

OmniAir

Connected Vehicle & Tolling

Certification Scope Matrixes

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Test Case for Standard:	V2X-RFID-Element
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Approval and Revision History

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1.0	01 October 2023	Randy Roebuck	No Comments and Board Approved Added Certified Device & Validation Definitions

Document Owner – Executive, Technology & Certification Services of OmniAir Consortium

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Forward

OmniAir Consortium is a 501(c) (6) nonprofit trade association advancing the deployment of standards-based, interoperable wireless transport technologies and applications that improve mobility, safety, and efficiency of ground transportation networks. Members include Connected Vehicle, Intelligent Transportation Systems (ITS) and Road Tolling technology device manufacturers, ITS deployers, testing laboratories, automotive OEMs, automotive suppliers, and other stakeholders, all promoting the proliferation of certified, interoperable devices. OmniAir Consortium is the owner of the Certification Elements outlined in this document.

OmniAir appoints the responsibility, management, and operation of the Certification Program Scopes to the OmniAir Technical Executive. Private or government entities such as USDOT, ITS America, Standards Development Organizations (SDO), or State DOTs may appoint or contract OmniAir as the certification body for other specific certification Programs.

The Certification Program activities are exclusive to OmniAir and include proprietary conformity requirement test plans and review of testing and documentation in order to render a certification decision. OmniAir awards an "OmniAir Certified" designation to devices that fully demonstrate conformance and interoperability to this Program's requirements.

Other "OmniAir Certified" components include V2X RSUs and OBUs, UHF RFID Single and Multi-protocol Tolling devices, OmniAir Authorized Test Laboratories (OATL), Qualified Test Equipment (OQTE), Known / Reference Devices (ORD), Authorized Field Test Sites (OAFTS), CV Module Certification Program (CVMCP), infrastructure devices communicating with RSUs and CV Applications.

This ISO/IEC 17067 based document has been prepared by the collaborative volunteer members of the OmniAir Consortium Certification Working Group. Access to the Program is by request to the OmniAir Consortium. All OmniAir certification scopes are governed by OmniAir Certification Program Policy (722-OA-CPPM).

1. Introduction

This OmniAir Certification Program Scopes create policies and process guidelines for an independently operated third-party certification program and this document lists the components of both Connected Vehicle (V2X) and Tolling (UHF RFID) technologies.

These program scopes are designed to promote the proliferation and deployment of OmniAir certified Connected Vehicle technology utilized in Vehicle-to-Everything (V2X) communications and Tolling using UHF RFID Multi-protocol technology. The concept and practice of an impartial, third-party certification provides a process for an objective evaluation and attestation that a device complies with standards-based requirements.

These are conformity assessment programs that verifies a vehicle-based devices (On-Board Unit (OBU) for V2X and Tags/Transponders for UHF RFID) and infra-structure-based devices (Roadside Units (RSU) and Readers/Interrogators for UHF RFID) have met industry consensus on protocol, interoperability, minimum performance, application behavior, and testing requirements. Certification is awarded to an applicant of a device that meets these requirements. The applicant

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may then use of the OmniAir Certified Mark within the usage guidelines so long as conformance to the OmniAir Authorized Test Plan is maintained.

This program does not include testing or certification for FCC compliance, safety certification, EMC regulatory, FIPS certification, durability or reliability testing, backhaul communications, cellular conformance or other wireless consortia certifications. This program may, however, verify such elements have been completed via documentation review.

This is one of several certification programs managed under the OmniAir Program Policy System. Please see OmniAir Certification Program Policies Manual (722-OA-CPPM) for additional information.

This program is developed to meet the certification needs of government transportation entities, connected vehicle technology implementers, other consortia, and CV product manufacturers. This program uses foundational elements from ISO/IEC 17065 and ISO/IEC 17067 for third-party product conformity assessment certification bodies with modifications appropriate for an industry-based consortia certification program.

The key objective of this program is to provide confidence that a device bearing the OmniAir Certified Mark:

- *Fulfills the OmniAir Certification Program Section 6 conformance requirements showing acceptable performance to a standardized set of tests defined in the Test Plan.*
- *If applicable, may be used as part of certification evidence when applying for security credentials managed by a 3rd party security credential management system.*
- *Is interoperable with other OmniAir Certificate Applicable Products.*
- *Can be used as evidence of device maturity in a procurement process.*

Other related benefits:

- *Speed of market acceptance of the technology by establishing industry-wide, common performance requirements.*
- *Differentiating factor for manufacturers with OmniAir certified products.*
- *Influence Infrastructure Owner Operator (IOO) purchasing decisions and contribute to market acceptance.*

2. Scope

The Scope of each Certification Program is to verify and inform identified list of elements compromising to operating device/product/services deemed as Certified or Qualified conforming to the requirements set at that release.

2.1. Out of Scope

The following items are out of scope for this certification program:

- Certification of entire peripheral components like traffic signal controller, lane controller, back-office processor is not covered but focused on trusted transportation communications only.

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3. References

3.1. Normative References

The latest versions of the following referenced documents are necessary for the application of this document and testing affiliated with program requirements.

- | | | |
|------|---------------------------|---|
| [1] | 721-OA-V2X | V2X Technical Requirements (i.e., Test Cases and Test Plan) |
| [2] | 722-OA-CPPM | Certification Program Policies Manual |
| [3] | 724-OA-CertInstr | Connected Vehicle Certification Instructions |
| [4] | 726-OA-OATL-List | Authorized Test Laboratory List (obsolete and shown on website) |
| [5] | 727-OA-Cert_Report | Connected Vehicle Certification Test Report Structure |
| [6] | 728-OA-Cert | Certification Findings Letter and Certificate |
| [7] | 731-OA-MDM | Document Management |
| [8] | 732-OA-FADI | Feedback, Appeal and Device Incident Form |
| [9] | 733-OA-ATL | Authorized Test Laboratory Program Manual |
| [10] | 737-OA-QTE | Qualified Test Equipment Program Manual |
| [11] | 741-OA-RPCG | Recertification and Product Change Guidelines |
| [12] | 742-OA-RDPM | Reference Device Program Manual |
| [13] | 744-OA-SCF | Standards Certification Consideration Framework |
| [14] | 745-OA-MSR | V2X Device - Minimum Testing Security Requirements |
| [15] | 746-OA-AFTS | Authorized Field Test Site Program |
| [16] | 750-OA-Tolling-MPD | Multi-Protocol Device (MPD) Conformity Assessment Program |
| [17] | 751-OA-V2X-Module | V2X Module |
| [18] | 752-OA-I2F-Interface | V2X Infrastructure-to-Roadside Program |
| [19] | 753(L)-OA-Cert-Matrix | Certification Matrix Profiles (a-V2X and b-UHF RFID Tolling) |
| [20] | 754-OA-V2X-Applications * | V2X Application Certification Framework Program |

3.2. Informative References

The latest versions of the following referenced documents are necessary for the application of this document and assisting the applicant with noted subject areas.

