Cellular V2X end-to-end application layer test solution

Verification of safety-critical V2X scenarios in a lab environment

Challenge

❚ The automotive industry is evolving towards connected and autonomous vehicles that offer many benefits by equipping vehicles with 3GPP Release 14 C-V2X ECUs
❚ Simulate reliable, repeatable and easy to verify end-to-end safety-critical V2X scenarios in a lab environment
❚ Covers all layers - the complete stack, 3GPP radio access layers for C-V2X mode 4, region-specific ITS protocol layers such as EU ITS-G5 and U.S. WAVE and the ITS application message sets
❚ Supports all common automotive bus connectivity such as CAN, LIN, MOST, FlexRay and automotive Ethernet to analyze or stimulate the ECU within an entire system from your desk

Solution

❚ Combined setup consisting of the R&S®CMW500 LTE network simulator together with the R&S®SMBV100A/B GNSS simulator and Vector CANoe .Car2x to develop and test C-V2X based communication applications
❚ Configure and run traffic scenarios to comprehensively test the 3GPP Rel. 14 physical layer up to the application layer of C-V2X ECUs
❚ The combined solution covers all layers: the complete stack, 3GPP radio access layers for C-V2X mode 4, region-specific ITS protocol layers such as EU ITS-G5 and U.S. WAVE and the ITS application message sets.


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Your benefit	Features
Tests are 100 % reproducible	This setup makes sure that scenarios are fully reproducible, which makes the solution ideal for validating safety-critical V2X scenarios in a lab environment.
Tests cover all layers	The **R&S®CMW500** in combination with the **R&S®SMBV100A** and Vector CANoe software gives the user the flexibility to test all layers of the protocol stack. The solution can be used to emulate real-world scenarios in a lab environment.
Support of all common automotive bus connectivity	The test solution allows bus connectivity via CAN, LIN, MOST, FlexRay and automotive Ethernet to analyze or stimulate the ECU remotely.

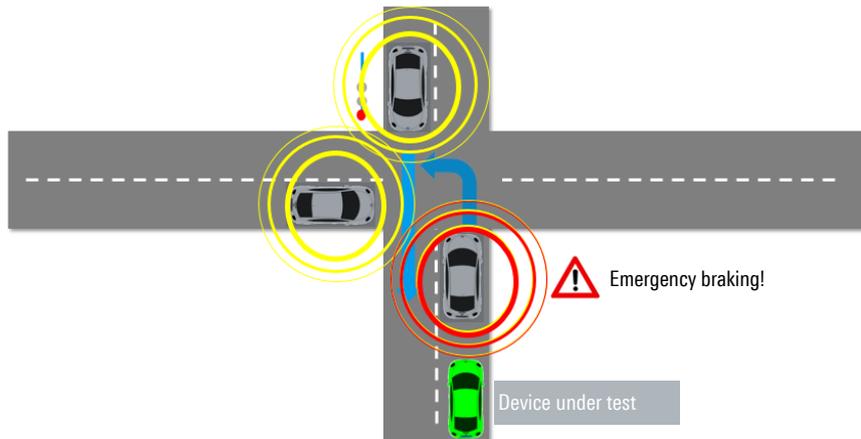### Testing of specific use cases such as:

❚ Emergency electronic brake light (EEBL)
❚ Left turn assist (LTA)
❚ Intersection movement assist (IMA)
❚ Congested highway with multiple simulated cars

ROHDE & SCHWARZ
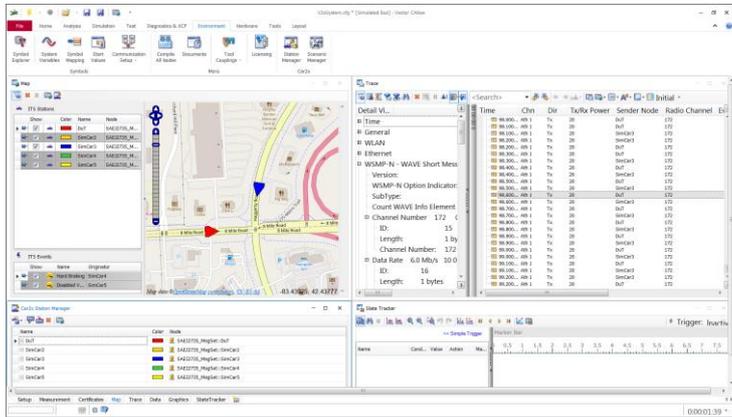
Vector CANoe .Car2X

Vector CANoe .Car2x, a comprehensive software tool for simulating, developing and testing V2X based communication applications
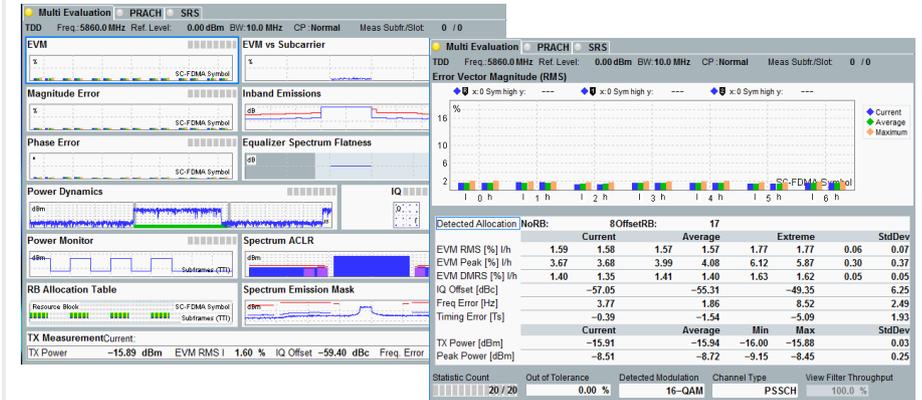
C-V2X RF measurements with R&S®CMW-KM570

The R&S®CMW500 provides various specific measurements. The R&S®CMW-KM570 option offers TX measurements to assess the performance of a C-V2X RF transmitter

Test scenario example

Emergency braking!

Device under test

The device under test is verified in a scenario with multiple simulated cars and receives an emergency electronic brake light warning.

▷ For more information, visit
www.rohde-schwarz.com/_234250.html
www.vector.com/canoe_car2x/

Other C-V2X test solutions offered by Rohde & Schwarz

R&S®SMBV

R&S®CMW500

GNSS   PC5

V2V module

R&S®CMW100-K06

R&S®CMW100-K06 for C-V2X and 5G NR sub 6 GHz production testing
Protocol test solution based on the R&S®CMW500 and R&S®SMBV100 supporting:
▌ Data transmission/reception and performance test cases
▌ GCF validated protocol conformance test cases