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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 • New test cases for LdCom
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2014-07-30	1.0.0	AUTOSAR Release Management	Initial release, including test suites on • RS_BRF_01592 – Data Transfer • RS_BRF_01648 – Large Data Type

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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 Related Documentation

2.1 Input documents

[1] Specification of Module Efficient COM for Large Data
AUTOSAR_SWS_LargeDataCOM.pdf

[2] Specification of RTE
AUTOSAR_SWS_RTE.pdf

[3] Specification of FlexRay ISO Transport Layer
AUTOSAR_SWS_FlexRayISOTransportLayer.pdf

[4] Specification of FlexRay Interface
AUTOSAR_SWS_FlexRayInterface.pdf

[5] Requirements on Runtime Environment
AUTOSAR_SRS_RTE.pdf

[6] Requirements on Communication
AUTOSAR_SRS_COM.pdf

[7] System Template
AUTOSAR_TPS_SystemTemplate.pdf

[8] Requirements on Acceptance Tests
AUTOSAR_ATR_Requirements.pdf

[9] Requirements on AUTOSAR Features
AUTOSAR_RS_Features.pdf

3 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.

4 RS_BRF_01592 - Data Transfer

4.1 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

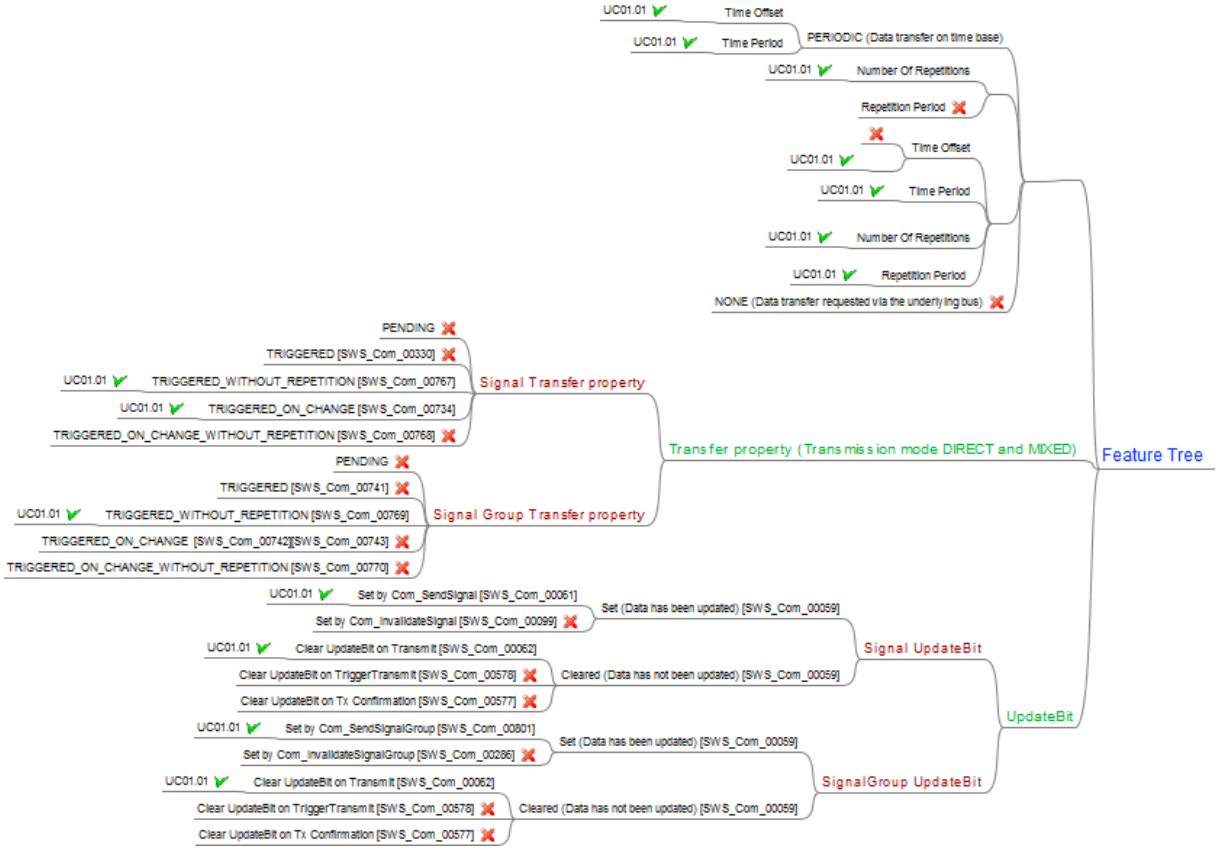

Figure 1 Mindmap of the features covered and not covered in the test cases

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

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 01.01: FlexRay Bus

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

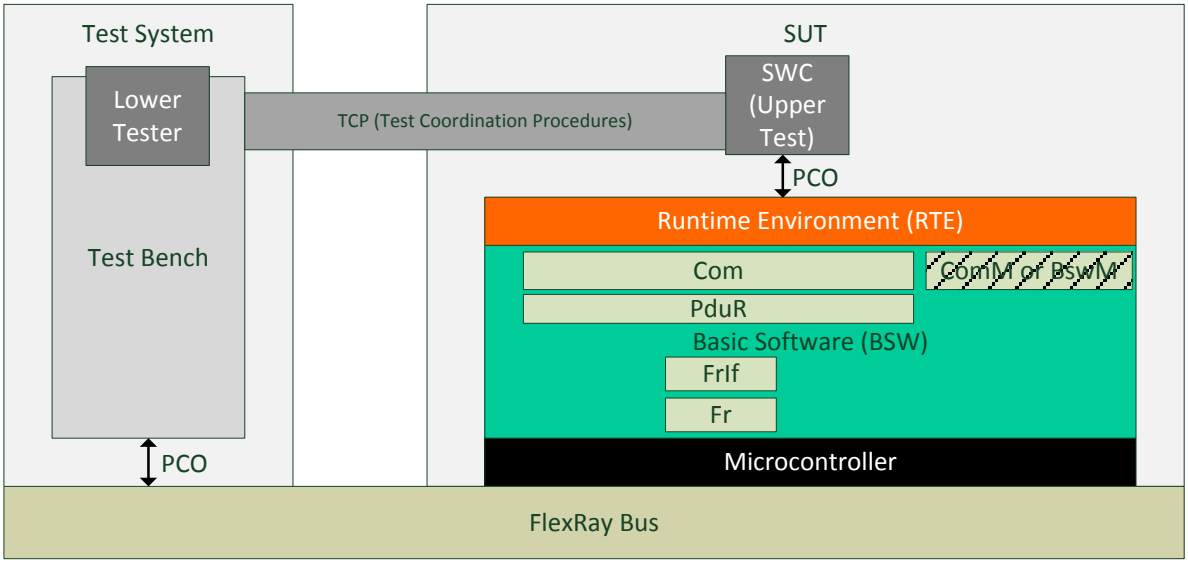

Figure 2 Acceptance test architecture required for the test cases

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

4.1.1.2 Specific Requirements

4.1.1.2.1 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.

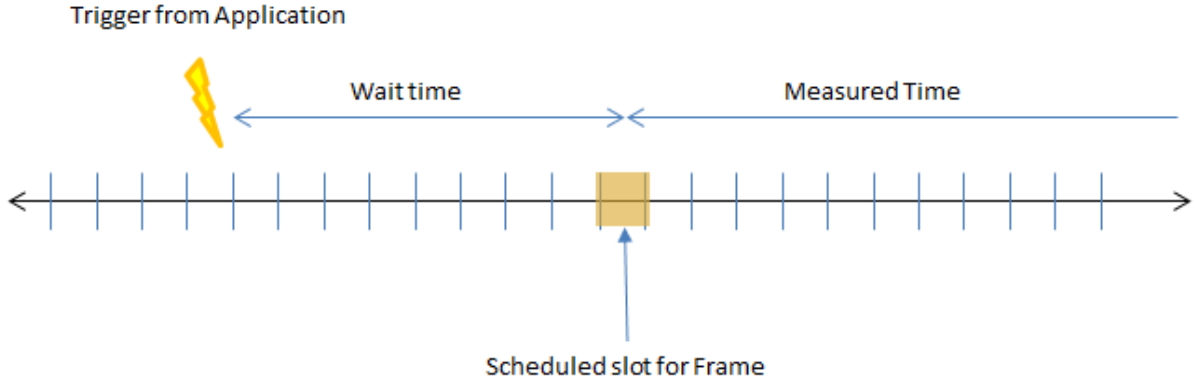

Figure 3 Flexray Scheduled frame Transmission

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

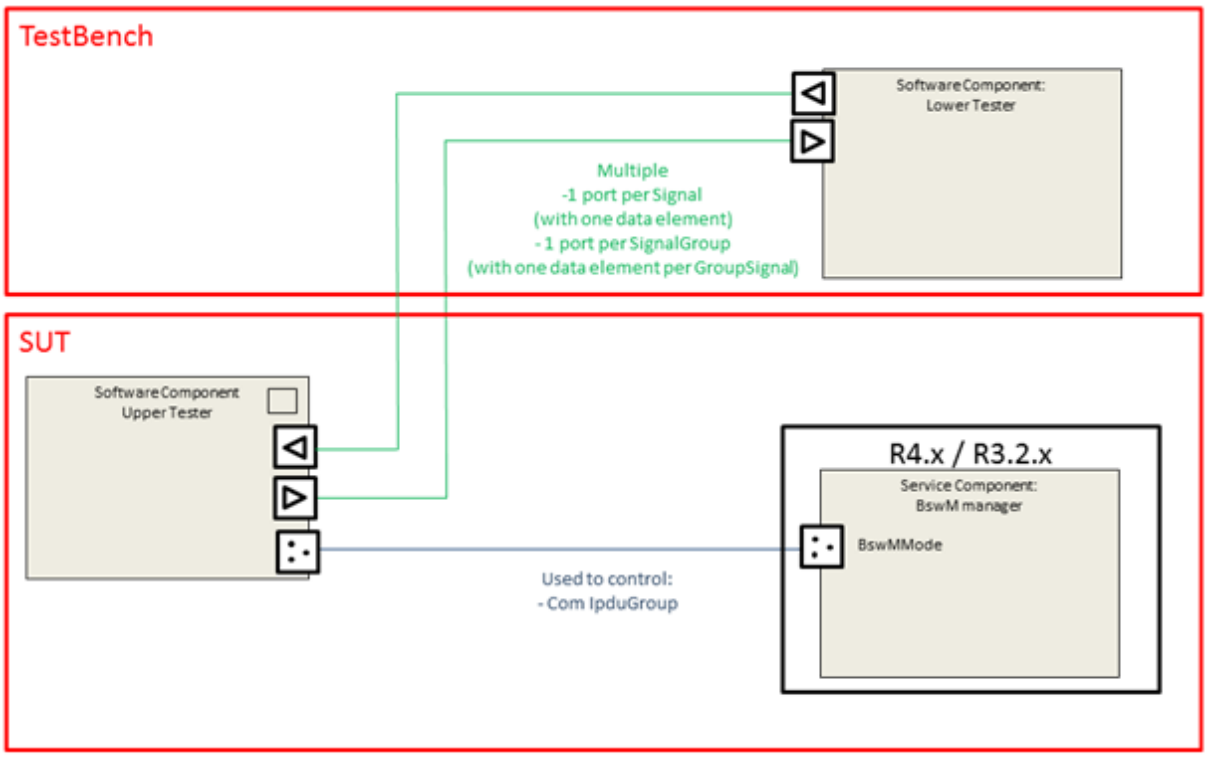

Figure 4 Required SWC description

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 4.3 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.

