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1 Scope of Document

This document is intended to list the general requirements resulting from concept UID 387 TCP/IP CommStack Extensions (TCP/IP).
These will need to be implemented by the following software specifications:

- 414 UDP Network Management (UdpNm)
- 415 Ethernet State Manager (EthSM)
- 416 Socket Adaptor (SoAd)
- 417 Ethernet Interface (EthIf)
- 418 Diagnostics over IP (DoIP)

The document also lists requirements on the COTS TCP/IP stack, these are intended to check for compatibility.

2 Acronyms and abbreviations

Abbreviation / Acronym:	*Description:*
ARP	Address Resolution Protocol
COTS	Commercial Of The Shelf
DEM	Diagnostic Event Manager
DET	Development Error Tracer
DHCP	Dynamic Host Configuration Protocol
DoIP	Diagnostics over IP
HTTP	HyperText Transfer Protocol
IANA	Internet Assigned Numbers Authority
ICMP	Internet Control Message Protocol
IP	Internet Protocol
SoAd	AUTOSAR Socket Adaptor Module
TCP	Transmission Control Protocol
TCP/IP	A family of communication protocols used in computer networks
UDP	User Datagram Protocol
UdpNm	AUTOSAR UDP Network Management Module
XCP	eXtended Calibration Protocol

Term:	*Description:*
AUTOSAR Connector	The SoAd serves as a (De)Multiplexer between different PDU sources/suppliers and the TCP/IP stack. The term AUTOSAR connector refers to an sources or supplier of a PDU.

3 Related documentation

3.1 Input documents

[1] AUTOSAR Requirements on BSW & RTE Features
AUTOSAR_RS_BSWAndRTEFeatures.pdf

3.2 Deliverables of AUTOSAR

[2] AUTOSAR Layered Architecture
AUTOSAR_EXP_LayeredSoftwareArchitecture.pdf

[3] AUTOSAR UDP Network Management
AUTOSAR_SWS_UDPNetworkManagement.pdf

[4] AUTOSAR Ethernet State Manager
AUTOSAR_SWS_EthernetStateManager.pdf

[5] AUTOSAR Socket Adaptor
AUTOSAR_SWS_SocketAdaptor.pdf

[6] AUTOSAR Ethernet Interface
AUTOSAR_SWS_EthernetInterface.pdf

3.3 Related standards and norms

[7] IEC 7498-1, “The Basic Model”, IEC Norm, 1994

[8] IEEE Std. 1003.1™, 2004 Edition, “POSIX”
http://www.opengroup.org/onlinepubs/000095399/

[9] ISO Standard on Diagnostics over IP (ISO WD DoIP), ISO 13400, to be published

[10] XCP, The Universal Measurement and Calibration Protocol Family, ASAM e.V., 2003

3.3.1 IETF Requests For Comments (RFCs)

[11] IETF RFC 791 Internet Protocol - DARPA Internet Program – Protocol Specification (September 1981)

[12] IETF RFC 793 Transmission Control Protocol - DARPA Internet Program - Protocol Specification (September 1981)

[13] IETF RFC 768 User Datagram Protocol (August 1980)

[14] IETF RFC 1122 Requirements for Internet Hosts - Communication Layers (October 1989)

[15] RFC 896, "Congestion Control in IP/TCP Internetworks", (Nagle algorithm)

[16] IETF RFC 2131 Dynamic Host Configuration Protocol (March 1997)

[17] IETF RFC 826 An Ethernet Address Resolution Protocol (November 1982)

[18] IETF RFC 792 Internet Control Message Protocol DARPA Internet Program - Protocol Specification (September 1981)

[19] IETF RFC 2132 DHCP Options and BOOTP Vendor Extensions (March 1997)

[20] IETF RFC 3927 Dynamic Configuration of IPv4 Link-Local Addresses (May 2005)

4 Conventions to be used

In requirements, the following specific semantics shall be used (based on the Internet Engineering Task Force IETF).
The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as:

