AGENDA ITEM 3: CNS/ATM IMPLEMENTATION AND RELATED ACTIVITIES

Agenda Item 3: CNS/ATM Implementation and Related Activities

CNS/ATM Implementations Coordination Sub-Group

3.1 The meeting reviewed the report of the tenth meeting of the Communications Navigation and Surveillance and Air Traffic Management Implementation Co-ordination Sub-Group (CNS/ATM/SG/10) as well as working papers covering CNS/ATM implementation matters. The meeting expressed its appreciation for the work progressed by the Sub-Group.

Status of CNS/ATM Implementation

Australia

Air Traffic Management Strategic Planning Framework

3.2 The meeting noted information provided by Australia on the Australian ATM Strategic Plan which was developed through a cooperative planning approach that involved a cross section of Government and aviation industry organizations that had a stake in the future of Australia's ATM system.

3.3 The Plan grew out of a need both from a pragmatic recognition of the current ad-hoc nature of CNS implementation and ATM enhancement – both regionally and globally - and from a recognition of the potential significant benefits of a cooperative approach to future investments in ATM systems by airspace users (in terms of airborne equipment) and service providers (in terms of ground based infrastructure and systems). Furthermore, there was a growing appreciation that ATM covers all aircraft operations from the time a flight was planned through to time the aircraft parks at the destination airport – not simply that component currently managed by the ATS Provider. The development of new ATM systems also had safety regulatory implications. Hence the need to engage broad representation from aircraft and airport operators and the aviation safety regulator in the strategic planning process.

3.4 As part of the ongoing process and the continued collaborative approach to planning, Australia had also developed a Target Operational Concept, which describes an ideal future vision of ATM. It presents a concept of how this advanced system would operate in terms of operational practice, need and outcome, and attempts to remain independent of enabling technologies and applications. The future concept, in articulating an ideal, also represents a target towards which the current system would aspire, and forms a basis for the design and development of transitional strategies and migratory planning.

3.5 The Australian ATM stakeholders realized that no one single organization could give effect to the level of coordination required to achieve the "ideal future" of ATM. Instead, a "round table" of key stakeholders needed to be created, each participating on a "strategic partnership" basis, each understanding that their participation was purely in the interests of harmonization and effective use of available resource. The ATM strategic management framework had been structured such that there was a core component of the key ATM stakeholders (the Australian ATM Strategic Management Group - ASTRA) consisting of the Australian industry, Airservices, the Civil Aviation Safety Authority, the Department of Transport and Regional Services and Defence.

3.6 The major benefit of adapting and adopting the ATM strategic management framework for the development of a regional ATM Strategic Plan, was that it would facilitate a systematic and collaborative approach by all ATM stakeholders to ATM planning and implementation within the region.

3.7 The meeting noted the approach taken by Australia and the strategic management framework developed for the future planning of the ATM system, and this should be taken into account in developing the APSC Regional Plan for the New CNS/STM Systems

Australia and Papua New Guinea ATM and GNSS projects

3.8 The meeting was updated by Australia on some of the ATM activities of Australia and Papua New Guinea on a number of ATM and GNSS projects that had taken place since CNS/ATM/IC/9 was held in March 2003.

3.9 The Australian Strategic ATM Group, (ASTRA), had continued their collaborative efforts in the development of a second version of the ATM Strategic Plan and its accompanying sub-plans which were expected to be formally launched in September 2003 and would be available on web site: www.astra.aero. The overall Plan, Volume III, includes the Communication, Navigation and Surveillance Plan, which contains the expected transition to GNSS based navigation as well as increasing the use of ADS-B for surveillance.

3.10 In recognition of the APANPIRG recommendation that new GNSS standards should be based on the FAA TSO C145/6 receiver standard, the ASTRA group was undertaking a research project to confirm the findings of previous theoretical studies and determine the operational issues associated with using this receiver to provide GNSS navigation in Australia domestic airspace. This study would include using a GPS simulator to test various fault and interference scenarios as well as flight-testing to examine human factor issues and operational use approvals. The study would also examine the operational use of the US SBAS signal from the WAAS, which was expected to be declared operational in July 2003.

3.11 An AusAID funded US DoT study in Papua New Guinea in 2001, recommended that the country transition domestic air transport operations to full GNSS using the TSO C145/6 receivers. Now that these receivers had been certified and were available, the PNG CAA, in conjunction with the industry, had decided to accept the DOT study findings. A project was being developed, with AusAID assistance, to move domestic IFR navigation in PNG to GNSS by 2006. Selected airports would retain conventional ground based aids including ILS and VOR/DME to support international operations.

Hong Kong, China

3.12 The meeting was advised by Hong Kong, China of its future development of the ATC systems. With more than four years operational experience at the new Hong Kong International Airport, it was recognized that the Hong Kong ATC systems would need to be enhanced to expand the systems capabilities, functionalities and human-machine interface. This would ensure that the systems continue to effectively handle the anticipated increase in density and complexity of air traffic movements in Hong Kong as well as the Pearl River Delta region.

3.13 In line with the ICAO global and regional implementation plans for CNS/ATM systems, the Civil Aviation Department (CAD) of Hong Kong, China was continuing its study and trial phases of CNS/ATM implementation, and would put those systems into operational use that had proved to offer additional operational and safety benefits.

3.14 Several major and critical systems either had been upgraded or would be replaced. The current status was as follows:

a) enhancement of Automatic Message Switching System (AMSS) – completed May 2002;

b) speech Processing Equipment (SPE) Enhancement – completed December 2002;

c) Aeronautical Information Database System (AIDB) Enhancement – completed January 2003;

d) enhancement of Radar Data Processing and Display System/Flight Data Processing System/Simulator (RDPDS/FDPS/SIM) – completed March 2003; and

e) replacement Route Surveillance Radar (RSR) – Factory Acceptance Test completed, and to be commissioned in end-December 2003.

3.15 To date trials had been conducted on the following CNS/ATM system elements:- Digital-ATIS (D-ATIS) and Digital-VOLMET (D-VOLMET); ADS/CPDLC; Pre-Departure Clearance (PDC) delivery via data-link; ATS Message Handling System (AMHS); VHF Digital Link (VDL) Mode 2; GNSS En-route applications; SATCOM; AIDC for ATM

3.16 With various enhancements made to the ATC systems, the runway movement rate at Hong Kong International Airport had been increased in phases from 31 movements per hour when the new Airport opened, to the present 49 movements per hour. Further increase in runway movement rate was being considered.

3.17 In its future planning, the DVOR/DME on Tung Lung Island would be replaced by 2006. To provide a complete radar/VHF communication coverage within the Hong Kong FIR, discussions with ATMB of CAAC were underway to make available to Hong Kong ATC, the SSR and VHF communication facilities to be installed in the South China Sea area. This would help to streamline the ATC operational workflow and achieve further enhancements on safety and airspace capacity.

India

GPS and GEO Augmented Navigation in India (GAGAN)

3.18 India provided updated information of GPS and GEO Augmented Navigation in India (GAGAN). Places for Reference Stations and Ionospheric Grid Stations (IGS) are finalized for installation of the requisite equipment. Installation of GPS-TEC at IGS was completed at four places i.e. Ahmedabad, Bhopal, Jodhpur and Delhi airport and installation of the remaining GPS-TEC receivers will be completed during 2003. Agreements were signed with universities and R&D institutions involved in the ionospheric studies for their participation in data collection, analysis and modelling. GAGAN would be developed to meet the ICAO GNSS SARPs and it would be interoperable with WAAS, EGNOS and MSAS.

Nepal

3.19 The meeting noted information provided by the Civil Aviation Authority of Nepal (CAAN) regarding the development of air transportation in Nepal Nepal. The following activities have been completed:

a) transformation of all coordinates into WGs-84 system and published in AIP Nepal;

b) the National CNS/ATM Transition plan for a 10 year period prepared and under review;

c) GPS based IFR en-route network as well as non precision approach (NPAs) procedures for six airports have been implemented on a trail bais;

d) in-house interaction programmme, presentations, workshops and seminars on different topics on CNS/ATM completed;

e) ATS Route G-348 (Kathmandu – Baghdogra – Paro) established.

3.20 In its ongoing activities, the requirements of CNS/ATM were being addressed and included: forming an ATN Task Force; establishing RCAG stations for VHF coverage of the Kathmandu FIR; establishing a VSAT link with ACCs in India; introducing GNSS navigation and GPS based procedures; revision of airspace to improve traffic flows; digitization of approach charts and amendment to the AIP Nepal; completing letters of agreement with India,; and completing outstanding EMARSSH routes.

3.21 In its future plans, the following matters were being progressed: upgrade of the AFTN network to the ATN and for transition in the year 2005; restructuring of the air routes; development of GPS based NPAs and SIDs; development of legislation to enable eventual implementation of IFR GPS based air navigation; and replacement of the CVOR/DME at Nepalgunj with a DVOR/DME.

