GPS Civil Signals Operational Capability IPT
Lt Col Ken McDougall, Dr Andrew Hansen
Overview

• IPT Objectives and Mission
• IPT Organization
• Civil Signals Roadmap
• Sub-working Groups
Civil Signal Operational Capability

What do operational declarations mean for stakeholders?

- The commitments that USG makes on GPS open signal broadcast
- The signals that can reliably be planned on in 20 years
- The category or service level, i.e. safety-of-life, critical infrastructure, economic bases, convenience functions
- The sequence and timeframes for using given signals

How do we declare operational use?

- Joint DoD/DOT statement on operational capability for GPS users
- Joint use declaration stands upon the GPS Civil Signal components
  - USG commitments (NSPD-39, GPS SPS PS, IS 200x, APB, NANUs, etc.)
  - Ground segment (command, control, and monitor)
  - Space segment (SIS interface and broadcast)
GPS Civil Signals Capability IPT

• Mission
  – Conduct interagency collaboration to deliver the following four modernized GPS civil signals operational capabilities to civilian users
    • Dual Frequency Civil Navigation (DFCN)
    • L2C Position Navigation, and Time Transfer (PNT) Determination
    • L5 PNT Determination
    • L1C PNT Determination

• Deliverables
  – Integrated baseline schedule
  – Playbook defining actions and organizations to achieve mission success
  – Materiel Fielding Plan

• Management Direction
  – Plan actions to achieve civil signals IOC/FOC criteria
  – Plan joint testing of civil signals
  – Do not increase cost or negatively impact Acquisition Program Baseline (APB) for GPS programs
  – Identify opportunities and risks for early use of Civil Signals
GPS Civil Signals Capability IPT Organization

**GP Leadership**
(GP-1, GP-2, GPJ)

- **Role**: Provide IPT oversight; set priorities and strategic agenda; refer interagency concerns
- **Battle Rhythm**: Quarterly telecon; face-to-face as needed

**CSIPT Mentor**
(Col Byrne)

**Steering Group**
Chair: James Horejsi

- **Role**: Provide IPT oversight; set priorities and strategic agenda; refer interagency concerns
- **Battle Rhythm**: Bi-annual along with FAA PMR

**Function** | **POC**
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GPS Lead | James Horejsi
DOT Lead | Karen Van Dyke
FAA Lead | Deborah Lawrence

**Working Group**
Chair: Lt Col Ken McDougall

- **Role**: Perform work supporting priorities and strategic agenda; collaborate with interagency stakeholders
- **Battle Rhythm**: Biweekly telecon; face-to-face as needed

**Lines of Effort**

| **Lines of Effort** | **POC** |
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Civil Nav Requirements | Lt Benjamin Ratner
Joint Civil Test Planning | Lt Marcy Gouri
Enterprise Integration | Lt Col Ken McDougall

| **Lines of Effort** | **POC** |
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Multi-GNSS Considerations | Capt Daniel Barnes
Risk Mitigation Opportunities | Lt Marcy Gouri

Space Starts Here
## GPS Civil Signals Summary

<table>
<thead>
<tr>
<th>Signal</th>
<th>L1 C/A</th>
<th>L2C</th>
<th>L5</th>
<th>L1C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description (Primary Users)</strong></td>
<td>Original civil signal for positioning, navigation, and timing</td>
<td>Civil signal for commercial applications</td>
<td>Civil signal for safety-of-life applications; frequency band protected</td>
<td>Civil signal for Multi-Global Navigation Satellite Systems (MGNSS) interoperability</td>
</tr>
<tr>
<td><strong>GPS Block</strong></td>
<td>IIA, IIR, IIR-M, IIF, IIIF</td>
<td>IIR-M, IIF, III, IIIF</td>
<td>IIF, III, IIIF</td>
<td>III, IIIF</td>
</tr>
<tr>
<td><strong>Operational satellites</strong></td>
<td>31</td>
<td>19</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td><strong>Signal Status</strong></td>
<td>Operational, set healthy</td>
<td>Pre-operational for test, set healthy; limited CNAV messages</td>
<td>Pre-operational for test, set unhealthy; limited CNAV messages</td>
<td>Pre-operational for test, set unhealthy</td>
</tr>
<tr>
<td><strong>Declaration Target</strong></td>
<td>FOC achieved</td>
<td>Joint Use (FY24)</td>
<td>Joint Use (FY27)</td>
<td>Formative</td>
</tr>
<tr>
<td><strong>Gates to Next Declaration (Owner)</strong></td>
<td>FOC achieved</td>
<td>- 5th Ed PS (OSD CIO)</td>
<td>- 5th Ed PS (OSD CIO)</td>
<td>- 6th Ed PS (OSD CIO)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Monitoring Sufficiency (PNT EXCOM)</td>
<td>- Monitoring Sufficiency (PNT EXCOM)</td>
<td>- Adequate SV constellation (AFSPC)</td>
</tr>
<tr>
<td><strong>Actions for CSIPT</strong></td>
<td>- Completed</td>
<td>- Staffing Process</td>
<td>- Staffing Process</td>
<td>- TBD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Joint justification</td>
<td>- Joint Declaration</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Safety-of-Life Operational Suitability</td>
<td></td>
</tr>
</tbody>
</table>
GPS Civil Signals Capability IPT
Civil Coordination

