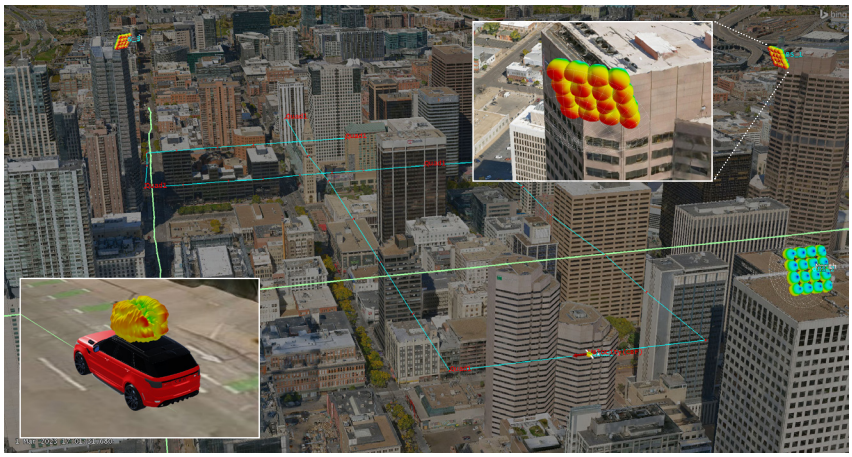
Ansys

MISSION

RF Channel Modeler

High-Fidelity Channel Modeling in Dynamic Virtual Environments.

Ansys RF Channel Modeler offers a streamlined workflow for RF systems engineers to model large scale dynamic RF systems simulations while considering the effects and impacts of specific operating environments. With the incorporation of high-resolution terrain, buildings, 3D models (all with corresponding material properties) along with other geospatial data, engineers can realistically evaluate their RF systems designs and analyze high frequency signal propagation effects to anticipate real world performance.



Dynamic simulations produce high-fidelity channel data which you can further analyze, export, and share to understand a modeled system's capabilities at the channel level.

/ Use Cases

- Wireless component and device design
- Wireless networking protocol and system development
- Wireless network design and planning
- Network reliability testing and evaluation
- Radar signature analysis

/ Network Planning and Optimization

Ansys RF Channel Modeler delivers an innovative network planning and optimization solution to RF systems engineers across the telecommunications industry. The combination of advanced systems simulation capabilities using Ansys STK's highly realistic digital simulation environment provides network engineers with the ability to realistically evaluate advanced communications and RF systems performance in urban environments ahead of expensive physical deployments and product development efforts.

- Scalable, GPU Enhanced Processing
- Include Detailed Terrain and Structures
- Import Advanced RF Antenna Patterns
- 5G/6G Network Modeling
- Analyze Scattering and Coupling Data Results
- Include Multi-path and Diffraction Effects
- Support Array Designs and Beamforming
- Optimize Infrastructure Asset Placement
- Time-Dynamic Physics Engine

/ Advanced Synthetic Radar Simulation

Ansys RF Channel Modeler extends RF signals analysis beyond communications systems to model wideband coherent radar signature analysis. Engineers define radar system properties and employ RF Channel Modeler's embedded GPU-enabled shooting and bouncing ray engine to produce highly-accurate synthetic radar scenes. STK's mission-centric workflows allow engineers to manufacture complex situations to represent any number of radar system applications such as ground moving targets, airborne tracking, or even large area Synthetic Aperture Radar (SAR) imaging scenarios to understand collection planning and produce accurate synthetic datasets. Engineers and data analysts can also use these radar target signatures and SAR images to apply AI/ML techniques, and test proprietary detection and target identification algorithms.

- Model SAR/ISAR Radar Imaging Applications
- Consider Realistic Radar Scattering Effects
- Highly Accurate Synthetic Data Generation
- Time-Dynamic Wideband Imaging
- Incorporate Realistic 3D Target Models
- Easily Create Virtual Test Conditions
- Generate Target-Specific Radar Scattering Data
- Large Synthetic Data Set Creation

