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Table of Contents

1	Acronyms and abbreviations	4
2	Scope	5
3	RS_BRF_01592 - Data Transfer	6
3.1	General Test Objective and Approach	6
3.1.1	Test System	7
3.1.1.1	Overview on Architecture	7
3.1.1.2	Specific Requirements.....	7
3.1.1.3	Test Coordination Requirements	7
3.1.2	Test Configuration.....	7
3.1.2.1	Required ECU Extract of System Description Files	8
3.1.2.2	Required ECU Configuration Description Files.....	9
3.1.2.3	Required Software Component Description Files	9
3.1.2.4	Mandatory vs. Customizable Parts	10
3.1.3	Test Case Design.....	10
3.2	Re-usable Test Steps.....	10
3.3	Test Cases	11
3.3.1	[ATS_COMLIN_00201] Signal on Tx requested by underlying bus - unconditional Frame (NONE)	11
3.3.2	[ATS_COMLIN_00215] Signal Group on Tx requested by underlying bus - unconditional Frame (NONE)	12
3.3.3	[ATS_COMLIN_00216] Signal on Tx Time Base frame - sporadic frame (PERIODIC).....	14
3.3.4	[ATS_COMLIN_00217] Signal Group on Tx Time Base frame - sporadic frame (PERIODIC).....	16
3.3.5	[ATS_COMLIN_00218] Signal on user request frame - sporadic frame (DIRECT).....	17
3.3.6	[ATS_COMLIN_00219] Signal Group on user request frame - sporadic frame (DIRECT)	19
4	RS_BRF_01648 - Large Data Type	22
4.1	General Test Objective and Approach	22
4.1.1	Test System	23
4.1.1.1	Overview on Architecture	23
4.1.1.2	Specific Requirements.....	23
4.1.1.3	Test Coordination Requirements	23
4.1.2	Test Configuration.....	23
4.1.2.1	Required ECU Extract of System Description Files	24
4.1.2.2	Required ECU Configuration Description Files.....	25
4.1.2.3	Required Software Component Description Files	25
4.1.2.4	Mandatory vs. Customizable Parts	25
4.1.3	Test Case Design.....	26
4.2	Re-usable Test Steps.....	26
4.3	Test Cases	26
4.3.1	[ATS_COMLIN_00241] Large Data TP transmission on LIN (≥ 7 bytes)	26
4.3.2	[ATS_COMLIN_00277] Large Data TP reception on LIN (≥ 7 bytes)	27

1 Acronyms and abbreviations

Abbreviation / Acronym:	Description:
AT	Acceptance Test
ECU	Electronic Control Unit
LIN	Local Interconnect Network
LT	Lower Tester
PCO	Point of Control and Observation
PDU	Protocol Data Unit
Rx	Reception
SUT	System Under Test
SWC	Software Component
TCP	Test Coordination Procedures
Tx	Transmission
UT	Upper Tester

2 Scope

The following test cases are used to verify the correct behavior of all the communication features which are dependent on the LIN bus.

Each test case documents for which releases of the AUTOSAR software specification it can be used:

- When test cases are known to be applicable for a release, this is mentioned in the “AUTOSAR Releases” field of the test case specifications. You can find a summary of the applicability of all test cases to the software specification releases in the “AUTOSAR_TR_ATSReleaseApplicability” document.
- When test cases are known to require adaptations (in their configuration requirements or test sequences), this is mentioned in the “Needed Adaptation to other Releases” field of the test case specifications.

3 RS_BRF_01592 - Data Transfer

3.1 General Test Objective and Approach

This Test Specification intends to cover the Data Transfer feature of the Com as described in the AUTOSAR Feature [RS_BRF_01592].

The tests use a test bench environment and Embedded Software Components that use the feature.

This test case document has been established to cover the following features:

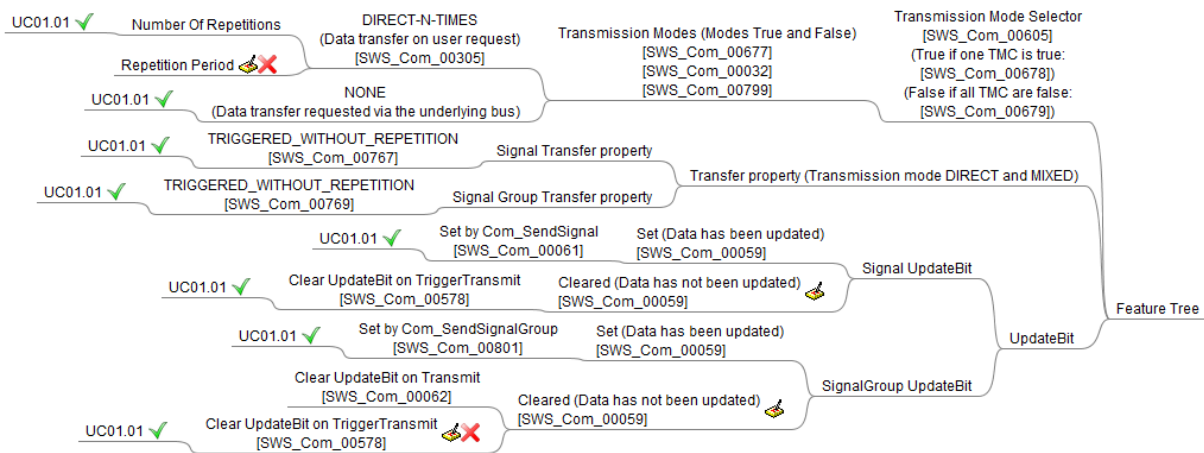


Figure 1 Mindmap of the features covered and not covered in the test cases

* The covered use cases are marked with a green check mark.

This specification gives the description of required tests environments (test bench, uses case, arxml files) and detailed tests cases for executing tests.

3.1.1 Test System

3.1.1.1 Overview on Architecture

In order to cover the required features / sub-features coverage, the environment has been separated in several uses case.

3.1.1.1.1 Use case 01.01: LIN Bus

For this use case, the aim is to test the data transfer on LIN bus:

