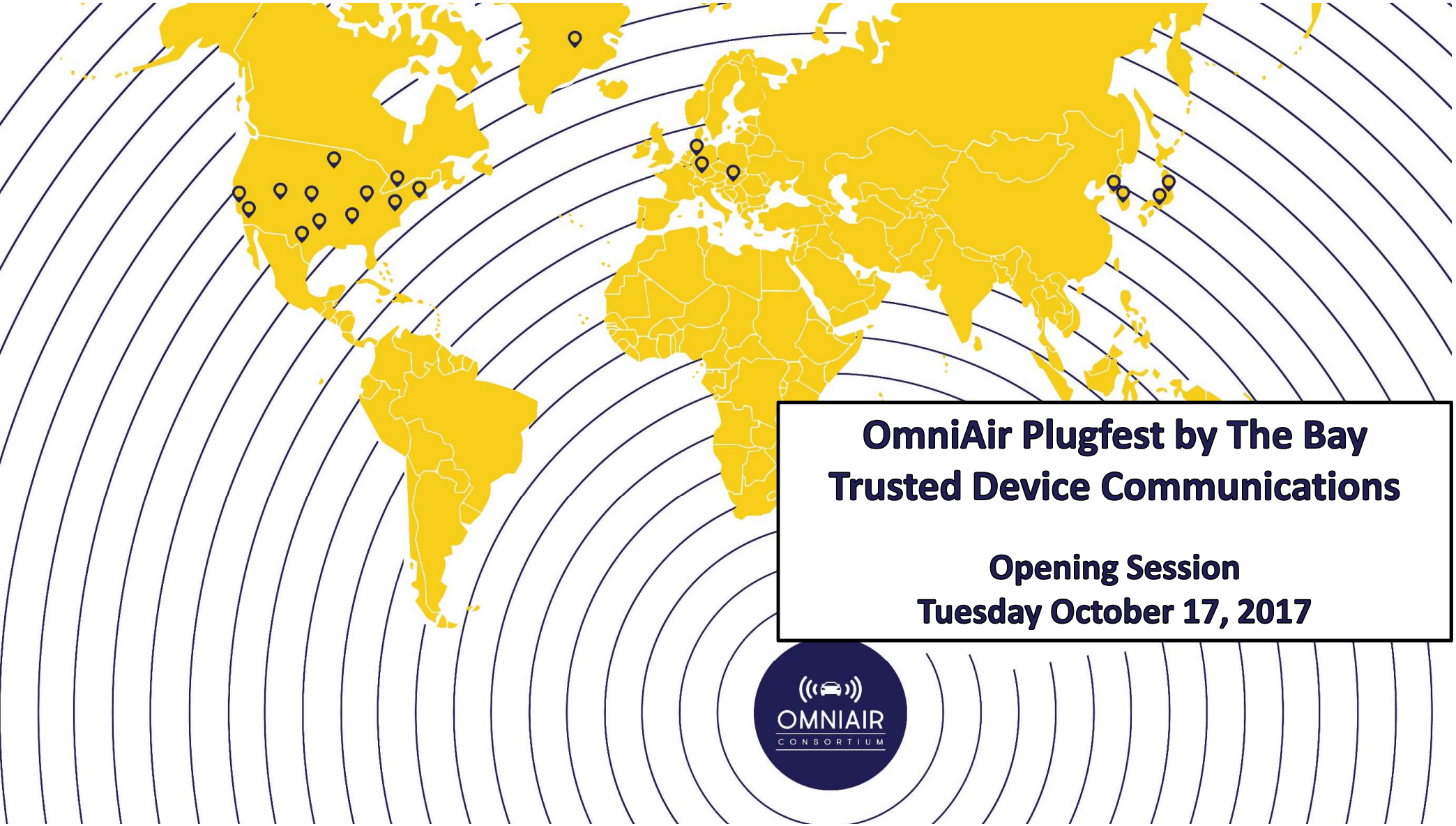


OmniAir Plugfest by The Bay
Trusted Device Communications

Opening Session
Tuesday October 17, 2017

OMNIAIR
CONSORTIUM

Visitor Agreement

By signing below, I certify to UL LLC and its related companies ("UL") that in return for UL allowing me to visit their facilities, I agree, on behalf of myself and, where applicable, my company, to the following:

- I understand that these facilities include dangerous equipment and processes, and that I could be injured. Therefore, I agree to wear all required personal protective equipment (e.g. safety glasses, hardhat, etc.) and to obey the requests of UL's staff.
- I will familiarize myself with the evacuation routes. In the event of an emergency, my escort or tour guide will escort me to the appropriate safe area.
- At all times during the visit, I will remain with my escort in the designated areas and will follow my escort's instructions.
- I will not examine, touch and/or handle anything in the laboratory unless authorized by UL personnel including products or samples that do not belong to me.
- I will wear and display the visitor badge - visible between the shoulders and waist – at all times and return it at the end of the visit.
- While visiting the facility, I acknowledge that I may have access to Confidential Information, and I agree not to use, remove from UL premises, reproduce, disclose or otherwise make publicly available any Confidential Information without UL's prior written consent. "Confidential Information" means any information or materials of UL or its customers that I observe or is disclosed to me in any format during my visit, including without limitation the set-up and design of testing equipment, UL processes, tools, business and marketing plans, client samples and product information including names, identifying features, technical specifications, testing phases and/or results.
- I will not use a camera, cell phone and/or any other device capable of recording or taking pictures unless specifically authorized in writing by a UL Lab Operations manager or their designate. Written authorization from lab management shall include specific details of what may be photographed or recorded. Any recording or photographing must be performed under supervision of lab management or their designate and must not include photography or videotaping of another company's products or testing.
- I have reviewed, understood and agreed to abide by UL's Visitor Safety Guidelines.

Daily Opening Statement: OMNIAIR CONSORTIUM - *ANTITRUST STATEMENT*

It is the policy of the OmniAir Consortium ("OmniAir") that the organization, its officers, Board of Directors, members and participants in its activities, shall comply in all respects with federal and State antitrust and/or fair competition laws, regulations, and rules, as may be applicable. Accordingly, no activity or discussion at any OmniAir-sponsored meeting or other function relating to competition or relating to practices that may restrain trade is permitted. Such prohibited topics include establishing prices, allocating markets, encouraging boycotts, regulating production, or any other understanding or agreement that may be construed as anti-competitive.

- Plugfest Registration sold out closed early with 37 devices, 150+ participants and ## companies representing 30 device manufacturers and 11 test equipment providers / test laboratories.
- No In-kind USDOT Contribution Requests since it is industry sponsored event. Congratulate the daily sponsor!
- Each Room Capacity is 68 people. Each test station is limited to 5. Test Equipment Operator is preferred 1 and 2 max.
- Testing Ticket per Device was designed to have people present at both test station and informational sessions running in parallel. Three people will be recommended at next plugfest's Testing Ticket per Device.
- Survey will be available at plugfest closing. We understand limited capacity issue!

Survey Feedback from previous Plugfests

- Increase test session duration and give testers break – Completed.
  - 2 hours slots (previous 1.5 hours) allowing 1.45 hours testing and 15 minute break / transition.
- Provide technical preparation awareness sessions – Completed.
  - 4 sessions held with first (~90 attendees) and last (~16).
- Announce plugfest 2 months in advance and test documents 1 month in advance – Completed
- Add more test slots – Completed
  - 260+ Bay Area (conformance / security) versus previous 143 San Antonio (bench/field) and 134 Detroit (bench). April 2018 in Detroit focusing on Release 2 (Interoperability & Field Sampling)!
- Provide Parallel Activities when not testing – Completed
  - Policy Workshop, Standards Update/Feedback, CV Pilot Roundtable, Security / Certificate Assistance, Test Equipment Providers Overview, Technical Committee & Certification Process.
- Focus on Conformance Certification and enabling Security – Completed
  - Conformance certification release 1 launching and using plugfest results as finalization.
  - Security / SCMS / Certificates 2016 being introduced and industry evaluated.
- Continue analytical device field location testing – Location and Provider Did Not Allow.
  - Providing Mobile Vehicle Testing with device interoperability consistency verification.
- Implement Interoperability and Field Verification Sampling – starting Release 2 activities (trial test cases and industry initiation calling).
- Cooperative, Collective, Comfortable and Friendly Atmosphere – Trying!

What makes OmniAir successful?

- Maintain technical and industry creditability and integrity!
- Our role is to help everyone to achieve and earn “Certification” but not give “Certification!”
- Successful certifications benefits everyone. Goal is to achieve six before next plugfest.
- Currently have one authorized V2X-DSRC test laboratory (7Layers) and two qualified test equipment providers (Danlaw & Spirent).
- Conformance Release 1 criteria requires combination of test equipment in both automated and manual modes to complete certification testing.
- Certification Components:
  - Test Cases / Device Profiles
  - Test Equipment
  - Test Laboratories
  - Reference Devices
  - Devices to Certify

Test Equipment:

- 3M
- Anritsu
- Danlaw
- Keysight
- Marben
- Spirent

Devices: OBUs - 27, RSUs - 10	
• Alps (OBU) • Aricent (OBU) • Autotalks (OBU) • Blackberry (OBU) • Carnavicom (OBU) • Chemtronics x2(OBE & RSU) • Cohda (RSU & OBU) • Commsignia (RSU & OBU) • Continental (OBU) • Danlaw (OBUx2) • Delphi (OBU) • Denso (OBU) • Essys (RSU) • eTrans (RSU & OBU)	• Genvict (OBU) • Hitachi (OBU) • ITRI (OBU) • IT-Telecom (RSU & OBU) • KETI (RSU & OBU) • Laird (OBU) • Lear (RSU & OBU) • Murati (OBU) • Panasonic (OBU) • Renesas (OBU) • Savari x2 (RSU & OBU) • Siemens (RSU) • SiriusXM (OBU) • Sumitomo (OBU)

Educational Activities Running Parallel to Test Sessions

Daily Test Sessions start 8:30am and ends 7:00pm Tuesday—Thursday and ends 3:00pm Friday

Daily Testing Stations	UL 802.11p 1609	7Layers 1609 J2945	Spirent 1609 J2945	Danlaw 802.11p 1609	Intertek 802.11p 1609	Dekra 802.11p 1609
8:00 to 9:45 am						
10:00 to 11:45 am						
1:00 to 2:45 pm						
3:00 to 4:45 pm						
5:00 to 6:45 pm						

One Testing Ticket reserved two slots per day if available!

