Wireless InSite® 3D Wireless Prediction Software
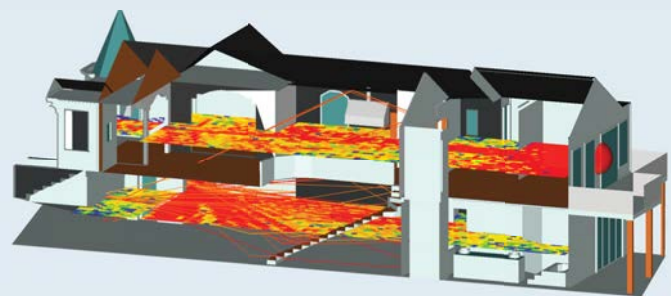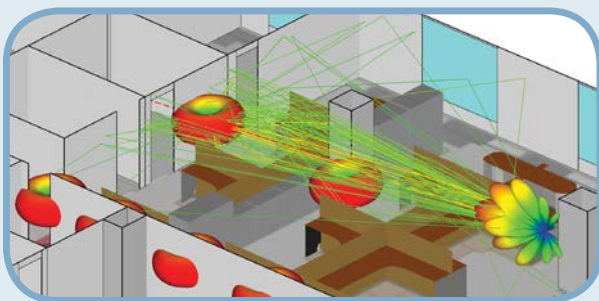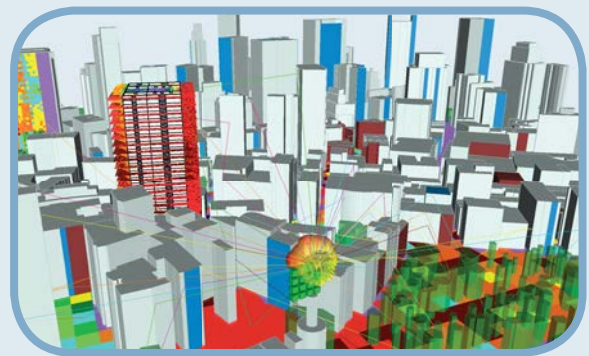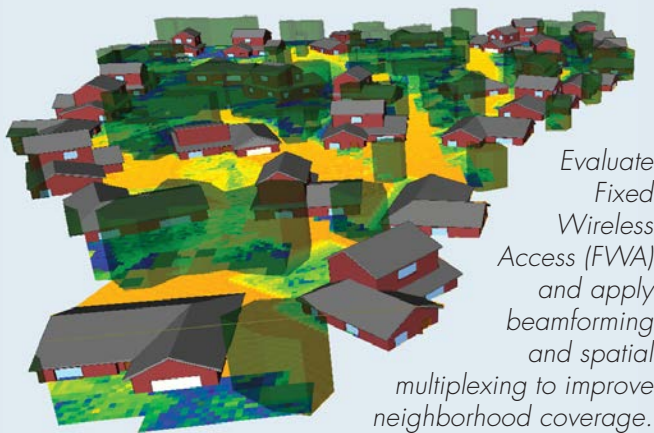
Wireless InSite is site-specific radio propagation software for the analysis and design of wireless systems for communication, networking, sensors, and other applications in urban, indoor, or rural environments. Its focus is accuracy, providing full 3D ray-tracing simulations that can predict detailed channel information critical for new technologies in 5G and WiFi, while applying innovative optimizations and accelerations to ensure reasonable run times.

- Design wireless links
- Optimize antenna coverage
- Analyze key channel and signal characteristics for RF and mmWave frequency bands
- Predict coverage from base stations and access points

- Assess the performance of new device designs in realistic environments
- Evaluate wireless backhaul solutions
- Simulate MIMO and massive MIMO
- Capture complex scattering at higher frequencies

Evaluate Fixed Wireless Access (FWA) and apply beamforming and spatial multiplexing to improve neighborhood coverage.

Predict coverage and multipath for small cell using massive MIMO.

Analyze device performance for mmWave systems in indoor scenes with diffuse scattering effects.

Analyze Wi-Fi and other wireless systems in realistic indoor environments.

Multiple Versions for Various Needs

Wireless InSite Standard

Suite of propagation models based on high-fidelity two-dimensional and three-dimensional ray-tracing. Supports urban and indoor wireless, and longer-range rural applications.

Wireless InSite Professional

Bundles high-fidelity models from the Standard Version with fast ray-based and empirical models. Includes diffuse scattering, optimizations (APG) and APIs for select models, allowing users to develop custom applications.

Wireless InSite MIMO

Bundles the features in the Professional version with MIMO capabilities, including MIMO array builder, optimized MIMO simulation, throughput and comms analysis, and channel results analyzer. Capture MIMO channel data and apply beamforming, spatial multiplexing, and diversity techniques to improve performance and predict throughput from multiple MIMO streams.

Wireless InSite Capabilities	Standard Version	Professional Version	MIMO Version
X3D Ray Model (GPU)	●	●	●
Full 3D Propagation Model	●	●	●
Urban Canyon Ray Model (2D)	●	●	●
Vertical Plane Ray Model (2D)	●	●	●
Free Space	●	●	●
Triple Path Geodesic		●	●
Hata		●	●
COST Hata		●	●
Vertical Plane Urban Propagation		●	●
Walfisch-Ikegami		●	●
OPAR		●	●
APIs		●	●
Optimizations (APG)		●	●
Diffuse Scattering		●	●
MIMO Throughput/Comms Analysis			●
MIMO Antenna Designer			●
MIMO Simulation Optimization			●
MIMO Channel Outputs			●
MIMO Throughput/Capacity/BER Outputs			●

Wireless InSite Key Features and Outputs

Modeling Capabilities

- Accurate, accelerated 3D ray-tracing model (X3D) captures antennas, polarization, phase, and multipath in detail

