**INTERNATIONAL CIVIL AVIATION ORGANIZATION**

**AFI PLANNING AND IMPLEMENTATION REGIONAL GROUP FIFTEENTH MEETING (APIRG/15)**

(Nairobi, Kenya, 26 – 30 September 2005)

**Agenda Item 6: Review of significant developments related to air navigation**

# DEVELOPMENTS IN THE MODERNIZATION OF AIR NAVIGATION SYSTEMS

(Presented by the Secretariat)

**SUMMARY**

This paper provides an overview of recent developments in the modernization of air navigation systems within the purview of the Air Navigation Commission. The paper shows the current status of ICAO provisions relating to CNS/ATM systems, a summary of the work of relevant panels and study groups, tabular representations of regional developments and some observations.

Action by APIRG is in paragraph 4.

## 1. INTRODUCTION

1.1 This working paper contains the combined annual report on the modernization of air navigation systems as well as regional developments in the air navigation field. A summary of the development status of air navigation systems-related SARPs, PANS and guidance material is in **Appendix A** to this paper. The recent main activities of panels of the Commission and air navigation study groups involved in CNS/ATM-related fields are provided in a tabular form in **Appendix B**. Finally, a tabular representation of regional developments is reflected in **Appendix C**.

## 2. SARPs, PANS AND GUIDANCE MATERIAL RELATED TO AIR NAVIGATION SYSTEMS

### 2.1 Communications

2.1.1 The manual on the very high frequency (VHF) digital link (VDL) Mode 4 as an air-ground data link with point-to-point and broadcast capabilities was completed. Also, amendments to the VDL Mode 4 Standards and Recommended Practices (SARPs) enable this air-ground data link to be used as a point-to-point communication link, in addition to its capabilities to be used for automatic dependent surveillance – broadcast (ADS-B). Also, work on the integration of next-generation satellite systems (NGSS) into the relevant SARPs and manuals with aeronautical mobile-satellite service (AMSS) material is nearly completed and expected to become available in 2005-2006. A study of the feasibility of using

Transmission Control Protocol/Internet Protocol (TCP/IP) protocol suite for the aeronautical telecommunication network (ATN) and the possible use of Voice over Internet Protocols (VoIP) was initiated. Finally, the development of guidelines on the use of the public Internet for aeronautical applications was completed. The guidelines are to be published in the form of an ICAO manual.

2.1.2 The development of draft SARPs and guidance material on the UAT is expected to be completed in 2005. Work on frequency assignment planning criteria for VDL Mode 2 as well as for VDL Mode 3 and Mode 4, together with guidance on the on-board implementation of these systems will also reach maturity. Monitoring of emerging technology alternatives for air-ground communication systems will continue. As for the ATN, current provisions will be updated as a result of experience with implementation and, pending the feasibility study results on using TCP/IP, work on the development of additional ICAO provisions will start. Attention will also be paid to the optional use of message encryption for confidentiality features.

## 2.2 Navigation

2.2.1 Pursuant to the incorporation of the first package of global navigation satellite system (GNSS) SARPs in Annex 10 — *Aeronautical Telecommunications* and subsequent enhancements thereto, work is under way on the development and validation of SARPs for new and/or enhanced GNSS elements and signals, such as modernized Global Positioning System (GPS), the GLObal NAVigation Satellite System (GLONASS) and GALILEO. Procedures and criteria for arrival procedures and approaches with vertical guidance (APV) using satellite-based augmentation system (SBAS) are being developed.

2.2.2 Implementation of GNSS (mainly GPS) based non-precision approach (NPA) will be continued in ICAO regions. Considering the introduction of the first SBAS (wide area augmentation system (WAAS)) in the United States and the forthcoming introduction of other similar systems (European Geostationary Navigation Overlay Service (EGNOS), the GPS and GEO Augmented Navigation (GAGAN) and multifunctional transport satellite-based augmentation system (MSAS)) in the 2005-2007 time frame, a number of States plan the implementation of procedures for SBAS-based APV as the next step in transition to satellite-based navigation. This planning, however, does not discourage the implementation of APV procedures using barometric vertical navigation (Baro-VNAV). Development of performance requirements and SARPs for more demanding GNSS applications (e.g. precision approaches for CAT II/III operations) and new GNSS elements (e.g. GALILEO, ground-based regional augmentation system (GRAS)) will continue. Current studies of interference to GNSS signals and mitigation methods, including the assessment of ionospheric effects on SBAS performance in equatorial areas, will progress using, in particular, test bed facilities installed in South America and Asia that collect data in the presence of ionospheric anomalies to assess their effects on GNSS, particularly on SBAS APV operations.

2.2.3 SARPs have recently been introduced in Annex 15 — *Aeronautical Information Services*, with consequential amendments to Annex 4 — *Aeronautical Charts*, Annex 11 — *Air Traffic Services* and Annex 14 — *Aerodromes (Volumes I and II)*, concerning electronic terrain data, common reference systems for air navigation, and the updating of existing specifications for obstacle data and aeronautical data quality requirements. Work is underway on a new manual to support the implementation of provisions on terrain and obstacle databases, on another new aeronautical data quality manual and on an amendment to the *World Geodetic System — 1984 (WGS-84) Manual* (Doc 9674) related to common reference systems.

## 2.3 Surveillance

2.3.1 A circular containing guidance material on airborne separation assistance system (ASAS) is being processed for publication following its completion and review by the Commission during the first

quarter of 2004. A draft manual on airborne collision avoidance system (ACAS) was completed and it will be presented to the Commission in 2005. To support the radio frequency (RF) link for ADS-B, SARPs for airborne ADS-B system components have been developed that will be presented to the Commission in 2005. The development of SARPs and guidance material for the universal access transceiver (UAT), which would also serve as a data link for ADS-B (in particular for general aviation), continued.

2.3.2 Issues relating to the operational use of ACAS, ADS-B and the proposed ASAS will be addressed. Implementation of ACAS worldwide will be monitored, and ACAS procedures for civil aircraft operation in case of interception by military aircraft will be further studied. Feasibility of downlinking resolution advisories (RA) to air traffic control centres is being studied.

**2.4 Air traffic management**

2.4.1 The *Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual* (Doc 9830) and *Manual on Simultaneous Operations on Parallel or Near-Parallel Instrument Runways* (Doc 9643) were published in 2004. The *Manual on Safety Management for Air Traffic Services* was finalized and is available on ICAO-NET. The *Air Traffic Services Planning Manual* (Doc 9426) and the *Manual on Required Navigation Performance (RNP)* (Doc 9613) were updated and are expected to be published in 2005. Phraseologies dealing with 8.33 kHz channel spacing, reduced vertical separation minimum (RVSM) and GNSS were introduced into the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) as well as a definition for "runway incursion" and procedures for reporting thereon.

**2.5 Runway safety**

2.5.1 As part of the awareness and education campaign on runway safety, a seminar was held for NAM/CAR/SAM Regions in Santiago, Chile from 18 to 22 October 2004, and another is planned for Eastern Europe, Russian Federation and the countries of the Commonwealth of Independent States in Moscow, from 12 to 16 September 2005.

2.5.2 A runway incursion education and awareness campaign began with a series of worldwide seminars to promote the implementation of runway safety programmes in the States. Work is in progress to finish the ICAO Runway Safety Toolkit which will include references to relevant ICAO SARPs and procedures along with documentation on runway safety programmes, educational videos and posters. A manual on runway safety is under development, with appropriate guidance material for States to use to prevent runway incursions. The subject manual will include standard taxonomy for runway incursion severity and type of error, as well as best practices to prevent runway incursions from States and international organizations.

**2.6 Flight Safety and Human Factors Programme**

2.6.1 As a consequence of Recommendation 2/5 of the AN-Conf/11 (Monitoring safety during normal operations), the Secretariat has initiated the development of a programme, the Normal Operations Safety Survey (NOSS), to monitor safety during normal air traffic services operations. NOSS will be developed for implementation as part of air traffic services safety management systems (SMS), and will be adapted to take into consideration needs and existing experience within States and air traffic services providers. The Normal Operations Safety Survey Study Group (NOSSSG) will assist the Secretariat in the development of the guidance material necessary to implement NOSS.