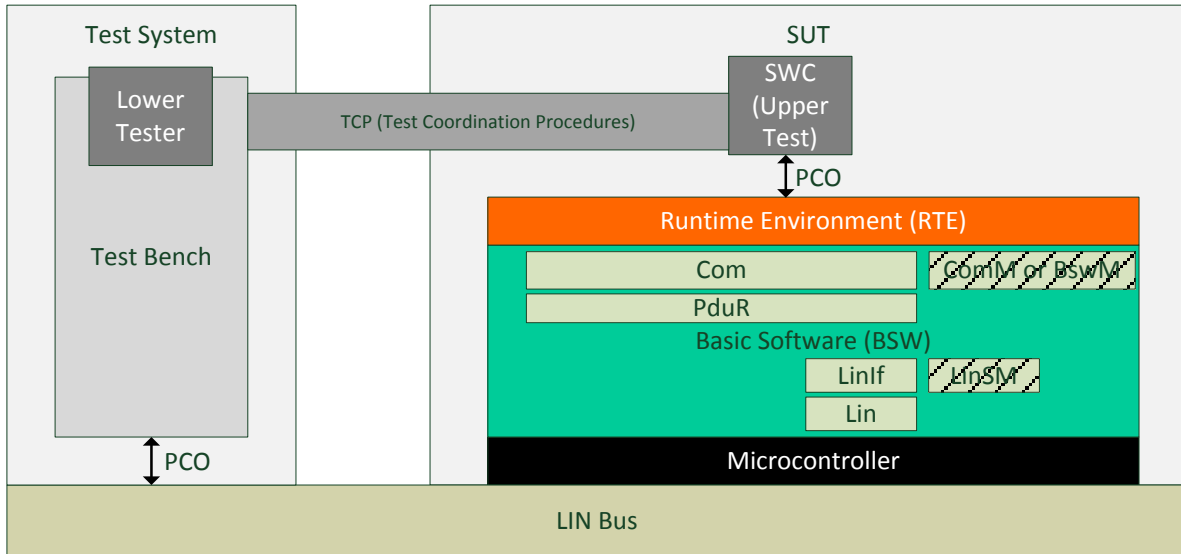


Figure 2 Acceptance test architecture required for the test cases

The test system architecture consists of Test Bench that executes only test sequencer and gives actions request through Test coordination Procedures to embedded SWC.

3.1.1.2 Specific Requirements

Not Applicable.

3.1.1.3 Test Coordination Requirements

Not Applicable.

3.1.2 Test 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 suites is implemented.

3.1.2.1 Required ECU Extract of System Description Files

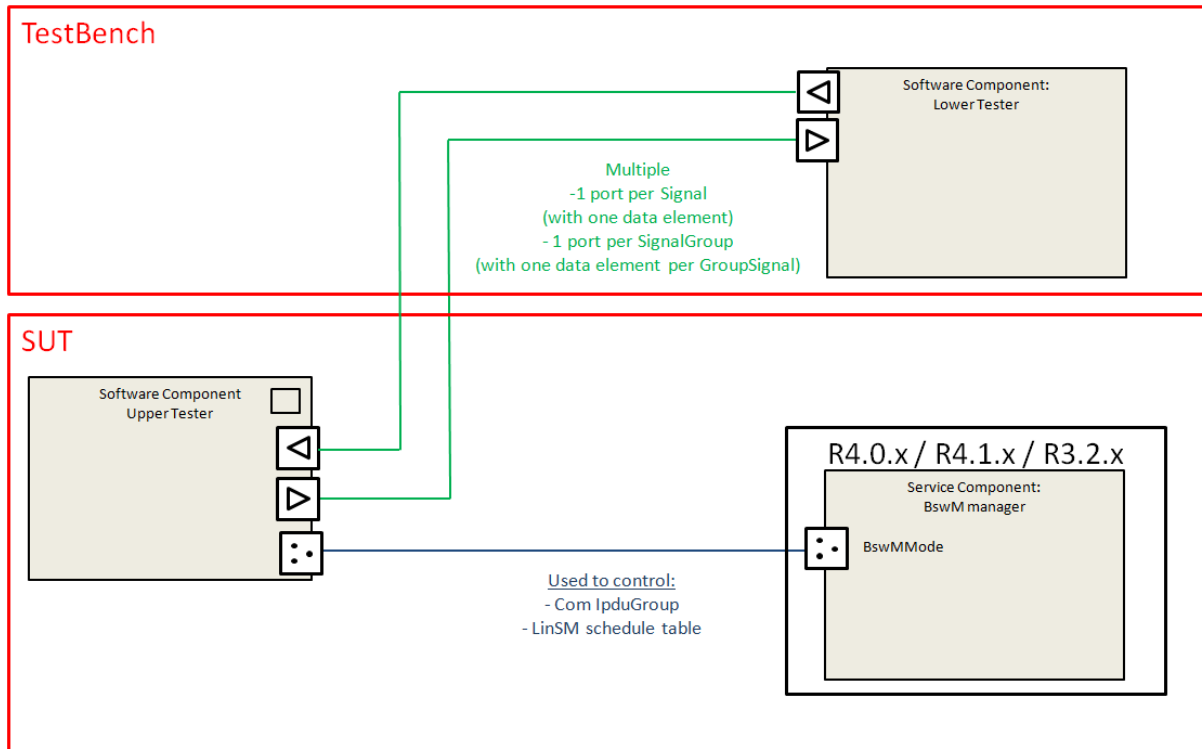


Figure 3 Required SWC description

A Mode-Switch Interface IF_AT_SwC_ActionsBswM must be created. The SWC Upper Tester is the owner of this state machine and BswM read the state through BswMMode Port. BswM shall launch actions according to following table (check 3.3 Test Cases for details):

ModeDeclaration	BswM Actions
IPDU_ACTIVATED	OnEntry: -Start IpduGroup
IPDU_DEACTIVATED	OnEntry: -Stop IpduGroup
IPDU_OFF_ON	OnEntry: -Stop IpduGroup -Re-start IpduGroup
LIN_START_SCHEDULE	OnEntry: -Start LIN Schedule Table
IPDU_ACTIVATED_LIN_START_SCHEDULE	OnEntry: -Start IpduGroup -Start LIN Schedule Table

For the Software Component point of view, for each test case, the communication interfaces are defined as follow:

Port name	Data element type	Data element	Mapping	Type
<TestCaseName>_<signalname>	Uint8	<signalname>	<Signalname>	Signal
<TestCaseName>_<signalgroupname>	Struct { Uint8: groupsignal1; ... Uint8: groupsignalx; }	Groupsignal	Groupsignal1-> <signal1name> Groupsignal2-> <signal2name> <PortName>-> <signalgroupname>	Signal Group

Therefore ports and signals names are changed according to Test Case number, but the building rule is the same.

Unless a different configuration is specified in test case, Sender/Receiver Ports uses for communication “Non queued Data Element” and “Explicit Data access” for associated runnables.

3.1.2.1.1 Use Case UC01.01: LIN Bus

The communication database is depicted below:

IPduGroup	IPdu	SignalGroup	Signal	Tx ECU	Rx ECU
AT_201_IpduGroup	AT_201_Ipdu		AT_201_Sg1	SUT	TestBench
AT_215_IpduGroup	AT_215_Ipdu	AT_215_SgGr1	AT_215_GrSg1 AT_215_GrSg2	SUT	TestBench
AT_216_IpduGroup	AT_216_Ipdu		AT_216_Sg1 AT_216_Sg2	SUT	TestBench
AT_217_IpduGroup	AT_217_Ipdu	AT_217_SgGr1	AT_217_GrSg1 AT_217_GrSg2	SUT	TestBench
AT_218_IpduGroup	AT_218_Ipdu		AT_218_Sg1	SUT	TestBench
AT_219_IpduGroup	AT_219_Ipdu	AT_219_SgGr1	AT_219_GrSg1 AT_219_GrSg2	SUT	TestBench

3.1.2.2 Required ECU Configuration Description Files

The section describes the common EcuC parameters between test cases that are required by the implementer of the test cases.

