

**INTERNATIONAL CIVIL AVIATION ORGANIZATION
NORTH AMERICAN, CENTRAL AMERICAN AND CARIBBEAN OFFICE**

**TWENTY-SIXTH EASTERN CARIBBEAN INFORMAL WORKING GROUP MEETING
(26TH E/CARIWG)**

(Barbados, 3 to 7 June 2002)

Agenda Item 7: MET Developments

7.1 Current status of WAFS and transition to final phase

(Working Paper presented by the Secretariat)

SUMMARY

This working paper presents an overview of the current status of WAFS and information on the direction and timetable provided by the ICAO WAFS Study Group for the transition to the final phase of WAFS.

1 Introduction

1.1 The world area forecast system (WAFS) was created in response to fundamental changes in the operational requirements that arose in the mid to late 1970s due to the growing consolidation and maturity of the jet age, both technically and commercially. The WAFS goals were to provide global integrated, comprehensive meteorological information for flight planning and flight documentation for direct use by meteorological authorities, operators, flight crews, air traffic service units and other users thus it combines meteorology and communications.

1.2 Originally, the initial phase comprised two World Area Forecast Centers (WAFCs) producing standardized, high quality global forecasts of upper winds and temperatures in numerical format. These numerical forecasts were transmitted to fifteen Regional Area Forecast Centers (RAFC) which produced graphical upper wind/temperature charts based on the numerical output, and significant weather (SIGWX) and ensured it was communicated to States within their areas of responsibility.

2. Status of the WAFS

2.1 *Transfer of responsibilities from RAFCs to the WAFCs*

2.1.1 Planning for the transfer of responsibilities from RAFCs to the WAFCs has been conducted by the ICAO Planning and Implementation Regional Groups (PIRGs), in accordance with Council action on relevant recommendation of the ICAO COM/MET/82 Divisional Meeting/Seventh Session of the World Meteorological Organization, Commission for Aeronautical Meteorology (CAeM). The transition plans, and the intent and date for closure of RAFCs were duly noted by the ICAO Council. The responsibilities of the RAFCs have been taken over by the two WAFCs Washington and London. According to ICAO, in keeping with the objective of providing the required meteorological information in a cost-effective manner, the transition of responsibilities from the RAFCs to the WAFCs will be completed in June or July 2002, and any remaining RAFCs will be closed.

2.2 *Vision of final phase*

2.2.1 Recently a Special Meeting of the ICAO WAFS Task Force (2-3 April 2002) was held in Santiago, Chile and took note that in accordance with the ICAO WAFS Study Group vision presented to the Air Navigation Bureau for the final phase of WAFS, each of the two WAFCs will provide, through ICAO approved communication means, global gridded wind and temperature data in GRIB (GRIdded Binary) code format, high level global SIGWX (SWH) forecasts between FL250 and FL630 in a digital product code referred to as BUFR (Binary Universal Form for the Representation of meteorological data) code format, and medium level SIGWX (SWM) forecasts between FL100 and FL250 over limited geographical areas as required in the Regional Air Navigation Plans. In this regard, according to ICAO timetable for the global transition to the final phase of WAFS, States will produce the necessary wind and temperature charts from supplied GRIB data by mid-2003 and SWH charts and SWM charts from the supplied BUFR data set by late 2004. The timetable in the CAR/SAM Regions is provided in **Appendix A**.

2.2.2 The bulk of graphical WAFS products is currently disseminated via T4 fax formatted charts, which are very large in terms of broadcast bandwidth requirements on the satellite. The same information is currently sent via use of the GRIB and BUFR codes on the SADIS (Satellite Distribution System for Aeronautical Information, the third satellite uplink which is provided by the United Kingdom) and GRIB is used for the gridded products on the International Satellite Communication System (ISCS), provided by the United States. The same information can be sent via the latter methods using approximately 10% of the bandwidth. This would represent a significant cost saving, should the bandwidth be reduced, or would allow a significant increase in the number of products disseminated, should that be required in the future. Also, this replacement to the T4 format will allow the forecaster much greater flexibility in forecast production for the end user.