• DOT Leadership
  – Participation Authority Derived from NSPD-39
    • Actively engaged by the Space-based PNT Executive Committee (DOT co-chair)
    • Represent all civil departments and agencies on open signal matters
    • Engage users and public via Civil GPS Service Interface Committee (CGSIC)
  – Delegated to the Office of the Secretary of Transportation (OST)

• Key Civil Participation
  – National Transportation Systems Center (Volpe Center)
  – FAA Office of Navigation Services
  – FAA Technical Center
  – DOT Extended Positioning and Navigation Committee

• Extensive Equities and Test Assets from DOT/FAA
  – Official document of import is the GPS SPS Performance Standard (PS)
  – Transportation and Critical Infrastructure services built upon PS
  – PNT policy and forward-look inserted in the Federal Radionavigation Plan
  – Bring knowledge base of user community and other GNSS systems

• Primary IPT objective is operational determination on civil signals
Objectives

- Ensure common understanding of civil signals requirements in GPS Capability Development Documents (CDDs)
- Assess whether or not GPS CDD Key Performance Parameters (KPPs), Key System Attributes (KSAs), and Additional Performance Attributes (APAs) satisfy DOT-FAA operational expectations
- Initiate and support GPS Technical Baseline Request for Change (RFC) on Advanced Receiver Autonomous Integrity Monitoring (ARAIM) Integrity Support Messages (ISM) (MT38, MT39, MT40)

Leads

- Lt Benjamin Ratner, SMC/ZAC
- Calvin Miles, FAA
Objectives

- Understand Air Force criteria and process for declaring L2C, L5, and L1C civil signals initial operational capabilities (IOCs) and full operational capabilities (FOCs)
- Support integration of materiel solutions satisfying civil signals IOC and FOC criteria
- Understand and support Air Force and DOT-FAA processes for operational acceptance (OA) of civil signal capabilities
- Recommend and support civil signals early use opportunities

Leads

- Lt Col Ken McDougall, SMC/ZAC
- Andrew Hansen, DOT
Objectives
- Explore potential non-FAA use of GPS L5 / Galileo E5 signals and determine help needed
  - Main Task: Consolidate and conduct analysis that supports a declaration of L5/E5 Early Use by the DOT
  - Current Status: Early Phase 1—Analysis Planning
  - Current Status: No action planned at this time; preparatory information for civil users, standing-by to support MGUE Inc 2 needs, if applicable

Leads
- Capt Daniel Barnes, SMC/ZAC
- Jason Burns, FAA
Objectives

- Understand civil test approach as early as possible; e.g. drivers, objectives, schedule, assets, location
- Support civil test planning for
  - IST 2-5 GPS III Contingency Operations (Control Segment)
  - IST 2-6 M-Code Early Use (Control Segment)
  - IST 3-1 OCX/GPS III (Control Segment)
  - IST 3-2 Gen III PNT (Space & Control Segment)
  - GPS Enterprise MOT&E (Space, Control, and User Segment)
- Recommend additional civil test planning details in forthcoming GPS Enterprise Test & Evaluation Master Plan (E-TEMP) Rev C/D
- Understand and support DOT-FAA process for determining L5 operational suitability in safety-of-life applications

Leads

- Lt Marcy Gouri, SMC/PCE
- Noah Rosen, FAA
• Objectives
  – Recommend and support civil signals risk mitigation opportunities via System Integration (SI) Demonstrations, Live Sky Events, and Pre-operational Signal Broadcasts
  – Provide recommendations and support planning for CNAV pre-operational persistent broadcast of L2C, L5, and L1C

• Leads
  – Lt Marcy Gouri, SMC/PCE
  – Noah Rosen, FAA