



**INTERNATIONAL CIVIL AVIATION ORGANIZATION
ASIA AND PACIFIC OFFICE**

**REPORT OF
FIRST MEETING OF IONOSPHERIC STUDIES TASK FORCE (ISTF/1)**

Tokyo, Japan
(27 – 29 February 2012)

	Page
PART I - HISTORY OF THE MEETING	
Introduction.....	i-3
Attendance	i-3
Opening of the Meeting	i-3
Officers and Secretariat.....	i-3
Working Arrangements, Language and Documentation.....	i-3
PART II - REPORT OF AGENDA ITEMS	
Agenda Item 1: Election of chair (s) person	1
Agenda Item 2: Review of relevant meetings/conferences	1
Agenda Item 3: Status of State’s relevant activities	2
Agenda Item 4: Data collection and analysis strategy	4
- Task Force deliverables	
Agenda Item 5: Conditions for use of Data.....	4
Agenda Item 6: Review filled up Data Collection Templates.....	5
Agenda Item 7: Develop consensus on	5
- Data Collection	
o Data Collection Strategy	
o Data Collection Methodology	
- Analysis	
o Analysis Strategy	
o Analysis Methodology	
- Data Sharing	
o Data Exchange Format	
o Sharing strategy for analysis Tools	
o Result sharing strategy	
- Data Archiving	
Agenda Item 8: Any other business	7

LIST OF ATTACHMENTS

Attachment 1: List of participants

Attachment 2: List of working, information papers and presentations

LIST OF APPENDICES

Appendix A: Guidance Material/ Sample Memorandum of Understanding (MOU) for States/Administrations

Appendix B: Data sheets from States/Administrations for GNSS receiver sites and network

Appendix C: Revised Terms of Reference for Ionospheric Studies Task Force (ISTF)

PART I – HISTORY OF THE MEETING

1. Introduction

1.1 The First Meeting of Ionospheric Studies Task Force (ISTF/1) was held at Mita Kaigisho, (Mita Conference Hall), Tokyo, Japan from 27 to 28 February 2012, and at Electronic Navigation Research Institute (ENRI), Tokyo, Japan on 29 February 2012. The meeting was hosted by Japan Civil Aviation Bureau (JCAB) and ENRI.

2. Attendance

2.1 The Meeting was attended by 30 participants from 9 States/Administrations. A list of participants is provided at **Attachment 1**.

3. Opening of the Meeting

3.1 Inaugurating the meeting, Mr. Takafumi Nakada, Director CNS Planning Office, Japan Civil Aviation Bureau (JCAB) welcomed all the participants. He introduced Electronic Navigation Research Institute (ENRI) and highlighted the cooperation between JCAB and ENRI in various activities. Mr. Nakada also mentioned the initiatives taken under Collaborative Actions for Renovation of Air Traffic Services (CARATS) project highlighting significant improvements likely to accrue from it. Briefly introducing the future programmes of JCAB for the next two years, he touched upon the GBAS trials taken up in the Kansai Airfield. Mr. Kanada appreciated the creation of Ionospheric Studies Task Force (ISTF).

4. Officers and Secretariat

4.1 Dr. Susumu Saito from ENRI was the chairman and Mr. Sujan K. Saraswati, Regional Officers CNS of the ICAO Asia and Pacific Office, acted as the Secretary of the meeting.

5. Working Arrangements, Language and Documentation

5.1 The ISTF met as a single body. The working language for the meeting was English inclusive of all documentation and this Report. Lists of Working/ Information Papers and Presentations are provided at **Attachment 2**.

Adoption of agenda

5.2 The agenda adopted by the meeting was as follows:

- Agenda Item 1: Election of chair (s) person
- Agenda Item 2: Review of relevant meetings/conferences
- Agenda Item 3: Status of State's relevant activities
- Agenda Item 4: Data collection and analysis strategy
- Task Force deliverables
- Agenda Item 5: Conditions for use of Data
- Agenda Item 6: Review filled up Data Collection Templates
- Agenda Item 7: Develop consensus on
- **Data Collection**
 - o Data Collection Strategy
 - o Data Collection Methodology
 - **Analysis**
 - o Analysis Strategy
 - o Analysis Methodology
 - **Data Sharing**
 - o Data Exchange Format
 - o Sharing strategy for analysis Tools
 - o Result sharing strategy
 - **Data Archiving**
- Agenda Item 8: Any other business

Agenda Item 1: Election of chair (s) person

1.1 Starting the proceedings of the meeting, nominations for the Chairmanship of the Task Force were invited. Meeting elected Dr. Susumu Saito from ENRI as the chairman supported by Singapore, India and Hong Kong, China.

Agenda Item 2: Review of relevant meetings/conferences

2.1 Secretariat presented a brief report on the outcome of APANPIRG/22 meeting relevant to ionospheric data collection, analysis and sharing tasks. Terms of Reference adopted by the CNS/MET Sub Group in its 15th Meeting was reviewed and some changes were suggested to make them more relevant to the objectives of the Task Force. Various tasks required to be completed for the development of a regional ionospheric model were identified. It was agreed that the first step should be to confirm if there is a need to use a more complex ionospheric threat model in the APAC Regions after analysis of the shared data and then go to the next step of developing it if it is required. It was clarified that the ionospheric characterization requirements for GBAS and SBAS are different and hence different models need to be developed for them. It was concluded that there is adequate

theoretical knowledge and research experience available in the region on the basic CONUS model and the relevant ionospheric study, which will be of great help to the Task Force.

2.2 Through a Working Paper, Secretariat informed the meeting about the revision of the ICAO Navigation System Panel (NSP) document on Ionospheric effect on GNSS for aviation, which was approved by the NSP in its meeting held in October 2006. The NSP subsequently concluded in November 2010 that the vulnerability of aviation due to the increased solar activity is expected to occur in the next few years and hence the document needs to be revised. Draft of the revised document was reviewed by the NSP Whole Group meeting held from 6 to 14 December 2011. The revised document was presented to the meeting with a request to forward comment on the contents of the document to Mr. Roland Lejeune on his mailing address: rlejeune@mitre.org

2.3 Secretariat presented brief outcome of the Sixteenth Meeting of Asia Pacific Economic Cooperation (APEC) GNSS Implementation Team (GIT/16) and First Asia Oceania Space Weather Alliance (AOSWA) Workshop held from 15 to 17 and 22 to 24 February 2012 respectively. Meeting was informed that APEC GIT had agreed to share GNSS Test-bed data with the Task Force. Some economies had also agreed to share their national data. AOSWA had invited ICAO APAC Office to join the Alliance as an Associate. Task Force was of the opinion that collaborating with AOSWA will be helpful in progressing the task of the Task Force. Meeting reminded ICAO APAC office about requesting UN for identifying data sources, which can assist the Task Force in its assigned task. Meeting was informed about other projects which had been taken up within the region (Malaysia) and in other regions (Brazil) on collection of scintillation data.

Agenda Item 3: Status of State's relevant activities

3.1 States/Administrations participating in the meeting presented their status of ionospheric data collection and analysis.

Australia

3.2 Status of Ionospheric data collection and analysis in Australia was presented by Australian Space Weather Agency. Continuously Operating Reference Stations (CORS) network in Australia is operating with approximately 100 reference stations and is expected to be completed in 2012. A Kalman Filter based TEC Model has been developed and implemented in Australia. Presentation also described the works done for the implementation of GBAS.

Hong Kong China

3.3 Hong Kong China gave a presentation on their preparation for regional GBAS ionospheric study. Hong Kong China lies within the low latitude region which has more severe solar storm phenomenon. Ionospheric effect on GBAS will be crucial to its safe successful implementation. Meeting was informed that a GPS Monitoring Station had been set up in the Hong Kong International Airport to collect ionospheric data starting from December 2010. Effort was made to successfully get the consent of Hong Kong Lands Department, the owner of the Hong Kong Satellite Positioning Reference Station Network ("the Network"), to share their data subject to the agreement on the conditions of using their data. The network currently consists of 12 Continuously Operating Reference Stations (CORS) which is evenly distributed in Hong Kong China with separation distance in the range of 10 – 15 km and data sample rate of 1 second. Data back to October 2000 is available for GBAS ionospheric study in the region.

India

3.4 Presentation started with a comprehensive status report on GAGAN implementation and included India's efforts of data collection and analysis. GAGAN is expected to be certified for operation by the end of 2013. System will use geo-stationary satellites GSAT 8, 10 and 15 and includes 15 Indian Reference stations. Additionally, GAGAN had deployed 26 receivers, which provide RINEX and ISMR data with a sampling interval of 10 seconds, to study the ionosphere over Indian region. The recent results of very high intensity and long duration scintillation in the wake of coming solar maxima were presented, emphasizing significant threat to GNSS applications. In response to a query, meeting was informed that India had developed a Multi Layer Data Fusion (MLDF) model and will be implemented in the GAGAN system.

