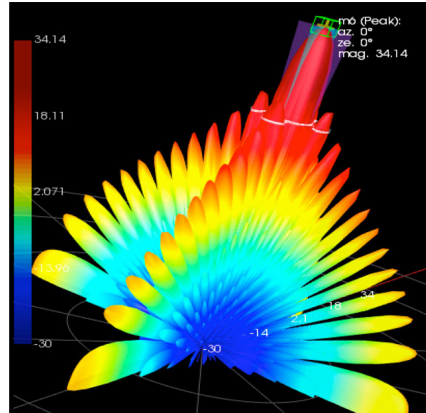
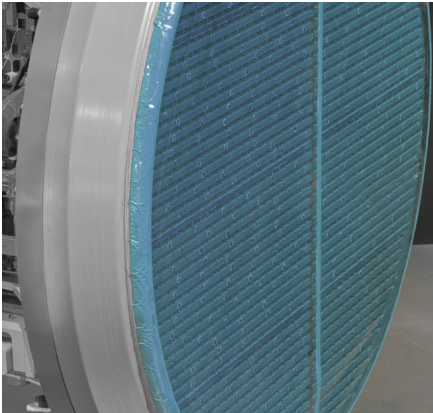


Keysight Technologies

Keysight EEsof EDA SystemVue

Technical Overview



Introduction

SystemVue is a multi-domain modeling and verification cockpit for electronic system-level (ESL) design. It allows system architects and algorithm developers to cross traditional Baseband and RF boundaries in order to innovate the physical layer (PHY) of next-generation aerospace/defense and wireless communications systems. SystemVue simplifies tasks by integrating popular DSP modeling and implementation interfaces, along with accurate RF EDA tools, Standards/IP references, and Test & Measurement links into a single, highly productive environment.

The result is that SystemVue “speaks RF,” links model-based design across important domains, and cuts PHY development and verification time in half.

Key benefits

- Robust RF fidelity for today’s baseband/PHY environments, which allows baseband designers to virtualize the RF and eliminate excess margin
- Superior integration with test accelerates real-world maturity and streamlines your model-based design flow, from architecture to verification
- World-class reference IP puts Keysight Technologies, Inc. instrument-grade interoperability and Layer 1 compliance inside your block diagram, before you have hardware
- Unified, open, polymorphic modeling simplifies tool flow, reduces department costs and supports a customizable, vendor-neutral environment
- Priced for networked workgroups to maximize design re-use and capitalize on baseband and RF synergies

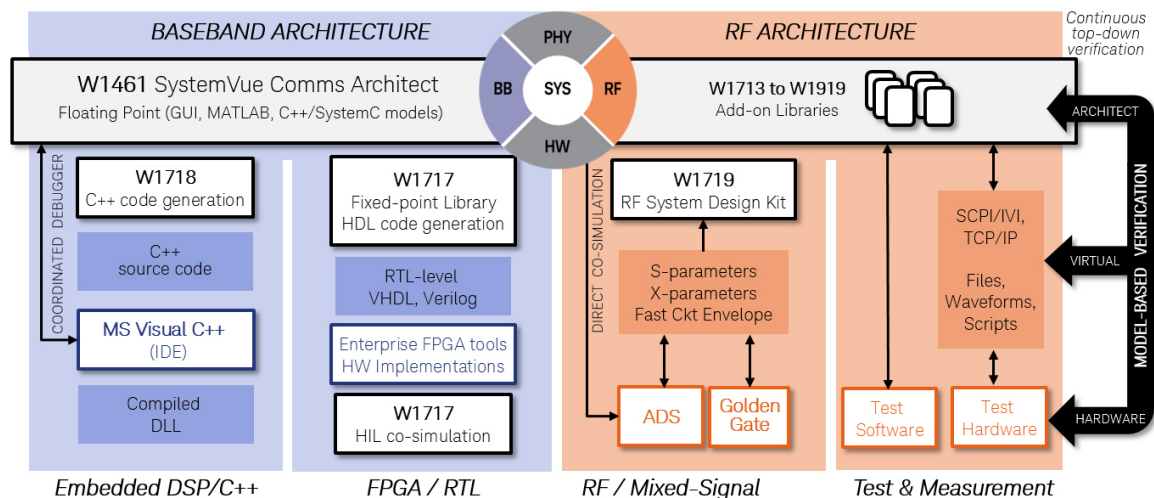


Figure 1. SystemVue provides a unified "cockpit" for modeling and design verification across multiple design flows.