No specific configuration requirements for ECU Configuration files as they can be derived from EcuExtract

3.1.2.3 Required Software Component Description Files

The section describes the SWC-D that are required by the implementer of the test cases.

Refer to Figure 3.

3.1.2.4 Mandatory vs. Customizable Parts

Mandatory parameters are listed in Tests Cases (see 3.3 Test Cases).

Customizable parameters are (these values are test case independent):

- ComSignalType (ISignal.networkRepresentationProps.swBaseType), ComSignalLength (baseTypeSize) and ComBitSize (ISignal.length) → must be consistent to associated dataElement
- ComSignalInitValue (ISignal.initValue)
- PduLength (Pdu.length)
- ComBitPosition (ISignalToIPduMapping.startPosition) and ComUpdateBitPosition (ISignalToIPduMapping.updateIndicationBitPosition) values → the location of these elements in the PDU
- LIN frames identifiers

3.1.3 Test Case Design

Not Applicable.

3.2 Re-usable Test Steps

Not Applicable.

3.3 Test Cases

3.3.1 [ATS_COMLIN_00201] Signal on Tx requested by underlying bus - unconditional Frame (NONE)

Test Objective	Signal on Tx requested by underlying bus - unconditional Frame (NONE)		
ID	ATS_COMLIN_00201	AUTOSAR Releases	3.2.1 3.2.2 4.0.3 4.1.1
Affected Modules	Com, PduR, LinIf, Lin, LinSM	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00117		
Trace to R4.1.1 Item	COM: SWS_Com_00059 COM: SWS_Com_00061 COM: SWS_Com_00135 COM: SWS_Com_00578		
Requirements / Reference to Test Environment	Use Case UC01.01		
Configuration Parameters	<p>ComIpdu(SignalIPdu): AT_201_Ipdu1(Mapped on LIN Frame=>LinTopology) - ComIPduDirection(CommConnectorPort.communicationDirection) = SEND - ComTxModeTrue (IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming) -- NONE(no timing assigned) - No transmissionAcknowledge for signals contained in this Pdu - ComTxIPduClearUpdateBit = TriggerTransmit</p> <p>ComSignal(ISignalToPduMapping): Sg1 - updateIndicationBitPosition is configured - ComSignalInitValue(ISignal.initValue) = Sg1_Value_Init != Sg1_Value_1</p> <p>LinIfFrame(LinFrameTriggering) (Tx UNCONDITIONAL Frame => Periodic frame on Lin Bus) - LinIfFrameType = UNCONDITIONAL(frame = LinUnconditionalFrame) -- LinIfPduDirection = LinIfTxPdu(FramePort.CommConnectorPort.communicationDirection)</p> <p>LinIfScheduleTable(LinScheduleTable) (slot only set once in RUN_CONTINUOUS Schedule Table) - runMode = RUN_CONTINUOUS - Only 1 LinIfEntry(tableEntry) linked to previously configured FrameTriggering</p>		
Summary	<p>Aim: - Check that sent signal is taken into account in Periodic UNCONDITIONAL Tx LIN frame.</p> <p>Sequence: 1) Action: Start Ipdu Group - Result: Ipdu is not sent (Tx Mode NONE) 2) Action: Start LIN Schedule Table - Result: Ipdu is sent out on associated slot execution (Tx Mode NONE [SWS_Com_00135]) - Result: Signal value is initial value (Value_Init)</p>		

	<p>- Result: Signal update bit is 0 3) Action: Update signal with Value_1 - Result: Periodic Time is not changed (Ipdu is always sent out on associated slot execution) - Result: UpdateBit is set to 1, only in the first send after step 3. After that, it is 0. [SWS_Com_00059][SWS_Com_00061][SWS_Com_00578] - Result: Signal value is changed to Value_1 for all new occurrences of the Tx frame</p>	
Needed Adaptation to other Releases	None	
Pre-conditions	Com stack is initialized, but ipdu groups are not running Lin schedule table not started	
Main Test Execution		
Test Steps		Pass Criteria
Step 1	<p>SWC: Request ModeSwitch (call Rte_Switch associated to BswMMode port) to IPDU_ACTIVATED (Start Ipdu Group AT_201_IpduGroup)</p>	<p>BUS: AT_201_Ipdu is not sent (Tx Mode NONE)</p>
Step 2	<p>SWC: Request ModeSwitch (call Rte_Switch associated to BswMMode port) to LIN_START_SCHEDULE (Start LIN Schedule Table)</p>	<p>BUS: AT_201_Ipdu is sent out on associated slot execution (Tx Mode NONE) AT_201_Sg1 update bit is 0 AT_201_Sg1 value is initial value (AT_201_Sg1_Value_Init)</p>
Step 3	<p>SWC: Send signal AT_201_Sg1 with AT_201_Sg1_Value_1 (call Rte_Write() for AT_201_Sg1 Port)</p>	<p>BUS: AT_201 Periodic Time is not changed AT_201_Sg1 UpdateBit is set to 1 in the first send, after that, it is 0 AT_201_Sg1 value is now AT_201_Sg1_Value_1</p>
Post-conditions	Not Applicable	

3.3.2 [ATS_COMLIN_00215] Signal Group on Tx requested by underlying bus - unconditional Frame (NONE)

Test Objective	Signal Group on Tx requested by underlying bus - unconditional Frame (NONE)		
ID	ATS_COMLIN_00215	AUTOSAR Releases	3.2.1 3.2.2 4.0.3 4.1.1
Affected Modules	Com, PduR, LinIf, Lin, LinSM	State	reviewed
Trace to Requirement on Acceptance	ATR: ATR_ATR_00117		

Test Document	
Trace to R4.1.1 Item	COM: SWS_Com_00059 COM: SWS_Com_00135 COM: SWS_Com_00578 COM: SWS_Com_00801
Requirements / Reference to Test Environment	Use Case UC01.01
Configuration Parameters	<p>ComIPdu(SignalIPdu):AT_215_Ipdu1(Mapped on LIN Frame=>LinTopology) - ComIPduDirection(CommConnectorPort.communicationDirection)=SEND - ComTxModeTrue (IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming) -- NONE (no timing assigned) - ComTxIPduClearUpdateBit = TriggerTransmit</p> <p>ComSignalGroup(ISignalToPduMapping):SgGr1 - updateIndicationBitPosition is configured - ComGroupSignal(ISignalToPduMapping):GrSg1/GrSg2 -- GrSg1: ComSignalInitValue(ISignal.initValue) = GrSg1_Value_Init != GrSg1_Value_1 -- GrSg2: ComSignalInitValue(ISignal.initValue) = GrSg2_Value_Init != GrSg2_Value_1</p> <p>LinIfFrame(LinFrameTriggering)(Tx UNCONDITIONAL Frame => Periodic) - LinIfFrameType = UNCONDITIONAL(frame = LinUnconditionalFrame) -- LinIfPduDirection = LinIfTxPdu(FramePort.CommConnectorPort.communicationDirection)</p> <p>LinIfScheduleTable(LinScheduleTable) - runMode = RUN_CONTINUOUS - Only 1 LinIfEntry(tableEntry) linked to previously configured FrameTriggering</p>
Summary	<p>Aim: - Check that SignalGroup is taken into account in Periodic UNCONDITIONAL Tx LIN frame.</p> <p>Sequence: 1) Action: Start Ipdu Group - Result: Ipdu is not sent (Tx Mode NONE) 2) Action: Start LIN Schedule Table - Result: Ipdu is sent out on associated slot execution (Tx Mode NONE [SWS_Com_00135]) - Result: GroupSignal values are initial value (Value_Init) - Result: SignalGroup update bit is 0 3) Action: Send SignalGroup with update of GroupSignal to Value_1 - Result: Periodic Time is not changed (Ipdu is always sent out on associated slot execution) - Result: SignalGroup UpdateBit is set to 1, only in the first send after step 3. After that, it is 0. [SWS_Com_00059][SWS_Com_00801][SWS_Com_00578] - Result: GroupSignal values are changed to Value_1 for all new occurrences of the Tx frame</p>
Needed Adaptation to other Releases	None
Pre-conditions	Com stack is initialized, but ipdu groups are not running Lin schedule table not started

