

Best Practices for Navigating Modern RF Testing and Design

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2026 Slovenia**



Two Platforms for RF Capabilities

Low-SWAP Prototyping with USRP

Open-Source Software Compatible

Integration of RF with baseband and digital

Software migration path to tactical hardware



High-Performance Prototyping and Test with PXI

Instrument-grade hardware

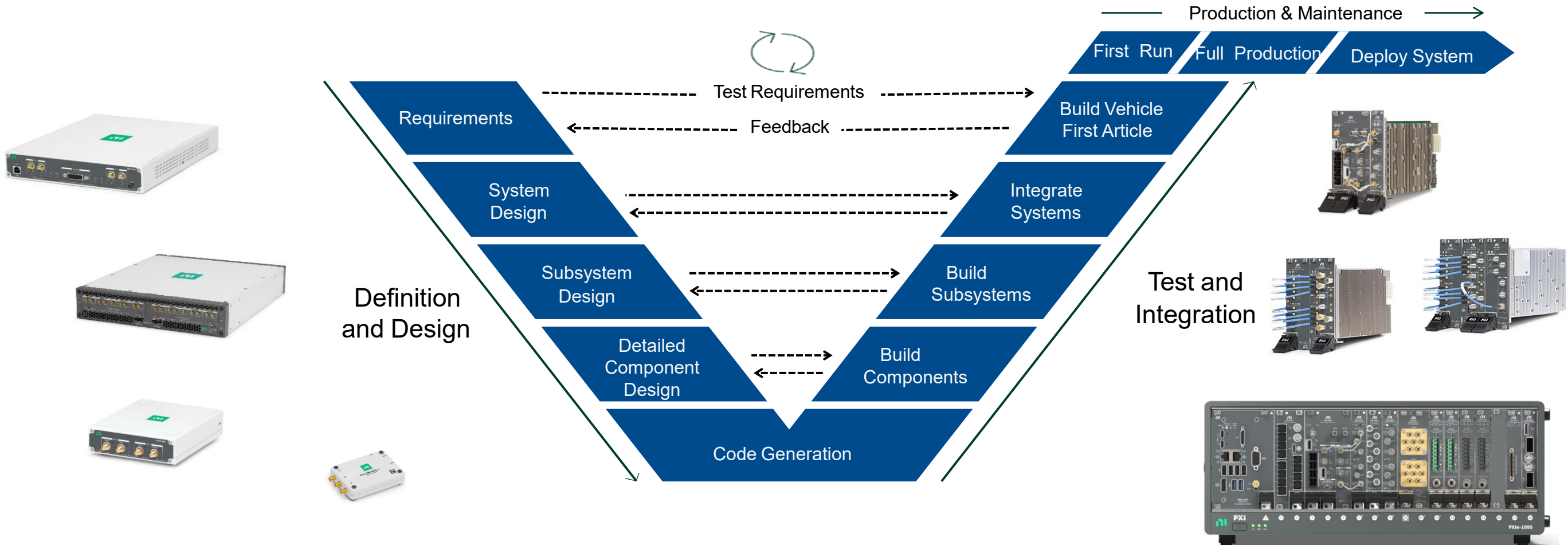
Higher frequency and bandwidth option

Advanced Applications |

5G Test, Radar / EW Test, Communication Nav Test



Comprehensive RF Portfolio for the Entire Lifecycle



Software Defined Radios

Modular RF Test Instruments

USRP Product Portfolio Overview



 Ettus Research A National Instruments Brand	Ettus Research USRP B2XX	Ettus Research USRP E320	Ettus Research USRP N310 / N32X	Ettus Research USRP X310	Ettus USRP X410	Ettus USRP X420	Ettus USRP X440
Frequency	70 MHz – 6 GHz	70 MHz – 6 GHz	3 MHz-6 GHz (N32X) 10 MHz-6 GHz (N310)	*10MHz – 6 GHz	1MHz – 7.2 GHz	10MHz-20GHz	30MHz – 4 GHz IF
Bandwidth	56 MHz	56 MHz	200 MHz (N32X) 100 MHz (N310)	*160 MHz	400 MHz	GHz	Up to 1.6 GHz
Channels	2 Tx, 2 Rx	2 Tx, 2 Rx	2 Tx, 2 Rx (N32X) 4 Tx, 4 Rx (N310)	2 Tx, 2 Rx *4 Rx (TwinRx)	4 Tx, 4 Rx	2 Tx, 2 Rx	8 Tx, 8 Rx
Architecture	Integrated	Integrated	Integrated	*Configurable w/ Daughterboards	Integrated	Integrated	Integrated
Communication	USB	10 GbE	10 GbE or PCIe	10 GbE or PCIe	100/10 GbE or PCIe	100 GbE	100 GbE
Synchronization	2x2 MIMO	2x2 MIMO	Up to 128x128 (N32X) Full Phase Synchronization	*2x2 MIMO	4x4 MIMO	*2x2 MIMO	8x8 MIMO
SW Support	GNU Radio, C++, Python, MATLAB, LabVIEW	GNU Radio, C++, Python, MATLAB, RFNoC	GNU Radio, C++, Python, MATLAB, RFNoC	GNU Radio, C++, Python, MATLAB, RFNoC, LabVIEW, LabVIEW FPGA	GNU Radio, C++, Python, MATLAB, RFNoC, LabVIEW, LabVIEW FPGA	GNU Radio, C++, Python, MATLAB, RFNoC, LabVIEW, LabVIEW FPGA	GNU Radio, C++, Python, RFNoC
Key Features	Low SWAP-C, Highly portable	Low SWAP, Embedded Deployable, Standalone	Stand Alone, Wide bandwidth, Multi- Channel Sync Ready (N32X)	*Configurable RF Front End, Programable FPGA	RFSoc based FPGA, 5G Ready, Wide bandwidth, Multi- Channel	RFSoc based FPGA, 5G Ready, Wide bandwidth, Multi- Channel	RFSoc based direct sampling, phase coherency, wide bandwidth

NI Ettus USRP X420

Research and Prototyping in 5G NR FR3 and X-/Ku-band multi-channel applications

Features:

- 10 MHz to 20 GHz frequency range
- Up to 1 GHz Bandwidth
- 2 TX, 2 RX channel
- Multi-Channel Phase Coherency <1 degree RMS
- 5G NR RX EVM of < -35 dB at 7 GHz
- Xilinx Zynq Ultrascale+ RFSoc ZU28DR
- Dual 100 Gigabit Ethernet or Aurora via QSFP28
- 10 MHz and PPS reference import, LO export and import per channel
- GPIO, JTAG control

Benefits:

- Expanding USRP frequency range to 20 GHz for applications like multi-channel radar systems and NTN for 6G
- Highest quality RF performance USRP ever released

Applications

- Radar/EMSO
- Satellite communications
- Non-terrestrial networks (NTN)
- 6G research in FR3



Released in May

NI Ettus USRP B310

Raising the bar for entry-level USRP capabilities for research, prototyping, and deployment

Features:

- 350 MHz to 7.2 GHz frequency range
- 100 MHz Bandwidth
- 2 TX, 2 RX channel
- 2 Independent LOs
- Multi-Device-Synchronization (8x8 without external hardware)
- PCIe plug-in card or TB3 desktop module
- 10 MHz and PPS reference import, GPSDO
- GPIO, JTAG control

Why Choose B310?

- Low-latency data transfer and native GPU co-processing support
- Available as “shielded board” for easier system integration
- Facilitates MIMO, beamforming, and full-duplex research with accurate timing for scalable and distributed SDR systems
- Supports a wide variety of wireless standards with wideband and high-throughput signal processing



Applications

- Teaching and Research
- GPU Coprocessing
- Spectrum Sensing
- 5G Small Cells

Vector Signal Transceiver Architecture

NI VST = Vector Signal Analyzer + Vector Signal Generator + Software Defined Radio

Calibrated Wideband Vector Signal Analyzer:

Frequency Range: 30 MHz to 26.5 GHz

Up to 2 GHz Instantaneous IQ BW

Programmable gain ranging: +25 dBm max

Independent or coherent operation with signal generator

Supports multi-channel synchronization and coherency



Calibrated Wideband Signal Generator:

