



**Asia-Pacific  
Economic Cooperation**

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2015/TPTWG41/IEG-GIT/002

**Final Report -19<sup>th</sup> Global Navigation Satellite  
Systems Implementation Team (GIT/19) Meeting, 1-3  
April 2014, Christchurch, New Zealand**

Purpose: Information  
Submitted by: GIT Co-Chairs (United States, Chinese Taipei)



**APEC**  
PHILIPPINES  
2 0 1 5

**Global Navigation Satellite Systems  
Implementation Team Meeting  
Jeju, Korea  
27-28 May 2015**

**Final Report**  
**The 19<sup>th</sup> Meeting of the APEC GNSS Implementation Team (GIT/19)**  
**1-3 April 2014, Christchurch, New Zealand**

**1. GENERAL**

The 19<sup>th</sup> Meeting of the Asia Pacific Economic Cooperation (APEC) GNSS Implementation Team (GIT/19) was hosted by New Zealand from 1-3 April 2014 in conjunction with the 39<sup>th</sup> APEC Transportation Working Group (TPTWG) meeting.

Ten APEC Economies, namely China, Indonesia, Japan, Republic of Korea, Philippines, New Zealand, Russia, Chinese Taipei, Thailand, and the United States participated in GIT/19 meeting. Presentations covered GIT projects: Performance-Based Navigation Regulatory Review and Evaluation Program, Regional GNSS Receiver Autonomous Integrity Monitoring (RAIM) Prediction System. Presentations also included an update on the APEC GIT website, economy reports on GNSS implementation in APEC Economies, covering GNSS applications in air, maritime, land and rail transportation.

Updated information on GNSS constellations was provided with a report on GPS from the United States, GLONASS from Russia and Beidou from People's Republic of China which were well received by the GIT.

The working language during GIT/19 was English.

**2. OPENING OF THE APEC GIT/19**

New Zealand, as the Host Economy, provided welcoming remarks to all GIT members. New Zealand noted the importance of GNSS for all modes of transportation and in enhancing supply chain connectivity. The Host Economy also encouraged the GIT members to explore Christchurch and view recovery efforts demonstrating the resiliency of this region after the significant earthquake damage in 2010 and 2011.

Ms. Karen Van Dyke, U.S. Department of Transportation, Office of the Secretary for Research and Technology, Co-Chair, expressed a great appreciation from the GIT to Indonesia for hosting GIT/18. She expressed regrets from the APEC GIT Co-Chair, Mr. Noppadol Pringvanich, for not being able to attend the GIT/19 Meeting, and unfortunately not being able to continue to as the GIT co-chair.

**3. AGENDA ITEM 1: ADOPTION OF THE AGENDA**

The GIT Co-Chair drew attention of the GIT/19 to the draft agenda. A request for a GNSS '101' was added to the agenda. The agenda is attached as Appendix A to this report.

**4. AGENDA ITEM 2: SELECTION OF GIT Co-Chair**

The GIT unanimously selected Dr. Jaching Chou from Chinese Taipei to serve as co-chair of the GIT. Jaching Chou received his PhD from civil and environmental engineering, Utah State University, USA. He is a senior transportation analyst of Institute of Transportation, Ministry of Transportation and Communications, Chinese Taipei. He has conducted several GNSS applications in the areas of Intelligent Transportation Systems and Intermodal Transport. He has attended many GIT meetings for many times and has provided updates on GNSS applications in all modes of transport has been shared. He has proactively participated in GIT's activities and the GIT expressed appreciation for him agreeing to serve as co-chair. The GIT also recognized Noppadol Pringvanich and expressed appreciation for his dedicated service as a GIT co-chair.

**5. AGENDA ITEM 3: REPORT OF THE 18<sup>th</sup> MEETING OF THE APEC GIT**

Ms. Van Dyke, GIT Co-Chair, summarized the GIT activities during its 18<sup>th</sup> meeting in July 2013 in Bali, Indonesia. The GIT/19 reviewed, updated, and endorsed the GIT/18 report as shown in Appendix B.