RF Channel Modeler Core Capabilities

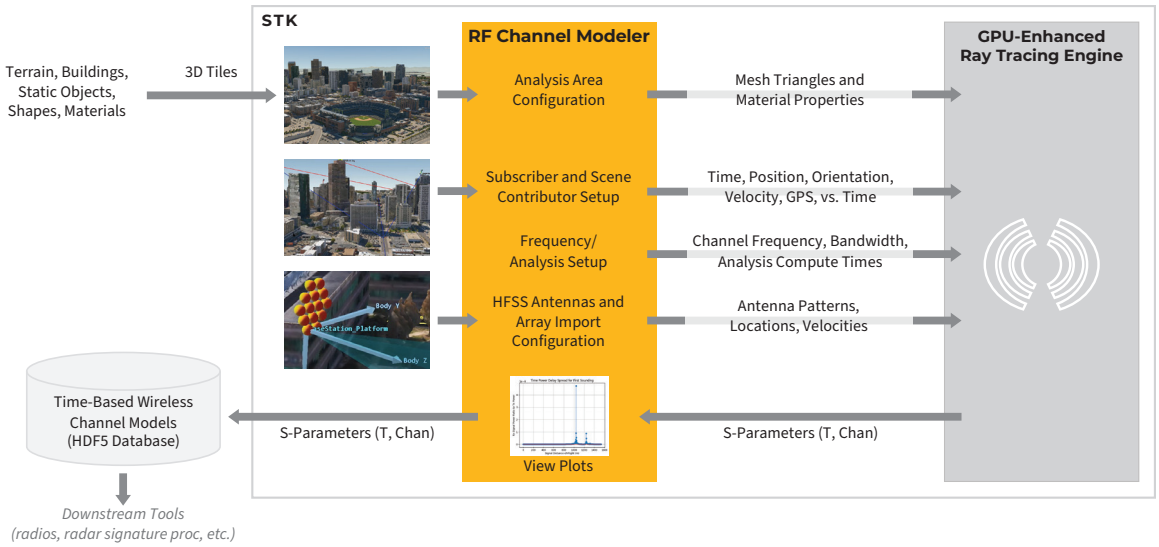
Use a model-based design approach to represent RF systems within a physics-accurate digital environment. Explore and test designs across simulated situations and conditions which would otherwise be difficult to replicate under real-world field-testing scenarios by following a streamlined modeling and simulation workflow:

- **Model the Operating Environment**. From general underlying terrain and topography data to high resolution building models, RF Channel Modeler's workflow starts by defining an accurate digital simulation environment. With support for OGC 3D Tiles standard, RF Channel Modeler makes it easy to consume large geospatial data sets, ideal for highly detailed meshed 3D models such as urban cityscapes
- **Model Platforms in Motion**. RF Channel Modeler provides a physics-based motion and orientation modeling engine. Whether your RF systems are stationary base stations or user equipment installed on vehicles, aircraft, or other platforms, you can create simple representative routes or import existing trajectory data and quickly put your models in motion.
- **Model RF Systems**. Easily create representative models of transmitter, receiver, or even radar systems necessary for your simulations. Get started with built-in models of common designs or import existing complex antenna designs directly from Ansys HFSS and configure the desired channel spectrum analysis settings. Load complete HFSS phased array base stations with a single click, simplifying the workflow and enabling high-fidelity antenna designs to be easily integrated into the simulated environment.
- **Analyze and Explore**. The engine ingests the terrain, buildings, objects, and materials contained in the 3D Tiles data as meshed triangle geometry facets and material properties and leverages advanced GPU capabilities for scalable simulation execution. Analysts can explore the resulting data containing scattering parameter (s-parameter) antenna-to-antenna coupling data between all antennas considered in the modeled scenario over the specified analysis period. This data is also available for external post-processing and scripting as needed, making this a flexible solution for large, extended simulation data exploration and analysis efforts.

Radar Signature Analysis

Ansys RF Channel Modeler can create synthetic radar data for any collection geometry in any geospatial domain to support both Synthetic Aperture Radar (SAR) and Inverse SAR (ISAR) data generation. This combines Ansys STK's ability to define the collection scenario and Ansys Perceive EM's ability to seamlessly support synthetic data generation in raw I&Q form. This data can then be processed to create all data associated with the collection scenario: frequency response, Range Time Intensity (RTI), Doppler Time Intensity (DTI), and wideband radar Images. This complex data supports:

- Data analysts for event recreation and training
- Collection planners to optimize expensive test plans
- Development of AI/ML algorithms requiring massive amounts of realistic signature data.



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