

**Conformance test specifications for**

**Wireless Access in  
Vehicular Environments (WAVE) —  
Networking Services**

**Test Suite Structure and Test Purposes (TSS & TP)**

|  |  |
| --- | --- |
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# Scope

This document provides the Test Suite Structure and Test Purposes for WAVE Network Services (WNS) as defined in IEEE 1609.3 [2]. The document defines a set of Test Purposes including Test Descriptions and the structure for the Test Suite.

The ISO standard for the methodology of conformance testing (ISO/IEC 9646‑1 [3] and ISO/IEC 9646‑2 [4]) as well as the ETSI rules for conformance testing (ETS 300 406 [7]) are used as a basis for the test methodology.

# References

## Normative References

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

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

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

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

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

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

[8] IEEE Std. 1609.2-2016: "IEEE Standard for Wireless Access in Vehicular Environments - security Services for Applications and Management Messages".

[9] IETF RFC 4862, IPv6 Stateless Address Configuration.

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

[11] TCIS (V0.6.0): “Test Control Interface Specification.”: Revision date 4/21/2017, download from <https://github.com/certificationoperatingcouncil/TCI_ASN1>.

## Informative References

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

[i.1] ETSI EG 202 798 (V1.1.1): "Intelligent Transport Systems (ITS); Testing; Framework for conformance and interoperability testing".

# Definitions and Abbreviations

## Definitions

For the purposes of the present document, the terms and definitions given in IEEE 1609.3 [2], ISO/IEC 9646‑1 [3] and in ISO/IEC 9646‑7 [6] apply.

# 3.2 Abbreviations

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

BI Behavior Invalid

BSM Basic Safety Message

BV Behavior Valid

CH[#] Operating Channel

CCH Control Channel

DSRC Dedicated Short Range Communication

EIRP Equivalent Isotropically Radiated Power

ICMP Internet Control Message Protocol

IETF Internet Engineering Task Force

ITS Intelligent Transport Systems

IUT Implementation Under Test

PDU Protocol Data Unit

PICS Protocol Implementation Conformance Statement

PSID Provider Service Identifier

SCH Service Channel

SUT System Under Test

TAI International Atomic Time

TC Test Configuration

TP Test Purposes

TS Test System

TSS Test Suite Structure

WAVE Wireless Access in Vehicular Environments

WME WAVE Management Entity

WNS WAVE Network Services

WRA WAVE Routing Advertisement

WSA WAVE Service Advertisement

WSM WAVE Short Message

SAP Service Access Point

TSF Timing Synchronization Function

Terminology adopted in this document is chosen to be consistent with the analogous terms used in ETSI specifications [i.1]. For example, the IUT may be viewed as a reference to a physical device subjected to the testing. However, unlike device testing, the tests described in this document are focused on testing a subset of the overall device functionality. Therefore, a device neutral term is adopted to refer to a device such as an Implementation-Under-Test (IUT).

Test Purposes (TPs) and test descriptions described in this document are analogous to test cases commonly used in many test methodologies. These terms are also adopted for consistency with [i.1]. Note, that the goal for TPs is to describe an abstract test approach in terms of test requirements regardless of the test system implementation.

When the implementation of a conformance test system is considered, the notion of the IUT is replaced with the SUT (System-Under-Test). The SUT is comprised of the IUT with additional components which are used to facilitate testing, but are not part of the IUT. For example, the SUT may include the IUT with a special testing port, additional software and a specific configuration supporting an interface to a test system.

# Prerequisites and Test Configurations

## Test Configurations

This clause introduces the test configurations that is used for the definition of test purposes. The test configurations cover the various scenarios of the WAVE Network Services (WNS) tests.

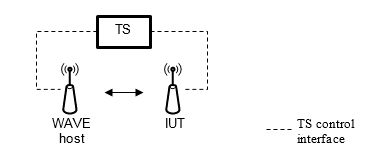


Figure 4‑1 Test Configuration 1 (TC1) – Sending/Receiving WSMs

The Test Configuration 1 as shown in Figure 4‑1is applied for the tests dealing with transmission and reception of WAVE Short Messages (WSM).

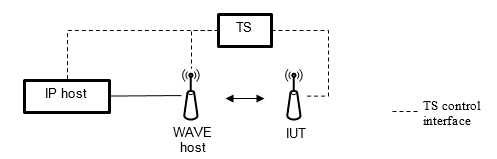


Figure 4‑2 Test Configuration 2 (TC2) – IPv6 Host Communications

The Test Configuration 2 as shown in Figure 4‑2 is applied for the communication test group dealing with exchange between IUT and IP host using IPv6 protocol. TC2 depicts an IP host connected to the WAVE host via a wired Ethernet link with the corresponding routing tables established to facilitate two-way packet exchanges between the IUT and the IP host.

### Global Test Parameters

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

Note: All the WSM messages transmitted from the IUT will be of a broadcast type unless otherwise specified.

#### Channels

Select test values for Channel specified using *pChannel* according to the following table:

**Table 4‑1: Channels**

| **Parameter name** | **Range of permitted values** | **Setting used for testing** | **Reference** |
| --- | --- | --- | --- |
| Channel specified as *pChannel* | 10MHz channels:  172, 174, 176, 178, 180, 182, 184  20MHz channels:  175, 181 | 172 | [2] |
| Channels specified as CH1 and CH2 |  | Perform test sequence with the following channel sets:  CH1=178, CH2 = 174  CH1=174, CH2 = 178  CH1=178, CH2 = 178  CH1=174, CH2 = 174  CH1=172, CH2 = 184 | [2] |

For those TPs where tests must be repeated using different channels defined by *pChannel*, set *pChannel* consecutively to values 172, 178, 182, and 184.

#### Data Rate

Select test values for Data Rate specified using *pDataRate* according to the following table.

**Table 4‑2: Data Rates**

| **Parameter name** | **Range of permitted values** | **Setting used for testing** | **Reference** |
| --- | --- | --- | --- |
| Data Rate (Mbps) | 10MHz channels:  3, 4.5, 6, 9, 12, 18, 24, 27 | 6 | [2] |

If test require repetition using different data rates, use the following discrete values 3, 6, 12, 27Mbps

#### Transmit Power

The transmit power out of the DSRC Radio Subsystem measured at the antenna connector of the Subsystem housing, unless otherwise stated in the Test Purpose shall use *pTxPowerDefault, where*

*pTxPowerDefault* = Round\_Up (( (MaxTxPowerCap - PwrRange) + MaxTxPowerCap) / 2)

The rationale for parameters *MaxTxPowerCap, vPwrRange, vTxPwrCtrlStep* used in this documentis as specified in SAE J2945/1 [1]*.*

PwrRange is calculated per [1] as: MaxTxPowerCap – (vRPMax – vTxPwrRange) + MinSectorAntGain – CLoss

Assuming

vRPMax = 20dBm [[1]]*.*

vTxPwrRange = 10dBm [[1]]*.*

              MinSectorAntGain – CLoss = 0 (for module testing at connector port)

Then PwrRange = MaxTxPowerCap – 10dBm

*MaxTxPowerCap* is the maximum conducted transmit power setting in dBm of the DSRC Radio Subsystem at which 802.11 transmitter requirements are met. *MaxTxPowerCap* will need to be provided with the IUT by the test requestor.

**Table 4‑3: Transmit Power**

| **Parameter name** | **Range of permitted values** | **Setting used for testing[[1]](#footnote-1)** | **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 | *pTxPowerDefault* | Default setting selected per [[1]] |

If test must be repeated using different values of *pTxPower*, the following discrete settings will be used (dBm):

* *pTxPowerDefault* – 2 \* vTxPwrCtrlStep
* *pTxPowerDefault* – vTxPwrCtrlStep
* *pTxPowerDefault*
* *pTxPowerDefault* + vTxPwrCtrlStep
* *pTxPowerDefault* + 2 \* vTxPwrCtrlStep

Where vTxPwrCtrlStep = 1dB [1]

#### PSID

Select test values for PSID specified using *pPSID* according to the following table.

**Table 4‑4: PSID**

| **Parameter name** | **Range of permitted values (p-encoded)** | **Setting used for testing** | **Reference** |
| --- | --- | --- | --- |
| PSID | 1byte PSID: 0p00 to 0p7F  2byte PSID: 0p80-00 to 0pBF-FF  3byte PSID: 0pC0-00-00 to 0pDF-FF-FF  4byte PSID: 0pE0-00-00-00 to 0pEF-FF-FF-FF | 0p7F  0pBF-FF  0pDF-FF-FF  0pEF-FF-FF-FF | [5] |
| PSID1  PSID2 |  | 0p7F  0pBF-FF | [5] |
| PSID for  WSA  WAVE Sec Mgmt  BSM  IP routing |  | 0p80-07  0p23  0p20  0pEF-FF-FF-FE | [5] |

#### User Priority

**Table 4‑5: User Priority**

| **Parameter name** | **Range of permitted values** | **Setting used for testing** | **Reference** |
| --- | --- | --- | --- |
| User Priority | 0-7 | 3 | [2] |

#### WSM Max Data Length

Set the value for *WsmMaxDataLength* to 1400 bytes

#### Transmission Repeat Rates

Select test values for message repeat rates according to the following table.

**Table 4‑6: Repeat Rate**

| **Parameter name** | **Range of permitted values (msg/sec)** | **Setting used for testing** | **Reference** |
| --- | --- | --- | --- |
| Repeat Rate for WSA transmissions (*pWSARepeatRate*)  *Repeat Period Tolerance for WSA (pWSARepeatPeriodTolerance)* | 0 – 51 | 10 msg/sec or 100ms repeat period  Repeat period tolerance 10ms | Recommended practice  Repeat period tolerance derived from [1] |
| Repeat Rate for WSM transmissions  *(pWSMRepeatRate)*  *Repeat Period Tolerance for WSM (pWSMRepeatPeriodTolerance)* | 0 – 51 | 10 msg/sec or 100ms repeat period  Repeat period tolerance 10ms | Recommended practice  Repeat period tolerance derived from [1] |

Where relationship between the Repeat Rate and the Repeat Period is as follows:

pWSMRepeatPeriod = 1 / pWSMRepeatRate

pWSARepeatPeriod = 1 / pWSARepeatRate

Message Repeat Rates in Table 4‑6 show the number of messages per 1 sec interval whereas in [11] the Repeat Rates are defined as the number of messages per 5 sec interval. When pWSARepeatRate and pWSMRepeatRate are used in a test system which uses the TCI interface from [11], the test settings in **Table 4‑6** must be multiplied by 5. For example, when the SUT is tested at a repeat rate of 10 messages per second, it will receive a TCI message with the repeat rate value set to 50 messages (per 5 seconds).

#### Average Repeat Rates for Received Messages

Use the following method to determine the uppler and lower limits of the Repeat Period Mean for sample received messages:

Record reception times for the received messages as Tn. The total number of the received message in the test sample is denoted as MsgRvcCount. The index “n” refers to individual messages in the test sample.

The minimum recommended value for MsgRcvCount is 100.

Calculate average repeat rate AvgRP =  , where 

Calculate standard deviation RPStdDev= 

Following the statistics outlined in the article “Standard Error” on Wikipedia [https://en.wikipedia.org/wiki/Standard\_error]

Calculate the standard error of the mean SEM = 

Assuming 95% confidence,

The Upper limit of the Repeat Period Mean RPMup = AvgRP + (1.96 x SEM )

The Lower limit of the Repeat Period Mean RPMlo = AvgRP - (1.96 x SEM )

##### Test Criteria for Repeat Rates

Test criteria are established by comparing Repeat Period and Tolerance established in the Table 4‑6 with the Repeat Period Mean calculated from a test sample.

The Upper Limit of the Repeat Period Mean expected to be less or equal than the requested Repeat Period plus the Repeat Period Tolerance

RPMup ≤ RepeatPeriod + RepeatPeriodTolerance

The Lower Limit of the Repeat Period Mean expected to be greater or equal than the requested Repeat Period minus the Repeat Period Tolerance

RPMlo ≥ RepeatPeriod – RepeatPeriodTolerance

Where RepeatPeriod and RepeatPeriodTolerance for WSM and WSA are listed in Table 4‑6.

#### IP transmission and reception

For IP datagrams, the channel, transmit power, and data rate parameters (default values) to be used are stored in a transmitter profile. This transmitter profile will be provided by the equipment vendor and used to parameterize the test.

## Feature Restriction and Behavior Description

### Feature Restriction

In this clause all feature restrictions are listed:

* For multiple radio devices only one radio is tested at a time.
* 20MHz channels are not considered in the scope of this document
* Testing for other IETF protocols except ICMPv6 is not considered
* Immediate/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
* Testing for the SAP defined in [2] is not considered

## Rules for the Behavior Description

The description of the TP is built according to 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.

### Conditions for the Initial State

Overall state diagram for a test system is shown below.

State 2

IUT is in “Initial State”

State 1

IUT is powered off

State 3

Test Purpose Initial Conditions/Pre-test Conditions

State 4

Test Execution

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).
* No external DSRC units within range of IUT, DSRC Packet Capture Tool, and DSRC Reference Unit are transmitting outside of the test setup.
* The IUT is powered up
* Radio interface is initialized but does not transmit or receive messages over any DSRC channels
* Radio acquired and locked its position based on GNSS
* MAC address is assigned to the DSRC interface
* Unless otherwise stated, the IUT is not transmitting
* Unless otherwise stated, Congestion Control is disabled
* The IUT is provisioned with any required security credentials to enable transmission or reception of messages over DSRC
* The IUT is running Certification Interface Application [11].

Some TPs may from a different initial condition. Initial conditions required for specific test cases defined in the Initial condition section of a Test Purpose. However, the “initial state” defined above is the starting point before the different initial conditions are established.

When execution of the initial condition does not succeed, it leads to the assignment of an Inconclusive verdict.

# Test Suite Structure (TSS)

## Structure for Network Services Tests

The test suite is structured as a tree with the root defined as 16093. The tree is of rank 3 with the first rank a Group, the second a Sub-group, and the third a category. The third rank is the standard ISO conformance test categories.

### Root

The root identifies the 1609.3 protocol given in IEEE 1609.3 [2].

### Groups

This level contains three message types identified as:

WAVE Short Messages

WAVE Service Advertisements

Internet Protocol

### Sub-Groups

This level contains functional areas identified in the Table 5‑1

**Table 5‑1: Functional areas**

|  |  |
| --- | --- |
| **Functional areas** | **Description** |
| Configuration | Validation of IUT configuration parameters |
| Service Change | WSA alterations due to changes in provider service |
| Communications | Testing communications in continuous and alternating operation |
| Message Structure | Validation of message structure |
| Protocol Operation | Testing for message payload boundaries |
| Packet Processing | Message reception and processing |
| Radio Operation | Consistency between radio settings and those included in messages |

### Categories

This level contains the standard ISO conformance test categories limited to the behavior valid event and behavior invalid event.

# Test Purposes (TP)

## Introduction

### TP definition conventions

The TPs are defined by the rules shown in Table 6‑1 built according to 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 according to the TP naming conventions defined in the clause below. |
| Summary | Short description of test purpose objective according to 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 |
| IUT | IUT category for which this test is applicable |
| **Event Types** | |
| Stimulus | Corresponds to an event that enforces an IUT to proceed with a specific protocol action, like sending a message for instance. |
| Check | Ensures the conditions are appropriate to move to the next step in the test procedure, e.g. the receipt of protocol messages on reference points (i.e. output of the test system) with valid content, typically before the IUT stimulus is triggered. These events are not associated with the verdict evaluation (i.e. Pass/Fail) |
| 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 IUT configuration. |
| Procedure | Procedural action directing the flow of TP execution. |

### TP Identifier Naming Conventions

TP identifiers are built according to Table 6‑2.

**Table** **6‑2: TP naming convention**

| **Identifier** | **TP-<root>-<gr>-<sgr>-<x>-<nn> or TP-<root>-<gr>-<x>-<nn> when no <sgr>** |  |  |
| --- | --- | --- | --- |
|  | <root> = root | 16093 |  |
|  | <gr> = group | WSM | WAVE Short Messages |
|  |  | WSA | WAVE Service Advertisements |
|  |  | IP | Internet Protocol |
|  | <sgr> =sub- group | CFG | Configuration |
|  |  | CHG | Service Change |
|  |  | COM | Communications |
|  |  | MST | Message Structure |
|  |  | POP | Protocol Operation |
|  |  | PP | Packet Processing |
|  |  | ROP | Radio Operation |
|  | <x> = type of testing | BV | Valid Behavior tests |
|  |  | BI | Invalid Syntax or Behavior Tests |
|  | <nn> = sequential number |  | 01 to 99 |

### Naming Convention for Variants

Some TPs use the concept of variants to provide more concise description. Their definition, how they are used and their naming conventions are defined in this clause.

