IS-GPS-200, IS-GPS-705, IS-GPS-800 ICWG MEETING MINUTES

Minutes Date: 10-Mar-2010

Minutes By: Gopal/Abayon

Meeting Date: 10-Mar-2010

Meeting Time: 0800 - 0930

Location: Teleconference

Chairs: Capt Neal Roach, USAF
Vimal Gopal, SE&I

Discussions:

Introductions:
- ICC started by polling line. Capt Roach then started the meeting.

IS-GPS-705:
- The ICC started with the change made to section 20.3.3.3.1.2.1 where group delay differential was replaced with inter-signal biases. Bud Bakeman asked what this exactly meant. Karl Kovach explained that it is not a group delay differential since group delay is a term reserved for frequencies. He stated that the word bias was more appropriate.
- Figure 20-1: This figure was updated to include the L2C phasing information. Chris Hegarty mentioned that the associated text describing this figure should also be updated. The ICC took an action to update this as well as the associated text in IS-GPS-200.

IS-GPS-800:
- 3.2.1.7.1: ICC went over the change associated with removing the phrase "and C/A" from the original proposal in response a comment from the space IPT. ICC also went over the parenthetical examples of code pairs described in the requirement. Chris Hegarty agreed to the change, however, noted that it would be inconvenient for users to calculate the relationship between L1C and C/A because they would have to go through P(Y) to do this.
- 3.5.3.9.1: The same change that was done to IS-GPS-705 was presented here with respect to group delay differential and inter-signal biases. Chris Hegarty questioned the industry definition of group delay differential. Karl Kovach mentioned to Chris Hegarty that he had IEEE definitions that he could send to Chris if needed. Mike Munoz asked whether it would be helpful to include the word *time* to clarify the type of bias. Karl Kovach mentioned that the time is implied by context.
- 3.2.1.8.3: ICC explained to the group that Soon Yi requested that the ICWG proposed language be rejected and instead requested that a TBD be placed for this section instead. A brief discussion took place on where these parameters would potentially be placed. Chris Hegarty mentioned that he would contact Larry Young to submit a comment against this section. Purvis Naick also requested to see this comment.

IS-GPS-200:
- There were several administrative changes; however, the focus of this presentation was on the substantive and critical changes.

- 30.3.3.3.1.1.1: ICC went over the same change that was done to IS-GPS-705 and IS-GPS-800 with respect to the change from group delay differential to inter-signal biases.
- Figure 30-8 & Table 30-XI: This change was not on the website, so the ICC read it aloud. The change involved reverting Table 30-XI back to its original CCB'ed language and updating Figure 30-8 to match this table. The ICC also mentioned that all subscripts have been standardized throughout the documents.
- Figure 30-1: Boeing submitted a comment to update this figure to include the new L2C phasing bit.
- 3.3.1.2: Boeing submitted a comment to leave the 0.6 dB value for block IIF and prior SVs and have the 0.3 dB value apply only to GPS III SVs.
- Carrier Phase Noise:
- The ICC focused the discussion on IS-GPS-800, since this is where the controversy of this requirement is centered. The issue is the re-introduction of a TBR into the document as a result of the reversion. Two requirement options are described.
- Chris Hegarty mentioned that the bottom requirement contained the term "Jaffe-Rechtin" PLL which is sensitive below 10 Hz. This would imply that Lockheed Martin would have to validate this requirement by testing below 10 Hz. However, Lockheed Martin has stated that they require additional funding to secure test equipment sensitive enough to test below 10 Hz. Chris believed that reverting the language back to the original spec would not obviate the need to test below 10 Hz and therefore the reversion is pointless.
- Lockheed Martin stated that they meet the bottom requirement without the need to secure additional test equipment. GPC requested a TIM to discuss how they plan to do this.
- The ICC recommended that the documents continue with the change process while resolving this issue in parallel. Karl Kovach asked GPC whether they would fund the additional cost required for testing down to 1 Hz since the L1C signal is a civil signal. Mr. Nagle responded by saying that this would be the case for new requirements, but if left as a TBR, they would need prompt resolution.
- Lockheed Martin preferred to not have any TBRs in the documents as they are already in the CDR phase of their program. However, GPC preferred to keep the TBR so that the issue would be flagged and tracked in the future. A brief recess was ordered by Capt Roach.
- At the end of the recess, Capt Roach announced that the way forward would be to revert to the original language and keep the TBR with the understanding that a plan would be developed to work and eliminate the TBR for the next revision. Tom Nagle requested this decision be documented. Capt Roach said he would meet with Mr. Nagle today to discuss this. The discussion on carrier phase noise concluded.

