SPACE-BASED POSITIONING
NAVIGATION & TIMING
NATIONAL ADVISORY BOARD

National Space-Based Positioning, Navigation, and Timing Advisory Board

Intersession Meeting 21A

August 6, 2018

Call to Order

J.J. Miller

- The National Space-Based Positioning, Navigation, and Timing (PNT) Advisory Board was established per presidential policy to provide independent advice and council on technical and policy matters of national and international importance

- PNT Board members are nominated by member agencies of the PNT Executive Committee (EXCOM), and appointment by the NASA Administrator after rigorous review. They serve as Special Government Employees (SGEs) or Representatives.

- Deliberations are governed by the Federal Advisory Committee Act (FACA). As a FACA body, the PNT Board is bound by ethical standards intended to avoid any potential conflicts of interest.

- Any member who perceives a potential conflict with a particular issue must recuse themselves from the discussion, with the recusal noted for the record

- PNT Board meeting minutes will be posted, along with all presentations, at the PNT National Coordination Office (NCO) website (www.gps.gov)

- Today's meeting is the implementation of an action at the 21st PNT Advisory Board session, where the 1st Vice Chair called for an interim half-day public WebEx meeting to:
  - Finalize and Approve the National Space-Based PNT Advisory Board Topics Paper
  - Finalize and Approve the National Space-Based PNT Advisory Board Memorandum on Spectrum Issues

Outline – Agenda for PNTAB Intersession Meeting 21A

12:00-12:10 PM (10 mins)	MEETING OPENS *Call to Order & Administrative Notes*	Mr. James J. Miller, *Executive Director, PNT Advisory Board, NASA Headquarters*
12:10-12:25 PM (15 mins)	Welcome Comments & Meeting Objectives *PNT Board Focus & Priorities*	Hon John Stenbit, *Chair, PNT Advisory Board*
12:25-1:55 PM (90 mins)	PNT Board Working Group / Subcommittee Reports to Chair on PNT Topic Papers *Deliverable 1: Topic/Issue Paper to PNT EXCOM*	PNTAB Working Group Leads
	Agriculture	Mr. Ron Hatch
	Aviation and Aerospace	Mr. Scott Burgett
	Critical Infrastructure and Timing	Adm Thad Allen
	Military	Lt Gen Larry James
	Policy and Governance	Mr. Dana Goward
	Science	Dr. Gerhard Beutler
	Spectrum	Dr. Sergio Camacho-Lara
	Transportation (Non-Aviation)	Mr. Russell Shields
1:55-2:10 PM (15 mins)	Opening Remarks for Spectrum Recommendations *Follow-Up from 21st PNT Board Meeting of May 16-17 – non-recused members*	Governor Jim Geringer, *2nd Vice-Chair*
2:10-3:40 PM (90 mins)	PNT Board Recommendations & Analysis of Impacts from Broadband Proposal(s) *Deliverable 2: PNT Board Memo(s) to PNT EXCOM*	Dr. Bradford Parkinson, *1st Vice-Chair*
3:40-4:00 PM (20 mins)	Afternoon Wrap-Up & Next Steps *Time permitting*	All Members
4:00	ADJOURNMENT	

Note: The end result of the WebEx/telecon will be, for the public record on GPS.gov, PNT Board Topic papers, GPS spectrum impact analysis charts, and resulting PNT Board memo to PNT EXCOM

Deliverables for this Meeting

1. *National Space-Based PNT Advisory Board Topics Paper to PNT EXCOM*

2. *National Space-Based PNT Advisory Board Memorandum on Spectrum to PNT EXCOM*

Topics Paper – Agriculture – 1 of 2

Ms. Ciganer, Mr. Hatch

- Overview and Use
  - Precision control of farm vehicles has revolutionized agriculture
    - Automated steering allows:
      - Improved accuracy and operation at night, in dust, and in fog
    - Economic and environmental benefits include:
      - Precision application of water, seeds, nutrients and pesticides
      - Avoids overlap and unnecessary application
      - Estimated benefits at more than US$30 Billion annually
      - California alone estimated at over US$2 Billion annually
- Opportunities
  - Huge economic benefits in many special situations: A prime example is an Australian study of "Controlled Traffic Farming." – all farm vehicles follow the same paths limiting soil compaction where the plants are grown:
    - 68% increase in farm gross margin
    - 67% decrease in farm labor costs
    - 90% reduction in soil erosion
    - 93% reduction in nitrogen loss through soil runoff
    - 52% reduction in carbon dioxide emissions and associated diesel use
    - 45% reduction in repair and maintenance costs

