

Space & Missile Systems Center



GPS Civil Signals Operational Capability
IPT

Lt Col Ken McDougall, Dr Andrew Hansen



Overview



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- IPT Objectives and Mission
- IPT Organization
- Civil Signals Roadmap
- Sub-working Groups



Civil Signal Operational Capability



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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)



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- 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



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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
GPS Lead	James Horejsi
DOT Lead	Karen Van Dyke
FAA Lead	Deborah Lawrence

- Oversight
- Direction & guidance

- Project status
- Concerns

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	POC	Lines of Effort	POC
Civil Nav Requirements	Lt Benjamin Ratner	Multi-GNSS Considerations	Capt Daniel Barnes
	Calvin Miles		Jason Burns
Joint Civil Test Planning	Lt Marcy Gouri	Risk Mitigation Opportunities	Lt Marcy Gouri
	Noah Rosen		Noah Rosen
Enterprise Integration	Lt Col Ken McDougall		
	Andrew Hansen		



GPS Civil Signals Summary



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Signal	L1 C/A	L2C	L5	L1C
Description (Primary Users)	Original civil signal for positioning, navigation, and timing	Civil signal for commercial applications	Civil signal for safety-of-life applications; frequency band protected	Civil signal for Multi-Global Navigation Satellite Systems (MGNSS) interoperability
GPS Block	IIA, IIR, IIR-M, IIF, III, IIIF	IIR-M, IIF, III, IIIF	IIF, III, IIIF	III, IIIF
Operational satellites	31	19	12	0
Signal Status	Operational, set healthy	Pre-operational for test, set healthy; limited CNAV messages	Pre-operational for test, set unhealthy; limited CNAV messages	Pre-operational for test, set unhealthy
Declaration Target	FOC achieved	Joint Use (FY24)	Joint Use (FY27)	Formative
Gates to Next Declaration (Owner)	FOC achieved	<ul style="list-style-type: none"> - 5th Ed PS (OSD CIO) - Monitoring Sufficiency (PNT EXCOM) 	<ul style="list-style-type: none"> - 5th Ed PS (OSD CIO) - Monitoring Sufficiency (PNT EXCOM) 	<ul style="list-style-type: none"> - 6th Ed PS (OSD CIO) - Adequate SV constellation (AFSPC)
Actions for CSIPT	- Completed	<ul style="list-style-type: none"> - Staffing Process - Joint justification 	<ul style="list-style-type: none"> - Staffing Process - Joint Declaration - Safety-of-Life Operational Suitability 	- TBD



GPS Civil Signals Capability IPT Civil Coordination



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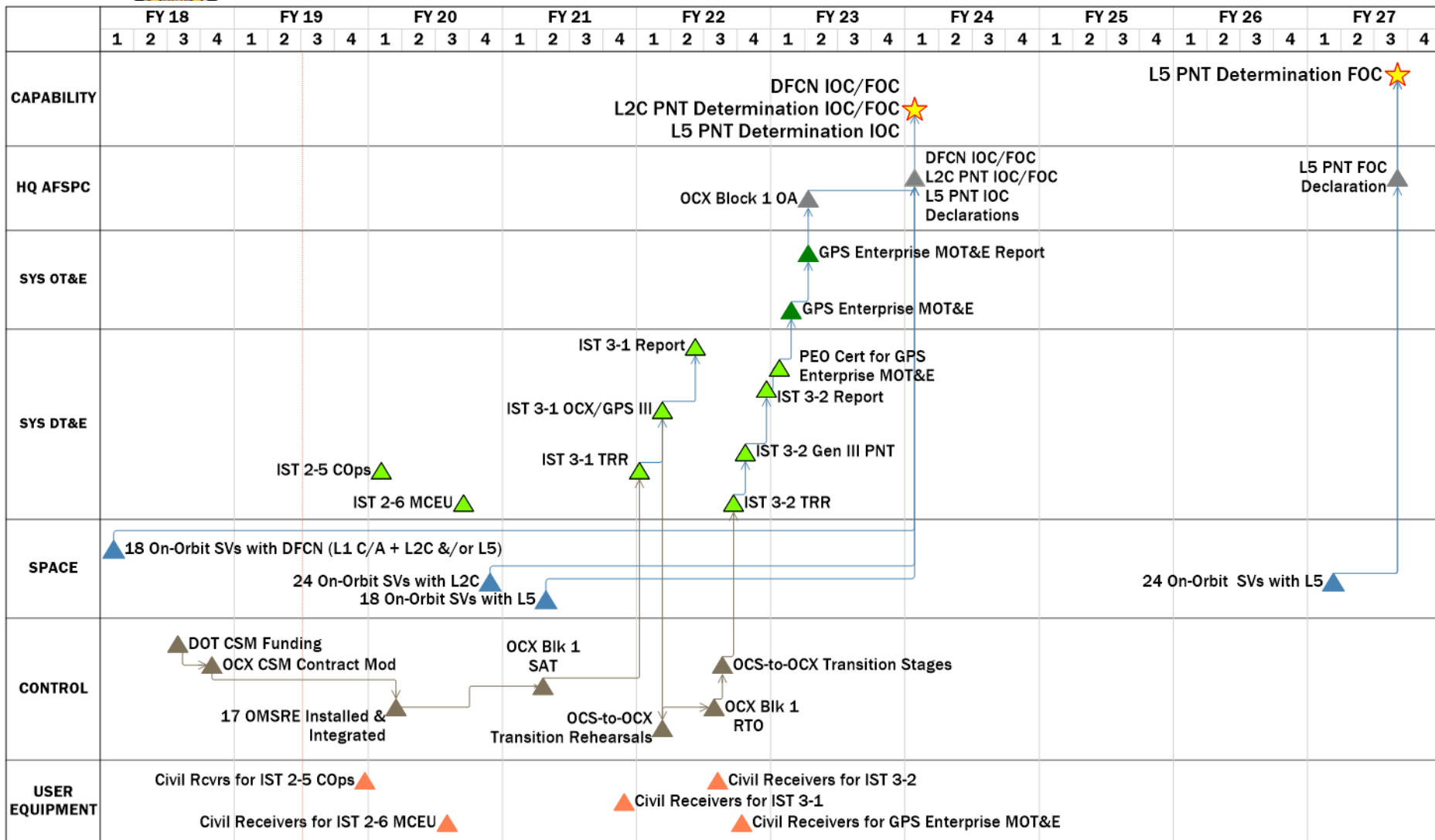
- DOT Leadership
 - Participation Authority Derived from NSPD-39
 - Actively engaged by the Space-based PNT Executive Committee (DOT co-chair)
 - Represent all civil departments and agencies on open signal matters
 - Engage users and public via Civil GPS Service Interface Committee (CGSIC)
 - Delegated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



GPS Civil Signals Roadmap



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Generated from the GPS Enterprise Master Schedule (EMS) - GPS SE&I

Snapshot Date: 4/5/2019



Civil Navigation Requirements (CNR) Sub-Working Group



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- 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



Enterprise Capabilities Integration (ECI) Sub-Working Group



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- 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



Multiple Global Navigation Satellite Systems (Multi-GNSS) Sub-Working Group



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- 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
- Assist SMC/PCU in determining strategy to implement Multi-GNSS in Increment 2, consistent with Section 1609, Enhancement of Positioning, Navigation, and Timing Capacity, of the FY19 National Defense Authorization Act
 - 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



Joint Civil Test Planning Sub-Working Group



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- 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



Risk Mitigation Sub-Working Group



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- 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