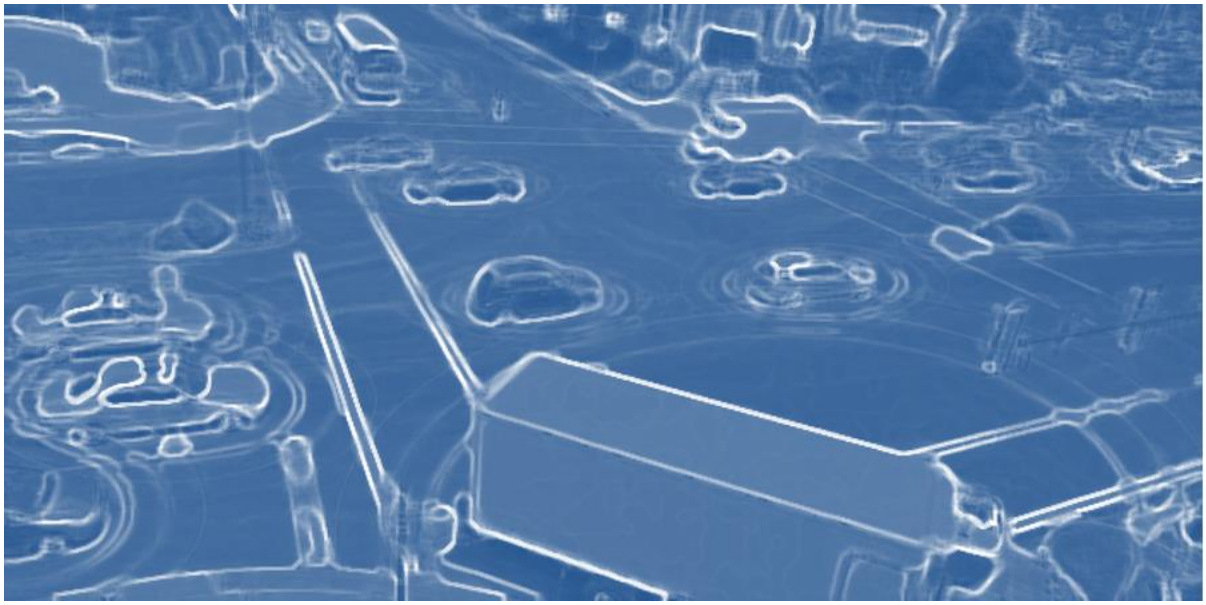

Conformance test specifications for

Wireless Access in Vehicular Environments (WAVE) V2I Test Suite Structure and Test Purposes (TSS & TP)

Document Mnemonics:	WAVEV2I-TSS&TP
Revision:	[V0.3]
Revision Date:	10/8/2017

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1 Scope

This document provides the Test Suite Structure and Test Purposes for the RSU as defined in the DSRC Roadside Unit (RSU) Specifications Document v4.1. In addition, several V2I tests are included for testing OBUs receiving RSU V2I messages.

These tests shall be executed in addition to the COC Council 802.11, 1609.2, 1609.3, 1609.4 and 2945/1 certification tests written for the V2V devices.

The ISO standard for the methodology of conformance testing (ISO/IEC 9646-1 [3] and ISO/IEC 9646-2 [4]) are used as a basis for the test methodology.

2 References

2.1 Normative References

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

[1] SAE J2945/1 MAR2016: “On-board System Requirements for V2V Safety Communications”.

[2] IEEE Std. 1609.4-2016 “IEEE Standard for Wireless Access in Vehicular Environments (WAVE) -- Multi-Channel Operation”.

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

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

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

[6] IEEE Std. 1609.12-2016 “IEEE Standard for Wireless Access in Vehicular Environments – Identifier Allocations”.

[7] TCIS (V0.3.0): “Test Control Interface Specification”, Revision date: 7/19/2016

[8] IEEE Std 802.11™-2012: “Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications”.

[9] IEEE Std 1609.3-2016 “IEEE Standard for Wireless Access in Vehicular Environments (WAVE) — Network Services”.

[10] DSRC Roadside Unit (RSU) Specifications Document v4.1, Version 1, Submitted: October 31, 2016.

[11] SAE J2735 (2016-01): “Dedicated Short Range Communication (DSRC) Message Set Dictionary”

[12] WAVENS-TSS&TP (V1.1): “Conformance test specifications for Wireless Access in Vehicular Environments (WAVE) — Networking Services Test Suite Structure and Test Purposes (TSS & TP)”. Revision date: 9/12/2016

[13] WAVESEC-TSS&TP (V1.0): “Conformance test specifications for Wireless Access in Vehicular Environments (WAVE) — Security Services Test Suite Structure and Test Purposes (TSS & TP)”. Revision date: 10/10/2016

2.2 Informative References

The following referenced documents are not necessary for the application of the present document but they assist the user regarding 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 IEEE 1609.4 [2], ISO/IEC 9646-1 [3] and in ISO/IEC 9646-7 [5] apply.

3.2 Abbreviations

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

BI	Behavior Invalid
BV	Behavior Valid
CCH	Control Channel
CH[#]	Operating Channel
DSRC	Dedicated Short Range Communications
GPGGA	Global Positioning System Fix Data
IEEE	Institute of Electrical and Electronics Engineers
IFM	Immediate Forward Message
IP	Internet Protocol
ISO	International Organization for Standardization
MAC	Media Access Control
MIB	Management Information Base
NMEA	National Marine Electronics Association
OBU	On-board Unit
PC	Personal Computer
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
PSID	Provider Service Identifier
RF	Radio Frequency
RSU	Roadside Unit
SAE	Society of Automotive Engineers
SCH	Service Channel
SCMS	Security Credential Management System
SRM	Store and Repeat Message
SPAT	Signal Phase & Timing
SUT	System Under Test
TC	Test Configuration
TP	Test Purposes
TS	Test System

TSF	Timing Synchronization Function
TSS	Test Suite Structure
UTC	Coordinated Universal Time
V2I	Vehicle-to-Infrastructure
V2V	Vehicle-to-Vehicle
WAVE	Wireless Access in Vehicular Environments
WSM	WAVE Short Message
WRA	WAVE Routing Advertisement
WSA	WAVE Service Advertisement

4 Prerequisites and Test Configurations

4.1 Test Configurations

This clause introduces the test configuration that is used for the definition of test purposes and test descriptions. The test configuration covers the various scenarios of the test procedures in this document. The complete configuration is shown below, some test procedures may not use all components.

