



International Civil Aviation Organization

Fourth ATN Transition Task Force Meeting

Mumbai, India, 8 - 12 April 2002

Agenda Item 10: Any other business

REVIEW OF COMPARISON STATUS OF REGIONAL DEVELOPMENTS OF AIR NAVIGATION SYSTEMS INCLUDING CNS/ATM SYSTEMS

(Presented by Secretariat)

SUMMARY

This paper presents the comparison of regional developments of air navigation systems including implementation of elements of the ATN.

1. Introduction

1.1 As a follow-up to the Council decisions, the attached material was compiled in February 2002, which provided a snapshot, using a matrix-based approach, on comparative analyses of regional developments in air navigation systems and related fields.

2. Discussion

2.1 The implementation status of elements of the CNS/ATM systems and other major activities of APANPIRG need to be reviewed.

2.2 The presentation of a matrix-based data on the regional developments in air navigation systems is now going to be ongoing annual exercise for APANPIRG and its Sub-Groups to closely monitor development. This would also facilitate inter-regional co-ordination.

3. Action by the meeting

3.1 The meeting is invited to:

- i) note the information provided in this paper;
- ii) note the inter-regional developments in relation to the ASIA/PAC region; and
- iii) update the information for Asia and Pacific regions, as required.

COMPARATIVE ANALYSIS OF REGIONAL DEVELOPMENTS IN AIR NAVIGATION SYSTEMS

1. INTRODUCTION

1.1 Air navigation systems have been evolving on the basis of regional and national requirements that must be harmonized towards the implementation of an integrated global air traffic management system and its supporting infrastructure of communications, navigation and surveillance systems. While there is an established process for monitoring the reports of each planning and implementation regional group (PIRG) by the Air Navigation Commission and the Council, a need has been expressed for a comparative study of regional developments in air navigation systems so as to understand the global situation and to enhance the planning and implementation of a cohesive, global air navigation infrastructure of facilities and services.

2. OBJECTIVES OF THE TASK

2.1 The objectives behind the comparative analysis amongst the regions are;

- a) Compiling the data on regional developments in air navigation systems and related fields;
- b) Noting the pace of implementation of air navigation systems in each region;
- c) Recognizing the issues which are specific to the regions;
- d) Identifying the interregional issues;
- e) Carrying out the interregional coordination to facilitate seamlessness between adjacent regions; and
- f) Enhancing the planning and implementation of a cohesive, global air navigation infrastructure of facilities and services.

3. PRESENTATION OF DATA IN THE MATRIX

3.1 The attached matrix-based comparative analysis of regional developments in air navigation systems reflects the data that was presented in the Appendix to C-WP/11729. Also, in order to present a comprehensive picture historical data, wherever possible, has been indicated in *italics*.

AIR TRAFFIC MANAGEMENT							
No	System	APANPIRG	APIRG	EANPG	GREPECAS	MIDANPIRG	NATSPG
1	Revision of ATS route structure	<i>South China Sea - 1 November 2001.</i> Asia to Europe through Middle East via south of Himalayas - 28 November 2002.	Establishment of new ATS routes, namely UB540 Johannesburg-Francistown-Victoria Falls-Livingstone- 28 November 2002. Extension of route UR982 (Lome-Sao-Tome)- 28 November 2002. Implementation of RNAV Route UM114- 28 November 2002.	Asia to Europe through Middle East via south of Himalayas - 28 November 2002. Revision of route structure in Eastern and Western part of Europe - On going.	The development of a new ATS RNAV route network in CAR/SAM Regions - In progress.	Asia to Europe through Middle East via south of Himalayas - 28 November 2002.	-
2	RVSM	<i>Pacific airspace- implemented on 24 February 2000.</i> Western Pacific airspace - 21 February 2002. Hong Kong FIR and Sanya AOR - 31 October 2002. Asia to Europe south of Himalayas - 27 November 2003.	Being pursued by RVSM/RNAV/ RNP TF. Target date to be determined. <i>Parts of Region falling in SAM and EUR corridor - 24 January 2002.</i>	<i>European Region - 24 January 2002.</i>	<i>EUR/SAM corridor - 24 January 2002.</i> CAR/SAM and NAM Regions - 1 April 2004.	Middle East Region - 27 November 2003.	<i>Horizontal RVSM expansion in the entire NAT Region from FL 310 to FL 390 completed on 1 November 2001.</i> <i>Vertical expansion of RVSM throughout NAT Region from FL 290 to FL 410 – 24 January 2002.</i>

