

Space & Missile Systems Center



GPS Configuration Management Process & Public Interface Control Working Group (PICWG)

17 September 2019

Presenters:

Mr. Dan Godwin (SMC)
Lt Benjamin Ratner (SMC)
Jennifer Lemus (SAIC)



Overview

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- Introduction to the GPS technical baseline configuration management (CM) process
- Review public technical baseline changes from past year
- 2019 Public Interface Control Working Group (PICWG)
- Preview of proposed GPS technical changes
- Closing – How to submit GPS technical baseline concerns?



GPS CM Process Overview

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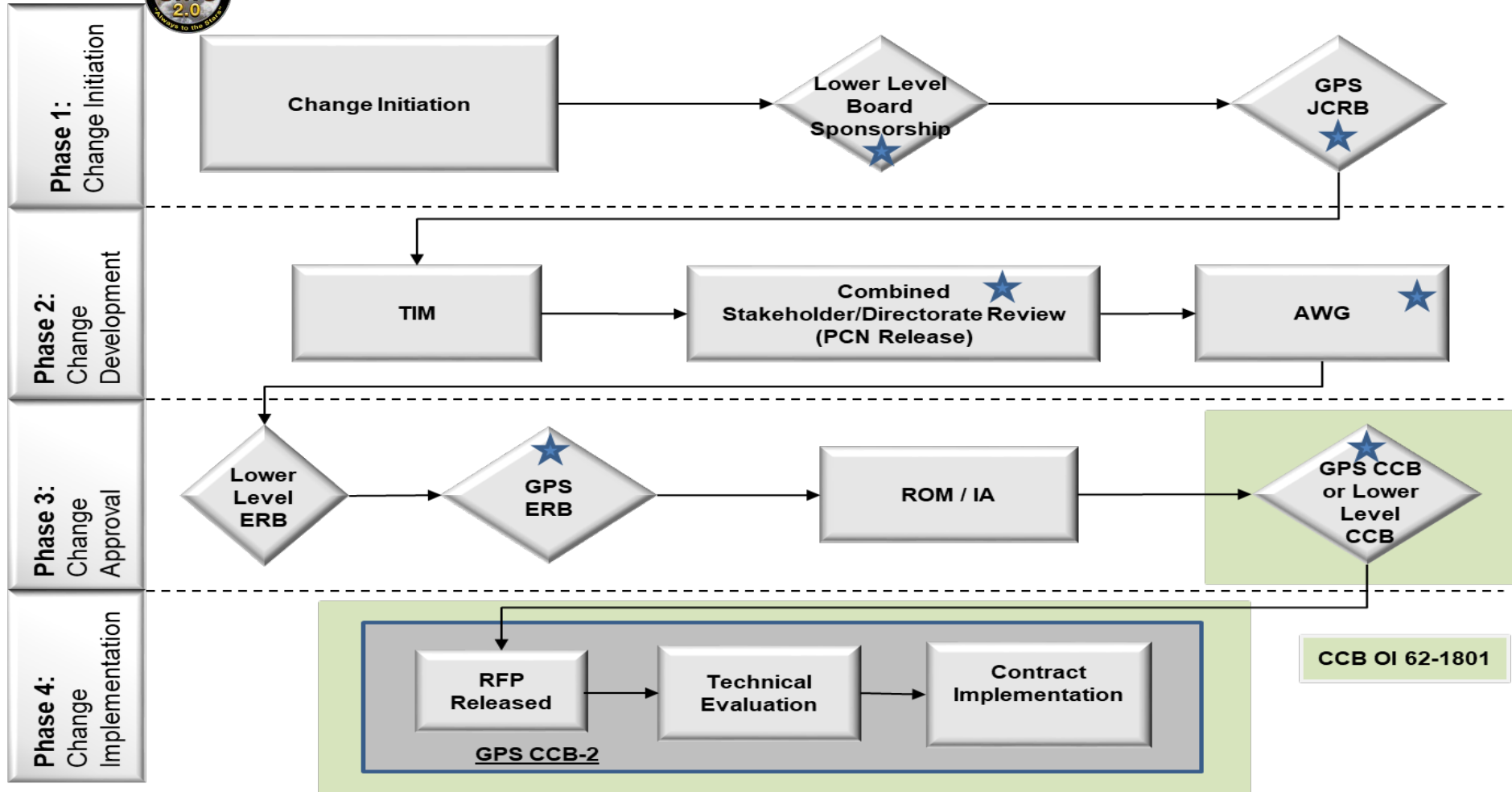
- Three SPO Process Documents – Provide guidance to carry out disciplined CM
 - Technical Baseline Configuration Management Process (TBCMP) Plan, 3 May 2019
 - Change Control Board (CCB) Operation Instruction, 3 May 2019
 - Adjudication Working Group (AWG) & Rough Order of Magnitude Charter, 3 May 2019
- Purpose of PICWG & Public Forum – Open to Everyone
 - Inform worldwide users on GPS public document changes and revisions (involving interface specification(s) and interface control document(s))
 - Collect issues and comments for analysis, adjudication and possible integration into future document revisions levied onto GPS Programs of Record
 - Brief public stakeholders on special topics that involve the GPS Technical Baseline
- GPS Public Technical Baseline Documents
 - **IS-GPS-200:** Navigation User Interfaces
 - **IS-GPS-705:** User Segment L5 Interfaces
 - **IS-GPS-800:** User Segment L1C Interface
 - **ICD-GPS-240:** (Legacy) GPS Control Segment to User Support Community Interfaces
 - **ICD-GPS-870:** Next Gen GPS Control Segment to User Support Community Interfaces



