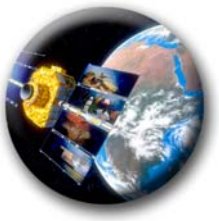

IS-GPS-200 ICWG
MEETING MINUTES

Minutes Date: 05-Oct-2009

Minutes By: Gopal/Kogus/Buckley

Meeting Date: 29-Sep-2009

Meeting Time: 0800 - 1800

Location: Los Angeles Airport Doubletree Hotel

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

Discussions:

At this ICWG, the ICC went page-by-page through the last CCB'ed version of the document. All changes in the document that were made after the last ICWG were reviewed. The following is a list of the sections that were reviewed as well as any discussions that took place and any changes that were made to the document as a result.

- Section 3.3.1.1
  - Mike Dash recommended taking out the Block IIA/IIR/etc distinctions since every block is mentioned. This change was not implemented after Steven Brown's recommendation to remove the Block III designation from the first sentence (Block III is not spec'ed for 20.46 MHz bandwidth). There were some additional discussions on how to word this paragraph, however, the final decision was to simply remove "III" from the first sentence.
- Section 3.3.1.4
  - Chris Hegarty mentioned that the existing wording was not clear. Therefore, the language was modified to say "at or below" instead of "at least". Subsequent sentences were updated accordingly.
- Section 3.3.1.5.1
  - AJ Van Dierendonck and Ann Cignar recommended removing the 2nd paragraph because it contained a reference to language section 6.3 that decreased confidence of the user community adopting L2C.
  - Ann Cignar recommended language to reference the federal register announcement on GPS phase relationships. This item was deferred for further discussion after Karl Kovach's presentation on phase relationships.
  - Later in the meeting, Karl Kovach presented a Preliminary PIRN that contained language that described the federal register announcement relating to GPS phase relationships. However, this language went through coordination by the Pentagon and alternative language was developed using a reference to IOC.
    - Ann Cignar mentioned that the reference (in Section 3.3.1.5) to this alternative reduced the user community's confidence to adopt the L2C signal and therefore recommended we change the reference from Section 6.3.8 to Section 3.3.1.5.3 (Phase Continuity). This was the final implementation.

- 3.3.1.5.3

- Steven Brown felt that the existing language was unclear and could be interpreted in such a way that the LM SV design could violate it.
- An action was taken by LM to provide alternative language. On 30-Sept-09, LM provided alternative language that was agreed to by the ICWG. This language ruled out intentional phase discontinuities, however, it excluded discontinuities caused by signal modulation.

- Section 3.3.1.6
  - Chen-Shu Chiu felt that the 2nd sentence in the paragraph referencing combining loss was unclear. The sentence was then changed to accommodate his concern. Specifically, we inserted language to tell the user that any signal combining techniques used would be transparent to the user. This language was agreed to by the ICWG.
  - Chris Hegarty initially questioned the "off-axis relative power" phrase. However, after seeing the phrase "referenced to peak transmitted power", he felt the sentence was appropriate.
- Table 3-Va
  - It was discussed whether it would be appropriate to mention that the bandwidths indicating should be over a 24 MHz bandwidth. The final decision was to spec it over a 20.46 MHz bandwidth. LM took an action to verify whether the numbers in the table would still work over this new bandwidth. On 30-Sep-09, LM came back and confirmed that the numbers in the table still work over 20.46 MHz.
  - Mike Dash recommended that UE vendors should review this table to ensure that legacy receivers would not be impacted.
- Table 3-Vc
  - Clarified table by adding "over 99.5% of the solid angle…" to match language in SS-SS-800. ICWG members concurred on changes to the table.
- Section 3.3.1.6.1
  - Changes were made to this section and it's associated table on 30-Sept-09. See meeting minutes for this date (IS-GPS-800_09302009_ICWG_minutes.doc).
  - Added "i.e. 0 dB axial ratio"
  - Modified table to include a note to clarify SSV power levels
- Section 3.3.1.7.1
  - Changed from two sigma probability to 95% probability for a several reasons (ICWG community preferred LM to take more data points, 95% probability is more "direct" that saying "two sigma", etc).
- Section 3.3.1.7.2
  - GPC questioned why we removed the word "random". They felt it was removed to justify the SVN-49 anomaly. The word "random" was not removed due to the SVN-49 anomaly. The word "random" was removed becausethe variations were not necessarily all random. To be clearer, GPC recommended including the word "random", but also mention "non-random" variations. This implementation was agreed to by the ICWG.
  - Also, the probability was changed to 95% probability from (two sigma). This change was made by the ICWG because the variations are random and non-random.
- Section 3.3.1.8
  - Changed the probability to 95% to be consistent with the rest of 3.3.1.
  - Karl Kovach recommended adding an additional sentence similar to section 3.3.1.7.2 to include corrections for the bias components.
- Section 3.3.1.2
  - The original language submitted by the Correlation Loss/Phase Carrier Noise WG was reviewed by the ICWG. A discussion between Bud Bakeman, Chris Hegarty and AJ Van Dierendonck took place. Alternative language was agreed to and real-time changes were made to the document.
  - On Thursday, while reviewing correlation loss language in IS-GPS-705, the ICWG decided to modify the language further. It was decided that there would be no need to have two columns to describe the correlation loss for two test receivers (24.0 MHz & 30.69 MHz) and that we could just collapse the columns in the table into one column for the receiver being described in the text of the paragraph.
- Section 3.3.1.3