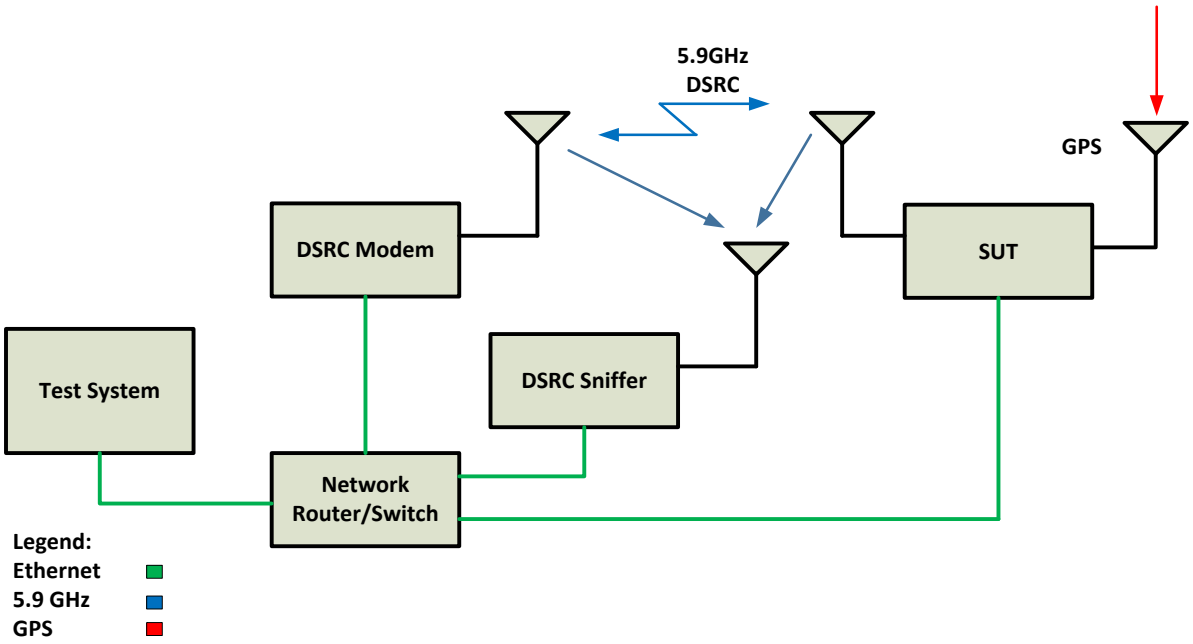


Figure 1. Test Configuration 1 (TC1)

4.1.1 Functional Blocks

Following are the functional blocks used in the above diagram.

4.1.1.1 Test System

The Test System is based on a Personal Computer laptop running, among other things, a Test Software, an SNMP Manager software and DSRC Message sniffer software (e.g. WireShark).

4.1.1.2 SUT

The DSRC System Under Test (SUT) refers to a system that is being tested for correct implementation. The SUT may be an RSU or an OBU. The choice is identified for each Test Purpose in the header element titled SUT.

4.1.1.3 DSRC Modem

The DSRC Modem is a device capable of transmitting on command a valid DSRC over the air packet, the content of this packet is controlled by the test system. Also, this device can receive a DSRC over-the-air packet and forward the received packet to the Test System for analysis.

4.1.1.4 Network Switch/Router

The Network Switch/Router is used to connect to all network devices in the test setup (in Figure 1) via Ethernet cables. Then, the Test System laptop can be used to configure and monitor the DSRC modem and the SUT.

4.1.2 Test parameters

Below are listed test parameters/conditions that are applicable to all test cases in this specification.

4.1.2.1 Channels

Table 4-1 lists all the channel used for testing, unless otherwise specified, the default channel, channel 178, is used for testing.

Table 4-1: Channels

Parameter name	Range of permitted values	Setting used for testing	Reference
Channel	10MHz channels: 172, 174, 178, 180, 182, 184	178	[9]

4.1.2.2 Data Rate

Table 4-2 lists all the data rates that can be used for testing, unless otherwise specified the default data rate of 6 Mbps is used for testing.

Table 4-2: Data Rates

Parameter name	Range of permitted values	Setting used for testing	Reference
Data Rate (Mbps)	3, 4.5, 6, 9, 12, 18, 24, 27	6	[9]

4.1.2.3 Transmit Power

Table 4-3 lists the possible transmit power that can be used for testing, unless otherwise specified the default power of 20 dbm is used for testing.

Table 4-3: Transmit Power

Parameter name	Range of permitted values	Setting used for testing	Reference
Transmit Power (dbm)	Transmit Power (EIRP): Class A: -92 to 23 dBm Class B: -92 to 23 dBm Class C: -92 to 33 dBm Class D: non-government use: -92 to 33 dBm government use : -92 to 44.8 dBm	20	Default setting selected per [1]

4.1.2.4 PSID

Table 4-4 lists the PSID used for testing.

Table 4-4: PSID

Message Type	Setting used for testing	Reference
WSA	0p80-07	[6]
BSM	0p20	[6]
SPAT	0p80-02	[6]
MAP	0p80-02	[6]
TIM	0p80-03	[6]
IP routing	0pEF-FF-FF-FE	[6]

4.2 Feature Restriction

4.2.1 Feature Restriction

In this clause, all feature restrictions are listed:

- 20MHz channels are not considered
- Immediate access or extended access to communication media is not considered
- No testing for Channel Load
- No testing for TSF messages
- Only signed WSAs are considered
- Multicast IPv6 is not tested

4.3 Rules for the behavior description

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

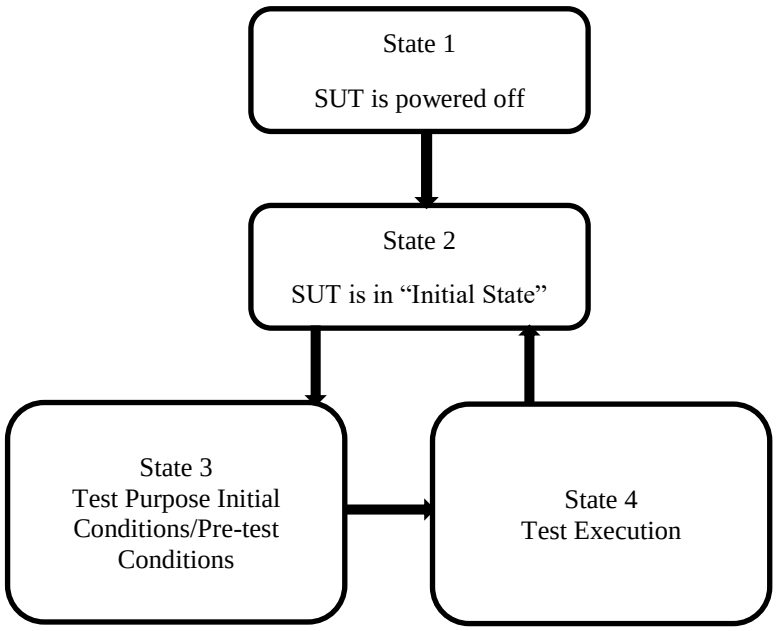
Test purposes use a generic "Initial State" that corresponds to a state where the IUT is ready for starting the test execution. Furthermore, the IUT shall be left in this "Initial State", when the test is completed.

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.

4.3.1 States in Initial Conditions

Most of the TPs start from the “initial state” which is defined as follows:

- Test Environment and Test System has reached room temperature (21 degrees Celsius +/- 5 degrees).
- The SUT acquired a GPS fix with 4 or more satellites.
- The SUT system time configured to use the UTC time standard
- SNMP setup
    - The RSU SNMP Agent is loaded and activated with the MIB database from [10] and configured to use authentication and privacy.
    - The Test System operator started the SNMPv3 Manager loaded with the RSU MIB database from [10] and provided authorized credentials to access the RSU SNMP agent using SNMPv3 protocol.
    - The RSU SNMP3 agent is configured to send traps to the IP address and port of the SNMP Manager running on the Test System.



Initial conditions required for specific test cases defined in the Initial condition section of a Test Purpose.

5 Test Suite Structure (TSS)

5.1 Structure for Network Services tests

5.1.1 Root

The root identifies the RSU as defined in the DSRC Roadside Unit (RSU) Specifications Document v4.1. [10]. Some tests pertaining reception and processing of the RSU messages use OBU as the root identifier.

5.1.2 Groups

This level contains the testing types identified as:

- SNMP;
- Message Processing;
- RSU Multi-Channel Operation (1609.4);
- RSU GPS Positioning Operation Test purposes

5.1.3 Sub-Groups

Only the SNMP testing group contains sub-groups identified as:

- Operational Mode;
- Functional Requirements;
- Positioning;
- Message Processing;
- Notifications;

6 Test Purposes (TP)

6.1 Introduction

6.1.1 TP definition conventions

The TPs are defined by the rules shown in Table 6-1 built per EG 202 798 [i.1].