Main Test Execution		
Test Steps	Pass Criteria	
Step 1	SWC: Request ModeSwitch (call Rte_Switch associated to BswMMode port) to IPDU_ACTIVATED (Start Ipdu Group AT_215_IpduGroup)	BUS: AT_215_Ipdu is not sent (Tx Mode NONE)
Step 2	SWC: Request ModeSwitch (call Rte_Switch associated to BswMMode port) to LIN_START_SCHEDULE (Start LIN Schedule Table)	BUS: AT_215_Ipdu is sent out on associated slot execution (Tx Mode NONE) AT_215_SgGr1 update bit is 0 AT_215_GrSg1 value is initial value (AT_215_GrSg1_Value_Init) AT_215_GrSg2 value is initial value (AT_215_GrSg2_Value_Init)
Step 3	SWC: AT_215_SgGr1.AT_215_GrSg1=AT_215_GrSg1_Value_1 AT_215_SgGr1.AT_215_GrSg2=AT_215_GrSg2_Value_1 call Rte_Write() for Port AT_215_SgGr1 (Rte will send group signal AT_215_GrSg1 with AT_215_GrSg1_Value_1 send group signal AT_215_GrSg2 with AT_215_GrSg2_Value_1 send signal group AT_215_SgGr1)	BUS: AT_215_Ipdu Periodic Time is not changed AT_215_SgGr1 UpdateBit is set to 1 in the first send, after that, it is 0 AT_215_GrSg1 value is now AT_215_GrSg1_Value_1 AT_215_GrSg2 value is now AT_215_GrSg2_Value_1
Post-conditions	Not Applicable	

3.3.3 [ATS_COMLIN_00216] Signal on Tx Time Base frame - sporadic frame (PERIODIC)

Test Objective	Signal on Tx Time Base frame - sporadic frame (PERIODIC)		
ID	ATS_COMLIN_00216	AUTOSAR Releases	3.2.1 3.2.2 4.0.3 4.1.1
Affected Modules	Com, PduR, LinIf, Lin, LinSM	State	reviewed
Trace to Requirement on Acceptance Test Document			
Trace to R4.1.1 Item	COM: SWS_Com_00059 COM: SWS_Com_00061 COM: SWS_Com_00222 COM: SWS_Com_00578		
Requirements	Use Case UC01.01		

/ Reference to Test Environment		
Configuration Parameters	<p>ComIpdu(SignalIpdu): AT_216_Ipdu1 (Mapped on LIN Frame => LinTopology) - ComIpduDirection(CommConnectorPort.communicationDirection) = SEND - ComTxModeTrue (IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming) -- PERIODIC (CyclicTiming) --- timePeriod = 2 * Schedule Table Duration - ComTxIPduClearUpdateBit(no upstream template parameter) = TriggerTransmit</p> <p>ComSignal(ISignalToPduMapping): Sg1 - updateIndicationBitPosition is configured - ComSignalInitValue(ISignal.initValue) = Sg1_Value_Init != Sg1_Value_1</p> <p>LinIfFrame(LinFrameTriggering) (Tx SPORADIC Frame) - LinIfFrameType = SPORADIC(frame = LinSporadicFrame) -- LinIfPduDirection = LinIfTxPdu(FramePort.CommConnectorPort.communicationDirection)</p> <p>LinIfScheduleTable(LinScheduleTable) - runMode = RUN_CONTINUOUS - Only 1 LinIfEntry(tableEntry) linked to previously configured FrameTriggering</p>	
Summary	<p>Aim: - Check that sent signal is taken into account in Periodic SPORADIC Tx LIN frame (Period is handled by Com).</p> <p>Sequence: 1) Action: Start Ipdu Group and LIN Schedule Table - Result: Ipdu is sent out every PeriodTime, on next associated slot execution (Tx Mode PERIODIC [SWS_Com_00222]) - Result: Signal value is initial value (Value_Init) - Result: Signal update bit is 0 2) Action: Update signal with Value_1 - Result: Periodic Time is not changed - Result: UpdateBit is set to 1, only in the first send after step 2. After that, it is 0. [SWS_Com_00059][SWS_Com_00061][SWS_Com_00578] - Result: Signal value is changed to Value_1 for all new occurrences of the Tx frame</p>	
Needed Adaptation to other Releases	None	
Pre-conditions	Com stack is initialized, but ipdu groups are not running Lin schedule table not started	
Main Test Execution		
Test Steps		Pass Criteria
Step 1	<p>SWC:</p> <p>Request ModeSwitch (call Rte_Switch associated to BswMMMode port) to IPDU_ACTIVATED_LIN_START_SCHEDULE (start Ipdu Group AT_216_IpduGroup and LIN Schedule Table)</p>	<p>BUS:</p> <p>AT_216_Ipdu is sent out every PeriodTime, on next associated slot execution (Tx Mode PERIODIC) AT_216_Sg1 update bit is 0 AT_216_Sg1 value is initial value (AT_216_Sg1_Value_Init)</p>
Step 2	<p>SWC:</p>	<p>BUS:</p>

	Send AT_216_Sg1 (call Rte_Write() for Port AT_216_Sg1) with AT_216_Sg1_Value_1	AT_216_Ipdu Periodic Time is not changed AT_216_Sg1 UpdateBit is set to 1 in the first send, after that, it is 0 AT_216_Sg1 value is now changed AT_216_Sg1_Value_1
Post-conditions	Not Applicable	

3.3.4 [ATS_COMLIN_00217] Signal Group on Tx Time Base frame - sporadic frame (PERIODIC)

