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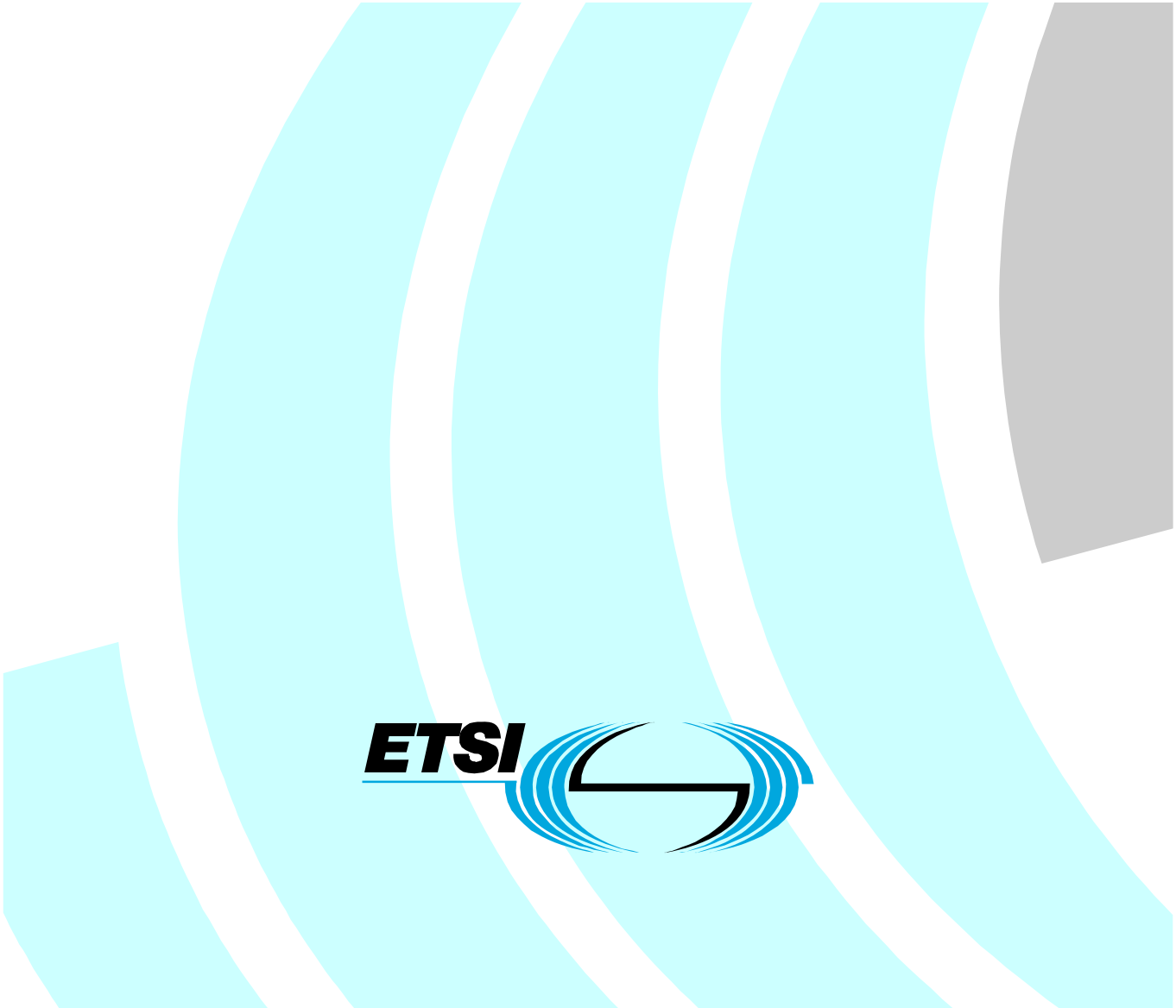
Technical Specification

Intelligent Transport Systems (ITS);
Testing;
Conformance test specification for
Decentralized Environmental Notification Messages (DENM);
Part 2: Test Suite Structure and Test Purposes (TSS&TP)



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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Intelligent Transport System (ITS).

The present document is part 2 of a multi-part deliverable covering Conformance test specification for Decentralized Environmental Notification Messages (DENM) as identified below:

Part 1: "Test requirements and Protocol Implementation Conformance Statement (PICS) proforma";

Part 2: "Test Suite Structure and Test Purposes (TSS&TP)";

Part 3: "Abstract Test Suite (ATS) and Protocol Implementation eXtra Information for Testing (PIXIT)".