- SHALL: This word means that the definition is an absolute requirement of the specification.
- SHALL NOT: This phrase means that the definition is an absolute prohibition of the specification.
- MUST: This word means that the definition is an absolute requirement of the specification due to legal issues.
- MUST NOT: This phrase means that the definition is an absolute prohibition of the specification due to legal constraints.
- SHOULD: This word, or the adjective "RECOMMENDED", mean that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.
- SHOULD NOT: This phrase, or the phrase "NOT RECOMMENDED" mean that there may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
- MAY: This word, or the adjective „OPTIONAL“, means that an item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because the vendor feels that it enhances the product while another vendor may omit the same item. An implementation, which does not include a particular option, MUST be prepared to interoperate with another implementation, which does include the option, though perhaps with reduced functionality. In the same vein an implementation, which does include a particular option, MUST be prepared to interoperate with another implementation, which does not include the option (except, of course, for the feature the option provides.)

5 Requirements traceability

Document: AUTOSAR Requirements on BSW & RTE Features [1].

Requirement	***Satisfied by***
[BRF00286]	OK, see Chapter 6
[BRF00283]	OK, see Chapter 6

6 Requirements Specification

6.1 General Requirements

6.1.1 Configuration

6.1.1.1 [BSW41900053] SWS shall specify configuration

Initiator:	BMW/Daimler
Date:	2009-02-12
Short Description:	SWS shall specify configuration
Type:	New
Importance:	High
Description:	The SWS documents shall include a configuration section to allow adaption of the functionality.
Rationale:	The functionality needs to be adapted to different use-cases and environments.
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.1.2 AUTOSAR Interfaces

6.1.2.1 [BSW41900055] SoAd shall support UDP NM

Initiator:	BMW/Vector
Date:	2009-03-16
Short Description:	SoAd shall support UDP NM
Type:	New
Importance:	High
Description:	The SoAd shall offer an interface API for UDP NM to send network management messages. This interface shall mimic the API of interfaces in Autosar.
Rationale:	--
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.1.2.2 BSW41900056 SoAd shall support XCP

Initiator:	Vector
Date:	2009-01-26
Short Description:	Interface to support XCP
Type:	New
Importance:	Medium
Description:	The SoAd module shall offer a data path to the AUTOSAR XCP module.
Rationale:	Exchange XCP frames between master and client
Use Case:	Calibration and Measurement
Dependencies:	--
Conflicts:	--
Supporting Material:	ASAM XCP

6.2 TCP/IP Protocol Stack (TCPIP)

6.2.1 TCPIP Functional Overview

The TCP/IP protocol stack (TCP/IP stack) is intended to handle layers 2 through 4 of the ISO/OSI layer model. This includes, but is not limited to protocols like `IP`, `DHCP`, `ARP`, `TCP`, `UDP`, `ICMP` and others.
In Terms of this model the SoAd and therefore the whole AUTOSAR COM stack above represent the application at layer 7.

6.2.2 TCPIP Non-Functional Requirements (Qualities)

6.2.2.1 [BSW41900052] Interfaces to the TCP/IP stack

Initiator:	BMW/Daimler
Date:	2009-02-12
Short Description:	The interfaces of the TCP/IP stack shall conform to those specified in the AUTOSAR SWS documents.
Type:	New
Importance:	High
Description:	The upper layer interfaces of the TCP/IP stack shall conform to those described in SWS Socket Adaptor. The lower layer interfaces of the TCP/IP stack shall conform to those described in SWS Ethernet Driver.
Rationale:	It is intended to use off the shelf (COTS) software for the TCP/IP stack.
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.2.3 TCPIP Functional Requirements

6.2.3.1 [BSW41900045] TCPIP automatic IP address assignment

Initiator:	Daimler
Date:	modified 2009-01-22
Short Description:	DoIP IP assignment
Type:	Change [BSW41900023]
Importance:	Medium
Description:	The TCP/IP stack shall implement a mechanism to automatically configure an IP addresses, if DoIP is to be used.
Rationale:	This is necessary when no static IP-addresses are assigned to still allow for plug and play configuration of the TCP/IP stack.
Use Case:	--
Dependencies:	[BSW41900002]
Conflicts:	--
Supporting Material:	[9]