Republic of Korea

3.5 Establishment of a Technical Task Execution Group was proposed by Republic of Korea to support the objectives of Ionospheric Studies Task Force. The proposal suggested that Ionospheric Studies Task Force be divided into a number of expert groups, each expert group taking up one task. Korea supports one common model instead of individual models for each country. Republic of Korea also presented Long Term Ionospheric Anomaly Monitoring for GBAS. Limitations of currently used CONUS Threat Model for LAAS were pointed out and it was informed that this model is based on limited data and also with an excessive distance between the stations. Automated Ionospheric Front Velocity Estimation Gradient Model was briefly introduced in the presentation. The tool has been developed for mid Latitude region with maximum separation distance being 100km and the minimum being 2km. It was mentioned that a significant work needs to be done to adapt the tool for the low Latitude region. Republic of Korea GPS permanent network comprises of 86 sites, with 20 to 50 km spacing. Seasonal variations of the ionospheric effect were also discussed.

Singapore

3.6 Presentation briefed the meeting about GBAS implementation and highlighted collaboration agreement with Singapore Land Authority regarding sharing of data. CAAS, in addition has its own monitoring setup with a baseline distance of about 3km. An additional station has been proposed to specifically study the impact of landing aircraft on the performance of GBAS system. Presentation emphasized significance of data collection and issues being faced in data collection were discussed. In response to a query, it was clarified that very short baseline was chosen in consideration of the performance during the landing phase of the flight. Japan informed that ENRI, AEROTHAI and KMITL University were also studying short baseline systems.

Thailand

3.7 Regarding Ionospheric Monitoring Station, since 2010, AEROTHAI had installed the ground stations at Hat Yai International Airport, Surat Thani Airport and Suvarnabhumi International Airport. Each station is equipped with a dual frequency receiver with data logged at 1 Hz interval with an averaged data of 200 Mega Byte logged per day. Additional ground stations at Phitsanulok Airport and Chiang Mai International Airport will be installed in 2012 and at Ubon Ratchathani Airport and Udon Thani International Airport in 2013.

3.8 In addition, AEROTHAI has set up a cooperation project with Electronic Navigation Research Institute (ENRI) and King Mongkut's Institute of Technology Ladkrabang (KMITL) to conduct research and development of Short Baseline Ionospheric Study near Suvarnabhumi International Airport. AEROTHAI is also proposing to sign a contract with the Department of Public Works and Town & Country Planning for sharing of data.

USA

3.9 Presentation emphasized that it was difficult to predict depletion and scintillation, particularly since they are not observed to be related to the earth's magnetic activity. Ionospheric storm of 2003-04 was touched upon and its effects, particularly for short-time, after the operationalization of WAAS on July 1, 2003 were briefly discussed. It has been observed that WAAS receivers have better stability compared to a normal receiver, which may be attributable to the better antenna used in WAAS. Also, loss of lock for L2 was observed to be much worse as compared to L1 and as a result of that it did not become possible to calculate TEC for those periods when L2 went out of lock because of scintillation. Later, India informed that effect on L5 was also observed to be more severe than the effect observed on L1. USA informed about the tool developed to automatically pull out the depletions from the data. Presentation also introduced SBAS Ionospheric Working Group (IWG) engaged in studying ionospheric effects on the performance of SBAS. Structure of scintillation monitor used in USA was explained.

Philippines

3.10 Philippines is using 13 stations to collect data since 2007, 4 additional stations will be added by NAMRIA with a target system of 38 stations in the coming years. These receivers are controlled and operated by the National Mapping and Resource Information Authority (NAMRIA). Agreement between CAAP and NAMRIA is still under negotiations regarding data sharing and restrictions, it is hoped that it will be finalized this year.

Japan

3.11 GEONET, with more than 1200 receivers all over the Japan, is being used for data collection. 200 receivers were selected by ENRI to collect data at 1 Hz interval. The number has been optimized in view of the data cost and priority for data in low latitude region. Short baseline measurements are being conducted in Ishigaki, Japan and in Bangkok in collaboration with KMITL and AEROTHAI, and such measurements are also planned in Indonesia.

Agenda Item 4: Data collection and analysis strategy

4.1 It was decided that this Agenda Item should be discussed along with Agenda Item 7. The relevant discussion has been reported under Agenda Item 7.

Agenda Item 5: Conditions for use of Data

5.1 It was agreed that two kinds of data will be handled in the ionospheric study, one will be the shared data received from the States/Administrations and the other will be the outcome of analysis of the shared data. It was therefore suggested that two different sets of conditions need to be considered for handling these two kinds of data. It was generally agreed that the shared data should be subject to the condition defined by the data source and the conditions for handling the outcome of analysis of the shared data may be taken up at a later date after the project has progressed. It was decided that the Task Force will focus on the aviation application of the study and will concentrate on the development of ionospheric models for GBAS/SBAS in this region should the need be identified.

5.2 The Task Force went through the document shared by Hong Kong China regarding the conditions of using the data captured by the Hong Kong Satellite Positioning Reference Station Network and adopted it as the guidance material and sample MOU for States to enter into similar data sharing agreement with their national organizations. The meeting also agreed after deliberation that the condition on purely using the shared data for the study and development of ionospheric model in Asia and Pacific Region for satellite-based air navigation, as highlighted in the document shared by

Hong Kong China, shall be adopted as the standard wording in similar MOU or agreement to be made by States in this region. A copy of the document is provided in **Appendix A** as guidance material/sample MOU for States. Following agreement was made during the course of the meeting on data sharing issue:

Decision 1/1 - Agreement on use of Shared Data

That, the shared data should only be used for the study and development of ionospheric model in the Asia/Pacific Region for the purpose of satellite-based air navigation.

Agenda Item 6: Review filled up Data Collection Templates

6.1 Meeting was reminded that a data collection template was circulated by ICAO APAC Office, through a State Letter in June, 2011. Response had been received from India, USA and Singapore. During the course of the meeting, data collection information in the prescribed template was also provided by Japan, Hong Kong China, Thailand and Australia. Republic of Korea agreed to share their data collection information. Japan agreed to prepare a consolidated summary based on the data sheets from States/Administrations for GNSS receiver sites and network. Data sheets containing information of GNSS receiver sites and network in different States/Administrations are included as **Appendix B** to this Report.

Agenda Item 7: Develop consensus on

- **Data Collection**
 - o Data Collection Strategy
 - o Data Collection Methodology
- **Analysis**
 - o Analysis Strategy
 - o Analysis Methodology
- **Data Sharing**
 - o Data Exchange Format
 - o Sharing strategy for analysis Tools
 - o Result sharing strategy
- **Data Archiving**

7.1 Meeting reviewed the information provided by Republic of Korea and it was decided that the ionospheric study should be task based. The following five sets of tasks and the corresponding task leads were identified in the meeting:

Sequence	Tasks	Description	Task Details	Task Lead
First	DATA COLLECTION	Collection, integration, administration and distribution of data collected from States and Administrations	<ul style="list-style-type: none"> • Identification of data sources, data collection, sharing, distribution and archiving • Defining data sharing format 	Dr. Susumu Saito (Japan)
	IONO ANALYSIS	Formulation of ionosphere analysis methodologies, data analysis and characterization of the ionosphere to generate information required for completion of the IONO MODEL task	<ul style="list-style-type: none"> • Identification of analysis methodology • Analysing ionospheric data and characterizing the ionosphere 	Mr. Jong-kyun Chung (ROK)
Second	TEC GENERATION	Generation of regional TEC gradient information for ionospheric study in the Asia/Pacific region	<ul style="list-style-type: none"> • Generation of ionospheric TEC gradient information in the region 	Dr. Michael Terkildsen (Australia)
	SCINTILLATION DATA	Generation of regional scintillation information for ionospheric study in the Asia/Pacific region	<ul style="list-style-type: none"> • Generation of ionospheric scintillation information in the region 	Dr. Michael Terkildsen (Australia)
Third	IONO MODEL	Review of the information from IONO ANALYSIS/ TEC GENERATION/ SCINTILLATION DATA and development of GBAS and SBAS models for the Asia/Pacific region if needed	<ul style="list-style-type: none"> • Identification of the need for regional GBAS and SBAS ionospheric models • Development of these regional models if required 	GBAS: Dr. Takayuki Yoshihara (Japan)
				SBAS: Dr. Takeyasu Sakai (Japan)

It was also agreed not to create separate Sub Groups and the Task Leads identified should communicate with other members of the Task Force through e-mail.