**6. AGENDA ITEM 4: REVIEW OF THE APEC GIT STRATEGY**

An update to the APEC GIT Strategy Document to include an initiative that aligns the strategy with the statement in the Transportation Ministerial TMM-8 statement will be circulated to GIT members for review and concurrence following GIT/18. The GIT/19 agreed to adopt the revision to the APEC GIT Strategy as shown in Appendix C.

**7. AGENDA ITEM 5: REVIEW OF THE GIT/18 ACTION ITEMS**

The Action Items were reviewed, including new Action Items, endorsed by the GIT/19 meeting. One outstanding action item from the previous meeting will be completed.

**Action 19-1:** The GIT Co-Chairs to update the GIT Membership Directory and provide to the GIT for review.

## 8. AGENDA ITEM 6: PROGRESS AND UPDATE OF THE ON-GOING APEC GIT PROJECTS AND ACTIVITIES

### 8.1 APEC GIT Website

The Republic of Korea reported a status on the APEC GIT website. A brief history and latest update of the website was reported including the GIT/19 meeting notice which was posted on the website. The meeting papers and presentation materials of the GIT/19 will also be posted as soon as the meeting finished. The website can be found at [www.apecgit.org](http://www.apecgit.org).

On the request from APEC Secretariat, the GIT Membership Directory has been removed from the website to protect the private information. The access to GIT Membership Directory will be allowed only to the APEC GIT members.

**Action 19-2:** The Republic of Korea will renovate the APEC GIT website and request the GIT members to review new website and update the GIT Membership Directory by themselves.

### 8.2 Performance Based Navigation Regulatory Review and Evaluation Program (PBNRREVP)

Mr. Andrew Basallote, the Philippine representative, provided an update on the status of recommendations of the PBN Regulatory Review Evaluation Program (PBNRREVP) visit conducted in the Philippines on 5 – 9 November 2012, as follows:

- Training for flight operations inspectors in the Flight Operations Department is urgently required- trained Flight Operation Inspectors (FOI) are adequate
- Amendment to the Philippine Civil Aviation Regulations (**PCAR**), AC 08-007 and Manual of Special Operational Approvals- Chapter 5 is required- final draft is for review of the Regulations Review Committee (RRC) and to be published by the end of April 2014.
- CAAP should consider the mandating of PBN capability in order to minimize disruption at key airports when conventional navigation systems are unavailable- on-going activity.
- CAAP should establish a regulatory process to ensure that procedure design, including design by internal and third party designers is completed in accordance with ICAO Doc 9906 *Quality Assurance Manual for Flight Procedure Design*-for publication.
- The training of ATC staff must be completed as planned and in a timely manner to ensure that there is no delay to the implementation of PBN procedures- on-going activity.
- The Philippines PBN Working Group should convene regularly to support and monitor the implementation of PBN- on-going activity.
- CAAP should publish information to advise the Industry (domestic and foreign) of the Philippines PBN Implementation strategy and timeline- on-going activity.

- CAAP should actively encourage air operators to obtain PBN operational approval in order to obtain tangible benefits from the PBN Implementation Program- on-going activity.

**Action 19-3:** The GIT will coordinate with Aviation Experts Group to determine if there is interest in conducting PBNRREVP site visits beyond the ones conducted in Malaysia and the Philippines.

### **8.3 Joint Multi-GNSS Demonstration for ground transportation applications in the Asia Pacific region**

Japan Aerospace Exploration Agency (JAXA) provided an update on the Multi-GNSS Demonstration program. JAXA highlighted the number of GNSS satellites currently available and planned for the future. JAXA has prepared a Draft Concept Note to examine the benefits of GNSS for ITS applications, provided as Appendix D, that has been circulated for review and comments by the GIT. GIT/19 noted the importance of multi-constellation performance and the value of the project. GIT/19 encouraged its member economies to consider co-sponsoring the Concept. JAXA noted that they are seeking economies to serve as co-sponsors. Current co-sponsors are Chinese Taipei, Thailand, and the United States. Other economies that expressed interest in potentially co-sponsoring are: the Republic of Korea, New Zealand, the Philippines, and the Russian Federation.

