SWP4.1: C-ITS-S

C-ITS-S Test Specification

WP4 - Living Laboratory

Version: 03.60

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Overview of changes

No.	Version	Status	Date	Type of Change
1	03.60	Released	2016-07-29	Third Release – Third Update

Table 1: Document History

Reference to the status and version administration:

Status:

In progress	the document is currently in editing mode
Released	the document has been checked and released by quality assurance, it can only be modified if the version number is updated.

Versions:

Takes place in two stages. Released documents receive the next higher integral version number.

00.01, 00.02 etc.	Not released versions, with the status in progress
01, 02, etc.	Released version with the status released

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Document Information

1.1 Purpose of this document

This document lists all test cases relevant to the C-ITS-S required for system requirements verification and validation. Each test case is described using the same template striving after completeness and comprehensibility.

Table 2 Test Case Explanation

Attribute	Explanation	
Test case ID	Unique Identifier with the following format: SWP4.1 C-ITS-S: TC_C_001 SWP4.2 R-ITS-S: TC_R_001 SWP4.3 V-ITS-S: TC_V_001 SWP4.4 Security: TC_SEC_001 SWP4.5 Coexistence: TC_CoEx_001 (or directly a component test case) SWP4.6 use cases: • TC_IVI_001 • TC_RWW_001 • TC_ISS_001 • TC_CAM_001 • TC_DENM_001 SWP4.7 System Requirements Verification: TC_SYS_001	
Test case type	Manual or automatic execution	
Test case purpose	State a short name and describe the objective of the test case.	
Test case source	Unique requirement ID plus short name of the requirement.	
Test components*	State the SUT/ DUT (can be one device or more devices) of the test case.	
Precondition	Quote precondition or ID of test case to be executed in advance. A certain state of the SUT/ DUT might be necessary before test case execution.	
Testing environment	State the environment of the SUT/ DUT (laboratory test or field test) and the test tools required for executing the respective test case (e.g. V-ITS-S test tool for validating ITS-G5).	
Test steps*	Per test step: description, input, and expected output (data with value range)	
#	Description	Input(I)/Output(O)/Validation(V)
0	Description of test step.	Input required or output expected for this test step. One validation condition per test case descripted in the last test step.

Attribute		Explanation	
n	-		-
Post condition*		State of test components after test case execution	

NOTE: * = several

The list of test cases will be complete, if each requirement from Ref. [ECo-AT SWP2.3 system overview] regarding the component/topic XYZ (e.g. interface IF1) is referenced to at least one test case in this document. Uncompleted test cases will be included in a later version of the document.

1.2 Definitions, Terms and Abbreviations

Abbreviation / Term	Definition
HiL	Hardware in the loop
SiL	Software in the loop
SUT	System under test
Test case	High level, implementation free description of a test case. Implementation of test cases shall be handled using test scripts dedicated to the test topic or test component.
TC	Test case
TCC	Traffic Control Center
TLC	Traffic Light Controller
UC	Use Case
UTC	Coordinated Universal Time
V-ITS-S	Vehicle ITS Station
C-ITS-S	Central ITS Station
R-ITS-S	Roadside ITS Station

Table 3: Definitions, Terms and Abbreviations

1.3 References

All references in this document can be found in the master table of references available in the “ECo-AT_SWP2.3_MasterTableOfReferences_v03.60.pdf” document.

2 Description of Test Cases

Table 4: TC_C_001

Attribute	Explanation	
Test case ID	TC_C_001	
Test case type	Manual	
Test case purpose	Unique messages Verify that messages generated by the C-ITS-S have a unique identification based on “datexMsgID”	
Test case source	R_G_002 Unique messages	
Test components*	C-ITS-S	
Precondition	New messages come from IF1 interface (any types) ITS messages on IF3 should be generated out of a different IF1 payload	
Testing environment	Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool in order to trigger data through IF1 • C-ITS-S test tool, in order to inspect the generated messages	
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	Generate a message	I: data received from IF1 for message generation O: first message generated with an identifier (i.e. datexMsgID)
1	Generate a new message	I: new data received from IF1 for message generation O: second message generated with an identifier (i.e. datexMsgID)
2	Check unique identifier	I: First and second message generated V: message identifiers (i.e. datexMsgID) are different
Postcondition*		

Table 5: TC_C_002 (Requirement is under revision)

Attribute	Explanation
Test case ID	TC_C_002
Test case type	Manual

Attribute		Explanation
Test case purpose		Check of message content (IVI) Verification that IVI messages are generated (i.e. structure and contents) according to the specification.
Test case source		R_G_003 Check of message content
Test components*		C-ITS-S
Precondition		The C-ITS is able to receive DATEX II messages related to the signage either from a test environment or from a real control system.
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool in order to trigger messages through IF1
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	Generate DATEX II message on the IF1with signage content in test environment or from real traffic control system.	(O) DATEX II message with signage content
1	Receive DATEX II message from IF1 in C-ITS-S	(I) DATEX II message with signage content
2	Message is transformed in the C-ITS-S into a IVI-message.	
3	IVI-message is sent via IF3 to a test environment or to a R-ITS-S	(O) IVI-message according to the standard defined in ECo-AT (ETSI?)
4	Copy and print IVI-message in XML-format	(O) XML-structure
5	Comparison	(V) Compare XML structure with predefined structure; check on deviations
Postcondition*		

Table 6: TC_C_003 (Requirement is under revision)

Attribute	Explanation
Test case ID	TC_C_003

Attribute	Explanation	
Test case type	Manual	
Test case purpose	Check of message content (DENM) Verification that DENM messages are generated (i.e. structure and contents) according to the specification.	
Test case source	R_G_003 Check of message content	
Test components*	C-ITS-S	
Precondition	A DENM message has been created	
Testing environment	Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool in order to trigger messages through IF1	
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	Generate DATEX II message on the IF1 with event content in test environment or from real traffic control system.	(O) DATEX II message with event content
1	Receive DATEX II message from IF1 in C-ITS-S	(I) DATEX II message with event content
2	Message is transformed in the C-ITS-S into a DENM-message.	
3	DENM-message is sent via IF3 to a test environment or to a R-ITS-S	(O) DENM-message according to the standard defined in ECo-AT (ETSI?)
4	Copy and print DENM-message in XML-format	XML-structure
5		(V) Compare XML-structure with predefined structure; check on deviations
Postcondition*		