7.2 The Task Force considered that for the equatorial region, the CONUS model may not be appropriate for GBAS since it was developed specifically for mid-latitude region. It was understood that in equatorial region, very steep TEC gradients are observed and CONUS model was not designed to work for such steep gradients.

7.3 Republic of Korea informed that plasma bubbles have not been observed over the main land in its territory, however there is a possibility that they may appear over Jeju Islands. Australia also informed absence of depletion and hence confirmed suitability of CONUS model in the mid-latitude Australia but not sure for the northern Australia. Other States/Administration echoed that depletion and scintillation are a major issue in the region. It was therefore agreed that a common threat model should be developed for the region.

7.4 Task Lead for Data Collection task informed the meeting that a draft guideline for data collection (data format, period of interest etc.) will be developed and will be circulated to the Task Force members. Task Leads were reminded that though they will be required to report the progress in the next Task Force meeting, they should keep members informed of the significant development of task under their purview through e-mail.

7.5 Task Force decided that a mechanism for sharing the data in the data archive should be worked out. A suggestion was made to create a web based forum to exchange information. ICAO APAC Office was invited to look into the possibility of accommodating this requirement in the regional website. ICAO APAC Office will advise the feasibility in the next Task Force meeting.

7.6 Task Force reviewed Terms of Reference adopted by the CNS/MET Sub Group in its 15th Meeting and proposed amendments to explicitly spell out the objectives of the Task Force. Meeting recommended to modify items 6 and 7 of the Terms of Reference and formulated following Draft Decision for consideration by the CNS/MET Sub-group:

Draft Decision 1/2 - Terms of Reference of ISTF

That, the revised Terms of Reference for Ionospheric Studies Task Force (ISTF) provided in **Appendix C** to the Report be adopted.

Agenda Item 8: Any other business

8.1 USA informed the meeting about the 3rd China Satellite Navigation Conference (CSNC) to be held from 15 to 19 May 2012 in Guangzhou, China. Agenda for the Conference was presented in the meeting and members were invited to attend.

8.2 Task Force accepted the proposal from Hong Kong China to invite CNS/MET Sub Group to urge the States, which are not participating in the Task Force, to share ionospheric data from their national sources and developed the following draft Conclusion:

Draft Conclusion 1/3 - Sharing of ionospheric data

That, the States which are not participating in the Ionospheric Studies Task Force be urged to share ionospheric data from their national sources with the Task Force to support development of regional ionospheric models for GBAS and SBAS.

8.3 Periodicity of the meetings was discussed in detail. Some members were of the opinion that the meetings should be held once in six months in its initial phase in view of the forthcoming solar storm and the urgency of developing a harmonized approach for data collection and analysis to maximize the benefits. After reviewing the resource constraints and expected progress of the tasks identified in the meeting, it was decided that the Second meeting of the Task Force should be held in October 2012 and the Third meeting should be scheduled tentatively for April 2013.

8.4 Technical tour to ENRI was organized on 29 February 2012. Task Force was briefed about various projects that had been taken up in the ENRI, which included the proposal to use SSR Mode S data link communication, implementation of Multilateration in Haneda Airport, and electromagnetic environment measurement. In a brief presentation, information on the GBAS trials conducted in Kansai Airport and the data collection setup was explained. Task Force members were invited to ENRI International Workshop on ATM/CNS (EIWAC 2013), which will be held in Tokyo, Japan in 2013. Task Force was also briefed about the QZSS programme taken up in Japan. Infrastructure resources in ENRI were introduced. Simple GNSS data collection system and precise ionospheric delay difference estimation method were demonstrated.

8.5 Task Force once again appreciated the excellent secretariat support from the ICAO APAC Office, and thanked Japan Civil Aviation Bureau and the Electronic Navigation Research Institute for hosting the meeting and for the arrangements made.

Conditions of use of the Hong Kong Satellite Positioning Reference Station Data

1. The Hong Kong Satellite Positioning Reference Station Data ("Data") are only provided for reference and for uses in connection with the "Study and Development of Ionospheric Model in Asia and Pacific Region for Satellite-based air navigation". The prior written consent of the Government of the Hong Kong Special Administrative Region ("Government") is required if users want to use the Data in any way other than that permitted above. Request for consent should be sent to Geodetic Survey Section, Survey and Mapping Office of Lands Department (geodetic@landsd.gov.hk).

Disclaimer

2. No express or implied warranty, representation or statement is given or made by the Government as to the accuracy, completeness, timeliness and fitness for a particular purpose of the Data. The Government will not be liable for any errors in, omissions from, or misstatements or misrepresentations (whether express or implied) concerning any Data, and will not have or accept any liability, obligation or responsibility whatsoever for any loss, destruction or damage (including without limitation, special, incidental, indirect or consequential loss, destruction or damage) however arising from or in respect of any use or misuse of or reliance on the Data or inability to use them.

Users of the Data shall be responsible for making their own assessment of the Data and are advised to verify the Data by making reference, for example, to original publications and obtaining independent professional advice before acting upon them.

ISTF/1
Appendix B to the Report

Data sheet for GNSS Receiver Network (Ionospheric Delay)

State:

Australia

Date: Jan

2012

Filled by:

M.Terkildsen

(IPS / Bureau

of

Meteorology)

4: Gradient

3: Vertical delay at grid-

point

2: Slant delay

1: Rinex

0: Rec. specific rawdata

Network Name	Latitude range (deg.)		Longitude range (deg.)		Source Data					Shared Data						
	From:	To:	From:	To:	Number of Receivers	Minimum Receiver Distance (km)	Receiver Type	Data Type	Sampling Interval (sec)	Operated by	Ownership	Sampling Interval (sec)	Period From:	To:	Shared Data Levels	Restriction
ARGN / Auscope	-45	-10	110	155	80	~100	various	RINEX	1,30	Geoscience Australia / Various state agencies	Geoscience Australia / Various state agencies	1,30	various; after y2000	now	1	
SPRGN	-22	10	145	205	12	600	various	RINEX	30	Geoscience Australia	Geoscience Australia	30	various; after y2001	now	1	

Comment: Various short-baseline state CORS networks have not explicitly been included here. The data from these networks is not freely available and access is on a cost recovery or negotiated basis

ISTF/1
Appendix B to the Report

Data sheet for Receiver Sites (Ionospheric Delay)
State: Australia

Date: Jan 2012
Filled by:
M.Terkildsen
(IPS / Bureau of
Meteorology)

4: Gradient
3: Vertical delay at grid-
point

2: Slant delay
1: Rinex
0: Rec. specific rawdata

				Source Data				Shared Data					
Site Name	Latitude (deg.)	Longitude (deg.)	Altitude (m)	Receiver Type	Data Type	Sampling Interval (sec)	Operated by	Ownership	Sampling Interval (sec)	Period From:	To:	Shared Data Levels	Restriction
Darwin (dwni)	-12.4433	130.9559	87.7	GSV-4004B	NovAtel Binary	30	BoM / IPS	BoM / IPS	30	6/3/2010	now	1,2,3	Secondary Distribution Prohibited
Weipa (weip)	-12.6783	141.9205	87.9	GSV-4004B	NovAtel Binary	30	BoM / IPS	BoM / IPS	30	1/1/2010	now	1,2,3	Secondary Distribution Prohibited
Willis Is (wili)	-16.2874	149.9648	78	GSV-4004B	NovAtel Binary	30	BoM / IPS	BoM / IPS	30	12/13/2010	now	1,2,3	Secondary Distribution Prohibited
Learmonth (lear)	-22.2185	114.1031	1	NovAtel OEMV	NovAtel Binary	30	BoM / IPS	BoM / IPS	30	9/13/2011	now	1,2,3	Secondary Distribution Prohibited
Culgoora (culg)	-30.3142	149.5664	247.7	NovAtel OEMV	NovAtel Binary	30	BoM / IPS	BoM / IPS	30	9/12/2011	now	1,2,3	Secondary Distribution Prohibited
Lord Howe Is (ldhi)	-31.5415	159.0785	42.8	NovAtel OEMV	NovAtel Binary	30	BoM / IPS	BoM / IPS	30	1/1/2010	now	1,2,3	Secondary Distribution Prohibited
Macquarie Is	-54.4998	158.9359	0	GSV-4004B	NovAtel Binary	30	BoM / IPS	BoM / IPS	30	6/1/2011	now	1,2,3	Secondary Distribution