SystemVue Environment

W1461BP SystemVue Communications Architect

The W1461 SystemVue Communications Architect is the core environment, with essential simulators and libraries. It includes many capabilities that are not found in other system-level communications design tools, or are only available as added-cost options.

Optional capabilities are also available.

Core environment

- Easy to use, multi-threaded, advanced Windows application
- Polymorphic design entry supports “model-based design” flow (GUI blocks, language-based C++ or MATLAB, VHDL, Verilog, and SystemC)
- Scripting, 3D dynamic graphs, and file I/O streamline verification tasks
- Easily encapsulate existing IP from a variety of formats into one flow
- Priced and licensed attractively for networked workgroups

Custom C++ model development interface

- Build floating-point and fixed-point models in C++, and SystemC
- Debug models using familiar Microsoft Visual C++ 2013 interface

Native algorithm modeling and debugger

- Native integration of MATLAB Script from MathWorks, included with SystemVue
- Familiar command-line interface, interactive debugger, and scripting
- Optionally, if you already own a locally-licensed copy of MATLAB and toolboxes, extend SystemVue to use them directly, with a single mouse click

High-performance dataflow simulation engine

- Supports complex RF envelope carriers, timed synchronous dataflow and dynamic dataflow for high-performance modern PHY's with RF effects
- Advanced Scheduler with native multi-rate allows complex topologies
- Multi-threaded for faster simulation on multi-core CPUs
- Free support for external co-simulation, such as ModelSim and Aldec Riviera-PRO

Model physical layer effects with versatile block sets

- Over 300 simulation blocks included in the base platform
- Handles analog effects such as phase noise, S-parameters, and more
- Additional design flow support for ADS X-parameters* and GoldenGate “fast-envelope” models are available through the W1719 option

Links to measurement and hardware verification

- SCPI and IVI instrument interaction over TCP/IP embedded directly within dataflow simulations, or from a command line
- Re-use the same verification set-ups, scripts, test vectors, and wireless IP as you move from algorithm into test
- Integrated with other Keysight measurement software applications, such as 89600 VSA, FlexDCA, I/O Libraries, and Command Expert
- Includes free, flexible blocksets and application examples for signal generation of OFDM, Zigbee, and other formats

Digital filter synthesis

- Direct analysis and implementation of fixed point FIR filters
- FIR, IIR and analog communications filter types

SystemVue Libraries

The SystemVue environment provides nearly 300 native simulation models, plus value-added OFDM and Zigbee signal sources. Listed below are optional libraries that can be added to any SystemVue environment.

W1902EP/ET

Digital modem library

Versatile transmit/receive library supporting modulation/demodulation and EVM/BER measurements for approximately 40 popular communications formats. Matched TX/RX pair includes framing and adaptive equalization, DSSS (spread spectrum), and synchronization needed for milcomm, satcomm, and test and measurement applications.

W1904EP/ET

Adaptive equalization library

Library of adaptive-equalization blocks that allow system designers to work with already-corrected channel performance. The blocks also serve as algorithmic references to test user-developed models and hardware implementations.

W1905EP/ET

Radar model library

Provides signal processing reference models for radar and electronic warfare system architectures in a variety of applications including Pulsed Doppler, Automotive/FMCW, Phased Array/Beamforming, Synthetic Aperture, and UWB Radars. Enables moving multi-static scenario modeling by adding TXs, RXs, targets, clutter, fading, interferers, and the RF effects necessary for realistic system analysis and early R&D verification. Connects to wideband test equipment and 3rd party software to create highly capable test beds. (Note: Also includes W1720).