In case where for a single parameter multiple values can be tested, then a table is appended after the TP. This table lists all the different value which need to be tested. The TP identifier is appended with –X (e.g. **TP-16093-WSA-MST-BV-04-X**). If there are fields for which multiple values can be tested then X is appended. The field itself is written as X\_FIELD\_NAME (e.g. **X\_WAVE\_Element\_ID**).

Any TP which contains variants must be repeated for all values of X enabled by appropriate selection of PICS identified for an IUT in the PICS proforma.

### References

All Test Purposes are derived from requirements defined in [2]. Traceability between TPs and sub-clauses of referenced standard specifications is established in the Table A- 1. For each PICS, a reference section from [2] is listed and an applicable test purposes are identified in the TP ID column.

### PICS selection and mnemonics for reference

Table A- 1 includes a complete list of PICS defined in [2] with a traceability to TPs included in the TP ID column.

Table 6‑3 lists mnemonic names and maps them to a subset of PICS item number. This is a partial list of PICS used in selecting of certain TPs or TPs which incorporated variances.

**Table 6‑3: Mnemonics for PICS reference**

|  |  |
| --- | --- |
| **Mnemonic** | **PICS** **item** |
| PIC\_ChannelNumber | [2] Annex D, N1.3.2.4. |
| PIC\_DataRate | [2] Annex D, N1.3.2.5. |
| PIC\_TransmitPowerUser | [2] Annex D, N1.3.2.6. |
|  |  |
| PIC\_URepeatRate | [2] Annex D, N2.1.6.4.1. |
| PIC\_U2DLocation | [2] Annex D, N2.1.6.4.2. |
| PIC\_U3DLocation | [2] Annex D, N2.1.6.4.3. |
| PIC\_UAdvertiserId | [2] Annex D, N2.1.6.4.4. |
| PIC\_UPSC | [2] Annex D, N2.1.7.2.1. |
| PIC\_UIPV6Address | [2] Annex D, N2.1.7.2.2. |
| PIC\_UServicePort | [2] Annex D, N2.1.7.2.3. |
| PIC\_UProviderMACAddress | [2] Annex D, N2.1.7.2.4. |
| PIC\_URCPIThreshold | [2] Annex D, N2.1.7.2.5. |
| PIC\_UWSACountThreshold | [2] Annex D, N2.1.7.2.6. |
| PIC\_UWSACountThresholdInt | [2] Annex D, N2.1.7.2.6.1. |
| PIC\_UChannelAccess | [2] Annex D, N2.1.8.2.2. |
| PIC\_UEDCAParamSet | [2] Annex D, N2.1.8.2.1. |
| PIC\_USecondaryDNS | [2] Annex D, N2.1.9.1.1. |
| PIC\_UGatewayMACAddress | [2] Annex D, N2.1.9.1.2. |
|  |  |
| PIC\_PRepeatRate | [2] Annex D, N2.2.6.1. |
| PIC\_P2DLocation | [2] Annex D, N2.2.6.2. |
| PIC\_P3DLocation | [2] Annex D, N2.2.6.3. |
| PIC\_PAdvertiserId | [2] Annex D, N2.2.6.4. |
| PIC\_PPSC | [2] Annex D, N2.2.9.1. |
| PIC\_PIPV6Address | [2] Annex D, N2.2.9.2. |
| PIC\_PServicePort | [2] Annex D, N2.2.9.3. |
| PIC\_PProviderMACAddress | [2] Annex D, N2.2.9.4. |
| PIC\_PRCPIThreshold | [2] Annex D, N2.2.9.5. |
| PIC\_PWSACountThreshold | [2] Annex D, N2.2.9.6. |
| PIC\_PWSACountThresholdInt | [2] Annex D, N2.2.9.6.1. |
| PIC\_PChannelAccess | [2] Annex D, N2.2.12.2. |
| PIC\_PEDCAParamSet | [2] Annex D, N2.2.12.1. |
| PIC\_PSecondaryDNS | [2] Annex D, N2.2.13.1.1. |
| PIC\_PGatewayMACAddress | [2] Annex D, N2.2.13.1.2. |

### Sources of TP definitions

All TPs are specified according to IEEE 1609.3 [2]. Traceability from PICS to TPs is included in the Appendix A.

The Appendix A includes a full list of PICs from IEEE 1609.3. SAE J2945/1 [[1]] uses a subset of PICS from IEEE 1609.3. Those PICS are identified with status V2V and SCMS. The remaining PICS excluded from the SAE J2945/1 are identified with the status RSE.

## Test Purposes for 1609.3

### WSM packet validation

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-WSM-MST-BV-01 | |
| **Summary** | | To verify that the IUT will transmit a WSM with the correct LLC EtherType, WSMP-N Header Subtype, WSMP-N Header Option Indicator and WSMP-N Header WSMP version. | |
| **Test Configuration** | | TC1 | |
| **IUT** | |  | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
|  | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The IUT is configured to transmit **WSM\_without\_nExt** in Table 7‑1. |  |
| 2 | Stimulus | The IUT transmits WSM |  |
| 3 | Verify | The IUT transmitted WSM | Pass/Fail |
| 4 | Verify | WSM is included in 802.11 frame, containing Logical-Link Control section, containing ‘Type’ field indicating EtherType value 0x88DC. | Pass/Fail |
| 4 | Verify | WSM N-Header contains ‘Subtype’ (bits 4-7) indicating ‘0’ | Pass / Fail |
| 5 | Verify | WSM N-Header contains ‘WSMP-N Header Option Indicator’ (bit 3) indicating ‘0’ for **WSM\_without\_nExt,** or indicating ‘1’ for **WSM\_nExt.** | Pass / Fail |
| 6 | Verify | WSM-N-Header containing ‘WSMP Version’ indicating ‘3’ | Pass/Fail |
| 7 | Configure | The IUT is configured to transmit **WSM\_nExt** in Table 7‑2. |  |
| 8 | Procedure | Repeat steps 2-6 |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-WSM-MST-BV-02 | |
| **Summary** | | Verify that the IUT will transmit WSM containing valid WSM-N-Header TPID, WSM-T-Header, containing PSID and WSM Data. | |
| **Test Configuration** | | TC1 | |
| **IUT** | |  | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The IUT is configured to transmit **WSM\_without\_nExt** in Table 7‑1. with ‘*pPSID*’ and the ‘WSM Payload’ of a valid length identified by pWSM\_Length |  |
| 2 | Stimulus | The IUT transmits WSM |  |
| 3 | Verify | The IUT transmitted WSM | Pass / Fail |
| 4 | Verify | WSM N-Header contains ‘TPID’ indicating ‘0’ | Pass / Fail |
| 5 | Verify | WSM T-Header contains ‘ProviderServiceIdentifier’ indicating ‘*pPSID*’ | Pass / Fail |
| 6 | Verify | WSM T-Header does not contain ‘WAVE Information Elements’ | Pass / Fail |
| 7 | Verify | WSM Payload contains ‘WSMLength’, indicating the value equal to *pWSM\_Length*. | Pass / Fail |
| 8 | Verify | WSM Payload contains ‘WSMData’. The length of WSMData is equal to pWSM\_Length | Pass / Fail |
| 9 | Procedure | Repeat steps 1-8 for ‘*pPSID*’ with sizes 1,2,3 and 4 Bytes listed in Table 4‑4. |  |
| 10 | Configure | The IUT is configured to transmit **WSM\_nExt** in Table 7‑2. |  |
| 11 | Procedure | Repeat steps 2-9 |  |

### WSM transmission parameters

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-WSM-ROP-BV-01 | |
| **Summary** | | Verify that the IUT will transmit WSM containing valid WSM-N-Header including WAVE Info Element Extension ‘Channel Number’ and matching the actual channel used by the IUT. | |
| **Test Configuration** | | TC1 | |
| **IUT** | |  | |
| **Reference:** | |  | |
| **PICS Selection** | | PIC\_ChannelNumber | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The IUT is configured to transmit **WSM\_nExt** in Table 7‑2 using channel ‘*pChannel*’ and include WAVE Element Extension fields ‘Channel Number’. |  |
| 2 | Stimulus | The IUT transmits WSM |  |
| 3 | Verify | The IUT transmitted WSM | Pass / Fail |
| 4 | Verify | WSM N-Header contains ‘Subtype/Option Indicator/WSMP Version’ indicating ‘0x0B’ (Subtype=0, Opt Ind = 1, Version = 3) | Pass / Fail |
| 5 | Verify | WSM N-Header contains ‘Wave Info Element’ contains ’Count’ matching the number of ‘Wave Info Element’ included in the message (>= 1, cannot be ‘0’) | Pass / Fail |
| 6 | Verify | WSM N-Header contains ‘WAVE Info Element’ containing ‘WAVE Element ID’ indicating ‘15’ (Channel Number) | Pass / Fail |
| 7 | Verify | WSM N-Header contains ‘WAVE Elem Length’ indicating ‘1’ | Pass / Fail |
| 8 | Verify | WSM N-Header contains ‘WAVE Elem’ data indicating the Channel Number value equal to ‘*pChannel*’ | Pass / Fail |
| 9 | Verify | The Channel value in the WSM N-Header matches the actual channel used by the IUT | Pass / Fail |
| 10 | Procedure | Repeat steps 1-9 for other values of ‘*pChannel*’ listed in Section 4.1.1.1. |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-WSM-ROP-BV-02 | |
| **Summary** | | Verify that the IUT will transmit WSM containing valid WSM-N-Header including WAVE Info Element Extension ‘Data Rate’ and matching the actual data rate used by the IUT. | |
| **Test Configuration** | | TC1 | |
| **IUT** | |  | |
| **Reference:** | |  | |
| **PICS Selection** | | PIC\_DataRate | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The IUT is configured to transmit **WSM\_nExt** in Table 7‑2 using ‘*pDataRate*’ and include WAVE Element Extension fields ‘Data Rate’ |  |
| 2 | Stimulus | The IUT transmits WSM |  |
| 3 | Verify | The IUT transmitted WSM | Pass / Fail |
| 4 | Verify | WSM N-Header contains ‘Subtype/Option Indicator/WSMP Version’ indicating ‘0x0B’ (Subtype=0, Opt Ind = 1, Version = 3) | Pass / Fail |
| 5 | Verify | WSM N-Header contains ‘Wave Info Element’ containing ’Count’ matching the number of ‘Wave Info Element’ included in the message (>= 1, cannot be ‘0’) | Pass / Fail |
| 6 | Verify | WSM N-Header contains ‘WAVE Info Element’ containing ‘WAVE Element ID’ indicating ‘16’ (Data Rate) | Pass / Fail |
| 7 | Verify | WSM N-Header contains ‘WAVE Elem Length’ indicating ‘1’ | Pass / Fail |
| 8 | Verify | WSM N-Header contains ‘WAVE Elem’ data indicating the Data Rate value equal to ‘*pDataRate*’ | Pass / Fail |
| 9 | Verify | The Data Rate value in the WSM N-Header matches the actual data rate used by the IUT | Pass / Fail |
| 10 | Procedure | Repeat steps 1-9 for other values of ‘*pDataRate’* listed in Section 4.1.1.2. |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-WSM-ROP-BV-03 | |
| **Summary** | | Verify that the IUT will transmit WSM containing valid WSM-N-Header including WAVE Info Element Extension ‘Transmit Power Used’. | |
| **Test Configuration** | | TC1 | |
| **IUT** | |  | |
| **Reference:** | |  | |
| **PICS Selection** | | PIC\_TransmitPowerUsed | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The IUT is configured to transmit **WSM\_nExt** in Table 7‑2 using ‘*pTxPower*’ and include WAVE Element Extension fields ‘Transmit Power Used’ |  |
| 2 | Stimulus | The IUT transmits WSM |  |
| 3 | Verify | The IUT transmitted WSM | Pass / Fail |
| 4 | Verify | WSM N-Header contains ‘Subtype/Option Indicator/WSMP Version’ indicating ‘0x0B’ (Subtype=0, Opt Ind = 1, Version = 3) | Pass / Fail |
| 5 | Verify | WSM N-Header contains ‘Wave Info Element’ containing ’Count’ matching the number of ‘Wave Info Element’ included in the message (>= 1, cannot be ‘0’) | Pass / Fail |
| 6 | Verify | WSM N-Header contains ‘WAVE Info Element’ containing ‘WAVE Element ID’ indicating ‘4’ (Transmit Power Used) | Pass / Fail |
| 7 | Verify | WSM N-Header contains ‘WAVE Elem Length’ indicating ‘1’ | Pass / Fail |
| 8 | Verify | WSM N-Header contains ‘WAVE Elem’ data indicating the Transmit Power Used value equal to ‘*pTxPower*’. | Pass / Fail |
| 9 | Procedure | Repeat steps 1-8 for other values of ‘*pTxPower’* listed in the Section 4.1.1.3 |  |

### Reception of WSMs

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-WSM-PP-BV-01 | |
| **Summary** | | Verify that the IUT registered for a PSID service will receive a WSM containing valid WSM-N-Header, valid WSM-T-Header, WSM Data field and excluding optional WAVE Info Element extensions. | |
| **Test Configuration** | | TC1 | |
| **IUT** | |  | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state * The WAVE Host is transmitting on a fixed channel ‘*pChannel*’ in continuous mode messages ***WSM\_without\_nExt*** defined in Table 7‑1 with a ‘*pPSID*’ | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | IUT configured to received WSMs with ‘*pPSID*’ in continuous mode on channel ‘*pChannel*’ |  |
| 2 | Check | WSMs is detected on channel ‘*pChannel*’ |  |
| 3 | Check | WSM N-Header contains ‘Subtype/Option Indicator/WSMP Version’ indicating ‘0x03’ (Subtype=0, Opt Ind = 0, Version = 3) |  |
| 4 | Check | WSM N-Header contains ’TPID’ indicating ‘0’ |  |
| 5 | Check | WSM T-Header contains ‘ProviderServiceIdentifier’ indicating ‘*pPSID*’ |  |
| 6 | Check | WSM T-Header does not contain ‘WAVE Information Elements’ |  |
| 7 | Check | WSM T-Header contains ‘WSM Length’ |  |
| 8 | Check | WSM contains ‘WSM Data’ field |  |
| 9 | Verify | The IUT receives WSMs with ‘*pPSID*’ | Pass / Fail |
| 10 | Procedure | Repeat steps 1-9 for ‘*pPSID*’ with sizes 1,2,3 and 4 Bytes listed in Table 4‑4. |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-WSM-PP-BV-02 | |
| **Summary** | | Verify that the IUT registered for a PSID service will receive a WSM containing valid WSM-N-Header, valid WSM-T-Header, optional WAVE Info Element extensions, and WSM Data field. | |
| **Test Configuration** | | TC1 | |
| **IUT** | |  | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state * The WAVE Host is transmitting on a fixed channel ‘*pChannel*’ in continuous mode messages ***WSM\_nExt*** defined in Table 7‑2 with ‘*pPSID*’. | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | IUT configured to received WSMs with ‘*pPSID*’ in continuous mode on channel ‘*pChannel*’ |  |
| 2 | Check | WSMs is detected on channel ‘*pChannel*’ |  |
| 3 | Check | WSM N-Header contains ‘Subtype/Option Indicator/WSMP Version’ indicating ‘0x0B’ (Subtype=0, Opt Ind = 1, Version = 3) |  |
| 4 | Check | WSM N-Header contains ‘WAVE Info Element’ containing ’Count’ indicating ‘3’ |  |
| 5 | Check | WSM N-Header contains ‘WAVE Info Element’ containing ’WAVE Element ID’ indicating ’15’ (Channel), ‘WAVE Elem Length’ indicating ‘1’ and ‘WAVE Elem’ data indicating value matching ‘*pChannel*’ |  |
| 6 | Check | WSM N-Header contains ‘WAVE Info Element’ containing ’WAVE Element ID’ indicating ’16’ (Data Rate), ‘WAVE Elem Length’ indicating ‘1’ and ‘WAVE Elem’ data. |  |
| 7 | Check | WSM N-Header contains ‘WAVE Info Element’ containing ’WAVE Element ID’ indicating ’4’ (Transmit Power Used), ‘WAVE Elem Length’ indicating ‘1’ and ‘WAVE Elem’ data |  |
| 8 | Check | WSM N-Header contains ’TPID’ indicating ‘0’ |  |
| 9 | Check | WSM T-Header contains ‘ProviderServiceIdentifier’ indicating ‘*pPSID*’ |  |
| 10 | Check | WSM T-Header does not contain ‘WAVE Information Elements’ |  |
| 11 | Check | WSM T-Header contains ‘WSM Length’ |  |
| 12 | Check | WSM contains ‘WSM Data’ |  |
| 13 | Verify | The IUT receives WSMs with ‘*pPSID*’ | Pass / Fail |
| 14 | Procedure | Repeat steps 1-13 for ‘*pPSID*’ with sizes 1,2,3 and 4 Bytes listed in Table 4‑4. |  |

