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## Document Change History

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2006-11-28	2.1.1	AUTOSAR Administration	<ul style="list-style-type: none"><li>Initial release (The V1.0.0 was only as Pre-Release available within Release 1.0)</li></ul>

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## 1 Introduction and functional overview

This document specifies the AUTOSAR communication stack type header file. It contains all types that are used across several modules of the communication stack of the basic software and all types of all basic software modules that are platform and compiler independent.

It is strongly recommended that those communication stack type files are unique within the AUTOSAR community to guarantee unique types and to avoid type changes when changing from supplier A to B.

## 2 Acronyms and abbreviations

Acronyms and abbreviations that have a local scope are not contained in the AUTOSAR glossary. These must appear in a local glossary.

Acronym:	Description:
API	Application Programming Interface
DCM	Diagnostic Communication Manager
I-PDU	Interaction Layer PDU. In AUTOSAR the Interaction Layer is equivalent to the Communication Services Layer.
L-PDU	Data Link Layer PDU. In AUTOSAR the Data Link Layer is equivalent to the Communication Hardware Abstraction and Microcontroller Abstraction Layer.
N-PDU	Network Layer PDU. In AUTOSAR the Network Layer is equivalent to the Transport Protocol.
OSEK/VDX	In May 1993 OSEK has been founded as a joint project in the German automotive industry aiming at an industry standard for an open-ended architecture for distributed control units in vehicles. OSEK is an abbreviation for the German term "Offene Systeme und deren Schnittstellen für die Elektronik im Kraftfahrzeug" (English: Open Systems and the Corresponding Interfaces for Automotive Electronics). Initial project partners were BMW, Bosch, DaimlerChrysler, Opel, Siemens, VW and the IIT of the University of Karlsruhe as co-ordinator. The French car manufacturers PSA and Renault joined OSEK in 1994 introducing their VDX-approach (Vehicle Distributed eXecutive) which is a similar project within the French automotive industry. At the first workshop on October 1995 the OSEK/VDX group presented the results of the harmonised specification between OSEK and VDX. After the 2nd international OSEK/VDX Workshop in October 1997 the 2nd versions of the specifications were published.
PDU	Protocol Data Unit
SDU	Service Data Unit - Payload of PDU
TP	Transport Protocol

Abbreviation:	Description:
Com	Communication
EcuC	ECU Configuration
e.g.	[lat.] <i>exempli gratia</i> = [eng.] for example
i.e.	[lat.] <i>id est</i> = [eng.] that is



## 3 Related documentation

### 3.1 Input documents

- [1] [GeneralSRS] General Requirements on Basic Software Modules  
AUTOSAR\_SRS\_BSWGeneral.pdf
- [2] [SRSSPAL] General Requirements on  
SPAL AUTOSAR\_SRS\_SPALGeneral.pdf
- [3] [StdTypes] Specification of Standard Types  
AUTOSAR\_SWS\_Std\_Types.pdf
- [4] [PltfTypes] Specification of Platform Types  
AUTOSAR\_SWS\_Platform\_Types.pdf
- [5] [CompTypes] Specification of Compiler Abstraction  
AUTOSAR\_SWS\_CompilerAbstraction.pdf
- [6] [CANTP] Specification of CAN Transport Layer  
AUTOSAR\_SWS\_CANTransportLayer.pdf
- [7] [FlexRayTP] Specification of FlexRay Transport Layer  
AUTOSAR\_SWS\_FlexRayTransportLayer.pdf
- [8] [CANTRCV] Specification of CAN Transceiver Driver  
AUTOSAR\_SWS\_CANTransceiverDriver.pdf
- [9] [FRTRCV] Specification of FlexRay Transceiver Driver  
AUTOSAR\_SWS\_FlexRayTransceiverDriver.pdf
- [10] [BSMDT] Basic Software Module Description Template,  
AUTOSAR\_TPS\_BSWModuleDescriptionTemplate.pdf
- [11] [BSWModule] List of Basic Software Modules  
AUTOSAR\_TR\_BSWModuleList
- [12] [BSWGeneral] General Specification of Basic Software Modules  
AUTOSAR\_SWS\_BSWGeneral.pdf

### 3.2 Related standards and norms

- [CProgLang] ISO/IEC 9899:1990 Programming Language – C
- [ISONM] ISO/IEC 15765-2; 2003 Diagnostics on Controller Area Networks (CAN) –  
Network layer services

### **3.3 Related specification**

AUTOSAR provides a General Specification on Basic Software modules (→ chapter 3.1) (SWS BSW General), which is also valid for Communication Stack Types.

