

VisSim/Comm™ 7

Communication System Design Software

VisSim/Comm is a Windows-based simulation environment for modeling end-to-end communication systems at the signal or physical level. With its full complement of communication blocks and powerful, time-domain simulation engine, VisSim/Comm provides fast and accurate solutions for analog, digital, and mixed-mode communication systems.

Integrated development environment

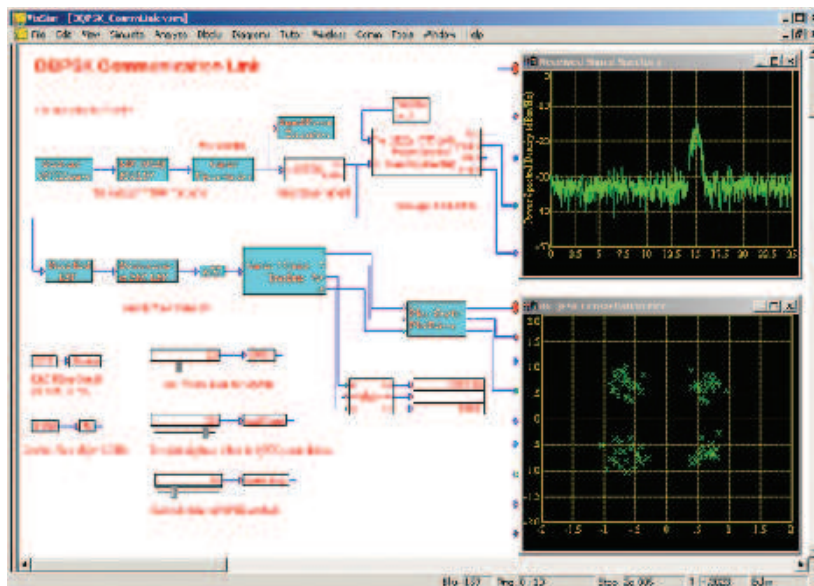
Using VisSim/Comm, you can seamlessly move among the stages of model construction, simulation, optimization, and validation. This means that you can simulate and view signal waveforms at any phase of the communication system chain.

Intuitive block diagram interface

VisSim/Comm's intuitive block diagram interface makes it easy to build, modify, and maintain even the most complex system models. Simply drag blocks off the Blocks and Comm menus and wire them together with the mouse. This means that all your modeling and simulation tasks can be completed without writing a line of code.

Integrated VisSim Viewer

VisSim/Comm includes the VisSim Viewer, a run-time, view-only version of VisSim. The Viewer allows you to share your models with individuals not licensed to use VisSim. The Viewer preserves model integrity by prohibiting recipients from changing wiring and block diagram structure. The Viewer does provide the flexibility for recipients to change block and simulation parameters to test different design scenarios.



DQPSK communication link with full simulation of carrier and symbol receiver tracking loops.

Includes
MATHCAD®
Integration

Modeling Highlights

- Drag-and-drop block diagram construction
- 200+ communication and mathematical blocks
- Analog, digital, and mixed-mode communication system design
- Large model development
 - Explorer window for easy navigation
 - Hierarchical design with password protection
 - Embedded diagrams
 - Wire checking
 - Connector labels
 - Global, local, and scoped variables
 - Search utility
- Analog and digital modulators and demodulators
- Adaptive equalizers
- Encoders and decoders
- Vector and matrix operations
- Gaussian noise, fading, and multipath channels
- Filter design support
 - FIR (lowpass, highpass, bandpass, bandstop, Gaussian, Hilbert, and user-defined)
 - IIR (Bessel, Chebyshev, Butterworth, inverse Chebyshev, and elliptic)
 - Pulse shaping filters
 - Raised cosine and root raised cosine
 - Arbitrary magnitude and phase
 - Filter response viewer
 - Decimating FIR filters
- Phase-locked loops
- Distortion true RF elements
- Complex math operators
- Complex envelope representation
- Little and big endian representations for binary files
- Data I/O in ASCII, .M, .MAT, .WAV formats
- DLL interface to create custom blocks in C, C++, Fortran, or Pascal
- DDE with Copy Link and Paste Link
- Multi-document interface
- Multi-level undo and redo
- Windows Clipboard support

Simulation Highlights

- Continuous-time, discrete-time, and hybrid simulation
- Interactive, batch, auto-restart, and single step execution modes

Simulation Highlights

- Euler, trapezoidal, and Runge Kutta 2nd integration algorithms
- Error highlighting
- Range checking on communication blocks
- Estimation functions for BER, average power, mean, variance, correlation, and delay
- Automated BER generation
- MatLab interface for .MAT and .M files
- Look-up table wizard
- Global variables
- Signal probes
- Pushbutton conversion of s- and z-domain transfer functions
- Multi-rate capability
- Parameter optimization
- Implicit system solvers