1 Scope

The present document provides the Test Suite Structure and Test Purposes (TSS&TP) for Decentralized Environmental Notification Messages (DENM) as defined in TS 102 637-3 [1] in compliance with the relevant requirements and in accordance with the relevant guidance given in ISO/IEC 9646-7 [5].

The ISO standard for the methodology of conformance testing (ISO/IEC 9646-1 [1] and ISO/IEC 9646-2 [1]) as well as the ETSI rules for conformance testing (ETS 300 406 [6]) are used as a basis for the test methodology.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

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2.1 Normative references

The following referenced documents are necessary for the application of the present document.

[1] ETSI TS 102 637-3 (V1.1.1): "Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Part 3: Specifications of Decentralized Environmental Notification Basic Service".

[2] ISO/IEC 9646-1 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework - Part 1: General concepts".

[3] ISO/IEC 9646-2 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 2: Abstract Test Suite specification".

[4] ISO/IEC 9646-6 (1994): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework -- Part 6: Protocol profile test specification".

[5] ISO/IEC 9646-7 (1995): "Information technology -- Open Systems Interconnection -- Conformance testing methodology and framework - Part 7: Implementation Conformance Statements".

[6] ETSI ETS 300 406 (1995): "Methods for testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ETSI EG 202 798: "Intelligent Transport Systems (ITS); Testing; Framework for conformance and interoperability testing".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

- terms given in TS 102 637-3 [1];
- terms given in ISO/IEC 9646-6 [4] and in ISO/IEC 9646-7 [5].

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

BV	Valid Behaviour
CAN	Controller Area Network
DEN	Decentralized Environmental Notification
DENM	Decentralized Environmental Notification Message
DRCX	DENM Reception
EUPD	Event Update
EVGN	Event Generation
EXTI	Expiration Time
ITS	Intelligent Transportation Systems
IUT	Implementation Under Test
MSGF	Message Format
PETY	Periodicity
SLCI	Specific Location Container Information
SSCI	Specific Situation Container Information
TDEV	Two different events
TNEV	Termination/Negation of an Event
TP	Test Purposes
TSS	Test Suite Structure
V2I	Vehicle-to-Infrastructure
V2V	Vehicle-to-Vehicle

4 Test Suite Structure (TSS)

4.1 Structure for DEN tests

Table 1 shows the DEN Test Suite Structure (TSS) including its subgroups defined for conformance testing.

Table 1: TSS for DEN

Root	Group	category
DEN	Message Format	Valid behaviour
	Event Generation	Valid behaviour
	Specific Situation Container Information	Valid behaviour
	Specific Location Container Information	Valid behaviour
	Periodicity	Valid behaviour
	Two different events	Valid behaviour
	Expiration Time	Valid behaviour
	Event Update	Valid behaviour
	Termination/Negation of an Event	Valid behaviour
	DENM Reception	Valid behaviour

The test suite is structured as a tree with the root defined as DEN. The tree is of rank 2 with the first rank a Group, the second a category. The second rank is the standard ISO conformance test categories.

4.2 Test groups

The test suite has a total of three levels. The first level is the root. The second level separates the root into various functional areas. The third level is the standard ISO conformance test categories.

4.2.1 Root

The root identify the Decentralized environmental Notification Messages (DENM) given in TS 102 637-3 [1].

4.2.2 Groups

This level contains three functional areas identified as:

- Message Format;
- Event Generation;
- Specific Situation Container Information;
- Periodicity;
- Two different events;
- Expiration Time;
- Event Update;
- Termination/Negation of an Event; and
- DENM Reception.

4.2.3 Categories

This level contains the standard ISO conformance test categories limited to the valid behaviour.

5 Test Purposes (TP)

5.1 Introduction

5.1.1 TP definition conventions

The TP definition is built according to EG 202 798 [i.1].

5.1.2 TP Identifier naming conventions

The identifier of the TP is built according to table 2.

Table 2: TP naming convention

Identifier:	TP/<root>/<gr>/<x>/<nn>		
	<root> = root	DEN	
	<gr> = group	MSGF	Message Format
		EVGN	Event Generation
		SSCI	Specific Situation Container Information
		SLCI	Specific Location Container Information
		PETY	Periodicity
		TDEV	Two different events
		EXTI	Expiration Time
		EUPD	Event Update
		TNEV	Termination/Negation of an Event
		DRCX	DENM Reception
	<x> = type of testing	BV	Valid Behaviour tests
	<nn> = sequential number		01 to 99

5.1.3 Rules for the behaviour description

The description of the TP is built according to EG 202 798 [i.1].