ISTF/1
Appendix B to the Report

Data sheet for Receiver Sites (Ionospheric Scintillation)
 State: Australia
 Date: Jan 2012
 Filled by:
 M.Terkildsen
 (IPS / Bureau of
 Meteorology)

3: Irregularity drift velocity

2: Scintillation index
 1: Rawdata in common
 format

0: Receiver specific rawdata

				Source Data				Shared data					
Site Name	Latitude (deg.)	Longitude (deg.)	Altitude (m)	Receiver Type	Data Type	Sampling Interval (sec)	Operated by	Ownership	Sampling Interval (sec)	Period From:	To:	Shared Data Levels	Restriction
Darwin (dwri)	-12.4433	130.9559	87.7	GSV-4004B	GSV Binary	60	BoM / IPS	BoM / IPS	60	6/10/2010	now	2,1	Secondary Distribution Prohibited
Weipa (weip)	-12.6783	141.9205	87.9	GSV-4004B	GSV Binary	60	BoM / IPS	BoM / IPS	60	1/7/2010	now	2,1	Secondary Distribution Prohibited
Willis Is (will)	-16.2874	149.9648	78	GSV-4004B	GSV Binary	60	BoM / IPS	BoM / IPS	60	12/13/2010	now	2,1	Secondary Distribution Prohibited
Macquarie Is	-34.4998	158.9359	0	GSV-4004B	GSV Binary	60	BoM / IPS	BoM / IPS	60	6/11/2011	now	2,1	Secondary Distribution Prohibited

ISTF/1
Appendix B to the Report

Data sheet for GNSS Receiver Network (Ionospheric Delay)

State: Hong Kong, China
Date: 13-Jan-12
Filled by: George Wong

4: Gradient
3: Vertical delay at grid-point
2: Slant delay
1: Rinex
0: Rec. specific rawdata

Network Name	(deg.)		(deg.)		Source Data						Shared Data					
	From:	To:	From:	To:	Number of Receivers	Receiver Distance (km)	Receiver Type	Data Type	Sampling Interval (sec)	Operated by	Ownership	Sampling Interval (sec)	Period From:	To:	Shared Data Levels	Restriction
The Hong Kong Satellite Positioning Reference Station Network	22.25	22.49	113.89	114.34	12		Leica CRS1000 Leica SR530 Leica GRX1200Pro Leica GRX1200+GNSS	RINEX	5 (current)	Lands Department, The Government of the Hong Kong Special Administrative Region	Lands Department, The Government of the Hong Kong Special Administrative Region	5	10/5/2000	12/31/2015	1	Subject to the agreed conditions of use of data. For This Project Only

ISTF/1
Appendix B to the Report

Data sheet for Receiver Sites (Ionospheric Delay)
State: Hong Kong, China

Date: 13-Jan-12
Filled by: George Wong

4: Gradient
3: Vertical delay at grid-point
2: Slant delay
1: Rinex
0: Rec. specific rawdata

				Source Data				Shared Data					
Site Name	Latitude (deg.)	Longitude (deg.)	Altitude (m)	Receiver Type	Data Type	Sampling Interval (sec)	Operated by	Ownership	Sampling Interval (sec)	Period From:	To:	Shared Data Levels	Restriction
CAD GPS Monitoring Site (HKIA) - Ant1	22.30841745	113.89391605	WGS84 Altitude (m) = 10.084 Height above MSL (m) = 13.265	Novatel OEMV-3	Novatel OEMV-3 binary format	1	CivilAviation Department, The Government of the Hong Kong Special Administrative Region	CivilAviation Department, The Government of the Hong Kong Special Administrative Region	1	12/1/2010	12/31/2015	1	Subject to the agreed conditions of use of data. For This Project Only
CAD GPS Monitoring Site (HKIA) - Ant2	22.30846094	113.89389863	WGS84 Altitude (m) = 9.917 Height above MSL (m) = 13.098	Novatel OEMV-3	Novatel OEMV-3 binary format	1	CivilAviation Department, The Government of the Hong Kong Special Administrative Region	CivilAviation Department, The Government of the Hong Kong Special Administrative Region	1	12/1/2010	12/31/2015	1	Subject to the agreed conditions of use of data. For This Project Only

ISTF/1
Appendix B to the Report

Data sheet for Receiver Sites (Ionospheric Delay)
 State: Hong Kong, China
 Date: 13-Jan-12
 Filled by: George Wong

4: Gradient
 3: Vertical delay at grid-point
 2: Slant delay
 1: Rinex
 0: Rec. specific rawdata

				Source Data				Shared Data					
Site Name	Latitude (deg.)	Longitude (deg.)	Altitude (m)	Receiver Type	Data Type	Sampling Interval (sec)	Operated by	Ownership	Sampling Interval (sec)	Period From:	To:	Shared Data Levels	Restriction
CAD GPS Monitoring Site (HKIA) - Ant1	22.30841745	113.89391605	WGS84 Altitude (m) = 10.084 Height above MSL (m) = 13.265	Novatel OEMV-3	Novatel OEMV-3 binary format	1	CivilAviation Department, The Government of the Hong Kong Special Administrative Region	CivilAviation Department, The Government of the Hong Kong Special Administrative Region	1	12/1/2010	12/31/2015	1	Subject to the agreed conditions of use of data. For This Project Only
CAD GPS Monitoring Site (HKIA) - Ant2	22.30846094	113.89389863	WGS84 Altitude (m) = 9.917 Height above MSL (m) = 13.098	Novatel OEMV-3	Novatel OEMV-3 binary format	1	CivilAviation Department, The Government of the Hong Kong Special Administrative Region	CivilAviation Department, The Government of the Hong Kong Special Administrative Region	1	12/1/2010	12/31/2015	1	Subject to the agreed conditions of use of data. For This Project Only

Data sheet for GNSS Receiver Network (Ionospheric Delay)

State: INDIA
 Date: 1-Jun-11
 Filled by: Surendra Sunda, Airports Authority of India

Network Name	Latitude range (deg.)		Longitude range (deg.)		Number of Receiver	Minimum Receiver Distance (km)	Receiver Type	Data Type	Samp. Interval (sec)	Operated by	Shared Data Level Restriction	
	From:	To:	From:	To:							1	Secondary Distribution Prohibite
GAGAN-TEC	8.5	31	72.2	92.7	26	400	GSV4004, OEMV3	RAW BINAf	10	AAI/ISRO	1	Secondary Distribution Prohibite

Data sheet for Receiver Sites (Ionospheric Delay)

State: INDIA
Date: 1-Jun-11
Filled by: Surendra Sunda, Airports Authority of India

Site Name	Latitude (deg.)	Longitude (deg.)	Altitude (m)	Receiver Type	Data Type	Samp. Interval (sec)	Operated by	Shared Data Level Restriction
AHM	23.02	72.51	121.3	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
AIZ	23.84	92.67	452.3	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
AGT	10.83	72.17	17.3	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
BBN	20.25	85.8	43.9	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
BGD	26.68	88.32	185.4	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
BNG	12.95	77.68	983.9	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
BHO	23.28	77.34	596.2	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
DEL	28.56	77.22	233.9	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
GAY	24.74	84.94	123.8	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
GWH	26.12	91.59	102.2	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
HUB	15.36	75.08	681.5	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
HYD	17.45	78.47	550	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
JOD	26.26	73.05	275.6	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
KOL	22.64	88.44	25.6	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
LKN	26.76	80.88	214.2	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
MDR	9.83	78.09	154.8	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
MUM	19.09	72.85	15.7	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
PBR	11.65	92.73	24.5	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
RPR	21.18	81.74	342	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
SHM	31.08	77.06	1562.3	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
TRV	8.47	76.92	39.7	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
VZG	17.78	83.22	24.7	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
KHA	24.82	79.92	239.6	GSV 4004	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
NAG	21.08	79.06	324.2	lovatel OEM V:	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
AUR	19.86	75.39	594.2	lovatel OEM V:	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited
AGR	27.16	77.97	179.3	lovatel OEM V:	Raw Binary	10	AAI/ISRO	1 Secondary Distribution Prohibited

Data sheet for GNSS Receiver Network (Ionospheric Scintillation)

State: INDIA
Date: 1-Jun-11
Filled by: Surendra Sunda, Airports Authority of India

Network Name	Latitude range (deg.)		Longitude range (deg.)		Number of Receivers	Minimum Receiver Distance (km)	Receiver Type	Data Type	Samp. Interval (sec)	Operated by	Shared Data Level	Restriction
	From:	To:	From:	To:								
GAGAN-TEC	8.5	31	72.2	92.7	23	400	GSV 4004	Raw Binary	0.02	AAI/ ISRO	2	Secondary Distribution Prohibited

