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Intelligent Transport Systems (ITS); Testing; Conformance test specifications for Decentralized Environmental Notification Basic Service (DEN); Part 2: Test Suite Structure and Test Purposes (TSS & TP)

Reference RTS/ITS-00158

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ETSI

650 Route des Lucioles F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C Association à but non lucratif enregistrée à la Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

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

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

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

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

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

Modal verbs terminology

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1 Scope

The present document provides the Test Suite Structure and Test Purposes (TSS & TP) for Decentralized Environmental Notification Basic Service (DEN) as defined in ETSI EN 302 637-3 [1] in compliance with the relevant requirements and in accordance with the relevant guidance given in ISO/IEC 9646-7 [7].

The ISO standard for the methodology of conformance testing (ISO/IEC 9646-1 [4] and ISO/IEC 9646-2 [5]) as well as the ETSI rules for conformance testing (ETSI ETS 300 406 [8]) are used as a basis for the test methodology.

2 References

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

[1]	ETSI EN 302 637-3 (V1.2.2): "Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Part 3: Specifications of Decentralized Environmental Notification Basic Service".
[2]	ETSI TS 102 869-1 (V1.4.1): "Intelligent Transport Systems (ITS); Testing; Conformance test specifications for Decentralized Environmental Notification Basic Service (DEN); Part 1: Test requirements and Protocol Implementation Conformance Statement (PICS) pro forma".
[3]	ETSI TS 102 871-1 (V1.3.1): "Intelligent Transport Systems (ITS); Testing; Conformance test specifications for GeoNetworking ITS-G5; Part 1: Test requirements and Protocol Implementation Conformance Statement (PICS) pro forma".
[4]	ISO/IEC 9646-1 (1994): "Information technology Open Systems Interconnection Conformance testing methodology and framework Part 1: General concepts".
[5]	ISO/IEC 9646-2 (1994): "Information technology Open Systems Interconnection Conformance testing methodology and framework Part 2: Abstract Test Suite specification".
[6]	ISO/IEC 9646-6 (1994): "Information technology Open Systems Interconnection Conformance testing methodology and framework Part 6: Protocol profile test specification".
[7]	ISO/IEC 9646-7 (1995): "Information technology Open Systems Interconnection Conformance testing methodology and framework Part 7: Implementation Conformance Statements".
[8]	ETSI ETS 300 406 (1995): "Methods for testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

2.2 Informative 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.

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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 (V1.1.1): "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 terms and definitions given in ETSI EN 302 637-3 [1], ISO/IEC 9646-6 [6] and ISO/IEC 9646-7 [7] apply.

3.2 Abbreviations

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

ATS	Abstract Test Suite
BO	Inopportune test events for Behaviour tests
BTP	Basic Transport Protocol
BTP-B	Basic Transport Protocol Type B
BV	valid test events for Behaviour tests
CAN	Controller Area Network
CLT	Current Local Time
DE	Data Element
DEN	Decentralized Environmental Notification
DENM	Decentralized Environmental Notification Message
EVGN	Message transmission - Event Generation
EVRP	Message transmission - Message Repetition
EVTR	Message transmission - Event Termination
EVUP	Message transmission - Event Update
GBC	Geographically-Scoped Broadcast
ISO	International Organization for Standardization
ITS	Intelligent Transportation Systems
ITS-S	Intelligent Transport System - Station
IUT	Implementation Under Test
KAFW	Keep-alive Forwarding
MSGF	Message Format
MSRV	Message reception
PAR	Message transmission - Lower-layer parameters
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
SSP	Service Specific Permissions
TI	Timer tests
TP	Test Purposes
TS	Test Suite
TSS	Test Suite Structure

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.

Root	Group	category
DEN	Message format	Valid
	Event Generation	Valid
	Event Update	Valid and Inopportune
	Event Termination	Valid, Inopportune and Timer
	Message Repetition	Valid
	Lower-layer parameters	Valid
	Message reception	Valid and Inopportune
	Keep-alive Forwarding	Valid and Timers

Table 1: TSS for DEN

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 functional area and the second rank is the standard ISO conformance test categories.

4.2 Test groups

4.2.1 Introduction

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.

4.2.2 Root

The root identifies the Decentralized Environmental Notification Basic Service (DEN) given in ETSI EN 302 637-3 [1].

4.2.3 Groups

This level contains height functional areas identified as:

- Message format
- Event Generation
- Event Update
- Event Termination
- Message Repetition
- Lower-layer parameters
- Message reception
- Keep-alive Forwarding

4.2.4 Categories

This level contains the standard ISO conformance test categories behaviour: valid events and inopportune events and Timer.

5 Test Purposes (TP)

5.1 Introduction

5.1.1 TP definition conventions

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

5.1.2 TP Identifier naming conventions

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

Identifier:	TP/ <root>/<gr>/<x>/<nn></nn></x></gr></root>		
	<root> = root</root>	DEN	
	<gr> = group</gr>	MSGF	Message transmission - Message format
		EVGN	Message transmission - Event Generation
		EVUP	Message transmission - Event Update
		EVTR	Message transmission - Event Termination
		EVRP	Message transmission - Message Repetition
		PAR	Message transmission - Lower-layer parameters
		MSRV	Message reception
		KAFW	Keep-alive Forwarding
	<x> = type of testing</x>	BV	Behaviour: Valid event tests
		BO	Behaviour: Inopportune event tests
		ТІ	Timer tests
-	<nn> = sequential number</nn>		01 to 99

Table 2: TP naming convention

5.1.3 Rules for the behaviour description

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

ETSI EN 302 637-3 [1] does not use the finite state machine concept. As consequence, the test purposes use a generic "Initial 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" refers to the starting point of the initial device configuration. There are no pending actions, no instantiated buffers or variables, which could disturb the execution of a test.

5.1.4 Sources of TP definitions

All TPs are specified according to ETSI EN 302 637-3 [1].

5.1.5 Mnemonics for PICS reference

To avoid an update of all TPs when the PICS document is changed, table 3 introduce mnemonics name and the correspondence with the real PICS item number.

The PICS item column refers to Table/Item of ETSI TS 102 869-1 [2].