### WSM communications with continuous channel access

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-WSM-COM-BV-01 | |
| **Summary** | | Verify that the IUT will transmit WSMs in continuous operation on a selected channel | |
| **Test Configuration** | | TC1 | |
| **IUT** | |  | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The IUT is configured to transmit ***WSM\_nExt\_ch*** defined in Table 7‑3 in continuous operation on a fixed channel ‘*pChannel*’ |  |
| 2 | Stimulus | The IUT to transmits WSMs continuously with an average rate ‘*pWSMRepeatRate*’ |  |
| 3 | Verify | WSMs are detected on the channel ‘*pChannel*’ | Pass / Fail |
| 4 | Verify | WSMs N-Header contains ‘WAVE Info Element’ containing ’Channel Number’ indicating ‘*pChannel*’ | Pass / Fail |
| 5 | Verify | For *n* samples of WSMs calculate *RPMup* and *RPMlo* per Section 4.1.1.8, and apply the test criteria stated in 4.1.1.8.1 | Pass / Fail |
| 6 | Procedure | Repeat steps 1-5 for ‘*pChannel*’ specified in the Section 4.1.1.1. |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-WSM-COM-BV-02 | |
| **Summary** | | Verify that the IUT will receive WSMs in continuous operation on a selected channel. | |
| **Test Configuration** | | TC1 | |
| **IUT** | |  | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state * The WAVE Host is transmitting on a channel ‘*pChannel*’ in continuous mode messages ***WSM\_nExt\_ch*** defined in Table 7‑3 with an average rate ‘*pWSMRepeatRate*’ | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The IUT is configured to receive WSMs in continuous operation on a fixed channel ‘*pChannel*’ with ‘*pPSID*’ |  |
| 2 | Check | WSMs are transmitted continuously on channel ‘*pChannel*’ |  |
| 3 | Check | WSMs N-Header contains ‘WAVE Info Element’ containing ’Channel Number’ indicated ‘*pChannel*’ |  |
| 4 | Check | WSMs contains ProviderServiceIdentifier indicating ‘PSID’ |  |
| 5 | Check | WSMs are transmitted continuously with an average rate ‘*pWSMRepeatRate*’ |  |
| 6 | Verify | For *n* samples of WSMs calculate *RPMup* and *RPMlo* per Section 4.1.1.8, and apply the test criteria stated in 4.1.1.8.1 | Pass / Fail |
| 7 | Procedure | Repeat steps 1-6 for ‘*pChannel*’ specified in the Section 4.1.1.1. |  |

### WSM communications with alternating channel access

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-WSM-COM-BV-03 | |
| **Summary** | | Verify that the IUT will transmit WSM1 and WSM2 on the channels CH1 and CH2 respectively in alternating operation. | |
| **Test Configuration** | | TC1 | |
| **IUT** | |  | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The IUT is configured to transmit WSM1 with ‘*PSID1’* using ***WSM\_nExt\_ch*** defined in Table 7‑3, on channel ‘*CH1*’ in alternating operation during time slot 1. |  |
| 2 | Configure | The IUT is configured to transmit WSM2 with ‘*PSID2’* using ***WSM\_nExt\_ch*** defined in Table 7‑3 on channel ‘*CH2*’ in alternating operation during time slot 2. |  |
| 3 | Stimulus | The IUT transmits WSM1 and WSM2 with an average rate ‘*pWSMRepeatRate*’ for each message. |  |
| 4 | Verify | WSM1 is detected on the channel ‘*CH1*’ time slot 1. | Pass / Fail |
| 5 | Verify | WSM1 N-Header contains ‘WAVE Info Element’ containing ’Channel Number’ indicating ‘*CH1*’. | Pass / Fail |
| 6 | Verify | For *n* samples of WSM1 calculate *RPMup* and *RPMlo* per Section 4.1.1.8, and apply the test criteria stated in 4.1.1.8.1 | Pass / Fail |
| 7 | Verify | WSM2 is detected on the channel ‘*CH2*’ time slot 2. | Pass / Fail |
| 8 | Verify | WSM2 N-Header contains ‘WAVE Info Element’ containing ’Channel Number’ indicating ‘*CH2*’. | Pass / Fail |
| 9 | Verify | For *n* samples of WSM2 calculate *RPMup* and *RPMlo* per Section 4.1.1.8, and apply the test criteria stated in 4.1.1.8.1 | Pass / Fail |
| 10 | Procedure | Repeat steps 1-9 for combination of ‘CH1’ and ‘CH2’ specified in Table 4‑1. |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-WSM-COM-BV-04 | |
| **Summary** | | Verify that the IUT will transmit WSM1 on the channel CH1 and receive WSM2 on the channel CH2. | |
| **Test Configuration** | | TC1 | |
| **IUT** | |  | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state * The WAVE Host is transmitting WSM2 with ‘*PSID2*’ using ***WSM\_nExt\_ch*** defined in Table 7‑3 on channel ‘*CH2*’ in alternating operation during slot 2 with an average repeat rate ‘*pWSMRepeatRate*’ | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The IUT is configured to transmit WSM1 with ‘*PSID1*’ using ***WSM\_nExt\_ch*** defined in Table 7‑3 on channel ‘*CH1*’ in alternating operation during slot 1. |  |
| 2 | Configure | The IUT is configured to receive WSM2 in alternating operation on channel ‘CH2’ during time slot 2. |  |
| 3 | Stimulus | The IUT transmits WSM1 with an average rate ‘pWSMRepeatRate’. |  |
| 4 | Verify | WSM1 are transmitted on channel ‘*CH1*’ time slot 1. | Pass / Fail |
| 5 | Verify | WSM1 N-Header contains ‘WAVE Info Element’ containing ’Channel Number’ indicated ‘*CH1*’. | Pass / Fail |
| 6 | Verify | For *n* samples of WSM1 calculate *RPMup* and *RPMlo* per Section 4.1.1.8, and apply the test criteria stated in 4.1.1.8.1 | Pass / Fail |
| 7 | Check | WSM2 is detected on the channel ‘*CH2*’ during time slot 2. |  |
| 8 | Check | WSM2 N-Header contains ‘WAVE Info Element’ containing ’Channel Number’ indicated ‘*CH2*’. |  |
| 9 | Verify | The IUT indicates WSM messages available on ‘CH2’. | Pass / Fail |
| 10 | Verify | For *n* samples of WSM2 received by the IUT, calculate *RPMup* and *RPMlo* per Section 4.1.1.8, and apply the test criteria stated in 4.1.1.8.1 | Pass / Fail |
| 11 | Procedure | Repeat steps 1-10 for combination of ‘CH1’ and ‘CH2’ specified in the Table 4‑1. |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-WSM-COM-BV-05 | |
| **Summary** | | Verify that the IUT will receive WSMs on channels CH1 and CH2 in alternating operation. | |
| **Test Configuration** | | TC1 | |
| **IUT** | |  | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state * The WAVE Host is transmitting WSM1 with ‘*PSID1*’ using ***WSM\_nExt\_ch*** defined in Table 7‑3 on channel ‘*CH1*’ in alternating operation during time slot 1 with an average rate ‘*pWSMRepeatRate*’ * The WAVE Host is transmitting WSM2 with ‘*PSID2*’ using ***WSM\_nExt\_ch*** defined in Table 7‑3 on channel ‘*CH2*’ in alternating operation during time slot 2 with an average rate ‘*pWSMRepeatRate*’ | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The IUT is configured to receive WSM1 and WSM2 in alternating operation on channels ‘CH1’ and ‘CH2’ respectively. |  |
| 2 | Check | WSM1 is detected on the channel ‘CH1’ in time slot 1. |  |
| 3 | Check | WSM1 N-Header contains ‘WAVE Info Element’ containing ’Channel Number’ indicated ‘CH1’. |  |
| 4 | Check | WSM2 is detected on the channel ‘CH2’ in time slot 2. |  |
| 5 | Check | WSM2 N-Header contains ‘WAVE Info Element’ containing ’Channel Number’ indicated ‘CH2’. |  |
| 6 | Verify | The IUT indicates WSM1 messages available on ‘CH1’ | Pass / Fail |
| 7 | Verify | For *n* samples of WSM1 received by the IUT, calculate *RPMup* and *RPMlo* per Section 4.1.1.8, and apply the test criteria stated in 4.1.1.8.1 | Pass / Fail |
| 8 | Verify | The IUT indicates WSM2 messages available on ‘CH2’. | Pass / Fail |
| 9 | Verify | For *n* samples of WSM2 received by the IUT calculate *RPMup* and *RPMlo* per Section 4.1.1.8, and apply the test criteria stated in 4.1.1.8.1 | Pass / Fail |
| 10 | Procedure | Repeat steps 1-9 for combination of ‘CH1’ and ‘CH2’ specified in the Table 4‑1. |  |

### Transmission of WSMs with payload exceeding WsmMaxLength

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-WSM-POP-BI-01 | |
| **Summary** | | Verify that the IUT will transmit WSMs with payload not exceeding *WsmMaxLength*, and will not transmit WSMs with payload exceeding *WsmMaxLength.* | |
| **Test Configuration** | | TC1 | |
| **IUT** | |  | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | Configure the IUT to transmit ***WSM\_without\_nExt*** defined in Table 7‑1 where WSM-T-Header ‘WSM Length’ is equal ‘WsmMaxLength – h - 1, where h is the length of WSMP header (may range between 4-7 bytes depending on size of PSID). |  |
| 2 | Stimulus | The IUT transmits WSMs |  |
| 3 | Verify | WSMs are detected over the air | Pass / Fail |
| 4 | Configure | Configure the IUT to transmit ***WSM\_without\_nExt*** defined in Table 7‑1 where WSM-T-Header ‘WSM Length’ is greater than ‘WsmMaxLength’ |  |
| 5 | Stimulus | The IUT to transmit WSMs |  |
| 6 | Verify | WSMs are NOT detected over the air during the 1sec after the Step 5 Stimulus. | Pass / Fail |

### WSA packet validation

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-WSA-MST-BV-01 | |
| **Summary** | | Verify that the IUT will transmit a WSM with a valid WSM header required for the WSA message. | |
| **Test Configuration** | | TC1 | |
| **IUT** | | IUT (Provider role) | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The IUT is configured to transmit **WSA\_nExt\_1** as defined in Table 7‑6, Table 7‑4, and Table 7‑5 |  |
| 2 | Stimulus | The IUT transmits WSA |  |
| 3 | Verify | WSA is transmitted | Pass / Fail |
| 4 | Verify | WSM N-Header contains ‘Subtype/Option Indicator/WSMP Version’ indicating ‘0x03’ (Subtype=0, Opt Ind = 0, Version = 3) | Pass / Fail |
| 5 | Verify | WSM N-Header contains ‘TPID’ indicating ‘0’ | Pass / Fail |
| 6 | Verify | WSM T-Header contains ‘ProviderServiceIdentifier’ indicating 0p80-07 | Pass / Fail |
| 7 | Verify | WSM T-Header contains WSM Length greater than ‘0’ | Pass / Fail |

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-WSA-MST-BV-02 | |
| **Summary** | | Verify that the IUT will transmit WSA with the correct version number and valid WSA Header. | |
| **Test Configuration** | | TC1 | |
| **IUT** | | IUT (Provider role) | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The IUT is configured to transmit **WSA\_nExt\_1** as defined in Table 7‑6, Table 7‑4, and Table 7‑5 |  |
| 2 | Stimulus | The IUT transmits WSA |  |
| 3 | Verify | WSA is transmitted | Pass / Fail |
| 4 | Verify | WSA Header containing WSA Version indicating ‘3’ | Pass / Fail |
| 5 | Verify | WSA Header containing field ‘WSA Header Option Indicator’ indicating ‘0b1110’ | Pass / Fail |
| 6 | Verify | WSA Header containing field ‘WSA Identifier’ (4bits). | Pass / Fail |
| 7 | Verify | WSA Header containing field ‘Content Count’ (4bits). | Pass / Fail |

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| **Identifier** | | TP-16093-WSA-MST-BV-03 | |
| **Summary** | | Verify that the IUT will transmit WSM containing a signed WSA. | |
| **Test Configuration** | | TC1 | |
| **IUT** | | IUT (Provider role) | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The IUT is configured to transmit **WSA\_nExt\_1** as defined in Table 7‑6, Table 7‑4, and Table 7‑5 |  |
| 2 | Stimulus | The IUT transmits WSA |  |
| 3 | Verify | WSA is transmitted | Pass / Fail |
| 4 | Verify | WSM T-Header contains ‘ProviderServiceIdentifier’ indicating 0p80-07 | Pass / Fail |
| 5 | Verify | WSM Payload contains ’Ieee1609Dot2Data’ containing ’protocolVersion’ indicating ‘3’ | Pass / Fail |
| 6 | Verify | Ieee1609Dot2Data contains ‘content’ indicating ‘signedData’ | Pass / Fail |
| 7 | Verify | Ieee1609Dot2Data contains ‘tbsData’ containing ‘payload’ containing ‘protocolVersion’ indicating ‘3’ | Pass / Fail |
| 8 | Verify | Ieee1609Dot2Data contains ‘tbsData’ containing ‘content’ indicating ‘unsecuredData’ | Pass / Fail |
| 9 | Verify | Ieee1609Dot2Data contains ‘tbsData’ containing ‘headerInfo’ containing ‘psid’ indicating ‘0p80-07’ (WSA PSID) | Pass / Fail |
| 10 | Verify | Ieee1609Dot2Data contains ‘signer’ | Pass / Fail |
| 11 | Verify | Ieee1609Dot2Data contains ‘signature’ | Pass / Fail |

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| **Identifier** | | | TP-16093-WSA-MST-BV-04-X | | | |
| **Summary** | | | Verify that the IUT will transmit WSA containing valid WSA Header Info Element Extension fields | | | |
| **Test Configuration** | | | TC1 | | | |
| **IUT** | | | IUT (Provider role) | | | |
| **Reference:** | | |  | | | |
| **PICS Selection** | | | Select appropriate PICS from sub-table **Variants**, column **PICS Selection** | | | |
| **Pre-test conditions** | | | | | | |
| * The IUT is in the initial state | | | | | | |
| **Test Sequence** | | | | | | |
| **Step** | | **Type** | **Description** | | | **Verdict** |
| 1 | | Configure | The IUT is configured to transmit **WSA\_nExt\_1** as defined in Table 7‑6, Table 7‑4, and Table 7‑5, using WSAheader\_3D in Table 7‑8. | | |  |
| 2 | | Stimulus | The IUT transmits WSA | | |  |
| 3 | | Verify | The IUT transmitted WSA | | | Pass / Fail |
| 4 | | Verify | WSA Header contains ’Header Option Indicator’ indicating ’WAVE Info Element Extension field’ (Bit 3) is set. | | | Pass / Fail |
| 5 | | Verify | WSA Header contains ’WSA Header Info Elem Extension field’ containing ’Count’ matching the number of Info Elements present in the message (cannot be ‘0’) | | | Pass / Fail |
| 6 | | Verify | WSA Header contains ’WSA Header Info Elem Extension field’ containing ‘Info Element’ containing ‘WAVE Element ID’ indicating ‘**X\_WAVE\_Element\_ID**’ (containing X\_Info\_Element field) | | | Pass / Fail |
| 7 | | Verify | WSA Header contains ’WSA Header Info Elem Extension field’ containing ‘WAVE Elem Length’ indicating the value specified by ‘**X\_Size**’ | | | Pass / Fail |
| 8 | | Verify | WSA Header contains ’WSA Header Info Elem Extension field’ containing ‘WAVE Elem’ data | | | Pass / Fail |
| 9 | | Procedure | Repeat steps 6-8 for all variants **X** selected by ‘**PICS Selection**’ | | |  |
| **Variants** | | | | | | |
| **X** | **X\_Info\_Element (X\_Size)** | | | **X\_WAVE\_Element\_ID** | **PICS Selection** | |
| A | Repeat Rate (1) | | | 17 | PIC\_PRepeatRate | |
| B | 3D Location (10) | | | 6 | PIC\_P3DLocation | |
| C | Advertiser Identifier (range 1-32) | | | 7 | PIC\_PAdvertiserId | |