- The paragraph was presented at the ICWG. LM noted that this paragraph did not fit their technical baseline. We changed the last parameter from -90 dBc/Hz at 10 kHz to -80 dBc/Hz at 1 kHz. On Thursday, we revisited this topic and changed the -80 dBc/Hz at 1 kHz to -80 dBc/Hz and 10 kHz. We also clarified the last sentence.

- Section 3.3.1.6
  - Bob Chiu and others felt the words "combining loss" were confusing and recommended removing the words.
  - Chris Hegarty helped develop alternative language "Any combining operation…transparent to user segment" that was accepted by the ICWG members.
- Section 6
  - Several administrative actions were assigned to Vimal Gopal to maintain clarity and consistency of the section with the rest of the document (and the other SIS interfaces). See Action Items below for details.
- Section 20.3.2
  - Mike Dash asked why we are describing SV memory in this document. A comment was added to the CRM to track this issue. The issue will be resolved in the next revision.
- Section 20.3.3.1
  - The 2nd paragraph (which was proposed addition) was discussed and it was determined that the paragraph was not appropriate since it was redundant with the 3rd paragraph and therefore was rejected.
  - Tom Jelmeland from Boeing commented that he does not think Bit 23 of each TLM can be guaranteed to be either "0" or "1" in the AEP software. Steve Brown from LM responded that for the LM satellites this does not matter since the SVs control the bit 23 assignments that the user sees. An action was assigned to Boeing to study the integrity impacts for IIF SVs.
- Section 20.3.3.3.1.3
  - Added the following sentences:
    - Integrity properties of the URA are specified with respect to the upper bound values of the URA index (see 20.3.3.1). URA accounts for signal-in-space contributions to user range error that include, but are not limited to, the following: the net effect of clock parameter and code phase error in the transmitted signal for single-frequency L1C/A or single-frequency L2C users who correct the code phase as described in Section 30.3.3.3.1.1.1, as well as the net effect of clock parameter, code phase, and intersignal correction error for dual-frequency L1/L2 and L1/L5 users who correct for group delay and ionospheric effects as described in Section 30.3.3.3.1.1.2.
    - The above sentences were added to address a comment by Rhonda Slattery (comment #254).
- Section 20.3.3.5.1.4
  - Mike Dash submitted a comment requesting codes 101-111 be designated with SV configuration. ICWG reviewed the recommendation and concurred.
- Section 30.3.3
  - Mike Dash recommended removing the statement ", and the SV should be used at user's own risk". It was removed real-time during the ICWG.
- Section 30.3.3.1.1
  - Mike Dash recommended adding verbiage about "enhanced" level of assurance.
- Section 30.3.3.1.1.4
  - The following sentence was added to the end: "Integrity properties of the URA are specified with respect to the upper bound values of the URA index (see 20.3.3.1)."
- Section 30.3.3.2.4
  - The following paragraph was inserted into the section:
    - Clock-related URA (URAoc) accounts for signal-in-space contributions to user range error that include, but are not limited to, the following: the net effect of clock parameter and code phase error in the transmitted signal for single-frequency L1C/A or single-frequency L2C users who correct the code phase as described in Section 30.3.3.3.1.1.1, as well as the net effect of clock parameter, code phase, and intersignal correction error for