2.2.3 In this regard, each WAFC will produce SIGWX forecast for approximately one half of the globe and the two WAFCs will coordinate and harmonize the boundaries, then combine their forecasts into a single global SWH BUFR file. Each WAFC will produce and share SWM BUFR files for limited areas where required and provide those files to the other WAFC for distribution. Forecasting quality assurance will continue to be in place as it is today. Thus identical BUFR files would be made available to WAFS users globally and the WAFS products, GRIB, BUFR and OPMET, will continue to be transmitted on ICAO satellite broadcasts. Once the final phase is achieved, the WAFCs expect WAFS to be a dynamic and evolving system, including new methods of delivery of the products.

3. STAR –4 replacement computer workstations

3.1 The Special Meeting agreed that to meet the ICAO goals of enhanced air safety, the WAFCs are going to great lengths to harmonize the content and depiction of their graphical products. . Washington and London WAFCs are in the process of changing the product suite and codes as a result of increased traffic on the broadcast. In addition, the WAFCs have taken over the responsibility of the RAFC. The existing STAR 4 workstations cannot reprogramme these new code changes, nor can the existing workstations allow the end user the flexibility to generate specific products to meet customer needs on a demand for basis, thus, must be replaced with newer WAFS workstations. Thus, it is important that each State purchase workstations with depiction software to generate “standard” charts. This would ensure that any chart rendering of a WAFC chart would look like a WAFC chart. To accomplish this, the WAFCs developed stringent chart presentation specifications that have been or are to be supplied to all workstation manufacturers. The WAFCs have also provided all workstations manufacturers with a functional requirement that must be met for WAFS. Likewise, States must ensure their personnel are properly trained to produce the required charts for flights crews from the GRIB and BUFR coded data.

3.2 Once the transition to the final phase of WAFS is completed existing STAR 4 will no longer produce graphics as they cannot process BUFR code and T4 coded charts will no longer be made available.

3.3 The Special Meeting was advised that new WASF computer workstations use software language and communications protocols common to nearly all personal computer and the Internet. WAFC Washington presented a list of six possible vendors for new workstations. Five of these also currently supply workstations for SADIS. The vendors offer a wide variety of meteorological and aeronautical computer workstations that are compatible with WAFS. WAFS workstations capabilities should be matched closely with the capabilities required by meteorological and aeronautical service as the WAFS workstations vary widely in cost, depending on its total capabilities. Appendix B provides a listing of WAFS workstations vendors. WAFC Washington pointed out there are a number of States in CAR/SAM Region receiving money for meteorological service modernization such as Small Island Developing States (SIDS) and other supported by USAID and the World Bank. It would be expected if a State were receiving funding under one of these programmes it would include the WAFS workstations in the project. WAFC Washington also pointed out donor States will make funds available through the WMO Voluntary Cooperation Programme (VCP).

4. Provision of Training in the CAR/SAM Regions in support of the WAFS workstations

4.1 The meeting was informed that most straightforward way to accomplish the task of ensuring that all States have the capability of using the GRIB and BUFR codes is to address the issues through the ICAO Regions. An assessment of need is required in order to determine the level of training that is required in the CAR/SAM Regions. Following the receipt of information regarding the current status across the Regions, the States will fall into two main categories in terms of their training requirements for GRIB and BUFR code usage. Most States fall into the category, whereby they use an “off the shelf” software package from one of the known manufacturers to decode both GRIB and BUFR. The second category, contains a handful of States that have written their own software to carry out this task. The level of training and support for each of the above categories will be quite different.

4.2 For those States that have “off the shelf” software the only remaining task would be to provide simple training to ensure that operational staff is able to make full and proper use of the software that they have. It is possible to accomplish this goal by two means. First, it was suggested that a series of training seminars could be held in the CAR/SAM Regions in support of using the workstations. Another alternative that may be more economical and efficient would be required the workstation manufacturers to provide suitable software training material for this purpose. In most circumstances, the workstations manufacturers have already acknowledged their willingness to provide this level training.

4.3 The initial training need will be for States with STAR4 and other workstations to produce wind/temperature charts from the global GRIB data. ICAO verified that almost all States within CAR/SAM require training. The initial training will be planned to take place from late 2002 through early 2003.

5. New contract for the International Satellite Communications System (ISCS)

5.1 The contract for the existing ISCS expire at the end of September 2003. The meeting was advised that the US National Weather Service and the Federal Aviation Administration (FAA) are currently in the process of selecting a successor to the existing system with o interruption of services to States.