Test Objective	Signal Group on Tx Time Base frame - sporadic frame (PERIODIC)		
ID	ATS_COMLIN_00217	AUTOSAR Releases	3.2.1 3.2.2 4.0.3 4.1.1
Affected Modules	Com, PduR, LinIf, Lin, LinSM	State	reviewed
Trace to Requirement on Acceptance Test Document			
Trace to R4.1.1 Item	COM: SWS_Com_00059 COM: SWS_Com_00222 COM: SWS_Com_00578 COM: SWS_Com_00801		
Requirements / Reference to Test Environment	Use Case UC01.01		
Configuration Parameters	<p>ComIpdu(SignalIpdu): AT_217_Ipdu1(Mapped on LIN Frame => LinTopology) - ComIpduDirection(CommConnectorPort.communicationDirection) = SEND - ComTxModeTrue (IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming) -- PERIODIC (CyclicTiming) / timePeriod = 2 * Schedule Table Duration - ComTxIPduClearUpdateBit= TriggerTransmit</p> <p>ComSignalGroup(ISignalToPduMapping):SgGr1 - updateIndicationBitPosition is configured - ComGroupSignal(ISignalToPduMapping):GrSg1/GrSg2 -- GrSg1: ComSignalInitValue(ISignal.initValue) = GrSg1_Value_Init != GrSg1_Value_1 -- GrSg2: ComSignalInitValue(ISignal.initValue) = GrSg2_Value_Init != GrSg2_Value_1</p> <p>LinIfFrame(LinFrameTriggering) (Tx SPORADIC Frame) - LinIfFrameType = SPORADIC(frame = LinSporadicFrame) -- LinIfPduDirection = LinIfTxPdu(FramePort.CommConnectorPort.communicationDirection)</p> <p>LinIfScheduleTable(LinScheduleTable) - runMode = RUN_CONTINUOUS - Only 1 LinIfEntry(tableEntry) linked to previously configured FrameTriggering</p>		

Summary	<p>Aim:</p> <ul style="list-style-type: none"> - Check that sent SignalGroup is taken into account in Periodic SPORADIC Tx LIN frame (Period is handled by Com). <p>Sequence:</p> <p>1) Action: Start Ipdu Group and LIN Schedule Table</p> <ul style="list-style-type: none"> - Result: Ipdu is sent out every PeriodTime, on next associated slot execution (Tx Mode PERIODIC [SWS_Com_00222]) - Result: GroupSignal values are initial value (Value_Init) - Result: SignalGroup update bit is 0 <p>2) Action: Send SignalGroup with update of GroupSignal to Value_1</p> <ul style="list-style-type: none"> - Result: Periodic Time is not changed - Result: SignalGroup UpdateBit is set to 1, only in the first send after step 2. After that, it is 0. [SWS_Com_00059][SWS_Com_00801][SWS_Com_00578] - Result: GroupSignal values are changed to Value_1 for all new occurrences of the Tx frame 	
Needed Adaptation to other Releases	None	
Pre-conditions	Com stack is initialized, but ipdu groups are not running Lin schedule table not started	
Main Test Execution		
Test Steps		Pass Criteria
Step 1	<p>SWC:</p> <p>Request ModeSwitch (call Rte_Switch associated to BswMMode port) to IPDU_ACTIVATED_LIN_START_SCHEDULE (start Ipdu Group AT_217_IpduGroup and LIN Schedule Table)</p>	<p>BUS:</p> <p>AT_217_Ipdu is sent out every PeriodTime, on next associated slot execution (Tx Mode PERIODIC) AT_217_SgGr1 update bit is 0 AT_217_GrSg1 value is initial value (AT_217_GrSg1_Value_Init) AT_217_GrSg2 value is initial value (AT_217_GrSg2_Value_Init)</p>
Step 2	<p>SWC:</p> <p>AT_217_SgGr1.AT_217_GrSg1=AT_217_GrSg1_Value_1 AT_217_SgGr1.AT_217_GrSg2=AT_217_GrSg2_Value_1 Call Rte_Write() for Port AT_217_SgGr1 Rte will:</p> <ul style="list-style-type: none"> - Send group signal AT_217_GrSg1 with AT_217_GrSg1_Value_1 - Send group signal AT_217_GrSg2 with AT_217_GrSg2_Value_1 - Send signal group AT_217_SgGr1 	<p>BUS:</p> <p>AT_217_Ipdu Periodic Time is not changed AT_217_SgGr1 UpdateBit is set to 1 in the first send, after that it is 0 AT_217_GrSg1 value is now AT_217_GrSg1_Value_1 AT_217_GrSg2 value is now AT_217_GrSg2_Value_1</p>
Post-conditions	Not Applicable	

3.3.5 [ATS_COMLIN_00218] Signal on user request frame - sporadic frame (DIRECT)

Test Objective	Signal on user request frame - sporadic frame (DIRECT)
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ID	ATS_COMLIN_00218	AUTOSAR Releases	3.2.1 3.2.2 4.0.3 4.1.1
Affected Modules	Com, PduR, LinIf, Lin, LinSM	State	reviewed
Trace to Requirement on Acceptance Test Document			
Trace to R4.1.1 Item	COM: SWS_Com_00767		
Requirements / Reference to Test Environment	Use Case UC01.01		
Configuration Parameters	<p>ComIpdu(SignalIpdu): AT_218_Ipdu1 (Mapped on LIN Frame => LinTopology)</p> <ul style="list-style-type: none"> - ComIpduDirection(CommConnectorPort.communicationDirection) = SEND - ComTxModeTrue <p>(IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming)</p> <ul style="list-style-type: none"> -- DIRECT (EventControlledTiming) --- NumberOfRepetitions = 2 --- RepetitionPeriod = x ms <p>ComSignal(ISignalToPduMapping): Sg1</p> <ul style="list-style-type: none"> - ComTransferProperty (transferProperty) = TRIGGERED_WITHOUT_REPETITION - ComSignalInitValue(ISignal.initValue) = Sg1_Value_Init != Sg1_Value_1 <p>LinIfFrame(LinFrameTriggering) (Tx SPORADIC Frame)</p> <ul style="list-style-type: none"> - LinIfFrameType = SPORADIC(frame = LinSporadicFrame) -- LinIfPduDirection = LinIfTxPdu(FramePort.CommConnectorPort.communicationDirection) <p>LinIfScheduleTable(LinScheduleTable)</p> <ul style="list-style-type: none"> - runMode = RUN_CONTINUOUS - Only 1 LinIfEntry(tableEntry) linked to previously configured FrameTriggering 		
Summary	<p>Aim:</p> <ul style="list-style-type: none"> - Check that sent signal is taken into account in SPORADIC Tx LIN frame. <p>Sequence:</p> <ol style="list-style-type: none"> 1) Action: Start Ipdu Group and LIN Schedule Table - Result: Ipdu is not sent out 2) Action: Update signal with Value_1 (Triggered without repetition) [SWS_Com_00767] - Result: Ipdu is sent only one time with Value_1 		
Needed Adaptation to other Releases	None		
Pre-conditions	Com stack is initialized, but ipdu groups are not running Lin schedule table not started		
Main Test Execution			
Test Steps		Pass Criteria	
Step 1	SWC: Request ModeSwitch (call Rte_Switch	BUS: AT_218_Ipdu is not sent out	

	associated to BswMMMode port) to IPDU_ACTIVATED_LIN_START_SCHEDULE (start Ipdu Group AT_218_IpduGroup and LIN Schedule Table)	
Step 2	SWC: Send signal AT_218_Sg1 (call Rte_Write() for Port AT_218_Sg1) with AT_218_Sg1_Value_1 (Triggered without repetition)	BUS: AT_218 Ipdu is sent only one time AT_218_Sg1 value is AT_218_Sg1_Value_1
Post-conditions	Not Applicable	