- Frequency Range: 30 MHz to 26.5 GHz

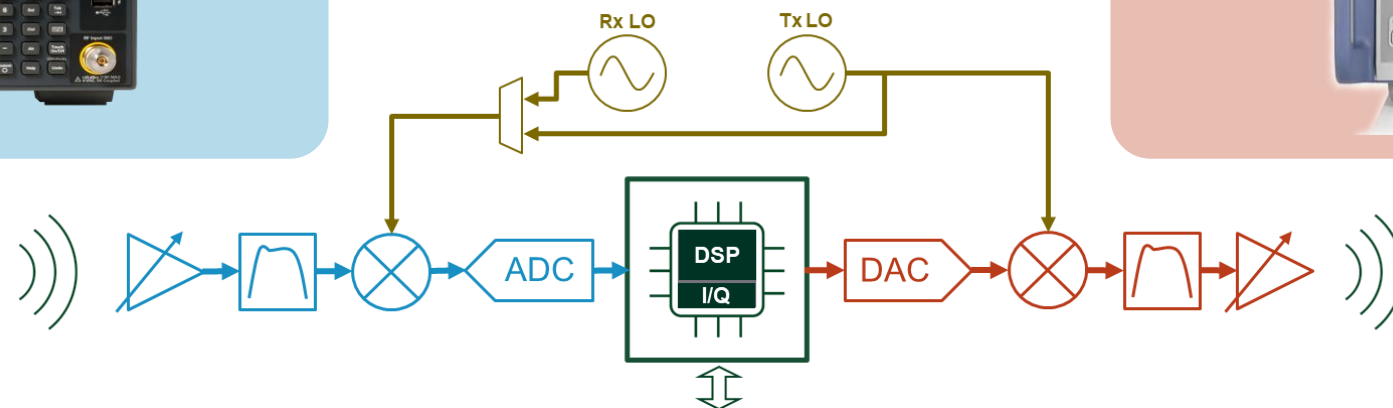
- Up to 2 GHz Instantaneous IQ BW

- RF Output Power: > +20 dBm

- Integrated Pulse Modulation, >100 dB on/off ratios

- Independent or coherent operation with signal analyzer

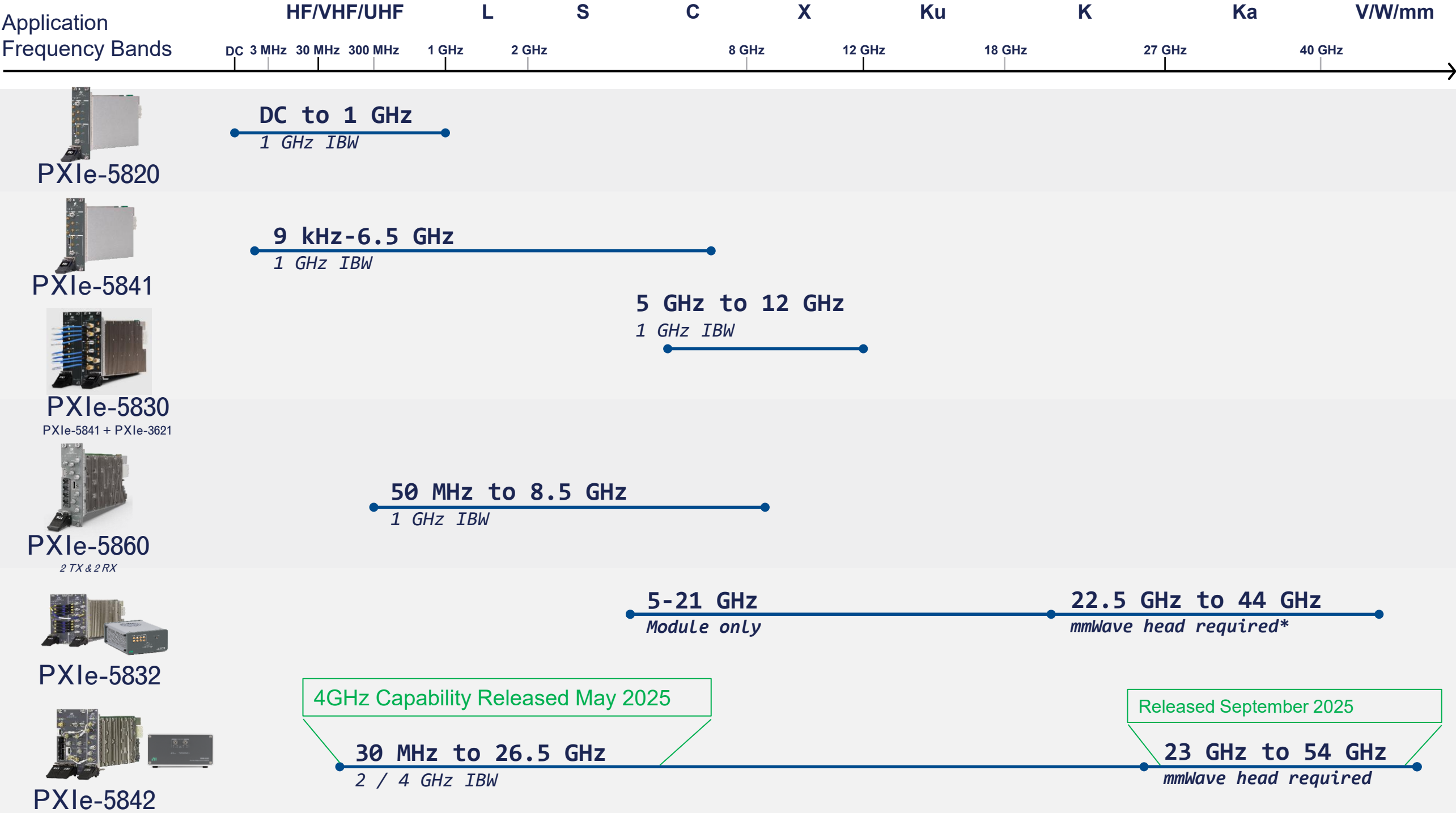
- Supports multi-channel synchronization and coherency



Software Defined Radio Capability / Common Expandable FPGA

Full IBW Digital Streaming up to 4GHz
NI Provided Expansion Applications (MEG, RPS, RTG)
User Developed / Defined Expanded Capability

Vector Signal Transceiver Family



PXIe-5841 Core VST

Cost-Effective, Calibrated RF Signal Generation and Analysis

- **9 kHz – 6 GHz** frequency coverage, great for low coverage of low frequency **ISM bands** and legacy **Wi-Fi, Bluetooth, cellular, radar**
- Up to 1 GHz instantaneous bandwidth
- **15** unique variants for added flexibility*
 - **Analyzer-only, Generator-only, and Transceiver** options
 - **200 MHz, 1 GHz** bandwidth options
 - Optional enhanced LO for improved phase noise
 - Optional FPGA for IP customization
- **Target applications:** AM/FM testing, consumer electronics, healthcare device test, general-purpose ISM band test



<u>18</u> Variants*	200 MHz BW	1 GHz BW
Transceiver	☑	☑ (optional FPGA ☑)
Analyzer-only	☑	☑ (optional FPGA ☑)
Generator-only	☑	☑ (optional FPGA ☑)

**All available configurations can include an improved LO with the PXIe-5655*

PXIe-5820 Baseband VST

Combines a **wideband IQ digitizer** and **wideband IQ arbitrary waveform generator** in a single 2-slot instrument

- DC – 500 MHz frequency coverage
- 1.25 GS/s for **complex IQ data**
- 0.38 μ s generator tuning time
- Ref In/Out connections, I+/- and Q+/- ports, and digital I/O control
- **3 unique variants** for added flexibility
 - **Generator-only**, and **Transceiver** options
 - Optional **FPGA Extension**
- **Target applications:** arbitrary waveform generation, envelope tracking, baseband I/Q test

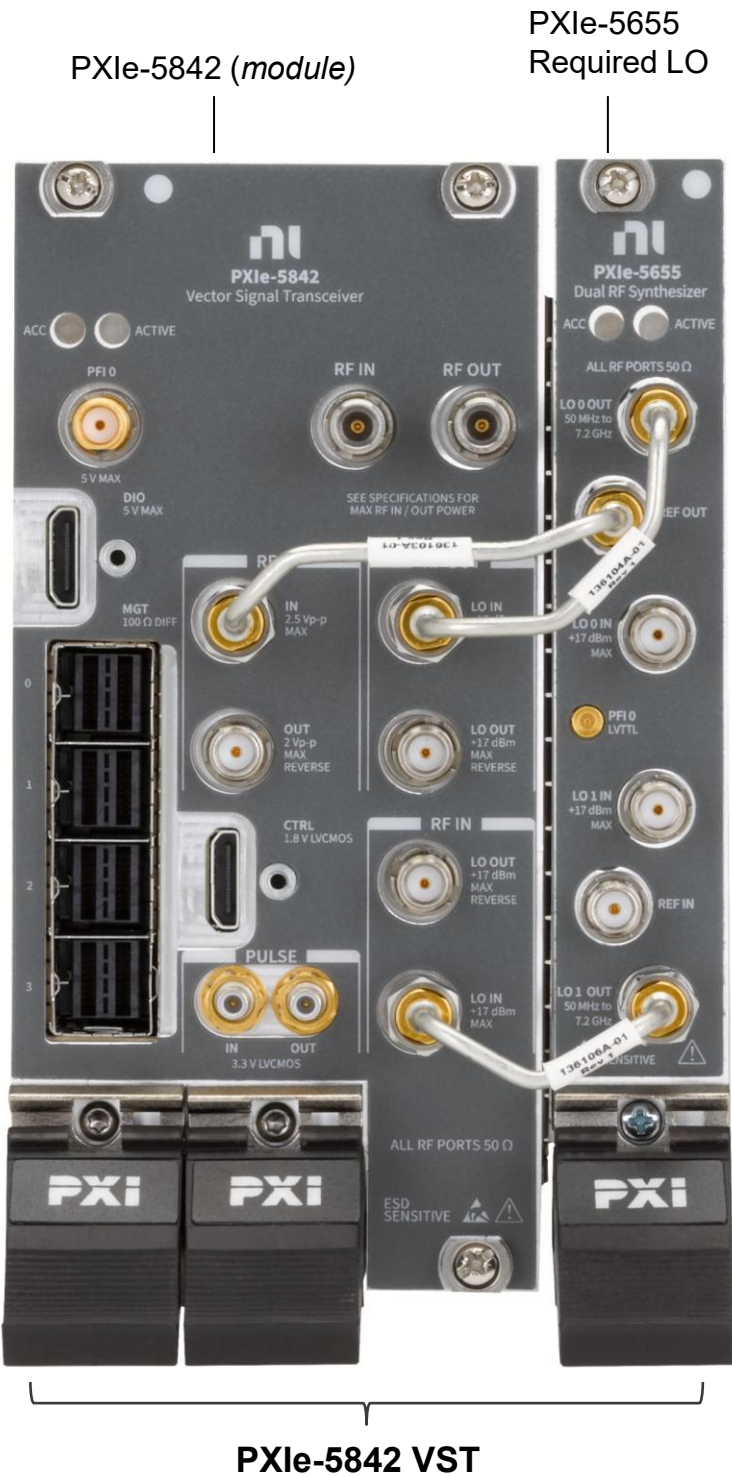
P/N	Direction	Bandwidth	FPGA Extension
783967-01	TRx (VST)	1 GHz	Yes
789179-01	TRx (VST)	1 GHz	No
789180-01	Transmit-only (VSG)	1 GHz	No



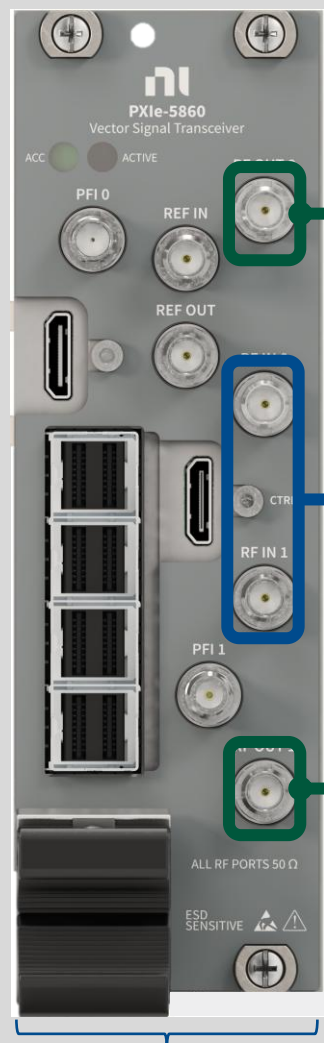
PXIe-5842 | 26.5 GHz „VST3”

- **Extended** contiguous **frequency coverage** (mmWave extension up to 54 GHz)
- **Wide** instantaneous **bandwidth**
- **Best-in-class EVM** performance
- Expand Capabilities with **Flexible Licensing/Upgrade Options** (S-parameter add-on module)
- Modulated and Harmonic Measurements
- Integrated Synthetic Noise Source for NF measurements
- Best in class T-Clk synchronization
- MIMO expandable

Parameter	Instrument Capability
Frequency Range	30 MHz – 26.5 GHz
Bandwidth	Up to 4 GHz
RF IN / OUT Flatness (2 GHz)	< ±0.45 dB typ. / < ±0.4 dB typ.
RF IN / OUT Absolute Accuracy	< ±0.4 dB typ.
Max Unleveled Tx Power	+25 dBm typ. (<18 GHz)
802.11be, 320 MHz EVM	Better than -52 dB (noise comp enabled)



