International Civil Aviation Organization

NINETEENTH MEETING OF THE METEOROLOGY SUB-GROUP (MET SG/19) OF APANPIRG

Bangkok, Thailand, 3 - 6 August 2015

Agenda Item 6: Research, development and implementation issues in the MET field

6.1 WAFS (including WAFS TF Report)

UPDATE OF WAFS SERVICE REFERENCE DOCUMENT

(Presented by Chairman, WAFS Task Force)

SUMMARY

This paper presents an update of the WAFS service reference document that was developed by the WAFS Task Force (WAFS TF) for distribution to States/Territories in ASIA/PAC Region.

1. Introduction

1.1 The WAFS service reference document, which was developed in October 2010, aims to provide States/Territories in the ASIA/PAC region with an overview of WAFS, the role of the two WAFCs, the available communication mechanisms, datasets and summarizes the end-user equipment options available to User States.

2. Discussions

2.1 The WAFS service reference document was last updated after MET SG/19 and was presented in Appendix A. The document was sent to States/Territories in the ASIA/PAC region in October 2014. The WAFS TF will review the document during MET SG/19 and update it if necessary.

3. Action by the meeting

3.1 The meeting is invited to note the information provided in this paper.

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ICAO Asia Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG)

World Area Forecast System (WAFS)

- Service Reference

THIS DOCUMENT IS AN ASIA/PAC REGION MET SUB GROUP TASK FORCE DOCUMENT. IT DOES NOT HAVE OFFICIAL STATUS UNDER WAFSOPSG/SADISOPSG OR WIFS GUIDANCE DOCUMENTATION FROM USA. IN THE CASE OF DIFFERENCES BETWEEN DOCUMENTS, OFFICIAL WAFSOPSG/SADISOPSG OR WIFS DOCUMENTATION WILL TAKE PRECEDENCE. READERS ARE ADVISED TO REFER REGULARLY TO THE WAFSOPSG AND SADISOPSG WEB SITES FOR THE LATEST INFORMATION

Version	2.3
Date Created:	30 August 2014
Created by:	ICAO APANPIRG WAFS TF

1 Introduction

1.1 Purpose

To provide a reference document on the World Area Forecast System (WAFS) for use by User States within the Asia and Pacific (ASIA/PAC) region. This document provides an overview of WAFS, the role of the two World Area Forecast Centres (WAFCs), the available communication mechanisms, datasets and summarises the end-user equipment options available to User States.

1.2 Scope

This document is intended to collate general information on WAFS from many sources and provide a high-level overview of information. Rather than repeat details contained in other documents, this document will provide links to these documents.

1.3 References & Useful Links

APANPIRG WAFS TF :
http://www.icao.int/APAC/Pages/apanpirg-framework.aspx
ICAO :
http://www.icao.int/safety/meteorology/Pages/default.aspx
SADIS :
http://www.metoffice.gov.uk/aviation/sadis
SADISOPSG :
http://www.icao.int/safety/meteorology/sadisopsg/Pages/default.aspx
Secure SADIS FTP Guide :
http://www.icao.int/safety/meteorology/sadisopsg/SADIS%20User%20Guide/Forms/AllItems.aspx
SADIS User Guide :
http://www.icao.int/safety/meteorology/sadisopsg/SADIS%20User%20Guide/Forms/AllItems.aspx
WAFSOPSG :
http://www.icao.int/safety/meteorology/wafsopsg/Pages/default.aspx
WAFS SIGWX Backup Test Schedule :
http://www.icao.int/safety/meteorology/WAFSOPSG/Reference%20Documents/Forms/AllItems.aspx
WIFS :
http://aviationweather.gov/wifs/
WIFS User Guide :
http://aviationweather.gov/wifs/page/open/id/5
WAFC London Performance Indicators webpage :
http://www.metoffice.gov.uk/public/weather/aviation-wafc/#?tab=wafcPerformance
WAFC Washington Performance Indicators webpage :
http://www.emc.ncep.noaa.gov/gmb/icao/ncep_scores.html
Training module regarding the use of WAFS gridded CB, icing and turbulence forecasts :
http://www.icao.int/safety/meteorology/WAFSOPSG/Pages/GuidanceMaterial.aspx

