INTERNATIONAL CIVIL AVIATION ORGANIZATION

AFI PLANNING AND IMPLEMENTATION REGIONAL GROUP (APIRG)

REPORT OF THE SIXTH MEETING OF THE METEOROLOGY SUB-GROUP (MET/SG/6)

(Nairobi, 21 - 23 May 2002)

Prepared by the Secretary of MET/SG

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PART 1 - HISTORY OF THE MEETING

1.1 Date and Site of the Meeting

1.1.1 The sixth meeting of the Meteorology Sub-group (MET/SG) was held at the ICAO Eastern and Southern African Office in Nairobi, Kenya from 21 to 23 May 2002.

1.2 Officers and Secretariat

1.2.1 Mr. L. Mollel, the Regional Director of the Eastern and Southern African Office opened the meeting. He expressed his appreciation to the participants attending this sixth meeting of the MET/SG, and highlighted the tasks to be accomplished during the meeting.

1.2.2 The meeting was chaired by Mr. J. Namu Ndwiga, Senior Meteorologist, JKIA MET Office, Nairobi. Mr. H. Cisse, Regional Officer, Aeronautical Meteorology of the ICAO Western and Central African Office, Secretary of the Sub-group was assisted by Mr. B.M. Sekwati, Regional Officer, Aeronautical Meteorology of the ICAO Eastern and Southern African Office and Mr. A. Sene, Regional Officer Communications, Navigation and Surveillance of the ICAO Eastern and Southern African Office.

1.3 Attendance

1.3.1 The meeting was attended by twenty-four (24) participants from fourteen (14) states and two (2) international Organizations.

1.3.2 The list of participants is at **Appendix A**.

1.4 Working Languages

1.4.1 The discussions were conducted in English and French and the documentation was issued in both languages. The interpretation services were provided by three freelance interpreters.

1.5 Agenda

1.5.1 The following Agenda was adopted:

Agenda Item 1: Election of Chairman and Vice-Chairman of the Sub-Group

Agenda Item 2: Review of APIRG Conclusions and Decisions

Agenda Item 3: WAFS in the AFI Region

Agenda Item 4: AFI Meteorological Bulletins Exchange (AMBEX) Scheme

Agenda Item 5: Provision of tropical cyclone and volcanic ash advisories for the AFI Region

Agenda Item 6: Deficiencies in the MET Field

Agenda Item 7: New Challenges facing AFI Meteorological Services

Agenda Item 8: Terms of reference, work programme and composition of the MET/SG

Agenda Item 9: Any other business

1.6 **Draft Conclusions and Decisions**

1.6.1 The MET/SG recorded its action in the form of draft conclusions, draft decisions, with the following significance.

1.6.2 **Draft Conclusions**

1.6.2.1 Draft Conclusions, when approved by the APIRG, deal with matters which in accordance with the APIRG Terms of Reference, merit the attention of States or on which further action will be initiated by ICAO in accordance with established procedures.

1.6.3 **Draft Decisions**

1.6.3.1 Draft Decisions, when approved by APIRG, deal with matters of concern only to the APIRG and its contributory bodies.

1.6.4 **MET/SG Decisions**

1.6.4.1 Decisions dealing with matters of concern only to the MET/SG.

PART II - REPORT ON THE AGENDA

Agenda Item 1: Election of Chairman and Vice-Chairman of the Subgroup

1.1 In accordance with the relevant provisions contained in the APIRG Procedural Handbook, the Sub-group elected its Chairman and Vice-Chairman. Mr. Johnson Namu Ndwiga, Senior Meteorologist, Jomo Kenyatta International Airport, Nairobi, Kenya and Mr. Madina Boubacar Diallo, Chief of Meteorological Services, Gbessia Airport, Conakry, Guinea were re-elected Chairman and Vice-Chairman, respectively.

Agenda Item 2: Review of APIRG Conclusions and Decisions

1. **Discussions**

1.1 The Sub-group made an in depth review of Conclusions and Decisions formulated by MET/SG/1, 2, 3, 4 and 5 meetings and which were adopted by the APIRG. It noted action taken and progress made so far on the implementation of these conclusions and decisions in particular those relating to operation of the AMBEX Scheme and the WAFS.

Agenda Item 3: WAFS in the AFI Region

3.1 The meeting reviewed the status of the implementation of the World Area Forecast System (WAFS) in the AFI Region in particular the Satellite Distribution System for information relating to air navigation (SADIS) provided by the United Kingdom as an integral part of the ICAO aeronautical fixed service (AFS). The meeting also reviewed the detailed information provided by the World Area Forecast Centre (WAFC) London on the operation of the SADIS.

3.2 The meeting noted the follow-up action carried out by ICAO and UK MET Office concerning Conclusion 13/63 of APIRG/13 on the training on the use of GRIB and BUFR codes. It was also noted that a seminar, in French language, was organized at EAMAC Niamey in March 2002 in favour of 15 States of Western and Central Africa. The meeting agreed that a second seminar will be organized for English speaking States. South Africa has offered to host this second seminar. The following conclusion was formulated:

Conclusion 6/1: Second training Seminar on the use of GRIB and BUFR codes.

That : as a follow-up of Conclusion 13/63 of APIRG/13 a second training seminar on the use of GRIB and BUFR codes be organized for English speaking States.

3.3 The meeting was also of the view that there is a need for States to acquire the latest version of workstations software relating to the use of GRIB and BUFR codes. The following conclusion was formulated:

Conclusion 6/2: Need for latest version of workstation software

That; States are encouraged to acquire the latest version of workstation software from their respective workstation suppliers for the use of GRIB and BUFR codes.

3.4 The meeting was informed of the transfer of Regional Area Forecast Centre (RAFC) Dakar responsibilities to the World Area Forecast Centre (WAFC) London effective since 2 January 2002, the transfer of that of RAFC Nairobi effective 13 May 2002. The meeting noted the closure of all AFI RAFCs and therefore formulated the following conclusion:

Conclusion 6/3 : Closure of the AFI RAFCs (Dakar, Las Palmas and Nairobi)

That as a follow-up of conclusion 12/32 of APIRG/12 on the AFI WAFS transition plan all AFI RAFCs have ceased function as of 13 May 2002.