The base standards are not using finite state machine concept. As consequence, the test purposes use a generic "Intial State" that corresponds to a state where the IUT is ready for starting the test execution. Furthermore, the IUT shall be left in this "Initial State", when the test is completed.

Being in the"Initial State", no pending actions, which could disturb the execution of following test purposes, are left in the IUT.

5.1.4 Sources of TP definitions

All TPs are specified according to TS 102 637-3 [1].

5.2 Test purposes for DEN

5.2.1 Message Format

TP Id	TP/DEN/MSGF/BV/0]1
Test objective	Checks the DENM message is well-formatted and contains mandatory DENM management container fields, mandatory DENM situation container fields and mandatory DENM location container fields
Reference	TS 102 637-3 [1], clause 6.2.4
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer any event trigger indicating the severity information (SEVERITY)
}
then {
the IUT sends a valid DENM message
containing management container fields
containing situation container fields,
containing location container fields,
}
}	

TP Id	TP/DEN/MSGF/BV/02
Test objective	Checks the DENM message is well-formatted and contains mandatory DENM management container fields, mandatory DENM situation container fields, mandatory DENM location container fieldsand the value of the isNegation field in the management container
Reference	TS 102 637-3 [1], clause 6.2.4
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer any event trigger indicating the reliability (RELIABILITY)
}
then {
the IUT sends a valid DENM message
containing management container fields
containing isNegation indicating "FALSE",
containing situation container fields,
containing location container fields,
}
}	

5.2.2 Event Generation

TP Id	TP/DEN/EVGN/BV/01
Test objective	Checks that the IUT generates DENM messages associated to a Dangerous Driving
Reference	TS 102 637-3 [1], clauses 4.1, 6.2.4 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer a first 'Dangerous Driving event' cause
}
then {
the IUT sends a valid DENM message
containing DE_dataVersion indicating "0",
containing DF_situation.CauseCode indicating "101"
containing DF_situation.SubCauseCode
}
}	

TP Id	TP/DEN/EVGN/BV/02
Test objective	Checks that the IUT generates DENM messages associated to a Wrong Way Driving
Reference	TS 102 637-3 [1], clauses 4.1, 6.2.4 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer a first 'Wrong Way Driving event' cause
}
then {
the IUT sends a valid DENM message
containing DE_dataVersion indicating "0",
containing DF_situation.CauseCode indicating the corresponding value
containing DF_situation.SubCauseCode
}
}	

TP Id	TP/DEN/EVGN/BV/03
Test objective	Checks that the IUT generates DENM messages associated to a Intersection Violation
Reference	TS 102 637-3 [1], clauses 6.2.4 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer a first 'Intersection Violation event' cause
}
then {
the IUT sends a valid DENM message
containing DE_dataVersion indicating "0",
containing DF_situation.CauseCode indicating "102"
containing DF_situation.SubCauseCode
}
}	

TP Id	TP/DEN/EVGN/BV/04
Test objective	Checks that the IUT generates DENM messages associated to a Accident
Reference	TS 102 637-3 [1], clauses 4.1, 6.2.4 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer a first 'Accident event' cause
}
then {
the IUT sends a valid DENM message
containing DE_dataVersion indicating "0",
containing DF_situation.CauseCode indicating the corresponding value
containing DF_situation.SubCauseCode
}
}	

TP Id	TP/DEN/EVGN/BV/05
Test objective	Checks that the IUT generates DENM messages associated to a Vehicle problems
Reference	TS 102 637-3 [1], clauses 4.1, 6.2.4 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer a first 'Vehicle problems event' cause
}
then {
the IUT sends a valid DENM message
containing DE_dataVersion indicating "0",
containing DF_situation.CauseCode indicating "103"
containing DF_situation.SubCauseCode
}
}	

TP Id	TP/DEN/EVGN/BV/06
Test objective	Checks that the IUT generates DENM messages associated to a Slow vehicle
Reference	TS 102 637-3 [1], clauses 4.1, 6.2.4 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer a first 'Slow vehicle event' cause
}
then {
the IUT sends a valid DENM message
containing DE_dataVersion indicating "0",
containing DF_situation.CauseCode indicating the corresponding value
containing DF_situation.SubCauseCode
}
}	

