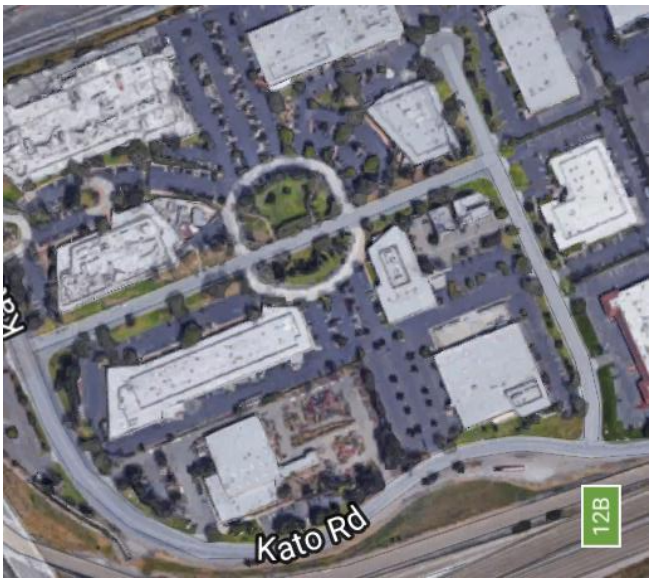
Hard Braking Event Instructions

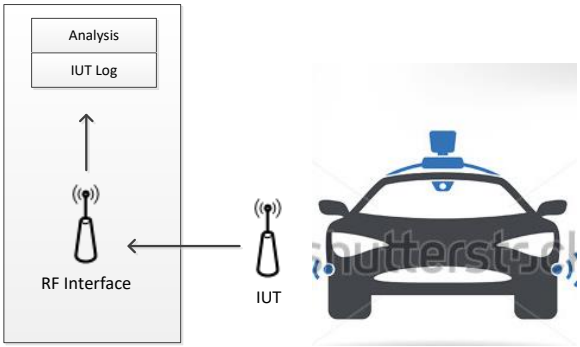
Test Case Verification Objective:

- BSM: TP-BSM-ST-BV-02 thru 03-x, TP-BSM-ST-BV-08, TP-BSM-ST-BV-09
- Critical Flag Timing: TP-BSM-MV-BV-07-X
- Vehicle Event Flag: TP-BSM-ST-BV-01-X
- Certificate Population during Critical Event Flag: TP-BSM-ST-BV-01-X
- RadiusOfCurve: Straight Line

Test Location:

- Business Complex in non-congested/empty street where UL-Fremont located.



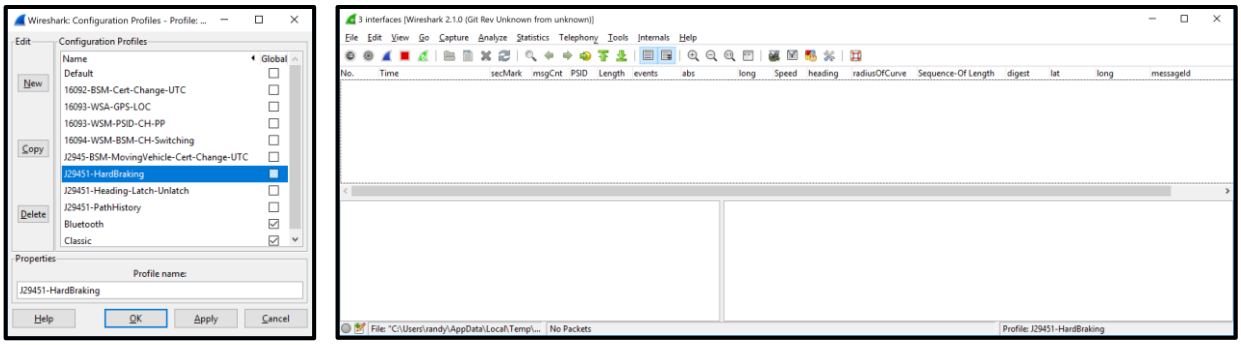


States in Initial Conditions

- IUT is powered up and transmitting.
- GNSS in open-sky conditions is being received and lock.
- IUT has security enabled with certificates and digests to successfully transmit BSMs.
- N-Type Headers enabled for power, channel and data rate.
- IUT is configured to transmit BSMs on a 10 MHz channel vChannelNumber (CH172), data rate vDataRate (6 Mbps) and power vPowerLevel (20 dBm) at 10 Hz transmission rate.