Single-Channel PXIe-5860



PXIe-5860 TWO Channels Released

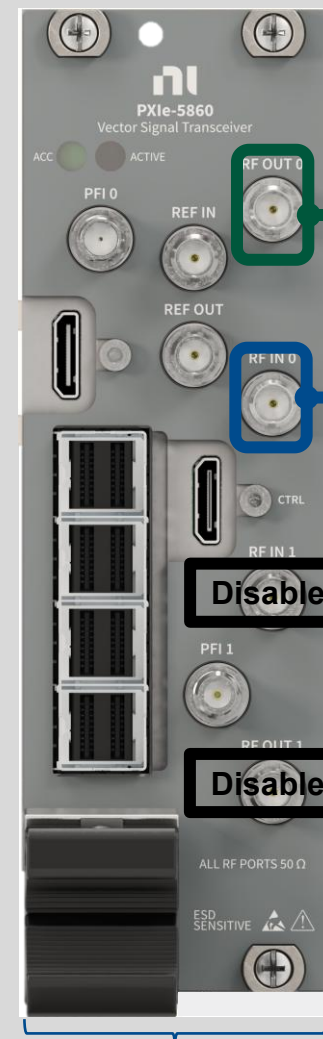
- Two** Vector Signal Generators (VSG)
- 50 MHz – 8.5 GHz Frequency Range
 - 1 GHz Bandwidth
 - 22 dBm Maximum Output Power
 - 0.25 dB Amplitude Accuracy (Typ)

- Two** RF Vector Signal Analyzers (VSA)
- 50 MHz – 8.5 GHz Frequency Range
 - 26 dBm Maximum Reference Level
 - 1 GHz Bandwidth
 - 0.25 dB Amplitude Accuracy (Typ)

Two PXI Slots

Supports PXIe-5633 Add-on (x2)

P/N: 789449-01



PXIe-5860 ONE Channel Release: May 2026

- Two** Vector Signal Generator (VSG)
- 50 MHz – 8.5 GHz Frequency Range
 - 1 GHz Bandwidth
 - 22 dBm Maximum Output Power
 - 0.25 dB Amplitude Accuracy (Typ)

- Two** RF Vector Signal Analyzer (VSA)
- 50 MHz – 8.5 GHz Frequency Range
 - 26 dBm Maximum Reference Level
 - 1 GHz Bandwidth
 - 0.25 dB Amplitude Accuracy (Typ)

Two PXI Slots

Supports PXIe-5633 Add-on (x1)

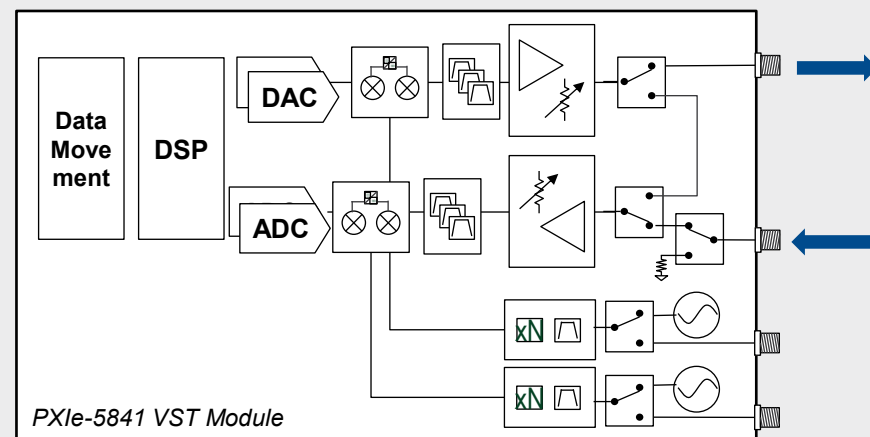
P/N: 790790-01

High Level VST Compare | Block Diagram



PXIe-5841 VST2

Detailed VST2 Block Diagrams: [High Level](#), [RF In](#), [RF Out](#), [LO](#)



PXIe-5841 VST Module

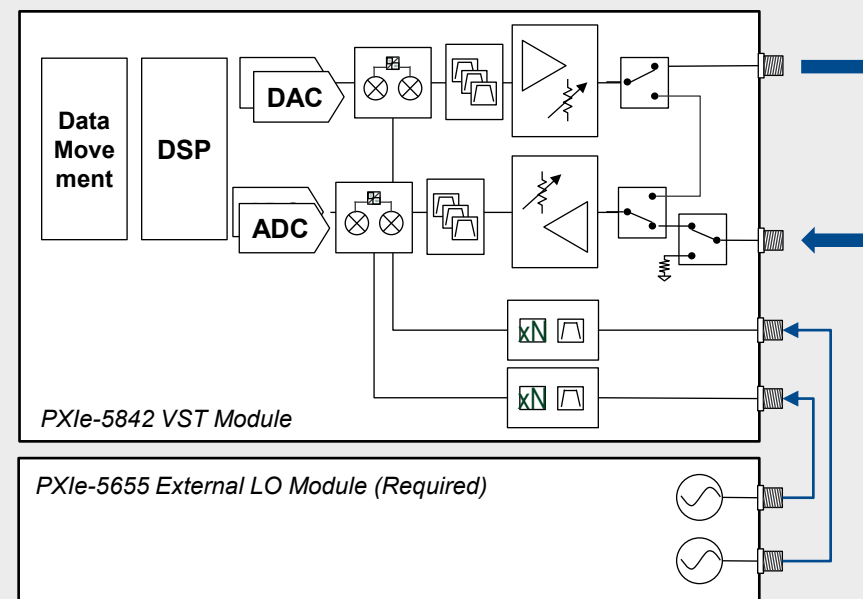
(Optional PXIe-5655 External LO Module not shown)

Direct up/down conversion (Zero-IF) Architecture
<120 MHz directly sampled with DACs/ADCs
Multiple Filtered RF bands
Internal or External LO (w/ 5655)



PXIe-5842 VST3

Detailed VST3 Block Diagram



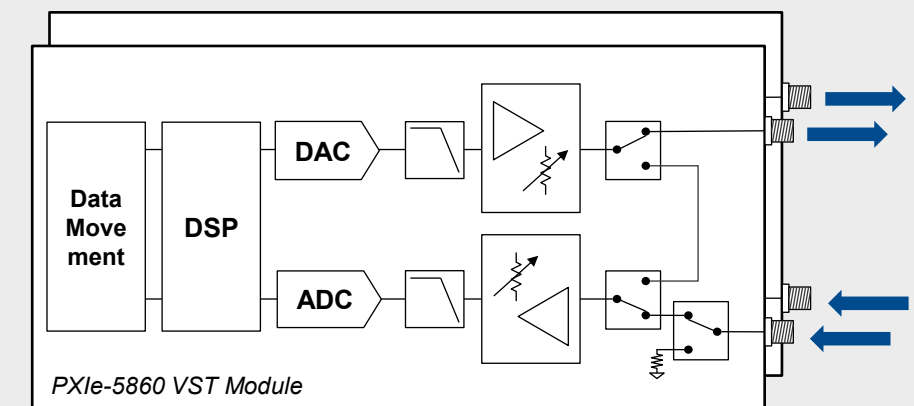
PXIe-5842 VST Module

PXIe-5655 External LO Module (Required)

Direct up/down conversion (Zero-IF) Architecture
<1.75 GHz directly sampled with DACs/ADCs
Multiple Filtered RF bands
External LO required (no internal LO option)



PXIe-5860 McVST



PXIe-5860 VST Module

Direct Sampling Architecture
All frequencies ~50MHz to 8.5GHz directly sampled
Simple RF Front End – minimal filtering required
No LO Required

PXIe-5633 26.5 GHz Vector Network Analyzer

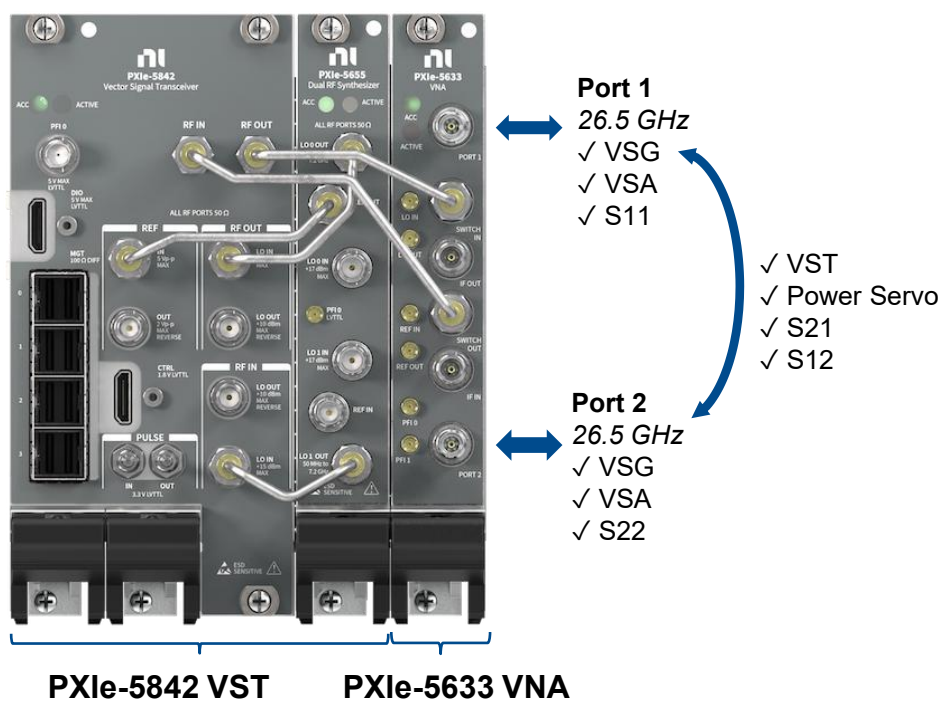
RFmx VNA features enhanced with each release

VNA Mode



Parameter	Specification
Frequency Range	50 MHz– 26.5 GHz
Dynamic Range	>125 dB
Source Power	15 dBm (12 GHz)
Directivity (Raw / Corrected)	>13 dB, >44 dB (12 GHz)
Trace Noise	< 0.006 dB