1.4 Acronyms and Abbreviations

The following is a list of acronyms and abbreviations used within this document:

AFS	Aeronautical Fixed Service
AIREP	Air-report
ANSP	Air Navigation Service Provider
APANPIRG	Asia Pacific Air Navigation Planning and Implementation Regional Group
BUFR	Binary Universal Form for the Representation of meteorological data

CB	Cumulonimbus
MET SG	Meteorology Sub-Group
EDTO	Extended Diversion Time Operations
FTP	File Transfer Protocol
GRIB	GRIdded Binary
GRIB1	GRIB Edition 1
GRIB2	GRIB Edition 2
HTTPS	Hypertext Transfer Protocol Secure
ICAO	International Civil Aviation Organization
ISCS	International Satellite Communications System
METAR	Meteorological Aviation Report / Aviation Routine Weather Report
MWO	Meteorological Watch Office
OPMET	Operational Meteorological Information
PC	Personal Computer
PNG	Portable Network Graphics
RANP	Regional Air Navigation Plan
SADIS	Satellite Distribution System for information relating to air navigation
SADISOPSG	Satellite Distribution System Operations Group
SIGMET	Significant Meteorological (Information)
SIGWX	Significant Weather
SPECI	Special Report / Aviation Selected Special Weather Report
SWH	High-level SIGWX
SWM	Medium-level SIGWX
TAF	(Terminal) Aerodrome Forecast
TCA	Tropical Cyclone Advisories
UK	United Kingdom
UKMO	UK Meteorological Office
USA	United States of America
US NWS	United States National Weather Service
VAA	Volcanic Ash Advisories
WAFC	World Area Forecast Centre
WAFS	World Area Forecast System
WAFS TF	WAFS Task Force
WAFSOPSG	World Area Forecast System Operations Group
WIFS	WAFS Internet File Service
WMO	World Meteorological Organization

2 WAFS Overview

The purpose of the World Area Forecast System (WAFS) is to provide the worldwide aviation community with operational meteorological forecasts and information about meteorological phenomena required for flight planning and safe, economic, and efficient air navigation. On behalf of the International Civil Aviation Organization (ICAO) and World Meteorological Organization, the WAFS comprises two Provider States, these being the United Kingdom Meteorological Office (UKMO) and the United States National Weather Service (US NWS). The WAFS Provider States each operate a World Area Forecast Centre (WAFC) known as WAFC London and WAFC Washington.

The WAFCs provide:

- global gridded forecasts of upper winds; upper-air temperatures and humidity; geopotential altitude of flight levels; flight level and temperature of tropopause; direction, speed and flight level of maximum wind; cumulonimbus clouds; icing; and turbulence; and
- global High-level SIGWX (SWH) products and Medium-level SIGWX (SWM) products for limited geographical areas.

The official distribution mechanism for WAFS data is via UK's SAtellite DIStribution (SADIS) system and Internet-based Secure SADIS FTP and the USA's WAFS Internet[1] File Service (WIFS). The SADIS system forms part of the ICAO Aeronautical Fixed Service (AFS).

In addition to the WAFS data, the above distribution mechanisms also forward OPMET data (TAF, METAR, SIGMET etc.) for purposes of flight planning only (i.e. not for time critical purposes).

2.1 Charts

The two WAFCs provide global High-level SIGWX (SWH) products covering FL250-630. The WAFC's also provide Medium-level SIGWX (SWM) products, covering FL100-450[2], for limited geographic areas as defined in the regional air navigation agreements. At the time of writing these agreements specified that area's "ASIA SOUTH", "EUR" and "MID" will be provided by WAFC London and area "NAT" will be provided by WAFC Washington.

The WAFCs provide the SWH and SWM products as both coded data and charts, in BUFR[3] and PNG formats, respectively. The PNG format is provided for back-up purposes and is only available for the areas defined in ICAO Annex 3 Figures A8-1, A8-2 and A8-3.

