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1 Acronyms and abbreviations

Abbreviation / Acronym:	Description:
AT	Acceptance Test
CAN	Controller Area Network
ECU	Electronic Control Unit
LT	Lower Tester
NM	Network Management
PCO	Point of Control and Observation
PDU	Protocol Data Unit
RfC	Request for Change
Rx	Reception
SUT	System Under Test
SWC	Software Component
TCP	Test Coordination Procedures
Tx	Transmission
UT	Upper Tester

Table 1 Acronyms and Abbreviations

2 Scope

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

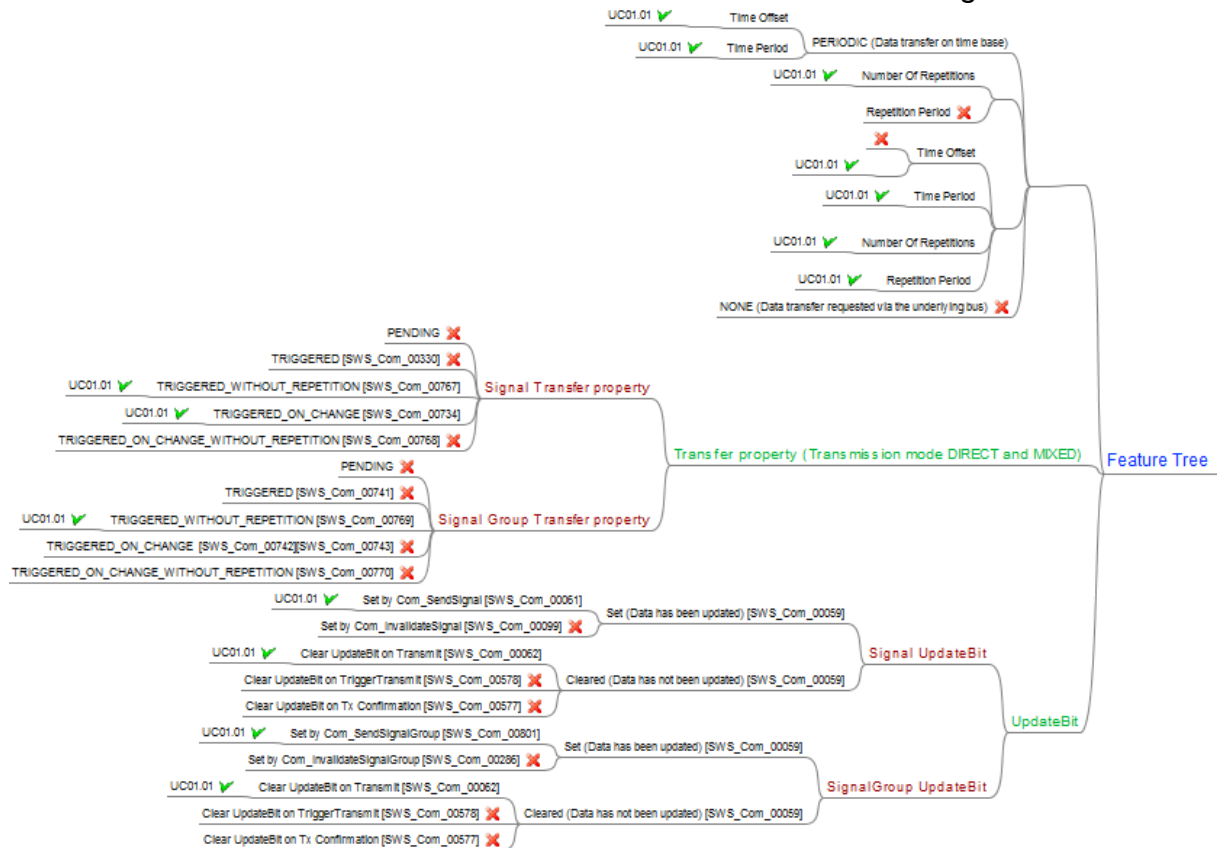


Figure 1 Mindmap of the features covered and not covered in the test cases

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: FlexRay Bus

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

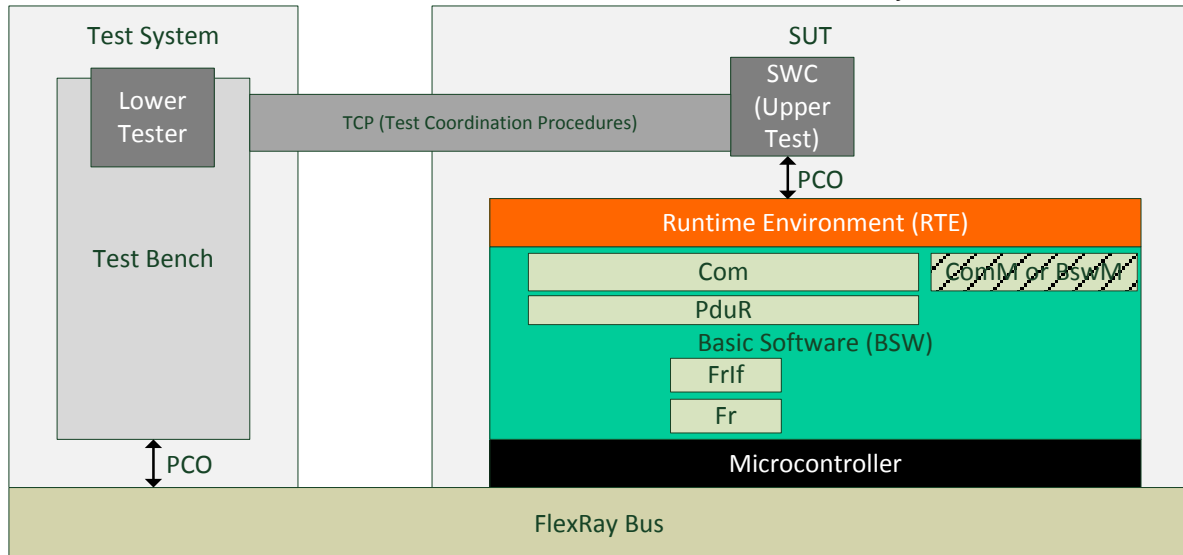


Figure 2 Acceptance test architecture required for the test cases

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

3.1.1.2.1 Flexray Scheduled Frame Transmission

For FlexRay test cases the term “on next associated slot” is used. This is because the FlexRay frames can only be send on the bus on its scheduled slot. So any Trigger will not cause a frame to be send on the bus immediately but after a “wait time”. All time measurements will start after this as shown in figure.