Table 6-1: TP definition rules

Test Purpose ID	The Test Purpose ID is a unique identifier. It shall be specified per the TP naming conventions defined in the clause below.
Summary	Short description of test purpose objective per the requirements from the base standard.
References	The reference indicates the sub-clauses of the reference standard specifications in which the conformance requirement is expressed.
Test Configuration	The Config Id references the test configuration selected for this TP.
PICS Selection	Reference to the PICS statement involved for selection of the TP. It may contain a Boolean expression.
Pre-Test Conditions	A list of test specific pre-conditions that need to be met by the SUT including information about equipment configuration, i.e. precise description of the initial state of the SUT required to start executing the test sequence
Test Sequence	An ordered list of equipment operation and observations. In case of a conformance test description the test sequence contains also the conformance checks as part of the observations
Event Types	
Stimulus	Corresponds to an event that enforces an SUT to proceed with a specific protocol action, like sending a message for instance.
Verify	Consists of verifying that the IUT behaves according to the expected behavior (for instance the IUT behavior shows that it receives the expected message). Outcome of this event typically evaluate for verdict (i.e. Pass/Fail)
Configure	Corresponds to an action to modify the SUT configuration.
Procedure	Procedural action directing the flow of TP execution.

6.2 RSU SNMP Test purposes

6.2.1 Operational Mode

6.2.1.1 TP-RSU-SNMP-OPR-BV-01

Identifier		TP-RSU-SNMP-OPR-BV-01	
Summary		The roadside unit shall allow an authorized user to perform a MIB walk on the SNMPv3 MIB to produce a complete list of all supported MIBs and OIDs and the current setting for each Object. Also, verify that MIB changes are retained after SUT power is cycled.	
Test Configuration		TC1	
SUT		RSU	
Reference:		USDOT_RSU-Req_490-v001, Req_489-v001, Req_487-v001	
PICS Selection			
Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Verify	All MIB entries as defined in Appendix B of [10] are present.	Pass/Fail
2	Verify	Each entry has a valid default value.	Pass/Fail
3	Verify	Modify writable MIB entries with different valid values.	Pass/Fail

4	Configure	Power cycle the SUT and then login into the RSU SNMP agent.	
5	Verify	Verify that the new values are still present in the MIB.	Pass/Fail

6.2.2 Functional Requirements

6.2.2.1 TP-RSU-SNMP-FUN-BV-01

Identifier	TP-RSU-SNMP-FUN-BV-01	
Summary	Verify that the roadside unit shall forward WSMP messages received on any DSRC interface, containing a specified PSID, to a specified network host, as configured in SNMPv3 MIB OID 1.0.15628.4.1.7.	
Test Configuration	TC1	
SUT	RSU	
Reference:	USDOT_RSU-Req_437-v005	
PICS Selection		
Pre-test conditions		
• The SUT is in the initial state as described in 4.3.1		
Test Sequence		
Step	**Type**	**Description**	**Verdict**
1	Configure	Set MIB parameters to the values listed in parentheses: • rsuDsrcFwdPsid (0x20) • rsuDsrcFwdDestIpAddr (Test System IPv6 address) • rsuDsrcFwdDestPort (Test System UDP port) • rsuDsrcFwdProtocol (UDP) • rsuDsrcFwdRssi (any valid value) • rsuDsrcFwdMsgInterval (1 sec) • rsuDsrcFwdDeliveryStart (current time of the test) • rsuDsrcFwdDeliveryStop (2 minutes after Delivery Start Time) • rsuDsrcFwdEnable (1 – enable)	
2	Configure	Set the SUT to receive WSM on channel 172	
3	Configure	Set the Test System to transmit a WSM to the SUT on channel 172 with the specified PSID (0x20), at a rate of 1 msg/sec	
4	Stimulus	The Test System to transmit WSM repetitively for 3 minutes.	
5	Verify	The MIB Fwd Status is set to “active”	Pass/Fail
6	Verify	The Test System received WSM messages forwarded from the SUT on the port specified in the MIB until Delivery Stop time.	Pass/Fail

6.2.2.2 TP-RSU-SNMP FUN-BV-02

Identifier	TP-RSU-SNMP FUN-BV-02
Summary	Verify that the roadside unit shall send the GPGGA NMEA String to a specified UDP port at a specified rate, upon acquisition of 3 or more Satellites, as configured in SNMPv3 MIB OID 1.0.15628.4.1.8.
Test Configuration	TC1
SUT	RSU
Reference:	USDOT_RSU-Req_438-v004
PICS Selection	
Pre-test conditions	
• The SUT is in the initial state as described in 4.3.1	
Test Sequence	

Step	Type	Description	Verdict
1	Verify	Verify that the following sub-entries exist under GPS Output node: • Output Port • Output IP Address • Output Interface • Output Interval • Output String • RefLat (Reference Latitude) • RefLon (Reference Longitude) • RefElv (Reference Elevation) • Max Deviation	Pass/Fail
2	Configure	Set the MIB entries: • The Output IP address in the MIB to be the IP address of the Test System • The Output Port to be the port of the application on the Test System receiving the NMEA messages. • The Output Interface to the SUT Ethernet port • The Output Interval to be 60 (sec)	
3	Verify	• The SUT is sending the GPGGA NMEA string at the specified Output Interval. • The GPGGA NMEA string contains time, latitude, longitude, altitude, fix quality, number of satellites consistent with the current SUT position. • The GPGGA NMEA string shows the number of satellites to be 4 or more. • The MIB entry rsuGpsStatus (1.0.15628.4.1.3) shows the number of satellites equal to the report from the GPGGA NMEA string • The MIB entry rsuGpsOutputString (OID 1.0.15628.4.1.8.5) contains the GPGGA NMEA string output from the SUT	Pass/Fail
4	Verify	The position information included in the GPGGA sentence matches with information provided by a reference GPS receiver.	Pass/Fail

6.2.3 Positioning

6.2.3.1 TP-RSU-SNMP-POS-BV-01

Identifier		TP-RSU-SNMP-POS-BV-01	
Summary		The roadside unit shall notify a remote host via SNMPv3 if its GPS position deviates from the stored reference by more than a configurable radius (OID 1.0.15628.4.1.100.0.11)	
Test Configuration		TC1	
SUT		RSU	
Reference:		USDOT_RSU-Req_614-v002 (partial 1 of 3)	
PICS Selection			
Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1 • Configure the Test System to receive SNMP traps from the SUT			
Test Sequence			
Step	**Type**	**Description**	**Verdict**

1	Configure	Set RefLat, RefLon and RefElv in the MIB subtree OID 1.0.15628.4.1.8. to match the RSU coordinates obtained from GPGGA NMEA string generated by the SUT. Set rsuGpsMaxDeviation to a value corresponding to 10 meters	
2	Verify	The SUT does not generate position deviation notifications (OID 1.0.15628.4.1.100.1.11)	Pass/Fail
3	Configure	Increase the **RefLat** entry in the SUT MIB by twice the amount specified in the rsuGpsMaxDeviation.	
4	Verify	The SUT generates an SNMP trap rsuGpsDeviationMsg indicating the discrepancy in the SUT latitude information.	Pass/Fail
5	Configure	Repeat step 1	
6	Configure	Increase the **RefLon** entry in the SUT MIB by twice the amount specified in the MIB entry Max Deviation.	
7	Verify	The SUT generates an SNMPv3 trap rsuGpsDeviationMsg indicating the discrepancy in the SUT longitude information.	Pass/Fail
8	Configure	Repeat step 1	
9	Configure	Increase the **RefElv** entry in the SUT MIB by twice the amount specified in the MIB entry Max Deviation.	
10	Verify	The SUT generates an SNMPv3 trap rsuGpsDeviationMsg indicating the discrepancy in the elevation information.	Pass/Fail