Data sheet for GNSS Receiver Network (Ionospheric Scintillation)

State: INDIA
Date: 1-Jun-11
Filled by: Surendra Sunda, Airports Authority of India

Network Name	Latitude range (deg.)		Longitude range (deg.)		Number of Receivers	Minimum Receiver Distance (km)	Receiver Type	Data Type	Samp. Interval (sec)	Operated by	Shared Data Level	Restriction
	From:	To:	From:	To:								
GAGAN-TEC	8.5	31	72.2	92.7	23	400	GSV 4004	Raw Binary	0.02	AAI/ ISRO	2	Secondary Distribution Prohibited

ISTF/1
Appendix B to the Report

Data sheet for GNSS Receiver Network (Ionospheric Delay)
State: Japan

Date: 23-Feb-12
Filled by: Susumu Saito/ENRI

4: Gradient
3: Vertical delay at grid-point
2: Slant delay
1: Rinex
0: Rec. specific rawdata

Network Name	Latitude range (deg.)		Longitude range (deg.)		Source Data					Shared Data					
	From:	To:	From:	To:	Number of Receivers	Minimum Receiver Distance (km)	Receiver Type	Data Type	Sampling Interval (sec)	Operated by	Ownership	Sampling Interval (sec)	Period From:	To:	Shared Data Levels
GEONET	24	45.5	123	154	200	10	RINEX	1,30	Geospatial Information Authority of Japan	ENRI	1,30	4/1/2008	now	4,2	For This Project Only

ISTF/1
Appendix B to the Report

Data sheet for Receiver Sites (Ionospheric Delay)
State: Japan

Date: 23-Feb-12
Filled by: Susumu Saito/ENRI

4: Gradient
3: Vertical delay at grid-point
2: Slant delay
1: Rinex
0: Rec. specific rawdata

				Source Data				Shared Data					
Site Name	Latitude (deg.)	Longitude (deg.)	Altitude (m)	Receiver Type	Data Type	Sampling Interval (sec)	Operated by	Ownership	Sampling Interval (sec)	Period From:	To:	Shared Data Levels	Restriction
ENRI-Ishigaki-1	24.34	124.17	38	Novatel Euro-3	NovAtel Binary	0.5	ENRI	ENRI	0.5	4/1/2008	now	4,2,1	Secondary Distribution Prohibited
ENRI-Ishigaki-2	24.34	124.17	32	Novatel Euro-3	NovAtel Binary	0.5	ENRI	ENRI	0.5	4/1/2008	now	4,2,1	Secondary Distribution Prohibited
ENRI-Ishigaki-3	24.34	124.16	32	Novatel Euro-3	NovAtel Binary	0.5	ENRI	ENRI	0.5	4/1/2008	now	4,2,1	Secondary Distribution Prohibited
ENRI-Ishigaki-4	24.34	124.17	30	Novatel Euro-3	NovAtel Binary	0.5	ENRI	ENRI	0.5	4/1/2008	now	4,2,1	Secondary Distribution Prohibited
ENRI-Ishigaki-5	24.34	124.17	30	Novatel Euro-3	NovAtel Binary	0.5	ENRI	ENRI	0.5	4/1/2008	now	4,2,1	Secondary Distribution Prohibited

ISTF/1
Appendix B to the Report

Data sheet for GNSS Receiver Network (Ionospheric Scintillation)
 State: Japan
 Date: 23-Feb-12
 Filled by: Susumu Saito/ENRI

3: Irregularity drift velocity
 2: Scintillation index
 1: Rawdata in common
 format
 0: Receiver specific rawdata

Name	Latitude range (deg.)		Longitude range (deg.)		Source Data						Shared Data					
	From:	To:	From:	To:	Receivers	Receiver	Receiver Type	Data Type	Sampling Interval	Operated by	Ownership	Sampling Interval	From:	To:	Shared Data Levels	Restriction
ENRI-Ishigaki	24.32	24.345	124.159	124.172	4	0.4	GSV-4004B	GSV Binary	0.02	ENRI	ENRI	0.02,60	4/1/2007	now	2,1	Secondary Distribution Prohibited
ENRI-Japan	24	45.5	123	154	4		GSV-4004,GSV-4004B	GSV Binary	0.02	ENRI	ENRI	0.02,60	4/1/2007	now	2,1	Secondary Distribution Prohibited

ISTF/1
Appendix B to the Report

Data sheet for Receiver Sites (Ionospheric Scintillation)

State: Japan

Date: 23-Feb-12

Filled by: Susumu Saito/ENRI

3: Irregularity drift velocity

2: Scintillation index

1: Rawdata in common format

0: Receiver specific rawdata

				Source Data				Shared data					
Site Name	Latitude (deg.)	Longitude (deg.)	Altitude (m)	Receiver Type	Data Type	Sampling Interval (sec)	Operated by	Ownership	Sampling Interval (sec)	Period From:	To:	Shared Data Levels	Restriction
ENRI-Ishigaki-1	24.34	124.17	38	GSV-4004B	GSV Binary	0.02	ENRI	ENRI	0.02,60	4/1/2007	now	2,1	Secondary Distribution Prohibited
ENRI-Ishigaki-2	24.34	124.17	32	GSV-4004B	GSV Binary	0.02	ENRI	ENRI	0.02,60	4/1/2007	now	2,1	Secondary Distribution Prohibited
ENRI-Ishigaki-3	24.34	124.16	32	GSV-4004B	GSV Binary	0.02	ENRI	ENRI	0.02,60	4/1/2007	now	2,1	Secondary Distribution Prohibited
ENRI-Ishigaki-4	24.34	124.17	30	GSV-4004B	GSV Binary	0.02	ENRI	ENRI	0.02,60	4/1/2007	now	2,1	Secondary Distribution Prohibited
ENRI-Ishigaki-5	24.34	124.17	30	GSV-4004B	GSV Binary	0.02	ENRI	ENRI	0.02,60	4/1/2007	now	2,1	Secondary Distribution Prohibited
ENRI-Wakkanai	45.36	141.81		GSV-4004	GSV Binary	0.02	ENRI	ENRI	0.02,60	4/1/2007	now	2,1	Secondary Distribution Prohibited
ENRI-Chofu	35.68	139.56		GSV-4004	GSV Binary	0.02	ENRI	ENRI	0.02,60	4/1/2007	now	2,1	Secondary Distribution Prohibited
ENRI-Hirara	24.79	125.3		GSV-4004	GSV Binary	0.02	ENRI	ENRI	0.02,60	4/1/2007	now	2,1	Secondary Distribution Prohibited
ENRI-Yonaguni	24.47	123.02		GSV-4004B	GSV Binary	0.02	ENRI	ENRI	0.02,60	4/1/2007	now	2,1	Secondary Distribution Prohibited

Data sheet for GNSS Receiver Network (Ionospheric Delay)

State: Singapore

Date: 28-Jun-11

Filled by: Gao Shu

4: Gradient
3: Vertical delay at grid-point
2: Slant delay
1: Rinex
0: Rec. specific rawdata

Network Name	Latitude range (deg.)		Longitude range (deg.)		Source Data					Shared Data						
	From:	To:	From:	To:	Number of Receivers	Minimum Receiver Distance (km)	Receiver Type	Data Type	Sampling Interval (sec)	Operated by	Ownership	Sampling Interval (sec)	Period From:	To:	Shared Data Levels	Restriction
SiReNt	1.210413200	1.4703765	103.6799379	103.9716568	6	10	Trimble NetRS/NetRB	RINEX	1	Singapore Land Authority	Singapore Land Authority	1	8/1/2008	now	1	Other: [Sharing of data under discussion now]

Note: 4 new monitoring stations will be installed at Singapore Changi Airport by end 2011. (Information of these new stations in accordance to this Template format will be provided later).