2.2 Data Sets

The WAFCs provide global forecasts of:

- upper wind, temperature and geopotential altitude data covering a range of flight levels from FL050 to FL530;
- humidity data covering a range of flight levels from FL050 to FL180;
- flight level and temperature of tropopause;
- maximum wind (height, speed, direction);
- horizontal extent and flight levels of base and top of CB clouds;
- icing for a range of layers from FL060 to FL300;
- clear-air turbulence for a range of layers from FL240 to FL450; and
- in-cloud turbulence for a range of layers from FL100 to FL300

in GRIB[4] Edition 2 (GRIB2) format.

Unlike other WAFS gridded datasets, the parameter values for the gridded turbulence, CB and icing datasets issued by the two WAFCs are harmonised (i.e. identical). More detailed information about the gridded forecasts for CB Cloud, Icing and Turbulence may be found in the section titled *Guidance on the Harmonized WAFS Grids for Cumulonimbus Clouds, Icing, Turbulence Forecasts* at:
http://www.icao.int/safety/meteorology/WAFSOPSG/Pages/GuidanceMaterial.aspx.

The WAFCs have produced a training module regarding the use of WAFS gridded CB, icing and turbulence forecasts. This guidance is provided via the internet with an English language voiceover. In

[1] An enabling clause in Annex 3, Amendment 75, permits the use of the public Internet for distribution of non-time critical data. WAFS data and OPMET data used for flight planning purposes only comes under this definition.
[2] This exceeds the Annex 3 requirement of FL100-FL250
[3] BUFR stands for Binary Universal Form for the Representation of meteorological data. Technical details are contained in the WMO Manual 306 Part B specification, which can be obtained via the WMO ftp site - http://www.wmo.int/pages/prog/www/WMOCodes/WMO306_vI2/VolumeI.2.html. BUFR provides efficient storage of meteorological features in a machine independent form, where all the information to describe the features are contained within the data.
[4] GRIB stands for GRIdded Binary. GRIB is a mathematically concise data format commonly used in meteorology to store gridded data. It is standardized by the WMO Commission for Basic Systems, known under number GRIB FM 92-IX. The details of GRIB2 code form can be found at the following link:
http://www.wmo.ch/pages/prog/www/DPS/FM92-GRIB2-11-2003.pdf

addition, ICAO has provided PDF versions of the training module in the following languages: Arabic, Chinese, English, French, Russian and Spanish. The training module and the related PDFs are supplemental to the existing guidance material 'Guidance on the Harmonized WAFS Grids for Cumulonimbus Cloud, Icing and Turbulence Forecasts - 11 September 2012'. All the material above is available via :

http://www.icao.int/safety/meteorology/WAFSOPSG/Pages/GuidanceMaterial.aspx

The aforementioned gridded products are produced four times daily, for T+06 to T+36 at 3-hour time steps. This data can be used in flight planning systems to optimise flights routes or to generate a range of charts, such as wind and temperature charts, cross sections, etc. See 2.2.1.

As described in Section 2.1, the two WAFCs provide T+24 SIGWX Forecasts (SWH and SWM) in BUFR code. The data is generated every 6 hours and is available 17 hours before validity, unless WAFC back-up procedures are invoked, in which case the data is available no later than 15 hours before validity[5]. This data allows users to generate SIGWX charts for standard ICAO areas or user defined domains.

As noted in Section 2, the AFS/Internet based distribution mechanisms include a range of global OPMET data. These datasets include alphanumeric messages such as METAR, SPECI, TAF, SIGMET, VAA, TCA, and special AIREPs.

Administrative messages as defined in Section 4.2 are also broadcast as OPMET.

2.3 Satellite Based Reception of WAFS Data – SADIS 2G

The UK provides point to multi-point data distribution service via satellite in real-time. This service is provided by the UKMO's SADIS 2G satellite positioned at 00N 060E. The coverage provided by the satellite service is shown in Figure 1.