4.1.2.1.1 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	SUT	TestBench
			AT_228_GrSg2		
AT_229_IpduGroup	AT_229_Ipdu		AT_229_Sg1	SUT	TestBench
			AT_229_Sg2		
AT_230_IpduGroup	AT_230_Ipdu	AT_230_SgGr1	AT_230_GrSg1	SUT	TestBench
			AT_230_GrSg2		
		AT_230_SgGr2	AT_230_GrSg3		
			AT_230_GrSg4		
			AT_230_GrSg5		

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

4.1.2.2 Required ECU Configuration Description Files

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

4.1.2.3 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.

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
- 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_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|4.2.1|4.2.2
Affected Modules	Com, PduR, FrIf, Fr	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00117		
Trace to SWS 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	SignalIPdu: AT_227_Ipdu1 - CommConnectorPort.communicationDirection = SEND - IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming -- PERIODIC (CyclicTiming) --- timeOffset >= 4 * gdCycle --- timePeriod >= 2 * gdCycle (different from timeOffset) - ComTxIPduClearUpdateBit(no upstream template parameter) = Transmit ISignalToPduMapping: Sg1 - updateIndicationBitPosition is configured - ISignal.initValue = Sg1_Value_Init != Sg1_Value_1 [Immediate Tx STATIC Frame] FlexRayFrameTriggering - FlexrayAbsolutelyScheduledTiming.CycleRepetition = 1 - FlexrayAbsolutelyScheduledTiming.slotID (Static) FrIfTxPdu(Pdu) - FrIfImmediate = True - FrIfNoneMode = False		
Summary	Aim: - Check that send signal is taken into account in the periodic frame Sequence: 1) Action: Start Ipdu Group - 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 - 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	None.		

Adaptation to other Releases		
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_227_IpduGroup)	***[LT<FR>]*** 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	***[LT<FR>]*** 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	

4.3.2 [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|4.2.1|4.2.2
Affected Modules	Com, PduR, FrIf, Fr	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00117		
Trace to SWS 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 - 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
Summary	Aim: - Check that send SignalGroup is taken into account in the periodic frame Sequence: 1) Action: Start Ipdu Group - 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 - 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
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_228_IpduGroup)	***[LT<FR>]*** 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)

Step 2	***[SWC]*** SgGr1.AT_228_GrSg1 = AT_228_GrSg1_Value_1 SgGr1.AT_228_GrSg1=AT_228_GrSg2_Value_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)	***[LT<FR>]*** 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	

4.3.3 [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|4.2.1|4.2.2
Affected Modules	Com, PduR, FrIf, Fr	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00117		
Trace to SWS 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 - FlexrayAbsolutelyScheduledTiming.CycleRepetition = 1 - FlexrayAbsolutelyScheduledTiming.slotID (Dynamic) FrIfTxPdu(Pdu) - FrIfImmediate = True - FrIfNoneMode = False		

Summary	Aim: - Check that send signal is taken into account in the direct frame Sequence: 1) Action: Start Ipdu Group - Result: Ipdu is not send out 2) Action: Update signal with Value_1 (Triggered without repetition) [SWS_Com_00767] - 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)	***[LT<FR>]*** 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)	***[LT<FR>]*** 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	

4.3.4 [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|4.2.1|4.2.2
Affected Modules	Com, PduR, FrIf, Fr	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00117		
Trace to SWS Item	COM: SWS_Com_00769		
Requirements / Reference to Test Environment	Use Case UC01.01		
Configuratio	SignalIPdu: AT_230_Ipdu1		

n Parameters	- CommConnectorPort.communicationDirection = SEND - IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming -- DIRECT (EventControlledTiming) --- NumberOfRepetitions = 2 --- RepetitionPeriod = Configured based on Frame Property ComSignalGroup(ISignalToPduMapping): SgGr1 - transferProperty = TRIGGERED_WITHOUT_REPETITION - ISignalToPduMapping: GrSg1 -- ISignal.initValue = GrSg1_Value_Init != GrSg1_Value_1 - ISignalToPduMapping: GrSg2 -- ISignal.initValue = GrSg2_Value_Init != GrSg2_Value_1 ISignalToPduMapping: SgGr2 - transferProperty = TRIGGERED - ISignalToPduMapping: GrSg1 -- ISignal.initValue = GrSg1_Value_Init != GrSg1_Value_1 - ISignalToPduMapping: GrSg2 -- ISignal.initValue = GrSg2_Value_Init != GrSg2_Value_1 [Immediate Tx DYNAMIC Frame] FlexRayFrameTriggering/FlexrayAbsolutelyScheduledTiming - CycleRepetition = 1 - slotID (Dynamic) FrIfTxPdu(Pdu) - FrIfImmediate = True - FrIfNoneMode = False
Summary	Aim: - Check that send SignalGroup is taken into account in the direct frame Sequence: 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	***[SWC]*** Request ModeSwitch (call Rte_Switch associated to BswMMode port) to IPDU_ACTIVATED (start Ipdu group AT_230_IpduGroup)	***[LT<FR>]*** AT_230_Ipdu is not send out
Step 2	***[SWC]*** 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	***[LT<FR>]*** 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

	(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))	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
Post-conditions	Not Applicable	

4.3.5 [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|4.2.1|4.2.2
Affected Modules	Com, PduR, FrIf, Fr	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00117		
Trace to SWS Item	COM: SWS_Com_00222 COM: SWS_Com_00734		
Requirements / Reference to Test Environment	Use Case UC01.01		
Configuration Parameters	SignalIPdu: AT_231_Ipdu1 - CommConnectorPort.communicationDirection = SEND - IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming -- MIXED (EventControlledTiming and CyclicTiming) --- NumberOfRepetitions = 0 --- timeOffset >= 4 * gdCycle --- timePeriod >= 2 * gdCycle (different from timeOffset) ISignalToPduMapping: Sg1 - transferProperty = TRIGGERED_ON_CHANGE - ISignal.initValue = Sg1_Value_Init != Sg1_Value_1 [Immediate Tx DYNAMIC Frame] FlexRayFrameTriggering - FlexrayAbsolutelyScheduledTiming.CycleRepetition = 1 - FlexrayAbsolutelyScheduledTiming.slotID (Dynamic) FrIfTxPdu(Pdu) - FrIfImmediate = True - FrIfNoneMode = False		
Summary	Aim: - Check that send signal is taken into account in the mixed frame Sequence: 1) Action: Start IpduGroup - 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) 2) Action: Update signal (triggered on change) with a new value Value_1 [SWS_Com_00734] - Result: an I-PDU send out event is added between two I-PDU send out period - Result: Signal is the new value 3) Action: Update signal (triggered on change) with the same value Value_1 [SWS_Com_00734] - 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	***[SWC]*** Request ModeSwitch (call Rte_Switch associated to BswMMode port) to IPDU_ACTIVATED (start Ipdu group AT_231_IpduGroup)	***[LT<FR>]*** 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)
Step 2	***[SWC]*** Update signal AT_231_Sg1 (triggered on change) with a new value AT_231_Sg1_Value_1	***[LT<FR>]*** 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
Step 3	***[SWC]*** Update signal AT_231_Sg1 (triggered on change) with the same value AT_231_Sg1_Value_1	***[LT<FR>]*** AT_231_Ipdu send out period is not change (event ipdu was not send) AT_231_Sg1 value is AT_231_Sg1_Value_1
Post-conditions	Not Applicable	

4.3.6 [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|4.2.1|4.2.2
Affected Modules	Com, PduR, FrIf, Fr	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00117		

Trace to SWS Item	COM: SWS_Com_00222 COM: SWS_Com_00743
Requirements / Reference to Test Environment	Use Case UC01.01
Configuration Parameters	SignalIPdu: AT_232_Ipdu1 - CommConnectorPort.communicationDirection = SEND - IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming -- MIXED (EventControlledTiming and CyclicTiming) --- NumberOfRepetitions = 0 --- timeOffset >= 4 * gdCycle --- timePeriod >= 2 * gdCycle (different from timeOffset) ISignalToPduMapping: SgGr1 - transferProperty = TRIGGERED_WITHOUT_REPETITION - ISignalToPduMapping: GrSg1 -- ISignal.initValue = GrSg1_Value_Init != GrSg1_Value_1 - ISignalToPduMapping: GrSg2 -- ISignal.initValue = GrSg2_Value_Init != GrSg2_Value_1 [Immediate Tx DYNAMIC Frame] FlexRayFrameTriggering - FlexrayAbsolutelyScheduledTiming.CycleRepetition = 1 - FlexrayAbsolutelyScheduledTiming.slotID (Dynamic)
Summary	Aim: - Check that send SignalGroup is taken into account in the mixed frame Sequence: 1) Action: Start IpduGroup - 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] - 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] - 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	***[SWC]*** Request ModeSwitch (call Rte_Switch associated to BswMMode port) to IPDU_ACTIVATED (start IpduGroup AT_232_IpduGroup)	***[LT<FR>]*** 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)
Step 2	***[SWC]*** 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 (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))	***[LT<FR>]*** 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)
Step 3	***[SWC]*** 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)	***[LT<FR>]*** 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)
Post-conditions	Not Applicable	