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| **Identifier** | | | TP-16093-WSA-MST-BV-05-X | | | |
| **Summary** | | | Verify that the IUT will transmit WSA containing a valid Service Info Segment | | | |
| **Test Configuration** | | | TC1 | | | |
| **IUT** | | | IUT (Provider role) | | | |
| **Reference:** | | |  | | | |
| **PICS Selection** | | | Select appropriate PICS from sub-table **Variants**, column **PICS Selection** | | | |
| **Pre-test conditions** | | | | | | |
| * The IUT is in the initial state | | | | | | |
| **Test Sequence** | | | | | | |
| **Step** | | **Type** | **Description** | | | **Verdict** |
| 1 | | Configure | The IUT is configured to transmit **WSA\_nExt\_IP** as defined in Table 7‑7 and containing one ‘Service Info Segment’ with a service ‘*pPSID*’ available on ‘*pChannel*’ and referenced in ‘Channel Info Segment’. | | |  |
| 2 | | Stimulus | The IUT transmits WSA | | |  |
| 3 | | Verify | The IUT transmitted WSA | | | Pass / Fail |
| 4 | | Verify | WSA Header contains ’Header Option Indicator’ indicating ’Service Info Segment’ (Bit 2) is set. | | | Pass / Fail |
| 5 | | Verify | WSA Service Info Segment contains ’Count’ indicating ‘1’ | | | Pass / Fail |
| 6 | | Verify | WSA Service Info Segment contains ’Service Info Instance’ containing ‘*pPSID*’ | | | Pass / Fail |
| 7 | | Verify | WSA Service Info Segment contains ’Service Info Instance’ containing ‘Channel Index’ indicating ‘1’ (i.e. pointer to channel parameters within the ‘Channel Info Segment’) | | | Pass / Fail |
| 8 | | Verify | WSA Service Info Segment contains ’Service Info Instance’ containing ‘Service Info Option Indicator’ indicating ‘1’ (presence of the Service Info Information Element Extension field) | | | Pass / Fail |
| 9 | | Verify | WSA Service Info Segment contains ’Service Info Instance’ contains ‘Info Element Extension field’ containing ‘Count’ matching the number of Info Element present (>=1, cannot be 0) | | | Pass / Fail |
| 10 | | Verify | WSA Service Info Segment contains ’Service Info Instance’ contains ‘Info Element Extension field’ contains ‘Info Element’ containing ‘WAVE Element ID’ indicating ‘**X\_WAVE\_Element\_ID**’ (containing X\_Info\_Element\_Ext\_Field) | | | Pass / Fail |
| 11 | | Verify | WSA Service Info Segment contains ’Service Info Instance’ contains ‘Info Element Extension field’ contains ‘Info Element’ containing ‘WAVE Elem Length’ indicating the value specified by ‘**X\_Size**’. | | | Pass / Fail |
| 12 | | Verify | WSA Service Info Segment contains ’Service Info Instance’ contains ‘Info Element Extension field’ contains ‘Info Element’ containing ‘WAVE Elem’ data. | | | Pass / Fail |
| 13 | | Procedure | Repeat steps 10-12 for all variants **X** selected by ‘**PICS Selection**’ | | |  |
| **Variants** | | | | | | |
| **X** | **X\_Info\_Element\_Ext\_Field (X\_Size)** | | | **X\_WAVE\_Element\_ID** | **PICS Selection** | |
| A | Provider Service Context (range 1- 31) | | | 8 | PIC\_PPSC | |
| B | IPv6 Address (16) | | | 9 | PIC\_PIPV6Address | |
| C | Service Port (2) | | | 10 | PIC\_PServicePort | |
| D | Provider MAC Address (6) | | | 11 | PIC\_PProviderMACAddress | |
| E | RCPI Threshold (1) | | | 19 | PIC\_PRCPIThreshold | |
| F | WSA Count Threshold (1) | | | 20 | PIC\_PWSACountThreshold | |
| G | WSA Count Threshold Interval (1) | | | 22 | PIC\_PWSACountThresholdInt | |

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| **Identifier** | | | TP-16093-WSA-MST-BV-06-X | | | |
| **Summary** | | | Verify that the IUT will transmit WSA containing a valid Channel Info Segment | | | |
| **Test Configuration** | | | TC1 | | | |
| **IUT** | | | IUT (Provider role) | | | |
| **Reference:** | | |  | | | |
| **PICS Selection** | | | Select appropriate PICS from sub-table **Variants**, column **PICS Selection** | | | |
| **Pre-test conditions** | | | | | | |
| * The IUT is in the initial state | | | | | | |
| **Test Sequence** | | | | | | |
| **Step** | | **Type** | **Description** | | | **Verdict** |
| 1 | | Configure | The IUT is configured to transmit **WSA\_nExt\_IP** as defined in Table 7‑7. | | |  |
| 2 | | Stimulus | The IUT transmits WSA | | |  |
| 3 | | Verify | The IUT transmitted WSA | | | Pass / Fail |
| 4 | | Verify | WSA Header contains ’Header Option Indicator’ contains ’Channel Info Segment’ (Bit 1) is set. | | | Pass / Fail |
| 5 | | Verify | WSA Channel Info Segment contains ’Count’ indicating ‘1’ | | | Pass / Fail |
| 6 | | Verify | WSA Channel Info Segment contains ’Channel Info Instance’ containing ‘Operating Class’ | | | Pass / Fail |
| 7 | | Verify | WSA Channel Info Segment contains ’Channel Info Instance’ containing ‘Channel Number’ (size 1 octet) | | | Pass / Fail |
| 8 | | Verify | WSA Channel Info Segment contains ’Channel Info Instance’ containing ‘Transmit Power Level’ (size 1 octet) | | | Pass / Fail |
| 9 | | Verify | WSA Channel Info Segment contains ’Channel Info Instance’ containing ‘Adaptable’ (size 1 bit) | | | Pass / Fail |
| 10 | | Verify | WSA Channel Info Segment contains ’Channel Info Instance’ containing ‘Data Rate’ (size 7 bits) (value in the range from 0x02 through 0x7F) | | | Pass / Fail |
| 11 | | Verify | WSA Channel Info Segment contains ’Channel Info Instance’ containing ‘Channel Info Option Indicator’ indicating ‘1’ (Info Element Extension field is present) | | | Pass / Fail |
| 12 | | Verify | WSA Channel Info Segment contains ’Channel Info Instance’ contains ’Info Element Extension field’ containing ‘Count’ indicating ‘2’ (the number of Info Element Extension fields) | | | Pass / Fail |
| 13 | | Verify | WSA Channel Info Segment contains ’Channel Info Instance’ containing ’Info Element Extension field’ containing ‘WAVE Element ID’ indicating ‘**X\_WAVE\_Element\_ID**’ (containing X\_Info\_Element) | | | Pass / Fail |
| 14 | | Verify | WSA Channel Info Segment contains ’Channel Info Instance’ contains ’Info Element Extension field’ containing ‘WAVE Elem Length’ indicating the value specified by ‘**X\_Size**’ | | | Pass / Fail |
| 15 | | Verify | WSA Channel Info Segment contains ’Channel Info Instance’ contains ’Info Element Extension field’ containing ‘WAVE Elem’ data matching data in the sample WSA. | | | Pass / Fail |
| 16 | | Procedure | Repeat steps 13-15 for all variants X selected by ‘PICS Selection’ | | |  |
| **Variants** | | | | | | |
| **X** | **X\_Info\_Element (X\_Size)** | | | **X\_WAVE\_Element\_ID** | **PICS Selection** | |
| A | Channel Access (1) | | | 21 | PIC\_PChannelAccess | |
| B | EDCA Parameter Set (16) | | | 12 | PIC\_PEDCAParamSet | |

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| **Identifier** | | | TP-16093-WSA-MST-BV-07-X | | | |
| **Summary** | | | Verify that the IUT will transmit WSA containing valid WRA Segment | | | |
| **Test Configuration** | | | TC1 | | | |
| **IUT** | | | IUT (Provider role) | | | |
| **Reference:** | | |  | | | |
| **PICS Selection** | | | Select appropriate PICS from sub-table **Variants**, column **PICS Selection** | | | |
| **Pre-test conditions** | | | | | | |
| * The IUT is in the initial state | | | | | | |
| **Test Sequence** | | | | | | |
| **Step** | | **Type** | **Description** | | | **Verdict** |
| 1 | | Configure | The IUT is configured to transmit **WSA\_nExt\_IP** as defined in Table 7‑7. | | |  |
| 2 | | Stimulus | The IUT transmits WSA | | |  |
| 3 | | Verify | The IUT transmitted WSA | | | Pass / Fail |
| 4 | | Verify | WSA Header contains ’Header Option Indicator’ contains ’WAVE Routing Advertisement’ (Bit 0) is set. | | | Pass / Fail |
| 5 | | Verify | Only one instance of WSA WAVE Routing Advertisement is present | | | Pass / Fail |
| 6 | | Verify | WSA WAVE Routing Advertisement contains ‘Router Lifetime’ (size 2 octets) | | | Pass / Fail |
| 7 | | Verify | WSA WAVE Routing Advertisement contains ‘IpPrefix’ (size 16 octets) | | | Pass / Fail |
| 8 | | Verify | WSA WAVE Routing Advertisement contains ‘Prefix Length’ (size 1 octets) | | | Pass / Fail |
| 9 | | Verify | WSA WAVE Routing Advertisement contains ‘Default Gateway’ (size 16 octets) | | | Pass / Fail |
| 10 | | Verify | WSA WAVE Routing Advertisement contains ‘Primary DNS’ (size 16 octets) | | | Pass / Fail |
| 11 | | Verify | WSA WAVE Routing Advertisement contains ’Info Element Extension field’ containing ‘Count’ indicating the number of ‘Info Elements’ | | | Pass / Fail |
| 12 | | Verify | WSA WAVE Routing Advertisement contains ’Info Element Extension field’ containing ‘WAVE Element ID’ indicating ‘**X\_Info\_Element**’ | | | Pass / Fail |
| 13 | | Verify | WSA WAVE Routing Advertisement contains ’Info Element Extension field’ containing ‘WAVE Elem Length’ not exceeding ‘**X\_Size**’ | | | Pass / Fail |
| 14 | | Verify | WSA WAVE Routing Advertisement contains ’Info Element Extension field’ containing ‘WAVE Elem’ data matching data in the sample WSA. | | | Pass / Fail |
| 15 | | Procedure | Repeat steps 12-14 for all variants X selected by ‘PICS Selection’ | | |  |
| **Variants** | | | | | | |
| **X** | **X\_Info\_Element (X\_Size)** | | | **X\_WAVE\_Element\_ID** | **PICS Selection** | |
| A | Secondary DNS (size 16 octets) | | | 13 | PIC\_PSecondaryDNS | |
| B | Gateway MAC Address (size 6 octets) | | | 14 | PIC\_PGatewayMACAddress | |

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| **Identifier** | | TP-16093-WSA-MST-BV-08 | |
| **Summary** | | Verify that the IUT will transmit WSA containing valid WSA Header Info Element Extension field 2D Location. | |
| **Test Configuration** | | TC1 | |
| **IUT** | | IUT (Provider role) | |
| **Reference:** | |  | |
| **PICS Selection** | | PIC\_P2DLocation | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The IUT is configured to transmit **WSA\_nExt\_1** as defined in Table 7‑6, Table 7‑4, and Table 7‑5, using **WSAheader\_2D** in Table 7‑9. |  |
| 2 | Stimulus | The IUT transmits WSA |  |
| 3 | Verify | The IUT transmitted WSA | Pass / Fail |
| 4 | Verify | WSA Header contains ’Header Option Indicator’ indicating ’WAVE Info Element Extension field’ (Bit 3) is set. | Pass / Fail |
| 5 | Verify | WSA Header contains ’WSA Header Info Elem Extension field’ containing ’Count’ matching the number of Info Elements present in the message (cannot be ‘0’) | Pass / Fail |
| 6 | Verify | WSA Header contains ’WSA Header Info Elem Extension field’ containing ‘Info Element’ containing ‘WAVE Element ID’ indicating ‘5’ (containing 2D Location) | Pass / Fail |
| 7 | Verify | WSA Header contains ’WSA Header Info Elem Extension field’ containing ‘WAVE Elem Length’ not exceeding ‘9 octets’ | Pass / Fail |
| 8 | Verify | WSA Header contains ’WSA Header Info Elem Extension field’ containing ‘WAVE Elem’ data | Pass / Fail |
| Note: This TP is similar to TP-16093-WSA-PP-BV-04-B except WSA Header contains 2D instead of 3D location. | | | |

### WSA reception

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| **Identifier** | | TP-16093-WSA-PP-BV-01 | |
| **Summary** | | Verify that the IUT will indicate to the upper layer availability of a provider service when the IUT receives secure WSAs containing WSA Header Info Elem Extension fields. | |
| **Test Configuration** | | TC1 | |
| **IUT** | | IUT (User role) | |
| **Reference:** | |  | |
| **PICS Selection** | | PIC\_URepeatRate, PIC\_U3DLocation, PIC\_UAdvertiserId, PIC\_U2DLocation | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state. * The WAVE Host is transmitting **WSA\_nExt\_1** as defined in Table 7‑6, using WSAheader\_3D in Table 7‑8. WSA\_nExt\_1 contains one PSID service ‘pPSID’. WSAs are transmitted on channel ‘pChannel’ with ‘pWSARepeatRate’. | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
|  | Configure | The IUT is configured to receive WSA on channel ‘pChannel’. |  |
|  | Check | WSAs are transmitted |  |
|  | Check | WSA is included in WSM containing T-Header containing ’ProviderServiceIdentifier’ indicating ‘0p80-07 (WSA). |  |
|  | Check | WSA is included in WSM containing ’WSMData’ containing ’Ieee1609Dot2Data’, containing ’protocolVersion’ indicating ‘3’ |  |
|  | Check | WSA is included in WSM containing ‘Ieee1609Dot2Data’, containing ‘content’ indicating ‘signedData’. |  |
|  | Check | WSA is included in WSM containing ‘Ieee1609Dot2Data’, containing ‘tbsData’, containing ‘headerInfo’, containing ‘psid’ indicating ‘0p80-07’ (WSA PSID) |  |
|  | Check | WSA is included in WSM containing ‘Ieee1609Dot2Data’, containing ‘signer’ |  |
|  | Check | WSA is included in WSM containing ‘Ieee1609Dot2Data’, containing ‘signature’ |  |
|  | Check | WSA Header contains ’Header Option Indicator’ indicating ’WAVE Info Element Extension field’ (Bit 3) is set. |  |
|  | Check | WSA Header containing field ‘WSA Identifier’. |  |
|  | Check | WSA Header containing field ‘Content Count’. |  |
|  | Check | WSA Header contains ’WSA Header Info Elem Extension field’ containing ’Count’ indicating ‘3’ (3 extensions are present) |  |
|  | Check | WSA Header contains ’WSA Header Info Elem Extension field’, containing ‘Info Element’, containing ‘WAVE Element ID’ indicating ‘17’ (containing Repeat Rate) |  |
|  | Check | WSA Header contains ’WSA Header Info Elem Extension field’, containing ‘Info Element’, containing ‘WAVE Element ID’ indicating ‘6’ (containing 3D Location) |  |
|  | Check | WSA Header contains ’WSA Header Info Elem Extension field’, containing ‘Info Element’, containing ‘WAVE Element ID’ indicating ‘7’ (containing Advertiser Identifier) |  |
|  | Check | WSA includes one instance of ‘Service Info Segment’ containing ‘ProviderServiceIdentifier’ indicating ‘**pPSID’**. |  |
|  | Verify | The IUT indicates availability of service with ‘**pPSID’**. | Pass / Fail |
|  | Procedure | Repeat steps 1-17 with WAVE Host transmitting **WSA\_nExt\_1** as defined in Table 7‑6, using WSAheader\_2D in Table 7‑9. |  |