Topics Paper – Agriculture – 2 of 2

Ms. Ciganer, Mr. Hatch

- Threats
  - High precision applications require wide bandwidths and very sensitive receivers to achieve the inch level accuracy needed for many applications
    - Marginal environments: High precision needed even when partial blockage of signals such as caused by foliage along tree lined boundaries
    - Example of use: Injection of fertilizer directly over seeds
  - Precision agriculture applications often require repeatability which depends upon reliable reception of Global Positioning System (GPS) signals
  - High precision, sensitive GPS receivers are vulnerable to strong signals in the nearby spectrum environment.
- Recommended Actions
  - The huge economic benefits to agriculture of high precision GPS needs to be carefully protected
  - High precision requires the use of the entire spectrum bandwidth available to GPS receivers
  - The GPS spectrum must be protected from any changes that would affect reliable reception of GPS signals for high precision uses such as agriculture

Topics Paper - Aviation & Aerospace – 1 of 2

Dr. Axelrad, Capt Burns, Mr. Burgett, Mr. Murphy

- Overview and Use
  - GPS provides the essential/fundamental infrastructure for real-time navigation of all types of aircraft from drones to commercial and military aircraft
    - Augmented by space and ground based systems, GPS supports all phases of flight including taxi, takeoff, climb, cruise, descent, approach and landing in all weather conditions
  - Space missions, including human spaceflight and operational satellites, make widespread use of GPS for onboard positioning and timing
    - Commercial Low Earth Orbit (LEO) constellations for worldwide internet & weather, increase this reliance on GPS
    - Launch vehicles rely on GPS w/inertial and other sensors to support all mission phases
    - GPS measurements from orbiting satellites provide critical data for weather prediction, scientific analysis of global water distribution, and space weather
- Threats
  - Aviation and aerospace applications require aggressive protection of the GPS spectrum to ensure future use
  - The availability of systems to interfere with or deny GPS has dramatically increased over the last decade
  - Technologies are available for intentional jamming (blocking the GPS signal) and spoofing (providing false signals to GPS receivers)

Topics Paper - Aviation & Aerospace – 2 of 2

Dr. Axelrad, Capt Burns, Mr. Burgett, Mr. Murphy

- Recommended Actions
  - Continue to support the deployment and improvement of four signals for civil users. These four signals are designated: L1 C/A, L2C, L5 and L1C
  - Protect GPS spectrum for aviation users – especially operating in congested urban areas
  - Upgrade Interim Ground Segment to control GPS III satellites and enable monitoring of GPS Civil Signals—required to bridge between current Control Segment (OCS) and the modernized Control Segment (OCX)
  - Improve requirements/capabilities of aviation and space-borne receivers to enhance, among other things, Receiver Autonomous Integrity Monitoring (RAIM), as well as robustness to interference and spoofing
  - Establish process for approving usage of international Global Navigation Satellite System (GNSS) signals in the U.S.

Topics Paper - Critical Infrastructure and Timing

ADM Allen, Dr. Betz, Mr. Faga, Mr. Goward, Mr. Shields

- Overview and Use
  - GPS currently provides positioning, navigation, and timing for many sectors of critical infrastructure
  - GPS is a single point of failure
  - Many actions directed in NSPD-39 to address related issues have not yet been implemented
- Threats
  - Proposed repurposing of nearby spectrum threatens critical and high value uses of GPS
  - Jamming and spoofing of GPS receivers is a growing problem
- Opportunities
  - Emerging alternative capabilities for positioning, navigation, and timing
  - More competent and robust receivers
- Recommended Actions
  - Adopt spectrum regulations that protect current and future uses of GPS and GNSS
  - Implement nationwide capabilities for prompt and effective interference detection & mitigation
  - Encourage manufacturers to offer more competent and robust receivers and antennas, and owner/operators to field them
  - Encourage diversification of PNT sources; remove Federal Communications Commission (FCC) requirement for licensing use of foreign GNSS
  - Implement Enhanced Loran (eLoran) as a backup for GPS timing in the continental United States, subject to verification of cost and performance. Further, agencies should be strongly encouraged to continue development of other capabilities.

