CAC
Center for Advanced Communications
College of Engineering, Villanova University

Distinguished Lecturer Series

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Speaker: Dr. John W. Betz, The MITRE Corporation
Topic: Advanced in Satellite-Based Navigation

Abstract

A decade ago, there were two global satellite-based navigation systems, the United States' Navstar Global Positioning System (GPS) and the Russian Federation's GLObal NAvigation Satellite System (GLONASS). Each of these dual-use systems provided signals on a single frequency for open civil use, and dual-frequency military signals. Although the GLONASS constellation and quality of service deteriorated in the late 1990s, GPS has become the world standard. Millions of operating receivers worldwide and a virtually endless number of applications testify to the reliable and high quality positioning and time provided by GPS. Now, multiple satellite-based navigation systems are being developed in different parts of the world, while GPS and GLONASS are each being modernized. The result will be more systems, more satellites, and more signals, along with improved signal designs that offer receiver designers the opportunity to provide even better performance than is obtained from GPS today. This presentation reviews the history and looks at the future of satellite-based navigation. It discusses some of the challenges associated with the growing number of systems, and relates strategies being employed to deal with these challenges. It then applies some theoretical results to characterize performance of some new signal designs, demonstrating performance advantages over the original signals that have already proven to be so capable.

Biography

Dr. Betz is a Fellow of The MITRE Corporation, working in MITRE's Center for Command and Control. Since 1997 he has worked primarily on satellite-based navigation for the Navstar GPS and also, since 2002, on international negotiations concerning compatibility and interoperability of GPS with other GNSS including Europe's Galileo system, Japan's QZSS, Russia's GLONASS, India's IRNSS, and China's COMPASS. Since 2004, he has been a member of the U.S. Air Force Scientific Advisory Board (AF SAB). He was named Chair of the AF SAB in October 2008, leading 52 engineers and scientists selected from academia and industry who serve as a major force in determining U.S. Air Force research and development policy and providing technical advice to Air Force senior leadership.

Before joining MITRE, he worked at The Analytic Sciences Corporation and RCA Automated Systems, where he was involved in a variety of signal processing, simulation, and system engineering activities. He holds a PhD in Electrical and Computer Engineering from Northeastern University, and has been a lecturer and Adjunct Professor at Northeastern. He has authored or coauthored more than 50 refereed journal papers, book chapters, and papers in conference proceedings, and holds two patents.

Dr. Betz is a 2009 Fellow of the IEEE, and also a Fellow of the Institute of Navigation, where he also was co-recipient of its Burka Award for authoring papers contributing to the advancement of navigation and space guidance. For his role in the United States/European Union negotiations on GPS and Galileo, he received the U.S. State Department Superior Honor Award.