W1906EP/ET

5G baseband verification library

Simulation-based algorithmic reference library to support pre-5G standards exploration of system-level performance, providing models in three main areas: Candidate PHY waveforms and coding; high-order MIMO and phased array/beamforming; and millimeter-wave channel modeling. Support links to both EDA simulation and wideband test equipment, for realistic results. (Note: Also includes W1720).

W1908EP/ET

Automotive radar model library

Provides parameterized simulation models and reference designs for automotive radar scenario simulation. Includes automotive radar waveform generation, signal modulation, antenna models, pedestrian channel simulation and radar signal processing. Reference designs and scenarios such as multi-targets, range and micro-Doppler pedestrian velocity measurements and 3D phased array radar scanning provide useful starting points for automotive radar designs.

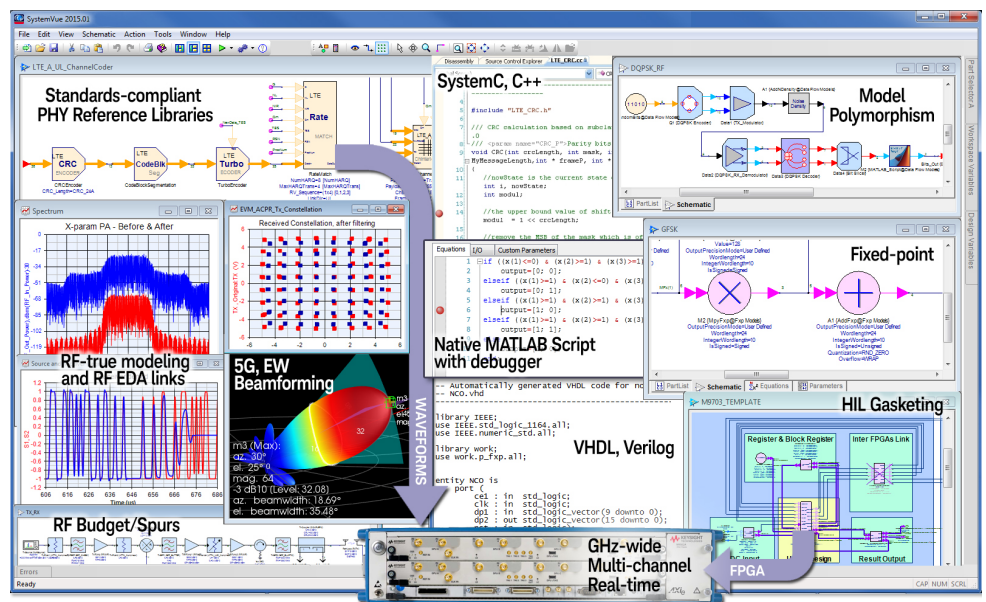


Figure 2. SystemVue provides a modeling and verification cockpit for high-performance communication system architectures where RF and Baseband performance must be considered together. With open baseband modeling and realistic RF, together with links to standards references.

SystemVue Design Kits and Application Personalities

Application personalities and design kits can be added to SystemVue to accomplish deeper analysis and/or implementation tasks, for both RF system architectures and digital hardware design. They can be added to any SystemVue environment.

W1711EP/ET

SystemVue Engine

Provides 1 additional dataflow simulation engine, on top of the engine already included with SystemVue environment. Typically used for remote simulations on Windows/Linux compute clusters; also can be embedded into custom applications using API, such as instrument signal generation). A “network” license is recommended for use with compute clusters.

W1712EP/ET

SystemVue Distributed Computing
8-pack

Enables up to 8 concurrent dataflow simulations on distributed simulation clusters. Provides interface to grid managers such as LSF. (W1711 is recommended, but not required. Only available in networked licensed configurations.)

W1713EP/ET

SerDes Models

Model set that helps gigabit SerDes architects to investigate PHY-level signal processing for maximum interconnect performance. Includes optical SerDes models.