**Action 19-4:** The GIT requests any economies interested in participating as a co-sponsor for this project to formally identify themselves by May 15, 2014.

**Action 19-5:** The GIT will work on a review of the draft concept note by early June 2014 to incorporate any updates in preparation of the Concept Note for Session 2 project proposal submission.

## **8.4 Regional RAIM Prediction System**

Thailand presented the meeting with the latest development of Regional Receiver Autonomous Integrity Monitoring (RAIM) prediction system. The meeting noted the ICAO APANPIRG 22 – September 2011 Conclusion 22/24 – Endorsement of minimum Technical and Operational Requirements for a Regional RAIM Prediction System

That, the States in the Asia/Pacific Region be encouraged to participate in the Regional RAIM Prediction System and the Minimum Technical and Operational Requirements for ASIA/PAC Regional RAIM Prediction System provided be adopted.

The meeting further noted that the initial operations of RAIM prediction system for Bangkok FIR have commenced in October 2013 utilizing the same engine as EUROCONTROL AUGUR RAIM prediction system and that the service can be accessed at [www.netra.aero](http://www.netra.aero) .

Thailand invited APAC ICAO member States and APEC economies to share use the system under a cost sharing arrangement.

## **9. AGENDA ITEM 7: UPDATE ON SATELLITE CONSTELLATION AND PLANS**

### **Global Positioning System**

Mr. Ken Alexander, U.S. National Coordination Office for Space-Based PNT presented the U.S. space-based PNT policy and program update. The policy portion of the brief addressed the 2010 national space policy directive that included provisions for use of other states' GNSS services to complement GPS services and increase their resiliency. Mr. Alexander also addressed growing GPS/GNSS use in critical infrastructure and the 2013 Presidential Directive to provide critical infrastructure resiliency. Administration plans to provide 500 MHz for new wireless broadband services continues to challenge the use of critical GPS services. As a result, the Department of Transportation and the Federal Aviation Administration initiated a GPS Adjacent Band Compatibility Assessment to determine adjacent band power limits as a function of frequency separation to inform future service providers.

In the U.S. program update, Mr. Alexander highlighted the status and configuration of the current constellation, the 20 February 2014 GPS IIF launch and planning for a subsequent launch. Additionally, the GPS signal-in-space performance user range error continued at 0.8 meters (rms) for 2013. Mr. Alexander addressed the modernization status for the GPS operational control segment and the GPS III satellite including future size, weight and power saving initiatives and new search and rescue and laser retroreflectors payloads for satellite vehicle 9 plus.

Mr. Alexander also discussed 2013 GPS civil navigation message testing and ongoing planning for April 2014 preoperational L2C and L5 CNAV message deployment including a

5 March 2014 Federal Register Notice seeking to gain comment on the planned deployment. L2C and L5 will eventually replace civil need for semi-codeless access to military P(Y) signals and all semi-codeless GPS users need to migrate to the new civil signals by Dec 31, 2020.

## **GLONASS**

Mr. Nikolay Barabanov from the Russian Federation discussed the active adoption of GLONASS technology for enhancement of transportation safety. ERA-GLONASS Accident Emergency Response System Project was launched at the end of last year in Russia. In three years, the system will cover the country's entire territory. The project is being implemented by the National Navigation Services Provider NIS GLONASS per instructions of the President and the Government of the Russian Federation.

Grave traffic accident fatality statistics dictates the necessity of deploying a system such as ERA-GLONASS as quickly as possible. A great number of casualties annually are lost to road traffic accidents and more than half of these people died before they reached the hospital. In the first hour after an accident (the "Golden Hour"), the human body mobilizes all of its resources for survival. The rescuers and paramedics task is to accomplish as possible within this "Golden Hour".

