International Civil Aviation Organization

Middle East Air Navigation Planning and Implementation Regional Group (MIDANPIRG)

Seventh Meeting
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Agenda Item 3: Latest developments in the Air Navigation field

REPORT ON DEVELOPMENTS IN THE MODERNIZATION OF AIR NAVIGATION SYSTEMS

(Presented by the Secretariat)

SUMMARY

This paper provides an overview of the developments in the modernization of air navigation systems in 2000/2001, as well as future developments. Proposed action by MIDANPIRG is in paragraph 5.

1. INTRODUCTION

1.1 This paper provides information on technical and operational developments in the filed of air navigation systems in 2000/2001, as well as future developments related to communications, navigation and surveillance/air traffic management (CNS/ATM) systems.

2. OVERVIEW

2.1 This report provides information on the status of the programmes of the relevant ANC panels, the Secretariat and the Planning and Implementation Regional Groups (PIRGs). These programmes are designed to modernize the air navigation infrastructure worldwide by increasing airspace and airport capacity and operational efficiency, and providing higher levels of aviation safety and service regularity. The term “modernization” refers to building on existing air navigation systems, focussing mainly on emerging technologies, such as satellites and data links, for improved communication, navigation and surveillance functions, thus making the advanced air traffic management concepts feasible.

2.2 That work related to air navigation systems and, in particular, development and implementation, continued to rank among the highest priority items on ICAO’s work programme. Therefore, there was a need for timely completion of the necessary Standards and Recommended Practices (SARPs), Procedures for Air Navigation Services (PANS) and guidance material, in order to provide a sound basis for implementation of emerging new air navigation systems. Through its panels of the Air Navigation Commission and the Secretariat, assisted by study groups, ICAO has progressed the development of SARPs, PANS and guidance material, as described in this paper. Near-term future developments are summarized as well. Implementation of air navigation systems requires planning on a global, regional and national basis. The work of PIRGs in this respect is summarized in Section 4.

2.3 A summary of the development status of air navigation systems related SARPs, PANS and guidance material is at **Appendix A** to this paper. A summary of the main activities of panels of the Commission and study groups involved in air navigation systems during 1999 – 2000 is provided in a tabular form at Appendix B. The associated tasks in the Technical Work Programme (TWP) of the Organization in the Air Navigation Field are listed in the same table.

3. SARPS, PANS AND GUIDANCE MATERIAL RELATED TO AIR NAVIGATION SYSTEMS

3.1 Developments in 2000

Communications

3.2 Draft SARPs for aeronautical telecommunication network (ATN) systems management, security and directory services were completed at the third meeting of the ATN Panel (ATNP/3) in February 2000 and were subsequently included in Amendment 76 to Annex 10 — *Aeronautical Telecommunications*.

3.1.2 Assessment of next-generation satellite communication systems and associated SARPs was completed at the seventh meeting of the Aeronautical Mobile Communications Panel (AMCP/7) that was held from 22 to 30 March 2000.

3.1.3 Validation activities for VHF digital link (VDL) Modes 3 and 4 and associated SARPs were also completed at AMCP/7. VDL Mode 4 is intended for use in surveillance functions. SARPs for VDL Modes 3 and 4 have been included in Amendment 76 to Annex 10.

Navigation

3.1.4 Progress continued in a number of States and international organizations on the development and implementation of global navigation satellite systems (GNSS). A number of States approved the global positioning system (GPS) for supplemental or primary use for some operations and types of airspace.

3.1.5 The Global Navigation Satellite System Panel (GNSSP) completed the validation of the first package of SARPs for GNSS that had been recommended for inclusion in Annex 10, Volume I, and contained general provisions and technical specifications for the global positioning system (GPS), global navigation satellite system (GLONASS), aircraft-based augmentation systems (ABAS), satellite-based augmentation systems (SBAS), and ground-based augmentation system (GBAS).

