GSAW 2012 Tutorial J:

Introduction To Satellite Communications

Length: Half day

Overview:

This tutorial provides attendees an introduction to satellite communications with a focus on the telemetry and command paths. Attendees will follow the flow of satellite telemetry and commands between the space-vehicle and the operator. Each step in the path (spacecraft, space link, antenna site, ground network and control center) is described; areas of complexity discussed; criteria for architectural decisions are highlighted; and technology trends are presented.

Instructors: Rob Andzik, Randy Culver, Jeff Papenfuss, AMERGINT Technologies

Biographies:

Rob Andzik:

Rob Andzik attended the University of Colorado where he obtained degrees in Aerospace Engineering and Computer Science. He has over 17 years experience in the space industry working for Lockheed Martin, RT Logic and now AMERGINT Technologies. He has participated in the design, implementation and support of numerous ground systems including the International Space Station, GPS, AFSCN, CCS-C, DigitalGlobe, MMSOC and many others. Rob is a co-chair of the OMG Space Domain Task Force and the author of OMG's Ground Equipment Monitoring Service (GEMS) specification.

Randy Culver:

Randy has over twenty years experience in satellite ground and satellite test systems. Over that period, he worked directly on more than fifty Government and commercial space systems. His technical skills include systems architecture, product design, and integration/test of satellite control centers and remote ground antenna facilities. His expertise spans the signal/data processing associated with payload, telemetry, commanding, and ranging communications links.

Randy was one of five founders of RT Logic in 1997 and served as president for the company's first eleven and a half years. RT Logic became an industry leading product supplier for satellite ground systems, and the company's annual revenues grew from $3M to $54M. Prior to RT Logic, Randy worked for IBM Federal Systems for twelve years as a systems engineer and engineering manager.

Randy holds a MS degree from Purdue University in Electrical Engineering and a BS degree from Virginia Tech in Engineering Science.

Jeff Papenfuss:

Mr Papenfuss is a seasoned Systems Architect with expertise in signal/data processing and associated communications link design and implementation. His domain experience includes architecting, implementing and integrating satellite-ground links, commercial wireless radio

links (GPRS, GSM) and signal processing for early warning radar systems. He is experienced in leading teams of engineers through the development and deployment of signal processing systems. Jeff has nearly 20 years experience in design, integration and test of complex RF communications systems and subsystems, most recently serving as the lead architect for the Air Force Rapid Attack Identification and Reporting System (RAIDRS) while at RT Logic. His hands-on experience spans the entire program life cycle from overall system architecture and design, link analysis, DSP algorithm definition and simulation, software architecture and design, system integration and test. In addition, Mr. Papenfuss led the development of numerous signal processing products including the Frequency Conversion Subsystem family of products, a Satellite Channel Simulator, a Geolocation Reference Transmitter and a Spectral Monitoring System.

Mr. Papenfuss holds a MSEE from the University of Colorado, Colorado Springs where he specialized in Systems and Signal Processing. He also holds a BS in Electrical Engineering from the University of New Mexico.

What Participants Should Expect to Learn:

Students should be familiar with the space domain and have a basic understanding of satellite operations.

Who Should Attend:

Upon taking the course, students will have an understanding and appreciation of the ground and space communication links and the complexities involved.