		
Parent Container	TcpIpPhysAddrChgHandler		
Description	This parameter defines the name of the physical address change function <Up>_PhysAddrTableChg.		
Multiplicity	1		
Type	EcucFunctionNameDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: ECU		

No Included Containers


TcpIpSocketOwnerConfig: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = 1
+subContainer
TcpIpSocketOwner: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
+parameter
TcpIpSocketOwnerUpperLayerType: EcucEnumerationParamDef
+literal
CDD: EcucEnumerationLiteralDef
+literal
SOAD: EcucEnumerationLiteralDef
+parameter
TcpIpSocketOwnerTcpIpEventName: EcucFunctionNameDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpSocketOwnerHeaderFileName: EcucStringParamDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpSocketOwnerRxIndicationName: EcucStringParamDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpSocketOwnerTxConfirmationName: EcucStringParamDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpSocketOwnerTcpAcceptedName: EcucStringParamDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpSocketOwnerTcpConnectedName: EcucStringParamDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpSocketOwnerCopyTxDataName: EcucStringParamDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpSocketOwnerLocalIpAddrAssignmentChgName: EcucStringParamDef
lowerMultiplicity = 0
upperMultiplicity = 1

10.2.40 TcpIpSocketOwnerConfig

SWS Item	**ECUC_TcpIp_00172 :**
Container Name	TcpIpSocketOwnerConfig
Description	Specifies the upper layer modules of TcpIp using the socket API.
Configuration Parameters	

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
TcpIpSocketOwner	1..*	This container is a subcontainer of TcpIpSocketOwnerConfig and specifies an upper layer of TcpIp that uses the socket API.

10.2.41 TcpIpSocketOwner

SWS Item	**ECUC_TcpIp_00173 :**
Container Name	TcpIpSocketOwner
Description	This container is a subcontainer of TcpIpSocketOwnerConfig and specifies an upper layer of TcpIp that uses the socket API.
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00180 :**		
Name	TcpIpSocketOwnerCopyTxDataName		
Parent Container	TcpIpSocketOwner		
Description	This parameter defines the name of the <Up_CopyTxData> function of the TcpIpSocketOwner module. The function name shall only be configurable if TcpIpSocketOwnerUpperLayerType is set to CDD.		
Multiplicity	0..1		
Type	EcucStringParamDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local dependency: TcpIpSocketOwnerUpperLayerType		

SWS Item	**ECUC_TcpIp_00175 :**
Name	TcpIpSocketOwnerHeaderFileName
Parent Container	TcpIpSocketOwner
Description	This parameter specifies the name of the header file containing the definition of the TcpIpSocketOwner module functions. The header file name shall only be configurable if TcpIpSocketOwnerUpperLayerType is set to CDD.
Multiplicity	0..1
Type	EcucStringParamDef
Default value	--
maxLength	--
minLength	--
regularExpression	--

Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00181 :**		
Name	TcpIpSocketOwnerLocalIpAddrAssignmentChgName		
Parent Container	TcpIpSocketOwner		
Description	This parameter defines the name of the <Up_LocalIpAddrAssignmentChg> function of the TcpIpSocketOwner module. The function name shall only be configurable if TcpIpSocketOwnerUpperLayerType is set to CDD.		
Multiplicity	0..1		
Type	EcucStringParamDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local dependency: TcpIpSocketOwnerUpperLayerType		

SWS Item	**ECUC_TcpIp_00176 :**		
Name	TcpIpSocketOwnerRxIndicationName		
Parent Container	TcpIpSocketOwner		
Description	This parameter defines the name of the <Up_RxIndication> function of the TcpIpSocketOwner module. The function name shall only be configurable if TcpIpSocketOwnerUpperLayerType is set to CDD.		
Multiplicity	0..1		
Type	EcucStringParamDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local dependency: TcpIpSocketOwnerUpperLayerType		

SWS Item	**ECUC_TcpIp_00178 :**
Name	TcpIpSocketOwnerTcpAcceptedName
Parent Container	TcpIpSocketOwner
Description	This parameter defines the name of the <Up_TcpAccepted> function of the TcpIpSocketOwner module. The function name shall only be configurable if TcpIpSocketOwnerUpperLayerType is set to CDD.
Multiplicity	0..1
Type	EcucStringParamDef
Default value	--

maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local dependency: TcpIpSocketOwnerUpperLayerType		

SWS Item	**ECUC_TcpIp_00179 :**		
Name	TcpIpSocketOwnerTcpConnectedName		
Parent Container	TcpIpSocketOwner		
Description	This parameter defines the name of the <Up_TcpConnected> function of the TcpIpSocketOwner module. The function name shall only be configurable if TcpIpSocketOwnerUpperLayerType is set to CDD.		
Multiplicity	0..1		
Type	EcucStringParamDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local dependency: TcpIpSocketOwnerUpperLayerType		

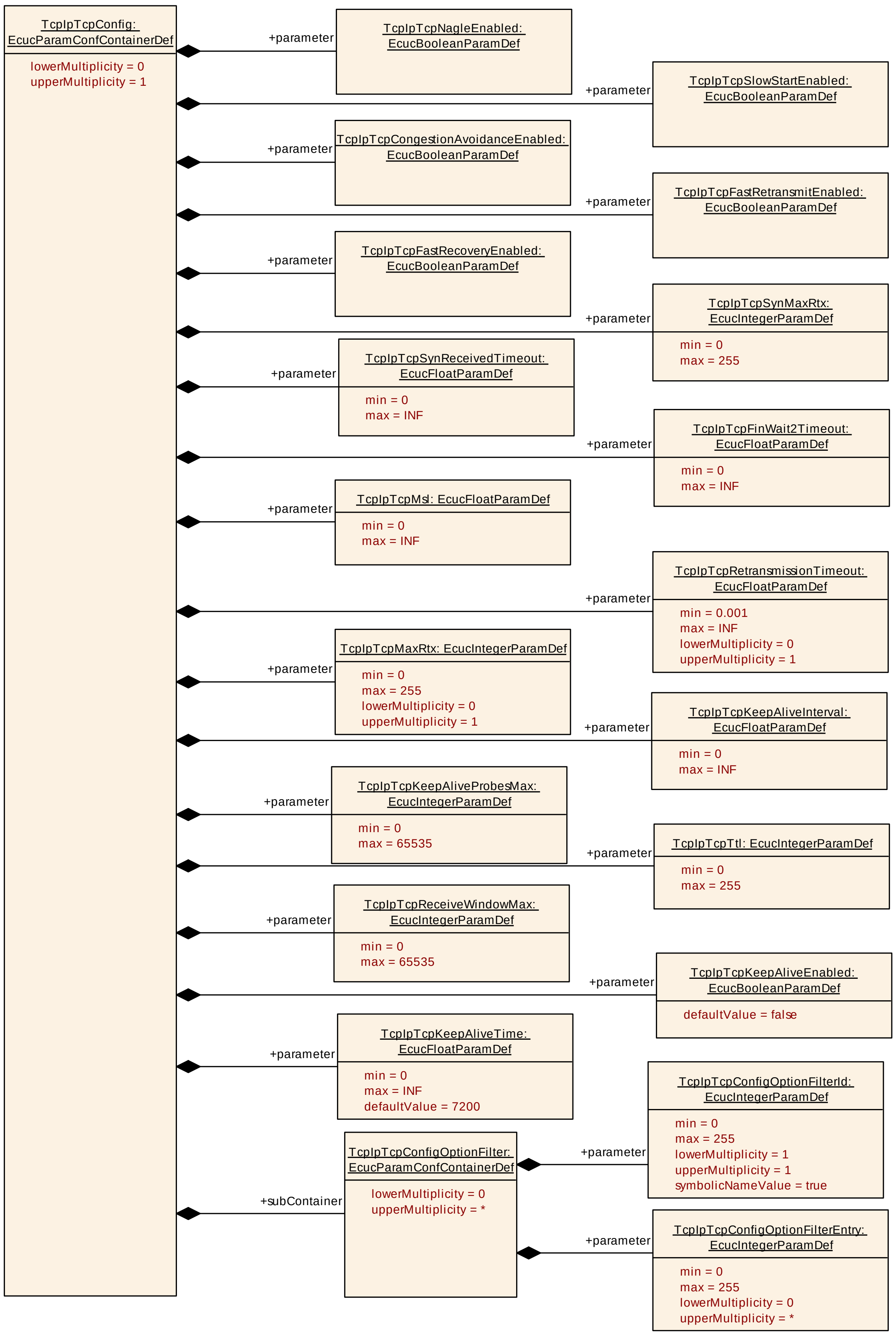
SWS Item	**ECUC_TcpIp_00197 :**		
Name	TcpIpSocketOwnerTcpIpEventName		
Parent Container	TcpIpSocketOwner		
Description	This parameter defines the name of the <Up_TcpIpEvent> function of the TcpIpSocketOwner module. The function name shall only be configurable if TcpIpSocketOwnerUpperLayerType is set to CDD.		
Multiplicity	0..1		
Type	EcucFunctionNameDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local dependency: TcpIpSocketOwnerUpperLayerType		

SWS Item	**ECUC_TcpIp_00177 :**
Name	TcpIpSocketOwnerTxConfirmationName
Parent Container	TcpIpSocketOwner
Description	This parameter defines the name of the <Up_TxConfirmation> function of the TcpIpSocketOwner module. The function name shall only be

	configurable if TcpIpSocketOwnerUpperLayerType is set to CDD.		
Multiplicity	0..1		
Type	EcucStringParamDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME, VARIANT-POST-BUILD
	Post-build time	--	
Scope / Dependency	scope: local dependency: TcpIpSocketOwnerUpperLayerType		

SWS Item	**ECUC_TcpIp_00174 :**		
Name	TcpIpSocketOwnerUpperLayerType		
Parent Container	TcpIpSocketOwner		
Description	This parameter specifies the type of the upper layer module.		
Multiplicity	1		
Type	EcucEnumerationParamDef		
Range	CDD	Complex Driver	
	SOAD	Socket Adaptor	
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