Topics Paper - Military

Dr. Betz, Lt Gen James, Mr. McGurn

- Overview and Use
  - GPS utilization permeates virtually every aspect of military operations
  - Must provide assured PNT capability in a multitude of contested environments
- Threats
  - Variety of threats exist to deny/disrupt GPS access for military operations
    - Jamming and spoofing of receivers, attacks on ground segment and satellites
- Opportunities
  - New Space Segment, Ground Segment and User Segment capabilities address these threats
    - GPS block III and IIIF satellites, M-Code with increased power, Military GPS User Equipment (MGUE) Increment 2
- Recommended Actions
  - Support GPS III and IIIF Procurement
  - Conduct military exercises in challenging PNT environments
  - Upgrade GPS Ground Segment
  - Rapidly develop MGUE Increment 2
  - Demonstrate the utility of backup/augmentation with international GNSS signals
  - Accelerate deployment of anti-jam technology on military platforms

Topics Paper - Policy and Governance – 1 of 2

ADM Allen, Mr. Faga, Mr. Goward, Mr. P. Marquez, Mr. McGurn

- Overview
  - Challenges persist regarding the use of signals from multiple GNSS
  - Uses of space-based PNT services have grown far beyond the scope of what existed when the current policy and governance
  - In the last 14 years unanswered policy questions and a rapidly evolving technology environment have resulted in many NSPD-39 mandates being unexecuted
  - A more coherent governance structure must be implemented to ensure current and future mandates are met

- Threats / Critical Unresolved GPS/PNT Issues
  - Monitoring Performance of GPS Civil Signal – Efforts to establish a monitoring regime to ensure we meet our commitments have, to date, been poorly supported and funded, especially as it relates to the civil user segment where capabilities exist but are not resourced or integrated in national monitoring framework
  - Interference Detection and Mitigation – The board knows of no systematic government efforts to either detect interference with GPS signals or to mitigate their effects
  - International Data Sharing –Since GPS is both a civil and a military system, how information sharing requests should be adjudicated has remained an open question. The PNT governance structure is dispersed functionally and the various roles of agencies and departments lack integration.

Topics Paper - Policy and Governance – 2 of 2

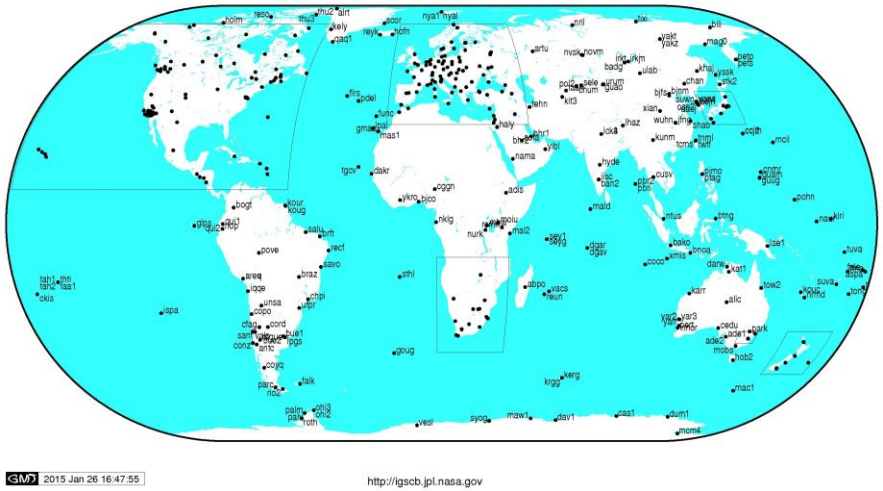
ADM Allen, Mr. Faga, Mr. Goward, Mr. P. Marquez, Mr. McGurn