3.22 In Human Resource Development (HRD), CAAN had completed a study with the help of Kathmandu University School of Management. The study includes a guideline for HRD plan for a period of five years and to support its institutional capacity and service quality enhancement goal. To keep pace with the rapid growth of the civil aviation industry, a need had been identified for development in the area of physical infrastructure, installation, maintenance and operation of CNS/ATM equipment. CAAN was able to meet the ICAO Standard since only licensed staffs were allowed to perform their duties. The Civil Aviation Training Centre was upgraded to Civil Aviation Academy to provide different types of training for civil aviation sectors.

New Zealand

3.23 The meeting was advised by New Zealand, that New Zealand Airways Corporation Ltd, the air navigation service provider for New Zealand, had established a project in early 2000 to renew its domestic ATM system. This system was required to support not only the current capacity, performance and functional requirements but also predicted growth over the next 10 years and had the ability to implement any required CNS/ATM concepts.

3.24 The SkyLine system, supplied by Lockheed Martin was selected and the initial system was required to provide services to 3 major International Towers, 4 Regional Towers and 3 En-route Centres; that encompassed 39 radar positions, and provided a feature-rich, high availability, distributed and modular architecture as well as a seamless expansion capability. Transition to the SkyLine system was planned to occur in three phases over a four month period during which time the new and old systems would operate seamlessly together; with messages between the two being exchanged using AIDC. The first two phases of the transition had been completed successfully, with the third, and last, transition expected to be completed in early September 2003.

3.25 The domestic SkyLine system had been successfully integrated with New Zealand's Oceanic system and the existing domestic system (Aircat) via AIDC. This system provides the platform to implement other CNS/ATM features such as CPDLC, ADS-B, ATN, PDC, etc when operationally required.

Republic of Korea

3.26 The Republic of Korea presented information to the meeting on its modernization project of the new Incheon ACC, which was completed in November 2001 with state-of-the-art technology, leading to increased capacity and enhanced control system that would ensure safe and expedient operation of aircraft in the 21st century. The ACC modernization project was started in May 1995 and completed in October 2001. The new system underwent a transition period from August to September 2001 when both the new and old systems were operated. After the final operation trial at the end of September, the new system was officially established as the operating system on 17 October 2001. No deficiencies in the new operation were found during the transition period.

United States

Controller-pilot Data Link Communications (CPDLC)

3.27 The meeting noted information provided by the United States on implementation of CPDLC (Build 1) at the Miami Air Route Traffic Control Center (ARTCC) in October 2002. CPDLC Build 1 was designed for domestic operations in continental United States.

3.28 It was planned to expand CPDLC Build 1A to seven ARTCCs and upgrade the CPDLC equipment at the Miami ARTCC in the 2004-2006 timeframe, with all eight ARTCCs having CPDLC operations by the end of 2006. At the present time the CPDLC program, Build 1A and beyond, had unfortunately been suspended indefinitely. Although there had been promising results, the current budget constraints within the FAA, the events of September 11, 2001, and the economic challenges facing aviation were factors which made this decision necessary.

3.29 With regard to implementation of ADS/CPDLC in oceanic areas within the area of responsibility of the United States, the meeting noted that the Advanced Technologies Oceanic Procedures (ATOP) Build 1Ocean 21 Auto System was being integrated into the New York and Oakland ACCs. An enhanced Build 2 Ocean 21 Auto System had been developed for Anchorage ACC, which provides radar data processing capabilities for use in radar transition airspace as well as enhancements required to support reduction of separation in Pacific airspace to 30 NM lateral and longitudinal. Once this system was operational at the Anchorage ACC, both New York and Oakland would be retro-fitted with the enhanced Build 2 Ocean 21 giving equivalent capabilities to Anchorage.

. Viet Nam

3.30 Viet Nam informed the meeting that the national air navigation system was being upgraded in Viet Nam. With new surveillance radar system put into operation in the Ha Noi FIR, Viet Nam had three PSRs and six SSRs connecting by two FDP/RDPs. ILS/DME with precision approach lighting CAT 2 system at Tansonnhat international airport was planned to be operational in third quarter of 2003. A new 3800 m long runway with ILS and lighting CAT2 system at Noibai international airport would be operational in 2004. One more new VHF RCAG station would be installed for ACC Ho Chi Minh to enhance the communication coverage serving air routes over the high seas.

Report of the South Pacific FANS Interoperability Team

3.31 The meeting noted that the success of the South Pacific (SOPAC) FIT during its first five years of operation had led to the formation of similar groups that monitor FANS operations (ADS and CPDLC operations using the FANS 1/A aircraft systems) in other regions. Currently there were

three other groups covering the Central and North Pacific, North Atlantic, and the Bay of Bengal. There was also some discussion about another group being established to coordinate FANS implementation in the Polar Region.

3.32 Boeing continues to act as the Central Reporting Agency (CRA) for the SOPAC FIT and had begun to fill the role of CRA Support Agency (CRASA) for the FAA element of the IPACG FIT. The CRA receives problem reports from stakeholders and coordinates problem report resolution with the respective FIT. The CRA also processes monthly system performance data. The Japan Civil Aviation Bureau (JCAB) has established a similar CRA function for aircraft flying in the Tokyo and Naha FIRs; its supporting CRASA liaises closely with CRASA personnel at Boeing.

3.33 In the South Pacific Region, four of the five ATS providers had fully commissioned FANS controller workstations offering CPDLC, ADS, and ATC Inter-Facility Ground/Ground Data Communications (AIDC) services. The fifth ATSP was currently in the process of upgrading its existing workstations to include ADS capability.

3.34 Operational problems (i.e., due to controllers or pilots failing to follow procedures) and technical problems (i.e., due to hardware or software faults) continue to be reported in the SOPAC FIRs. Overall, the number of problem reports received had decreased. End-to-end system performance was high and relatively stable, and monitoring continues.

3.35 The user-preferred route (UPR) trials had been completed and UPRs were now a normal facet of regional operations. Significant operating benefits had been realized by the participating airlines since UPRs were first introduced. Using UPR procedures, airlines could optimize flight plans according to their own unique operating parameters for the type of aircraft, weight, and forecast weather at the time of departure. On long-haul flights, which were typically payload limited, use of UPR procedures enable Airlines to carry additional payload, which generates additional revenue on each flight.

3.36 The SOPAC FIT continues to work on reduction of separation minima based on overall system performance and FANS equipage. CPDLC provides the communications enhancements necessary for the implementation of 50 NM lateral separation in areas of convective weather activity. As other FIRs achieve full FANS functionality, FANS functions would allow a reduction of longitudinal separation to 50 NM throughout the South Pacific. Further reductions in both lateral and longitudinal separation minima to 30 NM remain a final goal for the team.

CNS/ATM Implementation Planning Matrix

3.37 The meeting noted that the CNS/ATM Implementation Planning Matrix, which contains the implementation status of CNS elements such as ATN, AIDC, CPDLC, GNSS and ADS had been updated. The Matrix was reviewed by APANPIRG and its Sub-Groups on a regular basis to assess progress of implementation. The Matrix would be progressively developed to include implementation status of major CNS/ATM elements covering all ASIA/PAC FIRs. The updated Matrix is provided in **Appendix A** to the Report on Agenda Item 3.

MET component of CNS/ATM

Report of the MET/ATM Task Force of the CNS/MET SG

3.38 The meeting noted the report of the MET/ATM Task Force of the CNS/MET SG. The report had emphasized that the meteorological information/products specified in Annex 3 in the majority of cases had been developed to cater for flight planning requirements. Traditionally, the ATM users had used these products, which were adequate for a range of uses. In recent times

however, the advancement of the ATM systems and procedures had generated demand for more user-focused meteorological information. This demand had been approached on a number of fronts and scales. On the global scale it was present in the development of the WAFS while at the local scale a wide range of meteorological information was being provided by States to satisfy the specific requirements of the ATM. The report concentrated on the meteorological service being provided by a number of States in the ASIA/PAC Region with respect to user requirement, content and systems.

3.39 Hong Kong, China presented information on the development of the meteorological systems in support of the new CNS/ATM systems by the Hong Kong Observatory (HKO) during the past year in the following areas: downlink of meteorological data from aircraft; a trial on real-time retrieval of weather information from an HKO database via the ground-to-ground ATN/ATS Message Handling System (AMHS); and new weather services in support of ATM.

3.40 The meeting noted that application of the mode-S data link specified in ICAO Manual on Mode S Specific Services (Doc 9688) in automatic air-reporting, which would not incur ACARS communication cost, appeared to be an attractive alternative to ADS, especially for the ascent/descent phases of the flight. The meeting further noted that, if a particular airspace was already under the coverage of surveillance radars, ADS might not be used for aircraft surveillance and thus no automatic air-reports would be available from the airspace concerned. While the weather reporting function had been specified for the mode-S data link, it had not been implemented in the onboard mode-S transponder software. Furthermore, the transponder supplier indicated no plan to implement the weather reporting function due to the lack of requirements from airlines.

