Keysight Technologies
EEsof EDA
SystemVue 2013

Technical Overview

KEYSIGHT TECHNOLOGIES

Introduction

SystemVue is a multi-domain modeling & 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

- Best-in-class RF fidelity among 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

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 math, VHDL, Verilog, and SystemC)
- Scripting, 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++
- Debug models using standard familiar Microsoft Visual Studio interface
- Use built-in code generation to export Win32 DLL models to other applications, including Keysight ADS

Native algorithm modeling and debugger

- Native support for hundreds of comms-oriented math functions, syntax
- Text and GUI interfaces for easy model creation, simulation and verification
- Familiar command-line interface, interactive debugger and TCP/IP links
- Direct integration of MATLAB as a supplemental equation parser

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

- Approximately 300 simulation blocks included in the base platform
- Handles analog effects such as phase noise, S-parameters, zero IF DC offsets, frequency-dependence, and more (Additional support for X-parameters* and GoldenGate "fast-envelope" model is 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
- Instantiate filters directly from system-level blocks with a mouse click

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 & 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 exploring trade-offs in radar system architectures for Pulsed Doppler, FMCW, Phased Array, Synthetic Aperature, and UWB Radars. Enables scenario modeling by adding targets, clutter, fading, noise, interferers, and the RF effects necessary for realistic system
analysis and early R&D verification using connections to live test equipment.

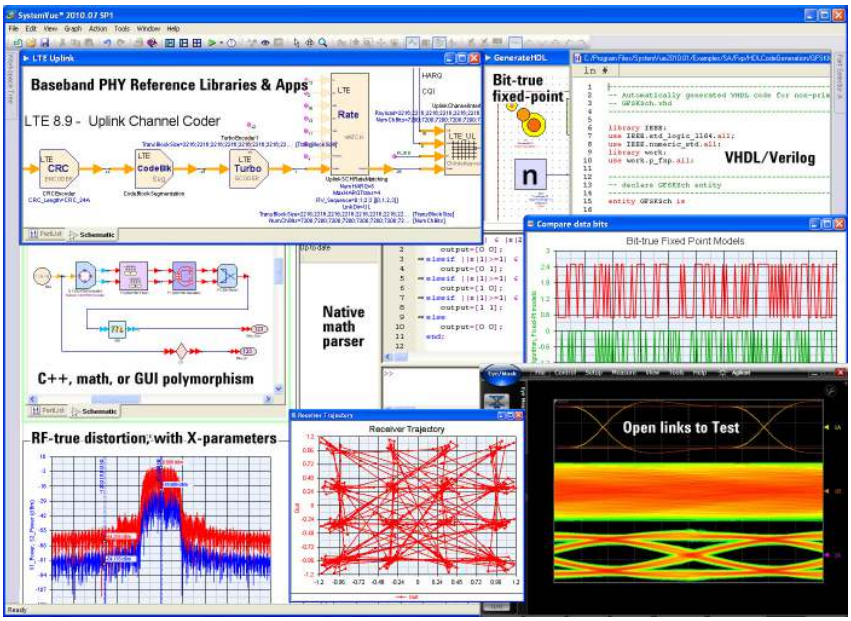

Figure 1. SystemVue provides a modeling and verification cockpit for high-performance communication system architectures where RF and Baseband performance must be considered together. With open baseband modeling and realistic RF, together with links to standards references.

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	Model set that helps gigabit SerDes architects to investigate PHY-level signal pro 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.
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 and SunGrid. (W1711 is recommended, but not required.)
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 and WINNER-II channel fading for 4G link-level simulation and throughput scenarios. Allows fully-configurable 8x8 MIMO array needed for LTE Advanced, with importation of 2D antenna patterns for realistic MIMO OTA with crosstalk and propagation effects. Supports beamforming synthesis to create directional basestation patterns.
W1716EP/ET Digital pre-distortion builder	Models nonlinear wideband PAs and mitigates nonlinearites and memory effects to improve ACLR ≥ 20 dB (typical) for 4G waveforms. Extracts Volterra, Memory Polynomial, or Look-up Table coefficients, then builds baseband pre-distortion network to mitigate nonlinearites and memory effects. Includes Crest Factor Reduction (CFR). Integrates with either wideband test equipment or RF EDA software, such as Keysight ADS/GoldenGate.
W1717EP/ET Hardware design kit	Provides a hardware design flow option for FPGA rapid prototyping and algorithm validation. Includes a bit-true, cycle accurate fixed-point library, VHDL and Verilog code-generation, and connects to Altera Quartus Pro II and Xilinx ISE for convenient 1-step code generation & synthesis. Also enables "Hardware-in-the-loop" (HIL) co-simulation with Xilinx Virtex 6 development boards.
W1718EP/ET C++ code generator	Generates transportable, license-free C++ models from the SystemVue interface, allowing you to connect your PHY algorithms to design, implementation, and verification tools on other platforms and OS's. Works with virtually any platform, and integrated especially well with Microsoft Visual Studio.
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.

SystemVue Baseband Exploration and Verification Libraries

SystemVue baseband verification libraries

Baseband verification libraries provide compiled sources, receivers, function blocks, and reference designs that adhere to the physical layer of modern emerging standards. They are used to create, examine and receive PHY waveforms and test vectors at various locations in a system diagram in order to exercise system architectures and algorithms, down to the block level. With native TCP/IP connectivity, they also support co-design with test equipment and hardware development boards for both baseband and modulated-carrier signals.

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 9.1. Supports closed-loop throughput measurements with active HARQ, FDD, TD-LTE, and MIMO modes. The W1910 supports Win32 DLL code-generation (for exporting models to other platforms), and also interoperates Keysight 89600 VSA and Signal Studio personalities for LTE.