2.6.2 Three States have indicated their intention to conduct surveys of their normal ATS operations during 2005, by each conducting a NOSS on a trial basis. The actual timing of these trials depends upon the development of the necessary draft guidance materials by NOSSSG. The trials are tentatively planned for the second or third quarter of 2005. The experience from these trials will subsequently be incorporated into the final development of the guidance material by NOSSSG.

### 2.7 Safeguarding the aeronautical frequency spectrum

2.7.1 The draft ICAO position for the International Telecommunication Union (ITU) World Radiocommunication Conference (WRC-2007) has been coordinated with Contracting States and updated, as necessary, in preparation for WRC-2007. In addition to various issues relating to the protection of aeronautical frequency spectrum, the position will concentrate on the availability of additional frequency spectrum for the implementation of future technology alternatives for air-ground communications on the basis of the outcome of the Eleventh Air Navigation Conference (AN-Conf/11). In parallel, work is in progress on the development of guidance material relating to the protection of aeronautical communication and navigation systems from harmful interference.

## 3. GENERAL OBSERVATIONS BY THE COMMISSION

3.1 The Commission noted that progress was being made with certain elements of the CNS/ATM systems and that a number of regional initiatives had been put in place to develop the air navigation infrastructure and procedures. In particular, the ongoing implementation of RVSM on major traffic flows worldwide was noted with satisfaction. In that regard, it was noted that while Regional Monitoring Agencies (RMAs) had been established, work was underway to address associated institutional and economic issues on a global scale.

3.2 The Commission also noted the use of certain aviation systems that are not standardized by ICAO or not fully compliant with SARPs for CNS/ATM systems. While such systems often yield operational and/or economical benefits to providers and users of air navigation services in the interim period, their impact on the implementation of end-state SARPs-compliant systems should be taken into account, particularly in relation to equipment life cycle and retrofit considerations. The Commission will further study this matter to identify the possible need for specific action by ICAO.

## 4. ACTION BY APIRG

4.1 The Meeting is invited to:

a) note the information provided in this working paper;

b) take into account in the work programme of APIRG; and

c) enhance the ongoing interregional coordination for the harmonized implementation of air navigation systems.

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**APPENDIX A**

**DEVELOPMENT STATUS OF SARPS AND GUIDANCE MATERIALRELATED TO CNS/ATM SYSTEMS**

| Main field | | Elements | SARPs/PANS | | Guidance material | |
|---|---|---|---|---|---|---|
| | | | Target completions date | Status | Target completions date | Status |
| **ATM** | **ATM** | Global air traffic management requirements | 2005 | • Annexes 2 and 11 SARPs and PANS-ATM procedures under development. | 2003 | • The ATM operational concept was endorsed by the Eleventh Air Navigation Conference in October 2003 and approved by the Air Navigation Commission (ANC) in January 2004 under delegated authority.. |
| | | Interoperability and functional integration of flight operations, ATS, ATFM and tactical ASM | 2005 and beyond | • Annexes 2 and 11 SARPs and PANS-ATM procedures under development | 2003 | • The ATM operational concept was endorsed by the Eleventh Air Navigation Conference in October 2003 and approved by the ANC in January 2004 under delegated authority. |
| | | Required total system performance (RTSP) | 2005 | • Draft policy statement under development | 2003 | • Definition developed.<br>• Role and functionality of RTSP being explored as part of work on the global ATM operational concept. |
| | | ATM requirements for communications, navigation and surveillance | 2005 | • Annexes 2, 6 and 11 SARPs and PANS-ATM procedures under development. | 2005 | • Additional guidance material for the *Manual of Air Traffic Services Data Link Applications* (Doc 9694) under development. |
| | **ASM** | Airspace infrastructure planning | — | — | | • *Manual on Airspace Planning Methodology for the Determination of Separation Minima* (Doc 9689) published.<br>• Further guidance material under development by SASP and ATMCP |
| | | RNP and RNAV for en-route operations | Completed | • Annex 11 SARPs and PANS-ATM procedures adopted by Council in 1998. | Completed | • Update of the *Manual on Required Navigation Performance (RNP)* (Doc 9613) completed.<br>• Second edition published. |

| Main field | | Elements | SARPs/PANS | | Guidance material | |
|---|---|---|---|---|---|---|
| | | | Target completions date | Status | Target completions date | Status |
| | | Separation between aircraft | 2005 | • PANS-ATM procedures approved by Council in 1998 | 2003 | • Amendment to the *Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum between FL 290 and FL 410* (Doc 9574) completed.<br>• Additional guidance is under development for the *Manual on Airspace Planning Methodology* (APM) (Doc 9689). |
| | | ATS (uplink of MET data) | Completed | • SARPs and procedures concerning D-VOLMET have been included in Annex 3 and PANS-ATM respectively. | 2005 | • *Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services* (Doc 9377) to be amended to include guidance material. |
| | | ATS (uplink of SIGMET information in graphical format) | Completed | • Initial SARPs for graphical SIGMETs have been included in Annex 3 | 2005 | • *Manual of Aeronautical Meteorological Practice* (Doc 8896) to be amended to include guidance material. |
| | | WAFS planning and implementation (final phase) | Ongoing | • SARPs for global WAFS SIGWX forecasts in binary format (BUFR code) for direct transmission to airline and ATM computers have been included in Amendment 73 to Annex 3. | 2005 | • *Manual of Aeronautical Meteorological Practice* (Doc 8896) to be amended to include guidance material. |
| | | ATS applications for air-ground data links | 2005 | • Annex 11 SARPs and PANS-ATM procedures are being developed. | Completed | • The *Manual of Air Traffic Services Data Link Applications* (Doc 9694) published and dispatched in second quarter 1999.<br>• Additional guidance is under development. |
| | | Data interchange between automated ATS systems | 2005 | • Annex 11 SARPs and PANS-ATM procedures under development. | — | — |
| | **ATFM** | ATFM systems and procedures | 2005 | • Annexes 2 and 11 SARPs and PANS-ATM procedures to be developed. | 2005 | • ATFM part of the ATM operational concept under development |

| Main field | Elements | SARPs/PANS | | Guidance material | |
|---|---|---|---|---|---|
| | | Target completions date | Status | Target completions date | Status |
| CNS/ATM | Human Factors | Completed | • HF-related SARPs were developed and incorporated in Annexes 10 and 11.<br>• Further, HF-related requirements for inclusion in the PANS-OPS were developed during 2000, with an applicability date of 1 November 2001. | Completed | • *Human Factors Guidelines for Air Traffic Management (ATM) Systems* (Doc 9758) was completed and published in 2000. |
| | Human Resource Planning and Training | — | — | 2005 | • The human resource planning guidance material is under development.<br>• A potential approach and format for regional training planning was developed. |
| COM | VHF digital link (Modes 3 and 4) | Completed | — | Completed | — |
| | UAT | 2005 | • Draft SARPs are near completion. | 2005 | • Manual on UAT near completion |
| | ATN | Completed | • Completed in 2001. | 2005 | • Updates to detailed technical specifications and guidance material near completion. |
| NAV | RNP (en-route) | Completed | • Adopted/approved by Council in 1994 (Annexes 2, 4, 6, 11, 15 and PANS-ATM). | 2005 | • Second edition of Doc 9613, *Manual on Required Navigation Performance (RNP)* was published in 1999.<br>• Additional guidance material on approval of aircraft and operations for RNP 10 was published in 2001.<br>• Similar guidance material for RNP 4 is under development. |
| | WGS-84 (common reference systems) | Completed | • Adopted by Council in 1994, 1995, 1997 and 1998 of WGS-84<br>• Annexes 4, 11, 14 (both volumes) and 15 updated, provisions applicable from 1 January 1998. | Completed | • *WGS-84 Manual* (Doc 9674) Second edition, which was published in 2002, included provisions relating to taxiway and apron surveying points.<br>• ICAO WGS-84 Web site is operational on test basis. |