VST + VNA Mode



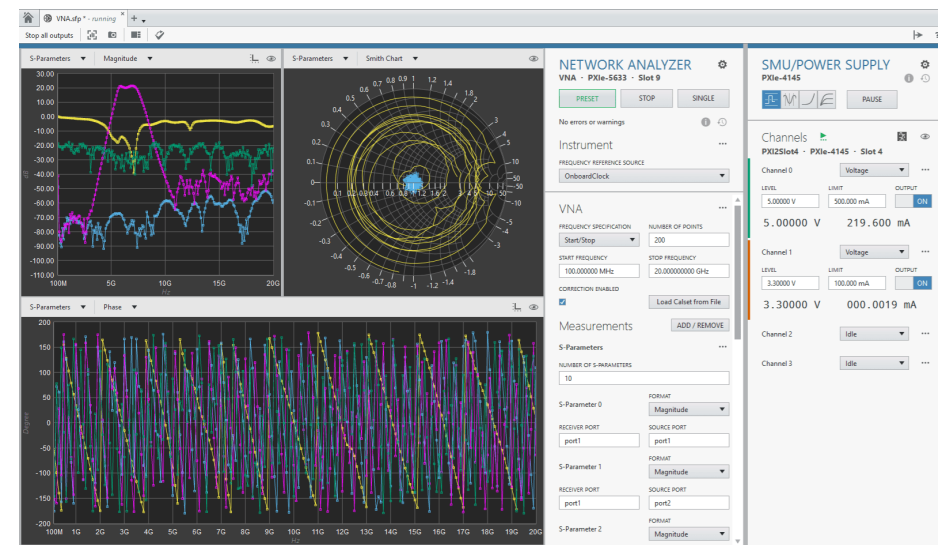
Combined 3-in-1 Instrument

- VSA
- VSG
- VNA

Unique VST Pass-Through Path on VNA

- Enables full VST functionality at VNA ports

RFmx VNA



S-Parameter Sweeps

- CW and Pulsed S-parameters
- Sweep Functionality: List, Linear, Segmented, Sweep Interpolation

Trace Capabilities

- Display formats: Magnitude, Phase, SWR, Impedance, Admittance
- Memory Traces, Trace Markers & Trace Math

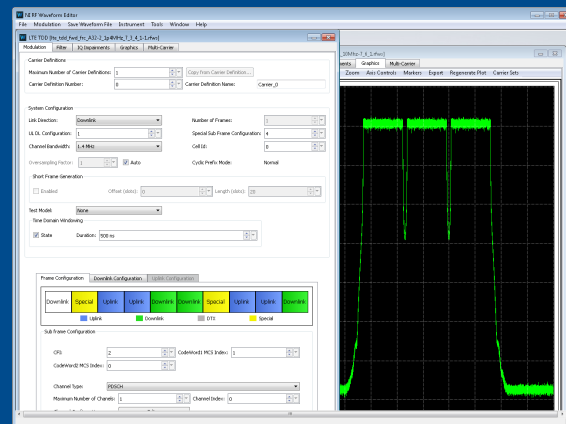
Calibration Support

- Automatic Calibration with CAL-5501 Vector Calibration Module
- Mechanical Calkit support (SOLT, SOLR, TRL) and guided VNA calibration
- Calibration Set Store, Load
- Fixture embedding/de-embedding
- Manual Port Extension (delay, loss)

Synchronization (Events, Triggers) For Faster Test Programs

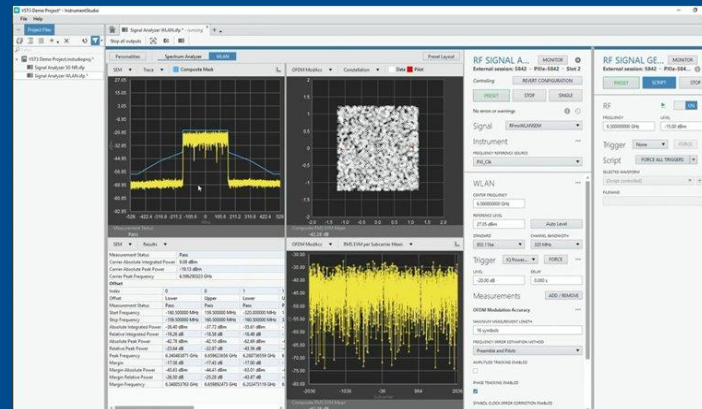
Software: NI RFmx Components

GENERATE



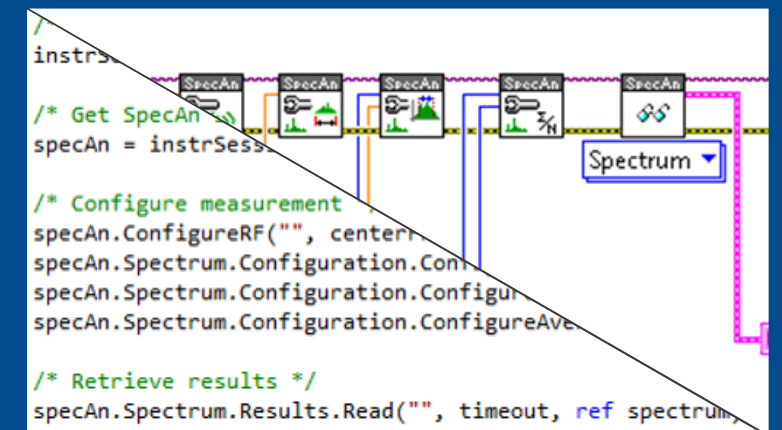
RFmx Waveform Creator

MEASURE



RFmx Soft Front Panel in
InstrumentStudio

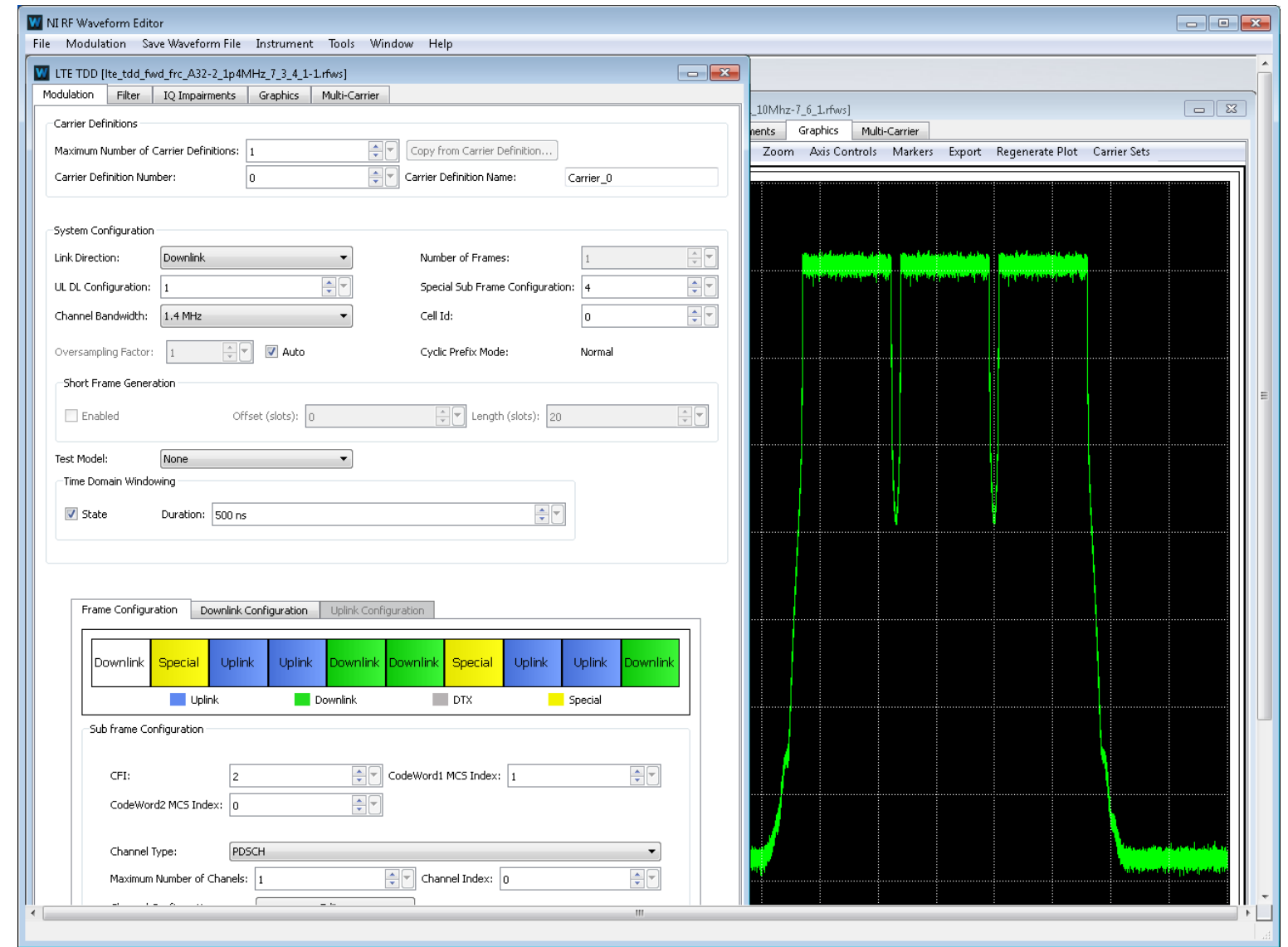
AUTOMATE



RFmx API
LabVIEW / Python / C#

RFmx Waveform Creator

- Test waveform creation for general purpose modulation and communication standards
 - Preconfigured, spec compliant configurations
 - Filtering, impairments, and CFR
 - Waveform visualization and hardware playback
 - Create unencrypted and unlocked waveform files for use with signal generators, DUTs, and in simulation
- License included with RFmx measurement personalities



RFmx Soft Front Panels – InstrumentStudio

Interactive measurements for all RFmx personalities in one application

- Familiar and intuitive user experience
- Easy configuration of multiple composite measurements

