

**Asia-Pacific
Economic Cooperation**

2009/TPTWG32/HOD

**FINAL REPORT OF THE GLOBAL
NAVIGATION SATELLITE SYSTEM (GNSS)
IMPLEMENTATION TEAM (GIT)**

Purpose: Information

Submitted by: United States and Thailand





Final Report
The 13th Meeting of the APEC GNSS Implementation Team (GIT/13)
27-29 July 2009, Singapore

1. GENERAL

The 13th Meeting of the Asia Pacific Economic Cooperation (APEC) GNSS Implementation Team (GIT/13) was hosted by Singapore at the Raffles Convention Center from 27 to 29 July 2009 in conjunction with the 32th APEC Transportation Working Group Meeting

The meeting was attended by 32 experts from nine (9) APEC economies (Peoples Republic of China, Japan, Republic of Korea, Malaysia, the Philippines, Chinese Taipei, Singapore, Thailand, and the United States), and one (1) non-APEC economy (India with an official guest status). A list of attendees is at Appendix A to this report.

There were 10 economies reports and 2 industrial presentations which were presented under Agenda Item 9 and 10, and the working language was English.

2. AGENDA ITEM 1: OPENING OF GIT/13

Ms. Karen Van Dyke, US Department of Transportation, Research and Innovation Technology Administration, opened the GIT/13 meeting, and extended her warm welcome to all participants. She expressed appreciation to the Singapore government for their support to GNSS-related activities.

Ms. Van Dyke noted that she had received notification from Mr. Hiroshi Inoguchi, GIT Co-Chair, that he would not be able to continue in this capacity due to a career advancement. The Agenda would include an election of a new Co-Chair. Ms. Van Dyke welcomed the participants to GIT/13, and reminded them of the successful GNSS Technological Innovation Summit hosted by AEROTHAI in conjunction with the last meeting. The GNSS Summit was very successful with more than 180 participants from a wide variety of transport modes and developed useful guidance for future work of GIT. She anticipated that GIT/13 would make the most use of the outcome from the Summit.

3. AGENDA ITEM 2: ADOPTION OF THE AGENDA

Ms. Van Dyke drew the attention of the GIT/13 to the draft agenda and obtained their approval. Mr. Noppadol Pringavinch of Thailand requested two additional agenda items under Other Business concerning the Second APEC New Aviation Technology Workshop and the outcome of the 5th ICAO Performance Based Navigation Task Force Meeting.

4. AGENDA ITEM 3: REPORT OF GIT CO-CHAIRS

Ms. Van Dyke summarized the GIT activities that were reported to the Intermodal and Intelligent Transport Systems Experts Group (IEG) by Ms. Alice Wong, during the 31st meeting of APEC Transportation Working Group (TPT-WG 31) which was held in Lima, Peru on 25-29 August, 2008.

The meeting noted that:

- a) the IEG Chair would continue to coordinate with the GIT Co-Chairs, on an intersessional basis, on outstanding matters, such as identification of points of contact from all transport modes with GNSS responsibility within each economy;

- b) GIT activity was brought to the attention of all economies and all Expert Group representatives at the plenary meeting since GNSS applications may be relevant to all transportation modes in APEC;
- c) the Maritime Experts Group requested a briefing on maritime situational awareness at TPT-WG/31;
- d) the 31st TPT-WG meeting was held on 25-29 August 2008 in Lima, Peru. A report of GIT activity, including the Summit, was presented to the IEG during the TPT-WG/31.

The meeting also noted that:

- a) Ms. Karen Van Dyke was selected for a vacant Co-Chair;
- b) Reports at the GIT/12 were received from Australia, Peoples Republic of China, India, Japan, Republic of Korea, Malaysia, the Philippines, Chinese Taipei, Thailand and the United States;
- c) The GIT/12 endorsed a proposal to survey and assess current deployment of applications for surface transportation using GNSS and the proposal was circulated for comment during the inter-sessional period where additional co-sponsors were obtained; and
- d) The GIT/12 discussed its vision, mission, goal and objectives and amended its terms of reference and work program including eight action items:
 - 1) Involve other modes;
 - 2) Review Draft Project Proposal;
 - 3) Identify GNSS Courses within each economy;
 - 4) Identify Shortages of technical staff in critical areas across all modes;
 - 5) Update the 31st TPT-WG;
 - 6) Identify Education Event;
 - 7) Identify Issues and strategies to provide the accurate generation and maintenance of aviation and maritime databases;
 - 8) Evaluate commonality of GNSS applications for multimodal use; and
 - 9) Consider impact of lightning strikes on GNSS applications.

5. **AGENDA ITEM 4: REVIEW OF APEC TRANSPORTATION MINISTERIAL STATEMENT, TERMS OF REFERENCE AND ACTION PROGRAM**

Ms. Van Dyke relayed the outcome of the 6th APEC Transportation Ministerial meeting held at the Philippine International Convention Center in Manila from 27 – 29 April, 2009, as it relates to the issue of GNSS. The APEC GIT reviewed the Joint Transportation Ministerial Statement and noted the supports and directives from the APEC transportation Ministers relevant to the works of the APEC GIT, especially those in paragraph 17, 18, 19, 20, 37, 38, 39 and 40.