Table 3: Mnemonics for PICS reference

Mnemonic	PICS item
PICS_DENM_GENERATION	A.2/1
PICS_DENM_UPDATE	A.2/2
PICS_DENM_REPETITION	A.2/3
PICS_DENM_CANCELLATION	A.2/4
PICS_DENM_NEGATION	A.2/5
PICS_DENM_RECEPTION	A.2/6
PICS_DENM_KAF	A.2/7
PICS_IMPACT_REDUCTION	A.12/2
PICS_SECURITY	ETSI TS 102 871-1 [3], A.32/12

5.2 Test purposes for DEN

5.2.1 Message Transmission

5.2.1.1 Message Format

TP ld	TP/DEN/ MSGF/BV-01	
Test objective	Check that protocolVersion is set to 1 and messageID is set to 1	
Reference	ETSI EN 302 637-3 [1], clause B.1	
PICS Selection	PICS_DENM_GENERATION	
	Initial conditions	
with { the IUT being in th }	e "initial state"	
*	Expected behaviour	
when { the IUT receive } then { the IUT sends containing containing indic	ensure that { when { the IUT receives an AppDENM_Trigger request from the application layer }	

TP ld	TP/DEN/ MSGF/BV-02		
Test objective	Check that sent DENM contains at least one 'trace' DE		
Reference	ETSI EN 302 637-3 [1], clause 6.1.3.2		
PICS Selection	PICS_DENM_GENERATION		
	Initial conditions		
with {			
the IUT being in the	e "initial state"		
}			
	Expected behaviour		
ensure that {			
when {			
the IUT receives an AppDENM_Trigger request from the application layer			
}			
then {			
the IUT sends a valid DENM			
containing location container			
containir	containing at least one 'trace'		

5.2.1.2 Event Generation

TP ld		
	TP/DEN/EVGN/BV-01	
Test objective	Check that DEN Basic Service generates a new DENM on reception of a valid	
	AppDENM_Trigger request	
Reference	ETSI EN 302 637-3 [1], clause 6.1.2.1	
PICS Selection	PICS_DENM_GENERATION	
	Initial conditions	
with {		
the IUT being in th	e "initial state"	
}		
	Expected behaviour	
ensure that {		
when {		
the IUT receive	es an AppDENM_Trigger request from the application layer	
}		
then {		
the IUT sends	a valid DENM	
}		
}		
v		
TP ld	TP/DEN/EVGN/BV-02	

TP ld	TP/DEN/EVGN/BV-02		
Test objective	Check that a new ActionID value is assigned for each newly generated DENM		
Reference	ETSI EN 302 637-3 [1], clause 6.1.1.1		
PICS Selection	PICS_DENM_GENERATION		
	Initial conditions		
with {			
the IUT being in the	e "initial state"		
and the IUT having	generated several events		
}			
	Expected behaviour		
ensure that {			
when {			
the IUT is requested to generate a new event			
then {			
the IUT sends a	the IUT sends a valid DENM		
containing management container			
containing actionID			
indicating an unused value			
}			
}			

TP ld	TP/DEN/EVGN/BV-03	
Test objective	Check that a newly created ActionID contains the StationID of the originating ITS-S that	
	detected the event	
Reference	ETSI EN 302 637-3 [1], clause 6.1.1.1	
PICS Selection	PICS_DENM_GENERATION	
with {		
the IUT being in th	ne "initial state"	
}		
,	Expected behaviour	
ensure that {	·	
when {		
the IUT is requ	uested to generate a new event	
}		
then {		
the IUT sends	a valid DENM	
containing	management container	
contain	ing actionID	
	taining originatingStationID	
indicating its own StationID		
}		

TP ld	TP/DEN/EVGN/BV-04	
Test objective	Check that cause and subcause values included in DENM as provided by application	
Reference ETSI EN 302 637-3 [1], clauses 7.1.4, B.17		
PICS Selection	PICS_DENM_GENERATION	
	Initial conditions	
with {		
the IUT being in the	e "initial state"	
}		
	Expected behaviour	
ensure that {		
when {		
	s an AppDENM_trigger request from the application layer	
	situation container	
	ng eventType	
	aining causeCode	
	ndicating Value1	
	aining subCauseCode	
lr	ndicating Value2	
} than (
then { the IUT sends a		
	ituation container	
	ng eventType	
	aining causeCode	
	Indicating Value1	
	aining subCauseCode	
indicating Value2		
۳ ۱		
7		
<u> </u>		

TP Id	TP/DEN/EVGN/BV-05
Test objective	Check that referenceTime is set to the current time when generating a DENM for a new event
Reference	ETSI EN 302 637-3 [1], clause 8.2.1.3
PICS Selection	PICS_DENM_GENERATION
	Initial conditions
with {	
the IUT being in the	e "initial state"
and the IUT having	generated several events
}	
	Expected behaviour
ensure that {	
when {	
the IUT is reque	ested to generate a new event
}	
then {	
the IUT sends a	a valid DENM
containing n	nanagement container
	ng referenceTime
	ating CLT
}	
}	

TP ld	TP/DEN/EVGN/BV-07
Test objective	Check that sequenceNumber is set to a next unused value each time an event is detected
Reference	ETSI EN 302 637-3 [1], clauses 6.1.1.1 and 8.2.1.2
PICS Selection	PICS_DENM_GENERATION
	Initial conditions
with {	
the IUT being in th	e "initial state"
and the IUT having	g generated several events
and the IUT having	g generated its last DENM
containing man	agement container
containing a	actionID
containi	ng sequenceNumber
indic	cating SEQ1
and no active ever	nt being associated with sequenceNumber SEQ1 + 1
}	
	Expected behaviour
ensure that {	
when {	
the IUT is requ	ested to generate a new event
}	
then {	
the IUT sends a	a valid DENM
containing r	nanagement container
	ng actionID
	aining sequenceNumber
i	ndicating SEQ1 + 1
}	
}	

TP ld	TP/DEN/EVGN/BV-08
Test objective	Check that sequenceNumber is set to a next unused value each time an event is detected
	(Sequence number wrap around)
Reference	ETSI EN 302 637-3 [1], clauses 6.1.1.1 and 8.2.1.2
PICS Selection	PICS_DENM_GENERATION
	Initial conditions
with {	
the IUT being in th	
	g generated several events
and the IUT having	g generated its last DENM
containing mar	nagement container
containing a	actionID
containi	ng sequenceNumber
indic	sating SEQ1
and an active ever	nt being associated with sequenceNumber SEQ1 + 1
	nt being associated with sequenceNumber SEQ1 + 2
}	
	Expected behaviour
ensure that {	
when {	
the IUT is requ	ested to generate a new event
}	
then {	
the IUT sends	a valid DENM
containing r	nanagement container
	ng actionID
cont	aining sequenceNumber
	ndicating SEQ1 + 2
}	-
}	

	TP/DEN/EVGN/BV-10
Test objective	Check that actionID are generated using newly assigned stationID when a pseudonym change
	occurs
Reference	ETSI EN 302 637-3 [1], clause 6.1.1.2
PICS Selection	PICS_DENM_GENERATION
	Initial conditions
with {	
the IUT being in the	
	generated several events
	agement container
containing ac	
	g originatingStationID
	ating STATION_ID_1
and the IUT having	changed its StationID
}	
	Expected behaviour
ensure that {	
when {	
the IUT is reques	sted to generate a new event
} then {	
the IUT sends a	
	anagement container
	g actionID
	ining originatingStationID
	dicating its new StationID
1	
5	

5.2.1.3 Event Update

TP Id	TP/DEN/EVUP/BV-01
Test objective	Check that DEN Basic Service generates an update DENM on reception of a valid
-	AppDENM_update request
Reference	ETSI EN 302 637-3 [1], clause 6.1.2.2
PICS Selection	PICS_DENM_UPDATE
	Initial conditions
with {	
the IUT being in the	e "initial state"
and the IUT having	generated an event
}	
	Expected behaviour
ensure that { when { the IUT receive } then { the IUT sends a }	s an AppDENM_update request from the application layer