Table 7: TC_C_004

Attribute	Explanation
Test case ID	TC_C_004
Test case type	Manual
Test case purpose	Configuration of R-ITS-S

Attribute		Explanation
		Prove that the parameters (system parameter sets, firmware update) of the R-ITS-S can be adjusted.
Test case source		R_C_030 Configuration of R-ITS-S
Test components*		C-ITS-S
Precondition		At least one device (R-ITS-S) is connected, that parameters are visible. The parameters of this device can be adjusted.
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool in order to trigger a DENM as input for IF1
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	Select one R-ITS-S at the C-ITS-S	O: R-ITS-S selected
1	Open menu for setting the parameters of the selected R-ITS-S at the C-ITS-S	O: parameter setting view opened
2	Change one or more parameters of a R-ITS-S	I: new parameter O: new parameter is configured on the interface
3	Send parameters to selected R-ITS-S	
4	Check via the GUI of the C-ITS-S changed parameter	V: Changed parameters are configured on the R-ITS-S
Postcondition*		Parameters of the R-ITS-S has been changed.

Table 8: TC_C_005

Attribute	Explanation
Test case ID	TC_C_005
Test case type	Manual or automatic execution, manual Validation.
Test case purpose	R-ITS-S selection for message distribution The C-ITS-S shall be able to send DENM data and IVI data to a subset of R-ITS-Ss. This subset shall be chosen, based on the R-ITS-S dissemination selection method (circle method). Prove that only R-ITS-Ss in the relevant area according to the defined algorithm (circle method) are chosen for message distribution.

Attribute	Explanation
Test case source	R_C_017: R-ITS-S selection for message distribution
Test components*	DUT: C-ITS-S
Precondition	C-ITS-S (DUT) is up and running C-ITS-S is configured with at least 4 R-ITS-Ss (2 R-ITS-S positions are inside the dissemination radius, 2 R-ITS-S positions are outside the dissemination radius) Dissemination radius and event position are configured that 2 R-ITS-S are inside the dissemination radius, 2 R-ITS-S are outside the dissemination radius Predefined DENM content for ECo-AT other DENM applications *a)* C-ITS-S test tool is up and running or *b)* R-ITS-Ss in the field are up and running
Testing environment	Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • C-ITS-S test tool in order to trigger a DENM as input for the dissemination algorithm • a) C-ITS-S test tool, in order to inspect to which R-ITS-S the messages are distributed or • b) R-ITS-Ss in the field connected to the C-ITS-S o R-ITS-S test tool, in order to inspect if a message is received
Test steps*	

#	Description	Input(I)/Output(O)/Validation(V)
0	trigger at C-ITS-S to generate DENM with predefined content	I: trigger at C-ITS-S to generate DENM O: DENM message for dissemination algorithm (dissemination algorithm is configured as stated in preconditions)
1	dissemination algorithm selects R-ITS-Ss for message distribution	I: DENM message as input for the dissemination algorithm O: DENM is distributed to the relevant R-ITS-S (2 R-ITS-S positions are inside the dissemination radius, 2 R-ITS-S positions are outside the dissemination radius) V: a) Check at the C-ITS-S test tool, if the 2 relevant R-ITS-S are selected for message distribution

Attribute		Explanation
		a) check if the 2 not relevant R-ITS-S are not chosen for message distribution or b) Check if the 2 relevant R-ITS-S received the DENM data b) check if the 2 not relevant R-ITS-Ss did not receive the DENM data
Postcondition*		-

Table 9: TC_C_006

Attribute		Explanation
Test case ID		TC_C_006
Test case type		Manual
Test case purpose		Firmware upload to R-ITS-S Demonstrate that the C-ITS-S is able to upload firmware through IF3 to a R-ITS-S.
Test case source		R_C_030 Configuration of R-ITS-S
Test components*		C-ITS-S
Precondition		At least one R-ITS-S must be connected.
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • R-ITS-S
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	Open C-ITS-S GUI for upload	O: Screen / window for firmware upload
1	Select file type and file name	I: File name
2	Select one R-ITS-S	I: Name of R-ITS-S
3	Start upload	I: Start command / Enter
4	Open upload list of C-ITS-S	O: The R-ITS-S selected appears in the list on succeeded uploads
5	Inspect firmware upload at R-ITS-S	V: check R-ITS-S firmware version

Attribute	Explanation
Postcondition*	

Table 10: TC_C_007 (Requirement is under revision)

Attribute	Explanation	
Test case ID	TC_C_007	
Test case type	Manual or automatic execution, manual Validation.	
Test case purpose	Configuration of CAM aggregation parameters The CAM aggregation parameters for each R-ITS-S shall be configurable from the C-ITS-S. Following parameters shall be configurable: • Short collection interval • Long collection interval • Detection zones o Detection zone (1..8) o Detection zone ID o Geo area ▪ Rectangle method ▪ Heading method • Groups o Station type group (1..8) ▪ Short station type group ID ▪ Station type (1..7)	
Test case source	R_C_076: Configuration of CAM Aggregation Parameters	
Test components*	DUT: C-ITS-S	
Precondition	C-ITS-S up and running R-ITS-S test tools up and running Connection between R-ITS-S and C-ITS-S (IF3) is established (TC_R_XXX)	
Testing environment	Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • R-ITS-S test tool (R-ITS-S or emulated R-ITS-S) with ability to receive a set provided CAM aggregation configuration from C-ITS-S • R-ITS-S test tool to inspect aggregated data configuration	
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	Configuration of CAM aggregation on C-ITS-S and transmission to R-ITS-S test tool	I: manual configuration of CAM aggregation parameters on C-ITS-S O: C-ITS-S sends CAM aggregation configuration to R-ITS-S test tool via IF3

Attribute		Explanation
1	R-ITS-S receives and sets the CAM aggregation configuration	I: R-ITS-S test tool receives CAM aggregation configuration O: R-ITS-S test tool sets the received CAM aggregation configuration data V: R-ITS-S CAM aggregation configuration is equal to the configuration at the C-ITS-S • Short collection interval • Long collection interval • Detection zones o Detection zone (1..8) o Detection zone ID o Geo area ▪ Rectangle method ▪ Heading method • Groups o Station type group (1..8) ▪ Short station type group ID ▪ Station type (1..7)
Postcondition*		-

Table 11: TC_C_008 (Requirement updated – TC under revision)