Additionally, Ms. Van Dyke noted that the Terms of Reference and the GIT/12 Program of Action adopted at GIT/12 were relevant to the Ministerial Statement.

The APEC GIT reviewed its Terms of Reference which includes intermodal transportation applications of GNSS technology based on the proposal accepted by GIT/12. The meeting agreed on the following Terms of Reference to be forwarded to IEG and the APEC TPT for its considerations:

- Facilitate Global Navigation Satellite System (GNSS) application to support seamless intermodal transportation to enhance safety, security, and sustainability in line with the APEC Transportation Ministerial Directives

- Identify actions to facilitate and collaborate on implementations of GNSS applications for transportation in the APEC region, complementing, but not duplicating, the work of the International Civil Aviation Organization (ICAO), the International Maritime Organization (IMO), and the International Committee GNSS (ICG)
- Provide a public/industry forum to address GNSS technologies related to transportation issues that will benefit the APEC region (include non-APEC economies and international organizations)

Action 13/1: The APEC GIT requested its revised Terms of Reference to be forwarded to IEG and the APEC TPT for its considerations and endorsements.

The US tabled a draft strategy for the APEC GIT for future actions 2010 – 2015 for consideration of the delegates. The APEC GIT updated its strategy for the adoption of measures to include GNSS technologies to in the development of the seamless intermodal transportation systems. The strategy as shown in Appendix B has been accepted by the GIT/13 as an advanced draft and expected to be finalized at GIT/14.

Action 13/2: All economies are requested to review the draft strategy intersessionally.

6. AGENDA ITEM 5: CONSIDERATION OF REQUEST OF MARITIME EXPERTS GROUP TO PROVIDE BRIEFING

Ms. Van Dyke noted that, at the 31st TPT-WG Meeting, the Maritime Experts Group received a briefing by Mr. Noppadol Pringvanich, Thailand, concerning the outcomes of the APEC GNSS Technological Innovation Summit, in particular the presentation on maritime issues. The Chairman of the MEG requested that the GIT provide a briefing on maritime situational awareness at the 32nd TPT-WG Meeting.

A briefing on Maritime Safety and Security Information System (MSSIS) was prepared intersessionally and provided to both the GIT/13 and the MEG during the 32nd TPT-WG Meeting by LT Justin Guiterman, USA.

7. AGENDA ITEM 6: UPDATE FROM THE IEG CHAIR

Mr. Walter Kulyk, the Chairman of the Intermodal Experts Group (IEG), addressed the GIT/13. The IEG Chair encouraged the APEC GIT to identify its mission, goals and objectives in a clear and concise manner in order to contribute greater value to APEC deliberations and to be consistent with the Ministerial Directives. He cited the APEC GNSS Test Bed project that greatly contributed to APEC cooperation in aviation. He saw the APEC GIT as having continuing influence in surface and maritime transportation and encouraged greater input into the draft project proposal on GNSS applications on land transportation.

The IEG Chair also encouraged the APEC GIT to gain greater visibility about its activities within the APEC TPT WG by co-locating some of its meetings with the APEC TPT-WG, updating its website, and developing public relation outputs.

8. AGENDA ITEM 7: SELECTION OF GIT CO-CHAIR

Ms. Van Dyke recalled that one of the two Co-Chairs posts was now vacant. Nominations were solicited.

Mr. Noppadol Pringvanich, Engineering Manager from AEROTHAI, Thailand was nominated by Chinese Taipei and seconded by Malaysia, the Philippines and the Peoples Republic of China. Subsequently, the meeting unanimously elected him as the new GIT Co-Chair.

9. AGENDA ITEM 8: UPDATE ON PROJECT PROPOSAL

Ms. Maureen Walker, Senior State Department Officer, Space-based PNT Coordination Office, on behalf of Mr. Walter Kulyk of the U.S. Department of Transportation and the Chair of the IEG representing U.S. to the APEC TPT-WG., re-presented a project proposal concerning survey and assessment of current deployment of applications for surface transportation utilizing GNSS in the APEC Region.

The proposed survey and assessment is designed to benefit all APEC economies by providing a survey of current applications using GNSS within surface transportation. The survey will seek to identify the issues/problems that economies face in implementing GNSS, and identify the common solutions employed to address those issues/problems. The project will also document the characteristics of the three most promising applications. This GNSS survey will specifically target freight and passenger rail but will also extend to the broad range of other surface transportation modes, as relevant. The assessment will seek to identify the lessons learned and best practices that are essential to promoting collaborative intermodal approaches to transportation in an effort to facilitate trade throughout the APEC region. This study addresses a need for applications impacting the safety, security and efficiency of the transportation sectors in the APEC region. The proposed study, sponsored by the United States and co-sponsored by Canada, Peoples Republic of China, the Philippines, Thailand, New Zealand, Chinese Taipei and Republic of Korea. The project will cover identification, assessment and cost-benefit analysis of GNSS applications related to the broader surface transportation system. The project will include input from local government officials and seek the contributions of key private industries and other APEC economies.

