Document Title	Acceptance Test Specification of TCP communication
Document Owner	AUTOSAR
Document Responsibility	AUTOSAR
Document Identification No	684
Document Classification	Auxiliary

Document Status	Final
Part of AUTOSAR Standard	Acceptance Tests for Classic Platform
Part of Standard Release	1.2.0

Document Change History			
Date	Release	Changed by	Change Description
2016-12-15	1.2.0	AUTOSAR Release Management	• Checked and adapted to Classic Platform Release 4.2.2 • Minor corrections
2015-10-31	1.1.0	AUTOSAR Release Management	Initial release, including test suites on • RS_BRF_01784 - AUTOSAR communication shall support the TCP-IP protocol stack

Disclaimer

This specification and the material contained in it, as released by AUTOSAR, is for the purpose of information only. AUTOSAR and the companies that have contributed to it shall not be liable for any use of the specification.

The material contained in this specification is protected by copyright and other types of Intellectual Property Rights. The commercial exploitation of the material contained in this specification requires a license to such Intellectual Property Rights.

This specification may be utilized or reproduced without any modification, in any form or by any means, for informational purposes only. For any other purpose, no part of the specification may be utilized or reproduced, in any form or by any means, without permission in writing from the publisher.

The AUTOSAR specifications have been developed for automotive applications only. They have neither been developed, nor tested for non-automotive applications.

The word AUTOSAR and the AUTOSAR logo are registered trademarks.

Advice for users

AUTOSAR specifications may contain exemplary items (exemplary reference models, "use cases", and/or references to exemplary technical solutions, devices, processes or software).

Any such exemplary items are contained in the specifications for illustration purposes only, and they themselves are not part of the AUTOSAR Standard. Neither their presence in such specifications, nor any later documentation of AUTOSAR conformance of products actually implementing such exemplary items, imply that intellectual property rights covering such exemplary items are licensed under the same rules as applicable to the AUTOSAR Standard.

Table of Contents

Acronyms and abbreviations

Abbreviation /	Description:

Acronym:	
AT	Acceptance Test
ECU	Electronic Control Unit
IUT	Implementation Under Test
LT	Lower Tester
PDU	Protocol Data Unit
SP	Service Primitive
TS	Test System
UDP	User Datagram Protocol (according to IETF RFC 768)
TCP	Transmission Control Protocol
UT	Upper Tester
IP	Internet Protocol
ICMP	Internet Control Message Protocol
TTL	Time To Live
TOS	Type Of Service
MTU	Maximum Transmission Unit
URG	Flag Urgent Pointer field significant in TCP Header
ACK	Flag Acknowledgment field significant in TCP Header
PSH	Flag Push Function in TCP Header
RST	Flag Reset the connection in TCP Header
SYN	Flag Synchronize sequence numbers in TCP Header
FIN	Flag No more data from sender in TCP Header
TCB	Transmission Control Block
MSL	Maximum Segment Lifetime
<LTIface-m>	m-th Interface of LT
<IUTIface-n>	n-th Interface of IUT
<IUTIface-n-IP>	IP address of n-th Interface of IUT
<LTIface-m-IP>	IP address of m-th Interface of LT

1 Related Documentation

1.1 Input documents

[1] AUTOSAR Specification of TCP/IP Stack
AUTOSAR_SWS_TcpIp.pdf

[2] AUTOSAR System Template
AUTOSAR_TPS_SystemTemplate.pdf

[3] AUTOSAR SRS Ethernet
AUTOSAR_SRS_Ethernet.pdf

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

[5] Specification of ECU Configuration
AUTOSAR_TPS_ECUConfiguration.pdf

[6] Feature Specification of the Acceptance Tests
AUTOSAR_ATR_Features_Eth.doc

1.2 Related standards and norms

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

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

1.3 Testability Protocol and Service Primitives

[9] Testability Protocol and Service Primitives
AUTOSAR_PRS_TestabilityProtocolAndServicePrimitives.pdf

2   RS_BRF_01784 - AUTOSAR communication shall support the TCP-IP protocol stack

2.1 General Test Objective and Approach

This document intends to provide a test-specification for various features of Transmission Control Protocol (TCP) as mentioned in RS_BRF_01784.

It uses the TCP message headers and operations as described in Trace to SWS Item. It also uses various parts of RFC 793, RFC 813, and RFC 1122 as reference.

This test-chapter aims to test following requirements which are mentioned in the "AUTOSAR SWS Specification of TCP/IP Stack" for a TCP stack:

I.   [SWS_TCPIP_00061] : implement the Transmission Control Protocol (TCP) as defined in IETFRFC 793.

II. [SWS_TCPIP_00104] : 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).

Following test sub-sections have been derived to test the above mentioned requirements:

·   Connection establishment and basic workings of the TCP State Machine.

·   Processing and generating TCP checksums.

·   Processing unacceptable acknowledgments and out of window sequence numbers.

·   Testing error conditions.

This specification gives the description of required test environments and detailed test cases for executing tests.

Please refer to the "Traceability Matrix" (Appendix-A) mentioned at the end of this document, which gives a consolidated correlation between the AUTOSAR requirement, IETF RFC sections and the test cases mentioned in this document.

2.1.1 Test System

2.1.1.1 Overview on Architecture
The basic test system architecture is depicted in the following figure:

Figure 1: Basic test system architecture

Test System
- controls the Upper Tester and the Lower Tester
- evaluates the test results

The Upper Tester (UT)
- is part of the Test System
- sends / receives Testability SPs and propagates the needed actions to the IUT
- receives return values from the IUT
- communicates return values with the Lower tester to achieve test execution coordination with the Lower tester interface

The Lower Tester (LT)
- is part of the Test System
- records any Ethernet encapsulated packets during the test execution
- sends Ethernet PDUs to the IUT
- coordinates and synchronizes with the Upper Tester

2.1.1.2 Specific Requirements
The Testability Protocol and Service Primitives [9] shall be implemented as a part of the UT
in order to propagate the needed Service Primitives and actions to the IUT.

2.1.1.3 Test Coordination Requirements
As observation of the IUT is done by the test cases at both the Lower Tester and the Upper Tester, a test coordination procedure for collecting the local test verdicts (at LT and UT) at one central place is required. It is up to the test system designer /

implementer to define that "central place" and to design and implement the test coordination functionality.

2.1.2 Configuration

This section describes sets of requirements on configuration. These sets are later referenced by test cases. No configuration files are provided. They need to be developed when the test suite is implemented.

The configuration can be divided into two separate parts. The '**TCP Tester Configuration**' describes variables used to parameterize the Tester. The '**TCP IUT Configuration**' describes the necessary settings of the IUT in order to allow a test case to perform. Now onwards this configuration will be referenced as "*TCP Test Configuration-1*".

2.1.2.1 TCP Tester Configuration

The Test Configuration is changeable during runtime and contains parameters that are referenced by test cases and can be adjusted by a test case itself. In case the test configuration parameter is only referenced the following default parameters will apply.

Test configuration parameters			
Parameter	Descriptions	Default values	Parameter names used during test
Ethernet Interface to be used by Lower Tester	Name of the Ethernet interface on the host machine that tester will use.	Eth-0	\<TesterIFace-n\> [e.g. \<TesterIFace-0\>, \<TesterIFace-1\> etc]
Ethernet Interface to be used by IUT	Name of the Ethernet interface that system under test will use.	As configured	\<IUTIface-n\> [e.g. \<IUTIface-0\>, \<IUTIface-1\> etc]
Lower Tester IP Address pool	This is the IP address pool to be used by LT. (Note – Lower Tester may need to simulate a series of IP addressed during a test, this pool will be used for that purpose).	As configured	\<Host-n-IP\> [e.g. \<Host-1-IP\>, \<Host-2-IP\> etc]
Lower Tester port pool	This is the port pool to be used by LT. (Note – Lower Tester may need to use multiple ports during a test, this pool will be used for that purpose).	20000	\<unusedTCP-LT-Port-N\>
IUT IP	This is the IP address of the	As	

Address	Implementation Under Test's connection to that network.	configured	<IUTIface-n-IPAddr> [e.g. <IUTIface-0-IPAddr> denotes the IP address of 0th interface of IUT]
IUT port number	This is the IUT port number to be used during the test.	20001	<unusedTCP-IUT-Port1>
Listen Time	This is the maximum time interval (in seconds) for which LT waits for a packet for cases when a certain event has been triggered on the IUT either by some protocol timer or using some external mechanism.	10 seconds	<ListenTime>
Tolerance Time	Time tolerance (in ms) to be used during various calculations for time sensitive tests.	500 ms	<ToleranceTime>
Sample TCP data	Sample TCP data used by TESTER	<TCPDATATCPDATATCPDATA….. up to n octets>	<TCPData-n>
Default IP TTL	Specifies the time to live value for outgoing frames.	64	<defaultIPTTL>
Minimum Buffer Size	Minimum Memory size in bytes reserved for TCP/IP buffers	50bytes	MIN_MEM_BUF
Maximum segment lifetime (MSL)	Maximum segment lifetime is the time a TCP segment can exist in the internetwork system. It is arbitrarily defined to be 2 minutes long	120 seconds	MSL

Table 1: Table of input parameters for Tester

2.1.2.2 TCP IUT Configurations

In order to make a test run possible, it is required to make a number of configurations at the IUT and the corresponding configuration parameters can be derived from the AUTOSAR System Template. ECUC Parameters can also be used if needed especially when no corresponding System Template Parameter is present.

2.1.2.2.1 Required System Descriptions

In order to perform the 'Test Cases' of this ATS, following basic System Description must be available.

1. ApplicationEndpoint.TransportProtocolConfiguration.TcpUdpConfig.TcpTp.portNumber = <unusedTCP-IUT-Port1>
2. ApplicationEndpoint.TransportProtocolConfiguration.TcpUdpConfig.TcpTp.dynamicallyAssigned = FALSE
3. For IPv4 scenario:
    a. SystemTemplate::Fibex::Fibex4Ethernet::EthernetTopology::NetworkEndpointAddress::IPv4Configuration.ipv4Address = <IUTIface-0-IPAddr>
4. For IPv6 scenario:
    b. SystemTemplate::Fibex::Fibex4Ethernet::EthernetTopology::NetworkEndpointAddress:: IPv6Configuration.ipv6Address = <IUTIface-0-IPAddr>

2.1.2.2.2 Required values for TCP/IP Stack configuration parameters
1. TcpIp.TcpIpGeneral.TcpIpGeneral.TcpIpTcpEnabled = TRUE
2. TcpIp.TcpIpGeneral.TcpIpGeneral.TcpIpBufferMemory > MIN_MEM_BUF
3. TcpIp.TcpIpConfig.TcpIpCtrl.TcpIpEthIfCtrlRef = <IUTIface-0>
4. TcpIp.TcpIpConfig.TcpIpLocalAddr = <IUTIface-0-IPAddr>
5. EthGeneral.EthCtrlOffloading.EthCtrlEnableOffloadChecksumTCP = FALSE
6. TcpIp.TcpIpConfig.TcpIpLocalAddr.TcpIpAddressType = TCPIP_UNICAST

2.1.2.3 Required Software Component Description Files
Not applicable

2.1.2.4 Mandatory vs. Customizable Parts
All the parameters mentioned at section 3.1.2.1 and section 3.1.2.2 are mandatory parameters to run any of the below mentioned test cases.
There could be a need for few more configuration items at ECU, however they are individual test case specific and defined at each test-case level.

2.2 General remarks

Please be aware, that some Test Cases require no reaction from the DUT in order to pass. There should be a generic test to ensure the DUT is still reactive and was not compromised by the previous test case execution. If the DUT is not reactive the previous test case execution must be interpreted as not passed.
One example could be writing a volatile information to the DUT and verify that this information is still available after the test case execution.

2.3 Service Primitives

Depending on the necessity of a test case, the test system may use various service-primitives for the IUT to take certain actions.

For the complete working model of Service Primitives please refer to [9]

Name	Description
Create And Bind	Triggers the IUT to create a socket and optionally binds this socket to a port and a local IP address.
Send Data	Triggers the IUT to send a specified data to a specified target.
Close Socket	Triggers the IUT to close all the open sockets which were created during a particular test case.
Receive and Forward	Triggers the IUT to receive data from the LT through test-channel and forward back the data to UT.
Configure Socket	This SP is used to select and set certain parameters that can be configured on a TCP or UDP socket.
Listen and Accept	Marks a socket as listen socket that will be used to accept incoming connections. Whenever a new connection was established this SP provides the socket ID of the new connection together with the listen socket, client port, and address in an event.
Connect	Triggers a TCP connection to a remote destination
Get Version	This SP will return the testability protocol version of the used testability implementation. The minor version is changed in case of modifications to the testability protocol that do not break backward compatibility. The major version is changed in case of changes on existing SPs and parameters or the introduction of new service groups
Start Test	The purpose of this SP is to have a defined entry tag in trace at the point in time the test was started
End Test	All sockets of the test channel will be closed, counters are set to the default value, buffers are cleared and active service primitives will be terminated. Other service primitive calls will be ignored. Another purpose of this SP is to have a defined entry tag in trace at the point in time the test was stopped.

Table 2: Table of Service Primitives

2.4 Assumptions

At the beginning of each test it has to be ensured that the IUT must be in the following conditions:
- All IUT interfaces that are connected to the Test System MUST be enabled.
- All IUT interfaces that are NOT connected to The Test System MUST be disabled
- There's no other unit in the test system that can inadvertently affect a test case.

2.5 Terminologies

2.5.1 General terminologies

Unless otherwise specified explicitly in a test case, the default timeout interval for test system to wait for an expected message from IUT is calculated as (<ListenTime> + <ToleranceTime>). Bothe these entries are configurable for Tester (ref: section 3.1.2.1)

2.5.2 Reusable message transmission statements:

This section defines the reusable messages and their structures. These message transmissions will be used at various test-steps in the below mentioned test cases.

Message Number	Messages	Illustrations
1	LT sends TCP SYN message to IUT.	LT sends TCP segment to IUT containing: - Source Port field set to <unusedTCP-LT-Port1> - Source IP address field set to <Host-1-IP> - Destination Port field set to <unusedTCP-IUT-Port1> - Destination IP address field set to <IUTIface-1-IPAddr> - SYN flag set to 1 - All other flags set to zero. All other fields are set to their default values. And sequence number and acknowledge number set to proper value.