Attribute	Explanation
Test case ID	TC_C_008
Test case type	Manual or automatic execution, manual validation.
Test case purpose	C-ITS-S time synchronization with NTP server C-ITS-S time shall be synchronized to a common time reference with an NTP server.
Test case source	R_C_069: C-ITS-S Time Synchronization
Test components*	DUT: C-ITS-S
Precondition	C-ITS-S (DUT) is up and running NTP Server is up and running Connection between C-ITS-S and NTP Server is established Time from NTP server can be read out
Testing environment	

Attribute		Explanation
		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • NTP-Server • C-ITS-S test tool in order to set and inspect the R-ITS-S system time
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	Set system time of C-ITS-S ahead	I: set system time of C-ITS-S min. 30 minutes ahead of NTP server time O: system time of C-ITS-S is min. 30 minutes ahead of NTP server time
1	Check of time synchronization	I: wait for max 5 minutes O: synchronized time at C-ITS-S V: after 5 minutes the difference between system time of C-ITS-S and NTP server time is max. 20 ms
Postcondition*		-

Table 12: TC_C_009

Attribute		Explanation
Test case ID		TC_C_009
Test case type		Manual
Test case purpose		Log Availability To prove that the C-ITS-S is able to show available logged data to an operator.
Test case source		R_C_073 Log availability
Test components*		C-ITS-S
Precondition		There is an archive for the data.
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT)
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)

Attribute		Explanation
0	Open the C-ITS-S GUI	O: GUI is shown
1	Log in user operator credentials	I: insert operator credentials for login O: operator is logged in
2	Check the information is displayed to the operator	V: the operator has access to the recorded datasets
Postcondition*		

Table 13: TC_C_010

Attribute		Explanation
Test case ID		TC_C_010
Test case type		Manual
Test case purpose		Visualization of R-ITS-S To prove that the position of the stationary R-ITS-Ss are visualized on the GUI.
Test case source		R_C_049 Visualization of R-ITS-S;
Test components*		C-ITS-S
Precondition		Position of R-ITS-S test case: The position of the R-ITS-S has to be known by the tester (for validation with the displayed position at the C-ITS-S) R-ITS-S details test case: The details of the R-ITS-S has to be known by the tester (for validation with the displayed data at the C-ITS-S)
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • Test tool (Stationary R-ITS-S or Stationary R-ITS-S emulator)
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	Open the C-ITS-S GUI	O: A graphical representation of the map with the positioned stationary R-ITS-Ss is displayed

Attribute		Explanation
1	Select a stationary R-ITS-S on the map	V: Details of the stationary R-ITS-Ss about the status, and position are shown and match with the real/emulated situation
Postcondition*		

Table 14: TC_C_011

Attribute		Explanation
Test case ID		TC_C_011
Test case type		Manual
Test case purpose		Visualization of RW trailer To prove that the position of the R-ITS-S mounted on the RW-trailers are visualized on the GUI.
Test case source		R_C_050 Visualization of RW-Trailers;
Test components*		C-ITS-S
Precondition		Position of RW-Trailer test case: The position of the RW-Trailer has to be known by the tester (for validation with the displayed position at the C-ITS-S) RW-Trailer details test case: The details of the RW-Trailer have to be known by the tester (for validation with the displayed data at the C-ITS-S)
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • R-ITS-S test tool (R-ITS-S mounted on the RW-trailers or R-ITS-S mounted on the RW-trailers emulator)
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	Open the C-ITS-S GUI	O: A graphical representation of the map with the positioned R-ITS-Ss mounted on the RW-trailers will be shown.

Attribute		Explanation
1	Select a R-ITS-S mounted on the RW-trailers on the map	V: Details of the R-ITS-S mounted on the RW-trailers about the status and position are shown and match with the real/emulated situation
Postcondition*		

Table 15: TC_C_012

Attribute		Explanation
Test case ID		TC_C_012
Test case type		Manual
Test case purpose		Visualization of deployed messages To prove that the status and deployed messages are shown on the C-ITS-S GUI.
Test case source		R_C_088 Presentation of status and deployed messages
Test components*		C-ITS-S
Precondition		C-ITS-S (DUT) is up and running
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT)
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	Open the C-ITS-S GUI	O: A map with the positioned devices is shown.
1	Click on a device and select the status tab	V: Status of the device, including deployed message, is shown.
Postcondition*		

Table 16: TC_C_013

Attribute	Explanation
Test case ID	TC_C_013
Test case type	Manual or automatic execution, manual Validation.
Test case purpose	IVI data reception from TCC

Attribute	Explanation	
	Demonstrate that the C-ITS-S is able to receive the information via IF1 from the TCC, in order to generate an IVI message.	
Test case source	R_C_001: IVI data reception from TCC	
Test components*	DUT: C-ITS-S	
Precondition	.C-ITS-S (DUT) is up and running TCC test tool is up and running Connection between TCC and C-ITS-S (IF1) is established (TC_C_XXX) Predefined IVI content	
Testing environment	Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool (TCC or TCC emulator) with ability to send IVI data to C-ITS-S via IF1 • C-ITS-S test tool for validating that the received data is the required info to generate an IVI message	
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	TCC sends IVI data to C-ITS-S via IF1	I: Trigger, in order to generate IVI data with predefined content at the TCC test tool O: TCC test tool sends IVI data to C-ITS-S via IF1
1	C-ITS-S receives IVI data	I: C-ITS-S receives IVI data from TCC test tool via IF1 O: received IVI data at C-ITS-S is ready for mapping to IVI message V: C-ITS-S test tool validates that the received data is the required info to generate an IVI message for IF3
Postcondition*	-	

Table 17: TC_C_014

Attribute	Explanation
Test case ID	TC_C_014
Test case type	Automatic

Attribute		Explanation
Test case purpose		Convergence functionality To demonstrate that the C-ITS-S provides the functionalities required for IF5.
Test case source		R_C_107 C-ITS-S Convergence functionality
Test components*		C-ITS-S
Precondition		The interface IF1 is established and a device with TCC functionalities is sending the relevant data. WEB Server Test tool is running.
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • WEB Server Test tool
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	C-ITS-S sends DENM data to WEB Server test tool over IF5	I: DENM data is available at C-ITS-S O: C-ITS-S sends DENM data to WEB server test tool via IF5
n	WEB Server test tool receives DENM data	I: WEB Server test tool receives DENM data from C-ITS-S via IF5 O: received DENM data at WEB Server test tool is ready to be shared over IF8 V: WEB Server test tool validates that the received data is the required info to share the DENM message over IF8
Postcondition*		

Table 18: TC_C_015

Attribute	Explanation
Test case ID	TC_C_015
Test case type	Manual or automatic execution, manual Validation.
Test case purpose	DENM data reception from TCC Demonstrate that the C-ITS-S is able to receive the information via IF1 from the TCC, in order to generate a DENM message.