In addition, this proposed project seeks to build on the considerable knowledge base developed to this point by the APEC GIT through their series of meetings and activities beginning in March 2000, and seeks the input of GNSS committees or international working groups within the APEC Economies, including the U.S. PNT Office and the GIT under the APEC TPT-WG.

During discussion of the proposal, the Co-Chairs requested that delegates to review the proposal in light of the APEC Transportation Ministerial Directives, the draft strategy of the APEC GIT and the IEG Chair's call for a more concise mission statement.

After deliberations on the project proposal, the APEC GIT, recognizing the benefits of GNSS technologies to enhance safety and efficiency of surface transportation, considers the project to be in line with the APEC Transportation Ministerial Directive as outlined in the Joint Ministerial Statement, especially paragraphs 17, 18, 19, 20, 39 and 40. The APEC GIT also considers the project to be a great opportunity to enhance its activity beyond aviation as GNSS is becoming an essential capability to provide seamless intermodal transportation. The project will support the task of the GIT as has been trusted by the APEC Transportation Working Group and is in agreement with the revised Terms of Reference of the APEC GIT. With that remark, the APEC GIT requests the IEG to support the re-submission of the project proposal to be further considered by the APEC Transportation Working Group and the Budget Management Committee

Action 13/3: The APEC GIT requests the IEG to support the re-submission of the project proposal to be further considered by the APEC Transportation Working Group and the Budget Management Committee

10. AGENDA ITEM 9: ECONOMY REPORTS ON INITIATIVES/ACTIVITIES ON GNSS IMPLEMENTATION

10.1 Thailand

Mr. Noppadol Pringvanich presented the current progress on the GNSS and Performance Based Navigation (PBN) implementation for aviation in Thailand. Since May 2007, the National Working Group on PBN and GNSS was formed to provide a forum of all aviation stakeholders for GNSS and PBN implementation. Since February 2009, Thailand has authorized full operations of RNAV(GNSS) approaches at Phuket International Airport. Additional RNAV(GNSS) procedures have been designed for Samui and Hatyai International Airports. These approaches will later be revised to include Baro-VNAV profiles. Additionally, RNAV 1 SIDs/STARs and RNP approaches are now being developed for Suvarnabhumi, Don Mueang, Chiang Mai and Krabi. Regarding PBN and GNSS for aviation routes, Thailand is now considering implementing RNAV and RNP routes for major city-pairs both within domestic airspace and in coordination with neighboring States. RNAV 10, RNAV 5 and RNP 4 are now being considered for this en-route implementation.

10.2 Republic of Korea

Dr. Gi-wook Nam, Korea Aerospace Research Institute (KARI) presented current GNSS activities in Korea.

- GBAS test-bed was installed at Jeju airport for the purpose of R&D and is now being used to monitor GNSS signal. GBAS CAT-1 implementation is planned to be operational by 2014.
- Construction of nationwide Maritime DGPS has been completed and the enhancement of MDGPS is planned to provide more accurate and reliable DGPS service to the users. Enhanced Loran is also going to be implemented in a near future.
- Development of GNSS based infrastructure for the Ubiquitous Transportation System is ongoing. Feasibility study has been finished and the core technology will be developed from Sept. this year.
- APEC GIT website is out of date and thus the enhancement is required. If member economies of GIT want to keep running the GIT website, Korea will enhance and maintain the GIT website.

10.3 People's Republic of China

Mr. Qin Zhi, Senior Engineer from Air Traffic Management Bureau of CAAC reported their GNSS activities progress update information since last GIT meeting. These include GBAS Trials and Implementation, GRIMS (GNSS Integrity Monitoring), ADS-B Trials and Implementation, RNP/RNAV Trials and Implementation of Performance-Based Navigation (PBN). He explained the China technical policy choice at that time different from east and west since ICAO CNS/ATM concept matured and to the recently implementation and its evolution and technical choice today. And he also mentioned their progress when they have flight inspection aircraft with GNSS capability and some test results have been given and the step forward.

10.4 India

Mr. V.K. Chaudhary, Executive Director (CNS Planning, Airports Authority of India) provided the update for India. GAGAN is India's SBAS initiative. This was planned to be executed in two phases: TDS phase (Technology Demonstration System) and FOP (final operational phase). TDS has been successfully completed in August 2007 and has achieved targeted performance of 7.6 m accuracy both in horizontal and vertical direction, within the parameters of GAGAN reference stations,

95% of the time with time to alarm 6.2 seconds.

FOP comprising of two Indian Master Control Center, 3 Indian land uplink stations and 15 Indian reference stations is proposed to be completed by June 2013 providing APV 1.4 level (HAL:40m VAL: 50m, TTA: 6 seconds of service).

India has established a network of 24 TEC (Total Election Contents) stations to collect ionospheric data over entire Indian land mass for the purpose of development of region specific ionospheric model.