TP Id	TP/DEN/EVGN/BV/07
Test objective	Checks that the IUT generates DENM messages associated to a Traffic jam
Reference	TS 102 637-3 [1], clauses 4.1, 6.2.4 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer a first 'Traffic jam event' cause
}
then {
the IUT sends a valid DENM message
containing DE_dataVersion indicating "0",
containing DF_situation.CauseCode indicating the corresponding value
containing DF_situation.SubCauseCode
}
}	

TP Id	TP/DEN/EVGN/BV/08
Test objective	Checks that the IUT generates DENM messages associated to a Road work
Reference	TS 102 637-3 [1], clauses 4.1, 6.2.4 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer a first 'Road work event' cause
}
then {
the IUT sends a valid DENM message
containing DE_dataVersion indicating "0",
containing DF_situation.CauseCode indicating the corresponding value
containing DF_situation.SubCauseCode
}
}	

TP Id	TP/DEN/EVGN/BV/09
Test objective	Checks that the IUT generates DENM messages associated to a Intersection collision
Reference	TS 102 637-3 [1], clauses 4.1, 6.2.4 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer a first 'Intersection collision event' cause
}
then {
the IUT sends a valid DENM message
containing DE_dataVersion indicating "0",
containing DF_situation.CauseCode indicating "104"
containing DF_situation.SubCauseCode
}
}	

TP Id	TP/DEN/EVGN/BV/10
Test objective	Checks that the IUT generates DENM messages associated to a Hazardous location
Reference	TS 102 637-3 [1], clauses 4.1, 6.2.4 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer a first 'Hazardous location event' cause
}
then {
the IUT sends a valid DENM message
containing DE_dataVersion indicating "0",
containing DF_situation.CauseCode indicating "105"
containing DF_situation.SubCauseCode
}
}	

TP Id	TP/DEN/EVGN/BV/11
Test objective	Checks that the IUT generates DENM messages associated to a Precipitation
Reference	TS 102 637-3 [1], clauses 4.1, 6.2.4 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer a first 'Precipitation event' cause
}
then {
the IUT sends a valid DENM message
containing DE_dataVersion indicating "0",
containing DF_situation.CauseCode indicating the corresponding value
containing DF_situation.SubCauseCode
}
}	

TP Id	TP/DEN/EVGN/BV/12
Test objective	Checks that the IUT generates DENM messages associated to a Extreme weather condition
Reference	TS 102 637-3 [1], clauses 4.1, 6.2.4 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer a first 'Extreme weather condition event' cause
}
then {
the IUT sends a valid DENM message
containing DE_dataVersion indicating "0",
containing DF_situation.CauseCode indicating the corresponding value
containing DF_situation.SubCauseCode
}
}	

TP Id	TP/DEN/EVGN/BV/13
Test objective	Checks that the IUT generates DENM messages associated to a Hazardous driving condition
Reference	TS 102 637-3 [1], clauses 4.1, 6.2.4 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer a first 'Hazardous driving condition' cause
}
then {
the IUT sends a valid DENM message
containing DE_dataVersion indicating "0",
containing DF_situation.CauseCode indicating the corresponding value
containing DF_situation.SubCauseCode
}
}	

TP Id	TP/DEN/EVGN/BV/14
Test objective	Checks that the IUT generates DENM messages associated to a Visibility reduced
Reference	TS 102 637-3 [1], clauses 4.1, 6.2.4 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer a first 'Visibility reduced event' cause
}
then {
the IUT sends a valid DENM message
containing DE_dataVersion indicating "0",
containing DF_situation.CauseCode indicating the corresponding value
containing DF_situation.SubCauseCode
}
}	

TP Id	TP/DEN/EVGN/BV/15
Test objective	Checks that the IUT generates DENM messages associated to a Rescue on the way
Reference	TS 102 637-3 [1], clauses 4.1, 6.2.4 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer a first 'Rescue on the way event' cause
}
then {
the IUT sends a valid DENM message
containing DE_dataVersion indicating "0",
containing DF_situation.CauseCode indicating the corresponding value
containing DF_situation.SubCauseCode
}
}	

5.2.3 Specific Situation Container Information

TP Id	TP/DEN/SSCI/BV/01
Test objective	Checks the DENM includes DE_trafficFlow if application informs about it
Reference	TS 102 637-3 [1], annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer any event trigger indicating Traffic flow information
}
then {
the IUT sends a valid DENM message
containing DE_dataVersion indicating "0",
containing DF_situation.CauseCode
containing DE_trafficFlow
}
}	