Motor vehicles in Russia will be equipped with specialized ERA-GLONASS terminals to instantly determine the accident location and automatically notify ambulance, police, and rescue services regardless of the vehicle occupants' condition.

Mainstream use of the ERA-GLONASS navigation information system will serve as the basis for implementation of regional socio-economic and innovative development programs, and enhance the competitive capacity of Russian companies.

## **BeiDou**

Mr. QIN ZHI, senior engineer from Air Traffic Management Bureau of Civil Aviation Administration of China, updated the BDS (BeiDou Navigation Satellite System). The presentation covered three parts. development plan. latest progress and recent plan. He explained after BDS regional services to users in the Asia-pacific area from the end of 2012. It has provided continuous stable and reliable satellite navigation services.

China has paid more attention to completing its policies, applications and standardizations affairs, promote compatibility and interoperability with other navigation satellite system. The latest news release was on December 27th, 2013, the first anniversary of BeiDou Navigation Satellite System providing full operation regional service, BeiDou Navigation Satellite System Public Service Performance Standard, and BeiDou Navigation Satellite System Signal-In-Space Interface Control Document (version 2.0). At the same time, BeiDou initiated the third step of space constellation deployment the test satellites will be launched in 2014.

## **Korean SBAS**

Ms. Jisun Lee from the Republic of Korea reported a plan for developing and implementing K-SBAS. The background, goals, and schedule of the K-SBAS program were introduced. The goal of K-SBAS program is to provide APV-I commercial service from 2022. The K-SBAS is going to be developed according to the ICAO standards and in compatible with the existing SBASs. The basic configuration of K-SBAS is that it consists of around 5 the wide area reference stations (WRS), data networks and 2 sets of Ground Facilities and Geosynchronous satellites. More detailed configuration will be set up as the K-SBAS development goes on. Korean government is willing to cooperate with ICAO and all member states, especially those countries currently operating SBAS system, for example, interoperability with K-SBAS. The Korean government welcomes any support from all member states.

## **10. AGENDA ITEM 8: UPDATE FROM INTERMODAL AND ITS EXPERT GROUP (IIEG) CHAIR**

Ms. Mimi Sukhdeo, Deputy Chair of the Intermodal and ITS Expert Group, met with the GIT and expressed appreciation for all of the work of the GIT and for holding its meeting in conjunction with the Transportation Working Group to share information on ongoing GIT projects and issues.

## **11. AGENDA ITEM 9: REPORT FROM INTERNATIONAL ORGANIZATIONS**

No reports from international organizations were provided.

## **12. AGENDA ITEM 10: ECONOMY REPORTS ON INITIATIVES/ACTIVITIES ON GNSS IMPLEMENTATION**

### **Australia**



Australia was not able to attend GIT/19, but provided a summary on the topic of reporting the loss of Communications, Navigation, and Surveillance (CNS) capabilities. This is based on an incident involving a timing error in a Japanese SBAS message that resulted in some GNSS receivers not initializing or ceasing to operate. The Civil Aviation Safety Authority of Australia learned of this problem after several weeks and was not notified as they should have been under ICAO procedures. Australia advocates proper reporting of the loss of navigation accuracy or loss of the navigation function, since they are mandatory reportable events.

## **China**

Mr. QIN ZHI, senior engineer from Air Traffic Management Bureau of Civil Aviation Administration of China, at the meeting Agenda 10: Economy Reports on Initiatives/Activities on GNSS Implementation, oral report to the meeting about the recent some progress. BeiDou Open Service BII Draft SARPs Part A and Part B, and Validation Matrix for Draft BeiDou SARPs – Part A& Part B, presented draft SARPs and associated guidance material for BeiDou Open Service signal is already delivered to ICAO NSP for further discuss now. China PBN implementation is more than 20 thousand kilometers already, near to 20% of CAAC total en-route now, and the Chengdu- Lhasa en-route ADS-B operation control separation minima is from 10 to 5 minutes already. All of the R&D projects which were last updated at the last meeting will be closed by the end of this year, it is expected at the next meeting there are more conclusions about this activity of GNSS implementation. The GBAS operation validation test will be conducted at Shanghai's airport, now every detail is under discussed for implementation.