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

## **4 Constraints and assumptions**

### **4.1 Limitations**

No limitations.

### **4.2 Applicability to car domains**

No limitations.

### **4.3 Applicability to safety related environments**

No restrictions, because the subject of this specification is a header file specifying types. It does not include or implement any functionality.

## 5 Software Architecture

### 5.1 Dependencies to other modules

The communication stack type header file defines communication types based on the platform types [PltfTypes] (Platform\_Types.h) and Compiler (Compiler.h) header file [CompTypes]. To prevent multiple includes of header files, the communication stack header file includes the standard types header file [StdTypes] which already includes both other files.

## 6 Requirements traceability

Requirement	Description	Satisfied by
SRS_Com_02043	AUTOSAR COM and LargeDataCOM shall provide a receive indication function	SWS_Comtype_00004, SWS_Comtype_00006, SWS_Comtype_00007, SWS_Comtype_00010, SWS_Comtype_00014, SWS_Comtype_00015, SWS_Comtype_00017, SWS_Comtype_00030
SRS_Com_02045	AUTOSAR COM and LargeDataCOM shall provide a function to request the transmit buffer data for lower layer triggered transmission	SWS_Comtype_00004, SWS_Comtype_00006, SWS_Comtype_00007, SWS_Comtype_00010, SWS_Comtype_00014, SWS_Comtype_00015, SWS_Comtype_00017, SWS_Comtype_00030
SRS_Com_02095	AUTOSAR COM and LargeDataCOM shall use the TP to fragment and reassemble large signals	SWS_Comtype_00004, SWS_Comtype_00006, SWS_Comtype_00007, SWS_Comtype_00010, SWS_Comtype_00014, SWS_Comtype_00015, SWS_Comtype_00017, SWS_Comtype_00030
SRS_Com_02114	AUTOSAR COM and LargeDataCOM shall support independent development of CP Software Clusters	SWS_COMTYPE_91001

## 7 Functional specification

### 7.1 General issues

**[SWS\_Comtype\_00004]** [It is not allowed to add any project or supplier specific extension to this file. Any extension invalidates the AUTOSAR conformity. ] (SRS\_Com\_02043, SRS\_Com\_02045, SRS\_Com\_02095)

**[SWS\_Comtype\_00015]** [Because many of the communication stack type are depending on the appropriate ECU, this file shall be generated dependent on the specific ECU configuration for each ECU independently. ] (SRS\_Com\_02043, SRS\_Com\_02045, SRS\_Com\_02095)

**[SWS\_Comtype\_00030]** [The value of PduIdType and PduLengthType shall be derived from the 'PduIdTypeEnum' and 'PduLengthTypeEnum' of the EcuCPduCollection container respectively. ] (SRS\_Com\_02043, SRS\_Com\_02045, SRS\_Com\_02095)

### 7.2 Error classification

#### 7.2.1 Development Errors

There are no development errors.

#### 7.2.2 Runtime Errors

There are no runtime errors.

#### 7.2.3 Transient Faults

There are no transient faults.

#### 7.2.4 Production Errors

There are no production errors.

### 7.2.5 Extended Production Errors

There are no extended production errors.