W1911EP/ET
WiMAX™ baseband verification library

The W1911 provides over 75 highly-parameterized functional blocks for source, coding and receive functions. Helps you gain confidence in compliance and interoperability with WiMAX specifications 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 receiver verification for IEEE 802.11ac Draft 2.0. Also provides full blocksets and reference designs for 802.11a/b/g/n, as well as Bluetooth 2.1.

W1918EP/ET
LTE-Advanced baseband verification library

The W1918 includes the W1910 LTE library (3GPP Release 9.1), and also adds over 60 new blocks and MIMO reference designs for 3GPP Release 10 (LTE-Advanced).

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.

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

W1912ET

LTE baseband exploration library

Provides source code access for blocks in the W1910 LTE baseband verification library for 1 year and includes a 1 year license for the W1910ET. Source code access for other standards and IP, such as LTE-Advanced, 2G/3G standards, Digital Pre-Distortion, GNSS Satellite Navigation, and others is also optionally available; please inquire.

W1913ET

WiMAX baseband exploration library

Provides source code for blocks in the W1911 WiMAX baseband verification library for 1 year and includes a 1 year license for the W1911ET.

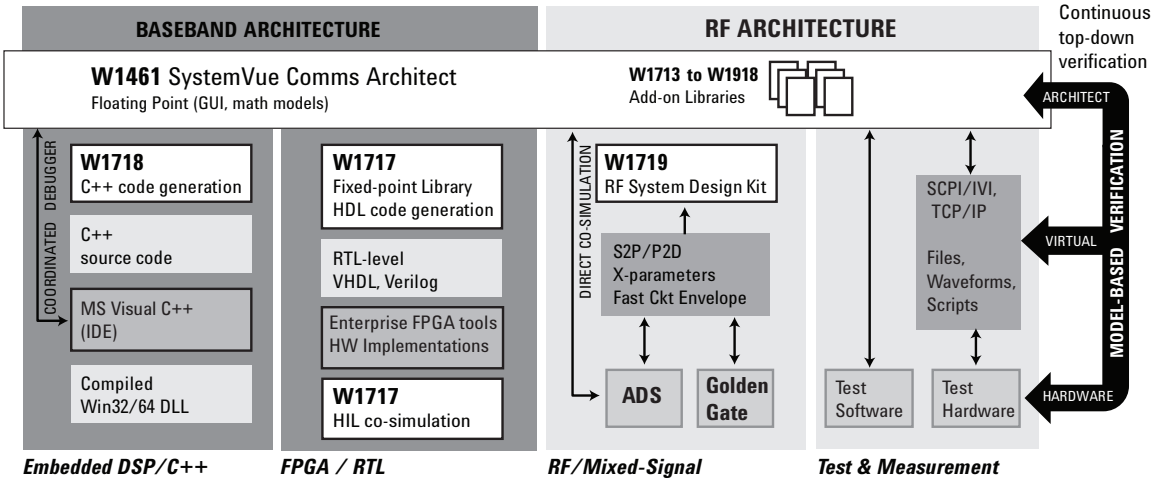

Figure 2. The W1465 SystemVue System Architect bundle provides design and verification options across multiple disciplines such as C++, FPGA, RF, and Test & Measurement. This allows enterprise workgroups to share specifications, data, and licenses across a common environment.

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) – "Digital Pre-Distortion" with the W1716 (2 days) – "Radar Signal Processing" with the W1905 (2 days) – "IBIS AMI Modeling" with the W1714 (2 days) – "Fundamentals of DSP for Digital Comms" (3 days, N3520A/B) – "DSPedia" comms tutorials and examples (self-paced DVD, N3520M)	– Start-up assistance – Custom training, including applications and libraries such as LTE, DSSS, etc – Custom model development, such as IBIS AMI – Automation with test equipment – Integration with 3rd party applications, such as STK 10.0 – Selected C++ source code, IP access – Additional topics, as arranged

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. 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
W1461BP SystemVue Communications Architect (core environment)					
Graphical environment, scripting		■	■	■	■
Native math algorithm modeling, debug		■	■	■	■
Dataflow simulator, and co-simulation interface		■	■	■	■
C++ modeling, VisualStudio integration		■	■	■	■
~300 blocks, including OFDM, Zigbee, and other		■	■	■	■
Digital Filter tool		■	■	■	■
Instrument connectivity, scripting		■	■	■	■
Optional SystemVue libraries and application personalities					
W1711	SystemVue engine				
W1712	SystemVue distributed computing 8-pack				
W1713	SerDes models				
W1714	AMI model generator (note 3)				
W1715	MIMO channel builder				
W1716	Digital pre-distortion builder				
W1717	Hardware design kit (note 2)		■		■
W1718	C++ code generator				■
W1719	RF system design kit			■	■
W1902	Digital Modem Library				
W1904	Adaptive EQ library				■
W1905	Radar model library				
W1910	LTE baseband verification library				
W1911	WiMAX baseband verification library				
W1912	LTE baseband exploration library (note 4)				
W1913	WiMAX baseband exploration library (note 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				

Notes:

1. *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.*
2. *The W1717 hardware design kit now includes the W1903 fixed-point library. The W1903 library is no longer available as a separate library.*
3. *The W1714 AMI model generator requires the W1718 C++ code generator. The W1714 also includes the W1713.*
4. *These products require custom quotation*

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*X-parameters is a trademark and registered trademark of Agilent Technologies in the US, EU, JP, and elsewhere. The X-parameters format and underlying equations are open and documented. For more information, visit www.keysight.com/find/eesof-x-parameters-info.

WiMAX is a trademark of the WiMAX Forum.

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