TP ld	TP/DEN/EVUP/BV-02
Test objective	Check that the actionID is not changed by DENM update, as long as the stationID of the
	originating ITS-S remains unchanged
Reference	ETSI EN 302 637-3 [1], clauses 6.1.2.2 and 8.2.1.2
PICS Selection	PICS_DENM_UPDATE
	Initial conditions
with {	
the IUT being in the	e "initial state"
and the IUT having	generated an event
containing man	agement container
containing a	InctionID
	g ACTION_ID1
and the IUT not have	ving changed its stationID
}	
	Expected behaviour
ensure that {	
when {	
the IUT receives	s an AppDENM_update request associated with ACTION_ID1 from the application layer
}	
then {	
the IUT sends a valid DENM	
containing management container	
containing actionID	
indic	ating ACTION_ID1
}	
}	

TP ld	TP/DEN/EVUP/BV-03
Test objective	Check that referenceTime is set to the current time when generating a DENM for an updated
	event
Reference	ETSI EN 302 637-3 [1], clause 6.1.2.2
PICS Selection	PICS_DENM_UPDATE
	Initial conditions
with {	
the IUT being in the	
	generated an event
	agement container
containing a	
	g ACTION_ID1
	eferenceTime
indicatin	g REFERENCETIME1
}	
	Expected behaviour
ensure that {	
when {	
the IUT receive	s an AppDENM_update request associated with ACTION_ID1 from the application layer
} then (
then { the IUT sends a	
	nanagement container
	ng actionID
	ating ACTION_ID1
	taining referenceTime
	ating CLT > REFERENCETIME1
}	
}	

TP ld	TP/DEN/EVUP/BO-04
Test objective	Check that DEN Basic Service does not send any update DENM if actionID is not in originating
	ITS-S message table
Reference	ETSI EN 302 637-3 [1], clause 8.2.1.2
PICS Selection	PICS_DENM_UPDATE
	Initial conditions
with {	
the IUT being in th	e "initial state"
	g generated an event
	iving sent an event being associated with actionID ACTION_ID1
	inating Station ID
	s own stationID
	sequenceNumber
indicating S	
}	
5	Expected behaviour
ensure that {	·
when {	
•	ested to update an event associated to actionID ACTION_ID1
}	
, then {	
•	ot send any DENM for this event
}	
,	
1	

5.2.1.4 Event Termination

TP Id	TP/DEN/EVTR/BV-01
Test objective	Check that DEN Basic Service generates a cancellation DENM when application indicates the
	premature termination of an event for which it is the originator
Reference	ETSI EN 302 637-3 [1], clauses 6.1.2.4 and 8.2.1.3
PICS Selection	PICS_DENM_CANCELLATION
	Initial conditions
with {	
the IUT being in the	e "initial state"
and the IUT having	I generated an event
containing man	agement container
containing a	
indicatin	g ACTION_ID1
	ing validityDuration
indicatin	g DURATION_1
}	
	Expected behaviour
ensure that {	
when {	
the IUT receive	s an AppDENM_termination request associated to ACTION_ID1 from the application layer
}	
then {	
the IUT sends a	a valid DENM
containing r	nanagement container
containii	ng actionID
indic	ating ACTION_ID1
and con	taining termination
indic	ating value isCancellation
}	
}	

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TP ld	TP/DEN/EVTR/BV-02
Test objective	Check that DEN Basic Service generates a negation DENM when application indicates the
	premature termination of an event for which it is not the originator
Reference	ETSI EN 302 637-3 [1], clause 6.1.2.4
PICS Selection	PICS_DENM_NEGATION
	Initial conditions
with {	
the IUT being in the	e "initial state"
	g received an event
containing man	nagement container
containing a	
	ig ACTION_ID1
	aining originatingStationID
ir	ndicating stationID different from its own stationID
}	
	Expected behaviour
ensure that {	
when {	

the IUT receives an AppDENM_termination request associated to ACTION_ID1 from the application layer } then { the IUT sends a valid DENM containing management container containing actionID indicating ACTION_ID1 and containing termination indicating value isNegation

TP ld	TP/DEN/EVTR/BV-03	
Test objective	Check that referenceTime is set to the latest value received for this event in negation DENM	
Reference	ETSI EN 302 637-3 [1], clauses 6.1.2.4 and 8.2.1.3	
PICS Selection	PICS_DENM_NEGATION	
	Initial conditions	
with {		
the IUT being in the		
and the IUT having		
	agement container	
containing a		
	g ACTION_ID1	
	aining originatingStationID	
	ndicating stationID different from its own stationID	
	ing referenceTime g REFERENCETIME1	
and the IUT having		
	agement container	
containing a		
	g ACTION_ID1	
	ing referenceTime	
	g REFERENCETIME2 > REFERENCETIME1	
}		
* 	Expected behaviour	
ensure that {		
when {		
the IUT receive	s an AppDENM_termination request associated to ACTION_ID1 from the application layer	
}		
then {		
the IUT sends a		
	nanagement container	
	ng actionID	
	ating ACTION_ID1	
	taining referenceTime	
	indicating value REFERENCETIME2	
and containing termination indicating value isNegation		
indic	alling value isivegalion	
J N		
17		

TP Id	TP/DEN/EVTR/BV-04
Test objective	Check that situation container, location container and a la carte container are not present in a
	cancellation DENM
Reference	ETSI EN 302 637-3 [1], clause 7.1.1
PICS Selection	PICS_DENM_CANCELLATION
	Initial conditions
vith {	
the IUT being in the	e "initial state"
and the IUT having	generated an event
	agement container
containing a	
indicatin	g ACTION_ID1
	Expected behaviour
ensure that {	
when {	
the IUT receive	s an AppDENM_termination request associated to ACTION_ID1 from the application layer
}	
then {	
the IUT sends a	
	nanagement container
	ng actionID
	ating ACTION_ID1
	taining termination
	ating value isCancellation
	taining situation container
	taining location container
and not con	taining a la carte container
}	

TP Id TP/DEN/EVTR/BV-05 Check that situation container, location container and a la carte container are not present in a **Test objective** negation DENM Reference ETSI EN 302 637-3 [1], clause 7.1.1 **PICS Selection** PICS_DENM_NEGATION Initial conditions with { the IUT being in the "initial state" and the IUT having received an event containing management container containing actionID indicating ACTION_ID1 containing originatingStationID indicating stationID different from its own stationID Expected behaviour ensure that { when { the IUT receives an AppDENM_termination request associated to ACTION_ID1 from the application layer then { the IUT sends a valid DENM containing management container containing actionID indicating ACTION ID1 and containing termination indicating value isNegation and not containing situation container and not containing location container and not containing a la carte container }

TP ld	TP/DEN/EVTR/BO-06
Test objective	Check that DEN Basic Service does not send any termination DENM if actionID is not in
	originating ITS-S message table or receiving ITS-S message table (IUT stationID)
Reference	ETSI EN 302 637-3 [1], clause 8.2.2
PICS Selection	PICS_DENM_CANCELLATION
	Initial conditions
with {	
the IUT being in th	e "initial state"
and the IUT having	g generated several events
and the IUT not ha	iving sent event being associated with ACTION_ID1
	inatingStationID
	s own stationID
	sequenceNumber
indicating S	SEQ1
}	
	Expected behaviour
ensure that {	
when {	
	ested to terminate an event associated to ACTION_ID1
	originatingStationID
	ng its own stationID
	ning sequenceNumber
indicatir	ng SEQ1
}	
then {	
the IUI does n	ot send any termination DENM for this event
}	
}	
	ciated to ACTION_ID1 cannot be present in receiving ITS-S message table as its stationID is nID (see TP/DEN/EVTR/BV-07).