3.3.6 [ATS_COMLIN_00219] Signal Group on user request frame - sporadic frame (DIRECT)

Test Objective	Signal Group on user request frame - sporadic frame (DIRECT)		
ID	ATS_COMLIN_00219	AUTOSAR Releases	3.2.1 3.2.2 4.0.3 4.1.1
Affected Modules	Com, PduR, LinIf, Lin, LinSM	State	reviewed
Trace to Requirement on Acceptance Test Document			
Trace to R4.1.1 Item	COM: SWS_Com_00769		
Requirements / Reference to Test Environment	Use Case UC01.01		
Configuration Parameters	ComIpdu(SignalIpdu): AT_219_Ipdu1 (Mapped on LIN Frame => LinTopology) - ComIpduDirection(CommConnectorPort.communicationDirection) = SEND - ComTxModeTrue (IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming) -- DIRECT (EventControlledTiming) --- NumberOfRepetitions = 2 --- RepetitionPeriod = x ms ComSignalGroup(ISignalToPduMapping): SgGr1 - ComTransferProperty (transferProperty) = TRIGGERED_WITHOUT_REPETITION - ComGroupSignal(ISignalToPduMapping): GrSg1/GrSg2 -- GrSg1: ComSignalInitValue(ISignal.initValue) = GrSg1_Value_Init != GrSg1_Value_1 -- GrSg2: ComSignalInitValue(ISignal.initValue) = GrSg2_Value_Init != GrSg2_Value_1 LinIfFrame(LinFrameTriggering) (Tx SPORADIC Frame) - LinIfFrameType = SPORADIC(frame = LinSporadicFrame) -- LinIfPduDirection = LinIfTxPdu(FramePort.CommConnectorPort.communicationDirection)		

	LinIfScheduleTable(LinScheduleTable) - runMode = RUN_CONTINUOUS - Only 1 LinIfEntry(tableEntry) linked to previously configured FrameTrigger	
Summary	Aim: - Check that sent SignalGroup is taken into account in SPORADIC Tx LIN frame. Sequence: 1) Action: Start Ipdu Group and LIN Schedule Table - Result: Ipdu is not sent out 2) Action: Send SignalGroup (Triggered without repetition) without updating GroupSignal [SWS_Com_00769] - Result: Ipdu is sent only one time with GroupSignal not updated (Value_Init) 3) Action: Send SignalGroup (Triggered without repetition) with update of GroupSignal to Value_1 [SWS_Com_00769] - Result: Ipdu is sent only one time with GroupSignal updated (Value_1)	
Needed Adaptation to other Releases	None	
Pre-conditions	Com stack is initialized, but ipdu groups are not running Lin schedule table not started	
Main Test Execution		
Test Steps	Pass Criteria	
Step 1	SWC: Request ModeSwitch (call Rte_Switch associated to BswMMMode port) to IPDU_ACTIVATED_LIN_START_SCHEDULE (start Ipdu Group AT_219_IpduGroup and LIN Schedule Table)	BUS: AT_219_Ipdu is not sent out
Step 2	SWC: AT_219_SgGr1.AT_219_GrSg1=AT_219_GrSg1_Value_Init AT_219_SgGr1.AT_219_GrSg2=AT_219_GrSg2_Value_Init Call Rte_Write() for Port AT_219_SgGr1 - Send GroupSignal AT_219_GrSg1 with AT_219_GrSg1_Value_Init - Send GroupSignal AT_219_GrSg2 with AT_219_GrSg2_Value_Init - Send SignalGroup AT_219_SgGr1 (Triggered without repetition)	BUS: AT_219_Ipdu is sent only one time AT_219_GrSg1 value is AT_219_GrSg1_Value_Init AT_219_GrSg2 value is AT_219_GrSg2_Value_Init
Step 3	SWC: AT_219_SgGr1.AT_219_GrSg1=AT_219_GrSg1_Value_1 AT_219_SgGr1.AT_219_GrSg2=AT_219_GrSg2_Value_1 Call Rte_Write() for Port AT_219_SgGr1 - Send GroupSignal AT_219_GrSg1 with AT_219_GrSg1_Value_1 - Send GroupSignal AT_219_GrSg2	BUS: AT_219_Ipdu is sent only one time AT_219_GrSg1 value is AT_219_GrSg1_Value_1 AT_219_GrSg2 value is AT_219_GrSg2_Value_1

	with AT_219_GrSg2_Value_1 - Send SignalGroup AT_219_SgGr1 (Triggered without repetition)	
Post-conditions	Not Applicable	

4 RS_BRF_01648 - Large Data Type

4.1 General Test Objective and Approach

This Test Specification intends to cover the communication transfer of data sizes larger than the maximum transmission unit of the underlying bus as described in the AUTOSAR Feature [RS_BRF_01648].

The tests use a test bench environment and Embedded Software Components that use the feature.

This test case document has been established to cover the following features:

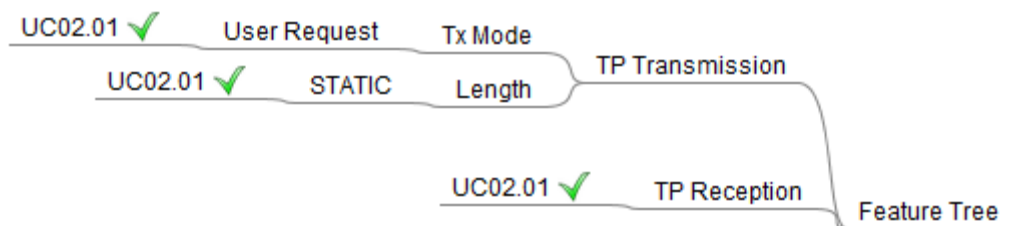


Figure 4 Mindmap of the features covered and not covered in the test cases

* The covered use cases are marked with a green check mark.

This specification gives the description of required tests environments (test bench, uses case, arxml files) and detailed tests cases for executing tests.

4.1.1 Test System

4.1.1.1 Overview on Architecture

In order to cover the required features / sub-features coverage, the environment has been separated in several uses case.