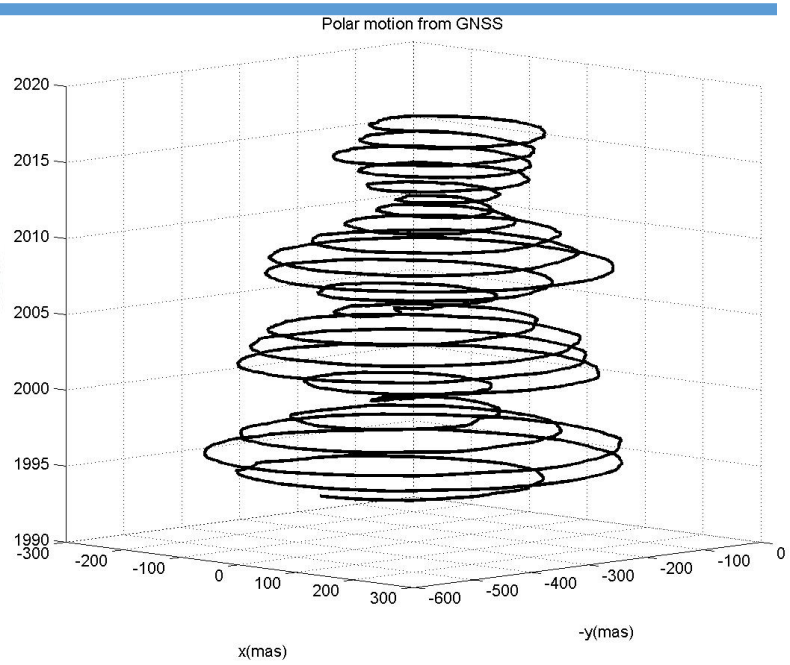
- Threats / Critical Unresolved GPS/PNT issues (cont.)
  - Complementary and Backup System – Senior Government officials have twice announced plans to meet this NSPD-39 mandate, once in 2008 and again in 2015. No action has been taken.
  - Spectrum Protection –The FCC's expertise with radio-communications, and its lack of expertise in radio-navigation continues to be a challenge for GPS stakeholders. Comprehensive and coherent governance may require legislation to update foundational laws and regulations. The FCC has responded to some chronic interference incidents, but has extremely limited capability and capacity.
  - Use of Multiple GNSS Constellations within the United States – Cell phone and satellite navigation receiver manufacturers have incorporated non-U.S. GNSS within their equipment. Yet FCC rules require any non-federal receiver in the U.S. using non-U.S. signals to be licensed. None of the millions of receivers in the U.S. have yet been licensed.

- Recommended Actions
  - Civil users in the U.S. should be allowed to legally access without an individual license and use non-U.S. GNSS signals
  - The Administration should consider revisions to current policy guidance and an integrated governance framework that addresses current fragmentation of resources and accountability