## **New Zealand**

New Zealand has been discussing with key stakeholder what are the barriers to Intelligent Transport System rollout in New Zealand, including Cooperative ITS systems. GNSS coverage and accuracy has been identified as one of these potential barriers, given New Zealand's geographical location and terrain. Issues such as the possible need for additional augmentation are being considered. The government has been developing an ITS action plan that will set out a programme of action in this area over the next 3-5 years.

## **Republic of Korea**

Republic of Korea provided the update on a status of developing the GNSS jammer localization system. The test & evaluation of prototype has been finished with successful result. The prototype system detected the moving jammer within 50m of localization error. The field test will be done in one of the airports by the end of 2014.

High Accurate DGPS (HADGPS) using RTK is being developed for ITS. The test-bed was set up and tested to measure the performance of HADGPS. The accuracy of HADGPS was measured less than 1m and enough to recognize the lane of road. For the next step, the test-bed will be enhanced for the trial service of ITS.

## **Russia**

The economy report from Russia was included in the GLONASS discussion under Agenda Item 6.

## **Chinese Taipei**

Mr. Jaching Chou provided progress report on GNSS activities in Chinese Taipei. Taipei FIR has proactively coordinated with adjacent FIRs to perform AIDC, and CPDLC operation is under planning. Several GPS interference cases have reported, and proper procedures have developed for this situation. DME-DME routes for remote islands' PBN operation are developed. Since Taipei FIR is fully covered by radar, ADS-B amendment is announced on Dec. 2, 2013, where ADS-B out equipage required only when radar is not in service. However, ADS-B for certain routes above F290 will be implemented at the end of 2014. Attentions have been paid to GANP and APSAP, and future ASBU planning in Taipei FIR based on APSAP and regional features will be formulated.

The update of GNSS applications in co-operative ITS and intermodal transportation was provided. GNSS plays important role in traffic information collection under its cloud computing architecture and several ITS V2X trials. GNSS is used to create inland route inventory database while planning the best shipping route in land transport, and supply chain visibility for machine tools logistics operation between Chinese Taipei and China is achieved by integrating information from GNSS based cargo tracking and vessel tracking using AIS. Finally, National e-GNSS service modernization by using GPS and GLONASS receivers was introduced, and cooperation with Galileo and Beidou was presented.

## **The United States**

Mr. Alexander provided an update on U.S. GPS/GNSS augmentations and other topics. His brief illustrated the FAA planned navigation services transition towards greater use of GPS/GNSS and studies to identify evolved, or new, alternative PNT systems (APNT). The transition includes removal of all non-directional beacons and most VHF omni-range radios (VOR) over the longer term with the provision of a VOR minimum operational network (MON) in the medium term until APNT steady state operational services.

WAAS SBAS currently provides over 3900 LP/LPV approaches and is planned to provide LPV at all qualifying runway ends (over 5000) in the National Airspace System by 2016. Additionally, WAAS phase III deployment is complete and phase IV dual-frequency (L1C/A and L5) is underway. Current plans are to sustain WAAS operations through 2044. Phase IV includes support for dual-frequency avionics performance standards development and work towards multi-constellation standards. Mr. Alexander also discussed 11 complete, or in progress, aircraft and operator equipping initiatives and resulting benefits cases.

Mr. Alexander overviewed a reference multi-constellation Advanced RAIM concept allowing vertical guidance (LPV, LPV-200) and worldwide coverage and harmonized understanding of the concept, requirements and candidate architecture considerations to form a basis for coordination with ICAO, RTCA, EUROCAE, etc. Mr. Alexander provided an status on FAA support for category III ground facility system design approval. ICAO is targeting a 2015 completion for all work to validate developmental baseline standards for ground-based augmentation system (GBAS) category II/III capability. Mr. Alexander overviewed FAA GPS/GNSS intentional interference and spoofing study team activities and initial recommendations for avionics and aircraft integration mitigations.