2	LT sends TCP SYN-ACK message to IUT.	LT sends TCP segment to IUT containing: - Source Port field set to `<unusedTCP-LT-Port1>` - Source IP address field set to `<Host-1-IP>` - Destination Port field set to `<unusedTCP-IUT-Port1>` - Destination IP address field set to `<IUTIface-1-IPAddr>` - SYN flag set to 1 - ACK flag set to 1 - All other flags set to zero. All other fields are set to their default values. And sequence number and acknowledge number set to proper value.
3	LT sends TCP ACK message to IUT.	LT sends TCP segment to IUT containing: - Source Port field set to `<unusedTCP-LT-Port1>` - Source IP address field set to `<Host-1-IP>` - Destination Port field set to `<unusedTCP-IUT-Port1>` - Destination IP address field set to `<IUTIface-1-IPAddr>` - ACK flag set to 1 - All other flags set to zero. All other fields are set to their default values. And sequence number and acknowledge number set to proper value.
4	LT sends TCP FIN message to IUT.	LT sends TCP segment to IUT containing: - Source Port field set to `<unusedTCP-LT-Port1>` - Source IP address field set to `<Host-1-IP>` - Destination Port field set to `<unusedTCP-IUT-Port1>` - Destination IP address field set to `<IUTIface-1-IPAddr>` - FIN flag set to 1 - All other flags set to zero. All other fields are set to their default values. And sequence number and acknowledge number set to proper value.

5	LT sends TCP FIN-ACK message to IUT.	LT sends TCP segment to IUT containing: - Source Port field set to <unusedTCP-LT-Port1> - Source IP address field set to <Host-1-IP> - Destination Port field set to <unusedTCP-IUT-Port1> - Destination IP address field set to <IUTIface-1-IPAddr> - FIN flag set to 1 - ACK flag set to 1 - All other flags set to zero. All other fields are set to their default values. And sequence number and acknowledge number set to proper value.
6	LT sends TCP RST message to IUT.	LT sends TCP segment to IUT containing: - Source Port field set to <unusedTCP-LT-Port1> - Source IP address field set to <Host-1-IP> - Destination Port field set to <unusedTCP-IUT-Port1> - Destination IP address field set to <IUTIface-1-IPAddr> - RST flag set to 1 - Sequence number set to inside of the receive window of IUT All other fields are set to their default values.

Table 3: Reusable message transmission statements

2.5.3 Reusable test steps:

This section elaborates statements which will be reused in various test cases. Test cases will use the phrases mentioned in the below table.

Serial Number	Phrases	Illustrations
1	TS performs three-way handshaking to move IUT to ESTABLISHED state.	**Step-1**: UT causes the IUT to <Listen and Accept> at <unusedTCP-IUT-Port1> **Step-2**: LT sends TCP segment to IUT containing: - Source Port field set to <unusedTCP-LT-Port1> - Source IP address field set to <Host-1-IP> - Destination Port field set to <unusedTCP-IUT-Port1> - Destination IP address field set to <IUTIface-1-IPAddr> - SYN flag set to 1 - All other flags set to zero. All other fields are set to their default values. **Step-3**: LT verifies that IUT replies back with a TCP segment containing: - Source Port field set to <unusedTCP-IUT-Port1> - Source IP address field set to <IUTIface-1-IPAddr> - Destination Port field set to <unusedTCP-LT-Port1> - Destination IP address field set to <Host-1-IP> - SYN flag set to 1 - ACK flag set to 1 - All other flags set to zero. - All other fields are set to their default values. Sequence number and acknowledge number set to proper value. **Step-3**:

| | | LT sends TCP segment to IUT containing:
 - Source Port field set to <unusedTCP-LT-Port1>
 - Source IP address field set to <Host-1-IP>
 - Destination Port field set to <unusedTCP-IUT-Port1>
 - Destination IP address field set to <IUTIface-1-IPAddr>
 - ACK flag set to 1

 All other fields are set to their default values. Sequence number and acknowledge number set to proper value.

 TS verifies that the connection with IUT reached to ESTABLISHED state [Ref: Serial number – 1 of Table 5: 'Reusable Verification Terminologies']. |

Table 4: Reusable test steps

2.5.4 Reusable TCP-STATE verification statements:

This section defines various verification procedures that would be referenced by test cases.
Test System (TS) will use these reusable verification statements in the test cases.

Serial Number	Reusable verification statements	Illustrations
1	TS verifies that the connection with IUT is in ESTABLISHED state.	**Step-1**: LT sends TCP message to IUT containing: - Destination-port field set to <unusedTCP-IUT-Port1> - Source-port field set to <unusedTCP-LT-Port1> - TCP Data field containing <TCP-DATA-1> - All other fields are set to their default values. **Step-2**: LT verifies that IUT replies back with a TCP segment containing:

		- Source Port field set to <unusedTCP-IUT-Port1> - Source IP address field set to <IUTIface-1-IPAddr> - Destination Port field set to <unusedTCP-LT-Port1> - Destination IP address field set to <Host-1-IP> - ACK flag set to 1 and other flags set to zero. - Sequence and Acknowledgement numbers are set correctly.
2	TS verifies that connection with IUT is in LISTEN state.	**Step-1**: LT sends TCP segment to IUT containing: - Source Port field set to <unusedTCP-LT-Port1> - Source IP address field set to <Host-1-IP> - Destination Port field set to <unusedTCP-IUT-Port1> - Destination IP address field set to <IUTIface-1-IPAddr> - SYN flag set to 1 - All other flags set to zero. All other fields are set to their default values. And sequence number and acknowledge number set to proper value. **Step-2**: LT verifies that IUT replies back with a TCP segment containing: - Source Port field set to <unusedTCP-IUT-Port1> - Source IP address field set to <IUTIface-1-IPAddr> - Destination Port field set to <unusedTCP-LT-Port1> - Destination IP address field set to <Host-1-IP> - SYN and ACK flag set to 1 - Sequence and Acknowledgement numbers are set correctly.
3	TS verifies that the connection with IUT is in SYN-RECEIVED state.	**Step-1**: LT sends TCP segment to IUT containing: - Source Port field set to <unusedTCP-LT-Port1> - Source IP address field set to <Host-1-IP>

		- Destination Port field set to <unusedTCP-IUT-Port1>
		- Destination IP address field set to <IUTIface-1-IPAddr>
		- ACK flag set to 1
		- All other flags set to zero.
		All other fields are set to their default values. And sequence number and acknowledge number set to proper value.
		Step-2:
		<u>TS verifies that the IUT reached to ESTABLISHED state</u> [Ref: Serial number – 1 of this table].
4	TS verifies that the connection with IUT is in SYN-SENT state.	**Step-1**:
		LT sends TCP segment to IUT containing:
		- Source Port field set to <unusedTCP-LT-Port1>
		- Source IP address field set to <Host-1-IP>
		- Destination Port field set to <unusedTCP-IUT-Port1>
		- Destination IP address field set to <IUTIface-1-IPAddr>
		- SYN flag set to 1
		- ACK flag set to 1
		- All other flags set to zero.
		All other fields are set to their default values. And sequence number and acknowledge number set to proper value.
		Step-2:
		LT verifies that IUT replies back with a TCP segment containing:
		- Source Port field set to <unusedTCP-IUT-Port1>
		- Source IP address field set to <IUTIface-1-IPAddr>
		- Destination Port field set to <unusedTCP-LT-Port1>
		- Destination IP address field set to <Host-1-IP>

		- ACK flag set to 1 - Other control flags set to zero. **Step-3**: TS verifies that the IUT reached to ESTABLISHED state [Ref: Serial number – 1 of this table].
5	TS verifies that the IUT reached to CLOSED state	**Step-1**: LT sends TCP segment to IUT containing: - Source Port field set to \<unusedTCP-LT-Port1> - Source IP address field set to \<Host-1-IP> - Destination Port field set to \<unusedTCP-IUT-Port1> - Destination IP address field set to \<IUTIface-1-IPAddr> - Ack flag set to 1 All other fields are set to their default values. And sequence number and acknowledge number set to proper value. **Step-2**: LT verifies that IUT replies back with a TCP segment containing: - Source Port field set to \<unusedTCP-IUT-Port1> - Source IP address field set to \<IUTIface-1-IPAddr> - Destination Port field set to \<unusedTCP-LT-Port1> - Destination IP address field set to \<Host-1-IP> - RST flag set to 1
6	TS verifies that the connection with IUT reached to LAST-ACK state	**Step-1:** LT sends TCP segment to IUT containing: - Source Port field set to \<unusedTCP-LT-Port1> - Source IP address field set to \<Host-1-IP> - Destination Port field set to \<unusedTCP-IUT-Port1> - Destination IP address field set to

		<IUTIface-1-IPAddr> - ACK flag set to 1 **Step-2**: TS verifies that the IUT reached to CLOSED state
7	TS verifies that the connection with IUT is in CLOSE-WAIT state.	**Step-1**: UT causes the IUT to issue a <Close Socket> call **Step-2**: LT verifies that IUT generates a TCP segment containing: - Source Port field set to <unusedTCP-IUT-Port1> - Source IP address field set to <IUTIface-1-IPAddr> - Destination Port field set to <unusedTCP-LT-Port1> - Destination IP address field set to <Host-1-IP> - FIN flag set to 1 - All other flags set to zero. All other fields are set to their default values. Sequence number and acknowledge number set to proper value. **Step-3**: TS verifies that the connection with IUT reached to LAST-ACK state.
8	TS verifies that the connection with IUT is in TIME-WAIT state.	**Step-1**: LT waits for 2 * MSL time-period. **Step-2**: TS verifies that the IUT reached to CLOSED state
9	TS verifies that the connection with IUT is in CLOSING state.	**Step-1**: LT sends TCP segment to IUT containing: - Source Port field set to <unusedTCP-LT-Port1>

		- Source IP address field set to <Host-1-IP> - Destination Port field set to <unusedTCP-IUT-Port1> - Destination IP address field set to <IUTIface-1-IPAddr> - ACK flag set to 1 All other fields are set to their default values. Sequence number and acknowledge number set to proper value. **Step-2**: TS verifies that the connection with IUT is in TIME-WAIT state
10	TS verifies that the IUT is in FIN-WAIT-2 state.	**Step-1**: LT sends TCP segment to IUT containing: - Source Port field set to <unusedTCP-LT-Port1> - Source IP address field set to <Host-1-IP> - Destination Port field set to <unusedTCP-IUT-Port1> - Destination IP address field set to <IUTIface-1-IPAddr> - FIN flag set to 1 All other fields are set to their default values. Sequence number and acknowledge number set to proper value. **Step-2**: LT verifies that IUT replies back with a TCP segment containing: - Source Port field set to <unusedTCP-IUT-Port1> - Source IP address field set to <IUTIface-1-IPAddr> - Destination Port field set to <unusedTCP-LT-Port1> - Destination IP address field set to <Host-1-IP> - ACK flag set to 1 All other fields are set to their default values. Sequence number and acknowledge number set to proper value.

		Step-3: TS verifies that the IUT is in TIME-WAIT state
11	TS verifies that the connection with IUT is in FIN-WAIT-1 state.	**Step-1**: LT sends TCP segment to IUT containing: - Source Port field set to <unusedTCP-LT-Port1> - Source IP address field set to <Host-1-IP> - Destination Port field set to <unusedTCP-IUT-Port1> - Destination IP address field set to <IUTIface-1-IPAddr> - ACK flag set to 1 All other fields are set to their default values. Sequence number and acknowledge number set to proper value. **Step-2**: TS verifies that the IUT is in FIN-WAIT-2 state

Table 5: Reusable Verification Terminologies

2.5.5 Service Primitive Terminologies

This section defines several service primitive actions and terminologies those are used in various test cases.

Serial Number	Service Primitive Terminologies	Elaborations
1	UT causes the IUT to <Listen and Accept> at <unusedTCP-IUT-Port1>	UT issues service primitive <Listen and Accept> to instruct IUT to start listening for connections at <unusedTCP-IUT-Port1>. Whenever a new connection was established this SP provides the socket ID of the new connection together with the listen socket, client port, and address in an event. Note – The prerequisite is that the

		corresponding socket was already created and bound to <unusedTCP-IUT-Port1>.
2	UT causes the IUT to issue a <Connect> call destined to <unusedTCP-LT-Port1> and <Host-1-IP>	UT issues service primitive <Connect> (i.e. an active OPEN call) to instruct IUT to originate TCP SYN message containing: - Source Port field set to <unusedTCP-IUT-Port1> - Source IP address field set to <IUTIface-1-IPAddr> - Destination Port field set to <unusedTCP-LT-Port1> - Destination IP address field set to <Host-1-IP> - SYN flag set to 1
3	UT causes the IUT to issue a <Close Socket> call	UT issues service primitive <CLOSE> to instruct IUT to originate TCP FIN message containing: - Source Port field set to <unusedTCP-IUT-Port1> - Source IP address field set to <IUTIface-1-IPAddr> - Destination Port field set to <unusedTCP-LT-Port1> - Destination IP address field set to <Host-1-IP> - FIN flag set to 1
4	UT triggers the IUT to <Send Data> a TCP data segment	UT issues service primitive <Send Data> to instruct IUT to send a TCP data segment containing: - Source Port field set to <unusedTCP-IUT-Port1> - Source IP address field set to <IUTIface-1-IPAddr> - Destination Port field set to <unusedTCP-LT-Port1> - Destination IP address field set to <Host-1-IP> - TCP Data contains <TCP-DATA-1>

| 5 | Close all active TCP connections created during this test case between TS and IUT | UT issues service primitive <CLOSE> to close all the sockets created during this test operation. The service primitive will use 'abort' flag set. |

Table 6: Reusable Service Primitive Terminologies

2.6 Topology

2.6.1 TCP Topology-1

DESCRIPTION:

This topology simulates HOST to HOST communication scenario between the IUT and LT. In this topology both LT and IUT should be on the same network.

3 Test Cases

3.1 Connection establishment and basic working of the TCP State Machine

3.1.1 [ATS_TCP_00390] IUT MUST send a SYN-ACK in response to a SYN in LISTEN state

Test Objective	IUT MUST send a SYN-ACK in response to a SYN in LISTEN state		
ID	ATS_TCP_00390	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20001		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	TS triggers the IUT to create and listen on a passive socket at a specified port by sending the service-primitive <Create And Bind> and service-primitive <Listen And Accept> respectively to the IUT via the UT. LT sends a TCP message with SYN flag set to IUT. IUT must respond back with a corresponding TCP message having both SYN and ACK flags are set to one.		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		
Main Test Execution			
Test Steps		**Pass Criteria**	
Step 1	[UT]: UT causes the IUT to <Listen and Accept> at <unusedTCP-IUT-Port1>		
Step 2	**[LT]:** LT sends TCP SYN message to IUT with sequence number LT_lastUsedSeq		

Step 3	**[LT]:** Receive TCP segment from IUT	

Step 4	**[LT]:**
	
	Verify that the received TCP segment from IUT contains:
	
	• Source Port field set to
	
	    `<unusedTCP-IUT-Port1>`
	
	• Source IP address field set to
	
	    `<IUTIface-1-IPAddr>`
	
	• Destination Port field set to `<unusedTCP-LT-Port1>`
	• Destination IP address field set to
	
	    `<Host-1-IP>`
	
	• SYN flag set to 1
	• ACK flag set to 1
	• All other flags set to zero.
	
	• Acknowledgement number set to LT_lastUsedSeq
		The TCP segment from the IUT shall contain:
		
		• SYN flag set to 1
		• ACK flag set to 1
		• All other flags set to zero.
		