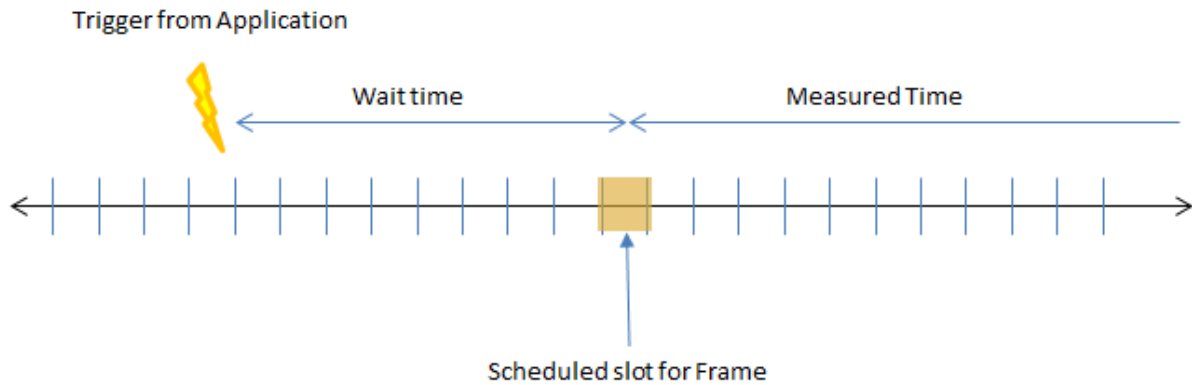


Figure 3 Flexray Scheduled frame Transmission

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

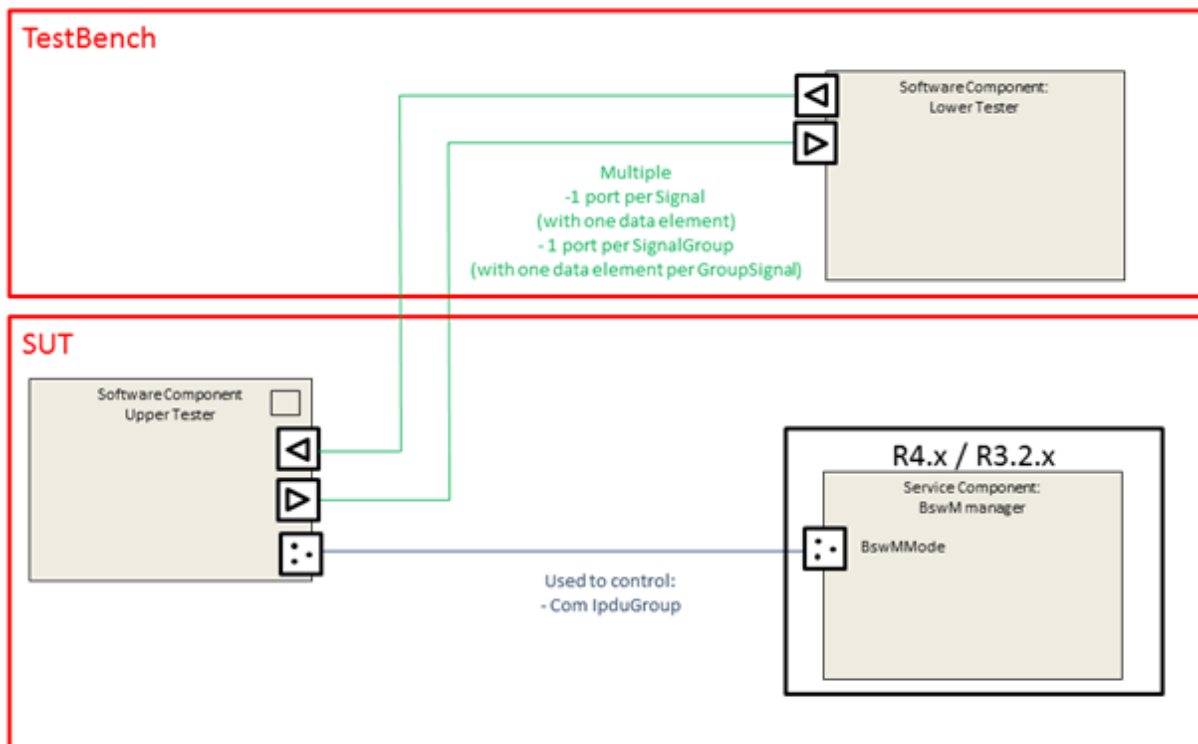


Figure 4 Required SWC description

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

Table 2 Required Mode Declaration

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

Port name	Data element type	Dataelement	Mapping	Type
<TestCaseName>_<signalname>	UInt8	<signalname>	<Signalname>	Signal
<TestCaseName>_<signalgroupname>	Struct { UInt8: groupsignal1; ... UInt8: groupsignalx; }	Groupsignal	Groupsignal1-> <signal1name> Groupsignal2-> <signal2name> <PortName>-> <signalgroupname>	Signal Group

Table 3 SWC Interfaces used

Therefore ports and signals names change 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 Non queued Data Element and Explicit Data access for associated runnables.

3.1.2.1.1 Use Case 01.01: FlexRay Bus

The communication database is depicted below:

IPduGroup	IPdu	SignalGroup	Signal	Tx ECU	Rx ECU
AT_227_IpduGroup	AT_227_Ipdu		AT_227_Sg1	SUT	TestBench
AT_228_IpduGroup	AT_228_Ipdu	AT_228_SgGr1	AT_228_GrSg1 AT_228_GrSg2	SUT	TestBench
AT_229_IpduGroup	AT_229_Ipdu		AT_229_Sg1 AT_229_Sg2	SUT	TestBench
AT_230_IpduGroup	AT_230_Ipdu	AT_230_SgGr1 AT_230_SgGr2	AT_230_GrSg1 AT_230_GrSg2 AT_230_GrSg3 AT_230_GrSg4 AT_230_GrSg5	SUT	TestBench

AT_231_IpduGroup	AT_231_Ipdu		AT_231_Sg1	SUT	TestBench
AT_232_IpduGroup	AT_232_Ipdu	AT_232_SgGr1	AT_232_GrSg1	SUT	TestBench
			AT_232_GrSg2		
AT_281_IpduGroup1	AT_281_Ipdu1		AT_281_Sg1	SUT	TestBench
AT_281_IpduGroup2	AT_281_Ipdu2		AT_281_Sg2	SUT	TestBench

Table 4 Communication Database

3.1.2.2 Required ECU Configuration Description Files

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

3.1.2.3 Required Software Component Description Files

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

Refer to Figure 4.