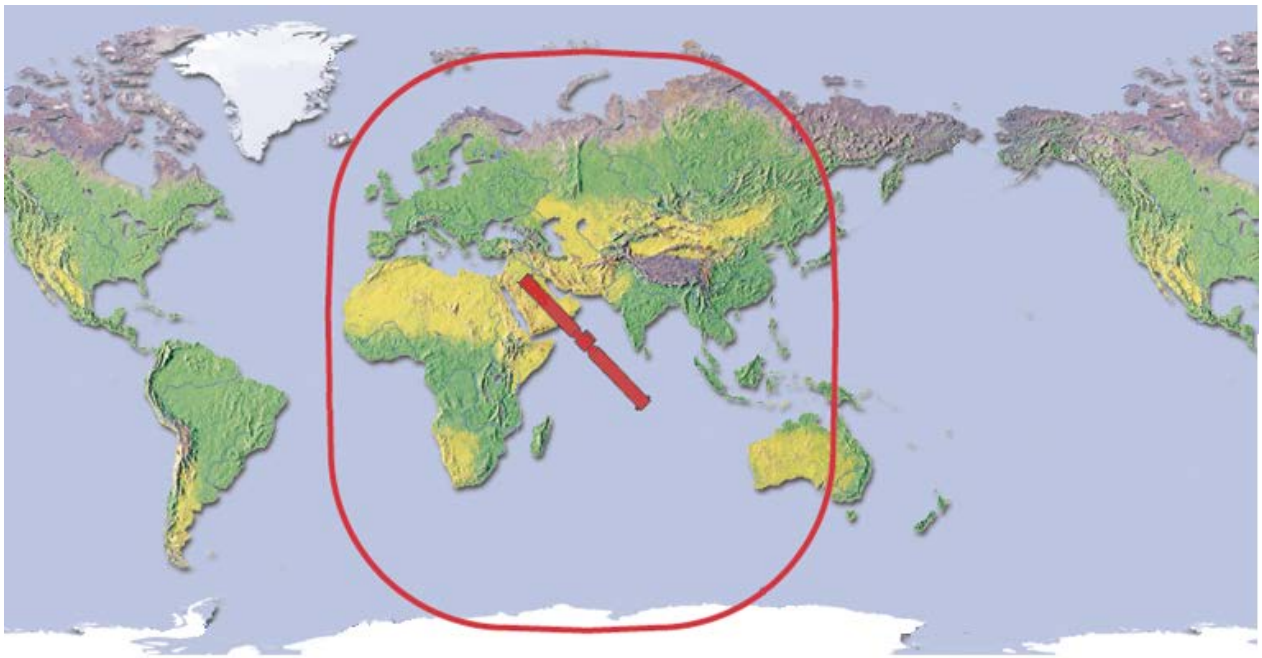

Figure 1: Schematic of SADIS 2G satellite footprint. Reception signal strengths, particularly at the edges of the footprints, are not so simply or sharply defined. Consult SADIS guidance document for detailed information.

[5] The WAFCs will issue SIGWX forecasts to normal schedule during planned SIGWX backup tests (see link in section 1.3). In the event of a real backup event, SIGWX forecasts may be issued up to 2 hours later than normal

2.4 Obtaining WAFS Data Via The Public Internet

The UKMO currently provides access via Secure SADIS FTP service as an alternative to the SADIS satellite service (SADIS 2G) or as a backup to the satellite service. SADIS 2G satellite broadcast is expected to be extended beyond 2015 but NOT beyond November 2019. States/Territories are required to migrate to operational use of the Secure SADIS FTP service in the intervening period.

The US NWS provides a service known as WAFS Internet File Service (WIFS) which allows users to retrieve data via HTTPS[6] protocol.

2.5 WAFS End-User system components

User States wishing to utilize WAFS data require the following components:

1. Visualisation software
2. PC/server on which to run the visualisation software
3. Communications with the:
    - Internet based Secure SADIS FTP or WIFS); and/or
    - Satellite based SADIS 2G (until November 2019).