Conclusions:
- A question was asked on whether the language reversion for carrier phase noise would be applied to other docs. The ICC answered the reversion has already been made to the other documents and that the TBR was only an issue for IS-GPS-800.
- Capt Roach mentioned that there would be a different website to post documents for better visibility and streamlined access for review.
- Chris Hegarty said he would write up a carrier phase noise issue email for Tom Nagle.
- Bud Bakeman mentioned he has submitted Correlation Loss language to be included in the next revision.
- Capt Roach thanked everyone for their participation and re-iterated that minutes were taken and would be distributed after PA review. The meeting ended at 0932.

Supporting Materials:

❑ IS-GPS-200_10Mar2010.docx	❑ IS-GPS-705_10Mar2010.docx
❑ IS-GPS-200_CRM_WAS-IS_10Mar2010.docx	❑ IS-GPS-800_10Mar2010.docx
❑ IS-GPS-705_CRM_WAS-IS_10Mar2010.docx	❑
❑ IS-GPS-800_CRM_WAS-IS_10Mar2010.docx	❑

Attendees:

Name	Company / Organization
Munoz, Michael	GPSW/SE&I
Lagatree, Robert	GPSW/SE&I
Bakeman, Bud	GPSW/GPSG
Holmes, Jack	Aerospace/ETG
Nagle, Tom	GPSW/GPC
Naick, Purvis	GPSW/GPC
Kovach, Karl	Aerospace
Brown, Steven	Lockheed Martin
Kawakami, Todd	GPSW/GPD
Schmitt, Terry	Rockwell Collins
Peetz, Bruce	Trimble
Jelmeland, Tom	Boeing
Hegarty, Chris	MITRE

Action Items from this ICWG:

IS-GPS-200:

No.	Due Date	Actionee	Item	Resolution
1	10-Mar-10	Vimal Gopal	Add descriptive text to Section 30 to compliment the change to Figure 30-8.	Complete
2	10-Mar-10	Vimal Gopal	Setup a TIM to go over Correlation Loss requirement. Include GPSW/GPC, Lockheed Martin, GPSW/GPSG, EN, SE&I	Open

IS-GPS-705:

No.	Due Date	Actionee	Item	Resolution
1	10-Mar-10	Vimal Gopal	Add descriptive text to Section 30 to compliment the change to Figure 20-1.	Complete

IS-GPS-800:
None.

Action Items from last ICWG:

IS-GPS-200:

No	Due Date	Actionee	Item	Resolution
1	01-Jul-08	Thomas Davis	1) Replace "unauthorized user" with SPS/PPS or similar wording (from comment #4)	Completed. Updated in the document