3.5 The meeting reviewed and updated FASID Table MET 7 on the list of authorized users of the SADIS, **Appendix B** to this Report refers. ASECNA informed the meeting of the installation of the Dakar SADIS two-way VSAT on April 2002.

3.6 The meeting was aware of some difficulties relating to the back-up systems for the SADIS and it was emphasized that this matter has been taken up by SADISOPSG/6 meeting and a back-up systems will be provided soon.

3.7 The meeting also reviewed the membership list of AFI States to the SADISPOSG and noted that the members are: Côte d'Ivoire, Kenya, Senegal, South Africa and ASECNA. The mandatory cost recovery of the SADIS service was also discussed and the following conclusion concerning the principles for the AFI representation in the SADISOPSG was formulated:

Conclusion 6/4 : Composition of the SADIS Operations Group (SADISOPSG)

That:

a) members of the SADISOPSG be appointed only from States which are users of the service and hence participate in the mandatory cost recovery scheme; and

b) in accordance with the principle, the AFI members in the SADISOPSG as of the year 2002 will be Côte d'Ivoire, Kenya, Senegal, South Africa and ASECNA.

3.8 The meeting reviewed and updated the SADIS Strategic Assessment Tables as given at **Appendix C** to this report.

Agenda Item 4: AFI Meteorological Bulletins Exchange (AMBEX) Scheme

4.1 The meeting noted that following the approval by ICAO Council and by delegated authority, the Air Navigation Commission (ANC), of conclusion 13/66 formulated by the APIRG/13 meeting held in Sal, Cape Verde, June 2001, the Secretariat has revised the AMBEX Handbook and introduced METAR exchanges as well as general improvement of the content of the handbook. The meeting agreed to the changes introduced and the following Decision was formulated:

Decision 6/5: Introduction of METARs in AMBEX exchanges

That States be invited to implement METAR exchanges as contained in the AMBEX Handbook 6th Edition.

4.2 The meeting discussed the requirements for trend type forecasts and aerodromes forecasts (TAFs) of Port-Gentil, Gabon. It was noted that the aerodrome of Port-Gentil caters for international flights to more than 10 other aerodromes in Central and Western Africa. It was also noted that the MET Centre at Libreville prepares the TAFs of Port-Gentil for dissemination to MET centres requiring them. Trend type forecasts are being issued at Port-Gentil by qualified MET personnel. In these circumstances, the meeting decided that Port-Gentil MET centre fulfils the requirements to be included in the AMBEX exchanges and in FASID MET Table 1A for Trend type forecasts requirements. The following decision was formulated:

Decision 6/6: Inclusion of Port-Gentil in AMBEX exchanges and FASID Table MET 1A for Trend type forecasts

That the aerodrome of Port-Gentil be included in AMBEX exchanges and in AFI FASID Table MET 1A as it fulfils the requirements.

Agenda Item 5: Provision of tropical cyclones and volcanic ash advisories for the AFI Region

5.1 The meeting discussed the issuance of tropical cyclone and volcanic ash advisories including related SIGMETs in the AFI Region. It recognized that volcanic ash and tropical cyclones continue to be a threat to aircraft operations.

5.2 The meeting was concerned that operational procedures for the dissemination of information on volcanic eruptions and associated volcanic ash clouds in areas which could affect routes used by international flights were not always fully complied with by States operating ACCs and MWOs. It was agreed that States should comply with procedures in Doc.9766 - *Handbook on the International Airways Volcano Watch (IAVW) Operational Procedures and Contact List*.

5.3 The meeting agreed that Tropical Cyclone Advisory Centre (TCAC), La Reunion and Volcanic Ash Advisory Centre (VAAC), Toulouse continue to provide the advisories in accordance with their responsibilities. TCAC, La Reunion would update their software for tropical advisories to take into account changes introduced by Amendment No.72 to Annex 3 applicable 1 November 2001.

5.4 States operating MWOs were urged to ensure that SIGMETs for tropical cyclones and volcanic ash are issued in accordance with SARPs in Chapter 7 of Annex 3.

5.5 The meeting agreed that States should endeavour to have personnel continually trained on the requirements of Annex 3 SARPs and associated procedures and ensure that communications facilities are operational most of the time.

5.6 The meeting formulated the following conclusion

Conclusion 6/7:

That;

a) States operating MWOs ensure that SIGMETs for tropical cyclones and volcanic ash are issued in accordance with Chapter 7 of Annex 3 and comply with procedures in ICAO Doc.9766 - *Handbook on the International Airways Volcano Watch (IAVW) Operational Procedures and Contact List*;

b) personnel manning MWOs, TCACs and VAACs are constantly provided with training to ensure compliance with the SARPs.

Agenda Item 6: Deficiencies in the MET field

6.1 The meeting reviewed and updated the list of deficiencies based on the uniform methodology approved by Council for identification, assessing, tracking and reporting of deficiencies of air navigation systems. The review also took into account the new approved definition of deficiency by Council and remedial action from States concerned and inclusion of additional deficiencies identified since APIRG/13 meeting. The updated list of deficiencies in the meteorology field is at **Appendix D**.

6.2 The meeting was informed that ICAO is in the process of creating an Air Navigation Safety Board to deal among other matters with deficiencies in the air navigation systems.

Agenda Item 7: New challenges facing AFI Meteorological services

7.1 The meeting discussed the major challenges facing the majority of the AFI meteorological services in particular autonomous management, cost recovery and introduction of quality assurance.

7.2 The meeting noted that efforts were being made to overcome the difficulties and so face the challenges. In fact the meeting was aware that the First Meeting of Directors General of Civil Aviation (DGCA/1) Western and Central Africa held in Abuja, Nigeria from 19 to 21 March 2002 had pointed out these difficulties and proposed appropriate solutions for AFI meteorological services. These solutions are related to cost recovery and the establishment of autonomous entities for the management of meteorological services. Along the lines of the DGCA/1 meeting recommendations, the sub-group formulated the following conclusions:

Conclusion 6/8: Cost recovery of aeronautical meteorological services

That: States in establishing a cost recovery system for aeronautical meteorological services should use relevant ICAO and WMO documents and cooperate with airports, air navigation services and other aeronautical partners, including users.