6.2.4 Message Processing – Store and Repeat-Encoded Payload

6.2.4.1 TP-RSU-SNMP-SAR-BV-01

Identifier		TP-RSU-SNMP-SAR-BV-01	
Summary		The roadside unit shall allow authorized users to add/remove Messages from the Active Message directory through SNMPv3 rsuSRMStatusTable (OID 1.0.15628.4.1.4) The roadside unit SHALL allow authorized users to view the contents of Active Messages in the Active Message directory through SNMPv3 rsuSRMStatusTable (OID 1.0.15628.4.1.4) The roadside unit SHALL allow authorized users to modify an Active Message in the SNMPv3 rsuSRMStatusTable (OID 1.0.15628.4.1.4)	
Test Configuration		TC1	
SUT		RSU	
Reference:		USDOT_RSU-Req_454-v003, USDOT_RSU-Req_455-v003 and USDOT_RSU-Req_457-v003.	
PICS Selection			
Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1 • The SUT SNMPv3 rsuSRMStatusTable is loaded with 2 messages			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Configure	Two test messages are loaded in the MIB rsuSRMStatusTable	
2	Verify	The SUT transmits the message over the air with message parameters set in step 1.	Pass/Fail
3	Configure	Modify one of the test messages in the MIB	
4	Verify	The SUT transmits the modified message with the new changes.	Pass/Fail
5	Configure	Remove one of the messages from the MIB.	
6	Verify	The SUT no longer transmit the message over the air.	Pass/Fail

6.2.5 Notifications

6.2.5.1 TP-RSU-SNMP-NOT-BV-01

Identifier	TP-RSU-SNMP-NOT-BV-01		
Summary	The roadside unit shall notify a remote host via SNMPv3 of its current NMEA GPGGA string at a configurable interval rsuGpsOutputInterval (OID 1.0.15628.4.1.8.4)		
Test Configuration	TC1		
SUT	RSU		
Reference:	USDOT_RSU-Req_614-v002 (partial 3 of 3)		
PICS Selection			
Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1 • Configure the Test System to receive SNMP traps from the SUT			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Configure	The SUT MIB rsuGpsOutput (OID 1.0.15628.4.1.8) is configured with the sub-entries: • rsuGpsOutputPort • rsuGpsOutputAddress • rsuGpsOutputInterface Set rsuGpsOutputInterval to 1 sec	
2	Verify	The SUT is transmitting NMEA GPGGA string at periodic regular time intervals of 1 second as specified by the MIB.	Pass/Fail
3	Configure	Set rsuGpsOutputInterval to 20 sec	
4	Verify	The SUT is transmitting NMEA GPGGA string at periodic regular time intervals of 20 seconds as specified by the MIB.	Pass/Fail
5	Configure	Set rsuGpsOutputInterval to 300 sec	
6	Verify	The SUT is transmitting NMEA GPGGA string at periodic regular time intervals of 300 seconds as specified by the MIB.	Pass/Fail

6.2.5.2 TP-RSU-SNMP-NOT-BV-02

Identifier	TP-RSU-SNMP-NOT-BV-02		
Summary	Verify that multiple users can access RSU with different valid SNMPv3 authentication credentials Verify that RSU sends a notification if a configurable number of consecutive authentication attempts have failed.		
Test Configuration	TC1		
SUT	RSU		
Reference:	USDOT_RSU-Req_615-v001, Req_467-v001		
PICS Selection			
Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1 (i.e. the first instance of the SNMPv3 Manager has access to the SUT SNMP Agent) • Second authenticated user accounts setup for access to the SNMPv3 SUT agent • Configure the Test System to receive SNMP traps from the SUT			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Configure	Start the second instance of the SNMPv3 Manager using different user credentials, load the MIB from [10] and access the SUT SNMP Agent	

2	Configure	Change the notification threshold limit for invalid access to a number N in range 1-100	Pass/Fail
3	Verify	The first instance of the SNMPv3 manager can walk the SUT MIB tree.	Pass/Fail
4	Verify	The second instance of the SNMPv3 manager with different authenticated user credentials can walk the SUT MIB tree.	Pass/Fail
5	Configure	In the second instance of the SNMPv3 Manager, use invalid password and try to access the SUT N+1 times to trigger a trap.	
6	Verify	The SUT send a trap notification indicating several consecutive authentication attempts have failed.	Pass/Fail

6.2.5.3 TP-RSU-SNMP-NOT-BV-03

Identifier	TP-RSU-SNMP-NOT-BV-03		
Summary	Verify that RSU sends a notification if a time source input has been lost for a configurable period or has failed after a configurable number of query attempts (note: the time source itself shall also be indicated) (OID 1.0.15628.4.1.100.0.7)		
Test Configuration	TC1		
SUT	RSU		
Reference:	USDOT_RSU-Req_615-v001, USDOT_RSU-Req_618-v002		
PICS Selection			
Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1 • Configure the Test System to receive SNMP traps from the SUT			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Verify	The SUT MIB entry rsuGpsStatus (1.0.15628.4.1.3) shows the number of satellites 4 or more	Pass/Fail
2	Configure	Change the notification threshold limit for rsuTimeSourceLostMsg (.1.0.15628.4.1.100.1.7) to a number of seconds N in range 10-1000	
3	Stimulus	Remove the GPS antenna from the SUT connector.	
4	Verify	The SUT MIB entry rsuGpsStatus (1.0.15628.4.1.3) shows the number of satellites is 0	Pass/Fail
5	Configure	Wait a period of time set in step 2.	
6	Verify	The SUT sends a notification rsuTimeSourceLostMsg that a time source has failed and indicating which time source has failed.	Pass/Fail

6.3 Message Processing Test purposes

6.3.1 Receive and Decode MAP/SPAT

6.3.1.1 TP-OBU-MSG-BV-01

Identifier	TP-OBU-MSG-BV-01
Summary	Verify that OBU can receive and decode MAP messages over DSRC on CH172
Test Configuration	TC1
SUT	OBU
Reference:	
PICS Selection	
Pre-test conditions	
• The SUT is in the initial state as described in 4.3.1	

• The Test System transmits WSMs on CH172 containing MAP messages (MessageFrame containing MSG_MapData per [11])			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Stimulus	At least one MAP message is sent over Channel 172	
2	Verify	The SUT received MAP messages	Pass/Fail
3	Verify	The SUT decoded correctly at least one randomly picked sample MAP message in its entirety as indicated by the SUT output in log file, console, etc	Pass/Fail

6.3.1.2 TP-OBU-MSG-BV-02

Identifier	TP-RSU-MSG-BV-02
Summary	Verify that the OBU can receive and decode SPAT messages over DSRC on CH172
Test Configuration	TC1
SUT	OBU
Reference:	
PICS Selection	

Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1 • The Test System transmits WSMs on CH172 containing SPAT messages (MessageFrame containing MSG_SignalPhaseAndTiming per [11])			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Stimulus	At least one SPAT message is sent over Channel 172	
2		The SUT received SPAT messages	
3	Verify	The SUT decoded correctly at least one randomly picked sample SPAT message in its entirety as indicated by the SUT output in log file, console, etc	Pass/Fail

6.3.2 Transmit MAP/SPAT

6.3.2.1 TP-RSU-MSG-BV-01

Identifier	TP-RSU-MSG-BV-01
Summary	Verify that the RSU transmits MAP messages (i.e. MessageFrame containing MSG_MapData per [11]) according to the specified Time instructions
Test Configuration	TC1
SUT	RSU
Reference:	RSU-Req_468-v001, RSU-Req_470-v001
PICS Selection	

Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Configure	The SUT time instructions for MAP transmissions are set with the start date/time at T1 and the stop date/time at T2, where T1 and T2 are set in the future, and T1 is earlier than T2	
2	Stimulus	The SUT activated to send MAP messages continuously over Channel 172 according to the time instructions	
3	Verify	The SUT does not transmit MAP messages earlier than T1	Pass/Fail

4	Verify	The MAP message are transmitted only from T1 to T2.	Pass/Fail
5	Verify	The SUT does not transmit MAP messages after T2	Pass/Fail

6.3.2.2 TP-RSU-MSG-BV-02

Identifier		TP-RSU-MSG-BV-02	
Summary		Verify that the RSU changes message transmit parameters when the RSU Store & Repeat Message (SRM) proxy configuration is altered	
Test Configuration		TC1	
SUT		RSU	
Reference:		USDOT_RSU-Req_468-v001	
PICS Selection			
Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1 • Sample MAP message payloads (i.e. MessageFrame containing MSG_MapData per [11]) is encoded in octet string format			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Config	The SUT SRM proxy parameters are configured with the values listed in parentheses: • SRM Psid (0x8002) • SRM DsrcMsgId (any valid value) • SRM TxMode (continuous) • SRM TxChannel (172) • SRM TxInterval (1 second apart) • SRM DeliveryStart (present date/time) • SRM DeliveryStop (future date/time) • SRM Payload (encoded MAP message) • SRM Enable (1 – enable)	
2	Stimulus	The SUT sends at least one WSM with MAP	
3	Verify	The SUT transmitted WSMs with the parameters specified in step 1	Pass/Fail
4	Config	Make changes to the following SRM proxy parameters using other valid values: • SRM Psid • SRM TxMode • SRM TxChannel • SRM TxInterval • SRM DeliveryStart • SRM DeliveryStop • SRM Payload	
5	Stimulus	The SUT sends at least one WSM after parameter changes took effect.	
6	Verify	The SUT transmitted WSM messages according with the changed parameters specified in step 4	Pass/Fail

6.3.2.3 TP-RSU-MSG-BV-03

Identifier	TP-RSU-MSG-BV-03
Summary	Verify that the RSU can convert inbound UDP frames to outbound SPAT messages with a delay not exceeding 50 milliseconds from the time the messages are received from an external host
Test Configuration	TC1

SUT	RSU		
Reference:	USDOT_RSU-Req_554-v001, USDOT_RSU-Req_471-v003		
PICS Selection			
Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1 • The DSRC Sniffer configured to capture outbound WSM messages from the SUT on channel 172. • The DSRC Sniffer software configured to capture inbound UDP messages to the SUT Ethernet interface and the UDP port assigned to the SUT Immediate Forward Proxy configured for SPAT • The Test System transmitting UDP containing SPAT messages to the SUT UDP port assigned to the SUT Immediate Forward Proxy configured for SPAT o UDP containing SPAT means UDP payload includes MessageFrame per [11] containing MSG_SignalPhaseAndTiming encoded per [11]			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Configure	The SUT Immediate Forward Proxy is configured to receives UDP messages and forward them as outbound WSMs on Channel 172, continuous mode.	
2	Stimulus	The SUT receives UDP messages over the Ethernet interface	
3	Verify	The SUT sends WSMs containing SPAT messages on Channel 172, continuous mode.	Pass/Fail
4	Verify	Measure the delay between the time T1 when the SUT receives a UDP message from the SUT Ethernet port, and the time T2 when the corresponding SPAT is sent over DSRC. Verify that the delay (T2-T1) does not exceed 50 milliseconds	Pass/Fail

6.3.2.4 TP-RSU-MSG-BV-04

Identifier	TP-RSU-MSG-BV-04		
Summary	Verify that the RSU changes message transmit parameters when the RSU Immediate Forward Message (IFM) proxy configuration is altered		
Test Configuration	TC1		
SUT	RSU		
Reference:	USDOT_RSU-Req_554-v001, USDOT_RSU-Req_471-v003		
PICS Selection			
Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1 • The Test System sends UDP messages containing SPAT information to the SUT o UDP containing SPAT means UDP payload includes MessageFrame from [11] containing MSG_SignalPhaseAndTiming and encoded per [11]			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
7	Config	The SUT IFM proxy parameters are configured with the values listed in parentheses: • IFM Psid (0x8002) • IFM DsrcMsgId (any valid value) • IFM TxMode (continuous) • IFM TxChannel (172) • IFM Enable (1-enable)	
8	Stimulus	The SUT sends at least one WSMs with SPAT message	
9	Verify	The SUT transmitted WSMs with the parameters specified in step 1	Pass/Fail

10	Config	Make changes to the following IFM parameters using other valid values: • IFM Psid • IFM DsrcMsgId • IFM TxMode • IFM TxChannel	
11	Stimulus	The SUT sends at least one WSM after parameter changes took effect.	
12	Verify	The SUT sends at least one WSM after parameter changes took effect.	Pass/Fail
13	Verify	The SUT transmitted WSM messages according with the changed parameters specified in step 4	Pass/Fail

6.4 RSU Multi-Channel Operation (1609.4) Test purposes

6.4.1.1 TP-RSU-16094-MCTXRX-BV-01

Identifier		TP-RSU-16094-MCTXRX-BV-01	
Summary		The roadside unit shall support Continuous Mode and Alternating Mode radio operations simultaneously	
Test Configuration		TC1	
SUT		RSU	
Reference:		Req_360-v002, Req_588-v001	
PICS Selection			
Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Configure	The Test System is set to receive WSMs • on radio 1 in continuous channel mode on channel 178 and • on radio2 in alternating mode using o timeslot0 on channel 172 and o timeslot1 on channel 174	
2	Configure	The SUT is set to transmit at a repeat rate of 10 packets per second • WSM1 in continuous channel mode on channel 178 and • WSM2 (different WSM payload from WSM1) in alternating mode using timeslot0 on channel 172 and • WSM3 (different WSM payload from WSM1 and WSM2) in alternating mode using timeslot1 on channel 174	
3	Stimulus	The SUT transmitted WSM1 on channel 178, WSM2 on channel 172 and WSM3 on channel 174.	
4	Verify	The Test System received WSM1, WSM2 and WSM3 every 100 ms.	PASS / FAIL
5	Stimulus	The SUT to stop transmitting.	
6	Procedure	Repeat steps 1-4 with channel 182 for the continuous mode, channel 180 (timeslot0) and 184 (timeslot1) for the two alternating mode channels.	
7	Configure	The SUT to the initial state.	
8	Configure	The SUT to receive WSMs • on radio 1 in continuous channel mode on channel 178 and • on radio 2 in alternating mode using o timeslot0 on channel 172 and	

		○ on channel 174 using timeslot1.	
9	Configure	The Test System to transmit at a repeat rate of 10 packets per second • WSM1 in continuous channel mode on channel 178 and • WSM2 (different WSM payload from WSM1) in alternating mode using timeslot0 on channel 172 and • WSM3 (different WSM payload from WSM1 and WSM2) in alternating mode using timeslot1 on channel 174	
10	Stimulus	The Test System transmitted WSM1 on channel 178, WSM2 on channel 172 and WSM3 on channel 174.	
11	Verify	The Test System received WSM1, WSM2 and WSM3 every 100 ms	PASS / FAIL
12	Stimulus	The SUT to stop receiving.	
13	Procedure	Repeat steps 8-11 with channel 182 for the continuous mode, channel 180 (timeslot0) and 184 (timeslot1) for the two alternating mode channels.	

