



GIS Applications

Institute for Telecommunication Sciences (ITS)



- Propagation coverages (LFMF, HF and VHF) for one or more transmitters draped over surfaces.
- Composite, interference, overlap, point-to-point and coupled outdoor/indoor coverages (VHF).
- 2-D and 3-D visualization environments
- FCC database downloads.
- Fly-through visualization capabilities
- Web based propagation models and frequency coordination in development

ITS has developed an enhanced suite of Geographic Information System (GIS) based propagation model applications for outdoor and indoor analyses. Databases for GIS use, including terrain, satellite and aircraft imagery, roads and other transportation infrastructure layers, building data and population, are becoming more available and affordable. These databases can be easily incorporated into GIS systems and can be shared among users in web based or standalone GIS applications. The Institute has developed generic and application-specific GIS programs that aid Government agencies, private cellular companies, public and private radio and television stations, transportation companies and consultants in the performance of their missions to efficiently manage the telecommunications infrastructure of the United States.

The primary GIS based tool developed by ITS is the Communication Systems Planning Tool (CSPT). CSPT is a menu driven propagation tool suite developed for frequencies from 150 KHz to 20 GHz that allows the user to select models and use a variety of image catalogs and terrain libraries that cover most of the world. Users can create specific analysis areas using this data and can perform propagation scenarios for their specific application. Applications can range from world-wide outdoor coverage studies to indoor propagation studies of one building in an urban environment. Figure 1 shows a sample transmitter coverage for a small portion of New York City in both 2D and 3D.

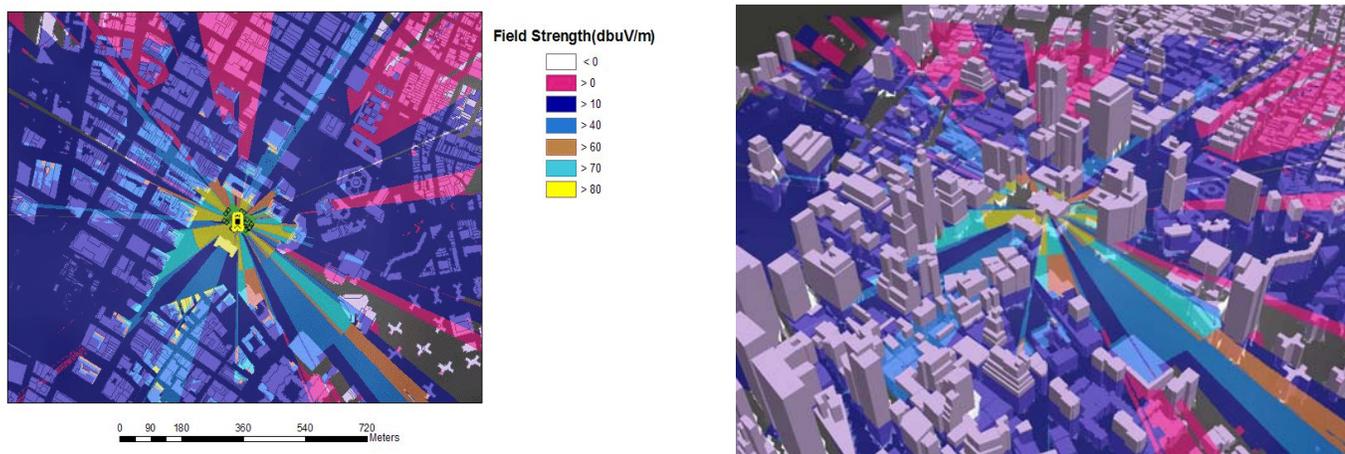


Figure 1. A CSPT-VHF study for New York showing both 2D and 3D results

The CSPT tool also allows the user to create a simple rendition of a building, including windows, doors and interior walls so that the tool can create coupled indoor/outdoor (shown in Figure 2) or outdoor/indoor coverages.