GPS CM Process Overview

(High Level Flow Chart)

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Unclassified

JCRB – Joint Change Review Board
 TIM – Technical Interchange Meeting
 PCN – Public Change Notice

AWG – Adjudication Working Group
 ERB – Engineering Review Board
 ROM – Rough Order of Magnitude

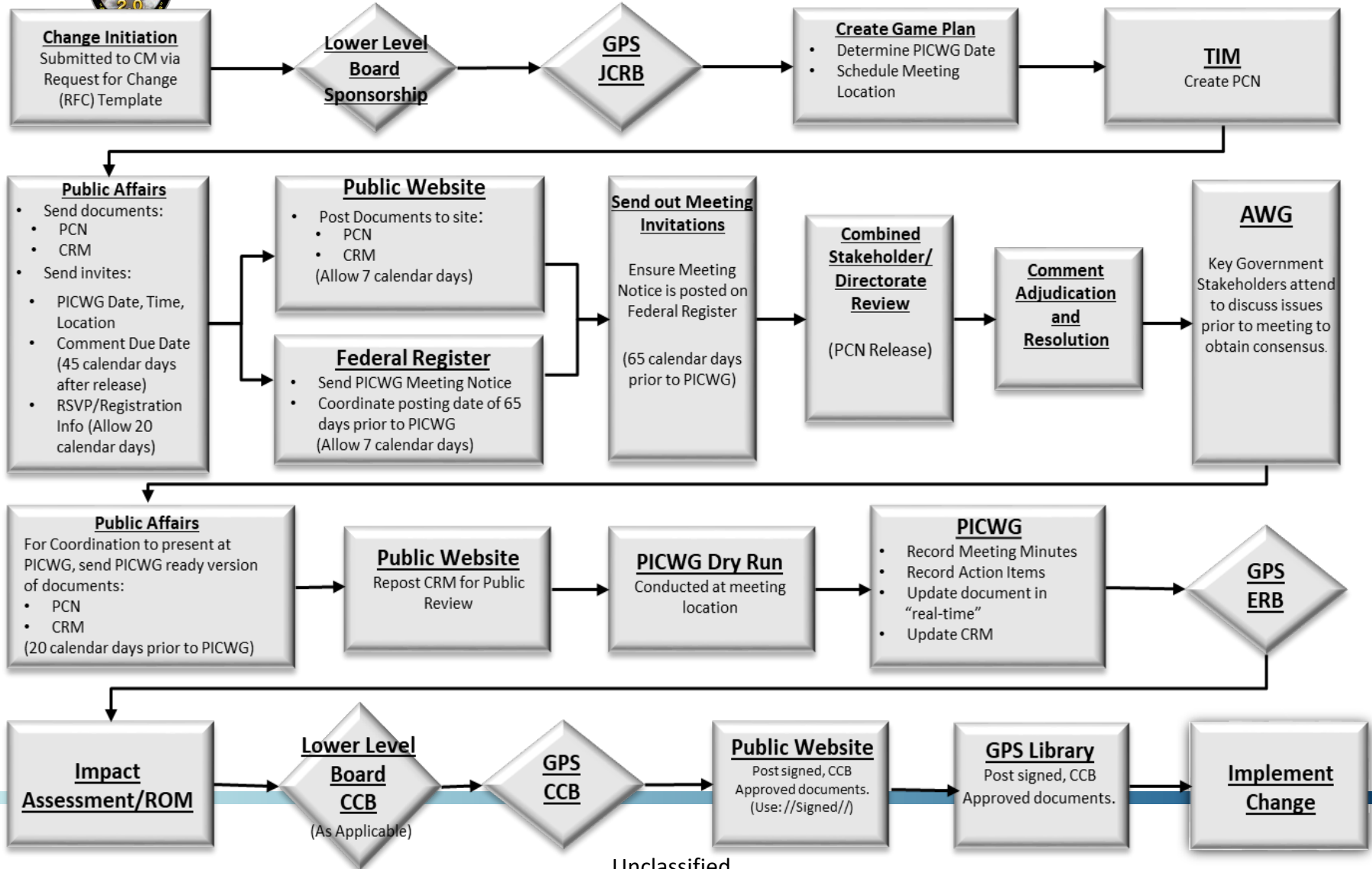
IA – Impact Assessment
 CCB – Configuration Control Board
 RFP – Request for Proposal