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| **Identifier** | | TP-16093-WSA-PP-BV-02 | |
| **Summary** | | Verify that the IUT will indicate to the upper layer availability of a provider service when the IUT receives WSAs containing Service Info Segment with Info Element Extension fields. | |
| **Test Configuration** | | TC1 | |
| **IUT** | | IUT (User role) | |
| **Reference:** | |  | |
| **PICS Selection** | | PIC\_UPSC, PIC\_UIPV6Address, PIC\_UServicePort, PIC\_UProviderMACAddress, PIC\_URCPIThreshold, PIC\_UWSACountThreshold, PIC\_UWSACountThresholdInt | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state. * The WAVE Host transmitting **WSA\_nExt\_IP** as defined in Table 7‑7. WSA\_nExt\_IP contains one PSID service ‘pPSID’. WSAs are transmitted on channel ‘pChannel’ with ‘pWSARepeatRate’. | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
|  | Configure | The IUT is configured to receive WSA on channel ‘pChannel’. |  |
|  | Check | WSAs are transmitted |  |
|  | Check | WSA Header contains ’Header Option Indicator’ indicating ’Service Info Segment’ (Bit 2) is set. |  |
|  | Check | WSA Service Info Segment contains ’Count’ indicating ‘1’ |  |
|  | Check | WSA Service Info Segment contains ’Service Info Instance’ containing ‘pPSID’ |  |
|  | Check | WSA Service Info Segment contains ’Service Info Instance’ containing ‘Channel Index’ indicating ‘1’ (i.e. pointer to channel parameters within the ‘Channel Info Segment’). |  |
|  | Check | WSA Service Info Segment contains ’Service Info Instance’ containing ‘Service Info Option Indicator’ indicating ‘1’ (presence of the Service Info Information Element Extension field) |  |
|  | Check | WSA Service Info Segment contains ’Service Info Instance’ contains ‘Info Element Extension field’ containing ‘Count’ indicating ‘7’ (7 extensions are present) |  |
|  | Check | WSA Service Info Segment contains ’Service Info Instance’, containing ‘Info Element Extension field’, containing ‘Info Element’, containing ‘WAVE Element ID’ indicating ‘8’ (containing PSC) |  |
|  | Check | WSA Service Info Segment contains ’Service Info Instance’, containing ‘Info Element Extension field’, containing ‘Info Element’, containing ‘WAVE Element ID’ indicating ‘9’ (containing IPv6 Address). |  |
|  | Check | WSA Service Info Segment contains ’Service Info Instance’, containing ‘Info Element Extension field’, containing ‘Info Element’, containing ‘WAVE Element ID’ indicating ‘10’ (containing Service Port). |  |
|  | Check | WSA Service Info Segment contains ’Service Info Instance’, containing ‘Info Element Extension field’, containing ‘Info Element’, containing ‘WAVE Element ID’ indicating ‘11’ (containing Provider MAC Address). |  |
|  | Check | WSA Service Info Segment contains ’Service Info Instance’, containing ‘Info Element Extension field’, containing ‘Info Element’, containing ‘WAVE Element ID’ indicating ‘19’ (containing RCPI Threshold). |  |
|  | Check | WSA Service Info Segment contains ’Service Info Instance’, containing ‘Info Element Extension field’, containing ‘Info Element’, containing ‘WAVE Element ID’ indicating ‘20’ (containing WSA Count Threshold). |  |
|  | Check | WSA Service Info Segment contains ’Service Info Instance’, containing ‘Info Element Extension field’, containing ‘Info Element’, containing ‘WAVE Element ID’ indicating ‘22’ (containing WSA Count Threshold Interval). |  |
|  | Verify | The IUT indicates availability of service with ‘**pPSID’**. | Pass / Fail |

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| **Identifier** | | TP-16093-WSA-PP-BV-03 | |
| **Summary** | | Verify that the IUT will indicate to the upper layer availability of a provider service when the IUT receives WSAs containing Channel Info Segment with Info Element Extension fields. | |
| **Test Configuration** | | TC1 | |
| **IUT** | | IUT (User role) | |
| **Reference:** | |  | |
| **PICS Selection** | | PIC\_UChannelAccess, PIC\_UEDCAParamSet | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state. * The WAVE Host transmitting **WSA\_nExt\_IP** as defined in Table 7‑7. WSA\_nExt\_IP contains one PSID service ‘pPSID’. WSAs are transmitted on channel ‘pChannel’ with ‘pWSARepeatRate’. | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
|  | Configure | The IUT is configured to receive WSA on channel ‘pChannel’. |  |
|  | Check | WSAs are transmitted |  |
|  | Check | WSA Header contains ’Header Option Indicator’ contains ’Channel Info Segment’ (Bit 1) is set. |  |
|  | Check | WSA Service Info Segment contains ’Service Info Instance’ containing ‘pPSID’ |  |
|  | Check | WSA Channel Info Segment contains ’Count’ indicating ‘1’ |  |
|  | Check | WSA Channel Info Segment contains ’Channel Info Instance’ containing ‘Operating Class’ |  |
|  | Check | WSA Channel Info Segment contains ’Channel Info Instance’ containing ‘Channel Number’ |  |
|  | Check | WSA Channel Info Segment contains ’Channel Info Instance’ containing ‘Transmit Power Level’ |  |
|  | Check | WSA Channel Info Segment contains ’Channel Info Instance’ containing ‘Adaptable’ |  |
|  | Check | WSA Channel Info Segment contains ’Channel Info Instance’, containing ‘Data Rate’ (size 7 bits) (value in the range from 0x02 through 0x7F) |  |
|  | Check | WSA Channel Info Segment contains ’Channel Info Instance’ containing ‘Channel Info Option Indicator’ indicating ‘1’ (Info Element Extension field is present) |  |
|  | Check | WSA Channel Info Segment contains ’Channel Info Instance’ containing ’WAVE Info Element Extension’, containing ‘Count’ indicating ‘2’ (2 Info Element Extension fields are present) |  |
|  | Check | WSA Channel Info Segment contains ’Channel Info Instance’ containing ’WAVE Info Element Extension’, containing ‘Info Element’, containing ‘WAVE Element ID’ indicating ‘21’ (containing Channel Access). |  |
|  | Check | WSA Channel Info Segment contains ’Channel Info Instance’ containing ’WAVE Info Element Extension’, containing ‘Info Element’, containing ‘WAVE Element ID’ indicating ‘12’ (containing EDCA Parameter Set). |  |
|  | Verify | The IUT indicates availability of service with ‘**pPSID’**. | Pass / Fail |

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| **Identifier** | | TP-16093-WSA-PP-BV-04 | |
| **Summary** | | Verify that the IUT will indicate to the upper layer availability of a provider service when the IUT receives WSAs containing WAVE Router Advertisement with Info Element Extension fields. | |
| **Test Configuration** | | TC1 | |
| **IUT** | | IUT (User role) | |
| **Reference:** | |  | |
| **PICS Selection** | | PIC\_USecondaryDNS, PIC\_UGatewayMACAddress | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state. * The WAVE Host transmitting **WSA\_nExt\_IP** as defined in Table 7‑7. WSA\_nExt\_IP contains one PSID service ‘pPSID’. WSAs are transmitted on channel ‘pChannel’ with ‘pWSARepeatRate’. | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
|  | Configure | The IUT is configured to receive WSA on channel ‘pChannel’. |  |
|  | Check | WSAs are transmitted |  |
|  | Check | WSA Header contains ’Header Option Indicator’ contains ’WAVE Routing Advertisement’ (Bit 0) is set. |  |
|  | Check | WSA Service Info Segment contains ’Service Info Instance’ containing ‘pPSID’ |  |
|  | Check | Only one instance of WSA WAVE Routing Advertisement is present |  |
|  | Check | WSA WAVE Routing Advertisement contains ‘Router Lifetime’ |  |
|  | Check | WSA WAVE Routing Advertisement contains ‘IpPrefix’ |  |
|  | Check | WSA WAVE Routing Advertisement contains ‘Prefix Length’ |  |
|  | Check | WSA WAVE Routing Advertisement contains ‘Default Gateway’ |  |
|  | Check | WSA WAVE Routing Advertisement contains ‘Primary DNS’ |  |
|  | Check | WSA WAVE Routing Advertisement contains ’Info Element Extension field’ containing ‘Count’ indicating the number of ‘Info Elements’ indicating ‘2’ (2 Info Element Extension fields are present) |  |
|  | Check | WSA WAVE Routing Advertisement contains ’Info Element Extension field’ containing ‘WAVE Element ID’ indicating ‘13’ (containing Secondary DNS). |  |
|  | Check | WSA WAVE Routing Advertisement contains ’Info Element Extension field’ containing ‘WAVE Element ID’ indicating ‘14’ (containing Gateway MAC Address). |  |
|  | Verify | The IUT indicates availability of service with ‘**pPSID’**. | Pass / Fail |

### WSA transmission parameters

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-WSA-ROP-BV-01 | |
| **Summary** | | Verify that the IUT will transmit WSA at a specified repeat rate. | |
| **Test Configuration** | | TC1 | |
| **IUT** | | IUT (Provider role) | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The IUT configured to transmit **WSA\_nExt\_1** as defined in Table 7‑6, using WSAheader\_3D in Table 7‑8, with the WSA repeat rate set to ‘*pWSARepeatRate*’ |  |
| 2 | Stimulus | The IUT transmitted WSAs |  |
| 3 | Verify | WSAs are detected | Pass / Fail |
| 4 | Verify | WSA Header contains ’WSA Header Info Elem Extension field’ containing ‘Info Element’ ‘Repeat Rate’ indicating value ‘*pWSARepeatRate*’ ([2] specifies that the Repeat Rate value is encoded as the number of messages per 5 sec interval) | Pass / Fail |
| 5 | Verify | For *n* samples of WSA calculate *RPMup* and *RPMlo* per Section 4.1.1.8, and apply the test criteria stated in 4.1.1.8.1 | Pass / Fail |

### WSA changes

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-WSA-CHG-BV-01 | |
| **Summary** | | Verify the IUT ability to change WSA when PSC of an advertised service changes in WSA. | |
| **Test Configuration** | | TC1 | |
| **IUT** | | IUT (Provider role) | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state. | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The IUT is transmitting **WSA\_1srvPSC** defined in Table 7‑14 with one ‘vPSID1’ service and ‘PSC’ set to any valid value. |  |
| 2 | Check | WSA contains one ‘Service Info Instance’, containing PSID indicating value ‘vPSID1’ and containing a PSC value. |  |
| 3 | Stimulus | The IUT is requested to change the PSC value included in WSA to a different valid value. |  |
| 4 | Verify | WSA is transmitted in the format of **WSA\_1srvPSC** defined in Table 7‑14 containing one ‘Service Info Instances’, containing value ‘vPSID1’. | Pass / Fail |
| 5 | Verify | WSA Header containing ‘Content Count’ (CC) changed. The current value of ‘CC’ = (‘Previous value of CC’+1) mod 16. | Pass / Fail |
| 6 | Verify | WSA is included in WSM containing ’WSMData’ containing ’Ieee1609Dot2Data’. ‘Ieee1609Dot2Data’ contains ‘signature’. The current value of ‘signature’ is different from the ‘signature’  In the WSA before the update. | Pass / Fail |

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-WSA-CHG-BV-02 | |
| **Summary** | | Verify the IUT ability to change WSA when a service is deleted from WSA | |
| **Test Configuration** | | TC1 | |
| **IUT** | | IUT (Provider role) | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state. | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The IUT is transmitting **WSA\_2srv** defined in Table 7‑16 with two services ‘vPSID1’ and ‘vPSID2’. |  |
| 2 | Check | WSA contains two ‘Service Info Instances’, containing PSIDs indicating values ‘vPSID1’ and ‘vPSID2’ respectively. |  |
| 3 | Stimulus | The IUT is request to deleted one service from WSA with ‘vPSID2’. |  |
| 4 | Verify | WSA is transmitted in the format of **WSA\_1srv** defined in Table 7‑15 containing one ‘Service Info Instances’, containing PSID indicating value ‘vPSID1’. | Pass / Fail |
| 5 | Verify | WSA Header containing ‘Content Count’ (CC) changed. The current value of ‘CC’ = (‘Previous value of CC’+1) mod 16. | Pass / Fail |
| 6 | Verify | WSA is included in WSM containing ’WSMData’ containing ’Ieee1609Dot2Data’. ‘Ieee1609Dot2Data’ contains ‘signature’. The current value of ‘signature’ is different from the ‘signature’  In the WSA before the update. | Pass / Fail |

### IP Configuration

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-IP-CFG-BV-01 | |
| **Summary** | | Verify that the IUT will use WaveRoutingAdvertisement information in WSA to configure its global IPv6 address. | |
| **Test Configuration** | | TC1 | |
| **IUT** | | IUT (User role) | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The WAVE Host is transmitting **WSA\_IProuting** as defined in Table 7‑17 with ‘pWSARepeatRate’. |  |
| 2 | Check | WSA Service Info Segment containing ‘Provider Service Identifier’ indicating ‘IP routing’ (0pEF-FF-FF-FE) |  |
| 3 | Check | WSA WAVE Routing Advertisement containing ‘IpPrefix’ indicating value ‘IPP’ |  |
| 3 | Check | WSA WAVE Routing Advertisement containing ‘Default Gateway’ indicating value ‘DG’ |  |
| 4 | Check | WSA WAVE Routing Advertisement containing ‘Primary DNS’ indicating value ‘PD’ |  |
| 5 | Check | WSA WAVE Routing Advertisement containing ‘Gateway MAC Address’ indicating value ‘GMA’ |  |
| 6 | Configure | The IUT is requested to register for the ‘IP routing’ service indicated by PSID (0pEF-FF-FF-FE) |  |
| 7 | Stimulus | The IUT received WSAs, generated an indication of available service ‘IP routing’ and joined the service. |  |
| 8 | Verify | The IUT assigned a new IPv6 address to for the WAVE interface. | Pass / Fail |
| 9 | Verify | The IUT WAVE interface IP configuration contains ‘IPv6’ address indicating ‘a combination of ‘IPP’ and the MAC address of the WAVE Interface’ derived using stateless configuration procedure [9]. | Pass / Fail |
| 10 | Verify | The IUT WAVE interface IP configuration contains ‘Default Gateway IP’ address indicating ‘DG’. | Pass / Fail |
| 11 | Verify | IUT Wave Interface IP configuration contains ‘Primary DNS’ address indicating ‘PD’. | Pass / Fail |
| 12 | Verify | IUT Wave Interface IP configuration contains ‘Gateway MAC’ address indicating ‘GMA’. | Pass / Fail |

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-IP-CFG-BV-02 | |
| **Summary** | | Verify that the IUT will simultaneously be configured with the following IPv6 addresses for the WAVE interface: link-local (from its MAC) and global IPv6. | |
| **Test Configuration** | | TC1 | |
| **IUT** | |  | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Stimulus | The IUT is configured with a link-local IPv6 address derived from MAC address via IPv6 Stateless Address Configuration [9]. |  |
| 2 | Verify | The IUT WAVE interface is assigned a linked-local IPv6 address derived from MAC address via IPv6 Stateless Address Configuration [9]. | Pass / Fail |
| 3 | Stimulus | The IUT WAVE interface is configured with a global static IPv6 address provided via static configuration. |  |
| 4 | Verify | The IUT WAVE interface is assigned a global IPv6 address provided via static configuration. | Pass / Fail |

### Changing IP configuration

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-IP-CHG-BV-01 | |
| **Summary** | | Verify that IUT will reset link-local IPv6 address of the WAVE interface to a specific value. | |
| **Test Configuration** | | TC1 | |
| **IUT** | |  | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state. | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The IUT WAVE interface is configured with a link-local IPv6 address. |  |
| 2 | Check | The link-local IPv6 address derived from MAC address via IPv6 Stateless Address Configuration [9]. |  |
| 3 | Stimulus | The IUT is requested to reset link-local IPv6 address to a specific value ‘newIPv6-linked-local’. |  |
| 4 | Verify | The IUT WAVE interface is configured with a new link-local IPv6 address matching ‘newIPv6-link-local’. | Pass / Fail |