- | | | |
|------|-----------------------|---|
| [21] | FCC 03-324 | Federal Communications Commission Regulatory |
| [22] | FHWA-JPO-17-589 | Dedicated Short-Range Communications Roadside Specifications (RSU 4.1a) |
| [23] | ITE CTI 4001:2022 | Roadside Unit (RSU) Standard |
| [24] | ISO/IEC 9646-1 (1994) | Information technology -- Open Systems Interconnection --
Conformance Testing Methodology and Framework - Part 1:
General Concepts |
| [25] | ISO/IEC 9646-2 (1994) | Information Technology -- Open Systems Interconnection --
Conformance Testing Methodology and Framework -- Part 2:
Abstract Test Suite Specification |
| [26] | ISO/IEC 9646-7 (1995) | Information Technology -- Open Systems Interconnection --
Conformance Testing Methodology and Framework - Part 7:
Implementation Conformance Statements |

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- [27] TSI EG 202 798 Intelligent Transport Systems (ITS); Testing; Framework for Conformance and Interoperability Testing.
- [28] ISO/IEC 17000 Conformity Assessment – Vocabulary and General Principles
- [29] ISO/IEC 17025 General Requirements for Competence of Testing & Calibration Laboratories
- [30] ISO/IEC 17065 Conformity Assessment – Requirements for Bodies Certifying Products, Processes and Services
- [31] ISO/IEC 17067 Conformity Assessment – Fundamentals of Product Certification and Guidelines for Product Certification Schemes
- [32] ISO/IEC TR 18047-6:2017-10 Information technology — RFID Device Conformance - Part 6: Test Methods for Air Interface Communications at 860MHz to 960MHz
- [33] CAMP EE Requirements and Specifications Supporting SCMS Software Release
- [34] SCMS Manager End-Entity Security Requirements, Design Guidance and Validation Approach

3.3. Communication Protocols & Standards

- [35] TS 360100-034vC Kapsch Active TDM Over-Air Specification for Electronic Toll Communications
- [36] ISO-6B80K Transcore SeGO Protocol Specification
- [37] ISO/IEC 18000-63:2015 Information Technology – RFID for Item Management - Part 63: Parameters for Air Interface Communications at 860 MHz to 960 MHz Type C
- [38] AVI Standard, v3.2 6C Coalition dated 13 December 2019
- [39] IAG Radio-Frequency Identification Protocol Conformance Specification" Version 1.0.
- [40] 3GPP TS 36-521 & 36-523 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Release 14/15
- [41] ETSI ETS 300 406 (1995) Methods for testing and Specification (MTS); Protocol and Profile Conformance Testing; Standardization Methodology
- [42] IEEE 802.11-2012 IEEE Standard for Information Technology-Telecommunications - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications
- [43] IEEE Std. 1609.0 IEEE Guide for Wireless Access in Vehicular Environments (WAVE) – Architecture.
- [44] IEEE 1609.2-2016, 2019 & 2022 IEEE Standard for Wireless Access in Vehicular Environments - Security Services for Applications and Management Messages
- [45] IEEE Std 1609.3-2020 IEEE Standard for Wireless Access in Vehicular Environments (WAVE) — Network Services
- [46] IEEE 1609.4-2016 & 2019 IEEE Standard for Wireless Access in Vehicular Environments – Multi-Channel Services
- [47] IEEE 1609.12:2019 IEEE Standard for Wireless Access in Vehicular Environments – Identifier Allocations
- [48] SAE J2735:2020 Dedicated Short Range Communications (DSRC) Message Set Dictionary
- [49] SAE J2945/1:2020 Standard - Onboard System Requirements for V2V Safety Communications
- [50] SAE J3161:2022 Standard: LTE-V2X Deployment Profiles and Radio Parameters for Single Radio Channel Multi-Service Coexistence
- [51] SAE J3161/1:2022 Standard: Onboard System Requirements for LTE-V2V Safety Communications

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[52] SAE J3161/1A:2022

Test Procedure - Onboard System Requirements for LTE-V2V
Safety Communications

3.4. Test Specifications regarding Connected Vehicle

721-OA-V2X is the governing document in defining the Connected Vehicle V2X Test Plan based on device capabilities and uses individual test specifications “700 series” shown below and their recommended parameters guidelines (* - Planned or In-works):

[53]	737-OA-TCI2	Test Control Interface v2
[54]	739-OA-TCI3	Test Control Interface v3
[55]	748-OA-CertGen-Testing	SCMS Certificates Request Instructions
[56]	759-OA-TSS&TP-CV2XModule	LTE-V Module-Global
[57]	760-OA-TSS&TP-80211p	WAVE MAC & Physical Layer (PHY)
[58]	761-OA-TSS&TP-36521	3GPP LTE-V Radio Release 14
[59]	762-OA-TSS&TP-J31611	LTE-V2X V-V Minimum Performance & Message Profiles
[60]	763-OA-TSS&TP-16092	WAVE Security Services
[61]	764a-OA-TSS&TP-CAMP	SCMS Security Certificates & Services (CAMP-based)
[62]	764b-OA-TSS&TP-160921	SCMS Security Certificates & Services (IEEE 1609-2-1based)
[63]	765-OA-TSS&TP-16093	WAVE Network Services
[64]	766-OA-TSS&TP-16094	WAVE Multi-Channel & EDCA
[65]	767-OA-TSS&TP-J29451	V-V Minimum Performance (Bench)
[66]	768-OA-TSS&TP-J29451A	V-V Minimum Performance (Device-Level Field)
[67]	769-OA-TSS&TP-J29451A	V-V Minimum Performance / BSM Drive Test Checklist (Device-Level Field)
[68]	770-OA-TSS&TP-RSU41	RSU 4.1 Procedure
[69]	771-OA-TSS&TP-TS10 *	Dual Operating RSU
[70]	772-OA-TSS&TP-CTI4001 *	CTI 4001 RSU
[71]	773-OA-TSS&TP-CI-TSCRSUIF *	Connected Intersection - TSC RSU Interface
[72]	780a-OA-TSS&TP-V2VApps *	V2V Applications Set
[73]	780b-OA-TSS&TP-V2IApps*	V2I or I2V Applications Set
[74]	781-OA-TSS&TP-V2XHUB *	V2XHUB Usage
[75]	782-OA-TSS&TP-MAP	MAP Message Transmission
[76]	783-OA-TSS&TP-SPAT	SPaT Message Transmission
[77]	784-OA-TSS&TP-SPAT1202	SPAT Message Transmission with NEMA 1202v3 Interface
[78]	785-OA-TSS&TP-1218	NTCIP 1218 Interface with V2X Operations
[79]	786-OA-TSS&TP-TIM	Travelers Information Message Transmission
[80]	787-OA-TSS&TP-PSM *	Personal Safety Message Transmission
[81]	788-OA-TSS&TP-J3217 *	J3217 V2X Tolling

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3.5. Test Specifications regarding Tolling

850-OA-TSS&TP-SPD-MPD-TestPlan is the governing document in defining the Tolling test plan based on device capabilities and uses individual test specifications “800 series” shown below and their recommended parameters guidelines.