Attribute		Explanation
Test case source		R_C_003: DENM data reception from TCC
Test components*		DUT: C-ITS-S
Precondition		C-ITS-S (DUT) is up and running TCC test tool is up and running Connection between TCC and C-ITS-S (IF1) is established (TC_C_XXX) Predefined DENM content for ECo-AT UC other DENM applications
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool (TCC or TCC emulator) with ability to send DENM data to C-ITS-S via IF1 • C-ITS-S test tool for validating that the received data is the required info to generate an DENM message
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	TCC sends DENM data to C-ITS-S via IF1	I: Trigger, in order to generate DENM data with predefined content at the TCC test tool O: TCC test tool sends DENM data to C-ITS-S via IF1
1	C-ITS-S receives DENM data	I: C-ITS-S receives DENM data from TCC test tool via IF1 O: received DENM data at C-ITS-S is ready for mapping to DENM message V: C-ITS-S test tool validates that the received data is the required info to generate a DENM message for IF3
Postcondition*		-

Table 19: TC_C_016

Attribute	Explanation
Test case ID	TC_C_016
Test case type	Manual
Test case purpose	RWW reception from R-ITS-S

Attribute		Explanation
		Demonstrate that the C-ITS-S is able to receive the RWW information from the R-ITS-S via IF3
Test case source		R_C_012 RWW reception from R-ITS-S
Test components*		C-ITS-S
Precondition		Interfaces IF3 is established and a device with R-ITS-S functionalities is sending the relevant data.
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • R-ITS-S or test environment providing RWW-message
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	A test environment or an R_ITS-S is providing a RWW-message in IF3.	O: RWW-message on IF3 in OCIT-C format
1	The C-ITS-S is receiving an RWW-message on IF3	I: RWW-message on IF3 in OCIT-C format
2	Check internal data model of C-ITS-s on input	V: Compare internal data model contents with contents sent from R-ITS-S on completeness.
Postcondition*		

Table 20: TC_C_017

Attribute	Explanation
Test case ID	TC_C_017
Test case type	Automatic
Test case purpose	DENM data reception from R-ITS-S Demonstrate that the C-ITS-S is able to receive the DENM data from the R-ITS-S via IF3
Test case source	R_C_013 DENM data reception from R-ITS-S
Test components*	C-ITS-S
Precondition	Interface IF3 is established and a device with R-ITS-S functionalities is sending the relevant data.
Testing environment	Both, field test and laboratory test are usable on the level of component test. Required components:

Attribute		Explanation
		• C-ITS-S (DUT) • R-ITS-S or test environment providing DENM message
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	A test environment or an R_ITS-S is providing a DENM-message in IF3.	O: DENM-message on IF3 in OCIT-C format
n1	The C-ITS-S is receiving a DENM-message on IF3	I: DENM-message on IF3 in OCIT-C format
2	Check internal data model of C-ITS-s on input	V: Compare internal data model contents with contents sent from R-ITS-S on completeness.
Postcondition*		

Table 21: TC_C_018

Attribute		Explanation
Test case ID		TC_C_018
Test case type		Automatic
Test case purpose		DENM Data Provision to TCC Prove that a DENM-message received from IF3 are automatically forwarded to the TCC
Test case source		R_C_083 DENM Data Provision to TCC
Test components*		C-ITS-S
Precondition		Both interfaces IF3 and IF1 are established and a device with R-ITS-S functionalities is sending the relevant data.
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • R-ITS-S or test tool for message generation
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	The R-ITS-S is sending a DENM-message on IF3	O: DENM-message (OCIT-C)
1	The C-ITS-S receives a DENM-massage on IF3	I: DENM-message (OCIT-C)

Attribute		Explanation
2	Transformation from OCIT-C into DATEX II	
3	The C-ITS-S sends a DENM-message in DATEX II via the IF1.	O: DENM-message
4	Use interface inspection tool to view / print DENM-message	O: DATEX II-structure V: Compare DATEX II-structure with predefined structure; check on deviations
Postcondition*		

Table 22: TC_C_019

Attribute		Explanation
Test case ID		TC_C_019
Test case type		Automatic
Test case purpose		Aggregated CAM data reception Demonstrate that the C-ITS-S is able to receive the CAM aggregated data from the R-ITS-S via IF3
Test case source		R_C_011 Aggregated CAM data reception
Test components*		C-ITS-S
Precondition		IF3 is established and an R-ITS-S or a test toll for message generation is sending the relevant aggregated data.
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • R-ITS-S or test tool for message generation
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	A test environment or an R_ITS-S is providing aggregated CAM-data on IF3.	O: Aggregated CAM-message on IF3 in OCIT-C format
1	The C-ITS-S is receiving the aggregated CAM-data message on IF3	I: Aggregated CAM-message on IF3 in OCIT-C format

2	Check internal data model of C-ITS-s on input	V: Compare internal data model contents with contents sent from R-ITS-S on completeness.
Postcondition*		

Table 23: TC_C_020

Attribute	Explanation	
Test case ID	TC_C_020	
Test case type	Automatic	
Test case purpose	Aggregated CAM data provision to TCC Prove that the aggregated CAM data received from IF3 is automatically forwarded to the TCC	
Test case source	R_C_004 Aggregated CAM data provision to TCC	
Test components*	C-ITS-S	
Precondition	Both interfaces IF3 and IF1 are established and an R-ITS-S or a test toll for message generation is sending the relevant data.	
Testing environment	Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • R-ITS-S or test tool for message generation	
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	The R-ITS-S is sending aggregated CAM--message on IF3	O: Aggregated-CAM-message (OCIT-C)
1	The C-ITS-S receives an aggregated CAM-message on IF3	I: Aggregated CAM-message (OCIT-C)
2	Transformation from OCIT-C into DATEX II	
3	The C-ITS-S sends an aggregated CAM-message in DATEX II via the IF1.	O: aggregated CAM-data
4	Use interface inspection tool to view / print DENM-message	O: DATEX II-structure V: Compare DATEX II-structure with predefined structure; check on deviations
Postcondition*		