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-IP-CHG-BV-02 | |
| **Summary** | | Verify that IUT will reset IPv6 address of the WAVE interface to a different value | |
| **Test Configuration** | | TC1 | |
| **IUT** | |  | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state. | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The IUT WAVE interface is configured with a link-local IPv6 address. |  |
| 2 | Check | The link-local IPv6 address indicating value ‘IPv6-link-local’ address derived from MAC address via IPv6 Stateless Address Configuration [9]. |  |
| 3 | Stimulus | The IUT is requested to reset link-local IPv6 address to a new undefined value. |  |
| 4 | Verify | The IUT WAVE interface is configured with a new link-local IPv6 address different from ‘IPv6-link-local’ value. | Pass / Fail |
| 5 | Procedure | Repeat steps 3-4 for 10 times and record ‘IPv6-link-local’ value for each iteration. |  |
| 6 | Verify | ‘IPv6-link-local’ value changes to different non-repeated values | Pass / Fail |

### Communication using IPv6

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-IP-COM-BV-01 | |
| **Summary** | | Verify that the IUT will initiate a 2-way communication using IPv6 protocol to a Remote Host on a different subnet. | |
| **Test Configuration** | | TC2 | |
| **IUT** | | IUT (User role) | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state. | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The WAVE Host is transmitting **WSA\_IProuting** defined in Table 7‑17 containing ‘IP routing’ service. |  |
| 2 | Configure | The IP Host is connected to the WAVE Host and configured with a global IPv6 address on a different subnet than the IUT’s subnet. |  |
| 3 | Configure | The IUT received WSAs, generated an indication of the available service ‘IP routing’. |  |
| 4 | Check | The IUT configured the WAVE interface IPv6 information using WSA’s WRA information. |  |
| 5 | Stimulus | The IUT is sending IPv6 packets (e.g. ICMP ping6) to the IP Host global IPv6 address. |  |
| 6 | Verify | The IUT receives responses (e.g. ICMP ping 6 echo) from the IP Host. | Pass / Fail |

|  |  |  |  |
| --- | --- | --- | --- |
| **Identifier** | | TP-16093-IP-COM-BV-02 | |
| **Summary** | | Verify that the IUT will initiate a 2-way communication using IPv6 protocol to a WAVE Host using link-local address. | |
| **Test Configuration** | | TC2 | |
| **IUT** | | IUT (User role) | |
| **Reference:** | |  | |
| **PICS Selection** | |  | |
| **Pre-test conditions** | | | |
| * The IUT is in the initial state. | | | |
| **Test Sequence** | | | |
| **Step** | **Type** | **Description** | **Verdict** |
| 1 | Configure | The WAVE Host is transmitting **WSA\_IProuting** defined in Table 7‑17 containing ‘IP routing’ service. |  |
| 2 | Configure | The IUT received WSAs, generated an indication of the available service ‘IP routing’. |  |
| 3 | Check | The IUT configured the WAVE interface IPv6 information using WSA’s WRA information. |  |
| 4 | Stimulus | The IUT is sending IPv6 packets (e.g. ICMP ping6) to the WAVE Host link-local IPv6 address. |  |
| 5 | Verify | The IUT receives responses (e.g. ICMP ping 6 echo) from the WAVE Host to the IUT link-local IPv6 address. | Pass / Fail |

# Messages and Information Element Contents

This section contains the default values of common messages and information elements used in TPs.

## WAVE Short Messages

### Message defaults

The following assumptions apply to all messages defined in this section.

* All WSMs containing WSA payload are transmitted with the IEEE 1609.2 security (see 7.2.2).
* All other WSMs are transmitted without IEEE 1609.2 security.
* Default values for message parameters are defined in 4.1.1

### Message details

#### WAVE Short Messages without optional extensions

Table 7‑1 WSM\_without\_nExt

|  |  |  |
| --- | --- | --- |
| Information Element | Value/Remark | Comment |
| WSM\_without\_nExt ::= SEQUENCE { |  |  |
| controlField SEQUENCE { |  |  |
| Subtype | 0 (nullNetworking) |  |
| optionIndicator | 0 (not present) |  |
| Version | 3 |  |
| } |  |  |
| nExtensions SEQUENCE {} | Not present |  |
| transport | bcMode (tpid = 0) | PSID addressing with no WAVE Information Element Extension field |
| destAddress | pPSID | PSID values defined in Table 4‑4 |
| Body | A valid WSM payload | Payload is comprised of the WSMLength and WSMData fields as specified in 8.1.3 in [2] |
| } |  |  |

#### WAVE Short Messages with optional extensions

Table 7‑2 WSM\_nExt

|  |  |  |
| --- | --- | --- |
| Information Element | Value/Remark | Comment |
| **WSM\_nExt** ::= SEQUENCE { |  |  |
| controlField SEQUENCE { |  |  |
| Subtype | 0 (nullNetworking) |  |
| optionIndicator | 1 (present) |  |
| Version | 3 |  |
| } |  |  |
| nExtensions SEQUENCE { |  |  |
| { extensionId | 15 (Channel Number) |  |
| value | Any valid value | Default values defined in Table 4‑1 |
| } |  |  |
| { extensionId | 16 (Data Rate) |  |
| value | Any valid value | Default values defined in Table 4‑2 |
| } |  |  |
| { extensionId | 4 (Tx Power Used) |  |
| value | Any valid value | Default values defined in Table 4‑3 |
| } |  |  |
| } |  |  |
| transport | tpid = 0 | PSID addressing with no WAVE Information Element Extension field |
| destAddress | vPSID | PSID values defined in Table 4‑4 |
| body | A valid WSM payload | Payload is comprised of the WSMLength and WSMData fields as specified in 8.1.3 in [2] |
| } |  |  |

#### WAVE Short Messages with channel information

Table 7‑3 WSM\_nExt\_ch

|  |  |  |
| --- | --- | --- |
| Information Element | Value/Remark | Comment |
| **WSM\_nExt\_ch** ::= SEQUENCE { |  |  |
| controlField SEQUENCE { |  |  |
| Subtype | 0 (nullNetworking) |  |
| optionIndicator | 1 (present) |  |
| Version | 3 |  |
| } |  |  |
| nExtensions SEQUENCE { |  |  |
| { extensionId | 15 (Channel Number) |  |
| value | Any valid value | Default values defined in Table 4‑1 |
| } |  |  |
| {} |  | Other extensions are optional |
| } |  |  |
| transport | bcMode (tpid = 0) | PSID addressing with no WAVE Information Element Extension field |
| destAddress | pPSID | PSID values defined in Table 4‑4 |
| body | A valid WSM payload | Payload is comprised of the WSMLength and WSMData fields as specified in 8.1.3 in [2] |
| } |  |  |

## WAVE Service Advertisement (WSA)

### Message defaults

The following assumptions apply to all messages defined in this section.

* All WSA message contents are transmitted inside 1609.2 signed message data structure.
* Default values for message parameters are defined in 4.1.1

### Message details

#### WSM and security wrapper for WSA

Table 7‑4 WSMheader\_WSA

|  |  |  |
| --- | --- | --- |
| Information Element | Value/Remark | Comment |
| **WSMheader\_WSA** ::= SEQUENCE { |  |  |
| controlField SEQUENCE { |  |  |
| Subtype | 0 (nullNetworking) |  |
| optionIndicator | 0 (not present) |  |
| Version | 3 |  |
| } |  |  |
| nExtensions SEQUENCE {} | Not present |  |
| transport | bcMode (tpid = 0) | PSID addressing with no WAVE Information Element Extension field |
| destAddress | 135 (psid=0p80-07) | PSID value for WSA is 0p80-07 as defined in [5]. |
| body | Valid WSA payload | WSM payload created according to **Ieee1609Dot2Data** |
| } |  |  |

Table 7‑5 Ieee1609Dot2Data

|  |  |  |
| --- | --- | --- |
| Information Element | Value/Remark | Comment |
| Requires WSMheader\_WSA  in Table 7‑4 |  |  |
| Ieee1609Dot2Data ::= SEQUENCE { |  |  |
| protocolVersion | 3 |  |
| content | signedData |  |
| hashID | sha256 |  |
| tbsData SEQUENCE { |  |  |
| payload SEQUENCE { |  |  |
| protocolVersion | 3 |  |
| content unsecuredData | Valid WSA payload | WSA payload created according to **WSA\_nExt\_1,** **WSA\_nExt\_IP,** or **WSA\_min** |
| } |  |  |
| headerInfo SEQUENCE { |  |  |
| psid | 135 (psid=0p80-07) | PSID value for WSA is 0p80-07 |
| } |  |  |
| } |  |  |
| signer SEQUENCE {} | Any valid value | Constructed according to [8] |
| signature SEQUENCE {} | Any valid value | Constructed according to [8] |
| } |  |  |

#### WSA with optional extension parameters

Table 7‑6 WSA\_nExt\_1

|  |  |  |
| --- | --- | --- |
| Information Element | Value/Remark | Comment |
| Requires Ieee1609Dot2Data  in Table 7‑5 |  |  |
| **WSA\_nExt\_1** ::= SEQUENCE { |  |  |
| WSAheader SEQUENCE {} | WSAheader\_3D or WSAheader\_2D | See definition in Table 7‑8 or Table 7‑9 |
| WSAserviceInfos SEQUENCE {} | WSAserviceInfos | See definition in Table 7‑10 |
| WSAchannelInfos SEQUENCE {} | WSAchannelInfos | See definition in Table 7‑12 |
| WSAroutingAdvertisement SEQUENCE{} | Not present |  |
| } |  |  |

Table 7‑7 WSA\_nExt\_IP

|  |  |  |
| --- | --- | --- |
| Information Element | Value/Remark | Comment |
| Requires Ieee1609Dot2Data  in Table 7‑5 |  |  |
| **WSA\_nExt\_IP** ::= SEQUENCE { |  |  |
| WSAheader SEQUENCE {} | WSAheader\_3D or WSAheader\_2D | See definition in Table 7‑8 or Table 7‑9 |
| WSAserviceInfos\_IP SEQUENCE {} | WSAserviceInfos | See definition in Table 7‑11 |
| WSAchannelInfos SEQUENCE {} | WSAchannelInfos | See definition in Table 7‑12 |
| WSAroutingAdvertisement SEQUENCE{} | WSAroutingAdvertisement | See definition in Table 7‑13 |
| } |  |  |

Table 7‑8 WSAheader\_3D

|  |  |  |
| --- | --- | --- |
| Information Element | Value/Remark | Comment |
| Requires WSA\_nExt\_1  in Table 7‑6 |  |  |
| **WSAheader\_3D** ::= SEQUENCE { |  |  |
| version SEQUENCE { |  |  |
| messageID | saMessage |  |
| rsvAdvPrtVersion | 3 (WSA version 3) |  |
| headerOptionIndicator | 0b1110 |  |
| } |  |  |
| body SEQUENCE { |  |  |
| changeCount SEQUENCE { |  |  |
| saID | Any valid value |  |
| contentCount | Any valid value |  |
| } |  |  |
| extensions SEQUENCE { |  |  |
| { extensionId | 17 (Repeat Rate) |  |
| value | Any valid value |  |
| } |  |  |
| { extensionID | 6 (3D location) |  |
| value SEQUENCE { |  |  |
| latitude | Any valid value |  |
| longitude | Any valid value |  |
| elevation | Any valid value |  |
| }  } |  |  |
| { extensionID | 7 (Advertiser ID) |  |
| value | Any valid value |  |
| }  }  }  } |  |  |

Table 7‑9 WSAheader\_2D

|  |  |  |
| --- | --- | --- |
| Information Element | Value/Remark | Comment |
| Requires WSA\_nExt\_1  in Table 7‑6 |  |  |
| **WSAheader\_3D** ::= SEQUENCE { |  |  |
| version SEQUENCE { |  |  |
| messageID | saMessage |  |
| rsvAdvPrtVersion | 3 (WSA version 3) |  |
| headerOptionIndicator | 0b1110 |  |
| } |  |  |
| body SEQUENCE { |  |  |
| changeCount SEQUENCE { |  |  |
| saID | Any valid value |  |
| contentCount | Any valid value |  |
| } |  |  |
| extensions SEQUENCE { |  |  |
| { extensionId | 17 (Repeat Rate) |  |
| value | Any valid value |  |
| } |  |  |
| { extensionID | 5 (2D location) |  |
| value SEQUENCE { |  |  |
| latitude | Any valid value |  |
| longitude | Any valid value |  |
| }  } |  |  |
| { extensionID | 7 (Advertiser ID) |  |
| value | Any valid value |  |
| }  }  }  } |  |  |

Table 7‑10 WSAserviceInfos

|  |  |  |
| --- | --- | --- |
| Information Element | Value/Remark | Comment |
| Requires WSA\_nExt\_1  in Table 7‑6 |  |  |
| **WSAserviceInfos** ::= SEQUENCE { |  |  |
| { |  |  |
| serviceID | pPSID | PSID values defined in **Table 4‑4** |
| channelIndex | firstEntry | 1st entry in Channel Info Segment |
| extension SEQUENCE { |  |  |
| extensionId | 8 (PSC) |  |
| psc | Any valid value |  |
| } |  |  |
| } |  |  |
| } |  |  |

Table 7‑11 WSAserviceInfos\_IP

|  |  |  |
| --- | --- | --- |
| Information Element | Value/Remark | Comment |
| Requires WSA\_nExt\_1  in Table 7‑6 |  |  |
| WSAserviceInfos\_IP ::= SEQUENCE { |  |  |
| { |  |  |
| serviceID | pPSID | PSID values defined in 4.1.1.4 |
| channelIndex | firstEntry | 1st entry in Channel Info Segment |
| extension SEQUENCE { |  |  |
| { extensionId | 8 (PSC) |  |
| psc | Any valid value |  |
| } |  |  |
| { extensionId | 9 (IPv6Address) |  |
| IPv6Address | Any valid value |  |
| } |  |  |
| { extensionId | 10 (ServicePort) |  |
| ServicePort | Any valid value |  |
| } |  |  |
| { extensionId | 11 (ProviderMACAddress) |  |
| ProviderMACAddress | Any valid value |  |
| } |  |  |
| { extensionId | 19 (RcpiThreshold) |  |
| RcpiThreshold | Any valid value |  |
| } |  |  |
| { extensionId | 20 (WsaCountThreshold) |  |
| WsaCountThreshold | Any valid value |  |
| } |  |  |
| { extensionId | 22 (WsaCountThresholdInterval) |  |
| WsaCountThresholdInterval | Any valid value |  |
| } |  |  |
| } |  |  |
| } |  |  |
| } |  |  |

Table 7‑12 WSAchannelInfos

|  |  |  |
| --- | --- | --- |
| Information Element | Value/Remark | Comment |
| Requires WSA\_nExt\_1  in Table 7‑6 |  |  |
| **WSAchannelInfos** ::= SEQUENCE { |  |  |
| { |  |  |
| operatingClass | Any valid value |  |
| channelNumber | Any valid value |  |
| powerLevel | Any valid value |  |
| dataRate | Any valid value |  |
| adaptable | Any valid value |  |
| extensions SEQUENCE { |  |  |
| { extensionId | 12 (EDCA) |  |
| EdcaParameterSet {} | Any valid value |  |
| } |  |  |
| { extensionId | 21 (Channel Access) |  |
| value | alternatingSCH |  |
| } |  |  |
| }  }  } |  |  |

Table 7‑13 WSAroutingAdvertisement

|  |  |  |
| --- | --- | --- |
| Information Element | Value/Remark | Comment |
| WSAroutingAdvertisement ::= SEQUENCE { |  |  |
| { |  |  |
| lifetime | Any valid value |  |
| ipPrefix | Any valid value |  |
| ipPrefixLength | Any valid value |  |
| defaultGateway | Any valid value |  |
| primaryDns | Any valid value |  |
| extensions SEQUENCE { |  |  |
| { extensionId | 14 (Gateway MAC) |  |
| value | Any valid value |  |
| } |  |  |
| { extensionId | 13 (Secondary DNS) |  |
| value | Any valid value |  |
| } |  |  |
| }  }  } |  |  |