5.2 The new system is planned to improved performance of the existing data communications network by implementing the TCP/IP data communications network protocol. Implementation of TCP/IP provide the following benefits:

- a) increased data capacity during peak loads
- b) remote equipment diagnostics to reduce downtime

5.3 In addition the successor ISCS system will also provide:

- a) leased data communications network facilities utilizing commercial , international satellites and other communications facilities to broadcast a broad range of WAFS, OPMET and RMTN weather products and to collect a limited range of weather products from RMTN sites.
- b) Leased equipment to interface the leased data communication network with the existing Very Small Aperture Terminal (VSAT) and workstations owned by the member States.

6. Summary

6.1 The final phase of the WAFS is envisaged as a system to deliver essential meteorological data to aviation users in an efficient and cost efficient manner. This will be done by eliminating high bandwidth facsimile products and replacing them with workstation generated products generated from GRIB and BUFR data. When BUFR is implemented, a resource savings to the WAFCs will occur by eliminating the WAFS overlap areas on the significant weather forecasts. This goal cannot be achieved without the significant effort by ICAO, all States who are WAFS users, the WAFCs and WMO to ensure of necessary workstations and software, to provide risk reduction training to their personnel and accountability.

7. Actions

- 7.1 The meeting is asked to note and consider the material presented in this paper.

APPENDIX A

Task to be completed to support Transition To the Final Phase of WAFS

TASK	DESCRIPTION OF TASK	DATE
1	WAFC Washington to provide global gridded W/T data in GRIB code	Completed
2	WAFC Washington to produce SWH charts	Completed
3	ICAO Regional MET Officers survey states ability to produce wind/temperature charts from GRIB data for the purpose of assessing training needs	Completed
4	ICAO to coordinate with States and users if there is validated regional requirements for SWM charts for limited geographical area	Completed
5	U.S. to provide BUFR decode software to the workstation manufacturers	Completed
6	Provide the technical functionality specifications for the purpose of acquiring new WAFS workstations	June 2002
7	Buenos Aires and Brasilia RAFC close	July 2002
8	States to initiate a process to procure new workstations, service agreements and training to support these stations with a planned installation of workstations by November 2003	July 2002
9	Establishment of back-up distribution arrangements for WAFS products	November 2002
10	Training to be completed on existing workstations provided to States who need assistance to produce wind/temperature charts from GRIB data in support of Task 14	May 2003
11	Provision of test BUFR coded SIGWX forecasts on satellite broadcasts	mid-2002
12	All states that receive GRIB products capable of converting GRIB forecasts to wind/temperature charts	mid-2003
13	Training in the operational conversion of BUFR to SIGWX charts	late-2003 to late- 2004
14	Removal of T4 wind/temperature charts from satellite broadcast	mid-2003
15	Satellite distribution of global SWH and SWM in BUFR format	late-2003
16	States have the ability to operate the decoding and presentation software to convert BUFR SIGWX forecasts into operational graphical products	mid-2004
17	Removal of T4 SIGWX products from satellite broadcast	late-2004

WAFS transition to Final Phase Completed

APPENDIX B

WAFS Computer Workstation Vendors

Global Science & Technology, Inc. 9111 Edmonston Road Suite 202 Greenbelt, Maryland 20770 USA	Boyd, Vice President, Commercial Services Phone (301) 313- 0164 Ext 209
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COROBOR Systemes 134 Rue ulian Grimau 94400 Vitry France	Michel Bourgues, Director Phone 33 1 45 73 60 60
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Info-Electronics Systems Inc. 1755 St-Regis Suite N° 100 Dollard-des-Ormeaux Quebec Canada H9B 2M9	Harinder Ahluwalia, President Phone (514) 421-0767
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Netsys International (Pty) Ltd. P.O. Box 35798 Menlo Park 0102 South Africa	Ryn Bodde, Managing Director Phone 27 12 348- 4246
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Almos SIGMEX BV Landzichtweg 70 P.O. Box 422 4100 AK Culemborg The Netherlands	Alan Crisp, Sales and Marketing Phone 0345 54 40 80
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Sofreavia 3 Carrefour de Weiden 92441 Issy les Moulineaux Cedex France	Mr. T. Roy Phone 33 1 4123 4600
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