4.3.7 [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|4.2.1|4.2.2
Affected Modules	COM, FrIf	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00117		
Trace to SWS Item	FlexRayInterface: SWS_FrIf_05287 COM: SWS_Com_00800		
Requirements / Reference to Test Environment	Use Case UC01.01		
Configuration Parameters	[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)		

	SignalIPdu: AT_281_Ipdu1 - IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming -- DIRECT(EventControlledTiming) --- NumberOfRepetition = 0 SignalIPdu: AT_281_Ipdu2 - IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming -- PERIODIC (CyclicTiming) --- timePeriod = 320ms --- timeOffset = (5ms)
Summary	Aim: Check the transmission behavior of the Fr Frame transmission. - 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	***[SWC]*** Request ModeSwitch (call Rte_Switch associated to BswMMode port) to IPDU_ACTIVATED for IPDU Group AT_281_IpduGroup1 and IPDU Group AT_281_IpduGroup2	***[LT<FR>]*** The Frame should be observed on bus after OffsetTime with PDU update bit of AT_281_Ipdu1 not set PDU update bit of AT_281_Ipdu2 set
Step 2	***[SWC]*** Call Rte_Write() API for Port AT_281_Sg1 (Trigger)	***[LT<FR>]*** The Frame should be observed on bus with PDU update bit of AT_281_Ipdu1 set PDU update bit of AT_281_Ipdu2 set
Step 3	***[SWC]*** Call Rte_Write() API for Port AT_281_Sg1 (Trigger), Before the Frame is send on the bus call Rte_Switch associated to BswMMode port to IPDU_DEACTIVATED for IPDU Group AT_281_IpduGroup1	***[LT<FR>]*** The Frame should be observed on bus with PDU update bit of AT_281_Ipdu1 not set PDU update bit of AT_281_Ipdu2 set

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

5 RS_BRF_01648 - Large Data Type

5.1 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:

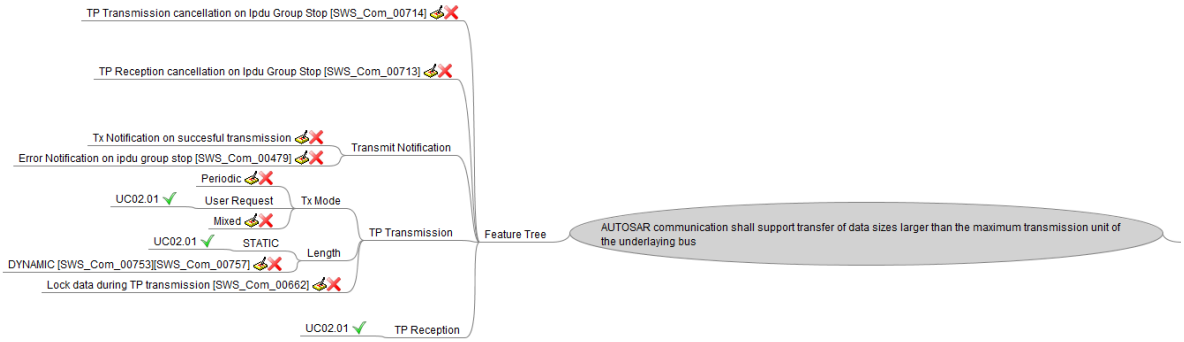

Figure 5 Mindmap of the features covered and not covered in the test cases

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

5.1.1 Test System

5.1.1.1 Overview on Architecture

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

5.1.1.1.1 Use case 02.01: FlexRay Bus

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

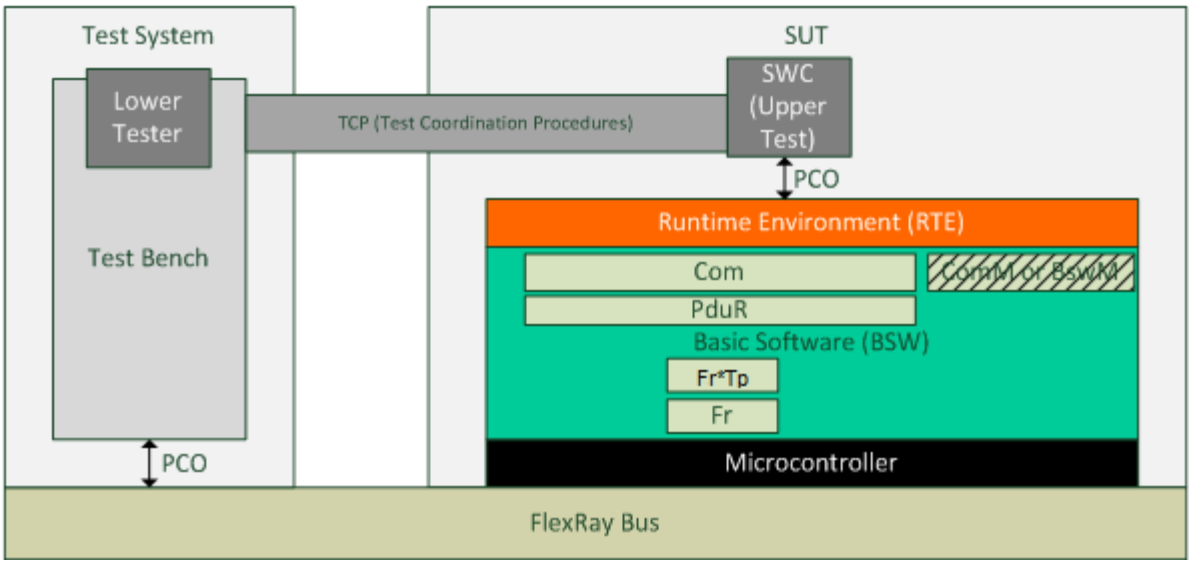

Figure 6 Acceptance test architecture required for the test cases

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

5.1.1.2 Specific Requirements

Not Applicable.

5.1.1.3 Test Coordination Requirements

Not Applicable.

5.1.2 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.

5.1.2.1 Required ECU Extract of System Description Files

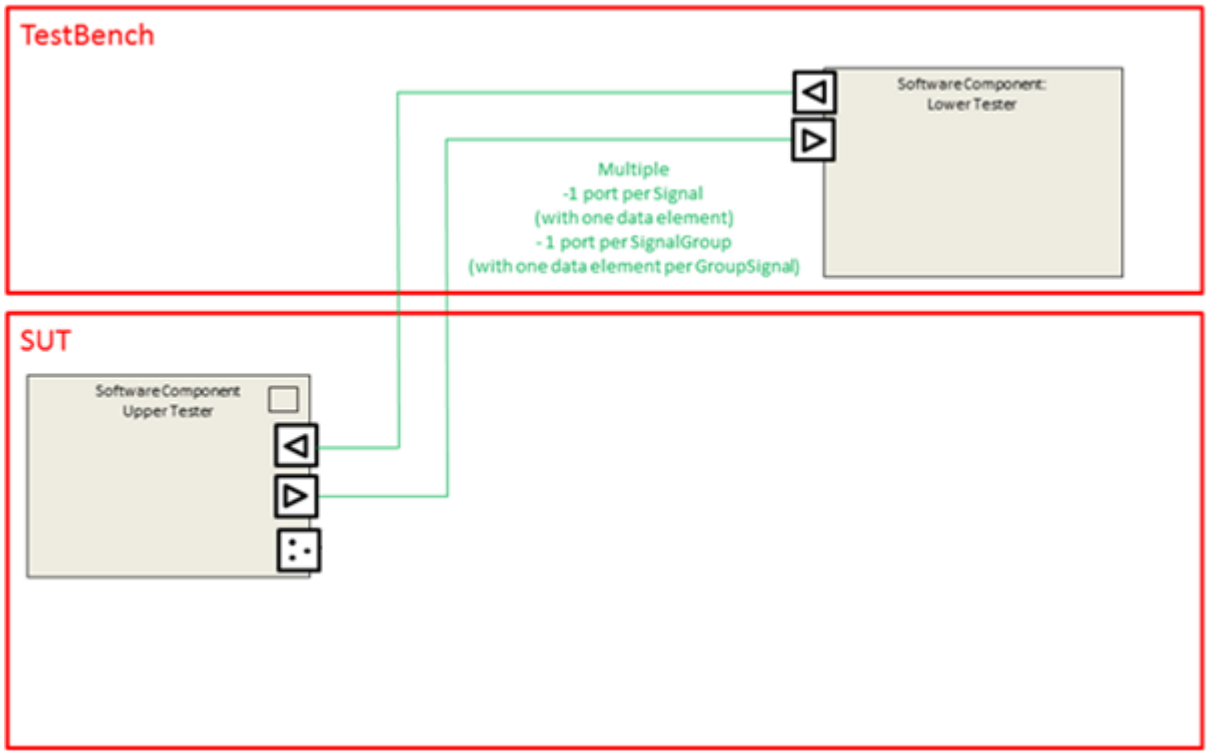

Figure 7 Required SWC description

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>	Uint8	<signalname>	<Signalname>	Signal

<TestCaseName>_<signalgroupname>	Struct
	{
	Uint8: groupsignal1;
	…
	Uint8: 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.

5.1.2.1.1 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

5.1.2.2 Required ECU Configuration Description Files

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

5.1.2.3 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.

5.1.2.4 Mandatory vs. Customizable Parts

Mandatory parameters are listed in Tests Cases (see 5.3 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

5.1.3 Test Case Design

Not Applicable.

5.2 Re-usable Test Steps

Not Applicable.

