



Homeland Security

ATIS — WORKSHOP ON SYNCHRONIZATION AND TIMING SYSTEMS

“GPS Time -- Can You Live Without it?”

April 6, 2017



SPACE-BASED POSITIONING
NAVIGATION & TIMING
NATIONAL COORDINATION OFFICE

Robert Crane
Senior Advisor

Timing is Everything!



Applications:

- Aviation
- Agriculture
- Search & Rescue
- Surveying & Mapping
- Trucking & Shipping
- Fishing & Boating
- Scientific
- Timing Stamps
- Tracking
- Exploration
- Offshore drilling
- Military



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GPS Overview



Civil Cooperation

- 1+ Billion civil & commercial users worldwide
- Search and Rescue
- Civil Signals
 - L1 C/A (Original Signal)
 - L2C (2nd Civil Signal)
 - L5 (Aviation Safety of Life)
 - L1C (International)



37 Satellites / 31 Set Healthy

Baseline Constellation: 24 Satellites

Satellite Block	Quantity	Average Age	Oldest
GPS IIR	12	15.1	19.6
GPS IIR-M	7	9.5	11.4
GPS IIF	12	3.1	6.7
Constellation	31	9.2	19.6

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Spectrum

- World Radio Conference
- International Telecommunication Union
- Bilateral Agreements
- Adjacent Band Compatibility



Department of Transportation

- Federal Aviation Administration

Department of Homeland Security

- U.S. Coast Guard

Department of Defense

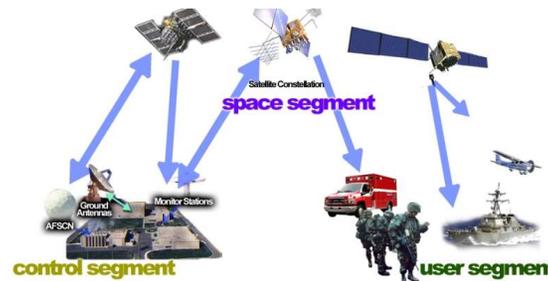
- Services (Army, Navy, AF, USMC)
- Agencies (NGA & DISA)
- U.S. Naval Observatory
- PNT EXCOMS
- GPS Partnership Council

Maintenance/Security

- All Level I and Level II
 - Worldwide Infrastructure
 - NATO Repair Facility
- Develop & Publish ICDs Semi-Annually
 - ICWG: Worldwide Involvement
- Update GPS.gov Webpage
- Load Operational Software on over 970,000 SAASM Receivers
- Distribute PRNs for the World
 - 120 for US and 90 for GNSS

International Cooperation

- 57 Authorized Allied Users
 - 25+ Years of Cooperation
- GNSS
 - Europe - Galileo
 - China - Beidou
 - Russia - GLONASS
 - Japan - QZSS
 - India - IRNSS



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The World Depends on Critical Infrastructure, GPS, and Timing



Petroleum Industry



Power Grids



Precision Agriculture



Space Applications



Air Traffic Control



Surveying & Mapping



Personal Navigation



Supply Chains



Industrial Control



Telecom



Transit Operations



Shipping & Maritime Applications



Financial Markets



Emergency Services

Operationalizing Resilience

- Foundations of Resilience
- Emerging Technologies and Resiliency
- Policy Matters
- Critical Infrastructure Resiliency & Sector Interdependencies
- Possible Overreliance on GPS
- Contingency Plans

What Should Resiliency Mean to the PNT Community?

- Rapidly recover from any disruptions and restore the essential functions of the economy, society, and government, as quickly as possible.
- Therefore outages/disruptions are significantly mitigated by introduction and adoption of best practices and independent P/N/T sources such that a disruption is by and large a non-event.
- Back-up
- Best Practices: www.gps.gov links to –
Development of Global Positioning System (GPS) Equipment Used by Critical Infrastructure (2017) - https://ics-cert.us-cert.gov/sites/default/files/documents/Improving_the_Operation_and_Development_of_Global_Positioning_System_%28GPS%29_Equipment_Used_by_Critical_Infrastructure_S508C.pdf
Best Practices for Improved Robustness of Time and Frequency Sources in Fixed Locations (2015) - https://ics-cert.us-cert.gov/sites/default/files/documents/Best%20Practices%20-%20Time%20and%20Frequency%20Sources%20in%20Fixed%20Locations_S508C.pdf



Summary

- Time and Frequency
- Modernize, with new security features, the U.S. GPS
- International Cooperation on Interoperability and Compatibility
- Continuously Improve Receivers Found in Critical Infrastructure
- Continuously Improve Timing-Dependent Systems and Networks
- Ensure PNT Definitions and Policies Remain Current and Useful
- Examine Complementary/Back-up Options
- Conclusion – Can you live without GPS time?



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For more information, visit:

- www.gps.gov
- www.dhs.gov/critical-infrastructure

Jim Platt	Robert Crane
DHS PNT Program Office	National Coordination Office
James.Platt@hq.dhs.gov	Robert.Crane@hq.dhs.gov



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