ISTF/1
Appendix B to the Report

Data sheet for Receiver Sites (Ionospheric Delay)
State: Singapore

Date: 28-Jun-11
Filled by: Gao Shu

4: Gradient
3: Vertical delay at grid-point
2: Slant delay
1: Rinex
0: Rec. specific rawdata

				Source Data				Shared Data					
Site Name	Latitude (deg.)	Longitude (deg.)	Altitude (m)	Receiver Type	Data Type	Sampling Interval (sec)	Operated by	Ownership	Sampling Interval (sec)	Period From:	To:	Shared Data Levels	Restriction
SNYP	1.379138269	103.8487486	55.5	Trimble NetRS	RINEX	1	Singapore Land Authority	Singapore Land Authority	1	8/1/2008	now	1	Other: [Sharing of data under discussion now]
SNTU	1.345813636	103.6799379	76.1	Trimble NetRS	RINEX	1	Singapore Land Authority	Singapore Land Authority	1	8/1/2008	now	1	Other: [Sharing of data under discussion now]
SLOY	1.372637075	103.9716568	50.9	Trimble NetRS	RINEX	1	Singapore Land Authority	Singapore Land Authority	1	8/1/2008	now	1	Other: [Sharing of data under discussion now]
SSEK	1.470376497	103.8145138	40.7	Trimble NetRS	RINEX	1	Singapore Land Authority	Singapore Land Authority	1	8/1/2008	now	1	Other: [Sharing of data under discussion now]
SKEP	1.267176228	103.8072043	37.5	Trimble NetRS	RINEX	1	Singapore Land Authority	Singapore Land Authority	1	8/1/2008	now	1	Other: [Sharing of data under discussion now]
SSMK	1.210413200	103.7754165	25.4	Trimble NetR8	RINEX	1	Singapore Land Authority	Singapore Land Authority	1	8/21/2009	now	1	Other: [Sharing of data under discussion now]

ISTF/1
Appendix B to the Report

Data sheet for GNSS Receiver Network (Ionospheric Scintillation)
 State: Singapore
 Date: 28-Jun-11
 Filled by: Gao Shu

3: Irregularity drift velocity
 2: Scintillation index
 1: Rawdata in common
 format
 0: Receiver specific rawdata

Network Name	Latitude range (deg.)		Longitude	Source Data						Shared Data					
	From:	To:	From:	Number of Receivers	Minimum Receiver Distance (km)	Receiver Type	Data Type	Sampling Interval (sec)	Operated by	Ownership	Sampling Interval (sec)	Period From:	To:	Shared Data Levels	Restriction

Singapore does not have any Ionospheric Scintillation Measurement

ISTF/1
Appendix B to the Report

Data sheet for Receiver Sites (Ionospheric Scintillation)

State: Singapore
Date: 28-Jun-11
Filled by: Gao Shu

3: Irregularity drift velocity
2: Scintillation index
1: Rawdata in common format

0: Receiver specific rawdata

				Source Data				Shared data					
Site Name	Latitude (deg.)	Longitude (deg.)	Altitude (m)	Receiver Type	Data Type	Sampling Interval (sec)	Operated by	Ownership	Sampling Interval (sec)	Period From:	To:	Shared Data Levels	Restriction

Singapore does not have any Ionospheric Scintillation Measurement Station.

ISTF/1
Appendix B to the Report

Data sheet for GNSS Receiver Network (Ionospheric Delay)
State: Thailand

Date: February 28, 2012
Filled by: Nattapong Siansawasdi

4: Gradient
3: Vertical delay at grid-point
2: Slant delay
1: Rinex
0: Rec. specific rawdata

Network Name	Latitude range (deg.)		Longitude range (deg.)		Source Data						Shared Data					
	From:	To:	From:	To:	Number of Receivers	Minimum Receiver Distance (km)	Receiver Type	Data Type	Sampling Interval (sec)	Operated by	Ownership	Sampling Interval (sec)	Period From:	To:	Shared Data Levels	Restriction
AEROTHAI	06 56 10.82428	18 45 21.339	98 57 42.303	100 45 38.94116	4	300	Novatel OEMV-3	Novotel binary format	1	AEROTHAI	AEROTHAI	1	May 2010	now	0	Secondary Distribution Prohibited

ISTF/1
Appendix B to the Report

Data sheet for Receiver Sites (Ionospheric Delay)
State: Thailand

Date: February 28, 2012
Filled by: Nattapong Siansawasdi

4: Gradient
3: Vertical delay at grid-point
2: Slant delay
1: Rinex
0: Rec. specific rawdata

				Source Data				Shared Data					
Site Name	Latitude (deg.)	Longitude (deg.)	Altitude (m)	Receiver Type	Data Type	Sampling Interval (sec)	Operated by	Ownership	Sampling Interval (sec)	Period From:	To:	Shared Data Levels	Restriction
AEROTHAI-VTBS	13 41 40.23819	100 45 38.94116	WGS84 Altitude (m) = 7.34	Novatel OEMV-3	Novotel binary format	1	AEROTHAI	AEROTHAI	1	April 2011	now	0	Secondary Distribution Prohibited
AEROTHAI-VTCC	18 45 21.339	98 57 42.303	WGS84 Altitude (m) = 337.52	Novatel OEMV-3	Novotel binary format	1	AEROTHAI	AEROTHAI	1	March 2012	now	0	Secondary Distribution Prohibited
AEROTHAI-VTSS	06 56 10.82428	100 23 44.35901	WGS84 Altitude (m) = 42.92	Novatel OEMV-3	Novotel binary format	1	AEROTHAI	AEROTHAI	1	April 2011	now	0	Secondary Distribution Prohibited
AEROTHAI-VTSB	09 07 12.74140	99 07 29.74934	WGS84 Altitude (m) = 12.1	Novatel OEMV-3	Novotel binary format	1	AEROTHAI	AEROTHAI	1	May 2010	now	0	Secondary Distribution Prohibited

ISTF/1
Appendix B to the Report

Data sheet for GNSS Receiver Network (Ionospheric Scintillation)
 State: Thailand
 Date: February 28, 2012
 Filled by: Nattapong Siansawasdi

3: Irregularity drift velocity
 2: Scintillation index
 1: Rawdata in common
 format
 0: Receiver specific rawdata

Latitude range (deg.)		Longitude range (deg.)		Source Data							Shared Data					
Network Name	From:	To:	From:	To:	Number of Receivers	Receiver Distance (km)	Receiver Type	Data Type	Interval (sec)	Operated by	Ownership	Interval (sec)	Period From:	To:	Shared Data Levels	Restriction

ISTF/1
Appendix B to the Report

Data sheet for Receiver Sites (Ionospheric Scintillation)
 State: Thailand
 Date: February 28, 2012
 Filled by: Nattapong Siansawasdi

3: Irregularity drift velocity
 2: Scintillation index
 1: Rawdata in common format
 0: Receiver specific rawdata

				Source Data				Shared data					
Site Name	Latitude (deg.)	Longitude (deg.)	Altitude (m)	Receiver Type	Data Type	Sampling Interval (sec)	Operated by	Ownership	Sampling Interval (sec)	Period From:	To:	Shared Data Levels	Restriction

ISTF/1
Appendix B to the Report

Data sheet for GNSS Receiver Network (Ionospheric Delay)
State: United States

Date: 7/6/2011
Filled by: Bill Wanner

4: Gradient
3: Vertical delay at grid-point
2: Slant delay
1: Rinex
0: Rec. specific rawdata

Network Name	Latitude range (deg.)		Longitude range (deg.)		Source Data						Shared Data					
	From:	To:	From:	To:	Number of Receivers	Minimum Receiver Distance (km)	Receiver Type	Data Type	Sampling Interval (sec)	Operated by	Ownership	Sampling Interval (sec)	Period From:	To:	Shared Data Levels	Restriction
WAAS	14	71	-162	-54	114		Novatel G2 WAAS	WAAS Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now		0	No Restriction
National Satellite Test Bed (NSTB)	21	39	-157	-74	11		Trimble Net RS, Novatel G2 WAAS, Novatel OEM4, Novatel Euro Pak 3M, Novatel G2 Scintillation, Novatel ProPak G2	NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now		0	No Restriction

ISTF/1
Appendix B to the Report

Data sheet for Receiver Sites (Ionospheric Delay)

State: United States

Date: July 6, 2011

Filled by: Bill Wanner

4: Gradient
3: Vertical delay at grid-point
2: Slant delay
1: Rinex
0: Rec. specific rawdata

				Source Data				Shared Data					
Site Name	Latitude (deg.)	Longitude (deg.)	Altitude (m)	Receiver Type	Data Type	Sampling Interval (sec)	Operated by	Ownership	Sampling Interval (sec)	Period From:	To:	Shared Data Levels	Restriction
Bethel	60	-161		Novatel G2 52 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003	Now	0	No Restriction
Billings	45	-108		Novatel G2 1112 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003	Now	0	No Restriction
Barrow	71	-156		Novatel G2 15 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003	Now	0	No Restriction
Cold Bay	55	-162		Novatel G2 49 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003	Now	0	No Restriction
Fairbanks	64	-147		Novatel G2 149 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003	Now	0	No Restriction
Honolulu	21	-157		Novatel G2 25 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003	Now	0	No Restriction
Juneau	58	-134		Novatel G2 16 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003	Now	0	No Restriction
Merida	20	-89		Novatel G2 29 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003	Now	0	No Restriction
Mexico City	19	-99		Novatel G2 2235 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003	Now	0	No Restriction
Puerto Vallarta	20	-105		Novatel G2 11 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003	Now	0	No Restriction
San Jose del Cabo	23	-109		Novatel G2 104 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003	Now	0	No Restriction
Tapachula	14	-92		Novatel G2 55 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003	Now	0	No Restriction