Test Sessions full through Friday

Daily Testing Stations	3M J2735 MSG	Danlaw 802.11p J2735	Keysight 1609 J2735 BSM	[illegible] RSU4.1	V2V Mobile Inter-op
8:00 to 9:45 am					XXXXXXXXXXXXXX
10:00 to 11:45 am					Group Assignments
1:00 to 2:45 pm					Group Assignments
3:00 to 4:45 pm					Group Assignments
5:00 to 6:45 pm					XXXXXXXXXXXXXX

OMNIAIR CONSORTIUM

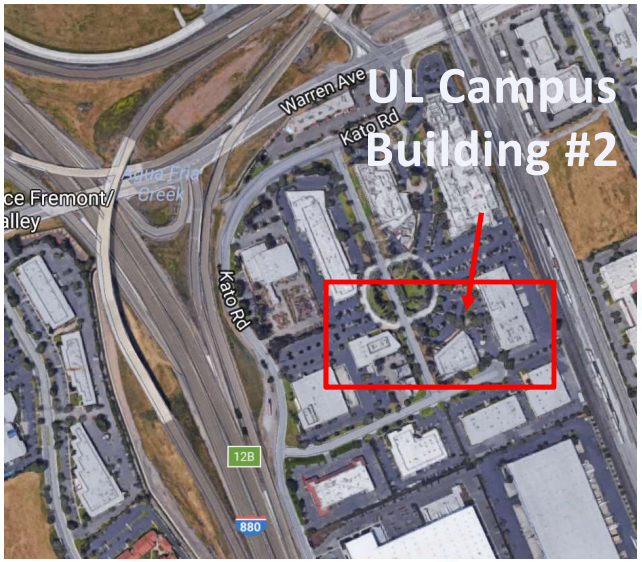
UL Verification Services

Address:
47266 Benicia St,
Fremont, CA 94538
(510) 771-1000

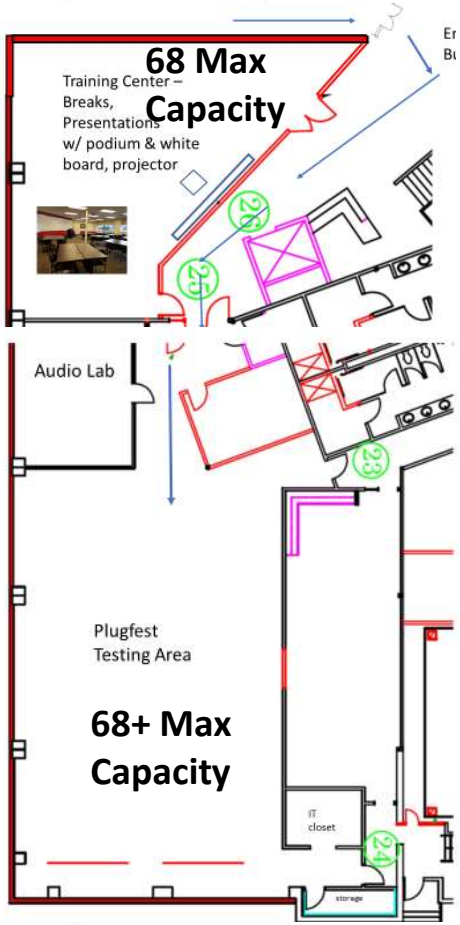
Shipping Address:
843 Auburn Ct.
Fremont, CA 94538
510-319-4000
Attn: Kendra Pridemore/Plugfest

- Test Equipment Manufacturers/Labs setup on Monday, October 16 starting at 8:00am until 1:00pm
- Tables setup and GPS Repeater in Testing Area (30'x40').
- Training Center (30'x35'x40' Triangle) with 10' Screen

Contact:
Andrew Harding
(248) 427-5323
andrew.harding@ul.com
Kendra Pridemore
(313) 421-7667
kendra.a.pridemore@ul.com



UL Fremont



Agenda - Activities Running Parallel to Test Sessions

Tuesday October 17		**Requirements / Needs Working**
8:00 to 8:15 am	Introductions	UL
8:15 to 9:30 am	Testing Overview	Randy Roebuck - OmniAir & Dmitri Khijniak - 7Layers
9:45 to 11:00 am	Standards SAE	David Kelley
11:00 to 12:00 pm	Standards IEEE	Kevin Smith
12:00 to 1:00 pm	Group Interoperability OBU/RSU Broadcast	Randy Roebuck - OmniAir
1:00 to 2:00 pm	Standard RSE	Ed Lesie
2:00 to 3:00 pm	Security & Certificates Interactive	Green Hills ISS & OnBoardSecurity
3:30 to 5:30 pm	Connected Vehicle Pilots Round Table	Steven Novasad & David Benevelli
Wednesday October 18		**Test Equipment Sponsor Day**
8:00 to 8:30 am	Announcements	UL / OmniAir
8:30 to 9:30 am	Authorized Test Laboratory	7Layers
9:30 to 10:30 am	Analytics for Connected Vehicles	Innovizo
10:30 to 11:15 am	Test Software	Marben
11:15 to 12:00 pm	Connected Roads	3M
12:00 to 1:00 pm	Group Interoperability OBU / RSU Broadcast	OmniAir
1:00 to 2:00 pm	Qualified Test Equipment	Danlaw
2:00 to 3:00 pm	Qualified Test Equipment	Spirent
3:00 to 4:00 pm	Test Equipment System	Keysight
4:00 to 5:00 pm	Test Equipment System	Anritsu
5:00 to 6:00 pm	Test Laboratory	UL
Thursday October 19		**Certification Working Day**
8:00 to 8:30 am	Announcements	UL / OmniAir
8:30 to 9:15 am	General Questions & Answers	Green Hills ISS & OnBoardSecurity
9:30 to 11:30 am	Application Process & Recertification Criteria	Kndra Pridemore – UL & Randy Roebuck - OmniAir
11:30 to 12:30 pm	Group Interoperability OBU/RSU Broadcast	Randy Roebuck - OmniAir
1:00 to 4:00 pm	CV Technical Committee	Dmitri Khijniak - 7Layers & Randy Roebuck – OmniAir
4:00 to 5:00 pm	Cyber Security Session	
Friday October 20		
8:00 to 8:30 am	Announcements	UL / OmniAir
8:30 to 10:00 am	Spring 2018 Plugfest Info & Survey	Jason Conley - OmniAir
9:00 to 1:00 pm	Private Sessions	OmniAir Staff

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Test Cases and Profiles:

- TC marked Required or Informational
- Each TC consideration requires two devices and two test tools verification.
- Requires plugfest trial.
- Using plugfest results for updating & finalization.
- Thursday's Technical Committee will address test cases and device profiles.

Test Case Name	Test Case Description	Validated	Profile				
			V2V OBU SC	V2V OBU MC	V2V OBU VAD	V2I RSU	Module
TP-BSM-ST-BV-01-X	DE_VehicleEventFlags if an event is occurring		R	R			
TP-BSM-ST-BV-02	First BSM transmitted after device restart uses a random time		R	R			
TP-BSM-ST-BV-03-X	Transmits BSM Correct Contents & Parameters		R	R			
TP-BSM-ST-BV-04	BSMs generated randomly of their scheduled generation time?		R	R			
TP-BSM-ST-BV-06	MsgCount incremented/rollover & TemporaryID not changed		R	R			
TP-BSM-ST-BV-07	Identification data						
TP-BSM-ST-BV-08	IUT signs every BSM						
TP-BSM-ST-BV-09	IUT Certificate afte						
TP-BSM-ST-BV-10-X	IUT certificate attac						
TP-BSM-ST-BV-13	After a device startu						
TP-BSM-ST-BV-18	data retention acro						
TP-BSM-ST-BI-19	IUT does not send						
TP-BSM-ST-BV-20-V	IUT's System Clock						
TP-BSM-ST-BV-21-V	Message Transmissi						
----BSM with security certificates							
TP-BSM-ST-BV-05	Identification data						
TP-BSM-ST-BV-11	IUT does not transm						
TP-BSM-ST-BV-12	IUT does not transm						
TP-BSM-ST-BV-14-V	Certificates Storage						
TP-BSM-MV-BV-12	wheelBrakes values						
TP-BSM-MV-BV-13	vehicle transmissio						
TP-BSM-MV-BV-14	vehicle length and						
J2735 & J2945/1	Transmit BSMs						
J2735	Receive BSMs						
IEEE 1609.3	Transmit WSAs						
IEEE 1609.3	Receive WSAs						
J2735	Transmit SPaT						
J2735	Receive SPaT						
J2735	Transmit TIM						
J2735	Receive TIM						
J2735	Transmit RTCM						
J2735	Receive RTCM						

Test Case Name	Test Case Description	Validated	Profile				
			V2V OBU SC	V2V OBU MC	V2V OBU VAD	V2I RSU	Module
TP-16093-WSM-MST-BV-01	IUT transmits WSM Correct Version & EtherType.		R	R		R	
TP-16093-WSM-MST-BV-02	IUT transmits valid WSM-T-Header & PSID		R	R		R	
TP-16093-WSM-ROP-BV-01	IUT transmits valid WSM CH N-Header		R	R		R	
TP-16093-WSM-ROP-BV-02	IUT transmits valid WSM Data Rate N-Header		R	R		R	
TP-16093-WSM-ROP-BV-03	IUT transmits valid WSM Transmit Power-N-Header		R	R		R	
TP-16093-WSM-PP-BV-01	IUT receives WSM without Header extensions		R	R	R	R	
TP-16093-WSM-PP-BV-02	IUT receives WSM with Header extensions		R	R	R	R	
TP-16093-WSM-COM-BV-01	IUT transmits WSMs in continuous mode		R	R		R	
TP-16093-WSM-COM-BV-02	IUT receives WSMs in continuous mode		R	R	R	R	
TP-16093-WSM-COM-BV-03	IUT transmits in alternating mode CH1 & CH2 (time slots 1&2?)			R		R	
TP-16093-WSM-COM-BV-04	IUT transmits on CH1 & receive on CH2			R		R	
TP-16093-WSM-COM-BV-05	IUT acknowledges WSMs in alternating mode CH1 and CH2			R		R	
TP-16093-WSM-POP-BI-01	IUT does not transmit WSMs exceeding WsmMaxLength		R	R		R	
TP-16093-WSA-MST-BV-01	IUT transmits WSMs v						
TP-16093-WSA-MST-BV-02	IUT transmits WSA co						
TP-16093-WSA-MST-BV-03	IUT transmits signed						
TP-16093-WSA-MST-BV-04-X	IUT transmits WSA He						
TP-16093-WSA-MST-BV-05-X	IUT transmits WSA Se						
TP-16093-WSA-MST-BV-06-X	IUT transmits WSA Ch						
TP-16093-WSA-MST-BV-07-X	IUT transmits WSA W						
TP-16093-WSA-MST-BV-08	IUT transmits WSA va						
TP-16093-WSA-PP-BV-01	IUT acknowleges secu						
TP-16093-WSA-PP-BV-02	IUT acknowledges WS						
TP-16093-WSA-PP-BV-03	IUT acknwlegdes WSA						
TP-16093-WSA-PP-BV-04	IUT acknowledges WS						
TP-16093-WSA-ROP-BV-01	IUT transmits WSA at						
TP-16093-WSA-CHG-BV-01	IUT changes WSA whe						
TP-16093-WSA-CHG-BV-02	IUT changes WSA whe						
TP-16093-IP-CFG-BV-01	IUT use WRA to confi						
TP-16093-IP-CFG-BV-02	IUT configures link-lo						
TP-16093-IP-CHG-BV-01	IUT resets link-local IP						
TP-16093-IP-CHG-BV-02	IUT resets IPv6 addres						
TP-16093-IP-COM-BV-01	IUT initiates a 2-way I						
TP-16093-IP-COM-BV-02	IUT initiates a 2-way I						
TP-16094-RXT-MDE-BV-01	IUT acknowledges W						
TP-16094-RXT-MDE-BV-02	IUT ackowledges WS						
TP-16094-TXT-MDE-BV-01	IUT transmits WSMs						
TP-16094-TXT-MDE-BV-02	IUT transmits WSMs						
TP-16094-TXT-IP6-BV-01	IUT transmits IPv6s o						
TP-16094-TXT-PER-BV-01	IUT transmits WSMs						
TP-16094-TXT-PER-BV-02	IUT transmits WSMs						
TP-16094-TXT-PER-BV-03	IUT transmits WSMs						