3.1.6 Development of satellite-based augmentation systems continued. This form of augmentation is expected to support the use of GNSS for all phases of flight including approach with vertical guidance (APV) and Category I precision approach. Several architectures for ground-based augmentation systems to support precision approach applications also continued to be developed and tested. The latter type of augmentation may be used by some States as an alternative in support of Category I operations.

Surveillance

3.1.7 Amendments to SSR Mode S and airborne collision avoidance system (ACAS) SARPs and guidance material were completed at the seventh meeting of the Secondary Surveillance Radar Improvements and Collision Avoidance Systems Panel (SICASP/7) meeting held in Montreal from 11 to 22 September 2000. Additionally, the panel completed a draft circular on airborne separation assurance system (ASAS) to assist in the development of requirements.

Human factors

3.1.8 The manual on *Human Factors Guidelines for Air Traffic Management (ATM) Systems* (Doc 9758) was published in July 2000. The manual aims to provide guidance to ICAO panels and study groups when developing CNS/ATM-related SARPs. It will also assist States in the consideration of human factors issues when purchasing and implementing CNS/ATM-related technology.

Regional human resource planning and training needs for CNS/ATM implementation

3.1.9 A human resource planning manual has been completed in draft and is expected to be reviewed by the Human Resources and Planning and Training Needs Study Group (HRPTSG) in the third quarter of 2001. The manual, which contains a chapter on training needs due to new technology, addresses tactical and strategic human resource planning, as well as a procedure for converting human resources plans into long-range training plans and short-range instructional schedules.

3.1.10 An initial version of a computer programme is being written in parallel with the *Human Resources Planning Manual* that is designed to indicate how CNS/ATM technologies will affect job profiles and the resulting human resource planning and training requirements. The first working version of the software is scheduled to be ready toward the end of the year 2001.

3.3 **Near-term activities**

Communications

3.2.1 Active tests and trials for SARPs-compliant VDL Mode 3 and VDL Mode 4 are underway in North America and Europe. There is a potential for new SARPs for universal access transceiver (UAT) serving as a radio frequency (RF) link for automatic dependent surveillance-broadcast (ADS-B) and VDL Mode 4 serving as a communication link. Discussion is currently underway in AMCP on these two topics. The AMCP is also undertaking a comparative analysis of the UAT, and VDL Mode 4 for their suitability to serve as ADS-B RF links.

3.2.2 In line with the Assembly Resolution A32-14, an evaluation of the aeronautical mobile-satellite service (AMSS) SARPs is taking place for a possible split into SARPs and a technical manual containing detailed technical specifications.

Navigation

3.2.3 Near-term enhancements to GNSS SARPs are progressing. This will improve system performance and expand services provided by SBAS and GBAS. 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) will continue.

3.2.4 These activities will be supported by development of procedures and criteria for approaches with vertical guidance (APV) and Category I operations based on SBAS and GBAS.

Surveillance

3.2.5 Work on surveillance enhancements to support ADS-B on the SSR Mode S data link, including compatibility assessment of ADS-B and ACAS and development of the relevant SARPs will continue. Development of technical requirements for the airborne separation assurance system (ASAS) will commence. Development of the concept of required surveillance performance (RSP) will be initiated.

Air traffic management

3.2.6 Work continues on the development of ADS and controller-pilot data link communications (CPDLC) procedures as well as further reductions in separation minima aimed at increasing airspace capacity while maintaining or enhancing present safety levels. Progress is being made on the development of an operational concept document that will provide a road-map to States and regional planning groups for implementation of CNS/ATM systems.

4. GLOBAL AND REGIONAL PLANNING AND IMPLEMENTATION RELATED TO AIR NAVIGATION SYSTEMS

4.1 Global plan

4.1.1 Planning for the modernization of air navigation systems continued in 2000 through the efforts of Contracting States and the work of several PIRGs. Following the initiative taken by the CAR/SAM/3 regional air navigation (RAN) meeting in October 1999, some specific implementation plans were integrated into regional air navigation plans. The *Global Air Navigation Plan for CNS/ATM Systems* (Global Plan) (Doc 9750) was distributed to States and was successfully integrated into the work of the PIRGs.