No Included Containers


TcpIpTcpConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpTcpNagleEnabled: EcucBooleanParamDef
+parameter
TcpIpTcpSlowStartEnabled: EcucBooleanParamDef
+parameter
TcpIpTcpCongestionAvoidanceEnabled: EcucBooleanParamDef
+parameter
TcpIpTcpFastRetransmitEnabled: EcucBooleanParamDef
+parameter
TcpIpTcpFastRecoveryEnabled: EcucBooleanParamDef
+parameter
TcpIpTcpSynMaxRtx: EcucIntegerParamDef
min = 0
max = 255
+parameter
TcpIpTcpSynReceivedTimeout: EcucFloatParamDef
min = 0
max = INF
+parameter
TcpIpTcpFinWait2Timeout: EcucFloatParamDef
min = 0
max = INF
+parameter
TcpIpTcpMsl: EcucFloatParamDef
min = 0
max = INF
+parameter
TcpIpTcpRetransmissionTimeout: EcucFloatParamDef
min = 0.001
max = INF
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpTcpMaxRtx: EcucIntegerParamDef
min = 0
max = 255
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpTcpKeepAliveInterval: EcucFloatParamDef
min = 0
max = INF
+parameter
TcpIpTcpKeepAliveProbesMax: EcucIntegerParamDef
min = 0
max = 65535
+parameter
TcpIpTcpTtl: EcucIntegerParamDef
min = 0
max = 255
+parameter
TcpIpTcpReceiveWindowMax: EcucIntegerParamDef
min = 0
max = 65535
+parameter
TcpIpTcpKeepAliveEnabled: EcucBooleanParamDef
defaultValue = false
+parameter
TcpIpTcpKeepAliveTime: EcucFloatParamDef
min = 0
max = INF
defaultValue = 7200
+subContainer
TcpIpTcpConfigOptionFilter: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = *
+parameter
TcpIpTcpConfigOptionFilterId: EcucIntegerParamDef
min = 0
max = 255
lowerMultiplicity = 1
upperMultiplicity = 1
symbolicNameValue = true
+parameter
TcpIpTcpConfigOptionFilterEntry: EcucIntegerParamDef
min = 0
max = 255
lowerMultiplicity = 0
upperMultiplicity = *

10.2.42 TcpIpTcpConfig

SWS Item	**ECUC_TcpIp_00025 :**		
Container Name	TcpIpTcpConfig		
Description	Specifies the configuration parameters of the TCP (Transmission Control Protocol) sub-module.		
Configuration Parameters			

SWS Item	**ECUC_TcpIp_00061 :**		
Name	TcpIpTcpCongestionAvoidanceEnabled		
Parent Container	TcpIpTcpConfig		
Description	Enables (TRUE) or disables (FALSE) support of TCP congestion avoidance algorithm according to IETF RFC 5681.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00063 :**		
Name	TcpIpTcpFastRecoveryEnabled		
Parent Container	TcpIpTcpConfig		
Description	Enables (TRUE) or disables (FALSE) support of TCP Fast Recovery according to IETF RFC 5681.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00062 :**		
Name	TcpIpTcpFastRetransmitEnabled		
Parent Container	TcpIpTcpConfig		
Description	Enables (TRUE) or disables (FALSE) support of TCP Fast Retransmission according to IETF RFC 5681.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00066 :**
Name	TcpIpTcpFinWait2Timeout
Parent Container	TcpIpTcpConfig
Description	Timeout in [s] to receive a FIN from the remote node (after this node has initiated connection termination), i.e. maximum time waiting in FINWAIT-2 for a connection termination request from the remote TCP.

Multiplicity	1		
Type	EcucFloatParamDef		
Range	[0 .. INF]		
Default value	--		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00082 :**		
Name	TcpIpTcpKeepAliveEnabled		
Parent Container	TcpIpTcpConfig		
Description	Enables (TRUE) or disables (FALSE) TCP Keep Alive Probes according to IETF RFC 1122 chapter 4.2.3.6		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	false		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00070 :**		
Name	TcpIpTcpKeepAliveInterval		
Parent Container	TcpIpTcpConfig		
Description	Specifies the interval in [s] between subsequent keepalive probes.		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	[0 .. INF]		
Default value	--		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local dependency: TcpIpTcpKeepAliveEnabled		

SWS Item	**ECUC_TcpIp_00071 :**		
Name	TcpIpTcpKeepAliveProbesMax		
Parent Container	TcpIpTcpConfig		
Description	Maximum number of times that a TCP Keep Alive is retransmitted before the connection is closed.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 65535		
Default value	--		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local dependency: TcpIpTcpKeepAliveEnabled		

SWS Item	**ECUC_TcpIp_00087 :**

Name	TcpIpTcpKeepAliveTime		
Parent Container	TcpIpTcpConfig		
Description	Specifies the time in [s] between the last data packet sent (simple ACKs are not considered data) and the first keepalive probe. Note: Setting this configuration parameter to a value smaller or equal to the value of TcpIpMainFunctionPeriod results in the transmission of keep alive probes within every MainFunction cycle.		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	[0 .. INF]		
Default value	7200		
Post-Build Variant Value	true		
Value Configuration Class	**Pre-compile time**	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local dependency: TcpIpTcpKeepAliveEnabled		

SWS Item	**ECUC_TcpIp_00069 :**		
Name	TcpIpTcpMaxRtx		
Parent Container	TcpIpTcpConfig		
Description	Maximum number of times that a TCP segment is retransmitted before the TCP connection is closed. This parameter is only valid if TcpIpTcpRetransmissionTimeout is configured. Note: This parameter also applies for FIN retransmissions.		
Multiplicity	0..1		
Type	EcucIntegerParamDef		
Range	0 .. 255		
Default value	--		
Post-Build Variant Value	true		
Value Configuration Class	**Pre-compile time**	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	dependency: TcpIpTcpRetransmissionTimeout		

SWS Item	**ECUC_TcpIp_00067 :**		
Name	TcpIpTcpMsl		
Parent Container	TcpIpTcpConfig		
Description	Maximum segment lifetime in [s]. (Note: TIME-WAIT = 2 x TcpIpTcpMsl - to ensure that the remote node received the acknowledgment to its connection termination request.)		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	[0 .. INF]		
Default value	--		
Post-Build Variant Value	true		
Value Configuration Class	**Pre-compile time**	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00059 :**
Name	TcpIpTcpNagleEnabled
Parent Container	TcpIpTcpConfig
Description	Enables (TRUE) or disables (FALSE) support of Nagle's algorithm according to IETF RFC 896. If enabled the Nagle's algorithm is activated

	per default for all TCP sockets, but can be deactivated via TcpIp_ChangeParameter() API.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00073 :**		
Name	TcpIpTcpReceiveWindowMax		
Parent Container	TcpIpTcpConfig		
Description	Default value of maximum receive window in bytes.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 65535		
Default value	--		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00068 :**		
Name	TcpIpTcpRetransmissionTimeout		
Parent Container	TcpIpTcpConfig		
Description	Timeout in [s] before an unacknowledged TCP segment is sent again. If the timeout is disabled or set to INF, no TCP segments shall be retransmitted.		
Multiplicity	0..1		
Type	EcucFloatParamDef		
Range	[0.001 .. INF]		
Default value	--		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00060 :**		
Name	TcpIpTcpSlowStartEnabled		
Parent Container	TcpIpTcpConfig		
Description	Enables (TRUE) or disables (FALSE) support of TCP slow start algorithm according to IETF RFC 5681.		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00064 :**

Name	TcpIpTcpSynMaxRtx		
Parent Container	TcpIpTcpConfig		
Description	Maximum number of times that a TCP SYN is retransmitted. Note: SYN will be retried after TcpIpTcpRetransmissionTimeout. The connection will be dropped if no matching connection request has been received after the last TCP SYN has been sent and TcpIpTcpRetransmissionTimeout has been expired.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 255		
Default value	--		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00065 :**		
Name	TcpIpTcpSynReceivedTimeout		
Parent Container	TcpIpTcpConfig		
Description	Timeout in [s] to complete a remotely initiated TCP connection establishment, i.e. maximum time waiting in SYN-RECEIVED for a confirming connection request acknowledgment after having both received and sent a connection request.		
Multiplicity	1		
Type	EcucFloatParamDef		
Range	[0 .. INF]		
Default value	--		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00072 :**		
Name	TcpIpTcpTtl		
Parent Container	TcpIpTcpConfig		
Description	Default Time-to-live value of outgoing TCP packets.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 255		
Default value	--		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
TcpIpTcpConfigOptionFilter	0..*	This container describes the white list for the filtering of TCP options, i.e. segments containing TCP options not listed here shall be silently dropped.

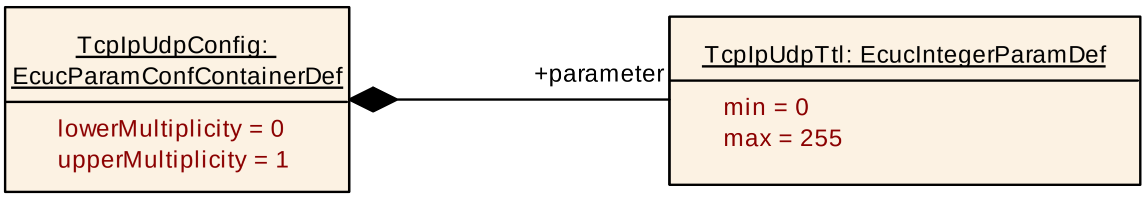
10.2.43 TcpIpTcpConfigOptionFilter

SWS Item	**ECUC_TcpIp_00202 :**		
Container Name	TcpIpTcpConfigOptionFilter		
Description	This container describes the white list for the filtering of TCP options, i.e. segments containing TCP options not listed here shall be silently dropped.		
Post-Build Variant Multiplicity	true		
Multiplicity Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Configuration Parameters			

SWS Item	**ECUC_TcpIp_00204 :**		
Name	TcpIpTcpConfigOptionFilterEntry		
Parent Container	TcpIpTcpConfigOptionFilter		
Description	TCP option kind allowed by this filter.		
Multiplicity	0..*		
Type	EcucIntegerParamDef		
Range	0 .. 255		
Default value	--		
Post-Build Variant Multiplicity	true		
Post-Build Variant Value	true		
Multiplicity Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00203 :**		
Name	TcpIpTcpConfigOptionFilterId		
Parent Container	TcpIpTcpConfigOptionFilter		
Description	Identification of the TCP option filter.		
Multiplicity	1		
Type	EcucIntegerParamDef (Symbolic Name generated for this parameter)		
Range	0 .. 255		
Default value	--		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