Test Case Name	Test Case Description	Validated	Profile				
			V2V OBU SC	V2V OBU MC	V2V OBU VAD	V2I RSU	Module
TP-80211-RXT-MAC-BV-01	IUT receives MAC frame		R	R	R	R	R
TP-80211-TXT-MAC-BV-01	MAC transmit frame format		R	R		R	R
TP-80211-TXT-PHY-BV-01	Transmit spectral mask		R	R		R	R
TP-80211-TXT-PHY-BV-02	center frequency tolerance		R	R		R	R
TP-80211-TXT-PHY-BV-03	symbol clock frequency tolerance		R	R		R	R
TP-80211-TXT-PHY-BV-04	Constellation RMS error & modulation accuracy		R	R		R	R
TP-80211-TXT-PHY-BV-05	Observed power is within spectral flatness		R	R		R	R
TP-80211-TXT-PHY-BV-06	Transmitter center frequency leakage		R	R		R	R
TP-80211-TXT-PHY-BV-07	Transmitter power is a monotonically increasing		R	R		R	R
TP-80211-RXT-PHY-BV-01	Receiver minimum input sensitivity		R	R	R	R	R
TP-80211-RXT-PHY-BV-02	OFDM adjacent channel rejection		R	R		R	R
TP-80211-RXT-PHY-BV-03	OFDM non adjacent channel rejection		R	R		R	R
TP-80211-RXT-PHY-BV-04	Receiver maximum input level		R	R	R	R	R
TP-80211-RXT-PHY-BV-05	Received channel power indicator		R	R	R	R	R
TP-16092-SPDUBSM-SEND-BV-01	BSM Security Header		R	R			
TP-16092-SPDUBSM-SEND-BV-02	BSM digitally signed certificate		R	R			
TP-16092-SPDUBSM-SEND-BV-03	BSM digitally signed digest		R	R			
TP-16092-SPDUBSM-SEND-BV-04	BSM certificate per vMaxCertDigestInterval.		R	R			
TP-16092-SPDUBSM-SEND-BV-05	BSM digest with valid signature		R	R			
TP-16092-SPDUBSM-SEND-BV-06	BSM certificate with valid signature		R	R			
TP-16092-SPDUBSM-RECV-BV-01	IUT acknowledges valid BSM security header.		R	R	R	R	
TP-16092-SPDUBSM-RECV-BV-02	IUT acknowledges valid BSM implicit certificate.		R	R	R	R	
TP-16092-SPDUBSM-RECV-BV-03	IUT acknowleges valid BSM signed digest.		R	R	R	R	
TP-16092-SPDUBSM-RECV-BV-04	IUT acknowledges valid BSM's certificate generationTime & Expiration		R	R	R	R	
TP-16092-SPDUBSM-RECV-BV-05	IUT acknowledges BSM's Digest generationTime & Expiration Time		R	R	R	R	
TP-16092-SPDUBSM-CERTCHG-BV-01	BSM's vCertChangeInterval Changes		R	R			
TP-16092-SPDUBSM-RECV-BI-01	IUT acknowledges invalid BSM with incorrect digest signature.		R	R	R	R	
TP-16092-SPDUBSM-RECV-BI-02	IUT acknowledges invalid BSM with incorrect certificate signature.		R	R	R	R	
TP-16092-SPDUWSA-SEND-BV-01	IUT generates correct WSA security header.					R	
TP-16092-SPDUWSA-SEND-BV-02	IUT generates correct WSA certificate data structure.					R	
TP-16092-SPDUWSA-SEND-BV-03	IUT generates WSA's signed ***digest*** of known certificate.					R	
TP-16092-SPDUWSA-SEND-BV-04	IUT generates WSA's Signed Certificate & ***Signature***					R	
TP-16092-SPDUWSA-RECV-BV-01	IUT acknowledge valid WSA security header.		R	R		R	
TP-16092-SPDUWSA-RECV-BV-02	IUT acknowledges valid implicit certificate signed WSA.		R	R		R	
TP-16092-SPDUWSA-RECV-BV-03	IUT acknowledges valid WSA signed digest of known certificate.		R	R		R	
TP-16092-SPDUWSA-RECV-BI-01	IUT acknowledges invalid WSA w/incorrect cert signature & not transmit.		Info	Info		Info	

Device Profiles

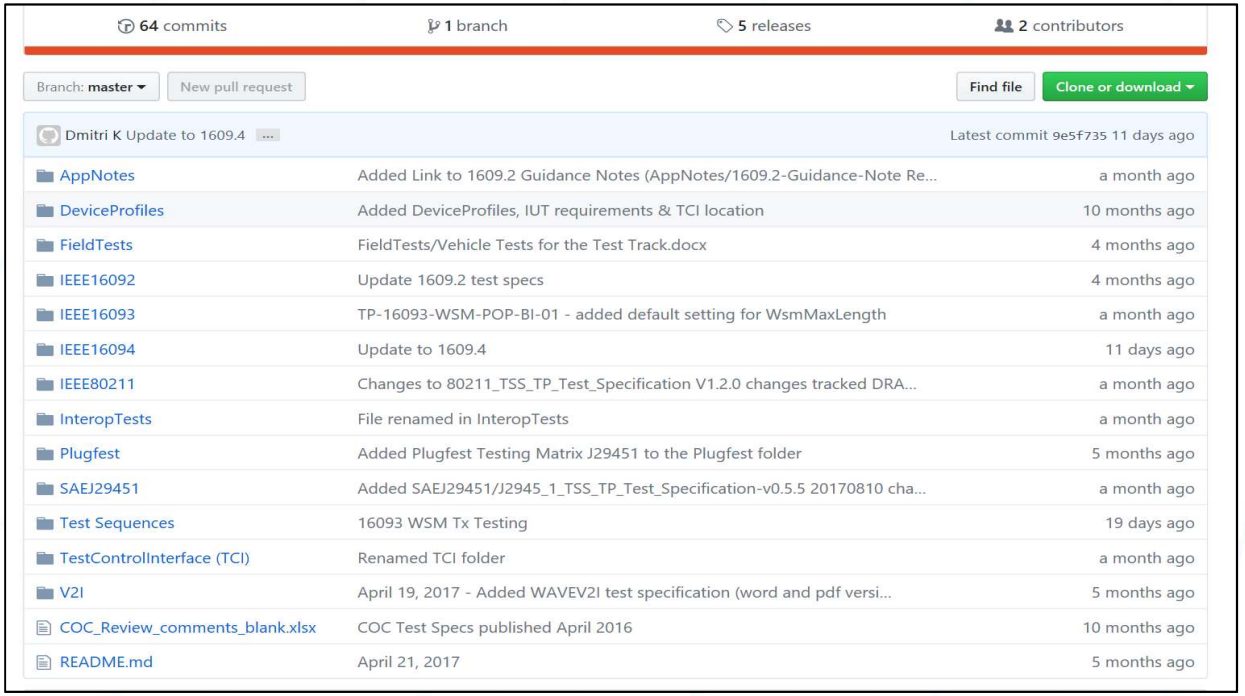
Requirements	V2V OBU Single channel	V2V OBU Multi channel	V2I RSU	V2V OBU VAD Single channel	Module (802.11p)
802.11p	All tests on 1 channel	All tests on all channels	All tests on all channels	Receive only, 1 channel	All tests on all channels
1609.3	WSM only, Tx/Rx	WSM, IPv6 - Tx/Rx, WSA Rx	WSM, IPv6 - Tx/Rx, WSA Tx	WSM - Rx	
1609.4	Continuous mode	Continuous & Alternating mode	Continuous & Alternating mode	Continuous mode	
1609.2	Security for BSM	Security for BSM, WSA	Security for BSM, WSA	Security for BSM	
2945/1	All tests	All tests	Receive tests	Receive tests	
RSU4.1v5			All tests		
Vehicle tests	Info only	Info only	Info only	Info only	Info only