- Supports outdoor, indoor, outdoor-to-indoor, and indoor-to-outdoor

- Special features including foliage and atmosphere

- Suite of models providing fast 2D methods and empirical model options for quick analysis

- Monte-Carlo capabilities capture parameter uncertainty within a single ray-trace

- Comms analysis computes SINR, throughput, and BER

MIMO Analysis

- Optimized calculations handle large arrays to support massive MIMO

- Beamforming, spatial multiplexing, and diversity capture MIMO improvements to channel response

- Communications analysis computes SINR, throughput, and BER for multiple MIMO streams, as well as total for MIMO channel

Diffuse Scattering

- Lambertian or Directive Scattering models
- Parameters defined by material
- Scattering from any point along path

Acceleration and Optimization

- GPU acceleration and multi-threading

- Optimal algorithms for processing and handling complex geometry

- Geometry caching reduces run times for subsequent simulations

Imports and Databases

- Global geodata available

- Geometry importers for buildings, floor plans, and objects

- Custom antennas

- USGS foliage and terrain

Outputs and MIMO System Outputs

- Received power, path loss*
- Visualize propagation paths
- Field outputs
- Time-of arrival*
- Direction-of-arrival/departure*
- RMS delay spread*
- Angle spread of arrival/departure*
- H-matrix*
- Complex impulse response*
- Signal-to-interference-plus-noise*
- Throughput and capacity*
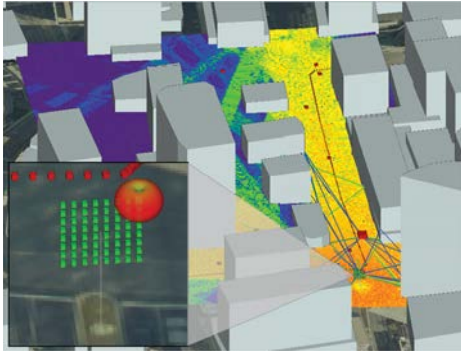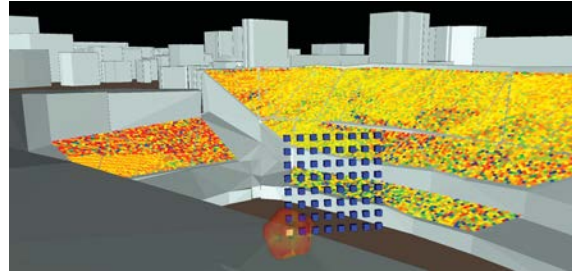- Bit Error Rate (BER)*

*included in MIMO channel data outputs

Wireless InSite MIMO

Wireless InSite offers a unique capability for optimized simulation of 5G MIMO systems.

Fidelity ▶

- GPU-based ray tracer that models precise paths from each Tx element to each Rx element

- Place and orient full arrays while maintaining relative positions of antennas along routes


◀ Optimized MIMO Channel Prediction

- MIMO optimizations allow rapid determination of exact paths between all Tx and Rx antennas

- Predict complex impulse response, H-matrix, time and direction of arrival/departure, RMS delay spread, angle spread

MIMO Array Builder ▶

- Array builder for building MIMO arrays with arbitrary patterns, rotations and spacings

- Alternatively, import array patterns simulated with Remcom's XFdtd® full wave solver

Beamforming Improves Throughput Along Route
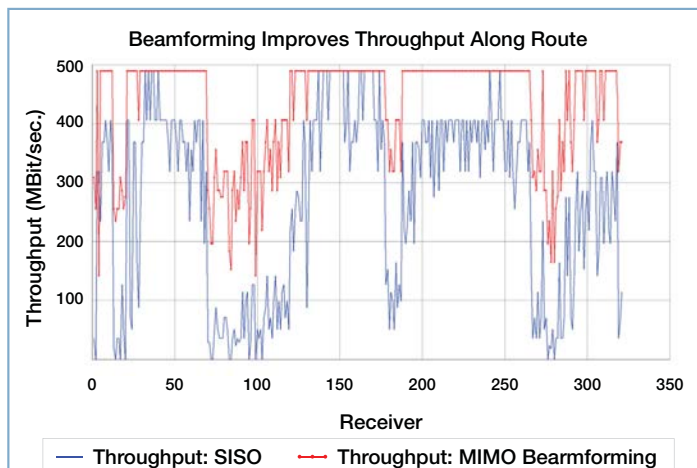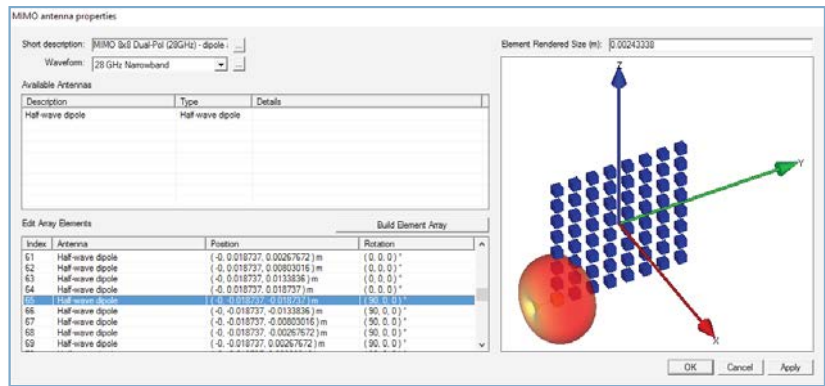
◀ MIMO Communications Analysis

- MIMO beamforming, spatial multiplexing, and diversity techniques applied to compute signal characteristics of MIMO data streams

- Bit Error Rate for various modulation coding schemes

- Throughput and capacity for MIMO systems

- CSV export for channel and comm outputs