2.5.1 Visualisation Software

There are a number of companies that offer commercial-off-the-shelf software capable of visualising the WAFS/OPMET datasets and generating graphical charts. Software is available for both Windows and Linux operating systems. The UK Met Office (as SADIS Provider) maintains a list of the companies offering WAFS capable visualisation software compatible with its systems. The details can be found at:
http://www.metoffice.gov.uk/aviation/sadis/manufacturers

The SADIS Provider State has performed an evaluation of these software systems, the results of which can be found at:
http://www.metoffice.gov.uk/aviation/sadis/software.

Some WAFS users have elected to implement their own bespoke software. Alternatively many flight planning systems support the visualisation of WAFS data and flight plan optimisation based on WAFS data, however these systems are outside the scope of this document.

2.5.2 PC/Server

All systems require a PC or server on which to run the visualisation software. For redundancy, User States may elect to install the visualisation software on multiple PCs/servers or under platform virtualisation such as VMware.

2.5.3 Data From The SADIS or WIFS Services

User States need to determine from which of the SADIS or WIFS Providers they should obtain their data, and the Regional Air Navigation Plan will give guidance on which of the two providers should be used.

The SADIS Provider can provide access to satellite based communications (until November 2019) and to internet based communications.

[6] The primary open source product for access using the HTTPS protocol is the "GNU Wget package" (GNU is a recursive acronym for "GNU's Not Unix" and is pronounced "guh-NEW").

The satellite based service will require dedicated hardware including:

- a satellite antenna (normally 1.8 or 2.4 metre diameter)
- low noise block
- digital receiver
- router
- cabling including coaxial, power, communications (RS-232/Ethernet/USB)

Information regarding the cost of the above equipment, installation and support and maintenance can be obtained directly from the suppliers via the link below. For redundancy purposes, some User States elect to install multiple satellite reception systems or alternatively use internet based communication systems as a backup.

Further details on suppliers of this satellite data reception system can be found at:
http://www.metoffice.gov.uk/aviation/sadis/manufacturers

User States wishing to implement SADIS 2G can find procurement guidelines at:
http://www.metoffice.gov.uk/aviation/sadis/procure.

Secure SADIS FTP and WIFS are Internet based services. They will require suitable hardware and software to download data via the Internet, and to visualise the data. Contracts with Internet Service Providers will be necessary.

The SADIS Provider provides information regarding suppliers of such equipment at:
http://www.metoffice.gov.uk/aviation/sadis/manufacturers

3 System Operation

The WAFS is used by a variety of users groups around the world including airlines, Air Navigation Service Providers (ANSPs) and Meteorological Watch Offices (MWOs). This section is intended to provide an overview of the WAFS from the generation of datasets by the WAFC to typical end-users.

The two WAFCs run global meteorological models, which run four times daily. The WAFCs gridded parameters in GRIB2 format are direct outputs from these models, whereas as the SIGWX products are manually generated by forecasters. The forecasters generate these SIGWX datasets by drawing each feature based on an analysis of satellite imagery, meteorological models and a range of other forms of guidance. The generated SIGWX products are provided in accordance with the Standards and Recommended Practices of ICAO Annex 3.

The SIGWX products are available in both BUFR and PNG format. It is anticipated that users will generate charts for their region from the BUFR data and that the PNG charts are made available as a backup. T+24 SIGWX products are produced every 6 hours, valid for 0000Z, 0600Z, 1200Z or 1800Z and are available 17 hours before validity under normal conditions, and no later than15 hours under backup conditions[7]. The SIGWX charts are valid for use within a period starting 3 hours before, until 3 hours after validity time (section 5.3.3.4 of ICAO Doc 8896 – *Practice of Aeronautical Meteorological Practice* refers).

[7] The WAFCs will issue SIGWX forecasts to normal schedule during planned SIGWX backup tests (see link in section 1.3). In the event of a real backup event, SIGWX forecasts may be issued up to 2 hours later than normal.

Unlike the SIGWX products which are generated for a single validity time (T+24), the WAFCs global gridded datasets are generated for a range of time steps between T+06 and T+36 hours. Within this time range, the GRIB2 data is available in 3 hourly steps, i.e.