Test Station Tracking Sheet

	For use by Test Station	Test Operator:	Date:					Test System:											
2	Test Case Name (TP-....)	Test Case Description	V2V OBU SC	V2V OBU MC	V2V OBU VAD	V2I RSU	Module	Device	Device	Device	Device	Device	Device	Device	Device	Device	Device	Device	Comments
3	80211-RXT-MAC-BV-01	IUT receives MAC frame	R	R	R	R	R												
4	80211-TXT-MAC-BV-01	MAC transmit frame format	R	R		R	R												
5	80211-TXT-PHY-BV-01	Transmit spectral mask	R	R		R	R												
6	80211-TXT-PHY-BV-02	center frequency tolerance	R	R		R	R												
7	80211-TXT-PHY-BV-03	symbol clock frequency tolerance	R	R		R	R												
8	80211-TXT-PHY-BV-04	Constellation RMS error & modulation accuracy	R	R		R	R												
9	80211-TXT-PHY-BV-05	Observed power is within spectral flatness	R	R		R	R												
10	80211-TXT-PHY-BV-06	Transmitter center frequency leakage	R	R		R	R												
11	80211-TXT-PHY-BV-07	Transmitter power is a monotonically increasing	R	R		R	R												
12	80211-RXT-PHY-BV-01	Receiver minimum input sensitivity	R	R	R	R	R												
13	80211-RXT-PHY-BV-02	OFDM adjacent channel rejection	R	R		R	R												
14	80211-RXT-PHY-BV-03	OFDM non adjacent channel rejection	R	R		R	R												
15	80211-RXT-PHY-BV-04	Receiver maximum input level	R	R	R	R	R												
16	80211-RXT-PHY-BV-05	Received channel power indicator	R	R	R	R	R												
17	**1609.2 testing**																		
18	16092-SPDUBSM-SEND-BV-01	BSM Security Header	R	R															
19	16092-SPDUBSM-SEND-BV-02	BSM digitally signed certificate	R	R															
20	16092-SPDUBSM-SEND-BV-03	BSM digitally signed digest	R	R															
21	16092-SPDUBSM-SEND-BV-04	BSM certificate per vMaxCertDigestInterval.	R	R															
22	16092-SPDUBSM-SEND-BV-05	BSM digest with valid signature	R	R															
23	16092-SPDUBSM-SEND-BV-06	BSM certificate with valid signature	R	R															
24	16092-SPDUBSM-RECV-BV-01	IUT acknowledges valid BSM security header.	R	R		R													
25	16092-SPDUBSM-RECV-BV-02	IUT acknowledges valid BSM implicit certificate.	R	R	R	R													
26	16092-SPDUBSM-RECV-BV-03	IUT acknowleges valid BSM signed digest.	R	R	R	R													
27	16092-SPDUBSM-RECV-BV-04	IUT acknowledges valid BSM's certificate generationTime & Expiration Time	R	R															
28	16092-SPDUBSM-RECV-BV-05	IUT acknowledges BSM's Digest generationTime & Expiration Time		R	R	R													
29	16092-SPDUBSM-CERTCHG-BV-01	BSM's vCertChangeInterval Changes	R	R															
30	16092-SPDUBSM-RECV-BI-01	IUT acknowledges invalid BSM with incorrect digest signature.		R	R	R													
31	16092-SPDUBSM-RECV-BI-02	IUT acknowledges invalid BSM with incorrect certificate signature.	R	R	R	R													
32	16092-SPDUWSA-SEND-BV-01	IUT generates correct WSA security header.				R													
33	16092-SPDUWSA-SEND-BV-02	IUT generates correct WSA certificate data structure.				R													
34	16092-SPDUWSA-SEND-BV-03	IUT generates WSA's signed digest of known certificate.				R													
35	16092-SPDUWSA-SEND-BV-04	IUT generates WSA's Signed Certificate & Signature				R													
36	16092-SPDUWSA-RECV-BV-01	IUT acknowledge valid WSA security header.	R	R		R													
37	16092-SPDUWSA-RECV-BV-02	IUT acknowledges valid implicit certificate signed WSA.	R	R		R													
38	16092-SPDUWSA-RECV-BV-03	IUT acknowledges valid WSA signed digest of known certificate.	R	R		R													
39	16092-SPDUWSA-RECV-BI-01	IUT acknowledges invalid WSA wIncorrect cert signature & not transmit.	Info	Info		Info													
40	**1609.3 testing**																		
41	16093-WSM-MST-BV-01	IUT transmits WSM Correct Version & EtherType.	R	R		R													
42	16093-WSM-MST-BV-02	IUT transmits valid WSM-T-Header & PSID	R	R		R													
43	16093-WSM-ROP-BV-01	IUT transmits valid WSM CH N-Header	R	R		R													
44	16093-WSM-ROP-BV-02	IUT transmits valid WSM Data Rate N-Header	R	R		R													
45	16093-WSM-ROP-BV-03	IUT transmits valid WSM Transmit Power-N-Header	R	R		R													
46	16093-WSM-PP-BV-01	IUT receives WSM without Header extensions	R	R	R	R													
47	16093-WSM-PP-BV-02	IUT receives WSM with Header extensions	R	R	R	R													
48	16093-WSM-COM-BV-01	IUT transmits WSMs in continuous mode	R	R		R													
49	16093-WSM-COM-BV-02	IUT receives WSMs in continuous mode	R	R	R	R													
50	16093-WSM-COM-BV-03	IUT transmits in alternating mode CH1 & CH2 (TS1&2)		R		R													
51	16093-WSM-COM-BV-04	IUT transmits on CH1 & receive on CH2		R		R													
52	16093-WSM-COM-BV-05	IUT acknowledges WSMs in altern. mode CH1 and CH2		R		R													
53	16093-WSM-POP-BI-01	IUT does not transmit WSMs exceeding WsmMaxLength	R	R		R													
54	16093-WSA-MST-BV-01	IUT transmits WSMs with a WSM header for the WSA				R													
55	16093-WSA-MST-BV-02	IUT transmits WSA correct version & valid header				R													
56	16093-WSA-MST-BV-03	IUT transmits signed WSAs				R													
57	16093-WSA-MST-BV-04-X	IUT transmits WSA Header fields				R													
58	16093-WSA-MST-BV-05-X	IUT transmits WSA Service Info Segment				R													
59	16093-WSA-MST-BV-06-X	IUT transmits WSA Channel Info Segment				R													
60	16093-WSA-MST-BV-07-X	IUT transmits WSA WRA Segment				R													
61	16093-WSA-MST-BV-08	IUT transmits WSA valid 2D Location				R													
62	16093-WSA-PP-BV-01	IUT acknowleges secure WSAs Header Extensions	R	R															
63	16093-WSA-PP-BV-02	IUT acknowledges WSAs Service Info Segment	R	R															
64	16093-WSA-PP-BV-03	IUT acknwledges WSAs Channel Info Segment	R	R															
65	16093-WSA-PP-BV-04	IUT acknowledges WSAs WRA	R	R															
66	16093-WSA-ROP-BV-01	IUT transmits WSA at a specified repeat rate.				R													
67	16093-WSA-CHG-BV-01	IUT changes WSA when PSC changes				R													
68	16093-WSA-CHG-BV-02	IUT changes WSA when service deleted				R													
69	16093-IP-CFG-BV-01	IUT use WRA to configure its global IPv6 address.		R															
70	16093-IP-CFG-BV-02	IUT configures link-local and global IPv6.		R		R													
71	16093-IP-CHG-BV-01	IUT resets link-local IPv6 address to a specific value		R															
72	16093-IP-CHG-BV-02	IUT resets IPv6 address		R															
73	16093-IP-COM-BV-01	IUT initiates a 2-way IPV6 to Remote Host on a different subnet.		R		R													
74	16093-IP-COM-BV-02	IUT initiates a 2-way IPV6 to Host using link-local address.		R		R													

Device Requirements & Testing:

- **Test Equipment Interface:** TCIs per 802.11p, 1609 and J2945/1
- **Test Case & TCI Specifications:** *https://github.com/certificationoperatingcouncil/COC_TestSpecs*
- **PSIDs: per Message Types:** 0x7F (test) and specific for test cases
- **Security Certificates:** Fall 2017 Plugfest or CAMP QA versions
- **Bench Testing per Test Cases:** Wired (no Over-The-Air)
- **Group Interoperability:** Wireless / Over-The-Air



64 commits | 1 branch | 5 releases | 2 contributors

Branch: master | New pull request | Find file | Clone or download

Dmitri K Update to 1609.4 ... Latest commit 9e5f735 11 days ago

AppNotes	Added Link to 1609.2 Guidance Notes (AppNotes/1609.2-Guidance-Note Re...	a month ago
DeviceProfiles	Added DeviceProfiles, IUT requirements & TCI location	10 months ago
FieldTests	FieldTests/Vehicle Tests for the Test Track.docx	4 months ago
IEEE16092	Update 1609.2 test specs	4 months ago
IEEE16093	TP-16093-WSM-POP-BI-01 - added default setting for WsmMaxLength	a month ago
IEEE16094	Update to 1609.4	11 days ago
IEEE80211	Changes to 80211_TSS_TP_Test_Specification V1.2.0 changes tracked DRA...	a month ago
InteropTests	File renamed in InteropTests	a month ago
Plugfest	Added Plugfest Testing Matrix J29451 to the Plugfest folder	5 months ago
SAEJ29451	Added SAEJ29451/J2945_1_TSS_TP_Test_Specification-v0.5.5 20170810 cha...	a month ago
Test Sequences	16093 WSM Tx Testing	19 days ago
TestControlInterface (TCI)	Renamed TCI folder	a month ago
V2I	April 19, 2017 - Added WAVEV2I test specification (word and pdf versi...	5 months ago
COC_Review_comments_blank.xlsx	COC Test Specs published April 2016	10 months ago
README.md	April 21, 2017	5 months ago

Test Cases:

- Specifications similar to previous Plugfest & frozen since August.
  - Changes since May Plugfest – small editorial changes based on vendor feedback, change track provided
  - Small changes to TCI ASN.1 to support IPv6
  - TCI Msg generator updated
- Will be updating test cases from test equipment qualification, Plugfest results and industry group feedback.

OMNIAIR CONSORTIUM

Test Slots Schedule Criteria (~250):

- Arranged to accommodate facility capacity.
- Arranged where every device manufacturer visits every test tool provider. Some may want to visit test provider "Anritsu & Keysight) not own their schedule during lunch.
- Did not know everyone's schedule on Friday! Please tell Ryan or Randy that your company will not attend on Friday where these test slots can be reassigned.
- Viewed every device as deployable and ready for certification.
- Using anonymous results for test case updating & finalization.
- Each device manufacturer can trade with others and arrange with Ryan for reassignment and poster schedule change.

Bay Area Plugfest 2017 Test Slot Assignments

Schedule was constructed with facility capacity issue and every device manufacturer seeing every test station type! Room Capacity = 45, Maximum People at Test Station = 4

30 Testing Tickets = | 27 OBUs + 10 RSUs | Testing Capacity = 25 Devices (3 sessions per day) | 11 Indoor + 1x3 Outdoor Test Stations | Testing Slots = **256**

Tuesday

Daily Testing Stations	UL 802.11p & 1609	7Layers RSU, 1609 & J2945	Spirent 1609 & J2945 GPS	Intertek 802.11p & 1609	Danlaw 802.11p, 1609 & RSU	Dekra 802.11p & 1609	Keysight 802.11p, 1609 & J2945
8 - 9:45am	Test Set-up	Test Set-up	Test Set-up	Test Set-up	Test Set-up	Test Set-up	Test Set-up
10 - 11:45 am	Denso OBU	Chemtronics OBU or RSU	Murata OBU	Renesas OBU	Cohda OBE or RSU	Lear (OBU or RSU)	eTrans OBU or RSU
1 - 2:45 pm	IT-Telecom OBU or RSU	Keti OBU or RSU	Panasonic OBU	Autotalks OBU	Blackberry OBU	Carnavicom OBU	Delphi OBU
3 - 4:45 pm	Lear OBU or RSU	Essys RSU	Danlaw OBE1 or OBE2	Aricent OBU	Chemtronics OBU or RSU	SiriusXM OBU	ITRI OBU
5 - 6:45 pm	Panasonic OBU	Saravi OBU or RSU	Sumitomo OBU	Continental OBU	Wayties OBU	Aricent OBU	Hitachi OBU
ght 802.11P with TCI	Reserved	XXXXXXXXXXXXX	XXXXXXXXXXXXX	1st Qualifier	2nd Qualifier	3rd Qualifier	