4.1.2 Substantial progress was made in all regions toward the implementation of reduced separation minima based on the modern air navigation systems. In the Pacific Region, the concept of required navigation performance (RNP) formed the basis for a reduction of separation to 50 NM both longitudinally and laterally. Initial steps continued to be taken to implement similar reductions in the AFI, Caribbean, Middle East and South American Regions. RNP-5 airspace is being planned for implementation in parts of the Middle East Region and in the South Atlantic corridor connecting Europe and South America. RNP-5, in conjunction with area navigation (RNAV), allowed States and aircraft operators in the European Region to take advantage of airborne RNAV capabilities within the coverage of existing VOR-based systems. Work continued on the introduction of reduced vertical separation minima (RVSM) in the European Region and was successfully implemented in parts of the Pacific Region.

4.1.3 Programmes to implement CPDLC, and the ATS message handling system (AMHS) commenced in some ICAO regions. Also, the automatic dependent surveillance (ADS) trials currently being conducted, together with extensive work on the development of ADS procedures aimed at using ADS for separation purposes, should lead to the application of ADS in oceanic airspace for conformance monitoring and separation purposes. These developments should eventually lead to a more efficient utilization of the airspace while increasing capacity.

4.1.4 The first amendment to the Global Plan includes changes to take into account the most recent work of the GNSSP and the Air Traffic Management Operational Concept Panel (ATMCP). A new section addressing the environment will be added to include the latest work of the ICAO Committee on Aviation Environmental Protection (CAEP) and relevant aspects of national planning.

4.1.5 In follow-up of the above, the Global Plan, its associated planning methodology and the tables in Volume II are now in the process of being formally integrated into the work of the PIRGs.

4.2 Regional plans

General

4.2.1 The following paragraphs summarize the regional developments which have been initiated and implemented by the planning and implementation regional groups.

AFI Planning and Implementation Regional Group (APIRG)

4.2.2 The thirteenth meeting of APIRG, initially scheduled for 2000, was postponed to June 2001. However, its subsidiary bodies continued with their work programmes in order to complete the tasks allocated at APIRG/12 and subsequently present them to APIRG/13 for its consideration. The major developments undertaken by the subsidiary bodies of APIRG in the field of air navigation include: reviewing the status of implementation of the air navigation plan; updating the GNSS implementation strategies; planning for improving WGS-84 implementation; reviewing and addressing the shortcomings and deficiencies; stressing the urgency to establish autonomous entities; development of a proposal for a new larger aeroplane task force to evaluate and advise States on its likely impact; development of an Aeronautical Information Circular (AIC) on the use of aircraft collision avoidance systems (ACAS) II and pressure-altitude reporting SSR transponders; development of a plan for the extension of VHF coverage and utilization of a VHF band; addressing the interference to high frequency radio telephony (HFRT); development of a proposal for modifications to the current AFTN network; development of a recommendation for the dissolution of the Aeronautical Fixed Service Task Force and creation of a COM/SG/ATN Task Force; and development of a recommendation for the inclusion of METAR exchanges in the AMBEX scheme.

ASIA/PAC Air Navigation Planning and Implementation Regional Group (APANPIRG)

4.2.3 The eleventh meeting of APANPIRG, which took place in Bangkok, Thailand in October 2000, further reviewed and updated the Asia/Pacific Regional Plan for CNS/ATM Systems. The other major developments in the field of air navigation in the Asia/Pacific Regions include: the agreement to implement reduced vertical separation minima in the airspace of the western Pacific/South China Sea, effective 21 February 2002; completion of the regional aeronautical telecommunication network planning document; finalization of the Asia/Pacific basic air navigation plan and facilities and services implementation document; development of a framework for the harmonization of air navigation systems carried out during the first interregional coordination meeting that was held in Bangkok in October 2000; reviewing and addressing the shortcomings and deficiencies of the Asia/Pacific Regions; the establishment of a task with a target date of 11 July 2002 for the development of a revised air traffic services route structure from Asia to/from Europe and the Middle East; and release of forecasts for the nine major traffic flows across the Asia and Pacific Regions, including traffic forecasts for the top twenty-five city pairs in each of the nine major traffic flows.