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
- FlexRay 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_COMFR_00227] Signal on Time Base frame (PERIODIC)

Test Objective	Signal on Time Base frame (PERIODIC)		
ID	ATS_COMFR_00227	AUTOSAR Releases	3.2.1 3.2.2 4.0.3 4.1.1
Affected Modules	Com, PduR, FrIf, Fr	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_00062 COM: SWS_Com_00222		
Requirements / Reference to Test Environment	Use Case UC01.01		
Configuration Parameters	<p>SignalIPdu: AT_227_Ipdu1</p> <ul style="list-style-type: none"> - CommConnectorPort.communicationDirection = SEND - IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming -- PERIODIC (CyclicTiming) --- timeOffset >= 4 * gdCycle --- timePeriod >= 2 * gdCycle (different from timeOffset) - ComTxIPduClearUpdateBit(no upstream template parameter) = Transmit <p>ISignalToPduMapping: Sg1</p> <ul style="list-style-type: none"> - updateIndicationBitPosition is configured - ISignal.initValue = Sg1_Value_Init != Sg1_Value_1 <p>[Immediate Tx STATIC Frame]</p> <p>FlexRayFrameTriggering</p> <ul style="list-style-type: none"> - FlexrayAbsolutelyScheduledTiming.CycleRepetition = 1 - FlexrayAbsolutelyScheduledTiming.slotID (Static) <p>FrIfTxPdu(Pdu)</p> <ul style="list-style-type: none"> - FrIfImmediate = True - FrIfNoneMode = False 		
Summary	<p>Aim:</p> <ul style="list-style-type: none"> - Check that send signal is taken into account in the periodic frame <p>Sequence:</p> <ol style="list-style-type: none"> 1) Action: Start Ipdu Group <ul style="list-style-type: none"> - Result: Ipdu is sent out after OffsetTime, on next associated slot execution [SWS_Com_00222] - 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 <ul style="list-style-type: none"> - Result: Periodic Time is not changed - Result: UpdateBit is set to 1, only in the first send after step 2. After it is 0. [SWS_Com_00059][SWS_Com_00061][SWS_Com_00578] 		

	- Result: Signal value is changed to Value_ for all new occurrences of the Tx frame	
Needed Adaptation to other Releases	None.	
Pre-conditions	FlexRay cluster is synchronized.	
Main Test Execution		
Test Steps		Pass Criteria
Step 1	SWC: Request ModeSwitch (call Rte_Switch associated to BswMMMode port) to IPDU_ACTIVATED (start Ipdu group AT_227_IpduGroup)	BUS: AT_227_Ipdu is sent out after OffsetTime, on next associated slot execution AT_227_Ipdu is sent out every PeriodTime, on next associated slot execution Signal AT_227_Sg1 value is initial value (AT_227_Sg1_Value_Init) Signal AT_227_Sg1 update bit is 0
Step 2	SWC: Update signal AT_227_Sg1 (Call Rte_Write() API for Port AT_227_Sg1) with AT_227_Sg1_Value_1	BUS: AT_227_Ipdu Periodic Time is not changed AT_227_Sg1 UpdateBit is set to 1 in the first send, after that, it is 0. Signal AT_227_Sg1 value is now AT_227_Sg1_Value_1
Post-conditions	Not Applicable	

3.3.2 [ATS_COMFR_00228] SignalGroup on Time Base frame (PERIODIC)

Test Objective	SignalGroup on Time Base frame (PERIODIC)		
ID	ATS_COMFR_00228	AUTOSAR Releases	3.2.1 3.2.2 4.0.3 4.1.1
Affected Modules	Com, PduR, Frlf, Fr	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_00062 COM: SWS_Com_00222 COM: SWS_Com_00801		
Requirements / Reference to Test Environment	Use Case UC01.01		
Configuration Parameters	SignalIPdu: AT_228_Ipdu1 - CommConnectorPort.communicationDirection = SEND		

	<ul style="list-style-type: none"> - IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming -- PERIODIC (CyclicTiming) --- timeOffset >= 4 * gdCycle --- timePeriod >= 2 * gdCycle (different from timeOffset) - ComTxIPduClearUpdateBit(no upstream template parameter) = Transmit ISignalToPduMapping: SgGr1 - updateIndicationBitPosition is configured - ISignalToPduMapping: GrSg1 -- ISignal.initValue = GrSg1_Value_Init != GrSg1_Value_1 - ISignalToPduMapping: GrSg2 -- ISignal.initValue = GrSg2_Value_Init != GrSg2_Value_1 [Immediate Tx STATIC Frame] FlexRayFrameTriggering - FlexrayAbsolutelyScheduledTiming.CycleRepetition = 1 - FlexrayAbsolutelyScheduledTiming.slotID (Static) FrIfTxPdu(Pdu) - FrIfImmediate = True - FrIfNoneMode 				
<p>Summary</p>	<p>Aim:</p> <ul style="list-style-type: none"> - Check that send SignalGroup is taken into account in the periodic frame <p>Sequence:</p> <ol style="list-style-type: none"> 1) Action: Start Ipdu Group <ul style="list-style-type: none"> - Result: Ipdu is sent out after OffsetTime, on next associated slot execution [SWS_Com_00222] - 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 2) Action: Send SignalGroup with update of GroupSignal to Value_1 <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 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</p>	<p>None.</p>				
<p>Pre-conditions</p>	<p>FlexRay cluster is synchronized.</p>				
<p>Main Test Execution</p>					
<p>Test Steps</p>					
<p>Step 1</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">SWC:</th> <th style="width: 50%;">BUS:</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;"> <p>Request ModeSwitch (call Rte_Switch associated to BswMMode port) to IPDU_ACTIVATED (start Ipdu group AT_228_IpduGroup)</p> </td> <td style="vertical-align: top;"> <p>AT_228_Ipdu is sent out after OffsetTime, on next associated slot execution. Then, AT_228_Ipdu is sent out every PeriodTime, on next associated slot execution (Tx Mode PERIODIC) AT_228_SgGr1 update bit is 0 AT_228_GrSg1 value is initial value (AT_228_GrSg1_Value_Init) AT_228_GrSg2 value is initial value (AT_228_GrSg2_Value_Init)</p> </td> </tr> </tbody> </table>	SWC:	BUS:	<p>Request ModeSwitch (call Rte_Switch associated to BswMMode port) to IPDU_ACTIVATED (start Ipdu group AT_228_IpduGroup)</p>	<p>AT_228_Ipdu is sent out after OffsetTime, on next associated slot execution. Then, AT_228_Ipdu is sent out every PeriodTime, on next associated slot execution (Tx Mode PERIODIC) AT_228_SgGr1 update bit is 0 AT_228_GrSg1 value is initial value (AT_228_GrSg1_Value_Init) AT_228_GrSg2 value is initial value (AT_228_GrSg2_Value_Init)</p>
SWC:	BUS:				
<p>Request ModeSwitch (call Rte_Switch associated to BswMMode port) to IPDU_ACTIVATED (start Ipdu group AT_228_IpduGroup)</p>	<p>AT_228_Ipdu is sent out after OffsetTime, on next associated slot execution. Then, AT_228_Ipdu is sent out every PeriodTime, on next associated slot execution (Tx Mode PERIODIC) AT_228_SgGr1 update bit is 0 AT_228_GrSg1 value is initial value (AT_228_GrSg1_Value_Init) AT_228_GrSg2 value is initial value (AT_228_GrSg2_Value_Init)</p>				