3.41 The meeting recognized that the availability of some 50,000 automatic air-reports in the U.S. had demonstrated the significant value this would provide to improvement of numerical weather prediction for aviation weather forecast. On the other hand, at present, only one State in the ASIA/PAC Region was able to receive automatic air-reports through ADS.

3.42 In view of the foregoing, the meeting formulated the following Conclusion:

Conclusion 14/44 – Application of Mode-S data link in automatic weather reporting

That, ICAO be invited to consider the application of the Mode-S data link in automatic air-reporting as an alternative to ADS over areas covered by surveillance radars and to consider ways to facilitate its implementation in the ASIA/PAC Region.

D-VOLMET

3.43 The meeting was informed by Hong Kong, China of the D-VOLMET service implemented in April 2001, in parallel with the VOLMET radio voice broadcast service. The D-VOLMET messages provided the same OPMET information as in the VOLMET broadcast and were updated immediately when new information was available. Aircraft equipped with the appropriate ACARS hardware and software could retrieve the D-VOLMET messages via data link service provider who served as the data transporter. The meeting noted the benefits of the D-VOLMET service to aircraft, including reduced workload for pilots, removal of errors due to reception/transcription, retrieval at will by pilots, quick access to latest weather information including the SIGMET, and improved area coverage.

Future Work Programme of the MET/ATM TF

3.44 The report of the MET/ATM/TF provided some initial guidance to States on the development of tailor-made products to support ATM. It was the view of the meeting that the work on

the MET component of the CNS/ATM system should continue involving experts from both MET and ATM fields. It was agreed in this regard, that the MET/ATM Task Force of CNS/MET SG should continue its work and that the terms of reference of the Task Force should be updated to reflect the discussion of this meeting.

3.45 The meeting recognized the importance of the exchange of information between the MET and ATM communities in order to enhance the awareness of the requirements for MET support to the ATM and the current and future capabilities of the meteorological information and services. Such exchange would foster the mutual understanding between the two communities and facilitate further development of the MET component of the new CNS/ATM systems in the ASIA/PAC Region. In noting this, the meeting formulated the following Conclusion:

Conclusion 14/45 – Fostering of exchanges between MET and ATM

That,

a) the MET Authorities/Providers of the States, be encouraged to continually assess with the corresponding ATM authorities the requirements for MET information with the aim of developing new products/information to support the ATM, bearing in mind the potential costs and benefits involved; and

b) ICAO be invited, in coordination with WMO, to organize a MET/ATM coordination seminar in ASIA/PAC Region in 2004, to foster the exchanges between the MET and ATM experts in order to facilitate further development of the MET component of the CNS/ATM systems in the ASIA/PAC Region.

Airspace user perspective on CNS/ATM services in the Asia Pacific Region

3.46 IATA presented an airspace user perspective on CNS/ATM services in the Asia Pacific Region. The meeting noted the history of the development of the CNS/ATM system the ICAO Special Committee on Future Air Navigation Systems (FANS) established in 1983 to study, identify and assess new technologies, including satellite technology, and to made recommendations for the future development of navigation systems for civil aviation, up to the introduction of operational data link services using the FANS 1/A aircraft system.

3.47 The first operational CPDLC services, pioneered by ISPACG and its partners using the FANS 1/A aircraft systems, were introduced in the South Pacific in 1995. The data link trials, which began in 1993 resolved interoperability issues and led to development of a South Pacific Operations Manual (SPOM) for operating procedures for FANS 1/A aircraft.

3.48 Subsequent developments in the South Pacific had resulted in almost total coverage of the Pacific Ocean with CPDLC and ADS services to suitably equipped aircraft. This enabled FANS 1/A equipped aircraft to experience significant benefits by using flexible tracks between Australia/New Zealand and the United States, which resulted in considerable flight time and fuel savings per flight. However, IATA stated that, elsewhere, the implementation of FANS had been a long and frustrating experience with millions of dollars invested on expectation of near term benefits. ICAO separation standards for 30 NM lateral and longitudinal separation became available in November 2002, and IATA felt that more effort needed to be made to implement these separation minima to take advantage of the significant benefits that could be realized.

3.49 IATA advised the meeting that airlines and States in the Asia Pacific Region had invested in the FANS 1/A system, and in excess of 2000 FANS 1/A capable civil air transport aeroplanes were in service. In addition, significant numbers of U.S. military (approximately 1400 over

a period to 2016) and all Airbus A330, A340, A380 and Boeing B767, B777 and B747 aircraft were FANS 1/A capable. In addition, there were significant numbers of integrated or stand-alone FANS automation systems provided by ATS Providers in the Asia/Pacific. With such significant investment by States and users in FANS technology, IATA was of the opinion, that regrettably, there was very little benefit being currently realized.

3.50 IATA would like to see more ICAO assistance in fostering the expansion of existing CNS/ATM capabilities within the region, particularly in the planning, trials and demonstrations of CPDLC, ADS and RNP 4. IATA was pleased that APANPIRG and ICAO were addressing key priorities for CNS/ATM Implementation, They supported the positive steps being taken by ICAO through ICAO's ADS-B Implementation Task Force and the decision to recommend Mode-S enhanced (1090-ES) as the regional link protocol for ADS-B.

3.51 IATA stressed that considering the economic recovery of the airline industry and the existing numbers of aircraft equipped with the FANS 1/A capability, it was of utmost importance that both providers and users start to realise the safety and economic benefits of FANS - the existing generation of CNS/ATM. IATA was concerned that the next generation of CNS/ATM may have little chance of gaining airline acceptance, if the benefits to presently equipped aircraft were not seen in the next few years.

3.52 The meeting noted IATA's concerns over the pace of implementation of CNS/ATM systems taking advantage of FANS 1/A. The meeting recognized that the FANS 1/A system was not ICAO SARPs compliant, and there had been lengthy deliberations in many forums on how best to make use of these systems on a global basis, when the technology being used did not meet ICAO technical performance requirements for provision of ATC services. However, in spite of early difficulties, and the need for many States to upgrade their ATM systems to a level that could support data link services, there had been notable progress in recent times. The meeting noted that it had been generally accepted that FANS 1/A aircraft systems, with its supporting technologies, were an acceptable interim system that should be utilized to the extent possible. Although SARPs were not being developed for FANS 1/A, ICAO had provided horizontal separation minima (30 and 50 NM) that were developed using FANS 1/A and associated ATM ground systems' technical performance. Also, ICAO had carried out a major technical review of the *Asia/Pacific Manual on CNS/ATM Operations*, which included substantial material from the SPOM, to ensure that the guidance was in accordance with the procedures contained in the PANS-ATM, as reported above.

Key Priorities

3.53 The meeting noted that while reviewing the information on the developments and activities relating to CNS/ATM system, the CNS/ATM/IC/SG identified the need to include implementation of Data Link Flight Information Services (DFIS) applications including D-ATIS, D-VOLMET and PDC into the list of key priorities in the CNS/ATM implementation based on benefits identified.

3.54 Following the discussion on proposed changes to the regional strategy for the GNSS implementation, the Sub-Group meeting recognized the need to update to the existing key priorities items and to add a new key priority regarding implementation of APV and RNP Approaches in the list of key priorities in the CNS/ATM implementation.

3.55 The Sub-Group also recognized the need to include a new item of Safety Management System.

3.56 The meeting noted the updated information in the Table of Key Priorities and identified new key priority items. In view of the foregoing, the meeting formulated the following Decision.

Decision 14/46 – Amendment to the key priorities for implementation of the CNS/ATM systems for the Asia/Pacific Region

That, the amended list of Key Priorities for implementation of the CNS/ATM systems for the Asia/Pacific Region be adopted as shown in **Appendix B** to the Report on Agenda Item 3.

Review of the *Asia Pacific Regional Plan for New CNS/ATM Systems*

3.57 The meeting noted that the CNS/ATM/IC/SG/10 had reviewed and updated the *Asia Pacific Regional Plan for New CNS/ATM Systems*. The meeting noted that key aspects of the plan were focused on the nine major traffic flows, the ATM operational enhancements for en-route operations, associated required aircraft functions and ground services, and the ATM system transition time lines. The meeting noted that a detailed review and updating of the tables could not be fully carried out at the Sub-Group meeting due to the limited time available, which had been constrained due to the combining of the two Sub-Group meetings. The information on the facilities and services required were also related to the ANP FASID, and correlation of the material in these documents was required. The Sub-Group had considered whether the tables still provided useful information and whether the annual review and update should continue.