6.4.1.2 TP-RSU-1609-4-TXT-BV-01

Identifier	TP-RSU-1609-4-TXT-BV-01		
Summary	Each DSRC radio in the roadside unit SHALL be configurable to send messages either on Channel 178 during the Control Channel (CCH) interval or on any of the 10 MHz or 20 MHz channels with no time interval restrictions.		
Test Configuration	TC1		
SUT	RSU		
Reference:	Req_421-v001, Req_587-v001		
PICS Selection			
Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Configure	The Test System to receive WSMs in alternating channel mode using timeslot0 on channel 178 and on alternating mode using timeslot1 on channel2 (channel 172 to start).	
2	Configure	The SUT to transmit WSM1 in alternating channel mode using timeslot0 on channel 178 and WSM2 (different WSM payload from WSM1) on alternating channel mode using timeslot1 on channel2 at a repeat rate of 10 packets per second.	
3	Stimulus	The SUT to transmit WSM1 on channel1 and WSM2 on channel2.	
4	Verify	The Test System receives WSM1 and WSM2 every 100 ms.	PASS / FAIL
5	Stimulus	The SUT to stop transmitting.	
6	Procedure	Repeat steps 1-4 with values for channel2 = 174, 176, 180, 182 and 184.	
	Comment	***20 MHz channels are not supported.*** ***Restrictions on time intervals are not verified.***	

6.4.1.3 TP-RSU-1609-4-RXT-TXT-BV-01

Identifier	TP-RSU-1609-4-RXT-TXT-BV-01

Summary		Roadside unit DSRC Radios in Alternating Mode shall be capable of switching to the configured Service Channel every Service Channel interval with no time interval restrictions.	
Test Configuration		TC1	
SUT		RSU	
Reference:		Req_422-v001	
PICS Selection			
Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Configure	The Test System to receive WSMs in alternating mode on channel 178 using timeslot0 and on alternating mode using timeslot1 on channel2 (172 to start).	
2	Configure	The SUT to transmit WSM1 in alternating mode on channel1 and WSM2 (different WSM payload from WSM1) on alternating mode using timeslot1 on channel2 at a repeat rate of 10 packets per second.	
3	Stimulus	The SUT to transmit WSM1 on channel1 and WSM2 on channel2.	
4	Verify	The Test System receives WSM1 and WSM2 every 100 ms.	PASS / FAIL
5	Stimulus	The SUT to stop transmitting.	
6	Procedure	Repeat steps 1-4 with values for channel2 = 174, 176, 180, 182 and 184.	
7	Configure	The SUT to the initial state.	
8	Configure	The SUT to receive WSMs in alternating mode using timeslot0 on channel 178 and on alternating mode using timeslot1 on channel2 (172 to start).	
9	Configure	The Test System to transmit WSM1 in alternating mode on channel 178 using timeslot0 and WSM2 (different WSM payload from WSM1) on alternating mode using timeslot1 on channel2 at a repeat rate of 10 packets per second.	
10	Stimulus	The Test System to transmit WSM1 on channel 178 and WSM2 on channel2.	
11	Verify	The SUT receives WSM1 and WSM2 every 100 ms.	PASS / FAIL
12	Stimulus	The SUT to stop receiving.	
13	Procedure	Repeat steps 8-11 with values for channel2 = 174, 176, 180, 182 and 184.	
	Comment	***Restrictions on time interval are not verified.***	

6.5 RSU GPS Positioning Operation Test purposes

6.5.1.1 TP-RSU-POS-FUN-BV-01

Identifier	TP-RSU-POS-FUN-BV-01
Summary	Verify that RSU uses its built-in positioning system to determine its position on the surface of the earth
Test Configuration	TC1
SUT	RSU
Reference:	RSU_Req_510-v002, Req_363-v001
PICS Selection	
Pre-test conditions	
• The SUT is in the initial state as described in 4.3.1 • GPS signal is available	

• The location of the RSU position is established as the *Expected SUT Position*			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Check	The SUT is powered up and acquired GPS signal and its 3D position	
2	Stimulus	The *Measured SUT Position* information is retrieved from the SUT	
3	Verify	The *Measured SUT Position* is within the *Test Requirement* (see Note1 below) of the *Expected SUT Position*	Pass/Fail
4	Configure	The SUT is power cycled	
5	Procedure	Repeat steps 1-4 two more times	
Note1: Test Requirement is established as the Maximum difference between the *Measured SUT Position* and the *Expected SUT Position* shall not exceed 3 meters			

6.5.1.2 TP-RSU-POS-FUN-BV-02

Identifier	TP-RSU-POS-FUN-BV-02
Summary	Verify that RSU system clock conforms to the UTC timing standard
Test Configuration	TC1
SUT	RSU
Reference:	RSU-Req_514-v002
PICS Selection	

Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1 • GPS signal is available • A reference UTC time clock is available			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Check	The SUT acquired GPS signal and its 3D position	
2	Check	Retrieve the SUT system time	
3	Verify	The SUT system time is uses the UTC format as compared to the reference clock time	Pass/Fail

6.5.1.3 TP-RSU-POS-FUN-BV-03

Identifier	TP-RSU-POS-FUN-BV-03
Summary	Verify that the RSU system clock is based off timing information from its built-in positioning system that manages leap second corrections
Test Configuration	TC1
SUT	RSU
Reference:	RSU-Req_513-v003, Req_363-v001
PICS Selection	

Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1 • GPS signal is available • A reference UTC time clock is available			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Check	The SUT acquired GPS signal and its 3D position	
2	Verify	The SUT current system time matches the reference clock	Pass/Fail
3	Stimulus	Manually change the SUT system time to an incorrect value	
4	Verify	The SUT corrected its internal system clock to match the reference clock within 1 min	Pass/Fail

6.6 WSA Test purposes

6.6.1 WSA transmission

6.6.1.1 TP-RSU-WSA-V2I-BV-01

Identifier		TP-RSU-WSA-V2I-BV-01	
Summary		Verify that the RSU transmits WSA with security profile defined in IEEE 1609.3-2016 Annex H.1	
Test Configuration		TC1	
SUT		RSU	
Reference:		RSU-Req_586-v001	
PICS Selection			
Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1 and the section 4.3.1 in [13]			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Verify	Perform TP-16092- SPDUWSA-SEND-BV-01 from [13]	Pass/Fail
2	Verify	Perform TP-16092- SPDUWSA-SEND-BV-02 from [13]	Pass/Fail
3	Verify	Perform TP-16092- SPDUWSA-SEND-BV-03 from [13]	Pass/Fail
4	Verify	Perform TP-16092- SPDUWSA-SEND-BV-04 from [13]	Pass/Fail

6.6.1.2 TP-RSU-WSA-FUN-BV-01

Identifier		TP-RSU-WSA-FUN-BV-01	
Summary		Verify that RSU transmit WSA with Service Channel (SCH) Services from WSA MIB OID 1.0.15628.4.1.13	
Test Configuration		TC1	
SUT		RSU	
Reference:		RSU-Req_570-v002, Req_587-v001	
PICS Selection			
Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Configure	The WSA MIB subtree (OID 1.0.15628.4.1.13) parameters are configured with the values listed in parentheses: Service 1 • rsuWsaPsid (0x8003) • rsuWsaPriority (any valid value) • rsuWsaProviderContext (any valid value) • rsuWsaIpAddress (none) • rsuWsaPort (none) • rsuWsaChannel (176) Service 2 • rsuWsaPsid (0xEFFFFFFE) • rsuWsaPriority (any valid value) • rsuWsaProviderContext (any valid value) • rsuWsaIpAddress (IPv6 address of RSE) • rsuWsaPort (any valid value) • rsuWsaChannel (176)	Pass/Fail
2	Stimulus	The SUT transmits WSAs	