| Main field | Elements | SARPs/PANS | | Guidance material | |
|---|---|---|---|---|---|
| | | Target completions date | Status | Target completions date | Status |
| | | Completed | • Updating of WGS-84 (as the horizontal reference system) to include temporal changes in the tectonic plate motion required for precise geodetic and some air navigation applications.<br>• Introduction into Annex 15 of the vertical reference system for international civil aviation and consequential amendments to Annexes 4, 11 and 14 (both volumes).<br>• Introduction into Annex 15 of the temporal reference system for international civil aviation. | 2005 | • Amendment to the *World Geodetic System — 1984 (WGS-84) Manual* (Doc 9674) to reflect the changes resulting from the Amendment 33 to Annex 15, specifically on the common reference systems for air navigation. |
| | Aeronautical terrain and obstacle databases | 2006 | • The Secretariat with the assistance of The East Tennessee State University (ETSU) developed an aeronautical communication transfer protocol for the exchange of aeronautical information/data and a new concept for computerized AIS systems. Further development continues in accordance with Rec 1/8 of the 11th AN/Conf. | 2006 | • To be developed by the Secretariat in the form of new manual (guidance material) on all aspects of electronic aeronautical data. |
| | | 2006 | • Initial SARPs for electronic aeronautical charts for cockpit display were incorporated by Amendment 52 to Annex 4 in 2002.<br>• Further SARPs for Annex 4 under development. | 2006 | • Under development by the Secretariat |
| | | Completed | • SARPs for the electronic terrain and obstacle data format and interchange developed by the Secretariat and incorporated into Annex 15 by Amendment 33, and as a consequence, Annexes 4, 11 and 14 amended. Annex 15 provisions applicable from 20 November 2008 and 18 November 2010. | 2005 | • New guidance material concerning the electronic terrain obstacle and aerodrome mapping data and their interchange under the development by the Secretariat. |

| Main field | Elements | SARPs/PANS | | Guidance material | |
|---|---|---|---|---|---|
| | | Target completions date | Status | Target completions date | Status |
| | GNSS performance criteria to support operational requirements | • Completed. | | • Completed. | |
| | GNSS performance criteria to support advance operations (CAT II/III, A-SMGCS and curved approaches) | 2005/2007 | • Under development. | 2005/2007 | • To be developed in parallel with SARPs. |
| | SARPs for the use of existing satellite navigation systems with augmentation sub-systems | • Completed. | | • Completed. | • To be published in the form of a manual. |
| | SARPs for new GNSS elements and signals | 2007 | • Work on the develoment of SARPs for new elements of GNSS (GPS second civil frequency, GALILEO, GLONASS-M) is under way. | 2007 | • Under development |
| | GBAS CAT I flight procedure criteria | Completed | • GBAS completed. State letter sent | — | — |
| | RNP < 0.3 flight procedure criteria | 2007 | Under development by the OCP. | — | — |
| | Quality assurance in-flight procedure design | 2007 | Under development by the OCP. | — | — |
| **SUR** | Surveillance system specifications for emerging surveillance systems and architectures | 2004 | Surveillance enhancements (ANC Task No. CNS-9601) being developed by SCRSP. | 2005 | • A circular on ASAS was completed and is under publication. |
| | SSR procedures | Completed | Update of Annex 11 and PANS-ATM. | Completed | |
| | ADS-C procedures | 2005 | Annex 11 SARPs and PANS-ATM procedures developed by the OPLINKP/1 in September 2005 and SASP. | Completed | *Manual of ATS Data Link Applications* (Doc 9694) published and dispatched in second quarter 1999. The first amendment is being developed. |
| | ADS-B and equivalent | 2005 | Being developed by OPLINKP (OPLINKP/1 in September 2005). | 2005 | Amendment to the *Manual of ATS Data Link Applications* (Doc 9694) to be developed. |

| Main field | Elements | SARPs/PANS | | Guidance material | |
|---|---|---|---|---|---|
| | | Target completions date | Status | Target completions date | Status |
| | ADS: inclusion of turbulence reporting | Completed | • Annex 3 SARPs and PANS-ATM turbulence reporting procedures based on the eddy dissipation rate have been developed with the assistance of METLINKSG. | — | — |

**LEGEND**

| | | | | | |
|---|---|---|---|---|---|
| ATM | — | Air traffic management | GNSS | — | Global navigation satellite system |
| ADS | — | Automatic dependent surveillance | NAV | — | Navigation |
| ADS-B | — | ADS broadcast | RNAV | — | Area navigation |
| AIS | — | Aeronautical information services | RNP | — | Required navigation performance |
| ASM | — | Airspace management | SSR | — | Secondary surveillance radar |
| ATFM | — | Air traffic flow management | SUR | — | Surveillance |
| ATN | — | Aeronautical telecommunication network | UAT | — | Universal access transceiver |
| ATS | — | Air traffic services | WAFS | — | World area forecast system |
| CNS | — | Communications, navigation, and surveillance | WGS | — | World geodetic system |
| COM | — | Communications | | | |



— — — — — — — — —

| PANEL/STUDY GROUP | WORK PROGRAMME | | | |
|---|---|---|---|---|
| | **TASKS** | **TITLE** | **TARGET COMPLETION DATE** | **STATUS/RECENT PROGRESS** |
| OPLINKP | ATM-9102 | ATS applications for air-ground data links | 2005 and beyond | Work continued on draft SARPs, procedures and guidance material relating to the use of ADS, CPDLC and other data link applications. |
| | ATM-9502 | ATM requirements for communication | Ongoing | The development of the concept of required communication performance (RCP) was completed and distributed to States and international organizations for comments. |
| | ATM-9506 | Automatic dependent surveillance (ADS) systems and procedures | 2005 | |
| | ATM-9103 | Data interchange between automated ATS systems | 2005 | Provisions applicable to air traffic services interfacility data communications (AIDC) are being developed. |
| | ATM-0002 | ADS-B, Traffic situational awareness and airborne separation assurance | Ongoing | Development of an operational concept has been completed and amendments to PANS-ATM to use ADS-B for ground surveillance should be completed in 2005. Operational requirements for the use of a system to increase aircraft situational awareness and airborne separation assurance are being developed. |
| ACP (formerly AMCP) | CNS-7002<br>CNS-0401<br>CNS-0001 | Aeronautical electromagnetic spectrum | Ongoing task | Work on development and support of ICAO position for WRC-2007 and other interference-related issues is ongoing. |
| | CNS-8702 | Aeronautical mobile satellite air-ground data link (AMSS subnetwork) | 2005 | Restructuring of the AMSS SARPs (separation of core from detailed technical specifications) near completion. |
| | CNS-9902 | Next-generation AMSS systems | 2005 | Draft NGSS SARPs to be consolidated with restructured AMSS SARPs. |
| | CNS-9102 | VHF air-ground digital link (VDL subnetwork) | Completed | Completed. |
| | CNS-9603 | Air-ground data link to support navigation and surveillance applications | 2005 | Validation of the VDL Modes 3 and 4 SARPs completed. Development of draft UAT SARPs near completion. |
| | CNS-9602 | High frequency data link (HFDL) | Completed | Completed. |
| ATMRRP (Formerly ATMCP) | ATM-9501 | Required total system performance | 2005 and beyond | The ATM Operational concept was endorsed by the Eleventh Air Navigation Conference in October 2003 and approved by the Air Navigation Commission in January 2004 under delegated authority. Further work on RTSP is being undertaken by the panel in parallel with and based on its work on ATM system requirements. |
| | ATM-9202 | Global air traffic management | 2005 and beyond | |
| | ATM-9510 | Interoperability and functional integration of flight operations, ATS, ATFM and tactical ASM | 2005 and beyond | |