Topics Paper - Science – 1 of 5

Dr. Beutler, Mr. Dimmen, Mr. Higgins, Dr. Camacho-Lara





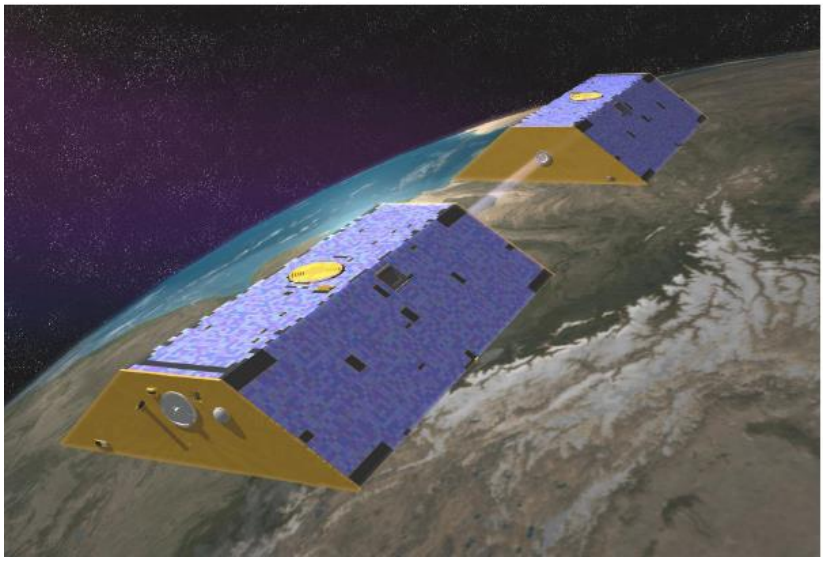
Top: IGS tracking Network,

Right: Polar Motion in milliarcseconds

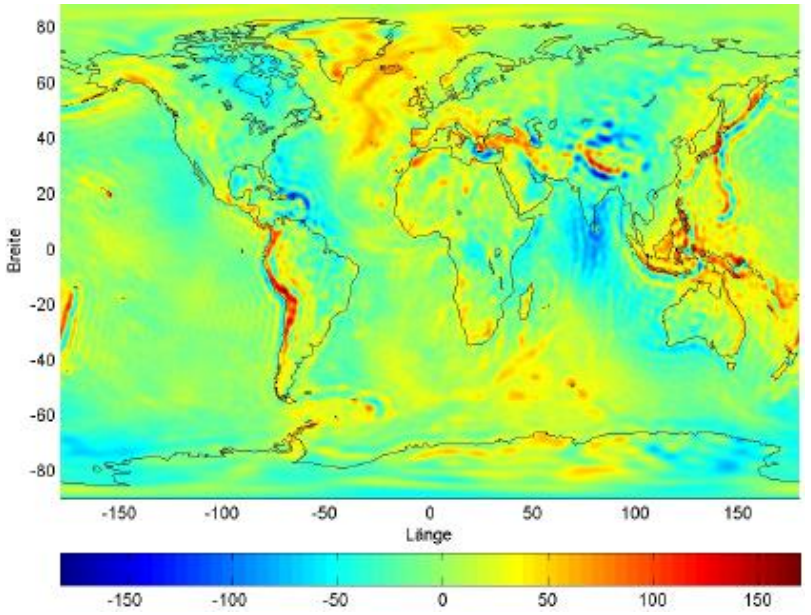
- Overview and Use
  - Today, GNSS are indispensable for Earth and atmosphere science
  - Global geophysical products include the International Terrestrial Reference Frame (ITRF), Earth Rotation Parameters (ERPs), ionosphere and troposphere models
  - Precise GNSS orbits and clock corrections are determined together with geophysical parameter

Topics Paper – Science – 2 of 5

Dr. Beutler, Mr. Dimmen, Mr. Higgins, Dr. Camacho-Lara



Gravity Recovery and Climate Experiment (GRACE) twin satellites

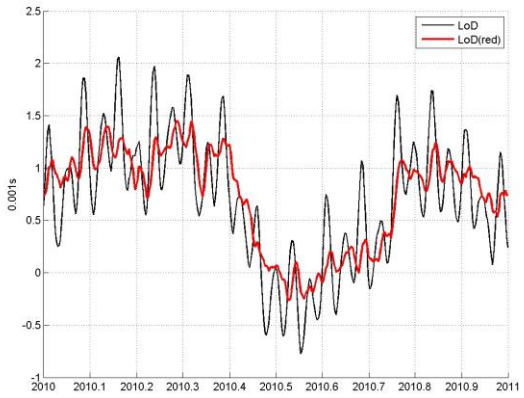


Gravity anomalies from GRACE orbits and inter-satellite distance measurements

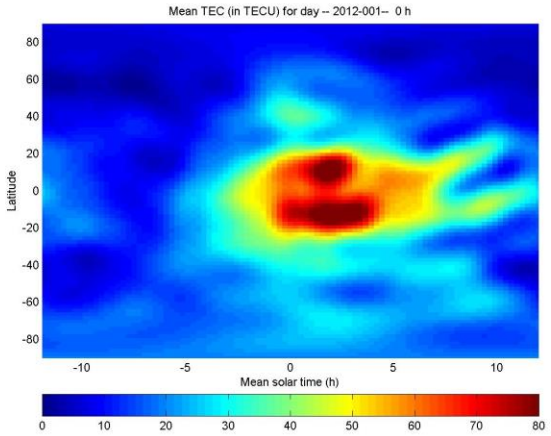
- Overview and Use (continued)
  - Today, Precise GNSS orbits and clock corrections are the backbone for precise orbit determination (POD) of most LEO satellites and, e.g., for gravity field determination
  - Precise GNSS orbits and clock corrections are also the basis for high-accuracy terrestrial navigation and positioning

Topics Paper – Science – 3 of 5

Dr. Beutler, Mr. Dimmen, Mr. Higgins, Dr. Camacho-Lara



Excess Length of Day measured by GNSS (black), tidal terms removed (red) in year 2010



Electron content on Jan. 1, 2012, 00h-01h

Threats

- GNSS sat&ops info are not openly available
- --> IGS white paper on satellite and operations information, (https://kb.igs.org/hc/en-us/articles/...)
- Laser retro-reflector arrays currently not deployed on all GNSS satellites, in particular currently on no active GPS satellite!
- While scientific GNSS receivers are the “Formula-I” GNSS user equipment, extracting “the last bit of information”, they are, like all precise positioning receivers, extremely vulnerable to interference
- The use of high-precision receivers expands rapidly into industrial and mass market applications, including safety-of-life applications like automated passenger vehicles. The dependency on improved orbits and clocks produced within the International GNSS Service (IGS) increases.