TP ld	TP/DEN/EVTR/BO-07
Test objective	Check that DEN Basic Service does not send any termination DENM if actionID is not in
	originating ITS-S message table or receiving ITS-S message table (non-IUT stationID)
Reference	ETSI EN 302 637-3 [1], clause 8.2.2
PICS Selection	PICS DENM NEGATION
	Initial conditions
with {	
the IUT being in t	
	g received several events
and the IUT not h	aving received event being associated with ACTION_ID1
	ginatingStationID
	STATION_ID1 different from its own stationID
	g sequenceNumber
indicating	SEQ1
,	
	Expected behaviour
ensure that {	
when {	
the IUT is requ	uested to terminate an event associated to ACTION_ID1
	originatingStationID
	ng STATION_ID1
and contai	ning sequenceNumber
indicati	ng SEQ1
}	
then {	
the IUT does	not send any termination DENM for this event
}	
}	
NOTE: Event asso	ociated to ACTION_ID1 cannot be present in originating ITS-S message table as its stationID is
	tationID (see TP/DEN/EVTR/BV-06).

TP Id	TP/DEN/EVTR/BV-08		
Test objective	Check that referenceTime is set to the current time when generating a cancellation DENM		
Reference	ETSI EN 302 637-3 [1], clause 8.2.1.3		
PICS Selection	PICS_DENM_CANCELLATION		
	Initial conditions		
with {			
the IUT being in the	e "initial state"		
	generated an event		
	agement container		
containing a			
	indicating ACTION_ID1		
	ing validityDuration		
	indicating DURATION_1		
	ing referenceTime		
indicatin	g REFERENCETIME1		
}	-		
	Expected behaviour		
ensure that {			
when {			
the IUT receive	s an AppDENM_termination request associated to ACTION_ID1 from the application layer		
} then (}		
then {			
	the IUT sends a valid DENM		
containing management container containing actionID			
indicating ACTION_ID1			
and containing termination			
indicating value isCancellation			
and containing referenceTime			
indicating CLT			
}			
}			

5.2.1.5 Message Repetition

TP ld	TP/DEN/EVRP/TI-01	
Test objective	Check that DEN Basic Service repeats DENM transmission according to repetitionInterval	
-	parameter provided by application	
Reference	ETSI EN 302 637-3 [1], clauses 6.1.2.3, 8.2.2 and 5.4.1.2	
PICS Selection	PICS_DENM_REPETITION	
	Initial conditions	
with {		
the IUT being in th	e "initial state"	
and the IUT having	g received an AppDENM_trigger request from the application layer	
containing repe		
	NTERVAL_1	
	repetitionDuration	
	DURATION_1	
	and containing validityDuration	
	indicating DURATION_2 > DURATION_1	
	and the IUT having generated the corresponding event	
	containing management container	
containing		
indicating ACTION_ID1		
}	E-marked backgroup	
11	Expected behaviour	
ensure that {		
when {		
	ed of expiration of the time associated with INTERVAL_1	
} than (
then { the IUT repeats the transmission of the valid DENM associated with ACTION ID1		
	S the transmission of the valid denvir associated with AC HON_IDT	
j l		
}		

TP ld	TP/DEN/EVRP/BV-02		
Test objective	Check that the repeated DENM is always the most up-to-date message		
Reference	ETSI EN 302 637-3 [1], clauses 6.1.2.3 and 8.2.2		
PICS Selection	PICS_DENM_REPETITION		
	Initial conditions		
with {			
the IUT being in the	e "initial state"		
and the IUT having	received an AppDENM_trigger request from the application layer		
containing repe			
indicating IN			
and containing	repetitionDuration		
	URATION_1		
	and containing validityDuration		
	URATION_2 > DURATION_1		
	generated the corresponding event		
	containing management container		
	containing actionID		
indicatin	indicating ACTION_ID1		
and the IUT having generated an update of the event associated with ACTION_ID1 modifying partly the event			
}			
	Expected behaviour		
ensure that {			
when {			
the IUT is alerted of expiration of the time associated with INTERVAL_1			
}			
then {			
	the IUT repeats the transmission of the most up-to-date valid DENM associated with ACTION_ID1		
}			
}			

TP Id	TP/DEN/EVRP/BV-03	
Test objective	Check that DEN Basic Service stops retransmitting DENM after event's validityDuration	
	expiration	
Reference	ETSI EN 302 637-3 [1], clauses 6.1.2.4 and 8.2.2	
PICS Selection	PICS_DENM_REPETITION	
	Initial conditions	
with {		
the IUT being in the	e "initial state"	
	received an <i>App</i> DENM_ <i>trigger</i> request from application layer	
containing repe		
indicating IN		
	repetitionDuration	
	URATION_1	
and containing		
	URATION_2 > DURATION_1	
	generated the corresponding event	
	containing management container	
	containing actionID	
	indicating ACTION_ID1	
and containing validityDuration		
indicating DURATION_2 and the IUT having repeated (one or more times) the transmission of the valid DENM associated with ACTION ID1		
DEININ associated with	ACTION_IDT	
}	Expected behaviour	
angura that (
ensure that { when {		
	ad of expiration of the time appreciated with DURATION 2	
the IUT is alerted of expiration of the time associated with DURATION_2		
then {		
	ne retransmission of the DENM associated with ACTION_ID1	
}		
}		
UU		

TP ld	TP/DEN/EVRP/BV-04		
Test objective	Check that DEN Basic Service stops retransmitting DENM after event's repetitionDuration		
_	expiration		
Reference	ETSI EN 302 637-3 [1], clause 8.2.2		
PICS Selection	PICS_DENM_REPETITION		
	Initial conditions		
with {			
the IUT being in the	e "initial state"		
and the IUT having	received an AppDENM_trigger request from application layer		
containing repe	titionInterval		
indicating IN			
	repetitionDuration		
	indicating DURATION_1		
and containing			
	URATION_2 > DURATION_1		
	and the IUT having generated the corresponding event		
	containing management container		
	containing actionID		
	indicating ACTION_ID1		
and containing validityDuration			
indicating DURATION_2 and the IUT having repeated (one or more times) the transmission of the valid			
DENM associated with	ACTION_ID1		
}			
	Expected behaviour		
ensure that {			
when {			
the IUT is alerte	ed of expiration of the time associated with DURATION_1		
} 			
then {	a retransmission of the DENIM associated with ACTION ID1		
	ne retransmission of the DENM associated with ACTION_ID1		
}			
}			

