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PROP*Sim+*
TM

Radio Channel Simulator



PROPSim+™ represents the latest technology in multipath fading simulator systems. With features like 35 MHz bandwidth and 312 fading paths it has the power to meet the channel simulation requirements of current and future mobile, WLL and radio LAN systems and many other wireless applications.

PROP*Sim+*™ was developed with input from customers in the leading edge of wireless communication technology. This, coupled with high-performance RF/DSP hardware and advanced channel simulation software, has led to a product of unparalleled performance and versatility. Consequently, PROP*Sim+*™ can be used to simulate a wide range of radio channels including:

• GSM	•TETRA	• IMT-2000
•DCS/PCN/PCS	• ISM-band	• W-CDMA, CDMA-2000
• DECT	• UMTS	• IS-54. IS-95, IS-136
• FPLMTS	•HiperLAN	• user defined / measured channels

PROPSim+™ offers:

- Reduced time to market your products
- Superior features for your product
- Superior quality for your product
- Reduced need for field tests
- Repeatable tests
- More realistic channel simulation
- Compliance with industry standards and regulations
- Avoidance of design flaws

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PROPSim+™ New Features:

- Improved usability (e.g. new 32-bit user interface for Windows™95, 98 or NT 4.0)
- New, more accurate channel models
- Synchronized multiple simulator operation
- Extenended center frequency area up to 6 GHz
- Multiple baseband outputs (12) for simulating antenna arrays
- Extended selection of customizable features

PROP*Sim*+™ is marketed by Elektrobit Ltd.

Due to its unique performance, PROPSim+™ can be used in a number of applications

Transceiver development measurements

- design decisions, optimizing designs and studying design margins.

Transceiver type approval measurements

- validating the performance of a product against a specified standard.

Transceiver performance validation

- replacing cumbersome field tests by porting measured channels to PROP*Sim*+™
- The only way to perform systematic, repeatable validation.

System performance comparisons

- comparing systems in a number of different radio environments.

Cellular network design

- improving network coverage by simulating multipath radio propagation with different fading environments.

Exploitation of channel measurement results in radio propagation investigations

- Fast evaluation of channel models can be done by measuring real channel data and porting it to the simulator.

Advanced Windows™ based simulation software

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PROPSim+™ is controlled by a standard PC having a GPIB interface card. Different propagation environments can be created with multiple modelling tools:



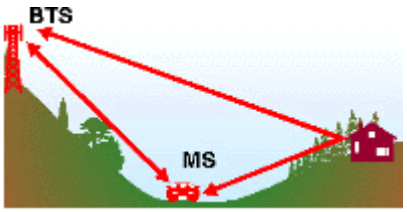
PROP*Sim*+™ Software is an easy
and powerful tool for network channel simulation.

Simulation Control

- guides the user through the simulation session
- provides special features such as step-by-step simulation
- all parameters - such as vehicle speed and center frequency - can be set via the simulation control.

Examples of different fading environments

Rural



Urban

Channel Modeling

General Impulse Response (IR) Generator

- creates models based on tap delays, strenghts and fading distributions.

Predefined Channel Models

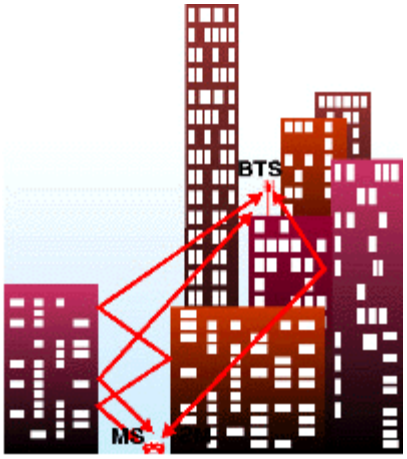
- GSM / DCS, IS-54, IS-95, ITU and TETRA

The library of predefined channel models can be easily expanded

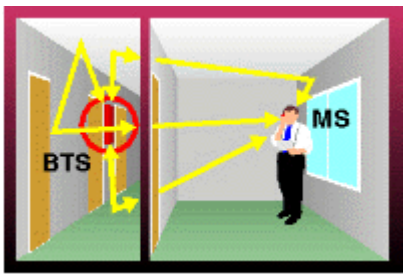
PropSoft

- PropSoft is a unique modeling tool that creates dynamic time varying channels by giving the transmitter position, the receiver route and scatterer properties.