Conclusion 6/9: Autonomous entities and meteorological service for air navigation

That : when considering the establishment of autonomous entities to manage their air navigation services, States should take due account of the provision of meteorological service to air navigation.

7.3 The meeting emphasized on the need for aviation meteorology personnel in quality and quantity for efficient management of AFI aeronautical meteorological services in consideration of quality management. It was recognized that aeronautical meteorological services should stress on quality assurance. The following conclusion was formulated:

Conclusion 6/10: Quality Management

That States should give priority to implementation of a quality management system (ISO 9000 series of standards) in order to improve meteorological service for international air navigation.

7.4 South Africa made a presentation on restructuring, marketing and cost recovery of meteorological services. The meeting was also presented with a case study on management and cost recovery of meteorological services in Nigeria.

Meteorology chapter of the AFI Regional Plan for CNS/ATM systems

7.5 The meeting was aware that the CNS/ATM Implementation Plan for the AFI Region (Doc.003) has been prepared, however, the chapter relating to meteorology is still yet to be developed. It was agreed that action is required to develop the appropriate meteorological inputs for inclusion into the plan. An initial draft Meteorology Chapter for the AFI CNS/ATM systems was presented to the meeting. It was agreed that in view of the multidisciplinary nature of the CNS/ATM systems, to form a Task Force composed of appropriate experts from States and international organizations to further develop the meteorology component. The terms of reference and composition of the Task Force and the initial draft meteorology chapter for AFI CNS/ATM Implementation Plan are at **Appendix E**.

7.6 The meeting formulated the following conclusion:

Conclusion 6/11: Meteorology Chapter for the AFI CNS/ATM Implementation Plan

That :

a Task Force composed of experts in ATM, CNS and MET from Kenya, Nigeria, Senegal, South Africa, UK, ASECNA and IATA be established to develop the meteorology component of the AFI CNS/ATM Implementation Plan along the lines given at Appendix E.

Agenda Item 8: Terms of reference, Work programme and composition of the MET/SG

8.1 The meeting considered the terms of Reference, the Work Programme and composition of the MET/SG as given at **Appendix F.**

Agenda Item 9 Any Other Business

9.1 The meeting agreed and urged Members that for the Sub-Group to continue producing quality work, it was of paramount importance that Members prepare and present working papers on the relevant agenda items of its meetings. It was also agreed that in future working papers be distributed in advance by e-mail or be posted in the Regional Offices Web sites to facilitate advance study and reference. Web Site of ICAO WACAF Office: http://www.icao.int/WACAF
ESAF Office: http://www.icao.int/ESAF

STATE/ETAT	NAME/NOM	DESIGNATION/FONCTION	ADDRESS/ADRESSE
CACAS - Civil Aviation Caretaker Authority Somalia	Mr. Augustine Warratho	Chief, Aeronautical Meteorology	CACAS P. O. Box 46294 Nairobi Tel : +254 2 622785/6/9 Fax : + 254 2 522340 E-mail : icaosom@africaonline.co.ke
CAMEROUN	M. Louis-Marie Temfak	Chef Service Exploitation Météo	ASECNA BP 4063 Douala Cameroun Tel: +237 342 8850/4848 Fax: +237 342 7117
CONGO	Mme. Claudine Kaya	Chef Service Exploitation Météo	ASECNA BP 218 Brazzaville Congo or BP 1500 Brazzaville Congo Tel: 242 82 00 51 Fax: 82 00 50 E-mail: gomat_cg@yahoo.fr
	Mme. Janine Evelyne Biyot	Chef de Division Telecommunication	Agence Nationale de l'Aviation civile BP 128 Congo Brazzaville Tel : +242 810227 Fax : +242 812090 E-mail: dirmet@nsl.congonet.cg

STATE/ETAT	NAME/NOM	DESIGNATION/FONCTION	ADDRESS/ADRESSE
CÔTE D'IVOIRE	M. Jérôme D. Ago	Chef de Service Expl. Météo	ASECNA 15 BP 918 Abidjan 15 Tel: +225 21277474 Fax: +255 21277171 E-mail:
FRANCE	M. Philipe Husson	VAAC Operations leader	Météo France DP 42 Avenue G. Coriolis 31057 Toulouse Cedex 01 France Tel : +33 5 61078230 Fax : E-mail : philippe.husson@meteo.fr
GABON	M. Moise Betole Ada	Chief, MET Office	MET Office of Libreville BP 2252 ASECNA Gabon Libreville Tel : +241 732825/316194 Fax : +241 73 3095 E-mail : semt@st.asecna.gab
GAMBIA	Mr. Seedy Jobe	Aeronautical Meteorologist	The Gambia Civil Aviation Authority P. O. Box 285 Banjul Int'l Airport The Gambia Tel: +220 473000 Fax: +220 472190 E-mail:

STATE/ETAT	NAME/NOM	DESIGNATION/FONCTION	ADDRESS/ADRESSE
GHANA	Mr. Amos T. Narh	Meteorologist	Ghana Meteorological Services P. O. Box 87 Legon, Accra or MET Office Box KA 9471 Airport, Accra Ghana Tel: 776464 Fax: 777172 E-mail:amos_narh@yahoo.co.uk meteokia@africaonline.com.gh/302600
KENYA	Mr. William Nyakwada	Assistant Director	Meteorological Department P. O. Box 30259 Nairobi, Kenya Tel: +254 2 567880/9 Fax: +254 2 576955 E-mail: nyakwada@lion.meteo.go.ke
	Mr. Johnson N. Ndwiga	Senior Meteorologist	JKIA MET Office P. O. Box 19021 Nairobi Kenya Tel : +254 2 822245/822003 Fax : +254 2 822003 E-mail: namu@meteo.go.ke
	Mr. James Muhoro	Senior Meteorologist	MET Office Moi Int'l Airport P. O. Box 98512 Mombasa Kenya Tel : +254 11 433789 Fax : E-mail: msa @lion.meteo.go.ke