Caribbean and South American Planning and Implementation Regional Group (GREPECAS)

4.2.4 The ninth meeting of GREPECAS (GREPECAS/9) took place in Rio de Janeiro, Brazil in August 2000 and focussed mainly on the follow-up to the recommendations and conclusions of the Third Caribbean/South American (CAR/SAM/3) Regional Air Navigation Meeting (Buenos Aires, October 1999) and on GREPECAS management matters. GREPECAS/9 also took note of the action of its CNS/ATM Implementation Coordination Subgroup on human resources and training, institutional aspects, regional global navigation satellite system augmentation, area navigation trial routes in the CAR/SAM Regions, the Eastern Caribbean CNS/ATM Systems Transition Plan, and implementation of a satellite-based augmentation system/ground-based augmentation system in Brazil. In connection with the introduction of new CNS/ATM systems, main traffic flows were studied to identify future operational requirements and technical and operational solutions, and the associated cost/benefit and sensitivity analyses were being carried out.

European Air Navigation Planning Group (EANPG)

4.2.5 The forty-second meeting of the EANPG (EANPG/42) was held in Paris, France in December 2000. It took actions aimed at improving interregional cooperation to overcome identified problems relating to air traffic services (ATS) route planning, operational cooperation between air traffic control (ATC) units and modernization of ATM systems in the eastern part of Europe. It also approved a draft CNS/ATM transition plan for the region and agreed to the creation of national CNS/ATM planning

focal points, the creation of a sub-group to carry out tasks related to CNS/ATM transition planning and the exploitation and consolidation of traffic statistics and forecasts in support of CNS/ATM transition planning. EANPG/42 also gave consideration to the new European Organisation for the Safety of Air Navigation (EUROCONTROL) performance-driven planning process, the EUROCONTROL Link 2000+ programme and GNSS developments. The EANPG also noted that, in accordance with the Reduced Vertical Separation Minimum (RVSM) Master Plan developed by EUROCONTROL, the implementation of RVSM was planned for 24 January 2002. It accordingly reviewed the status of RVSM developments and safety objectives and formally drew up the safety objectives for the implementation of RVSM in the European RVSM area.

Middle East Air Navigation Planning and Implementation Regional Group (MIDANPIRG)

4.2.6 The sixth meeting of the MIDANPIRG was held in Cairo, Egypt in September 2000. The major developments in the field of air navigation in the Middle East Region are summarized as follows: a target date of 27 November 2003 has been set for the implementation of reduced vertical separation minima in the Middle East airspace; the guidance principles for the ground element in the aeronautical telecommunication network transition have been prepared; the Middle East basic air navigation plan and the facilities and services implementation document are scheduled for finalization by the first half of 2001; the Middle East Regional Plan for CNS/ATM Systems has been reviewed, updated and harmonized with the format of the *Global Air Navigation Plan for CNS/ATM Systems* (Doc 9750); the terms of reference of MIDANPIRG have been revised to include financial and environmental considerations; the carriage of ACAS II in the Middle East Region has been made mandatory effective 1 July 2001; a list of priority routes in the Middle East Region has been drawn up for the introduction of RNP-5 and the shortcomings and deficiencies in the Middle East Region were reviewed and addressed as a part of its work programme.

North Atlantic Systems Planning Group (NAT SPG)

4.2.7 The thirty-sixth meeting of the NAT SPG took place in Paris, France in June 2000. A considerable amount of time was spent ensuring that the further implementation of RVSM was carried out in a safe and efficient manner, to developing tools to enable the implementation of reduced longitudinal separation minima using today's technology and to overseeing the establishment of the Future Air Navigation Systems (FANS) 1/A trials. The group also made working arrangements for the development of a plan for the transition from high frequency services to data link applications across the North Atlantic area. The NAT SPG continued to attach importance to economic and financial matters with a view to ensuring the cost-effective management of the North Atlantic air traffic management system.