		• Acknowledgement number set to LT_lastUsedSeq

Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.1.2 [ATS_TCP_00391] IUT MUST move on to ESTABLISHED state after receiving ACK in SYN-RECEIVED state

Test Objective	IUT MUST move on to ESTABLISHED state after receiving ACK in SYN-RECEIVED state		
ID	ATS_TCP_00391	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20002		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		

Configuration Parameters	3.1.2 TCP Test Configuration-1	
Summary	TS triggers the IUT to create and listen on a passive socket at a specified port by sending the service-primitive <Create And Bind> and service-primitive <Listen And Accept> respectively to the IUT via the UT. Complete three-way handshaking with IUT. TS verifies that IUT has moved to ESTABLISHED state.	
Needed Adaptation to other Releases	None	
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>	
Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[UT]: UT causes the IUT to <Listen and Accept> at <unusedTCP-IUT-Port1>	
Step 2	**[LT]:** LT sends TCP SYN message to IUT with sequence number LT_lastUsedSeq.	
Step 3	**[LT]:** Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • SYN flag set to 1 • ACK flag set to 1	The TCP segment from the IUT shall contain: • SYN flag set to 1 • ACK flag set to 1 • All other flags set to zero. • Acknowledgement number set to LT_lastUsedSeq

	• All other flags set to zero. • Acknowledgement number set to LT_lastUsedSeq	
Step 5	**[LT]:** LT sends TCP ACK message to IUT.	
Step 6	[TS]: TS verifies that the connection with IUT is in ESTABLISHED state (Ref: section 3.4.3)	Verify that the TCP connection between IUT and TESTER moves to "Connection Established" state.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.1.3 [ATS_TCP_00392] IUT MUST send an ACK in response to a FIN received in ESTABLISHED state

Test Objective	IUT MUST send an ACK in response to a FIN received in ESTABLISHED state		
ID	ATS_TCP_00392	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20003		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	TS triggers the IUT to create and listen on a passive socket at a specified port by sending the service-primitive <Create And Bind> and service-primitive <Listen And Accept> respectively to the IUT via the UT. TS completes the three-way handshaking and brings the IUT to connection ESTABLISHED state. LT sends a TCP message with FIN flag set to IUT. IUT must respond back with a corresponding TCP message having ACK flag set to one and 'Acknowledgement number' is set accordingly corresponding to the FIN message sent by LT earlier.		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and		

bind it to port <unusedTCP-IUT-Port1>		
Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.	
Step 2	**[LT]:** LT sends TCP FIN message to IUT with sequence number LT_lastUsedSeq.	
Step 3	**[LT]:** Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.1.4 [ATS_TCP_00393] In CLOSED state, IUT MUST send a SYN on an active OPEN call

Test Objective	In CLOSED state, IUT MUST send a SYN on an active OPEN call		
ID	ATS_TCP_00393	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to	ATR: ATR_ATR_00125		

Requirement on Acceptance Test Document	
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20004
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1
Configuration Parameters	3.1.2 TCP Test Configuration-1
Summary	TS triggers the IUT to create an active socket by sending the service-primitive <Create And Bind> via the UT. TS triggers the IUT to issue an OPEN call by sending service-primitive <Connect> via the UT. LT receives and verifies that the TCP message coming from IUT contains SYN flag set to one.
Needed Adaptation to other Releases	None
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>
Main Test Execution	

Test Steps		Pass Criteria
Step 1	[UT]: UT causes the IUT to issue a <Connect> call destined to <unusedTCP-LT-Port1> and <Host-1-IP>	
Step 2	**[LT]:** Receive TCP segment from IUT	
Step 3	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to	The TCP segment from the IUT shall contain: • SYN flag set to 1

	<Host-1-IP> • SYN flag set to 1	
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.

3.1.5 [ATS_TCP_00394] IUT MUST send a FIN on a CLOSE call in ESTABLISHED state

Test Objective	IUT MUST send a FIN on a CLOSE call in ESTABLISHED state		
ID	ATS_TCP_00394	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20005		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	TS completes the three-way handshaking and brings the IUT to connection ESTABLISH state. TS triggers the IUT to initiate the connection close by sending service-primitive <Close Socket> via the UT LT receives and verifies that the TCP message coming from IUT contains FIN flag set to one.		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		
Main Test Execution			
Test Steps		**Pass Criteria**	
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.		
Step 2	[UT]: UT causes the IUT to issue a <Close Socket> call		

Step 3	[LT]: Receive TCP segment from IUT	
Step 4	[LT]: Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • FIN flag set to 1	The TCP segment from the IUT shall contain: FIN flag set to 1
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.1.6 [ATS_TCP_00396] IUT MUST send a FIN on a CLOSE call in CLOSE-WAIT state

Test Objective	IUT MUST send a FIN on a CLOSE call in CLOSE-WAIT state		
ID	ATS_TCP_00396	AUTOSAR Releases	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20007		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	TS brings the IUT to CLOSE-WAIT state. TS triggers the IUT to initiate the connection close by sending service-primitive		

	<Close Socket> via the UT. LT receives and verifies that the TCP message coming from IUT contains FIN flag set to one	
Needed Adaptation to other Releases	None	
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>	
Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.	
Step 2	**[LT]:** LT sends TCP FIN message to IUT with sequence number LT_lastUsedSeq.	
Step 3	**[LT]:** Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq
Step 5	[UT]: UT causes the IUT to issue a <Close Socket> call	

Step 6	**[LT]:** Receive TCP segment from IUT	

Step 7	**[LT]:**
	
	Verify that the received TCP segment from IUT contains:
	
	• Source Port field set to
	
	  \<unusedTCP-IUT-Port1\>
	
	• Source IP address field set to
	
	  \<IUTIface-1-IPAddr\>
	
	• Destination Port field set to
	
	  \<unusedTCP-LT-Port1\>
	
	• Destination IP address field set to
	
	  \<Host-1-IP\>
	
	FIN flag set to 1
		The TCP segment from the IUT shall contain:
		
		• FIN flag set to 1

Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.1.7 [ATS_TCP_00397] IUT MUST send an ACK after receiving a FIN in FIN-WAIT-1 state

Test Objective	IUT MUST send an ACK after receiving a FIN in FIN-WAIT-1 state		
ID	ATS_TCP_00397	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20008		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	TS brings the IUT to FIN-WAIT-1 state. LT sends a TCP message with FIN flag set to IUT.		

	LT receives and verifies that the TCP message coming from IUT contains ACK flag set to one.	
Needed Adaptation to other Releases	None	
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>	
Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.	
Step 2	[UT]: UT causes the IUT to issue a <Close Socket> call	
Step 3	[LT]: Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • FIN flag set to 1	The TCP segment from the IUT shall contain: • FIN flag set to 1
Step 5	**[LT]:** LT sends TCP FIN message to IUT with sequence number LT_lastUsedSeq.	

Step 6	[LT]: Receive TCP segment from IUT	
Step 7	[LT]: Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.1.8 [ATS_TCP_00398] IUT MUST send an ACK after receiving a FIN in FIN-WAIT-2 state

Test Objective	IUT MUST send an ACK after receiving a FIN in FIN-WAIT-2 state		
ID	ATS_TCP_00398	AUTOSAR Releases	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20009		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		

Summary	TS brings the IUT to FIN-WAIT-2 state. LT sends a TCP message with FIN flag set to IUT. LT receives and verifies that the TCP message coming from IUT contains ACK flag set to one.
Needed Adaptation to other Releases	None
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>

Main Test Execution	

Test Steps		Pass Criteria
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.	
Step 2	[UT]: UT causes the IUT to issue a <Close Socket> call	
Step 3	[LT]: Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • FIN flag set to 1	The TCP segment from the IUT shall contain: • FIN flag set to 1

Document ID 684 : AUTOSAR_ATS_CommunicationCan

Step 5	**[LT]:** LT sends TCP ACK message to IUT.	
Step 6	**[LT]:** LT sends TCP FIN message to IUT with sequence number LT_lastUsedSeq.	
Step 7	**[LT]:** Receive TCP segment from IUT	

Step 8	**[LT]:**
	
	Verify that the received TCP segment from IUT contains:
	
	• Source Port field set to
	
	   \<unusedTCP-IUT-Port1\>
	
	• Source IP address field set to
	
	   \<IUTIface-1-IPAddr\>
	
	• Destination Port field set to
	
	   \<unusedTCP-LT-Port1\>
	
	• Destination IP address field set to
	
	   \<Host-1-IP\>
	
	• ACK flag set to 1
	• Acknowledgement number set in correct relation to LT_lastUsedSeq
		The TCP segment from the IUT shall contain:
		
		• ACK flag set to 1
		• Acknowledgement number set in correct relation to LT_lastUsedSeq

Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.1.9 [ATS_TCP_00399] IUT MUST move on to CLOSED state from TIME-WAIT state after a timeout of 2*MSL where TIME-WAIT is reached through FINWAIT-2 state

Test Objective	IUT MUST move on to CLOSED state from TIME-WAIT state after a timeout of 2*MSL where TIME-WAIT is reached through FINWAIT-2 state		
ID	ATS_TCP_00399	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		

Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20010	
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1	
Configuration Parameters	3.1.2 TCP Test Configuration-1	
Summary	TS brings the IUT to FIN-WAIT-2 state. LT sends a TCP message with FIN flag set to IUT. Once IUT gets back with an ACK, LT waits for 2 * MSL time-period and then sends a TCP message to IUT containing FIN flag set to one. LT receives and verifies that the TCP message coming from IUT contains RST flag set to one	
Needed Adaptation to other Releases	None	
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>	
Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.	
Step 2	[UT]: UT causes the IUT to issue a <Close Socket> call	
Step 3	[LT]: Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to	The TCP segment from the IUT shall contain: • FIN flag set to 1

	<IUTIface-1-IPAddr>	
	• Destination Port field set to <unusedTCP-LT-Port1>	
	• Destination IP address field set to <Host-1-IP>	
	• FIN flag set to 1	
Step 5	**[LT]:** LT sends TCP ACK message to IUT	
Step 6	**[LT]:** LT sends TCP FIN message to IUT sequence number LT_lastUsedSeq.	
Step 7	**[LT]:** Receive TCP segment from IUT	
Step 8	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq
Step 9	**[LT]:** LT waits for 2 * MSL time-period	
Step 10	**[TS]:** TS verifies that the IUT reached to CLOSED	

	state	
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.1.10 [ATS_TCP_00400] IUT MUST NOT move on to CLOSED state from TIME-WAIT state before a timeout of 2*MSL where TIME-WAIT is reached through FINWAIT-2 state

Test Objective	IUT MUST NOT move on to CLOSED state from TIME-WAIT state before a timeout of 2*MSL where TIME-WAIT is reached through FINWAIT-2 state		
ID	ATS_TCP_00400	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20011		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	TS brings the IUT to FIN-WAIT-2 state. LT sends a TCP message with FIN flag set to IUT. Once IUT gets back with an ACK, LT does not waits for MSL time-period and immediately sends a TCP message to IUT containing FIN flag set to one. LT receives and verifies that the TCP message coming from IUT contains ACK flag set to one and RST flag set to zero		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		
Main Test Execution			
Test Steps		**Pass Criteria**	
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.		
Step 2	[UT]:		

	UT causes the IUT to issue a <Close Socket> call	
Step 3	**[LT]:** Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • FIN flag set to 1	The TCP segment from the IUT shall contain: • FIN flag set to 1
Step 5	**[LT]:** LT sends TCP ACK message to IUT.	
Step 6	**[LT]:** LT sends TCP FIN message to IUT with sequence number LT_lastUsedSeq.	
Step 7	**[LT]:** Receive TCP segment from IUT	
Step 8	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr>	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq

	• Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq	
Step 9	**[LT]:** LT sends TCP FIN message to IUT. • Sequence number is set to same value as of step-6 mentioned above (LT_lastUsedSeq).	•
Step 10	**[LT]:** Receive TCP segment from IUT	
Step 11	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1 • RST flag set to zero. • Acknowledgement number set in correct relation to LT_lastUsedSeq	The TCP segment from the IUT shall contain: • ACK flag set to 1 • RST flag set to zero • Acknowledgement number set in correct relation to LT_lastUsedSeq
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.1.11 [ATS_TCP_00401] IUT MUST move on to CLOSED state from TIME-WAIT state after a timeout of 2*MSL where TIME-WAIT is reached through CLOSING state

Test Objective	IUT MUST move on to CLOSED state from TIME-WAIT state after a timeout of 2*MSL where TIME-WAIT is reached through CLOSING state		
ID	ATS_TCP_00401	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20012		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	TS brings the IUT to CLOSING state. LT sends a TCP message with ACK flag set to IUT. It should move IUT to TIME-WAIT state. LT waits for 2 * MSL time-period and then sends a TCP message to IUT containing FIN flag set to one. LT receives and verifies that the TCP message coming from IUT contains RST flag set to one		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		
Main Test Execution			
Test Steps		**Pass Criteria**	
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.		
Step 2	[UT]: UT causes the IUT to issue a <Close Socket> call		
Step 3	[LT]:		

	Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • FIN flag set to 1	The TCP segment from the IUT shall contain: • FIN flag set to 1
Step 5	**[LT]:** LT sends TCP FIN message to IUT with sequence number LT_lastUsedSeq.	
Step 6	**[LT]:** Receive TCP segment from IUT	
Step 7	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq

	• Acknowledgement number set in correct relation to LT_lastUsedSeq
Step 8	[LT]: LT sends TCP ACK message to IUT.
Step 9	[LT]: LT waits for 2 * MSL time-period
Step 10	[TS]: TS verifies that the IUT reached to CLOSED state
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.

3.1.12 [ATS_TCP_00402] IUT MUST NOT move on to CLOSED state from TIME-WAIT state before a timeout of 2*MSL where TIME-WAIT is reached through CLOSING state

Test Objective	IUT MUST NOT move on to CLOSED state from TIME-WAIT state before a timeout of 2*MSL where TIME-WAIT is reached through CLOSING state		
ID	ATS_TCP_00402	AUTOSAR Releases	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20013		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	TS brings the IUT to CLOSING state. LT sends a TCP message with FIN flag set to IUT. Once IUT gets back with an ACK, LT does not wait for MSL time-period and immediately sends a TCP message to IUT containing FIN flag set to one. LT receives and verifies that the TCP message coming from IUT contains ACK flag set to one and RST flag set to zero		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and		

bind it to port <unusedTCP-IUT-Port1>	
Main Test Execution	
Test Steps	**Pass Criteria**
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.	
Step 2	[UT]: UT causes the IUT to issue a <Close Socket> call	
Step 3	[LT]: Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • FIN flag set to 1	The TCP segment from the IUT shall contain: • FIN flag set to 1
Step 5	**[LT]:** LT sends TCP FIN message to IUT with sequence number LT_lastUsedSeq.	
Step 6	**[LT]:** Receive TCP segment from IUT	
Step 7	**[LT]:** Verify that the received TCP segment from IUT contains:	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number

	• Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq	set in correct relation to LT_lastUsedSeq
Step 8	**[LT]:** LT sends TCP ACK message to IUT.	
Step 9	**[LT]:** LT sends retransmission of TCP FIN message of step 5 to IUT (use the same sequence number as in step 5: LT_lastUsedSeq)	
Step 10	**[LT]:** Receive TCP segment from IUT	
Step 11	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to	The TCP segment from the IUT shall contain: • ACK flag set to 1 • RST flag set to zero • Acknowledgement number set in correct relation to LT_lastUsedSeq

	<Host-1-IP>
	• ACK flag set to 1 • RST flag set to zero • Acknowledgement number set in correct relation to LT_lastUsedSeq
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.