STATE/ETAT	NAME/NOM	DESIGNATION/FONCTION	ADDRESS/ADRESSE
KENYA (cont')	Mr. Sospeter Muiruri	Senior Meteorologist	Meteorologist Department P. O. Box 30259 Nairobi Tel : +254 2 578340 Fax : +254 2 578343 E-mail : muiruri@lion.meteo.go.ke
	Mr. David Kyulu	Meteorologist I Aeronautical Section	Meteorology Department P. O. Box 30259 Nairobi Kenya Tel : +254 2 567880 Ext 2049 Fax : E-mail : mweumutua@yahoo.com
	Mr. Peter M. Macharia	Meteorologist I Aeronautical	Meteorological Department P. O. Box 34834 Nairobi Kenya Tel : +254 2 567880/92 E-mail : peter.macharia@lion.meteo.go.ke
NIGER	M. Harouna Kimba	Chef Service Météo (Suppléant)	ASECNA BP 1096 NIAMEY Tel : +227 73 2514/18/19 Fax: E-mail:
NIGERIA	Mr. Thaddeus Obidike	Deputy Director	Department of Meteorology Federal Ministry of Aviation PMB 12542, Lagos Nigeria Tel: +234 1 2633371 Fax: +234 1 2636097 E-mail: obidike@meteo-ng.com

STATE/ETAT	NAME/NOM	DESIGNATION/FONCTION	ADDRESS/ADRESSE
SENEGAL	M. Mamadou Watt	Chef Servie Météo	ASECNA Bp 8338 Aéroport L.S. Senghor Dakar-Yoff Senegal Tel: +221 8200272/8692358 Fax: +221 8200272 E-mail: wattmam@asecna.org
SOUTH AFRICA	Mr. Mike Edwards	Managing Director	Aviation Weather Centre Johannesburg Int'l Airport Private Bag 1194 1627 South Africa Tel: +27 11 390 3756 Fax: +27 11 970 3419 E-mail: Edwards@weather sa.co.za
	Mr. Rezien Benefezdt	Chief Information Officer	South Africa Weather Service Private Bag X097 Pretoria South Africa Tel: +27 12 309 3093 Fax: +27 11 9703419 E-mail: rezien@weathersa.co.za
UNITED KINGDOM	Mr. Neil Halsey	International Aviation Manager	The MET Office Sutton House, London Road Bracknell United Kingdom Tel: +44 1344 856268 Fax: +44 1344 854156 E-mail: neil.halsey @metoffice.com

STATE/ETAT	NAME/NOM	DESIGNATION/FONCTION	ADDRESS/ADRESSE
INTERNATIONAL ORGANIZATIONS			
ASECNA	M. Antoine Miampika	Chef du Département Météo p.i.	ASECNA BP 3144 Dakar République du Sénégal Tel : 8207537 Fax : 8207494/8207495 E-mail : miampikaamt@asecna.org
	M. Louis Finke-Fictime	Chef Service Exploitation	ASECNA 75 rue de a Boetie 75008 Paris France Tel : +331 44 950714 Fax : +331 42257311 E-mail : finkelou@asecna.fr
IATA	Mr. Meissa Ndiaye	Assistant Director	IATA P. O. Box 47979 Nairobi Tel : +254 2 710100 Fax : +254 2 723978 E-mail : ndiayeM@iata.org

TABLE MET 7/TABLEAU MET 7
IMPLEMENTATION OF THE SADIS IN THE AFI REGION/
MISE EN OEUVRE DU SADIS DANS LA RÉGON AFI

SATELLITE DISTRIBUTION SYSTEM/SYSTÈME DE DISTRIBUTION PAR SATELLITE				
State/Etat	**WAFS User/ Usager WAFS**	**Location of VSAT/ Emplacement du VSAT**	**Access Approved/ Accès Approuvé**	**Equipment operational/ Equipement Opérationnel**
1	2	3	4	5
Benin	ASECNA	Cotonou/Aéroport Cajehoun	X	1W
Botswana	NMS	Gaborone/S.S. Khama Airport	X	1W
Burkina Faso	ASECNA	Ouagadougou/Aéroport	X	1W
Burundi	NMS		X	
Cameroon	ASECNA	Douala/Airport	X	1W
Central African Republic			X	
Chad	ASECNA	Ndjamena/Aéroport	X	1W
Congo	ASECNA	Brazzaville/Maya Maya Aéroport	X	1W
Congo (RD)	NMS	Kinshasa/Aeroport N'Jili	X	1W
Côte d'Ivoire	ASECNA	Abidjan/F.H. Boigny Aéroport	X	1W
Equatorial Guinea	ASECNA	Malabo/Aéroport	X	1W
Eritrea	NMS		X	
Ethiopia	NMS	Addis Ababa/Bole Intl.	X	1W
Ethiopia	Ethiopian Airlines	Addis Ababa	X	1W
Gabon	ASECNA	Libreville/Aéroport MBa	X	1W
Gambia	NMS	Banjul/Yundum Intl.	X	1W
Ghana	NMS		X	1W
Guinea	NMS	Conakry/Aéroport Gbessia	X	1W
Kenya	NMS NMS	Nairobi/Jomo Kenyatta Intl. Mombasa/Moi Intl.	X	1W
Madagascar	ASECNA	Antananarivo/Aéroport IVATO	X	1W

SATELLITE DISTRIBUTION SYSTEM/SYSTÈME DE DISTRIBUTION PAR SATELLITE				
State/Etat	**WAFS User/ Usager WAFS**	**Location of VSAT/ Emplacement du VSAT**	**Access Approved/ Accès Approuvé**	**Equipment operational/ Equipement Opérationnel**
1	2	3	4	5
Malawi	NMS		X	
Mali	ASECNA		X	
Mauritania	ASECNA		X	
Mauritius	NMS	Mauritius/Sirs. Rangoolam Intl.	X	1W
Namibia	NMS	Windhoek/Airport	X	1W
Niger	ASECNA	Niamey/Aéroport Diori Hamani	X	1W
Niger	EAMAC	Niamey EAMAC	X	IW
Nigeria	NMS NMS	Lagos Oshodi Abuja N.A. Airport	X X	 1W 1W
Senegal	ASECNA ASECNA	Dakar -/Aéroport L.S. Senghor Dakar -/Aéroport L.S. Senghor	X X	1W 2W
Seychelles	NMS	Mahé/Seychelles Intl.	X	1W
Sierra Leone	NMS		X	
Somalia	NMS		X	
South Africa	NMS NMS	Pretoria/NMS Pretoria/NMS	X X	2W 1W
Swaziland	NMS	Mbabane/NMS HQ	X	1W
Tanzania	NMS	Dar-Es-Salaam	X	1W
Togo	ASECNA	Lome/Tokoin	X	1W
Uganda	NMS	Entebbe/Intl.	X	1W
Zambia	NMS	Lusaka/Intl.	X	1W

