International Civil Aviation Organization

THE SECOND MEETING OF IONOSPHERIC STUDIES TASK FORCE (ISTF/2)

15 – 17 October 2012, Bangkok, Thailand

Agenda Item 2: Review outcome of relevant meetings/conferences

a) APEC GIT 16/17

REVIEW OUTCOME OF APEC GIT 16/17

(Presented by the Secretariat)

SUMMARY

ICAO APAC Office has been participating and contributing to the GNSS related regional activities. This year, APAC Office participated and contributed in the 16th APEC GIT Meeting and sent its contribution to the 17th APEC GIT Meeting. This paper briefly describes ISTF related outcome of these two meetings.

1. INTRODUCTION

1.1 Sixteenth Meeting of the APEC GNSS Implementation Team was held at the Sheraton Grand Hotel, Sukhumvit, Bangkok from 15 to 17 February, 2012. The meeting was hosted by Aeronautical Radio of Thailand (AEROTHAI). The event included a public/industry forum in order to incorporate the views of the private sector in the APEC GIT work programme. Twenty four (24) experts from eight (8) APEC member economies (Australia, China, Republic of Korea, the Philippines, Chinese Taipei, Thailand and the United States), International Civil Aviation Organization and two industrial organizations participated in the meeting.

1.2 Seventeenth Meeting of the APEC GNSS Implementation Team (GIT/17) was held in St. Petersburg, Russia from 30 July to 1 August. Seven (7) APEC Economies (China, Japan, Republic of Korea, Philippines, Russia, Chinese Taipei and USA) participated in the meeting.

2. DISCUSSION

APEC GIT/16

2.1 Multi-GNSS Asia Secretariat, Japan Aerospace Exploration Agency (JAXA) presented status of the Multi-GNSS Demonstration Campaign to the APEC GIT/16. Current status of Asia Oceania Multi-GNSS Demonstration Campaign was informed. Multi-GNSS Asia (MGA) was established to promote the demonstration of multi-GNSS campaign activities and it was informed that the participation from the organizations related to GNSS application will be welcomed in the MGA. Detailed information about MGA is available on the website www.multignss.asia.

United States GPS Programme

2.2 State Department Representative, US Space-Based Positioning Navigation & Timing National Coordination Office informed the meeting that US has continuously provided GPS service since 1993 and that constellation currently includes 31 operational satellites spanning from the Block IIA to Block IIR to the latest generation Block IIF. As US continues to modernize GPS, new capabilities and civil signals are being developed and deployed including L2C, L5 and eventually L1C. The 4th civil signal L1C is designed in coordination with the international partners to facilitate interoperability. It will be launched with GPS III in 2014 and is expected to be fully operational with 24 satellites by around 2021. The control segment is also being updated to enable new capabilities for new signal in the satellites. International Astronomical Federation bestowed its 60th anniversary award to the US GPS programme in 2011 for the benefits that it has brought to the humanity.

BeiDou China

2.3 Brief updates on the BeiDou constellation were provided by China to the meeting. It was informed that tenth BeiDou satellite was successfully launched on 2 December, 2011. China Satellite Navigation Office (CSNO) had released test version of BeiDou SIS Interface Control Document (ICD) and announced BeiDou Satellite navigation system begun providing continuous positioning navigation and timing services in China and the regional area since 27 December, 2011. It was informed that six additional BeiDou satellites will be launched in 2012. After the launch, capability of service performance will be enhanced further and coverage will be extended to most part of the Asia Pacific Region. Flight Inspection Center of CAAC used its civil aviation flight inspection aircraft to assess BeiDou performance in space with the help of a BeiDou receiver on board the aircraft and found that initial results show around 12 meter accuracy. The performance was validated during an en-route flight from Beijing to Inner Mongolia Xilinhaote Airport through ten departures/landings. It was informed that CAAC recently gave first license to a Chinese company TEDC (Civil Aviation Air Traffic Control Technology Equipment Development Co. Ltd.), supplying ADS-B ground station (ADSB 2000A 1090ES) on 8 February, 2012. Meeting was also informed about the Third China Satellite Navigation Conference (CSNC 2012) which was held from 15 to 19 May, 2012 in Guangzhou, China and International Committee on GNSS (ICG) Seventh Meeting to be held in Beijing, China from 4 to 7 November, 2012. Both these programmes are sponsored by China.