3.1.13 [ATS_TCP_00403] IUT MUST ignore a data segment in SYN-SENT state

Test Objective	IUT MUST ignore a data segment in SYN-SENT state		
ID	ATS_TCP_00403	AUTOSAR Releases	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20014		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	TS brings the IUT to SYN-SENT state. LT sends a TCP DATA message <TCP-DATA-1> to IUT. IUT MUST ignore the data message and must not send any corresponding response back to LT		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		
Main Test Execution			
Test Steps		Pass Criteria	
Step 1	[UT]: UT causes the IUT to issue a <Connect> call destined to <unusedTCP-LT-Port1> and <Host-1-IP>		
Step 2	[LT]:		

	Receive TCP segment from IUT	
Step 3	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • SYN flag set to 1	The TCP segment from the IUT shall contain: • SYN flag set to 1
Step 4	[UT]: UT causes the IUT to <RECEIVE AND FORWARD> from LT at <unusedTCP-IUT-Port1> through <IUTIface-0>	
Step 5	**[LT]:** LT sends TCP segment to IUT containing: • Source Port field set to <unusedTCP-LT-Port1> • Source IP address field set to <Host-1-IP> • Destination Port field set to <unusedTCP-IUT-Port1> • Destination IP address field set to <IUTIface-1-IPAddr> • TCP Data contains <TCP-DATA-1>	

	All other fields are set to their default values. sequence number set to value relative to the last sent sequence number of LT acknowledge number set to last sent sequence number of IUT	
Step 6	[TS]: Verify that IUT discards that TCP segment.	The IUT discards the TCP message silently, i.e. no TCP segment comes from IUT containing: • ACK flag set to 1, and • Acknowledgement number matches with LT's data-frame's sequence number.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.1.14 [ATS_TCP_00404] IUT MUST ignore a data segment in CLOSE-WAIT state

Test Objective	IUT MUST ignore a data segment in CLOSE-WAIT state		
ID	ATS_TCP_00404	AUTOSAR Releases	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20015		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	TS brings the IUT to CLOSE-WAIT state. LT sends a TCP DATA message <TCP-DATA-1> to IUT. IUT MUST ignore the data message and must not send any corresponding response back to LT		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		

Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.	
Step 2	**[LT]:** LT sends TCP FIN message to IUT with sequence number LT_lastUsedSeq.	
Step 3	**[LT]:** Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq
Step 5	[UT]: UT causes the IUT to <RECEIVE AND FORWARD> from LT at <unusedTCP-IUT-Port1> through <IUTIface-0>	
Step 6	**[LT]:** LT sends TCP segment to IUT containing: • Source Port field set to <unusedTCP-LT-Port1>	

	• Source IP address field set to <Host-1-IP> • Destination Port field set to <unusedTCP-IUT-Port1> • Destination IP address field set to <IUTIface-1-IPAddr> • TCP Data contains <TCP-DATA-1> All other fields are set to their default values. Sequence number set to value relative to the last sent sequence number of LT. Acknowledge number set to last sent sequence number of IUT.	
Step 7	[TS]: Verify that IUT discards that TCP segment.	The IUT discards the TCP message silently, i.e. no TCP segment comes from IUT containing: • ACK flag set to 1, and • Acknowledgement number matches with LT's data-frame's sequence number.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.1.15 [ATS_TCP_00405] IUT MUST ignore a data segment in CLOSING state

Test Objective	IUT MUST ignore a data segment in CLOSING state		
ID	ATS_TCP_00405	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20016		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		

Configuration Parameters	3.1.2 TCP Test Configuration-1	
Summary	TS brings the IUT to CLOSING state. LT sends a TCP DATA message <TCP-DATA-1> to IUT. IUT MUST ignore the data message and must not send any corresponding response back to LT.	
Needed Adaptation to other Releases	None	
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>	
Main Test Execution		
Test Steps		Pass Criteria
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.	
Step 2	[UT]: UT causes the IUT to issue a <Close Socket> call	
Step 3	[LT]: Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> FIN flag set to 1	The TCP segment from the IUT shall contain: • FIN flag set to 1

Step 5	**[LT]:** LT sends TCP FIN message to IUT with sequence number LT_lastUsedSeq.	
Step 6	**[LT]:** Receive TCP segment from IUT	
Step 7	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq
Step 8	[UT]: UT causes the IUT to <RECEIVE AND FORWARD> from LT at <unusedTCP-IUT-Port1> through <IUTIface-0>	
Step 9	**[LT]:** LT sends TCP data segment to IUT containing: • Source Port field set to <unusedTCP-LT-Port1> • Source IP address field set to <Host-1-IP> • Destination Port field set to	

	<unusedTCP-IUT-Port1> • Destination IP address field set to <IUTIface-1-IPAddr> • TCP Data contains <TCP-DATA-1> All other fields are set to their default values. Sequence number set to value relative to the last sent sequence number of LT. Acknowledge number set to last sent sequence number of IUT.	
Step 10	[TS]: Verify that IUT discards that TCP segment.	The IUT discards the TCP message silently, i.e. no TCP segment comes from IUT containing: • ACK flag set to 1, and • Acknowledgement number matches with LT's data-frame's sequence number.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.1.16 [ATS_TCP_00406] IUT MUST ignore a data segment in LAST-ACK state

Test Objective	IUT MUST ignore a data segment in LAST-ACK state		
ID	ATS_TCP_00406	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20017		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	TS brings the IUT to LAST-ACK state. LT sends a TCP DATA message <TCP-DATA-1> to IUT.		

	IUT MUST ignore the data message and must not response back to LT.	
Needed Adaptation to other Releases	None	
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>	
Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.	
Step 2	**[LT]:** LT sends TCP FIN message to IUT with sequence number LT_lastUsedSeq.	
Step 3	**[LT]:** Receive TCP segment from IUT	
Step 4	[LT]: Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq
Step 5	[UT]: UT causes the IUT to issue a <Close Socket> call	
Step 6	**[LT]:**	

	Receive TCP segment from IUT	
Step 7	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> FIN flag set to 1	The TCP segment from the IUT shall contain: • FIN flag set to 1
Step 8	[UT]: UT causes the IUT to <RECEIVE AND FORWARD> from LT at <unusedTCP-IUT-Port1> through <IUTIface-0>	
Step 9	**[LT]:** LT sends TCP segment to IUT containing: • Source Port field set to <unusedTCP-LT-Port1> • Source IP address field set to <Host-1-IP> • Destination Port field set to <unusedTCP-IUT-Port1> • Destination IP address field set to <IUTIface-1-IPAddr> • TCP Data contains <TCP-DATA-1>	

	All other fields are set to their default values. Sequence number set to value relative to the last sent sequence number of LT. Acknowledge number set to last sent sequence number of IUT.	
Step 10	[TS]: Verify that IUT discards that TCP segment.	The IUT discards the TCP message silently, i.e. no TCP segment comes from IUT containing: • ACK flag set to 1, and • Acknowledgement number matches with LT's data-frame's sequence number.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.1.17 [ATS_TCP_00407] IUT MUST ignore a data segment in TIME-WAIT state

Test Objective	IUT MUST ignore a data segment in TIME-WAIT state		
ID	ATS_TCP_00407	AUTOSAR Releases	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20018		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	TS brings the IUT to TIME-WAIT state. LT sends a TCP DATA message <TCP-DATA-1> to IUT. IUT MUST ignore the data message and must not send any corresponding response back to LT		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		

Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.	
Step 2	[UT]: UT causes the IUT to issue a <Close Socket> call	
Step 3	[LT]: Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • FIN flag set to 1	The TCP segment from the IUT shall contain: • FIN flag set to 1
Step 5	**[LT]:** LT sends TCP FIN message to IUT with sequence number LT_lastUsedSeq.	
Step 6	**[LT]:** Receive TCP segment from IUT	
Step 7	**[LT]:** Verify that the received TCP segment from IUT contains:	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number set in correct relation to

	• Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq	LT_lastUsedSeq
Step 8	**[LT]:** LT sends TCP ACK message to IUT.	
Step 9	[UT]: UT causes the IUT to <RECEIVE AND FORWARD> from LT at <unusedTCP-IUT-Port1> through <IUTIface-0>	
Step 10	**[LT]:** LT sends TCP segment to IUT containing: • Source Port field set to <unusedTCP-LT-Port1> • Source IP address field set to <Host-1-IP> • Destination Port field set to <unusedTCP-IUT-Port1> • Destination IP address field set to <IUTIface-1-IPAddr> • TCP Data contains <TCP-DATA-1>	

	All other fields are set to their default values. Sequence number set to value relative to the last sent sequence number of LT. Acknowledge number set to last sent sequence number of IUT.	
Step 11	[TS]: Verify that IUT discards that TCP segment.	The IUT discards the TCP message silently, i.e. no TCP segment comes from IUT containing: • ACK flag set to 1, and • Acknowledgement number matches with LT's data-frame's sequence number.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.1.18 [ATS_TCP_00408] IUT sends an ACK after receiving a data segment in FIN-WAIT-1 state [classifier:MAY]

Test Objective	IUT sends an ACK after receiving a data segment in FIN-WAIT-1 state [classifier:MAY]		
ID	ATS_TCP_00408	AUTOSAR Releases	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20019		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	TS brings the IUT to FIN-WAIT-1 state. LT sends a TCP DATA message <TCP-DATA-1> to IUT. LT receives and verifies that the corresponding TCP message coming from IUT contains ACK flag set to one		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and		

	bind it to port <unusedTCP-IUT-Port1>	
Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.	
Step 2	[UT]: UT causes the IUT to issue a <Close Socket> call	
Step 3	[LT]: Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • FIN flag set to 1	The TCP segment from the IUT shall contain: • FIN flag set to 1
Step 5	[UT]: UT causes the IUT to <RECEIVE AND FORWARD> from LT at <unusedTCP-IUT-Port1> through <IUTIface-0>	
Step 6	**[LT]:** LT sends TCP segment to IUT containing: • Source Port field set to	

	<unusedTCP-LT-Port1>	
	• Source IP address field set to <Host-1-IP>	
	• Destination Port field set to <unusedTCP-IUT-Port1>	
	• Destination IP address field set to <IUTIface-1-IPAddr>	
	• TCP Data contains <TCP-DATA-1>	
	All other fields are set to their default values.	
	Sequence number set to value relative to the last sent sequence number of LT.	
	Acknowledge number set to last sent sequence number of IUT.	
Step 7	**[LT]:** Receive TCP segment from IUT	
Step 8	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1 Acknowledgement number matches with LT's data-frame's sequence number.	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number matches with LT's data-frame's sequence number.

Document ID 684 : AUTOSAR_ATS_CommunicationCan

Step 9	[TS]: Verify that IUT has received that TCP segment and successfully passed to upper layer (e.g. ETM)	The received TCP segment from UT shall contain: • TCP Data set to <TCP-DATA-1>
Post-conditions	Close all active TCP connections created during this test case between TS and IUT	

3.1.19 [ATS_TCP_00409] IUT sends an ACK after receiving a data segment in FIN-WAIT-2 state [classifier:MAY]

Test Objective	IUT sends an ACK after receiving a data segment in FIN-WAIT-2 state [classifier:MAY]		
ID	ATS_TCP_00409	AUTOSAR Releases	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20020		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	TS brings the IUT to FIN-WAIT-2 state. LT sends a TCP DATA message <TCP-DATA-1> to IUT. LT receives and verifies that the corresponding TCP message coming from IUT contains ACK flag set to one		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		
Main Test Execution			
Test Steps		Pass Criteria	
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.		

Step 2	[UT]: UT causes the IUT to issue a <Close Socket> call	
Step 3	[LT]: Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • FIN flag set to 1	The TCP segment from the IUT shall contain: • FIN flag set to 1
Step 5	**[LT]:** LT sends TCP ACK message to IUT.	
Step 6	[UT]: UT causes the IUT to <RECEIVE AND FORWARD> from LT at <unusedTCP-IUT-Port1> through <IUTIface-0>	
Step 7	**[LT]:** LT sends TCP segment to IUT containing: • Source Port field set to <unusedTCP-LT-Port1> • Source IP address field set to	

Document ID 684 : AUTOSAR_ATS_CommunicationCan

- AUTOSAR confidential -

	<Host-1-IP>	
	• Destination Port field set to <unusedTCP-IUT-Port1>	
	• Destination IP address field set to <IUTIface-1-IPAddr>	
	• TCP Data contains <TCP-DATA-1>	
	All other fields are set to their default values.	
	Sequence number set to value relative to the last sent sequence number of LT.	
	Acknowledge number set to last sent sequence number of IUT.	
Step 8	**[LT]:** Receive TCP segment from IUT	
Step 9	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1 Acknowledgement number matches with LT's data-frame's sequence number.	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number matches with LT's data-frame's sequence number.
Step 10	**[TS]:** Verify that IUT has received that TCP segment and successfully passed to upper layer (e.g. ETM)	The received TCP segment from UT shall contain: • TCP Data set to <TCP-DATA-

		1>
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.2 Processing and generating TCP checksums

3.2.1 [ATS_TCP_00410] IUT MUST check the checksum in any incoming segment, and MUST acknowledge in case of no error

Test Objective	IUT MUST check the checksum in any incoming segment, and MUST acknowledge in case of no error		
ID	ATS_TCP_00410	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00104 ATS_SID: SWS_SID_20021		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	TS completes the three-way handshaking and brings the IUT to connection ESTABLISH state. LT sends a TCP DATA message <TCP-DATA-1> to IUT with correctly computed checksum. IUT must respond back with a corresponding TCP message having ACK flag set to one.		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		
Main Test Execution			
Test Steps		**Pass Criteria**	
Step 1	[TS]:		

	TS performs three-way handshaking to move IUT to ESTABLISHED state.	
Step 2	**[LT]:** LT sends TCP segment to IUT containing: • Source Port field set to <unusedTCP-LT-Port1> • Source IP address field set to <Host-1-IP> • Destination Port field set to <unusedTCP-IUT-Port1> • Destination IP address field set to <IUTIface-1-IPAddr> • TCP Data contains <TCP-DATA-1> • TCP Checksum correctly computed All other fields are set to their default values. Sequence number set to value relative to the last sent sequence number of LT. Acknowledge number set to last sent sequence number of IUT.	
Step 3	**[LT]:** Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1>	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number matches with LT's data-frame's sequence number.