TP Id	TP/DEN/SSCI/BV/02
Test objective	Checks the DENM includes DF_linkedCause if application informs about it
Reference	TS 102 637-3 [1], annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer any event trigger indicating linked cause
}
then {
the IUT sends a valid DENM message
containing DE_dataVersion indicating "0",
containing DF_situation.CauseCode
containing DF_linkedCause
}
}	

TP Id	TP/DEN/SSCI/BV/03
Test objective	Checks the DENM includes DF_eventCharacteristics if application informs about it
Reference	TS 102 637-3 [1], annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer any event trigger indicating event characteristics
}
then {
the IUT sends a valid DENM message
containing DE_dataVersion indicating "0",
containing DF_situation.CauseCode
containing DF_eventCharacteristics
}
}	

5.2.4 Periodicity

TP Id	TP/DEN/PETY/BV/01
Test objective	Checks DENMs are generated at the frequency established
Reference	TS 102 637-3 [1], clauses 4.1, 5.2.1 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
the IUT having received from the application layer a event cause indicating the frequency of event transmission "FREQ" and
the IUT having sent the first valid DENM message
containing DE_frequency indicating "FREQ"
containing DE_actionID
containing DF_situation.CauseCode
}	

Expected behaviour	

ensure that {
the IUT sends the same valid DENM message previously sent at the frequency established associated to the same event
}	

TP Id	TP/DEN/PETY/BV/02
Test objective	Checks that the IUT sends received DENMs at the frequency established
Reference	TS 102 637-3 [1], clauses 4.1, 5.2.1 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives an external DENM
containing DE_frequency indicating "FREQ"
}
then {
the IUT sends the received valid DENM message at the frequency associated to this event until its expiration time
}
}	

5.2.5 Two different events

TP Id	TP/DEN/TDEV/BV/01
Test objective	Checks DENMs increase sequence Number if a new event is generated
Reference	TS 102 637-3 [1], annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state",
the IUT having received from the application layer an event A trigger
the IUT having sent DENM messages associated to the event A
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer a new event B trigger
}
then {
the IUT sends a valid DENM message
containing DF_situation.CauseCode indicating the code of the new event B generated
containing DE_actionID.sequenceNo increased by 1
containing DE_dataVersion indicating "0"
}
}	

5.2.6 Expiration Time

TP Id	TP/DEN/EXTI/BV/01
Test objective	Checks DENMs includes DE_expiryTime if indicated by the application
Reference	TS 102 637-3 [1], clause 4.1 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer any event trigger indicating the expiration time (EXP_TIME)
}
then {
the IUT sends a valid DENM message
containing DE_expiryTime indicating "EXP_TIME"
}
}	

TP Id	TP/DEN/EXTI/BV/02
Test objective	Checks DENMs do not include DE_expiryTime if not indicated by the application
Reference	TS 102 637-3 [1], clause 4.1 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer any event trigger not indicating the expiration time
}
then {
the IUT sends a valid DENM message
either not containing DE_expiryTime or
containing DE_expiryTime indicating "DEFAULT_EXP_TIME"
}
}	

TP Id	TP/DEN/EXTI/BV/03
Test objective	Checks DENMs are not generated anylonger after the expiration timer
Reference	TS 102 637-3 [1], clause 4.1 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
the IUT having received from the application layer any event trigger indicating the expiration time (EXP_TIME) and
the IUT having sending DENM messages associated to such a event during the estimated time
}	

Expected behaviour	

ensure that {
when {
on expiry of the expiration time
}
then {
the IUT does not send more DENM message associated to such a event
}	

5.2.7 Event Update

TP Id	TP/DEN/EUPD/BV/01
Test objective	Checks DE_dataVersion is increased by 1 when the expiration time is renewed
Reference	TS 102 637-3 [1], clause 4.1 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
the IUT having received from the application layer any event trigger indicating the expiration time (EXP_TIME)
the IUT having sending DENM messages associated to such a event during the expiration time
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer an update of the expiration time (NEW_EXP_TIME)
associated to such a event because the pre-set expiration time has reached to 70% of its limit and the event persistence is detected
}
then {
the IUT sends a DENM message
containing DF_situation.CauseCode,
containing DE_expiryTime indicating "NEW_EXP_TIME",
containing DE_dataVersion increased by 1,
containing the same DF_actionID
}
}	