5.3 Test Cases

5.3.1 [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|4.2.1|4.2.2
Affected Modules	Com, PduR, FrTp, FrIf, Fr	**State**	reviewed
Trace to Requirement on Acceptance	ATR: ATR_ATR_00118		

Test Document	
Trace to SWS Item	COM: ECUC_Com_00761
Requirements / Reference to Test Environment	Use Case UC02.01
Configuration Parameters	ComIpdu(SignalIPdu): AT_240_Ipdu1 (large I-PDU) - length = 255 (large, greater than a Single Frame) - ComIPduType = TP(TpConfig.TpConnection) - ComIPduDirection(CommConnectorPort.communicationDirection) = SEND - ComTxModeTrue (IPduTiming.TransmissionModeDeclaration.transmissionModeTrueTiming) -- DIRECT(EventControlledTiming) --- NumberOfRepetitions = 0 ComSignal(ISignalToPduMapping): Sg1 - dataElement with queued swImplPolicy - DataSendCompletedEvent mapped on signal transmission (ComNotification is configured) - ComTransferProperty (transferProperty) = TRIGGERED PduRRoutingPath: - Routing path for ComIpdu with PduRSrcBswModuleRef = BswMod_Com - PduRDestPdu with PduRDestBswModuleRef = BswMod_FrTp
Summary	Aim: - Check that Application layer can initiate a TP transmission greater than 254 bytes on FlexRay bus
Needed Adaptation to other Releases	Configuration: [n/a] Test Steps: [n/a] `Large data types and TP for regular COM is not possible in R3.x.` This test case shall be removed
Pre-conditions	Com stack is initialized AT_240_IpduGroup is running

Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	***[SWC]*** 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 tramsmission with 255 bytes))	***[LT<FR>]*** First Frame is received Frame ML (Message Length) is 255 bytes
Step 2	***[LT<FR>]*** Send Flow Control Clear to Send (BfS = <Message Length> = 255, BC = 0).	***[LT<FR>]*** All needed Consecutive Frames are received
Step 3	***[LT<FR>]*** Wait Last Frame reception	***[LT<FR>]*** Last Frame is received Frame Length is sufficent to received 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		

5.3.2 [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|4.2.1|4.2.2
Affected Modules	Com, PduR, FrTp, FrIf, Fr	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00118		
Trace to SWS Item	COM: ECUC_Com_00761		
Requirements / Reference to Test Environment	Use Case UC02.01		
Configuration Parameters	ComIpdu(SignalIPdu): AT_278_Ipdu1 (large I-PDU) - length = 255 (large, greater than a Single Frame) - ComIPduType = TP(TpConfig.TpConnection) - ComIPduDirection(CommConnectorPort.communicationDirection) = RECEIVE ComSignal(ISignalToPduMapping): Sg1 - dataElement with queued swImplPolicy - DataReceivedEvent mapped on signal reception (ComNotification is configured) PduRRoutingPath: - Routing path for ComIpdu with PduRSrcBswModuleRef = BswMod_FrTp - PduRDestPdu with PduRDestBswModuleRef = BswMod_Com		
Summary	Aim: - Check that Application layer can receive a TP Data greater or equal than 254 bytes on FlexRay bus		
Needed Adaptation to other Releases	Configuration: [n/a] Test Steps: [n/a]	`Large data types and TP for regular COM is not possible in R3.x.` This test case shall be removed	
Pre-conditions	Com stack is initialized AT_278_IpduGroup is running		
Main Test Execution			
Test Steps			**Pass Criteria**
Step 1	***[LT<FR>]*** Send Signal AT_278_Sg1 with AT_278_Sg1_Value_1 (this will initiate a TP tramsmission with 255 bytes)		***[LT<FR>]*** First Frame is sent Frame ML (Message Length) is 255 bytes

Step 2	***[LT<FR>]*** Wait reception of Flow Control Clear to Send	***[LT<FR>]*** Flow Control Clear to Send is received
Step 3	***[LT<FR>]*** Send all needed Consecutive Frames in response to Flow Control Frames from SUT	
Step 4	***[LT<FR>]*** Send Last Frame with last data bytes	
Step 5	***[SWC]*** Wait DataReceivedEvent	***[SWC]*** DataReceivedEvent is activated
Step 6	***[SWC]*** Call Rte_Receive() for AT_278_Sg1	***[SWC]*** AT_278_Sg1 value is AT_278_Sg1_Value_1 Return Value of Rte_Receive is RTE_E_OK
Post-conditions		

5.3.3 [ATS_COMFR_00708] Unsegmented Unacknowledged Data Transfer with known Message Length

Test Objective	Unsegmented Unacknowledged Data Transfer with known Message Length		
ID	ATS_COMFR_00708	**AUTOSAR Releases**	4.0.3|4.1.1|4.2.1|4.2.2
Affected Modules	FrTp	**State**	accepted
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00118		
Trace to SWS Item	FlexRayISOTransportLayer: SWS_FrTp_01007		
Requirements / Reference to Test Environment	Use Case UC02.01		
Configuration Parameters	FrTpUnknownMsgLength = FALSE TransportProtocols::FlexRayTpConnection.transmitter = E.g. 0x03 TransportProtocols::FlexRayTpConnection.receiver = E.g. 0x04 TransportProtocols::FlexRayTpConnection.multicast = TRUE TransportProtocols::FlexRayTpConnectionControl.timeoutAr TransportProtocols::FlexRayTpConnectionControl.timeoutAs TransportProtocols::FlexRayTpConnectionControl.timeBr TransportProtocols::FlexRayTpConnectionControl.timeoutBs TransportProtocols::FlexRayTpConnectionControl.timeoutCr Signal configuration: Fibe.g. :FibexCore::CoreCommunication::TransmissionModeTiming = DIRECT		

	Fibe.g. :FibexCore::CoreCommunication::Timing.EventControlledTiming.numberOfRepeats = E.g. 2 (user configurable) Fibe.g. :FibexCore::CoreCommunication::EventControlledTiming.repetitionPeriod = E.g. 100 ms (user configurable)	
Summary	Aim: To test DUT for transmission of unsegmented unacknowledged data with known message length.	
Needed Adaptation to other Releases		
Pre-conditions	1. DUT shall be initialized 2. DUT shall be in run state 3. DUT shall be in full communication	
Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[SWC] SWC shall trigger Rte_Write to send valid data on signal Sg1.	[SWC] Rte_Write shall return RTE_E_OK.
Step 2	[LT <FR>] Tester shall monitor and validate the frame.	[LT <FR>] Tester shall observe frames on the bus which are sent by DUT.
Step 3	-	[SWC] FrTp_TxConfirmation for the configured signal shall be invoked.
Post-conditions		

5.3.4 [ATS_COMFR_00709] Unsegmented Acknowledged Data Transfer with known Message Length

Test Objective	Unsegmented Acknowledged Data Transfer with known Message Length		
ID	ATS_COMFR_00709	**AUTOSAR Releases**	4.0.3|4.1.1|4.2.1|4.2.2
Affected Modules	FrTp	**State**	accepted
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00118		
Trace to SWS Item	FlexRayISOTransportLayer: SWS_FrTp_01008		
Requirements / Reference to Test Environment	Use Case UC02.01		
Configuration Parameters	TransportProtocols::FlexRayTpConnection.transmitter = E.g. 0x03 TransportProtocols::FlexRayTpConnection.receiver = E.g. 0x04		

	TransportProtocols::FlexRayTpConnection.multicast = TRUE TransportProtocols::FlexRayTpConnectionControl.timeoutAr TransportProtocols::FlexRayTpConnectionControl.timeoutAs TransportProtocols::FlexRayTpConnectionControl.timeBr TransportProtocols::FlexRayTpConnectionControl.timeoutBs TransportProtocols::FlexRayTpConnectionControl.timeoutCr TransportProtocols::FlexRayTpConnectionControl.timeFrif FrTpAckRt = TRUE Signal configuration: Fibe.g. :FibexCore::CoreCommunication::TransmissionModeTiming = DIRECT Fibe.g. :FibexCore::CoreCommunication::Timing.EventControlledTiming.numberOfRepeats = E.g. 2 (user configurable) Fibe.g. :FibexCore::CoreCommunication::EventControlledTiming.repetitionPeriod = E.g. 100 ms (user configurable)
Summary	Aim: To test DUT for transmission of unsegmented acknowledged data with known message length.
Needed Adaptation to other Releases	
Pre-conditions	1. DUT shall be initialized 2. DUT shall be in run state 3. DUT shall be in full communication
Main Test Execution	
Test Steps	**Pass Criteria**
Step 1	[SWC] SWC shall trigger Rte_Write to send valid data on signal Sg1. [SWC] Rte_Write shall return RTE_E_OK.
Step 2	[LT <FR>] Tester shall monitor and validate the frame. [LT <FR>] Tester shall observe frames on the bus which are sent by DUT. Tester shall send acknowledgement for flow control information (FlowControl_ACK).
Step 3	[SWC] SWC shall trigger Rte_Write to send valid data on signal Sg1. [SWC] Rte_Write shall return RTE_E_OK.
Step 4	[LT <FR>] Tester shall monitor and validate the frame. [LT <FR>] Tester shall observe no frames on bus with values sent by DUT. Tester shall send retry for flow control information (FRTP_ACK_WITH_RT).
Step 5	[LT <FR>] Tester shall monitor and validate frames after the reception of flow control frame with retry in the DUT. [LT <FR>] Tester shall observe frames in bus sent by DUT.