	• Destination IP address field set to <Host-1-IP> • ACK flag set to 1 Acknowledgement number matches with LT's data-frame's sequence number
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.

3.2.2 [ATS_TCP_00411] IUT MUST check the checksum in any incoming segment, and MUST NOT acknowledge in case of erroneous checksum

Test Objective	IUT MUST check the checksum in any incoming segment, and MUST NOT acknowledge in case of erroneous checksum		
ID	ATS_TCP_00411	AUTOSAR Releases	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00104 ATS_SID: SWS_SID_20022		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	TS completes the three-way handshaking and brings the IUT to connection ESTABLISH state. LT sends a TCP DATA message <TCP-DATA-1> to IUT with incorrectly computed checksum. IUT must not respond back with any corresponding TCP message to LT		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		
Main Test Execution			
Test Steps		Pass Criteria	
Step 1	[TS]: TS performs three-way handshaking to move		

Step 2	**[LT]:**	No TCP segment comes from IUT containing:
	LT sends TCP segment to IUT containing:	
	• Source Port field set to <unusedTCP-LT-Port1> • Source IP address field set to <Host-1-IP> • Destination Port field set to <unusedTCP-IUT-Port1> • Destination IP address field set to <IUTIface-1-IPAddr> • TCP Data contains <TCP-DATA-1> • TCP Checksum incorrectly computed	• ACK flag set to 1 • Acknowledgement number matches with LT's data-frame's sequence number.
	All other fields are set to their default values. Sequence number set to value relative to the last sent sequence number of LT. Acknowledge number set to last sent sequence number of IUT.	
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.2.3 [ATS_TCP_00412] IUT MUST generate checksum while sending TCP segments

Test Objective	IUT MUST generate checksum while sending TCP segments		
ID	ATS_TCP_00412	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00104 ATS_SID: SWS_SID_20023		
Requirements /	3.2 Service Primitives		

Reference to Test Environment	3.5.1 TCP Topology-1
Configuration Parameters	3.1.2 TCP Test Configuration-1
Summary	TS completes the three-way handshaking and brings the IUT to connection ESTABLISH state. TS triggers the IUT to send <TCP-DATA-1> to LT by sending service-primitive <Send Data> via the UT. LT receives and verifies that the TCP data message coming from IUT contains correctly calculated checksum corresponding to data <TCP-DATA-1>.
Needed Adaptation to other Releases	None
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>

Main Test Execution

Test Steps		Pass Criteria
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.	
Step 2	[UT]: UT triggers the IUT to <Send Data> a TCP data segment containing: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • TCP Data contains <TCP-DATA-1>	•
Step 3	**[LT]:** Receive TCP segment from IUT	

| Step 4 | [LT]:

Verify that the received TCP segment from IUT contains:

• Source Port field set to

   <unusedTCP-IUT-Port1>

• Source IP address field set to

   <IUTIface-1-IPAddr>

• Destination Port field set to

   <unusedTCP-LT-Port1>

• Destination IP address field set to

   <Host-1-IP>

• TCP Data contains <TCP-DATA-1>
• TCP Checksum correctly calculated and populated at checksum field | The TCP segment from the IUT shall contain:

• TCP Data contains <TCP-DATA-1>
• TCP Checksum correctly calculated and populated at checksum field |
| Post-conditions | Close all active TCP connections created during this test case between TS and IUT. | |

3.3 Processing unacceptable acknowledgments and out of window sequence numbers

3.3.1 [ATS_TCP_00413] IUT MUST return to LISTEN state, on receiving an acceptable RST, in SYN-RCVD state

Test Objective	IUT MUST return to LISTEN state, on receiving an acceptable RST, in SYN-RCVD state		
ID	ATS_TCP_00413	AUTOSAR Releases	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00104 ATS_SID: SWS_SID_20024		

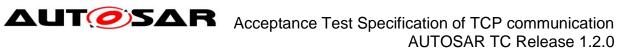| Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1	
Configuration Parameters	3.1.2 TCP Test Configuration-1	
Summary	TS brings the IUT to SYN-RECEIVED state. LT sends a TCP message to IUT containing RST flag set to one. IUT must not respond back and returns to LISTEN state. TS verifies that IUT has moved to the LISTEN state.	
Needed Adaptation to other Releases	None	
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>	
Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[UT]: UT causes the IUT to <Listen and Accept> at <unusedTCP-IUT-Port1	
Step 2	**[LT]:** LT sends TCP SYN message to IUT with sequence number LT_lastUsedSeq.	
Step 3	**[LT]:** Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to	The TCP segment from the IUT shall contain: • SYN flag set to 1 • ACK flag set to 1 • All other flags set to zero. • Acknowledgement number set to LT_lastUsedSeq

	<Host-1-IP> • SYN flag set to 1 • ACK flag set to 1 • All other flags set to zero. • Acknowledgement number set to LT_lastUsedSeq	
Step 5	**[LT]:** LT sends TCP RST message to IUT containing: • Sequence number set to inside of the receive window of IUT All other fields are set to their default values.	
Step 6	**[TS]:** TS verifies that connection with IUT is in LISTEN state (Ref: section 3.4.3).	Verify that IUT comes back to LISTEN state.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT	

3.3.2 [ATS_TCP_00414] IUT MUST NOT change state, on receiving an unacceptable RST in SYN-RCVD state

Test Objective	IUT MUST NOT change state, on receiving an unacceptable RST in SYN-RCVD state		
ID	ATS_TCP_00414	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00104 ATS_SID: SWS_SID_20025		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	TS brings the IUT to SYN-RECEIVED state.		

	LT sends a TCP message to IUT containing RST flag set to one with a sequence number outside of the receive window of the IUT. IUT must ignore that unacceptable TCP RST message and doesn't change the state. TS verifies that IUT is in SYN-RECEIVED state.	
Needed Adaptation to other Releases	None	
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>	
Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[UT]: UT causes the IUT to <Listen and Accept> at <unusedTCP-IUT-Port1>	
Step 2	**[LT]:** LT sends TCP SYN message to IUT with sequence number LT_lastUsedSeq.	
Step 3	**[LT]:** Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • SYN flag set to 1 • ACK flag set to 1 • All other flags set to zero. • Acknowledgement number set to	The TCP segment from the IUT shall contain: • SYN flag set to 1 • ACK flag set to 1 • All other flags set to zero. • Acknowledgement number set to LT_lastUsedSeq

	LT_lastUsedSeq	
Step 5	**[LT]:** LT sends TCP RST message to IUT containing: • Sequence number set to outside of the receive window of IUT All other fields are set to their default values.	
Step 6	[TS]: TS verifies that the connection with IUT is in SYN-RECEIVED state (Ref: section 3.4.3).	Connection with IUT is in SYN-RECEIVED state.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.3.3 [ATS_TCP_00415] IUT MUST send a RST after receiving an unacceptable ACK in SYN-RCVD state

Test Objective	IUT MUST send a RST after receiving an unacceptable ACK in SYN-RCVD state		
ID	ATS_TCP_00415	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00104 ATS_SID: SWS_SID_20026		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	TS brings the IUT to SYN-RECEIVED state. LT sends a TCP ACK message to IUT with a sequence number outside of the receive window of the IUT. IUT must respond back with a corresponding TCP message having RST flag set to one.		
Needed	None		

Adaptation to other Releases		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>	
Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[UT]: UT causes the IUT to <Listen and Accept> at <unusedTCP-IUT-Port1>	
Step 2	**[LT]:** LT sends TCP SYN message to IUT with sequence number LT_lastUsedSeq.	
Step 3	**[LT]:** Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • SYN flag set to 1 • ACK flag set to 1 • All other flags set to zero. • Acknowledgement number set to LT_lastUsedSeq	The TCP segment from the IUT shall contain: • SYN flag set to 1 • ACK flag set to 1 • All other flags set to zero. • Acknowledgement number set to LT_lastUsedSeq
Step 5	**[LT]:** LT sends TCP ACK message to IUT containing:	

	• Acknowledgement number set to outside of the receive window of IUT All other fields are set to their default values.	
Step 6	**[LT]:** Receive TCP segment from IUT	
Step 7	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> RST flag set to 1	The TCP segment from the IUT shall contain: • RST flag set to 1
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.3.4 [ATS_TCP_00416] In ESTABLISHED: IUT MUST return ack. with proper SEQ and ACK No. after receiving a segment with Out-of-sequence and remain in same state

Test Objective	In ESTABLISHED: IUT MUST return ack. with proper SEQ and ACK No. after receiving a segment with Out-of-sequence and remain in same state		
ID	ATS_TCP_00416	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20027		

Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1	
Configuration Parameters	3.1.2 TCP Test Configuration-1	
Summary	When the connection is in a synchronized state (ESTABLISHED, FIN-WAIT-1, FIN-WAIT-2, CLOSE-WAIT, CLOSING, LAST-ACK, TIME-WAIT), any unacceptable segment (out of window sequence number) must elicit IUT to send an empty acknowledgment segment containing the current send-sequence number and an acknowledgment indicating the next sequence number expected to be received from LT, and the connection remains in the same state	
Needed Adaptation to other Releases	None	
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>	
Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state..	
Step 2	**[LT]:** LT sends TCP segment to IUT containing: • Source Port field set to <unusedTCP-LT-Port1> • Source IP address field set to <Host-1-IP> • Destination Port field set to <unusedTCP-IUT-Port1> • Destination IP address field set to <IUTIface-1-IPAddr> • ACK flag set to 1 • Sequence number set to outside of the receive window of IUT (different to last sequence number used by LT: LT_lastUsedSeq) • Acknowledgement Number set to the last sequence number used by IUT (IUT_lastUsedSeq)	

	All other fields are set to their default values.	
Step 3	**[LT]:** Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • Sequence Number set to IUT_lastUsedSeq • Acknowledgement Number set to LT_lastUsedSeq • • • ACK flag set to 1	The TCP segment from the IUT shall contain: • Sequence Number set to IUT_lastUsedSeq • Acknowledgement Number set to LT_lastUsedSeq • ACK flag set to 1
Step 5	[TS]: TS verifies that the connection with IUT is in ESTABLISHED state (Ref: section 3.4.3)	Connection with IUT remains at ESTABLISH state.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT	

3.3.5 [ATS_TCP_00417] In ESTABLISHED: IUT MUST return ack. with proper SEQ and ACK No. after receiving a segment with an unacceptable ack. no. and remain in same state

Test Objective	In ESTABLISHED: IUT MUST return ack. with proper SEQ and ACK No. after receiving a segment with an unacceptable ack. no. and remain in same state

ID	ATS_TCP_00417	AUTOSAR Releases	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20028		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	When the connection is in a synchronized state (e.g. ESTABLISHED, FIN-WAIT-1, FIN-WAIT-2, CLOSE-WAIT, CLOSING, LAST-ACK, TIME-WAIT), any unacceptable segment (e.g. with an unacceptable acknowledgment number) must elicit IUT to send an empty acknowledgment segment containing the current send-sequence number and an acknowledgment indicating the next sequence number expected to be received from LT, and the connection remains in the same state		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		

Main Test Execution

Test Steps		Pass Criteria
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state..	
Step 2	**[LT]:** LT sends TCP data segment to IUT containing: • Source Port field set to <unusedTCP-LT-Port1> • Source IP address field set to <Host-1-IP> • Destination Port field set to <unusedTCP-IUT-Port1>	

- AUTOSAR confidential -

	• Destination IP address field set to <IUTIface-1-IPAddr> • ACK flag set to 1 • Sequence number set to last sequence number used by LT: LT_lastUsedSeq • Acknowledgement number set to outside of the receive window of IUT (different to the last sequence number used by IUT: IUT_lastUsedSeq) All other fields are set to their default values.	
Step 3	**[LT]:** Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • Sequence Number set to IUT_lastUsedSeq • Acknowledgement Number set to LT_lastUsedSeq • ACK flag set to 1	The TCP segment from the IUT shall contain: • Sequence Number set to IUT_lastUsedSeq • Acknowledgement Number set to LT_lastUsedSeq ACK flag set to 1
Step 5	[TS]: TS verifies that the connection with IUT is in ESTABLISHED state (Ref: section 3.4.3).	Connection with IUT remains at ESTABLISH state.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.3.6 [ATS_TCP_00418] In FIN-WAIT-1: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with Out-of-sequence and remain in same state

Test Objective	In FIN-WAIT-1: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with Out-of-sequence and remain in same state		
ID	ATS_TCP_00418	AUTOSAR Releases	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20029		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	When the connection is in a synchronized state (ESTABLISHED, FIN-WAIT-1, FIN-WAIT-2, CLOSE-WAIT, CLOSING, LAST-ACK, TIME-WAIT), any unacceptable segment (out of window sequence number) must elicit IUT to send an empty acknowledgment segment containing the current send-sequence number and an acknowledgment indicating the next sequence number expected to be received from LT, and the connection remains in the same state.		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		
Main Test Execution			
Test Steps		Pass Criteria	
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.		
Step 2	[UT]: UT causes the IUT to issue a <Close Socket> call		
Step 3	[LT]: Receive TCP segment from IUT		

Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> FIN flag set to 1	The TCP segment from the IUT shall contain: • FIN flag set to 1
Step 5	**[LT]:** LT sends TCP ACK message to IUT containing: • Sequence number set to outside of the receive window of IUT (different to last sequence number used by LT: LT_lastUsedSeq) • Acknowledgement Number set to the last sequence number used by IUT (IUT_lastUsedSeq) All other fields are set to their default values.	
Step 6	**[LT]:** Receive TCP segment from IUT	
Step 7	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to	The TCP segment from the IUT shall contain: • Sequence Number set to IUT_lastUsedSeq • Acknowledgement Number set to LT_lastUsedSeq • ACK flag set to 1

	<IUTIface-1-IPAddr>	
	• Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • Sequence Number set to IUT_lastUsedSeq • Acknowledgement Number set to LT_lastUsedSeq • ACK flag set to 1	
Step 8	[TS]: TS verifies that the connection with IUT is in FIN-WAIT-1 state (Ref: section 3.4.3)	Connection with IUT remains at FIN-WAIT-1 state.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT	

3.3.7 [ATS_TCP_00419] In FIN-WAIT-1: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with an unacceptable ack. no. and remain in same state

Test Objective	In FIN-WAIT-1: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with an unacceptable ack. no. and remain in same state		
ID	ATS_TCP_00419	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20030		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	When the connection is in a synchronized state (ESTABLISHED, FIN-WAIT-1, FIN-WAIT-2, CLOSE-WAIT, CLOSING, LAST-ACK, TIME-WAIT), any unacceptable segment (e.g. with an unacceptable acknowledgment number) must elicit IUT to send an empty acknowledgment segment containing the current send-sequence number and an acknowledgment indicating the next sequence number expected to be received from LT, and the connection remains in the same state.		
Needed	None		