NMS - National MET Services/ Service Météorologique National

SADIS STRATEGIC ASSESSMENT TABLES

ICAO REGION: AFI **TABLE 1**

MAIN ROUTING(S): AFTN (E.G CAPSIN AND AFTN/GTS/SADIS TWO-WAY)

	2002	Projected 2003	Projected 2004	Projected 2005	Projected 2006
ALPHANUMERIC OPMET DATA					
Number of **FC bulletins** issued per day	89	100	100	100	100
Average number of stations per FC bulletin	8	8	8	8	8
Number of **FT bulletins** issued per day	227	500	500	500	500
Average number of stations per FT bulletin	6	6	6	6	6
Number of **SA bulletins** issued per day	1021	500	600	650	700
Average number of stations per SA bulletin	15	15	15	15	15
Number of **SP bulletins** issued per day	13	0	0	0	0
Number of **SIGMET bulletins** issued per day	16	25	30	35	35
(WS<WV and WC) for relevant FIRS					
OTHER OPMET DATA					
Number of other bulletins issued per day					
(please specify header(s))					
Average number of stations per bulletin					
TOTALS					
Total number of OPMET bulletins per day	**1366**	**1125**	**1230**	**1285**	**1335**
Average size of OPMET bulletin (bytes)	**313**	**500**	**500**	**500**	**500**
TOTAL ESTIMATED OPMET DATA VOLUME PER DAY (BYTES)	**427K**	**563K**	**615K**	**642K**	**667K**

CURRENT AND PROJECTED T4 FACSIMILE CHART VOLUMES 2002-2006

ICAO REGION: AFI

TABLE 2

MAIN ROUTING(S): GTS

(E.G CAPSIN AND AFTN/GTS/SADIS TWO-WAY)

T4 FACSIMILE CHART INVENTORY	2002	Projected 2003	Projected 2004	Projected 2005	Projected 2006
Head number/Chart name					
Time of issue of chart (UTC)	0400,1000,1600, 2200	SEE BUFR TABLE	SEE BUFR TABLE	SEE BUFR TABLE	SEE BUFR TABLE
Average size of chart (bytes)	100	0	0	0	0
Chart type (e.g. wind/temp/SIGWX)	SIGWX	SEE BUFR	SEE BUFR	SEE BUFR	SEE BUFR
Chart level (FL range or medium/high level)	SWL/SWM	0	0	0	0
Validity time of chart VT (UTC)	1200,1800,0000, 0600	0	0	0	0
High number/Chart name					
Time of issue of chart (UTC)		SEE BUFR	SEE BUFR	SEE BUFR	SEE BUFR
Average size of chart (bytes)					
Chart ape (e.g. wind/temp/SIGWX)		SEE BUFR	SEE BUFR	SEE BUFR	SEE BUFR
Chart level (FL range or medium/high level)					
Validity time of chart VT (UTC)		SEE BUFR	SEE BUFR	SEE BUFR	SEE BUFR
TOTALS					
Total number of T4 charts issued per day	**4**	**SEE BUFR**	**SEE BUFR**	**SEE BUFR**	**SEE BUFR**
Average size of each chart (bytes)	**90K**				
TOTAL ESTIMATED T4 CHART DATA VOLUME PER DAY (BYTES)	**360K**	**SEE BUFR**	**SEE BUFR**	**SEE BUFR**	**SEE BUFR**

(Levels: medium FL 1000-250, high>FL250)
(*1 octet = 8 byte = 1 character)

CURRENT AND PROJECTED BUFR DATA VOLUMES 2002 - 2006

ICAO REGION: AFI TABLE 3

MAIN ROUTING(S): TWO-WAY/GTS

(E.G CAPSIN AND AFTN/GTS/SADIS TWO-WAY)

BUFR SIGWX MESSAGES	2002	Projected 2003	Projected 2004	Projected 2005	Projected 2006
WMO Header	**DAKAR**				
Time(s) of issue of data (UTC)	0	0700,1300,1900, 0100	0700,1300,1900, 0100	0700,1300,1900, 0100	0700,1300,1900, 0100
Average size of message (bytes)		15K	15K	15K	15K
Data level (e.g. FL range or low/medium/high level)		SWL/SWM*	SWL/SWM*	SWL/SWM*	SWL/SWM*
Validity time(s) of data VT (UTC)		1200,1800,0000, 0600	1200,1800,0000, 0600	1200,1800,0000, 0600	1200,1800,0000, 0600
WMO Header	**NAIROBI**				
Time(s) of issue of data (UTC)		0700,1300,1900, 0100	0700,1300,1900, 0100	0700,1300,1900, 0100	0700,1300,1900, 0100
Average size of message (bytes)		15K	15K	15K	15K
Data level (e.g. FL range or low/medium/high level)		SWL/SWM*	SWL/SWM*	SWL/SWM*	SWL/SWM*
Validity time(s) of data VT (UTC)		1200,1800,0000, 0600	1200,1800,0000, 0600	1200,1800,0000, 0600	1200,1800,0000, 0600
WMO Header	**PRETORIA**				
Time(s) of issue of data (UTC)		0700,1300,1900, 0100	0700,1300,1900, 0100	0700,1300,1900, 0100	0700,1300,1900, 0100
Average size of message (bytes)		15K	15K	15K	15K
Data level (e.g. FL range or low/medium/high level)		SWL/SWM*	SWL/SWM*	SWL/SWM*	SWL/SWM*
Validity time(s) of data VT (UTC)		1200,1800,0000, 0600	1200,1800,0000, 0600	1200,1800,0000, 0600	1200,1800,0000, 0600
TOTALS					
Total number of BUFR messages per day	**0**	**12**	**12**	**12**	**12**
Average size of messages (bytes*)	**0**	**15K**	**15K**	**15K**	**15K**
TOTAL ESTIMATED VOLUME OF BUFR MESSAGES PER DAY (BYTES)		**180K**	**180K**	**180K**	**180K**

(*1 octet = 8 byte = 1 character) (low level <FL 100, medium level: FL100 – 250, high level. FL 250) Note: It is assumed that only 3sites will have the capacity to send buffer codes information to WAFC London.