LightSquared Issues

2.4 Co-Chair, APEC GIT provided updates to the information about LightSquared issue. LightSquared's goal is to build a nationwide (US) 4G broadband network to cover 92% of USA by 2015 using the radiofrequency band adjacent to GPS. In January, 2011, the Federal Communication Commission (FCC) of USA granted conditional waiver to LightSquared that required resolving GPS concerns before commencing commercial operations. Multiple test efforts were conducted during 2011 on LightSquared original proposal and modifications to that proposal, including initial operation on 10 MHz portion of the band farthest away from GPS (lower 10MHz), but all results indicated substantial harmful interference to GPS receivers. 75% of the general location/navigation receivers, including non-certified aviation receivers tested, experienced unacceptable interference with the lower 10 MHz. In addition, FAA conducted analysis with LightSquared on certified avionics which indicated impact to GPS equipment supporting:

- Terrain Awareness Warning System (TAWS)
- GPS-based approaches and departures
- Automatic Dependent Surveillance – broadcast (ADS-B)

2.4.1 The FAA analysis concluded that LightSquared's proposals are not compatible with several GPS-dependent aircraft safety-of-flight systems. The consensus of the National Space-Based PNT Executive Committee is that there appears to be no practical solutions or mitigations that would permit the LightSquared broadcast service, as proposed, to operate in next few months or years. These results were confirmed in a letter of 14 February, 2012 from National Telecommunications and Information Administration (NTIA) to the FCC.

ASBU

2.5 ICAO APAC Office, through its presentation briefed the meeting about Aviation System Block Upgrade (ASBU), the concept proposed to be presented to the 12th Air Navigation Conference scheduled from 19 to 30 November, 2012. It was informed that the Concept of Operation adopted by APANPIRG in its Twenty Second Meeting stressed on the usage of GNSS for navigation and surveillance systems.

2.6 Following were the significant outcome of APEC GIT/16 meeting relevant for ISTF work plan:

a) Responding to ICAO APAC Office request for help in developing regional Ionospheric Models for GBAS and SBAS, member economies which contributed data towards the Test Bed project agreed to make the archival data available. Philippines informed about the agreement to share data collected 17 stations (to be expanded to 38 stations in future) belonging to national Mapping Agency. Meeting also appealed to the member economies to share their single/dual frequency archival data collected, with ICAO APAC Office Ionospheric Studies Task Force. Following Conclusion/Action Item were adopted by the meeting to address this issue:

Conclusion 16-2: The APEC GIT agrees to provide APEC GNSS Testbed data to support the Ionospheric Studies Task Force. Coordination activities should be coordinated between ICAO APAC Office and APEC GIT Co-Chairs.

Action Item 16-7: For the GIT member economies to continue collecting single/dual frequency GNSS data and to provide the GNSS and Ionospheric data to support activities of the ICAO Ionospheric Studies Task Force.

b) Responding to ICAO APAC Office request of support in developing a questionnaire to assess regulatory environment to support GNSS Implementation in the States, Meeting was reminded that a Project is likely to be signed for the PBN Regulatory Review and Evaluation Programme and it was agreed that the questionnaire should be developed in coordination/consultation with ICAO APAC Office.

Action Item 16-8: For the project consultant of the PBNRREVP to cooperate with the ICAO APAC Office through coordination with APEC GIT Co-Chair in the development of the questionnaire to assess the PBN and GNSS regulatory environment in the States/Economies.

c) To support ICAO APAC Office GNSS Implementation related activities, meeting developed following Action Item for the APEC GIT Co-Chair to inform ICAO APAC Office GNSS Seminar (26 March 2012) about the GNSS related activities taken up in APEC GIT.