| PANEL/STUDY GROUP | WORK PROGRAMME | | | |
|---|---|---|---|---|
| | **TASKS** | **TITLE** | **TARGET COMPLETION DATE** | **STATUS/RECENT PROGRESS** |
| ATNP (Disbanded in 2003. Outstanding work is being conducted by the ACP) | CNS-7001 | AFS systems planning studies | Completed | SARPs completed. Guidance material being processed for publication. |
| | CNS-9403 | Aeronautical telecommunication network (ATN) | 2005-2007 | Current work involves the development of provisions to incorporate Internet Protocol (IP) networks in the ATN and the development of optional message encryption provisions. |
| | CNS-9901 | AFS procedures | Completed | Completed. Further work may become necessary as implementation of new AFS systems progress. |
| NSP (formerly GNSSP) | CNS-9401 | Global navigation satellite system (GNSS) | Completed | First set of SARPs was adopted and included in Annex 10, Volume I as part of Amendment 76 in 2001. Further enhancements to SARPs were incorporated in Annex 10 as parts of Amendments 77 and 79 (the latter is under development). SARPs and guidance material for new GNSS elements are currently being developed. |
| | CNS-7002 | Aeronautical electromagnetic spectrum | Ongoing task (in coordination with AMCP) | |
| OCP | OPS-8502 | Development of procedures, areas and obstacle clearance criteria for the approach, holding and departure phases of flight for inclusion in PANS-OPS, Volumes I and II | 2005-2007 | Several issues related to GNSS-based procedures are being investigated. Development of procedures for APV, RNP performance levels less than 0.3 and enhanced DME/DME criteria is being progressed. |
| | OPS-9802 | Development of material for inclusion in PANS-OPS on instrument procedure data base integrity requirements | 2005 | A quality assurance working group has been established and will study a quality assurance requirements in the development of flight procedures to ensure data integrity. |
| | OPS-9803 | Development of obstacle clearance criteria for vertical navigation in all phases of approach procedures | 2005 | Initial proposals under development. |
| | OPS-0201 | Development of instrument procedures for helicopter operations at heliports | 2005 and beyond | Point in space procedures (using basic GNSS) have been completed and other instrument procedures are being developed. Relevant provisions of Annex 14 (relating to surfaces) are being reviewed. |
| OPSP | OPS-008 | Procedures for all-weather operations | 2006 | Operational requirements for performance-based navigation systems and operational priorities for development of material to support instrument approach and landing operations using new technology are being developed. To assist prevention of controlled flight into terrain accidents, procedures concerning the use of the continuous descent final approach technique and the use of minimum descent altitude as a decision altitude are also under development. Operational standards, procedures and guidance material concerning the use of head-up guidance systems, head-up displays and enhanced flight vision systems are also being developed. |

| PANEL/STUDY GROUP | WORK PROGRAMME | | | |
|---|---|---|---|---|
| | **TASKS** | **TITLE** | **TARGET COMPLETION DATE** | **STATUS/RECENT PROGRESS** |
| | ATM-8505 | Required navigation performance and area navigation for en-route operations | 2005 | SARPs completed. Second edition of Doc 9613, *Manual on Required Navigation Performance (RNP)* published in 1999. Additional guidance material on approval of aircraft and operators for RNP 10 published in 2001. Similar guidance material for RNP 4 under development. |
| | ATM-6301 | Separation between aircraft | 2005 and beyond | Developments of proposals were advanced for the amendment of SARPs and PANS concerning reduced separation minima including: lateral distance-based intersecting track separation; 30 NM oceanic lateral and longitudinal minima based on RNP 4 submitted for publication. Procedures for RNP 4 under development. The implementation of RVSM is continuing to be under review and the revision to the *Manual on Implementation of a 300 m (1 000 ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive* (Doc 9574) is completed. |
| SASP | ATM-9505 | Airspace infrastructure planning | Completed | |
| | CNS-7901 | Conflict resolution and collision avoidance systems | 2005 | Work is concentrating on surveillance enhancements and ADS-B while monitoring ACAS and Mode S implementation in the States. Activities on ASAS are progressing with the preparation of technical requirements for ASAS to be presented at SCRSP/1. |
| | CNS-9601 | Surveillance enhancements (emerging surveillance systems) | Completed | ASAS circular has been developed and is under publication. |
| SCRSP | CNS-9701 | Airborne separation assurance system (ASAS) | 2005 | |
| | AIS-9401 | Aeronautical data bases | 2006 | The Secretariat with the assistance of the East Tennessee State University (ETSU) developed an aeronautical communication transfer protocol for the exchange of aeronautical information/data and a prototype of the Computerized Aeronautical Information Services (CAIS) system. Progress on the subject by EURCONTROL/FAA is being taken into account in accordance with the Rec 1/8 of the Eleventh Air Navigation Conference. |
| ADMSG | AIS-9806 | Transfer and access of aeronautical information from ground-based automated systems. | 2006 | |
| AISMAPSG | AIS-9801 | Electronic aeronautical charts for cockpit display | 2006 | Amendment 52 to Annex 4 contained an interim amendment, applicable in 2002, concerning electronic charts for cockpit display. Further work is being progressed in consultation with the SAE G-10 Aerospace Behavioural Engineering Technology Committee, Aeronautical Charting Subcommittee. |
| AUPISG | CNS-0301 | Aviation use of the public Internet | Completed | Guidelines on the use of the public Internet were developed. |
| AVSSSG (Disbanded in 2003. Work is being conducted by the ACP) | CNS-7001 | AFS systems planning studies | Completed | The Manual on ATS ground-ground voice communications was published in 2003. |
| HFSG | PEL-9001 | Flight safety and human factors | Completed | Review of SARPs on CNS/ATM, to ensure that Human Factors are properly taken into consideration. SARPs submitted to the Council during the periodic cycles of revision of the relevant Annexes. |

| PANEL/STUDY GROUP | WORK PROGRAMME | | | |
|---|---|---|---|---|
| | **TASKS** | **TITLE** | **TARGET COMPLETION DATE** | **STATUS/RECENT PROGRESS** |
| HRPTSG | PEL-9601 | Regional human resource planning and training needs | Completed | A draft of the Human Resource Development Manual is complete.<br>A Human Resource Planning Seminar was developed and conducted for the first time in the CAR/SAM Regions. |
| METLINKSG | MET-9101 | Amendment to Annex 3 concerning automated air-reporting | Ongoing | The quality assurance of MET information included in ADS reports being studied. The need for the inclusion of additional MET parameters (e.g. icing) in the MET information data block of the ADS report format is being addressed in coordination with the OPLINKP. |
| | MET-9301 | Uplink of OPMET information to aircraft in flight | Completed | Amendment 73 to Annex 3 includes meteorological specifications (templates) for D-VOLMET, and other data link applications. |
| | MET-9601 | Development of SIGMET information | Completed | Amendment 73 to Annex 3 includes specifications for the dissemination and uplink of graphical SIGMETs. |
| NOSSSG | PEL-9001 | Flight safety and human factors | 2005 | The study group was established in March 2004 and held its first meeting in July 2004. The main task of the study group is the development of an ICAO NOSS manual. |
| TRNSG | CNS-9402 | Testing of radio navigation aids | Completed | The study group produced a new version of Doc 8071, Volume I, *Manual on testing of ground-based radio navigation systems* (replacing former Volumes I and II). TRNSG/3, 4 and 5 produced Volume II (GNSS) containing guidance material on testing of GNSS-based non-precision approaches, SBAS and GBAS. |
| | CNS-9401 | Global navigation satellite system (GNSS) | Completed | |
| WAFSOPSG | MET-8802 | WAFS planning and implementation | Ongoing | Amendment 73 to Annex 3 includes global WAFS SIGWX forecasts in binary format (BUFR) code for direct transmission to airline and ATM computers. |

**LEGEND**

| | | |
|---|---|---|
| ACP | — | Aeronautical Communications Panel |
| ****ATMCP | — | Air Traffic Management Operational Concept Panel |
| ATMRPP | — | Air Traffic Management Requirements and Performance Panel |
| *ATNP | — | Aeronautical Telecommunication Network Panel |
| **GNSSP | — | Global Navigation Satellite System Panel |
| NSP | — | Navigation Systems Panel |
| OCP | — | Obstacle Clearance Panel |
| OPLINKP | — | Operational Data Link Panel |
| SASP | — | Separation and Airspace Safety Panel |
| SCRSP | — | Surveillance and Conflict Resolution Systems Panel (Former SICASP) |