2	02-Jul-08	Thomas Davis	2) Section 6.3.5.3, verify number of code pairs in table 6-11	Complete. updated in the document
3	Next ICWG	Karl Kovach	3) Align 200 to the results of the NPEF	Open
4	Next ICWG	Karl Kovach	4) Karl Kovach to present results of constellation expansion working group at next ICWG	Completed.
5	15-Jun-08	Mike Deelo	5) Correlate number of bits for t_{0GGTO} within figure 30-8 and table 30-XI	Completed by V. Gopal
6	31-Jan-09	Mike Munoz	Coordinate with stakeholders possible solutions for redundant requirements throughout the 3 Public SIS docs.	Closed. Karl Kovach has provided a document that highlights all common requirements. GPSW is currently looking into ways to publicly release this document.
7	31-Jan-09	Karl Kovach Bruce Peetz	Review and provide new language for phase relationship before and after year 2020 for L2C. (comment 74)	Complete. New language incorporated into document. See phase relationship section.
8	31-Jan-09	Karl Kovach	Provide new language for how almanac data will be reported for the rest of the GPS PRNs defined in Section 6.3.5. (comment 91)	Complete. Methodology is explained in constellation expansion PPIRN.
9	31-Jan-09	Mike Deelo	Have the Correlation Loss/Phase noise WG discuss group delay issues/concerns (comment 83)	Completed. Changes incorporated into document.
10	05-Dec-08	Thomas Davis	Identify all inappropriate instances of "NAV" and replace with "navigation." (comment 69)	Closed.
11	31-Jan-09	Thomas Davis	Review older PIRNs for how they indicated a unique draft version number or date of a particular redline version	Closed. OBE.
12	31-Jan-09	Tom Stansell Karl Kovach Capt Hariharan	Research need for adding L2C PRN assignment for PRN 64-158	Closed. This issue will be OBE after Karl Kovach's PPIRN on constellation expansion (AI #8)

13	31-Jan-09	Mike Munoz	Verify P code sequence is correctly defined	Open
14	25-Feb-10	Vimal Gopal	Update IS-GPS-705 and IS-GPS-800 with updated Signal Coherence language. And revert Carrier Phase Noise back to original requirement. Present at next ICWG.	Complete
15	25-Feb-10	Vimal Gopal	Add parenthetical example for signal coherence language.	Complete
16	25-Feb-10	Vimal Gopal	Update Space Service Volume Group Delay Differential with a TBD.	Complete

IS-GPS-705:

No	Due Date	Actionee	Item	Resolution
1	08-Oct-09	Bud Bakeman	Look at the table in section 3.3.1.2. Review whether the numbers should be switched between the 30.69MHz and the 20.46 MHz	Closed. This AI was resolved during the 1-oct-09 ICWG review
2	07-Oct-09	Steve Brown	Lockheed Martin has taken action to review all Correlation Loss changes for all three documents.	Closed. It may be a non-issue for the respective bands, however, Lockheed Martin needs to review their assumptions and come back on Wednesday. ICC has provided Lockheed Martin the verbiage to the Corr. Loss section of all three SIS doc's (200, 800, 705). Lockheed Martin has responded to those sections under review on 6-oct-09. They have provided their assumptions to meet the Corr Loss spec's in each document.
3	08-Oct-09	John Buckley	Update the section 20.3.3.2.4(SV clock accuracy estimates) of IS-705 and insert the IS-GPS-800 language from its respective section.	Closed. ICC has updated document to reflect the correct sections in the document.
6	08-Oct-09	John Buckley	Apply the def. of L5CNAV shown in 3.2.1 for consistency in the entire document.	Open. Since there is a large number of NAV references in the document, this action will be deferred until the next revision. A new comment will be placed into the CRM. See comment #178 of the 705 CRM.
7	02-Oct-09	John Buckley	send the new language of the correlation loss sections for all three documents to Lockheed Martin.	Closed. This action was completed and Lockheed Martin has provided their response. Their assumptions are under review,