Action Item 16-9: For the APEC GIT Co-Chair, to make a presentation regarding APEC GIT activities to the ICAO APAP Office GNSS Seminar on 26 March 2012.

Action Item 16-10: For the APEC GIT member economies to encourage participation and to consider making presentations at the forthcoming ICAO APAC Office GNSS Seminar on 26 March 2012.

2.7 Australia, People's Republic of China, Republic of Korea, Chinese Taipei, Thailand and USA presented status of GNSS implementation in their Administrations.

APEC GIT/17

GLONASS

2.8 Russian Federal Space Agency (ROSCOSMOS) informed the meeting that Russian State policy on GLONASS promotes its use free of charge worldwide and provides compatibility and interoperability with other GNSS and augmentations. Space segment of GLONASS navigation system was completed in 2011. The completed space segment provides 100% coverage over Russian Federation and 99.5% coverage worldwide. At the moment, GLONASS is operating with its full operational capability with 24 operational and 4 spare satellites. System accuracy has improved significantly over the years and the current accuracy is 2.8 meters. New CDMA signal – civil L3OC – by Glonass – K was introduced in 2011. In 2012 active work on deployment of Russian *system of differential correction and monitoring* (SDCM) has been started. SDCM provides the characteristics upgrading of these systems in order to solve problems requiring high accuracy and reliability. At the moment there are 19 stations of measurement collections in the territory of the Russian Federation and 3 stations in Antarctica. SDCM is planned to contribute to increasing GLONASS accuracy for all users and the accuracy is expected to be 1 to 2 centimeters by 2020.

BeiDou

2.9 It was informed that there are currently 13 BeiDou navigation satellites in orbit and China plans to have another two launches with additional three BeiDou navigation satellites (2 MEO and 1 GEO) in August and October, 2012. These two successful launches will complete BeiDou regional system on schedule. It was also assured that the service for Asia/Pacific users will improve. Meeting was also informed that work on the development of BeiDou SARPs was progressing in ICAO.

ICAO Presentations

2.10 ICAO presented two papers to the meeting. The first presentation briefed GIT/17 about the outcome of GNSS-related ICAO work programmes, which included GNSS Workshop, ICAO PBN Task Force Meeting, ADS-B SITF and ISTF meeting. ICAO also reminded GIT regarding its request for GIT's support in developing GNSS questionnaire for survey. GIT Co-Chair informed the meeting that the GIT had now integrated this support for ICAO as a part of its on-going PBNRREV project. The contractor of the project was informed and he agreed to support ICAO on this activity. The GIT had also integrated the PBNRREV project into its 2010 – 2015 Strategy and had recorded its willingness to support ICAO GNSS activities in the same document.

2.11 In the second presentation, ICAO Flight Procedure Programme (FPP) Office provided a briefing of its GNSS and PBN activities in supporting PBN goal as detailed in ICAO Assembly Resolution A37-11. Since its establishment in 2009 and with its vision of becoming the Regional Center of Excellence in the area of Procedure Design, the FPP provides training and procedure design assistances to its member States in the Asia-Pacific Region. Following Action Item was developed based on the presentation:

> **Action Item 17-3:** Noting the benefits of the FPP membership in implementing GNSS in aviation, the APEC GIT encourages its member Economies, who are ICAO Member States and have not yet become a member of the FPP, to consider joining the FPP.

2.12 People's Republic of China, Republic of Korea, Chinese Taipei and United States presented status information on GNSS implementation in their administrations. Republic of Korea also high-lighted the incidents of interference on GPS observed in their airspace.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note information provided in the paper; and

b) consider utilizing the APEC Test Bed archival data for the purpose of developing ionospheric model for GBAS and SBAS.

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