Step 6	-	[SWC] FrTp_TxConfirmation for the configured signal shall be invoked
Post-conditions		

5.3.5 [ATS_COMFR_00710] Segmented UnAcknowledged Data Transfer with known Message Length

Test Objective	Segmented UnAcknowledged Data Transfer with known Message Length		
ID	ATS_COMFR_00710	**AUTOSAR Releases**	4.0.3|4.1.1|4.2.1|4.2.2
Affected Modules	FrTp	**State**	accepted
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00118		
Trace to SWS Item	FlexRayISOTransportLayer: SWS_FrTp_01009		
Requirements / Reference to Test Environment	Use Case UC02.01		
Configuration Parameters	FrTpUnknownMsgLength = FALSE TransportProtocols::FlexRayTpConnection.transmitter = E.g. 0x03 TransportProtocols::FlexRayTpConnection.receiver = E.g. 0x04 TransportProtocols::FlexRayTpConnectionControl.maxBufferSize = E.g. 600 TransportProtocols::FlexRayTpConnection.multicast = FALSE TransportProtocols::FlexRayTpConnectionControl.timeoutAr TransportProtocols::FlexRayTpConnectionControl.timeoutAs TransportProtocols::FlexRayTpConnectionControl.timeBr TransportProtocols::FlexRayTpConnectionControl.timeoutBs TransportProtocols::FlexRayTpConnectionControl.timeoutCr FrTpAckRt = FALSE Signal configuration: Fibe.g. :FibexCore::CoreCommunication::TransmissionModeTiming = DIRECT Fibe.g. :FibexCore::CoreCommunication::Timing.EventControlledTiming.numberOfRepeats = E.g. 2 (user configurable) Fibe.g. :FibexCore::CoreCommunication::EventControlledTiming.repetitionPeriod = E.g. 100 ms (user configurable)		
Summary	Aim: To test DUT for transmission of segmented unacknowledged data with known message length.		
Needed Adaptation to other Releases			
Pre-conditions	1. DUT shall be initialized 2. DUT shall be in run state 3. DUT shall be in full communication		

Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[SWC] SWC shall trigger Rte_Write to send valid data (with 980 bytes) on signal Sg1.	[SWC] Rte_Write shall return RTE_E_OK.
Step 2	[LT <FR>] Tester shall monitor and validate the frame after the reception of flow control frame in the DUT.	[LT <FR>] Tester shall observe frames on bus with values sent by DUT (256 bytes of data) Tester shall send flow control information with flow status as FlowControl_CTS.
Step 3	[LT <FR>] Tester shall monitor and validate frames	[LT <FR>] Tester shall observe frames on bus sent by DUT (next 354 bytes of data).
Step 4	[LT <FR>] Tester shall monitor and validate frames	[LT <FR>] Tester shall observe frames on bus sent by DUT (next 106 bytes of data). Tester shall send flow control information with flow status as FlowControl_CTS
Step 5	[LT <FR>] Tester shall monitor and validate frames	[LT <FR>] Tester shall observe frames on bus sent by DUT (next 248 bytes of data).
Step 6	[LT <FR>] Tester shall monitor and validate frames after the reception of flow control frame in the DUT	[LT <FR>] Tester shall observe frames on bus sent by DUT (next 132 bytes of data).
Step 7	-	[SWC] FrTp_TxConfirmation for the configured signal shall be invoked.
Post-conditions		

5.3.6 [ATS_COMFR_00711] Segmented Acknowledged Data Transfer with known Message Length

Test Objective	Segmented Acknowledged Data Transfer with known Message Length		
ID	ATS_COMFR_00711	**AUTOSAR Releases**	4.0.3|4.1.1|4.2.1|4.2.2
Affected Modules	FrTp	**State**	accepted
Trace to	ATR: ATR_ATR_00118		

Requirement on Acceptance Test Document	
Trace to SWS Item	FlexRayISOTransportLayer: SWS_FrTp_01010
Requirements / Reference to Test Environment	Use Case UC02.01
Configuration Parameters	FrTpUnknownMsgLength = FALSE TransportProtocols::FlexRayTpConnection.transmitter = E.g. 0x03 TransportProtocols::FlexRayTpConnection.receiver = E.g. 0x04 TransportProtocols::FlexRayTpConnectionControl.maxBufferSize = E.g. 600 TransportProtocols::FlexRayTpConnection.multicast = FALSE TransportProtocols::FlexRayTpConnectionControl.timeoutAr TransportProtocols::FlexRayTpConnectionControl.timeoutAs TransportProtocols::FlexRayTpConnectionControl.timeBr TransportProtocols::FlexRayTpConnectionControl.timeoutBs TransportProtocols::FlexRayTpConnectionControl.timeoutCr Signal configuration: Fibe.g. :FibexCore::CoreCommunication::TransmissionModeTiming = DIRECT Fibe.g. :FibexCore::CoreCommunication::Timing.EventControlledTiming.numberOfRepeats = E.g. 2 (user configurable) FrTpUnknownMsgLength = FALSE TransportProtocols::FlexRayTpConnection.transmitter = E.g. 0x03 TransportProtocols::FlexRayTpConnection.receiver = E.g. 0x04 TransportProtocols::FlexRayTpConnectionControl.maxBuf
Summary	Aim: To test DUT for transmission of segmented acknowledged data with known message length.
Needed Adaptation to other Releases	
Pre-conditions	1. DUT shall be initialized 2. DUT shall be in run state 3. DUT shall be in full communication

Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[SWC] SWC shall trigger Rte_Write to send valid data (with 980 bytes) on signal Sg1.	[SWC] Rte_Write shall return RTE_E_OK.
Step 2	[LT <FR>] Tester shall monitor and validate the frame after the reception of flow control frame in the DUT.	[LT <FR>] Tester shall observe frames on bus with values sent by DUT (246 bytes of data) Tester shall send flow control information with flow status as FlowControl_CTS.
Step 3	[LT <FR>]	[LT <FR>]

	Tester shall monitor and validate frames	Tester shall observe frames on bus sent by DUT (next 248 bytes of data).
Step 4	[LT <FR>] Tester shall monitor and validate frames	[LT <FR>] Tester shall observe frames on bus sent by DUT (next 106 bytes of data). Tester shall send flow control information with flow status as FlowControl_CTS
Step 5	[LT <FR>] Tester shall monitor and validate frames	[LT <FR>] Tester shall observe frames on bus sent by DUT (next 248 bytes of data).
Step 6	[LT <FR>] Tester shall monitor and validate frames after the reception of flow control frame in the DUT	[LT <FR>] Tester shall observe frames on bus sent by DUT (next 132 bytes of data). Tester shall send acknowledgement for flow control information (FlowControl_ACK).
Step 7	-	[SWC] FrTp_TxConfirmation for the configured signal shall be invoked.
Post-conditions		

5.3.7 [ATS_COMFR_00712] Successful Reception of Unsegmented Data over 1:1 Connection with Acknowledgement and no Retry Enabled

Test Objective	Successful Reception of Unsegmented Data over 1:1 Connection with Acknowledgement and no Retry Enabled		
ID	ATS_COMFR_00712	**AUTOSAR Releases**	4.0.3|4.1.1|4.2.1|4.2.2
Affected Modules	FrTp	**State**	accepted
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00118		
Trace to SWS Item	FlexRayISOTransportLayer: SWS_FrTp_01078 FlexRayISOTransportLayer: SWS_FrTp_01080		
Requirements / Reference to Test Environment	Use Case UC02.01		
Configuration Parameters	FrTpUnknownMsgLength = FALSE TransportProtocols::FlexRayTpConnection.transmitter = E.g. 0x03 TransportProtocols::FlexRayTpConnection.receiver = E.g. 0x04 TransportProtocols::FlexRayTpConnection.multicast = TRUE TransportProtocols::FlexRayTpConnectionControl.timeoutAr		

	TransportProtocols::FlexRayTpConnectionControl.timeoutAs TransportProtocols::FlexRayTpConnectionControl.timeBr TransportProtocols::FlexRayTpConnectionControl.timeoutBs TransportProtocols::FlexRayTpConnectionControl.timeoutCr Signal configuration: Fibe.g. :FibexCore::CoreCommunication::TransmissionModeTiming = DIRECT Fibe.g. :FibexCore::CoreCommunication::Timing.EventControlledTiming.numberOfRepeats = E.g. 2 (user configurable) Fibe.g. :FibexCore::CoreCommunication::EventControlledTiming.repetitionPeriod = E.g. 100 ms (user configurable)
Summary	Aim: To test DUT for successful reception of unsegmented data over 1:1 connection with acknowledgement and no retry enabled.
Needed Adaptation to other Releases	
Pre-conditions	1. DUT shall be initialized 2. DUT shall be in run state 3. DUT shall be in full communication

Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	[LT <FR>] Tester shall send the frame (10 bytes of data) value to the DUT	[SWC] Com notification (Com_TpRxIndication) for the configured signal shall be invoked.
Step 2	-	[LT <FR>] Tester shall send acknowledgement for flow control information (FlowControl_ACK).
Step 3	[SWC] SWC shall trigger Rte_Read to read data for a signal.	[SWC] Rte_Read shall return RTE_E_OK
Post-conditions		

5.3.8 [ATS_COMFR_00713] Successful Reception of Unsegmented Data over 1:1 Connection without Acknowledgement and no Retry Enabled

Test Objective	Successful Reception of Unsegmented Data over 1:1 Connection without Acknowledgement and no Retry Enabled		
ID	ATS_COMFR_00713	**AUTOSAR Releases**	4.0.3|4.1.1|4.2.1|4.2.2
Affected Modules	FrTp	**State**	accepted
Trace to Requirement on Acceptance	ATR: ATR_ATR_00118		

Test Document			
Trace to SWS Item	FlexRayISOTransportLayer: SWS_FrTp_01078 FlexRayISOTransportLayer: SWS_FrTp_01080		
Requirements / Reference to Test Environment	Use Case UC02.01		
Configuration Parameters	FrTpUnknownMsgLength = FALSE TransportProtocols::FlexRayTpConnection.transmitter = E.g. 0x03 TransportProtocols::FlexRayTpConnection.receiver = E.g. 0x04 TransportProtocols::FlexRayTpConnection.multicast = TRUE TransportProtocols::FlexRayTpConnectionControl.timeoutAr TransportProtocols::FlexRayTpConnectionControl.timeoutAs TransportProtocols::FlexRayTpConnectionControl.timeBr TransportProtocols::FlexRayTpConnectionControl.timeoutBs TransportProtocols::FlexRayTpConnectionControl.timeoutCr Signal configuration: Fibe.g. :FibexCore::CoreCommunication::TransmissionModeTiming = DIRECT Fibe.g. :FibexCore::CoreCommunication::Timing.EventControlledTiming.numberOfRepeats = E.g. 2 (user configurable) Fibe.g. :FibexCore::CoreCommunication::EventControlledTiming.repetitionPeriod = E.g. 100 ms (user configurable)		
Summary	Aim: To test DUT for successful reception of unsegmented data over 1:1 connection without acknowledgement and no retry enabled.		
Needed Adaptation to other Releases			
Pre-conditions	1. DUT shall be initialized 2. DUT shall be in run state 3. DUT shall be in full communication		
Main Test Execution			
Test Steps		**Pass Criteria**	
Step 1	[LT <FR>] Tester shall send the frame (10 bytes of data) value to the DUT	[SWC] Com notification (Com_TpRxIndication) for the configured signal shall be invoked.	
Step 2	[SWC] SWC shall trigger Rte_Read to read data for a signal.	[SWC] Rte_Read shall return RTE_E_OK and data shall be updated.	
Post-conditions			

5.3.9 [ATS_COMFR_00714] To check behavior of FrTp when Flow Control Frames are not received