W1714EP/ET

AMI model generator

Includes the gigabit SerDes simulation models of the W1713, and also generates simulation models compliant with the IBIS AMI standard, for use in channel simulators throughout the signal integrity community. (Note: Requires W1718).

W1715EP/ET

MIMO channel builder

Models full WINNER-II and 3D WINNER+ channel fading for 4G link-level simulation and throughput scenarios. Models the 8x8 MIMO arrays needed for LTE Advanced TX and RX, with importation of 2D antenna patterns for realistic system Throughput simulations that also account for crosstalk and propagation effects.

W1716EP/ET

Digital pre-distortion builder

Characterizes wideband power amplifiers and mitigates nonlinearities and memory effects to improve ACLR ≥ 20 dB (typical) for 4G waveforms. Extracts Volterra, Memory Polynomial, or Look-up Table coefficients, then builds baseband predistortion network. Includes Crest Factor Reduction (CFR). Integrates with live test equipment, measured X-parameters, or Keysight ADS/GoldenGate co-simulations.

W1717EP/ET

Hardware design kit

Provides a hardware design flow option for FPGA rapid prototyping. Includes a fixed-point library, VHDL/Verilog code-generation, and connects to Altera Quartus Pro II and Xilinx Vivado/ISE for convenient 1-step code generation & synthesis. Also enables “Hardware-in-loop” (HIL) co-simulation with Xilinx Virtex 6/7 boards and Keysight M9703A/B real-time applications.

W1718EP/ET

C++ code generator

Generates transportable, license-free C++ models from the SystemVue interface, connecting your PHY algorithms to implementation and verification tools on other platforms and OS's. This option is integrated well with Microsoft Visual C++ 2013.

W1719EP/ET

RF system design kit

Adds an RF System design personality. Provides dedicated spectral-domain simulator for accurate RF architecture studies, and enables bottom-up verification using X-parameters (ADS) and fast circuit envelope models (GoldenGate). Enables Baseband and System modelers to take advantage of RF architectures, without deep RF application knowledge.

W1720EP/ET

Phased array beamforming kit

Adds a phased array/beamforming personality that includes simulation models, measurements, and plotting for easily designing with hundreds of parallel channels, for high-order MIMO as well as beamforming. Works with both W1461 Dataflow and W1719 RF System tools. (Note: This module is included in the W1905 Radar and W1906 5G libraries). It accurately predicts the direction and power of radiated spurious intermods from phased array systems to avoid interference with nearby antennas and to comply with FCC emission standards. Accurate S-, X- and sys-parameters of phase shifters, attenuators, amplifiers and mixers can be included to accelerate hardware realization. Monte Carlo and user specified antenna element failure analysis enables mission-critical design.

SystemVue Baseband Exploration and Verification Libraries

SystemVue baseband verification libraries

Baseband verification libraries provide compiled models for sources, receivers, function blocks, and reference designs that adhere to the physical layer of modern emerging standards. They are used to create, debug, and demodulate PHY waveforms at various locations in system architectures and algorithms. They can be used to validate baseband MATLAB/C++ algorithms, RF system architectures, as well as test & measurement prototypes. These libraries also interoperate directly with personalities of the 89600 VSA software, to assure consistency throughout the design process.

SystemVue's standards-based baseband PHY libraries help you quickly create and verify algorithms and high-performance system architectures with confidence, so that they will work in the real world.

W1910EP/ET

LTE baseband verification library

The W1910 provides over 100 highly-parameterized functional blocks for source, coding and receiver verification, according to 3GPP LTE release 8. Supports closed-loop throughput measurements with active HARQ, FDD, TD-LTE, and MIMO modes.

W1911EP/ET

WiMAX™ baseband verification library

The W1911 provides over 75 highly-parameterized functional blocks for source, coding and receive functions to model compliance and interoperability with WiMAX specification in IEEE 802.16e-2005.

W1914EP/ET

DVB-x2 baseband verification library

The W1914 provides a configurable IP reference for SatComm transmit sources, so that you can verify baseband receiver architectures and algorithms for Digital Video Broadcast (DVB-S2 and DVB-T2) and ISDB-T compliant signals.