dual-frequency L1/L2 and L1/L5 users who correct for group delay and ionospheric effects as described in Section 30.3.3.3.1.1.2.
    - Rationale: Inserted to address comment #254 of the CRM
- Also added to the end:
    - Integrity properties of the URA are specified with respect to the upper bound values of the URA index (see 20.3.3.1).
    - Rationale: This was added to address a concern from GPC on what value should be used when using URA as an integrity parameter

Supporting Materials:

❑ IS-GPS-200_CRM_Post_29SeptICWG.xls	❑
❑ IS-GPS-200_Post_29SeptICWG.doc	❑
❑ IS-GPS-200_WAS-IS_Post_29SeptICWG.xls	❑
❑	❑

Attendees:

Name	Company / Organization
Abayon, Annabelle	GPSW/SE&I
Alba, Jose	SNL
Brown, Steven	LM GPS III
Buckley, John	GPS/SE&I
Chiu, Chen-shu	Aerospace
Ciganer, Ann	Trimble/USGIC
Dash, Michael	Arinc
Dobyne, John	Arinc/GPC
Frey, Chuck	LM Space
Getto, Luke	ITT SSD
Grundman, Ron	GPS III SE&I
Hegarty, Chris	MITRE

Name	Company / Organization
Hietzke, Wolf	SAIC/SE&I
Holmes, Jack K.	Aerospace
Ingham-Hill, Lilly	Sandia
Jeffris, Mike	MITRE
Jelmeland, Tom	Boeing
Kascak, Matt	GPS SE&I
Kovach, Karl	Aerospace
Lake, James	GPSW/SE&I
Liegeois, Rick	L-3 Interstate Electronic Corp.
Meares, Walter	SAIC/SE&I
Mullikin, Tom	Raytheon/OCX
Munoz, Mike	GPSW/SE&I
Nagle, Tom	GPC
Naick, Purvis	GPSW, GPC
Notley, William	GPSW, GPC
O'Laughlin, Daniel	MITRE
Ortiz, Humberto	SAIC/SE&I
Ortiz, Jorge	ITT CS

Name	Company / Organization
Phillips, Sarah	LM (NG OCX)
Ranney, Scott	LM Space
Renfro, Brent	ARL: Univ of Texas
Riley, Sturart	Trimble/USGIC
Saathoff, Jason	GPSW/SE&I
Tucker, Jack	GPSW/GPV (SAIC)
Van Dierendonck, AJ	AJ Systems/FAA/NASA
Vasquez, Sam	GPSW/SE&I
Wu, Shawkang	GPSW/SE&I
Yucis, Mike	ITT SSD

Action Items from this ICWG (Sep 09):

No.	Due Date	Actionee	Item	Resolution
1	29-Sept-09	Vimal Gopal	3.3.1.5 Signal Component Phasing Add in language from Federal Register that Karl Kovach has drafted. Review in ICWG sidebar conversation.	Closed. Trimble non-concured with 6.3.6 language.
2	06-Oct-09	Steven Brown	3.3.1.5.3 Phase Continuity. While a satellite is broadcasting standard C/A, standard P(Y), or standard L2C code signals with data which indicates C/A, P(Y), or L2C signal health is OK, there shall be no	Closed. LM provided new

No.	Due Date	Actionee	Item	Resolution
			intentional discontinuities in the respective C/A, P(Y), or L2C carrier phase LM opposes language. LM to provide updated verbiage. GPSW to send out with meeting minutes.	language which was agreed to by the ICWG.
3	29-Sept-09	Steven Brown	3.3.1.2 Correlation Loss. 3.3.1.6 User-Received Signal Levels. (Table 3-Va) Review that power levels calculated for 24.0 MHz are OK for 20.46 MHz	Closed. LM accepts power levels over the 20.46 MHz bandwidth.
4	06-Oct-09	Vimal Gopal	Clarify history of semantics in definition sections for change from "authorized vs unauthorized" to "SPS vs PPS"	Closed. In the first instances where SPS and PPS users are mentioned in the document, added (authorized) and (unauthorized), respectively.
5	06-Oct-09	Vimal Gopal	6.2.2 User Range Accuracy. User Range Accuracy (URA) is a statistical indicator of the GPS ranging accuracy obtainable with a specific signal and SV. Whether the integrity status flag is 'off' or 'on', 4.42 times URA bounds instantaneous URE under all	Closed. Updated section appropriately.