#### WSA containing multiple service instances

Table 7‑14 WSA\_1srvPSC

|  |  |  |
| --- | --- | --- |
| Information Element | Value/Remark | Comment |
| Requires Ieee1609Dot2Data  in Table 7‑5 |  |  |
| **WSA\_1srv** ::= SEQUENCE { |  |  |
| version SEQUENCE { |  |  |
| messageID | saMessage |  |
| rsvAdvPrtVersion | 3 (WSA version 3) |  |
| headerOptionIndicator | 0b0110 |  |
| } |  |  |
| body SEQUENCE { |  |  |
| changeCount SEQUENCE { |  |  |
| saID | Any valid value |  |
| contentCount | Any valid value |  |
| } |  |  |
| extensions SEQUENCE {} | Not present |  |
| serviceInfos SEQUENCE { |  |  |
| serviceID | pPSID | PSID values defined in Table 4‑4 |
| channelIndex | firstEntry | 1st entry in Channel Info Segment |
| extension SEQUENCE { |  |  |
| extensionId | 8 (PSC) |  |
| psc | Any valid value |  |
| } |  |  |
| } |  |  |
| channelInfos SEQUENCE { |  |  |
| operatingClass | 17 |  |
| channelNumber | Any valid value | Default values defined in Table 4‑1 |
| powerLevel | Any valid value | Default values defined in Table 4‑3 |
| dataRate | Any valid value | Default values defined in Table 4‑2 |
| adaptable | Any valid value |  |
| extensions SEQUENCE {} | Not present |  |
| routingAdvertisement SEQUENCE{} | Not present |  |
| } |  |  |

Table 7‑15 WSA\_1srv

|  |  |  |
| --- | --- | --- |
| Information Element | Value/Remark | Comment |
| Requires Ieee1609Dot2Data  in Table 7‑5 |  |  |
| **WSA\_1srv** ::= SEQUENCE { |  |  |
| version SEQUENCE { |  |  |
| messageID | saMessage |  |
| rsvAdvPrtVersion | 3 (WSA version 3) |  |
| headerOptionIndicator | 0b0110 |  |
| } |  |  |
| body SEQUENCE { |  |  |
| changeCount SEQUENCE { |  |  |
| saID | Any valid value |  |
| contentCount | Any valid value |  |
| } |  |  |
| extensions SEQUENCE {} | Not present |  |
| serviceInfos SEQUENCE { |  |  |
| serviceID | vPSID1 | PSID values defined in Table 4‑4 |
| channelIndex | firstEntry | 1st entry in Channel Info Segment |
| chOptions SEQUENCE {} | Not present |  |
| } |  |  |
| channelInfos SEQUENCE { |  |  |
| operatingClass | 17 |  |
| channelNumber | Any valid value | Default values defined in Table 4‑1 |
| powerLevel | Any valid value | Default values defined in Table 4‑3 |
| dataRate | Any valid value | Default values defined in Table 4‑2 |
| adaptable | Any valid value |  |
| extensions SEQUENCE {} | Not present |  |
| routingAdvertisement SEQUENCE{} | Not present |  |
| } |  |  |

Table 7‑16 WSA\_2srv

|  |  |  |
| --- | --- | --- |
| Information Element | Value/Remark | Comment |
| Requires Ieee1609Dot2Data  in Table 7‑5 |  |  |
| **WSA\_2srv** ::= SEQUENCE { |  |  |
| version SEQUENCE { |  |  |
| messageID | saMessage |  |
| rsvAdvPrtVersion | 3 (WSA version 3) |  |
| headerOptionIndicator | 0b0110 |  |
| } |  |  |
| body SEQUENCE { |  |  |
| changeCount SEQUENCE { |  |  |
| saID | Any valid value |  |
| contentCount | Any valid value |  |
| } |  |  |
| extensions SEQUENCE {} | Not present |  |
| serviceInfos SEQUENCE { |  |  |
| { serviceID | vPSID1 | PSID values defined in Table 4‑4 |
| channelIndex | firstEntry | 1st entry in Channel Info Segment |
| chOptions SEQUENCE {} | Not present |  |
| } |  |  |
| { serviceID | vPSID2 (different from pPSID) | PSID values defined in Table 4‑4 |
| channelIndex | firstEntry | 1st entry in Channel Info Segment |
| chOptions SEQUENCE {} | Not present |  |
| } |  |  |
| } |  |  |
| channelInfos SEQUENCE { |  |  |
| operatingClass | 17 |  |
| channelNumber | Any valid value | Default values defined in Table 4‑1 |
| powerLevel | Any valid value | Default values defined in Table 4‑3 |
| dataRate | Any valid value | Default values defined in Table 4‑2 |
| adaptable | Any valid value |  |
| extensions SEQUENCE {} | Not present |  |
| routingAdvertisement SEQUENCE{} | Not present |  |
| } |  |  |

#### WSA containing IP routing service

Table 7‑17 WSA\_IProuting

|  |  |  |
| --- | --- | --- |
| Information Element | Value/Remark | Comment |
| Requires Ieee1609Dot2Data  in Table 7‑5 |  |  |
| **WSA\_IProuting** ::= SEQUENCE { |  |  |
| version SEQUENCE { |  |  |
| messageID | saMessage |  |
| rsvAdvPrtVersion | 3 (WSA version 3) |  |
| headerOptionIndicator | 0b0111 |  |
| } |  |  |
| body SEQUENCE {} | Any valid value |  |
| serviceInfos SEQUENCE { |  |  |
| serviceID | 0pEF-FF-FF-FE | PSID values defined in Table 4‑4 |
| channelIndex | firstEntry | 1st entry in Channel Info Segment |
| chOptions SEQUENCE {} | Any valid value |  |
| } |  |  |
| channelInfos SEQUENCE {} | Any valid value |  |
| routingAdvertisement SEQUENCE{ |  |  |
| lifetime | Any valid value | Duration of the test |
| ipPrefix | Any valid value | Supports generation of global IPv6 |
| ipPrefixLength | Any valid value |  |
| defaultGateway | Any valid value | IPv6 address of the WAVE Host |
| primaryDns | Any valid value |  |
| extensions SEQUENCE { |  |  |
| { extensionId | 14 (Gateway MAC) |  |
| Value | Any valid value |  |
| } |  |  |
| }  }  } |  |  |

#### WSA containing minimum optional information

This configuration is not used and reserved for future use.

Table 7‑18 WSA\_min

|  |  |  |
| --- | --- | --- |
| Information Element | Value/Remark | Comment |
| Requires Ieee1609Dot2Data  in Table 7‑5 |  |  |
| **WSA\_min** ::= SEQUENCE { |  |  |
| version SEQUENCE { |  |  |
| messageID | saMessage |  |
| rsvAdvPrtVersion | 3 (WSA version 3) |  |
| headerOptionIndicator | 0b0110 |  |
| } |  |  |
| body SEQUENCE { |  |  |
| changeCount SEQUENCE { |  |  |
| saID | Any valid value |  |
| contentCount | Any valid value |  |
| } |  |  |
| extensions SEQUENCE {} | Not present |  |
| serviceInfos SEQUENCE { |  |  |
| serviceID | pPSID | PSID values defined in Table 4‑4 |
| channelIndex | firstEntry | 1st entry in Channel Info Segment |
| chOptions SEQUENCE {} | Not present |  |
| } |  |  |
| channelInfos SEQUENCE { |  |  |
| operatingClass | 17 |  |
| channelNumber | Any valid value | Default values defined in Table 4‑1 |
| powerLevel | Any valid value | Default values defined in Table 4‑3 |
| dataRate | Any valid value | Default values defined in Table 4‑2 |
| Adaptable | False |  |
| extensions SEQUENCE { |  |  |
| extensionId | 21 (Channel Access) |  |
| Value | alternatingSCH |  |
| } |  |  |
| routingAdvertisement SEQUENCE{} | Not present |  |
| } |  |  |

1. Traceability Matrix

This Section shows traceability from the requirements identified by PICS from IEEE 1609.3 [2] to the Test Purposes defined in this document.

For each element in the PICS table, the Support profile is identified based on the information provided in SAE J2945/1 [1]. The following support profiles are included:

* V2V – mandatory features required for in-vehicle safety applications requiring transmission or reception of signed BSM messages.
* SCMS – Items marked SCMS are required if IPv6 communication over DSRC is supported, e.g. for communication with security service SCMS and to download security certificates from SCMS.
* RSE – mandatory feature required for roadside equipment

V2V and SCMS profiles are derived from SAE J2934/1 [1]. Items left blank in the Support column are optional.