10.5 Japan

In the economy report of Japan, MSAS performance enhancement program, GBAS development update and long term vision for future air traffic systems were presented. With regard to the MSAS performance enhancement program, Japan has a plan to implement MSAS performance enhancement. Ten additional GMSs (Ground Monitor Station) and a new algorithm developed by ENRI are expected to enable performance improvement of MSAS aiming up to LPV200 in 2014. Japan also reported the current status of the development of GBAS. ENRI is engaged with the development of GBAS prototype in conjunction with research works of integrity monitors and ionosphere characteristics in low-medium latitude region. The aim of the prototype development is to resolve integrity related matters for future implementation of GBAS in Japan. Delivery of the prototype is expected in March 2010, followed by an installation and evaluations including flight tests. These GNSS related activities are to be properly reflected in the long term vision of future air traffic systems in Japan, which is now under discussions with the leadership of JCAB.

10.6 Malaysia

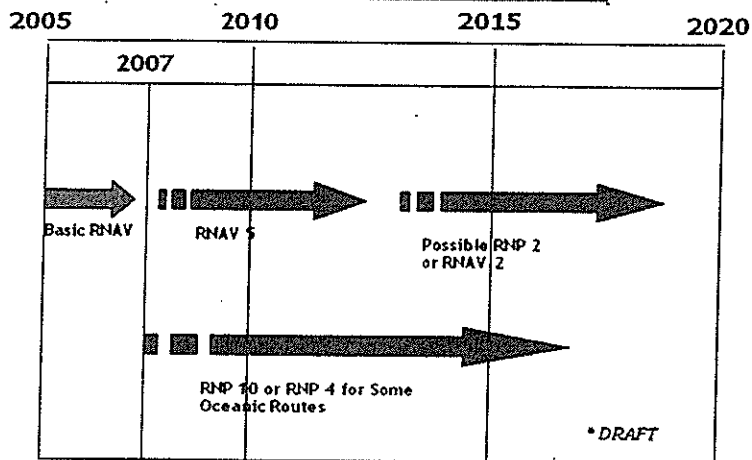
Mr. Lim Yong Heng (Wayne), Malaysia Department of Civil Aviation provided a status report of PBN/GNSS Application in Malaysia.

Malaysia is fully committed to comply with the timeline set by ICAO to implement the application of PBN/GNSS to enhance capacity and efficiency of airspace and sharing the inspiration to reduce aircraft carbon emission. In that respect Malaysia has implemented RNAV /RPN 10 over Bay of Bengal and South China Sea for en-route segment. For RNAV SIDs and STARs together with GNSS RNAV Non Precision Approach (NPA) at KLIA are expected to be fully completed by 2010. Additional infrastructure for GBAS are planned to be installed at major international airports by 2011. To realise this program all resources and parties are pooled together to get things going. A task force was formed involved air traffic management planner, regulators, procedure designers, aerodrome operators and ANSP and airline operators. Factors that required taking cognizance for the planning are airspace, design, track, infrastructure and safety analysis requirements.

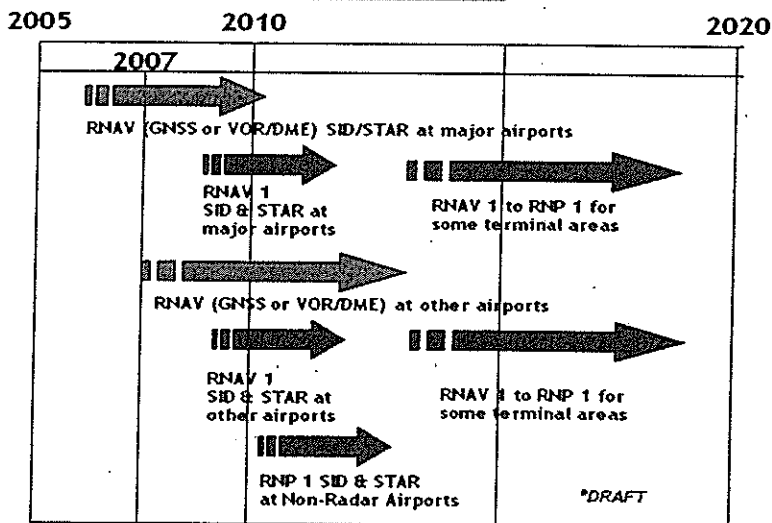
To meet the stringent requirement for aviation safety, flight procedures subscribe to design of ICAO are developed and reviewed from time to time via certification of airworthiness for aircraft equipage, flight inspection and calibration of the system.

For the purpose of comply with the ICAO timeline of PBN implementation, a roadmap emulated from the template recommended by ICAO for regional cooperation has been adopted by Malaysia. The development is focused on three stages such as en-route, terminal and approach for RNAV and RNP execution. The roadmap is still in the draft stage subject to the final endorsement from the task force and the Government.