No Included Containers

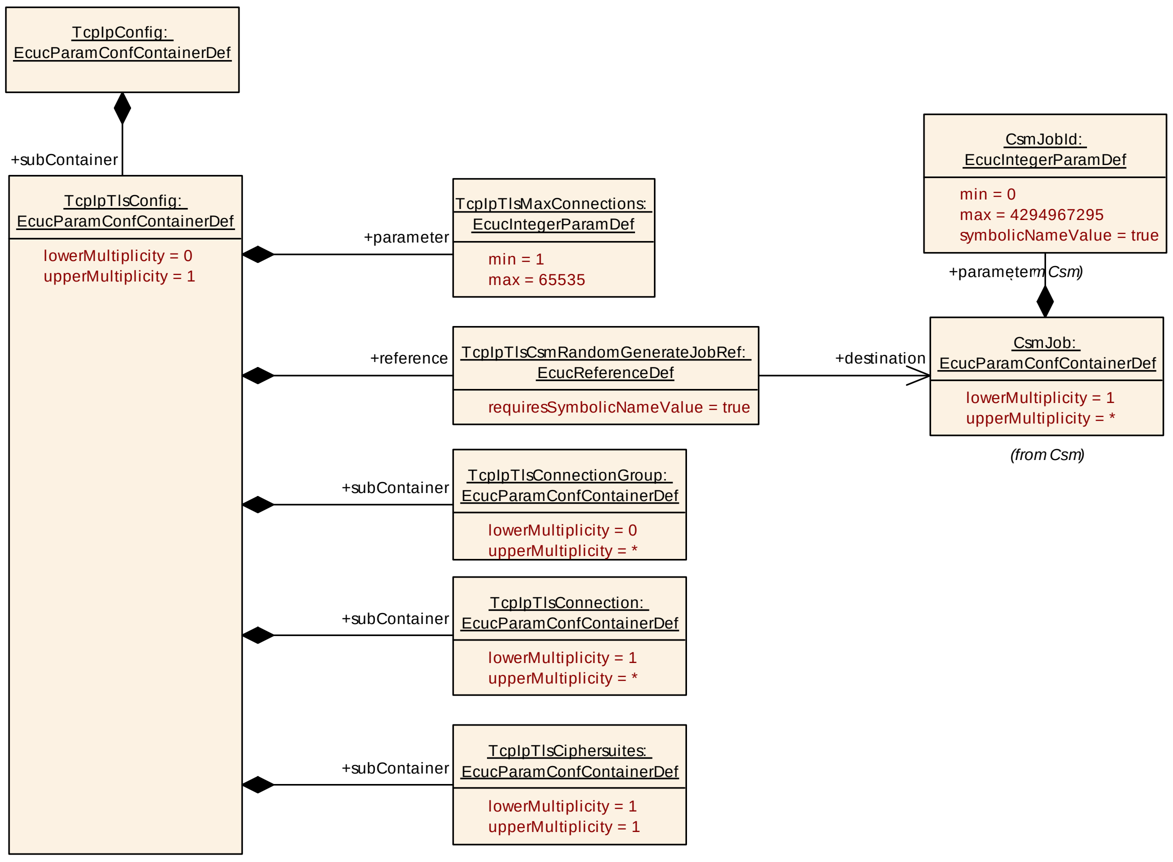

TcpIpUdpConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpUdpTtl: EcucIntegerParamDef
min = 0
max = 255

10.2.44 TcpIpUdpConfig

SWS Item	**ECUC_TcpIp_00026 :**
Container Name	TcpIpUdpConfig
Description	Specifies the configuration parameters of the UDP (User Datagram Protocol) sub-module
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00075 :**		
Name	TcpIpUdpTtl		
Parent Container	TcpIpUdpConfig		
Description	Default Time-to-live value of outgoing UDP packets.		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	0 .. 255		
Default value	--		
Post-Build Variant Value	true		
Value Configuration Class	***Pre-compile time***	X	VARIANT-PRE-COMPILE
	Link time	X	VARIANT-LINK-TIME
	Post-build time	X	VARIANT-POST-BUILD
Scope / Dependency	scope: local		

No Included Containers


TcpIpConfig: EcucParamConfContainerDef
+subContainer
TcpIpTlsConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpTlsMaxConnections: EcucIntegerParamDef
min = 1
max = 65535
+reference
TcpIpTlsCsmRandomGenerateJobRef: EcucReferenceDef
requiresSymbolicNameValue = true
+destination
CsmJobId: EcucIntegerParamDef
min = 0
max = 4294967295
symbolicNameValue = true
+parameter
(from Csm)
CsmJob: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
(from Csm)
+subContainer
TcpIpTlsConnectionGroup: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = *
+subContainer
TcpIpTlsConnection: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
+subContainer
TcpIpTlsCiphersuites: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = 1

10.2.45 TcpIpTlsConfig

SWS Item	**ECUC_TcpIp_00219 :**
Container Name	TcpIpTlsConfig
Description	Specifies the configuration parameters of the TLS (Transport Layer Security) sub module. **Tags:** atp.Status=draft
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00220 :**		
Name	TcpIpTlsMaxConnections		
Parent Container	TcpIpTlsConfig		
Description	Defines the max. number of TLS connections that can be opened at the same time. **Tags:** atp.Status=draft		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	1 .. 65535		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	*Pre-compile time*	X	All Variants
	Link time	--	
	Post-build time	--	

Scope / Dependency	scope: local

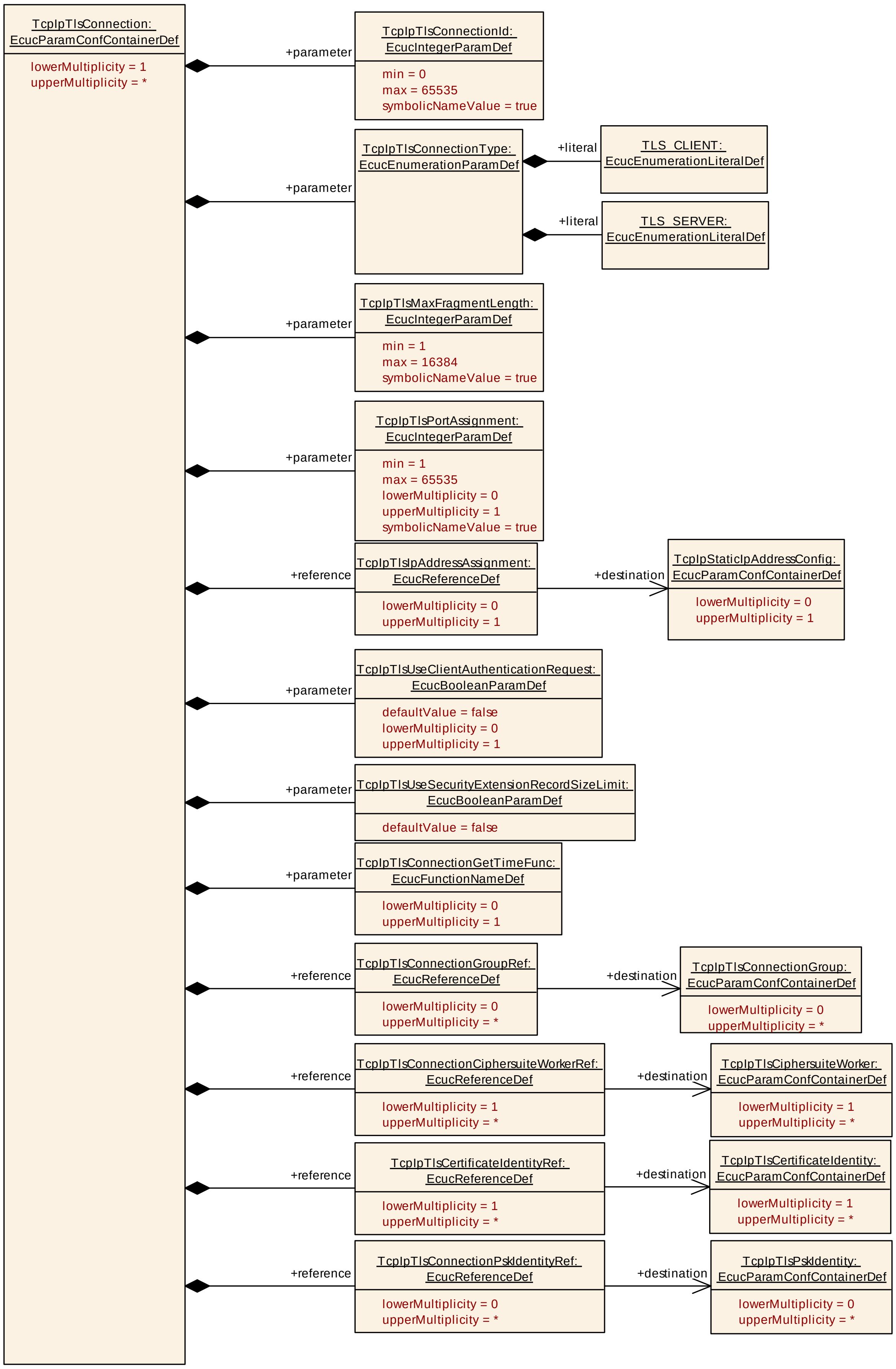
SWS Item	**ECUC_TcpIp_00221 :**		
Name	TcpIpTlsCsmRandomGenerateJobRef		
Parent Container	TcpIpTlsConfig		
Description	Reference to a CSM job to generate a random value. **Tags:** atp.Status=draft		
Multiplicity	1		
Type	Symbolic name reference to [CsmJob]		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
TcpIpTlsCiphersuites	1	This container provides the information about supported ciphersuites used by TLS. **Tags:** atp.Status=draft
TcpIpTlsConnection	1..*	This container defines the properties of a TLS connection **Tags:** atp.Status=draft
TcpIpTlsConnectionGroup	0..*	This optional container is used to collect all TlsConnections that belong to a TlsConnectionGroup. The intention of a TLS connection group is to share resources among TLS connections collected in a group, because only one connection of a group can be used at a time. **Tags:** atp.Status=draft

10.2.46 TcpIpTlsConnectionGroup

SWS Item	**ECUC_TcpIp_00224 :**
Container Name	TcpIpTlsConnectionGroup
Description	This optional container is used to collect all TlsConnections that belong to a TlsConnectionGroup. The intention of a TLS connection group is to share resources among TLS connections collected in a group, because only one connection of a group can be used at a time. **Tags:** atp.Status=draft
Configuration Parameters	