Table 24: TC_C_021

Attribute		Explanation
Test case ID		TC_C_021
Test case type		Automatic
Test case purpose		New DENM provision to R-ITS-S To test that the C-ITS-S can provide new DENM messages through IF3.
Test case source		R_C_084 DENM data provision to R-ITS-S
Test components*		C-ITS-S
Precondition		IF1 is providing new OtherDENM/RWW information or predefined DENM data is available on C-ITS-S. Mapping functionality works according to the specification. The interface IF3 is established and the C-ITS-S is sending the relevant data
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool in order to trigger DENM data through IF1 or C-ITS-S test tool in order to trigger DENM data as input for the mapping • R-ITS-S test tool, in order to inspect the generated messages
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	DENM data provision	I: new DENM data is available from IF1 or from predefined data O: new DENM data is available to be mapped into a DENM message
1	Generation of DENM message	I: Data available in the C-ITS-S is mapped into a DENM message O: DENM message is sent over IF3
2	Verification of the delivered DENM message	V: check that the DENM is sent over IF3 and is described according the specifications.
Postcondition*		

Table 25: TC_C_022

Attribute		Explanation
Test case ID		TC_C_022
Test case type		Automatic
Test case purpose		Updated DENM provision to R-ITS-S To test that the C-ITS-S can provide DENM updates through IF3.
Test case source		R_C_084 DENM data provision to R-ITS-S
Test components*		C-ITS-S
Precondition		IF1 is providing updated OtherDENM/RWW information (e.g. validity) or predefined DENM data is available on C-ITS-S. Mapping functionality works according to the specification. The interface IF3 is established and the C-ITS-S is sending the relevant data
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool in order to trigger DENM data through IF1 or C-ITS-S test tool in order to trigger DENM data as input for the mapping • R-ITS-S test tool, in order to inspect the generated messages
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	DENM updated data provision	I: updated DENM data is available from IF1 or from predefined data O: Updated DENM data is available to be mapped into an existing DENM message
1	Generation of DENM message	I: Data available in the C-ITS-S is mapped into an existing DENM message O: Updated DENM message is sent over IF3
2	Verification of the delivered DENM message	V: check that the updated DENM message is sent over IF3 and is described according the specifications.
Postcondition*		

Table 26:TC_C_023

Attribute	Explanation
Test case ID	TC_C_023
Test case type	Automatic
Test case purpose	New IVI provision to R-ITS-S To test that the C-ITS-S can provide new IVI messages through IF3.
Test case source	R_C_085 IVI Data provision to R-ITS-S
Test components*	C-ITS-S
Precondition	IF1 is providing new IVI information or predefined IVI data is available on C-ITS-S. Mapping functionality works according to the specification. The interface IF3 is established and the C-ITS-S is sending the relevant data
Testing environment	Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool in order to trigger IVI data through IF1 or C-ITS-S test tool in order to trigger a IVI as input for the mapping • R-ITS-S test tool, in order to inspect the generated messages
Test steps*	

#	Description	Input(I)/Output(O)/Validation(V)
0	IVI data provision	I: new IVI data is available from IF1 or from predefined data O: new IVI data is available to be mapped into a IVI message
1	Generation of IVI message	I: Data available in the C-ITS-S is mapped into a IVI message O: IVI message is sent over IF3
2	Verification of the delivered IVI message	V: check that the IVI is sent over IF3 and is described according the specifications.

Postcondition*	

Table 27:TC_C_024

Attribute	Explanation	
Test case ID	TC_C_024	
Test case type	Automatic	
Test case purpose	Updated IVI provision to R-ITS-S To demonstrate that the C-ITS-S can provide IVI updates through IF3.	
Test case source	R_C_085 IVI Data provision to R-ITS-S	
Test components*	C-ITS-S	
Precondition	IF1 is providing updated IVI information (e.g. validity) or predefined IVI data is available on C-ITS-S. Mapping functionality works according to the specification. The interface IF3 is established and the C-ITS-S is sending the relevant data	
Testing environment	Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool in order to trigger IVI data through IF1 or C-ITS-S test tool in order to trigger IVI data as input for the mapping • R-ITS-S test tool, in order to inspect the generated messages	
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	IVI udapted data provision	I: updated IVI data is available from IF1 or from predefined data O: Updated IVI data is available to be mapped into an existing IVI message
1	Generation of IVI message	I: Data available in the C-ITS-S is mapped into an existing IVI message O: Updated IVI message is sent over IF3
2	Verification of the delivered IVI message	V: check that the updated IVI message is sent over IF3 and is described according the specifications.
Postcondition*		

Table 28: TC_C_025

Attribute		Explanation
Test case ID		TC_C_025
Test case type		Automatic
Test case purpose		
Test case source		R_C_094 Forward single vehicle data
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0		
1		
2		
Postcondition*		

Table 29: TC_C_026

Attribute		Explanation
Test case ID		TC_C_026
Test case type		Automatic
Test case purpose		
Test case source		R_C_095 CEN-DSRC protected zones reception from TCC
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0		
1		

Attribute		Explanation
2		
Postcondition*		

Table 30: TC_C_027

Attribute		Explanation
Test case ID		TC_C_027
Test case type		Automatic
Test case purpose		
Test case source		R_C_090 Single vehicle data reception from R-ITS-S
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0		
1		
2		
Postcondition*		

Table 31: TC_C_028

Attribute		Explanation
Test case ID		TC_C_028
Test case type		Automatic
Test case purpose		
Test case source		R_C_097 CEN-DSRC protected zones distribution
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)

Attribute		Explanation
0		
1		
2		
Postcondition*		

Table 32: TC_C_029

Attribute		Explanation
Test case ID		TC_C_029
Test case type		Automatic
Test case purpose		
Test case source		R_C_098 Provision of CEN-DSRC protected zone data to R-ITS-S
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0		
1		
2		
Postcondition*		

Table 33: TC_C_030

Attribute	Explanation
Test case ID	TC_C_030
Test case type	Automatic
Test case purpose	Event Mapping from DATEX II to DENM on IF3 The C-ITS-S shall test the capability of mapping the DATEX II event data received from the TCC via IF1 to appropriate DENM events then sent on interface IF3.