6.2.3.2 [BSW41900014] TCPIP IPv4 implementation

Initiator:	Daimler
Date:	2008-11-27
Short Description:	IPv4 shall be implemented according to IETF RFC 791
Type:	New
Importance:	High
Description:	For DoIP the Internet Protocol (IPv4) shall at least be implemented in the TCP/IP stack as stated in IETF RFC 791
Rationale:	--
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	[9]; IETF RFC 791;

6.2.3.3 [BSW41900015] TCPIP ARP implementation

Initiator:	Daimler
Date:	2008-11-27
Short Description:	ARP shall be implemented according to IETF RFC 826
Type:	New
Importance:	High
Description:	For DoIP the Address Resolution Protocol (ARP) shall at least be implemented in the TCP/IP stack as stated in IETF RFC 826
Rationale:	--
Use Case:	--
Dependencies:	IETF RFC 791
Conflicts:	--
Supporting Material:	[9]; IETF RFC 826

6.2.3.4 [BSW41900016] TCPIP ICMP implementation

Initiator:	Daimler
Date:	2008-11-27
Short Description:	ICMP shall be implemented according to IETF RFC 792
Type:	New
Importance:	High
Description:	For DoIP the Internet Control Message Protocol (ICMP) shall at least be implemented in the TCP/IP stack as stated in IETF RFC 792
Rationale:	
Use Case:	--
Dependencies:	IETF RFC 791
Conflicts:	--
Supporting Material:	[9]; IETF RFC 792

6.2.3.5 [BSW41900017] TCPIP TCP implementation

Initiator:	Daimler
Date:	2008-11-27
Short Description:	TCP shall be implemented according to IETF RFC 793
Type:	New
Importance:	High
Description:	For DoIP the Transmission Control Protocol (TCP) shall at least be implemented in the TCP/IP stack as stated in IETF RFC 793
Rationale:	
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	[9]; IETF RFC 793

6.2.3.6 [BSW41900018] TCPIP UDP implementation

Initiator:	Daimler
Date:	2008-11-27
Short Description:	UDP shall be implemented according to IETF RFC 768
Type:	New
Importance:	High
Description:	For DoIP the User Datagram Protocol (UDP) shall at least be implemented in the TCP/IP stack as stated in IETF RFC 768
Rationale:	--
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	[9], IETF RFC 768

6.2.3.7 [BSW41900019] TCPIP TCP+UDP support

Initiator:	Daimler
Date:	2008-11-27
Short Description:	TCP and UDP related requirement specified in IETF RFC 1122 shall be implemented
Type:	New

Importance:	High
Description:	For DoIP the TCP and UDP related requirements specified in IETF RFC 1122 shall be implement in the TCP/IP stack
Rationale:	--
Use Case:	--
Dependencies:	IETF RFC 768, IETF RFC 793
Conflicts:	--
Supporting Material:	[9]; IETF RFC 1122

6.2.3.8 [BSW41900020] TCPIP DHCP implementation

Initiator:	Daimler
Date:	2008-11-27
Short Description:	DHCP shall be implemented according to IETF RFC 2131
Type:	New
Importance:	High
Description:	For DoIP the Dynamic Host Configuration Protocol (DHCP) shall at least be implemented in the TCP/IP stack as stated in IETF RFC 2131
Rationale:	--
Use Case:	--
Dependencies:	
Conflicts:	--
Supporting Material:	[9]; IETF RFC 2131

6.2.3.9 [BSW41900021] TCPIP DHCP “host name option” implementation

Initiator:	Daimler
Date:	2008-11-27
Short Description:	The DHCP host name option shall be implemented according to IETF RFC 2132
Type:	New
Importance:	High
Description:	For DoIP DHCP host name option shall at least be implemented in the TCP/IP stack as stated in IETF RFC 2132
Rationale:	--
Use Case:	--
Dependencies:	IETF RFC 2131, [BSW41900047]
Conflicts:	--
Supporting Material:	[9]; IETF RFC 2132