No Included Containers


TcpIpTlsConnection: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
+parameter
TcpIpTlsConnectionId: EcucIntegerParamDef
min = 0
max = 65535
symbolicNameValue = true
+parameter
TcpIpTlsConnectionType: EcucEnumerationParamDef
+literal
TLS_CLIENT: EcucEnumerationLiteralDef
+literal
TLS_SERVER: EcucEnumerationLiteralDef
+parameter
TcpIpTlsMaxFragmentLength: EcucIntegerParamDef
min = 1
max = 16384
symbolicNameValue = true
+parameter
TcpIpTlsPortAssignment: EcucIntegerParamDef
min = 1
max = 65535
lowerMultiplicity = 0
upperMultiplicity = 1
symbolicNameValue = true
+reference
TcpIpTlsIpAddressAssignment: EcucReferenceDef
lowerMultiplicity = 0
upperMultiplicity = 1
+destination
TcpIpStaticIpAddressConfig: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpTlsUseClientAuthenticationRequest: EcucBooleanParamDef
defaultValue = false
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpTlsUseSecurityExtensionRecordSizeLimit: EcucBooleanParamDef
defaultValue = false
+parameter
TcpIpTlsConnectionGetTimeFunc: EcucFunctionNameDef
lowerMultiplicity = 0
upperMultiplicity = 1
+reference
TcpIpTlsConnectionGroupRef: EcucReferenceDef
lowerMultiplicity = 0
upperMultiplicity = *
+destination
TcpIpTlsConnectionGroup: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = *
+reference
TcpIpTlsConnectionCiphersuiteWorkerRef: EcucReferenceDef
lowerMultiplicity = 1
upperMultiplicity = *
+destination
TcpIpTlsCiphersuiteWorker: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
+reference
TcpIpTlsCertificateIdentityRef: EcucReferenceDef
lowerMultiplicity = 1
upperMultiplicity = *
+destination
TcpIpTlsCertificateIdentity: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
+reference
TcpIpTlsConnectionPskIdentityRef: EcucReferenceDef
lowerMultiplicity = 0
upperMultiplicity = *
+destination
TcpIpTlsPskIdentity: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = *

10.2.47 TcpIpTlsConnection

SWS Item	**ECUC_TcpIp_00223 :**		
Container Name	TcpIpTlsConnection		
Description	This container defines the properties of a TLS connection **Tags:** atp.Status=draft		
Configuration Parameters			

SWS Item	**ECUC_TcpIp_00232 :**		
Name	TcpIpTlsConnectionGetTimeFunc		
Parent Container	TcpIpTlsConnection		
Description	Defines the function name for the Up_TlsGetCurrentTimeStamp() callback. **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	EcucFunctionNameDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local dependency: This definition is needed if a connection specific time shall be provided with the client hello message. If not present, the time will be set to 0.		

SWS Item	**ECUC_TcpIp_00225 :**		
Name	TcpIpTlsConnectionId		
Parent Container	TcpIpTlsConnection		
Description	Identifier of the connection. The set of configured identifiers shall be consecutive and gapless. **Tags:** atp.Status=draft		
Multiplicity	1		
Type	EcucIntegerParamDef (Symbolic Name generated for this parameter)		
Range	0 .. 65535		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00226 :**
Name	TcpIpTlsConnectionType
Parent Container	TcpIpTlsConnection
Description	Specifies if the TLS connection is a server or a client.

	Tags: atp.Status=draft		
Multiplicity	1		
Type	EcucEnumerationParamDef		
Range	TLS_CLIENT	--	
	TLS_SERVER	--	
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00227 :**		
Name	TcpIpTlsMaxFragmentLength		
Parent Container	TcpIpTlsConnection		
Description	Specifies the max length in bytes of a TLS fragment that is sent as a block. **Tags:** atp.Status=draft		
Multiplicity	1		
Type	EcucIntegerParamDef (Symbolic Name generated for this parameter)		
Range	1 .. 16384		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00285 :**		
Name	TcpIpTlsPortAssignment		
Parent Container	TcpIpTlsConnection		
Description	Specifies the port address that is used for TLS communication. **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	EcucIntegerParamDef (Symbolic Name generated for this parameter)		
Range	1 .. 65535		
Default value	--		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00230 :**
Name	TcpIpTlsUseClientAuthenticationRequest
Parent Container	TcpIpTlsConnection
Description	Defines if client authentication shall be applied for this TLS connection. **Tags:**

	atp.Status=draft		
Multiplicity	0..1		
Type	EcucBooleanParamDef		
Default value	false		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	dependency: Informs the TLS_SERVER that a client authentication shall be requested. Can be omitted on TLS_CLIENT side.		

SWS Item	**ECUC_TcpIp_00231 :**		
Name	TcpIpTlsUseSecurityExtensionRecordSizeLimit		
Parent Container	TcpIpTlsConnection		
Description	Defines if the security extension for max_fragment_length shall be supported as defined in IETF RFC 8449, chapter 4.1. **Tags:** atp.Status=draft		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	false		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00235 :**		
Name	TcpIpTlsCertificateIdentityRef		
Parent Container	TcpIpTlsConnection		
Description	References the container that contains the certificate and identity information. **Tags:** atp.Status=draft		
Multiplicity	1..*		
Type	Reference to [TcpIpTlsCertificateIdentity]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local dependency: There shall be only one TlsCertificateIdentity reference if server name identification is not used.		

SWS Item	**ECUC_TcpIp_00234 :**
Name	TcpIpTlsConnectionCiphersuiteWorkerRef

Parent Container	TcpIpTlsConnection		
Description	References the container that contains the jobs and keys to process the application data. **Tags:** atp.Status=draft		
Multiplicity	1..*		
Type	Reference to [TcpIpTlsCiphersuiteWorker]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

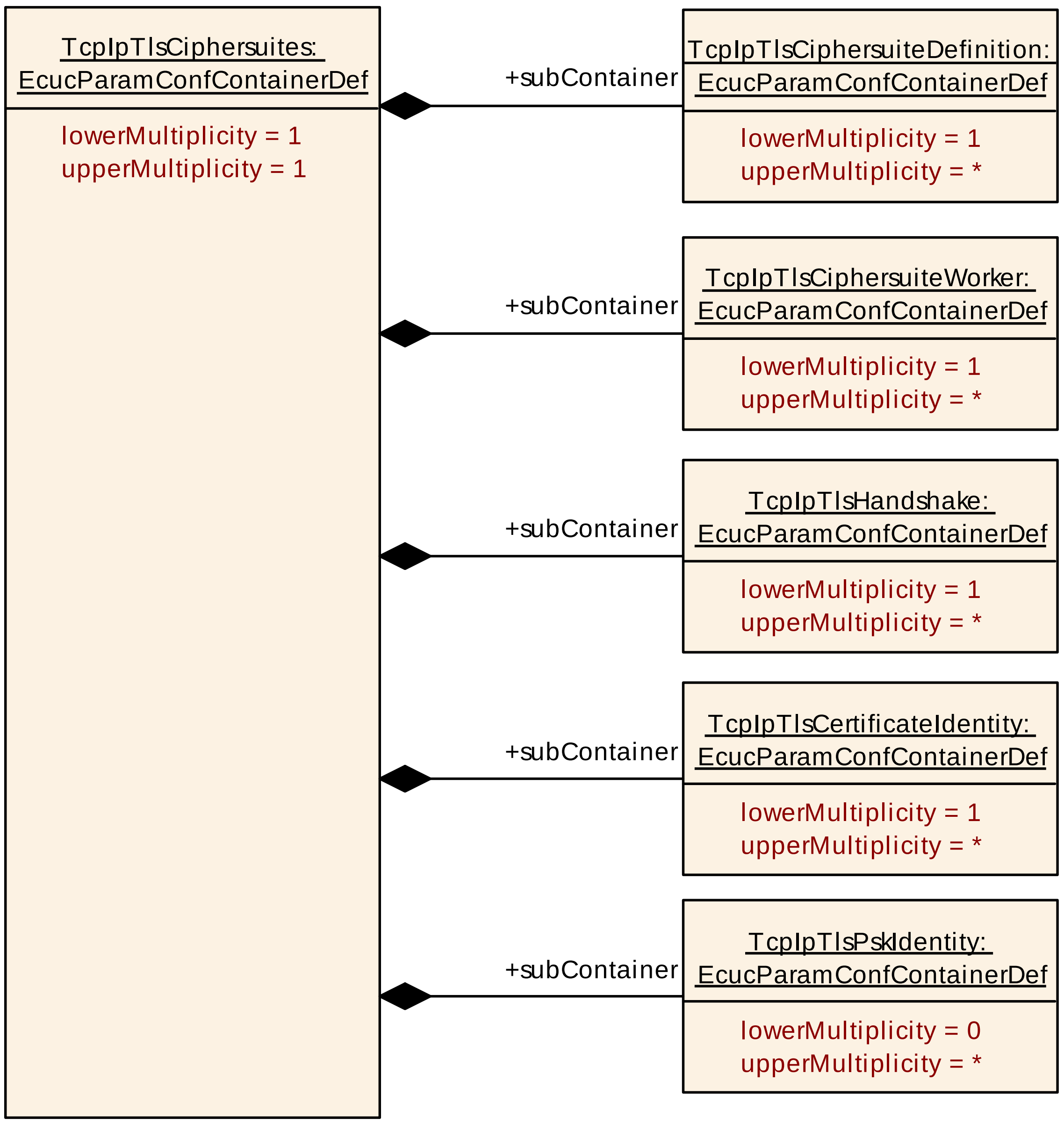
SWS Item	**ECUC_TcpIp_00233 :**		
Name	TcpIpTlsConnectionGroupRef		
Parent Container	TcpIpTlsConnection		
Description	Assigns the TLS connection to a connection group. **Tags:** atp.Status=draft		
Multiplicity	0..*		
Type	Reference to [TcpIpTlsConnectionGroup]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00236 :**		
Name	TcpIpTlsConnectionPskIdentityRef		
Parent Container	TcpIpTlsConnection		
Description	References the container that contains information about pre-shared keys. **Tags:** atp.Status=draft		
Multiplicity	0..*		
Type	Reference to [TcpIpTlsPskIdentity]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local dependency: A reference to PskIdentity container is only useful if at least		

	one CiphersuiteDefinition is referenced offering a PSK ciphersuite. Multiplicity might be reduced to 1 to provide a unique PSK identification depending on the TLS protocol version and/or ifit is used for the TLS server or client.		

SWS Item	**ECUC_TcpIp_00229 :**		
Name	TcpIpTlsIpAddressAssignment		
Parent Container	TcpIpTlsConnection		
Description	Contains additional information about the endpoint IP address information. If this reference is present, the IP address of the connecting socket shall also be checked if a TLS connection shall be assigned automatically to a socket. **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	Reference to [TcpIpStaticIpAddressConfig]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local dependency: If this item is not present but TcpIpTlsPortAssignment is defined, then IP address information is not relevant for the TLS connection assignment. If TcpIpTlsPortAssignment is not defined this item has no affect and shall not be defined, too.		