TP ld	TP/DEN/EVRP/BV-05		
Test objective	Check that DEN Basic Service does not repeat transmission of DENM if repetitionInterval is not		
	provided by application		
Reference	ETSI EN 302 637-3 [1], clause 8.2.1.5		
PICS Selection	PICS_DENM_REPETITION		
	Initial conditions		
with {			
the IUT being in the	e "initial state"		
and the IUT having	received an AppDENM_trigger request from application layer		
	not containing repetitionInterval		
and the IUT having	generated the corresponding event		
containing man	agement container		
containing a	containing actionID		
indicatin	indicating ACTION_ID1		
}			
	Expected behaviour		
ensure that {			
when {			
the IUT has detected that repetitionInterval is not provided for the event associated with ACTION_ID1			
}			
then {			
the IUT does no	ot repeat the transmission of the valid DENM associated with ACTION_ID1		
}			
}			

TP ld	TP/DEN/EVRP/BV-06		
Test objective	Check that DEN Basic Service does not repeat transmission of DENM if repetitionDuration is		
	not provided by application		
Reference	ETSI EN 302 637-3 [1], clause 8.1.2		
PICS Selection	PICS_DENM_REPETITION		
	Initial conditions		
with {			
the IUT being in th	e "initial state"		
and the IUT having	g received an AppDENM_trigger request from application layer		
	repetitionDuration		
•	and the IUT having generated the corresponding event		
	agement container		
containing	•		
	indicating ACTION_ID1		
}			
	Expected behaviour		
ensure that {			
when {			
the IUT has de	tected that repetitionDuration is not provided for the event associated with ACTION_ID1		
}			
then {			
the IUT does n	ot repeat the transmission of the valid DENM associated with ACTION_ID1		
}	·		
}			

TP Id	TP/DEN/EVRP/BV-08	
Test objective	Check that existing actionID in originating ITS-S are updated when stationID is modified	
Reference	ETSI EN 302 637-3 [1], clause 6.1.1.2	
PICS Selection	PICS DENM REPETITION	
	Initial conditions	
with {		
the IUT being in the	e "initial state"	
and the IUT having	received an <i>App</i> DENM_ <i>trigger</i> request from application layer	
containing repe	titionInterval	
indicating IN	JTERVAL_1	
and containing	repetitionDuration	
indicating D	URATION_1	
	validityDuration	
	URATION_2 > DURATION_1	
	generated the corresponding event	
	containing management container	
containing a		
	containing originatingStationID	
	indicating STATION_ID_1	
and containing validityDuration		
indicatin	g DURATION_1 and the IUT having changed its StationID	
}		
	Expected behaviour	
ensure that {		
when {		
the IUT changes its StationID and is alerted of expiration of the time associated with INTERVAL_1		
} there (
then {		
the IUT repeats the transmission of the valid DENM		
containing management container containing actionID		
containing originatingStationID		
indicating its new StationID		
}		
7		
U		

TP Id	TP/DEN/EVRP/BV-09		
Test objective	Check that actionID is not modified in repetitions of DENM if stationID is not modified		
Reference	ETSI EN 302 637-3 [1], clause 8.2.1.2		
PICS Selection	PICS_DENM_REPETITION		
	Initial conditions		
with {			
the IUT being in th			
	g received an AppDENM_trigger request from application layer		
containing repe	etitionInterval		
	NTERVAL_1		
	repetitionDuration		
	DURATION_1		
	validityDuration		
	DURATION_2 > DURATION_1		
	g generated the corresponding event		
	containing management container		
containing a			
	ng ACTION_ID_1		
	ning validityDuration		
	indicating DURATION_2		
and the IUT not ha	and the IUT not having changed its StationID		
}	Expected behaviour		
ensure that {			
when {			
the IUT is alerted of expiration of the time associated with INTERVAL_1			
}			
then {			
the IUT repeats the transmission of the valid DENM			
containing management container			
containing actionID			
indic	cating its ACTION_ID_1		
}			
}			

TP ld	TP/DEN/EVRP/BV-10		
Test objective	Check that ReferenceTime is not modified in repetitions of DENM		
Reference	ETSI EN 302 637-3 [1], clause 8.1.1.1		
PICS Selection	PICS DENM REPETITION		
	Initial conditions		
with {			
the IUT being in th	e "initial state"		
and the IUT having	g received an <i>App</i> DENM_ <i>trigger</i> request from application layer		
containing repe	stitionInterval		
	NTERVAL_1		
	repetitionDuration		
	URATION_1		
	validityDuration		
	URATION_2 > DURATION_1		
	generated the corresponding event		
	agement container		
	containing actionID		
	Ig ACTION_ID_1		
and containing validityDuration			
	indicating DURATION_2		
	and containing reference Time		
า	indicating REFERENCE_TIME_1		
<u>}</u>	Expected behaviour		
ensure that {			
when {			
the IUT is alerted of expiration of the time associated with INTERVAL_1			
}	}		
then {			
the IUT repeats the transmission of the valid DENM			
containing management container			
containing actionID			
	indicating its ACTION_ID_1		
	and containing referenceTime		
indic	cating REFERENCE_TIME_1		
}			
}			

Test objective Check that DEN Basic Service stops repeating DENM after event's default validityDuration expiration, when validityDuration was not provided Reference ETSI EN 302 637-3 [1], clause 8.2.1.5 PICS Selection PICS_DENM_REPETITION with { Initial conditions with { conditions and the IUT being in the "initial state" and the IUT having received an AppDENM_trigger request from application layer containing repetitionInterval indicating INTERVAL_1 > defaultValidityDuration and containing repetitionDuration		
Reference ETSI EN 302 637-3 [1], clause 8.2.1.5 PICS Selection PICS_DENM_REPETITION Initial conditions with { the IUT being in the "initial state" and the IUT having received an AppDENM_trigger request from application layer containing repetitionInterval indicating INTERVAL_1 > defaultValidityDuration		
PICS Selection PICS_DENM_REPETITION Initial conditions with { the IUT being in the "initial state" and the IUT having received an AppDENM_trigger request from application layer containing repetitionInterval indicating INTERVAL_1 > defaultValidityDuration		
Initial conditions with { the IUT being in the "initial state" and the IUT having received an <i>App</i> DENM_ <i>trigger</i> request from application layer containing repetitionInterval indicating INTERVAL_1 > defaultValidityDuration		
with { the IUT being in the "initial state" and the IUT having received an <i>App</i> DENM_ <i>trigger</i> request from application layer containing repetitionInterval indicating INTERVAL_1 > defaultValidityDuration		
the IUT being in the "initial state" and the IUT having received an <i>App</i> DENM_ <i>trigger</i> request from application layer containing repetitionInterval indicating INTERVAL_1 > defaultValidityDuration		
and the IUT having received an <i>App</i> DENM_ <i>trigger</i> request from application layer containing repetitionInterval indicating INTERVAL_1 > defaultValidityDuration		
containing repetitionInterval indicating INTERVAL_1 > defaultValidityDuration		
indicating INTERVAL_1 > defaultValidityDuration		
and containing repetitionDuration		
indicating DURATION_1		
and not containing validityDuration		
and the IUT having generated the corresponding event		
containing management container		
containing actionID		
indicating ACTION_ID_1		
}		
Expected behaviour		
ensure that {		
the IUT is alerted of expiration of the defaultValidityDuration		
}		
then {		
the IUT stops the repetition of the DENM associated with ACTION_ID1		
}		
}		