Topics Paper – Science – 4 of 5

Dr. Beutler, Mr. Dimmen, Mr. Higgins, Dr. Camacho-Lara

- Opportunities
  - Combined use of all available GNSS makes the science products more robust and, in general, more accurate
  - global change monitoring, including the detailed sea level monitoring over decades, depends to a great extent on precise multi-GNSS monitoring
  - High-accuracy GNSS monitoring based on all available systems is performed in the IGS
  - The IGS, a scientific service of the International Association of Geodesy (IAG), is based on a voluntary collaboration of more than 400 governmental and other organizations distributed all over the globe
  - High-accuracy GNSS applications are not only important for science. They are relevant for a much larger international community. Examples:
  - Virtually every first-order national survey is nowadays based on GNSS
  - GNSS are routinely used for time and frequency synchronization. They are also essential for the establishment and dissemination of Universal Coordinated Time (UTC), which is based on an ensemble of atomic clocks of the time labs.

Topics Paper – Science – 5 of 5

Dr. Beutler, Mr. Dimmen, Mr. Higgins, Dr. Camacho-Lara

- Recommended Actions from the point of view of science:
  - Remove bureaucratic obstacles hindering the use of all GNSS open services
  - Endorse all measures to mitigate or to avoid interference.
  - Equip all future GPS satellites with laser retro-reflector arrays to enable independent orbit validation
  - Provide open access to GPS satellite and operations characteristics for precise GPS orbit determination
  - Encourage all GNSS providers to provide the same open access
  - Endorse global monitoring and coordinating activities for scientific and other high-precision GNSS applications performed, e.g., by the IGS and the United Nations International Committee on GNSS (ICG), in particular in the area of multi-GNSS
- The latter four recommendations are specific for science and all highest-accuracy applications, the first two are more general

Topics Paper – Spectrum – 1 of 2

Mr. Brenner, Mr. Burgett, Dr. Camacho-Lara, Ms. Ciganer

- Overview and Use
  - GPS and other GNSS operate in spectrum allocated by the International Telecommunications Union (ITU) to RadioNavigation Satellite Services (RNSS)
- Threats
  - Access to radio frequencies free of harmful interference is crucial for reliable GPS/GNSS receiver performance. GPS/GNSS receivers operate below the ambient noise level.
  - Emissions (both in band and nearby bands) which raise the noise level in the RNSS spectrum can harm the functioning of GPS/GNSS receivers and constrain the development of new innovative applications

Topics Paper – Spectrum – 2 of 2

Mr. Brenner, Mr. Burgett, Dr. Camacho-Lara, Ms. Ciganer

- Recommended Actions
  - When setting national regulations, apply the ITU Radio Regulations and Recommendations to avoid introducing interference in the RNSS spectrum
  - Interference detection and mitigation infrastructure is needed to monitor the RNSS spectrum and ensure regulations are followed
  - Adopt and enforce policies to prohibit the manufacture, import, sale, and use of illegal jammers
  - Support the proposal at the ICG regarding the international general exchange of information related to GNSS spectrum protection and interference detection and mitigation
  - Coordinate with the National Space Council (NSpC) on GPS/GNSS spectrum issues as it will participate in ITU's next World Radiocommunications Conference (WRC) in November 2019

Topics Paper - Transportation (Non-Aviation) – 1 of 2

Mr. Dimmen, Dr. Rashad, Mr. Shields

- Overview and Use
  - Every sector of surface transportation depends on GPS or other GNSS
    - Uses include navigation, traffic information, transportation management, Vehicle-to-Vehicle (V2V) communications, automated driving, logistics, and many aspects of maritime transportation
  - The worldwide economic value of GPS in surface transportation is estimated to exceed US$25 billion per year
- Threats
  - GPS and other GNSS is in practice the only source of PNT data for many land vehicles and ships
    - It is a single point of failure
  - Signal interference, intentional or unintentional, threatens all GNSS
    - A conversion from satellite use to ground use of communications frequencies close to GPS would significantly degrade GPS in land vehicles
    - Spoofing and jamming are becoming real threats, especially as connected and automated vehicles are rolled out