AIR TRAFFIC MANAGEMENT

No	System	APANPIRG	APIRG	EANPG	GREPECAS	MIDANPIRG	NATSPG
3	Establishment of regional airspace performance monitoring structure	In progress with a target date of September 2002.	Under consideration.	Under development.	Under consideration.	Under consideration.	Implemented.
4	ACAS II	<i>Mandated from 23 March 2000.</i>	<i>Mandated from 1 January 2000.</i>	<i>Mandated from 1 January 2000.</i>	Mandated from 1 January 2003.	<i>Mandated from 1 July 2001.</i>	<i>Mandated from 31 March 2001.</i>
5	RNAV/RNP	RNP 10: 1) North Pacific and Tasman - 23 April 1998; 2) South China Sea - 1 November 2001; 3) Australia and Indonesia - 1 November 2001; 4) Bay of Bengal - November 2002. Other routes in progress.	RNP5 - implemented in continental Johannesburg FIR in 1998. For other routes - Under consideration.	RNAV/RNP5 implemented in ECAC area from January 1998. Implementation of precision RNAV (nearly equivalent to RNP 1) in terminal areas is planned for 2003.	EUR/SAM corridor RNP10 - 4 October 2001; Five routes approved by the CAR/SAM RAN/3 Meeting for RNAV implementation are undergoing testing. Tests and demonstrations carried out by TC project RLA/98/003 related to the use of RNAV and RNP10 on designated routes in the region has been approved. For other routes - Under consideration.	RNP 5 Phase 1 Implemented - 14 June 2001. Phase 2 - 28 November 2002.	MNPS implemented in 1981.

COMMUNICATIONS							
No	System	APANPIRG	APIRG	EANPG	GREPECAS	MIDANPIRG	NATSPG
1	ATN (Subnetworks, End systems and Intermediate systems)	ATN transition plan has been developed with a target date of 2005 for ground -ground application namely AMHS.	ATN implementation is Under study. Focus is more on improving current circuits with long term plans for migrating to AMHS.	ATN transition plan has been developed. Pre-operational trials are in progress.	Current AFTN is being improved. Plans for the implementation of ATN regional backbone and interface with the AFTN using a gateway were established. Implementation of AMHS and AIDC are being studied.	ATN implementation is under consideration with initial focus on ground -ground application namely AMHS and AIDC - Dates to be determined. Guiding principles have been prepared.	Investigation of operational ATN data link scenarios in the Region with focus on air-ground applications is in progress.
2	Air-ground communication infrastructure	VHF for voice and data in continental and terminal areas. AMSS for data and voice in oceanic and remote areas. SSR Mode S data link for high density airspace are being planned.	VHF Voice is provided in terminal areas. Extension of VHF coverage to en route areas is in progress in several FIRs. HF Voice is provided in most of FIRs and CPDLC based on FANS-1/A is being used.	Implementation of air-ground data link services is planned for 2002-2007. Horizontal expansion of 8.33 kHz channel spacing is planned effective from 31 October 2002. Vertical expansion of 8.33 kHz channel spacing may be necessary by 2008.	Implementation of VDL Mode 2 to support CPDLC and D-ATIS will be studied. Tests on HF DL are being conducted.	VHF for voice and data in continental and terminal areas. AMSS for data and Voice in oceanic and remote areas. SSR Mode S data link for high density airspace are being considered.	HF is the main communication and already saturated with difficulty of obtaining additional frequencies. CPDLC based on FANS 1/A is used for routine communications. AMSS application is being assessed.

COMMUNICATIONS							
No	System	APANPIRG	APIRG	EANPG	GREPECAS	MIDANPIRG	NATSPG
3	Ground-ground communication infrastructure	Some of the States have implemented digital networks. Other States are also considering upgrading their networks.	Two major satellite networks have been provided in the States of the Region. Other areas are also being considered.	Well developed. Many of the States have upgraded to digital networks.	Number of digital networks have been implemented in the Region. Interconnection of these networks so as to provide interoperability is in progress.	Establishment of a regional satellite based digital network is under consideration.	Well developed. Many of the States have upgraded to digital networks.

NAVIGATION

No	System	APANPIRG	APIRG	EANPG	GREPECAS	MIDANPIRG	NATSPG
1	GNSS	Transition to WGS-84 is in progress. Strategy for implementation of GNSS along with a check list has been developed. Satellite based augmentation system (MSAS) is being developed. GNSS is being used for oceanic and continental en- route operations.	Transition to WGS-84 is in progress. GNSS strategy has been adopted. SBAS test bed in cooperation with EGNOS is under installation. GNSS is being used for oceanic and continental en- route operations.	Transition to WGS-84 is on-going. Launching of AGalileo@, a new constellation of navigation satellites is under consideration with full operation capability slated for 2008. Satellite based augmentation system (EGNOS) is being developed. GNSS is being used for continental en route operations.	Transition to WGS-84 is in progress. SBAS test bed project in cooperation with WAAS was established. GNSS is being used for oceanic and continental en route operations.	Transition to WGS-84 is in progress. Strategy for implementation of GNSS is under development. SBAS test bed in cooperation with EGNOS is under study. GNSS is being planned for en-route operations effective from 2002.	Transition to WGS-84 completed. GNSS is being used for oceanic operations.