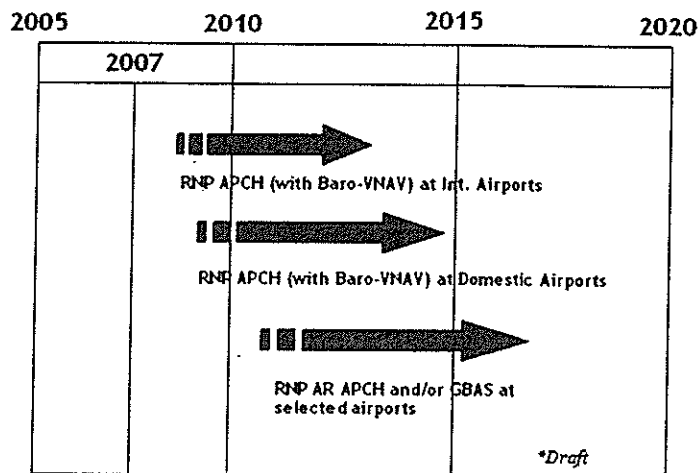
Roadmap - En-route



Roadmap - Terminal



Roadmap - Approach



Currently, under the program of CNS/ATM, Malaysia has carried out operational trial for ADS-C over the Bay of Bengal. Notwithstanding any frustration, the ADS-C system will be in full operations by the end of 2009.

To anticipate the total implementation of PBN/GNSS, readiness in other components of the system is essential. Among others, Malaysia is ready in preparation the programs for ATC training, assuming responsibility using GNSS and charting the legalised flight procedures. These will put the system operational in the right perspective.

Malaysia is happy to declare a Multilateration system is in place and fully operationally at KLIA since last year to complement the existing surface movement radar. Malaysia is also anticipated with excitement over the ADS-B system installing at Kuala Trengganu, a capital city of the state of Trengganu at the North East of Peninsula Malaysia. Work is in progress and expecting to be completed and on trial operation by early 2010.

Malaysia hopes to share the implementation experience of this ADS-B system in future and welcome any input from the Economy members on their experiences in order to avoid any pitfalls.

10.7 The Philippines

Mr. Andrew B. Basallote, Director of Air Navigation Service, Civil Aviation Authority of the Philippines, provided an update on the following:

- Creation of the Civil Aviation Authority of the Philippines (CAAP) in 2008, a quasi-judicial & quasi-legislative entity with corporate attributes and fiscal autonomy responsible for safety, air navigation service provision and airport operation;
- On WGS-84 implementation, all airfield coordinates are in WGS-84 datum and are published in the aeronautical information publication (AIP);
- On training on CNS/ATM technologies, 37 courses for CAAP ATS personnel and 22 courses for engineers/technicians were conducted. Likewise, 2 courses each for ASEAN ATS and engineers/technicians were completed in 2007 & 2008; and
- The New CNS/ATM Systems Development Project, which includes the acquisition of GNSS Signal Monitoring System for RAIM prediction and issuance of NOTAM on the status of GNSS space and ground elements, is in the final stage of pre-qualification. The project components are expected to be available to provide services by the end of the year 2012.

10.8 Singapore

Mr. Gao Shu, Civil Aviation Authority of Singapore, updated following GNSS initiatives in the aviation sector in Singapore:

- Baro-VNAV procedures were implemented at the Changi Airport, as a back-up for the existing Runway 01 ILS approach in April 2007;
- RNAV SIDs and STARs that were implemented in April 2006 enhanced safety and efficiency in the Singapore Approach, by optimizing flight profile, reducing fuel consumption, reducing workload of controllers and pilots, and reducing the uncertainty associated precious practice of radar vectoring;
- ADS-B trial was carried out with Indonesia from the end of 2006 till the 1st quarter of 2007, using an ADS-B station in Natuna Island, Indonesia. Singapore will install an ADS-B station in 2009 and plan it to be operational in 2010 together with new ATC system;
- Multilateration, using GPS position data, was implemented at Changi Airport in 2007;
- CAAS is monitoring the development of GBAS CAT I/II and plans to implement it when commercially available and beneficial.

10.9 *Chinese Taipei*

Dr. James Shau-Shiun Jan presented their implementation status of RAIM projects to support the new ATM system in Taipei FIR airspace. The first part of the presentation is on the development of the RAIM prediction system (RPS) which has two service interfaces: one is web based service and the other is the TCP/IP service to the new ATM system. The second part of the presentation is the real time RAIM system (RTRS) which provides RAIM information for the GPS/SBAS receiver. Finally, this briefing is concluded by showing the RPS operational results and provides their work status on the SBAS test bed (a NSTB like system).

10.10 *The United States*

Ms. Maureen Walker, Senior Advisor, Space-based PNT Coordination Office, presented U.S. space-based PNT policy. She stressed that there would be no direct user fees for civil GPS services. She noted that the U.S. space-based PNT policy is consistent with previous U.S. policy on GNSS. Mrs. Walker noted the recent decision by the U.S. concerning Selective Availability, explaining that it has not been used since deactivation in 2000 and would not be built into future GPS III satellites.

Mrs. Walker summarized the establishment of the National Space-Based PNT Executive Committee and of the Coordination Office and summarized the recent accomplishments of this office.

Mrs. Walker stressed the need for interoperability and compatibility, by examining current and proposed GNSS systems and the needs of the user. Finally, she outlined the potential role for the APEC GIT in responding to the 2009 Manila Transportation Summit and the need to link GNSS to fuel efficiency.