Topics Paper - Transportation (Non-Aviation) – 2 of 2

Mr. Dimmen, Dr. Rashad, Mr. Shields

- Opportunities
  - Emerging alternative backup capabilities for PNT
  - More competent and robust receivers
- Recommended Actions
  - Keep spectrum for ground communication adequately distant from GPS spectrum
  - Adopt approaches to harden GPS devices to recognize jamming and spoofing and counteract them
  - Encourage GNSS manufacturers to offer more competent and robust receivers and antennas, and encourage product manufacturers to incorporate enhanced GNSS receivers in their products
  - Encourage diversification of PNT sources
    - Have the FCC stop the need for individual licensing to use foreign GNSS
  - Select and implement backup capabilities for GPS per NSPD-39

Recommendations to PNT Executive Committee – 1 of 2
Gov. Geringer

- At the 21st PNT Advisory Board the 1st Vice Chair called for an Advisory Board interim half-day public meeting with the following agenda:
  - Finalize and Approve the National Space-Based PNT Advisory Board Topics Paper
  - Finalize and Approve the National Space-Based PNT Advisory Board Memorandum on Spectrum Issues to the National Space-Based PNT
- Published in the Federal Register / Vol. 83, No. 142 / Tuesday, July 24, 2018 / Notices / page 35028

35028 Federal Register / Vol. 83, No. 142 / Tuesday, July 24, 2018 / Notices

raised by these comments, will make a recommendation to the Assistant Secretary for Occupational Safety and Health whether to grant MET's application for expansion of its scope of recognition. The Assistant Secretary will make the final decision on granting the application. In making this decision, the Assistant Secretary may undertake other proceedings prescribed in Appendix A to 29 CFR 1910.7.

OSHA will publish a public notice of its final decision in the **Federal Register**.

IV. Authority and Signature

Loren Sweatt, Deputy Assistant Secretary of Labor for Occupational Safety and Health, authorized the preparation of this notice. Accordingly, the Agency is issuing this notice pursuant to 29 U.S.C. 657(g)(2), Secretary of Labor's Order No. 1–2012 (77 FR 3912, Jan. 25, 2012), and 29 CFR 1910.7.

Signed at Washington, DC, on July 18, 2018.

Loren Sweatt,

Deputy Assistant Secretary of Labor for Occupational Safety and Health.

[FR Doc. 2018–15773 Filed 7–23–18; 8:45 am]

BILLING CODE 4510–26–P

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

[Notice (18–057)]

National Space-Based Positioning, Navigation, and Timing Advisory Board; Meeting

AGENCY: National Aeronautics and Space Administration (NASA).

ACTION: Notice of meeting.

SUMMARY: In accordance with the Federal Advisory Committee Act, as amended, and the President's 2004 U.S. Space-Based Positioning, Navigation, and Timing (PNT) Policy, the National Aeronautics and Space Administration (NASA) announces an intersession meeting of the National Space-Based Positioning, Navigation and Timing (PNT) Advisory Board. The meeting will be held via teleconference and WebEx.

DATES: Monday, August 6, 2018, 12:00 p.m. to 4:00 p.m., Eastern Time.

FOR FURTHER INFORMATION CONTACT: Mr. James J. Miller, Designated Federal Officer, Human Exploration and Operations Mission Directorate, NASA Headquarters, Washington, DC 20546, (202) 358–4417, fax (202) 358–4297, or *jj.miller@nasa.gov.*

SUPPLEMENTARY INFORMATION: This meeting will be open to the public telephonically and by WebEx. Any interested person may call the USA toll free conference call number at 1–844–467–4685 or the USA local toll number at 1–720–259–7012 passcode: 106724 to participate in this meeting by telephone. The WebEx link is *https://nasa.webex.com/*, meeting number is 995 034 805, password is uuU7bDX* (case sensitive). This meeting was agreed to at the 21st session of the National Space-Based PNT Advisory Board, held May 16–17, 2018, in Baltimore, Maryland. The public may follow the discussions by dial-in and/or the web link provided. The agenda includes the following topics:

- Finalize and Approve the National Space-Based PNT Advisory Board Topics Paper
- Finalize and Approve the National Space-Based PNT Advisory Board Memorandum on Spectrum Issues to the National Space-Based PNT Executive Committee

Carol J. Hamilton,

Acting Advisory Committee Management Officer, National Aeronautics and Space Administration.