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Indoor



PROPSim+ creates a virtual environment of any kind.



- With PropSoft you can perform extremely realistic diversity or soft handoff tests by setting different antenna positions.

Correlative channels can be produced by creating two separate simulation files. The algorithms have originally been designed by Dr. Ulrich Dersch. The same algorithms are used in CODIT models and have been accepted by leading experts around the world.

A conversion tool

transforms the simulation files from different possible sources in to a format compatible with simulator hardware or simulator tools such as COSSAP. The source can be a measured radio channel or a channel modelling tool.

PROPSim+ Specifications

Key Characteristics

PROPSim+™ includes a unique combination of desired features which offer adaptability to user needs.

Configurable features:

- number of channels (1-2)
- number of fading paths (26-312)
- center frequency band (68 MHz - 6 GHz)

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Options:

- simulation of shadowing
- simulation of jamming
- satellite channel simulation
- adjustable output signal-to-noise ratio
- predefined channel models on CD-ROM
- channel models which are portable to software simulation tools such as COSSAP or SPW.
- WLL models
- multiple output (12 baseband outputs for simulating antenna arrays)
- adjustable output signal-to-noise ratio
- user specific options

PROPSim+™ Technical Data

Power supply	84...264 VAC, 440 W, 50/60 Hz
Mechanics (h x w x d)	400 x 450 x 440 mm, 19" rack mountable
Channels*	1 or 2, settable correlation between channels
Fading Paths (taps)	up to 312
Simulation Interfaces	RF to RF and/or baseband to baseband
RF Frequency Range	100...400 MHz, 600...2650 MHz, optional up to 6GHz
IF Frequency	500 MHz
RF Bandwidth	35 MHz
In-Band Spurious Level	less than -50 dBm
Image Level (Offset 1...5 MHz)	less than -48 dBm
RF Input Level (nominal)	-15...+10 dBm with 1 dB, steps settable via the user interface
RF Output Level (average)	-15...-40 dBm with 1 dB, steps settable via the user interface
Delay Resolution (DR)	2.5 ns at 28 MHz RF bandwidth (path-to-path delay variation <+/- 0.5ns, path-to-path insertion loss variation < 0.1dB)
Tap Spacing (TS)	25 ...3200 ns, settable via the user interface
Tap to tap amplitude and delay error (TS)	negligable due to digital tap combining
Maximum Propagation Delay	100 µs with 25 ns TS (max. 35 MHz RF bandwidth)

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	400 µs with 100 ns TS (max. 8 MHz RF bandwidth) 1.6 ms with 400 ns TS (max. 2 MHz RF bandwidth)
Maximum Doppler Shift	1250 Hz
Maximum Vehicle Speed	750 km/h at 1800 MHz center frequency
Resolution of Input Data	10 bits
Resolution of Tap Coefficients	10 bits
Resolution After Fading	12 bits
Fading Distributions	Classical (Rayleigh), Constant, Flat, Gaussian, Log-Normal, Nagakami, Rician, Suzuki, Pure Doppler
Channel Modelling	PropSoft, General IR Generator, actual channel measurements
Predefined Channel Models Available	ITU, TETRA, GSM, DCS/PCN/PCS, IS-54, IS-95
PropSoft Cell Types	Urban, Suburban, Suburban Hilly, Rural, Rural Hilly, or User Defined
Supported Windows™ Versions	95, 98, NT 4.0

* When multiple simulators are used, the number of channels is n x2 RF, where n is the number of the simulators

Elektrobit Ltd. reserves the right to change specifications without notice due to continuous improvement of the product.

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