[82]	800-OA-TSS&TP-CONF-TDM	TDM	Tolling Protocol Conformance
[83]	801-OA-TSS&TP-CONF-ISO6B80k		ISO 6B-80K Tolling Protocol Conformance
[84]	802-OA-TSS&TP-CONF-ISO6C		ISO 6C Tolling Protocol Conformance
[85]	810a-OA-TSS&TP-ENV-Devices		Tolling Environmental Tests for Tags & Readers per E-ZPass
[86]	820-OA-TSS&TP-TPP-Tags		Tag Parameter Performance for TDM, ISO 6B-80K and ISO-6C
[87]	825-OA-TSS&TP-Prog-Fulfil-Devices*		Programming, Fulfilment & Delivery
[88]	830-OA-TSS&TP-InOp-Devices		Device Interoperability Performance in Single & Multi-Protocol Tolling Operational States involving TDM, ISO 6B-80K & ISO-6C.
[89]	840-OA-TSS&TP-Gantry-SPD		Single Protocol Overhead Gantry Open Road Field Drive Test
[90]	841-OA-TSS&TP-Gantry-MPD		Multi-protocol Overhead Gantry Open Road Field Drive Test
[91]	841a-OA-TSS&TP-Gantry-MPD		Multi-protocol Overhead Gantry Open Road Field Drive Test per E-ZPass
[92]	842-OA-TSS&TP-Gantry-SPDBL		Single Protocol ISO-6C Overhead Gantry Open Road Field Drive Test Baseline
[93]	843-OA-TSS&TP-Plaza-MPD		Multi-protocol Plaza Field Drive Test per E-ZPass
[94]	850-OA-TSS&TP-Tolling-SPD-MPD-TestPlan		Single & Multi-Protocol Tolling Test Plan

3.6. Other Key Tolling Specifications

[95]	20200210-OAC-Tolling-MPD-NYC-MTA-WorkshopClose.pptx	
[96]	2021-IAGNG-001 dated 6/16/2021	North Carolina Turnpike Authority E-ZPass EC Equipment and Services Request for Proposal
[97]	IAG Validation Test Plan Volume 2 - Volume Test Scripts - Version 1.0	
[98]	EZPass-NextGen-Attachments.	
[99]	NEMA TS-2:2016	Traffic Controller Assemblies with NTCIP Requirements (v03.07)

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4. Terms, Definitions and Abbreviations

The following applicable terms and definitions for this document are drawn from ISO/IEC 17000, ISO/IEC 17065, and ISO/IEC 17067.

The following verbal forms are utilized in this document:

- **Shall:** Indicating a requirement
- **Should:** Indicating a recommendation
- **May:** Indicating permission or permitting
- **Can:** Indicating a possibility or a capability
- For the purposes of the present document, the following terms and definitions apply:

Abbr.	Item	Definition
ByD	By Design	Design parameters and/or theoretical analysis that ensure compliance. Applicant submitting a component or system for compliance testing shall provide the necessary technical information, in the form of a technical memorandum or similar. For Protocol requirements that are verified by design, the method of technical analysis is at the discretion of the submitting applicant and, except in special cases, is not specified by this document. In general, the technical analysis shall have sufficient rigor and technical depth to convince a test engineer knowledgeable of the Protocol that the requirement has been met.
CRC	Cyclic Redundancy Check	Error-detecting code used to determine if a block of data has been corrupted. CRCs are ubiquitous
IAG	Interagency Group	Entity responsible for creating and administering E-ZPass, a collaboration between many member agencies on the East Coast of United States that provides interoperable electronic tolling.
KD	Known Device	Device typically used in deployments and regarded as industry benchmark for specific protocol. It should be certified device conforming to its protocol standard. It may not be deemed as Reference Device without quantization and characterization testing and formalized under OmniAir's reference device program.
LPP	Local or Primary Protocol	Main protocol used by a tolling agency if used in multi-protocol reader operation mode algorithm. A protocol with majority of tags issued by a tolling agency.
ORT	Open Road Tolling	Environment where vehicles pass at normal freeway speeds and are identified through overhead gantry typically using radio frequency identification (RFID) protocol technology transmitted by transceiver/reader and tag (OBU) residing in the vehicle.
RD	Reference Device	Certified device with quantization and characterization testing and formalized under OmniAir's reference device program and used throughout OATL (authorized test laboratories) and OQTE (qualified test equipment) verification activities.
RD	Read	Successful wireless radio identification handshake (tag detection and response received by transceiver) and CRC while vehicle passing through the detection zone.

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4.1. Terms and Definitions

Applicant – The legal entity or individual who applies for the certification of a specified product. This party is contractually and financially responsible for the cost of the conformity assessment evaluation process. This entity also has rights to the information generated during the evaluation and the authority to withdraw a certification listing. An applicant requires being a member in good standing with the OmniAir Consortium and consistent participants in working group meetings and PlugFest events.

Authorized Test Laboratory (or Authorized Test Lab) – An independent entity or entities authorized by OmniAir to execute device testing for applicants with qualified test equipment for specific certification program(s). The Authorized Testing Laboratory is listed according to the specific certification program(s) for which it meets OmniAir authorization requirements.

Certification Agreement – A legally binding and enforceable agreement between the applicant and the certification body regarding party responsibilities, legal considerations, and certification activities.

Certification or Conformity Assessment Program – The specific foundational governance, procedures, and management to conduct conformity assessment of a product to standards-based requirements for the purpose of certification.

Certification Body – A legal entity or defined team within a legal entity which functions as a third-party conformity assessment body and operates certification programs.