No Included Containers

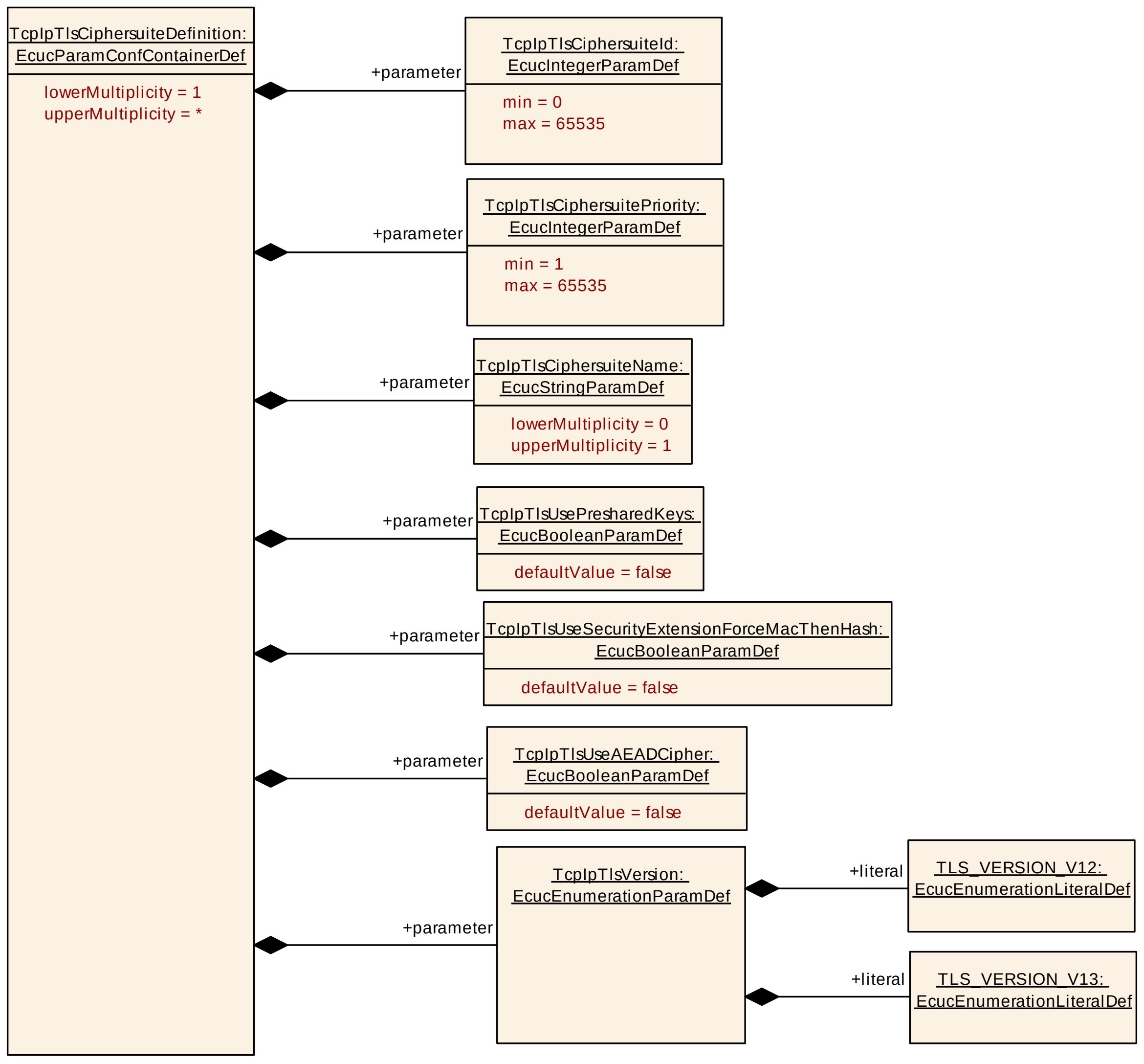


10.2.48 TcpIpTlsCiphersuites

SWS Item	**ECUC_TcpIp_00222 :**
Container Name	TcpIpTlsCiphersuites
Description	This container provides the information about supported ciphersuites used by TLS. **Tags:** atp.Status=draft
Configuration Parameters	

Included Containers		
Container Name	***Multiplicity***	***Scope / Dependency***
TcpIpTlsCertificateIdentity	1..*	This container provides information about the certificates used for ciphersuites. **Tags:**

		atp.Status=draft
TcpIpTlsCiphersuiteDefinition	1..*	This container provides the static information of a ciphersuite used by TLS. **Tags:** atp.Status=draft
TcpIpTlsCiphersuiteWorker	1..*	This container provides the jobs and keys necessary for TLS data transmission and reception. **Tags:** atp.Status=draft
TcpIpTlsHandshake	1..*	This container provides information that is needed to process a handshake. It contains the appropriate references to jobs and keys of the CSM to perform the key exchange cryptographic for the ciphersuite and involved certificates. **Tags:** atp.Status=draft
TcpIpTlsPskIdentity	0..*	This container provides information about static definition of pre-shared keys. It is used during the handshake to negotiate pre-shared keys between a client and a server. Note: The callbacks for pre-shared keys are an alternative to the static definition. The callbacks allow to define the associated keys at runtime if pre-shared keys are used but no static definition is available. The container definition is used for static configuration. **Tags:** atp.Status=draft


TcpIpTlsCiphersuiteDefinition: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
+parameter
TcpIpTlsCiphersuiteId: EcucIntegerParamDef
min = 0
max = 65535
+parameter
TcpIpTlsCiphersuitePriority: EcucIntegerParamDef
min = 1
max = 65535
+parameter
TcpIpTlsCiphersuiteName: EcucStringParamDef
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpTlsUsePresharedKeys: EcucBooleanParamDef
defaultValue = false
+parameter
TcpIpTlsUseSecurityExtensionForceMacThenHash: EcucBooleanParamDef
defaultValue = false
+parameter
TcpIpTlsUseAEADCipher: EcucBooleanParamDef
defaultValue = false
+parameter
TcpIpTlsVersion: EcucEnumerationParamDef
+literal
TLS_VERSION_V12: EcucEnumerationLiteralDef
+literal
TLS_VERSION_V13: EcucEnumerationLiteralDef

10.2.49 TcpIpTlsCiphersuiteDefinition

SWS Item	**ECUC_TcpIp_00237 :**
Container Name	TcpIpTlsCiphersuiteDefinition
Description	This container provides the static information of a ciphersuite used by TLS. **Tags:** atp.Status=draft
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00242 :**	
Name	TcpIpTlsCiphersuiteId	
Parent Container	TcpIpTlsCiphersuiteDefinition	
Description	ID that represents the ciphersuite according to IETF, e.g. RFC4492, Sect. 6, RFC8446, Appendix B.4 or RFC5246, Appendix A.5. **Tags:** atp.Status=draft	
Multiplicity	1	
Type	EcucIntegerParamDef	
Range	0 .. 65535	

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

SWS Item	**ECUC_TcpIp_00244 :**		
Name	TcpIpTlsCiphersuiteName		
Parent Container	TcpIpTlsCiphersuiteDefinition		
Description	Provides a verbal name for the ciphersuite. The name should be the one defined in the respective RFC, e.g. TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA256 (TLS 1.2) or TLS_AES_128_GCM_SHA256 (TLS 1.3) **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	EcucStringParamDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00243 :**		
Name	TcpIpTlsCiphersuitePriority		
Parent Container	TcpIpTlsCiphersuiteDefinition		
Description	Defines the priority of the cipher. The higher the number the lower the priority. **Tags:** atp.Status=draft		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	1 .. 65535		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00247 :**		
Name	TcpIpTlsUseAEADCipher		
Parent Container	TcpIpTlsCiphersuiteDefinition		
Description	Specifies if the ciphersuite supports AEAD for data en-/decryption. **Tags:** atp.Status=draft		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	false		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants

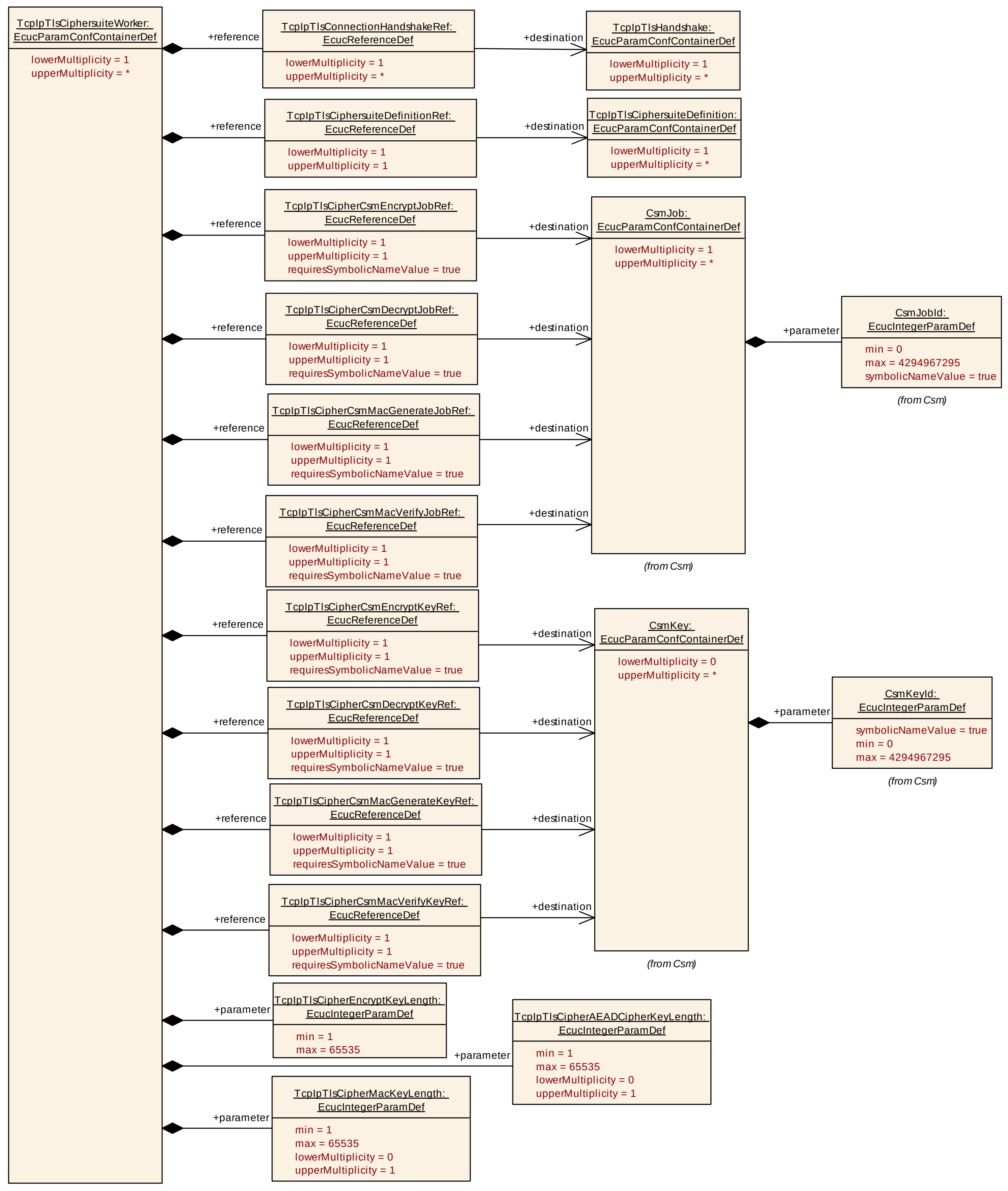
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00245 :**		
Name	TcpIpTlsUsePresharedKeys		
Parent Container	TcpIpTlsCiphersuiteDefinition		
Description	Defines if this ciphersuite uses pre-shared keys. If so, additional configuration or callbacks will be used for pre-shared key negotiation. **Tags:** atp.Status=draft		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	false		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00246 :**		
Name	TcpIpTlsUseSecurityExtensionForceMacThenHash		
Parent Container	TcpIpTlsCiphersuiteDefinition		
Description	Defines if the security extension according to IETF RFC 7366 shall be supported. This is useful for ciphersuites using CBC mode. **Tags:** atp.Status=draft		
Multiplicity	1		
Type	EcucBooleanParamDef		
Default value	false		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00248 :**		
Name	TcpIpTlsVersion		
Parent Container	TcpIpTlsCiphersuiteDefinition		
Description	Declares the TLS version that this ciphersuite shall be used for. **Tags:** atp.Status=draft		
Multiplicity	1		
Type	EcucEnumerationParamDef		
Range	TLS_VERSION_V12	--	
	TLS_VERSION_V13	--	
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers


TcpIpTlsCiphersuiteWorker: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
+reference
TcpIpTlsConnectionHandshakeRef: EcucReferenceDef
lowerMultiplicity = 1
upperMultiplicity = *
+destination
TcpIpTlsHandshake: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
+reference
TcpIpTlsCiphersuiteDefinitionRef: EcucReferenceDef
lowerMultiplicity = 1
upperMultiplicity = 1
+destination
TcpIpTlsCiphersuiteDefinition: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
+reference
TcpIpTlsCipherCsmEncryptJobRef: EcucReferenceDef
lowerMultiplicity = 1
upperMultiplicity = 1
requiresSymbolicNameValue = true
+destination
CsmJob: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
(from Csm)
+parameter
CsmJobId: EcucIntegerParamDef
min = 0
max = 4294967295
symbolicNameValue = true
(from Csm)
+reference
TcpIpTlsCipherCsmDecryptJobRef: EcucReferenceDef
lowerMultiplicity = 1
upperMultiplicity = 1
requiresSymbolicNameValue = true
+destination
+reference
TcpIpTlsCipherCsmMacGenerateJobRef: EcucReferenceDef
lowerMultiplicity = 1
upperMultiplicity = 1
requiresSymbolicNameValue = true
+destination
+reference
TcpIpTlsCipherCsmMacVerifyJobRef: EcucReferenceDef
lowerMultiplicity = 1
upperMultiplicity = 1
requiresSymbolicNameValue = true
+destination
+reference
TcpIpTlsCipherCsmEncryptKeyRef: EcucReferenceDef
lowerMultiplicity = 1
upperMultiplicity = 1
requiresSymbolicNameValue = true
+destination
CsmKey: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = *
(from Csm)
+parameter
CsmKeyId: EcucIntegerParamDef
symbolicNameValue = true
min = 0
max = 4294967295
(from Csm)
+reference
TcpIpTlsCipherCsmDecryptKeyRef: EcucReferenceDef
lowerMultiplicity = 1
upperMultiplicity = 1
requiresSymbolicNameValue = true
+destination
+reference
TcpIpTlsCipherCsmMacGenerateKeyRef: EcucReferenceDef
lowerMultiplicity = 1
upperMultiplicity = 1
requiresSymbolicNameValue = true
+destination
+reference
TcpIpTlsCipherCsmMacVerifyKeyRef: EcucReferenceDef
lowerMultiplicity = 1
upperMultiplicity = 1
requiresSymbolicNameValue = true
+destination
+parameter
TcpIpTlsCipherEncryptKeyLength: EcucIntegerParamDef
min = 1
max = 65535
+parameter
TcpIpTlsCipherAEADCipherKeyLength: EcucIntegerParamDef
min = 1
max = 65535
lowerMultiplicity = 0
upperMultiplicity = 1
+parameter
TcpIpTlsCipherMacKeyLength: EcucIntegerParamDef
min = 1
max = 65535
lowerMultiplicity = 0
upperMultiplicity = 1

10.2.50 TcpIpTlsCiphersuiteWorker

SWS Item	**ECUC_TcpIp_00238 :**
Container Name	TcpIpTlsCiphersuiteWorker
Description	This container provides the jobs and keys necessary for TLS data transmission and reception. **Tags:** atp.Status=draft
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00254 :**		
Name	TcpIpTlsCipherAEADCipherKeyLength		
Parent Container	TcpIpTlsCiphersuiteWorker		
Description	Defines the key length for en- / decryption with authentication data (AEAD). **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	EcucIntegerParamDef		
Range	1 .. 65535		
Default value	--		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local dependency: This value shall only be set if the cipher uses AEAD. If such a worker is selected, then Csm_AEADEncrypt() and Csm_AEADDecrypt() shall be used and AEAD shall be supported. Required to be set when TcpIpTlsCipherDefinition/TcpIpTlsAEADCipher is set to TRUE.		

SWS Item	**ECUC_TcpIp_00253 :**		
Name	TcpIpTlsCipherEncryptKeyLength		
Parent Container	TcpIpTlsCiphersuiteWorker		
Description	Defines the key length used for en- or decryption. The key length is valid for (symmetric) encryption and decryption. **Tags:** atp.Status=draft		
Multiplicity	1		
Type	EcucIntegerParamDef		
Range	1 .. 65535		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00257 :**		
Name	TcpIpTlsCipherMacKeyLength		
Parent Container	TcpIpTlsCiphersuiteWorker		
Description	Specifies the length of the MAC key **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	EcucIntegerParamDef		
Range	1 .. 65535		
Default value	--		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants

	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00255 :**		
Name	TcpIpTlsCipherCsmDecryptJobRef		
Parent Container	TcpIpTlsCiphersuiteWorker		
Description	Reference to a CSM job to perform the data decryption operation **Tags:** atp.Status=draft		
Multiplicity	1		
Type	Symbolic name reference to [CsmJob]		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00256 :**		
Name	TcpIpTlsCipherCsmDecryptKeyRef		
Parent Container	TcpIpTlsCiphersuiteWorker		
Description	Reference to a CSM key associated to the CSM job that performs the data decryption operation **Tags:** atp.Status=draft		
Multiplicity	1		
Type	Symbolic name reference to [CsmKey]		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00251 :**		
Name	TcpIpTlsCipherCsmEncryptJobRef		
Parent Container	TcpIpTlsCiphersuiteWorker		
Description	Reference to a CSM job to perform the data encryption operation **Tags:** atp.Status=draft		
Multiplicity	1		
Type	Symbolic name reference to [CsmJob]		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00252 :**
Name	TcpIpTlsCipherCsmEncryptKeyRef
Parent Container	TcpIpTlsCiphersuiteWorker
Description	Reference to a CSM key associated to the CSM job that performs the data encryption operation **Tags:** atp.Status=draft
Multiplicity	1
Type	Symbolic name reference to [CsmKey]

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

SWS Item	**ECUC_TcpIp_00258 :**		
Name	TcpIpTlsCipherCsmMacGenerateJobRef		
Parent Container	TcpIpTlsCiphersuiteWorker		
Description	Reference to a CSM job to perform the MAC generate operation **Tags:** atp.Status=draft		
Multiplicity	1		
Type	Symbolic name reference to [CsmJob]		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00259 :**		
Name	TcpIpTlsCipherCsmMacGenerateKeyRef		
Parent Container	TcpIpTlsCiphersuiteWorker		
Description	Reference to a CSM key associated to the CSM job that performs the MAC generate operation **Tags:** atp.Status=draft		
Multiplicity	1		
Type	Symbolic name reference to [CsmKey]		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00260 :**		
Name	TcpIpTlsCipherCsmMacVerifyJobRef		
Parent Container	TcpIpTlsCiphersuiteWorker		
Description	Reference to a CSM job to perform the MAC verify operation **Tags:** atp.Status=draft		
Multiplicity	1		
Type	Symbolic name reference to [CsmJob]		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

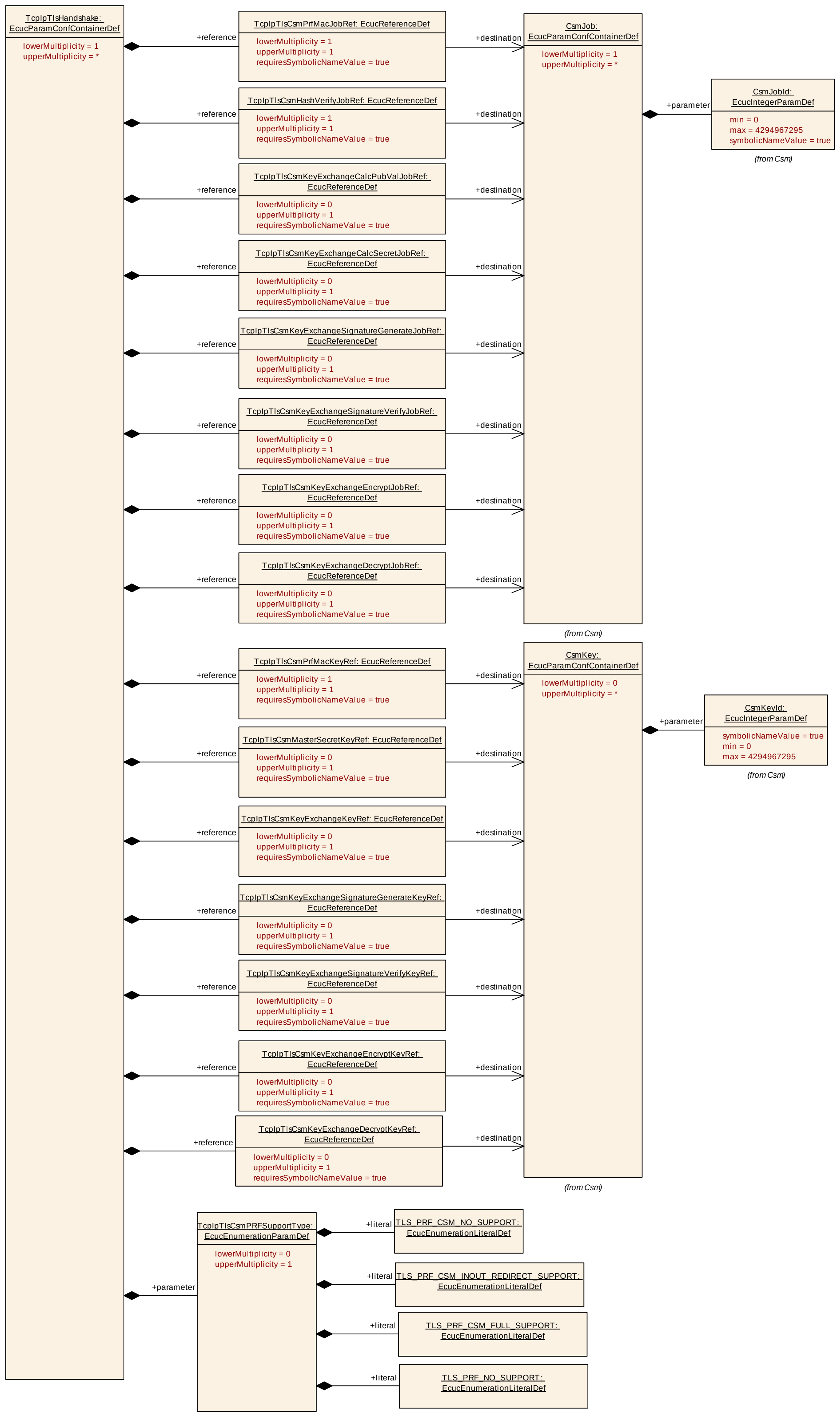
SWS Item	**ECUC_TcpIp_00261 :**
Name	TcpIpTlsCipherCsmMacVerifyKeyRef
Parent Container	TcpIpTlsCiphersuiteWorker
Description	Reference to a CSM key associated to the CSM job that performs the MAC verify operation **Tags:** atp.Status=draft