Adaptation to other Releases		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>	
Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.	
Step 2	[UT]: UT causes the IUT to issue a <Close Socket> call	
Step 3	[LT]: Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • FIN flag set to 1	The TCP segment from the IUT shall contain: • FIN flag set to 1
Step 5	**[LT]:** LT sends TCP ACK message to IUT containing:	

	• Sequence number set to last sequence number used by LT: LT_lastUsedSeq • Acknowledgement number set to outside of the receive window of IUT (different to the last sequence number used by IUT: IUT_lastUsedSeq) All other fields are set to their default values	
Step 6	**[LT]:** Receive TCP segment from IUT	
Step 7	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • Sequence Number set to IUT_lastUsedSeq • Acknowledgement Number set to LT_lastUsedSeq • ACK flag set to 1	The TCP segment from the IUT shall contain: • Sequence Number set to IUT_lastUsedSeq • Acknowledgement Number set to LT_lastUsedSeq • ACK flag set to 1
Step 8	[TS]: TS verifies that the connection with IUT is in FIN-WAIT-1 state (Ref: section 3.4.3)	Connection with IUT remains at FIN-WAIT-1 state
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.3.8 [ATS_TCP_00420] In FIN-WAIT-2: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with Out-of-sequence and remain in same state

Test Objective	In FIN-WAIT-2: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with Out-of-sequence and remain in same state		
ID	ATS_TCP_00420	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20031		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	When the connection is in a synchronized state (ESTABLISHED, FIN-WAIT-1, FIN-WAIT-2, CLOSE-WAIT, CLOSING, LAST-ACK, TIME-WAIT), any unacceptable segment (out of window sequence number) must elicit IUT to send an empty acknowledgment segment containing the current send-sequence number and an acknowledgment indicating the next sequence number expected to be received from LT, and the connection remains in the same state.		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		
Main Test Execution			
Test Steps		**Pass Criteria**	
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.		
Step 2	[UT]: UT causes the IUT to issue a <Close Socket> call		
Step 3	[LT]: Receive TCP segment from IUT		
Step 4	**[LT]:** Verify that the received TCP segment from	The TCP segment from the IUT shall contain: FIN flag set to 1	

- AUTOSAR confidential -

	IUT contains:
	
	• Source Port field set to
	
	    <unusedTCP-IUT-Port1>
	
	• Source IP address field set to
	
	    <IUTIface-1-IPAddr>
	
	• Destination Port field set to
	
	    <unusedTCP-LT-Port1>
	
	• Destination IP address field set to
	
	    <Host-1-IP>
	
	• FIN flag set to 1	

Step 5	**[LT]:** LT sends TCP ACK message to IUT.	
Step 6	**[LT]:** LT sends TCP ACK message to IUT containing: • Sequence number set to outside of the receive window of IUT (different to last sequence number used by LT: LT_lastUsedSeq) • Acknowledgement Number set to the last sequence number used by IUT (IUT_lastUsedSeq) All other fields are set to their default values.	
Step 7	**[LT]:** Receive TCP segment from IUT	

Step 8	**[LT]:**
	
	Verify that the received TCP segment from IUT contains:
	
	• Source Port field set to
	
	    <unusedTCP-IUT-Port1>
	
	• Source IP address field set to
	
	    <IUTIface-1-IPAddr>
		The TCP segment from the IUT shall contain:
		
		• Sequence Number set to IUT_lastUsedSeq
		• Acknowledgement Number set to LT_lastUsedSeq
		• ACK flag set to 1

	- Destination Port field set to <unusedTCP-LT-Port1> - Destination IP address field set to <Host-1-IP> - Sequence Number set to IUT_lastUsedSeq - Acknowledgement Number set to LT_lastUsedSeq ACK flag set to 1	
Step 9	[TS]: TS verifies that the IUT is in FIN-WAIT-2 state (Ref: section 3.4.3).	Connection with IUT remains at FIN-WAIT-2 state.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.3.9 [ATS_TCP_00421] In FIN-WAIT-2: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with an unacceptable ack. no. and remain in same state

Test Objective	In FIN-WAIT-2: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with an unacceptable ack. no. and remain in same state		
ID	ATS_TCP_00421	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20032		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	When the connection is in a synchronized state (ESTABLISHED, FIN-WAIT-1, FIN-WAIT-2, CLOSE-WAIT, CLOSING, LAST-ACK, TIME-WAIT), any unacceptable segment (e.g. with an unacceptable acknowledgement number) must elicit IUT to send an empty acknowledgment segment containing the current send-sequence number and an acknowledgment indicating the next sequence number expected to be received from LT, and the connection remains in the same state.		
Needed Adaptation to other Releases	None		

Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>	
Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.	
Step 2	[UT]: UT causes the IUT to issue a <Close Socket> call	
Step 3	[LT]: Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • FIN flag set to 1	The TCP segment from the IUT shall contain: • FIN flag set to 1
Step 5	**[LT]:** LT sends TCP ACK message to IUT.	
Step 6	**[LT]:** LT sends TCP ACK message to IUT containing:	

	• Sequence number set to last sequence number used by LT: LT_lastUsedSeq • Acknowledgement number set to outside of the receive window of IUT (different to the last sequence number used by IUT: IUT_lastUsedSeq) All other fields are set to their default values.	
Step 7	**[LT]:** Receive TCP segment from IUT	
Step 8	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • Sequence Number set to IUT_lastUsedSeq • Acknowledgement Number set to LT_lastUsedSeq • ACK flag set to 1	The TCP segment from the IUT shall contain: • Sequence Number set to IUT_lastUsedSeq • Acknowledgement Number set to LT_lastUsedSeq • ACK flag set to 1
Step 9	[TS]: TS verifies that the IUT is in FIN-WAIT-2 state (Ref: section 3.4.3).	Connection with IUT remains at FIN-WAIT-2 state.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.3.10 [ATS_TCP_00422] In CLOSE-WAIT: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with Out-of-sequence and remain in same state

Test Objective	In CLOSE-WAIT: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with Out-of-sequence and remain in same state		
ID	ATS_TCP_00422	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20033		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	When the connection is in a synchronized state (ESTABLISHED, FIN-WAIT-1, FIN-WAIT-2, CLOSE-WAIT, CLOSING, LAST-ACK, TIME-WAIT), any unacceptable segment (out of window sequence number) must elicit IUT to send an empty acknowledgment segment containing the current send-sequence number and an acknowledgment indicating the next sequence number expected to be received from LT, and the connection remains in the same state.		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		
Main Test Execution			
Test Steps		**Pass Criteria**	
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.		
Step 2	**[LT]:** LT sends TCP FIN message to IUT with sequence number LT_lastUsedSeq.		
Step 3	**[LT]:** Receive TCP segment from IUT		
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains:	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number set in correct relation to

	• Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq	LT_lastUsedSeq
Step 5	**[LT]:** LT sends TCP ACK message to IUT containing: • Sequence number set to outside of the receive window of IUT (different to LT_lastUsedSeq) • Acknowledgement Number set to the last sequence number used by IUT (IUT_lastUsedSeq) All other fields are set to their default values.	
Step 6	**[LT]:** Receive TCP segment from IUT	
Step 7	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to	The TCP segment from the IUT shall contain: • Sequence Number set to IUT_lastUsedSeq • Acknowledgement number set in correct relation to LT_lastUsedSeq • ACK flag set to 1

	<unusedTCP-LT-Port1>	
	• Destination IP address field set to <Host-1-IP>	
	• Sequence Number set to IUT_lastUsedSeq	
	• Acknowledgement number set in correct relation to LT_lastUsedSeq	
	• ACK flag set to 1	
Step 8	[TS]: TS verifies that the connection with IUT is in CLOSE-WAIT state (Ref: section 3.4.3).	Connection with IUT remains at CLOSE-WAIT state.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.3.11 [ATS_TCP_00423] In CLOSE-WAIT: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with an unacceptable ack. no. and remain in same state

Test Objective	In CLOSE-WAIT: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with an unacceptable ack. no. and remain in same state		
ID	ATS_TCP_00423	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20034		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	When the connection is in a synchronized state (ESTABLISHED, FIN-WAIT-1, FIN-WAIT-2, CLOSE-WAIT, CLOSING, LAST-ACK, TIME-WAIT), any unacceptable segment (e.g. with an unacceptable acknowledgement number) must elicit IUT to send an empty acknowledgment segment containing the current send-sequence number and an acknowledgment indicating the next sequence number expected to be received from LT, and the connection remains in the same state.		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		

Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.	
Step 2	**[LT]:** LT sends TCP FIN message to IUT with sequence number LT_lastUsedSeq.	
Step 3	**[LT]:** Receive TCP segment from IUT	
Step 4	[LT]: Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1	The TCP segment from the IUT shall contain: • ACK flag set to 1
Step 5	**[LT]:** LT sends TCP ACK message to IUT containing: • Sequence number set to last sequence number used by LT: LT_lastUsedSeq • Acknowledgement number set to outside of the receive window of IUT (different to the last sequence number used by IUT: IUT_lastUsedSeq)	

	All other fields are set to their default values.	
Step 6	**[LT]:** Receive TCP segment from IUT	
Step 7	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • Sequence Number set to IUT_lastUsedSeq • Acknowledgement number set in correct relation to LT_lastUsedSeq • ACK flag set to 1	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • Sequence Number set to IUT_lastUsedSeq • Acknowledgement number set in correct relation to LT_lastUsedSeq • ACK flag set to 1
Step 8	**[TS]:** TS verifies that the connection with IUT is in CLOSE-WAIT state (Ref: section 3.4.3).	Connection with IUT remains at CLOSE-WAIT state.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.3.12 [ATS_TCP_00424] In CLOSING: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with Out-of-sequence and remain in same state

Test Objective	In CLOSING: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with Out-of-sequence and remain in same state		
ID	ATS_TCP_00424	AUTOSAR Releases	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	State	reviewed
Trace to Requirement	ATR: ATR_ATR_00125		

on Acceptance Test Document	
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20035
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-
Configuration Parameters	3.1.2 TCP Test Configuration-1
Summary	When the connection is in a synchronized state (ESTABLISHED, FIN-WAIT-1, FIN-WAIT-2, CLOSE-WAIT, CLOSING, LAST-ACK, TIME-WAIT), any unacceptable segment (out of window sequence number) must elicit IUT to send an empty acknowledgment segment containing the current send-sequence number and an acknowledgment indicating the next sequence number expected to be received from LT, and the connection remains in the same state
Needed Adaptation to other Releases	None
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>

Main Test Execution

Test Steps		Pass Criteria
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.	
Step 2	[UT]: UT causes the IUT to issue a <Close Socket> call	
Step 3	[LT]: Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to	The TCP segment from the IUT shall contain: • FIN flag set to 1

	<unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • FIN flag set to 1	
Step 5	**[LT]:** LT sends TCP FIN message to IUT with sequence number LT_lastUsedSeq.	
Step 6	**[LT]:** Receive TCP segment from IUT	
Step 7	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq
Step 8	**[LT]:** LT sends TCP ACK message to IUT containing: • Sequence number set to outside of the receive window of IUT (different to LT_lastUsedSeq) • Acknowledgement Number set to the last sequence number used by IUT (IUT_lastUsedSeq)	

Document ID 684 : AUTOSAR_ATS_CommunicationCan
- AUTOSAR confidential -

	All other fields are set to their default values.	
Step 9	**[LT]:** Receive TCP segment from IUT	

Step 10	**[LT]:**
	
	Verify that the received TCP segment from IUT contains:
	
	• Source Port field set to
	
	   <unusedTCP-IUT-Port1>
	
	• Source IP address field set to
	
	   <IUTIface-1-IPAddr>
	
	• Destination Port field set to
	
	   <unusedTCP-LT-Port1>
	
	• Destination IP address field set to
	
	   <Host-1-IP>
	
	• Sequence Number set to IUT_lastUsedSeq
	• Acknowledgement number set in correct relation to LT_lastUsedSeq
	• ACK flag set to 1
		The TCP segment from the IUT shall contain:
		
		• Sequence Number set to IUT_lastUsedSeq
		• Acknowledgement number set in correct relation to LT_lastUsedSeq
		• ACK flag set to 1

Step 11	**[TS]:** TS verifies that the connection with IUT is in CLOSING state (Ref: section 3.4.3).	Connection with IUT remains at CLOSING state.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.3.13 [ATS_TCP_00425] In CLOSING: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with an unacceptable ack. no. and remain in same state

Test Objective	In CLOSING: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with an unacceptable ack. no. and remain in same state		
ID	ATS_TCP_00425	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement	ATR: ATR_ATR_00125		

on Acceptance Test Document	
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20036
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1
Configuration Parameters	3.1.2 TCP Test Configuration-1
Summary	When the connection is in a synchronized state (ESTABLISHED, FIN-WAIT-1, FIN-WAIT-2, CLOSE-WAIT, CLOSING, LAST-ACK, TIME-WAIT), any unacceptable segment (e.g. with an unacceptable acknowledgement number) must elicit IUT to send an empty acknowledgment segment containing the current send-sequence number and an acknowledgment indicating the next sequence number expected to be received from LT, and the connection remains in the same state
Needed Adaptation to other Releases	None
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1

Main Test Execution

Test Steps		Pass Criteria
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.	
Step 2	[UT]: UT causes the IUT to issue a <Close Socket> call	
Step 3	[LT]: Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to	The TCP segment from the IUT shall contain: • FIN flag set to 1

	<unusedTCP-LT-Port1>\n\n• Destination IP address field set to\n\n<Host-1-IP>\n\nFIN flag set to	
Step 5	**[LT]:**\n\nLT sends TCP FIN message to IUT with sequence number LT_lastUsedSeq.	
Step 6	**[LT]:**\n\nReceive TCP segment from IUT	
Step 7	**[LT]:**\n\nVerify that the received TCP segment from IUT contains:\n\n• Source Port field set to\n\n<unusedTCP-IUT-Port1>\n\n• Source IP address field set to\n\n<IUTIface-1-IPAddr>\n\n• Destination Port field set to\n\n<unusedTCP-LT-Port1>\n\n• Destination IP address field set to\n\n<Host-1-IP>\n\n• ACK flag set to 1\n• Acknowledgement number set in correct relation to LT_lastUsedSeq	The TCP segment from the IUT shall contain:\n\n• ACK flag set to 1\n• Acknowledgement number set in correct relation to LT_lastUsedSeq
Step 8	**[LT]:**\n\nLT sends TCP ACK message to IUT containing:\n\n• Sequence number set to last sequence number used by LT: LT_lastUsedSeq\n• Acknowledgement number set to outside of the receive window of IUT (different to the last sequence number used by IUT:	