Daily Testing Stations	Anritsu 802.11p & J2735	Leidos RSU 4.1	Marben - J2735 45 min: 8,10,1,3,5	Marben - J2735 45 min: 9,11,2,4	3M - J2735 45 min: 8,10,1,3,5	3M - J2735 45 min: 9,11,2,4
8 - 9:45am	Test Set-up	Test Set-up	Test Set-up	Test Set-up	Test Set-up	Test Set-up
10 - 11:45 am	Danlaw OBE1 or OBE2	Savari RSU	Autotalks OBU	Wayties OBU	Commsignia OBU or RSU	Laird OBU
1 - 2:45 pm	Renesas OBU	XXXXXXXXXXXXXXX	Essys RSU	Murata OBU	Alps OBU	Siemens RSU
3 - 4:45 pm	Savari OBU or RSU	Siemens RSU	KETI (OBU or RSU)	Sumitomo OBU	Hitachi OBU	Carnavicom OBU
5 - 6:45 pm	Alps OBU	IT-Telecom RSU	Delphi OBU	Blackberry OBU	Chemtronics OBU or RSU	ITRI OBU

Mobile Vehicle # A	Mobile Vehicle # B	Mobile Vehicle # C
xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
xxxxxxxxxxxxxxx	Autotalks OBU	Laird OBU
Etrans (OBU)	Continental OBU	SiriusXM OBU
Denso (OBU)	Commsignia OBU	Cohda OBU
xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx

Test Systems

Group Interoperability =	All
Danlaw (Dawlaw, Dekra, Intertek & UL) =	16
Sprient (7Layers & Sprinet) =	8
Anritsu or Keysight =	8
Leidos RSU =	3
3M =	8
Marben =	8
Mobile Vehicle =	7
Overnight 802.11P Qualifer =	3
Total =	**61**

Tuesday

Wednesday

Daily Testing Stations	UL 802.11p & 1609	7Layers RSU, 1609 & J2945	Spirent 1609 & J2945 GPS	Intertek 802.11p & 1609	Danlaw 802.11p, 1609 & RSU	Dekra 802.11p & 1609	Keysight 802.11p, 1609 & J2945
8 - 9:45am	Blackberry OBU	Siemens RSU	Denso OBU	ITRI OBU	Murata OBU	Continental OBU	Savari OBU or RSU
10 - 11:45 am	Carnavicom OBU	Danlaw OBE1 or OBE2	IT-Telecom OBU or RSU	Laird OBU	Siemens RSU	eTrans OBU or RSU	Autotalks OBU
1 - 2:45 pm	Alps OBU	Etrans OBU or RSU	SiriusXM OBU	Sumitomo OBU	Renesas OBU or RSU	Delphi OBU	Blackberry OBU
3 - 4:45 pm	Renesas OBU	Aricent OBU or RSU	Autotalks OBU	Hitachi OBU	Commsignia OBU or RSU	Wayties OBU	Chemtronics OBU or RSU
5 - 6:45 pm	Denso OBU	Lear OBU or RSU	Wayties OBU	Laird OBU	Essys RSU	Savari OBU or RSU	Aricent OBU or RSU
ght 802.11P with TCI	4th Qualifier	XXXXXXXXXXXXX	XXXXXXXXXXXXX	5th Qualifier	6th Qualifier	7th Qualifier	

Daily Testing Stations	Anritsu 802.11p & J2735	Leidos RSU 4.1	Marben - J2735 45 min: 8,10,1,3,5	Marben - J2735 45 min: 9,11,2,4	3M - J2735 45 min: 8,10,1,3,5	3M - J2735 45 min: 9,11,2,4
8 - 9:45am	Carnavicom OBU	Commsignia RSU	Chemtronics OBU or RSU	Etrans OBU or RSU	Aricent OBU or RSU	Cohda OBU or RSU
10 - 11:45 am	Blackberry OBU	KETI RSU	ITRI OBU		Denso OBU	Etrans OBU or RSU
1 - 2:45 pm	Cohda OBU or RSU	Chemtronics RSU	Essys RSU	Denso OBU		Panasonic OBU
3 - 4:45 pm	Wayties OBU	Siemens RSU	Savari OBE or RSU	IT-Telecom OBU or RSU	Keti RSU	Lear OBU or RSU
5 - 6:45 pm	Hitachi OBU	Cohda RSU	SiriusXM OBU	Panasonic OBU	Continental OBU	Sumitomo OBU

Mobile Vehicle # A	Mobile Vehicle # B	Mobile Vehicle # C
Delphi (OBU)	Danlaw (OBU1or2)	Renesas (OBU)
Savari (OBU)	Panasonic OBU	Chemtronics OBU
Sumitomo OBU	IT-Telecom OBU or RSU	Aricent OBU
Alps OBU	Murata OBU	
xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx

Test Systems

Group Interoperability =	None
Danlaw (Dawlaw, Dekra, Intertek & UL) =	20
Sprient (7Layers & Sprinet) =	10
Anritsu or Keysight =	10
Leidos RSU =	5
3M =	10
Marben =	10
Mobile Vehicle =	12
Overnight 802.11P Qualifer =	4
Total =	**81**

Wednesday

Thursday

Daily Testing Stations	UL 802.11p & 1609	7Layers RSU, 1609 & J2945	Spirent 1609 & J2945 GPS	Intertek 802.11p & 1609	Danlaw 802.11p, 1609 & RSU	Dekra 802.11p & 1609	Keysight 802.11p, 1609 & J2945
8 - 9:45am	KETI OBU or RSU	Blackberry OBU	Laird OBU	Autotalks OBU	Chemtronics OBU or RSU	Murata OBU	Siemens RSU
10 - 11:45 am	ITRI OBU	Cohda OBU or RSU	Savari OBU or RSU	Delphi OBU	Siemens RSU	Denso OBU	Murata OBU
1 - 2:45 pm	Lear OBU or RSU	Alps OBU	Carnavicom OBU	Chemtronics OBU or RSU	Essys RSU	Hitachi OBU	Panasonic OBU
3 - 4:45 pm	SiriusXM OBU	Commsignia OBU or RSU	Renesas OBU	Laird OBU	Savari OBU or RSU	Panasonic OBU	Sumitomo OBU
5 - 6:45 pm	Autotalks OBE	Hitachi OBU	Continental OBU	Aricent OBU	Danlaw OBE1 or OBE2	KETI OBU or RSU	Renesas OBU
ght 802.11P with TCI	8th Qualifier	XXXXXXXXXXXXX	XXXXXXXXXXXXX	9th Qualifier	10th Qualifier	11th Qualifier	

Daily Testing Stations	Anritsu 802.11p & J2735	Leidos RSU 4.1	Marben - J2735 45 min: 8,10,1,3,5	Marben - J2735 45 min: 9,11,2,4	3M - J2735 45 min: 8,10,1,3,5	3M - J2735 45 min: 9,11,2,4,6
8 - 9:45am	Delphi OBU	Etrans RSU		Commsignia OBU or RSU	Wayties OBU	Savari OBU or RSU
10 - 11:45 am	Etrans OBU or RSU	Lear RSU	Alps OBU	Carnavicom OBU	Laird OBU	Autotalks OBE
1 - 2:45 pm	Sumitomo OBU	IT-Telecom RSU	Hitachi OBU	Cohda OBU	Delphi OBU	Renesis OBU
3 - 4:45 pm	IT-Telecom OBU or RSU	Essys RSU	Aricent OBU	Continental OBU	Murata OBU	Danlaw OBE1 & OBE2
5 - 6:45 pm	SiriusXM OBU	Cohda RSU	Essys RSU	Danlaw OBE1 or OBE2	Chemtronics OBU & RSU	Essys RSU

Mobile Vehicle # A	Mobile Vehicle # B	Mobile Vehicle # C
ITRI OBU	Hitachi OBU	Carnavicom OBU
Blackberry OBU	Wayties OBU	Commsignia OBU
Denso OBU	Etrans OBU	Savari OBU
Chemtronics OBU	Lear OBU	KETI OBU
xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx

Test Systems

Group Interoperability =	All
Danlaw (Dawlaw, Dekra, Intertek & UL) =	20
Sprient (7Layers & Sprinet) =	10
Anritsu or Keysight =	10
Leidos RSU =	5
3M =	10
Marben =	10
Mobile Vehicle =	12
Overnight 802.11P Qualifer =	4
Total =	**81**

Thursday

Friday

Daily Testing Stations	UL 802.11p & 1609	7Layers RSU, 1609 & J2945	Spirent 1609 & J2945 GPS	Intertek 802.11p & 1609	Danlaw 802.11p, 1609 & RSU	Dekra 802.11p & 1609	Keysight 802.11p, 1609 & J2945
8 - 9:45am	It-Telecom OBU or RSU	ITRI OBU	Chemtronics OBU or RSU	SiriusXM OBU	Alps OBU	Sumitomo OBU	Essys RSU
10 - 11:45 am	Carnavicom OBU	Savari OBU or RSU	Delphi OBU	Murata OBU	KETI OBU or RSU	Continental OBU	Cohda OBU or RSU
1 - 2:45 pm	Cohda OBU or RSU	Danlaw OBU1 or OBU2	Wayties OBU	Etrans OBU or RSU	Commsignia OBU or RSU	xxxxxxxx	Continental OBU

Daily Testing Stations	Anritsu 802.11p & J2735	Leidos RSU 4.1	Marben - J2735 45 min: 8,10,1,3,5	Marben - J2735 45 min: 9,11,2,4	3M - J2735 45 min: 8,10,1,3,5	3M - J2735 45 min: 9,11,2,4,6
8 - 9:45am	Commsignia OBU	xxxxxxxxxxxxxxx	Renesas OBU	Lear OBU or RSU	Savari OBU or RSU	Blackberry OBU
10 - 11:45 am	Chemtronics OBU or RSU	xxxxxxxxxxxxxxx	Laird OBU	Siemens RSU	Renesas OBU	IT-Telecom OBU or RSU
1 - 2:45 pm	Panasonic OBU	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx

Friday

Test Systems

Group Interoperability =	None
Danlaw (Dawlaw, Dekra, Intertek & UL) =	11
Sprient (7Layers & Sprinet) =	6
Anritsu or Keysight =	6
Leidos RSU =	0
3M =	4
Marben =	6
Mobile Vehicle =	0
Overnight 802.11P Qualifer =	0
Total =	**33**
Totsl Testing =	**256**

Test Slots Open:

- Some open decoding slots (~5-10) are available!
- Device Manufacturers are responsible for test slot swapping.

