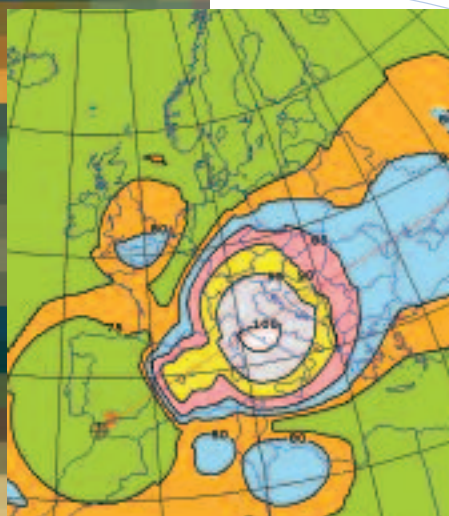




# The Institute for Telecommunication Sciences



A leader in radio science  
and telecommunications systems

**[www.its.bldrdoc.gov](http://www.its.bldrdoc.gov)**

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very day we depend on radio and telecommunications. We listen to the radio, watch satellite or cable television, talk on a cellular or home telephone, and depend on air traffic control radars to get us safely to our destinations. Our personal and business communications have become largely independent of distance and location. Over the past century, radio and wireless systems and telecommunications networks have become essential to life itself.

The Institute for Telecommunication Sciences (ITS) performs the research and engineering that enables the U.S. Government, national and international standards organizations, and many aspects of private industry to manage the radio spectrum and ensure that innovative, new technologies are recognized and effective.

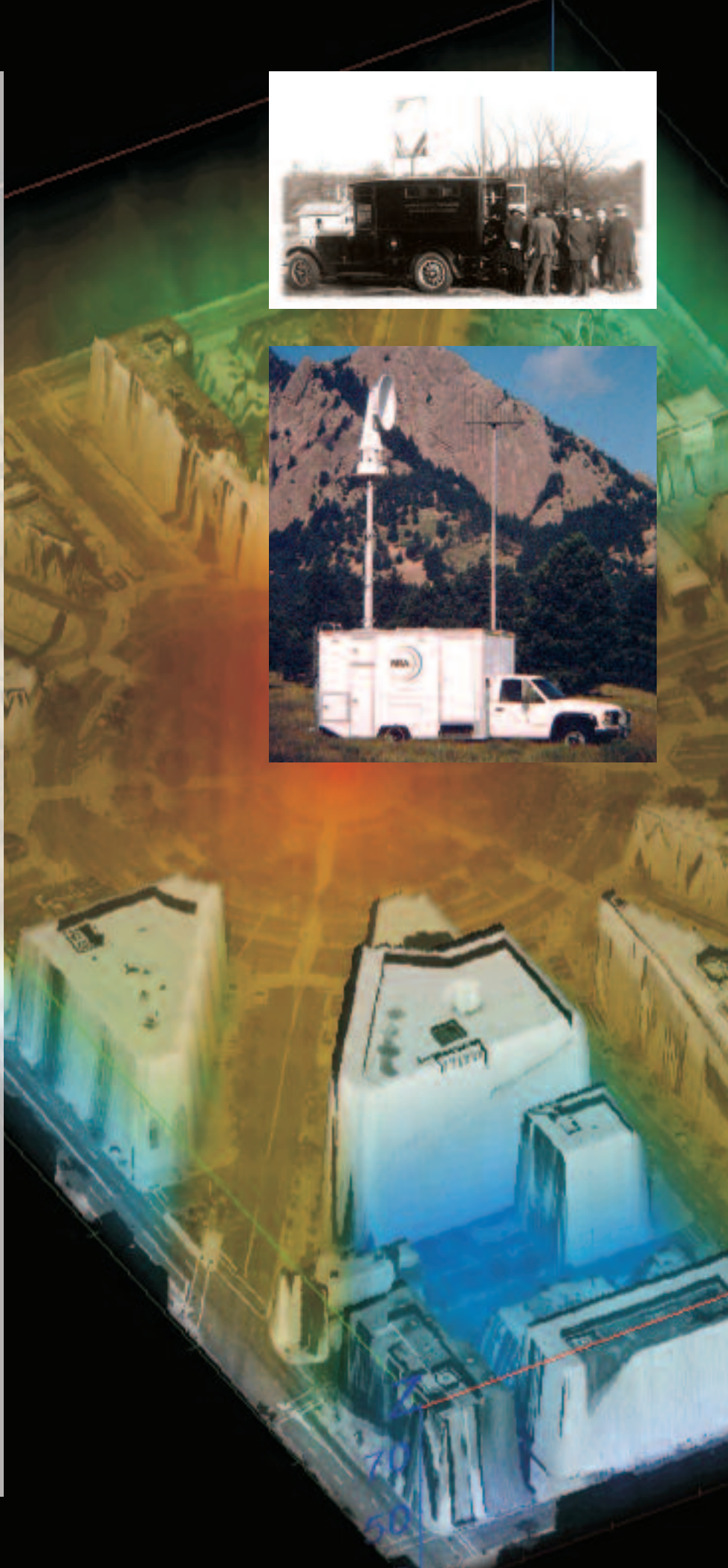
ITS possesses a unique combination of past experience, current knowledge, and facilities that enable it to solve complex telecommunications problems, as well as visualize the important needs for the future. ITS is well known for its pioneering work on radio wave propagation, development of measurement methods to characterize complex signals, and technology-independent determination of end-to-end system performance.