8	08-Oct-09	John Buckley	update the definitions of GPS Blks in section 6.2.2.	Open. Since these changes will need to be ICWG approved, this action will be deferred until the next revision. A comment in the 200 CRM (see comment #165) is tracking this as well.
9	Next ICWG	Rich/AJ	1) Set up a working group to evaluate 10 ns to 1ns change in signal coherence, evaluate the symmetry requirements	Closed. Decided that it would not be changed per the 14 Nov 08 TIM. 5-Oct-09: this AI was resolved and can be closed under the Correlation Loss Tiger Team resolution. Additional to their proposal, the proposed verbiage was under review at the last 1-oct-09 ICWG and the final verbiage was agreed upon by the stakeholders.
10	01-Jul-08	Munoz	2) Confirm the formulas that need to be changed, reference CRM from GPSW/GPC comment #20	Closed. Reassigned to Chris Hegarty for discussion at 19 Nov 09 ICWG. Updates to be provided at the next ICWG. 5-oct-09: The comment associated with this AI has been withdrawn (from 1-oct-09 ICWG), thus this AI is closed.
11	01-Jul-08	Munoz	3) Comment # 21 and 23, need to verify formulas that need to be changed, parenthesis,	Closed. Reassigned to Chris Hegarty for discussion at 19 Nov 09 ICWG. Updates to be provided at the next ICWG. 5-oct-09: ICC has confirmed both comments 21 and 23 have been accepted and implemented into documentation, thus this AI is closed.
12	Next ICWG	Kovach/AJ	4) Resolve issues with IODE and IODC	Open. Completed for CNAV-2. Need to make the same changes for CNAV. 5-oct-09: This AI is also evident in the IS-200 document. Comment #88 from the 200 CRM will resolve this concern. This comment 88, however, has been deferred until the next revision. AI remains open.
13	31-Jan-09	GPC	Provide more rationale for the removal of the Boeing letter of exception	Open. 5-oct-09: This is currently under review with PC/PK folks. ICC just needs to get clarification from PK regarding the path forward. This, however, may be an issue with the fact that Block IIF SVs are undergoing FCA/PCA. This comment will remain open.

IS-GPS-800:

No	Due date	Actionee	Item	Resolution
1	07-Oct-09	Ben Kogus	Create a table in section 3.2.1.5 (correlation loss) to be consistent with the IS-200.	Comment OBE. Subsequent ICWG discussions revealed that a table was unnecessary since the IS-GPS-800 only pertains to the 30.69 MHz bandwidth.
2	07-Oct-09	Ben Kogus	3.2.1.7.1: finalize in the paragraph callout in this section (x.x.x.x) there is another section with the same concern.	Closed.
3	30-Sep-09	Bill Notley	NASA must come back with a response to Lockheed Martin's study of why they need 1.5 ns max group delay uncertainty.	Closed. GPC concurs with the 1.5ns (Bill Notley and Purvis Naick discussed with NASA on the telephone during the ICWG and decided to override their non-concur).
4	01-Oct-09	C. Hegarty	Provide an analysis on the carrier phase noise and determine whether the more relaxed mask is appropriate. A comparative analysis will ensue for the verbiage from yesterday vs. today.	Closed. Chris Hegarty presented at ICWG day 3 session and ICWG members agreed upon verbiage for Carrier Phase Noise section.
5	01-Jul-08	Mike Deelo	3.2.1.7: Look at wording in IS GPS 200 and see if it clarifies the req. spec. for L1CP & L1CD, signal coherence.	Closed. No additional clarity from 200. Wording is essentially the same; slight difference in wording adds nothing.
6	30-May-08	Mike Deelo	3.2.1.5: Ensure CRM comment 126 and document changes are the same.	Proposed resolution to be presented by Bakeman at ICWG. Closed with ICWG approval of new language. Closed. At ICWG on 29 Sep 09 - 01 Oct 09, Chris Hegarty, AJ VD and others agreed that the proposed language by Bud Bakeman's working group added confusion to the requirement and all agreed (not including Bud) to keep the original language.
7	01-Jul-08	Soon Yi	3.2.1.5: Set up meeting w/ Aero & Mitre to review current correlation loss for verifiability.	Action completed pending approval of new language. Proposed resolution to be presented by Bakeman at ICWG. Closed. At ICWG on 29