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| ADMSG | — | Aeronautical Data Modelling Study Group |
| AISMAPSG | — | Aeronautical Information and Charts Study Group |
| AUPISG | — | Aviation Use of the Public Internet Study Group |
| *AVSSSG | — | ATS Voice Switching and Signalling Study Group |
| HFSG | — | Flight Safety and Human Factors Study Group |
| HRPTSG | — | Human Resource Planning and Training Study Group |
| METLINKSG | — | Meteorological Information Data Link Study Group |
| NOSSSG | — | Normal Operations Safety Survey Study Group |
| ***TRNSG | — | Testing of Radio Navaids Study Group |
| WAFSOPSG | — | World Area Forecast System Operations Group |

*Disbanded in 2003 — outstanding work to be carried out by the ACP
**Renamed NSP in 2003
***Disbanded in 2003 — outstanding work to be carried out by the NSP
****Renamed ATMRPP in 2004

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| AIR TRAFFIC MANAGEMENT | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **No.** | **System** | **ASIA/PAC** | **AFI** | **EUR** | **CAR/SAM** | **MID** | **NAM** | **NAT** |
| 1 | Revision of ATS route structure | Review of ATS routes – Ongoing.<br><br>APANPIRG/14 established the ATS Route Network Review Task Force (ARNR/TF).<br><br>Asia to Europe through Middle East via South of Himalayas (EMARSSH) – Implemented 28 Nov. 2002. | Established new ATS routes. | Revision of route structure in eastern and western part of Europe – Ongoing<br><br>Aegean Sea – major restructure to cater for Athens Olympics and beyond – Implemented Dec 2003.<br><br>Asia to Europe through Middle East via south of Himalayas (EMARSSH) – Implemented 28 Nov. 2002. | Phase II implementation of ATS RNAV route network in CAR/SAM Regions planned – Effective 31 Mar. 2005. | New Middle East ATS route network is planned – Implemented 22 Dec. 2003<br><br>Asia to Europe through Middle East via south of Himalayas (EMARSSH) – Implemented 28 Nov. 2002. | The ATS route structure of NAM Region – Under review. To be included in updated version of the NAM ANP. | — |
| 2 | RVSM | Pacific airspace – Implemented 24 Feb. 2000.<br><br>Western Pacific and South China Sea airspace – Implemented 21 Feb. 2002 (Phase 1) and 31 Oct. 2002 (Phase II).<br><br>Bay of Bengal and beyond – Implemented 27 Nov. 2003.<br><br>Japanese domestic airspace and Incheon, FIR planned, effective 9 June 2005. | Implementation strategy and action plan being considered by States - target date to be established.<br><br>Parts of Region falling in SAM and EUR corridor – Implemented 24 Jan. 2002.<br><br>Parts of AFI Region falling in MID region implemented RVSM – Effective 27 Nov. 2003. | Western part of European Region – Implemented 24 Jan. 2002.<br><br>Planning for expansion in Eastern part of the Region commenced.<br><br>EUR/SAM Corridor – Implemented 24 Jan. 2002.<br><br>EUR/MID corridor (Black Sea) 2005<br><br>South Caucasus States -Nov. 2004 | EUR/SAM corridor – Implemented 24 Jan. 2002.<br><br>CAR/SAM Regions – Implementation scheduled for 20 January 2005 in coordination with NAM and PAC Regions. | Middle East Region – Implemented 27 Nov.2003. | Canada implemented RVSM between FL 290 to FL 410, inclusive, in northern domestic airspace (north of 57N) and transition airspace (between 52N and 57N) on 18 Apr. 2002.<br><br>RVSM – Implementation in entire domestic airspace scheduled for 20 Jan. 2005, in coordination with CAR, SAM and PAC Regions. | Horizontal RVSM expansion in entire NAT Region from FL 310 to FL 390 – Completed 1 Nov. 2001.<br><br>Vertical expansion of RVSM throughout NAT Region from FL 290 to FL 410 – Implemented on 24 Jan. 2002. |

| AIR TRAFFIC MANAGEMENT | | | | | | | | |
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| **No.** | **System** | **ASIA/PAC** | **AFI** | **EUR** | **CAR/SAM** | **MID** | **NAM** | **NAT** |
| 3 | Establishment of Regional airspace safety system performance monitoring structure | Regional Airspace Monitoring Advisory Group established by APANPIRG/14 (Aug. 2003). | Under consideration. | Implemented. Financial mechanism being developed. | CARSAMMA (CAR/SAM Monitoring Agency) was designated as the monitoring agency for CAR/SAM Regions for RVSM and RNP implementation. | UAE support to MECMA (Middle East Central Monitoring Agency) discontinued from 1 June 2004. New regional mechanism to be established. | NAARMO was designated to monitor RVSM implementation. | Implemented. |
| 4 | ACAS II | *Mandated from 23 March 2000.* | *Mandated from 1 Jan. 2000.* | *Mandated from 1 Jan. 2000.* | *Mandated from 1 Jan,. 2003.* | *Mandated from 1 Jan. 2000.* | Implemented in Canada and United States airspace. | *Mandated from 31 March 200*1 |
| 5 | RNAV/RNP | RNP 10:<br>1) North Pacific and Tasman – 23 April 1998;<br><br>2) South China Sea – 1 Nov. 2001;<br><br>3) Australia and Indonesia – 1 Nov. 2001;<br><br>4) Bay of Bengal – Nov. 2002. Other routes – Under consideration.<br><br>RNP 4: Under development in the South Pacific area.<br><br>30/30 between Australia and New Zealand implemented on 20 January 2005. | RNP 5 – Implemented in continental Johannesburg FIR 1998.<br><br>RNP 10 – Implemented in Mauritius 5 Mar. 2003.<br><br>. | RNAV/RNP 5 – implemented in ECAC area Jan. 1998.<br><br>Implementation of precision RNAV (nearly equivalent to RNP 1) in terminal areas planned for 2004/2005. | EUR/SAM corridor RNP 10 – Implemented 4 Oct. 2001.<br><br>RNP 10 for routes UL 302 and UL 780 – Implemented 22 Jan. 2004.<br><br>Action plan developed to implement RNP 5 in Brasilia, Curitiba and Montevideo FIRs, with a target date of July 2007.<br><br>Studies for implementation being carried out by other States of the CAR/SAM Regions. | RNP 5 Phase I – Implemented 14 June 2001.<br><br>RNP 5/RNAV Phase 2 – Implementation started effective 28 Nov. 2002 as ongoing process.<br><br>P-RNAV to be implemented within some busy TMAs and to be superseded by RNP 1 at a later stage. | United States implemented RNP in domestic and oceanic airspace since 1998.<br><br>Canada planning to implement RNP in domestic airspace 2006.<br><br>Implementation of RNAV route structure in NAM Region – Under review in coordination with the CAR/SAM Regions. | MNPS – Implemented 1981. |

| COMMUNICATION | | | | | | | | |
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| **No.** | **System** | **ASIA/PAC** | **AFI** | **EUR** | **CAR/SAM** | **MID** | **NAM** | **NAT** |
| 1 | ATN (subnetworks, end-systems and intermediate systems and applications such as AMHS and AIDC). | ATN transition plan developed with a target date of 2005 for ground-ground application, namely ATN router and AMHS. | ATN implementation – Under study. Focus is more on improving current circuits with long-term plans for migrating to AMHS and AIDC. | ATN transition planning deferred until operational requirements established. Preoperational trials – In progress. | ATN transition plan – Under review. | Current AFTN circuits being improved for transition to ATN. | ATN transition plan developed with focus on ground-ground applications. Test, development and validation phases completed. Operational implementation – Under review. | Investigation of operational ATN data link scenarios in Region, with focus on air-ground applications – In progress. |
| | | AFTN-based AIDC procedure implemented by some States. Interface Control Document (ICD) for AIDC Version 2 adopted by APANPIRG/14. | | Link 2000 programme will gradually introduce operational applications over A-G ATN on VDL2 from 2003 to 2010. | With upgrade of CAR digital networks and REDDIG implementation (SAM Digital Network) in 2003, implementation of AMHS and AIDC would be facilitated. | Guiding principles being prepared for ground-ground applications, namely AMHS and AIDC. | | |
| | | AMHS tests progressing. First ATN Link established between Bangkok and Hong Kong on 15 June 2004. | | | | Pending availability of ATN infrastructure, some States are considering implementing AFTN-based AIDC procedure. | | |
| | | Several interface control documents (ICDs) developed to ensure harmonization and to facilitate the implementation. | | A comprehensive CIDIN network operates within the AFTN infrastructure. | | Document on ICD for AIDC – Under development. | | |