Attribute		Explanation
Test case source		R_C_099 Event Mapping from DATEX II to DENM (IF3)
Test components*		C-ITS-S
Precondition		IF1 is providing updated DENM information or predefined DENM data is available on C-ITS-S. The interface IF3 is established and the C-ITS-S is sending the relevant data
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool in order to trigger IVI/DENM data through IF1 or C-ITS-S test tool in order to trigger IVI/DENM data as input for the mapping • C-ITS-S test tool, in order to inspect the generated messages
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	DENM data provision	I: new DATEX II event data is available from IF1 O: new DATEX II event data is available to be mapped into a DENM message
1	Generation of DENM message	I: DATEX II event data available in the C-ITS-S is mapped into a DENM message O: DENM message is created to be sent over IF3
2	Verification of the created DENM message	V: check that the DENM messages is mapped correctly from DATEX II event data and is described according the specifications.
Postcondition*		

Table 34: TC_C_031

Attribute	Explanation
Test case ID	TC_C_031
Test case type	Automatic
Test case purpose	Event Mapping from DATEX II to DENM on IF5 The C-ITS-S shall test the capability of mapping the DATEX II event data received from the TCC via IF1 to appropriate DENM events then sent on interface IF5.
Test case source	R_C_108 Event Mapping from DATEX II to DENM (IF5)
Test components*	C-ITS-S

Attribute		Explanation
Precondition		IF1 is providing updated DENM information or predefined DENM data is available on C-ITS-S. The interface IF5 is established and the C-ITS-S is sending the relevant data
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool in order to trigger IVI/DENM data through IF1 or C-ITS-S test tool in order to trigger IVI/DENM data as input for the mapping • C-ITS-S test tool, in order to inspect the generated messages
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	DENM data provision	I: new DATEX II event data is available from IF1 O: new DATEX II event data is available to be mapped into a DENM message
1	Generation of DENM message	I: DATEX II event data available in the C-ITS-S is mapped into a DENM message O: DENM message is created to be sent over IF5
2	Verification of the created DENM message	V: check that the DENM messages is mapped correctly from DATEX II event data and is described according the specifications.
Postcondition*		

Table 35: TC_C_032

Attribute	Explanation
Test case ID	TC_C_032
Test case type	Automatic
Test case purpose	C-ITS-S Message Management for DENM on IF3 The C-ITS-S shall perform message management i.e. check the validity of (DENM UC based) DATEX II data records on IF1 and initiate or cancel the provision of DENMs on IF3 based on that validity.
Test case source	R_C_100 C-ITS-S Message Management for DENM (IF3)
Test components*	C-ITS-S
Precondition	IF1 is providing updated DENM information or predefined DENM data is available on C-ITS-S.

Attribute		Explanation
		The interface IF3 is established and the C-ITS-S is sending the relevant data
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool in order to trigger IVI/DENM data through IF1 or C-ITS-S test tool in order to trigger IVI/DENM data as input for the mapping • C-ITS-S test tool, in order to inspect the generated messages
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	DENM data provision	I: new DATEX II event data is available from IF1 O: new DATEX II event data is mapped into a DENM message
1	Comparison of generated DENM with active DENMs	O: compare the validity of the DENM with existing DENMs
2	Verification of validity of DENM	V: based on the comparison, a DENM will be updated if validity of the DENM differs from existing DENM before sending it on IF3
Postcondition*		

Table 36: TC_C_033

Attribute	Explanation
Test case ID	TC_C_033
Test case type	Automatic
Test case purpose	C-ITS-S Message Management for DENM on IF5 The C-ITS-S shall perform message management i.e. check the validity of (DENM UC based) DATEX II data records on IF1 and initiate or cancel the provision of DENMs on IF5 based on that validity.
Test case source	R_C_109 C-ITS-S Message Management for DENM (IF5)
Test components*	C-ITS-S
Precondition	IF1 is providing updated DENM information or predefined DENM data is available on C-ITS-S. The interface IF3 is established and the C-ITS-S is sending the relevant data
Testing environment	Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT)

Attribute		Explanation
		• TCC test tool in order to trigger IVI/DENM data through IF1 or C-ITS-S test tool in order to trigger IVI/DENM data as input for the mapping • C-ITS-S test tool, in order to inspect the generated messages
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	DENM data provision	I: new DATEX II event data is available from IF1 O: new DATEX II event data is mapped into a DENM message
1	Comparison of generated DENM with active DENMs	O: compare the validity of the DENM with existing DENMs
2	Verification of validity of DENM	V: based on the comparison, a DENM will be updated if validity of the DENM differs from existing DENM before sending it on IF5
Postcondition*		

Table 37: TC_C_034

Attribute	Explanation
Test case ID	TC_C_034
Test case type	Automatic
Test case purpose	DENM message generation for IF3 The C-ITS-S shall be able to generate DENM messages for transmission to the R-ITS-S supporting the following encodings of DENM: UPER, XER, and XERC
Test case source	R_C_101 DENM message generation for IF3
Test components*	C-ITS-S
Precondition	IF1 is providing updated DENM information or predefined DENM data is available on C-ITS-S. The interface IF3 is established and the C-ITS-S is sending the relevant data
Testing environment	Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool in order to trigger IVI/DENM data through IF1 or C-ITS-S test tool in order to trigger IVI/DENM data as input for the mapping • C-ITS-S test tool, in order to inspect the generated messages

Attribute		Explanation
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	DENM data provision	I: new DATEX II event data is available from IF1 O: new DATEX II event data is mapped into a DENM message
1	Generation of DENM message	I: DATEX II event data available in the C-ITS-S is mapped into a DENM message O: DENM message is encoded in UPER, XER and XERC to be sent over IF3
2	Verification of the encoding of the created DENM message	V: check that the DENM messages are available in the three encodings and is described according the specifications.
Postcondition*		

Table 38: TC_C_035

Attribute	Explanation
Test case ID	TC_C_035
Test case type	Automatic
Test case purpose	DENM message generation for IF5 The C-ITS-S shall be able to generate DENM messages for transmission to the R-ITS-S supporting the following encodings of DENM: UPER, XER, and XERC
Test case source	R_C_112 DENM message generation for IF5
Test components*	C-ITS-S
Precondition	IF1 is providing updated DENM information or predefined DENM data is available on C-ITS-S. The interface IF3 is established and the C-ITS-S is sending the relevant data
Testing environment	Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool in order to trigger IVI/DENM data through IF1 or C-ITS-S test tool in order to trigger IVI/DENM data as input for the mapping • C-ITS-S test tool, in order to inspect the generated messages
Test steps*	