GRIB2 data available for time steps +6, +9, +12, +15, +18, +21, +24, +27, +30, +33 and +36

It is intended that for anything other than basic situational awareness (e.g. Wind and Temperature charts), the GRIB data should be interpolated between time steps. This is particularly so with regard to use of winds in flight planning software.

OPMET messages are made available as soon as the messages are received by the WIFS and SADIS Provider States.

Once the data sets are available:

- SADIS satellite service pushes the data to SADIS users; and/or
- Users pull the data via Internet/FTP service.

User States wanting to utilise the WAFS data are required to either install or operate a satellite data reception system or have a permanent and reliable internet connection as defined in Section 2.5.3. In addition, User States will also need to operate visualisation software as defined in Section 2.5.1.

Under normal operating conditions a User State ingests data from their primary WAFC (Section 4.1). A User State may also contact the alternative WAFC provider in order to obtain an account for backup/contingency purposes (Section 3.2). The visualisation software ingests the WAFS data and generates products:

- At predefined times;
- Upon the arrival of new datasets; and/or
- As required by the operator.

Most WAFS visualisation software can be configured to generate a range of different products. Commonly generated products include:

- High-level SIGWX charts for any region of the globe from the BUFR data;
- Mid-level products for limited geographical regions from the BUFR data; and
- Wind and Temperature charts from GRIB data.

In addition, some visualisation software is also capable of providing a range of other products. These products can also be grouped together to form a flight packages for user defined routes and may contain:

- OPMET data (METAR/SPECI, TAF, SIGMET, AIRMET, TCA, VAA, etc);
- SIGWX charts;
- Wind and Temperature charts;
- Cross section charts; and
- Route/Flight forecasts in text format

Following the selection of the primary WAFC, the visualisation software needs to be configured to generate products from that WAFC. WAFC London transmits all its products with a source address of “EGRR”. WAFC Washington however transmits its data from 2 source addresses (“KWBC” GRIB; “KKCI” BUFR/PNG).

The visualisation software can typically be configured to disseminate the aforementioned charts and data sets to Users via a range of mechanisms including email, FTP and TCP communication protocols. End users of these charts include pilots, flight planners, air traffic controllers, meteorologists, etc. Airlines and ANSPs also often load the WAFS GRIB data into flight planning systems to optimise routes for efficiency and safety.

3.1 Errors or Omissions in WAFS products

Should a user detect any errors or omissions in the WAFC products they are encouraged to contact the WAFC directly using the following 24-hour contact details:

WAFC London service desk contact details:
email: servicedesk@metoffice.gov.uk
telephone: +44 (0) 1392-88 66 66

WAFC Washington service desk contact details:
Email: toc.nwstg@noaa.gov
telephone: +1 301 713 0902

Should the error or omission relate to a SIGWX product the WAFCs will typically issue a correction message as described in Section 4.2.1.

3.2 Backup Communications

The two WAFCs provide global forecasts of SWH charts and a range of gridded fields as defined in Section 2. Having global forecasts available from the two WAFCs provides a backup should an outage occur. The WAFS architecture supports the following:

- Loss of satellite based communication mechanism, SADIS:
  - The WAFCs each provide internet based services and these can be used as a backup source of data to that delivered over their satellite based services. It is incumbent on users to request access details from the primary WAFC.
- Complete loss of data from SADIS or WIFS provider.
  - In the extremely unlikely event that either the SADIS or the WIFS provider were to be completely unavailable, those users who have pre-arranged alternative accounts can make use of the alternate provider's internet based service to obtain data. It is incumbent on users to request and obtain access details for the alternate provider. Moreover, the WAFCs do not arrange backup/contingency accounts on behalf of users. Users also need to note that the data and data structures available from the two WAFCs are not identical mirrors of each other and Users are responsible for ensuring that their systems are able to decode both EGRR and KWBC/KKCI GRIB and BUFR data.