3.58 In this regard, the Sub-Group agreed that there was value in retaining the information but for the material to be of value, it needed to be kept up-to-date and this required time and resources to carry out the exercise, and States would need to bring to the meeting the necessary information. In this regard, the Secretariat was requested to remind States to update the tables prior to the meeting.

Safety and Security in Air Traffic Management

Status of Safe Flight 21

3.59 The meeting noted information provided by the United States on their Safe Flight 21 Programme, which was a cooperative government/industry programme to evaluate capabilities to improve aviation safety, efficiency, and capacity. This programme was conceived in 1998 and addresses the CNS issues and provides information to the FAA and industry so that they could make decisions about implementing these systems.

3.60 Safe Flight 21 was focused on a manageable set of operational capabilities that were important to the user community. These include the cockpit display of traffic, weather, and terrain information, improved information for controllers, and improved surface situational awareness. The new technologies were based on the use of GPS, ADS-B, Traffic Information Service-Broadcast (TIS-B), Flight Information Services-Broadcast (FIS-B), and the use of a multi-functional display in the cockpit and enhanced controller displays.

3.61 The objectives of Safe Flight 21 were to identify, evaluate, and mitigate the risks associated with the selection, implementation, and integration of planned CNS capabilities and corresponding procedures. In mitigating these risks, the programme would:

Safe Flight 21 Demonstration and Evaluation

3.62 Safe Flight 21 demonstrates and evaluates the benefits of the applications. Prior to committing the FAA and the users to a full-scale implementation of these enhancements, there would be a consensus of the feasibility and business case for the enhancements among the stakeholders. The FAA and industry would jointly define, develop, and evaluate the enhancements.

3.63 The Safe Flight 21 Programme Office would demonstrate and evaluate the benefits of this new technology. This would include operational and procedural issues, as well as cost/benefit matters. The review of operations and procedures would ensure that pilot, controller, operator, FAA air traffic maintenance, and flight standards issues were addressed. The cost/benefit activity would define the cost of the data link and quantify and qualify the economic and safety benefits derived from each capability.

3.64 The following Safe Flight 21 programme activities had taken place:

a) 2000 Operational evaluation to demonstrate the efficiency and safety benefits of using ADS-B and to evaluate air traffic controller use of ADS-B in the terminal area environment;

b) 2001 Air traffic modernization forum to demonstrate newly installed multi-lateration surveillance capabilities and the use of on-board moving map displays for monitoring surface aircraft and vehicle movement;

c) 2002 – A multi-lateration system installed at Louisville, Kentucky, and a new automation platform for that facility to support on-going ADS-B test and evaluation efforts was procured; and

d) 2003 - continuing to conduct CEFR simulations, survey and deliver new airport digital maps to the surface moving maps database and expand the vehicle tracking evaluation and establishment of a vehicle tracking test bed; RTCA Steering Committee SC-186 (ADS-B) approved the 1090 MHz ADS-B Minimum Operations Performance Standard (MOPS), Rev A; ADS-B demonstrations were ongoing in the Gulf of Mexico; and ADS-B ground stations had been installed on oil platforms to demonstrate surveillance applications in a non-radar environment.

3.65 As a result of Safe Flight 21 demonstration activities in Alaska and the Ohio River Valley, progress was being made toward implementing operational enhancements and applications related to the use of GPS, ADS-B, TIS-B, FIS-B, and the use of a multi-functional display in the cockpit and enhanced controller displays.

3.66 The Safe Flight 21 programme continues to evaluate and demonstrate potential applications to take full advantage of the ADS-B, TIS-B and FIS-B technology. Information on the Safe Flight 21 is on the FAA websites at: http://www.faa.gov/safeflight21 and http://www.alaska.faa.gov/capstone.

CNS/ATM training

Australia

3.67 Australia provided information to the meeting that they, along with several other South Pacific ATS providers, had been using CPDLC as the primary medium for communications in

oceanic airspace since 1995. In 1999, Australia introduced ADS services in the South Pacific, and by early 2000, ADS and CPDLC services were being provided to more than a dozen aircraft operators in all Australian non-radar airspace.

3.68 It was noted by the meeting that the implementation of data link had brought about significant changes in pilot/controller communications practices, operating procedures and surveillance techniques. Aircraft operators, ATS providers and other industry groups had worked together to ensure the data link practices and procedures used from region to region are as standard as possible. It was further pointed out that investigation of problem reports and incidents during more than 7 years of data link operations had highlighted the absolute necessity for pilots and controllers to use standard procedures and practices and to have understanding of the capabilities and limitations of data link systems. Most incidents involving missed communications, misunderstandings and failures to comply with ATC clearances could have been avoided if standard operating procedures and practices had been followed completely.

3.69 The meeting recognized based on the experience gained by Australia and other ATS providers in the South Pacific, that comprehensive controller and pilot training programmes were essential for building the appropriate knowledge. Once training programmes for CPDLC and ADS were in place, aircraft operators must obtain operational approval from the relevant authorities in the State of registry prior to the operational use of ATC data link. Other state authorities may also have operational approval requirements. Operators should obtain the relevant requirements and guidance directly from States in which data link operations are expected.

3.70 The meeting noted that Airservices Australia provided structured one and two-day training courses covering all operational aspects of ATC data link. These courses had been specifically designed for aircraft operators, ATS providers and safety regulators. Also, a number of airlines currently conducting data link operations had made their training programmes available to other operators on a commercial basis. A list of operators offering programmes can be obtained from IATA.

Hong Kong, China

3.71 The meeting noted information presented by Hong Kong, China on the importance of systematic and formalized training to personnel involved in the civil aviation industry. Hong Kong established the Hong Kong Civil Aviation Training Center in early 2003, which aims to deliver target oriented training programmes to aviation personnel on a global basis through a knowledge-sharing process.

3.72 To ensure the safety, efficiency and regularity of air transport services in the increasingly complex operating environment, personnel in the civil aviation industry must continuously demonstrate the highest level of professionalism, dedication and efficiency in their work. In this regard, quality, systematic and formalized training plays a vital role.

3.73 The Hong Kong Civil Aviation Department (CAD), was committed to the provision of a safe and efficient air transport system. The CAD, to reinforce its commitment and to respond to new challenges in the civil aviation industry, had developed comprehensive and target oriented training programmes for their staff. The establishment of the HKCATC in April 2003 builds on this experience and provides an opportunity for the CAD to make a contribution to improving the safety and efficiency of air transport through the establishment and conduct of systematic and formalized training for aviation personnel from around the world. Further information on the training programmes could be obtained through the Training Center Administrator on email: apsd@cad.gov.hk.

Republic of Korea

3.74 The meeting noted information presented by the Republic of Korea on the status of their international training course developed to contribute to the enhancement and promotion of safety for international civil aviation. The Republic of Korea had established specialized training courses on airway facilities and ATC not only for domestic personnel but also for international needs, contributing to the enhancement and promotion of safety in international civil aviation.

3.75 The Republic of Korea Civil Aviation Training Center was established as a dedicated civil aviation technical training institute in 1984 and had trained in-country aeronautical technical personnel since then. From the year 2001, the government had sponsored international training courses in the area of airway facilities and ATC at no expense to international trainees. Further, in January of 2001, international training courses had been established for aeronautical technical personnel from developing countries including those in Asia. These courses were conducted under co-sponsorship of the Civil Aviation Safety Authority, the Ministry of Construction and Transportation and the Korea International Cooperation Agency (KOICA), as part of a human resource development programme for developing countries. The training courses provide the opportunity for participants to experience Korean culture, and stimulates exchange of the latest aeronautical information and mutual understanding between the participating nations. The Republic of Korea would continue its effort to develop and expand the international training courses.

Environmental issues related to CNS/ATM system

3.76 The meeting noted informaiton provide by Australia on Airservices Australia's experience with aligning its Environmental Management System (EMS) to the International Standards Organisation (ISO 14001:1996 'Environment management systems – Specification with guidance for use'). This had proved to be an effective tool to facilitate the management of CNS/ATM environmental issues.

3.77 Airservices Australia's EMS ensures all changes to ATM practices that could impact on aircraft operations were assessed prior to implementation, to ensure that their potential impact had been minimised and were not significant. All environmental assessments were recorded in its advance risk management system (ARMS).

3.78 The EMS had helped to reduce Airservices Australia business risks and improve relations with stakeholders, the aviation industry, the public and regulators. With the efficiencies incorporated in the EMS, and in particular the efficiencies offered by ARMS, the implementation of the EMS was seen had having a very positive return on investment.

3.79 The meeting recalled that ICAO's work on environmental matters was primarily carried out by the Committee on Aviation Environmental Protection (CAEP). The meeting noted that environmental concerns were addressed during regional implementation projects such as establishment of ATS route structures and RVSM. Environment issues, which were of interest to CAEP, should continue to be provided and coordinated by the Regional Office.