Certification Requirement (or Conformance Requirement) – Specified requirements established by the certification body or certification program that shall be fulfilled by the applicant as a condition for establishing or maintaining certification. These may also include product requirements directly applicable to a product or its implementation features.

Certification Staff – Collective term for OmniAir staff or staff under OmniAir organizational control or under contract who directly participate in OmniAir certification activities. This includes executive management, technical, inspection, and administrative support personnel.

Certification Working Group – Entity that develops policies relating to the operation of the certification body, the individual certification programs and defines the operational guidelines and processes.

Certified Device – Device is one which has been certified by third-party certification body, tested by an independent, accredited test laboratory using qualified test systems and validated test cases/specifications, verifying device-level conformance to minimum set of industry standards, security and meeting interoperability requirements. Certified devices should bear certification marks and its public listing as evidence of certification.

Conformance Requirement – Specified requirements established by the certification body or certification program that shall be fulfilled by the applicant as a condition for establishing or maintaining certification. These may also include product requirements directly applicable to a product or its implementation features.

Conformity Assessment – The activities determining a product's compliance with defined, relevant conformance requirements.

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Engineering Change Order – a hardware or software upgrade of a device previously submitted for certification and governed by 741-OA-RPCG Recertification and Product Change Guideline.

Evaluation – May include activities such as initial application information gathering, development of a test plan, the performance of testing, the witnessing of testing, and all other activities associated with evaluating compliance and interoperability of the product with requirements, including any evaluation activities performed prior to the application for certification.

Executive Executive/Director - OmniAir staff position whose responsibilities include management of OmniAir personnel including the Engineering & Technology Programs, Marketing, Financial and Administrative staff. Executive Director and Technical Executive review and agree with Certification Findings Letter and provides joint signatory authority in granting certification certificates.

Legal Entity – Organization that has legal rights and duties related to contracts, agreements, payments, transactions, obligations, and penalties.

On-Board Unit- a V2X device intended to be installed in a vehicle to provide safety and mobility alerts and warning to the vehicle operator.

Product – A standalone functional electronic item submitted for conformity assessment. This can be a device, a module, a re-labeled device, or a variant device.

Program or Certification Owner – The organization or individual responsible for developing and maintaining a specific certification program.

Qualified Test Equipment (including Test System or Test Tool) – Test systems and test tools are designed to verify requirements, functionality, and conformance of devices(products) under test and are used by device manufacturers, technology implementors and authorized test laboratories (OATLs). The test systems and test tools are verified, validated, and approved by OmniAir's subject matter expert(s) using engineering practices according to standards/requirements and are identified on OmniAir's Qualified Test Equipment (OQTE) list.

Re-Labeled Device – A device that is identical to a currently certified device but has a different Applicant name and model name/number.

Surveillance Personnel – Competent persons who perform the surveillance procedures as defined by the certification body and/or the individual program.

Technical Executive - OmniAir staff position whose responsibilities include day to day operation of OmniAir certification programs, oversight of CVMCP application, authorization, and continued fulfillment of CVMCP contractual obligations, interpretation of program requirements, review of applicant provided information, delivering a certification requirement fulfillment decision, issuance of certification letters and OmniAir Certified Mark usage authorization.

V2X Device – A wireless electronic product operating in the frequency range of 5.895 – 5.925 GHz (5.9 GHz band) to support Vehicle-to-Everything applications.

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Validation in Deployment - V2X equipment should procure and install certified devices. This is inclusive of RSUs and OBUs for deployment on public ROWs, or in fleets, or other vehicles. Independent, third-party testing and certification provides assurance that devices conform to industry standards and meet requisite interoperability and security requirements. All validated intersections or systems should, at a minimum, include certified devices.

Variant Device – A device from the same Applicant that is similar to another device (parent) previously submitted for certification. The variant has a unique model name/number.

4.2. Abbreviations for Connected Vehicle

CV	Connected Vehicle
CVCA	Connected Vehicle Conformity Assessment
CVMCP	Connected Vehicle Module Certification Program
DSRC	Dedicated Short Range Communications
ECO	Engineering Change Order
FCC	Federal Communications Commission
FIPS	Federal Information Processing Standard Publication 140-2
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization
ITE	Institute of Transportation Engineers
ITS	Intelligent Transport Systems
OATL	OmniAir Authorized Testing Laboratory
OATL-PM	OmniAir Authorized Testing Laboratory Program Manual
OA–CPPM	OmniAir Certification Program Policy Manual
OA-MDM	OmniAir Manual for Document Management
OBU	On-Board Unit
OQTE	OmniAir Qualified Test Equipment (Test Systems / Test Tools)
RSE	Roadside Equipment
RSU	Roadside Unit
SAE	Society of Automotive Engineers
SCMS	Security Credential Management System
SDO	Standards Development Organization
TCI	Test Control Interface
TE	Technical Executive
V2I	Vehicle-to-Infrastructure
V2V	Vehicle-to-Vehicle
V2P	Vehicle-to-Pedestrian
V2X	Vehicle-to-Everything, typically including elements of V2V, V2I and V2P

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4.3. Abbreviations for UHF RFID Tolling

BI	Behavior Invalid
BV	Behavior Valid
ByD	By Design
DUT	Device under Test
ETC	Electronic Toll Collection
IOO	Infrastructure Operators Organization (Agencies)
ITS	Intelligent Transport Systems
IUT	Implementation Under Test (DUT being used in Tolling)
MPD	Multi-Protocol Device
MPT	Multi-Protocol Transponder (Tag)
OATL	OmniAir Authorized Test Laboratory
OAFTS	OmniAir Authorized Field Test Site
OQRD	OmniAir Qualified Reference Device
OQTE	OmniAir Qualified Test Equipment
RECV	Receive Message
RFID	Radio Frequency Identification
RSU or RSE	Road Site Unit / Equipment (RFID reader, transceiver, or interrogator)
R/W	Read and Write Operation
SEND	Send Message
SPD	Single-Protocol Device
SUT	System Under Test
TPP	Tag Parameter Performance
TC	Test Configuration System
TP	Test Purposes
TS	Test System or Test Specification
TSS	Test Suite Structure
UHF	Ultra-High Frequency