T	W	TH	F	SUM	Device Testing	SpirentTS	DanlawTS	3MTS	Anritsu	Keysight	Leidos	Marben	Driving
2	2	2	1	**7**	Alps (OBU)	1	2	1	1	0	0	1	1
2	4	2	0	**8**	Aricent (OBU)	1	3	1	0	1	0	1	1
3	2	3	0	**8**	AutoTalks (OBU)	1	3	1	0	1	0	1	1
2	3	2	1	**8**	Blackberry (OBU)	1	2	1	1	1	0	1	1
2	2	3	1	**8**	Carnavicom (OBU)	1	3	1	1	0	0	1	1
3	4	4	2	**13**	**Chemtronics (OBU)**	2	3	2	1	1	1	1	2
0	0	0	0	**0**	**Chemtronics (RSU)**	0	0	0	0	0	0	0	0
2	3	3	1	**9**	**Cohda (OBU or RSU)**	1	1	1	1	1	2	1	1
2	2	3	2	**9**	**Commsignia (OBU or RSU)**	1	2	1	1	0	1	1	2
2	2	2	2	**8**	Continental (OBU)	1	3	1	0	1	0	1	1
2	2	3	1	**8**	**Danlaw (OBU1 or OBU2)**	2	2	1	1	0	0	1	1
2	2	3	1	**8**	**Delphi (OBU)**	1	2	1	1	1	0	1	1
2	4	2	0	**8**	Denso (OBU)	1	3	1	0	0	0	1	2
2	2	4	1	**9**	**Essys (RSU)**	1	2	1	0	1	1	3	0
2	4	3	1	**10**	**Etrans (OBU or RSU)**	1	2	1	1	1	1	1	2
2	2	4	0	**8**	Hitachi (OBU)	1	2	1	1	1	0	1	1
2	2	2	1	**7**	ITRI (OBU)	1	2	1	0	1	0	1	1
2	3	2	2	**9**	**IT-Telecom (OBU or RSU)**	1	2	1	1	0	2	1	1
2	2	3	1	**8**	Keti (OBU or RSU)	1	3	1	0	0	1	1	1
2	2	3	1	**8**	Laird Tech (OBU)	1	3	2	0	0	0	1	1
2	2	3	1	**8**	**Lear (OBU or RSU)**	1	3	1	0	0	1	1	1
2	2	3	1	**8**	Murata (OBU)	1	3	1	0	1	0	1	1
2	3	2	1	**8**	**Panasonic (OBU)**	1	2	1	1	1	0	1	1
2	3	2	2	**9**	**Renesas (OBU)**	1	3	1	1	1	0	1	1
2	4	4	2	**12**	**Savari (OBU)**	2	2	2	1	1	1	1	2
0	0	0	0	**0**	**Savari (RSU)**	0	0	0	0	0	0	0	0
2	3	2	1	**8**	Siemens (RSU)	1	2	1	0	1	2	1	0
2	2	2	1	**7**	SiriusXM (OBU)	1	3	0	1	0	0	1	1
2	3	2	1	**8**	Sumitomo (OBU)	1	2	1	1	1	0	1	1
2	3	2	1	**8**	**Wayties (OBU)**	2	2	1	1	0	0	1	1
4	4	4	1	**13**	Overnight 802.11 Qualifier								
62	**78**	**79**	**31**	**250**	**Totals (30 tickets = 27 OBUs + 10 RSUs)**	**32**	**67**	**30**	**17**	**17**	**13**	**30**	**31**

Test Tool Overview

Test tools	Test stations	Capabilities overview
Danlaw	Danlaw, Dekra, Intertek, UL, (7layers)	COC Test Specs 802.11p, 1609.4, 1609.3, 1609.2 Use TCI
Spirent	7layers, Spirent	COC Test Specs 1609.3, 1609.2, 2945/1 (lab only) Use TCI
Anritsu	Anritsu	
Keysight	Keysight	COC Test Specs 802.11p, 1609.4, 1609.3, 1609.2, 2945/1 (partial), Use TCI
3M	3M	Rcv & decode 802.11p, 1609.3, 1609.2, J2735 msgs WSM, WSA, BSM, SPAT, MAP, TIM, etc
Marben	Marben	Rcv & decode 802.11p, 1609.3, 1609.2, J2735 msgs WSM, WSA, BSM, SPAT, MAP, TIM, etc
RSU tests	Leidos	Leidos - RSU testing per FHWA RSU Test Plan
3M & Other OBUs	Driving tests	Perform J2945/1 test and capture PCAP Location accuracy, latch/unlatch direction, path history analysis

Testing:

- Joint Cooperative Learning Activity between Test Laboratory, Test Equipment and Device Manufacturer.
- Five people per Test Station. One test operator preferred (2 max). Observers will need to escorted.
- Test Facilitator team (10) is **Randy Roebuck** (OminAir), **Dmitri Khijniak** (7 Layers), **Chris Ajayi** (3M), **Mostafa Kassem** (Danlaw), **Dirk Tepelmann** (Spirent), **Dan Fynaardt** (Green Hills ISS), **James Coleman** (OnBoardSecurity) and standards leaders (**Kevin Smith, David Kelley & Ed Leslie**). Other test laboratory representatives (**Ben Taylor** – MetLabs & etc.) and USDOT (**Jeff Bellone**) are invited.
- Introduce **Test Station Providers** – 3M, 7Layers, Anritsu, Danlaw, Dekra, Keysight, Intertek, Marben & Spirent.
- **Dmitri Khijniak** (OmniAir's CV technical committee chair) will be collecting test results COB through test sheets and designated USB sticks and reporting anonymous results and summary Thursday afternoon. PCAP recommended from J2735 messages from 3M test standard and any certificate changing test. Format is: "**[MessageType]-[Device Type]-[Manufacturer].pcap**"
- Group Test Equipment Provider Meeting at **7:45am** to address previous day issues.
- All indoor transmitting to be conducted "wire" or without antennas if not interfering.
- All test data transferred on OmniAir USB Requires plugfest trial.
- Using plugfest results for updating & finalization.

Tuesday October 17 – Schedule

Overnight 802.11p TCI Testing Bonus

Bay Area Plugfest 2017 Test Slot Assignments

Schedule was constructed with facility capacity issue and every device manufacturer seeing every test station type! Room Capacity = 68, Maximum People at Test Station = 5

30 Testing Tickets = 27 OBUs + 10 RSUs Testing Capacity = 25 Devices (3 sessions per day) 11 Indoor + 1x3 Outdoor Test Stations Testing Slots = **256**

Tuesday

Daily Testing Stations	UL 802.11p & 1609	7Layers RSU, 1609 & J2945	Spirent 1609 & J2945 GPS	Intertek 802.11p & 1609	Danlaw 802.11p, 1609 & RSU	Dekra 802.11p & 1609	Keysight 802,11p, 1609 & J2945
8 - 9:45am	Test Set-up	Test Set-up	Test Set-up	Test Set-up	Test Set-up	Test Set-up	Test Set-up
10 - 11:45 am	Denso OBU	Chemtronics OBU or RSU	Murata OBU	Renesas OBU	Cohda OBE or RSU	Lear (OBU or RSU)	eTrans OBU or RSU
1 - 2:45 pm	IT-Telecom OBU or RSU	Keti OBU or RSU	Panasonic OBU	Autotalks OBU	Blackberry OBU	Carnavicom OBU	Delphi OBU
3 - 4:45 pm	Lear OBU or RSU	Essys RSU	Danlaw OBE1 or OBE2	Aricent OBU	Chemtronics OBU or RSU	SiriusXM OBU	ITRI OBU
5 - 6:45 pm	Panasonic OBU	Saravi OBU or RSU	Sumitomo OBU	Continental OBU	Wayties OBU	Aricent OBU	Hitachi OBU
ght 802.11P with TCI	Reserved	XXXXXXXXXXXXX	XXXXXXXXXXXXX	1st Qualifier	2nd Qualifier	3rd Qualifier	

Test Systems

Group Interoperability =	All
Danlaw (Dawlaw, Dekra, Intertek & UL) =	16
Sprient (7Layers & Sprinet) =	8
Anritsu or Keysight =	8
Leidos RSU	3
3M =	8
Marben =	8
Mobile Vehicle =	7
Overnight 802.11P Qualifer =	3
Total =	**61**

Tuesday

Daily Testing Stations	Anritsu 802.11p & J2735	Leidos RSU 4.1	Marben - J2735 45 min: 8,10,1,3,5	Marben - J2735 45 min: 9,11,2,4	3M - J2735 45 min: 8,10,1,3,5	3M - J2735 45 min: 9,11,2,4	Mobile Vehicle # A	Mobile Vehicle # B	Mobile Vehicle # C
8 - 9:45am	Test Set-up	Test Set-up	Test Set-up	Test Set-up	Test Set-up	Test Set-up	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx
10 - 11:45 am	Danlaw OBE1 or OBE2	Savari RSU	Autotalks OBU	Wayties OBU	Commsignia OBU or RSU	Laird OBU	xxxxxxxxxxxxxx	Autotalks OBU	Laird OBU
1 - 2:45 pm	Renesas OBU	XXXXXXXXXXXXXX	Essys RSU	Murata OBU	Alps OBU	Siemens RSU	Etrans (OBU)	Continental OBU	SiriusXM OBU
3 - 4:45 pm	Savari OBU or RSU	Siemens RSU	KETI (OBU or RSU)	Sumitomo OBU	Hitachi OBU	Carnavicom OBU	Denso (OBU)	Commsignia OBU	Cohda OBU
5 - 6:45 pm	Alps OBU	IT-Telecom RSU	Delphi OBU	Blackberry OBU	Chemtronics OBU or RSU	ITRI OBU	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx

Overall Testing Requirements

- **Test Control Interfaces** [TCI] is strongly recommended for bench conformance testing through 1609.2, 1609.3 and 1609.4.
- Most **1609 tests** will be wired with device recommended in isolated box. Signal attenuators are recommended.
- **IEEE 802.11p testing** require TCI interface or test equipment's proprietary chipset interfaces. 802.11p is a wired test with the device in isolated box.
- Devices will require **security header** regardless if broadcasting unsecured or signed messages.
- All devices indoors will be operating at default parameters (Power 15 dBm, 6 Mbps, and PSID 0x7FFF - Test) for WSM except for individual parameter variable under test.
- **For 2945/1 testing**, device is expected to operate at default parameters. TCI is recommended for some J2945/1 bench testing for 0x20 BSMs (and 0x23 SCMS).
- Each test session may be required to use different channels for 1609.3 / 1609.4 (WSM, WSA and IPv6) testing at 10 & 20 Hz if interference occurs. N-Type Header (Channel,DateRate, Power) suggested.
- All **PCAP files** represent over-the-air captures both externally and internally.
- OmniAir's USBs will be used to transfer data and presentations. USB sticks provided to capture internal PCAP files under recommended file naming structure: "**[TestDescription]-[Device Type]-[Manufacturer]-[TestStation].pcap**"

Plugfest IP settings for testing with TCI

The communication between the Test Station and SUT using TCI uses UDP/IPv4 protocol. The IPv4 addresses selected from the following ranges:

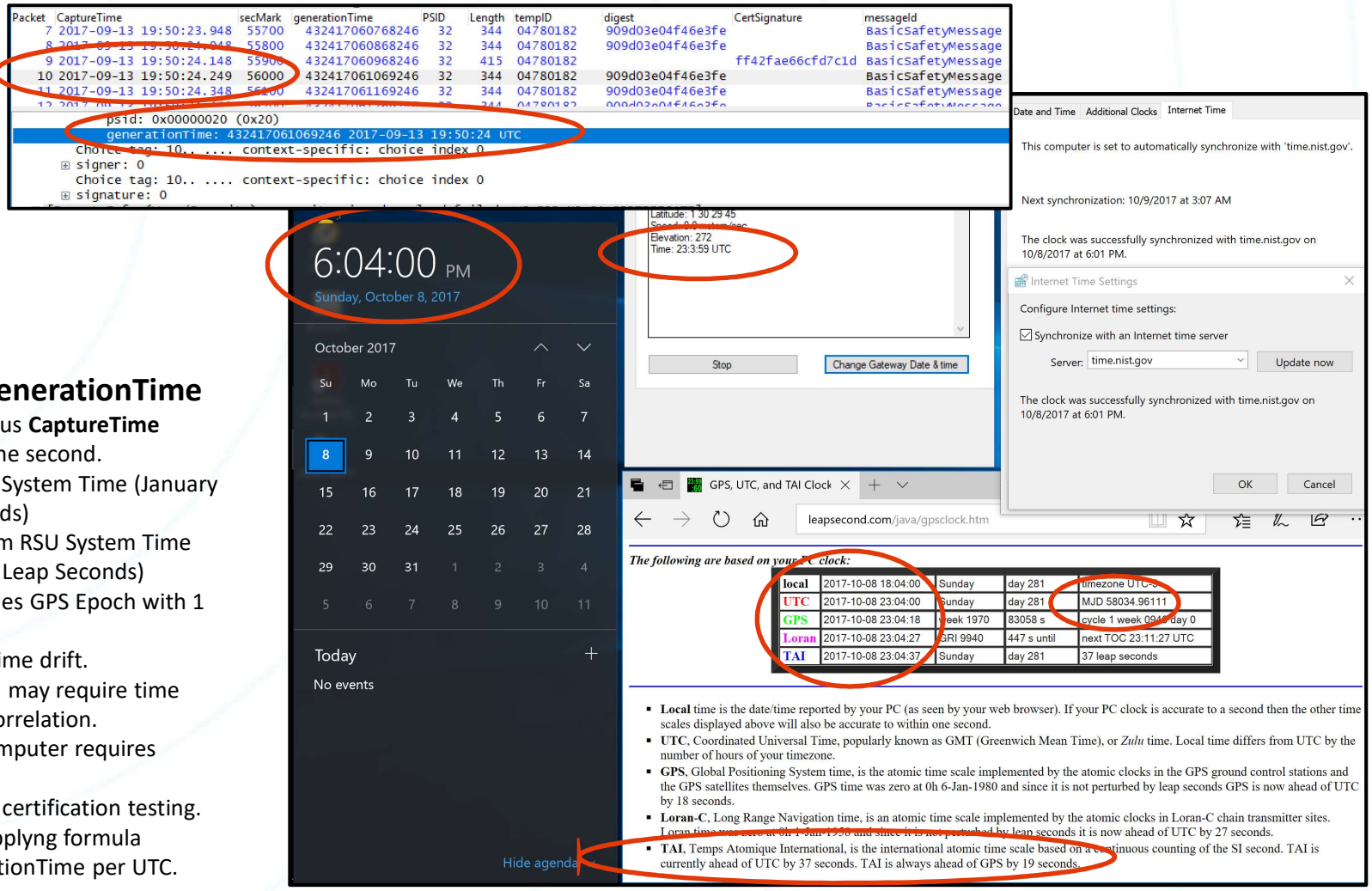
Testing System: **192.168.23.1 … 127**, subnet 255.255.255.0

SUT: **192.168.23.128 … 254**, subnet 255.255.255.0

IP Address assignment for Test Systems (which use TCI)	
3M	192.168.23.1…192.168.23.5 subnet 255.255.255.0
7Layers	192.168.23.6…192.168.23.10 subnet 255.255.255.0
Anritsu	192.168.23.11…192.168.23.15 subnet 255.255.255.0
Danlaw	192.168.23.16…192.168.23.20 subnet 255.255.255.0
Dekra	192.168.23.21…192.168.23.25 subnet 255.255.255.0
Green Hills	192.168.23.26…192.168.23.30 subnet 255.255.255.0
Intertek	192.168.23.31…192.168.23.35 subnet 255.255.255.0
Keysight	192.168.23.36…192.168.23.40 subnet 255.255.255.0
OmniAir	192.168.23.41…192.168.23.45 subnet 255.255.255.0
Onboard	192.168.23.46…192.168.23.50 subnet 255.255.255.0
Spirent	192.168.23.51…192.168.23.55 subnet 255.255.255.0
UL	192.168.23.56…192.168.23.60 subnet 255.255.255.0
Marben	192.168.23.61…192.168.23.65 subnet 255.255.255.0
Leidos	192.168.23.66…192.168.23.70 subnet 255.255.255.0
Unused	192.168.23.71…192.168.23.75 subnet 255.255.255.0
Unused	192.168.23.76…192.168.23.80 subnet 255.255.255.0
Common use	192.168.23.81…192.168.23.27 subnet 255.255.255.0
SUT device IP range	192.168.23.128 … 192.168.23.254, subnet 255.255.255.0

- **IEEE 1609.2a-2017** standard was published 09 October 2017.
- **SAE 2945/2** V2V Safety Awareness closed 10/16.
- San Antonio Plugfest **certificates expired** 10/2 (RSU) and 10/3 (OBU).
- **Chained Root Certificates** distributed to Device Manufacturers and Test Equipment Providers in early October. **Contact GHS** if you didn't get them.
- Security Library needs to accept New Certificates and Security Profiles.
- Updated Security Libraries became available in mid-October for device manufacturers and test equipment integration.
  - Understand JIT integrations did not allow internal testing before plugfest.
- **Local MAP Intersection** Sample (**David Kelley**) has been created and posted to **Github**. Unfortunately, RSU sites did not become available along test route.
- Questions for **Security & Certificates Interactive Session** (separate slide).
- Thursday's **Technical Committee meeting** - questions received and incorporated into agenda.
  - VAD Device Profile Consideration (Need Endorser, Sponsor, Requirements & Business Case)
  - Software Stack Certification Program Discussion (Need Endorser, Sponsor, Requirements & Business Case)

Lesson-learned: Device Use of Time in Security Testing

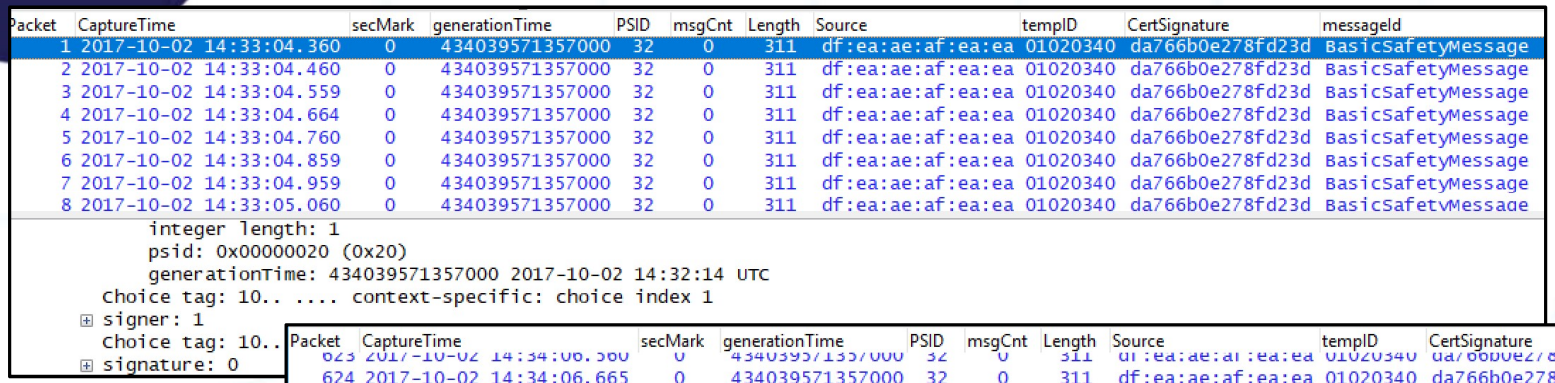


Security # 1 Parameter: GenerationTime

- **GenerationTime** (Transmit) versus **CaptureTime** (Receive Over-The-Air) within one second.
- GenerationTime (TAI) from OBE System Time (January 1, 2004 reference, 5 Leap Seconds)
- CaptureTime (UTC network) from RSU System Time (January 01, 1970 reference, 37 Leap Seconds)
- Each Device (OBE or RSU) includes GPS Epoch with 1 PPS adjustment.
- Device System should have no time drift.
- Security Library Implementation may require time adjustment to provide proper correlation.
- Any Device, Test Tool or Test Computer requires accurate TIME.
- UTC Time Check required for all certification testing.
- Test Equipment Providers are applyng formula conversion to represent GenerationTime per UTC.

What is the Analysis with the Test Results below?

- Test Equipment sent TCI command for repeat messages.
- Device under Test sent “repeat” of same message (Same values for secMark, msgCnt & GenerationTime).
- Device’s Security allowed “repeat” same message be transmitted and received under relevance validity parameters and replay without failure flag.
- Debating to have Test Case’s Security Profile “replay, relevance & consistency **“ set to true**.
- Many Wrongs ≠ Right! Improper Test Case Implementation yielded valuable “Negative” TC!