Table A- 1 IEEE 1609.3 PICS traceability to TPs

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **1609.3 PICS from [2]** | **Features in [2]** | **Reference**  **section in [2]** | **Status (J2945-1 [1])** | **Support (J2945-1 [1])** | **TP ID** | **TP Description** |
| N1. | **DATA PLANE** |  |  |  |  |  |
| N1.1. | **LLC** | 5.2 | M |  | TP-16093-WSM-MST-BV-01 | To verify that the IUT will transmit a WSM with the correct version number and EtherType. |
| N1.1.1. | LLC extensions for WSMP | 7.5 | N1.3:M |  | TP-16093-WSM-MST-BV-01 | See above |
| N1.2. | **IPv6** | 5.3, 6.4 | O1 | SCMS, RSE |  | See TPs for N1.2.-N1.2.7. |
| N1.2.1. | Use stateless configuration | 6.4 | O | SCMS | TP-16093-IP-CFG-BV-01 | Verify that the IUT will use WaveRoutingAdvertisement information in WSA to configure its global IPv6 address. |
| N1.2.2. | IP readdressing | 6.4.2 | M | SCMS | TP-16093-IP-CHG-BV-01 | Verify that IUT will reset link-local IPv6 address of the WAVE interface to a specific value. |
| TP-16093-IP-CHG-BV-02 | Verify that IUT will reset IPv6 address of the WAVE interface to a different value. |
| N1.2.3. | Send IP datagrams | 5.3 | O2 | SCMS, RSE | TP-16093-IP-COM-BV-01 | Verify that the IUT will initiate a 2-way communication using IPv6 protocol to a Remote Host on a different subnet, all IP communications are carried on a Service channel. |
| N1.2.4. | Receive IP datagrams | 5.3 | O2 | SCMS, RSE | TP-16093-IP-COM-BV-01 | See TP for N1.2.3. |
| N1.2.4.1. | Receive by link-local address | 6.4 | M | SCMS, RSE | TP-16093-IP-COM-BV-02 | Verify that the IUT will initiate a 2-way communication using IPv6 protocol to a WAVE Host using link-local address. |
| TP-16093-IP-CFG-BV-02 | Verify that the IUT will simultaneously be configured with the following IPv6 addresses for the WAVE interface: link-local (from its MAC) and global IPv6. |
| N1.2.4.2. | Receive by global address | 6.4 | M | SCMS, RSE | TP-16093-IP-COM-BV-01 | Verify that the IUT will initiate a 2-way communication using IPv6 protocol to a Remote Host on a different subnet, all IP communications are carried on a Service channel. |
| TP-16093-IP-CFG-BV-02 | Verify that the IUT will simultaneously be configured with the following IPv6 addresses for the WAVE interface: link-local (from its MAC) and global IPv6. |
| N1.2.4.3. | Receive by host multicast addresses | 6.4 | O3 |  |  | Not considered. |
| N1.2.4.4. | Receive by router multicast addresses | 6.4 | O3 |  |  | Not considered. |
| N1.2.5. | UDP | 5.4 | O | RSE | TP-16093-IP-COM-BV-01 | See TP for N1.2.3. |
| N1.2.6. | TCP | 5.4 | O | SCMS, RSE | TP-16093-IP-COM-BV-01 | See TP for N1.2.3. |
| N1.2.7. | Other IETF protocols | 5.4 | O |  |  | Not considered |
| N1.3. | **WSMP** | 5.5 | O1 | V2V, RSE | TP-16093-WSM-PP-BV-01 | Verify that the IUT will receive WSM containing valid WSM-N-Header, excluding optional WAVE Info Element extensions, WSM-T-Header, and WSM Data, and matching registered PSID. |
| TP-16093-WSM-PP-BV-02 | Verify that the IUT will receive WSM containing valid WSM-N-Header, optional WAVE Info Element extensions, WSM-T-Header, and WSM Data, and matching registered PSID. |
| N1.3.1. | ***WSM reception*** | 5.5.3 | O4 | V2V, RSE | TP-16093-WSM-PP-BV-01  … -02 | See TPs for N1.3. |
| TP-16093-WSM-COM-BV-02 | Verify that the IUT will receive WSMs in continuous operation on a selected channel. |
| TP-16093-WSM-COM-BV-04 | Verify that the IUT will transmit WSMs in alternating operation on a channel CH1 and receive WSMs on a channel CH2. |
| TP-16093-WSM-COM-BV-05 | Verify that the IUT will receive WSMs in alternating operation on channels CH1 and CH2. |
| N1.3.1.1. | Check WSMP Version number | 5.5.3, 8.3.2 | M | V2V, RSE (Version = 3) | TP-16093-WSM-PP-BV-01  … -02 | See TPs for N1.3. |
| N1.3.1.2. | Check Subtype field | 5.5.3, 8.3.2 | M | V2V, RSE (Subtype = 0 or 1) | TP-16093-WSM-PP-BV-01  … -02 | See TPs for N1.3. |
| N1.3.1.3. | Check TPID field | 5.5.3, 8.3.2 | M | V2V, RSE (TPID = 0) | TP-16093-WSM-PP-BV-01  … -02 | See TPs for N1.3. |
| N1.3.1.4. | WAVE Info Elem Extension field | 8.1.1 | M | V2V, RSE | TP-16093-WSM-PP-BV-02 | Verify that the IUT will receive WSM containing valid WSM-N-Header, excluding optional WAVE Info Element extensions, WSM-T-Header, and WSM Data, and matching registered PSID. |
| N1.3.1.5. | Deliver message based on Destination Address (PSID) | 5.5.3 | M | V2V, RSE | TP-16093-WSM-PP-BV-01  … -02 | See TPs for N1.3. |
| N1.3.2. | ***WSM transmission*** | 5.5.2 | O4 | V2V, RSE | TP-16093-WSM-MST-BV-01 | To verify that the IUT will transmit a WSM with the correct version number and EtherType |
| TP-16093-WSM-COM-BV-01 | Verify that the IUT will transmit WSMs in continuous operation on a selected channel |
| TP-16093-WSM-COM-BV-03 | Verify that the IUT will transmit WSM1 and WSM2 on channels CH1 and CH2 respectively in alternating operation. |
| TP-16093-WSM-COM-BV-04 | Verify that the IUT will transmit WSMs in alternating operation on a channel CH1 and receive WSMs on a channel CH2. |
| TP-16093-WSM-POP-BI-01 | Verify that the IUT will not transmit WSM with payload exceeding WsmMaxLength. |
| N1.3.2.1. | Insert WSMP version number | 8.3.2 | M | V2V, RSE (Version =3) | TP-16093-WSM-MST-BV-01 | See above |
| N1.3.2.2. | Insert Destination Address (PSID) | 8.3.2 | M | V2V, RSE | TP-16093-WSM-MST-BV-02 | Verify that the IUT will transmit WSM containing valid WSM-T-Header, PSID and WSM Data |
| N1.3.2.3. | Outbound message size | 5.5.2 | M | V2V, RSE | TP-16093-WSM-MST-BV-02 | See above |
| N1.3.2.4. | Transmit channel number | 8.3.4.2 | O | RSE | TP-16093-WSM-ROP-BV-01 | Verify that the IUT will transmit WSM containing valid WSM-N-Header including WAVE Info Element Extension ‘Channel Number’ and matching the actual channel used by the IUT |
| N1.3.2.5. | Transmit data rate | 8.3.4.3 | O | RSE | TP-16093-WSM-ROP-BV-02 | Verify that the IUT will transmit WSM containing valid WSM-N-Header including WAVE Info Element Extension ‘Data Rate’ and matching the actual data rate used by the IUT |
| N1.3.2.6. | Transmit Power Used | 8.3.4.4 | O | RSE | TP-16093-WSM-ROP-BV-03 | Verify that the IUT will transmit WSM containing valid WSM-N-Header including WAVE Info Element Extension ‘Transmit Power Used’ and matching the actual transmit power used by the IUT. |
| N1.3.2.7. | Channel Load | 8.3.4.5 | O |  |  | Not considered |
| N1.3.2.8. | Insert Subtype features | 8.3.2 | M | V2V, RSE (Subtype = 0) | TP-16093-WSM-MST-BV-01 | To verify that the IUT will transmit a WSM with the correct version number and EtherType. |
| TP-16093-WSM-MST-BV-02 | Verify that the IUT will transmit WSM containing valid WSM-T-Header, PSID and WSM Data. |
| N1.3.2.9. | Insert TPID | 8.3.2 | M | V2V, RSE (TPID = 0) | TP-16093-WSM-MST-BV-01  … - 02 | See TPs for N1.3.2.8. |
| N2 | MANAGEMENT PLANE | - | - |  |  | Not considered |
| N2.1. | **User role** | 6.2.1 | O | SCMS |  | See TPs for N2.1.1.- N2.1.9.1.3. |
| N2.1.1. | Receive WSAs over WSMP | 6.3.2 | O5 | SCMS | TP-16093-WSA-PP-BV-01 | Verify that the IUT will indicate to the upper layer availability of a provider service when it the IUT receives WSAs. |
| N2.1.2. | Verify and accept Secured WSA | 6.3.3, 8.2.1 | O5 | SCMS | TP-16093-WSA-PP-BV-01 | See TP for N2.1.1. |
| N2.1.3. | Accept unsecured WSA | 6.3.3, 8.2.1 | O5 |  |  | Not considered. |
| N2.1.4. | WAVE Info Elem Extension fields | 8.1.1 | M |  | TP-16093-WSA-PP-BV-01 | See TP for N2.1.1. |
| N2.1.5. | Calculate avail service link quality | 6.3.4 | O |  |  | Not considered |
| N2.1.6. | ***WSA header*** | 8.2.2 | M |  | TP-16093-WSA-PP-BV-01 | See TP for N2.1.1. |
| N2.1.6.1. | Check WSA version number | 8.2.2.2 | M | SCMS | TP-16093-WSA-PP-BV-01 | See TP for N2.1.1. |
| N2.1.6.2. | Check WSA Identifier | 8.2.2.4 | O |  | TP-16093-WSA-PP-BV-01 | See TP for N2.1.1. |
| N2.1.6.3. | Check Content Count | 8.2.2.5 | O |  | TP-16093-WSA-PP-BV-01 | See TP for N2.1.1. |
| N2.1.6.4. | WSA Header Info Element Ext field | 8.2.2.6 | M | SCMS | TP-16093-WSA-PP-BV-01 | See TP for N2.1.1. |
| N2.1.6.4.1. | Repeat Rate | 8.2.2.6.1 | O |  | TP-16093-WSA-PP-BV-01 | See TP for N2.1.1. |
| N2.1.6.4.2. | 2DLocation | 8.2.2.6.2 | O |  | TP-16093-WSA-PP-BV-01 | Verify that the IUT will receive WSA with Secure WSA envelope, WSA Header containing Info Element Extension field 2D Location, and will indicate to the upper layer availability of a provider service included in the WSA. |
| N2.1.6.4.3. | 3DLocation | 8.2.2.6.3 | O |  | TP-16093-WSA-PP-BV-01 | See TP for N2.1.1. |
| N2.1.6.4.4. | Advertiser Identifier | 8.2.2.6.4 | O |  | TP-16093-WSA-PP-BV-01 | See TP for N2.1.1. |
| N2.1.6.4.5. | Other info elements | 8.2.2.6 | O |  |  | Not considered |
| N2.1.7. | **Service Info Segment** | 8.2.3 | M | SCMS | TP-16093-WSA-PP-BV-02 | Verify that the IUT will receive WSA containing Service Info Segment with Info Element Extension fields, and will indicate to the upper layer availability of a provider service included in the WSA. |
| N2.1.7.1. | Number of Service Info Instances | 8.2.3 | M | SCMS | TP-16093-WSA-PP-BV-02 | See TP for N2.1.7. |
| N2.1.7.2. | WAVE Info Element Extension field | 8.2.3.5 | M | SCMS | TP-16093-WSA-PP-BV-02 | See TP for N2.1.7. |
| N2.1.7.2.1. | PSC | 8.2.3.5.1 | O | SCMS | TP-16093-WSA-PP-BV-02 | See TP for N2.1.7. |
| N2.1.7.2.2. | IPv6Address | 8.2.3.5.2 | O | SCMS | TP-16093-WSA-PP-BV-02 | See TP for N2.1.7. |
| N2.1.7.2.3. | Service Port | 8.2.3.5.3 | O | SCMS | TP-16093-WSA-PP-BV-02 | See TP for N2.1.7. |
| N2.1.7.2.4. | Provider MAC Address | 8.2.3.5.4 | O | SCMS | TP-16093-WSA-PP-BV-02 | See TP for N2.1.7. |
| N2.1.7.2.5. | RCPI Threshold | 8.2.3.5.5 | O | SCMS | TP-16093-WSA-PP-BV-02 | See TP for N2.1.7. |
| N2.1.7.2.6. | WSA Count Threshold | 8.2.3.5.6 | O | SCMS | TP-16093-WSA-PP-BV-02 | See TP for N2.1.7. |
| N2.1.7.2.6.1. | WSA Count Threshold Interval | 8.2.3.5.7 | O |  | TP-16093-WSA-PP-BV-02 | See TP for N2.1.7. |
| N2.1.7.2.7. | Other info elements | 8.2.3.5 | O | SCMS |  | Not considered |
| N2.1.8. | **Channel Info Segment** | 8.2.4 | M | SCMS | TP-16093-WSA-PP-BV-03 | Verify that the IUT will receive WSA containing Channel Info Segment containing Info Element Extension fields, and will indicate to the upper layer availability of a provider service included in the WSA. |
| N.2.1.8.1. | Number of Channel Info Instances | 8.2.4 | M | SCMS | TP-16093-WSA-PP-BV-03 | See TP for N2.1.8. |
| N.2.1.8.2. | WAVE Info Elem Extension field | 8.2.4.8 | M | SCMS | TP-16093-WSA-PP-BV-03 | See TP for N2.1.8. |
| N.2.1.8.2.1. | EDCA Parameter Set | 8.2.4.8.1 | O | SCMS | TP-16093-WSA-PP-BV-03 | See TP for N2.1.8. |
| N.2.1.8.2.2. | Channel Access | 8.2.4.8.2 | O | SCMS | TP-16093-WSA-PP-BV-03 | See TP for N2.1.8. |
| N.2.1.8.2.3. | Other info elements | 8.2.4.8 | O |  |  | Not considered |
| N2.1.9. | ***WAVE Router Advertisement*** | 8.2.5.1 | O | SCMS | TP-16093-WSA-PP-BV-04 | Verify that the IUT will receive WSA containing WAVE Router Advertisement containing Info Element Extension fields, and will indicate to the upper layer availability of a provider service included in the WSA. |
| N2.1.9.1. | WAVE Info Elem Extension field | 8.2.5.7 | M | SCMS | TP-16093-WSA-PP-BV-04 | See TP for N2.1.9. |
| N2.1.9.1.1. | Secondary DNS | 8.2.5.7.1 | O | SCMS | TP-16093-WSA-PP-BV-04 | See TP for N2.1.9. |
| N2.1.9.1.2. | Gateway MAC Address | 8.2.5.7.2 | O | SCMS | TP-16093-WSA-PP-BV-04 | See TP for N2.1.9. |
| N2.1.9.1.3. | Other info elements | 8.2.5.7 | O |  |  | Not considered |
| N2.2. | **Provider role** | 6.2.1 | O | RSE |  | See TPs for N2.2.- N2.2.13.1.2 |
| N2.2.1. | Send Service Advertisements over WSMP | 6.2.3.3 | M | RSE | TP-16093-WSA-MST-BV-01 | Verify that the IUT will transmit a valid WSM containing WSA with valid WSM headers. |
| N2.2.1.1. | Send secured WSA | 6.2.4.2.1, 8.2.1 | O6 | RSE | TP-16093-WSA-MST-BV-03 | Verify that the IUT will transmit WSM containing a secure WSA. |
| N2.2.1.2. | Send unsecured WSA | 6.2.4.2.1, 8.2.1 | O6 | RSE |  | Not considered |
| N2.2.2. | Send repeated advertisements | 6.2.4.2.1 | O | RSE | TP-16093-WSA-ROP-BV-01 | Verify that the IUT operating as provider will transmit WSA with a specific repeat rate. |
| N2.2.3. | Change ongoing advertisements | 6.2.2.2, 6.2.4.2.2 | O | RSE | TP-16093-WSA-CHG-BV-01 | Verify the IUT ability to change WSA when a new service added |
| N2.2.4. | Delete application-service | 6.2.3.6 | O | RSE | TP-16093-WSA-CHG-BV-02 | Verify the IUT ability to change WSA when a service is deleted from WSA |
| N2.2.5. | ***WSA header*** | 8.2.2 | M | RSE | Various | See TPs for N2.2.5.1-N2.2.6.5. |
| N2.2.5.1. | Set WSA Version | 8.2.2.2 | M | RSE | TP-16093-WSA-MST-BV-02 | Verify that the IUT will transmit WSA with the correct version number and valid WSA Header. |
| N2.2.5.2. | Set WSA Identifier | 8.2.2.4 | M | RSE | TP-16093-WSA-MST-BV-02 | See TP for N2.2.5.1. |
| N2.2.5.3. | Set Content Count | 8.2.2.5 | M | RSE | TP-16093-WSA-MST-BV-02 | See TP for N2.2.5.1. |
| N2.2.6. | WSA Header Info Element Ext field | 8.2.2.6 | M | RSE | TP-16093-WSA-MST-BV-04-X | Verify that the IUT will transmit WSA containing valid WSA Header Info Element Extension fields |
| N2.2.6.1. | Repeat Rate | 8.2.2.6.1 | O | RSE | TP-16093-WSA-MST-BV-04-A | See TP for N2.2.6. |
| N2.2.6.2. | 2DLocation | 8.2.2.6.2 | O | RSE | TP-16093-WSA-MST-BV-08 | Verify that the IUT will transmit WSA containing valid WSA Header Info Element Extension field 2D Location. |
| N2.2.6.3. | 3DLocation | 8.2.2.6.3 | O | RSE | TP-16093-WSA-MST-BV-04-B | See TP for N2.2.6. |
| N2.2.6.4. | AdvertiserIdentifier | 8.2.2.6.4 | O | RSE | TP-16093-WSA-MST-BV-04-C | See TP for N2.2.6. |
| N2.2.6.5. | Other info elements | 8.2.2.6 | O | RSE |  | Not considered |
| N2.2.7. | ***Service Info Segment*** | 8.2.3 | M | RSE | TP-16093-WSA-MST-BV-05-X | Verify that the IUT will transmit WSA containing a valid Service Info Segment |
| N2.2.8. | Number of Service Info Instances | 8.2.3 | M | RSE | TP-16093-WSA-MST-BV-05-X | See TP for N2.2.7. |
| N2.2.9. | WAVE Info Elem Extension field | 8.2.3.5 | O | RSE | TP-16093-WSA-MST-BV-05-X | See TP for N2.2.7. |
| N2.2.9.1. | PSC | 8.2.3.5.1 | O | RSE | TP-16093-WSA-MST-BV-05-A | See TP for N2.2.7. |
| N2.2.9.2. | IPv6Address | 8.2.3.5.2 | O | RSE | TP-16093-WSA-MST-BV-05-B | See TP for N2.2.7. |
| N2.2.9.3. | Service Port | 8.2.3.5.3 | O | RSE | TP-16093-WSA-MST-BV-05-C | See TP for N2.2.7. |
| N2.2.9.4. | Provider MAC Address | 8.2.3.5.4 | O | RSE | TP-16093-WSA-MST-BV-05-D | See TP for N2.2.7. |
| N2.2.9.5. | RCPI Threshold | 8.2.3.5.5 | O | RSE | TP-16093-WSA-MST-BV-05-E | See TP for N2.2.7. |
| N2.2.9.6. | WSA Count Threshold | 8.2.3.5.6 | O | RSE | TP-16093-WSA-MST-BV-05-F | See TP for N2.2.7. |
| N2.2.9.6.1. | WSA Count Threshold Interval | 8.2.3.5.7 | O | RSE | TP-16093-WSA-MST-BV-05-G | See TP for N2.2.7. |
| N2.2.9.7. | Other info elements | 8.2.3.5 | O | RSE |  | Not considered |
| N2.2.10. | ***Channel Info Segment*** | 8.2.4 | M | RSE | TP-16093-WSA-MST-BV-06-X | Verify that the IUT will transmit WSA containing a valid Channel Info Segment |
| N2.2.11. | Number of Channel Info Instances | 8.2.4 | M | RSE | TP-16093-WSA-MST-BV-06-X | See TP for N2.2.10. |
| N2.2.12. | WAVE Info Elem Extension field | 8.2.4.8 | O | RSE | TP-16093-WSA-MST-BV-06-X | See TP for N2.2.10. |
| N2.2.12.1. | EDCA Parameter Set | 8.2.4.8.1 | O | RSE | TP-16093-WSA-MST-BV-06-B | See TP for N2.2.10. |
| N2.2.12.2. | Channel Access | 8.2.4.8.2 | O | RSE | TP-16093-WSA-MST-BV-06-A | See TP for N2.2.10. |
| N2.2.12.3. | Other info elements | 8.2.4.8 | O | RSE |  | Not considered |
| N2.2.13. | ***Send WRA*** | 8.2.5 | O | RSE | TP-16093-WSA-MST-BV-07-X | Verify that the IUT will transmit WSA containing valid WRA Segment |
| N2.2.13.1. | WAVE Info Elem Extension field | 8.2.5.7 | O | RSE | TP-16093-WSA-MST-BV-07-X | See TP for N2.2.13. |
| N2.2.13.1.1. | Secondary DNS | 8.2.5.7.1 | O | RSE | TP-16093-WSA-MST-BV-07-A | See TP for N2.2.13. |
| N2.2.13.1.2 | Gateway MAC address | 8.2.5.7.2 | O | RSE | TP-16093-WSA-MST-BV-07-B | See TP for N2.2.13. |
| N2.2.13.1.3. | Other info elements | 8.2.5.7 | O |  |  | Not considered |
| N2.3. | **Timing advertisement** | - |  |  |  | Not considered |
| N2.3.1. | Timing Advertisement generation | 6.2.4.3 | O |  |  | Not considered |
| N2.4. | **MIB maintenance** | 6.5 |  |  |  | Not considered |
| N2.4.1. | Managed WAVE device | 6.5 | O |  |  | Not considered |
| N2.4.2. | MIB per standard | 6.5 | N2.4.1:M |  |  | Not considered |
| N2.4.3. | Other MIB | 6.5 | O |  |  | Not considered |

Revision History

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| --- | --- | --- |
| V0.1.0 | Sep 2015 | Initial Draft |
| V0.2.0 | Sep 17, 2015 | Editorial comments |
| V0.4.0 | Nov 18, 2015 | - Added message templates for WSM and WSAs.  - Specified default values for WSM/WSA parameters  - Removed test cases related to IPv6 multi-casting |
| V0.5.0 | Dec 1, 2015 | - Revised traceability table, updated some TPs |
| V0.6.0 | Jan 6, 2016 | - Multiple changes based on peer review/comments |
| V1.0 | Mar 29, 2016 | - Incorporated comments from reviewers |
| V1.1.0 | Oct 9, 2016 | - Incorporated comments from CAMP reviewers  - Clarifications to terminology and cleanup |
| V1.2.0 | Apr 26, 2017 | - Clarifications and corrections in section 4  - Modified criteria for testing Repeat Rate in section 4.1.1.8 and 4.1.1.8.1.  - Updates to TP-16093-WSA-ROP-BV-01, TP-16093-WSM-COM-BV-[01 – 05],  - Updates to TP-16093-WSM-ROP-BV-[01, 02] |
| V1.3.X | July 2017 | Editorial changes to  TP-16093-WSM-MST-BV-01, -02, TP-16093-WSM-ROP-BV-03 |

◙ End of Document ◙

1. Specified transmit power setting may be higher than acceptable receiver input and cause damage to the receiver. Use of an attenuator may be warranted to protect receiver input circuits. [↑](#footnote-ref-1)