## 8 API specification

### 8.1 Type definitions

#### 8.1.1 PduldType

[SWS\_COMTYPE\_00005]

<b>Name</b>	PduldType	
<b>Kind</b>	Type	
<b>Derived from</b>	<b>Basetype</b>	<b>Variation</b>
	uint16	The size of this global type depends on the maximum number of PDUs used within one software module.
	uint8	The size of this global type depends on the maximum number of PDUs used within one software module.
<b>Range</b>	0...<PduIdmax>	-- Zero-based integer number The size of this global type depends on the maximum number of PDUs used within one software module. This parameter shall be generated by the generator tool depending on the value configured in EcuC virtual layer. This parameter shall be generated in ComStack_Cfg.h file Example : If <b>no</b> software module deals with more PDUs that 256, this type can be set to uint8. If at least one software module handles more than 256 PDUs, this type must globally be set to uint16.
<b>Description</b>	This type is used within the entire AUTOSAR Com Stack except for bus drivers.	
<b>Available via</b>	ComStack_Types.h	

]()

[SWS\_Comtype\_00006] Variables of this type serve as a unique identifier of a PDU within a software module or a set thereof, and also for interaction of two software modules where the Pduld of the corresponding target module is being used for referencing.

] (SRS\_Com\_02043, SRS\_Com\_02045, SRS\_Com\_02095)

[SWS\_Comtype\_00007] In order to be able to perform table-indexing within a software module, variables of this type shall be zero-based and consecutive. There might be several ranges of Pdulds in a module, one for each type of operation performed within that module (e.g. sending and receiving).

] (SRS\_Com\_02043, SRS\_Com\_02045, SRS\_Com\_02095)



**[SWS\_Comtype\_00014]** PduLdmax, the maximum number of a PduLd range, is the number -1 of PDUs dealt with in the corresponding type of operation within that module.

\_( SRS\_Com\_02043, SRS\_Com\_02045, SRS\_Com\_02095)

### 8.1.2 PduLengthType

**[SWS\_COMTYPE\_00008]**

<b>Name</b>	PduLengthType	
<b>Kind</b>	Type	
<b>Derived from</b>	<b>Basetype</b>	<b>Variation</b>
	uint16	The size of this global type depends on the maximum length of PDUs to be sent by an ECU.
	uint32	The size of this global type depends on the maximum length of PDUs to be sent by an ECU.
	uint8	The size of this global type depends on the maximum length of PDUs to be sent by an ECU.
<b>Range</b>	0...<Pdu Lengthmax>	-- Zero-based integer number The size of this global type depends on the maximum length of PDUs to be sent by an ECU. This parameter shall be generated by the generator tool depending on the value configured in EcuC virtual layer. This parameter shall be generated in ComStack_Cfg.h file Example : If no segmentation is used the length depends on the maximum payload size of a frame of the underlying communication system (for FlexRay maximum size is 255, therefore uint8). If segmentation is used it depends on the maximum length of a segmented N-PDU (in general uint16 is used)
<b>Description</b>	This type shall be used within the entire AUTOSAR Com Stack of an ECU except for bus drivers.	
<b>Available via</b>	ComStack_Types.h	

h()

**[SWS\_Comtype\_00010]** Variables of this type serve as length information of a PDU. The length information is provided in number of bytes.

\_(SRS\_Com\_02043, SRS\_Com\_02045, SRS\_Com\_02095)

**[SWS\_Comtype\_00017]** PduLengthmax, the maximum length of a Pdu, is the length of the largest (possibly segmented) PDU to be sent by the ECU.

\_(SRS\_Com\_02043, SRS\_Com\_02045, SRS\_Com\_02095)

### 8.1.3 PduInfoType

[SWS\_COMTYPE\_00011]

<b>Name</b>	PduInfoType	
<b>Kind</b>	Structure	
<b>Elements</b>	SduDataPtr	
	<b>Type</b>	uint8*
	<b>Comment</b>	Pointer to the SDU (i.e. payload data) of the PDU. The type of this pointer depends on the memory model being used at compile time.
	MetaDataPtr	
	<b>Type</b>	uint8*
	<b>Comment</b>	Pointer to the meta data (e.g. CAN ID, socket ID, diagnostic addresses) of the PDU, consisting of a sequence of meta data items. The length and type of the meta data items is statically configured for each PDU. Meta data items with more than 8 bits use platform byte order.
	SduLength	
	<b>Type</b>	PduLengthType
<b>Comment</b>	Length of the SDU in bytes.	
<b>Description</b>	Variables of this type shall be used to store the basic information about a PDU of any type, namely a pointer variable pointing to its SDU (payload), a pointer to Meta Data of the PDU, and the corresponding length of the SDU in bytes.	
<b>Available via</b>	ComStack_Types.h	