	IUT_lastUsedSeq) All other fields are set to their default values.	
Step 9	[LT]: Receive TCP segment from IUT	
Step 10	[LT]: Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • Sequence Number set to IUT_lastUsedSeq • A Acknowledgement number set in correct relation to LT_lastUsedSeq • ACK flag set to 1	The TCP segment from the IUT shall contain: • Sequence Number set to IUT_lastUsedSeq • Acknowledgement number set in correct relation to LT_lastUsedSeq • ACK flag set to 1
Step 11	[TS]: TS verifies that the connection with IUT is in CLOSING state (Ref: section 3.4.3)..	Connection with IUT remains at CLOSING state
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.3.14 [ATS_TCP_00426] In LAST-ACK: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with Out-of-sequence and remain in same state

Test Objective	In LAST-ACK: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with Out-of-sequence and remain in same state

ID	ATS_TCP_00426	AUTOSAR Releases	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20037		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	When the connection is in a synchronized state (ESTABLISHED, FIN-WAIT-1, FIN-WAIT-2, CLOSE-WAIT, CLOSING, LAST-ACK, TIME-WAIT), any unacceptable segment (out of window sequence number) must elicit IUT to send an empty acknowledgment segment containing the current send-sequence number and an acknowledgment indicating the next sequence number expected to be received from LT, and the connection remains in the same state		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		
Main Test Execution			
Test Steps		**Pass Criteria**	
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.		
Step 2	[LT]: LT sends TCP FIN message to IUT with sequence number LT_lastUsedSeq.		
Step 3	[LT]: Receive TCP segment from IUT		
Step 4	[LT]: Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq	

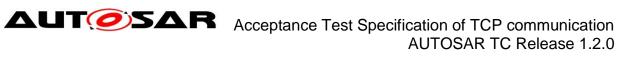|		<IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq	
Step 5	**[UT]:** UT causes the IUT to issue a <Close Socket> call	
Step 6	**[LT]:** Receive TCP segment from IUT	
Step 7	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • FIN flag set to 1	The TCP segment from the IUT shall contain: • FIN flag set to 1
Step 8	**[LT]:** LT sends TCP ACK message to IUT containing: • Sequence number set to outside of the receive window of IUT (different	

	to LT_lastUsedSeq) • Acknowledgement Number set to the last sequence number used by IUT (IUT_lastUsedSeq) All other fields are set to their default values.	
Step 9	**[LT]:** Receive TCP segment from IUT	
Step 10	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • Sequence Number set to IUT_lastUsedSeq • Acknowledgement number set in correct relation to LT_lastUsedSeq • ACK flag set to 1	The TCP segment from the IUT shall contain: • Sequence Number set to IUT_lastUsedSeq • Acknowledgement number set in correct relation to LT_lastUsedSeq • ACK flag set to 1
Step 11	**[TS]:** TS verifies that the connection with IUT reached to LAST-ACK state.	Connection with IUT remains at LAST-ACK state
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.3.15 [ATS_TCP_00427] In LAST-ACK: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with an unacceptable ack. no. and remain in same state

Test Objective	In LAST-ACK: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with an unacceptable ack. no. and remain in same state	
ID	ATS_TCP_00427	**AUTOSAR** 4.2.1|4.2.2

	Releases		
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20038		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	When the connection is in a synchronized state (ESTABLISHED, FIN-WAIT-1, FIN-WAIT-2, CLOSE-WAIT, CLOSING, LAST-ACK, TIME-WAIT), any unacceptable segment (e.g. with an unacceptable acknowledgement number) must elicit IUT to send an empty acknowledgment segment containing the current send-sequence number and an acknowledgment indicating the next sequence number expected to be received from LT, and the connection remains in the same state.		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		
Main Test Execution			
Test Steps		**Pass Criteria**	
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.		
Step 2	**[LT]:** LT sends TCP FIN message to IUT with sequence number LT_lastUsedSeq.		
Step 3	**[LT]:** Receive TCP segment from IUT		
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq	

	<IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq	
Step 5	[UT]: UT causes the IUT to issue a <Close Socket> call	
Step 6	**[LT]:** Receive TCP segment from IUT	
Step 7	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • FIN flag set to 1	The TCP segment from the IUT shall contain: • FIN flag set to 1
Step 8	**[LT]:** LT sends TCP ACK message to IUT containing:	

Document ID 684 : AUTOSAR_ATS_CommunicationCan

	• Sequence number set to last sequence number used by LT: LT_lastUsedSeq • Acknowledgement number set to outside of the receive window of IUT (different to the last sequence number used by IUT: IUT_lastUsedSeq) All other fields are set to their default values	
Step 9	**[LT]:** Receive TCP segment from IUT	
Step 10	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • Sequence Number set to IUT_lastUsedSeq • Acknowledgement number set in correct relation to LT_lastUsedSeq • ACK flag set to 1	The TCP segment from the IUT shall contain: • Sequence Number set to IUT_lastUsedSeq • Acknowledgement number set in correct relation to LT_lastUsedSeq • ACK flag set to 1
Step 11	[TS]: TS verifies that the connection with IUT reached to LAST-ACK state.	Connection with IUT remains at LAST-ACK state
Post-conditions	Close all active TCP connections created during this test case between TS and IUT	

3.3.16 [ATS_TCP_00428] In TIME-WAIT: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with Out-of-sequence and remain in same state

Test Objective	In TIME-WAIT: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with Out-of-sequence and remain in same state		
ID	ATS_TCP_00428	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20039		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	When the connection is in a synchronized state (ESTABLISHED, FIN-WAIT-1, FIN-WAIT-2, CLOSE-WAIT, CLOSING, LAST-ACK, TIME-WAIT), any unacceptable segment (out of window sequence number) must elicit IUT to send an empty acknowledgment segment containing the current send-sequence number and an acknowledgment indicating the next sequence number expected to be received from LT, and the connection remains in the same state		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		
Main Test Execution			
Test Steps		**Pass Criteria**	
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.		
Step 2	[UT]: UT causes the IUT to issue a <Close Socket> call		
Step 3	[LT]: Receive TCP segment from IUT		
Step 4	**[LT]:** Verify that the received TCP segment from	The TCP segment from the IUT shall contain:	

	IUT contains:	• FIN flag set to 1
	• Source Port field set to <unusedTCP-IUT-Port1>	
	• Source IP address field set to <IUTIface-1-IPAddr>	
	• Destination Port field set to <unusedTCP-LT-Port1>	
	• Destination IP address field set to <Host-1-IP>	
	• FIN flag set to 1	
Step 5	**[LT]:** LT sends TCP FIN message to IUT with sequence number LT_lastUsedSeq.	
Step 6	**[LT]:** Receive TCP segment from IUT	
Step 7	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq

Step 8	**[LT]:** LT sends TCP ACK message to IUT.	
Step 9	**[LT]:** LT sends TCP ACK message to IUT containing: • Sequence number set to outside of the receive window of IUT (different to LT_lastUsedSeq) • Acknowledgement Number set to the last sequence number used by IUT (IUT_lastUsedSeq) All other fields are set to their default values.	
Step 10	**[LT]:** Receive TCP segment from IUT	
Step 11	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • Sequence Number set to IUT_lastUsedSeq • Acknowledgement number set in correct relation to LT_lastUsedSeq • ACK flag set to 1	The TCP segment from the IUT shall contain: • Sequence Number set to IUT_lastUsedSeq • Acknowledgement number set in correct relation to LT_lastUsedSeq • ACK flag set to 1
Step 12	[TS]: TS verifies that the connection with IUT is in TIME-WAIT state (Ref: section 3.4.3).	Connection with IUT remains at TIME-WAIT state.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.3.17 [ATS_TCP_00429] In TIME-WAIT: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with an unacceptable ack. no. and remain in same state

Test Objective	In TIME-WAIT: IUT MUST return an ack. with proper SEQ and ACK No. after receiving a segment with an unacceptable ack. no. and remain in same state		
ID	ATS_TCP_00429	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20040		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	When the connection is in a synchronized state (ESTABLISHED, FIN-WAIT-1, FIN-WAIT-2, CLOSE-WAIT, CLOSING, LAST-ACK, TIME-WAIT), any unacceptable segment (e.g. with an unacceptable acknowledgement number) must elicit IUT to send an empty acknowledgment segment containing the current send-sequence number and an acknowledgment indicating the next sequence number expected to be received from LT, and the connection remains in the same state		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		
Main Test Execution			
Test Steps		**Pass Criteria**	
Step 1	[TS]: TS performs three-way handshaking to move IUT to ESTABLISHED state.		
Step 2	[UT]: UT causes the IUT to issue a <Close Socket> call		
Step 3	[LT]: Receive TCP segment from IUT		

Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • FIN flag set to 1	The TCP segment from the IUT shall contain: • FIN flag set to 1
Step 5	**[LT]:** LT sends TCP FIN message to IUT with sequence number LT_lastUsedSeq.	
Step 6	**[LT]:** Receive TCP segment from IUT	
Step 7	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • ACK flag set to 1 • Acknowledgement number set in	The TCP segment from the IUT shall contain: • ACK flag set to 1 • Acknowledgement number set in correct relation to LT_lastUsedSeq

	correct relation to LT_lastUsedSeq	
Step 8	**[LT]:** LT sends TCP ACK message to IUT	
Step 9	**[LT]:** LT sends TCP ACK message to IUT containing: • Sequence number set to last sequence number used by LT: LT_lastUsedSeq • Acknowledgement number set to outside of the receive window of IUT (different to the last sequence number used by IUT: IUT_lastUsedSeq) All other fields are set to their default values.	
Step 10	**[LT]:** Receive TCP segment from IUT	
Step 11	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • Sequence Number set to IUT_lastUsedSeq • Acknowledgement number set in correct relation to LT_lastUsedSeq • ACK flag set to 1	The TCP segment from the IUT shall contain: • Sequence Number set to IUT_lastUsedSeq • Acknowledgement number set in correct relation to LT_lastUsedSeq • ACK flag set to 1

Step 12	[TS]: TS verifies that the connection with IUT is in TIME-WAIT state (Ref: section 3.4.3).	Connection with IUT remains at TIME-WAIT state.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.3.18 [ATS_TCP_00430] In LISTEN state IUT must return a RST after receiving a segment with an unacceptable ACK and the connection remains in same state

Test Objective	In LISTEN state IUT must return a RST after receiving a segment with an unacceptable ACK and the connection remains in same state		
ID	ATS_TCP_00430	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20041		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	When the connection is in any non-synchronized state (LISTEN, SYN-SENT, SYN-RECEIVED), and the incoming TCP segment from LT acknowledges something not yet sent (i.e. the segment carries an unacceptable ACK) IUT must send a TCP message to LT having RST flag set to one		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		
Main Test Execution			
Test Steps		**Pass Criteria**	
Step 1	[UT]: UT causes the IUT to <Listen and Accept> at <unusedTCP-IUT-Port1>		
Step 2	**[LT]:** LT sends TCP ACK message to IUT containing:		

	• Acknowledgement number set to zero. • Sequence number set to a value outside the receive window of the IUT. All other fields are set to their default values	
Step 3	**[LT]:** Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • RST flag set to 1	The TCP segment from the IUT shall contain: • RST flag set to 1
Step 5	**[TS]:** TS verifies that connection with IUT is in LISTEN state (Ref: section 3.4.3).	Connection with IUT remains at LISTEN state
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.3.19 [ATS_TCP_00431] In SYN-SENT state IUT must return a RST after receiving a segment with an unacceptable ACK and the connection remains in same state

Test Objective	In SYN-SENT state IUT must return a RST after receiving a segment with an unacceptable ACK and the connection remains in same state		
ID	ATS_TCP_00431	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed

Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125	
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20042	
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1	
Configuration Parameters	3.1.2 TCP Test Configuration-1	
Summary	When the connection is in any non-synchronized state (LISTEN, SYN-SENT, SYN-RECEIVED), and the incoming TCP segment from LT acknowledges something not yet sent (i.e. the segment carries an unacceptable ACK) IUT must send a TCP message to LT having RST flag set to one.	
Needed Adaptation to other Releases	None	
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1	
Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[UT]: UT causes the IUT to issue a <Connect> call destined to <unusedTCP-LT-Port1> and <Host-1-IP>	
Step 2	**[LT]:** Receive TCP segment from IUT	
Step 3	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to	The TCP segment from the IUT shall contain: • SYN flag set to 1

	<Host-1-IP> • SYN flag set to 1	
Step 4	**[LT]:** LT sends TCP ACK message to IUT containing: • Acknowledgement number set to zero. • Sequence number set to a value outside the receive window of the IUT. All other fields are set to their default values	
Step 5	**[LT]:** Receive TCP segment from IUT	
Step 6	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • RST flag set to 1	The TCP segment from the IUT shall contain: • RST flag set to 1
Step 7	[TS]: TS verifies that the connection with IUT is in SYN-SENT state (Ref: section 3.4.3)	Connection with IUT remains at SYN-SENT state.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.3.20 [ATS_TCP_00432] In SYN-RECEIVED state IUT must return a RST after receiving a segment with an unacceptable ACK and the connection remains in same state

Test Objective	In SYN-RECEIVED state IUT must return a RST after receiving a segment with an unacceptable ACK and the connection remains in same state		
ID	ATS_TCP_00432	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00061 ATS_SID: SWS_SID_20043		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	When the connection is in any non-synchronized state (LISTEN, SYN-SENT, SYN-RECEIVED), and the incoming TCP segment from LT acknowledges something not yet sent (i.e. the segment carries an unacceptable ACK) IUT must send a TCP message to LT having RST flag set to one		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		
Main Test Execution			
Test Steps		**Pass Criteria**	
Step 1	[UT]: UT causes the IUT to <Listen and Accept> at <unusedTCP-IUT-Port1>		
Step 2	**[LT]:** LT sends TCP SYN message to IUT with sequence number LT_lastUsedSeq.		
Step 3	**[LT]:** Receive TCP segment from IUT		
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to	The TCP segment from the IUT shall contain: • SYN flag set to 1 • ACK flag set to 1 • All other flags set to zero. • Acknowledgement number

Document ID 684 : AUTOSAR_ATS_CommunicationCan

		<unusedTCP-IUT-Port1>	set to LT_lastUsedSeq
		• Source IP address field set to <IUTIface-1-IPAddr>	
		• Destination Port field set to <unusedTCP-LT-Port1>	
		• Destination IP address field set to <Host-1-IP>	
		• SYN flag set to 1 • ACK flag set to 1 • All other flags set to zero. • Acknowledgement number set to LT_lastUsedSeq	
Step 5	**[LT]:** LT sends TCP ACK message to IUT containing: • Acknowledgement number set to a value that is not the sequence number of the last received SYN/ACK message. • Sequence number set to a value that is not the sequence number of the last received SYN/ACK message. All other fields are set to their default values.	
Step 6	**[LT]:** Receive TCP segment from IUT	
Step 7	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to	The TCP segment from the IUT shall contain: • RST flag set to 1

	<unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • RST flag set to 1	
Step 8	[TS]: TS verifies that the connection with IUT is in SYN-RECEIVED state (Ref: section 3.4.3)..	Connection with IUT remains at SYN-RECEIVED state.
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.3.21 [ATS_TCP_00433] In LISTEN state IUT MUST send a RST after receiving a spurious SYN-ACK that potentially corresponds to an old SYN

Test Objective	In LISTEN state IUT MUST send a RST after receiving a spurious SYN-ACK that potentially corresponds to an old SYN		
ID	ATS_TCP_00433	AUTOSAR Releases	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00104 ATS_SID: SWS_SID_20044		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	TS triggers the IUT to create and listen on a passive socket at a specified port by sending the service-primitive <Create And Bind> and service-primitive <Listen And Accept> respectively to the IUT via the UT. LT sends a TCP message to IUT containing both SYN and ACK flag set to one. IUT must respond back with a corresponding TCP message having RST flag set to one.		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS. 2. UT uses service primitive <Create And Bind> to create a TCP socket at IUT and bind it to port <unusedTCP-IUT-Port1>		
Main Test Execution			
Test Steps		Pass Criteria	

Step 1	[UT]: UT causes the IUT to <Listen and Accept> at <unusedTCP-IUT-Port1>	
Step 2	**[LT]:** LT sends TCP SYN-ACK message to IUT containing: • Sequence number set to <Initial-Seq-num> • Acknowledgement number set to a random number between 1 and 2^32-1 All other fields are set to their default values	
Step 3	**[LT]:** Receive TCP segment from IUT	
Step 4	**[LT]:** Verify that the received TCP segment from IUT contains: • Source Port field set to <unusedTCP-IUT-Port1> • Source IP address field set to <IUTIface-1-IPAddr> • Destination Port field set to <unusedTCP-LT-Port1> • Destination IP address field set to <Host-1-IP> • RST flag set to 1	The TCP segment from the IUT shall contain: • RST flag set to 1
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.	