5. Activities, Roles and Responsibilities

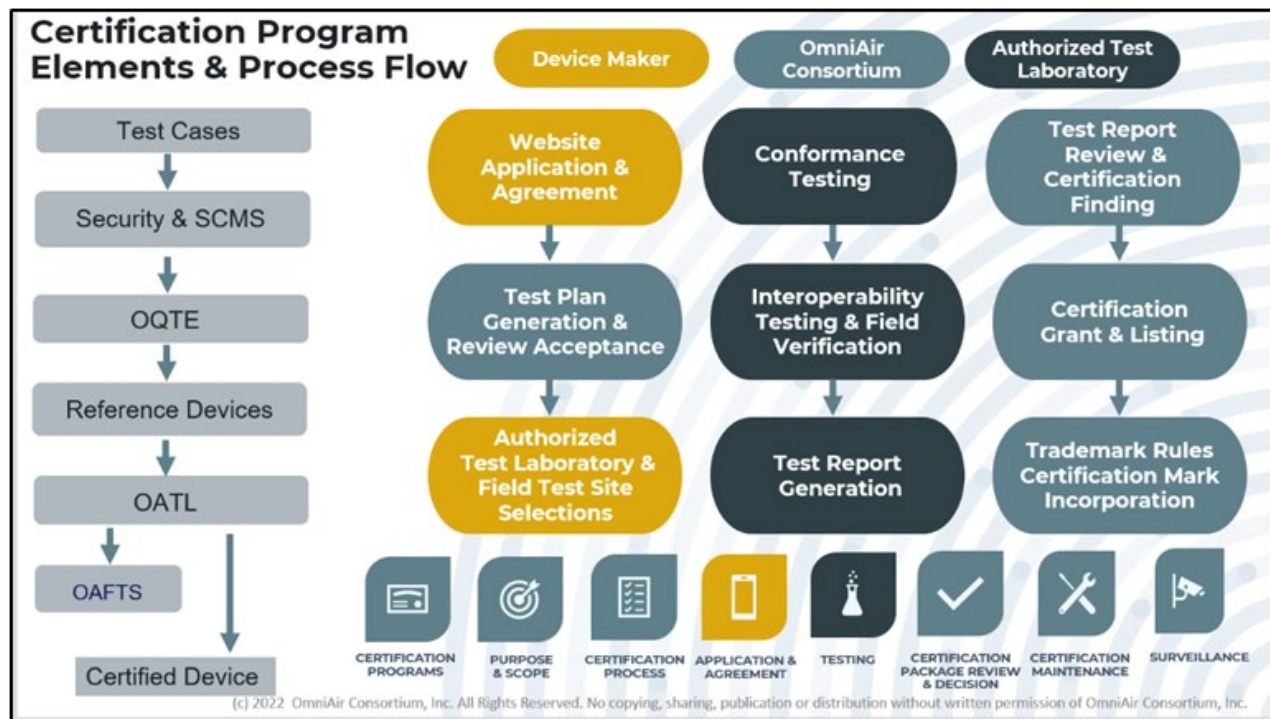
5.1. Activities Included in the Program

This certification program follows the functional and activities approach outlined in ISO/IEC 17000:2004, Annex A and most closely resembles an ISO/IEC 17067 Scheme Type 2 allowing for periodic surveillance of open market product samples for testing.

The certification functions are:

- **Selection** - also referred to as applying for certification in this program – the application submittal for certification and information gathering phase to develop a product specific test plan and proceed with the subsequent program activities.
- **Determination - or Inspection and Testing.** Conformity assessment testing activities to provide the test data and reports as evidence of completing tests listed on the Test Plan.
- **Review** – verifying the conformity assessment evidence is complete and fulfills the Program's requirements.
- **Decision on Certification** – A "Yes" or "No" decision of a product fulfilling Program requirements
- **Attestation** – includes issuing an OmniAir Certificate (statement of conformity or certification document) and granting the right to use the OmniAir Mark in accordance with usage guidelines and maintenance of certification.
- **Surveillance** – includes sampling from the manufacturer and/or open market to undergo inspection and/or testing activities to determine continued program compliance.

5.2. Interested Parties & Process:



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Applicants (Device/ Product / Services Providers)

Applicants (also referred to as vendors or suppliers) desiring certification must follow the procedures described herein. It is the applicant's responsibility to fulfill the requirements. Certification testing may be conducted at their choice of available OATLs.

Each applicant shall appoint a Primary Point of Contact (PPC) to be named on the Certification Application, who will be the interface with the assigned OmniAir technical lead. The PPC is responsible for authorizing access to applicant certification information, directory of certified products and for providing access to such information. The PPC will also be the individual responsible to updating the product changes that could affect certification.

The applicant (device provider) provides technical feedback and expertise in the committee structure. As the ultimate group that will need to implement the requirements, their feedback on value and input on design issues is essential.

Authorized Test Laboratory (OATL)

OATLs shall maintain compliance with the OmniAir policies for authorized laboratories. Interested organizations may contact OmniAir and apply to become an OATL. OATLs have authority to perform mandatory conformance testing as indicated on the proprietary Test Plan using OQTE (qualified test equipment), OAFTS (authorized field test sites) and shall follow guidelines described in this document and the OA-CPPM. The industry should promote and recruit to have a choice of OATLs in the certification process. OATL provides testing quote, schedule, and setup instructions directly to the applicant to perform and witness the testing to generate the test report. The testing cost is unknown to OmniAir.

Authorized Field Test Site (OAFTS)

OAFTS shall maintain compliance with the OmniAir policies for authorized field test sites where available to OATL for conducting &/or witnessing field testing to incorporate the test results into test report for certification review.

Infrastructure Operator Organizations or Agencies (IOO)

IOOs provide information to the committee on certification requirements the market needs, and which requirements would provide the greatest value. IOOs are the ultimate customer of certification documents and support the process by requiring their vendors to provide certified products. They participate and vote in the committee structure and provide feedback on what certification requirements are needed. IOOs also monitor the performance of the products in the field and can help OmniAir trigger recertification.

Award of the OMNIAIR Certification (Certificate and Mark)

OmniAir Technical Executive holds certification findings meeting and awards the OmniAir Certification (Certificate & Certification Mark) if the requirements are met. The Certification Mark constitutes an OmniAir judgment that a product has met or exceeded the requirements specified in this document and technical requirements profile in certification findings letter. The Marketing Executive creates the certificate, website listing, certified device data sheet posting and coordinated press release.

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6. Directory of Certified Products

The Online OmniAir Directory of Certified Products (including hardware / firmware / software identifiers) can be accessed at www.omniair.org. The directory is maintained by the OmniAir Technical Executive.

7. Surveillance

The surveillance program monitors the market to ensure proper use of the OmniAir Certification Mark and those products issued with the OmniAir Certification Mark maintain conformance to the program scope requirements. The surveillance program also provides a means of corrective action when a deficiency is encountered. Industry requests and PlugFests samples are used to conduct surveillance activities.