6.2.3.10 [BSW41900022] TCPIP link local IP implementation

Initiator:	Daimler
Date:	2008-11-27
Short Description:	The dynamic configuration of IPv4 link-local addresses as specified in IETF RFC 3927 shall be implemented
Type:	New
Importance:	High
Description:	For DoIP the dynamic configuration of IPv4 link-local addresses as specified in IETF RFC 3927 shall be implemented in the TCP/IP stack
Rationale:	--
Use Case:	--

Dependencies:	--
Conflicts:	--
Supporting Material:	[9]; IETF RFC 3927

6.2.3.11 [BSW41900054] TCPIP minimum functionality

Initiator:	Daimler
Date:	2008-11-27
Short Description:	The minimum functionality of the TCP/IP stack is defined by the configuration of the Socket Adaptor.
Type:	New
Importance:	High
Description:	If DoIP is not implemented the, the minimum requirements on the functionality of the TCP/IP stack shall be determined by the configuration of the Socket Adaptor.
Rationale:	--
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.3 SWS Socket Adaptor (SoAd)

6.3.1 SoAd Functional Overview

The SoAd is an adaptor layer, not only matching the AUTOSAR APIs to standard socket APIs [8], but also mapping PDU IDs to socket connections.

6.3.2 SoAd Non-Functional Requirements (Qualities)

6.3.2.1 [BSW41900046] SoAd DoIP implementation

Initiator:	BMW
Date:	2009-01-22
Short Description:	DoIP implementation
Type:	New
Importance:	High
Description:	The SoAd module shall implement the DoIP functionality as specified in [9].
Rationale:	Separation of SoAd and DoIP functionality leads to unjustified effort in the configuration and adds to the complexity of interfaces.
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	[9]

6.3.3 SoAd Functional Requirements

6.3.3.1 [BSW41900004] SoAd Multi-homed hosts

Initiator:	BMW
Date:	2008-08-22
Short Description:	Multi-homed hosts
Type:	New
Importance:	High
Description:	The SoAd shall support a local multi-homed host.
Rationale:	An ECU might be connected to multiple IP networks for different use-cases
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.3.3.2 [BSW41900002] SoAd IP address configuration

Initiator:	BMW
Date:	2008-08-22
Short Description:	IP address configuration
Type:	New
Importance:	High
Description:	The IP addresses as well as the method of acquisition shall be a configurable item.
Rationale:	--
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.3.3.3 [BSW41900001] SoAd TCP connection setup

Initiator:	BMW
Date:	2008-08-22
Short Description:	TCP connection setup
Type:	New
Importance:	High
Description:	The initialisation the SoAd shall be able to establish all TCP connections as described in the configuration.
Rationale:	--
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.3.3.4 [BSW41900005] SoAd Use of UDP and TCP

Initiator:	BMW
Date:	2008-08-22

Short Description:	Use of UDP and TCP
Type:	New
Importance:	High
Description:	Both UDP or TCP shall be usable.
Rationale:	--
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.3.3.5 [BSW41900009] SoAd Connection shutdown

Initiator:	BMW
Date:	2008-08-22
Short Description:	Connection shutdown
Type:	New
Importance:	Medium
Description:	Upon Shutdown the Socket Adaptor shall close all open TCP connections.
Rationale:	--
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.3.3.6 [BSW41900008] SoAd immediate retry

Initiator:	BMW
Date:	2008-08-22
Short Description:	immediate retry
Type:	New
Importance:	Medium
Description:	The Socket Adaptor shall immediately try to re-establish any TCP connection if it is lost. ‘never give up’ strategy
Rationale:	--
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.3.3.7 [BSW41900007] SoAd COTS Compatibility

Initiator:	BMW
Date:	2008-09-16
Short Description:	IEEE1003.1 compliance
Type:	New
Importance:	High
Description:	The Socket Adaptor shall able to use a socket interface compatible with IEEE1003.1. Compatibility refers to all names and types.
Rationale:	The use of COTS TCP/IP stacks shall be possible.
Use Case:	--
Dependencies:	--
Conflicts:	--

Supporting Material:	[8]

