(U) Visualizing the RF Environment

Date August 8, 2017

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HELPING WARFIGHTERS ADAPT

JIDO
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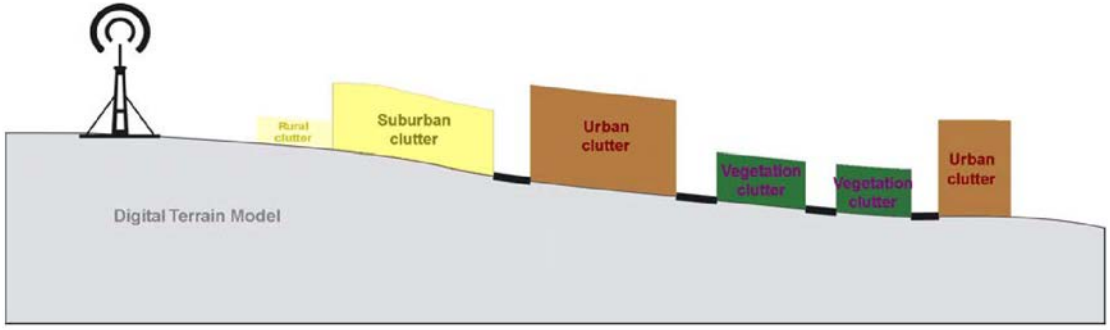
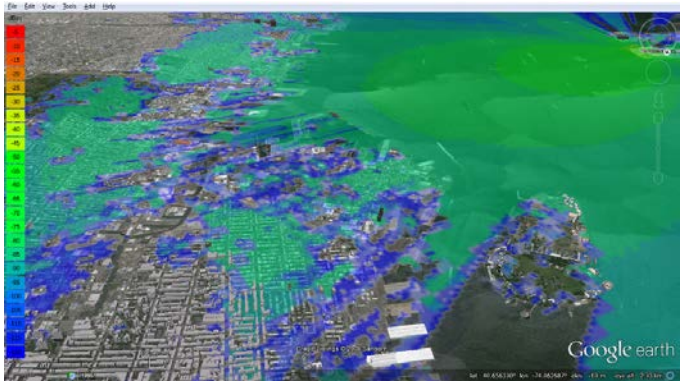
(U) Objectives

- (U) Modeling and simulation of RF sources, propagation, attenuation, interference, and multi-path effects for use by the tactical war-fighter.

- (U) More intuitive man-machine interfaces for data visualization of RF sources, propagation, attenuation, interference, and multi-path effects.





(U) Make the complex physics of RF propagation, etc. accessible and comprehensible to the non-technically educated to increase coalition spectrum dominance in the battlespace.

(U) Technical Challenges

- (U) RF propagation in a tactical environment is many dimensional, whilst our visual cortex has evolved to comprehend six data dimensions at most (*e.g.,* space, wavelength, intensity, and time). What are the best visualization methods for rapidly understanding the multi dimensions of RF propagation, such as space, time, phase, frequency bandwidth, and intensity?

- (U) Existing open source RF propagation software are designed for engineers to use and are not intuitive for non-technical users. An analysis of alternatives is required to determine the best framework to build upon to meet the requirements.

- (U) Service Labs and FFRDCs in house developed capabilities and DARPA RadioMap and PIXNET visualization projects need to be analyzed for potential capability merger.

- (U) Key visualization enabling capability may be Cesium V 1.35+ with 3-D tiles, released July 2017.

(U) Implicit Requirements

- (U) SWAP limited processing power at the tactical edge requires processing reach back using software as a service (*e.g.*, cloud computing converged with high performance computing) with data visualization over dis-advantaged networks.

- (U) Highly complex problem where engineering best practice dictate risk reduction through decomposition into multiple phases:

  – A. Phase 1: Modeling and simulation of tactical emitter and propagation environment with a plug-in architecture and multiple human factors assessments of novel data visualization techniques of modeling results. Deliverable is information and knowledge to inform requirements for subsequent phases.

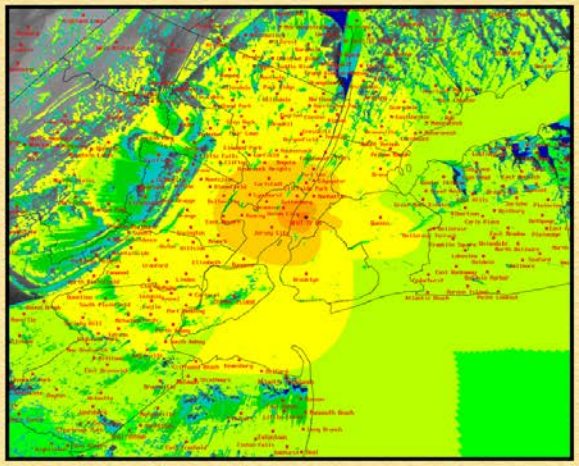


Figure 5

WFUT-TV 68's directional contour is illustrated in Figure 5 using **SPLAT!** Version 1.2.0. Although transmitting from New York City, WFUT's signal is directed west northwest toward Newark, New Jersey, the station's actual city of license. Beginning with version 1.2.0, **SPLAT!** can generate KML files compatible with Google Earth when performing point-to-point analyses:

(U) Summary

- (U) Objective is modeling and simulation of RF sources, propagation, attenuation, interference, and multi-path effects for use by the tactical war-fighter in a dis-advantaged communication environment.
- (U) Objective has a special focus on more intuitive man-machine interfaces for data visualization of RF sources, propagation, attenuation, interference, and multi-path effects.
- (U) Implicit requirement for open source (OS) and GOTS RF propagation modeling frameworks with a plug-in architecture for RF emitters and standard objects.
- (U) Implicit requirement for HTML 5 browser and augmented reality device multi-dimensional data visualization frameworks based on OS and GOTS capabilities.
- (U) Multiple human factors engineering (HFE) assessments are anticipated, led by government HFE teams.
- (U) Development will follow the dev-test-ops maturation methodology.
- (U) Development will utilize the DI2E collaboration portal.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