3	Verify	The WSA transmitted on the Control channel (178)	Pass/Fail
4	Verify	The WSA contains Service Info Segment, Channel Info Segment and the WAVE Router Advertisement containing information from the MIB configured in step 1	Pass/Fail

6.6.1.3 TP-RSU-WSA-FUN-BV-02

Identifier	TP-RSU-WSA-FUN-BV-02	
Summary	Verify that RSU transmits WSA with Service Channel (SCH) Services based on the Store and Repeat Messages (SRM) contained in MIB OID 1.0.15628.4.1.4 SRM services configured for the Control Channel (CCH), 178 are NOT included in the WSA	
Test Configuration	TC1	
SUT	RSU	
Reference:		
PICS Selection	Req_571-v001, Req_573-v002, Req_587-v001	
Pre-test conditions		
• The SUT is in the initial state as described in 4.3.1		
Test Sequence		
Step	**Type**	**Description**	**Verdict**
1	Configure	The WSA MIB subtree (OID 1.0.15628.4.1.4) parameters are configured with the values listed in parentheses: Service 1 • SRM Psid (0x8003) • SRM DsrcMsgId (unique valid value) • SRM TxMode (alternating) • SRM TxChannel (176) • SRM TxInterval (1 second apart) • SRM DeliveryStart (present date/time) • SRM DeliveryStop (future date/time) • SRM Payload (MessageFrame containing MSG_TravelerInformation encoded per [11]) • SRM Enable (1 – enable) Service 2 • SRM Psid (0x8003) • SRM DsrcMsgId (unique valid value) • SRM TxMode (alternating) • SRM TxChannel (178) • SRM TxInterval (1 second apart) • SRM DeliveryStart (present date/time) • SRM DeliveryStop (future date/time) • SRM Payload (MessageFrame containing MSG_TravelerInformation encoded per [11]) • SRM Enable (1 – enable)	
2	Configure	The MID table rsuDsrcChannelModeTable (OID 1.0.15628.4.1.12) is configured with values listed in parentheses: • rsuDCMRadio (name of the SUT wireless interface) • rsuDCMMode (alternating) • rsuDCMCCH (178) • rsuDCMSCH (176)	
3	Stimulus	The SUT transmits WSA	

4	Verify	WSA are transmitted on the channel 178	Pass/Fail
5	Verify	The WSA contains: • one Service Info Segment with parameters derived from Service 1 configuration • one Channel Info Segment with the Service channel 176 listing	Pass/Fail
6	Verify	The WSA does not contain: • Service Info Segment with parameters derived from Service 2 configuration • Channel Info Segment with the Control channel 178 listing	Pass/Fail

6.6.1.4 TP-RSU-WSA-FUN-BV-03

Identifier	TP-RSU-WSA-FUN-BV-03	
Summary	Verify that RSU transmits WSA with Service Channel (SCH) Services based on Immediate Forward Messages (IFM) received on non-DSRC interfaces as listed in MIB OID 1.0.15628.4.1.5 IFM services configured for the Control Channel (CCH), 178 are NOT included in WSA	
Test Configuration	TC1	
SUT	RSU	
Reference:	RSU-Req_572_v001, RSU-Req_574_v001, Req_587-v001	
PICS Selection		
Pre-test conditions		
• The SUT is in the initial state as described in 4.3.1		
Test Sequence		
Step	**Type**	**Description**	**Verdict**
1	Configure	The SUT IFM proxy parameters are configured with the values listed in parentheses: Service 1 • IFM Psid (0x8003) • IFM DsrcMsgId (unique valid value) • IFM TxMode (alternating) • IFM TxChannel (176) • IFM Enable (1-enable) Service 2 • IFM Psid (0x8003) • IFM DsrcMsgId (unique valid value) • IFM TxMode (alternating) • IFM TxChannel (178) • IFM Enable (1-enable)	
2	Configure	The MID table rsuDsrcChannelModeTable (OID 1.0.15628.4.1.12) is configured with values listed in parentheses: • rsuDCMRadio (name of the SUT wireless interface) • rsuDCMMode (alternating) • rsuDCMCCH (178) • rsuDCMSCH (176)	
3	Stimulus	The SUT transmits WSA	
4	Verify	WSA are transmitted on the channel 178	Pass/Fail
5	Verify	The WSA contains: • one Service Info Segment with parameters derived from Service 1 configuration • one Channel Info Segment with the Service channel 176 listing	Pass/Fail

6	Verify	The WSA does not contain: • Service Info Segment with parameters derived from Service 2 configuration • Channel Info Segment with the Control channel 178 listing	Pass/Fail

6.6.2 WSA reception and processing

6.6.2.1 TP-OBU-WSA-FUN-BV-01

Identifier		TP-OBU-WSA-FUN-BV-01	
Summary		Verify that OBU can receive WSA and join selected advertised service	
Test Configuration		TC1	
SUT		OBU	
Reference:			
PICS Selection			
Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1 and section 4.3.1. from [12]			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Verify	Perform TP-16093-WSA-PP-BV-01 from [12]	Pass/Fail
2	Verify	Perform TP-16093-WSA-PP-BV-02 from [12]	Pass/Fail
3	Verify	Perform TP-16093-WSA-PP-BV-03 from [12]	Pass/Fail
4	Verify	Perform TP-16093-WSA-PP-BV-04 from [12]	Pass/Fail

6.6.2.2 TP-OBU-WSA-FUN-BV-02

Identifier		TP-OBU-WSA-FUN-BV-02	
Summary		Verify that OBU can receive WSA with WRA and ping external host connected to RSU via Ipv6	
Test Configuration		TC1	
SUT		OBU	
Reference:			
PICS Selection			
Pre-test conditions			
• The SUT is in the initial state as described in 4.3.1 and section 4.3.1. from [12] • RSU connected to external host			
Test Sequence			
Step	**Type**	**Description**	**Verdict**
1	Verify	Perform TP-16093-IP-COM-BV-01 from [12]	Pass/Fail

6.6.2.3 TP-OBU-WSA-FUN-BV-03

Identifier	TP-OBU-WSA-FUN-BV-03
Summary	Verify that OBU can receive WSA with WRA and ping RSU via Ipv6
Test Configuration	TC1
SUT	OBU
Reference:	
PICS Selection	
Pre-test conditions	
• The SUT is in the initial state as described in 4.3.1 and section 4.3.1. from [12]	
Test Sequence	

Step	Type	Description	Verdict
1	Verify	Perform TP-16093-IP-COM-BV-02 from [12]	Pass/Fail

Appendix A:

Traceability Matrix

This section of the document contains the traceability matrix for RSU requirements from [10]. As shown below, Table A- 1 lists the RSU requirement ID from [10] (prefix "USDOT-RSU" in the ID omitted) traceability to TPs.