No.	Due Date	Actionee	Item	Resolution
			conditions with 1 -1e-5 per hour probability. When the integrity status flag is 'on', 5.73 times URA bounds instantaneous URE under all conditions with 1-1e-8 per hour probability. Update URA definition to speak to "upper bound" to be consistent with section 20 of the document.	
6	06-Oct-09	Vimal Gopal	6.2.2.1 Integrity Assured URA. When the integrity assurance monitoring is available, as indicated by a the “integrity status flag” being set, the URA value is chosen such that the probability of the “actual” URE exceeding a threshold is met (see section 3.5.3.10 for probability values). The URA value is conveyed to the user in the form of a URA index values. The URA index represents a range of values; for integrity assurance applications, it is prudent to use the RSS of the largest URA index values in the URA index range. Update integrity assured defintion and remove "prudent" and update "section 3.5.3.10"	Closed. The definition of "integrity assured URA" refers the reader to section 3.5.3.10 which states that the "upper bound" should be used.
7	06-Oct-09	Karl Kovach	Create PRN Expansion proposed language to send out with meeting minutes.	Closed. Karl to provided language to ICC which will reviewed by the ICWG community for the next

No.	Due Date	Actionee	Item	Resolution
				ICWG.
8	06-Oct-09	Vimal Gopal	Develop plan to incorporate PRN changes by Jan CCB.	Closed. Plan developed. PPIRN will be reviewed by ICWG community. Any issues will be worked out via a meeting. Final wording will be incorporated into document.
9	06-Oct-09	Vimal Gopal	Email out preliminary PIRN on Signal Phasing/Phase Continuity to audience	Closed. All changes will be emailed out to audience along with meeting minutes.
10	06-Oct-09	Vimal Gopal	Look into deleting first 4 sentences of section 20.3.2 Message Structure. Make sure reqts are covered in all generations of Space Segement specs. If keeping it in, please add "IIF" to the first sentence.	Closed. This item is being tracked as several deferred items in the CRM. Will remove these sentences in the next revision.

No.	Due Date	Actionee	Item	Resolution
11	06-Oct-09	Tom J.	Check if IIF and IIA SVs always set TLM bit 23 to "0". Learned from LM (Steve Brown) that IIR, IIR-M it is always set to "0".	Closed. In an email sent to Capt Roach and Vimal Gopal, Boeing has stated that for IIF and IIA SVs, the TLM bit 23 is not set to 0 always and is set randomly.
12	06-Oct-09	Vimal Gopal	Carry over section 20 changes to section and ensure LNAV and CNAV consistency and clarity upheld. Add in "enhanced" level of integrity assurance. Add in similar language in section 20 to section 30.3.3.1.1.4 (SV Accuracy) for the URA Index values.	Closed. Done in real time at the ICWG.

Action Items from last ICWG (Nov 08):

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	Open.
6	31-Jan-09	Mike Munoz	Coordinate with stakeholders possible solutions for redundant requirements throughout the 3 Public SIS docs.	Open.
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 on how almanac data will be reported for the rest of the GPS PRNs defined in Section 6.3.5. (comment 91)	Open. To be resolved 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

Next Scheduled Meeting:

The next ICWG is scheduled for November 10th, 2009 from 0800 to 1600. We will ONLY be discussing the Preliminary PIRN (PPIRN) on constellation expansion. Please click the link below for this PPIRN:

2009-07-02 PPIRN
for 200 for PRN 38-6

This ICWG will be a telecon. Dial-in information is as follows:

Phone: 1-800-FON-SAIC
Code: 4511074

There are limited number of lines that will be available on a first-come-first-serve basis. Participants are encouraged to share lines if possible. Please send any comments or further questions to:

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