Step 2	SWC: SgGr1.AT_228_GrSg1 = AT_228_GrSg1_Value_1 SgGr1.AT_228_GrSg1=AT_228_GrSg2_Val ue_1 Call Rte_Write API() for Port AT_228_SgGr1 (Rte will Send group signal AT_228_GrSg1 with AT_228_GrSg1_Value_1 Send group signal AT_228_GrSg2 with AT_228_GrSg2_Value_1 send SignalGroup AT_228_SgGr1)	BUS: AT_228_Ipdu Periodic Time is not changed AT_228_SgGr1 UpdateBit is set to 1 in the first send after that, it is 0 AT_228_GrSg1 value is now with AT_228_GrSg1_Value_1 AT_228_GrSg2 value is now with AT_228_GrSg2_Value_1
Post-conditions	Not Applicable	

3.3.3 [ATS_COMFR_00229] Signal on User Request frame (DIRECT)

Test Objective	Signal on User Request frame (DIRECT)		
ID	ATS_COMFR_00229	AUTOSAR Releases	3.2.1 3.2.2 4.0.3 4.1.1
Affected Modules	Com, PduR, Frlf, Fr	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00117		
Trace to R4.1.1 Item	COM: SWS_Com_00767		
Requirements / Reference to Test Environment	Use Case UC01.01		
Configuration Parameters	SignalIPdu: AT_229_Ipdu1 - CommConnectorPort.communicationDirection = SEND - IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming -- DIRECT (EventControlledTiming) --- NumberOfRepetitions = 2 --- RepetitionPeriod = Configured based on Frame Property ISignalToPduMapping: Sg1 - transferProperty = TRIGGERED_WITHOUT_REPETITION - ISignal.initValue = Sg1_Value_Init != Sg1_Value_1 ISignalToPduMapping: Sg2 - transferProperty = TRIGGERED - ISignal.initValue = Sg2_Value_Init [Immediate Tx DYNAMIC Frame] FlexRayFrameTriggering		

	<ul style="list-style-type: none"> - FlexrayAbsolutelyScheduledTiming.CycleRepetition = 1 - FlexrayAbsolutelyScheduledTiming.slotID (Dynamic) FrIfTxPdu(Pdu) <ul style="list-style-type: none"> - FrIfImmediate = True - FrIfNoneMode = False 	
Summary	Aim: <ul style="list-style-type: none"> - Check that send signal is taken into account in the direct frame Sequence: 1) Action: Start Ipdu Group <ul style="list-style-type: none"> - Result: Ipdu is not send out 2) Action: Update signal with Value_1 (Triggered without repetition) [SWS_Com_00767] <ul style="list-style-type: none"> - Result: Ipdu is sent only one time - Result: Signal value is sent with Value_1 	
Needed Adaptation to other Releases	None.	
Pre-conditions	FlexRay cluster is synchronized.	
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_229_IpduGroup)	BUS: AT_229_Ipdu is not send out
Step 2	SWC: Send signal AT_229_Sg1 (call Rte_Write() for Port AT_229_Sg1) with AT_229_Sg1_Value_1 (Triggered without repetition)	BUS: AT_229_Ipdu is sent only one time AT_229_Sg1 value is sent with AT_229_Sg1_Value_1 AT_229_Sg2 value is sent with AT_229_Sg2_Value_Init
Post-conditions	Not Applicable	

3.3.4 [ATS_COMFR_00230] SignalGroup on User Request frame (DIRECT)

Test Objective	SignalGroup on User Request frame (DIRECT)		
ID	ATS_COMFR_00230	AUTOSAR Releases	3.2.1 3.2.2 4.0.3 4.1.1
Affected Modules	Com, PduR, FrIf, Fr	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00117		
Trace to R4.1.1 Item	COM: SWS_Com_00769		

Requirements / Reference to Test Environment	Use Case UC01.01	
Configuration Parameters	<p>SignalIPdu: AT_230_Ipdu1</p> <ul style="list-style-type: none"> - CommConnectorPort.communicationDirection = SEND - IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming -- DIRECT (EventControlledTiming) --- NumberOfRepetitions = 2 --- RepetitionPeriod = Configured based on Frame Property <p>ComSignalGroup(ISignalToPduMapping): SgGr1</p> <ul style="list-style-type: none"> - transferProperty = TRIGGERED_WITHOUT_REPETITION - ISignalToPduMapping: GrSg1 -- ISignal.initValue = GrSg1_Value_Init != GrSg1_Value_1 - ISignalToPduMapping: GrSg2 -- ISignal.initValue = GrSg2_Value_Init != GrSg2_Value_1 <p>ISignalToPduMapping: SgGr2</p> <ul style="list-style-type: none"> - transferProperty = TRIGGERED - ISignalToPduMapping: GrSg1 -- ISignal.initValue = GrSg1_Value_Init != GrSg1_Value_1 - ISignalToPduMapping: GrSg2 -- ISignal.initValue = GrSg2_Value_Init != GrSg2_Value_1 <p>[Immediate Tx DYNAMIC Frame]</p> <p>FlexRayFrameTriggering/FlexrayAbsolutelyScheduledTiming</p> <ul style="list-style-type: none"> - CycleRepetition = 1 - slotID (Dynamic) <p>FrIfTxPdu(Pdu)</p> <ul style="list-style-type: none"> - FrIfImmediate = True - FrIfNoneMode = False 	
Summary	<p>Aim:</p> <ul style="list-style-type: none"> - Check that send SignalGroup is taken into account in the direct frame <p>Sequence:</p> <ol style="list-style-type: none"> 1) Action: Start IpduGroup - Result: I-PDU is not send out 2) Action: Send SignalGroup with update of GroupSignal to Value_1 (Triggered without repetition) [SWS_Com_00769] - Result: I-PDU is sent only one time - Result: GroupSignal values are sent with Value_1 	
Needed Adaptation to other Releases	None	
Pre-conditions	FlexRay cluster is synchronized.	
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 (start Ipdu group AT_230_IpduGroup)</p>	<p>BUS:</p> <p>AT_230_Ipdu is not send out</p>
Step 2	<p>SWC:</p>	<p>BUS:</p>