8. Certification Matrix

8.1. General

Certification Program Scopes	Specifications (* - In-works)	Radio Technology	Testing Functions	OQTE Test Equipment	OATL Test Lab	OAFTS Field Site	Reference Device	Module R1	OBU R1	RSU R1	Other Device
Connected Vehicle V2X Program	721-OA-V2X	X	Scopes	X	X	X	X	X	X	X	X
Certification Program Policies Manual	722-OA-CPPM	X	Certification Policy	X	X	X	X	X	X	X	X
Authorized Test Laboratory Program Manual	733-OA-ATL	X	Bench, Witness Field & Test Report		X		X	X	X	X	
Qualified Test Equipment Program Manual	737-OA-QTE	X	OQTE	X			X	C	X	X	
Recertification and Product Change Guidelines	741-OA-RPCG	X	Devices		X		X	X	X	X	X
Reference Device Program Manual	742-OA-RDPM	X	Devices	X	X	X	X		X	X	
Standards Certification Consideration Framework	744-OA-SCF		Scopes								
V2X Device: Minimum Testing Security Requirements	745-OA-MSR		Security				X		X	X	
Authorized Field Test Site Program	746-OA-AFTS	X	Field Testing	X	X	X	X		TBD	TBD	C
V2X Module	751-OA-V2X-Module	CV2X	Devices		O		O	X	O	O	O
V2X Infrastructure-to-Roadside Program	752-OA-I2F-Interface	X	Infrastructure			C				O (TBD)	X

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8.2. Connected Vehicle V2X

Certification Program Scopes	Specifications (* - In-works)	Radio Technology	Testing Functions	OQTE Test Equipment	OATL Test Lab	OAFTS Field Site	Reference Device	Module R1	OBU R1	RSU R1	Other Device
Test Elements								-			
Test Control Interface v2	737-OA-TCI2	DSRC		Obsolete	Obsolete	Obsolete	Obsolete	Obsolete	Obsolete	Obsolete	Obsolete
Test Control Interface v3	739-OA-TCI3	Both	Automated I/F	X			X	O	X	X	C
SCMS Certificates Request Instructions	748-OA-CertGen-Testing	X	Certificates/Signed	C	X	X	X		X	X	C
LTE-V Module-Global	759-OA-TSS&TP-CV2XModule	CV2X	Radio (Global)		C		O	X	O	O	O
WAVE MAC & Physical Layer (PHY)	760-OA-TSS&TP-80211p	DSRC	Radio (Region)	C	C				C	C	C
3GPP LTE-V Radio Release 14	761-OA-TSS&TP-36521	CV2X	Radio (Region)	C	X			X	X	X	X
LTE-V2X V-V Minimum Performance & Message Profiles	762-OA-TSS&TP-J31611 (adding add 3161/0 for RSUs)	CV2X	Device-Level Radio	C	C		X	C	X	X	X
WAVE Security Services	763-OA-TSS&TP-16092	X	Security WSM & WSA	C	X			C	X	X	X
SCMS Security Certificates & Services (CAMP-based)	764a-OA-TSS&TP-CAMP	x	Certificate Access	Expiring	Expiring		C (Expiring)		X (Expiring)	X (Expiring)	X (Expiring)
SCMS Security Certificates & Services (IEEE 1609-2-1 based)	764b-OA-TSS&TP-160921 *	CV2X	Certificate Access					C	O	O	O
WAVE Network Services	765-OA-TSS&TP-16093	X	WSM, WSA & IP		X		X		X	X	X
WAVE Multi-Channel & EDCA	766-OA-TSS&TP-16094	DSRC	CH Changing		C				C	C	C
V-V Minimum Performance (Bench)	767-OA-TSS&TP-J29451	X	Bench BSMs	C	X		C		X		
V-V Minimum Performance (Device-Level Field)	768-OA-TSS&TP-J29451A	X	Field BSMs	C	X	X	C		X		
V-V Minimum Performance / BSM Drive Test Checklist (Device-Level Field)	769-OA-TSS&TP-J29451A	X	Field BSMs	C	X	X	C		X		
RSU 4.1 Procedure	770-OA-TSS&TP-RSU41	DSRC	Bench WSMs WSA IF		C					Expiring	
RSU CV2X	771-OA-TSS&TP-CTI4001-TS10 Combo with Profiles /1, /2, & /3	X	DSRC & CV2X	C	C					O	
CTI 4001 RSU	772-OA-TSS&TP-CTI4001 *	CV2X	Bench WSMs WSA IF	C	C		O			CV2X	
Connected Intersection - TSC RSU Interface	773-OA-TSS&TP-CI-TSCRSUIF *	X	Infrastructure Data I/F		C	X	X			O	C
V2V Applications Set	780a-OA-TSS&TP-V2VApps *	X	Define	C	C	X			O		C
V2I or I2V Applications Set	780b79-OA-TSS&TP-V2IApps*	X	Define	C	C	X			O	O	C
V2XHUB Usage (in conjunction with OBU/RSU)	781-OA-TSS&TP-V2XHUB *	X	Messages	X	X		C				C
MAP Message Transmission	782-OA-TSS&TP-MAP	X	Intersection			C			Rx	Tx	C
SPaT Message Transmission	783-OA-TSS&TP-SPAT	X	Intersection			C			Rx	Tx	
SPAT Message Transmission with NEMA 1202v3 Interface	784-OA-TSS&TP-SPAT1202	CV2X	Intersection			C				O Tx	
NTCIP 1218 Interface with V2X Operations	785-OA-TSS&TP-1218 *	CV2X	TMC & RSU		RSU	C	X (RSU)			X	
Travelers Information Message Transmission	786-OA-TSS&TP-TIM *	X	Infrastructure						Rx	Tx	C
Personal Safety Message Transmission	787-OA-TSS&TP-PSM *	X	Infrastructure						O Rx	X	C
J3217 V2X Tolling	788-OA-TSS&TP-J3217 *	CV2X	Tolling Application						TBD	TBD	X
Radio Regulatory (DSRC Expiring)	FCC in USA. Other Local	CV2X	Compliance	N/A	O	Site	X	C	Part 95	Part 90	15/90/95
Safety					O						
Hardware Protected Security Environment (HPSE)					O				X	X	
Electrical Susceptibility					O						
Environmental Set (Temperature, Humidity, Vibration, Mechanical Shock/Drop etc) - Package					O			C	Undefined	X	
Durability/Reliability											
Temperature/Voltage (testing at L/M/H)					X	C	X	X	C	C	

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8.3. Tolling UHF RFID Single & Multi-Protocol