Two other extensions of CSPT allow the user to incorporate the ITS HF ICEPAC model and the ITS LFMF System 3 model which provides analysis capabilities from 150 KHz to 2 MHz for areas as large as the entire world. The CSPT tools can download FCC FM and TV databases, perform overlap, composite and interference studies and can report demographic information from the 1990, 2000 and 2007(estimated) Census Population databases.

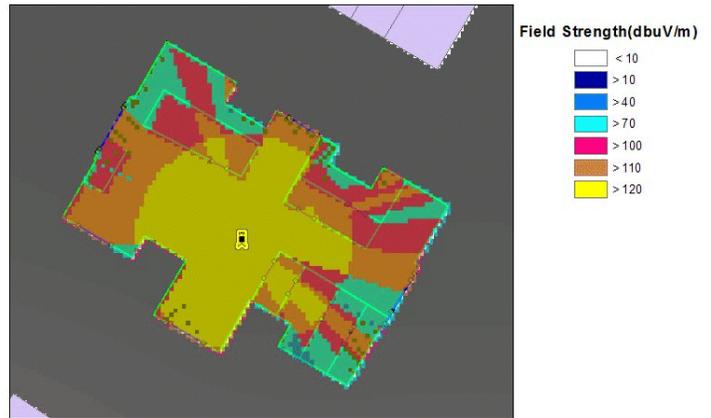


Figure 2. A CSPT-VHF indoor/outdoor study in New York

Over the last year, the Institute has been upgrading the CSPT to a cutting-edge web-based GIS solution called the PMW (Propagation Modeling Website), shown in Figure 3. The PMW allows users to log into a central server and use one database server to perform storage, retrieval and analysis. Analysis is currently performed in single-transmitter mode using the TIREM model. Batch transmitter mode and Longley-Rice model capabilities will be offered in a future release. The PMW is currently customized to fit the needs of our DoD sponsor and operate on their internal, secure network. Because the PMW contains publicly available propagation models, with some software modification, it could be deployed to the ITS server for public use. The PMW solution integrates COTS (commercial, off-the-shelf) GIS, database, and web-development products in a fully-customizable software programming environment that can be tailored to meet individual customer needs. The PMW currently displays 2D propagation analyses; these displays will become 3D as customizable GIS web technology becomes available.

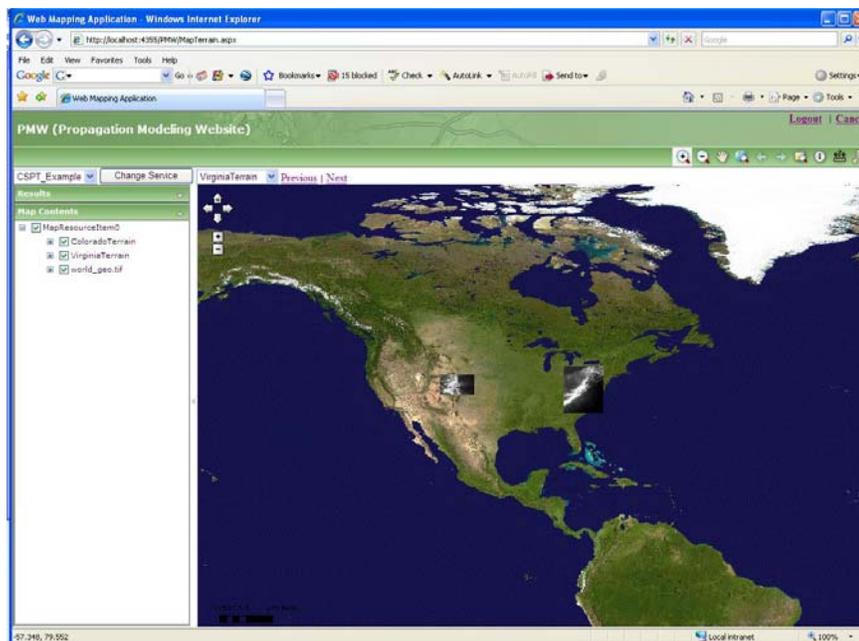


Figure 3. The PMW with user-selectable Virginia or Colorado terrain imagery

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