Logan Scott, PNT Leadership Summit, 9 September 2025

Four Pillars for GPS Modernization

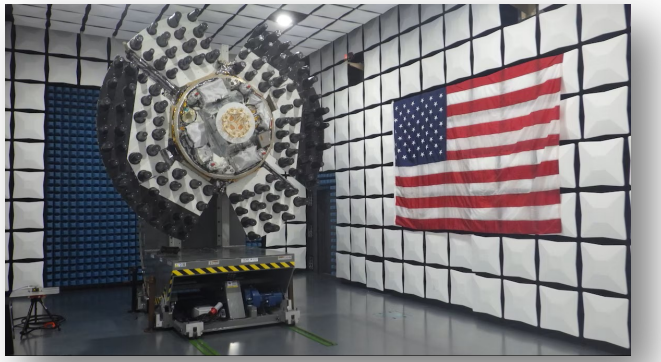
Logan Scott has over 45 years of military and civil GPS systems engineering experience. He is a consultant specializing in radio frequency signal processing and waveform design.

At Texas Instruments, he pioneered approaches for building high-performance, jamming-resistant digital receivers and adaptive arrays. In 1985 his team developed the world's first all-digital GPS receiver. At Omnipoint (now T-Mobile), he developed spectrum sharing techniques that led to a Pioneer's preference award from the FCC. He is a cofounder of Lonestar Aerospace, an advanced decision analytics company located in Texas.

Logan has been an active advocate for improved civil GPS location assurance for over 20 years and was the first to describe how civil navigation signals could be authenticated using delayed key concepts central to the Chimera signal. For the past 10 years he has been developing advanced signal concepts, including Chimera, for NTS-3, AFRL, and the University of Colorado.

Logan is a Fellow of the Institute of Navigation and a Senior Member of IEEE. In 2018 he received the GPS World Signals award. He received the ION PVH Weems award for 2022 and is a member of the President's National PNT Advisory Board. He is the author of Interference: Origins, Effects, and Mitigation in PNT21 and holds 46 US patents.

1: Software Defined Radio for Future Proofing



NTS-3 Launched
12 August 2025
Finally!!

- Future Proofing through Adaptation
  - Block III Satellites Expected to Last 35 years
  - Needs and Requirements Evolve Rapidly
  - SDR Allows Rapid Fielding of New Capabilities and Problem Fixes
  - Many Civil Receivers are Internet Connected SDR Now
- Experimental Signals on Operational Constellations Accelerates Innovation
  - Success in the field validates designs

2: Crosslinks for Connected Robustness

- Precise Ranging and Time Transfer
  - Constellation Autonomy
  - Relaxed Clock Requirements
- Timely and Robust Contact
  - Fast Integrity Warnings
  - Cross System Authentication
- Moderate Bandwidth
  - SDR Signal Provisioning

3: Augmentation Server Enables Transformative PNT Paradigms

We Live in a Connected World; Use It!

- Authenticated Supports and Distribution for:
  - Safe use of multiGNSS using Extant Resources
    - Sovereign Ephemeris, LTOC, Integrity, BCE signing etc.
  - Key Certificates for CHIMERA
    - Fast Channel Delayed Keys for 6 second Time to Authenticate
  - Precision Enhancements Using Extant High Accuracy Monitoring Systems
  - Hybrid Signal Architectures for Secure Radiocalibration and PoL
  - Signal Transmission Plans (TV Guide)
  - Jamming and Spoofing Heat Maps and Geolocation
  - BCE for Improved Antijam using Data Wipeoff
  - SOO Navigation Overlays for Resiliency and AntiSpoof

4: Vision, Leadership, and a Willingness to Execute

- Learned Helplessness is not a Strategy for Success
- **Identifiable, Knowledgeable, and Passionate Leadership Backed by Stable Funding**
- Adopt Formal Innovation Deployment Processes
  - SDR is a core enabler for innovation and, also, chaos (voice of experience)
  - Cellular Industry Uses a 2-year Major Release Cycle that offers a Model for Successfully managing Innovation

Backup

Some Important Buttresses

- Active Phased Arrays
  - Adjustable Coverage and Gain Patterns
  - Sort of Like a Garden Hose Nozzle
- Satellite Constellation Diversity
  - Rapid PPP/RTK Convergence (LEO)
  - Higher Power (LEO / GEO)
  - Direct to Device (D2D) Communications (LEO)
  - Acquisition Aids (GEO)
- Terrestrial Systems, Especially for Timing