4.1.1.1.1 Use case 02.01: LIN Bus

For this use case, the aim is to test the large data type transfer on LIN bus:

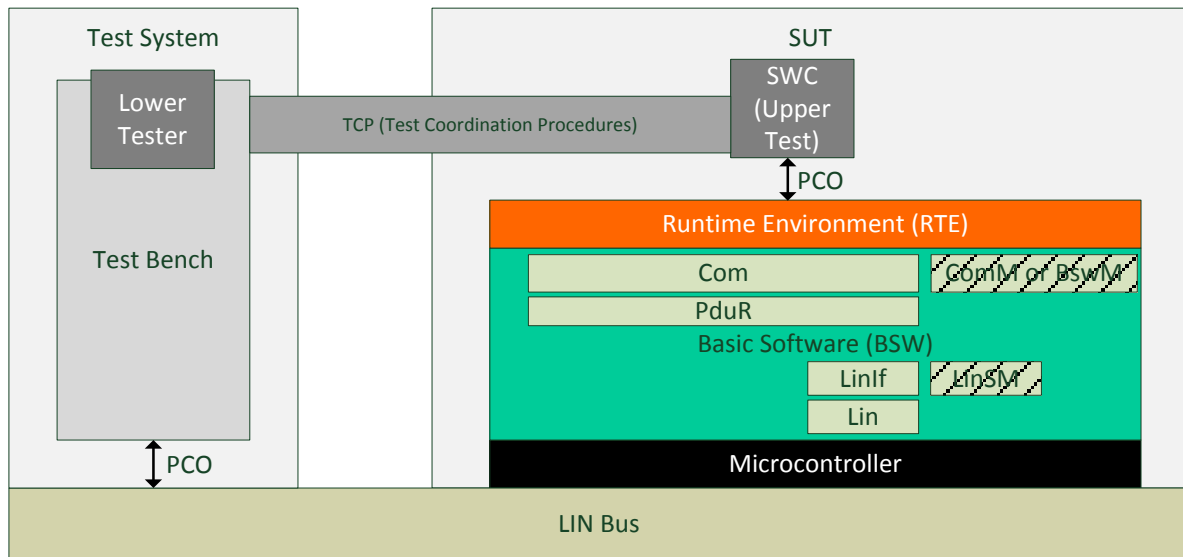


Figure 5 Acceptance test architecture required for the test cases

The test system architecture consists of Test Bench that executes only test sequencer and gives actions request through Test coordination Procedures to embedded SWC.

4.1.1.2 Specific Requirements

Not Applicable.

4.1.1.3 Test Coordination Requirements

Not Applicable.

4.1.2 Test 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 suites is implemented.

4.1.2.1 Required ECU Extract of System Description Files

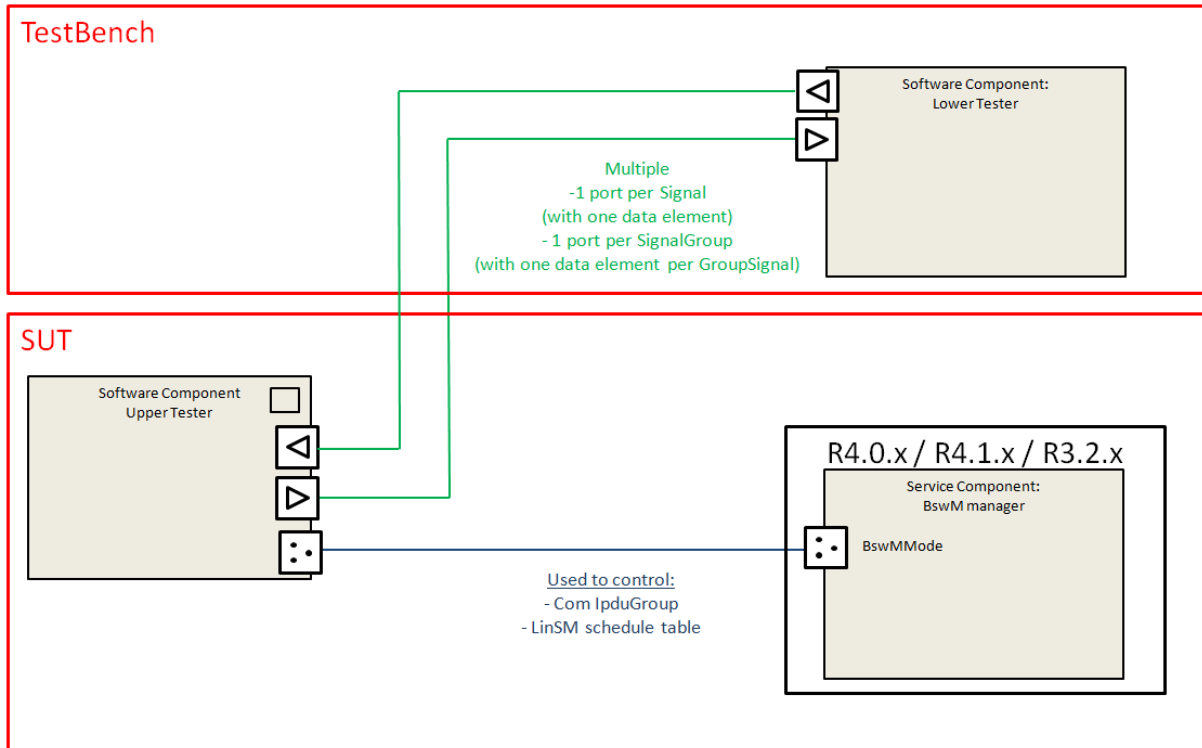


Figure 6 Required SWC description

A Mode-Switch Interface IF_AT_SwC_ActionsBswM must be created. The SWC Upper Tester is the owner of this state machine and BswM read the state through BswMMode Port. BswM shall launch actions according to following table (check 4.3 Test Cases for details):

ModeDeclaration	BswM Actions
IPDU_ACTIVATED	OnEntry: -Start IpduGroup
IPDU_DEACTIVATED	OnEntry: -Stop IpduGroup
IPDU_OFF_ON	OnEntry: -Stop IpduGroup -Re-start IpduGroup
LIN_START_SCHEDULE	OnEntry: -Start LIN Schedule Table
IPDU_ACTIVATED_LIN_START_SCHEDULE	OnEntry: -Start IpduGroup -Start LIN Schedule Table

For the Software Component point of view, for each test case, the communication interfaces are defined as follow:

Port name	Data element type	Data element	Mapping	Type
<TestCaseName>_<signalname>	Uint8	<signalname>	<Signalname>	Signal
<TestCaseName>_<signalgroupname>	Struct { Uint8: groupsignal1; ... Uint8: groupsignalx; }	Groupsignal	Groupsignal1-> <signal1name> Groupsignal2-> <signal2name> <PortName>-> <signalgroupname>	Signal Group

Therefore ports and signals names are changed according to Test Case number, but the building rule is the same.

Unless a different configuration is specified in test case, Sender/Receiver Ports used for communication queued Data Element and Explicit Data access for associated runnables.

4.1.2.1.1 Use Case 02.01: LIN Bus

The communication database is depicted below:

IPduGroup	IPdu	SignalGroup	Signal	Tx ECU	Rx ECU
AT_241_IpduGroup	AT_241_Ipdu		AT_241_Sg1	SUT	TestBench
AT_277_IpduGroup	AT_277_Ipdu		AT_277_Sg1	TestBench	SUT

4.1.2.2 Required ECU Configuration Description Files

The section describes the common EcuC parameters between test cases that are required by the implementer of the test cases.

No specific configuration requirements for ECU Configuration files as they can be derived from EcuExtract.

4.1.2.3 Required Software Component Description Files

The section describes the SWC-D that are required by the implementer of the test cases.

Refer to Figure 6.

4.1.2.4 Mandatory vs. Customizable Parts

Mandatory parameters are listed in Tests Cases (see 4.3 Test Cases).