W1915EP/ET

mmWave WPAN baseband verification library

The W1915 provides a configurable IP reference for 60 GHz wireless personal area network (WPAN) systems, including TX/RX reference designs for 802.11ad and 802.15.3c physical layers, enabling closed-loop BER and RF verification.

W1916EP/ET

3G baseband verification library

The W1916 provides over 300 highly-parameterized functional blocks for source, coding and receiver verification for multi-standard radio (MSR) designs requiring references for GSM, EDGE, CDMA, CDMA2000, WCDMA, HSDPA, HSUPA, and dual-carrier HSPA+.

W1917EP/ET

WLAN baseband verification library

The W1917 provides parameterized functional blocks for MIMO source, coding and transmitter/receiver verification for IEEE 802.11ax, along with full blocksets and reference designs for 802.11ac/a/b/g/n/p, 802.11ah, as well as Bluetooth 4.1 and BLE.

W1918EP/ET

LTE-Advanced baseband verification library

The W1918 includes the W1910 LTE library and extends it to LTE-Advanced Releases 9-13 with over 80 new blocks and MIMO reference designs. Includes recent extensions for NB-IoT.

W1919EP/ET

GNSS baseband verification library

The W1919 models baseband RX, TX, and scenarios for the GPS and Beidou2 satellite navigation standard. Modulation sources for GLONASS, and Galileo also included.

SystemVue baseband exploration libraries

Exploration libraries build on top of verification libraries. They provide source code, in addition to the compiled simulation models, allowing rapid investigation, troubleshooting and verification of innovative PHY designs. With working reference designs, preconfigured test benches and block-by-block “golden references,” architecture and hardware designers can use the same tool for model-based design and continue directly into hardware verification with test equipment. Exploration libraries are a tremendous learning and productivity tool.

SystemVue’s standards-based baseband PHY libraries help you quickly create and verify algorithms and high-performance system architectures with confidence, so that they will work in the real world.

Note: Special licensing and support considerations apply. Please contact your Keysight field sales representative for more information.

W1906BEL

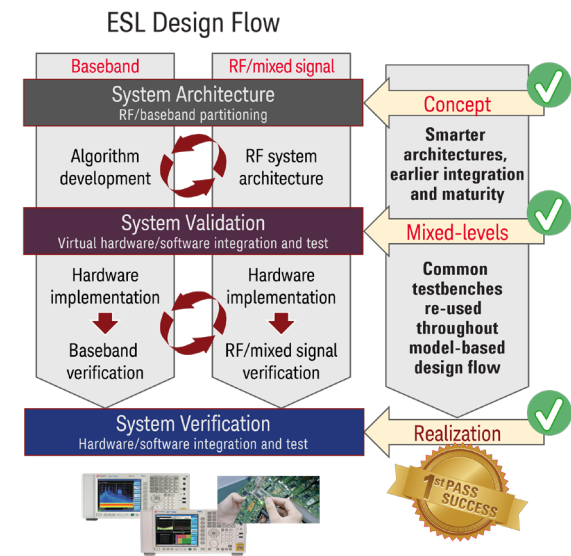
5G baseband exploration library

Provides C++ source code IP access and updates for 1 year under special agreement, to unlock Verizon-KT 5G signal waveforms, pre-5G PHY algorithms, 3GPP 38.901 100 GHz channel model, and multi-antenna hybrid beamforming and diversity technologies for user-modification and reference. By quotation only; please inquire.

W1912BEL

baseband exploration library

Provides C++ IP source code access for 1 year under special agreement for individual SystemVue libraries, such as NB-IoT (LTE-A Pro), LTE-Advanced, 2G/3G standards, Digital Pre-Distortion, and others. By quotation only; please inquire.



SystemVue enables Baseband and RF teams to cross-validate against other’s designs throughout the design process. This catches integration problems early, and provides a consistent “model-based engineering” approach across engineering disciplines, saving time and effort.