Test Objective	To check behavior of FrTp when Flow Control Frames are not received		
ID	ATS_COMFR_00714	**AUTOSAR**	4.0.3|4.1.1|4.2.1|4.2.2

		Releases	
Affected Modules	FrTp	**State**	accepted
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00118		
Trace to SWS Item	FlexRayISOTransportLayer: SWS_FrTp_01100		
Requirements / Reference to Test Environment	Use Case UC02.01		
Configuration Parameters	FrTpUnknownMsgLength = FALSE TransportProtocols::FlexRayTpConnection.transmitter = E.g. 0x03 TransportProtocols::FlexRayTpConnection.receiver = E.g. 0x04 TransportProtocols::FlexRayTpConnectionControl.maxBufferSize = E.g. 600 TransportProtocols::FlexRayTpConnection.multicast = FALSE TransportProtocols::FlexRayTpConnectionControl.timeoutAr TransportProtocols::FlexRayTpConnectionControl.timeoutAs TransportProtocols::FlexRayTpConnectionControl.timeBr TransportProtocols::FlexRayTpConnectionControl.timeoutBs TransportProtocols::FlexRayTpConnectionControl.timeoutCr FrTpAckRt = FALSE Signal configuration: Fibe.g. :FibexCore::CoreCommunication::TransmissionModeTiming = DIRECT Fibe.g. :FibexCore::CoreCommunication::Timing.EventControlledTiming.numberOfRepeats = E.g. 2 (user configurable) Fibe.g. :FibexCore::CoreCommunication::EventControlledTiming.repetitionPeriod = E.g. 100 ms (user configurable)		
Summary	Aim: To check the behaviour of FrTp when flow control frames are not received after a certain amount of time i.e. FrTpTimeoutBs during transmission of segmented data and to check whether FrTp notifies this to upper layer (PduR) about the result.		
Needed Adaptation to other Releases			
Pre-conditions	1. DUT shall be initialized 2. DUT shall be in run state 3. DUT shall be in full communication		
Main Test Execution			
Test Steps		**Pass Criteria**	
Step 1	[SWC] SWC shall trigger Rte_Write to send valid data (with 980 bytes) on signal Sg1.	[SWC] Rte_Write shall return RTE_E_OK.	
Step 2	[LT <FR>] Tester shall monitor and validate the frames.	[LT <FR>] Tester shall observe frames on bus with values sent by DUT (246 bytes of data)	
Step 3	[LT <FR>]	[LT <FR>]	

	After the expiry of the Timer FrTpTimeoutBs, tester shall monitor and validate the frame	Tester shall observe no frames on bus.
Post-conditions		

6 RS_BRF_01649- LdCom data transfer

6.1 General Test Objective and Approach

This Test Specification intends to cover communication transfer of array type signals, using LdCom as Interaction Layer on FlexRay bus as described in AUTOSAR Feature [RS_BRF_01649].

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

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

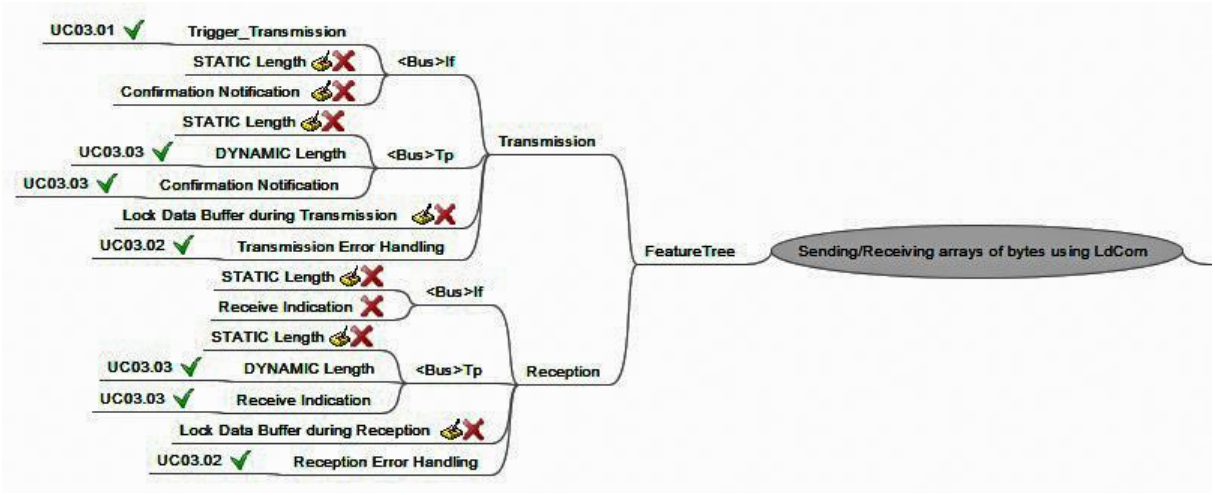

Figure 8: Mindmap of features covered and not covered in the test cases

This specification gives the description of required test environment (Test Bench, Use cases, arxml files) and detailed test case for executing tests.

6.1.1 Test System

6.1.1.1 Overview on Architecture

In order to cover the required features/sub-features, the environment has been separated into several Use cases.

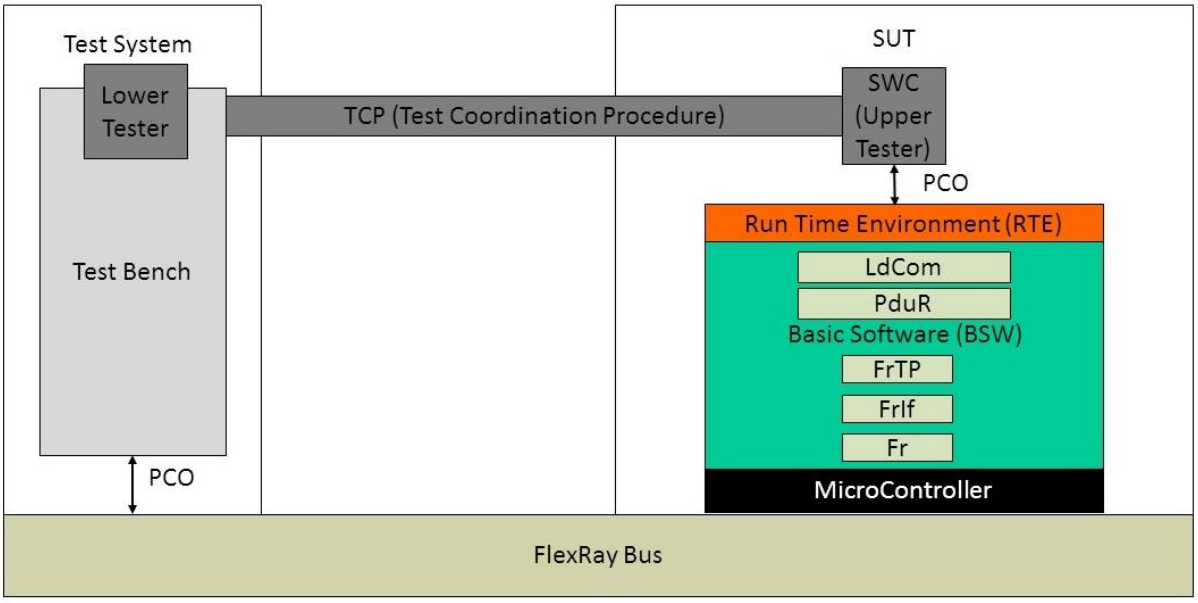

Figure 9: Test System architecture

The test system architecture consists of Test Bench that executes only test sequences and gives action request through test coordination procedures to embedded SWC.

6.1.1.1.1 Use case 03.01: Data Transfer of Array Signal of Size lesser than or equal to <BUS> Capability

For this use case, the aim is to test data transfer features of LdCom, for array signal of length lesser than or equal to underlying FlexRay bus capability.

6.1.1.1.2 Use case 03.02: Data Transfer of Arrays Signal of size more than <BUS> Capability

For this use case, the aim is to test data transfer features of LdCom, for array signal of length greater than FlexRay bus capability.

6.1.1.1.3 Use case 03.03: Data Transfer of Dynamic Array size Signals

For this use case, the aim is to test data transfer features of LdCom, for dynamic array signal on FlexRay bus.

6.1.1.2 Specific Requirements

Not Applicable.

6.1.1.3 Test Coordination Requirements

Not Applicable.

6.1.2 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 suite is implemented.

6.1.2.1 Required ECU Extract of System Description Files

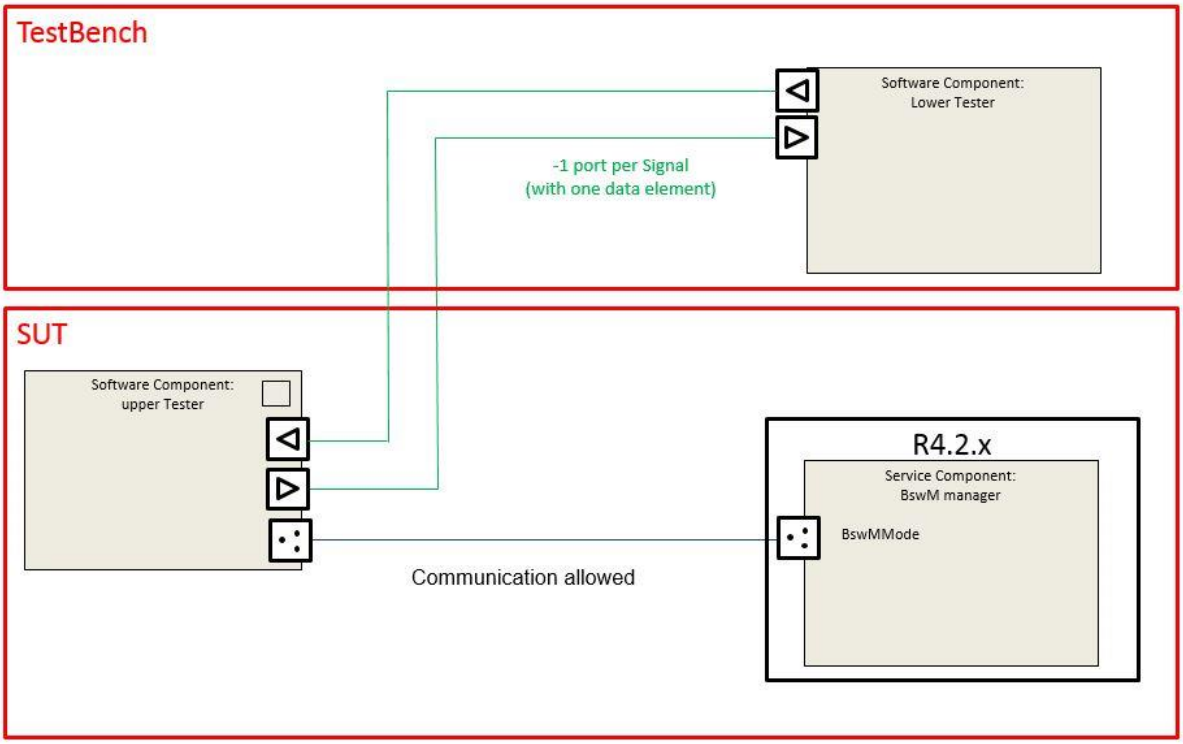

Figure 10: Required SWC description

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

Port name	Data element type	Data element	Mapping	Type
<TestCaseName>_<signalname>	UINT8_N	<signalname>	<signalname>	signal
<TestCaseName>_<signalname>	UINT8_DYN	<signalname>	<signalname>	signal

Table 7: SWC Interfaces used

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

For API calls Rte_Write(), Rte_Send(), Rte_Read(),Rte_Receive(), Rte_Feedback() refer [2] of Section 2.1 Input Documents.