He identified the aviation need for alternative PNT systems, NOAA National Continuously Operating Reference Stations status, DOT/USCG National Differential GPS investment decision analysis. Mr. Alexander identified the rationale for civil signal and signal performance monitoring. Finally, Mr. Alexander discussed an ongoing adjacent-band compatibility study intended to inform future proposals for non-space, commercial uses in the bands adjacent to the GPS signals. The objective is to ensure such proposals are implemented without affecting existing and evolving uses of space-based PNT that are vital to economic, public safety, scientific, and national security needs.

### **13. AGENDA ITEM 12: INDUSTRY PRESENTATIONS**

A presentation was provided by Mr. Vince Massimini from The MITRE Corporation on a summary of the United States Federal Aviation Administration (FAA) plans for backup to GNSS outages in the U.S. These plans include contingencies for the short term (until 2025) and potential plans for the longer term (after 2015). These plans are contingencies for aviation use in the event of a GNSS outage, but are not necessarily relevant for non-aviation contingencies.

In general, the FAA plans to use existing Distance Measuring Equipment (DME) and a reduced network of Very High Frequency (VHF) Omnidirectional Ranges (VORs) as a GPS backup until 2025. After 2025, research is being conducted to determine what technologies may be used that best support the FAA's NextGen operations.

#### **14. AGENDA ITEM 13: CONSIDERATION OF NEW CONCEPT NOTES AND PROJECT PROPOSALS**

In the GIT/19, there was discussion on a Concept Note for the Joint Multi-GNSS Demonstration for the applications on transportation field in the Asia Pacific region to be submitted in early 2014, which was discussed in Agenda Item 6.

#### **15. AGENDA ITEM 14: ARRANGEMENT FOR THE NEXT MEETING**

The meeting noted the venue and period of past meetings as shown below:

- GIT/1 in Los Angeles, U.S.A., February 2002;
- GIT/2 in Brisbane, Australia, September 2002;
- GIT/3 in Kobe, Japan, February 2003;
- GIT/4 in Chiang Mai, Thailand, October 2003;
- GIT/5 in Taipei, Chinese Taipei, March 2004;
- GIT/6 in Phuket, Thailand, October 2004;
- GIT/7 in Bali, Indonesia, February 2005;
- GIT/8 in Seoul, Korea, October 2005;
- GIT/9 in Penang, Malaysia, April 2006;
- GIT/10 in Manila, the Philippines, October 2006;
- GIT/11 in Tokyo, Japan, June 2007;
- GIT/12 in Bangkok, Thailand, May 2008;
- GIT/13 in Singapore, July 2009;
- GIT/14 in Seattle, USA, June 2010;
- GIT/15 in Brisbane, Australia, June 2011;
- GIT/16 in Bangkok, Thailand, February 2012;
- GIT/17 in St. Petersburg, Russia, July 2012;
- GIT/18 in Bali, Indonesia, July 2013;
- GIT/19 in Christchurch, New Zealand, April 2014.

The next APEC GIT/20 meeting is planned to be held in conjunction with APEC TPTWG41 in 2015.

#### **16. AGENDA ITEM 15: ADOPTION OF THE MEETING REPORT, CONCLUDING REMARKS**

The GIT/19 adopted the report of its 19<sup>th</sup> Meeting as shown in this document. The APEC GIT requested the report to be tabled at the closing Plenary Session of TPTWG39.

The GIT Co-Chairs expressed gratitude to New Zealand for the smooth arrangement of the meeting and warm hospitality extended to the participants. The GIT Co-Chairs thanked New Zealand for the administrative support which had been provided to the meeting. Finally the GIT co-chairs thanked the GIT participants for their active involvement in the discussions during the meeting.

**-END-**