6.3.3.8 [BSW41900010] SoAd Resource management

Initiator:	BMW
Date:	2008-09-15
Short Description:	Resource management
Type:	New
Importance:	Medium
Description:	The SoAd shall implement a mechanism by which resources can be shared among multiple socket connections.
Rationale:	--
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.3.3.9 [BSW41900011] SoAd Resource predictability

Initiator:	BMW
Date:	2008-09-15
Short Description:	Resource predictability
Type:	New
Importance:	High
Description:	The resources required for the socket connections shall be predictable by analyzing the configuration information.
Rationale:	--
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.3.3.10 [BSW41900012] SoAd No buffer memory

Initiator:	BMW
Date:	2008-08-22 modified 2009-02-10
Short Description:	No buffer memory
Type:	New
Importance:	High
Description:	The Socket Adaptor shall offer an API where no buffer memory is required in the SoAd when transferring data from the TCP/IP stack to the Autosar Connector.
Rationale:	--
Use Case:	--
Dependencies:	--
Conflicts:	New PduR API – Routing on the fly concept [BSW41900050] SoAd Transport Protocol API
Supporting Material:	AUTOSAR API will be able to satisfy this requirement!

6.3.3.11 [BSW41900013] SoAd Reduced Copy operation

Initiator:	BMW
Date:	2008-08-22
Short Description:	Reduced Copy operation
Type:	New
Importance:	high | medium | low
Description:	The Socket Adaptor shall be able to transfer data from the TCP/IP stack to the AUTOSAR connector using a single copy operation.
Rationale:	--
Use Case:	AUTOSAR API
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.3.3.12 [BSW41900006] SoAd No Protocol overhead

Initiator:	BMW
Date:	2008-08-22
Short Description:	No Protocol overhead
Type:	New
Importance:	Medium
Description:	The Socket Adaptor shall be able to transfer data using TCP/IP without the introduction of additional protocol overhead.
Rationale:	The protocol overhead introduced by Ethernet and TCP/IP is so large, that additional overhead is considered harmful.
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.3.3.13 [BSW41900048] SoAd PDU routing

Initiator:	BMW
Date:	2009-01-22
Short Description:	SoAd Routing
Type:	New
Importance:	High
Description:	SoAd shall implement a mechanism to bi-directionally route PDUs between an AUTOSAR connector and the TCP/IP stack.
Rationale:	This is necessary to allow communication
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.3.3.14 [BSW41900049] SoAd Interface API

Initiator:	BMW
Date:	2009-01-26
Short Description:	SoAd Interface API
Type:	New
Importance:	High
Description:	SoAd shall implement an API towards higher layers, which is equivalent to

	the API provided by interface modules like FrIf, CanIf and LinIf.
Rationale:	Higher layers shall not be aware of the underlining communication stack.
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.3.3.15 [BSW41900050] SoAd Transport Protocol API

Initiator:	BMW
Date:	2009-01-26
Short Description:	SoAd Transport Protocol API
Type:	New
Importance:	High
Description:	SoAd shall implement an API towards higher layers, which is equivalent to the API provided by transport layer modules like FrTP and CanTP.
Rationale:	Higher layers shall not be aware of the underlining communication stack.
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.3.3.16 [BSW41900051] SoAd to allow Call-Back API to TCP/IP stack

Initiator:	Vector
Date:	2009-01-26 modified 2009-02-12
Short Description:	SoAd AUTOSAR Call-Back API
Type:	New
Importance:	High
Description	The Socket Adapter shall specify and be able to use a call-back interface towards the TCP/IP stack.
Rationale	In addition to a COTS API, the SoAd shalls specify and be able to make use of a call-back interface, that reduces the number of required copy actions to and from the TCP/IP stack (optimized parameter) and reduces the latency (call-back functions).
Use Case	Instead of a commercial of the shelf TCP/IP stack an optimized automotive TCP/IP stack shall be usable.
Dependencies:	--
Conflicts:	--
Supporting Material:	

6.4 Diagnostics over IP (DoIP)

6.4.1 DoIP Fuctional Overview

The DoIP part of the SoAd implements the functionality required by [9].