CURRENT AND PROJECTED AIS DATA VOLUMES 2002 – 2006

ICAO REGION: AFI **TABLE 4**

MAIN ROUTING(S): AFTN, Two-Way (E.G CAPSIN AND AFTN/GTS/SADIS TWO-WAY)

AIS (Subject to statement of an operational requirement)	**2002**	**Projected 2003**	**Projected 2004**	**Projected 2005**	**Projected 2006**
ALPHANUMERIC AIS DATA (e.g. NOTAMs)					
Bulletin type:	No Requirement	NOTAMS	NOTAMS	NOTAMS	NOTAMS
Number of bulletins issued per day		100	300	300	300
Average size of each bulletin (byte*)		400	400	400	400
Bulletin type:					
Number of bulletins issued per day					
Average size of each bulletin (byte*)					
CHART AIS DATA (e.g. AIP CHARTS)					
Header number/Chart type (e.g. AIP)	No Requirement	AIP	AIP	AIP	AIP
Time(S) of issue of chart (UTC)		2	4	4	4
Average size of chart (bytes*)		100K	100K	100K	100K
Validity time of chart VT(UTC)					
Header number/Chart type (e.g. AIP)					
Time(S) of issue of chart (UTC)					
Average size of chart (bytes*)					
Validity time of chart VT(UTC)					
TOTALS	No Requirement				
Total number of AIS bulletins per day					
Average size of AIS bulletin (bytes)					
Total number of AIS charts issued per day					
Average size of AIS chart (bytes)					
TOTAL ESTIMATED VOLUME OF AIS DATA PER DAY (bytes)	**No Requirement**	**240K**	**520K**	**520K**	**520K**

(*1 octet = 8 byte = 1 character) Note: This information releases only to Volvanic Ash no NOTAMs and ASHTAMs

Deficiencies in the Meteorology Field

Identification		Deficiencies			Corrective action			
Requirements	Facilities or services	Description	Date first reported	Comments	Description	Executing body	Target date for imple-mentation	Priority for action
1	2	3	4	5	6	7	8	9
Implementation of MET facilities and services - AFI/7 Rec. 14/10	Angola/Luanda 4 de Fevereiro	Exchange of OPMET deficient - Problems of institutional aspect	1996	Advice given through correspondence and mission	Reorganize MET Services for autonomous management	Angola	-	U
Implementation of aero-autical MET offices - AFI/7 Rec. 14/11	Burundi/ Bujumbura	Inadequate staffing	1990	Advice given through correspondence and mission	Training of Forecasters	Burundi	-	B
Implementation of MET facilities and services - AFI/7 Rec. 14/10	Democratic Rep. of Congo/ Kinshasa Njili	Irregular OPMET data	1992	Advice through correspondence	Installation of reliable telecom. link	D. Rep. of Congo		B
Implementation of aero-autical MET offices - AFI/7 Rec. 14/11	Equatorial Guinea/Malabo	Inadequate staffing	1995	Advice given through correspondence and mission	Training of MET personnel	Equatorial Guinea	-	B
Implementation of MET facilities and services - AFI/7 Rec. 14/10	The Gambia/ Banjul - Yundum Intl.	Wind measurement unreliable	1994	Advice given through correspondence	Installation of reliable wind equipment	The Gambia	-	A

Identification		Deficiencies			Corrective action			
Requirements	Facilities or services	Description	Date first reported	Comments	Description	Executing body	Target date for imple-mentation	Priority for action
1	2	3	4	5	6	7	8	9
Implementation of MET facilities and services - AFI/7 Rec. 14/10	Guinea Bissau/ Bissau Osvaldo V.	Trend type landing fore-casts not issued	1995	Advice given through correspondence	Forecast unit to issue Trend type landing forecasts	Guinea Bissau	-	B
Implementation of MET facilities and services AFI/7 Rec.14/10	Lesotho/ Maseru Moshoeshoe 1	1) Siting of the observatory in an unsuitable location	1993	Advice given through missions	Identify a suitable location	Lesotho	-	U
		2) Anemometer on RWY 04 has been unserviceable for many months	1997	Advice given through missions	Instal a new sensor with displays at appropriate ATC and MET positions	Lesotho	-	U
Implementation of MET facilities and services - Implementation of aeronautical MET offices AFI/7 Rec. 14/10 and 14/11	Liberia/ Roberts Intl.	1) Assistance to operators and crew members deficient	2000	Advice given to authorities	Adequate equipment	Liberia		U
		2) inadequate staffing	2000	Advice given to authorities	Training of forecasters	Liberia		U

Identification		Deficiencies			Corrective action			
Requirements	Facilities or services	Description	Date first reported	Comments	Description	Executing body	Target date for imple-mentation	Priority for action
1	2	3	4	5	6	7	8	9
Implementation of MET facilities and services - AFI/7 Rec. 14/10	Malawi/ Lilongwe Intl.	Irregular OPMET data	1992	Advice through correspondence	Installation of reliable telecom. link	Malawi	-	B
Implementation of MET facilities and services - AFI/7 Rec. 14/10	Nigeria Kano MA	Provision of MET data to ATS deficient	1996	Advice given through correspondence and mission	Better display system of MET data to ATS units	Nigeria	2001	B
Implementation of aeronautical MET offices AFI/7 Rec.14/11	Rwanda/Kigali G.K.	Inadequate staffing	1994	TC Project RWA/87/006	Further training is needed	UN - Rwanda		B
Implementation of MET facilities and services. Implementation of aeronautical MET offices AFI/7 Rec. 14/10 AFI/7 Rec.14/11	Sao Tomé & Principe/ Sao Tomé	Irregular OPMET data inadequate staffing	1991	Advice given through correspondence	Installation of reliable telecom. link. Training of MET personnel	Sao Tome & Principe		B
Implementation of MET facilities and services - AFI/7 Rec. 14/10	Sierra Leone/ Lungi Airport	Data from basic MET equipment unreliable	1994	Advice given through correspondence	Installation of reliable MET basic equipment	Sierra Leone	-	B