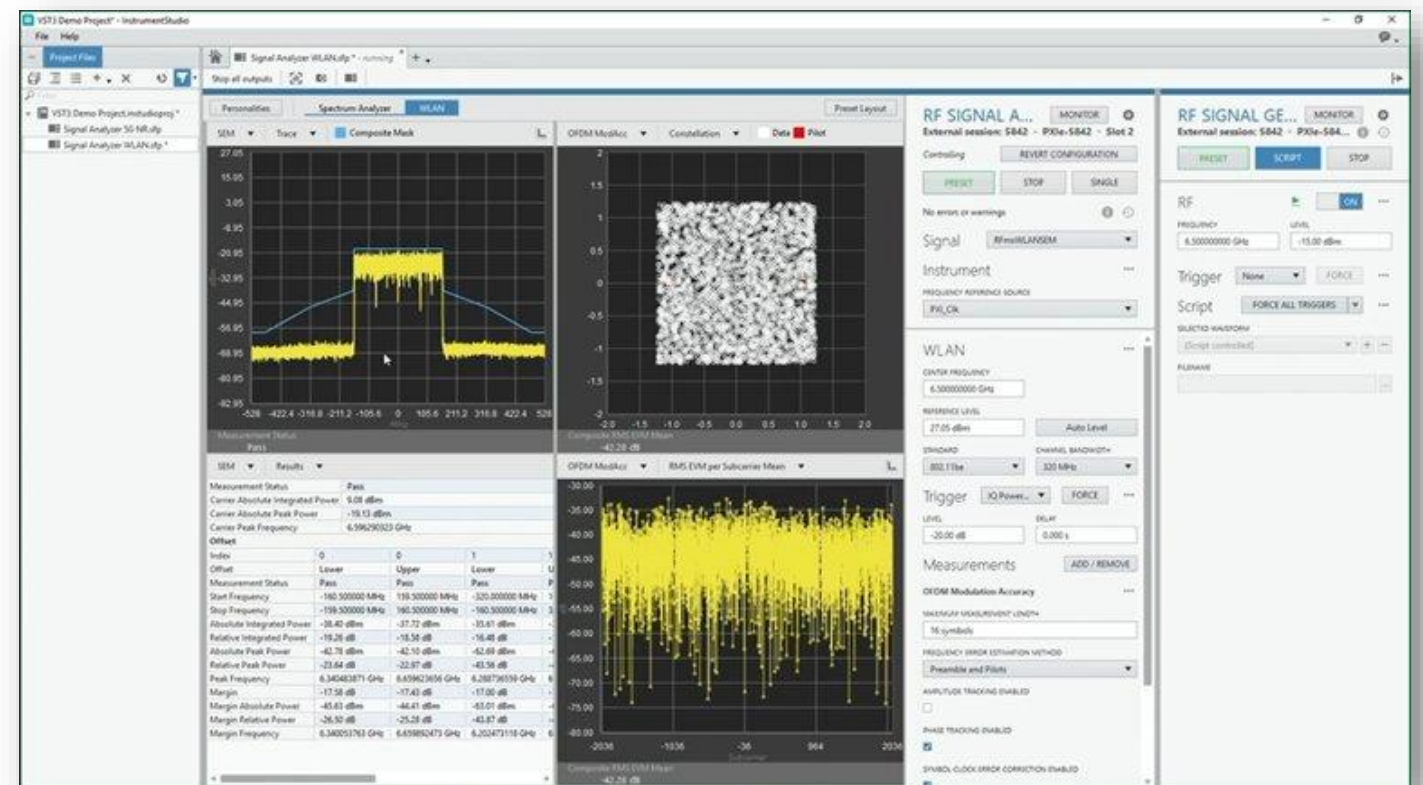
Debug and monitor automated tests

- Monitor execution of automated tests in real time
- Take control of instrumentation for interactive debug

Save measurement traces and results to file

Save and load configurations between SFP and automation code

Natively integrated alongside other InstrumentStudio front panels



RFmx Products

RFmx Product
[Application]

RFmx Add On
[Application]

RFmx Bundle

General Purpose

RFmx General Purpose Bundle

Spectrum
Analysis
[SpecAn]

Noise Figure
[SpecAn]

Phase Noise
[SpecAn]

Analog
Modulation
[Demod]

Digital
Modulation
[Demod]

Cellular

RFmx Cellular Bundle

NR

LTE/LTE-
Advanced
[LTE]

LTE-V2X
[LTE]

W-CDMA/HSPA+

NB-IoT/eMTC
[LTE]

EV-DO

CDMA2000

TD-SCDMA

GSM/EDGE+

Connectivity

RFmx Connectivity Bundle

WLAN 802.11
a/b/g/j/p/n/ac/ax/
be
[WLAN]

WLAN 802.11
a/b/g/j/p/n/ac/ax
[WLAN]

WLAN 802.11
a/b/g/j/p/n
[WLAN]

WLAN MIMO
[WLAN]

WLAN 802.11
a/b/g/j/p/n/ac/ax/
be
[WLAN]

WLAN 802.11
a/b/g/j/p/n/ac/ax/
be/bn
[WLAN]

Bluetooth

Power Amplifier
[SpecAn]

Pulse

VNA

Analysis Only
Mode

RFmx WLAN

WLAN 802.11a/b/g/j/p/n/ac/ax/be/bn (Wi-Fi 4/5/6/6E/7/8)

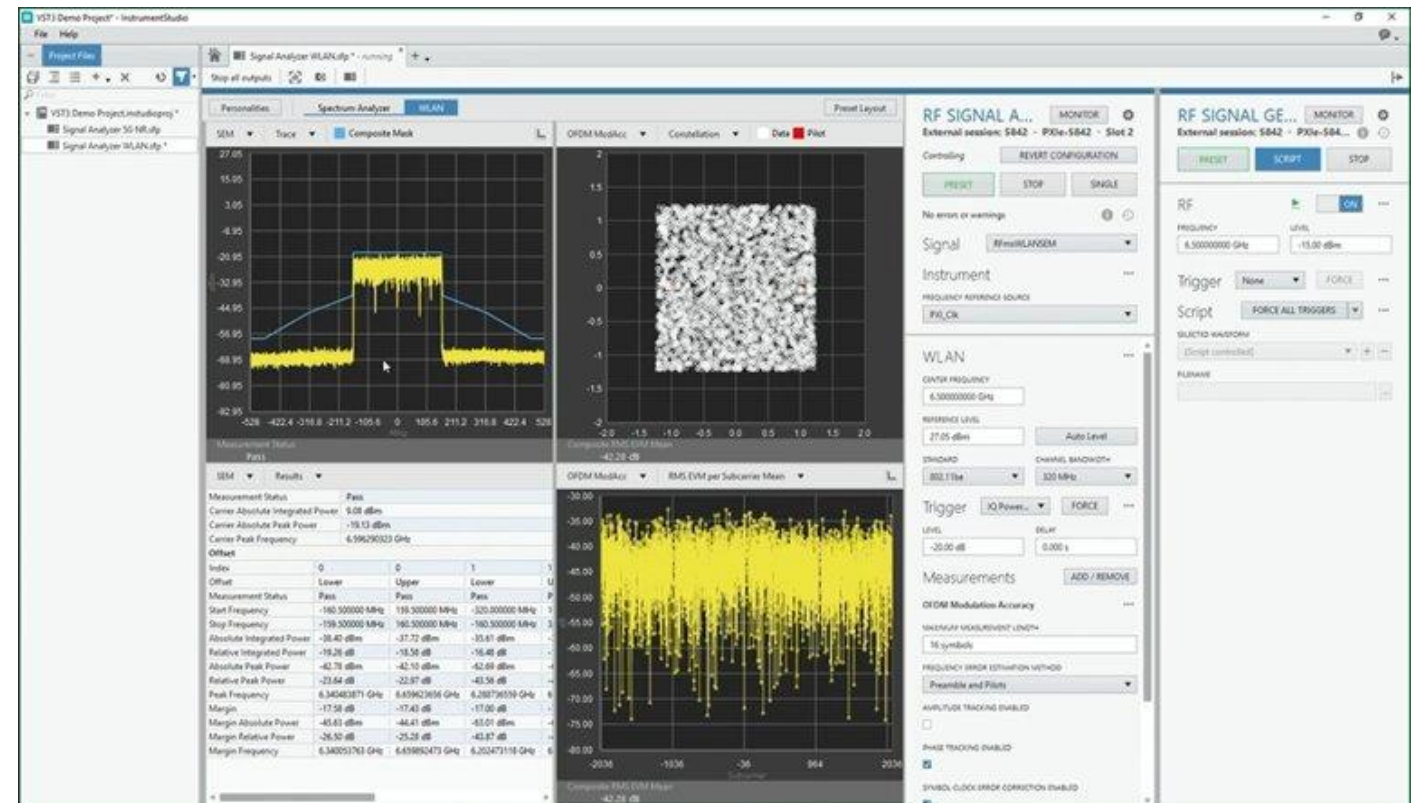
- 2.4, 5, and 6 GHz bands
- 1024, 4096 QAM modulation
- 160, 320 MHz channel bandwidth
- MU-OFDMA with per-user impairments and results
- Up to 8x8 MU-MIMO (Optional License)
- < -52 dB EVM with NI VST (320 MHz BW, Wi-Fi 7)

RF PHY Measurements

- TxP, ModAcc, SEM, IQ impairments, power ramp
- Common Pilot Error (CPE), unused tone error

RFmx Waveform Creator GUI

RFmx Measurement Soft Front Panel in InstrumentStudio

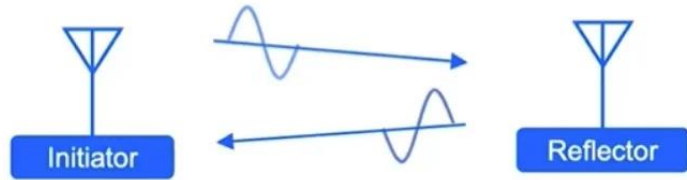
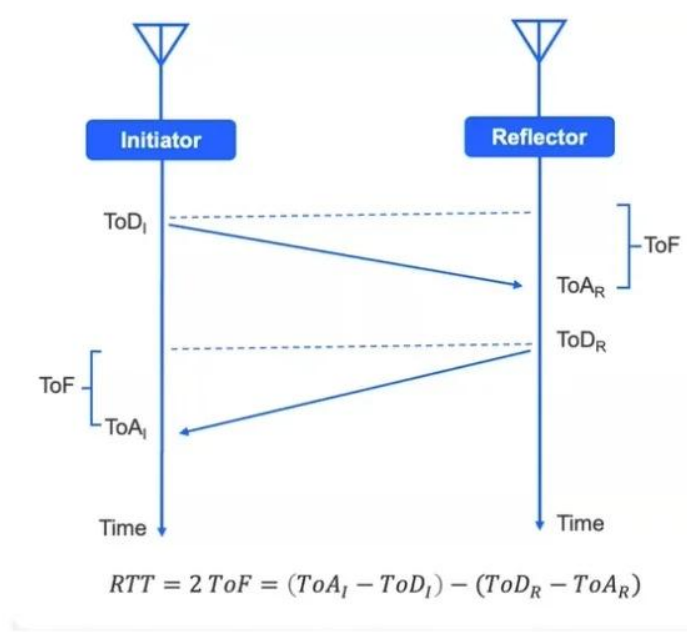
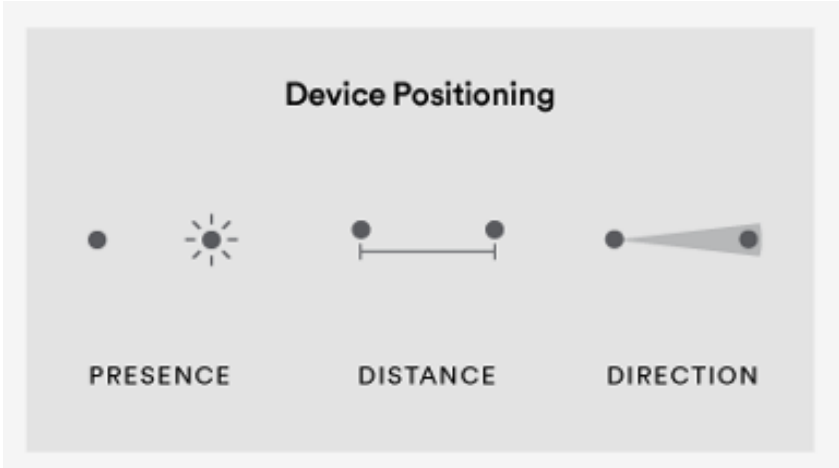