]()

### 8.1.4 PNCHandleType

[SWS\_COMTYPE\_00036]

<b>Name</b>	PNCHandleType
<b>Kind</b>	Type
<b>Derived from</b>	uint8
<b>Description</b>	Used to store the identifier of a partial network cluster.
<b>Available via</b>	ComStack_Types.h

]()

### 8.1.5 TPParameterType

[SWS\_COMTYPE\_00031]

<b>Name</b>	TPParameterType		
<b>Kind</b>	Enumeration		
<b>Range</b>	TP_STMIN	0x00	Separation Time
	TP_BS	0x01	Block Size
	TP_BC	0x02	The Band width control parameter used in FlexRay transport protocol module.
<b>Description</b>	Specify the parameter to which the value has to be changed (BS or STmin).		
<b>Available via</b>	ComStack_Types.h		

]()

### 8.1.6 BufReq\_ReturnType

[SWS\_COMTYPE\_00012]

<b>Name</b>	BufReq_ReturnType		
<b>Kind</b>	Enumeration		
<b>Range</b>	BUFREQ_OK	0x00	Buffer request accomplished successful. This status shall have the value 0.
	BUFREQ_E_NOT_OK	0x01	Buffer request not successful. Buffer cannot be accessed. This status shall have the value 1.
	BUFREQ_E_BUSY	0x02	Temporarily no buffer available. It's up the requester to retry request for a certain time. This status shall have the value 2.
	BUFREQ_E_OVFL	0x03	No Buffer of the required length can be provided. This status shall have the value 3.
<b>Description</b>	Variables of this type shall be used to store the result of a buffer request.		
<b>Available via</b>	ComStack_Types.h		

]()

### 8.1.7 TpDataStateType

[SWS\_COMTYPE\_00027]

<b>Name</b>	TpDataStateType		
<b>Kind</b>	Enumeration		
<b>Range</b>	TP_DATACONF	0x00	TP_DATACONF indicates that all data, that have been copied so far, are confirmed and can be removed from the TP buffer. Data copied by this API call are excluded and will be confirmed later.
	TP_DATARETRY	0x01	TP_DATARETRY indicates that this API call shall copy already copied data in order to recover from an error. In this case TxTpDataCnt specifies the offset of the first byte to be copied by the API call.
	TP_CONFENDING	0x02	TP_CONFENDING indicates that the previously copied data must remain in the TP.
<b>Description</b>	Variables of this type shall be used to store the state of TP buffer.		
<b>Available via</b>	ComStack_Types.h		

]()

### 8.1.8 RetryInfoType

[SWS\_COMTYPE\_00037]

<b>Name</b>	RetryInfoType		
<b>Kind</b>	Structure		
<b>Elements</b>	TpDataState		
	<b>Type</b>	TpDataStateType	
	<b>Comment</b>	The enum type to be used to store the state of Tp buffer.	
	TxTpDataCnt		
	<b>Type</b>	PduLengthType	
	<b>Comment</b>	Offset from the current position which identifies the number of bytes to be retransmitted.	
<b>Description</b>	Variables of this type shall be used to store the information about Tp buffer handling.		
<b>Available via</b>	ComStack_Types.h		

]()

### 8.1.9 NetworkHandleType

[SWS\_COMTYPE\_00038]

<b>Name</b>	NetworkHandleType		
<b>Kind</b>	Type		
<b>Derived from</b>	uint8		
<b>Range</b>	0..255	--	Zero-based integer number
<b>Description</b>	Variables of the type NetworkHandleType shall be used to store the identifier of a communication channel.		
<b>Variation</b>	--		
<b>Available via</b>	ComStack_Types.h		

]()

### 8.1.10 CbkHandleIdType

[SWS\_COMTYPE\_91001]{DRAFT} [

<b>Name</b>	CbkHandleIdType (draft)		
<b>Kind</b>	Type		
<b>Derived from</b>	uint16		
<b>Description</b>	Used for the handle Ids of Com and LdCom user callbacks. <b>Tags:</b> atp.Status=draft		
<b>Available via</b>	ComStack_Types.h		

](SRS\_Com\_02114)

## 8.2 Function definitions

Not applicable.

