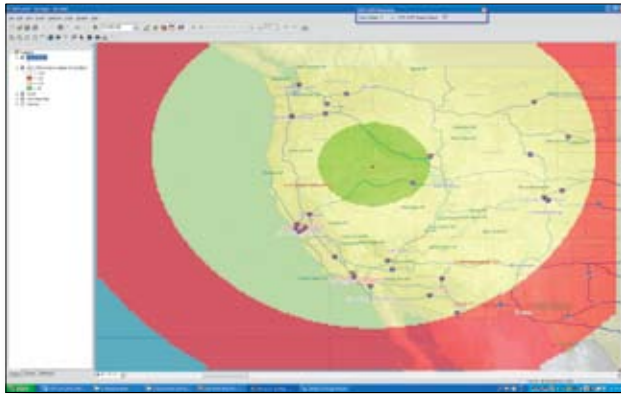


Communication System Planning Tools



Introduction

The Communication System Planning Tools (CSPT), also known as RF-Analyst in the defense community, was developed by the U.S. Department of Commerce, National Telecommunications and Information Administration (NTIA), Institute for Telecommunication Sciences (ITS) for the Department of Defense. The tools were developed so that the power of GIS, which has become a critical part of defense planning and analysis, can incorporate existing and planned electromagnetic wave prediction models. The CSPT extensions to ArcGIS® can be run either as stand-alone applications or within existing applications that need to add communication system analysis and planning to their application output.

Contact Information

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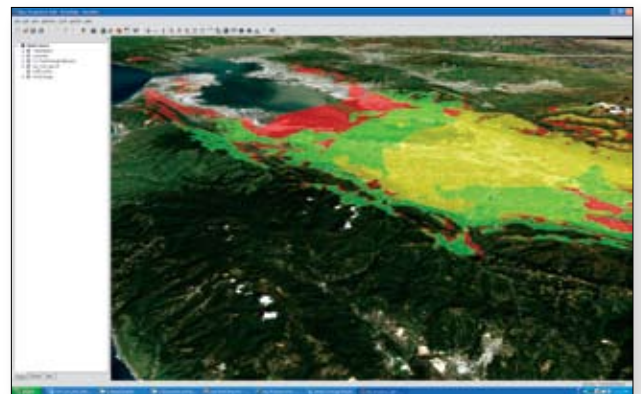
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Overview

The purpose of the CSPT extensions is primarily to support analysts in the performance of their mission within the military domain. The extensions are intended to be sufficiently intuitive in their use so the analyst can operate them efficiently with little or no training. There are three CSPT extensions:

1. CSPT_LFMF—The low frequency/medium frequency (LFMF) extension of CSPT covers the spectrum from 150 KHz to 2 MHz and uses the ITS System 3 LFMF model.
2. CSPT_HF—The high frequency (HF) extension of CSPT covers the spectrum from 2 MHz to 20 MHz and uses the ITS ICEPAC HF model.
3. CSPT_VHF—The VHF/UHF extension of CSPT covers the spectrum from 20 MHz to 20 GHz and uses a wide variety of models that are well known and widely used including Longley/Rice, TIREM, Walfisch/Ikegami, and IF77.

The CSPT extensions can be used as stand-alone applications or activated as part of the process flow of any other application. The extensions incorporate a simple wizard toolbar that provides access to the basic functions of communication system analysis and a full menu toolbar that gives the analyst access to many more advanced and complex analysis capabilities. Analysis outputs are saved and exported as layer files for easy reuse and incorporation in other applications or reports. The CSPT_VHF extension is capable of performing analysis for large areas (thousands of square kilometers) or small areas (less than one square kilometer) and can perform coupled outdoor-to-indoor and indoor-to-outdoor building analysis in urban areas.



Capabilities

Each extension of the CSPT suite has input requirements and capabilities suitable to that part of the spectrum. In general, the higher the frequency of the application or model, the more detailed the input data in support of that application needs to be. This is one of the greatest strengths of GIS for this type of application suite. Geographic information systems can import data of any type and resolution and can seamlessly present this data for use in an application.

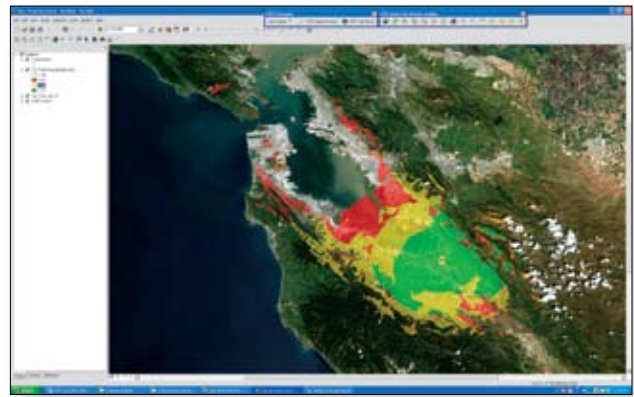
The LFMF and HF extensions of the CSPT suite generally do not need terrain data, although the LFMF extension can use it. These extensions have onboard databases for ground conductivity and dielectric constants, and they incorporate existing antennas or the ability to input antenna information. The HF extension allows the user to run many scenarios in batch mode, varying many input parameters in each scenario. This allows the analyst to see outputs that can be a function of a parameter or even time varying.

The VHF extension of the CSPT suite can use the ArcGIS Military Analyst extension to import data; it also allows the user to import data from one of many onboard databases that ship with the ESRI GIS product. The simple wizard menu of the CSPT_VHF extension guides the user in the definition of transmitter parameters, receiver parameters, antenna data and output units, and signal level contours. The analyst can also specify a distance out for analysis and a start and stop azimuth. The full menu toolbar additionally allows the user to construct scenarios such as interference analysis, overlap studies, multiple transmitter composites, point-to-point links, and coupled outdoor-to-indoor or indoor-to-outdoor building penetration scenarios. Analysis results can be exported directly into visualization tools such as ArcGlobe™, allowing the analyst very useful visualization of the results of an analysis.

Benefits

The many benefits of the CSPT extension suite include

- Ease of learning and use with many onboard help menus
- Choice of simple wizard or full menu approaches to analyses for the beginner or more advanced user
- Ability to be run as a stand-alone application or embedded in other existing applications
- Capability of importing many datasets needed for electromagnetic wave models such as terrain, buildings, imagery, antennas, and transportation infrastructure
- Saving of output results in easy-to-export analysis areas, geodatabases, and layer files
- Seamless exportation of data into ArcGlobe at the push of a button for improved visualization



Summary

CSPT are a simple, intuitive, and flexible suite of extensions for communication system planning and analysis that can run as stand-alone applications or be embedded in existing applications within the ESRI family of ArcGIS 9.x products including ArcMap™ and ArcGlobe. The analyst can create simple transmitter coverages or more advanced and complex analyses such as interference studies, overlap evaluations, point-to-point link analysis, and coupled indoor/outdoor analyses. The main purpose of CSPT is to provide analysts with a simple means of incorporating communication system planning and analysis within other applications in the performance of their mission.