5.2.8 Termination/Negation of an Event

TP Id	TP/DEN/TNEV/BV/01
Test objective	Checks DENM termination message is generated when event termination is detected
Reference	TS 102 637-3 [1], clauses 4.1, 5.3 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
the IUT having received from the application layer any event trigger
the IUT having sent DENM messages associated to such a event
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer a termination of the event
}
then {
the IUT sends a DENM message
containing DF_situation.CauseCode,
containing DE_dataVersion indicating "255",
containing the same DF_actionID
}
}	

TP Id	TP/DEN/TNEV/BV/02
Test objective	Checks DENM termination message is generated when event termination is detected
Reference	TS 102 637-3 [1], clause 5.3 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
the IUT having received DENM messages associated to a certain event
the IUT having sent DENM messages associated to such a event
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer a termination of the event indicating a period of time of the retransmission of the termination
}
then {
the IUT resends the DENM Termination message up to the expiration of the period of time indicated containing DE_dataVersion indicating "255"
}
}	

TP Id	TP/DEN/TNEV/BV/03
Test objective	Checks that DE_isNegation is activated if the event does not exist anymore
Reference	TS 102 637-3 [1], clause 5.3 and annex B
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
the IUT having received DENM messages associated to a certain event
}	

Expected behaviour	

ensure that {
when {
the IUT receives from the application layer that the event is not true
}
then {
the IUT sends a negation DENM message associated to the event received containing DE_isNegation indicating "TRUE"
}
}	

TP Id	TP/DEN/TNEV/BV/04
Test objective	Checks that DEN cancels DENM message after reception of a negation message
Reference	TS 102 637-3 [1], clause 5.3
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
the IUT having received DENM messages associated to any event
}	

Expected behaviour	

ensure that {
when {
the IUT receives a termination DENM message associated to the previous event containing DE_isNegation indicating "TRUE
}
then {
the IUT cancels all previously received DENMs concerning the same event
}
}	

5.2.9 DENM Reception

TP Id	TP/DEN/DRCX/BV/01
Test objective	Checks that DENM dispatches a valid DENM message to the ITS application layer
Reference	TS 102 637-3 [1], clause 5.1.1
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
}	

Expected behaviour	

ensure that {
when {
the IUT receives a first valid DENM message associated to any event
}
then {
the IUT dispatches the event information to the ITS application Layer
}
}	

TP Id	TP/DEN/DRCX/BV/02
Test objective	Checks that DENM discards DENM message associated to the same event
Reference	TS 102 637-3 [1], clause 5.1.1
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
the IUT having received one DENM message associated to any event
}	

Expected behaviour	

ensure that {
when {
the IUT receives a valid DENM message associated to the same event either from the same ITS originator or from another ITS Station
}
then {
the IUT discards the DENM message
}
}	

TP Id	TP/DEN/DRCX/BV/03
Test objective	Checks that DENM discards outdated DENM message
Reference	TS 102 637-3 [1], clause 5.1.1
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
the IUT having received one DENM message associated to any event
}	

Expected behaviour	

ensure that {
when {
the IUT receives an outdated DENM message associated to any event
}
then {
the IUT discards the DENM message
}
}	

TP Id	TP/DEN/DRCX/BV/04
Test objective	Checks that DEN cancels DENM message after the reception of a termination message
Reference	TS 102 637-3 [1], clause 5.3
PICS Selection	
Initial conditions	

with {
the IUT being in the "initial state"
the IUT having received DENM messages associated to any event
}	

Expected behaviour	

ensure that {
when {
the IUT receives a termination DENM message associated to previous event
containing DE_dataVersion indicating "255"
}
then {
the IUT cancels all previously received DENMs concerning the same event
}
}	

Annex A (informative): Bibliography

- ETSI TS 102 637-1: "Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Part 1: Functional Requirements".
- ETSI TS 102 637-2 (V1.2.1): "Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Part 2: Specification of Cooperative Awareness Basic Service".
- ETSI TS 102 637-4: "Intelligent Transport Systems (ITS); Vehicular Communications; Basic set of applications; Part 4: Operational Requirements.".
- ETSI TS 102 869-1: "Intelligent Transport Systems (ITS); Testing; Conformance test specification for Decentralized Environmental Notification Messages (DENM); Part 1: Test requirements and Protocol Implementation Conformance Statement (PICS) proforma".

History

Document history		
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