For API calls Rte_LdComCbkTxConfirmation, Rte_LdComCbkTpRxIndication, Rte_LdComRxIndication, Rte_LdComCbkTpTxConfirmation refer [1] of Section 2.1 Input Documents.

6.1.2.1.1 Use case 03.01: Data Transfer of Array Signal of Size lesser than or equal to <BUS> Capability

The communication database is depicted below:

IPdu	Signal	TxECU	RxECU
AT_1239_IPdu	AT_1239_Sg1	SUT	TestBench

Table 8: Communication Database

6.1.2.1.2 Use case 03.02: Data Transfer of Array Signal of size more than <BUS> Capability

The communication database is depicted below:

IPdu	Signal	TxECU	RxECU
AT_1489_IPdu	AT_1489_Sg1	SUT	TestBench
AT_1490_IPdu	AT_1490_Sg1	TestBench	SUT

Table 9: Communication Database

6.1.2.1.3 Use case 03.03: Data Transfer of Dynamic Array size Signals

The communication database is depicted below:

IPdu	Signal	TxECU	RxECU
AT_1485_IPdu	AT_1485_Sg1	SUT	TestBench
AT_1486_IPdu	AT_1486_Sg1	SUT	TestBench
AT_1487_IPdu	AT_1487_Sg1	TestBench	SUT
AT_1488_IPdu	AT_1488_Sg1	TestBench	SUT

Table 10: Communication Database

6.1.2.2 Required ECU Configuration Description Files

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

6.1.2.3 Required Software Components Description Files

No specific configuration requirements for Software Components.

6.1.2.4 Mandatory vs. Customizable Parts

Mandatory parameters are:

- ISignalToIPduMapping.startPosition => 0
- ISignalToIPduMapping.packingByteOrder =>Opaque
- ISignalToIPduMapping.transferProperty =>triggered/ triggeredWithoutRepetition
  See 6.3 Test Cases for further details.

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

- FlexRay frames identifiers

6.1.3 Test Case Design

Not Applicable.

6.2 Re-usable Test Steps

Not Applicable.

6.3 Test Cases

6.3.1.1 [ATS_COMFR_01239] LdCom Trigger Transmission using FrIf API

Test Objective	LdCom Trigger Transmission using FrIf API		
ID	ATS_COMFR_01239	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	LdCom, PduR, FrIf, Fr	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00117 ATR: ATR_ATR_00127 ATR: ATR_ATR_00128		
Trace to SWS Item	LargeDataCOM: SWS_LDCOM_00011		
Requirements / Reference to Test Environment	Use Case UC03.01		
Configuration Parameters	LdComIpdu(SignalIPdu): AT_1239_IPdu -ISignal.length = 200 (<254 bytes) -LdComApiType = LDCOM_IF -LdComIPduDirection(CommConnectorPort.communicationDirection) = LDCOM_SEND -LdComTxCopyTxData = Rte_LdComCbkTriggerTransmit_Sg1 -LdComTxConfirmation = Rte_LdComCbkTxConfirmation_Sg1 LdComSignal(ISignalToPduMapping): Sg1 -DataSendCompletedEvent mapped on TxConfirmation PduRRoutingPath: -Routing path for ComIpdu with PduRSrcBswModuleRef = BswMod_LdCom -PduRDestPdu with PduRDestBswModuleRef = BswMod_FrIf		
Summary	- To initiate LdCom trigger transmission from application through IF-API.		
Needed Adaptation to other Releases	n/a		

Pre-conditions	Com stack is initialized.	
Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	*[SWC]* Trigger Rte_Write() for AT_1239_Sg1 with value AT_1239_Sg1_Value1 and signal length 200 bytes.	*[INFO]* Transmit request by LdCom module is queued by incrementing a TrigTxCounter.
Step 2	-	*[INFO]* FrIf_TriggerTransmit() is invoked by FrIf and TrigTxCounter is decremented. Transmission of L-SDU is initiated by Fr driver.
Step 3	*[LT<FR>]* Monitor and validate the frame on bus.	*[LT<FR>]* Frame shall be observed with data transmitted from SUT.
Step 4	-	*[SWC]* Rte_LdComCbkTxConfirmation API is invoked for the signal. DataSendCompletedEvent is activated for the same.
Post-conditions	NONE	

6.3.1.2 [ATS_COMFR_01485] LdCom Transmission using FrTp API for Dynamic Array Size with in Single Frame (Signal Size <254 bytes) and Notification for PDU transfer

Test Objective	LdCom Transmission using FrTp API for Dynamic Array Size with in Single Frame (Signal Size <254 bytes) and Notification for PDU transfer		
ID	ATS_COMFR_01485	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	LdCom, PduR, FrTp, FrIf, Fr	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00121 ATR: ATR_ATR_00127		
Trace to SWS Item	LargeDataCOM: SWS_LDCOM_00012 LargeDataCOM: SWS_LDCOM_00013		
Requirements / Reference to Test Environment	Use Case UC03.03		
Configuration Parameters	LdComIpdu(SignalIPdu): AT_1485_IPdu (normal I-Pdu) -ISignal.length = 200 (<254 bytes) -LdComApiType = LDCOM_TP -LdComIPduDirection(CommConnectorPort.communicationDirection) = LDCOM_SEND -LdComTxCopyTxData = Rte_LdComCbkCopyTxData_Sg1		

	-LdComTxConfirmation = Rte_LdComCbkTpTxConfirmation_Sg1 LdComSignal(ISignalToPduMapping): Sg1 -dataElement with queued swImplPolicy -DataSendCompletedEvent mapped on TxConfirmation -SystemSignal.dynamicLength = true PduRRoutingPath: -Routing path for ComIpdu with PduRSrcBswModuleRef = BswMod_LdCom -PduRDestPdu with PduRDestBswModuleRef = BswMod_FrTp
Summary	-To check that application can initiate a Ldcom transmission through FrTp API for a dynamic signal of length less than 254 bytes on FlexRay bus. As this is indirect testing for LdCom transmission confirmation, notification is given to software component of Upper Tester about the transmission of signal.
Needed Adaptation to other Releases	n/a
Pre-conditions	Com stack is initialized

Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	*[SWC]* Trigger Rte_Send() for dynamic signal AT_1485_Sg1 with value AT_1485_Sg1_Value_1 and signal length 200 bytes (This will initiate TP transmission).	*[SWC]* Rte_Send() shall return RTE_E_OK.
Step 2	*[LT<FR>]* Monitor and validate the frame on bus.	*[LT<FR>]* Frame shall be observed on bus with data transmitted by SUT.
Step 3	-	*[SWC]* Rte_LdComCbkTpTxConfirmation API shall be invoked for the signal shall be invoked. DataSendCompleted event is activated for the same.
Post-conditions	NONE	

6.3.1.3 [ATS_COMFR_01486] LdCom Transmission using FrTp API for Dynamic Array Size with Multiple PDU (Signal Size >254 bytes) API and Notification for PDU transfer

Test Objective	LdCom Transmission using FrTp API for Dynamic Array Size with Multiple PDU (Signal Size >254 bytes) API and Notification for PDU transfer		
ID	ATS_COMFR_01486	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	LdCom, PduR, FrTp, FrIf, Fr	**State**	reviewed
Trace to Requirement on Acceptance	ATR: ATR_ATR_00121 ATR: ATR_ATR_00127		

Test Document		
Trace to SWS Item	LargeDataCOM: SWS_LDCOM_00012 LargeDataCOM: SWS_LDCOM_00013	
Requirements / Reference to Test Environment	Use Case UC03.03	
Configuration Parameters	LdComIpdu(SignalIPdu): AT_1486_Ipdu (Large I-Pdu) -ISignal.length = 300 (>254 bytes) -LdComApiType = LDCOM_TP -LdComIPduDirection(CommConnectorPort.communicationDirection) = LDCOM_SEND -LdComTxCopyTxData = Rte_LdComCbkCopyTxData_Sg1 -LdComTxConfirmation = Rte_LdComCbkTpTxConfirmation_Sg1 LdComSignal(ISignalToPduMapping): Sg1 -dataElement with queued swImplPolicy -DataSendCompletedEvent mapped on TxConfirmation -SystemSignal.dynamicLength = true PduRRoutingPath: -Routing path for ComIpdu with PduRSrcBswModuleRef = BswMod_LdCom -PduRDestPdu with PduRDestBswModuleRef = BswMod_FrTp	
Summary	- To check that application can initiate a LdCom transmission through FrTp API for a dynamic signal of length greater than 254 bytes on FlexRay bus. As this is indirect testing of transmission confirmation, notification is given to software component of Upper Tester about the signal transmission.	
Needed Adaptation to other Releases	n/a	
Pre-conditions	Com stack is initialized.	
Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	*[SWC]* Trigger Rte_Send() for dynamic signal AT_1486_Sg1 with AT_1486_Sg1_Value_1 and signal length 300 bytes (This shall invoke TP transmission).	*[SWC]* Rte_Send() shall return RTE_E_OK.
Step 2	*[SWC]* First frame is observed on the bus. Wait for Flow Control with Flow Status ClearToSend.	*[SWC]* Flow Control with Flow Status ClearToSend is received.
Step 3	*[SWC]* Consecutive Frames are sent by SWC until all the data has been transmitted on reception of Flow Control frame.	*[LT<FR>]* Monitor the Consecutive frames on bus and validate the same.
Step 4	-	*[SWC]* Rte_LdComCbkTpTxConfirmation API is invoked for the signal. DataSendCompleted event is

		activated for the same.
Post-conditions	NONE	

6.3.1.4 [ATS_COMFR_01487] LdCom Reception using FrTp API for Dynamic Array Size with in Single Frame (Signal Size <254 bytes)