Multiplicity	1		
Type	Symbolic name reference to [CsmKey]		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00250 :**		
Name	TcpIpTlsCiphersuiteDefinitionRef		
Parent Container	TcpIpTlsCiphersuiteWorker		
Description	Reference to a a ciphersuite definition container **Tags:** atp.Status=draft		
Multiplicity	1		
Type	Reference to [TcpIpTlsCiphersuiteDefinition]		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00249 :**		
Name	TcpIpTlsConnectionHandshakeRef		
Parent Container	TcpIpTlsCiphersuiteWorker		
Description	References the container that contains the jobs and keys for handshake operation. Referencing multiple handshake containers allow to share them between workers and to choose the next unused during the handshake. **Tags:** atp.Status=draft		
Multiplicity	1..*		
Type	Reference to [TcpIpTlsHandshake]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers


TcpIpTlsHandshake: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
+reference
+destination
+parameter
+literal
TcpIpTlsCsmPrfMacJobRef: EcucReferenceDef
lowerMultiplicity = 1
upperMultiplicity = 1
requiresSymbolicNameValue = true
TcpIpTlsCsmHashVerifyJobRef: EcucReferenceDef
TcpIpTlsCsmKeyExchangeCalcPubValJobRef: EcucReferenceDef
TcpIpTlsCsmKeyExchangeCalcSecretJobRef: EcucReferenceDef
TcpIpTlsCsmKeyExchangeSignatureGenerateJobRef: EcucReferenceDef
TcpIpTlsCsmKeyExchangeSignatureVerifyJobRef: EcucReferenceDef
TcpIpTlsCsmKeyExchangeEncryptJobRef: EcucReferenceDef
TcpIpTlsCsmKeyExchangeDecryptJobRef: EcucReferenceDef
lowerMultiplicity = 0
upperMultiplicity = 1
requiresSymbolicNameValue = true
CsmJob: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
(from Csm)
CsmJobId: EcucIntegerParamDef
min = 0
max = 4294967295
symbolicNameValue = true
(from Csm)
TcpIpTlsCsmPrfMacKeyRef: EcucReferenceDef
TcpIpTlsCsmMasterSecretKeyRef: EcucReferenceDef
TcpIpTlsCsmKeyExchangeKeyRef: EcucReferenceDef
TcpIpTlsCsmKeyExchangeSignatureGenerateKeyRef: EcucReferenceDef
TcpIpTlsCsmKeyExchangeSignatureVerifyKeyRef: EcucReferenceDef
TcpIpTlsCsmKeyExchangeEncryptKeyRef: EcucReferenceDef
TcpIpTlsCsmKeyExchangeDecryptKeyRef: EcucReferenceDef
CsmKey: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = *
(from Csm)
CsmKeyId: EcucIntegerParamDef
symbolicNameValue = true
min = 0
max = 4294967295
(from Csm)
TcpIpTlsCsmPRFSupportType: EcucEnumerationParamDef
lowerMultiplicity = 0
upperMultiplicity = 1
TLS_PRF_CSM_NO_SUPPORT: EcucEnumerationLiteralDef
TLS_PRF_CSM_INOUT_REDIRECT_SUPPORT: EcucEnumerationLiteralDef
TLS_PRF_CSM_FULL_SUPPORT: EcucEnumerationLiteralDef
TLS_PRF_NO_SUPPORT: EcucEnumerationLiteralDef

10.2.51 TcpIpTlsHandshake

SWS Item	**ECUC_TcpIp_00239 :**
Container Name	TcpIpTlsHandshake
Description	This container provides information that is needed to process a handshake. It contains the appropriate references to jobs and keys of the CSM to perform the key exchange cryptographic for the ciphersuite and involved certificates. **Tags:** atp.Status=draft
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00264 :**		
Name	TcpIpTlsCsmPRFSupportType		
Parent Container	TcpIpTlsHandshake		
Description	Specifies how the CSM job supports the PRF operation. **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	EcucEnumerationParamDef		
Range	TLS_PRF_CSM_FULL_SUPPORT	--	
	TLS_PRF_CSM_INOUT_REDIRECT_SUPPORT	--	
	TLS_PRF_CSM_NO_SUPPORT	--	
	TLS_PRF_NO_SUPPORT	--	
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00265 :**		
Name	TcpIpTlsCsmHashVerifyJobRef		
Parent Container	TcpIpTlsHandshake		
Description	Reference to a CSM job to perform the hash operation for the whole handshake. **Tags:** atp.Status=draft		
Multiplicity	1		
Type	Symbolic name reference to [CsmJob]		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00267 :**		
Name	TcpIpTlsCsmKeyExchangeCalcPubValJobRef		
Parent Container	TcpIpTlsHandshake		
Description	Reference to a CSM job to perform the DH Key Exchange algorithm operation **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	Symbolic name reference to [CsmJob]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00269 :**		
Name	TcpIpTlsCsmKeyExchangeCalcSecretJobRef		
Parent Container	TcpIpTlsHandshake		
Description	Reference to a CSM job to perform the Key Exchange algorithm operation **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	Symbolic name reference to [CsmJob]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local dependency: Only required if asynchronous job is used for key exchange calculation.		

SWS Item	**ECUC_TcpIp_00276 :**		
Name	TcpIpTlsCsmKeyExchangeDecryptJobRef		
Parent Container	TcpIpTlsHandshake		
Description	Reference to a CSM job to perform data decryption, e.g. with RSA key exchange operation. **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	Symbolic name reference to [CsmJob]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	

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

SWS Item	**ECUC_TcpIp_00277 :**		
Name	TcpIpTlsCsmKeyExchangeDecryptKeyRef		
Parent Container	TcpIpTlsHandshake		
Description	Reference to a CSM key to perform data decryption, e.g. with RSA, used for exchange operation. **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	Symbolic name reference to [CsmKey]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00274 :**		
Name	TcpIpTlsCsmKeyExchangeEncryptJobRef		
Parent Container	TcpIpTlsHandshake		
Description	Reference to a CSM job to perform data encryption, e.g. with RSA key exchange operation. **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	Symbolic name reference to [CsmJob]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00275 :**
Name	TcpIpTlsCsmKeyExchangeEncryptKeyRef
Parent Container	TcpIpTlsHandshake
Description	Reference to a CSM key to perform data encryption, e.g. with RSA, used for exchange operation. **Tags:** atp.Status=draft
Multiplicity	0..1
Type	Symbolic name reference to [CsmKey]
Post-Build Variant	false

Multiplicity			
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00268 :**		
Name	TcpIpTlsCsmKeyExchangeKeyRef		
Parent Container	TcpIpTlsHandshake		
Description	Reference to a CSM key used for Diffie Hellman (DH) key exchange operation. **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	Symbolic name reference to [CsmKey]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00270 :**		
Name	TcpIpTlsCsmKeyExchangeSignatureGenerateJobRef		
Parent Container	TcpIpTlsHandshake		
Description	Reference to a CSM job to perform signature generation for DH operation **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	Symbolic name reference to [CsmJob]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00271 :**
Name	TcpIpTlsCsmKeyExchangeSignatureGenerateKeyRef
Parent Container	TcpIpTlsHandshake
Description	Reference to a CSM key to perform signature generation for DH operation **Tags:** atp.Status=draft
Multiplicity	0..1

Type	Symbolic name reference to [CsmKey]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00272 :**		
Name	TcpIpTlsCsmKeyExchangeSignatureVerifyJobRef		
Parent Container	TcpIpTlsHandshake		
Description	Reference to a CSM job to perform signature verification for DH operation **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	Symbolic name reference to [CsmJob]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00273 :**		
Name	TcpIpTlsCsmKeyExchangeSignatureVerifyKeyRef		
Parent Container	TcpIpTlsHandshake		
Description	Reference to a CSM key to perform signature verification for DH operation **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	Symbolic name reference to [CsmKey]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