Customizable parameters are (these values are test case independent):

- ComSignalType (ISignal.networkRepresentationProps.swBaseType), ComSignalLength (baseTypeSize) and ComBitSize (ISignal.length) → must be consistent to associated dataElement
- ComSignalInitValue (ISignal.initValue)
- PduLength (Pdu.length)
- ComBitPosition (ISignalToIPduMapping.startPosition) and ComUpdateBitPosition (ISignalToIPduMapping.updateIndicationBitPosition) values → the location of these elements in the PDU
- LIN frames identifiers

4.1.3 Test Case Design

Not Applicable.

4.2 Re-usable Test Steps

Not Applicable.

4.3 Test Cases

4.3.1 [ATS_COMLIN_00241] Large Data TP transmission on LIN (>= 7 bytes)

Test Objective	Large Data TP transmission on LIN (>= 7 bytes)		
ID	ATS_COMLIN_00241	AUTOSAR Releases	4.0.3 4.1.1
Affected Modules	Com, PduR, LinTp, LinIf, Lin	State	reviewed
Trace to Requirement on Acceptance Test Document			
Trace to R4.1.1 Item	COM: ECUC_Com_00761		
Requirements / Reference to Test Environment	Use Case UC02.01		
Configuration Parameters	ComIpdu(SignalIPdu): AT_241_Ipdu1 (large I-PDU) - length = 9 (large, greater than a Single Frame) - ComIPduType = TP(TpConfig.TpConnection) - ComIPduDirection(CommConnectorPort.communicationDirection) = SEND - ComTxModeTrue (IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming) -- DIRECT(EventControlledTiming) --- NumberOfRepetitions = 1 - ComTxIPduClearUpdateBit = TriggerTransmit ComSignal(ISignalToPduMapping): Sg1 - dataElement with queued swlmpIPolicy - DataSendCompletedEvent mapped on signal transmission (ComNotification is configured)		

	- ComTransferProperty (transferProperty) = TRIGGERED	
	PduRRoutingPath: - Routing path for ComIpdu with PduRSrcBswModuleRef = BswMod_Com - PduRDestPdu with PduRDestBswModuleRef = BswMod_LinTp	
Summary	Aim: - Check that Application layer can initiate a TP transmission greater than or equal to 7 bytes on LIN bus	
Needed Adaptation to other Releases	Configuration: [n/a]	Large data types and TP for regular COM is not possible in R3.x.
	Test Steps: [n/a]	This test case shall be removed
Pre-conditions	Com stack is initialized AT_241_IpduGroup is not running LIN schedule table is started	
Main Test Execution		
Test Steps		Pass Criteria
Step 1	SWC: Request ModeSwitch (call Rte_Switch associated to BswMMode port) to IPDU_ACTIVATED (Start Ipdu Group AT_241_IpduGroup)	BUS: AT_241_Ipdu is not sent out
Step 2	SWC: Call Rte_Send() for Port AT_241_Sg1 with AT_241_Sg1_Value_1 (Send AT_241_Sg1 with AT_241_Sg1_Value_1 (this will initiate a TP transmission with 9 bytes))	BUS: First Frame is received frame length is 8 byte, LEN (third frame byte) is 9 bytes Data contained in Bytes 4 to 8
Step 3	BUS: Wait Consecutive Frame reception	BUS: 1 Consecutive Frame is received frame length is 8 byte Data contained in Bytes 3 to 6 AT_241_Sg1 value is AT_241_Sg1_Value_1
Post-conditions	Not Applicable	

4.3.2 [ATS_COMLIN_00277] Large Data TP reception on LIN (>= 7 bytes)

Test Objective	Large Data TP reception on LIN (>= 7 bytes)		
ID	ATS_COMLIN_00277	AUTOSAR Releases	4.0.3 4.1.1
Affected Modules	Com, PduR, LinTp, LinIf, Lin	State	reviewed
Trace to Requirement			

on Acceptance Test Document					
Trace to R4.1.1 Item	COM: ECUC_Com_00761				
Requirements / Reference to Test Environment	Use Case UC02.01				
Configuration Parameters	<p>ComIpdu(SignalIpdu): AT_277_Ipdu1 (large I-PDU)</p> <ul style="list-style-type: none"> - length = 9 (large, greater than a Single Frame) - ComIpduType = TP(TpConfig.TpConnection) - ComIpduDirection(CommConnectorPort.communicationDirection) = RECEIVE - ComTxIpduClearUpdateBit = TriggerTransmit <p>ComSignal(ISignalToPduMapping): Sg1</p> <ul style="list-style-type: none"> - dataElement with queued swImplPolicy - DataReceivedEvent mapped on signal reception (ComNotification is configured) <p>PduRRoutingPath:</p> <ul style="list-style-type: none"> - Routing path for ComIpdu with PduRSrcBswModuleRef = BswMod_LinTp - PduRDestPdu with PduRDestBswModuleRef = BswMod_Com 				
Summary	<p>Aim:</p> <ul style="list-style-type: none"> - Check that Application layer can receive a TP Data greater than or equal to 7 bytes on LIN bus 				
Needed Adaptation to other Releases	<table border="1"> <tr> <td>Configuration: [n/a]</td> <td>Large data types and TP for regular COM is not possible in R3.x.</td> </tr> <tr> <td>Test Steps: [n/a]</td> <td>This test case shall be removed</td> </tr> </table>	Configuration: [n/a]	Large data types and TP for regular COM is not possible in R3.x.	Test Steps: [n/a]	This test case shall be removed
	Configuration: [n/a]	Large data types and TP for regular COM is not possible in R3.x.			
Test Steps: [n/a]	This test case shall be removed				
Pre-conditions	<p>Com stack is initialized</p> <p>AT_277_IpduGroup is not running</p> <p>LIN schedule table is started</p>				
Main Test Execution					
Test Steps	Pass Criteria				
Step 1	<p>SWC:</p> <p>Request ModeSwitch (call Rte_Switch associated to BswMMode port) to IPDU_ACTIVATED (Start Ipdu Group AT_277_IpduGroup)</p>	<p>SWC:</p> <p>No DataReceivedEvent for AT_277_Sg1</p>			
Step 2	<p>Lower Tester:</p> <p>On SRF header reception (Slave Response Frame), Send Signal AT_277_Sg1 with AT_277_Sg1_Value_1 (this will initiate a TP transmission with 9 bytes)</p>	<p>BUS:</p> <p>First Frame is sent frame length is 8 byte, LEN (third frame byte) is 9 bytes Data contained in Bytes 4 to 8</p>			
Step 3	<p>Lower Tester:</p> <p>On next SRF header reception (Slave Response Frame), Send Consecutive Frame with last data bytes</p>	<p>BUS:</p> <p>One Consecutive Frame is received</p>			

Step 4	TCP: Wait DataReceivedEvent	SWC: DataReceivedEvent is activated
Step 5	SWC: Call Rte_Receive() for AT_277_Sg1	SWC: AT_277_Sg1 value is AT_277_Sg1_Value_1 Return Value of Rte_Receive is RTE_E_OK
Post-conditions	Not Applicable	