	<p>AT_230_SgGr1.AT_230_GrSg1=AT_230_GrSg1_Value_1 AT_230_SgGr1.AT_230_GrSg2=AT_230_GrSg2_Value_1 Call Rte_Write() for Port AT_230_SgGr1</p> <p>(Rte will Send Group Signal AT_230_GrSg1 with AT_230_GrSg1_Value_1 Send Group Signal AT_230_GrSg2 with AT_230_GrSg2_Value_1 send SignalGroup AT_230_SgGr1 (Triggered without repetition))</p>	<p>AT_230_Ipdu is sent only one time AT_230_GrSg1 value is AT_230_GrSg1_Value_1 AT_230_GrSg2 value is AT_230_GrSg2_Value_1 AT_230_GrSg3 value is AT_230_GrSg3_Value_Init AT_230_GrSg4 value is AT_230_GrSg4_Value_Init AT_230_GrSg5 value is AT_230_GrSg5_Value_Init</p>
Post-conditions	Not Applicable	

3.3.5 [ATS_COMFR_00231] Signal on Time Base and User Request frame (MIXED)

Test Objective	Signal on Time Base and User Request frame (MIXED)		
ID	ATS_COMFR_00231	AUTOSAR Releases	3.2.1 3.2.2 4.0.3 4.1.1
Affected Modules	Com, PduR, FrIf, Fr	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00117		
Trace to R4.1.1 Item	COM: SWS_Com_00222 COM: SWS_Com_00734		
Requirements / Reference to Test Environment	Use Case UC01.01		
Configuration Parameters	<p>SignalIPdu: AT_231_Ipdu1</p> <ul style="list-style-type: none"> - CommConnectorPort.communicationDirection = SEND - IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming -- MIXED (EventControlledTiming and CyclicTiming) --- NumberOfRepetitions = 1 --- timeOffset >= 4 * gdCycle --- timePeriod >= 2 * gdCycle (different from timeOffset) <p>ISignalToPduMapping: Sg1</p> <ul style="list-style-type: none"> - transferProperty = TRIGGERED_ON_CHANGE - ISignal.initValue = Sg1_Value_Init != Sg1_Value_1 <p>[Immediate Tx DYNAMIC Frame] FlexRayFrameTriggering</p> <ul style="list-style-type: none"> - FlexrayAbsolutelyScheduledTiming.CycleRepetition = 1 - FlexrayAbsolutelyScheduledTiming.slotID (Dynamic) <p>FrIfTxPdu(Pdu)</p>		

	<ul style="list-style-type: none"> - FrIfImmediate = True - FrIfNoneMode = False 	
Summary	<p>Aim:</p> <ul style="list-style-type: none"> - Check that send signal is taken into account in the mixed frame <p>Sequence:</p> <p>1) Action: Start IpduGroup</p> <ul style="list-style-type: none"> - Result: I-PDU is sent out after OffsetTime, on next associated slot execution [SWS_Com_00222] - Result: I-PDU is sent out every PeriodTime, on next associated slot execution (Tx Mode PERIODIC [SWS_Com_00222]) - Result: Signal value is initial value (Value_Init) <p>2) Action: Update signal (triggered on change) with a new value Value_1 [SWS_Com_00734]</p> <ul style="list-style-type: none"> - Result: an I-PDU send out event is added between two I-PDU send out period - Result: Signal is the new value <p>3) Action: Update signal (triggered on change) with the same value Value_1 [SWS_Com_00734]</p> <ul style="list-style-type: none"> - Result: I-PDU send out period is not change (event I-PDU was not send) - Result: Signal is the same value 	
Needed Adaptation to other Releases	None	
Pre-conditions	FlexRay cluster is synchronized.	
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 (start Ipdu group AT_231_IpduGroup)</p>	<p>BUS:</p> <p>AT_231_Ipdu is sent out after OffsetTime, on next associated slot execution. Then, AT_231_Ipdu is sent out every PeriodTime, on next associated slot execution AT_231_Sg1 value is initial value (AT_231_Sg1_Value_Init)</p>
Step 2	<p>SWC:</p> <p>Update signal AT_231_Sg1 (triggered on change) with a new value AT_231_Sg1_Value_1</p>	<p>BUS:</p> <p>An AT_231_Ipdu send out event is added between two AT_231_Ipdu send out period AT_231_Sg1 value is AT_231_Sg1_Value_1</p>
Step 3	<p>SWC:</p> <p>Update signal AT_231_Sg1 (triggered on change) with the same value AT_231_Sg1_Value_1</p>	<p>BUS:</p> <p>AT_231_Ipdu send out period is not change (event ipdu was not send) AT_231_Sg1 value is AT_231_Sg1_Value_1</p>
Post-conditions	Not Applicable	

3.3.6 [ATS_COMFR_00232] Signal Goup on Time Base and User Request frame (MIXED)

Test Objective	Signal Goup on Time Base and User Request frame (MIXED)		
ID	ATS_COMFR_00232	AUTOSAR Releases	3.2.1 3.2.2 4.0.3 4.1.1
Affected Modules	Com, PduR, Frlf, Fr	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00117		
Trace to R4.1.1 Item	COM: SWS_Com_00222 COM: SWS_Com_00743		
Requirements / Reference to Test Environment	Use Case UC01.01		
Configuration Parameters	<p>SignalIPdu: AT_232_Ipdu1</p> <ul style="list-style-type: none"> - CommConnectorPort.communicationDirection = SEND - IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming -- MIXED (EventControlledTiming and CyclicTiming) --- NumberOfRepetitions = 1 --- timeOffset >= 4 * gdCycle --- timePeriod >= 2 * gdCycle (different from timeOffset) <p>ISignalToPduMapping: SgGr1</p> <ul style="list-style-type: none"> - transferProperty = TRIGGERED_WITHOUT_REPETITION - ISignalToPduMapping: GrSg1 -- ISignal.initValue = GrSg1_Value_Init != GrSg1_Value_1 - ISignalToPduMapping: GrSg2 -- ISignal.initValue = GrSg2_Value_Init != GrSg2_Value_1 <p>[Immediate Tx DYNAMIC Frame]</p> <p>FlexRayFrameTriggering</p> <ul style="list-style-type: none"> - FlexrayAbsolutelyScheduledTiming.CycleRepetition = 1 - FlexrayAbsolutelyScheduledTiming.slotID (Dynamic) 		
Summary	<p>Aim:</p> <ul style="list-style-type: none"> - Check that send SignalGroup is taken into account in the mixed frame <p>Sequence:</p> <ol style="list-style-type: none"> 1) Action: Start IpduGroup <ul style="list-style-type: none"> - Result: I-PDU is sent out after OffsetTime, on next associated slot execution [SWS_Com_00222] - Result: I-PDU is sent out every PeriodTime, on next associated slot execution (Tx Mode PERIODIC [SWS_Com_00222]) - Result: GroupSignal value is initial value (Value_Init) 2a) Action: Update GroupSignal (triggered on change) with the initial value 2b) Action: Send SignalGroup (triggered on change) [SWS_Com_00743] <ul style="list-style-type: none"> - Result: I-PDU send out period is not change (event I-PDU was not send) - Result: GroupSignal values are initial values 3a) Action: Update GroupSignal (triggered on change) with a new value 3b) Action: Send SignalGroup (triggered on change) [SWS_Com_00743] <ul style="list-style-type: none"> - Result: an I-PDU send out event is added between two I-PDU send out period - Result: GroupSignal is the new value 		