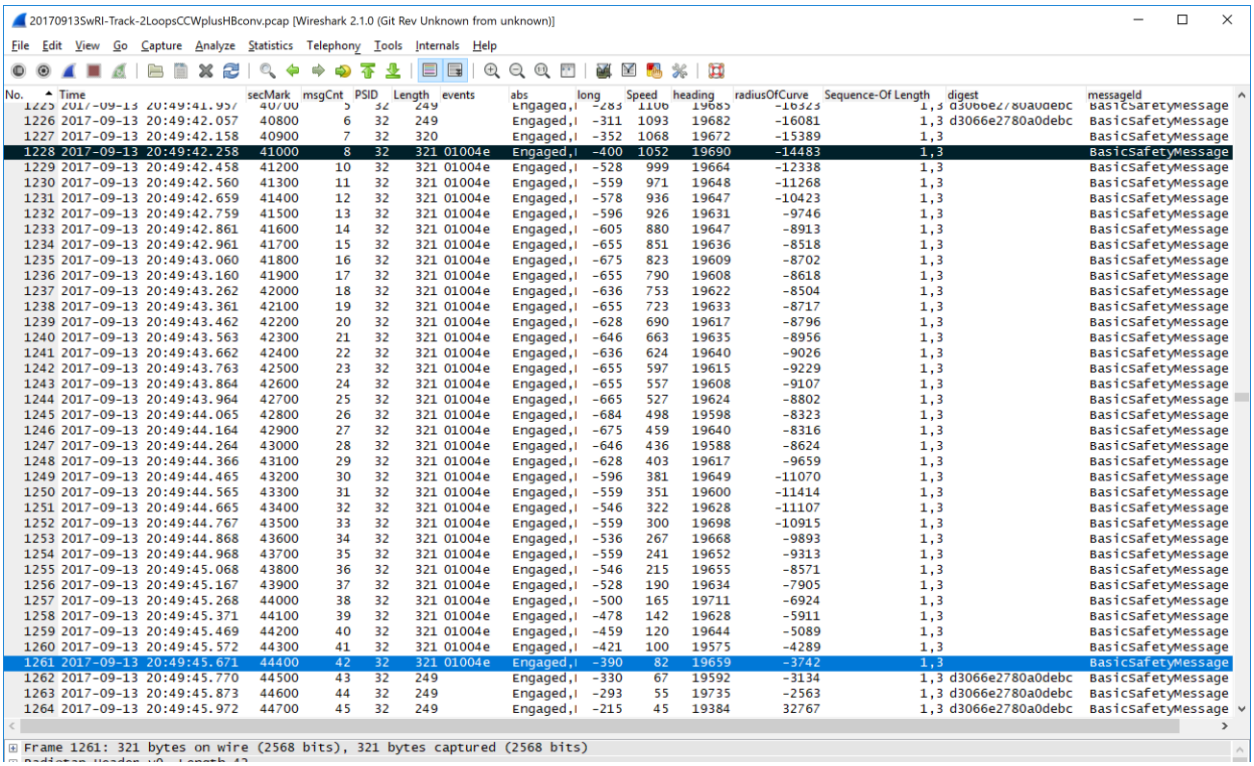
Setup Verification with Test Tool

1. Verify time correlation of Test Computer and UTC Network time at day start.
2. Verify time correlation of Test Tool (GPS PPS – Second value) and Test Computer at each test session.
3. Verify PCAP packet capture date/time stamp with the test computer at each test.
4. Select Configuration Profile “J29451-HardBraking” in Wireshark for this test.



BSM Capture Population Example of Hard Braking Event.

Hard Braking (3.413 seconds) shows starting at packet 1228 and ends packet 1261 showing event flag and no digests. Event flag occurred before 250 msec limit.



Setup OBU Verification while Vehicle Stationary

1. Three Sharkfin magnet mount dual “DSRC/GNSS” antennas with 10M cables with fakra connectors mounted on vehicle’s roof in organized alignment across vehicle directional center line. 10m cables These components are consistent with all tests and testing sessions.
2. Three IUTs should use center mounted antenna.
3. Each IUT should provide their power cable if cable is not available.
4. IUT verifies its UTC Time Correlation (TP-BSM-ST-BV-20-V) with its system clock and BSM capture of the test tool.
5. IUT verifies vehicle’s length and width (TP-BSM-MV-BV-14) in BSM that matches vehicle used in the test.

Test Procedure

1. Start packet sniffer with CH172 enabled and GPS/Time synchronized to record PCAP and WireShark in "J29451-BSM-HardBraking" configuration profile.
2. Power OBU under test with BSMs starting to transmit. Verify Capture TimeStamp and GPS coordinates being populated.
3. Start OBU under test with BSMs transmitting.
4. Drive route at approximately 45 mph (72 kph = 20 m/s) or speed limit. RadiusofCurve should be similar with road radius and pathHistory should be within 3 (straightaway) within 1m.
5. During straight away and traffic permits, conduct hard braking event in bringing the vehicle to sudden stop from 45 mph to 0 mph. Event flag is triggered when de-acceleration is greater than –4.00 m/s^2 (0.4 G). Save PCAP.
6. Repeat test for two runs.
7. Save PCAP as "HardBraking-OBU-[Manufacturer's Names] and show analysis.