5. ACTION BY MIDANPIRG

5.1 MIDANPIRG is invited to note the reported information on the modernization of air navigation systems.

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APPENDIX A

DEVELOPMENT STATUS OF SARPS AND GUIDANCE MATERIAL RELATED TO CNS/ATM SYSTEMS

MAIN FIELD		ELEMENTS	SARPS/PANS		GUIDANCE MATERIAL	
			TARGET COMPLETION DATE[1]	STATUS	TARGET COMPLETION DATE[2]	STATUS
ATM	ATM	Global air traffic management requirements	2005	Annexes 2 and 11 SARPs and PANS-ATM procedures under development.		Operational concept of global ATM being defined as part of updated global plan.
		Interoperability and functional integration of flight operations, ATS, ATFM and tactical ASM	2005	Annexes 2 and 11 SARPs and PANS-ATM procedures under development.		
		Required total system performance (RTSP)	2005	Draft policy statement under development.		
		ATM requirements for communications, navigation and surveillance	2002	Annexes 2, 6 and 11 SARPs and PANS-ATM procedures under development.		
	ASM	Airspace infrastructure planning	—	—	Completed	*Manual on Airspace Planning Methodology for the Determination of Separation Minima* (Doc 9689) published.
		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. Second edition published.

1) final action by the Air Navigation Commission
2) approval by the Secretary General

MAIN FIELD		ELEMENTS	SARPS/PANS		GUIDANCE MATERIAL	
			TARGET COMPLETION DATE[1]	STATUS	TARGET COMPLETION DATE[2]	STATUS
ATM	ATS	Separation between aircraft	2002	PANS-ATM procedures approved by Council in 1998; further amendment to Annexes 2, 6, 11 and PANS-ATM under development.	2001	Amendment to *Air Traffic Services Planning Manual* (Doc 9426) to be developed. 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. Additional guidance is under development for the Manual on APM (Doc 9689).
		ATS (uplink of MET data)	2001	Annex 3 SARPs and PANS-ATM procedures concerning D-ATIS and D-VOLMET being developed with the assistance of the METLINKSG.	—	—
		ATS (uplink of SIGMET information in graphical format)	2004	Initial Annex 3 SARPs specifying the code to be used for graphical SIGMETs being developed with the assistance of the METLINKSG.	—	—
		WAFS planning and implementation (final phase)	2004	Annex 3 SARPs for global WAFS SIGWX forecasts in binary format (BUFR code) for direct transmission to airline and ATM computers being developed with the assistance of WAFSSG.		
		ATS applications for air-ground data links	2003	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. Additional guidance is under development.

1) final action by the Air Navigation Commission
2) approval by the Secretary General

MAIN FIELD		ELEMENTS	SARPS/PANS		GUIDANCE MATERIAL	
			TARGET COMPLETION DATE[1]	STATUS	TARGET COMPLETION DATE[2]	STATUS
		Data interchange between automated ATS systems	2002	Annex 11 SARPs and PANS-ATM procedures under development.		
		ILS/MLS/GNSS[3] operations	2002	PANS procedures under review.		
	ATFM	ATFM systems and procedures	2005	Annexes 2 and 11 SARPs and PANS-ATM procedures to be developed.	2001	ATFM part of the ATM operational concept under development.
CNS/ATM		Human Factors	2001	HF-related SARPs were developed and incorporated in Annexes 10 and 11. Further, HF-related requirements for inclusion in the PANS-OPS were developed during 2000, with an applicability date of 1 November 2001.	2001	A chapter on Human Factors issues was developed and included in the *Manual of Air Traffic Services Data Link Applications* (Doc 9694). A manual on Human Factors Guidelines for Air Traffic Management Systems (Doc 9758) was completed and published in 2000.
		Human Resource Planning and Training			2001	The human resource planning guidance material is under development. A potential approach and format for regional training planning was developed.
COM		VHF digital link (Modes 3 and 4)	Completed	Mode 4 validation commenced in 1997. Mode 3 validation started in 1998. Validation of material in manuals ongoing.	Ongoing	SARPs adopted in 2001. Manuals on VDL technical details and implementation aspects will be published in 2001.