Bluetooth Channel Sounding

- **Goals**
 - Improve accuracy of distance measurements from 3-5m (RSSI) to 10-30 cm
 - Improve security and minimize interference
- **Applications**
 - Real-time location services
 - Secure building access
 - Digital keys (automotive)
 - Proximity detection
- **Implementation**
 - Uses phase-based ranging across multiple frequency tones
 - Uses round-trip timing

Mode	Description
Mode 0	Used to exchange synchronization information to align on timing and calibrate frequency of one side w.r.t. the other
Mode 1	Used to exchange a Round Trip Timing (RTT) packets
Mode 2	Used to exchange phase-based ranging (PBR) CS tones, to measure phase and amplitude of the communication channel
Mode 3	Used to exchange both RTT and PBR CS tones

Source: TI



Source: SiLabs

High Data Throughput (HDT)

- **Goals**

- Improve data rates of Bluetooth LE 2M PHY
- Support rates up to 7.5 Mbps
- Shorten time to transfer data between devices
- Enable new applications that require > 2 Mbps

- **Applications**

- Enhanced data transfer rates between devices
- Streaming high-definition audio

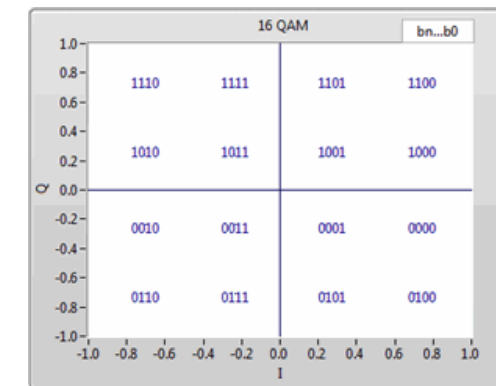
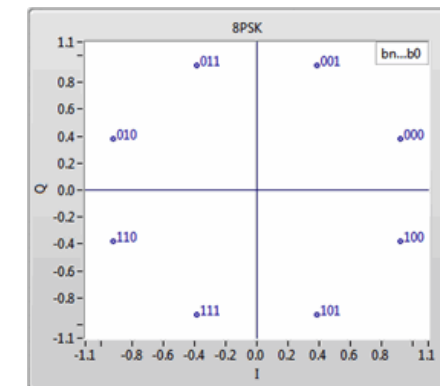
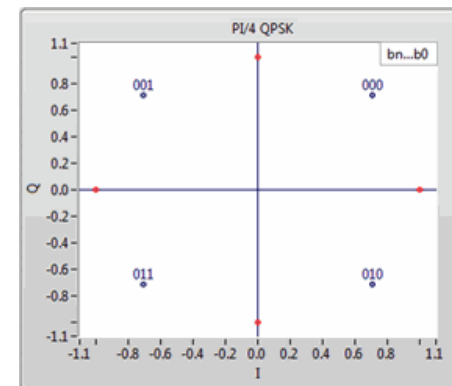
- **Implementation**

- Longer packets, extended payload length (hyperlength)
- Higher order modulation (single-carrier), up to 16 QAM

- **Test challenges**

- Stricter EVM requirements
- Extended payload length (hyperlength)
- ACP limits (new measurement at +/- 3 MHz)

Bit rate	2 Mb/s	3Mb/s	4 Mb/s	6 Mb/s	7.5 Mb/s
Tx EVM Limit	-10 dB	-13 dB	-16 dB	-19 dB	-22 dB
Maximum drift of non-ideal source	± 2 kHz	± 2 kHz	± 1 kHz	± 1 kHz	± 0.5 kHz
Maximum drift rate of non-ideal source	4 Hz/μs	4 Hz/μs	2 Hz/μs	2 Hz/μs	1 Hz/μs



Data Rate	Modulation	Coding Rate	Termination Sequence- two symbols (Bits)	Payload Bits Per Symbols
2Mb/s	Pi/4-QPSK	1/2	4	2
3Mb/s	Pi/4-QPSK	3/4	4	2
4Mb/s	8PSK	2/3	6	3
6Mb/s	16QAM	3/4	8	4
7.5Mb/s	16QAM	15/16	8	4

RFmx NB-IoT/eMTC

3GPP Release 14 Uplink eMTC (Cat-M1/M2)

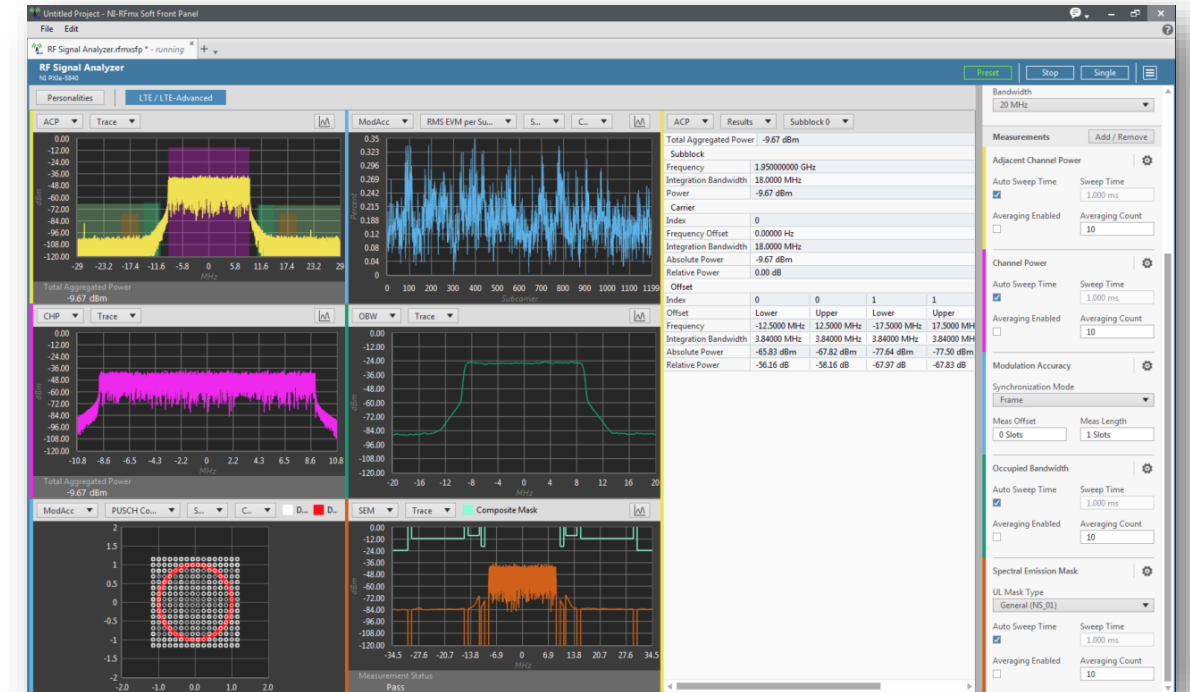
- 1.4, 5 MHz CBW
- Frequency Hopping (Cat-M1 only)
- Guard Symbols

3GPP Release 14 Uplink NB-IoT (Cat-NB1/NB2)

- Single Tone FDMA, Multitone SC-FDMA
- Modulation Schemes: BPSK, QPSK
- Subcarrier Spacing: 15 kHz, 3.75 kHz
- Channels: NPUSCH Format 1, NPUSCH Format 2

RF PHY Measurements

- ModAcc, ACLR, SEM, CHP, OBW
- Narrowband/wideband retuning, frequency hopping
- RFmx Waveform Creator GUI



RFmx Measurement Soft Front Panel in InstrumentStudio

RFmx LTE/LTE-Advanced

3GPP Release 12 LTE and LTE-Advanced

- Downlink (CP-OFDM), Uplink (SC-FDMA)
- TDD and FDD
- Carrier aggregation up to 5 CC
- Downlink test models

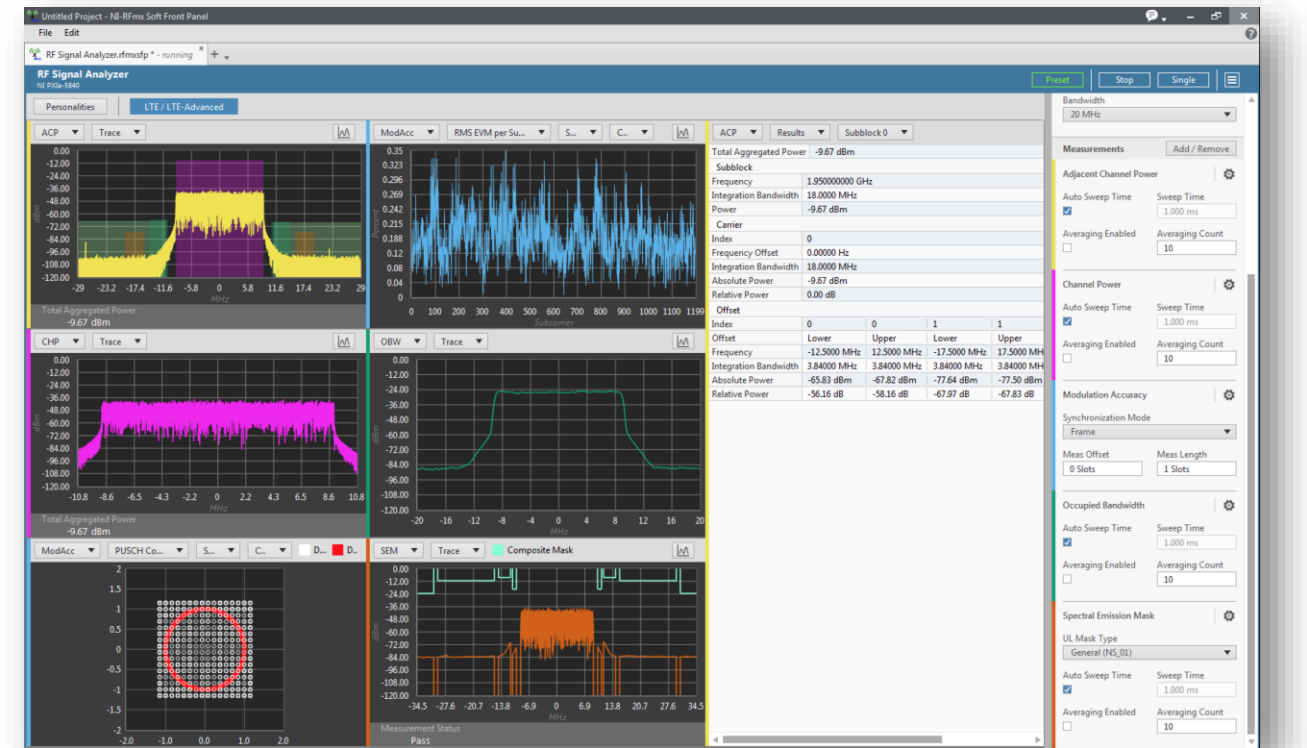
3GPP Release 14 LTE-Advanced Pro

- Carrier aggregation up to 32 CC
- eLAA (licensed assistance access)