#	Description	Input(I)/Output(O)/Validation(V)

Attribute		Explanation
0	DENM data provision	I: new DATEX II event data is available from IF1 O: new DATEX II event data is mapped into a DENM message
1	Generation of DENM message	I: DATEX II event data available in the C-ITS-S is mapped into a DENM message O: DENM message is encoded in UPER, XER and XERC to be sent over IF5
2	Verification of the encoding of the created DENM message	V: check that the DENM messages are available in the three encodings and is described according the specifications.
Postcondition*		

Table 39: TC_C_036

Attribute		Explanation
Test case ID		TC_C_036
Test case type		Automatic
Test case purpose		
Test case source		R_C_102 Event Mapping from DENM to DATEX II
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0		
1		
2		
Postcondition*		

Table 40: TC_C_037

Attribute	Explanation
Test case ID	TC_C_037

Attribute		Explanation
Test case type		Automatic
Test case purpose		
Test case source		R_C_106 RWW data augmentation
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0		
1		
2		
Postcondition*		

Table 41: TC_C_038

Attribute		Explanation
Test case ID		TC_C_038
Test case type		Automatic
Test case purpose		
Test case source		R_C_110 C-ITS-S “augmented RWW” DENM transmission: IF3 connection lost/resumed
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0		
1		
2		
Postcondition*		

Table 42: TC_C_039

Attribute		Explanation
Test case ID		TC_C_039
Test case type		Automatic
Test case purpose		
Test case source		R_C_111 C-ITS-S “augmented RWW” DENM transmission: updated RWW information
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0		
1		
2		
Postcondition*		

Table 43: TC_C_040

Attribute		Explanation
Test case ID		TC_C_040
Test case type		Automatic
Test case purpose		
Test case source		R_C_089 Mapping of CAM aggregation data
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0		
1		

Attribute		Explanation
2		
Postcondition*		

Table 44: TC_C_041

Attribute		Explanation
Test case ID		TC_C_041
Test case type		Automatic
Test case purpose		
Test case source		R_C_091 Mapping of single vehicle data
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0		
1		
2		
Postcondition*		

Table 45: TC_C_042

Attribute		Explanation
Test case ID		TC_C_042
Test case type		Automatic
Test case purpose		
Test case source		R_C_092 Mapping stationID to vehicleID for single vehicle data
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)

Attribute		Explanation
0		
1		
2		
Postcondition*		

Table 46: TC_C_043

Attribute		Explanation
Test case ID		TC_C_043
Test case type		Automatic
Test case purpose		
Test case source		R_C_093 Storage duration: mapping stationID to vehicleID
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0		
1		
2		
Postcondition*		

Table 47: TC_C_044

Attribute	Explanation
Test case ID	TC_C_044
Test case type	Automatic
Test case purpose	Event Mapping from DATEX II to IVI on IF3 The C-ITS-S shall test the capability of mapping the DATEX II event data received from the TCC via IF1 to appropriate IVI message then sent on interface IF3.

Attribute		Explanation
Test case source		R_C_103 Event Mapping from DATEX II to IVI
Test components*		C-ITS-S
Precondition		IF1 is providing updated IVI information or predefined IVI data is available on C-ITS-S. The interface IF3 is established and the C-ITS-S is sending the relevant data
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool in order to trigger IVI/DENM data through IF1 or C-ITS-S test tool in order to trigger IVI/DENM data as input for the mapping • C-ITS-S test tool, in order to inspect the generated messages
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	IVI data provision	I: new DATEX II event data is available from IF1 O: new DATEX II event data is available to be mapped into a IVI message
1	Generation of IVI message	I: DATEX II event data available in the C-ITS-S is mapped into a IVI message O: IVI message is created to be sent over IF3
2	Verification of the created IVI message	V: check that the IVI messages is mapped correctly from DATEX II event data and is described according the specifications.
Postcondition*		

Table 48: TC_C_045

Attribute	Explanation
Test case ID	TC_C_045
Test case type	Automatic
Test case purpose	C-ITS-S Message Management for IVI on IF3 The C-ITS-S shall perform message management i.e. check the validity of (IVI UC based) DATEX II data records on IF1 and initiate or cancel the provision of IVIs on IF3 based on that validity.
Test case source	R_C_104 C-ITS-S Message Management for IVI (IF3)
Test components*	C-ITS-S

Attribute		Explanation
Precondition		IF1 is providing updated IVI information or predefined IVI data is available on C-ITS-S. The interface IF3 is established and the C-ITS-S is sending the relevant data
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool in order to trigger IVI/DENM data through IF1 or C-ITS-S test tool in order to trigger IVI/DENM data as input for the mapping • C-ITS-S test tool, in order to inspect the generated messages
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	IVI data provision	I: new DATEX II data record is available from IF1 O: new DATEX II data record is mapped into an IVI message
1	Comparison of generated IVI with active IVIs	O: compare the validity of the IVI with existing IVIs
2	Verification of validity of IVI	V: based on the comparison, a IVI will be updated if validity of the IVI differs from existing IVI before sending it on IF3
Postcondition*		

Table 49: TC_C_046

Attribute	Explanation
Test case ID	TC_C_046
Test case type	Automatic
Test case purpose	IVI message generation for IF3 The C-ITS-S shall be able to generate IVI messages for transmission to the R-ITS-S supporting the following encodings of IVI: UPER, XER, and XERC
Test case source	R_C_105 IVI message generation for IF3
Test components*	C-ITS-S
Precondition	IF1 is providing updated IVI information or predefined IVI data is available on C-ITS-S. The interface IF3 is established and the C-ITS-S is sending the relevant data

Attribute		Explanation
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool in order to trigger IVI/DENM data through IF1 or C-ITS-S test tool in order to trigger IVI/DENM data as input for the mapping • C-ITS-S test tool, in order to inspect the generated messages
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	IVI data provision	I: new DATEX II data record is available from IF1 O: new DATEX II data record is mapped into an IVI message
1	Generation of IVI message	I: DATEX II data record available in the C-ITS-S is mapped into a IVI message O: IVI message is encoded in UPER, XER and XERC to be sent over IF3
2	Verification of the encoding of the created IVI message	V: check that the IVI messages are available in the three encodings and is described according the specifications.
Postcondition*		