Identification		Deficiencies			Corrective action			
Requirements	Facilities or services	Description	Date first reported	Comments	Description	Executing body	Target date for implementation	Priority for action
1	2	3	4	5	6	7	8	9
Implementation of MET facilities and services AFI/7 Rec.14/10	Swaziland/ Manzini Matsapha Airport	wind sensor height about 30 meters above aerodrome elevation	1993	Advice given through missions	Lower the height of the wind sensor to recommended WMO/ICAO standards	Swaziland	-	A

Meteorology Task Force for CNS/ATM Plan

Terms of Reference

a) Evaluate the current status of implementation, capabilities and developments of the meteorological systems in the AFI Region.

b) Evaluate the future operational needs and emerging capabilities of meteorological systems in the AFI Region and develop proposals for changes necessary to meet those needs.

c) Develop a regional plan for implementation of meteorological services and facilities for the new CNS/ATM systems including associated target dates and the responsible bodies.

d) Report to the MET Sub-Group for further coordination through the ICAO Secretariat and other relevant bodies.

Composition:

Kenya, Nigeria, Senegal, South Africa, U.K., ASECNA and IATA.

AFI CNS/ATM IMPLEMENTATION PLAN

METEOROLOGY

General

1. Meteorological Support to International Civil Aviation

1.1 Traditionally, the provision of meteorological information to support international civil aviation was based primarily at the national level and organized hierarchically, with a specific meteorological office designated to be associated with each flight information centre (FIC)/area control centre (ACC), approach control unit and air traffic control tower. The meteorological information provided was related to a flight information region (FIR) and particular aerodromes required as destinations and alternates in that FIR and in immediately adjacent FIRs. Communication of this information beyond the FIRs concerned was tightly controlled so as not to overload the AFTN unnecessarily. The meteorological information was provided to pilots before departure via face-to-face briefing and flight documents, and during the en-route phase, via voice communication broadcasts such as ATIS and HF/VHF VOLMET.

1.2 The fundamental changes in international civil aviation in the 1980s, such as
deregulation, increased air traffic and longer direct flights, and the increased associated costs of the provision of facilities and services, prompted the creation of CNS/ATM systems. The growth in air traffic requires the provision of meteorological services to be coordinated globally and modernized taking advantage of emerging technologies. Notable developments since then have been, first, the introduction of WAFS, which centralized the production and dissemination of upper wind and temperature forecasts and significant weather forecasts, and second, the enhancement of weather information provided to pilots and the more open exchange of OPMET messages.

2. Meteorological Systems to Support Global CNS/ATM

2.1 In recent years, advances in telecommunication and computer technology are making possible the provision of enhanced or additional meteorological data and products which are either critical to or are providing cost benefits to pre-flight planning, en-route or terminal operations. For example, medium level SIGWX forecasts and en-route diversion aerodrome reports and forecasts are provided to support ETOPS flights and centralized operational control. Also, the direct provision of en-route wind/temperature and SIGMET to ATC computers is producing beneficial effects on dynamic aircraft routing over the Pacific. In support to the global CNS/ATM, the past few years have witnessed substantial progress in a number of meteorological systems. Some highlights are: -

a) Final phase of WAFS - The rapid developments in computer and satellite technology and weather forecasting techniques have rendered it possible to migrate to the final phase of the WAFS much earlier than previously anticipated. The two WAFCs are distributing via satellite broadcast forecast winds, temperatures and humidity in GRIB format and global SIGWX forecast in BUFR format from 2002.

b) Exchange of OPMET messages - Provisions for D-VOLMET (i.e. D-METAR, D-TAF and D-SIGMET) in the form of templates and for the issuance of graphical SIGMET for volcanic ash cloud and tropical cyclones in graphical format in BUFR code have been incorporated in Amendment 72 to Annex 3. Also, weather databases will be an integral component of the future global ATN. The AMHS being developed under ATN will take over OPMET data exchange function from AFTN.

c) Uplink of meteorological information to the cockpit - Both national and commercial systems exist or are being developed to provide aircraft in flight with access to OPMET information. Systems delivering graphical information including weather radar and satellite cloud pictures to the cockpit are emerging.

Transition Guidelines

3. Meteorological Systems to support Transition to the new CNS/ATM Systems

3.1 The developments in meteorological systems must meet aeronautical requirements to improve safety and/or provide an identifiable cost benefit to users. The systems must converge, as far as possible, towards a seamless and transparent global system for the provision of meteorological service to international civil aviation. Processes should be automated as far as possible to enable virtual "instant" or real-time access to global meteorological information. With this in mind, the meteorologists' input will be increasingly transferred to the beginning of the processes, even to the extent of transferring knowledge and experience through artificial intelligence to dedicated expert systems.

3.2 The Global Air Navigation Plan for CNS/ATM Systems identifies the following development areas of the meteorological systems that are needed to support a global ATM system.

a) ***Final phase of WAF***S: rapid progress to the final phase of the WAFS with two WAFCs producing automated global upper winds/temperatures and SIGWX forecasts which may be input directly into ATC and airline computers;

b) ***Exchange of OPMET messages***: continued extension of the three ICAO direct satellite broadcasts to exchange global OPMET messages and, as necessary, other non-MET aeronautical information; the migration of ground-ground OPMET data exchange over AFTN to ATN AMHS;

c) ***Uplink of meteorological information***: automatic uplink of aerodrome weather observations to aircraft on approach or departure, including D-ATIS, data link runway meteorological information and METAR/TAF/SIGMET data link to replace HF and VHF VOLMET; and dedicated systems to detect hazardous weather, such as automated TDWR;

d) ***Downlink of meteorological data***: automatic downlink of meteorological information derived from aircraft sensors (wind, temperature, turbulence and humidity) to ATC computers to provide background upper wind fields and real-time descent wind profiles to assist in the automatic sequencing of aircraft on approach to maximize runway capacity; and relay of this information to the two WAFCs for assimilation in global numerical weather prediction models thereby improving the overall quality of subsequent global forecasts;

e) ***ATN weather database***: availability at ATC centres and airline centralized operational control of background upper wind fields for display, both in the form of WAFS global upper wind forecasts and "real-time" wind fields derived from the wind information reported automatically from aircraft in ADS messages; and reports and forecasts of hazardous weather, particularly volcanic ash, thunderstorms, clear-air turbulence and icing, to assist in tactical decision-making for aircraft surveillance, air traffic flow management, and updating flight plans for flexible/dynamic aircraft routing;

f) ***Wake vortex***: use of meteorological sensors including Doppler radar, possibly providing input to expert systems, which will provide automated runway wake vortex reports and forecasts to assist in optimizing aircraft separation, thereby maximizing runway capacity;

g) ***Volcanic ash***: reduction in time delay for volcanic ash reports and advisories and associated SIGMETs to reach area control centres and aircraft in-flight from volcano observatories, volcanic ash advisory centres (VAACs) and meteorological watch offices by employing more direct routing; and

h) ***Pre-flight briefin***g: harmonization of AIS, MET and flight plan (FPL) information to support combined automated AIS/MET/FPL pre-flight and in-flight briefing facilities.