A regional framework for the implementation of a global ATM System – progress and challenges

3.77 The meeting noted that, in order to achieve an interoperable global ATM system, ICAO has been addressing the planning and implementation of CNS/ATM systems worldwide in a progressive, cost-effective and cooperative manner. As the formulation of regional, sub-regional and national plans for air navigation systems including CNS/ATM systems is progressively gaining maturity, States and aircraft operators are investing in the enabling technologies to gain early benefits.

As this equipage progresses, both on the ground and in aircraft, further steps are need to be addressed to meet the challenges of integration, interoperability and harmonization of the systems thus leading to a global ATM system.

3.80 With the gradual and phased implementation of CNS/ATM systems, the meeting recognized that it becomes necessary to reconcile the differences both within regions (intra-regional) and with neighbouring regions (interregional) by adopting an approach based on regional cooperation and consensus-building, as well as by utilizing harmonization tools and techniques.

3.81 The meeting noted that the overall strategy for the realization of a global ATM system should be planned and implemented within the framework of the ATM operational concept. The strategy would consist of a mix of top-down and bottom-up approaches and would be guided by expectations of the ATM community. To promote the evolution and minimize the risks associated with the changes in the ATM infrastructure, a multiple sequence of step changes is encouraged within the time frame of twenty-five years, as defined in the ATM operational concept. The collective commitment is central to the success of this regional implementation framework. The meeting noted that, within this regional framework, it was essential to address the elements namely political plane, institutional aspects, operational matters and technical issues.

3.82 The meeting noted that a number of actions had been taken by ICAO related standard-setting organizations as well as manufacturers with regard to development of SARPs, avionics standards and guidance material, and the PIRGs through sub-regional groups and States had implemented, and put in place a number of ongoing initiatives enveloping ATM, communications, navigation, surveillance, economic and institutional areas. The meeting agreed that it was necessary for ICAO and the CNS/ATM partners to place emphasis on identifying and addressing the interface issues with a view to facilitating the harmonized implementation of air navigation systems giving rise to a global ATM system.

3.83 In this regard the meeting received clarification that the ATM operational concept after its review by AN-Conf/11 would be reflected in the *Global Air Navigation Plan for CNS/ATM Systems* (Global Plan, Doc 9750). Furthermore, the meeting was apprised that, ICAO was in the process of developing a global air navigation plan database containing all tabular material from all the regional ANPs (both Basic ANP and FASID), and these would be made available to all contracting States through web. This database, which can be updated online, would support regional and interregional planning, implementation and harmonization.

Review of the terms of reference and work programme of CNS/ATM/IC/SG

3.84 The meeting reviewed the Terms of Reference and work programme of the CNS/ATM/IC Sub-Group as amended by APANPIRG/13 Decision 13/43.

3.85 In considering the future work programme and TORs of the Sub-Group, the meeting was of the view that AN-Conf/11 would produce results that could have a major impact on the future planning and implementation of CNS/ATM in the ICAO regions, in particular in regard to ATM and application of the ATM operational concept. Also, developments in technology such as ADS-B, airborne separation assurance systems, data link communications and satellite voice communications would need to be reviewed, and the *Asia/Pacific Regional Plan for New CNS/ATM Systems* revised and guidance material developed as appropriate. Although it was not anticipated that AN-Conf/11 would have a major effect on regional activities in the short term, it was necessary to review the outcome of the Conference and consider its impact on the region. This could lead to new work items to be undertaken by the APANPIRG Sub-Groups, and changes to their TORs.

3.86 Further, the meeting recognized that the present work programme of the CNS/ATM/IC/SG was not task orientated and no timelines were established to complete its work. The meeting noted that the question of the Sub-Groups continued existence had been addressed by APANPIRG/10 and a Task Force had been established to review the Sub-Groups TORs and work programme. In its report on the review to APANPIRG/11, it was recommended that the CNS/ATM/IC/SG should be dissolved and the work items assigned to the ATS/AIS/SAR and CNS/MET Sub-Groups. The Task Force had recognized that the CNS/ATM/IC/SG had made significant contributions to the work of APANPIRG, in particular in the harmonization of the *Asia/Pacific Regional Plan for the New CNS/ATM Systems* with the *Global Air Navigation Plan for CNS/ATM Systems*, updating the Regional Plan, and formulating key priorities for the CNS/ATM implementation. APANPIRG/11 decided to defer the matter and review this again at APANPIRG/12.

3.87 At APANPIRG/12, it was noted, in regard to the future of the Sub-Group, that the CNS/ATM/IC/SG/8 members were very enthusiastic in their support of the Sub-Group continuing its activities with revised terms of reference, and with a work programme that placed greater emphasis on the co-ordination, monitoring and advancement of CNS/ATM activities. Also, there was a need to eliminate areas of duplication of work with other Sub-Groups. Accordingly, APANPIRG/12 agreed to the continuation of the Sub-Group (Conclusion 12/46 refers), and added additional tasks on business cases for various options of CNS/ATM implementation taking into account environmental benefits, to develop a framework for regional training plans and to co-ordinate,m and harmonize the establishment and operation of ASIA/PAC system performance monitoring agencies.

3.88 APANPIRG/13 further endorsed the continuation of the Sub-Group and had observed that implementation of CNS/ATM needed to be accelerated to derive early benefits and that the Sub-Group's activities were important to achieving this objective. APANPIRG/13 was therefore of a strong view that this Sub-Group should continue to carry out its functions in accordance with the TORs revised by APANPIRG/12. Also, in light of the importance of environmental issues, APANPIRG/13 amended the TORs of the Sub-Group to include more specific requirements to address environmental issues.

3.89 The CNS/ATM/IC/SG/10 meeting on reviewing the issues raised concerning its effectiveness and continuation, agreed that there was a need to undertake a major review of its TORs and work programme, and develop a detailed task list, timelines and to take into account the outcome of AN-Conf/11. Further, the Sub-Group was not in a position to complete this work due to the constraints on time and ATM representation at the meeting due to the combined meeting of the two Sub-Groups. Therefore, it recommended to APANPIRG/14 that a Task Force be formed to undertake this review.

3.90 The meeting discussed at length the background to the Sub-Groups continued existence, taking into account the issues for and against that had been raised at earlier APANPIRG meetings and raised again at this meeting. The meeting was aware of the changing role of the CNS/ATM/IC/SG and the overlapping of work with the other two Sub-Groups and there was a need to resolve this problem. Also, it was recognized that the Sub-Group did not have a detailed task list and deliverables identified with timelines.

3.91 At this stage, it was not evident to the meeting what the outcome of AN-Conf/11 would produce but there could be significant issues arising of relevance to the region. In this regard, there could be merit in assigning new tasks to the CNS/ATM/IC/SG. Also, the meeting was not able to arrive at a consensus whether to continue with the Sub-Group. Accordingly, the meeting decided that in view of the need to ensure APANPIRG was fulfilling its mandate in line with the Procedural Handbook in the functioning of its Sub-Groups, and in light of AN-Conf/11 to be held on 30 September – 3 October 2003, the meeting agreed to establish a Future Direction Task Force (FDTF). Its terms of reference are shown in **Appendix C** to the Report on Agenda Item 3.

Decision 14/47 – Establishment of the Future Directions Task Force (FDTF)

That, a post 11th Air Navigation Conference Future Directions Task Force be established in accordance with the terms of reference as shown in Appendix xx to the Report on Agenda item 3.

3.92 The meeting agreed that the Task Force should meet not later than May 2004 and report to APANPIRG/15, and inform the meetings of the Sub-Groups of the outcome of its review prior to APANPIRG /15.

Report on Regional developments in the modernization of air navigation systems

3.93 The meeting was presented with an overview of the regional developments in the modernization of air navigation systems as well as future plans of CNS/ATM systems. The meeting noted through the panels of the Air Navigation Commission and the Secretariat, assisted by study groups, ICAO has made substantial progress in the development of SARPs, PANS and guidance material

3.94 The meeting noted that various regional planning groups, through the sub-regional groups, have implemented and also put in place a number of ongoing initiatives enveloping ATM, communications, navigation, surveillance as well as economic and institutional areas that would enhance and expedite the process of attaining an integrated global ATM system. A detailed list of the sub-regional and regional projects/plans covering past, present and future contributing to regional harmonization was provided to the meeting. On examination of the comparative picture of regional developments, the meeting recognized the need to enhance the ongoing inter-regional coordination for the harmonized implementation of air navigation systems.