## 9 Sequence diagrams

Not applicable.

## 10 Configuration specification

### 10.1 Published parameters

For details refer to the chapter 10.3 “Published Information” in “SWS\_BSWGeneral” [12].



## 11 Not applicable requirements

[SWS\_COMTYPE\_00042] These requirements are not applicable to this

specification. ( SRS\_BSW\_00344, SRS\_BSW\_00404, SRS\_BSW\_00405,  
SRS\_BSW\_00345, SRS\_BSW\_00159, SRS\_BSW\_00167, SRS\_BSW\_00171,  
SRS\_BSW\_00380, SRS\_BSW\_00383, SRS\_BSW\_00388, SRS\_BSW\_00389,  
SRS\_BSW\_00390, SRS\_BSW\_00392, SRS\_BSW\_00393, SRS\_BSW\_00394,  
SRS\_BSW\_00395, SRS\_BSW\_00396, SRS\_BSW\_00397, SRS\_BSW\_00398,  
SRS\_BSW\_00399, SRS\_BSW\_00400, SRS\_BSW\_00342, SRS\_BSW\_00343,  
SRS\_BSW\_00160, SRS\_BSW\_00408, SRS\_BSW\_00346, SRS\_BSW\_00401,  
SRS\_BSW\_00168, SRS\_BSW\_00423, SRS\_BSW\_00101, SRS\_BSW\_00406,  
SRS\_BSW\_00416, SRS\_BSW\_00424, SRS\_BSW\_00425, SRS\_BSW\_00426,  
SRS\_BSW\_00427, SRS\_BSW\_00428, SRS\_BSW\_00429, SRS\_BSW\_00161,  
SRS\_BSW\_00162, SRS\_BSW\_00005, SRS\_BSW\_00164, SRS\_BSW\_00325,  
SRS\_BSW\_00413, SRS\_BSW\_00347, SRS\_BSW\_00314, SRS\_BSW\_00410,  
SRS\_BSW\_00361, SRS\_BSW\_00172, SRS\_BSW\_00323, SRS\_BSW\_00415,  
SRS\_BSW\_00007, SRS\_BSW\_00300, SRS\_BSW\_00307, SRS\_BSW\_00310,  
SRS\_BSW\_00373, SRS\_BSW\_00335, SRS\_BSW\_00411, SRS\_BSW\_00348,  
SRS\_BSW\_00353, SRS\_BSW\_00301, SRS\_BSW\_00302, SRS\_BSW\_00328,  
SRS\_BSW\_00312, SRS\_BSW\_00006, SRS\_BSW\_00357, SRS\_BSW\_00377,  
SRS\_BSW\_00304, SRS\_BSW\_00378, SRS\_BSW\_00306, SRS\_BSW\_00308,  
SRS\_BSW\_00309, SRS\_BSW\_00358, SRS\_BSW\_00407, SRS\_BSW\_00432,  
SRS\_BSW\_00433, SRS\_BSW\_00414, SRS\_BSW\_00359, SRS\_BSW\_00360,  
SRS\_BSW\_00330, SRS\_BSW\_00331, SRS\_BSW\_00009, SRS\_BSW\_00010,  
SRS\_BSW\_00333, SRS\_BSW\_00374, SRS\_BSW\_00379, SRS\_BSW\_00321,  
SRS\_BSW\_00341, SRS\_BSW\_00334, SRS\_BSW\_00336, SRS\_BSW\_00337,  
SRS\_BSW\_00369, SRS\_BSW\_00339, SRS\_BSW\_00422, SRS\_BSW\_00417,  
SRS\_BSW\_00409, SRS\_BSW\_00385, SRS\_BSW\_00386, SRS\_BSW\_00327,  
SRS\_BSW\_00350, SRS\_BSW\_00447, SRS\_BSW\_00456, SRS\_BSW\_00493,  
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