SURVEILLANCE							
No	System	APANPIRG	APIRG	EANPG	GREPECAS	MIDANPIRG	NATSPG
1	SSR Modes A/C and SSR Mode S	Currently SSR Modes A and C is employed. In the near future SSR Mode S in some terminal areas and high density en route will be planned.	Surveillance in most FIRs is through voice position - reporting. PSR and SSR Mode A/C is employed in some busy terminals and for en-route operations. A PSR/SSR Plan on selected airspaces has been developed and is included in the AFI FASID.	Currently SSR Modes A and C is employed. SSR Mode S in some terminal areas and high density en route is planned for implementation in 2005.	Currently SSR Modes A and C is employed. In the near future SSR Mode S in some terminal areas and high density en route will be planned. Plans for SSR data sharing are being studied.	The Region is well covered by radars (PSR/SSR Mode A/C). In near future SSR Mode S in some terminal areas and high density en route will be planned.	Surveillance in most of the NAT Region is via position reports using HF Voice at approximately every 10° of longitude.
2	ADS	ADS will be used initially for oceanic airspace and later in remote areas.	ADS will be used for low density, remote and oceanic airspace as well as outside SSR coverage.	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 as a backup to SSR in high density traffic areas.	To improve surveillance, the regional plan specifies ADS over the ATN. Nevertheless, provisions have been made to accommodate FANS 1/A-equipped aircraft.
3	ADS(B)	ADS (B) trials are in progress in a few States such as Australia and Japan. Implementation plans yet to be finalized.	To de determined.	ADS (B) trials are in progress in a few States such as Germany, Denmark, Sweden, and the United Kingdom. Implementation plans yet to be finalized.	ADS (B) trials are in progress in a few States such as the United States and Canada. Implementation plans yet to be finalized.	To de determined.	-

RELATED ISSUES							
No	System	APANPIRG	APIRG	EANPG	GREPECAS	MIDANPIRG	NATSPG
1	Transition from current single volume ANP to two volumes Basic ANP and FASID documents	<i>Approved by the President of the Council on 11 August 2001;</i> Yet to be published.	Material finalized and will go through an approval process.	Material finalized and published.	<i>Approved by the CAR/SAM/RAN 3 Meeting.</i> FASID is being kept up to date.	Scheduled for finalization by first quarter 2002.	The NAT Basic ANP and FASID are being reviewed and is scheduled to be completed by the middle of 2002.
2	Development and update of Regional plan for CNS/ATM systems	Reviewed and updated. It now includes a new chapter on the subject of meteorology.	Reviewed and updated.	Reviewed and updated.	Under review to update the Plan.	Reviewed and updated.	New plan being developed.
3	Meteorological component of CNS/ATM systems Transition to final phase of World Area Forecast System (WAFS)	Migration from traditional alphanumeric code forms to digital code forms (WMO BUFR and GRIB code forms), which are necessary for ATN, is being addressed. The Regional Area Forecast Centres have been phased out and their responsibilities have been transferred to the World Area Forecast Centres.	Migration from traditional alphanumeric code forms to digital code forms (WMO BUFR and GRIB code forms), which are necessary for ATN, is being addressed. The Regional Area Forecast Centres have been phased out and their responsibilities have been transferred to the World Area Forecast Centres	Migration from traditional alphanumeric code forms to digital code forms (WMO BUFR and GRIB code forms), which are necessary for ATN, is being addressed. The Regional Area Forecast Centres have been phased out and their responsibilities have been transferred to the World Area Forecast Centres.	Initial discussions have taken place to address migration from traditional alphanumeric code forms to digital code forms (WMO BUFR and GRIB code forms), which are required for ATN implementation. The transfer of responsibilities from the Regional Area Forecast Centres to the World Area Forecast Centre, Washington is under way.	Migration from traditional alphanumeric code forms to digital code forms (WMO BUFR and GRIB code forms), which are necessary for ATN, is being addressed. The Regional Area Forecast Centres have been phased out and their responsibilities have been transferred to the World Area Forecast Centres.	Not applicable as this issue is being addressed by the States as part of EANPG. Not applicable.