| COMMUNICATION | | | | | | | | |
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| **No.** | **System** | **ASIA/PAC** | **AFI** | **EUR** | **CAR/SAM** | **MID** | **NAM** | **NAT** |
| 2 | Air-ground communication infrastructure | Further improvements made in VHF voice in continental and terminal areas. VHF data link used for D-ATIS, D-VOLMET and CPDLC.<br><br>AMSS data (for ADS and CPDLC using FANS-1/A) used in oceanic and remote areas; AMSS voice used for non-routine & emergency communications.<br><br>SSR Mode S data link for high-density airspace being planned. | VHF voice provided in terminal areas.<br><br>Extension of VHF coverage to en-route areas<br>– In progress in several FIRs.<br><br>HF voice provided in most of FIRs. CPDLC based on FANS-1/A being used. | Implementation of air-ground data link services planned for 2002-2007.<br><br>Horizontal expansion of 8.33 kHz channel spacing from 7 to 29 States<br>– Implemented 31 Oct. 2002.<br><br>Vertical expansion of 8.33 kHz channel spacing from FL 245 to FL 195 planned for 2006. | VHF voice provided in continental and terminal areas.<br>HF voice provided in oceanic areas.<br>VHF/AMS have been improved.<br><br>Several States are implementing VDL Mode 2 to support CPDLC and D-ATIS.<br><br>Trials on HFDL are being conducted. | VHF voice provided in continental and terminal areas. VDL being studied.<br><br>AMSS for data and voice in oceanic and remote areas used.<br><br>SSR Mode S data link for high-density airspace being considered. | VDL Mode 2, HFDL and AMSS implementation planned to support CPDLC applications – Ongoing. | HF is main communication, and already saturated with difficulty of obtaining additional frequencies. Use of SATCOM voice for routine ATS being evaluated.<br><br>Trials to use CPDLC based on FANS-1/A for routine communications being carried out. |
| 3 | Ground-ground digital communication infrastructure | Some States have implemented digital networks.<br><br>Other States also considering upgrading their networks. | 3 major satellite networks provided in States of the Region, namely AFISNET, SADC and CAFSAT.<br><br>Another satellite network (NAFISAT) being developed for AFI northeast Region.<br><br>Consolidation of these networks being implemented. | Many States upgraded to digital networks. | Number of digital networks implemented in the Regions. Additional interconnectivity points for regional and interregional digital networks being implemented with aim of achieving harmonized digital platform. | Establishment of regional satellite-based digital network – Under consideration. The Feasibility study of the MID VSAT being updated and final document will be ready Dec.2004. | CAN/MEX/USA States have implemented digital ground-ground networks. | Well developed. Many States upgraded to digital networks. |

| NAVIGATION | | | | | | | | |
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| **No.** | **System** | **ASIA/PAC** | **AFI** | **EUR** | **CAR/SAM** | **MID** | **NAM** | **NAT** |
| 1 | GNSS | Transition to WGS-84 – Nearing completion . | Transition to WGS-84 – In progress. | Transition to WGS-84 – Ongoing. | Considerable progress achieved for WGS-84 implementation. | Transition to WGS-84 – In progress. | Transition to WGS-84 completed in Canada and United States; Mexico – In progress. | Transition to WGS-84 completed. |
| | | Strategy for GNSS implementation updated and adopted. Checklist to assist GNSS implementation, developed by APANPIRG, used by States for implementation. | GNSS strategy adopted. | Launching "Galileo", a new constellation of navigation satellites, decided by the European Council 26 Mar. 2002 with full operation capability 2008. | Strategy for implementation of GNSS adopted. . | Strategy for implementation of GNSS adopted. | GNSS/GPS strategy adopted for NPA and APV. | . |
| | | Satellite-based augmentation system (MSAS) being developed with a target date of commissioning with 1 satellite in 2004 and 2 satellites in 2006. Technology Demonstration System (TDS) of GANGAN in India will be completed by mid-2006, and target date for FOC is 2008. | SBAS test bed in cooperation with EGNOS implemented. | Satellite-based augmentation system (EGNOS) being developed with a target date of commissioning 2005. | SBAS test bed in cooperation with EGNOS and WAAS are being developed. Preoperational model of SBAS – Under study as a basis for the future operational system. Ionospheric model – Under study in order to apply the NPA Operation with SBAS test bed. | SBAS test bed, in cooperation with EGNOS, carried out. SBAS test bed based on WAAS planned. | SBAS based on United States-wide area augmentation system (WAAS) commissioned 10 July 2003 for initial operating capability. | |
| | | | Development of harmonized GNSS/NPA procedures for SADC States – Completed Dec. 2001, and for ASECNA States 2002. Plans for other FIRs – Under consideration. | | Several CAR States/ Territories have implemented GNSS/GPS NPA. | . | GNSS approach implementation programme initiated by all 3 States; GNSS augmentation system agreements completed for future expansion of GNSS concept. | |
| | | GNSS is used for oceanic and remote continental areas for en-route operations and NPA as supplemental means. | GNSS being used for oceanic and continental en-route operations. | GNSS is being used for continental en-route operations. | GNSS being used for oceanic and continental en-route operations. | GNSS being used for continental en-route and NPA operations. | GNSS being used for oceanic and continental en-route operations. | GNSS being used for oceanic operations |

| SURVEILLANCE | | | | | | | | |
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| **No.** | **System** | **ASIA/PAC** | **AFI** | **EUR** | **CAR/SAM** | **MID** | **NAM** | **NAT** |
| 1 | SSR Modes A/C and SSR Mode S | Currently, SSR Modes A/C employed. | Surveillance in most FIRs is through pilot voice position reporting. | Currently, SSR Modes A/C employed. | Currently, SSR Modes A/C employed.<br><br>ORCAM system is implemented. | Region well covered by radars (PSR/SSR Mode A/C). | Substantial improvements achieved in en-route area with upgrading of radar systems. In areas of Gulf of Mexico & Northern Canada, surveillance restricted to position reports sent by pilots via air-ground communications. | Surveillance in most of NAT Region is via position reports using HF voice approx. every 10 degrees of longitude. |
| | | | En-route aeronautical surveillance plan with SSR requirements included in AFI FASID. | ORCAM code management extended to entire Region. | Established use of ASTERIX protocol for SSR data sharing. | | | |
| | | SSR Mode S – Implemented in some terminal areas and high-density en-route. | PSR and SSR Mode A/C employed in some busy terminals and for en-route operations. | SSR Mode S in some terminal areas and high-density en-route planned for implementation:<br>▯ basic Mode S in 2003 to 2005;<br>▯ enhanced Mode S in 2005 to 2007. | Implementation of SSR Mode S in some terminal areas and high-density en-route areas – Ongoing. | SSR Mode S planned for some terminal and high-density en-route areas in 2006. | Agreement reached between Canada, Mexico and United States to implement SSR Mode S. | |