1) final action by the Air Navigation Commission
2) approval by the Secretary General

3) OCP is developing PANS-OPS criteria for SBAS/GBAS

MAIN FIELD	ELEMENTS	SARPS/PANS		GUIDANCE MATERIAL	
		TARGET COMPLETION DATE[1]	STATUS	TARGET COMPLETION DATE[2]	STATUS
COM (cont'd)	AMS	Completed	Included in Amendment 75 to Annex 10.	Completed	Included in Amendment 75 to Annex 10.
	Next generation satellite system	Completed	SARPs development completed by AMCP/7	Ongoing	Guidance material on specific systems to be developed as required.
NAV	RNP (en-route)	Completed —	Adopted/approved by Council in 1994 (Annexes 2, 4, 6, 11, 15 and PANS-ATM). —	Completed Completed	Guidance material for RNP1 operations under development. The *Manual on Airspace Planning Methodology for the Determination of Separation Minima* (Doc 9689) published in 1998.
	RNP (terminal area, approach, landing, departure)	Completed	Recommended by AWOP/16 and adopted by the Council in 1999.	Completed	Developed by AWOP, in parallel with SARPs.
	WGS-84	Completed	Adopted by Council in 1994, 1995, 1997 and 1998. Annexes 4, 11, 14 (both volumes) and 15 updated, provisions applicable from 1 January 1998.	Completed	*WGS-84 Manual*, (Doc 9674) and Amendment 1 issued. Amendment 2 concerning taxiway and apron points has been written and submitted for translation and publication. ICAO WGS-84 website is under development.
	Aeronautical data bases	2003	SARPs for the standard conceptual information model required for the provision and exchange of electronic aeronautical data initiated at the AIS/MAP/98 Divisional Meeting, are being developed by the Secretariat with the assistance of ADMSG.	2004	To be developed by the Secretariat with the assistance of AISMAPSG and ADMSG.

1) final action by the Air Navigation Commission
2) approval by the Secretary General

MAIN FIELD	ELEMENTS	SARPS/PANS		GUIDANCE MATERIAL	
		TARGET COMPLETION DATE[1]	STATUS	TARGET COMPLETION DATE[2]	STATUS
NAV (cont'd)		2001	Initial SARPs for electronic aeronautical charts for cockpit display were included in Amendment 52 to Annex 4.		
		2004	SARPs for the electronic terrain data are under development in consultation with RTCA/EUROCAE.		
	GNSS performance criteria to support operational requirements	2001	Draft material was developed at the GNSSP/3 (12 to 23 April 1999).	2001	Developed by GNSSP in parallel with SARPs.
	SARPs for the use of existing satellite navigation systems with augmentation sub-systems	2001	First package of SARPs was recommended by GNSSP/3 and adopted by Council in March 2001 for applicability on 1 November 2001.	2001	Developed by GNSSP in parallel with SARPs.

1) final action by the Air Navigation Commission
2) approval by the Secretary General

MAIN FIELD	ELEMENTS	SARPS/PANS		GUIDANCE MATERIAL	
		TARGET COMPLETION DATE[1]	STATUS	TARGET COMPLETION DATE[2]	STATUS
	SARPs for the longer-term GNSS	2004	Guidance on the long-term GNSS was developed by GNSSP/3 and the work on SARPs for new elements of GNSS (GPS second civil frequency, Galileo, GLONASS-M) is under way.	2004	Developed by GNSSP in parallel with SARPs.
SUR	Surveillance system specifications for emerging surveillance systems and architectures	2004	Surveillance enhancements (ANC Task No. CNS-9601) being develope+d by SCRSP.	Ongoing	
	SSR procedures	Completed	Update of Annex 11 and PANS-ATM.	Completed	
	ADS procedures	2001	Annex 11 SARPs and PANS-ATM procedures being developed by the OPLINKP and SASP.	Completed	*Manual of ATS Data Link Applications* (Doc 9694) published and dispatched in second quarter 1999.
	ADS-B and equivalent	On-going	Being developed by OPLINKP	Ongoing	Amendment to the *Manual of ATS Data Link Applications* (Doc 9694) to be developed.