5.2.1.6 Lower-layer parameters

TP ld	TP/DEN/PAR/BV-01
Test objective	Check that DENM is encapsulated in BTP type B packet
Reference	ETSI EN 302 637-3 [1], clause 5.4.2.2
PICS Selection	PICS_DENM_GENERATION
	Initial conditions
with {	
the IUT being in th	e "initial state"
}	
	Expected behaviour
ensure that {	
when {	
a DENM is gen	erated
}	
then {	
the IUT sends a	a DENM
encapsulate	ed in a BTP-B packet
}	
}	
TP ld	TP/DEN/PAR/BV-02

I P Id	IPID IP/DEN/PAR/BV-02	
Test objective	Fest objective Check that DENM is encapsulated in GBC packet	
Reference	ETSI EN 302 637-3 [1], clause 5.4.2.2	
PICS Selection	PICS_DENM_GENERATION	
	Initial conditions	
with {		
the IUT being in the	e "initial state"	
}		
	Expected behaviour	
ensure that {		
when {		
a DENM is generated		
then {		
the IUT sends a DENM		
encapsulated in a GBC packet		
}		

5.2.2 Message Reception

TP ld	TP/DEN/MSRV/BV-01	
Test objective	Check that receiving ITS-S transmits DENM to application if it concerns an unknown ActionID	
-	and if it is not a termination DENM	
Reference	ETSI EN 302 637-3 [1], clause 8.4.2	
PICS Selection	PICS_DENM_RECEPTION	
	Initial conditions	
with {		
the IUT being in the	e "initial state" having sent and the IUT not having received DENM	
	agement container	
containing a		
indicatin	g ACTION_ID1	
}		
	Expected behaviour	
ensure that {		
when {		
	s a DENM that is not a termination	
containing management container		
containing actionID		
indic	ating ACTION_ID1	
} thon (
then {		
the IUT transmits the DENM content to upper layer		
j h		
J		
триа		

TP ld	TP/DEN/MSRV/BV-02	
Test objective	Check that receiving ITS-S transmits DENM to application if it concerns a known ActionID and	
	referenceTime is greater than highest value received for this ActionID	
Reference	ETSI EN 302 637-3 [1], clause 8.4.2	
PICS Selection	PICS_DENM_RECEPTION	
	Initial conditions	
with {		
the IUT being in the	e "initial state"	
and the IUT having	received DENM	
containing man	agement container	
containing a		
	g ACTION_ID1	
	ng referenceTime	
indicatin	indicating REFERENCETIME_1	
}		
	Expected behaviour	
ensure that {		
when {		
the IUT receives		
	nanagement container	
	ng actionID	
	ating ACTION_ID1	
	aining referenceTime	
indica	ating REFERENCETIME_2 greater than REFERENCETIME_1	
}		
then {		
the IUT transmi	ts the DENM content to upper layer	
}		
}		

TP ld	TP/DEN/MSRV/BO-03
Test objective	Check that receiving ITS-S discards termination DENM if it concerns an unknown ActionID (IUT
-	stationId and unknown SequenceNumber)
Reference	ETSI EN 302 637-3 [1], clause 8.4.2
PICS Selection	PICS_DENM_RECEPTION
	Initial conditions
with {	
the IUT being in the	e "initial state"
	sent several events
and the IUT not ha	
containing action	
	CTION_ID1
}	
,	Expected behaviour
ensure that {	
when {	
•	s a termination DENM
containing a	
	g ACTION_ID1
3	
then {	
the IUT discard	
	es not forward the DENM content to upper layer
3	
}	

TP ld	TP/DEN/MSRV/BO-04		
Test objective	Check that receiving ITS-S discards termination DENM if it concerns an unknown ActionID		
-	(non-IUT stationId and unknown SequenceNumber)		
Reference	ETSI EN 302 637-3 [1], clause 8.4.2		
PICS Selection	PICS_DENM_RECEPTION		
	Initial conditions		
with {			
the IUT being in th	ie "initial state"		
and the IUT having	g received several events		
and the IUT not ha	aving received DENM		
containing acti			
indicating A	indicating ACTION_ID1		
}	-		
	Expected behaviour		
ensure that {			
when {			
the IUT receive	es a termination DENM		
containing	actionID		
indicatir	ng ACTION_ID1		
}	-		
then {			
the IUT discard	ds the DENM		
and the IUT do	es not forward the DENM content to upper layer		
}			
}			

70.11	
TP Id	TP/DEN/MSRV/BO-05
Test objective	Check that receiving ITS-S discards DENM if referenceTime is less than highest value received
	for this ActionID
Reference	ETSI EN 302 637-3 [1], clause 8.3.2
PICS Selection	PICS_DENM_RECEPTION
	Initial conditions
with {	
the IUT being in the	e "initial state"
and the IUT having	received DENM
containing man	agement container
containing a	actionID
indicatin	g ACTION_ID1
and contain	ing referenceTime
indicatin	g REFERENCETIME_1
}	-
	Expected behaviour
ensure that {	
when {	
the IUT receive	s a DENM
containing n	nanagement container
	ng actionID
	ating ACTION_ID1
	taining referenceTime
indic	ating REFERENCETIME_2 less than REFERENCETIME_1
}	
then {	
the IUT discard	
and the IUT doe	es not forward the DENM content to upper layer
}	
}	

TP ld	TP/DEN/MSRV/BO-06	
Test objective	Check that receiving ITS-S discards DENM if detectionTime is less than highest value received	
	for this ActionID	
Reference	ETSI EN 302 637-3 [1], clause 8.4.2	
PICS Selection	PICS_DENM_RECEPTION	
	Initial conditions	
with {		
the IUT being in the		
and the IUT having		
	agement container	
containing a		
	g ACTION_ID1	
	indicating REFERENCETIME_1 and containing detectionTime	
	ing detection line	
า		
5	Expected behaviour	
ensure that {		
when {		
the IUT receive	s a DENM	
	nanagement container	
containing actionID		
	indicating ACTION_ID1	
	taining referenceTime	
indicating REFERENCETIME_1		
and containing detectionTime		
indic	ating TIME_2 tess than TIME_1	
} there (
then { the IUT discard		
	es not forward the DENM content to upper layer	
	es not for ward the Diction content to upper layer	
}		
<u>1</u>		

