



VIPER®

Next-generation 3D propagation modeling and simulation for reliable and efficient network connectivity in a 5G world

VIPER® (Volumetric Integrative Propagation Engine for Ray-Tracing) is HII's cutting-edge software solution for true 3D propagation modeling and simulation, accurately predicting the behavior of dense 5G deployments. It is designed to empower smart cities and the Internet of Things by modeling and analyzing the complex interactions of transmitters and receivers within any environment. VIPER's adaptability allows precise evaluation of small-cell base stations, satellite constellations, spectrum-sharing arrangements and vehicle-to-transportation networks.

Mission Application

High-fidelity, real-time modeling to optimize RF propagation analysis and support the development of next-generation connectivity solutions.

- 5G deployment and spectrum sharing.
- Signal correlation with frequency assignment databases.
- Co-site and far-field analysis for platforms in operational environments.
- Synthetic IQ generation through RF channel modeling.
- Modeling of full-3D wedge and surface.



Advantages

- **Unmatched Speed:** Where traditional models take 2D shortcuts, VIPER® combines broad coverage of stochastic heat maps with deterministic ray-tracing to deliver ultra-fast and precise simulation results.
- **High-Fidelity Modeling:** Leverages sub-meter Light Detection and Ranging (Lidar) data with default or user-modified radio characteristics, guaranteeing accurate modeling of the RF environment and potential interference sources.
- **Full 3D Environments:** Integrates terrain-based analysis with the analysis of geoclimatic factors and fully 3D environmental characteristics, including real world-building geometry and materials.
- **Scalable Flexibility:** Adapts seamlessly to small-scale or global scenarios using variable geometry formats and is specifically designed to be part of the model-based design engineering (MBDE) and model-based systems engineering (MBSE) lifecycle.

Features

- Full 3D analysis achieving real-time speeds (path profiles in ~8 microseconds) using Vulkan Application Programming Interface (API), which integrates with Unity and Unreal Engine and is supported on iOS and Android (including TAK).
- Graphics Processing Units (GPU)-based propagation model capable of efficiently simulating complex wave interactions.
- Cloud scalable and standalone installable.
- Geometric scalability for deterministic simulation of real-world situations at lightning speed.
- Able to process native Lidar scans (LAS format) at varying point densities in operational environments with single simulations at ~6 degrees of horizontal resolution.



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