[FR Doc. 2018–15753 Filed 7–23–18; 8:45 am]

BILLING CODE 7510–13–P

NATIONAL CREDIT UNION ADMINISTRATION

Agency Information Collection Activities: Proposed Collection; Comment Request

AGENCY: National Credit Union Administration (NCUA).

ACTION: Notice and request for comment.

SUMMARY: The National Credit Union Administration (NCUA), as part of a continuing effort to reduce paperwork and respondent burden, invites the general public and other federal agencies to take this opportunity to comment on the following extensions of a currently approved information collections, as required by the Paperwork Reduction Act of 1995.

DATES: Written comments should be received on or before September 24, 2018 to be assured consideration.

ADDRESSES: Send comments regarding the burden estimates, or any other aspect of the information collection, including suggestions for reducing the burden to Dawn Wolfgang, National Credit Union Administration, 1775 Duke Street, Suite 5080, Alexandria, Virginia 22314; Fax No. 703–519–8572; or Email at *PRAComments@NCUA.gov.*

FOR FURTHER INFORMATION CONTACT: Requests for additional information should be directed to the address above or telephone 703–548–2279.

SUPPLEMENTARY INFORMATION:

OMB Number: 3133–0117.

Type of Review: Revision of a currently approved collection.

Title: Designation of Low Income Status, 12 CFR 701.34(a).

Abstract: The Federal Credit Union Act (12 U.S.C. 1752(5)) authorizes the NCUA Board to define low-income members so that credit unions with a membership serving predominantly low-income members can benefit from certain statutory relief and receive assistance from the Community Development Revolving Loan Fund. To utilize this authority a credit union must receive a low-income designation from NCUA as defined in NCUA's regulations at 12 CFR 701.34. NCUA uses the information from credit unions to determine whether they meet the criteria for the low-income designation.

Affected Public: Private Sector: Not-for-profit institutions.

Estimated Number of Respondents: 252.

Estimated Number of Responses per Respondent: 1.

Estimated Total Annual Reponses: 252.

Estimated Burden Hours per Response: 1.20.

Estimated Total Annual Burden Hours: 303.

Reason for Change: The burden associated with the appeals process has been consolidate under 12 CFR 746–B and has been removed from this information collection.

OMB Number: 3133–0121.

Type of Review: Extension of a currently approved collection.

Title: Notice of Change of Officials and Senior Executive Officers.

Forms: NCUA Form 4063 and 4063a.

Abstract: In order to comply with statutory requirements, the agency must obtain sufficient information from new officials or senior executive officers of troubled or newly chartered credit unions to determine their fitness for the position. This is established by the Financial Institutions Reform, Recovery, and Enforcement Act of 1989 (FIRREA) (Pub. L. 101–73). The forms provide a standardize format to collect the information needed.

Affected Public: Private Sector: Not-for-profit institutions; Individual or Household.

Estimated Number of Respondents: 219.

Estimated Number of Responses per Respondent: Individual 1; Credit Union 1.21.

Estimated Total Annual Reponses: 483.

Recommendations to PNT Executive Committee – 2 of 2
Gov. Geringer

- Myths in the media that were dispelled at the 21st PNTAB meeting:

1. *"… the suggestion that Ligado's proposal would harm GPS is a complete fallacy"*
2. *"Five of the largest GPS manufacturers have said they are not opposed to Ligado's spectrum proposal"*
3. *"Garmin stated it doesn't anticipate any performance-degradation issues"*
4. *"This testing [NASTCN} was developed and executed by our nation's top scientists and engineers and shows that GPS devices of all kinds can co-exist with Ligado's services"*
5. *"Ligado is not planning to become a national telecommunications provider with 40,000 towers. Instead, the company has asked the FCC to use the spectrum for new, targeted networks that will help America's industrial sector take advantage of 5G and the internet of things"*
6. *"[the PNTAB] ignored volumes of data and thousands of hours of testing collected and analyzed in 2016 at government labs in Colorado"*
7. *"They [Ligado]have dramatically reduced operating power levels, relinquished spectrum to create a wide guard band for GPS, and coordinated with the industry to show that these technologies can readily coexist"*