				Sep 09 - 01 Oct 09, Chris Hegarty, AJ VD and others agreed that the proposed language by Bud Bakeman's working group added confusion to the requirement and all agreed (not including Bud) to keep the original language.
8	Barring results of #6	Mike Deelo	3.2.1.3: To harmonize phase noise spec. across all signals in space documents.	Closed with closure of action 6.
9	Barring results of #6	Soon Yi	3.2.1.3: Provide analysis to show how the phase lock loop requirements and phase noise mask are related.	Closed with closure of action 6.
10	01-Aug-08	Mike Deelo	3.2.1.3: Set up working group to discuss and resolve re-wording of carrier phase noise language.	Proposed resolution to be presented by Bakeman at ICWG. Closed with ICWG approval of new language. Closed. Compromise reached between Lockheed Martin, Bud Bakeman, and Chris Hegarty on updated language for carrier phase noise.
11	01-Jul-08	Soon Yi/Mike Deelo	3.2.1.8.1: Look at IIF/IIRM data and analyze to see if 1 nanosecond is sufficient, justify the need for 1 nanosecond.	Closed. Lockheed Martin stated it could not meet 1 ns reqt, spec changed to 1.5 ns with GPC concurrence despite NASA disagreeing with the change.
12	Barring results of # 7	Mike Deelo	3.2.1.8.1, 3.2.1.8.2: Add GPS III req. of 1 nanosecond to legacy interface documents (200 & 705)	Not going to be done, impacts legacy systems as per TIM on 13 Nov 08. 11/18: Requires further discussion Closed. Lockheed Martin stated it could not meet 1 ns reqt, spec changed to 1.5 ns with GPC concurrence despite Nasa disagreeing with the change.
13	01-Jul-08	Soon Yi	3.2.1.9: Text added by Space IPT needs review by Aerospace and Mitre	Closed. Aerospace and Mitre reviewed during ICWG review cycle 29 Sept 09. Language updated to properly reflect signal combining.

14	Next ICWG	Thomas Davis/AJ	Setup a meeting to ensure ICD wording is consistent in all docs & add applicable requirements from 800 to 705 and 200, clearly identify which requirements apply to each block, including symmetry requirements.	Ongoing effort. Part of DOORS conversion.
15	Next ICWG	Thomas Davis	Evaluate removal of PRN code assignments from 800, 200, & 705 documents.	Reject. Evaluated removal of PRN codes, but decided against it because the Wing wants to control PRNs that are not even used by GPS, and there are not better documents available to do so.
16	15-Jun-08	Thomas Davis	Renumber paragraphs because of duplicate paragraph #s	Completed
17	01-Aug-08	Mike Munoz	Create a working group to discuss the integrity status flag further.	Separate working group not needed, PSICA took lead on documenting integrity CONOPS. Closed. Integrity language incorporated.
18	31-Jan-09	Mike Deelo	Form WG to discuss Correlation Loss language (CRM comment 139; 3.2.1.5 Correlation Loss)	Closed. WG created, language discussed at ICWG, ICWG members decided existing language was sufficient.
19	05-Dec-08	Thomas Davis / Bud Bakeman	Include new Phase Noise Language in ICWG minutes (CRM comment 138; 3.2.1.3 Carrier Phase Noise)	12/16/08: Wording still in work and will not be included in minutes. Will be brought to next ICWG15., Closed. Updated phase noise language agreed to in 29 Sept 09 ICWG.
20	31-Jan-09	Mike Munoz	Provide language for PRN sequences to be incorporated in all three public documents (CRM comment 226; 6.3.1).	Comment deferred. To be addressed after DOORS conversion.
21	31-Jan-09	Mike Munoz	Determine language for off-axis power gain (antenna gain vs. EIRP) (CRM comment 223; 3.2.1.9)	Closed. Updated language incorporated.
22	1/31/2009 (need input from PSICA WG - AI #19)	Thomas Davis	Move Integrity Status Flag information to appropriate section (potentially 3.5.3.5) (CRM comment 196; 3.5.3.5)	Closed. Created section 3.5.3.10 - Integrity Assurance.

