Huntington Ingalls Industries Hard Stuff Done Right <sup>11</sup>

> Next Generation Propagation Tool in a "Fast and Furious" Three-Dimensional World



# **VIPER CORE**

# True Full 3D Modeling in Near-Real Time

VIPER Core is the next generation propagation tool to provide true 3D modeling in near real-time with greater accuracy in full-3D simulation. The GPU based propagation modeling is capable of efficiently simulating complex wave interactions. The next generation propagation tool will replace legacy tools to more accurately predict signal loss. It implements wider range of frequency use (low, mid, high) millimeter-wave path analysis and micro-cell and pico-cell deployments, beamforming and phase array and massively MIMO networks.

# **VIPER CORE IS:**

Flexible

• Models urban clutter and irregular terrain

Accurate

• Models building and environmental materials

Speed (lacking from existing tools)

• True full 3D modeling in nearreal time

5G

• Supports millimeter wave frequencies

# **VIPER CORE IMPLEMENTS:**

- Wider range of frequency use (low, mid, high)
- Millimeter-wave path analysis
- Micro-cell and pico-cell deployments
- Massively MIMO networks

Full 3D modeling and GPU-based

- Building materials
- Clutter geometry
- Wedge/surface diffraction,
- Reflection
- Volumetric/voxelization
- Ray-tracing

### VIPER CORE ADDRESSES:

- Complex clutter morphologies/ dense urban deployments
- Co-site analysis/interference avoidance analysis
- Line-of-sight & BLOS calculations
- Aggregate coverage from multiple locations









#### VOLUMETRIC

The system does not merely calculate received power along a path from Tx to Rx but calculates the entire volume filled by the RF field inside a 3D space.

#### VOXELIZATION

Contiguous, homogenous structures, such as mountain ranges, buildings, or open-air spaces can be treated as a single voxel. Each voxel will contain the attributes of its bounded space and all localized physical properties can be stored in the material definitions including model-specific information (surface normal and geometric hints). Smaller voxels will populate the edges where geometry and material variation may increase.

#### **SPARSE VOXEL TREE**

The benefit of the sparse voxel tree is there is no need to investigate every voxel within the system. All the details of an object in the simulation are connected and subordinated to the main node and stored with the minimum amount of data redundancy which provides increased analysis speed.

#### **RAY-TRACING**

Ray-tracing is a way of drawing 3D picture and is a fundamentally different rendering process than rasterization, it simulates real light more accurately, i.e., where a signal has actually gone: not guesswork but actual 3D calculation.

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#### About Huntington Ingalls Industries, Technical Solutions:

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