3.3 The implementation of these elements and development of new systems to form a seamless global system will proceed step by step as aeronautical requirements for the service are stated and reflected, as appropriate, in the relevant ICAO SARPs. This is critical in order to indicate clearly that the service is required by international civil aviation to contribute to the maintenance or improvement in air safety and/or provide a demonstrated cost benefit to users associated with global ATM. Once the requirements are firmly established, standardization of the relevant meteorological facilities and services will facilitate the planning of a seamless and transparent meteorological system to support the global ATM system.

3.4 In planning for the implementation of meteorological systems, account has to be taken of the existing national, regional and global meteorological and telecommunications infrastructures and a determination made as to which parts will be able to support the global ATM system and which will need to be upgraded or replaced.

3.5 The routing structure of meteorological information needs to be identified early in the planning process. In general, it would seem that increasing emphasis will be placed in the future on "routine" meteorological information being accessible by the pilot automatically on demand, with directed or broadcast transmissions being restricted mainly to safety-related information. But having information accessible to the pilot may be achieved in practice either by having it uplinked and stored in the aircraft computers or stored on the ground in OPMET data bases and/or servers which may be interrogated by the pilot. The optimum balance between meteorological information broadcast or directed from the ground to aircraft - "push", and meteorological information obtained by pilots interrogating OPMET data bases - pull", must emerge from the development of the operational requirements, which will then be reflected in the pattern of global OPMET exchange requirements.

4. AFI Transition Timescale

4.1 The key Global and AFI Region events in the transition to the new meteorological systems are shown in Table 1. The timescales for the occurrence of the key events reflect present knowledge and will have to be updated as information becomes available.

4.2 The table is formatted in the same style as the Global Air Navigation Plan for CNS/ATM Systems, Part I, Chapter 8, Appendix A for ease of reference, standardization and amendment action as is required from time to time. It is essentially divided into two sections. The first section of the Table provides details regarding the **Development of SARPs** and **Aircraft Equipag**e. The second section of the Table gives a list of services and facilities to be considered for

Implementation and Operational Use. The implementation time frames of individual items will be incorporated as the plan develops.

Terms of Reference, Work programme and composition of the Meteorology Sub-Group (MET/SG)

1. Terms of Reference

1. To keep under review, the adequacy of meteorological facilities and services to meet new technological developments in the air navigation field and make proposals as appropriate for implementation by States to APIRG.

2. To identify, State by State, those specific deficiencies and shortcomings that constitute major obstacle to the provision of efficient and reliable meteorological facilities and services to meet the requirements of air navigation in the AFI Region and recommend specific measures to eliminate them.

2. Work Programme

No.	Task description	Priority	Target Date
1	Establish and maintain detailed lists, State by State of the specific deficiencies of facilities for the provision of atmospheric measurements pertaining to surface wind, pressure, visibility/runway visual range, cloud base, temperature and dew point temperature considered critical for flight safety	A	Continuing
2	Monitor the exchange of OPMET information through the AMBEX scheme in the AFI Region and between the AFI and ASIA/PACIFIC and EUR Regions	A	Continuing
3	Plan for the introduction of efficient inter-regional OPMET exchanges in coordination with the COM Sub-group as required	B	Continuing
4	Monitor the degree of implementation of very small aperture terminals (VSATs) for the reception of WAFS products (AFI/7 Rec. 14/12)	B	Continuing
5	Review and determine the necessary OPMET exchanges through the two-way VSAT SADIS stations in the AFI Region	A	Continuing
6	Monitor the quality of WAFS high and low level significant weather charts in the AFI Region, provide feed back to WAFC, London as appropriate	B	Continuing
7	Monitor the implementation of regional procedures for the issuance of volcanic ash and tropical cyclone advisories (AFI/7 Rec. 7/3 and 7/4)	A	Continuing

No.	Task description	Priority	Target Date
8	Review on a continuing basis the contents of Tables MET 1A and 1B and Tables MET 2A and MET 2B to ensure their validity in light of operational requirements and develop proposals to update them if necessary.	B	Continuing
9	Review the meteorological procedures in the introductory text to Part VI - Meteorology of the Basic AFI Regional Plan/ FASID, as well as Meteorological related issues in other sections of the Plan and relevant regional supplementary Meteorology procedures (SUPPs) in the Doc 7030, in the light of procedures employed in other regions and develop amendment proposals as appropriate, coordinating where necessary with other APIRG Sub-Groups.	A	Continuing
10	Monitor developments in the CNS/ATM Systems with regard to meteorological requirements in the AFI Region.	B	Continuing
11	Develop guidelines for the use of GRIB and BUFR codes in the AFI Region	A	Continuing
12	Monitor quality assurance/performance relating to the MET field	A	Continuing

Priority:

A High priority tasks on which work should be speeded up;

B Medium priority tasks, on which work should be undertaken as soon as possible, but without detriment to priority A tasks;

C Lesser priority tasks, on which work should be undertaken as time and resources permit, but without detriment to priority and A and B tasks.

3. **Composition**

Algeria, Burkina Faso, Cameroon, Congo, Côte d'Ivoire, Egypt, Eritrea, Ethiopia, France, Gabon, The Gambia, Ghana, Guinea, Kenya, Madagascar, Morocco, Niger, Nigeria, Senegal, South Africa, Spain, Tunisia, United Kingdom, Zambia, ASECNA and IATA.