6.4.2 DoIP Non-Functional Requirements (Qualities)

6.4.3 DoIP Functional Requirements

6.4.3.1 [BSW41900047] DoIP DHCP “host name option” access

Initiator:	BMW
Date:	2009-01-22
Short Description:	DoIP shall be able to access the DHCP host name option.
Type:	New
Importance:	High
Description:	The value used in the DHCP host name option shall be accessable and changeable by DoIP.
Rationale:	--
Use Case:	--
Dependencies:	[BSW41900021]
Conflicts:	--
Supporting Material:	[9]

6.4.3.2 [BSW41900024] DoIP routing

Initiator:	Daimler
Date:	2008-11-27
Short Description:	DoIP Routing
Type:	New
Importance:	High
Description:	DoIP shall implement a mechanism to bi-directionally route DoIP messages between the vehicle networks and TCP sockets.
Rationale:	This is necessary to allow DoIP communication
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	[9]

6.4.3.3 [BSW41900025] DoIP message recognition

Initiator:	Daimler
Date:	2008-11-27
Short Description:	Recognition of correct DoIp Messages
Type:	New
Importance:	High
Description:	DoIP shall provide a mechanism to recognize valid DoIP Messages
Rationale:	This is necessary to ensure correct DoIP communication
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	[9]

6.4.3.4 [BSW41900026] DoIP Vehicle Identification

Initiator:	Daimler
Date:	2008-11-27

Short Description:	Identify a vehicle in a network
Type:	New
Importance:	High
Description:	DoIP shall provide a mechanism to identify a vehicle respective its DoIP entity in a network
Rationale:	This is necessary to determine the IP addresses of the DoIP entity
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	[9]

6.4.3.5 [BSW41900027] DoIP diagnostic message

Initiator:	Daimler
Date:	2008-11-27
Short Description:	Message format for diagnostic messages
Type:	New
Importance:	High
Description:	DoIP shall implement a message format to allow the routing of diagnostic messages
Rationale:	This is necessary to allow DoIP
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	[9]

6.4.3.6 [BSW41900028] DoIP Socket handling

Initiator:	Daimler
Date:	2008-11-27
Short Description:	Socket connection handling
Type:	New
Importance:	Medium
Description:	DoIP shall implement a mechanism to allow the use and assignment of multiple sockets on a single port, while ensuring that no active communication is disturbed
Rationale:	This is necessary for the efficient use of socket communication
Use Case:	--
Dependencies:	--
Conflicts:	--
Supporting Material:	[9]

6.5 SWS Ethernet Interface (EthIf)

6.5.1 EthIf Functional Overview

The Ethernet Interface provides standardized interfaces to provide the communication with the Ethernet bus system of an ECU. The APIs are independent from the specific Ethernet Controllers and Transceivers and their access through the

responsible Driver layer. The Ethernet Interface is conceptually able to access one or more Ethernet Drivers and Ethernet Transceiver Drivers via one uniform interface.

6.5.2 EthIf Non-Functional Requirements (Qualities)

6.5.2.1 [BSW41900029] Interface of the Ethernet Interface module

Title:	Interface of the Ethernet Interface module
Initiator:	Vector
Date:	2009-01-20
Short Description:	Ethernet Interface shall be the single interface of all Ethernet modules to the Ethernet hardware drivers.
Type:	New
Importance:	Medium
Description:	The Ethernet Interface shall be the single interface for all upper modules (i.e. TCP/IP module and Ethernet State Manager) to the lower layer Ethernet hardware drivers for each Ethernet controller (Ethernet Driver) and Ethernet transceiver (Ethernet Transceiver Driver).
Rationale:	Interface and interaction
Use Case:	Multiple software modules shall transmit and receive data through multiple Ethernet connections in a uniform way.
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.5.2.2 [BSW41900030] EthIf Hardware abstraction

Title	Hardware abstraction
Initiator:	Vector
Date:	2009-01-20
Short Description:	The Ethernet Interface shall be independent of the actual hardware.
Type:	New
Importance:	Medium
Desc	The Ethernet Interface shall provide a hardware independent interface to its upper layer modules (i.e. TCP/IP module and Ethernet State Manager).
Rationale	Portability and reusability
Use Case	Exchanging the used Ethernet controller and transceiver shall be transparent and only be reflected by replacing the used driver.
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.5.3 EthIf Functional requirements

6.5.3.1 [BSW41900031] EthIf Interrupt / Polling mode

Title	Interrupt / Polling mode
Initiator:	Vector
Date:	2009-01-20
Short Description:	The Ethernet Interface shall be pre-compile time configurable for interrupt or polling.
Type:	New
Importance:	Medium
Desc	The Ethernet Interface shall provide configuration for interrupt and polling mode. In interrupt mode received frames shall be reported from the driver.