TP ld	TP/DEN/MSRV/BV-07
Test objective	Check that receiving ITS-S transmits DENM to application if it concerns a known ActionID and
	referenceTime is equal to highest received value and detectionTime is greater than highest
	received value
Reference	ETSI EN 302 637-3 [1], clause 8.4.2
PICS Selection	PICS_DENM_RECEPTION
	Initial conditions
with {	
the IUT being in the	
and the IUT having	
	agement container
containing a	
	g ACTION_ID1
	ng referenceTime
	g REFERENCETIME_1 ing detectionTime
	g TIME_1
li indicating	
5	Expected behaviour
ensure that {	·
when {	
the IUT receives	s a DENM
containing m	nanagement container
	ng actionID
	ating ACTION_ID1
	aining referenceTime
	ating REFERENCETIME_1
and containing detectionTime	
indica	ating TIME_2 greater than TIME_1
} then (
then {	to the DENIM content to upper lower
	ts the DENM content to upper layer
3	
J	

TP ld	TP/DEN/MSRV/BO-08
Test objective	Check that receiving ITS-S discards DENM for new event if SSP value of the signing certificate
	is not consistent with the causeCode
Reference	ETSI EN 302 637-3 [1], clause 8.4.2
PICS Selection	PICS_SECURITY
	Initial conditions
with {	
the IUT being in the	e "initial state"
}	
	Expected behaviour
ensure that {	
when {	
the IUT receives	s a secured DENM
containing m	nanagement container
containin	ng actionID
indica	ating ACTION_ID1
containing si	ituation container
containin	ng eventType
conta	aining causeCode
in	dicating VALUE_1
containing si	igning certificate
containin	ng SSP
not in	ndicating VALUE_1
}	
then {	
the IUT discards	s the DENM
and the IUT doe	es not forward the DENM content to upper layer
}	
}	

TP ld	TP/DEN/MSRV/BO-09		
Test objective	Check that receiving ITS-S discards DENM for existing event if SSP value of the signing		
	certificate is not consistent with the causeCode		
Reference	ETSI EN 302 637-3 [1], clause 8.4.2		
PICS Selection	PICS_SECURITY		
	Initial conditions		
	with {		
the IUT being in the "initial state"			
	received a secured DENM		
containing man	agement container		
	g ACTION_ID1		
containing situa			
containing e			
	ng causeCode		
	ating VALUE_1		
containing sign	ing certificate		
containing S			
indicatin	g VALUE_1		
}			
an arms that f	Expected behaviour		
ensure that { when {			
	s a secured DENM		
	nanagement container		
	ng actionID		
indicating ACTION_ID1			
	containing situation container		
	containing eventType		
	containing causeCode		
indicating VALUE_2			
containing signing certificate			
containing SSP			
not indicating VALUE_2			
} then {			
the IUT discards the DENM			
	es not forward the DENM content to upper layer		
}			
}			

TP ld	TP/DEN/MSRV/BV-10		
Test objective	Check that receiving ITS-S replies to requestResponseIndication		
Reference	ETSI EN 302 637-3 [1], clause B.40		
PICS Selection	PICS_DENM_RECEPTION AND PICS_IMPACT_REDUCTION		
	Initial conditions		
with {			
the IUT being in th	e "initial state"		
}			
	Expected behaviour		
ensure that {			
when {			
the IUT receive			
	nagement container		
	containing actionID		
	ng ACTION_ID1		
containing a la carte container			
	ng requestResponseIndication		
1 Indic	cating 0		
} then {			
the IUT sends	a DENM		
containing management container containing actionID			
indicating ACTION_ID2			
containing a la carte container			
containing ImpactReductionContainer			
containing requestResponseIndication			
indicating 1			
}	-		
}			

5.2.3 Keep-Alive Forwarding

TP ld	TP/DEN/KAFW/BV-01		
Test objective	Check that forwarding ITS-S forwards DENM if no DENM with same ActionId has been received		
	during forwarding delay		
Reference	ETSI EN 302 637-3 [1], clause 8.3.3		
PICS Selection	PICS_DENM_KAF		
	Initial conditions		
with {			
the IUT being in the			
and the IUT having	received a DENM		
containing actio			
indicating A			
	and containing transmissionInterval		
	RANS_INTERVAL1		
	and containing validityDuration		
indicating value more than 3 times greater than TRANS_INTERVAL1			
	starting timer T_Forwarding for this DENM		
	ving received further DENM		
	containing actionID		
indicating A	indicating ACTION_ID1		
}	Eveneted behaviour		
an aura that (Expected behaviour		
ensure that {			
when {			
the timer T_For	waruniy expires		
} then {			
the IUT reconstructs and sends the DENM associated to ACTION ID1			
1			

TP Id	TP/DEN/KAFW/BV-02		
Test objective	Check that forwarding ITS-S forwards DENM if no DENM with same ActionId and		
	referenceTime greater or equal to the last received DENM has been received during forwarding		
	delay		
Reference	ETSI EN 302 637-3 [1], clause 8.3.3		
PICS Selection	PICS_DENM_KAF		
	Initial conditions		
with {			
the IUT being in the			
and the IUT having			
containing action			
indicating A			
	transmissionInterval		
	RANS_INTERVAL1		
and containing			
	indicating REFERENCETIME_1		
and containing			
	alue more than 3 times greater than TRANS_INTERVAL1		
	and the IUT having starting timer T_Forwarding for this DENM		
	and the IUT having received DENM containing actionID		
	indicating ACTION_ID1 and containing referenceTime		
	alue REFERENCETIME_2 < REFERENCETIME_1		
	ving received further DENM		
	containing actionID		
	indicating ACTION_ID1		
and containing			
	alue REFERENCETIME_3 > REFERENCETIME_1		
}			
	Expected behaviour		
ensure that {			
when {			
	warding expires		
}			
then {			
the IUT reconstructs and sends the DENM associated to ACTION_ID1			
}			
}			

TP ld	TP/DEN/KAFW/TI-03		
Test objective	Check that forwarding delay is set to min(2 × transmissionInterval + rnd(0, 150 ms),		
	validityDuration)		
Reference	ETSI EN 302 637-3 [1], clause 8.3.2.5		
PICS Selection	PICS_DENM_KAF		
	Initial conditions		
with {			
the IUT being in the	e "initial state"		
and the IUT having			
containing actio			
	indicating ACTION_ID1		
	transmissionInterval		
	indicating TRANS_INTERVAL1		
	and containing validityDuration		
indicating va	alue DURATION_1 more than 3 times greater than TRANS_INTERVAL1		
}			
	Expected behaviour		
ensure that {			
when {			
the timer T_For	warding expires		
}			
then {			
	the IUT reconstructs and sends the DENM associated to ACTION_ID1 at a point of time corresponding to min (2 × transmissionInterval + rnd (0, 150 ms), validityDuration)		
niin (∠ × transm	1000000000000000000000000000000000000		
}			
3			

TP ld	TP/DEN/KAFW/BV-04		
Test objective	Check that Forwarding ITS-S replaces the ITS PDU header of forwarded DENMs		
Reference	ETSI EN 302 637-3 [1], clause 8.3.2.7		
PICS Selection	PICS_DENM_KAF		
	Initial conditions		
with {			
the IUT being in th			
	g received a DENM		
containing action			
	CTION_ID1		
	transmissionInterval		
	RANS_INTERVAL1		
	and containing validityDuration		
	indicating value more than 3 times greater than TRANS_INTERVAL1		
	and the IUT having starting timer T_Forwarding for this DENM and the IUT not having received further DENM		
containing action			
•	CTION_ID1		
}			
]	Expected behaviour		
ensure that {			
when {			
the timer T_Fo	the timer T_Forwarding expires		
}			
then {			
the IUT reconstructs and sends the DENM associated to ACTION_ID1			
containing ITS PDU header			
containing StationID			
indicating its own stationID			
}			
}			