RF PHY Measurements

- ModAcc, ACLR, SEM, CHP, OBW, ON/OFF Time Mask, Slot Power, Slot Phase
- RFmx Waveform Creator

RFmx Measurement Soft Front Panel in InstrumentStudio

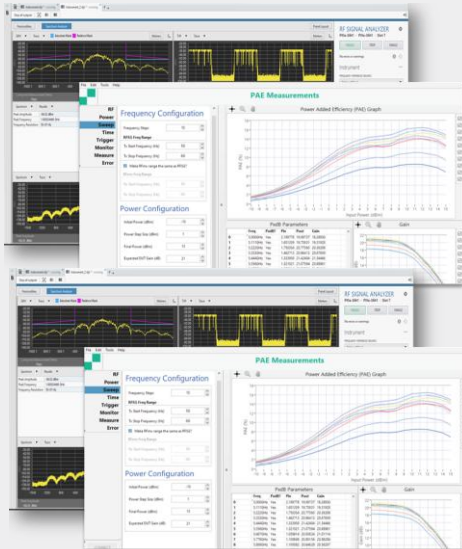


NI Solutions for EW and Radar Validation



NI's Solution for Test and Validation

- Scalable, modular, customizable system for any test application
- Introduction to the Vector Signal Transceiver (VST)



RF Parametric Test

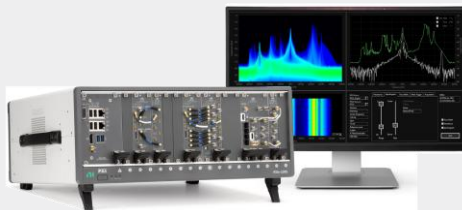
- Out-of-the-Box waveforms and measurement science
- Large (modulated) signal and small (S-parameters) signal analysis

Advanced Digital and Radar/EW Subsystem Testing

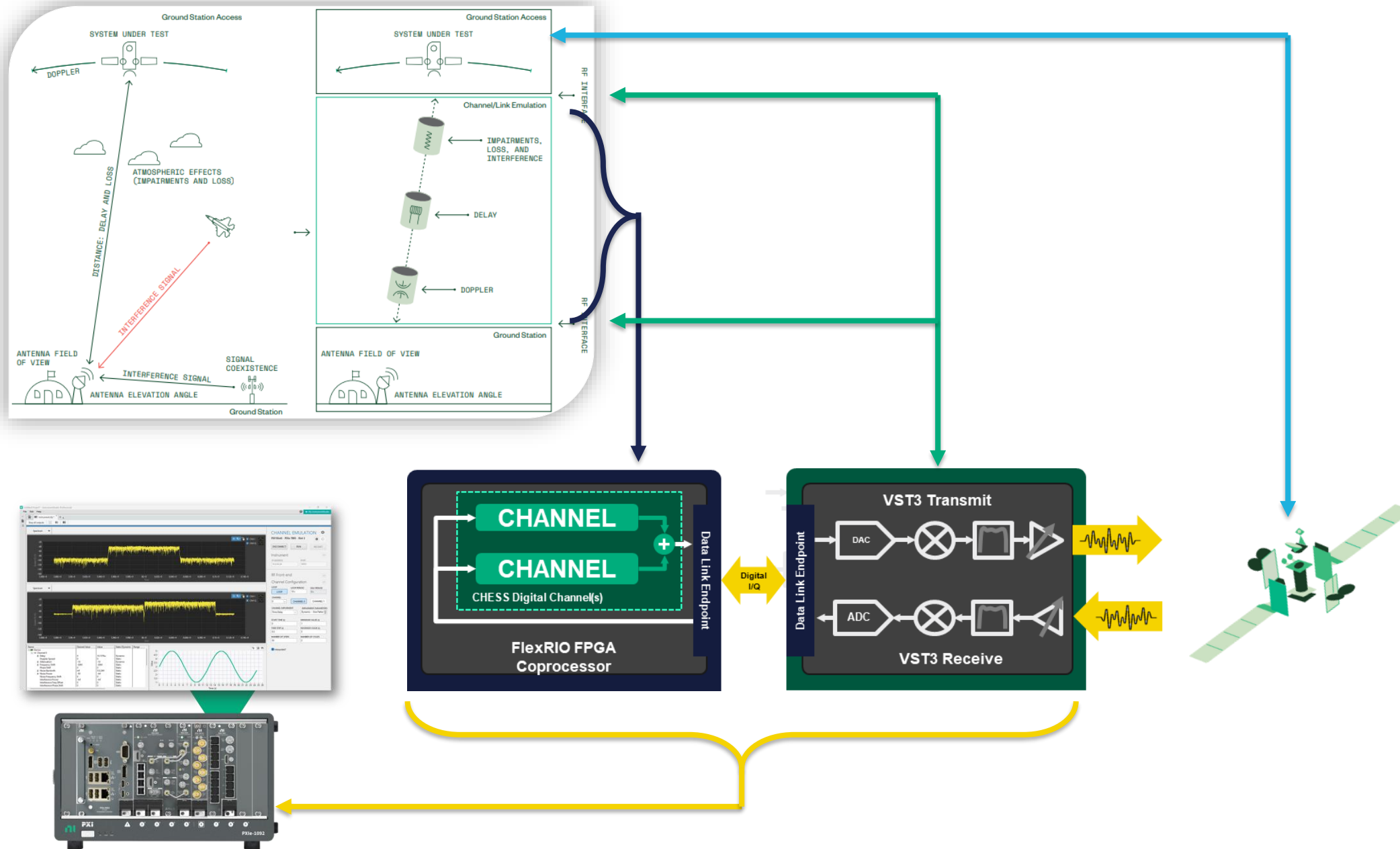
- RF to Bits Testing / Digital Transmit Receive Modules (DTRM)
- Radar Pulse Analysis Tools

Hardware-In-The-Loop (HIL) System Validation

- Radar Target Generation (Point Targets & High Fidelity)
- RF Multi-Emitter Generation
- Wideband Data Recording & Playback



Channel Emulation System Software (CHESS)

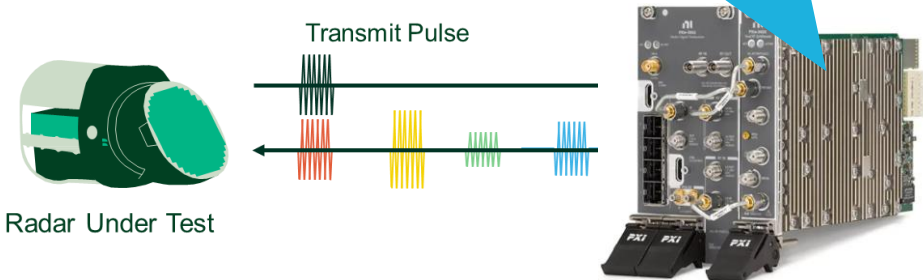
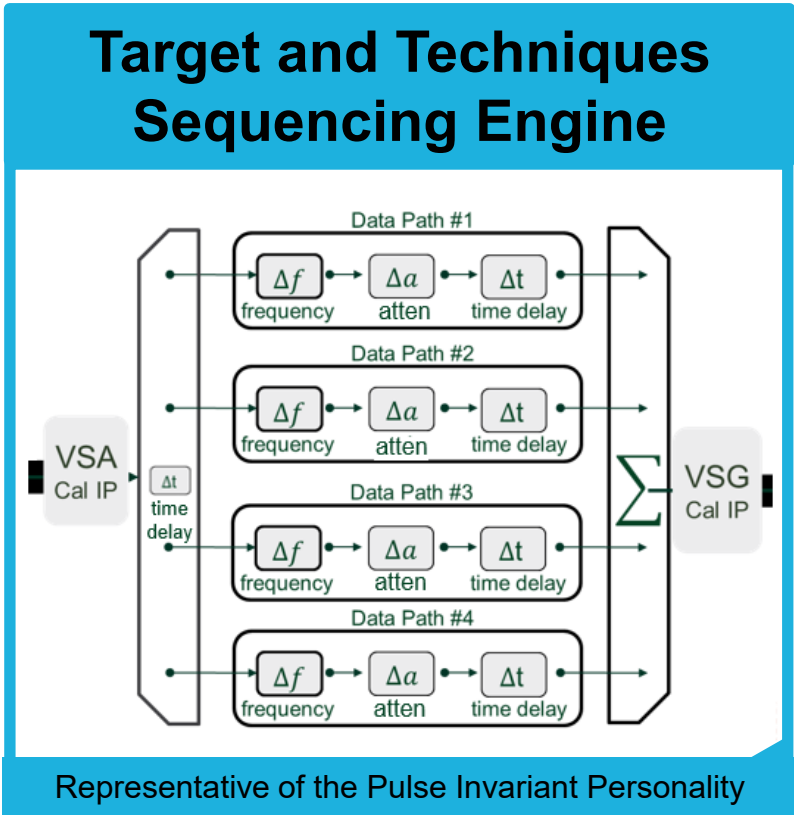


- CHESS enables real-time RF channel simulation of:
 - Doppler and fading
 - Path loss
 - Interference
 - Dynamic field-like effects
- Evaluate RF performance under realistic early conditions.
- Use simulation + HIL for repeatable, deterministic testing.