Visualization Highlights

- Interactive plots
 - Basic time domain, XY, frequency, and discrete plots
 - Phase scatter plots
 - Eye plots
 - BER curves
 - Complex FFT plots with averaging
 - External hold capacity
 - Multi XY traces
 - Log, semi-log, dB, and linear scales
 - Multi-plot windows
 - Automatic Y scaling and selectable time axis scaling
 - Full control of X and Y axis ranges
 - Over plotting and zooming
 - Read coordinates mode
 - Data I/O in ASCII, .M, and .MAT formats
- Filter Response Viewer
- Graphic and line animation
- Dynamic strip charts, bar graphs, needle meters, and histograms

General Highlights

- Integrated VisSim Viewer
- String processing
- WMF format support
- Global, local, and nested path aliases
- Mathcad 2000 integration

Comm and Standard Block Sets

The Comm block set includes over 200 block functions in the following categories:

- Channels
- Complex Math
- Decoders
- Demodulators
- Digital Elements
- Encoders
- Estimators
- Filters
- Modulators
- Multirate Support
- Operators
- Phase-Locked Loops
- RF Components
- Signal Sinks
- Signal Sources
- Vector Operators

In addition to the Comm blocks, VisSim/Comm also offers over 100 mathematical, engineering, and scientific blocks for linear, nonlinear, continuous, discrete, multi-rate, SISO, MIMO, and hybrid system design. These blocks are in the following categories:

- Animation
- Annotation
- Arithmetic
- Boolean
- DDE
- Integration
- Linear Systems
- MatLab Interface
- Matrix Operations
- Nonlinear
- Optimization
- Random Generator
- Real Time
- Signal Consumer
- Signal Producer
- Time Delay
- Transcendental

VisSim/Comm Options

VisSim/C-Code Translates VisSim models into highly optimized, ANSI C code that can be immediately put to use in a variety of applications or customized to meet specific design requirements.

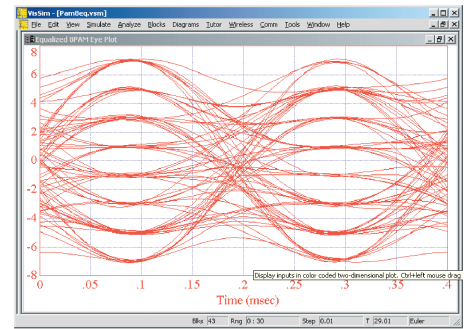
VisSim/Comm DSP Rapidly prototypes communication systems to DSPs or embedded systems.

VisSim/Comm Red River Supports real-time data acquisition from Red River Digital Tuner cards.

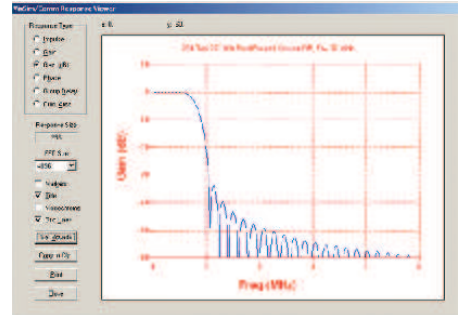
VisSim/Comm Turbo Code Supports modeling of PCCC Turbo Codes, including the UMTS specification.

VisSim/Comm Wireless LAN Supports simulating 802.11a/b/g, Bluetooth, and Ultrawideband designs.

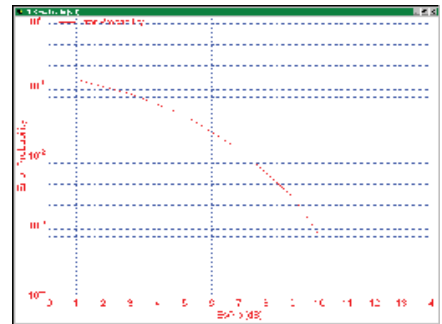
VisSim/Comm Personal Edition Entry-level version of VisSim/Comm offering much of the functionality of VisSim/Comm, with these limitations: no userFunction or embed block, some restrictions on Comm blocks, and limited to 100 blocks per diagram.



Equalized 8-level PAM signal.



Gain response of Root Raised Cosine Lowpass FIR using VisSim/Comm Filter Viewer.



BER curve.