Certification Program Scopes	Specifications * - to be created (in the work)	Radio Mode SP - MP	Testing Functions	OQTE Test Equipment	OATL Test Lab	OAFS Field Site	Reference Device	Transponder / Tag / OB	Reader	Programme	Other Device
Certification Program Policies Manual	722-OA-CPPM		Certification Fundamentals	X	X	X	X	X	X	X	
Authorized Test Laboratory Program Manual	733-OA-ATL	X	Bench, Witness Field & Test Report	X	X	X	X	X	X	X	
Qualified Test Equipment Program Manual & Audit Checklists	738-OA-QTE Scope & 738b-OQTE-ACSR (Tolling) Checklist	X	OATL & OAFS	X			X				
Recertification and Product Change Guidelines	741-OA-RPCG	X	Devices		X		X	X	X	X	
Reference Device Program Manual	742-OA-RDPM	X	Devices	X	X	X	X	X	X		
Standards Certification Consideration Framework	744-OA-SCF		Scopes								
Authorized Field Test Site Program	746-OA-AFTS	X	Field Testing	X	X	X	X	X	X		
Single & Multi-Protocol Device (MPD) Conformity Assessment Program	750-OA-Tolling-SPD-MPD	X	Bench & Field Testing								
Test Elements											
TDM Tolling Protocol Conformance	800-OA-TSS&TP-CONF-TDM	SP	TDM Bench Conformance	X	X			-	X	X	
ISO 6B-80K Tolling Protocol Conformance	801-OA-TSS&TP-CONF-ISO6B80k	SP	6B-80K Bench Conformance	X	X			X	X	X	
ISO 6C Tolling Protocol Conformance	802-OA-TSS&TP-CONF-ISO6C	SP	6C Bench Conformance	X	X			X	X	X	
Tolling Environmental Tests for Tags & Readers	810-OA-TSS&TP-ENV-Devices	X	Environmental		X		X	X	X	X	
Tag Parameter Performance for TDM, ISO 6B-80K and ISO-6C	820-OA-TSS&TP-TPP-Tags	X	Bench Tag Performance		X		X	X	X	X	
Programming, Fulfilment & Delivery	825-OA-TSS&TP-Prod-Fulfilment-Tags *	X	Tag Programming	X	X			X			
Device Interoperability Performance in Single & Multi-Protocol Tolling	830-OA-TSS&TP-InOp-Devices	X	Bench SP & MP				X	X	X		
Operational States Involving TDM, ISO 6B-80K & ISO-6C											
Single Protocol Overhead Gantry Field Drive Test	840-OA-TSS&TP-Gantry-SPD	SP	SP Open Road Testing		Witness	X	X	C	C	C	
Multi-protocol Overhead Gantry Field Drive Test	841-OA-TSS&TP-Gantry-MPD	MP	MP Open Road Testing		Witness	X	X	C	C	C	
Multi-protocol Overhead Gantry Field Drive Test per E-ZPass RFQ	841a-OA-TSS&TP-Gantry-MPD	MP	E-Zpass Matrix		Witness	X		X	X	X	
Single Protocol Overhead Gantry Field Drive Test Baseline	842-OA-TSS&TP-Gantry-SPDBL	SP (842-ISO6C)	Original 6C Testing		Witness	X	C	X	X	X	
Multi-Protocol Overhead Plaza Field Drive	843-OA-TSS&TP-Plaza-MPD	X	Plaza Testing		Witness	O	O		O	O	
Single & Multi-Protocol UHF RFID Tolling Test Plan	850-OA-TSS&TP-SPD-MPD-TestPlan	X	Test Plan	X	X	X	X	X	X		
Radio Regulatory	FCC (Readers Part 15 & 90, Active Tags) in USA.	Readers	Compliance				X	Active Only	X	Part 15B	
Safety	IEC 62368-1(Y)										
Hardware Protected Security Environment (HPSE)	FIPS-140								x		
Electrical Susceptibility	IEC 61000-4 & 6								x		
Environmental Set (Temperature, Humidity, Vibration, Mechanical Shock/Drop etc) - Package durability/reliability	See 810-OA-TSS&TP-ENV-Devices Criteria							x	x		
Temperature/Voltage (testing at L/M/H)											

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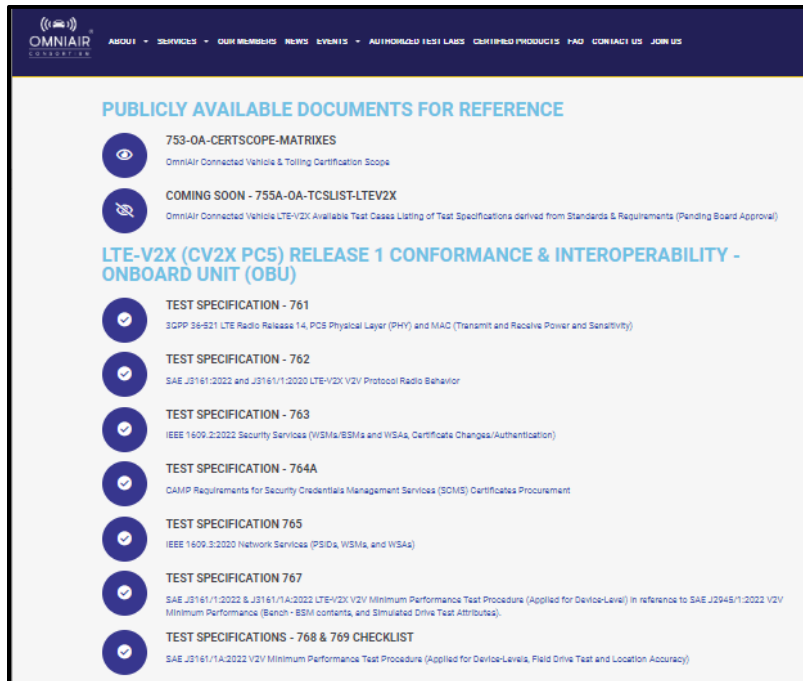
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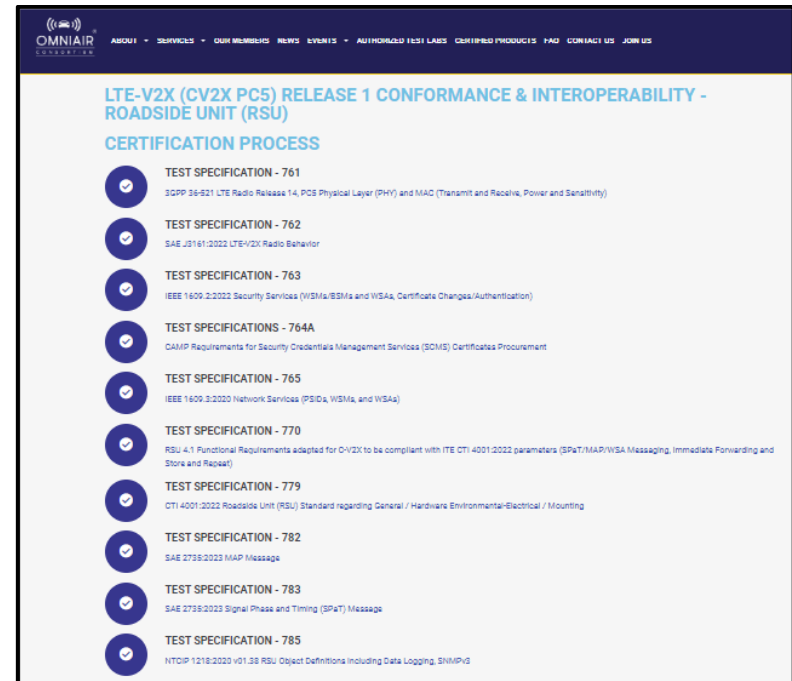
9. Certification Scope Summary Examples