Packet	CaptureTime	secMark	generationTime	PSID	msgCnt	Length	Source	tempID	CertSignature	messageId
1	2017-10-02 14:33:04.360	0	434039571357000	32	0	311	df:ea:ae:af:ea:ea	01020340	da766b0e278fd23d	BasicSafetyMessage
2	2017-10-02 14:33:04.460	0	434039571357000	32	0	311	df:ea:ae:af:ea:ea	01020340	da766b0e278fd23d	BasicSafetyMessage
3	2017-10-02 14:33:04.559	0	434039571357000	32	0	311	df:ea:ae:af:ea:ea	01020340	da766b0e278fd23d	BasicSafetyMessage
4	2017-10-02 14:33:04.664	0	434039571357000	32	0	311	df:ea:ae:af:ea:ea	01020340	da766b0e278fd23d	BasicSafetyMessage
5	2017-10-02 14:33:04.760	0	434039571357000	32	0	311	df:ea:ae:af:ea:ea	01020340	da766b0e278fd23d	BasicSafetyMessage
6	2017-10-02 14:33:04.859	0	434039571357000	32	0	311	df:ea:ae:af:ea:ea	01020340	da766b0e278fd23d	BasicSafetyMessage
7	2017-10-02 14:33:04.959	0	434039571357000	32	0	311	df:ea:ae:af:ea:ea	01020340	da766b0e278fd23d	BasicSafetyMessage
8	2017-10-02 14:33:05.060	0	434039571357000	32	0	311	df:ea:ae:af:ea:ea	01020340	da766b0e278fd23d	BasicSafetyMessage

```
        integer length: 1
        psid: 0x00000020 (0x20)
        generationTime: 434039571357000 2017-10-02 14:32:14 UTC
    Choice tag: 10.. .... context-specific: choice index 1
  ⊞ signer: 1
    Choice tag: 10..
  ⊞ signature: 0
```

Packet	CaptureTime	secMark	generationTime	PSID	msgCnt	Length	Source	tempID	CertSignature	messageId
624	2017-10-02 14:34:06.665	0	434039571357000	32	0	311	df:ea:ae:af:ea:ea	01020340	da766b0e278fd23d	BasicSafetyMessage
625	2017-10-02 14:34:06.760	0	434039571357000	32	0	311	df:ea:ae:af:ea:ea	01020340	da766b0e278fd23d	BasicSafetyMessage
626	2017-10-02 14:34:06.860	0	434039571357000	32	0	311	df:ea:ae:af:ea:ea	01020340	da766b0e278fd23d	BasicSafetyMessage
627	2017-10-02 14:34:06.960	0	434039571357000	32	0	311	df:ea:ae:af:ea:ea	01020340	da766b0e278fd23d	BasicSafetyMessage
628	2017-10-02 14:34:07.059	0	434039571357000	32	0	311	df:ea:ae:af:ea:ea	01020340	da766b0e278fd23d	BasicSafetyMessage
629	2017-10-02 14:34:07.160	0	434039571357000	32	0	311	df:ea:ae:af:ea:ea	01020340	da766b0e278fd23d	BasicSafetyMessage
630	2017-10-02 14:34:07.260	0	434039571357000	32	0	311	df:ea:ae:af:ea:ea	01020340	da766b0e278fd23d	BasicSafetyMessage

```
        psid: 0x00000020 (0x20)
        generationTime: 434039571357000 2017-10-02 14:32:14 UTC
    Choice tag: 10.. .... context-specific: choice index 1
  ⊞ signer: 1
    Choice tag: 10.. .... context-specific: choice index 0
  ⊞ signature: 0
```

Mobile Vehicle Interoperability Testing

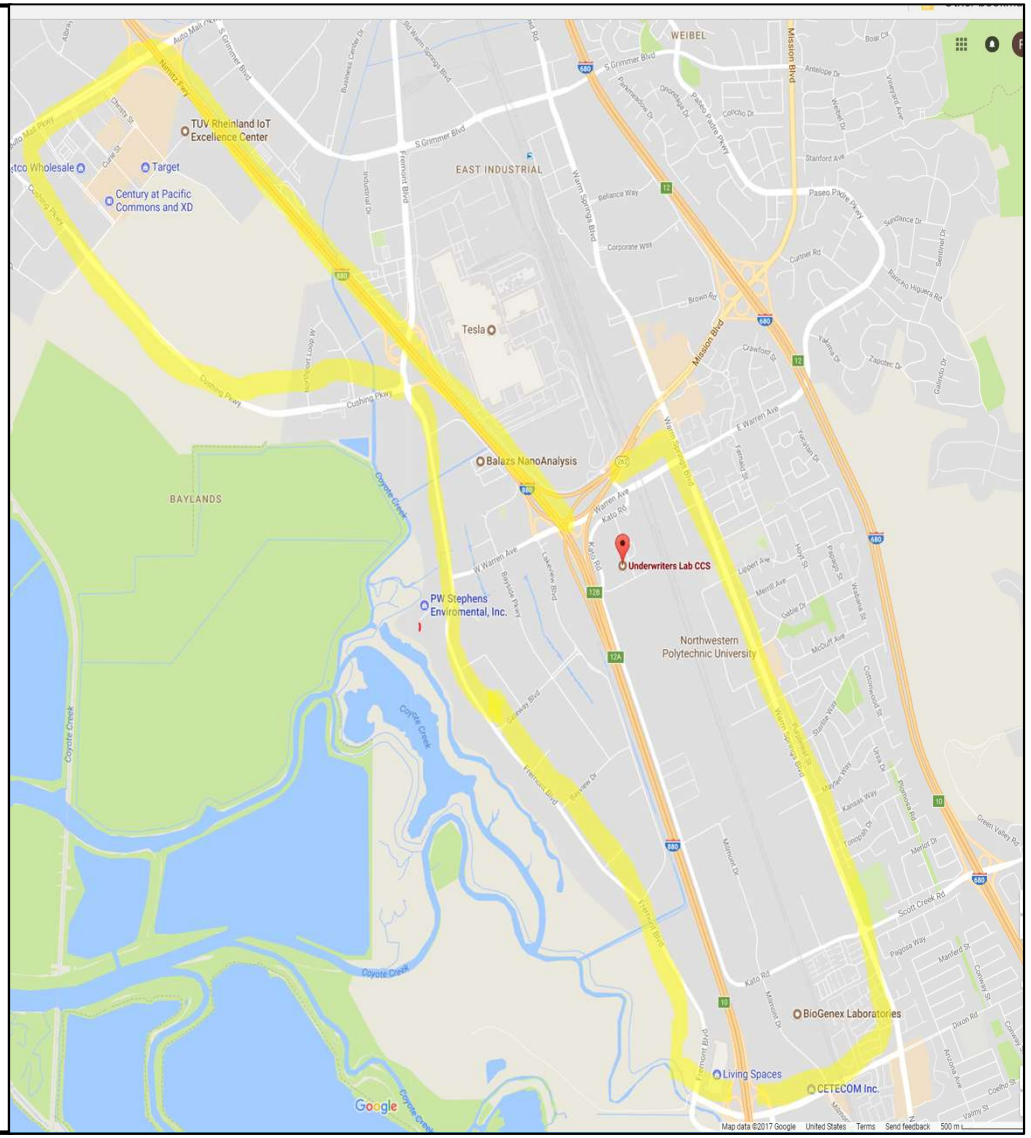
- Hired vehicle / driver sponsored by UL. Required to sign participation waiver. Operating under UL's FCC STA and regulatory product label in-place.
- OBUs with default settings and accurate UTC time.

Single Transmitting Device Test Case under Vehicle Movement

- Complex test will run each OBU separately with its device manufacturer representative (max 2) & test laboratory representative (max 1) in vehicle for:
  - Direction and Speed Unlatching and Latching
  - Vehicle Dimension (parameter are ### Length / ### Width)
- Each test case has saved PCAP which SwRI's PathHistory analysis can provided though Randy Roebuck – OmniAir.

Muliti – Transmitting Devices Test Case under Vehicle Movement

- One vehicle with multi-channel packet capture tool and 3 OBUs under test sending BSMs will drive proposed route under variety of speed conditions ~ 25-30 minutes to provide:
  - Parameter Consistency among different device providers.
  - Hard Braking Event Flag
  - Certificate Changing due to movement
- Route may to shorten due to traffic. One device representative only.
- No RSU opportunities to setup and transmit SPaT/MAP and TIM messages.
- 10M cables Dual GPS/DSRC Shark Fin Antennas with Fakra connectors acquired. Device need to provide vehicle power cable. Any other configuration would require device provider to provide accessories.
- Group assignments were made randomly with every OBU having opportunity.
- Multi-device PCAPNG capture needs to sorted into individual PCAPNG for PathHistory analysis.



Process at a Glance: If you are device vendor

In the morning – check your test slots – in case schedule was updated

Come to your test session on time. Leave your test session on time.

Track your results with test sheets (pick a copy)

Give test PCAP files if taken "**[Test Case Number or TestDescription]-[Device Type]-[Manufacturer]-[TestStation].pcap**" example **TP16093WSMMSTBV01-OBU-OmniAir-7layers-Session1.pcap**. Recommend for certificate changing and J2735 message decoding.

Give your stick to OmniAir (name????) by COB

Fill-out survey on Thursday

Process at a Glance: If you are test station operator

Daily debriefing @ 7:45am (where ?)

Track test results for each vendor using test tracking sheets

Dmitri will collect test tracking sheets COB daily

Note any exceptions to test cases or errors in test specifications

Contacts

- Host questions can be addressed to Kendra Pridemore (kendra.a.pridemore@ul.com) and Andrew Harding (andrew.harding@ul.com).
- Event and Logistics questions can be addressed to Ryan Hall (ryan.hall@omniair.org).
- Technical questions can be addressed to Dmitri Khijniak (Dmitri.khijniak@7layers.com) and Randy Roebuck (rdroebuck@omniair.org).

Group Interoperability – Tuesday per J2945/1, Wednesday per J2735 & Thursday per J2945/1 (Lunch)

- Conducted in Test Area. One representative to operate their device (37).
- Each Device Manufacturer needs to verify its accurate UTC system time.
- Each device set to Connected Vehicle default settings for OBE transmitting BSMs (CH 172) and RSU transmitting WSA (CH 172), SPaT/MAP (CH178) & TIM (CH172) Over-the-Air. Security enabled if possible.
- Start OTA packet capture tools as PCAPNG file on appropriate channels. Insure GPS signal and capture timestamp.
- Powerup all OBEs with automatic BSM transmissions. Run for 8 minutes and stop / power down. Verifying if no certificates changing (no location movement).
- Everyone records and save PCAP file and clear packet capture tool.
- Powerup all RSUs with automatic WSA, SPaT/MAP and TIM transmissions. Run for 8 minutes and stop / power down.
- Everyone records and save PCAP file and clear packet capture tool.
- Powerup all OBEs & RSUs with automatic BSM, WSA, SPaT/MAP and TIM transmissions. Run for 8 minutes and stop / power down.
- Everyone records and save PCAP file. This sessions ends and analysis can be completed on both internal and external PCAP captures.

General Industry Questions for Tuesday's Security & Certificates Interactive Sessions

No Product or Vendor Specific Questions!

- Live SCMS Demonstration for both RSU and OBE – Not Provided & Non-Informative.
- Minimum SCMS testing required in High Level Use Cases/Test Cases i.e. provision of certs over wired IP, over DSRC, download BSM certs, update BSM certs, …
- Discuss Security Profiles and their changes – BSM, WSA, SPAT, MAP, other apps
  - How often certs change, do messages signed with certs/digest or just certs
  - Cert restrictions – validity dates, regional restrictions, etc.
  - Key Parameters to Verify
- Differences between certs used in CV Pilot vs certs used in Plugfest and then Production
- Methods for obtaining device production certificates with OmniAir certification validation
- Method for obtaining chained root certificates for test equipment
- Need and procurement "Negative" test certificates
- Expected SCMS changes (i.e. next Plugfest in Spring – will the same certs work?, how to update certs?). These "Oct2017" certificates expire December 31, 2017.
- Certificates coming from their website and how to handle OER files in order to load binary files into devices and test equipment.
- Device's System Time correlation to Security Library to Capture Time where transmitted GenerationTime (TAI) required accurate relationship to UTC Capture Time.
- Security Library Implementation Requirements by Device Manufacturers.
- Security Profiles Checking for Relevance, Replays and etc.?