Communications Block Library

Channels

Add. White Gaussian Noise (Complex & Real)
Binary Symmetric Channel
Jakes Mobile*
Mobile Fading Channel*
Multipath
Propagation Loss*
Rice/Rayleigh Fading
Rummler Multipath
Saleh-Valenzuela (Complex & Real)*
TWTA
Vector AWGN

Complex Math

Addition
Complex to Mag/Phase
Complex to Real/Imag
Conjugate
Division
Inverse
Mag/Phase to Complex
Multiplication
Power
Real/Imag to Complex
Square Root

Demodulators

DPSK Detector (2,4,pi/4,8*,16*,32*)
FM Demodulator
IQ Detector*
PPM Demodulator
PSK Detector (2,4,8*,16*)
PAM Detector (2,4,8,16)
QAM Detector (16,32,64*,128*,256*)

Digital Elements

Accumulate and Dump
Binary Counter
Bits to Symbol
Buffer and Unbuffer
Divide by N
D Flip Flop
JK Flip Flop
Mux/Demux*
Packet Timing*
Parallel to Serial
Pulse Extend
Queue*
Serial to Parallel
State Machine*
Symbol to Bits

Encoders and Decoders

Block Interleaver
Convolutional Encoder
Convolutional Interleaver*
Depuncture*
Gray Decoder
Gray Encoder,
Hamming Decoder
Hamming Encoder
Manchester Encoder
Puncture*
Reed-Solomon Decoder
Reed-Solomon Encoder
Trellis Decoder*
Trellis Encoder*
Viterbi Decoder (Hard & Soft)

Estimators

Average Power (Complex & Real)
BER Control (#Errors)
BER Curve Control
Bit/Symbol Error Rate
Complex Correlation*
Correlation*
Delay Estimator
Event Time
File Correlation (Complex & Real)*

Frequency Counter
Mean
Median*
Min/Max
Variance
Vector Correlation*
Weighted Mean*

Filters

Adaptive Equalizer (Complex & Real)
Discrete Equalizer (Complex & Real)
File FIR
FIR
IIR
MagPhase*
Pulse Shaping Filter
Sampled File FIR*
Sampled FIR*
Variable Spaced Equalizer (Real & Complex)

Fixed Point

Fixed Point FIR
Fixed Point IIR
Fixed Point VCO (Real & Complex)

Instruments

BER Curve Display
Oscilloscope Display
Spectrum Analyzer Display (Complex & Real)

Modulators

AM
ASK
DPSK (2,4,pi/4,8*,16*,32*)
FM
FSK
IQ*
MSK
PM
PAM (4,8)
PPM (Real)
PSK (2,4,8*,16*)
QAM (16,32,64*,128*,256*)
SQPSK

Multirate Support

Clock Edge*
Clock Extend*
Interpolator*

Operators

A/D Converter
Compander
Complex Exponential
Complex FFT, IFFT
Conversions
D/A Converter
Delay (Complex & Real)
Gain (dB)
Integrate & Dump (Complex & Real)
I/Q Mapper*
Max Index
Modulo
Oscilloscope (Core)
Phase Rotate
Phase Unwrap*
Polynomial
Spectrum Analyzer (Complex & Real)
Subsample
Vector FFT

Phase-Locked Loops

Charge Pump
PLL Loop Filters (2nd & 3rd* order)
Type 2 Phase Detector
Type 3 Phase/Frequency Detector
Type 4 Phase/Frequency Detector*

RF Components

Amplifier

Antenna*
Attenuator
Cable*
Coupler
Double Balanced Mixer*
RF Conversions
RF Gain
Splitter/Combiner
Switch
Variable Attenuator*

Signal Sinks

File Write
File Value

Wave Write

Signal Sources

Complex Tone
File Data
Frequency Sweep
Impulse
Impulse Train
Noise
PN Sequence
Poisson Arrivals*
Random Distribution
Random Seed
Random Signals
Rectangular Pulses
Sinusoid
Spectral Mask*
VCO (Complex & Real)
Vector Constant
Walsh Sequence*
Wave Data
Waveform Generator

Vector Operators

Matrix to Vector
Subvector
Vector Bits to Symbols
Vector Demux
Vector Merge
Vector Mux
Vector Symbols to Bits
Vector to Matrix

* Not included with VisSim/Comm PE

Bolded block names are new in version 7

Technical Overview

Types of Systems

- Analog, Digital, and Mixed-mode communication systems

Operating Systems

- Windows 2000, Me, XP, or Vista

Technical Specifications

Max. blocks	500K*
Max. plots	500K*
Max. integrators	500K*
Max. data points	200K
Integration methods	3
Numeric precision	IEEE 64-bit
Data file form	ASCII, .M, .MAT, .WAV
ABCD state-space form	.MAT, .M

* Max blocks, plots, and integrators is 100 in VisSim/Comm PE

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Modeling The Future