	In polling mode the main function shall check for received frames.
Rationale	Interface and interaction
Use Case	For low latency interrupt mode is crucial. On systems with high system load the polling mode reduces the system load
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.5.3.2 [BSW41900032] EthIf Hardware configuration and initialization

Title	Hardware configuration and initialization
Initiator:	Vector
Date:	2009-01-20
Short Description:	The Ethernet Interface shall provide hardware configuration and intitialization.
Type:	New
Importance:	Medium
Desc	The Ethernet Interface shall provide hardware independent configuration and initialization interface.
Rationale	Hardware abstraction
Use Case	Exchanging the used Ethernet controller and transceiver shall be transparent and only be reflected by replacing the used driver.
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.5.3.3 [BSW41900033] EthIf Link state change indication

Title	Link state change indication
Initiator:	Vector
Date:	2009-01-20
Short Description:	The Ethernet Interface shall provide indication for link state change.
Type:	New
Importance:	Medium
Desc	The Ethernet Interface shall provide indication for link state change of connected transceivers.
Rationale	Interface and interaction
Use Case	Disconnection of the cable results in invalid IP address. Thus a new IP assignment cycle has to be started.
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.6 SWS Ethernet Driver (Eth)

6.6.1 Eth Functional Overview

The Ethernet Driver offers uniform interfaces for the Ethernet Interface. The Ethernet Driver hides hardware specific details of the used Ethernet controller.

6.6.2 Eth Non-functional requirements (Qualities)

6.6.2.1 [BSW41900034] Eth Hardware abstraction

Title	Hardware abstraction
Initiator:	Vector
Date:	2009-01-20
Short Description:	An Ethernet Driver shall offer a hardware independent interface.
Type:	New
Importance:	Medium
Desc	An Ethernet Driver shall offer a hardware independent interface for all Ethernet controllers of the same type
Rationale	Hardware abstraction
Use Case	Exchanging the used Ethernet controller shall be transparent and only be reflected by replacing the used driver.
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.6.3 Eth Functional requirements

6.6.3.1 [BSW41900035] Eth Interrupt / Polling mode

Title	Interrupt / Polling mode
Initiator:	Vector
Date:	2009-01-20
Short Description:	The Ethernet Driver shall be pre-compile time configurable for interrupt or polling.
Type:	New
Importance:	Medium
Desc	The Ethernet Driver shall provide configuration for interrupt and polling mode. In interrupt mode received frames shall be reported from the driver.
Use Case	For low latency interrupt mode is crucial. On systems with high system load the polling mode reduces the system load
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.6.3.2 [BSW41900036] Eth Hardware configuration and initialization

Title	Hardware configuration and initialization
Initiator:	Vector
Date:	2009-01-20
Short Description:	The Ethernet Driver shall provide hardware configuration and intitialization.
Type:	New
Importance:	Medium
Desc	The Ethernet Driver shall provide hardware independent configuration and initialization interface.
Rationale	Hardware abstraction
Use Case	Exchanging the used Ethernet controller shall be transparent and only be reflected by replacing the used driver.
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.7 SWS Ethernet Transceiver Driver (EthTrcv)

6.7.1 EthTrcv Functional Overview

The Ethernet Transceiver Driver offers uniform interfaces for the Ethernet Interface. The Ethernet Transceiver Driver hides hardware specific details of the used Ethernet transceiver.