RELATED ISSUES							
No	System	APANPIRG	APIRG	EANPG	GREPECAS	MIDANPIRG	NATSPG
4	Review of deficiencies	Addressed as part of the PIRG work programme. Appropriate management tools are being developed.	Addressed as part of the PIRG work programme. The list of deficiencies are grouped on the basis of States in addition to facility wise. Establishment of an aviation safety board is under consideration.	Addressed as part of the PIRG work programme.	Addressed as part of the PIRG work programme. An aviation safety board has been created.	Addressed as part of the PIRG work programme.	Addressed as part of the PIRG work programme.
5	Specific to the region	Guidance material to enhance aeronautical information services activities within the Region has been developed.	The new larger aeroplane task force has been established to evaluate the impact on aerodromes of the AFI Region. Establishment of an appropriate body for addressing regional human resource and training issues is under consideration.	Focussing on increasing the efficiency and capacity at international aerodromes through the implementation of capacity enhancing procedures.	Human resources and training issues are being addressed. The development of an ATS Quality Assurance Programme and its associated activities are being carried out.	Formulation of a plan for development of regional training capabilities within specific training centres is being addressed.	Work has been initiated for the development of operational and economic performance indicators to be used throughout NAT Region.

AIR TRANSPORT - TRAFFIC FORECASTS AND ECONOMIC ISSUES							
No	System	APANPIRG	APIRG	EANPG	GREPECAS	MIDANPIRG	NATSPG
1	Traffic Forecasting Groups(TFGs)	Traffic Forecasting Group is in existence since 1991. Forecasts prepared for major route group up to the year 2015. Tenth meeting of TFG was held in Bangkok from 11 to 20 June 2001.	Traffic Forecasting Group formed in 1998. Major route groups identified. Forecasts to be prepared in 2002. Second meeting of TFG was held in Nairobi from 12 to 16 March 2001.	Data developed by EUROCONTROL are being used.	Traffic Forecasting Group established in 1996. Forecasts prepared for major route group up to the year 2010. In support of the study of the transitional plan (Project RLA/98/003), forecasts for 18 major traffic flows have been prepared by the Secretariat in lieu of CAR/SAM TFG. Fourth meeting of TFG was held in Lima from 17 to 21 July 2000.	Traffic Forecasting Group created in 1998. Forecasts prepared for major route group up to the year 2015. Fourth meeting of MID-TFG was held in Cairo on 22 February 2001.	NAT Forecasting Group was established in 1965.
2	Traffic forecasts	Traffic forecasts have been developed and are currently under review to reflect changes due to recent events.	Forecasts are under development.	No ICAO involvement.	Traffic forecasts have been developed and are currently under review to reflect changes due to recent events.	Traffic forecasts have been developed and are currently under review to reflect changes due to recent events.	Traffic forecasts are developed annually. However, they are currently under review to reflect changes due to recent events.

AIR TRANSPORT - TRAFFIC FORECASTS AND ECONOMIC ISSUES							
No	System	APANPIRG	APIRG	EANPG	GREPECAS	MIDANPIRG	NATSPG
3	Cost benefit study, business case analysis and cost recovery system	To progress the task of establishing a framework for business case studies for the implementation of CNS/ATM systems, a special implementation project has been proposed.	Business case and cost benefit analysis has been carried out for SADC States for the UACC project. Similar exercise is under consideration for route AR4.	Business case and cost benefit analysis are being carried out by EUROCONTROL.	The Secretariat has been approached to assist in the economic aspects of the study of the transitional plan (Project RLA/98/003) to CNS/ATM systems.	A business case illustrative application is being developed for the region.	The feasibility of creating a common cost-recovery system for the provision of air navigation services in the northern part of the region is being considered. Cost effectiveness of implementation of new systems are studied as an ongoing exercise.

LEGAL ISSUES							
No	System	APANPIRG	APIRG	EANPG	GREPECAS	MIDANPIRG	NATSPG
1	Addressing legal issues such as universal accessibility, continuity, certification and liability.	Legal issues have been raised but these are beyond the scope of regional bodies. HQ should continue to provide guidance and address and resolve them at global level.	The subject has not yet been examined by APIRG. We expect the HQ to adequately address this issue for the benefit of PIRGs.	Legal issues were discussed in the context of the Galileo programme.	Legal issues are beyond the resolution at the regional level. HQ must provide the leadership in this domain.	The question is too large and complex. MIDANPIRG did not look into the matter deep.	-
2	Development of an interim legal framework	An interim legal framework, the ACharter on the Rights and Obligations of States Relating to GNSS Services@, was adopted in 1998 by the 32nd Session of the Assembly in the form of Resolution A32-19, which embodies certain fundamental principles applicable to GNSS. The ICAO headquarters is accelerating its efforts to resolve the complex legal issues involved and will continue to provide guidance at global level. The Secretariat Study Group on Legal Aspects of CNS/ATM systems will finalize the concept of a contractual framework for CNS/ATM systems and provide a path toward its implementation, including the consideration of an international convention. The security aspects concerning prevention of unlawful interference with CNS/ATM systems will also be reviewed in the context of aviation security.					

END