11. **AGENDA ITEM 10: COMMENTS FROM BUSINESS ORGANIZATIONS**

11.1 *Electronic Navigation Research Institute, Japan*

Mr. Susuma Saito, PhD, Senior Researcher, Communication, Navigation and Surveillance Department, Electronic Navigation Research Institute provided the briefing.

ENRI reported its research activity on GNSS. ENRI has been working on developing the MTSAT Satellite-Based Augmentation System (MSAS) and a Ground-Based Augmentation System (GBAS). ENRI understands that ionospheric disturbances are one of the most difficult part in the advanced use of GNSS. ENRI is studying the low latitude ionospheric phenomena such as the equatorial anomaly and plasma bubbles which accompanies large gradient in ionospheric delay. To have wide coverage of ionospheric observation, ENRI have constructed an observation network in Japan, and collaborates with National Institute of Information and Communications Technology (NICT), Kyoto University, and Nagoya University which have their own observation network in collaboration with institutes and universities in Asian countries. The network covers wide area of Southeast Asia and Japan. ENRI is carrying out simulation studies of GBAS influenced by plasma bubbles to evaluate the impact of plasma bubbles. ENRI is also studying the use of new GNSS signals, such as Galileo or SBAS ranging source signals to enhance the GNSS availability even in the case of small number of GPS satellites.

ENRI has been working with international institutions. An international workshop on ATM/CNS was held in March 2009. ENRI accepts foreign researchers and students, and collaborates with several institutions from France and Netherlands.

ENRI also referred to the report issued by USGAO in April 2009.

11.2 *MITRE Corporation, USA*

Mr. Vincent Massimini, Senior Principal Engineer, MITRE, updated the WAAS status as below:

Current Required Navigation Performance (RNP) Authorization Required (AR) approaches and criteria are based on the use of barometric vertical navigation (Baro-VNAV) for vertical guidance. Some RNP-capable aircraft do not have Baro-VNAV capability, however, and therefore cannot execute vertically-guided RNP AR approaches.

Recent work in the U.S.A. has focused on the use of Satellite-Based Augmentation System (SBAS) signals for vertical guidance during RNP AR approaches in place of baro VNAV. Eventually, it is believed that Ground-Based Augmentation System (GBAS) signals will eventually be able to be used, but these signals have not yet been tested.

The use of SBAS for vertical guidance during RNP AR approaches is feasible and should not require changes to existing standards, although some clarification information will likely be published.

The analysis done in the U.S.A. specifically applies to the U.S. SBAS, the Wide Area Augmentation System (WAAS). A similar analysis could be performed for other SBASs as appropriate.

12. **AGENDA ITEM 11: OTHER**

12.1 *APEC New Aviation Technology Workshop II*

Thailand presented a report on the second APEC New Aviation Technology Workshop which was held in Bangkok, Thailand from 17-19 June 2009. The workshop was jointly hosted by US Trade and Development Agency, US FAA and AEROTHAI. 157 delegates from 15 APEC Economies, India and ICAO, participated in the workshop. The discussion topics included Performance Based Navigation (PBN), Automatic Dependent Surveillance-Broadcast (ADS-B), Heads Up Displays (HUDs), Enhanced Flight Vision Systems (EFVS) and Synthetic Vision Systems (SVS). Seven APEC Economies and three industries made presentations at the workshop.

12.2 *Outcomes of the Fifth ICAO Performance Based Navigation Task Force*

The APEC GIT reviewed the outcomes of the fifth ICAO Asia-Pacific Performance Based Navigation Task Force, which was held in Bangkok, Thailand on 15-17 July 2009. This activity was conducted in consistent with current GIT's Terms of Reference on identifying measures to facilitate GNSS implementation in the APEC region with the framework of a regional approach, complementing, but not duplicating, the work of the ICAO and IMO.

The GIT meeting reviewed the PBN Task Force's conclusions especially the ones regarding 1) feasibility of establishing regional SBAS capability to support Approach with Vertical Guidance (APV) for all aircraft types and 2) examining the feasibility of establishing a regional RAIM prediction system. The GIT expressed its interest in supporting both ICAO's initiatives and requested the APEC GIT Co-Chairs to inform the ICAO Asia-Pacific PBN Task Force with the GIT's intentions and coordinated further activities.

On the issue of regional RAIM prediction system, the GIT noted RAIM prediction can be applied to all modes of transportations that utilized GNSS timing and navigation services. The GIT then discussed the possibility to utilize the existing APEC GNSS Test Bed hardware to support the implementation of the regional RAIM prediction system. The GIT invited its members to coordinate intersessionally and propose possible architectures and administrative arrangements for a regional

RAIM prediction system at the next APEC GIT meeting.

Action 13/4: Noting the possibility for the APEC GIT to support ICAO requirements on a regional RAIM prediction system, the GIT expressed its interest in supporting ICAO's initiative and requested the APEC GIT Co-Chairs to inform the ICAO Asia-Pacific PBN Task Force with the APEC GIT's intentions and to coordinate further activities.