Regional Airspace Safety Monitoring Advisory Group (RASMAG)

3.95 The Chairman of the Asia Pacific Airspace Safety Monitoring Task Force (APASM/TF) reported to the meeting on the outcome of the work of the Task Force, which had been completed at its sixth meeting held in May 2003 in accordance with APANPIRG/12 (Conclusion 12/44). The APASM/TF was tasked to develop an airspace safety system performance monitoring structure and funding arrangements for the Asia/Pacific Region. APANPIRG/13 (Conclusion 13/45 refers) reviewed progress by the APASM/TF and agreed to continue the work of the Task Force, with its final report and recommendations to be presented to APANPIRG/14 in August 2003.

Structure of the organization

3.96 The meeting noted that the Task Force initially developed a plan to establish a Regional Airspace Safety Monitoring Agency (RASMA), which would operate as a business entity fully funded by user charges, and under the authority of States, who would enter into multi-national agreements to make use of RASMA services.

3.97 During the course of its work, the Task Force considered that the institutional difficulties to form the RASMA as a business entity were too complex, and a number of States, for legal reasons, would have difficulty in making use of RASMA services. As existing airspace safety monitoring arrangements operated by States providing regional monitoring services in support of airspace implementation planning, were operating satisfactorily, the Task Force agreed that there was no requirement to establish a business organization. However, there was a need to coordinate and harmonize airspace safety monitoring activities on a regional and inter-regional basis, as well as to provide a common means of funding. Accordingly, establishing a permanent body of experts to

periodically review and evaluate the results of airspace safety monitoring would significantly enhance the airspace safety monitoring process.

3.98 The Task Force decided that the body should be established as a Sub-Group of APANPIRG operating within the ICAO system in accordance with the APANPIRG Procedural Handbook, and named the Regional Airspace Safety Monitoring Advisory Sub-Group (RASMA/SG). The establishment of the RASMA/SG should ensure that a group of multi-disciplinary experts would be permanently available to advise APANPIRG and States on airspace safety matters.

3.99 The meeting considered whether forming of a Sub-Group would be an appropriate arrangement in view of the long term nature of the groups activities. In accordance with the Procedural Handbook (Part I, paragraph 6 refers), the establishment of a Sub-Group for the proposed terms of reference of this Group, did not fit the conditions in the Handbook for establishing a Sub-Group. Accordingly, the meeting decided that a specialist group should be formed and titled the Regional Airspace Safety monitoring Advisory group with, terms of reference are as shown in the **Appendix D** to Agenda Item 3

Existing monitoring services

3.100 The meeting noted that within the Asia/Pacific Region, airspace safety monitoring was being carried out by several monitoring agencies: the United States FAA operates APARMO for RVSM monitoring in the Asia/Pacific Region and safety assessment services for its FIRs, Airservices Australia provides safety monitoring services for RVSM in its FIRs and other safety assessment services for the Asia Region, the Civil Aviation Authority of Singapore provides monitoring for RNP operations on the South China Sea ATS route structure, and AEROTHAI, Thailand was planning to take over RVSM monitoring responsibilities from APARMO for the Asia Region. Other States, e.g. India and Japan were establishing national monitoring programmes and indicated their willingness to provide regional or sub-regional airspace safety monitoring services.

3.101 Additionally, monitoring services were provided through the ISPACG and the IPACG, which operated the Central Reporting Agencies (CRAs) and FANS Interoperability Teams (FITs) for data link applications, i.e. ADS and CPDLC. In addition, the FANS Action Team – Bay of Bengal (FAT-BOB), had been established by ICAO for the Bay of Bengal area under the BBACG, and a similar arrangement was to be established for Southeast Asia (FAT-SEA) under the SEACG.

3.102 The meeting recognized that in order to provide an effective role, the membership to the RASMA Sub-Group should be from States and international organizations with extensive experience in conducting airspace safety monitoring, safety assessments and airspace safety management.

Funding arrangements

3.103 The meeting recalled that providing adequate resources to undertake the airspace safety monitoring work was a significant issues and it was essential that funding was made available on a continuous basis to avoid disruption to monitoring services essentials to the safety of the airspace concerned. In this regard, the meeting noted that, aircraft height-keeping performance monitoring services were presently being funded where required on a “user pays” basis. In addition, airspace data collection, analysis and safety risk assessments had been carried out for the region using human and technical resources provided by some States and organizations at no cost to the user. It was expected that user charges would continue to be the main means of funding airspace safety monitoring services. The meeting agreed that provision of monitoring services would need to be provided in a cost effective manner based on cost/benefit considerations.

Stakeholder considerations

3.104 The meeting noted that the stakeholders comprise a cross section of the aviation community from the air traffic service providers and airspace users through to the communications service providers. Their needs were diverse but all had a safety obligation to meet international standards and recommended practices. The establishment of a dedicated permanent regional airspace safety oversight body would centralizes these activities.

3.105 Further, the meeting recognized that stakeholders require airspace safety monitoring and safety assessment services to continue the development and improvement of the regional airspace, while providing a safe and efficient environment for aircraft operators. It was essential that the Asia Pacific Region had in place a transparent airspace safety oversight capability to which all States contribute and participate. The meeting agreed that this was best achieved for international airspace operations through ICAO and its contributing bodies. In this regard the meeting further agreed that APANPIRG was the appropriate body to oversee this activity.

Establishment of RASMAG

3.106 The meeting recognized that the RASMA Group would provide a framework for airspace safety monitoring services at a time when further monitoring activities were being established for implementation of ADS and CPDLC in the Asia Region as mentioned above. The present airspace monitoring activities were extensive and would continue to grow as more States provide data link capability and implement reduced vertical and horizontal separation minima. Therefore, it was timely to establish the RASMA Group to provide support and to keep airspace safety monitoring activities under review and to report to APANPIRG.

3.107 The meeting noted the detailed plan provided by the APASM/TF on the establishment of the RASMA Group, and expressed its appreciation to the Task Force members for having completed this important and difficult task, recognizing that this was the first region to have taken this step and bring together the diverse monitoring activities and bodies under a unified regional structure. The meeting agreed to establish the RASMA Group and formulated the following Decisions:

Decision 14/48 – Establishment of the Regional Airspace Monitoring Advisory Group (RASMAG)

That, the Regional Airspace Safety Monitoring Advisory Group (RASMAG) be established with terms of reference as shown in Appendix xx to the Report on Agenda Item 3. The RASMAG shall report annually to APANPIRG and the ATM/AIS/SAR/SG on the results of its airspace safety monitoring activities. The members of the Group should compromise experts from the regional monitoring agencies and other specialists as required.

Decision 14/49 – To dissolve the Asia/Pacific Airspace Safety Monitoring Task Force

That, the Asia/Pacific Airspace Safety Monitoring Task Force having completed its work programme be dissolved.

CNS/ATM Implementation Planning Matrix								
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**GNSS**		**ADS-B**	**ADS-C**	**Remarks**
				NPA Supplemental Means (S) Primary means (P)	**En-route Supplemental Means (S) Primary means (P)**			
AUSTRALIA	ATN tests were conducted. BIS Router and Backbone BIS Router will be implemented by 2005 and AMHS in 2005.	AFTN based AIDC Implemented between Brisbane and Auckland.	Implemented to support FANS1/A equipped aircraft.	Implemented (S) 260 GPS NPA Final 26 aerodromes to be completed 2002.	Developed en-route as (P) for approval to use in domestic airspace.	ADS-B trial being conducted.	FANS 1/A ADS-C implemented.	
BANGLADESH	ATN BIS Router and AMHS planned for 2005							
BHUTAN	ATN BIS Router planned for 2005			Procedures developed for NPA as (S)				
BRUNEI DARUSSALAM	ATN BIS Router planned for 2005							
CAMBODIA								
CHINA	ATN BIS Router will be implemented by 2005.	IDC between ACCs within China are being implemented.	Implemented to support ATS Route L888 and polar routes. Trial on HF data link conducted for use in western China.		Implemented in certain airspace as (S).		FANS 1/A ADS-C implemented to support L888 and polar routes.	