Table 50: TC_C_047

Attribute	Explanation
Test case ID	TC_C_047
Test case type	Automatic
Test case purpose	Event Mapping from DATEX II to IVI on IF5 The C-ITS-S shall test the capability of mapping the DATEX II event data received from the TCC via IF1 to appropriate IVI message then sent on interface IF5.
Test case source	R_C_113 IVI info mapping from DATEX II to IVI (IF5)
Test components*	C-ITS-S
Precondition	IF1 is providing updated IVI information or predefined IVI data is available on C-ITS-S. The interface IF5 is established and the C-ITS-S is sending the relevant data

Attribute		Explanation
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool in order to trigger IVI/DENM data through IF1 or C-ITS-S test tool in order to trigger IVI/DENM data as input for the mapping • C-ITS-S test tool, in order to inspect the generated messages
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	IVI data provision	I: new DATEX II event data is available from IF1 O: new DATEX II event data is available to be mapped into a IVI message
1	Generation of IVI message	I: DATEX II event data available in the C-ITS-S is mapped into a IVI message O: IVI message is created to be sent over IF5
2	Verification of the created IVI message	V: check that the IVI messages is mapped correctly from DATEX II event data and is described according the specifications.
Postcondition*		

Table 51: TC_C_048

Attribute	Explanation
Test case ID	TC_C_048
Test case type	Automatic
Test case purpose	C-ITS-S Message Management for IVI on IF5 The C-ITS-S shall perform message management i.e. check the validity of (IVI UC based) DATEX II data records on IF1 and initiate or cancel the provision of IVIs on IF5 based on that validity.
Test case source	R_C_114 C-ITS-S Message Management for IVI (IF5)
Test components*	C-ITS-S
Precondition	IF1 is providing updated IVI information or predefined IVI data is available on C-ITS-S. The interface IF3 is established and the C-ITS-S is sending the relevant data

Attribute		Explanation
Testing environment		Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool in order to trigger IVI/DENM data through IF1 or C-ITS-S test tool in order to trigger IVI/DENM data as input for the mapping • C-ITS-S test tool, in order to inspect the generated messages
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	IVI data provision	I: new DATEX II data record is available from IF1 O: new DATEX II data record is mapped into an IVI message
1	Comparison of generated IVI with active IVIs	O: compare the validity of the IVI with existing IVIs
2	Verification of validity of IVI	V: based on the comparison, a IVI will be updated if validity of the IVI differs from existing IVI before sending it on IF3
Postcondition*		

Table 52: TC_C_049

Attribute	Explanation
Test case ID	TC_C_049
Test case type	Automatic
Test case purpose	IVI message generation for IF5 The C-ITS-S shall be able to generate IVI messages for transmission to the R-ITS-S supporting the following encodings of IVI: UPER, XER, and XERC
Test case source	R_C_115 IVI message generation for IF5
Test components*	C-ITS-S
Precondition	IF1 is providing updated IVI information or predefined IVI data is available on C-ITS-S. The interface IF5 is established and the C-ITS-S is sending the relevant data
Testing environment	Both, field test and laboratory test are usable on the level of component test. Required components: • C-ITS-S (DUT) • TCC test tool in order to trigger IVI/DENM data through IF1 or C-ITS-S test tool in order to trigger IVI/DENM data as input for the mapping

Attribute		Explanation
		• C-ITS-S test tool, in order to inspect the generated messages
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0	IVI data provision	I: new DATEX II data record is available from IF1 O: new DATEX II data record is mapped into an IVI message
1	Generation of IVI message	I: DATEX II data record available in the C-ITS-S is mapped into a IVI message O: IVI message is encoded in UPER, XER and XERC to be sent over IF5
2	Verification of the encoding of the created IVI message	V: check that the IVI messages are available in the three encodings and is described according the specifications.
Postcondition*		

Table 53: TC_C_050

Attribute		Explanation
Test case ID		TC_C_050
Test case type		Automatic
Test case purpose		
Test case source		R_C_120 R-ITS-S basic initialization
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0		
1		
2		
Postcondition*		

Table 54: TC_C_051

Attribute		Explanation
Test case ID		TC_C_051
Test case type		Automatic
Test case purpose		
Test case source		R_C_121 R-ITS-S device management
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0		
1		
2		
Postcondition*		

Table 55: TC_C_052

Attribute		Explanation
Test case ID		TC_C_052
Test case type		Automatic
Test case purpose		
Test case source		R_C_116 IF1 and IF3 logging in C-ITS-S
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0		
1		
2		

Attribute	Explanation
Postcondition*	

Table 56: TC_C_053

Attribute		Explanation
Test case ID		TC_C_053
Test case type		Automatic
Test case purpose		
Test case source		R_C_117 Message dissemination logging
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0		
1		
2		
Postcondition*		

Table 57: TC_C_054

Attribute		Explanation
Test case ID		TC_C_054
Test case type		Automatic
Test case purpose		
Test case source		R_C_118 R-ITS-S reboot logging
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0		

Attribute		Explanation
1		
2		
Postcondition*		

Table 58: TC_C_055

Attribute		Explanation
Test case ID		TC_C_055
Test case type		Automatic
Test case purpose		
Test case source		R_C_119 IF1 and IF3 content logging in C-ITS-S
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0		
1		
2		
Postcondition*		

Table 59: TC_C_056

Attribute	Explanation
Test case ID	TC_C_056
Test case type	Automatic
Test case purpose	
Test case source	R_C_096 Grouping of CEN-DSRC protected zones
Test components*	C-ITS-S
Precondition	
Testing environment	
Test steps*	

Attribute		Explanation
#	Description	Input(I)/Output(O)/Validation(V)
0		
1		
2		
Postcondition*		

Table 60: TC_C_057

Attribute		Explanation
Test case ID		TC_C_057
Test case type		Automatic
Test case purpose		
Test case source		R_G_008 Log entries timestamp
Test components*		C-ITS-S
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0		
1		
2		
Postcondition*		

Table 61: TC_C_058

Attribute	Explanation
Test case ID	TC_C_058
Test case type	Automatic
Test case purpose	
Test case source	R_G_009 Logging format
Test components*	C-ITS-S

Attribute		Explanation
Precondition		
Testing environment		
Test steps*		
#	Description	Input(I)/Output(O)/Validation(V)
0		
1		
2		
Postcondition*		

3 Annex

ID	Date	Tester	Comment	Result

(End of Document)