Action 13/5: The APEC GIT invited its members to coordinate intersessionally and propose possible architectures and administrative arrangements for a regional RAIM prediction system at the next APEC GIT meeting.

The APEC GIT also noted that, subjected to ICAO APANPIRG's decision, the ICAO PBN Task Force will hold its next meeting in February 2010 in Hong Kong, China, in conjunction with the 2nd ICAO Asia-Pacific PBN Seminar.

12.3 *International Committee on GNSS*

Ms. Alice Wong, USA, summarized developments in the International Committee on GNSS (ICG) since the 3rd meeting that was sponsored by the U.S. in Pasadena in December of 2008. She provided purposes, memberships, four workgroups and the associated Providers Forum. More than 200 worldwide GNSS experts and industries were present. ICG and International GNSS Service will be hosting Asia Reference Framework in 2010 in Asia.

Ms. Maureen Walker, USA, suggested that the GIT/13 agreed that an official guest status for the International Committee on GNSS and the International Civil Aviation Organization should be extended. She also requested official guest status for the International GNSS Service, the International Federation of Surveyors and the International Association of Geodesy, non-government organizations involved with reference frames.

Action 13/6: The GIT requests the IEG and TPT to consider granting official guest status to the following organizations in order to attend future GIT meetings:

- International Civil Aviation Organization
- International Committee on GNSS
- International GNSS Service
- International Federation of Surveyors
- International Association of Geodesy

13. **AGENDA ITEM 12: NEXT MEETING**

The meeting noted the venue and period of past meetings as 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

Ms. Maureen Walker, USA, announced the US offer to host the next GIT/14 meeting. The proposed dates and venue are June 21-24, 2010 in Seattle, Washington. The contract to reserve the hotel was out for bid and information would be forthcoming.

14. AGENDA ITEM 13: ADOPTION OF REPORT

The APEC GIT accepted the report of its 13th Meeting as shown in this document. The APEC GIT requested the report to be tabled at the HOD Meeting and the closing Plenary Session of TPTWG/32

15. AGENDA ITEM 14: CONCLUDING REMARKS

Ms. Van Dyke and Mr. Noppadol Pringavinch, as Co-Chairs of the APEC GIT, expressed gratitude to Singapore for the smooth running of the meeting and warm hospitality extended to the participants. They thanks all administrative supports which had been excellently provided to the meeting. They also thanked the participants for their active involvement in discussions during the meeting.

- END -

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Asia Pacific Economic Cooperation
Global Navigation Satellite System
Implementation Team

Responding to the call of Ministers responsible for transportation in the APEC region, who recently met in Manila, the Philippines to continue the progress of work designed to achieve safe, secure and efficient transportation networks as well as realize the primary goals of free and open trade and liberalized investment in the region;

Interested in providing the APEC region with seamless and environmentally friendly transportation systems through innovation and use of advanced technology;

Desiring to reduce congestion, enhance transport safety and security and achieve effective sustainability;

Noting that the Ministers called for the enhancement of seamless interconnectivity of the different modes within the transportation system to ensure safe, secure and efficient movement of people and goods while improving the conservation of natural resources and reducing environmental impacts such as the effects of greenhouse gas emissions; and

Noting that satellite-based position, navigation, and timing services can serve as a critical infrastructure to enhance safety, security, sustainability and efficiency for all modes of transportation;

Emphasizing the belief that the development and implementation of selected integrated technologies are important to the successful management and operation of intermodal transportation, including Intelligent Transportation Systems (ITS) and Global Navigation Satellite Systems (GNSS);

Instructing the Working Groups to include activities addressing the ITS and the GNSS, encouraging international standards development through liaison with the ISO, workforce development training and improved supply chain management processes in an energy and environmentally sustainable way, while building upon the work of relevant regional and international multilateral organizations and minimizing duplication of efforts;

Building upon the GNSS Technological Innovation Summit held in Bangkok in May 2008; and

Drawing upon the revised Terms of Reference adopted at the 13th meeting of the GNSS Implementation Team

We, the APEC GNSS Implementation Team, do hereby adopt the following strategy and action program for the 2010 - 2015 timeframe.

**Strategy for the Adoption of Measures to include GNSS Technologies in the
development of Seamless Transportation Systems
2010 – 2015**

1. Introduction

The leading APEC economies are aware that inefficient and congested traffic systems adversely affect economic development. They are also aware that APEC members can benefit from the exchange of experiences and a more effective collaboration on the application of GNSS technologies to the existing and divided modes of transportation. The APEC GNSS Implementation Team should, therefore work together on developing mechanisms to identify solutions and play a proactive role in highlighting technological advances that can reduce congestion and emissions from outdated transport systems.

2. Existing Regional Policies and Instruments Guiding and Complementing the Strategy

Following the principles established by the APEC in the definition of its actions, this strategy will be based on reinforcing alliances and partnerships and promoting joint actions with existing organizations.

2.1 Local Instruments (within each economy)

The APEC economies count on mechanisms established for application of advanced technology to traffic management. These mechanisms are extremely diverse among different economies, a factor to take permanently into account. The institutional responsibilities of the civil air, road, maritime and rail bodies and institutions are not the same.

