Telecommunications Engineering, Analysis, and Modeling

The Telecommunications Engineering, Analysis, and Modeling Division conducts studies in these three areas for wireless and wireless-wireline hybrid applications.

Engineering work includes assessment of the components of telecommunications systems; evaluation of protocol and transport mechanism effects on network survivability and performance; and assessment of the impact of access, interoperability, timing, and synchronization on system effectiveness in national security/emergency preparedness (NS/EP), military, and commercial environments.

Analysis work is often performed in association with Telecommunications Analysis (TA) Services, which offers analysis tools online via the Internet. In addition, ITS can provide custom tools and analyses for larger projects or specialized applications.

Modeling has been one of ITS' greatest strengths for many years. Propagation models are incorporated with various terrain databases and data from other sources, such as the U.S. Census. Adaptations of historic models, and those for more specialized situations have been developed, enhanced, and compared. ITS engineers contribute their propagation modeling expertise to the ITU as well.

The **Wireless Networks Research Center** (WNRC), opened in May 2001, has been home to four projects in its first year. ITS engineers have been able to assist other Federal agencies with emerging technologies in 2.5G and 3G wireless communications. The WNRC was designed to accommodate studies of emerging technologies and PCS, analysis of wireless protocols, and studies of wireless network effects such as congestion and capabilities such as priority access. (See page 75 for more information about the WNRC.)

Areas of Emphasis

ENGINEERING

PCS Applications The Institute helps the Telecommunications Industry Association (TIA) committee TR46.2.1 develop an inter-PCS interference model and handbook. ITS also serves as editor for this committee. The project is funded by NTIA.

Cellular and PCS Network Measurements Analysis of commercial wireless networks is achieved by collecting network protocol messages and physical RF link measurements. To help develop a better understanding of the loading of commercial wireless networks, ITS has conducted a series of IS-95 network code channel occupancy measurements. This work is funded by multiple Department of Defense agencies

Wireless Network Analysis and Forecasting Wireless communication links are used to extend wired networks to solve the first mile/last mile connectivity problem. The Institute is actively investigating wireless networks and services expected to be used in the future, including the interference between wireless network technologies, such as that between 802.11b and Bluetooth. This work is funded by multiple DoD agencies.

ANALYSIS

Telecommunications Analysis (TA) Services The Institute provides network-based access to its research results, models, and databases supporting applications in wireless telecommunications system design and the evaluation of systems. These services are available to government and non-government customers and are funded by fee-for-use and fee-for-development charges.

Geographic Information System Applications The Institute has developed a menu-driven propagation model using geographic information system (GIS) formats. In addition, ITS has developed a 3-D fly-through capability. This work was funded by the Dept. of Defense and ARINC.

MODELING

Propagation Model Development & Comparisons The Institute develops enhancements to existing propagation models. This research includes examination of various related databases, such as terrain, and how they interact with the models. Models are also examined using sets of measured data. Some of the technical products from this effort are presented on behalf of the U.S. at the ITU-R. This project is funded by NTIA.