



**MEET IN ASIA PACIFIC FOR THE
WORLD'S LEADING TRANSPORT TECHNOLOGY EVENT**
ACTIVATING GLOBAL MOBILITY SOLUTIONS
ITS—ENHANCING LIVEABLE CITIES AND COMMUNITIES

**2016
MELBOURNE**
23rd World Congress on Intelligent Transport Systems
Melbourne Convention and Exhibition Centre
10–14 October 2016

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7layers
wireless engineering and test centers

**Certification program for 5.9GHz DSRC supporting connected
vehicle deployments in the U.S.**



Cooperative Systems deployments in US

- Connected Vehicle Testbeds (US)
 - Florida: Orlando, Tampa
 - New York city: Manhattan
 - Wyoming – I80
- USDOT Smart City grant
 - Columbus, OH
- Safety Pilot deployment
 - Michigan: Novi, Detroit downtown, Ann Arbor, I-94 corridor
- Other pilots
 - Long Island, NY
 - Berkley, Palo Alto, CA
 - Maricopa County, AZ
 - Denver, CO



USDOT certification project

- The USDOT competitively selected three certification service providers (7Layers, Danlaw, and Southwest Research Institute (OmniAir)) and launched a 2 year project in 2015.
- All three work together through the Certification Operating Council (COC) to support certification testing for CV Pilots
- Vision is to help the industry to organize and run a self-sustaining certification program supporting deployment of DSRC-based services.



Danlaw provides connected vehicle telematics solutions and embedded electronics to OEMs and their Tier-1 supply chain.



OmniAir Certification Services (OCS) is a non-profit organization founded by OmniAir to execute independent certification for the intelligent transportation industry.



7Layers is an international group of engineering & test centers having a core competence in wireless technologies.

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Why certification

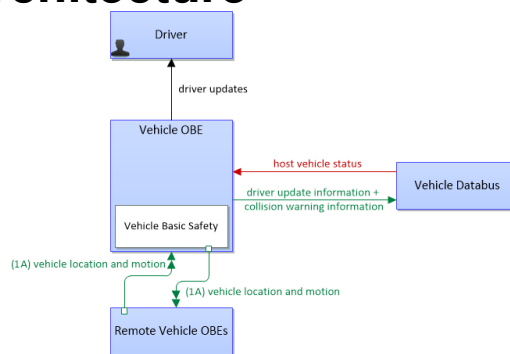
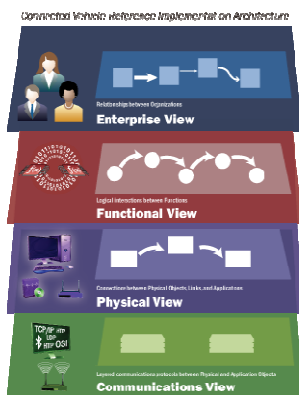
- Required by law (e.g. FCC)
- May be required by USDOT NPRM?
- Required to access security certificates
- Focuses on assurance of minimum quality standards
 - Conducted by independent neutral party
- Interoperable with OEM equipment
 - The same interpretation of technical standards
 - The same application configuration
- Enable government agencies and commercial entities to buy connected vehicle systems



U.S. Department of Transportation



Connected Vehicle Reference Implementation Architecture



Forward Collision Warning			
5	Physical	Jul 8, 2015	NAT

- Requirements, protocols, architecture and use cases for common V2X applications
- Systems Engineering Tool for Intelligent Transportation (SET-IT)
- Location: <http://www.iteris.com/cvria/>

Technical Standards

Data Messages

- SAE J2945/1 Requirements for V2V
- Encoding (ISO ASN.1 UPER)
- Process Information (SAEJ2735)

Data Transmission

- Transport (IEEE1609.3 WSMP, IPv6)
- Security (IEEE 1609.2)
- Link (IEEE 1609.4)
- Physical (IEEE 802.11)

Device Profiles

- V2V per SAE J2945/1
- V2V + SCMS per SAE J2945/1
- CV Pilot OBU
- CV Pilot RSU per USDOT RSU 4.1 spec

DSRC-WSMP		
vehicle location and motion -->		
Remote Vehicle OBEs		Transit Vehicle OBE
ITS Application Information Layer SAE J2735	Security Plane IEEE 1609.2	ITS Application Information Layer SAE J2735
Application Layer Undefined		Application Layer Undefined
Presentation Layer ISO ASN.1 DER	Security Plane Undefined	Presentation Layer ISO ASN.1 DER
Session Layer Undefined		Session Layer Undefined
Transport Layer IEEE 1609.3 WSMP	Security Plane Undefined	Transport Layer IEEE 1609.3 WSMP
Network Layer IEEE 1609.3 WSMP		Network Layer IEEE 1609.3 WSMP
Data Link Layer IEEE 1609.4, IEEE 802.11p, IEEE 802.11p	Security Plane Undefined	Data Link Layer IEEE 1609.4, IEEE 802.11p, IEEE 802.11p
Physical Layer IEEE 802.11p		Physical Layer IEEE 802.11p