The APEC GNSS Implementation Team is identified by this differentiated and complementary character to these mechanisms and establishes adaptability and flexibility as principles of its action.

2.2 Multilateral Organizations

- World Bank
- Inter-American Development Bank
- Asian Development Bank
- United Nations Development Program
- International Committee on Global Navigation Satellite Systems
- International Civil Aviation Organization
- International Maritime Organization
- International Standards Organization
- International Telecommunication Union

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With this remark, the APEC GIT agrees on the following strategic initiatives:

Initiative 1: Identify GNSS points of contact along with experts from government and non-government organizations within each economy.

Initiative 2: Collaborate with Aviation, Maritime and Land Expert Groups on the applications of GNSS technologies for seamless intermodal transportation system, including the request of Maritime Expert Group to explore the capability of Automatic Identification Systems (AIS) and the benefits for maritime situational awareness.

Initiative 3: Facilitate research and development to identify operational performance requirements (e.g. accuracy, integrity, availability and continuity) for applications in all modes of transport.

Initiative 4: Identify training needs and educational opportunities in the APEC region regarding GNSS technologies for all modes of transportation.

Initiative 5: Enhance the APEC GIT website, hosted by the Republic of Korea, to provide all APEC economies an opportunity to share developments on GNSS activities and share this information to the public to enhance visibility and educational outreach activities.

Initiative 6: Seek APEC funding to host a GNSS booth at future APEC Transportation Ministerial meetings and develop a documentary on the uses of GNSS in APEC economies.

4.2 Identify actions to facilitate and collaborate on implementations of GNSS applications for transportation in the APEC region

In order to identify actions to facilitate GNSS implementation in the APEC region within the framework of a regional approach, the APEC GIT, in line of the APEC Guiding Principle, seek to complement but not duplicate the work of the ICG, ICAO or the IMO.

With this remark, the APEC GIT agrees on the following strategic initiatives:

Initiative 1: Identify potential human capacity building projects regarding GNSS technologies and implementations to enhance technical capabilities of member economies.

Initiative 2: Collaborate with ICG, ICAO and IMO to explore possibilities of supporting their GNSS activities.

Initiative 3: Collaborate with ICAO, IMO and other international organizations to facilitate the establishment of regional RAIM prediction and GNSS signal monitoring service for the APEC region.

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2.4. International non-government organizations

- International Association of the Institutes of Navigation
- International Symposium on Certification of GNSS Systems and Services
- International Federation of Surveyors
- International GNSS Service
- International Astronomical Union
- International Association of Geodesy
- World ITS Congress

3. Preliminary Strategic lines

The APEC structure for action is based on the promotion of three strategic lines which define its identity and distinguishes it from other regional initiatives:

- ❖ Technical and Economic Cooperation
- ❖ Trade and Investment Liberalization
- ❖ Trade Facilitation

The main objective focuses on the importance and need of cooperation to apply GNSS solutions through the exchange of information and the scaling up of capacities among APEC member economies.

The revised Terms of Reference for the APEC GNSS Implementation Team call for:

- 1) **Facilitate Global Navigation Satellite System (GNSS) applications to support seamless intermodal transportation** to enhance safety, security, and sustainability in line with the APEC Transportation Ministerial Directives
- 2) **Identify actions to facilitate and collaborate on implementations of GNSS applications for transportation in the APEC region**, complementing, but not duplicating, the work of the International Civil Aviation Organization (ICAO), the International Maritime Organization (IMO), and the International Committee on GNSS (ICG)
- 3) **Provide a public/industry forum** to address GNSS technologies related to transportation issues that will benefit the APEC region (including non-APEC economies and international organizations)

4. Strategic Initiatives

4.1 Facilitate Global Navigation Satellite System (GNSS) applications to support seamless intermodal transportation

In order to promote GNSS technologies, the GIT must identify users and providers; identify expert government and non-government actors in the field; use opportunities to advise users of GNSS capabilities; and share information on latest developments.

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Initiative 4: Collaborate with ICAO, IMO and other international organizations to facilitate the establishment of regional augmentation systems capability to support ICAO Assembly Resolution on Approach with Vertical Guidance (APV), and possible expansion of the use of GNSS augmentation systems for all modes of transportation.

4.3 Public/Industry Forum

In order to promote GNSS technologies the APEC GIT should provide a public/industry forum to gather all stakeholders' input. This input has been considered a critical component to ensure successful operations and implementations of GNSS.

With this remark, the APEC GIT agrees on the following strategic initiatives:

Initiative 1: Enhance two-way communication channels among government, academics and industry to gather stakeholders' perspective and requirements and best practices for GNSS infrastructure and applications.

Initiative 2: Solicit industry input by developing a questionnaire to submit to the APEC Business Advisory Council to identify applications, users and impediments of GNSS technology in the Asia-Pacific region.

Initiative 3: Follow up to the success of the APEC GNSS Technological Innovation Summit, to seek funding and resources to conduct educational and industrial seminars/conferences on GNSS technologies.