4 Implementation Factors

4.1 Policy For Obtaining Access To SADIS/WIFS

WAFS service should be obtained as per direction from the Regional Air Navigation Plans (RANPs). The policy describing how a State should arrange to obtain data from the appropriate service is stated in Appendix E of the 5th Edition of the SADIS User Guide (June 2012) and in the WIFS User Guide: http://www.icao.int/safety/meteorology/WAFSOPSG/Pages/GuidanceMaterial.aspx. For reference, an uncontrolled copy is provided below.

PROCESS FOR DETERMINING FROM WHICH SERVICE (SADIS OR WIFS) A USER SHOULD OBTAIN OPMET INFORMATION AND WAFS FORECASTS

GENERAL

1. In order for the SADIS and WIFS Provider States to appropriately manage and maintain viable, mutually existing services delivering OPMET information and WAFS forecasts, the following process should be

followed in order to determine from which service (SADIS or WIFS) a user within a particular State should arrange to obtain their data.

STATES REQUIRED IN ICAO REGIONAL AIR NAVIGATION PLANS TO OBTAIN WAFS FORECASTS FROM SADIS FOR PRIMARY OPERATIONAL USE

2. For those States required by the ICAO Regional Air Navigation Plans to use SADIS as their primary source from which to obtain WAFS forecasts, the following procedure applies:

a) SADIS accounts will be provided (following normal authorization processes) on request to the SADIS Provider State; and,

b) participation in the SADIS cost recovery scheme will be required (except for LDCs as defined by United Nations).

c) WIFS accounts will be provided to authorized SADIS users by the WIFS Provider State for backup purposes on condition that:
— a SADIS account has been authorized and provided;
— there are no outstanding balances in respect of the SADIS cost recovery scheme; and
— use is restricted to backup purposes and periodic testing.

STATES REQUIRED IN ICAO REGIONAL AIR NAVIGATION PLANS TO OBTAIN WAFS FORECASTS FROM WIFS FOR PRIMARY OPERATIONAL USE

3. For those States required by the ICAO Regional Air Navigation Plans to use WIFS as their primary source from which to obtain WAFS forecasts, the following procedure applies:

a) WIFS accounts will be provided (following normal authorization processes) on request to the WIFS Provider State; and

b) SADIS accounts will be provided to authorized WIFS users by the SADIS Provider State for backup purposes on condition that:
— a WIFS account has been authorized and provided; and
— use is restricted to backup purposes and periodic testing.

STATES IDENTIFIED IN THE ICAO REGIONAL AIR NAVIGATION PLANS AS BEING ABLE TO OBTAIN WAFS FORECASTS FROM EITHER SADIS OR WIFS FOR PRIMARY OPERATIONAL USE

4. The State, having determined which of the two services (SADIS or WIFS) to obtain their primary operational supply of WAFS forecasts, the procedures in 2 and 3 will apply.

5. In exceptional circumstances, States that have an operational requirement to obtain data from both WIFS and Secure SADIS FTP on a continuous basis will have their requests considered on a case-by-case basis. Under such circumstances, a State taking both services will be required to contribute fully to the SADIS cost recovery scheme (unless recognized as United Nations LDC).

6. The definition of the threshold for operational versus backup purposes to be used on the SADIS and WIFS Internet-based services will be that as defined and endorsed by the SADISOPSG.

4.2 Administration Messages

The SADIS Provider and WIFS Provider notify User States of changes to services and documentation via Administration Messages. These Administration Messages are structured text messages which are provided to User States via each of the communication mechanisms (i.e. satellite, FTP, WIFS).

The SADIS administration messages include:

Header[8]	Description
NOUK10 EGRR	Messages used to advise on model or product delays/difficulties, or service outages. This message is also used to advise of forthcoming product changes that may require actions by users. This is the preferred bulletin header for messages that have an impact on the service itself.
NOUK11 EGRR	For messages that provide useful information to users, but do not have an immediate impact on the service. An example would the notification of SADIS or WAFS documentation updates (with the exception of SADIS User Guide updates, for which a NOUK13 EGRR will be used).
NOUK12 EGRR	Provides a text message directing users how to decode GRIB values. It is mainly used by Workstation Suppliers.
NOUK13 EGRR	SADIS User Guide Updates (ICAO can only authorise these messages).
NOUK31 EGGY	NATS advisory messages
NOBX99 EBBR	BMG METNOs describing changes to bulletins promulgated in the EUR Region
PLUK30 EGRR PLUK31 EGRR PLUK32 EGRR PLUK33 EGRR PLUK34 EGRR	The PL series have been reserved for any graphical ADMIN messages but users would be alerted and directed from a NOUK10 EGRR message