| SURVEILLANCE | | | | | | | | |
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| **No.** | **System** | **ASIA/PAC** | **AFI** | **EUR** | **CAR/SAM** | **MID** | **NAM** | **NAT** |
| 2 | ADS | ADS/CPDLC services (using FANS-1/A) operational in PAC Region. Operational trials being established for Southeast &West Asian Region.<br><br>APANPIRG/15 agreed the use of FANS 1/A Operations Manual (FOM) by States as the basis for ADS and CPDLC operations in conjunction with Annex 10 Vol. II, PANS/ATM and regional guidance material. | ADS will be used for low-density, remote and oceanic airspace as well as outside SSR coverage.<br><br>ADS trials<br>– In progress in SAT Region. | ADS will be used in some parts of the Region. | ADS will be used initially for oceanic airspace and, later, in remote areas. | ADS will be used initially for oceanic airspace and, later, in remote areas and possibly, in 2006, as backup to SSR in high-density traffic areas. | ADS will be used in oceanic or remote areas; however, further review needed for continental domestic airspace areas. | To improve surveillance, the regional plan specifies ADS over the ATN. Meanwhile, provisions have been made to utilize FANS-1/A-equipped aircraft.<br>ADS and other data link technologies being used for waypoint position reporting. |
| 3 | ADS-B | ADS-B deployment in Australia initiated. Trial in Hong Kong China Japan and Mongolia – In progress.<br><br>1090 MHz ES adopted for ADS-B link for near term air-ground surveillance service. | To be determined. | To be determined. | ADS-B implementation in Mexico in progress. Implementation plan of ADS-B in CAR/SAM Regions – Under study. | To be determined. | Agreement reached between Canada, Mexico and United States to implement ADS-B from Jan. 2007. | To be determined. |
| | | ADS-B air-ground surveillance expected to be implemented on subregional basis Jan. 2006. | | Mode S squitter related applications from 2007. | Mode S extended squitter as the data link for near-term ADS-B implementation was selected by States. | | | |

| RELATED ISSUES | | | | | | | | |
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| **No.** | **System** | **ASIA/PAC** | **AFI** | **EUR** | **CAR/SAM** | **MID** | **NAM** | **NAT** |
| 1 | Transition from current single volume ANP to two volumes Basic ANP and FASID documents | Material finalized and published on website. Document in final preparation stage for official publication.<br><br>Amendments continue to be processed for both ANP and FASID. | Material finalized and published. | Material finalized and published. Documents being kept up-to-date. | Material finalized and published. Documents being kept up-to-date. | Material finalized and awaiting publication. | Revision programme proposed to update FASID document. | Trial NAT Basic ANP and FASID being reviewed, and scheduled to be completed in 2005. |
| 2 | Development and update of Regional Plan for CNS/ATM Systems | Reviewed and updated.<br><br>New chapter on meteorology included. | Reviewed and updated. | Reviewed and updated. | Reviewed and updated.<br><br>GREPECAS/12 approved ATM Evolution Tables for en-route and terminal areas operations. | Reviewed and updated. | Reviewed and updated. | New Plan being developed. |

| RELATED ISSUES | | | | | | | | |
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| **No.** | **System** | **ASIA/PAC** | **AFI** | **EUR** | **CAR/SAM** | **MID** | **NAM** | **NAT** |
| 3 | Interregional groups which coordinate and ensure seamlessness in implementation of AN systems between Regions | South-West Asia ATS Coordination Group (SWACG).<br><br>Indian Ocean ATS Co-ordinating Group (IOACG).<br><br>Europe/Asia Air Routes Meeting (EAAR).<br><br>Informal Trans-Asia, Trans-Siberia and Cross-Polar Routes Steering Group (ITAPS). | Indian Ocean ATS Co-ordinating Group (IOACG).<br><br>Informal interface meetings between EUR/MID and EUR/AFI convened from time to time.<br><br>South Atlantic Coordination Group (SAT). | South-West Asia ATS Coordination Group (SWACG).<br><br>Joint EUR and NAT Regions data link steering group establish to ensure harmonized data link requirements.<br><br>Europe/Asia Air Routes Meeting (EAAR).<br><br>Informal interface meetings between EUR/MID and EUR/AFI convened from time to time.<br><br>South Atlantic Coordination Group (SAT).<br><br>Informal Trans-Asia, Trans-Siberia and Cross-Polar Routes Steering Group (ITAPS). | Eastern Caribbean and North East SAM Implementation and Coordination Group (E-CAR/NESAM ICG).<br><br>Central American Air Navigation Experts Working Group (CA/ANE/WG).<br><br>Central Caribbean Working Group (C/CAR WG).<br><br>Eastern Caribbean Working Group (E/CAR WG).<br><br>South Atlantic Coordination Group (SAT). | South-West Asia ATS Coordination Group (SWACG).<br><br>Informal interface meetings between EUR/MID and AFI/MID convened from time to time. | CANADA/MEXICO/ USA CNS/ATM Working Group.<br><br>Informal Trans-Asia, Trans-Siberia and Cross-Polar Routes Steering Group (ITAPS). | Joint EUR and NAT Regions data link steering group established to ensure harmonized data link requirements. |

| RELATED ISSUES | | | | | | | | |
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| **No.** | **System** | **ASIA/PAC** | **AFI** | **EUR** | **CAR/SAM** | **MID** | **NAM** | **NAT** |
| 4 | Meteorological component of CNS/ATM systems | Migration from T4 charts to WAFS forecasts in digital code forms (i.e. WMO BUFR and GRIB code forms) to be fully implemented by 1 July 2005. | | | | | | Not an applicable issue as it is being addressed by States as part of EANPG. |
| | | A second workshop on use of GRIB- & BUFR-coded WAFS data to be organized by WAFC Provider States, in coordination with ICAO and WMO in 2005. | Two workshops on use of GRIB- & BUFR-coded WAFS data were organized by WAFC Provider States, in coordination with ICAO and WMO in 2002 and 2003. | Two workshops on use of GRIB- & BUFR-coded WAFS data were organized by WAFC Provider States, in coordination with ICAO and WMO in 2003. | A workshop~~s~~ on use of GRIB- & BUFR-coded WAFS data for Spanish speaking States was organized by WAFC Provider States, in coordination with ICAO and WMO in 2004.<br><br>Similar workshop will be organized for English-speaking States in 2005. | A workshop on use of GRIB- & BUFR-coded WAFS data was organized by WAFC Provider States, in coordination with ICAO and WMO in 2003. | A workshop~~s~~ on use of GRIB- & BUFR-coded WAFS data was organized by WAFC Provider States, in coordination with ICAO and WMO in 2004. | Not applicable. |
| | | Two world area forecast centres (WAFC London and Washington), nine volcanic ash advisory centres (VAAC Anchorage, Buenos Aires, Darwin, London, Montreal, Tokyo, Toulouse, Washington and Wellington) and seven tropical cyclone advisory centres (TCAC Darwin, Honolulu, Miami, La Réunion, Nadi, New Delhi and Tokyo) to serve all ICAO Regions – Fully implemented. | | | | | | |
| | | D-VOLMET being implemented by some States. Trials on meteorological data downlink through ADS being conducted.<br><br>New ATM requirements for MET services being studied (MET/ATM Task Force); MET/ATM seminar planned for 2005 | | | | | | |

| RELATED ISSUES | | | | | | | | |
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| **No.** | **System** | **ASIA/PAC** | **AFI** | **EUR** | **CAR/SAM** | **MID** | **NAM** | **NAT** |
| 5 | Review of deficiencies | Addressed as part of APANPIRG work programme.<br><br>Dedicated task force established to develop appropriate management tools.<br><br>APANPIRG/15 (Aug. 2004) developed regional procedures for identification, assessment, reporting and monitoring status of air navigation deficiencies as a supplement to uniform methodology. | Addressed as part of APIRG work programme. List of deficiencies grouped on basis of States, in addition to facility-wise. Various COSCAPs also addressing this issue.<br><br>Establishment of Aviation Safety Board – Under consideration.<br><br>Air navigation infrastructure enhancement team for eastern and south Africa established. | Addressed as part of EANPG work programme. | Addressed as a part of GREPECAS work programme.<br><br>Aviation Safety Board established.<br><br>Adopted a regional procedure including last resort action to resolve all types of deficiencies in air navigation field. | Addressed as part of MIDANPIRG work programme.<br><br>Dedicated Air Navigation Safety Working Group established. | — | Addressed as part of NAT SPG work programme. |

