CN420 GNSS Modernization
ION GNSS 2007, September 24, 2006, 6:45 pm-9:30 pm, CEU: 2.5

Instructor: Thomas Stansell, Stansell Consulting

Prerequisite: Some knowledge of mathematics and computer science will be useful.

Intended Audience: Engineers, scientists, and managers interested in GNSS using GPS, Galileo, Glonass and/or other satellite navigation system seeking information on new GNSS signal formats and systems. The course provides information on Modernized GPS signals, Galileo, and the Quasi-Zenith Satellite System (QZSS). The course is a systems level course and not too detailed for the beginner to GNSS.

Notes Provided: Slides presented will be professionally spiral bound, with clear plastic cover, including color to add clarity where needed.

Reference List: A reference list will be provided as part of the note package for completeness and to allow the interested attendee to obtain additional information.

Course Overview: This course provides information on many aspects of GNSS modernization; the course covers topics on GPS modernization, Galileo signal formats and services, and QZSS concepts including:

Course Content: The main topics to be covered by this course are:

- Motivations for the current modernization
- GPS Modernization:
    - Clock and orbit accuracy improvements
    - L2C, L5, M-code, and L1C signals
        - Availability time frame
        - BPSK, BOC, and MBOC modulations
        - Code generation methods and performance differences
        - Time multiplexed and quad-phase pilot carriers
        - CNAV and CNAV-2 message formats
        - Forward error correction and interleaving differences
    - Interoperability with Galileo and QZSS
        - Benefits of interoperability
        - Common and unique center frequencies
        - Impact of different GPS and Galileo performance objectives
    - Decimeter tri-lane phase navigation
        - Comparison with differential code navigation
        - Code and phase measurement error characteristics
        - Factors affecting phase navigation accuracy
        - Response to loss of lock
        - Sub-decimeter navigation accuracy potential
        - Application opportunities and considerations

- Other GNSS
    - Chinese Compass with Beidou-2
    - Indian Regional Satellite System.

Course Outcomes: At the completion of this course, the attendee should have the ability to understand the various modernization efforts ongoing to GNSS and assess their applicability to various applications.