CNS/ATM Implementation Planning Matrix								
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**GNSS**		**ADS-B**	**ADS-C**	**Remarks**
				NPA Supplemental Means (S) Primary means (P)	**En-route Supplemental Means (S) Primary means (P)**			
HONG KONG, CHINA	-AMHS trial with Australia conducted in late 2002; - Tripartite BBIS trial with Beijing and Bangkok conducted in end of 2002; -BBIS/AMHS trials with Thailand and Japan are conducted in 2003. Implementation in 2003/2004; - An operational AMHS planned for commissioning by end of 2003.	Trial on the AFTN based AIDC with Guangzhou China commenced. Implementation planned for 2003/2004. AIDC trial with Sanya commenced in mid 2003.	Trials continuing for CPDLC. D-ATIS D-VOLMET and PDC implemented. VDL Mode-2 trial commenced Sep. 2002 and further trials being conducted.		Implemented in certain airspace as (S).	ADS-B trial scheduled for 2004.	FANS 1/A Trials continuing for ADS-C.	
MACAO, CHINA	ATN BIS router planned for 2005. Planning for trial with China and Hong Kong , China going on							ATZ within Hong Kong and Guangzhou FIRs. In ATZ full VHF coverage exist. Radar coverage for monitoring purposes.
COOK ISLANDS								
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA								

CNS/ATM Implementation Planning Matrix								
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**GNSS**		**ADS-B**	**ADS-C**	**Remarks**
				NPA Supplemental Means (S) Primary means (P)	**En-route Supplemental Means (S) Primary means (P)**			
FIJI	AMHS in-house trials planned for 2003. AMHS trials with USA in 2004. ATN BIS Router will be implemented in 2005.	Implementation of AFTN based AIDC with Brisbane and Auckland in 2003.	FANS-1. Implemented since 1997.	NPA procedures for (S) completed in Dec. 2002.	Implemented as (S).	ADS-B trials planned for 2004. Implementation in 2005/2006.	ADS-C implemented in oceanic airspace using EUROCAT 2000 X.	
FRANCE French Polynesia Tahiti		Implementation of limited message sets with adjacent centres under discussion.	FANS-1. Implemented since 1996.				FANS 1/A ADS-C implemented since March 1999.	
INDIA	ATN BIS Router and BBIS router planned for implemented at Mumbai in 2005.		FANS-1 limited Implemented at Kolkata and Chennai. Planned for Mumbai and Delhi.		SBAS (S). Planned for 2005.		FANS 1/A ADS-C implemented at Kolkata and Chennai. Plan to implement in Delhi and Mumbai.	
INDONESIA	ATN BIS Router planned implementation in 2005.	AFTN based AIDC planned for implementation between Brisbane and Jakarta in 2004.	FANS-1/A. CPDLC in Jakarta, Ujung Pandang FIRs planned for 2004.	Procedure to be completed in 2006 for NPA (S).			FANS 1/A ADS-C trial planned for Jakarta and Ujung Pandang FIRs for 2004.	

CNS/ATM Implementation Planning Matrix								
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**GNSS**		**ADS-B**	**ADS-C**	**Remarks**
				NPA Supplemental Means (S) Primary means (P)	**En-route Supplemental Means (S) Primary means (P)**			
JAPAN	ATN BBIS already implemented. AMHS implementation between Japan, USA and Hong Kong planned for 2004.	AIDC based. AFTN procedure implemented with Oakland USA.	FANS1/A system Implemented in Tokyo FIR.				FANS 1/A. ADS-C implemented in Tokyo FIR.	
KIRIBATI								
LAO PDR	ATN BIS Router planned for implementation with Bangkok in 2005.		FANS-1/A Planned for Bay of Bengal and South China Sea areas. Equipment is under test operation.		Implemented as (S).		FANS-1/A. ADS-C planned for Bay of Bengal and South China Sea areas. Equipment under test operation.	
MALAYSIA	ATN BIS Router planned for 2005.		Planned for Bay of Bengal and South China Sea areas.	NPA (S) at KLIA planned for 2003.			FANS 1/A ADS-C planned for Bay of Bengal and South China Sea areas.	
MALDIVES	BIS Router/AMHS trial planned for 2003 – 2005 and implementation in 2005.	Planned for 2006.	FANS1/A planned for 2006.		Trials planned for 2005-2008. Implementation in 2008.	Trials planned for 2004-2006. Implementation in 2006.		
MARSHALL ISLANDS				NPA (S) implemented at Majuro Atoll.				
MICRONESIA FEDERATED STATES OF								
Chuuk				NPA(S) implemented				

CNS/ATM Implementation Planning Matrix								
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**GNSS**		**ADS-B**	**ADS-C**	**Remarks**
				NPA Supplemental Means (S) Primary means (P)	**En-route Supplemental Means (S) Primary means (P)**			
Kosrae				NPA(S) implemented				
Pohnpei				NPA(S) implemented				
Yap				NPA(S) implemented				
MONGOLIA	ATN BIS Router planned for 2005. Trial with Bangkok planned for 2003.		Function available. Regular trials are conducted.	GPS procedures are being developed and implemented at 10 airports.	Implemented as (P).	ADS-B trial in progress implementation planned for 2006.	FANS 1/A ADS-C implemented since August 1998.	
MYANMAR	Trial for ATN BIS Router with Thailand planned for 2003. Test with China planned for 2005.		Implemented since August 1998				Implemented since August 1998	
NAURU								
NEPAL	BIS Router planned for 2005.			Development of arrival procedure and NPA as (S) completed. Departure procedure is being developed.	Implemented as (S).			
NEW ZEALAND	BIS Router planned for 2005. Implementation will be confirmed based on operational requirement.	AFTN based AIDC implemented between New Zealand, Australia and USA. Tests with Fiji planned by the end 2003.	FANS/1A. Implemented	42 NPA implemented presently.	will be implemented as required.	Trials planned 2006-2008. National coverage starts 2008 to be completed by 2010.	FANS 1/A Implemented.	

CNS/ATM Implementation Planning Matrix								
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**GNSS**		**ADS-B**	**ADS-C**	**Remarks**
				NPA Supplemental Means (S) Primary means (P)	**En-route Supplemental Means (S) Primary means (P)**			
PAKISTAN	Implementation of ATN considered for Phase II (2005-2010).	Implemented between Karachi and Lahore ACCs	Implementation planned from 2005-2010.	Arrival and departure NPA procedure as (s) are being developed.	Planned for 2005-2010.	Planned for 2005 – 2010.	Planned for 2005-2010	RADAR coverage provided in Karachi and Lahore FIRs.
PAPUA NEW GUINEA								
PHILIPPINES	ATN BIS Router planned for 2005. Implementation for AMHS also planned.		D-ATIS and CPDLC Planned for 2006.				FANS 1/A ADS-C planned for 2006.	
REPUBLIC OF KOREA	ATN BIS planned for 2005.	FTN based AIDC implemented between Incheon ACC and Seoul APP.					FANS 1/A ADS-C planned for 2003.	
SINGAPORE	ATN BBIS Router trial with Hong Kong conducted between April and June 2003. Trial with Thailand planned for 2004.		Implemented since 1997. Integrated in the ATC system in 1999. D-ATIS implemented since February 2000.	NPA (S) procedure developed and is being published in the AIP.	Implemented (S).	Trial planned for 2005.	FANS 1/A ADS-C implemented since 1997. Integrated with ATC system in 1999.	
SRI LANKA	ATN BIS Router Planned for 2005. AMHS planned along with BIS in 2005.		CPDLC implemented since November 2000.	NPA (S) planned for 2005.			FANS 1 /A ADS-C implemented since November 2000.	GPS based domestic route structure being developed.

CNS/ATM Implementation Planning Matrix								
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**GNSS**		**ADS-B**	**ADS-C**	**Remarks**
				NPA Supplemental Means (S) Primary means (P)	**En-route Supplemental Means (S) Primary means (P)**			
THAILAND	ATN G/G system implemented for domestic services. BBIS/BIS Routers already implemented. AMHS 2005.	ATN based AIDC Implemented in Domestic Sector.	FANS-1/A Implemented.		Implemented as (S).		FANS 1/A ADS-C Implemented.	
TONGA								
UNITED STATES								
Anchorage				NPA(S) implemented	En-route (P) implemented	ADS-B trials continuing.	FANS/1-ADS-C 2004.	
Fairbanks				NPA(S) implemented				
Guam (Agana NAS)				NPA(S) implemented				
Guam (Anderson)				NPA(S) implemented				
Honolulu Intl.				NPA(S) implemented	En-route (P) implemented		FANS 1/A ADS-C planned for Dec. 2004	
Johnston Atoll				NPA(S) implemented				
Kahului				NPA(S) implemented				

CNS/ATM Implementation Planning Matrix								
State/ Organization	**ATN G/G Boundary Intermediate System (BIS) Router/AMHS**	**AIDC**	**CPDLC**	**GNSS**		**ADS-B**	**ADS-C**	**Remarks**
				NPA Supplemental Means (S) Primary means (P)	**En-route Supplemental Means (S) Primary means (P)**			
Oakland	AMHS implementation between Japan and USA scheduled for March 2004. Acceptance testing Sept. 2003 – Feb. 2004. US/China and US/Fiji AMHS testing scheduled for 2004.	Implemented using AFTN procedure. ATN AIDC planned for 2005.	FANS-1 2001. Phase I ATN CPDLC implemented in Sept 2001. Phase IA planned for implementation at 20 en-route centres in USA for en-route function in 2006/2007 time frame.	NPA (S) implemented	En-route (P) implemented		FANS-1/A ADS-C planned for Dec. 2004.	
Saipan				NPA (S) implemented				
VANUATU								
VIET NAM	ATN BIS Router planned for 2005 and AMHS in 2005.	ATN based AIDC planned between Ho-Chi-Minh and Bangkok in 2005.	Planned for 2005.	Planned for NPA (S) for 2004.	Implementation as (S) planned for 2004.		FANS 1/A ADS-C planned for 2005.	Most of air space in Hanoi and Ho-Chi-Minh FIRs covered by RADAR.