6.7.2 EthTrcv Non-functional requirements (Qualities)

6.7.2.1 [BSW41900038] EthTrcv Hardware abstraction

Title	Hardware abstraction
Initiator:	Vector
Date:	2009-01-20
Short Description:	An Ethernet Transceiver Driver shall offer a hardware independent interface.
Type:	New
Importance:	Medium
Desc	An Ethernet Transceiver Driver shall offer a hardware independent interface for all Ethernet transceivers of the same type
Rationale	Hardware abstraction
Use Case	Exchanging the used Ethernet transceiver shall be transparent and only be reflected by replacing the used driver.
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.7.3 EthTrcv Functional requirements

6.7.3.1 [BSW41900039] EthTrcv Hardware configuration and initialization

Title	Hardware configuration and initialization
Initiator:	Vector
Date:	2009-01-20
Short Description:	The Ethernet Transceiver Driver shall provide hardware configuration and intitialization.
Type:	New
Importance:	Medium
Desc	The Ethernet Transceiver Driver shall provide hardware independent configuration and initialization interface.
Rationale	Hardware abstraction
Use Case	Exchanging the used Ethernet transceiver shall be transparent and only be reflected by replacing the used driver.
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.7.3.2 [BSW41900040] EthTrcv Link state change indication

Title	Link state change indication
Initiator:	Vector
Date:	2009-01-20
Short Description:	The Ethernet Transceiver Driver shall provide access to the link state.
Type:	New
Importance:	Medium
Desc	The Ethernet Transceiver Driver shall provide access to the link state of connected transceivers.
Rationale	Interface and interaction
Use Case	Disconnection of the cable results in invalid IP address. Thus a new IP assignment cycle has to be started.
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.8 SWS Ethernet State Manager (EthSM)

6.8.1 EthSM Functional Overview

The Ethernet State Manager offers uniform interfaces for the Communication Manager (ComM). The Ethernet State Manager hides network specific details.

6.8.2 EthSM Non-functional requirements

6.8.2.1 [BSW41900041] EthSM Network abstraction

Title	Network abstraction
Initiator:	Vector
Date:	2009-01-20
Short Description:	An Ethernet State Manager shall offer network independent state handling. - Uninitialized - No Communication - Full Communication
Type:	New
Importance:	Medium
Desc	
Rationale	Hardware abstraction
Use Case	Exchanging the used network shall be transparent and only be reflected by replacing the used State Manager.
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.8.3 EthSM Functional requirements

6.8.3.1 [BSW41900043] EthSM Network configuration and initialization

Title	Network configuration and initialization
Initiator:	Vector
Date:	2009-01-20
Short Description:	The Ethernet State Manager shall provide network configuration and intitialization.
Type:	New
Importance:	Medium
Desc	The Ethernet State Manager shall provide network independent configuration and initialization interface.
Rationale	Hardware abstraction
Use Case	Exchanging the used network shall be transparent and only be reflected by replacing the used State Manager.
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.9 SWS UDP Network Management (UdpNm)

6.9.1 UdpNm Functional Overview

The UDP Network Management offers uniform interfaces for the Network Management Interface (NmIf). The UDP Network Management hides network specific details.

6.9.2 UdpNm Non-functional requirements (Qualities)

6.9.2.1 [BSW41900042] UdpNm Network abstraction

Title	Network abstraction
Initiator:	Vector
Date:	2009-01-20
Short Description:	A UDP Network Management shall offer network independent interface.
Type:	New
Importance:	Medium
Desc	A UDP Network Management shall offer network independent interface
Rationale	Hardware abstraction
Use Case	Exchanging the used network shall be transparent and only be reflected by replacing the used Network Management.
Dependencies:	--
Conflicts:	--
Supporting Material:	--

6.9.3 UdpNm Functional requirements

6.9.3.1 [BSW41900037] UdpNm Network management information

Title	Network management information
Initiator:	Vector
Date:	2009-01-20
Short Description:	The UDP Network Management shall provide an interface for transmission of network management information.
Type:	New
Importance:	Medium
Desc	The UDP Network Management shall provide an interface to send and receive network management information over UDP.
Rationale	Hardware abstraction
Use Case	Exchanging the used network shall be transparent and only be reflected by replacing the used Network Management.
Dependencies:	--
Conflicts:	--
Supporting Material:	--