1) final action by the Air Navigation Commission
2) approval by the Secretary General

MAIN FIELD	ELEMENTS	SARPS/PANS		GUIDANCE MATERIAL	
		TARGET COMPLETION DATE[1]	STATUS	TARGET COMPLETION DATE[2]	STATUS
	ADS: inclusion of turbulence reporting	2001	Annex 3 SARPs and PANS-ATM turbulence reporting procedures based on the eddy dissipation rate being developed with the assistance of METLINKSG.		

LEGEND

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

1) final action by the Air Navigation Commission
2) approval by the Secretary General

APPENDIX B

PANELS AND STUDY GROUPS INVOLVED IN CNS/ATM-RELATED ACTIVITIES

PANEL/STUDY GROUP	WORK PROGRAMME			
	TASKS	TITLE	TARGET COMPLETION DATE	STATUS (PROGRESS IN 2000)
OPLINKP	ATM-9102	ATS applications for air-ground data links	2001 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	2001 and beyond	The development of the concept of required communication performance was progressed.
	ATM-9506	Automatic dependent surveillance (ADS) systems and procedures	2001 and beyond	
	ATM-9103	Data interchange between automated ATS systems	2001	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	Ground work was prepared for an operational concept and operational requirements for the use of a system to increase aircraft situational awareness and airborne separation assurance are being developed.
AMCP	CNS-7002	Aeronautical electromagnetic spectrum	Ongoing	AMCP continued work on spectrum protection tasks inherited from the disbanded FMSG.
	CNS-8702	Aeronautical mobile satellite air-ground data link (AMSS subnetwork)	Completed	Work on upgrades to the AMSS SARPs was completed.
	CNS-9902	Next-generation AMSS systems	Ongoing	Work on the development of acceptability criteria and SARPs for next-generation satellite systems was completed.
	CNS-9102	VHF air-ground digital link (VDL subnetwork)	Ongoing	Validation of the detailed technical specification for VDL Modes 3 and 4 ongoing.
	CNS-9603	Air-ground data link to support navigation and surveillance applications	Ongoing	Validation of the VDL Modes 3 and 4 SARPs completed.
	CNS-9602	High frequency data link (HFDL)	Ongoing	Validation of detailed technical specifications ongoing.
ATMCP	ATM-9501	Required total system performance	2002	The ATMCP Working Group has held 5 meetings. Progress is being made on operational concept document.
	ATM-9202	Global air traffic management	2002 and beyond	

PANEL/STUDY GROUP	WORK PROGRAMME			
	TASKS	TITLE	TARGET COMPLETION DATE	STATUS (PROGRESS IN 2000)
	ATM-9510	Interoperability and functional integration of flight operations, ATS, ATFM and tactical ASM	2002	
ATNP	CNS-7001	AFS systems planning studies	Completed	SARPs and technical specifications for ATN systems management, security and directory services were completed in 2000. Future work involves the incorporation of new and revised operational requirements and subnetworks into the ATN and enhancements to existing functions.
	CNS-8101	AFTN procedures and message format	Completed	
	CNS-9403	Aeronautical telecommunication network (ATN)	Completed	
	CNS-9901	AFS procedures	Completed	
GNSSP	CNS-9401	Global navigation satellite system (GNSS)	Completed	First set of SARPs recommended at GNSSP/3 Meeting, 12 to 23 April 1999.
	CNS-7002	Aeronautical electromagnetic spectrum	Ongoing task	
	OPS-8502	Flight procedures and obstacle clearance criteria based on GNSS & RNP systems	2001	
SASP	ATM-8505	Required navigation performance and area navigation for en-route operations	2001	Route spacings based on RNAV and RNP 1, a global target level of safety and the effects of GNSS on aircraft separation continued to be studied. Guidance material was developed for inclusion in the *Manual on Airspace Methodology for the Determination of Separation Minima* (Doc 9689).
	ATM-6301	Separation between aircraft	2001 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 lateral and longitudinal was presented to ANC for review in 1999. The reduction of longitudinal separation to below 10 minutes is 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.