Table A- 1 RSU Requirements Traceability Matrix

Req ID	Req Summary	Reference to Test Purposes
Req_355-v001	Use of authenticated NTP	Not tested
Req_360-v002	Continuous and alternating channel modes	TP-RSU-16094-MCTXRX-BV-01
Req_363-v001	RSU integrated GPS	TP-RSU-POS-FUN-BV-01 TP-RSU-POS-FUN-BV-03
Req_372-v002	IEEE 802.11 Conformance	802.11 test spec
Req_373-v003	IEEE 802.11 Physical layer	802.11 test spec
Req_375-v001	IEEE 802.11 Frame default values	802.11 test spec
Req_376-v001	IEEE 802.11 QOS	TP-80211-TXT-MAC-BV-01
Req_377-v001	IEEE 802.11 AIFSN	Not tested
Req_378-v001	IEEE 802.11 TXOP	Not tested
Req_379-v001	IEEE 802.11 Cwmin	Not tested
Req_382-v001	IEEE 802.11 Basic service set	802.11 spec testing
Req_383-v001	IEEE 802.11 Operating class	802.11 spec testing
Req_384-v003	IEEE 802.11 Operating class	802.11 spec testing
Req_385-v001	IEEE 802.11 EDCA	Not tested
Req_388-v002	IEEE1609.2 Conformance	Covered by 1609.2 test specification
Req_412-v002	IEEE1609.3 Conformance	Covered by 1609.3 test specification
Req_413-v001	IEEE1609.3 IP Data	TP-OBU-WSA-FUN-BV-02 TP-OBU-WSA-FUN-BV-03
Req_414-v001	IEEE1609.3 WSM Data	TP-OBU-MSG-BV-01 TP-OBU-MSG-BV-02 Also, covered by other test specifications, i.e. IEEE16093 test specification: TP-16093-WSM-ROP-BV-01 (transmit) TP-16093-WSM-PP-BV-01 (receive)
Req_415-v001	IEEE1609.3 PSID specific user priority	Covered by other test specifications (i.e. IEEE16093 and 80211 test specification)
Req_416-v001	COC V2I Testing Scope	TP-16093-WSM-ROP-BV-01
Req_419-v001	IEEE1609.4 standard conformance	Covered by other test specifications (i.e. IEEE16094 test specification)
Req_420-v002	IEEE1609.4 radio continuous or alternating mode	TP-16094-TXT-MDE-BV-01
Req_421-v001	IEEE1609.4 radio channel usage	TP-RSU-1609-4-TXT-BV-01 Use TP-16094-TXT-MDE-BV-02 but set one of the channels to 178. *20 MHz channels not supported* *Time interval bounds are not tested*
Req_422-v001	IEEE1609.4 continuous mode	TP-RSU-1609-4-RXT-TXT-BV-01 *20 MHz channels not supported*

Req ID	Req Summary	Reference to Test Purposes
		Time interval bounds are not tested
Req_424-v002	Service channel intervals	TP-RSU-1609-4-RXT-TXT-BV-01
Req_425-v002	RSU sets configuration	Not tested
Req_429-v001	IEEE1609.4 synchronized collision	Not tested
Req_430-v001	IEEE1609.4 readdressing option	Not tested
Req_432-v004	RSU receiver range	TP-802.11-RXT-PHY-BV-01
Req_433-v004	RSU transmission range	TP-802.11-TXT-PHY-BV-04 (Constell./output power)
Req_435-v001	RSU configuration via MIB	TP-RSU-SNMP-OPR-BV-01
Req_436-v001	IEEE1609.4 alternative channel mode	TP-RSU-1609-4-RXT-TXT-BV-01 *20 MHz channels not supported* *Time interval bounds are not tested*
Req_437-v005	DSRC message forwarding	TP-RSU-SNMP-FUN-BV-01
Req_438-v004	GPS output	TP-RSU-SNMP FUN-BV-02
Req_452-v002	SRM max file storage	Not tested
Req_453-v002	SRM Active Message file installation	Not tested
Req_454-v003	SRM removal	TP-RSU-SNMP-SAR-BV-01
Req_455-v003	SRM review	TP-RSU-SNMP-SAR-BV-01
Req_457-v003	SRM modifications	TP-RSU-SNMP-SAR-BV-01
Req_459-v001	SRM Authorized Access Log Entry	Not tested
Req_462-v001	SRM Active message log entry	Not tested
Req_467-v001	Multiple user access via SNMPv3	TP-RSU-SNMP-NOT-BV-02
Req_468-v001	SRM transmission	TP-RSU-MSG-BV-01, TP-RSU-MSG-BV-02
Req_469-v001	SRM failed access in log file	Not tested
Req_470-v001	SRM transmission	TP-RSU-MSG-BV-01
Req_471-v003	IMF transmissions	TP-RSU-MSG-BV-03 TP-RSU-MSG-BV-04
Req_487-v001	RSU use of MIB	TP-RSU-SNMP-OPR-BV-01
Req_489-v001	MIB default values	TP-RSU-SNMP-OPR-BV-01
Req_490-v001	MIB Walk	TP-RSU-SNMP-OPR-BV-01
Req_491-v002	MIB modification by authorized user	TP-RSU-SNMP-OPR-BV-01
Req_492-v002	MIB modification in log file	Not tested
Req_493-v001	MIB installation	Not tested
Req_494-v001	MIB copy authorization	Not tested
Req_495-v002	MIB validation status in log file	Not tested
Req_498-v001	MIB valid range checking	Not tested
Req_499-v001	MIB integrity mechanism	Not tested
Req_510-v002	Use of RSU GPS	TP-RSU-POS-FUN-BV-01
Req_511-v001	Position Failure log entry	Not tested
Req_512-v002	Position corrections	Not tested
Req_513-v003	System Time	TP-RSU-POS-FUN-BV-03
Req_514-v002	System Time Standard	TP-RSU-POS-FUN-BV-02
Req_554-v001	Immediate Forward Message Receive	TP-RSU-MSG-BV-03 TP-RSU-MSG-BV-04
Req_570-v002	WSA Configuration General	TP-RSU-WSA-FUN-BV-01
Req_571-v001	WSA Configuration SRM	TP-RSU-WSA-FUN-BV-02
Req_572-v001	WSA Configuration IFM	TP-RSU-WSA-FUN-BV-03

Req ID	Req Summary	Reference to Test Purposes
Req_573-v002	Control Channel SRM	TP-RSU-WSA-FUN-BV-02
Req_574-v001	Control Channel IFM	TP-RSU-WSA-FUN-BV-03
Req_586-v001	WSA Security Profile	TP-RSU-WSA-V2I-BV-01
Req_587-v001	WSA Broadcast Channel	TP-RSU-WSA-FUN-BV-01 TP-RSU-WSA-FUN-BV-02 TP-RSU-WSA-FUN-BV-03
Req_588-v001	WSA Broadcast Time Slot	TP-RSU-16094-MCTXRX-BV-01
Req_592-v002	RSU Reporting over SNMPv3	No testing
Req_602-v001	RSU store of GPS Reference	Log checking is not tested
Req_604-v002	Antenna Output Power	Optional requirement – Not tested
Req_613-v002	GPS data legitimacy	Optional requirement – Not tested
Req_614-v002	RSU notifications – GPS triggered	TP-RSU-SNMP-POS-BV-01 TP-RSU-SNMP-NOT -BV-01
Req_615-v001	RSU notifications – integrity/authentication triggered	TP-RSU-SNMP-NOT-BV-02 TP-RSU-SNMP-NOT-BV-03
Req_618-v002	RSU notifications – time integrity triggered	TP-RSU-SNMP-NOT-BV-03
Req_627-v001	TMC Message signature verification	No testing
Req_636-v001	RSU handling of expired app certificates	No testing
N/A	OBU reception of SPAT/MAP	TP-OBU-MSG-BV-01 TP-OBU-MSG-BV-02
N/A	OBU reception of WSA	TP-OBU-WSA-FUN-BV-01 TP-OBU-WSA-FUN-BV-02 TP-OBU-WSA-FUN-BV-03

Revision History

V0.1	3/13/2017	Initial Draft
V0.2	4/18/2017	Updated as a result of comments received from Noblis. Iteris and Volpe.
V0.3	Oct 2017	Editorial updates to: TP-RSU-SNMP-NOT-BV-02, TP-RSU-SNMP-FUN-BV-01

Need to Change

◙ End of Document ◙