GPS CM Process Overview

(Public Change Flow Chart)

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RFC-374 Status

(2018 Public Document Cleanup Changes)

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Problem Statement:

The following 2 topics were deferred from the 2017 Public ICWG and inserted into the 2018 cycle:

- *The Operational Advisories (OAs) that were published and archived contain plane/slot descriptions that are not in the constellation definition provided to the public in the SPS Performance Standard as well as the data provided by the National Geospatial-Intelligence Agency (NGA) (refer to <http://earth-info.nga.mil/GandG/sathtml/satinfo.html>).*
- *The OA did not have the capability to correctly publish information regarding fore/aft position since moving to the 24+3 constellation with three expanded slots. In addition, the Points of Contact of the public GPS Products were not represented in a way that allows for efficient updates. This is a continuation of RFC-351, which was CCB-approved on 8-Jan-2018.*

Additionally, the subject change resolved 3 document clean-up related areas:

- a) Signal-in-space topics needed clarification, as identified by the public in past Public ICWGs. Documents affected: IS-GPS-200, IS-GPS-705, and IS-GPS-800.*
- b) There were some administrative errors found during the UpRev process of the public documents.*
- c) Contractor signatories no longer required for government-controlled documents.*



RFC-374 Status – Cont'd

(2018 Public Document Cleanup Changes)

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Proposed Solution:

1. Modify the OA as agreed to in ICD-GPS-240 and ICD-GPS-870.
2. a) Provide clarity for the list of signal-in-space topics identified by the public. b) Clean up identified administrative changes in all public documents. c) Remove required contractor signatories from government-controlled documents.

Impacted Documents:

IS-GPS-200, IS-GPS-705, IS-GPS-800, ICD-GPS-240, ICD-GPS-870

- The RFC is officially closed out and CCB Approved
- Final Approved Revisions have been posted for Public Access on GPS.gov - <https://www.gps.gov/technical/icwg/>



RFC-400 Status

(Leap Second & Earth Orientation Parameter)

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Problem Statement:

As currently documented in the technical baseline for Earth Orientation Parameters (EOP) data and applications, CNAV/CNAV-2 users will calculate the wrong UT1 time immediately following a leap second change, as the linkage between Coordinated Universal Time (UTC) and UT1 time is not properly captured.

This issue affects user applications that require high precision pointing, which may include optical telescopes, spacecraft, or any system with this requirement. Documents affected: IS-GPS-200, IS-GPS-705, IS-GPS-800. The topic was originally a part of RFC-354 & RFC-374.

Proposed Solution:

Re-define the EOPs such that UT1 is calculated with respect to GPS time instead of UTC time. Therefore, since GPS time does not utilize leap seconds, there is no leap second problem for users when they calculate UT1.

Note: Previous courses of action (COAs) have been considered during RFC-354 and RFC-374.

Impacted Documents:

IS-GPS-200, IS-GPS-705, IS-GPS-800



RFC-400 Status – Cont'd

(Leap Second & Earth Orientation Parameter)

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- Virtual PICWG held May 7, 2019
 - Materials:
<https://www.gps.gov/technical/icwg/meetings/2019/05/>
- ERB Approved on 10 July
- Final Approved Revisions will be posted on GPS.gov following CCB & SMC Public Affairs approval



2019 Public Interface Control Working Group (PICWG)

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Wednesday, 25 September 2019: 0830-1600 PST

SAIC, 100 N Sepulveda Blvd., El Segundo, CA 90245

“The Great Room” Conference Room (Lobby)

- Dial In: 310-653-2663
- Meeting ID: 20190925; Password: 123456
- <https://conference.apps.mil/webconf/gpspublicmeeting>
- Please send registration information to SMCGPER@us.af.mil, providing your name, organization, telephone number, email address, and country of citizenship – **Submit by Sept 18th**
- Public stakeholder comments on proposed changes **due Sept 6th** to above workflow email utilizing Comment Resolution Matrix (CRM)



