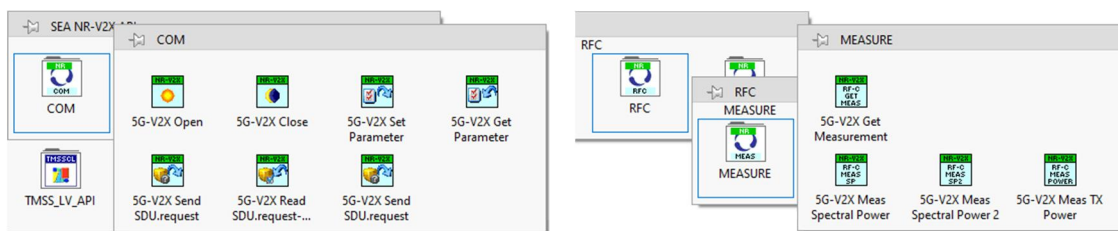
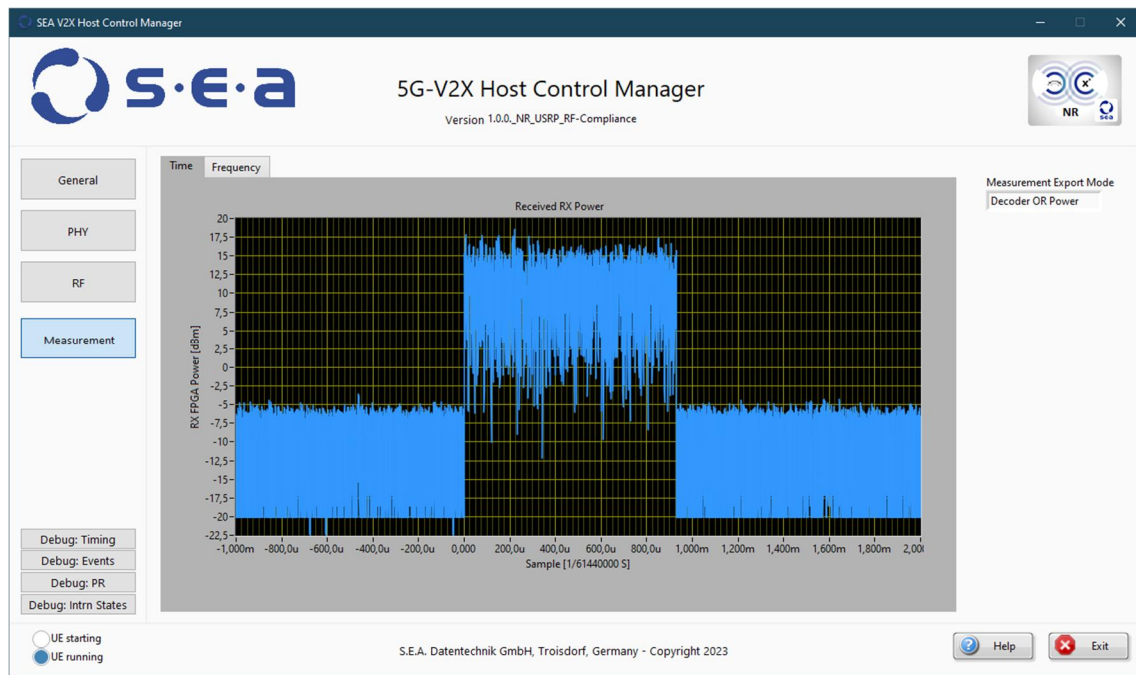


# 5G-V2X Toolkits for LabVIEW

Measure • Simulate • Manipulate • Monitor



- Use 5G-V2X side-link (PC5) communication
- 3GPP 5G-NR V2X side-link standards Rel. 16
- Develop & test with LabVIEW and NI SDR



## The Next Generation V2X Communication Technology – 5G-V2X

The next level of V2X communication has been defined by 3GPP based on 5G-NR technology specifically adapted to the needs of traffic environments. The 5G-NR technology for PC5 based side-link direct communication between dynamic and static traffic objects such as vehicles, traffic signs or traffic lights without any network infrastructure involvement was first been defined in the 3GPP Rel.16 standards. The 5G-NR technology bandwidth, performance and capabilities applied for direct 5G-V2X communication offers tremendous potential to enhance and expand V2X use cases for future more efficient and safer future transportation, especially in combination with autonomous driving.

### Flexibility with NI Software Defined Radio (SDR)

The 5G-V2X communication core is implemented by S.E.A. using NI Software Defined Radio hardware. Leveraging the power and flexibility of SDR enables the implementation of radio standards independent of chipset availability and enables S.E.A. to quickly follow future standards development or even implement specific customized signal processing for research projects on demand.

The existing S.E.A. add-on toolkits for V2X 802.11p and LTE-V based communications are also based on this approach and have successfully proven their unique capabilities for development and test applications using the same hardware components.

Depending on the application, the add-on toolkits require NI USRP or VST hardware.

### 5G-V2X RF Conformance Toolkit – Live RF-Measurements

The SEA 5G-V2X RF Conformance Toolkit for LabVIEW provides basic communication capabilities for the required signaling RF measurements. The LabVIEW API of the add-on toolkit provides easy access to all measurement functions for the implementation of conformance tests as defined by bodies such as 3GPP, Omniair, ETSI or GCF.

For online information the measurement tabs of the SEA Host Control Manager provide measurement function-dependent displays and status information.

### 5G-V2X Monitoring Toolkit – Extended Communication and Replay

This toolkit provides advanced communication capabilities including hardware-controlled replay of PDCP messages for multiple nodes as used in S.E.A.'s open-loop functional test systems. The LabVIEW API of the add-on toolkit provides easy access to all 5G-V2X communication and replay functionality. The transmitted PDCP messages are available for further processing in the application software, such as a customer V2X stack. The high performance supports the implementation of congestion emulation. For detailed online activity information, the SEA Host Control Manager provides status information and communication logs.

### 5G-V2X Channel Emulation Toolkit – RF Channel Emulation

This toolkit provides an 8-tap channel emulation for the parametrized emulation of the typical RF channel effects for a V2X transmission. Outgoing packets send are routed through the channel emulation prior to transmission. The channel emulator requires one of the above toolkits.

Product	S.E.A. Product ID	Required components
SEA 5G-V2X Add-On for LabVIEW – RF COMPLIANCE	66000084	PXI-System with NI PXI-5840, NI PXI-6683H, NI-PXI7975
SEA 5G-V2X Add-On for LabVIEW – MONITORING	66000083	2 x NI-USRP 2954 w. MXI-Kit or NI-USRP2954 + NI-PXI 7975
SEA 5G-V2X Add-On for LabVIEW – CHANNEL EMULATION	66000099	1 license of the above toolkits + additional NI-USRP 2954

**Turn-key test systems**  
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**Contact us !**



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