Test Objective	LdCom Reception using FrTp API for Dynamic Array Size with in Single Frame (Signal Size <254 bytes)		
ID	ATS_COMFR_01487	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	LdCom, PduR, FrTp, FrIf, Fr	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00121 ATR: ATR_ATR_00127		
Trace to SWS Item	LargeDataCOM: SWS_LDCOM_00015 LargeDataCOM: SWS_LDCOM_00016 LargeDataCOM: SWS_LDCOM_00017		
Requirements / Reference to Test Environment	Use Case UC03.03		
Configuration Parameters	LdComIpdu(SignalIPdu): AT_1487_IPdu (normal I-Pdu) -ISignal.length = 200(<254 bytes) -LdComApiType = LDCOM_TP -LdComIPduDirection(CommConnectorPort.communicationDirection) = LDCOM_RECEIVE -LdComRxIndication = Rte_LdComCbkTpRxIndication_Sg1 -LdComRxStartOfReception = Rte_LdComCbkStartOfReception_Sg1 -LdComRxCopyRxData = Rte_LdComCbkCopyRxData_Sg1 LdComSignal(ISignalToPduMapping): Sg1 -dataElement with queued swImplPolicy -DataReceivedEvent mapped on RxIndication -SystemSignal.dynamicLength = true PduRRoutingPath: -Routing path for ComIpdu with PduRSrcBswModuleRef = BswMod_FrTp -PduRDestPdu with PduRDestBswModuleRef = BswMod_LdCom		
Summary	- To check that application can receive LdCom data through FrTp API for a dynamic signal of length less than 254 bytes on FlexRay bus.		
Needed Adaptation to other Releases	n/a		
Pre-conditions	Com stack is initialized.		
Main Test Execution			
Test Steps			**Pass Criteria**
Step 1	*[LT<FR>]* Send a dynamic signal AT_1487_Sg1 with value AT_1487_Sg1_Value_1 and signal		*[SWC]* Rte_LdComCbkTpRxIndication API for the signal is invoked.

	length 200 bytes.	DataReceivedEvent is activated for the same.
Step 2	*[SWC]* Call Rte_Receive() for AT_1487_Sg1.	*[SWC]* AT_1487_Sg1_value is AT_1487_Sg1_Value_1. Rte_Receive() shall return RTE_E_OK.
Post-conditions	NONE	

6.3.1.5 [ATS_COMFR_01488] LdCom Reception using FrTp API for Dynamic Array Size with Multiple PDU (Signal Size >254 bytes)

Test Objective	LdCom Reception using FrTp API for Dynamic Array Size with Multiple PDU (Signal Size >254 bytes)		
ID	ATS_COMFR_01488	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	LdCom, PduR, FrTp, FrIf, Fr	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00121 ATR: ATR_ATR_00127		
Trace to SWS Item	LargeDataCOM: SWS_LDCOM_00015 LargeDataCOM: SWS_LDCOM_00016 LargeDataCOM: SWS_LDCOM_00017		
Requirements / Reference to Test Environment	Use Case UC03.03		
Configuration Parameters	LdComIpdu(SignalIPdu): AT_1488_IPdu (Large I-Pdu) -ISignal.length = 300(>254 bytes) -LdComApiType = LDCOM_TP -LdComIPduDirection(CommConnectorPort.communicationDirection) = LDCOM_RECEIVE -LdComRxIndication = Rte_LdComCbkTpRxIndication_Sg1 -LdComRxStartOfReception = Rte_LdComCbkStartOfReception_Sg1 -LdComRxCopyRxData = Rte_LdComCbkCopyRxData_Sg1 LdComSignal(ISignalToPduMapping): Sg1 -dataElement with queued swImplPolicy -DataReceivedEvent mapped on RxIndication -SystemSignal.dynamicLength = true PduRRoutingPath: -Routing path for ComIpdu with PduRSrcBswModuleRef = BswMod_FrTp -PduRDestPdu with PduRDestBswModuleRef = BswMod_LdCom		
Summary	- To check that application can receive LdCom data through FrTp API for a dynamic signal of length greater than 254 bytes on FlexRay bus.		
Needed	n/a		

Adaptation to other Releases		
Pre-conditions	Com stack is initialized.	
Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	*[LT<FR>]* Send a dynamic signal AT_1488_Sg1 with AT_1488_Sg1_Value_1 and signal length 300 bytes.	*[SWC]* First frame is recieved by SUT with Frame ML (Message Length) of 300 bytes. Flow Control with Flow status ClearToSend is sent.
Step 2	*[LT<FR>]* Consecutive frames are sent by LT until all the data has been transmitted on reception of Flow Control frame.	*[SWC]* DataReceivedEvent is invoked after all the Consecutive frames were received successfully.
Step 3	*[SWC]* Call Rte_Receive() for port AT_1488_Sg1.	*[SWC]* Received AT_1488_Sg1_value shall be same as AT_1488_Sg1_Value_1. Rte_Receive() shall return RTE_E_OK.
Post-conditions	NONE	

6.3.1.6 [ATS_COMFR_01489] LdCom Behavior in case of FrTp communication failures during multi PDU Transmission

Test Objective	LdCom Behavior in case of FrTp communication failures during multi PDU Transmission		
ID	ATS_COMFR_01489	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	RTE, LdCom	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00127 ATR: ATR_ATR_00128		
Trace to SWS Item	RTE: SWS_Rte_01380		
Requirements / Reference to Test Environment	Use Case UC03.02		
Configuration Parameters	LdComIpdu(SignalIPdu): AT_1489_IPdu -LdComApiType = LDCOM_TP -LdComIPduDirection(CommConnectorPort.communicationDirection) = LDCOM_SEND -ISignal.length > Size of <BUS> capability -LdComTxCopyTxData = Rte_LdComCbkCopyTxData_Sg1 -LdComTxConfirmation = Rte_LdComCbkTpTxConfirmation_Sg1		

	LdComSignal(ISignalToPduMapping): Sg1 -DataSendCompletedEvent mapped on TxConfirmation -transferProperty = TRIGGERED
Summary	-LdCom returns an appropriate error result to RTE on FrTp transmission failure. Note: Errors may occur due to Overflow, N_Bs timeout, N_As timeout, N_Cs timeout and so on. A Feedback call to RTE shall return transmission failure status to Application.
Needed Adaptation to other Releases	n/a
Pre-conditions	Com stack is initialized.

Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	*[SWC]* Trigger Rte_Write() for AT_1489_Sg1 with AT_1489_Sg1_Value_1.	*[SWC]* Rte_Write() shall return RTE_E_OK.
Step 2	*[LT<FR>]* Monitor and validate frame on bus.	*[LT<FR>]* Frame shall be observed on bus with data transmitted by SUT.
Step 3	*[SWC]* FrTp transmission is aborted because of an error Note: Errors are listed in the summary of this TestCase.	*[SWC]* Rte_LdComCbkTpTxConfirmation API is invoked with result E_NOT_OK.
Step 4	*[SWC]* Call Rte_Feedback() for port AT_1489_Sg1.	*[SWC]* Rte_Feedback() shall return RTE_E_NO_DATA.
Post-conditions	NONE	

6.3.1.7 [ATS_COMFR_01490] LdCom Behavior in case of FrTp communication failures during Reception

Test Objective	LdCom Behavior in case of FrTp communication failures during Reception		
ID	ATS_COMFR_01490	**AUTOSAR Releases**	4.2.1|4.2.2
Affected Modules	RTE, LdCom	**State**	reviewed
Trace to Requirement on Acceptance Test Document	ATR: ATR_ATR_00127 ATR: ATR_ATR_00128		
Trace to SWS Item	RTE: SWS_Rte_01387 RTE: SWS_Rte_01388		
Requirements /	Use Case UC03.02		

Reference to Test Environment		
Configuration Parameters	LdComIpdu(SignalIPdu): AT_1490_IPdu -length = 300(>254 bytes) -LdComApiType = LDCOM_TP -LdComIPduDirection(CommConnectorPort.communicationDirection) = RECEIVE -LdComRxIndication = Rte_LdComCbkTpRxIndication_Sg1 -LdComRxStartOfReception = Rte_LdComCbkStartOfReception_Sg1 -LdComRxCopyRxData = Rte_LdComCbkCopyRxData_Sg1 LdComSignal(ISignalToPduMapping): Sg1 -DataReceivedEvent mapped on signal reception	
Summary	-LdCom shall return an appropriate error result to RTE when there is a FrTp communication failure during reception. Note: Errors may occue due to Buffer unavailability, N_Cr timeout, N_Ar timeout and so on. Reception failure is notified on read request from the Application.	
Needed Adaptation to other Releases	n/a	
Pre-conditions	Com stack is initialized.	
Main Test Execution		
Test Steps		**Pass Criteria**
Step 1	*[LT<FR>]* Send the signal AT_1490_Sg1 with AT_1490_Sg1_Value_1 and signal length larger than single frame.	*[LT<FR>]* First frame is observed on bus with Frame ML (Message Length) > single frame length.
Step 2	*[SWC]* FrTp reception fails because of an error. Note: Errors are listed in the summary of this TestCase.	*[SWC]* Rte_LdComCbkTpRxIndication API is invoked with result E_NOT_OK.
Step 3	*[SWC]* Call Rte_Read() for AT_1490_Sg1.	*[SWC]* Rte_Read() shall return AT_1490_Sg1_value set to an invalid value.
Post-conditions	NONE	