9.1. Connected Vehicle V2X (OBU & RSU) Scopes Release 1



PUBLICLY AVAILABLE DOCUMENTS FOR REFERENCE

- 753-OA-CERTSCOPE-MATRIXES**
OmniAir Connected Vehicle & Tolling Certification Scope
- COMING SOON - 755A-OA-TCSLIST-LTEV2X**
OmniAir Connected Vehicle LTE-V2X Available Test Cases Listing of Test Specifications derived from Standards & Requirements (Pending Board Approval)
- LTE-V2X (CV2X PC5) RELEASE 1 CONFORMANCE & INTEROPERABILITY - ONBOARD UNIT (OBU)**
 - TEST SPECIFICATION - 761**
3GPP 36-821 LTE Radio Release 14, PCS Physical Layer (PHY) and MAC (Transmit and Receive Power and Sensitivity)
 - TEST SPECIFICATION - 762**
SAE J3161/1:2022 and J3161/1:2020 LTE-V2X V2V Protocol Radio Behavior
 - TEST SPECIFICATION - 763**
IEEE 1609.2:2022 Security Services (WSM/BSM and WSAs, Certificate Changes/Authentication)
 - TEST SPECIFICATION - 764A**
CAAMP Requirements for Security Credentials Management Services (SCMS) Certificates Procurement
 - TEST SPECIFICATION 765**
IEEE 1609.3:2020 Network Services (PSIDs, WSMs, and WSAs)
 - TEST SPECIFICATION 767**
SAE J3161/1:2022 & J3161/1A:2022 LTE-V2X V2V Minimum Performance Test Procedure (Applied for Device-Level) in reference to SAE J2945/1:2022 V2V Minimum Performance (Benchmark - BSM contents, and Simulated Drive Test Attributes)
 - TEST SPECIFICATIONS - 768 & 769 CHECKLIST**
SAE J3161/1A:2022 V2V Minimum Performance Test Procedure (Applied for Device-Level, Field Drive Test and Location Accuracy)



LTE-V2X (CV2X PC5) RELEASE 1 CONFORMANCE & INTEROPERABILITY - ROADSIDE UNIT (RSU)

CERTIFICATION PROCESS

- TEST SPECIFICATION - 761**
3GPP 36-821 LTE Radio Release 14, PCS Physical Layer (PHY) and MAC (Transmit and Receive, Power and Sensitivity)
- TEST SPECIFICATION - 762**
SAE J3161/1:2022 LTE-V2X Radio Behavior
- TEST SPECIFICATION - 763**
IEEE 1609.2:2022 Security Services (WSM/BSM and WSAs, Certificate Changes/Authentication)
- TEST SPECIFICATIONS - 764A**
CAAMP Requirements for Security Credentials Management Services (SCMS) Certificates Procurement
- TEST SPECIFICATION - 765**
IEEE 1609.3:2020 Network Services (PSIDs, WSMs, and WSAs)
- TEST SPECIFICATION - 770**
RSU 4.1 Functional Requirements adapted for O-V2X to be compliant with ITE OTI 4001:2022 parameters (SPAT/MAP/WSA Messaging, Immediate Forwarding and Store and Repeat)
- TEST SPECIFICATION - 779**
OTI 4001:2022 Roadside Unit (RSU) Standard regarding General / Hardware Environmental-Electrical / Mounting
- TEST SPECIFICATION - 782**
SAE 2738:2023 MAP Message
- TEST SPECIFICATION - 783**
SAE 2738:2023 Signal Phase and Timing (SPAT) Message
- TEST SPECIFICATION - 785**
NTOP 1218:2020 v01.38 RSU Object Definitions including Data Logging, SNMP/D

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9.2. Tolling UHF RFID Scope Release 2



UHF RFID Tolling Test Plan & Specifications

800-OA-TSS&TP-CONF-TDM TDM Tolling Protocol Conformance	830-OA-TSS&TP-InOp-Devices Device Interoperability Performance Single & Multi-Protocol Tolling Operational States involving TDM, ISO 6B-80K & ISO-6C
801-OA-TSS&TP-CONF-ISO6B80k ISO 6B-80K Tolling Protocol Conformance	840-OA-TSS&TP-Gantry-SPD Gantry Open Road Field Testing: Single-Protocol Operational Mode
802-OA-TSS&TP-CONF-ISO6C ISO 6C Tolling Protocol Conformance	841 -OA-TSS&TP-Gantry-MPD Gantry Open Road Field Testing: Multi-Protocol Mode
810a-OA-TSS&TP-ENV-Devices Tolling Environmental Tests for Tags & Readers	841a-OA-TSS&TP-Gantry-MPD-EZPass Gantry Open Road Field Testing: Multi-Protocol Mode per EZPass
820-OA-TSS&TP-TP-TP-Tags Tag Parameter Performance TDM, ISO 6B-80K or ISO-6C	842-OA-TSS&TP-Gantry SPDBL Gantry Open Road Field Testing: Single-Protocol Mode Baseline
825-OA-TSS&TP-PROG-FulFil-MPD Programming & Fulfilment Delivery TDM, ISO 6B-80K or ISO-6C	843-OA-TSS&TP-Plaza-MPD Gantry Plaza Field Testing: Single-Protocol Mode Baseline
	850-OA-TSS&TP-SPD-MPD-TestPlan Single & Multi-Protocol Device Operation Test Plan

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