

**INTERFACE CONTROL DOCUMENT**

**FOR**

**WAFS Internet File Services**



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## Document Change History

<b>Date</b>	<b>Author</b>	<b>Version</b>	<b>Description<sup>1</sup></b>
02/17/10	Solomon	1.0	Initial draft release.
03/05/10	Solomon	1.1	Incorporated user feedback including GRIB subdirectories and better file format descriptions.
03/11/10	Solomon	1.2	Added document change history and a brief description of the compression used in GRIB2 including a reference to the ISO standard for JPEG 2000. Also made the user references more broad than just WAFS workstations. Removed WIFS registration details and added toll free phone number.

<sup>1</sup> Minor corrections and cosmetic changes are not listed.

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## Scope

This document defines the interface between the World Area Forecast System (WAFS) users and the WAFS Internet File Service (WIFS). The purpose of WIFS is to allow WAFS users to retrieve data from the Consolidated Aviation Web Services (CAWS) FAA Quality Internet Communications Provider (QICP) certified web farms via the Internet.

## Background

The International Satellite Communications System (ISCS) provides timely delivery of critical aviation-related weather information to support air traffic management and flight operations in more than 80 countries. WIFS provides an alternative data repository available for the WAFS users over the Internet.

## Reference Documents

### INTERNATIONAL STANDARDS

- a) International Standard ISO 8802-2: 1998 Part 2: Logical Link Control
- b) WMO Publication FM92 GRIB Edition 1
- c) WMO Publication FM92 GRIB Edition 2
- d) WMO Publication FM94 BUFR
- e) ISO/IEC 15444-1:2004, JPEG 2000 Compression

### INDUSTRY STANDARDS

- a) Institute of Electrical and Electronics Engineers (IEEE) 802.3: Ethernet Local Area Network Specification
- b) GNU Free Documentation License (<http://www.gnu.org/software/wget/manual/wget.html#GNU-Free-Documentation-License>)
- c) GNU Wget 1.12 Manual (<http://www.gnu.org/software/wget/manual/wget.html>)
- d) RFC 791: Internet Protocol (IP)
- e) RFC 793: Transmission Control Protocol (TCP)
- f) W3C Portable Network Graphics (PNG) Specification (Second Edition)

## User Authentication

Users will be required to provide a valid user name and password before downloading data from WIFS. To obtain an account, contact the Aviation Weather Center toll free at (877) 280-2811 or send an email to [wifs.reg@noaa.gov](mailto:wifs.reg@noaa.gov).

## Interface Characteristics

To ensure a reliable service, the WIFS data is housed at three geographically diverse National Weather Service web farms. The base URLs to use to access WIFS at the three farms are shown in Table 1.

**Table 1 WIFS Primary URL for HTTPS Access**

<b>Web Farm</b>	<b>Base WIFS URL<sup>1</sup></b>	<b>First Letter of State<sup>2</sup></b>
<b>NWS HQ</b>	<a href="https://hq.aviationweather.gov/wifs/data">https://hq.aviationweather.gov/wifs/data</a>	A, B, C, D, E, F, G, H, I
<b>SRH HQ</b>	<a href="https://srh.aviationweather.gov/wifs/data">https://srh.aviationweather.gov/wifs/data</a>	J, K, L, M, N, O, P, Q, R, S
<b>CRH HQ</b>	<a href="https://crh.aviationweather.gov/wifs/data">https://crh.aviationweather.gov/wifs/data</a>	T, U, V, W, X, Y, Z

<sup>1</sup> Specific data are stored in separate subdirectories. See Table 2.

<sup>2</sup> Per U.S. English spelling.