Needed Adaptation to other Releases	None	
Pre-conditions	FlexRay cluster is synchronized.	
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 IpduGroup AT_232_IpduGroup)</p>	<p>BUS:</p> <p>AT_232_Ipdu is sent out after OffsetTime, on next associated slot execution. Then, AT_232_Ipdu is sent out every PeriodTime, on next associated slot execution (Tx Mode PERIODIC) AT_232_GrSg1 value is initial value (AT_232_GrSg1_Value_Init) AT_232_GrSg2 value is initial value (AT_232_GrSg2_Value_Init)</p>
Step 2	<p>SWC:</p> <p>AT_232_SgGr1.AT_232_GrSg1 = AT_232_GrSg1_Value_Init AT_232_SgGr1.AT_232_GrSg2 = AT_232_GrSg2_Value_Init call Rte_Write() API for Port AT_232_SgGr1</p> <p>(Rte will send GroupSignal AT_232_GrSg1 with the initial value (AT_232_GrSg1_Value_Init) send GroupSignal AT_232_GrSg2 with the initial value (AT_232_GrSg2_Value_Init) send SignalGroup AT_232_SgGr1 (triggered on change))</p>	<p>BUS:</p> <p>AT_232_Ipdu send out period is not change (event I-PDU was not send) AT_232_GrSg1 value is initial value (AT_232_GrSg1_Value_Init) AT_232_GrSg2 value is initial value (AT_232_GrSg2_Value_Init)</p>
Step 3	<p>SWC:</p> <p>AT_232_SgGr1.AT_232_GrSg1 = AT_232_GrSg1_Value_Init AT_232_SgGr1.AT_232_GrSg2 = AT_232_GrSg2_Value_1 call Rte_Write() API for Port AT_232_SgGr1 (Rte will call Com_SendSignal for AT_232_GrSg2 and send SignalGroup for AT_232_SgGr1 as property is triggered on change)</p>	<p>BUS:</p> <p>An AT_232_Ipdu send out event is added between two I-PDU send out period AT_232_GrSg1 value is initial value (AT_232_GrSg1_Value_Init) AT_232_GrSg2 value is the new value (AT_232_GrSg2_Value_1)</p>
Post-conditions	Not Applicable	

3.3.7 [ATS_COMFR_00281] Frame transmission when IPDU Group is stopped

Test Objective	Frame transmission when IPDU Group is stopped		
ID	ATS_COMFR_00281	AUTOSAR Releases	4.0.3 4.1.1

Affected Modules	COM, FrIf	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00117		
Trace to R4.1.1 Item	FlexRayInterface: SWS_FrIf_05287 COM: SWS_Com_00800		
Requirements / Reference to Test Environment	Use Case UC01.01		
Configuration Parameters	<p>[DECOUPLED TX DYNAMIC FRAME]: 2 ComIpdu: AT_281_Ipdu1, AT_281_Ipdu2 Both PDUs have configured PDU update Bits FlexrayAbsolutelyScheduledTiming.CycleRepetition= 64 (to ensure time to switch IPDU Group State)</p> <p>SignalIPdu: AT_281_Ipdu1 - IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming -- DIRECT(EventControlledTiming) --- NumberOfRepetition = 0</p> <p>SignalIPdu: AT_281_Ipdu2 - IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming -- PERIODIC (CyclicTiming) --- timePeriod = 320ms --- timeOffset = (5ms)</p>		
Summary	<p>Aim:</p> <p>Check the transmission behavior of the Fr Frame transmission.</p> <ul style="list-style-type: none"> - In case the FlexRay frame layout only contains stopped PDUs at the point in time they are triggered to be sent by the FlexRay Interface, no FlexRay Frame shall be transmitted. - In case the FlexRay frame layout contains at least one started PDU at the point in time they are triggered to be sent by the FlexRay Interface, the FlexRay Frame shall be transmitted. 		
Needed Adaptation to other Releases			
Pre-conditions	FlexRay cluster is synchronized.		
Main Test Execution			
Test Steps		Pass Criteria	
Step 1	<p><u>SWC:</u></p> <p>Request ModeSwitch (call Rte_Switch associated to BswMMode port) to IPDU_ACTIVATED for IPDU Group AT_281_IpduGroup1 and IPDU Group AT_281_IpduGroup2</p>		<p><u>BUS:</u></p> <p>The Frame should be observed on bus after OffsetTime with</p> <p>PDU update bit of AT_281_Ipdu1 not set</p> <p>PDU update bit of AT_281_Ipdu2 set</p>

Step 2	<p><u>SWC:</u></p> <p>Call Rte_Write() API for Port AT_281_Sg1 (Trigger)</p>	<p><u>BUS:</u></p> <p>The Frame should be observed on bus with</p> <p>PDU update bit of AT_281_Ipdu1 set</p> <p>PDU update bit of AT_281_Ipdu2 set</p>
Step 3	<p><u>SWC:</u></p> <p>Call Rte_Write() API for Port AT_281_Sg1 (Trigger),</p> <p>Before the Frame is send on the bus call Rte_Switch associated to BswMMode port to IPDU_DEACTIVATED for IPDU Group AT_281_IpduGroup1</p>	<p><u>BUS:</u></p> <p>The Frame should be observed on bus with</p> <p>PDU update bit of AT_281_Ipdu1 not set</p> <p>PDU update bit of AT_281_Ipdu2 set</p>
Step 4	<p><u>SWC:</u></p> <p>Request ModeSwitch (call Rte_Switch associated to BswMMode port) to IPDU_DEACTIVATED for IPDU Group AT_281_IpduGroup2</p>	<p><u>BUS:</u></p> <p>Frame should not be observed on bus</p>
Step 5	<p><u>SWC:</u></p> <p>Request ModeSwitch (call Rte_Switch associated to BswMMode port) to IPDU_ACTIVATED for IPDU Group AT_281_IpduGroup1</p>	<p><u>BUS:</u></p> <p>Frame should not be observed on bus</p>
Step 6	<p><u>SWC:</u></p> <p>Call Rte_Write() API for Port AT_281_Sg1 (Trigger)</p>	<p><u>BUS:</u></p> <p>The Frame should be observed on bus with</p> <p>PDU update bit of AT_281_Ipdu1 set</p> <p>PDU update bit of AT_281_Ipdu2 not set</p>
Step 7	<p><u>SWC:</u></p> <p>Call Rte_Write() API for Port AT_281_Sg1 (Trigger),</p> <p>Before the Frame is send on the bus call Rte_Switch associated to BswMMode port to IPDU_DEACTIVATED for IPDU Group AT_281_IpduGroup1</p>	<p><u>BUS:</u></p> <p>Frame should not be observed on bus</p>
Post-conditions	<p>Not Applicable</p>	