Test Specifications

Test Specifications	Title / Scope
WAVE802.11-TSS&TP	Test Suite Structure and Test Purposes for IEEE 802.11 (scope of DSRC)
WAVEMCO-TSS&TP	Test Suite Structure and Test Purposes for Multi Channel Operation (IEEE 1609.4)
WAVENS-TSS&TP	Test Suite Structure and Test Purposes for Network Services (IEEE 1609.3)
WAVESEC-TSS&TP	Test Suite Structure and Test Purposes for Security Services (IEEE 1609.2)
J2945.1-TSS&TP	Test Suite Structure and Test Purposes for J2945.1
Test System Interface	Test Command Interface protocol specification Published at https://github.com/certificationoperatingcouncil/TCI_ASN1

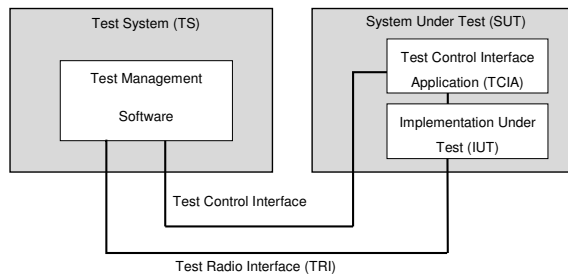
Reviewed and commented by



An example of a test procedure

Test Purpose Id	TP-80211-RXT-MAC-BV-02		
Summary	Transmit WSMs to IUT with static MAC address and verify frames are received by the IUT		
Test Configuration	Test Configuration 4		
Reference:	[2] Section 8.2.4.3.8		
PICS Selection	AD3, AD4 per [2]		
Pre-test conditions			
• The IUT is in initial state as per Section 4.3.1 of the test specification			
Test Sequence			
Step	Type	Description	Verdict
1	Configure	IUT as receiver on vChannel	
2	Configure	Test Equipment as transmitter on vChannel and vDataRate	
3	Configure	The test equipment to transmit WSMs at a nominal rate of 10 messages per second with a static MAC address of a test system.	
4	Stimulus	The test equipment to transmit.	
5	Verify	The IUT receives a WSM.	PASS/FAIL
6	Procedure	Repeat steps 2-5 for each supported value of vDataRate in Table 4-2	
7	Procedure	Repeat steps 1-6 for each supported value of vChannel in Table 4-1	
8	Configure	The IUT to initial state	

Test System Architecture



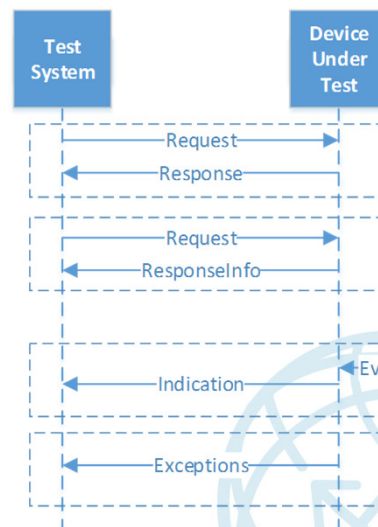
Test System vendors supporting Test Control Interface



- Built for automation
- Radio testing and protocol conformance
- Devices (IUTs) must implement a TCI application

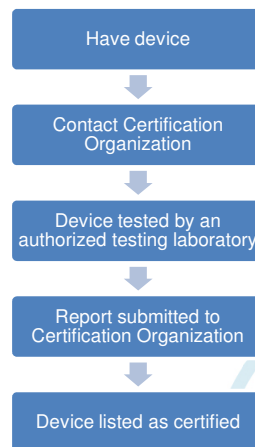
Test Control Interface

- Common interface definition between a test system and a Device Under Test (DUT)
 - Supported by test systems
 - Implemented as an application on DUT
- Supports automated testing
- Interface defined in ASN.1
- Download from github
 - https://github.com/certificationoperatingcouncil/TCI_ASN1
 - [TCI Msg Generator Portable](#)
- Supports all COC test specs



Certification Process

- Certification is similar to other certification schemes
- Certification applies to
 - in-vehicle modules (for OEM integration)
 - roadside devices
 - aftermarket devices
- Device manufacturers pay for certification



Device Certification Progression

Pre-commercial phase (2016-2017)

- Managed by the Certification Operating Council (USDOT project)
- Test specifications available
- 1st USDOT Plugtests for device interoperability in Nov 2016, Novi MI

Commercial certification phase (after 2017)

- Industry certification managed by an industry trade association - OmniAir

Interoperability Plugfest

As part of Phase 1 the Certification team will seek out vendors to conduct device testing and provide feedback as needed to support CV Pilot projects.

Proposed Plugfest Dates: November 15-18, 2016

Location: Danlaw facilities in Novi, Michigan

Organizers: COC organizations and Leidos

Participants: Device vendors, USDOT, Leidos, COC/OmniAir, Test Equipment Vendors, and Test Labs

Key Activity Tracks: V2V (BSM), Conformance Testing for core test specifications, interoperability testing among vendors


Agenda: Day 1 : public forum – open to everyone in person or via Web

Day 2-4 : open to device vendors

Register: <https://goo.gl/forms/Y5CQ6wFRQTNIAzrw1>



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7layers is the wireless/smart world expert of Bureau Veritas

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- worlds' leading wireless group
- located around the world with a strong footprint in Asia, Europe & North America.
- with more than 300 employees
- Independent test and validation services laboratory accredited to ISO 17025

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