Education and services

SystemVue-related training and custom consulting services can be delivered at your site, or at a convenient location near you. Typical services are listed below. Also, annual support maintenance is recommended for all SystemVue products, since the software is typically updated twice per year, and significant new capabilities become available within the base platform and libraries.

SystemVue training classes	SystemVue consulting services
“SystemVue Fundamentals” (2 days)	Start-up assistance and custom training
“Digital Pre-Distortion” with the W1716 (2 days)	Custom model development, such as DOCSIS 3.0/3.1, and DVB-S2X
“Radar Signal Processing” with the W1905 (2 days)	Integration with 3rd party applications, such as AGI STK
“IBIS AMI Modeling” with the W1714 (2 days)	Special IP access, such as C++ source code

SystemVue Bundles and Licensing

SystemVue may be purchased as the W1461BP SystemVue Core environment plus a series of individual modules, or in any of the available bundles. The configurations shown below are current as of the SystemVue 2016.08 software release. Explore SystemVue configurations online at: www.keysight.com/find/eesof-systemvue-configs

Model/Module	W1461BP Communications Architect	W1462BP FPGA Architect	W1464BP RF System Architect	W1465BP System Architect	W1467BP Array Architect
W1461BP SystemVue Communications Architect (core environment)					
Graphical environment, scripting	☐	☐	☐	☐	☐
MATLAB Script and C++ algorithm modeling, debug	☐	☐	☐	☐	☐
Dataflow simulator, > 300 models	☐	☐	☐	☐	☐
Digital filter tool	☐	☐	☐	☐	☐
T&M connectivity and co-simulation interfaces	☐	☐	☐	☐	☐
Optional SystemVue libraries and application personalities					
W1711 SystemVue engine					
W1712 SystemVue distributed computing 8-pack					
W1713 SerDes models					
W1714 AML model generator ³					
W1715 MIMO channel builder					
W1716 Digital pre-distortion builder					
W1717 Hardware design kit ²		☐		☐	
W1718 C++ code generator				☐	
W1719 RF system design kit			☐	☐	☐
W1720 Phased array beamforming kit ⁶					☐
W1902 Digital modem library					
W1904 Adaptive EQ library				☐	
W1905 Radar model library ⁶					
W1906 5G baseband verification library ^{5,6}					
W1908 Automotive Radar Library					
W1910 LTE baseband verification library					
W1911 WiMAX baseband verification library					
W1912 Baseband exploration library ⁴					
W1914 DVB-x2 baseband verification library					
W1915 mmWave WPAN baseband verification library					
W1916 3G baseband verification library					
W1917 WLAN baseband verification library					
W1918 LTE-Advanced baseband verification library					
W1919 EP/ET GNSS baseband verification library					

Both perpetual licenses (BP, EP suffix) and time-based (BT, ET suffix) licenses are available, in either nodelocked or floating configurations. Contact your local Keysight EDA representative for configurations and pricing.

The W1717 hardware design kit now includes the W1903 fixed-point library. The W1903 library is no longer available as a separate library.

The W1714 AML model generator requires the W1718 C++ code generator. The W1714 also includes the W1713.

These products require custom quotation.

W1907 5G Forward bundle includes W1906, W1918, W1910, W1916, and W1715.

W1905 Radar and W1906 5G include the W1720. The W1720 benefits from W1719.

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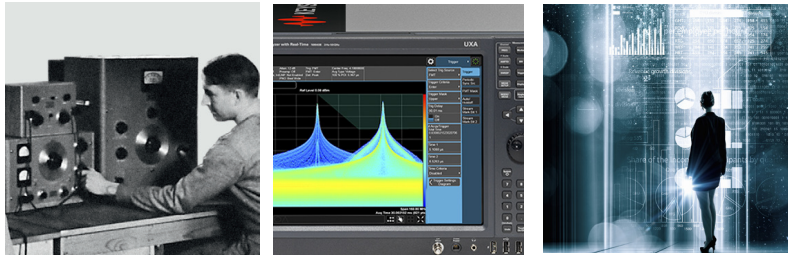
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