In order to maintain the integrity of the file times over multiple accesses, it is recommended that the **same farm** is continually used as long as it is accessible. See Figure 1 for a diagram of the WIFS Network. To help evenly distribute the load, each user state is asked to access data from a primary web farm. The primary web farm a particular user should access depends on the first letter in the state name based on the U.S. English spelling. In the event the primary farm is inaccessible, users should employ a round robin approach to ensure data accessibility. The web farm URLs and primary web farm assignments are shown in Table 1. The WIFS will provide access to the meteorological data listed in Table 2. The data will be retrievable over the Internet using the GNU Wget utility. The Wget utility is a free open source software package for retrieving files using standard TCP/IP protocols such as HTTP, HTTPS, FTP, and HTTP proxies. It is available for both Linux and Windows operating systems. See the GNU Wget online manual (<http://www.gnu.org/software/wget/>) for detailed information.

## Data Retrieval

The WIFS team recommends using the GNU Wget utility to retrieve the data. An example Wget command is shown below. Note that the correct username and password will be assigned by the WIFS administrator.

```
wget --user=<user_id> --password=<password> --no-check-certificate  
"https://crh.aviationweather.gov/wifs/data/BUFR/20100128_0000_JUBE99  
_EGRR.bufr"
```

The example Wget command above will retrieve the London WAFC's Significant Weather BUFR file from January 28, 2010. The retrieval in this example was made from the Central Region HQ web farm. The structure of the command including only the **required** arguments is described below. The Wget utility is powerful and includes the capability of performing recursion, statistics, logging, and much more. For a complete description of the GNU Wget utility see the references given in Appendix A.

```
wget --user=<user> --password=<password> --no-check-certificate <URL>
```