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:

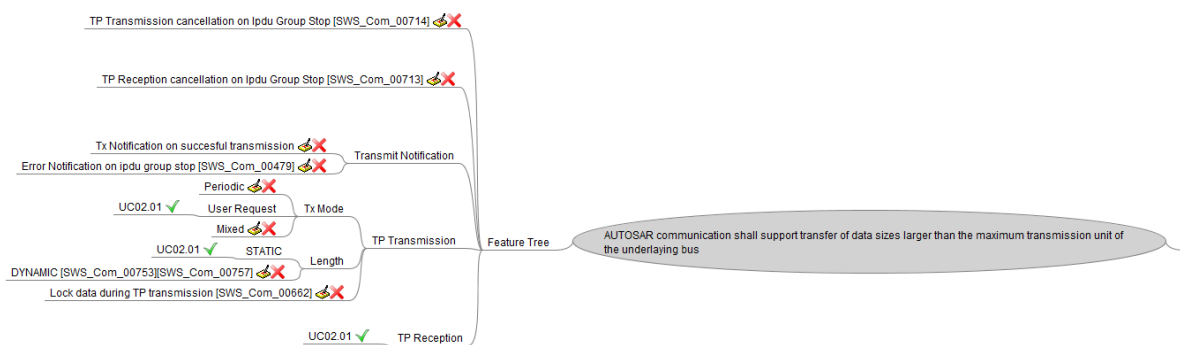


Figure 5 Mindmap of the features covered and not covered in the test cases

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: FlexRay Bus

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

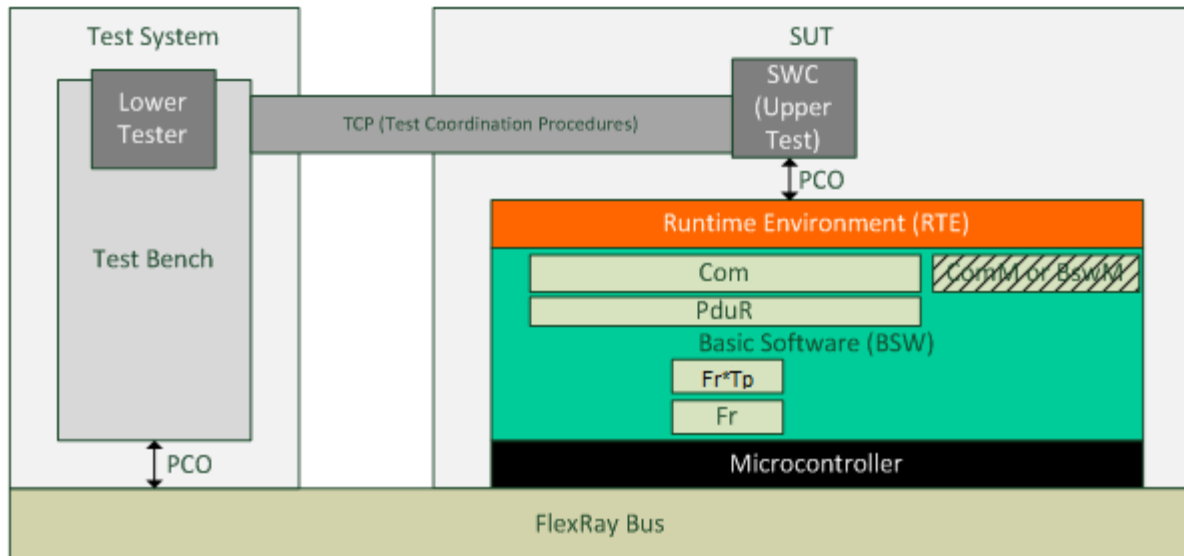


Figure 6 Acceptance test architecture required for the test cases

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

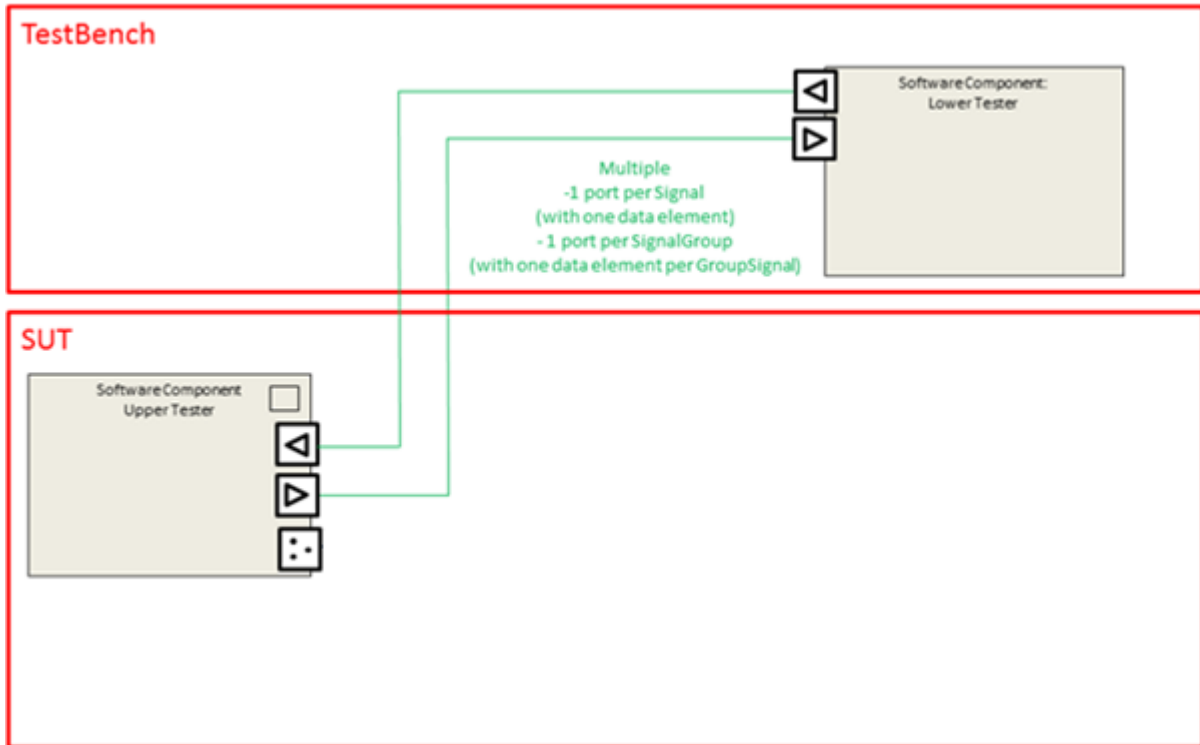


Figure 7 Required SWC description

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

Port name	Data element type	Dataelement	Mapping	Type
<TestCaseName>_<signalname>	Uin8	<signalname>	<Signalname>	Signal
<TestCaseName>_<signalgroupname>	Struct { Uin8: groupsignal1; ... Uin8: groupsignalx; }	Groupsignal	Groupsignal1-> <signal1name> Groupsignal2-> <signal2name> <PortName>-> <signalgroupname>	Signal Group

Table 5 SWC Interface used

Therefore ports and signals names change 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 (RTE restriction concerning Large Data Type) and Explicit Data access for associated runnables.