TP ld	TP/DEN/KAFW/BV-05		
Test objective	Check that forwarding ITS-S does not change actionID		
Reference	ETSI EN 302 637-3 [1], clause 8.3.2.2		
PICS Selection	PICS_DENM_KAF		
	Initial conditions		
with {	with {		
the IUT being in the			
and the IUT having			
containing action			
indicating A			
	RANS_INTERVAL1		
	validityDuration		
	indicating value more than 3 times greater than TRANS_INTERVAL1		
	and the IUT having starting timer T_Forwarding for this DENM and the IUT not having received further DENM		
containing actionID			
indicating ACTION ID1			
}			
	Expected behaviour		
ensure that {			
when {	when {		
the timer T_For	the timer T_Forwarding expires		
}			
then {			
the IUT reconstructs and sends the DENM			
containing management container			
containing actionID			
indicating ACTION_ID1			
J			

TP ld	TP/DEN/KAFW/BV-06		
Test objective	Check that forwarding ITS-S does not change referenceTime		
Reference	ETSI EN 302 637-3 [1], clause 8.3.2.3		
PICS Selection	PICS_DENM_KAF		
	Initial conditions		
with {			
the IUT being in th	e "initial state"		
and the IUT having	g received a DENM		
containing action	onID		
	ACTION_ID1		
	transmissionInterval		
	RANS_INTERVAL1		
	validityDuration		
	alue DURATION_1 more than 3 times greater than TRANS_INTERVAL1		
	referenceTime		
	REFERENCETIME_1		
and the IUT having starting timer T_Forwarding for this DENM			
	and the IUT not having received further DENM		
	containing actionID		
indicating A	indicating ACTION_ID1		
}			
ongura that (Expected behaviour		
ensure that {			
when {			
the timer T_Forwarding expires			
then {			
the IUT reconstructs and sends the DENM associated to ACTION ID1			
containing management container			
containing referenceTime			
indicating REFERENCETIME_1			
}			
}			

TP ld	TP/DEN/KAFW/BV-07	
Test objective	Check that forwarding ITS-S does not change termination	
Reference	ETSI EN 302 637-3 [1], clause 8.3.2.4	
PICS Selection	PICS_DENM_KAF	
	Initial conditions	
with {		
the IUT being in th		
	g received a DENM	
containing action	onID	
indicating A	CTION_ID1	
	transmissionInterval	
	RANS_INTERVAL1	
	validityDuration	
	indicating value DURATION_1 more than 3 times greater than TRANS_INTERVAL1	
	and containing termination	
indicating is		
	g starting timer T_Forwarding for this DENM	
	ving received further DENM	
	containing actionID	
indicating A	indicating ACTION_ID1	
Expected behaviour		
Expected behaviour		
when {		
	the timer T_Forwarding expires	
}		
then {		
the IUT reconstructs and sends the DENM associated to ACTION_ID1		
containing management container		
containing termination		
indicating isNegation		
}		
}	}	

TP ld	TP/DEN/KAFW/BV-08		
Test objective	Check that Forwarding ITS-S does not modify management, situation, location and alacarte		
	containers when forwarding a DENM		
Reference	ETSI EN 302 637-3 [1], clause 8.3.2.7		
PICS Selection	PICS_DENM_KAF		
	Initial conditions		
with {			
the IUT being in the			
and the IUT having			
	agement container		
	IANAGEMENTCONTAINER_1		
	situation container		
	ITUATION_1		
	location container		
	OCATION_1		
	alacarte container LACARTE_1		
	transmissionInterval		
	RANS_INTERVAL1		
	starting timer T_Forwarding for this DENM		
	and the IUT not having received further DENM containing actionID		
indicating A			
}			
,	Expected behaviour		
ensure that {			
when {			
the timer T_For	warding expires		
}	•		
	then {		
	the IUT reconstructs and sends the DENM associated to ACTION_ID1		
	containing management container		
indicating MANACEMENTCONTAINER_1			
and containing situation container			
indicating SITUATION_1 and containing location container			
indicating LOCATION_1			
and containing alacarte container			
indicating ALACARTE_1			
}			
}			
J			

TP ld	TP/DEN/KAFW/BV-09		
Test objective	Check that forwarding ITS-S stops forwarding DENM after validity expiration		
Reference	ETSI EN 302 637-3 [1], clause 8.3.3		
PICS Selection	PICS_DENM_KAF		
	Initial conditions		
with {			
the IUT being in the			
	received an event		
	agement container		
containing a			
	g ACTION_ID1		
	ing validityDuration		
indicating DURATION_1			
	transmissionInterval		
indicating TRANS_INTERVAL1			
and the IUT having starting timer T_Forwarding for this DENM			
	and the IUT not having received further DENM		
containing action	containing actionID		
indicating A	indicating ACTION_ID1		
}			
	Expected behaviour		
ensure that {			
when {			
the IUT is alerted of expiration of the time associated with DURATION_1			
}			
then {			
the IUT stops to reconstruct and to send the DENM associated with ACTION_ID1			
}			
}			

TP ld	TP/DEN/KAFW/BV-10		
Test objective	Check that forwarding ITS-S stops forwarding DENM if it is outside relevance area		
Reference	ETSI EN 302 637-3 [1], clause 8.3.3		
PICS Selection	PICS_DENM_KAF		
	Initial conditions		
with {			
the IUT being in the	e "initial state"		
and the IUT having	received an event		
	agement container		
containing a			
	g ACTION_ID1		
	and containing transmissionInterval		
	indicating TRANS_INTERVAL1		
and the IUT having starting timer T_Forwarding for this DENM			
and the IUT not having received further DENM			
5	containing actionID		
indicating A	indicating ACTION_ID1		
}	Eveneted behaviour		
	Expected behaviour		
ensure that {			
when {			
the IUT is alerted that its position is now outside of the relevance area associated with ACTION_ID1			
} then (
then {			
the IUT stops to reconstruct and to send the DENM associated with ACTION_ID1			
j			

TP Id	TP/DEN/KAFW/BV-11	
Test objective	Check that forwarding ITS-S does not forward DENM is transmissionInterval is not present	
Reference	ETSI EN 302 637-3 [1], clause 8.3.2.5	
PICS Selection	PICS_DENM_KAF	
	Initial conditions	
with { the IUT being in the "initial state"		
Expected behaviour		
ensure that { when { the IUT receives a DENM containing actionID indicating ACTION_ID1 and not containing transmissionInterval } then { the IUT does not reconstruct and to send the DENM associated with ACTION_ID1 } } }		

Annex A (informative): Bibliography

• ETSI TS 102 894-2 (V1.2.1): "Intelligent Transport Systems (ITS); Users and applications requirements; Part 2: Applications and facilities layer common data dictionary".

History

Document history		
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