Kotzebue	66	-162	Novatel G2 10 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Iqualuit	63	-68	Novatel G2 10 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Gander	48	-54	Novatel G2 146 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Winnipeg	49	-97	Novatel G2 222 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Goose Bay	53	-60	Novatel G2 37 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Albuquerque	35	-106	Novatel G2 1620 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Anchorage	61	-149	Novatel G2 80 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Chicago	41	-88	Novatel G2 195 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Boston	42	-71	Novatel G2 39 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Washington DC	39	-77	Novatel G2 80 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Denver	40	-105	Novatel G2 1541 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Dallas	32	-97	Novatel G2 155 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Houston	29	-95	Novatel G2 10 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Jacksonville	30	-81	Novatel G2 2 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Kansas City	38	-94	Novatel G2 305 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction

Los Angeles	34	-118	Novatel G2 763 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Salt Lake City	40	-111	Novatel G2 1287 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Miami	25	-80	Novatel G2 8 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Memphis	35	-89	Novatel G2 68 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Minneapolis	44	-93	Novatel G2 262 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
New York	40	-73	Novatel G2 6 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Oakland	37	-122	Novatel G2 3 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Cleveland	41	-82	Novatel G2 225 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Seattle	47	-122	Novatel G2 82 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
San Juan	18	-65	Novatel G2 28 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Atlanta	33	-84	Novatel G2 261 WAAS	WAAS/NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Prescott	35	-112	EuroPak 3M 1506 L1/L2 GEO	NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Bangor	45	-69	Novatel G2 47 WAAS	NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Arcata	41	-124	EuroPak 3M 46 L1/L2 GEO	NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Grand_Forks	48	-97	EuroPak 3M 237 L1/L2 GEO	NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction

Elko	41	-116	1541 Novatel OEM 4	NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Oklahoma_City	35	-98	EuroPak 3M 374 L1/L2 GEO	NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
San_Angelo	31	-101	568 ProPak G2	NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Mauna_Loa	20	-156	EuroPak 3M 3466 L1/L2 GEO	NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Atlantic City	39	-74	Trimble Net RS	NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction
Kotzebue	66	-162	EuroPak 3M 10 L1/L2 GEO	NSTB Format	1 second	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2003 Now	0 No Restriction

ISTF/1
Appendix B to the Report

Data sheet for Receiver Sites (Ionospheric Scintillation)

State:
Date:
Filled by:

3: Irregularity drift velocity
2: Scintillation index
1: Rawdata in common
format
0: Receiver specific rawdata

				Source Data				Shared data					
Site Name	Latitude (deg.)	Longitude (deg.)	Altitude (m)	Receiver Type	Data Type	Sampling Interval (sec)	Operated by	Ownership	Sampling Interval (sec)	Period From:	To:	Shared Data Levels	Restriction
Kotzebue	66	-162		Novatel G2 10 Scintillation	Novatel format	1 sec	Federal Aviation Administration	Federal Aviation Administration	1 second	1/1/2011	Now	0	No Restriction

REVISED TERMS OF REFERENCE OF ISTF

1. Take the responsibility for identification of the available GNSS data source
2. Make recommendation on sharing scenario for Ionospheric data collected
3. Make recommendations on selecting ionospheric data sources and sharing scenario for the collected data
4. Steer process for evaluation of the data analysis
5. Study the need for development of Regional Ionospheric Threat Models for GBAS and SBAS
6. ~~Provide guidance on the d~~Development of Regional Ionospheric Threat Models for GBAS and SBAS if the need is identified
7. Establish rules for use of [shared data and](#) the result of study for non-commercial purpose

First Meeting of Ionospheric Studies Task Force (ISTF/1)

**Tokyo, Japan
27-29 February 2012**

Attachment 1 to the Report

LIST OF PARTICIPANTS

STATE/ORGANIZATION/ NAME	DESIGNATION/ADDRESS	TEL/FAX/-EMAIL
AUSTRALIA (2)		
Mr. Rod M. Roberts	Team Leader, GNSS & FIS Airservices Australia Locked Bag 747 Eagle Farm Queensland 4009 <u>AUSTRALIA</u>	Tel: +61 (7) 3866 3871 Fax: E-mail: rod.roberts@airservicesaustralia.com
Mr. Michael Terkildsen	Project Lead GNSS and Ionospheric Modeling Bureau of Meteorology P.O. Box 1386 Sydney NSW 1240 <u>AUSTRALIA</u>	Tel: +61 (2) 9213 8000 Fax: +61 (2) 9213 8060 E-mail: m.terkildsen@ips.gov.au
HONG KONG, CHINA (2)		
Mr. Yuen Chi King	Senior Electronics Engineer HKSAR Civil Aviation Department 3/F, Dragaonair House 11 Tung Fai Road Hong Kong International Airport <u>HONG KONG, CHINA</u>	Tel: +852 2591 5009 Fax: +852 2845 7160 E-mail: ckyuen@cad.gov.hk
Mr. Wong Tak Yuen, George	Electronics Engineer HKSAR Civil Aviation Department 3/F, Dragaonair House 11 Tung Fai Road Hong Kong International Airport <u>HONG KONG, CHINA</u>	Tel: +852 2591 5030 Fax: +852 2845 7160 E-mail: gtywong@cad.gov.hk
INDIA (2)		
Mr. Lokappa Indi Chandramapp	Joint GM(Com) GAGAN Project, Bangalore Airports Authority of India Gagan Complex, ITPL Road Kundalahalli, Bangalore Karnataka <u>INDIA</u>	Tel: +91 (80) 2852 5066 Fax: +91 (80) 2854 3788 E-mail: cl_indi@rediffmail.com
Mr. Surendra V. Sunda	Manager(Com) GAGAN Project, Ahmedabad Airports Authority of India S.V.P.I. Airport Ahmedabad <u>INDIA</u>	Tel: +91 (79) 2691 3684 Fax: +91 79 2691 5807 E-mail: ssunda@gmail.com

STATE/ORGANIZATION/ NAME	DESIGNATION/ADDRESS	TEL/FAX/-EMAIL
JAPAN (13)		
Mr. Taku Satou	Special Assistant to the Director Japan Civil Aviation Bureau 2-1-3, Kasumigaseki Chiyoda-ku Tokyo 100-8918 <u>JAPAN</u>	Tel: +81 (3) 5253 8742 Fax: +81 (3) 5253 1663 E-mail: satou-t289@mlit.go.jp
Mr. Nobuchika Iwashita	Chief of Air Navigation Section Japan Civil Aviation Bureau 2-1-3, Kasumigaseki Chiyoda-ku Tokyo 100-8918 <u>JAPAN</u>	Tel: +81 (3) 5253 8742 Fax: +81 (3) 5253 1663 E-mail: iwashita-n298@mlit.go.jp
Mr. Manabu Koshino	Special Assistant to the Director Operation and Flight Inspection Division Air Navigation Services Department Japan Civil Aviation Bureau 1-8-7 Haneda-Kuukou, Oota-ku Tokyo 144-0041 <u>JAPAN</u>	Tel: +81 (3) 3747 0558 Fax: +81 (3) 3747 0568 E-mail: koshino-m097k@cab.mlit.go.jp
Mr. Kenji Uehara	Special Assistant to the Director Operation and Flight Inspection Division Air Navigation Services Department Japan Civil Aviation Bureau 1-8-7 Haneda-Kuukou, Oota-ku Tokyo 144-0041 <u>JAPAN</u>	Tel: +81 (3) 3747 0558 Fax: +81 (3) 3747 0568 E-mail: uehara-k46qj@cab.mlit.go.jp
Mr. Harumi Matsuki	Air Navigation Services Engineer Japan Civil Aviation Bureau Technical Management Center 1-12, Namiki, Tokorzawa City Saitama pref 359-0042 <u>JAPAN</u>	Tel: +81 (4) 2991 5568 Fax: +81 (4) 2991 5556 E-mail: matuki-h43wf@cab.mlit.go.jp
Mr. Shunji Tanahashi	Air Navigation Services Engineer Japan Civil Aviation Bureau Technical Management Center 1-12, Namiki, Tokorzawa City Saitama pref 359-0042 <u>JAPAN</u>	Tel: +81 (4) 2991 5562 Fax: +81 (4) 2991 5556 E-mail: tanahashi-s48v2@cab.mlit.go.jp
Dr. Takeyasu Sakai	Chief Researcher Electric Navigation Research Institute (ENRI) 7-42-23 Jindaiji-Higashi Chofu, Tokyo 182-0012 <u>JAPAN</u>	Tel: +81 (422) 413 194 Fax: +81 (422) 413 199 E-mail: sakai@enri.go.jp
Mr. Masahiro Ito	Chief Researcher Electric Navigation Research Institute (ENRI) 7-42-23 Jindaiji-Higashi Chofu, Tokyo 182-0012 <u>JAPAN</u>	Tel: +81 (422) 413 191 Fax: +81 (422) 413 199 E-mail: m-itou@enri.go.jp