Visit ni.com/CHESS

NI Solution | Radar Target Generation Software Details

Parameters	System Capability
Number of Targets per VST	4 Targets (Pulse Invariant Mode) 3 Targets (Pulse Aware mode)
Range (Time Delay)	Maximum: 15,000 km (100 ms) Minimum: 570 m / 3.8 uS [PXIe-5842] 119 m / 795 ns [PXIe-5841] (<1 m with low latency PRI Skipping)
Maximum Target Separation	Pulse Invariant 3,928 m (26.2 uS) [PXIe-5842] 7,856 m (52.4 uS) [PXIe-5841] Pulse Aware - No Limit
Velocity (Doppler)	± 2 MHz, <5Hz resolution Dynamic In band Doppler Frequency Correction
Amplitude	Output Power Range: 0dBm to -120 dBm w/ PXIe-5699 (Agile Attenuator) Input / Output Power & Signal Digital Dynamic Range – Per Module RF Specification ** Real Time Target Scintillations (Swerling Mode 1 - 5)
Signal Phase Control	Static Per Target Phase Control (within a single channel)
System Level Calibration	Integrated System Self-Calibration (De-embedding External Power Loss and Time Delay)
External Local Oscillator	Single Channel Supported (Improved Phase Noise)
Tunable Frequency Range	10 MHz to 26.5 GHz [PXIe-5842] 9KHz to 6 GHz [PXIe-5841]
Instantaneous Bandwidth	2 GHz IBW [PXIe-5842] 1 GHz IBW [PXIe-5841]
Supported Trigger Modes	Software, Hardware, Pulse Edge, Relative Time
Supported Modes	Target Configuration (Interface with Dynamic Scenario Generator “one at a time”) Target Configuration List (Pre-generated Scenario Generation “.CSV File”)
Update Rate	Up to 15 KHz From Host (Direct or List Mode) Up to >30 KHz From Coprocessor [implementation dependent]
FPGA Coprocessor Interfaces	IQ Streaming “Operating on RF Signal” Target Parameter Streaming (dF, dT, dA)



[RTG User manual \(Link\)](#)

[RTG Webpage](#)

** [PXIe-5842 Module RF Specifications \(Link\)](#)

** [PXIe-5841 Module RF Specification \(Link\)](#)

Multi-Emitter Generation (MEG) Software | 25Q4 Release

Real-time Signal generation for simulation of complex electromagnetic environments

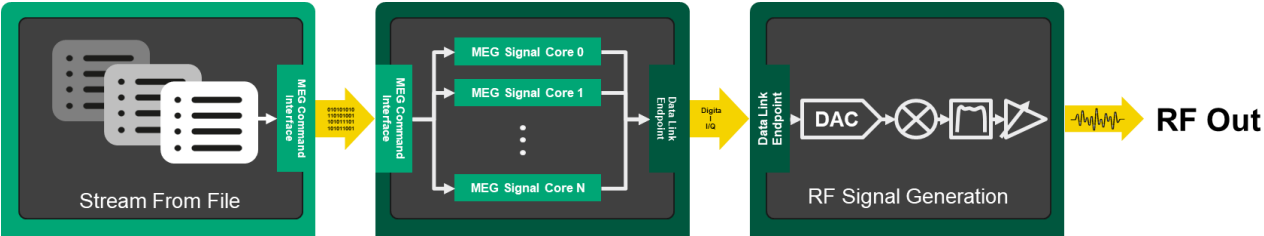
Features	System Capability
Frequency Range, Bandwidth	30 MHz – 26.5GHz, up to 2 GHz of Instantaneous Bandwidth ¹
Support Hardware	PXle-5842, PXle-7903
Number of System RF Ports	4 (w/ specifications) Up to 16 possible with custom system delivery
System Level RF Compensation (Across RF Ports)	Time Synchronization, Wideband RF Magnitude & Phase, De-embedding of external interfaces
Signal Simulation Density	4M Signals / second
Scenario Generation Modes	Stream pre-generated signal parameters from file/disk
Simultaneous Signal Generation	Up to 8 simultaneous signal generation engines
API and UI	- Standalone Multi-Emitter Application in InstrumentStudio - RF System Compensation Utility in InstrumentStudio - gRPC API for customer client development - MEG Command Interface for firmware control - Pulse Descriptor Word (PDW) Translator Utility²

¹ Based on supported RF HW Specifications

² Subject to ITAR and Export Control

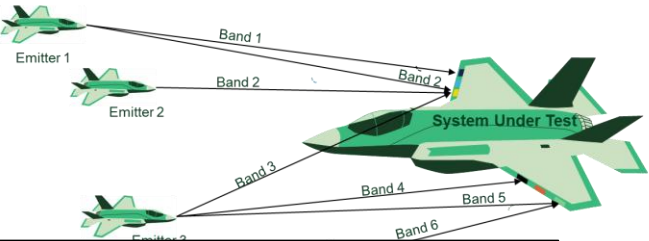
Signal Generation	Supported Features
Emitter Types	Modulation Core (x6): CW, Pulsed CW, Modulation: LFM, PSK, Barker Codes Waveform Playback Core (x2): User Defined Waveforms
Time Domain Pulse Shaping	Rectangular, Configurable Rise/Fall Time
Configurable Emitter Parameters	Start Time, Signal Width, Digital Frequency, Digital Amplitude, Start Phase, Rise Time / Fall Time, Modulation Parameters, Signal Repetition
User Defined Waveforms	User Defined Waveforms preloaded in onboard DRAM (PXle-7903), up to 10GB Single waveform maximum length equal to 1 second
Triggering	Start-on-Trigger (Generation), Export Start Event
Core Reconfiguration Time	Modulation Core: < 1.2 usec Waveform Playback Core: < 1.8 usec

Seamless streaming of scenarios from file in memory or disk



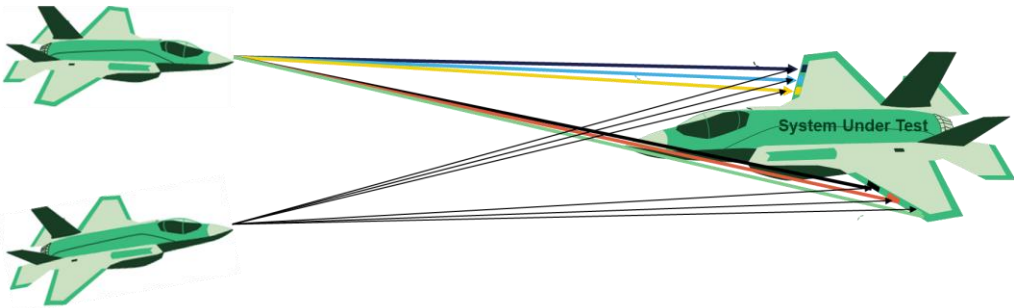
Non-DF Testing with Few Emitters

- Multiple VSTs for spectrum diversity/ coverage
- Does not require Phase Aligned RF Signal Generation – only time aligned RF signal generation
- COMINT Receiver/ Jammer test -> Time Aligned Playback of pre-generated Comms Waveforms from file



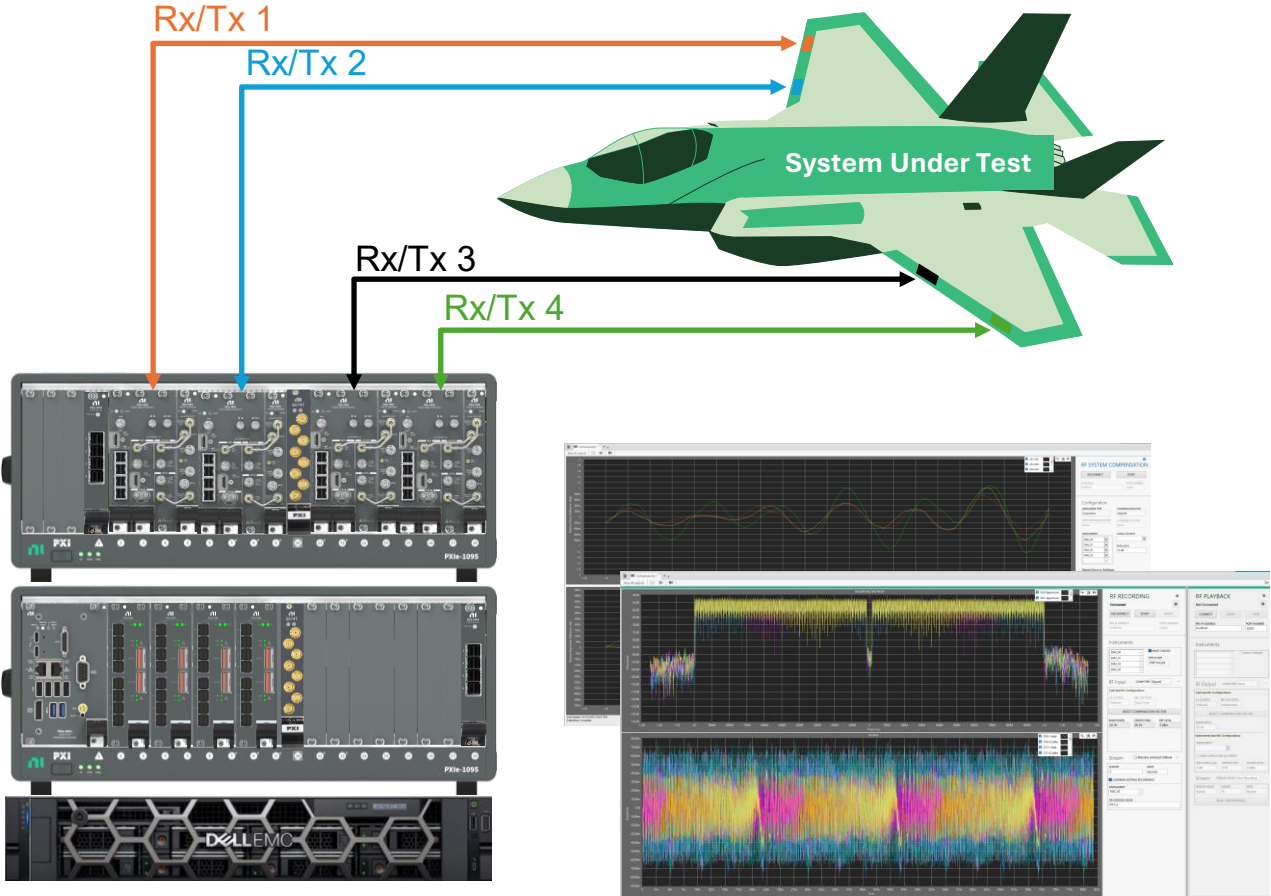
DF Testing with Few Emitters (TDOA, Interferometry, Watson Watt)

- Typically, Emitters in limited Frequency band
- Requires Phase Aligned RF Signal Generation
- COMINT Receiver test with DF -> Phase Aligned Playback of pre-generated Comms Waveforms from file



RPS Roadmap| Multi-Channel RF Record & Playback 25Q4

Parameters	System Capability
Frequency Range	30 MHz – 26.5 GHz
Instantaneous Bandwidth	Up to 2 GHz
Operation Mode	Record & Playback
Number of RF Channels	Up to 4
System Level Calibration	• LO Power compensation • Phase Coherent Compensation • Wideband Phase aligned compensation
Trigger Modes	Software, Digital Trigger (GPS, IRIG, Pulse)
Storage Options	<u>Ethernet Based Storage:</u> • More than 300 TB of storage • 2 GHz of IBW record up to 4 channels
Phase Synchronization	<2 degrees (across IBW after compensation)*
LO Configuration	• Independent LO setting/ Center frequency per channel • LO sharing option for phase alignment
Graphical User Interface	Ready to use GUI for: • Performing Power LO Calibration • Phase coherency/ phase alignment • Data preview, data recording, and data playback • Trigger selection and setup
Programming Software	gRPC supported API (Remote operation supported)
Data Storage Format	Support for SigMF format • Suitable for Machine learning • Human readable json Header file • Per channel binary Data file



*30MHz – 18 GHz

Q&A