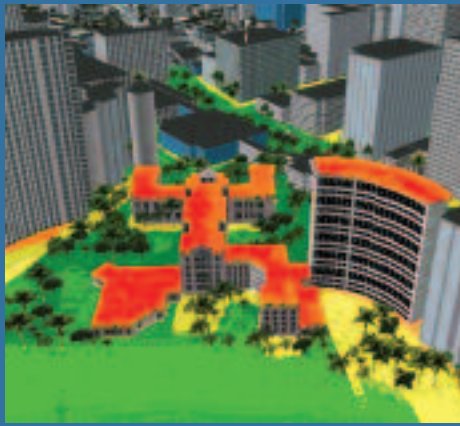
## OUR HISTORY

ITS traces its roots to the Interservice Radio Propagation Laboratory, founded in 1943 as an adjunct to World War II research and development efforts. By the end of the war, the Institute's continuing importance to the nation was unquestioned. It became the Central Radio Propagation Laboratory (CRPL) within the National Bureau of Standards, U.S. Department of Commerce. President Dwight Eisenhower dedicated a new CRPL facility in Boulder, Colorado in 1954. As part of a major reorganization, the Institute for Telecommunication Sciences (ITS) was created in 1967.

In 1977, ITS became part of the National Telecommunications and Information Administration (NTIA). ITS was designated as the principal telecommunications research link for NTIA and other federal agencies. For the past 15 years, that role has been expanded to embrace cooperative research with American industry and academia.

Today, ITS expertise is applied across the board — from assisting government agencies in planning and deploying a nationwide wireless alert system to solving complex interference problems and enabling private companies to market the latest high-tech ventures.





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## OUR EXPERTISE

### Radio Research Fundamentals and Spectrum Measurement

ITS completed the now-classic work in signal propagation modeling. Now, we adapt and enhance the original models and incorporate them with terrain data from remote sensing. Using the latest technology, we measure emission characteristics of federal transmitter systems and identify and resolve radio frequency interference. We also explore advanced antenna designs to improve the performance of next-generation wireless systems.

### Communication Systems and Networks

In addition to studying network protocols and technologies, we plan, implement, and evaluate wireless, wireline, and hybrid telecommunications systems. We also address issues of network management, quality of service, architecture design, network protection, and privacy. As part of our long-term commitment to interoperable communications in the public safety sector, we facilitate interconnectivity and interoperability between individual services and technologies. Finally, we provide pre- and post-procurement consulting.

### Standards Development

We're proud of our long and distinguished record of leadership and technical contributions to international, national, and local telecommunication standards committees. These include the International Telecommunication Union, the Telecommunications Industry Association, and the Alliance for Telecommunications Industry Solutions. ITS experts are regularly called upon to interpret and analyze standards and regulations devised by numerous other organizations.

### Wireless Voice/Data Systems and Emerging Technologies

ITS looks to the next generation of wireless systems and network access technologies – and beyond. We not only assess components of telecommunications systems, we evaluate protocols and transport mechanism effects on network survivability and



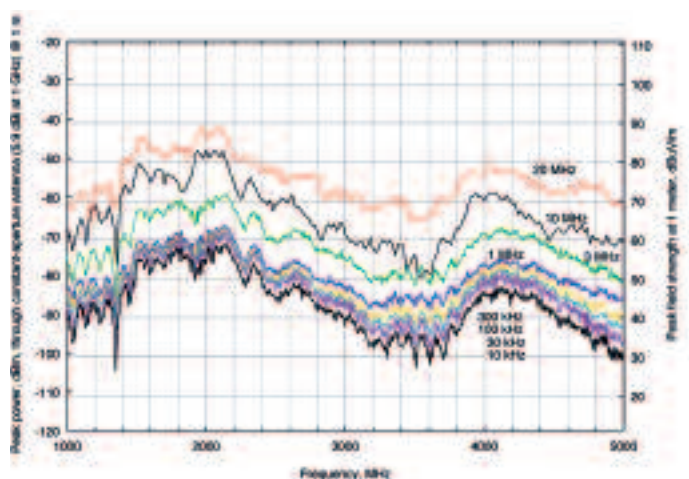
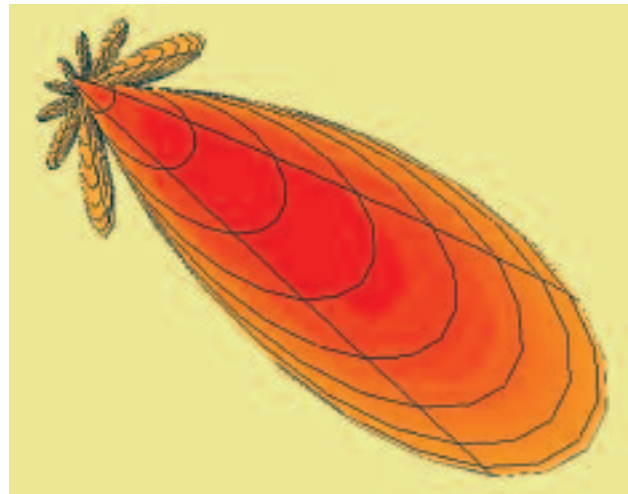
performance. We assess impacts of access, interoperability timing, and synchronization on system effectiveness in national security/emergency preparedness, military, and commercial environments. We also test emerging technologies, such as Voice over Internet Protocol and ultrawideband, to evaluate interoperability and improvements.