For further details refer to section 4.2 of SADIS Gateway Operations Handbook, from
http://www.icao.int/safety/meteorology/sadisopsg/SADIS%20User%20Guide/Forms/AllItems.aspx

The WIFS administration messages include:

Header	Description
NOXX10 KKCI	WIFS administration messages

4.2.1 Correction Messages

The two WAFCs have also implemented Correction Messages to advise users of errors or omissions in SIGWX forecasts (PNG or BUFR). It is intended that the content of such messages shall be brought to the attention of users of the WAFS SIGWX forecast at the pre-flight planning stage. Guidance regarding these bulletins is available on the WAFSOPSG website at URL:
http://www.icao.int/safety/meteorology/WAFSOPSG/Pages/GuidanceMaterial.aspx.

These messages are transmitted with the following headers:

WAFC London FXUK65 EGRR
WAFC Washington FXUS65 KKCI

[8] The message header takes the form TTAAii CCCC. For further details, see:
http://www.wmo.int/pages/prog/www/ois/Operational_Information/Publications/WMO_386/AHLsymbols/TableDefinitions.html

5 Further Information

5.1 WAFC General Contact Details

User States wanting to access the system should contact the relevant WAFC.

5.1.1 WAFC Washington

NWS/Aviation Weather Center
Attention: Mr Matt Strahan
Chief, International Operations Branch
7220 NW 101st Terrace
Kansas City, Missouri
USA 64153-2371
E-mail addressed to: matt.strahan@noaa.gov
Fax number: +1 816-880-0650

5.1.2 WAFC London

The Met. Office
Attention: Mr. Nigel Gait
International Aviation Manager
Fitzroy Road
Exeter
Devon EX1 3PB
United Kingdom
E-mail addressed to: nigel.gait@metoffice.gov.uk
Fax number: +44 1392-885-681

5.2 Technical Groups

There are a number of technical groups involved with the development and implementation of WAFS. These include:

APANPIRG WAFS TF:
http://www.icao.int/APAC/Pages/apanpirg-framework.aspx

SADISOPSG:
http://www.icao.int/safety/meteorology/sadisopsg/Pages/default.aspx

WAFSOPSG:
http://www.icao.int/safety/meteorology/wafsopsg/Pages/default.aspx

6 Significant Changes to WAFS

Past changes :

Date Effective	**Description**
1 Mar 2010	GRIB 2 data available via SADIS FTP, including trial forecasts of CB, icing & turbulence parameters
May 2010	WIFS operational
18 Nov 2010	Secure SADIS FTP service commenced operation
18 Nov 2010	GRIB2 over SADIS 2G and ISCS commences
June 2011	Maximum icing parameter endorsed for use in planning EDTO operations only
29 Nov 2011	Harmonised CB, icing and turbulence operational
1 Jul 2012	Cessation of the ISCS satellite service
1 Jul 2012	Cessation of the ISCS FTP service
5 Jul 2012	Re-prioritisation of GRIB2 over GRIB1
3 Dec 2012	Cessation of SADIS FTP service.
14 Nov 2013	Cessation of WAFS Upper Air Forecasts in GRIB1 form.
14 Nov 2013	Gridded global forecasts of CB, icing and turbulence parameters in GRIB format endorsed for operational use.

Planned future changes :

Planned date	**Description**
Nov 2014	Implementation of WAFS re-issuance policy for WAFS GRIB2 and WAFS SIGWX forecasts.
Nov 2019	Planned cessation of SADIS 2G satellite broadcast.

Note: There is no planned cessation date for the current SIGWX forecasts.