| RELATED ISSUES | | | | | | | | |
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| **No.** | **System** | **ASIA/PAC** | **AFI** | **EUR** | **CAR/SAM** | **MID** | **NAM** | **NAT** |
| 6 | Specific to Region | Guidance material to enhance AIS activities within Region developed.<br><br>AIS quality assurance manual developed. | New larger aeroplane task force developed strategy for future work, including evaluation of impact on aerodromes in AFI Region.<br><br>Establishment of appropriate body to address regional human resource and training issues – Under consideration. | Focus on increasing efficiency and capacity at international aerodromes through implementation of safety and capacity enhancing procedures. | Human resources and training issues being addressed.<br><br>Development of AIS Quality Assurance Programme and its associated activities – Being carried out.<br><br>ATS Quality Management System Guidance Documents harmonized with ISO 9001:000 developed/approved by GREPECAS/12.<br><br>SAR Quality Management System Guidance Documents in harmony with ISO 9001:2000 – Under development.<br><br>Steps to implement an automated AIS system – In progress. | Formulation of plan for developing regional training capabilities in specific training centres will be addressed through dedicated task force. | ICD established for radar interoperability between Canada, Mexico and United States. | Work initiated to develop operational and economic performance indicators for use throughout NAT Region. |

| ORGANIZATIONAL ISSUES | | | | | | | | |
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| **No.** | **System** | **ASIA/PAC** | **AFI** | **EUR** | **CAR/SAM** | **MID** | **NAM** | **NAT** |
| 1 | Establishment of subregional entities/groups to provide air navigation services | Advice provided to States about benefits of cooperative arrangements and mechanism. | Southern Africa Development Community (SADC).<br><br>Agency for the Safety of Air Navigation in Africa and Madagascar (ASECNA).<br><br>Common Market for Eastern and Southern Africa (COMESA).<br><br>Roberts FIR Organization (Guinea, Liberia and Sierra Leone).<br><br>Harmonization of standards, procedures and regulations being implemented. Establishment of subregional safety oversight facility being implemented. | European Organization for the Safety of Air Navigation (EUROCONTROL).<br><br>Regional Air Navigation Services Development Association (RADA).<br><br>International Organization Information Coordinating Council on Air Navigation Charges (IKSANO).<br><br>Central European Air Traffic Services (CEATS).<br><br>Central Flow Management Unit (CFMU).<br><br>Maastricht ACC | Central American Corporation for Air Navigation Services (COCESNA).<br><br>SAM Subregional Group for Digital Network (REDDIG).<br><br>Eastern Caribbean subregional group for digital network (E-CAR).<br><br>Central Caribbean subregional group for digital network (MEVA).<br><br>Trinidad and Tobago provides ATS within Piarco FIR that embraces all the States and Territories of Eastern Caribbean. | Europe-Middle East Regional Coordination Mechanism on Air Traffic Management (EMAC). | Subregional group comprised of CAN/MEX/USA. | — |

| ECONOMIC ISSUES | | | | | | | | |
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| **No.** | **System** | **ASIA/PAC** | **AFI** | **EUR** | **CAR/SAM** | **MID** | **NAM** | **NAT** |
| 1 | Cost-benefit study, business case analysis and cost-recovery system | Advice was provided to national meteorological service providers about application of ICAO's guidance and policies on cost recovery.<br><br>Development of revenue-sharing model for Nadi FIR (2003). | Business case and cost-benefit analysis carried out for SADC States for UACC project.<br><br>Similar exercise under consideration for areas of routing AR4 (Europe to southern Africa). | Business case and cost-benefit analysis being carried out by EUROCONTROL. No ICAO Secretariat involvement.<br><br>Advice provided at two different occasions (workshops) on cost recovery of MET (Nov. 2003) and air navigation services (June-July 2004) for States in Central and Eastern parts of Europe. | ICAO-assisted in economic aspects of the study of the transitional plan (Project RLA/98/003) to CNS/ATM systems through development and integration of financial module.<br><br>ICAO also participated in organization of ~~a~~ two seminars on the economics and institutional aspects of CNS/ATM systems in Honduras (Oct. 2002) and Brazil (May 2004).<br><br>GREPECAS Task Force on Institutional Aspects for CNS/ATM implementation reactivated; held its first meeting in Brazil, May 2004. | Business case illustrative application developed for the Region.<br><br>SIP workshop on the development of business case for the implementation of CNS/ATM systems was held in Cairo in Sept. 2004. | Business case and cost-benefit analysis being carried out by CAN/MEX/USA. No ICAO Secretariat involvement. | Feasibility of creating common cost-recovery system for provision of AN services in northern part of Region was considered. No changes to current system envisaged.<br><br>Cost-effectiveness of implementing new systems studied as ongoing exercise through NAT cost-effectiveness programme. |

| TRAFFIC FORECASTS | | | | | | | | |
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| **No.** | **System** | **ASIA/PAC** | **AFI** | **EUR** | **CAR/SAM** | **MID** | **NAM** | **NAT** |
| 1 | Traffic Forecasting Groups (TFGs) | TFG is in existence since 1991.<br><br>12th meeting of TFG, Bangkok<br>23-30 July 2004.<br><br>Next meeting: tentatively in 2006. | TFG formed in 1998.<br><br>3rd meeting of TFG, Dakar<br>24–26 March 2003.<br><br>Next meeting: tentatively in 2005. | Data developed by EUROCONTROL being used. | TFG established in 1996.<br><br>Next meeting: tentatively in 2005. | TFG created in 1998.<br><br>The Middle East Regional Traffic Forecasting Group (MER TFG) integrated into MIDANPIRG as Sub-Group (TF SG).<br><br>First meeting of the TF SG was held in Cairo on 11-13 Sept. 2004. | No ICAO Secretariat involvement. | NAT Forecasting Group established 1965. |
| 2 | Traffic forecasts | Passenger and aircraft movement forecasts for transpacific and intra-Asia/Pacific developed up to 2020. Passenger forecasts for major city-pairs developed up to 2007. | Passenger and aircraft movement forecasts developed for major route groups up to 2018. | Forecasting done by EUROCONTROL and IATA.<br>No ICAO Secretariat involvement. | Forecasts prepared for 6 major air routes identified by the TFG up to 2012 and the 18 major traffic flows included in the CAR/SAM ANP. | Forecasts of major traffic flows to/from/within MID Region as well as aircraft movement forecasts for city-pairs within each major traffic flow up to 2015 has been updated.<br><br>Conducted peak period analysis for some airports in Region. | | Medium- and long-term traffic (passenger and aircraft movements) forecasts developed biannually. Forecasts up to 2010, 2015 and 2020 developed in April 2004. |

| LEGAL ISSUES | | | | | | | | |
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| 1 | Addressing legal issues such as universal accessibility, continuity, certification and liability | Legal issues raised, but these are beyond scope of regional bodies. HQ should continue to provide guidance, and address and resolve these issues at global level. | Subject not yet examined by APIRG. HQ should address this issue adequately for benefit of PIRGs. | Legal issues discussed in context of Galileo programme. | Legal issues are beyond resolution at regional level. HQ must provide leadership in this domain. | Issue too large and complex. MIDANPIRG did not look into the matter in depth. | — | — |
| 2 | Development of interim legal framework | An interim legal framework, the "Charter on the Rights and Obligations of States relating to GNSS Services", adopted in 1998 by the 32nd Session of the Assembly in the form of Resolution A32-19, embodies certain fundamental principles applicable to GNSS.<br><br>The 35th Session of the Assembly adopted Resolution A35-3, which, *inter alia*, invites Contracting States to consider using regional organizations to develop mechanisms necessary to address any legal or institutional issues that could inhibit the implementation of CNS/ATM in the region, while ensuring that such mechanisms will be consistent with the Chicago Convention, and public international law. It directs the Secretary General to monitor the situation and further directs the Council to register regional initiatives, to consider the value and to make them public as soon as possible. | | | | | | |

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