4.1.2.1.1 Use Case 02.01: FlexRay Bus

The communication database is depicted below:

IPduGroup	IPdu	Signal	Tx ECU	Rx ECU
AT_240_IpduGroup	AT_240_Ipdu	AT_240_Sg1	SUT	TestBench
AT_278_IpduGroup	AT_278_Ipdu	AT_278_Sg1	TestBench	SUT

Table 6 Communication Database

4.1.2.2 Required ECU Configuration Description Files

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 7.

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)
- FlexRay 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_COMFR_00240] Large Data TP transmission on FlexRay (> 254 bytes)

Test Objective	Large Data TP transmission on FlexRay (> 254 bytes)		
ID	ATS_COMFR_00240	AUTOSAR Releases	4.0.3 4.1.1
Affected Modules	Com, PduR, FrTp, FrIf, Fr	State	reviewed
Trace to Requirement on Acceptance	ATR: ATR_ATR_00118		

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_240_Ipdu1 (large I-PDU)</p> <ul style="list-style-type: none"> - length = 255 (large, greater than a Single Frame) - ComIPduType = TP(TpConfig.TpConnection) - ComIPduDirection(CommConnectorPort.communicationDirection) = SEND - ComTxModeTrue (IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming) -- DIRECT(EventControlledTiming) --- NumberOfRepetitions = 1 <p>ComSignal(ISignalToPduMapping): Sg1</p> <ul style="list-style-type: none"> - dataElement with queued swImplPolicy - DataSendCompletedEvent mapped on signal transmission (ComNotification is configured) - ComTransferProperty (transferProperty) = TRIGGERED <p>PduRRoutingPath:</p> <ul style="list-style-type: none"> - Routing path for ComIPdu with PduRSrcBswModuleRef = BswMod_Com - PduRDestPdu with PduRDestBswModuleRef = BswMod_FrTp 			
Summary	<p>Aim:</p> <ul style="list-style-type: none"> - Check that Application layer can initiate a TP transmission greater than 254 bytes on FlexRay bus 			
Needed Adaptation to other Releases	<table border="1"> <tr> <td>Configuration: [n/a]</td> <td rowspan="2">Large data types and TP for regular COM is not possible in R3.x. This test case shall be removed</td> </tr> <tr> <td>Test Steps: [n/a]</td> </tr> </table>	Configuration: [n/a]	Large data types and TP for regular COM is not possible in R3.x. This test case shall be removed	Test Steps: [n/a]
Configuration: [n/a]	Large data types and TP for regular COM is not possible in R3.x. This test case shall be removed			
Test Steps: [n/a]				
Pre-conditions	<p>Com stack is initialized AT_240_IpduGroup is running</p>			
Main Test Execution				
Test Steps	Pass Criteria			
Step 1	<p>SWC:</p> <p>Call Rte_Send() for Port AT_240_Sg1 with AT_240_Sg1_Value_1 (Send AT_240_Sg1 with AT_240_Sg1_Value_1 (this will initiate a TP transmission with 255 bytes))</p>	<p>BUS:</p> <p>First Frame is received Frame ML (Message Length) is 255 bytes</p>		
Step 2	<p>BUS:</p> <p>Send Flow Control Clear to Send (BfS = <Message Length> = 255, BC = 0).</p>	<p>BUS:</p> <p>All needed Consecutive Frames are received</p>		
Step 3	<p>BUS:</p> <p>Wait Last Frame reception</p>	<p>BUS:</p> <p>Last Frame is received Frame Length is sufficient to received</p>		

		last data bytes (nearest word value greater than or equal to needed length) AT_240_Sg1 value is AT_240_Sg1_Value_1
Post-conditions		

4.3.2 [ATS_COMFR_00278] Large Data TP reception on FlexRay (> 254 bytes)

Test Objective	Large Data TP reception on FlexRay (> 254 bytes)		
ID	ATS_COMFR_00278	AUTOSAR Releases	4.0.3 4.1.1
Affected Modules	Com, PduR, FrTp, Frlf, Fr	State	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00118		
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_278_Ipdu1 (large I-PDU) - length = 255 (large, greater than a Single Frame) - ComIpduType = TP(TpConfig.TpConnection) - ComIpduDirection(CommConnectorPort.communicationDirection) = RECEIVE</p> <p>ComSignal(ISignalToPduMapping): Sg1 - dataElement with queued swImplPolicy - DataReceivedEvent mapped on signal reception (ComNotification is configured)</p> <p>PduRRoutingPath: - Routing path for ComIpdu with PduRSrcBswModuleRef = BswMod_FrTp - PduRDestPdu with PduRDestBswModuleRef = BswMod_Com</p>		
Summary	<p>Aim: - Check that Application layer can receive a TP Data greater or equal than 254 bytes on FlexRay bus</p>		
Needed Adaptation to other Releases	<p>Configuration: [n/a]</p> <p>Test Steps: [n/a]</p>	<p>Large data types and TP for regular COM is not possible in R3.x.</p> <p>This test case shall be removed</p>	
Pre-conditions	<p>Com stack is initialized AT_278_IpduGroup is running</p>		
Main Test Execution			

Test Steps		Pass Criteria
Step 1	<p>Lower Tester:</p> <p>Send Signal AT_278_Sg1 with AT_278_Sg1_Value_1 (this will initiate a TP transmission with 255 bytes)</p>	<p>BUS:</p> <p>First Frame is sent Frame ML (Message Length) is 255 bytes</p>
Step 2	<p>BUS:</p> <p>Wait reception of Flow Control Clear to Send</p>	<p>BUS:</p> <p>Flow Control Clear to Send is received</p>
Step 3	<p>Lower Tester:</p> <p>Send all needed Consecutive Frames in response to Flow Control Frames from SUT</p>	
Step 4	<p>Lower Tester:</p> <p>Send Last Frame with last data bytes</p>	
Step 5	<p>TCP:</p> <p>Wait DataReceivedEvent</p>	<p>SWC:</p> <p>DataReceivedEvent is activated</p>
Step 6	<p>SWC:</p> <p>Call Rte_Receive() for AT_278_Sg1</p>	<p>SWC:</p> <p>AT_278_Sg1 value is AT_278_Sg1_Value_1 Return Value of Rte_Receive is RTE_E_OK</p>
Post-conditions		