3.4 Testing error conditions

3.4.1 [ATS_TCP_00434] In CLOSED state, IUT MUST ignore a RST control message

Test Objective	In CLOSED state, IUT MUST ignore a RST control message		
ID	ATS_TCP_00434	AUTOSAR Releases	4.2.1|4.2.2
Affected Modules	TcpIP, EthIf, Eth	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00125		
Trace to SWS Item	TcpIp: SWS_TCPIP_00104 ATS_SID: SWS_SID_20045		
Requirements / Reference to Test Environment	3.2 Service Primitives 3.5.1 TCP Topology-1		
Configuration Parameters	3.1.2 TCP Test Configuration-1		
Summary	IUT is in CLOSED state. LT sends a TCP message to IUT containing RST flag set to one. IUT must not respond back		
Needed Adaptation to other Releases	None		
Pre-conditions	1. IUT is in CLOSED state and no active TCP connection is made with TS.		
Main Test Execution			
Test Steps		**Pass Criteria**	
Step 1	**[LT]:** LT sends TCP RST message to IUT.	No TCP segment comes from IUT containing: • ACK flag set to 1 • Acknowledgement number matches with LT's data-frame's sequence number.	
Post-conditions	Close all active TCP connections created during this test case between TS and IUT.		

4   Appendix – A :: Traceability Matrix

The AUTOSAR SWS for TCP/IP contain some requirements which are not granular enough for testing. There are few requirements which references to some IETF RFC (or sections of IETF RFCs) where multiple test cases need to be derived.

In other ATS documents, the test cases reference to the specific items from AUTOSAR SWS documents, but for the Ethernet related scenario this would blow up into many test cases referencing the same AUTOSAR specification item (i.e. "Trace to SWS Item").

For this purpose, this ATS document proposes an identification of specification statement from the IETF RFCs so that they can be referenced in the test cases.

Below mentioned table gives a consolidated picture about each test cases, their origination point (i.e. reference at relevant RFC's section, page etc), their purpose and it also provides a 'classifier' that depicts the importance of the feature. All the testable statements that falls under mandatory category with respect to the reference RFC sections has been taken in here.

Below table is organized with the following columns

1. Statement ID
    o   Is a unique identifier.
    o   For example: ATS_SID_20000, ATS_SID_20001
2. Related AUTOSAR specification item
    o   Single AUTOSAR SWS requirement which requires the statement
3. Reference in IETF RFC
    o   provides the location of the statement
    o   It is constructed with a comma separated list of:
        ▪   IETF RFC number,
        ▪   Page number,
        ▪   section number (if exists)
        ▪   section name,
    o   For example: RFC 1122, Page 77, Section 4.1.3.1, 'Ports'.
4. Content
    o   The statement copy pasted from corresponding IETF RFC or from AUTOSAR SWS document. The test method is derived to verify this 'statement'.
5. Classifier
    o   It is used to signify the requirement category in the specification. There are five different types of classifiers:
        ▪   MUST: This classifier means that the relevant statement is an absolute requirement of the specification. Usually corresponding statements consists words like "must", "shall", "required".

        ▪   MUST NOT: This classifier means that the relevant statement is an absolute prohibition of the specification. Usually corresponding statements consists words like "must not", "shall not".

        ▪   SHOULD: This classifier means that for the relevant statement 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. Usually corresponding statements consists words like "should", "would", "recommended", "suggested".

- SHOULD NOT: This classifier means that for the relevant statement there may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications must be understood and carefully weighed before choosing a different course. Usually corresponding statements consists words like "should not", "not recommended".

- MAY: This classifier signifies 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.). Usually corresponding statements consists words like "may", "optional".

Sl. No.	Statement ID	AUTOSAR SWS #	Reference in IETF RFC	Content	Classifier
1	ATS_SID_20001	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	IUT MUST send a SYN-ACK in response to a SYN in LISTEN state	MUST
2	ATS_SID_20002	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	IUT MUST move on to ESTABLISHED state after receiving ACK in SYN-RECEIVED state	MUST
3	ATS_SID_20003	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	IUT MUST send an ACK in response to a FIN received in ESTABLISHED state	MUST
4	ATS_SID_20004	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	In CLOSED state, IUT MUST send a SYN on an active OPEN call	MUST
5	ATS_SID_20005	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	IUT MUST send a FIN on a CLOSE call in ESTABLISHED state	MUST
6	ATS_SID_20006	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	IUT MUST send a FIN on a CLOSE call in SYN-RECEIVED state	MUST
7	ATS_SID_20007	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	IUT MUST send a FIN on a CLOSE call in CLOSE-WAIT state	MUST
8	ATS_SID_20008	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	IUT MUST send an ACK after receiving a FIN in FIN-WAIT-1 state	MUST
9	ATS_SID_20009	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	IUT MUST send an ACK after receiving a FIN in FIN-WAIT-2 state	MUST
10	ATS_SID_20010	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	IUT MUST move on to CLOSED state from TIME-WAIT state after a timeout of 2*MSL where TIME-WAIT is reached through FINWAIT-2 state	MUST

11	ATS_SID_20011	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	IUT MUST NOT move on to CLOSED state from TIME-WAIT state before a timeout of 2*MSL where TIME-WAIT is reached through FINWAIT-2 state	MUST
12	ATS_SID_20012	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	IUT MUST move on to CLOSED state from TIME-WAIT state after a timeout of 2*MSL where TIME-WAIT is reached through CLOSING state	MUST
13	ATS_SID_20013	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	IUT MUST NOT move on to CLOSED state from TIME-WAIT state before a timeout of 2*MSL where TIME-WAIT is reached through CLOSING state	MUST
14	ATS_SID_20014	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	IUT MUST ignore a data segment in SYN-SENT state	MUST
15	ATS_SID_20015	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	IUT MUST ignore a data segment in CLOSE-WAIT state	MUST
16	ATS_SID_20016	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	IUT MUST ignore a data segment in CLOSING state	MUST
17	ATS_SID_20017	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	IUT MUST ignore a data segment in LAST-ACK state	MUST
18	ATS_SID_20018	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	IUT MUST ignore a data segment in TIME-WAIT state	MUST
19	ATS_SID_20019	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	IUT MAY send an ACK after receiving a data segment in FIN-WAIT-1 state	MAY
20	ATS_SID_20020	SWS_TCPIP_00061	RFC 793, Section3.2 , 'Terminology', page 23	IUT MAY send an ACK after receiving a data segment in FIN-WAIT-2 state	MAY
21	ATS_SID_20021	SWS_TCPIP_00104	1) RFC 1122 section4.2.2.7, 'TCP Checksum', page 86 2) TCP Checksum: RFC 793, Section 3.1, 'Header Format', Page 16	IUT MUST check the checksum in any incoming segment, and MUST acknowledge in case of no error	MUST
22	ATS_SID_20022	SWS_TCPIP_00104	1) RFC 1122 section4.2.2.7, 'TCP Checksum', page 86 2) TCP Checksum: RFC 793, Section 3.1, 'Header Format', Page 16	IUT MUST check the checksum in any incoming segment, and MUST NOT acknowledge in case of erroneous checksum.	MUST

Document ID 684 : AUTOSAR_ATS_CommunicationCan

23	ATS_SID_20023	SWS_TCPIP_00104	1) RFC 1122 section4.2.2.7, 'TCP Checksum', page 86 2) TCP Checksum: RFC 793, Section 3.1, 'Header Format', Page 16	IUT MUST generate checksum while sending TCP segments.	MUST
24	ATS_SID_20024	SWS_TCPIP_00104	RFC 793, section3.4, 'Establishing a connection', page 33	IUT MUST return to LISTEN state, on receiving an acceptable RST, in SYN-RCVD state	MUST
25	ATS_SID_20025	SWS_TCPIP_00104	RFC 793, section3.4, 'Establishing a connection', page 33	IUT MUST NOT change state, on receiving an unacceptable RST in SYN-RCVD state	MUST
26	ATS_SID_20026	SWS_TCPIP_00104	RFC 793, section3.4, 'Establishing a connection', page 35	IUT MUST send a RST after receiving an unacceptable ACK in SYN-RCVD state	MUST
27	ATS_SID_20027	SWS_TCPIP_00061	RFC 793, section3.4, 'Establishing a connection', page 37	In ESTABLISHED state IUT MUST return an acknowledgement with proper SEQ and ACK numbers after receiving a segment with Out-of-sequence and remain in same state	MUST
28	ATS_SID_20028	SWS_TCPIP_00061	RFC 793, section3.4, 'Establishing a connection', page 37	In ESTABLISHED state IUT MUST return an acknowledgement with proper SEQ and ACK numbers after receiving a segment with an unacceptable acknowledgment number and remain in same state	MUST
29	ATS_SID_20029	SWS_TCPIP_00061	RFC 793, section3.4, 'Establishing a connection', page 37	In FIN-WAIT-1 state IUT MUST return an acknowledgement with proper SEQ and ACK numbers after receiving a segment with Out-of-sequence and remain in same state	MUST
30	ATS_SID_20030	SWS_TCPIP_00061	RFC 793, section3.4, 'Establishing a connection', page 37	In FIN-WAIT-1 state IUT MUST return an acknowledgement with proper SEQ and ACK numbers after receiving a segment with an unacceptable acknowledgement number and remain in same state	MUST
31	ATS_SID_20031	SWS_TCPIP_00061	RFC 793, section3.4, 'Establishing a connection', page 37	In FIN-WAIT-2 state IUT MUST return an acknowledgement with proper SEQ and ACK numbers after receiving a segment with Out-of-sequence and remain in same state	MUST

32	ATS_SID_20032	SWS_TCPIP_00061	RFC 793, section3.4, 'Establishing a connection', page 37	In FIN-WAIT-2 state IUT MUST return an acknowledgement with proper SEQ and ACK numbers after receiving a segment with an unacceptable acknowledgement number and remain in same state	MUST
33	ATS_SID_20033	SWS_TCPIP_00061	RFC 793, section3.4, 'Establishing a connection', page 37	In CLOSE-WAIT state IUT MUST return an acknowledgement with proper SEQ and ACK numbers after receiving a segment with Out-of-sequence and remain in same state	MUST
34	ATS_SID_20034	SWS_TCPIP_00061	RFC 793, section3.4, 'Establishing a connection', page 37	In CLOSE-WAIT state IUT MUST return an acknowledgement with proper SEQ and ACK numbers after receiving a segment with an unacceptable acknowledgement number and remain in same state	MUST
35	ATS_SID_20035	SWS_TCPIP_00061	RFC 793, section3.4, 'Establishing a connection', page 37	In CLOSING state IUT MUST return an acknowledgement with proper SEQ and ACK numbers after receiving a segment with Out-of-sequence and remain in same state	MUST
36	ATS_SID_20036	SWS_TCPIP_00061	RFC 793, section3.4, 'Establishing a connection', page 37	In CLOSING state IUT MUST return an acknowledgement with proper SEQ and ACK numbers after receiving a segment with an unacceptable acknowledgement number and remain in same state	MUST
37	ATS_SID_20037	SWS_TCPIP_00061	RFC 793, section3.4, 'Establishing a connection', page 37	In LAST-ACK state IUT MUST return an acknowledgement with proper SEQ and ACK numbers after receiving a segment with Out-of-sequence and remain in same state	MUST
38	ATS_SID_20038	SWS_TCPIP_00061	RFC 793, section3.4, 'Establishing a connection', page 37	In LAST-ACK state IUT MUST return an acknowledgement with proper SEQ and ACK numbers after receiving a segment with an unacceptable acknowledgement number and remain in same state	MUST
39	ATS_SID_20039	SWS_TCPIP_00061	RFC 793, section3.4, 'Establishing a connection', page 37	In TIME-WAIT state IUT MUST return an acknowledgement with proper SEQ and ACK numbers after receiving a segment with Out-of-sequence and remain in	MUST

				same state	
40	ATS_SID_20040	SWS_TCPIP_00061	RFC 793, section3.4, 'Establishing a connection', page 37	In TIME-WAIT state IUT MUST return an acknowledgement with proper SEQ and ACK numbers after receiving a segment with an unacceptable acknowledgement number and remain in same state	MUST
41	ATS_SID_20041	SWS_TCPIP_00061	RFC 793, section3.9, 'Event Processing', page 65	In LISTEN state IUT must return a RST after receiving a segment with an unacceptable ACK and the connection remains in same state	MUST
42	ATS_SID_20042	SWS_TCPIP_00061	RFC 793, section3.4, 'Establishing a connection', page 36	In SYN-SENT state IUT must return a RST after receiving a segment with an unacceptable ACK and the connection remains in same state	MUST
43	ATS_SID_20043	SWS_TCPIP_00061	RFC 793, section3.4, 'Establishing a connection', page 36	In SYN-RECEIVED state IUT must return a RST after receiving a segment with an unacceptable ACK and the connection remains in same state	MUST
44	ATS_SID_20044	SWS_TCPIP_00104	RFC 793, section3.4, 'Establishing a connection', page 35	In LISTEN state IUT MUST send a RST after receiving a spurious SYN-ACK that potentially corresponds to an old SYN.	MUST
45	ATS_SID_20045	SWS_TCPIP_00104	RFC 793, section3.9, 'Event Processing', page 65	In CLOSED state, IUT MUST ignore a RST control message	MUST

Table 4: Traceability matrix