Key Priorities for CNS/ATM Implementation in the Asia/Pacific Region

NO.	KEY PRIORITIES	DESCRIPTION	MILESTONES	SUB-GROUP	STATUS
1	ATN Implementation	Implementation of Ground-to-Ground element of ATN is required.	2005	CNS/MET ATN Transition Task Force	2005
2	Incorporation of CNS/ATM Material into Regional ANP & FASID	Incorporation of CNS/ATM Material into Regional ANP & FASID	APANPIRG/13	ATS/AIS/SAR	On-going
3	WGS-84 Implementation	To achieve uniformity in aeronautical data publication across the Region in order to ensure a standard reference system for CNS/ATM.	Immediate (Effective Date was 1 Jan 1998)	ATS/AIS/SAR	Implementation is monitored at each meeting using the uniform format for the reporting of WGS-84 implementation. Report progress to APANPIRG/14
4	RVSM Implementation	To provide more efficient flight profiles and to increase airspace capacity in conjunction with the implementation of CNS/ATM.	Bay of Bengal – 27 November 2003	ATS/AIS/SAR	

NO.	KEY PRIORITIES	DESCRIPTION	MILESTONES	SUB-GROUP	STATUS
5	RNP Implementation En-route RNP 10 & 4 Terminal RNP 4& 1 Approach RNP 0.3	*Implement RNP based navigation, operation and procedures to improve the efficiency and flexible use of airspace.*	On Going Report to APANPIRG	ATS/AIS/SAR & CNS/ATM/IC	Phased implementation.
6	ADS-C	The implementation of ADS in oceanic or remote areas in accordance with the Regional CNS/ATM Plan is required for the enhancement of safety and ATM.	APANPIRG	ATS/AIS/SAR	-Phased implementation. Revised Regional CNS/ATM Guidance Material developed containing ADS section. -Implementation focus and timetable need to be developed. -States are gaining experience in the use of ADS.
7	Technical Co-operation in Regional CNS/ATM Planning & Implementation	The continuation and enhancement of ICAO's co-ordinating role of technical co-operation in CNS/ATM planning and implementation, in close co-operation with all partners and taking into account the regional approach, is required.	APANPIRG/14	All	Sub-groups to identify requirements.
8	Preparation for WRC-2007	The co-operative participation of States is required with their respective telecommunications regulatory authorities, regional groups such as the APT and at the WRC, preparatory meetings and study groups to ensure that aviation spectrum requirements	WRC-2007	All	

NO.	KEY PRIORITIES	DESCRIPTION	MILESTONES	SUB-GROUP	STATUS
		are fulfilled including GNSS spectrum requirements are protected.			
9	GNSS Implementation • ABAS • SBAS • GBAS	To implement GNSS in accordance with the Asia Pacific Regional Strategy. Develop regional GNSS Augmentation requirements Ensure region wide awareness of developing GNSS systems integrate into Regional Plan.	On Going. Report to APANPIRG	All	*SBAS – WAAS IOC announced on 10 July 2003* *SBAS receiver - TSO C145/6 receivers now available* *GBAS – FAA LAAS contract for delivery in 2006*
10	ATS route implementation	To review and develop new requirements for ATS routes.	APANPIRG/15	ATS/AIS/SAR	*2004*

NO.	KEY PRIORITIES	DESCRIPTION	MILESTONES	SUB-GROUP	STATUS
11	Final phase of WAFS	To implement transition to the final phase of WAFS to support the CNS/ATM system.	2004	CNS/MET SG	• WAFS Transition Plan and Procedures has been developed and is being successfully implemented. • Transfer of responsibility of RAFCs to WAFCs London and Washington has been implemented. • Closure of RAFCs has been implemented.
12	MET Chapter 8 of the ASIA/PAC Regional Plan for New CNS/ATM System	To develop MET components of the ASIA/PAC CNS/ATM concept/strategy To develop MET Chapter of the Regional CNS/ATM Plan	2003 2004	CNS/MET SG with assistance of the ATS/AIS/SAR SG METATM TF	• The first draft of MET Chapter of the Regional CNS/ATM Plan has been developed. • METATM TF to develop MET components of the ASIA/PAC CNS/ATM concept/strategy.
13	Data – link Communications	Implementation of CPDLC. AIDC to be introduced where ATS automated systems are implemented.	On -going 2005	All All	Sub – Groups to review progress of implementation. Implementation focus and time table need to be developed.

NO.	KEY PRIORITIES	DESCRIPTION	MILESTONES	SUB-GROUP	STATUS
14	ADS-B	Data Link Selection for ADS/B recommended by ADS-B Task Force Target date of Implementation: States, where appropriate, implement "ADS-B out" for ground-based surveillance services on a sub-regional basis. ADS-B Task Force to develop implementation plan and sub-groups foster implementation.	2003 2006	CNS/MET All	APANPIRG/14 adopted 1090 MHz ES as the data link for ADS-B in ASIA/PAC region.
15	Implementation of APV and RNP Approaches	Review applicability of APV and RNP Approach Design Standards for Asia Pacific. Develop implementation strategy.	On Going. Report to APANPIRG	ATS/AIS/SAR	APV and RNP Design standards now in PANS OPS. Aircraft certified for RNP and APV approaches.

NO.	KEY PRIORITIES	DESCRIPTION	MILESTONES	SUB-GROUP	STATUS
16	Data Link Flight Information Services (DFIS) applications	To implement the following applications via request/response mode of data link in the Asia and Pacific Regions: a) Data link –automatic terminal information services (D-ATIS); b) VOLMET data link service (D-VOLMET); c) Pre-Departure Clearance (PDC) delivery via data-link;	2008	All	Trials and demonstrations are conducted and some operational services are provided by States; D-VOLMET to be implemented by VOLMET Broadcast Stations specified in the FASID.
17	Safety Management Systems	States to establish national safety management systems and effective application of safety programmes which are required for the provision of air traffic services.	APANPIRG/14	CNS/ATM/IC RASMA/SG (Subject to APANPIRG/14)	Annex 11 provision effective 27 November 2003.

FUTURE DIRECTIONS TASK FORCE

Terms of Reference of the Future Directions Task Force (FDTF)

Considering:

a) the Terms of Reference of APANPIRG;

b) the Terms of Reference and Subject/Task List of the ATM/AIS/SAR, CNS/ATM/IC and CNS/MET Sub-Groups and the RASMA Group; and

c) the outcomes of the 11th Air Navigation Conference

The Task Force shall:

a) in light of c) above, and review the terms of reference and work programme of APANPIRG's contributory bodies;

b) review the coordination, effectiveness and efficiency of the Sub-Groups to achieve the APANPIRG objectives taking into account the terms of reference and work programme of each Sub-Group; and

c) to make recommendations as to the changes that may be necessary in the operation of APANPIRG's contributory bodies.

The Future Directions Task Force to be constituted from:

a) the Chairperson or nominee of the ATM/AIS/SAR, CNS/ATM/IC and CNS/MET Sub Groups and RASMA Group; and

b) not more than ten other members drawn from States and International Organizations:

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DRAFT TERMS OF REFERENCE
REGIONAL AIRSPACE SAFETY MONITORING ADVISORY GROUP (RASMAG)

Terms of Reference of the RASMAG

The objectives of the Group are to:

a) facilitate the safe implementation of reduced separation minima and CNS/ATM applications within the Asia and Pacific Regions in regard to airspace safety monitoring; and

b) assist States to achieve the established levels of airspace safety for international airspace within the Asia and Pacific Regions.

To meet these objectives the Group shall:

a) review airspace safety performance in the Asia and Pacific Regions at the regional level and within international airspace;

b) review and develop as necessary guidance material for airspace safety monitoring, assessment and reporting activities;

c) recommend and facilitate the implementation of airspace safety monitoring and performance assessment services;

d) review and recommend on the competency and compatibility of monitoring organizations;

e) review, coordinate and harmonise regional and inter-regional airspace safety monitoring activities;

f) review regional and global airspace planning and developments in order to anticipate requirements for airspace safety monitoring and assessment activities;

g) address other airspace safety related issues as necessary;

h) facilitate the distribution of safety related information to States, and

i) provide to APANPIRG comprehensive reports on regional airspace safety.

Task List

To review the safety monitoring programmes in the Asia and Pacific Regions for implementation and operation of:

a) reduced vertical separation minimum (RVSM);

b) reduced horizontal (lateral and longitudinal) separation minima using RNP; and

c) aircraft separation applications using ADS and CPDLC).

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