STATE/ORGANIZATION/ NAME	DESIGNATION/ADDRESS	TEL/FAX/-EMAIL
Dr. Susumu Saito	Senior Researcher Electric Navigation Research Institute (ENRI) 7-42-23 Jindaiji-Higashi Chofu, Tokyo 182-0012 <u>JAPAN</u>	Tel: +81 (422) 413 191 Fax: +81 (422) 413 199 E-mail: susaito@enri.go.jp
Dr. Takayuki Yoshihara	Senior Researcher Electric Navigation Research Institute (ENRI) 7-42-23 Jindaiji-Higashi Chofu, Tokyo 182-0012 <u>JAPAN</u>	Tel: +81 (422) 413 181 Fax: +81 (422) 413 199 E-mail: yosihara@enri.go.jp
Dr. Seigo Fujita	Researcher Electric Navigation Research Institute (ENRI) 7-42-23 Jindaiji-Higashi Chofu, Tokyo 182-0012 <u>JAPAN</u>	Tel: +81 (422) 413 191 Fax: +81 (422) 413 199 E-mail: s-fujita@enri.go.jp
Dr. Takuya Tsugawa	Senior Researcher National Institute of Information and Communication Technology 4-2-1 Nukui-Kita Koganei, Tokyo 184-8795 <u>JAPAN</u>	Tel: +81 (42) 327 5239 Fax: +81 (42) 327 6163 E-mail: tsugawa@nict.go.jp
Mr. Hideaki Tashiro	General Manager of Satellite Navigation Research Unit Japan Radio Air Navigation Systems Association Kaiji Center Building 4-5 Kojimachi, Chiyoda-ku Tokyo 102-0083 <u>JAPAN</u>	Tel: +81 (3) 5214 1352 Fax: +81 (3) 5214 1359 E-mail: tashiro@jrnsa.or.jp
PHILIPPINES (2)		
Mr. Gary M. Jadio	Supervising Air Navigation Systems Specialist Air Navigation Operations Department Air Navigation Service Civil Aviation Authority of the Philippines Mia Road, Pasay City 1300 <u>PHILIPPINES</u>	Tel: +63 (2) 879 9255 Fax: +63 (2) 879 9252 E-mail: gmjadio@yahoo.com
Mr. Joferand Joseph Y. Torrefranca	Senior ANS Specialist Air Navigation Project Planning & Design Department Air Navigation Service Civil Aviation Authority of the Philippines Mia Road, Pasay City 1300 <u>PHILIPPINES</u>	Tel: +63 (2) 879 9129 Fax: +63 (2) 879 9168 E-mail: joferand@yahoo.com

STATE/ORGANIZATION/ NAME	DESIGNATION/ADDRESS	TEL/FAX/-EMAIL
REPUBLIC OF KOREA (4)		
Mr. Gang Hun	Assistant Director Ministry of Land, Transport and Maritime Affairs 1-8, Byeoryang-dong Gwacheon-si Gyeonggi-do 427-040 <u>REPUBLIC OF KOREA</u>	Tel: +82 (2) 2669 6414 Fax: +82 (2) 6342 7299 E-mail: networkh@korea.kr
Mr. Nam Gi Wook	Principal Researcher Korea Aerospace Research Institute 115 Gwahakro Yuseong-gu Deajun, 305806 <u>REPUBLIC OF KOREA</u>	Tel: +82 (42) 860 2365 Fax: +82 (42) 860 2789 E-mail: gwnam@kari.re.kr
Mr. Chung Jong Kyun	Senior Research Scientist Korea Astronomy & Space Science Institute 776, Daedeokdae-Ro Yuseong-gu Daejeon 305 348 <u>REPUBLIC OF KOREA</u>	Tel: +82 (42) 865 3239 Fax: +82 (42) 861 5610 E-mail: jkchung@kasi.re.kr
Mr. Lee Jiyun	Assistant Director Department of Aerospace Engineering Korea Advanced Institute of Science and Technology 335 Gwahangno Yuseong-gu Deajeon 303-501 <u>REPUBLIC OF KOREA</u>	Tel: +82 (42) 350 3725 Fax: +82 (42) 350 5765 E-mail: jiyunlee@kaist.ac.kr
SINGAPORE (2)		
Mr. Gao Shu	Executive Engineer (Communications/Nav aids) Civil Aviation Authority of Singapore Changi Airport P.O. Box 1, Singapore 918141 <u>SINGAPORE</u>	Tel: +65 6595 6073 Fax: +65 6542 2447 E-mail: gao_shu@caas.gov.sg
Mr. Huang Keith	Engineer (Surveillance) Civil Aviation Authority of Singapore Changi Airport P.O. Box 1, Singapore 918141 <u>SINGAPORE</u>	Tel: +65 6595 6065 Fax: +65 6542 2447 E-mail: keith_huang@caas.gov.sg
THAILAND (2)		
Mr. Nattapong Siansawasdi	Senior Systems Engineer Aeronautical Radio of Thailand Ltd. 102 Soi Ngamduplee Tungmhomek, Sathon Bangkok 10120 <u>THAILAND</u>	Tel: +66 81 916 1608 (Mobile) Fax: +66 (2) 287 8645 E-mail: nattapong.si@aerothermal.co.th

STATE/ORGANIZATION/ NAME	DESIGNATION/ADDRESS	TEL/FAX/-EMAIL
Ms. Wissinee Taechotirote	Senior Systems Engineer Aeronautical Radio of Thailand Ltd. 102 Soi Ngamduplee Tungmhamek, Sathon Bangkok 10120 <u>THAILAND</u>	Tel: +66 (2) 287 8293 Fax: +66 (2) 287 8645 E-mail: wissinee.ta@aerothai.co.th
USA (1)		
Ms. Patricia H. Doherty	FAA Contractor/Boston College Boston College 140 Commonwealth Avenue Chestnut Hill MA 02467 <u>USA</u>	Tel: +1 (617) 552 8767 Fax: +1 (617) 552 2818 E-mail: Patricia.Doherty@bc.edu
ICAO (1)		
Mr. Sujan K. Saraswati	Regional Officer CNS International Civil Aviation Organization 252/1, Vibhavadee Road Ladyao, Chatuchak Bangkok 10900 <u>THAILAND</u>	Tel: +66 (2) 537 8189 Ext. 155 Fax: +66 (2) 537-8199 E-mail: ssaraswati@bangkok.icao.int



International Civil Aviation Organization

**FIRST MEETING OF IONOSPHERIC STUDIES
TASK FORCE (ISTF/1)**

27 – 29 February 2012, Tokyo, Japan



LIST OF WORKING/INFORMATION PAPERS AND PRESENTATIONS

WP/IP/SP No.	Agenda	Subject	Presented by
WORKING PAPERS			
1	-	Provisional Agenda	Secretariat
2	2	Review of Twenty Second Meeting of Asia and Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/22)	Secretariat
3	2	Ionospheric Effect on GNSS Aviation Operations	Secretariat
4	2	Review Outcome of APEC GIT/16 and AOSWA/1	Secretariat
5	4, 8	A Proposal for the Establishment of Technical Task Execution Group to Support the Ionospheric Study Task Force	Republic of Korea
INFORMATION PAPERS			
1	-	Meeting Bulletin	Secretariat
2	4	Ionospheric Data Collection and Analysis – Recent Results	India
PRESENTATIONS			
SP/1		Long-Term Ionospheric Anomaly Monitoring for Ground -Based Augmentation Systems (GBAS)	Republic of Korea
SP/2		Status of GNSS Ionospheric Study in Korea	Republic of Korea
SP/3		Status of Ionospheric Data Collection and Analysis for GNSS in Japan	Japan
SP/4		Ionospheric Research for WAAS	FAA/USA
SP/5		Preparations for GBAS Ionospheric Study in Asia and Pacific Regions	Hong Kong, China
SP/6		GBAS Ionospheric Research Project in Singapore	Singapore