23	05-Dec-08	Karl Kovach	Coordinate Integrity Status Flag information with PSICA WG (CRM comment 196; 3.5.3.5)	Closed. Language in 3.5.3.10 is from PSICA WG.
24	31-Jan-09	Tom Stansell / Lockheed Martin	Follow up on phase options for fixed phase requirement. Lockheed Martin to provide language on implementation of phase relation. (CRM comment 148; 3.2.1.6)	Closed. Updated language incorporated.
25	31-Jan-09	GPC	Follow up on comment on specifying power at receiver antennas (space user) (CRM comment 248; 3.2.1.9)	Closed. Updated language incorporated.
26	31-Jan-09	GPC / Mike Munoz	Determine appropriate location of PR equations and parameters (SSV group delay bias and values) (CRM comment 246; 3.5.3.9.3)	Open. Currently a TBD in the IS-GPS-800.
27	05-Dec-08	Thomas Davis / Steve Brown	Remove equations and SSV information from IS-GPS-800 and provide reference/pointer to TBD location. Steve Brown to verify removal. (CRM comment 246; 3.5.3.9.3)	Closed. Reference statement (add to 3.2.1.8.3 - keep first sentence): "The details are provided in TBD." Delete remainder of this section. Partial changes made in real time during ICWG for reference/pointer statement.
28	31-Jan-09	GPC	Provide more rationale for proposed change to chip transition of two modulating signals (CRM comment 231; 3.2.1.7.1)	Closed. Updated rationale provided by originator and captured in CRM.
29	31-Jan-09	Karl Kovach and Chris Hegarty	Determine appropriate location for ISCs for L1C/A, L2C, L5I5, and L5Q5. (CRM comment 191; Figure 3.5-1)	Closed. Incorporated Chris Hegarty's recommended locations.
30	31-Jan-09	Mike Munoz	Create table similar to IS-GPS-200 Table 30-XII (CRM comment 188; 3.2.3.1)	Open. Comment deferred until next revision.
31	05-Dec-08	GPC	Follow up and provide clarification or withdraw comment on Figure 3.2-2 (CRM comment 183)	Closed. Clarifications added for S1 Polynomial Tables and Figures. GPC concurs.
32	31-Jan-09	PSICA WG	Spec should provide a value for the duration that the clock parameters from a previous data set will remain valid after the transmission of a new data set. (Comment 192, 3.5.3)	Closed. Added further clarification to requirement stating that parameters remain applicable, but their accuracy degrades over time.
33	31-Jan-09	PSICA WG	Clarify how the overall URA should be computed from the individual clock and ephemeris and whether the URA terms account for errors in the inter-signal group delay differential corrections. (Comments 199 & 200, 3.5.3.8)	Closed. Added clarifications in section 3.5.3.8 on clock URA considerations. Also added clarifications in section 3.5.3.10 defining URA as the RSS of URAoc and

				URAoe.
34	31-Jan-09	PSICA WG	Determine if UDRA and UDRA-dot are to be integrity assured (Comment 205, 3.5.4.4.4)	Closed. Responded to originator that UDRA and UDRA-dot are not integrity assured. Also, added a definition of UDRA. PSICA WG and ICWG members did not feel like it was necessary to directly state that UDRA and UDRA-dot are not integrity assured in the spec.
35	31-Jan-09	PSICA WG	Provide clarification on how the overall URA should be computed from the individual clock and ephemeris URAs	Closed. See comment 29.
36	31-Jan-09	PSICA WG	Make clear whether the URA terms account for errors in the inter-signal group delay differential corrections	Closed. See comment 29.
37	31-Jan-09	PSICA WG	Determine a value for the duration that the clock parameters from a previous data set will remain valid after the transmission of a new data set.	Closed. See comment 28.

Next Scheduled Meeting:

TBD.