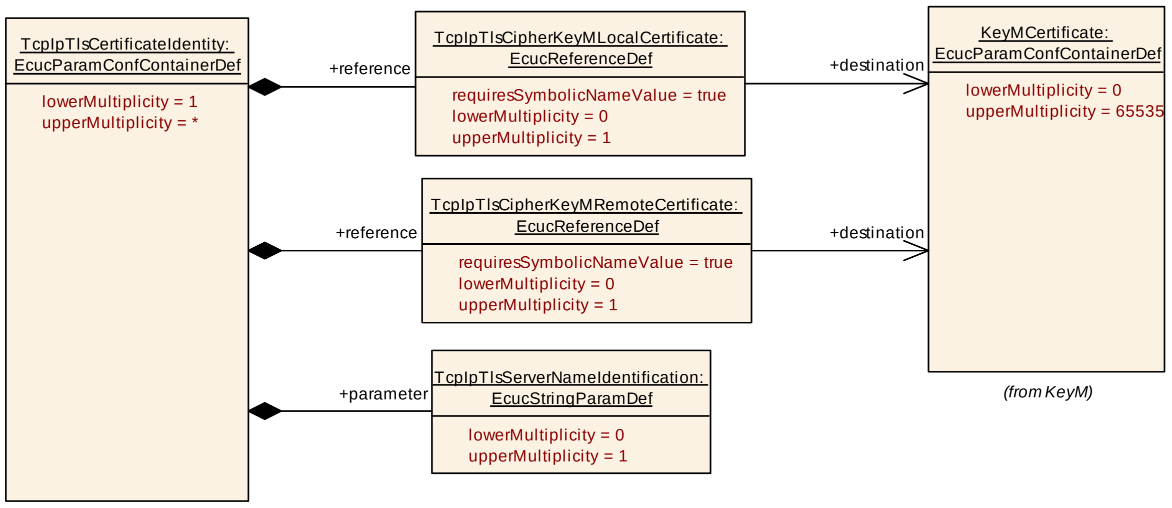
SWS Item	**ECUC_TcpIp_00266 :**
Name	TcpIpTlsCsmMasterSecretKeyRef
Parent Container	TcpIpTlsHandshake
Description	This is the reference to the master key that is calculated during the session. **Tags:**

	atp.Status=draft		
Multiplicity	0..1		
Type	Symbolic name reference to [CsmKey]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00262 :**		
Name	TcpIpTlsCsmPrfMacJobRef		
Parent Container	TcpIpTlsHandshake		
Description	Reference to a CSM job to perform the PRF hash operation **Tags:** atp.Status=draft		
Multiplicity	1		
Type	Symbolic name reference to [CsmJob]		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

SWS Item	**ECUC_TcpIp_00263 :**		
Name	TcpIpTlsCsmPrfMacKeyRef		
Parent Container	TcpIpTlsHandshake		
Description	Reference to a CSM key associated to the CSM job that performs the PRF hash operation **Tags:** atp.Status=draft		
Multiplicity	1		
Type	Symbolic name reference to [CsmKey]		
Post-Build Variant Value	false		
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

No Included Containers


TcpIpTlsCertificateIdentity: EcucParamConfContainerDef
lowerMultiplicity = 1
upperMultiplicity = *
+reference
TcpIpTlsCipherKeyMLocalCertificate: EcucReferenceDef
requiresSymbolicNameValue = true
lowerMultiplicity = 0
upperMultiplicity = 1
+destination
KeyMCertificate: EcucParamConfContainerDef
lowerMultiplicity = 0
upperMultiplicity = 65535
+reference
TcpIpTlsCipherKeyMRemoteCertificate: EcucReferenceDef
requiresSymbolicNameValue = true
lowerMultiplicity = 0
upperMultiplicity = 1
+destination
+parameter
TcpIpTlsServerNameIdentification: EcucStringParamDef
lowerMultiplicity = 0
upperMultiplicity = 1
(from KeyM)

10.2.52 TcpIpTlsCertificateIdentity

SWS Item	**ECUC_TcpIp_00240 :**
Container Name	TcpIpTlsCertificateIdentity
Description	This container provides information about the certificates used for ciphersuites. **Tags:** atp.Status=draft
Configuration Parameters	

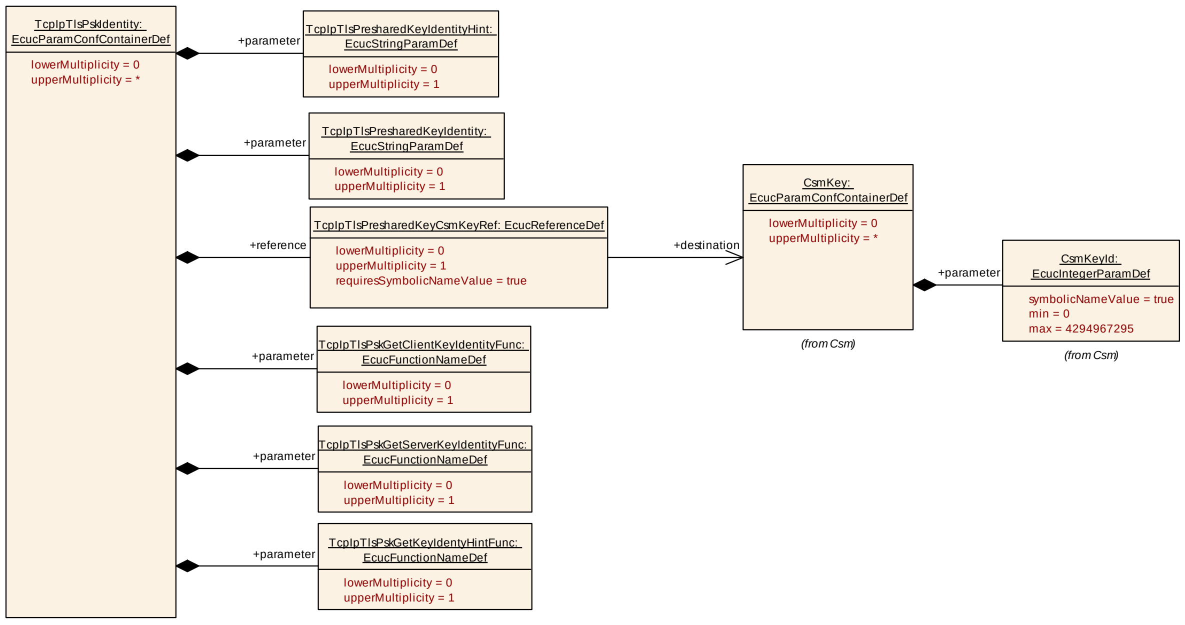
SWS Item	**ECUC_TcpIp_00278 :**		
Name	TcpIpTlsServerNameIdentification		
Parent Container	TcpIpTlsCertificateIdentity		
Description	Defines a server identification name. If present, the name will be added as an extension with the "TLS client hello" handshake message. The TLS server will check for the name to identify the server certificate. **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	EcucStringParamDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local dependency: Only needed if server name authentication is used.		

SWS Item	**ECUC_TcpIp_00286 :**

Name	TcpIpTlsCipherKeyMLocalCertificate		
Parent Container	TcpIpTlsCertificateIdentity		
Description	Reference to a KeyM certificate used to address the local certificate.		
Multiplicity	0..1		
Type	Symbolic name reference to [KeyMCertificate]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local dependency: Required if TcpIpTlsConnectionType is TLS_SERVER. Also required if TcpIpTlsConnectionType is TLS_CLIENT and the server requests a bidirectional authentication.		

SWS Item	**ECUC_TcpIp_00287 :**		
Name	TcpIpTlsCipherKeyMRemoteCertificate		
Parent Container	TcpIpTlsCertificateIdentity		
Description	Reference to KeyM certificate container to reference the remote certificate.		
Multiplicity	0..1		
Type	Symbolic name reference to [KeyMCertificate]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local dependency: This optional parameter is needed by the TLS_CLIENT and is used to verify the certificate provided by the TLS_SERVER. It is also required by the TLS_SERVER if bidirectional authentication will be requested. Otherwise, this parameter can be omitted.		

No Included Containers



10.2.53 TcpIpTlsPskIdentity

SWS Item	**ECUC_TcpIp_00241 :**
Container Name	TcpIpTlsPskIdentity
Description	This container provides information about static definition of pre-shared keys. It is used during the handshake to negotiate pre-shared keys between a client and a server. Note: The callbacks for pre-shared keys are an alternative to the static definition. The callbacks allow to define the associated keys at runtime if pre-shared keys are used but no static definition is available. The container definition is used for static configuration. **Tags:** atp.Status=draft
Configuration Parameters	

SWS Item	**ECUC_TcpIp_00284 :**		
Name	TcpIpTlsPresharedKeyIdentity		
Parent Container	TcpIpTlsPskIdentity		
Description	This item provides the key identification. The TLS client selects the pre-shared key based on the identification hint provided by the server and returns the key identification name back to the server. **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	EcucStringParamDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	

	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local dependency: The callback function < Up_TlsClientGetPskIdentity> is used if the ciphersuite defines pre-shared key but this parameter is not present.		

SWS Item	**ECUC_TcpIp_00279 :**		
Name	TcpIpTlsPresharedKeyIdentityHint		
Parent Container	TcpIpTlsPskIdentity		
Description	Provides the identity hint for a pre-shared key. This information is transmitted by the TLS Server to provide its identification to the TLS client. The TLS client uses the same information to select the pre-shared key. **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	EcucStringParamDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local dependency: The callback function <Up_TlsServerGetPskIdentityHint> is used if the ciphersuite defines pre-shared key but this parameter is not present.		

SWS Item	**ECUC_TcpIp_00281 :**		
Name	TcpIpTlsPskGetClientKeyIdentityFunc		
Parent Container	TcpIpTlsPskIdentity		
Description	Defines the function name for the Up_TlsClientGetPskIdentity() callback. **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	EcucFunctionNameDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	

	Post-build time	--	
Scope / Dependency	scope: local dependency: This definition is needed if a pre-shared key ciphersuite is used and TcpIpTlsPresharedKeyIdentity configuration parameter is not present. In this case, the callback function will be used to query the key identification.		

SWS Item	**ECUC_TcpIp_00283 :**		
Name	TcpIpTlsPskGetKeyIdentyHintFunc		
Parent Container	TcpIpTlsPskIdentity		
Description	Defines the function name for the Up_TlsServerGetPskIdentityHint() callback. **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	EcucFunctionNameDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local dependency: This definition is needed if a pre-shared key ciphersuite is used and TcpIpTlsPresharedKeyGetKeyIdentityHint configuration parameter is not present. In this case, the callback function will be used to query the key identity hint.		

SWS Item	**ECUC_TcpIp_00282 :**		
Name	TcpIpTlsPskGetServerKeyIdentityFunc		
Parent Container	TcpIpTlsPskIdentity		
Description	Defines the function name for the Up_TlsServerGetPskIdentity () callback. **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	EcucFunctionNameDef		
Default value	--		
maxLength	--		
minLength	--		
regularExpression	--		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local		

	dependency: This definition is needed if a pre-shared key ciphersuite is used and TcpIpTlsPresharedKeyIdentity configuration parameter is not present. In this case, the callback function will be used to query the key identification.

SWS Item	**ECUC_TcpIp_00280 :**		
Name	TcpIpTlsPresharedKeyCsmKeyRef		
Parent Container	TcpIpTlsPskIdentity		
Description	Reference to a CSM key associated to the CSM job that performs the PRF hash operation **Tags:** atp.Status=draft		
Multiplicity	0..1		
Type	Symbolic name reference to [CsmKey]		
Post-Build Variant Multiplicity	false		
Post-Build Variant Value	false		
Multiplicity Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Value Configuration Class	***Pre-compile time***	X	All Variants
	Link time	--	
	Post-build time	--	
Scope / Dependency	scope: local dependency: Callback <Up_Tls[Server|Client]GetPskIdentity> is used instead if this parameter is not present.		

No Included Containers

10.3 Published Information

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