PANEL/STUDY GROUP	WORK PROGRAMME			
	TASKS	TITLE	TARGET COMPLETION DATE	STATUS (PROGRESS IN 2000)
	ATM-9505	Airspace infrastructure planning	Completed	
SCRSP	CNS-7901	Conflict resolution and collision avoidance systems	2004	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)	2004	
	CNS-9701	Airborne separation assurance system (ASAS)	2004	
ADMSG	AIS-9401	Aeronautical data bases	2005	Evaluation and validation of the SICIM and FAA/EUROCONTROL AICM/AIXM were initiated at the first meeting in November 1999; further work in 2001-05.
AISMAPSG	AIS-9801	Electronic aeronautical charts for cockpit display	2003	Amendment 29 to Annex 15 introduced aeronautical data base requirements including the quality system, data integrity and protection and publication resolutions. At the 3rd meeting (December 1999) work continued on tasks AIS-9801 and AIS-9802. The group will continue work in 2001-05.
	AIS-9802	Electronic terrain data	2003	
	AIS-9806	Electronic exchange of aeronautical information	2005	
AVSSSG	CNS-7001	AFS systems planning studies	2001	The third meeting of AVSSSG was held in Montreal in October 2000. SARPs on ATS voice networks were adopted in 2001. Guidance material is being completed.
HFSG	PEL-9001	Flight safety and human factors	2001	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. Further, HF-related requirements are to be included in PANS-RA have been developed.
HRPTSG	PEL-9601	Regional human resource planning and training needs	2002	The first draft of the Human Resource Development Manual is under development. An initial version of a computer programme designed to indicate how CNS/ATM technologies affect job profiles and the consequential human resource planning and training requirements was developed.

PANEL/STUDY GROUP	WORK PROGRAMME			
	TASKS	TITLE	TARGET COMPLETION DATE	STATUS (PROGRESS IN 2000)
METLINKSG	MET-9101	Amendment to Annex 3 concerning automated air-reporting	2001	Amendment 72 to Annex 3 being developed including the details of the turbulence index to be reported.
	MET-9301	Future requirements for the uplink of OPMET information to aircraft in flight	2001	Amendment 72 to Annex 3 being developed including the meteorological specifications (templates) for D-ATIS and D-VOLMET.
	MET-9602	SIGMET information in graphical format	2004	Amendment 72 being developed including the specification of the numerical code to be used for the dissemination and uplink of graphical SIGMETs.
TRNSG	CNS-9402	Testing of radio navigation aids	Completed	First and second meetings of the study group produced a revised version of Doc 8071, Volume I, *Manual on testing of ground-based radio navigation systems* (replacing former Volumes I and II). TRNSG/3 produced Volume II (GNSS)
	CNS-9401	Global navigation satellite system (GNSS)	Completed	
WAFSSG	MET-8802	WAFS planning and implementation	2001	Amendment 72 to Annex 3 being developed to include global WAFS SIGWX forecasts in binary format (BUFR) code for direct transmission to airline and ATM computers.

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LEGEND

ANC Panels

AMCP — Aeronautical Mobile Communications Panel
ATMCP — Air Traffic Management Operational Concept Panel
ATNP — Aeronautical Telecommunication Network Panel
GNSSP — Global Navigation Satellite System Panel
OCP — Obstacle Clearance Panel
OPLINKP — Operational Data Link Panel
RGCSP — Review of the General Concept of Separation Panel
SCRSP — Surveillance and Conflict Resolution Systems Panel (Former SICASP)

Study Groups

ADMSG — Aeronautical Data Modelling Study Group
AISMAPSG — Aeronautical Information and Charts Study Group
AVSSSG — ATS Voice Switching/Signalling Systems 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
TRNSG — Testing of Radio Navaids Study Group
WAFSSG — World Area Forecast System Study Group