RFC-395 Preview

(2019 Public Document Changes)

Problem Statement:

1. IS-GPS-705 identifies dual frequency users as “L1/L2” and “L1/L5 (recommended)”. Users may interpret frequency pair (L2/L5) as a viable dual frequency; that is not recommended.
2. The user implementation community has identified equations in the Elements of Coordinates Systems tables in documents IS-GPS-200, IS-GPS-705, and IS-GPS-800 that can benefit from an improvement.
3. Documents IS-GPS-200, IS-GPS-705, and IS-GPS 800 are not consistent in their definition of when to broadcast CNAV UTC data. These documents need to be made consistent.
4. ICD-GPS-870 Appendices 1-6, public release GPS products, were derived and developed from ICD-GPS-240 (AEP) to account for OCX transition. Currently OCX uses a translator tool to convert modernized into legacy format to maintain backwards compatibility that AEP produces. Appendices 1-6 must reflect the backwards compatibility format until the public users are well-informed of availability of the modernized format (GPS community).
5. OCX provides a utility to convert modernized GPS products to the legacy, AEP-formatted GPS products. The legacy formats are characterized with default filenames, which are important for the public user community to interpret and process the GPS products. However, these default filenames are not described in ICD-GPS-870.
6. Public documents need clarification and clean-up, as identified in past Public ICWGs and as newly-identified changes of administrative nature.
7. Currently the Operational Advisories (OAs) that are published and archived contain plane/slot descriptions that are not in the constellation definition provided to the public in the SPS Performance Standard as well as the data provided by the National Geospatial-Intelligence Agency (NGA) (refer to <http://earthinfo.nga.mil/GandG/sathtml/satinfo.html>). The OA does not have the capability to correctly publish information regarding fore/aft position since moving to the 24+3 constellation with three expanded slots. (Moved from RFC374)



Proposed Solution:

1. In IS-GPS-705, state operational use of the group of signals (L2/L5) is at the users own risk.
2. Recommend a different, less complicated kinematic formulation that improves the equations in the Elements of Coordinate Systems tables in the Signal in Space (SiS) documents.
3. Ensure consistency across documentation of when to broadcast CNAV UTC data in documents IS-GPS-200, IS-GPS-705, and IS-GPS 800.
4. Clarify ICD-GPS-870 Appendix 1-6 are legacy and update definitions in Appendices 1-6 read as built (eg. Appendix 1 describes the legacy NANU types and NANU message format. The sample file in this section is consistent with the legacy format. Sample file for the modernized format will be provided by the GPS community).
5. Add in ICD-GPS-870 a description of default filenames for all legacy GPS products.
6. Provide clarity and clean up identified administrative changes in all public documents.
7. This topic was originally addressed in RFC-374 but needs to be re-addressed in order to update ICD-GPS-870 such that OCX produces an OA with section one set to the original data or set to "RESERVED."

Impacted Documents:

IS-GPS-200, IS-GPS-705, IS-GPS-800, ICD-GPS-870



RFC-403 Preview

(Space Vehicle Health Bit Clarification)

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Problem Statement:

The CNAV & CNAV-2 health summary bits for L1, L2, and L5 are not clearly defined and can be interpreted in multiple ways.

Documents affected: IS-GPS-200, IS-GPS-705, IS-GPS-800 and ICD-GPS-870.

Proposed Solution:

Clarify the definition of the health summary bits. In addition, establish precedence for health indicators that eliminates ambiguity. May require a fix to message types.

Impacted Documents:

IS-GPS-200, IS-GPS-705, IS-GPS-800, ICD-GPS-870



Summary

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- Worldwide GPS public stakeholders may submit technical baseline concerns to the POCs below or SMC GPS Requirements Workflow using a Comment Resolution Matrix (CRM) form (see backup references):
 - Mr. Daniel Godwin, daniel.godwin.5@us.af.mil
 - Lt Benjamin Ratner, benjamin.ratner.1@us.af.mil
 - GPS Requirements Section Workflow, SMCGPER@us.af.mil
- Please RSVP to 2019 PICWG by COB tomorrow, 18 Sept
- Questions/comments?



References

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2019 PICWG Meeting Materials:

<http://www.gps.gov/technical/icwg/meetings/2019/09/>

Current Document Versions:

<https://www.gps.gov/technical/icwg/#meetings>



CRM Template

Federal Register Notice:

<https://www.federalregister.gov/documents/2019/06/21/2019-13177/2019-public-interface-control-working-group-for-the-navstar-gps-public-documents>

GPS Technical Baseline Configuration Management (TBCMP) Process Documents:

<https://www.gps.gov/technical/icwg/>