### Audio and Video Quality Research

For over 15 years, ITS has very successfully conducted research on digital audio and video quality. This research is firmly grounded in both digital signal processing theory and the modeling of human perception. The work has resulted in a variety of software tools that provide quick, reliable estimates of audio and video quality as perceived by users. These tools become more valuable each day as digital coding and transmission, and the resulting quality issues, become more and more prevalent.

### Electromagnetic Modeling & Analysis

We seek to understand and improve telecommunications at the most fundamental level – the parameters that limit network performance. ITS maintains ongoing investigations in broadband wireless systems performance, advanced antenna designs, and noise as a limiting factor for advanced communication systems.



## OUR FACILITIES

### Audio-Visual Laboratories

Our labs offer a wide range of audio and video recording, storage, processing, reproduction, objective quality assessment, and subjective testing capabilities. These support the development of quality estimation techniques for compressed digital audio and video, subjective testing techniques for audio and video signals, and coding algorithms.

### Interoperability Research Laboratory (IRL)

The IRL is used for interoperability testing of TIA-102 radios, and backward compatibility testing of those radios and legacy FM systems. Capabilities include receiver and transmitter measurements such as receive sensitivity, co-channel and adjacent-channel rejection, spurious response rejection, and transmitter emissions mask.

### Radio Spectrum Measurement System (RSMS)

The RSMS is a state-of-the-art system for gathering information on spectrum occupancy, equipment compliance, electromagnetic compatibility, and interference resolution. The RSMS incorporates automated, semi-automated, and manual techniques for measuring and analyzing radio emissions. Measurements can be taken in the lab or in the field, and can be either stationary or mobile. An integral part of the RSMS is our fourth generation measurement vehicle.

### Secure Internet

We are linked to the Secret Internet Protocol Routable Network (SIPRNET). This gives Department of Defense users direct access to ITS tools and facilities in a secure environment.

### Table Mountain Field Site and Radio Quiet Zone

Established in 1954, Table Mountain is a unique radio research facility located north of Boulder. The site is designated a "Radio Quiet Zone" where state law and federal regulations restrict the magnitude of strong, external signals in order to minimize radio frequency interference with sensitive research projects.

### Telecommunications Analysis Services (TA Services)

TA Services supports a broad range of programs allowing users to design or analyze the performance of telecommunications systems. The latest engineering models and research data developed by ITS are available via a web-based interface (<http://flattop.its.bldrdoc.gov>). ITS also provides custom tools and analyses for specialized applications.

### Wireless Networks Research Center (WNRC)

The WNRC offers a common lab area for work in wireless networks and wireless network access technologies. Capabilities range from an RF/network interface and experimental IEEE 802.11b WLAN to code domain analyzer capability and short- and long-range wireless test links.





## OUR SPONSORS

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Our work benefits the development and application of science and engineering for the good of all. As part of our mission, we are directed to solve telecommunications challenges for federal and state agencies.

We support NTIA in the development of telecommunications policy and the management of the federal spectrum. Our research contributes to, and reinforces NTIA's overall program, and advances goals of the Department of Commerce.

We provide specialized support to other federal agencies. Our major federal sponsors include agencies of the Department of

Defense, the Department of Homeland Security, the Department of Transportation, and the Department of Commerce.

For private industry and academia, we may establish cooperative research and development agreements. These support technology transfer and commercialization of telecommunications products and services. We guarantee protection of intellectual property. ITS has worked with organizations such as the American Automobile Manufacturers Association, Intel Corporation, Lucent Technologies, Motorola, the University of Colorado, and the University of Pennsylvania.

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## OUR CONTACT POINTS

Now you know about us. We'd like to hear from you.

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