where user = your WIFS login name

password = your WIFS password

no-check-certificate = required argument

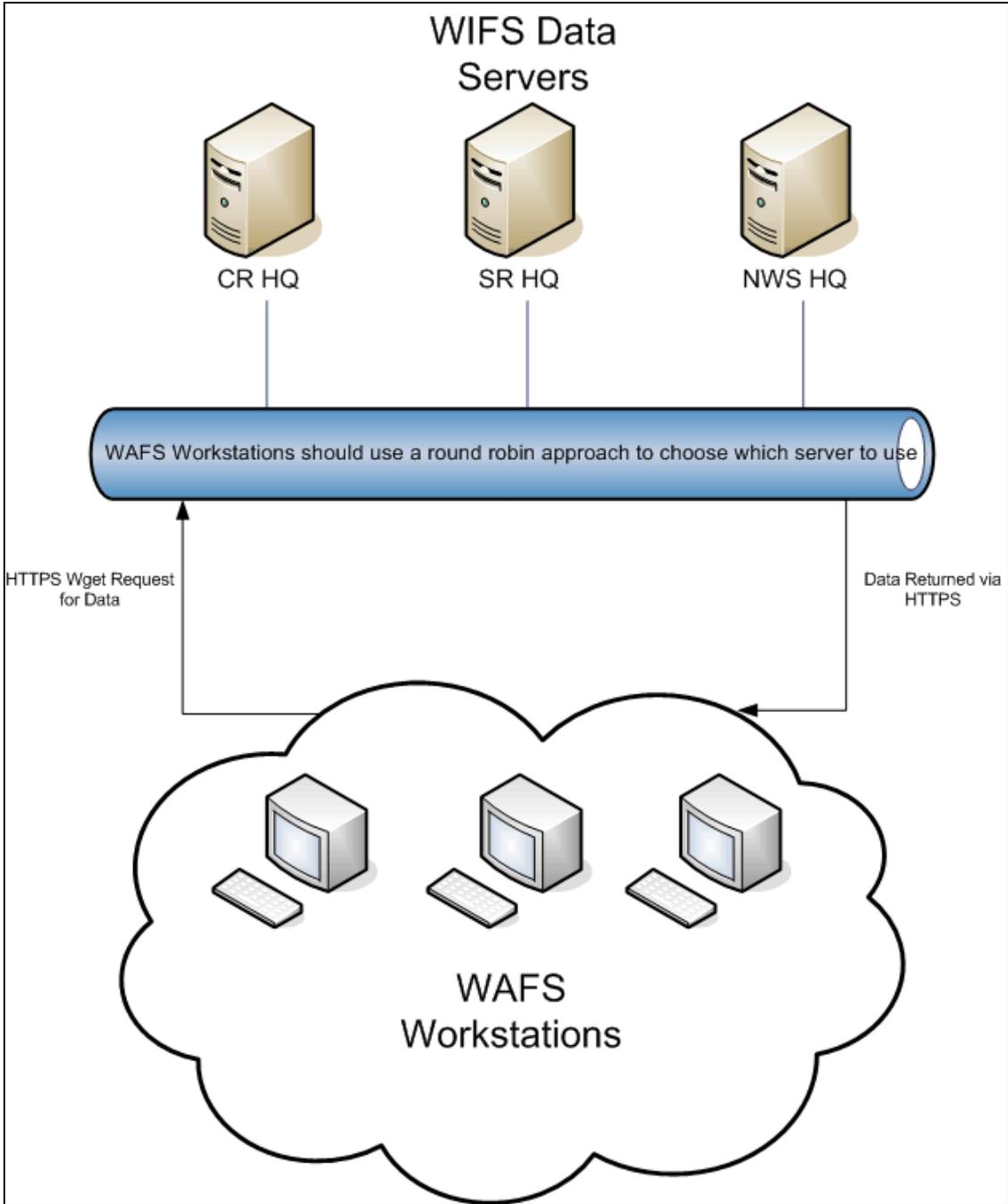


Figure 1 WIFS Network Interface Diagram

**Table 2 WIFS Data**

<b>DATA</b>	<b>FORMAT</b>	<b>LOCATION<sup>1,2</sup></b>
METAR	ASCII	<b>OPMET-MINUTE, OPMET-HOURLY, OPMET-ROLLING</b>
TAF	ASCII	<b>OPMET-MINUTE, OPMET-HOURLY, OPMET-ROLLING</b>
SIGMET for Volcanic Ash	ASCII	<b>OPMET-MINUTE, OPMET-HOURLY, OPMET-ROLLING</b>
SIGMET for Tropical Cyclone	ASCII	<b>OPMET-MINUTE, OPMET-HOURLY, OPMET-ROLLING</b>
SIGMET for other	ASCII	<b>OPMET-MINUTE, OPMET-HOURLY, OPMET-ROLLING</b>
Volcanic Ash Advisory	ASCII	<b>OPMET-MINUTE, OPMET-HOURLY, OPMET-ROLLING</b>
Tropical Cyclone Advisory	ASCII	<b>OPMET-MINUTE, OPMET-HOURLY, OPMET-ROLLING</b>
Air Report	ASCII	<b>OPMET-MINUTE, OPMET-HOURLY, OPMET-ROLLING</b>
Volcanic Ash NOTAM	ASCII	<b>OPMET-MINUTE, OPMET-HOURLY, OPMET-ROLLING</b>
ASHTAM	ASCII	<b>OPMET-MINUTE, OPMET-HOURLY, OPMET-ROLLING</b>
Administrative	ASCII	<b>OPMET-MINUTE, OPMET-HOURLY, OPMET-ROLLING</b>
Global Forecast System (GFS)	GRIB I	<b>GRIB<sup>3</sup></b>
Global Forecast System (GFS)	GRIB II	<b>GRIB<sup>4</sup></b>
High-Level Significant Weather	BUFR/PNG	<b>BUFR/PNG</b>
Mid-Level Significant Weather	BUFR/PNG	<b>BUFR/PNG</b>

<sup>1</sup> Directory location is relative to the base URL path (e.g., <https://hq.aviationweather.gov/wifs/data/>)

<sup>2</sup> OPMET-MINUTE files contain one minute's worth of data and are named by the minute. OPMET-HOURLY files contain one hour's worth of data and are named by the hour. The OPMET-ROLLING file contents are: M05\_OPMET files contain the latest 5 minutes of data; M30\_OPMET files contain the latest 30 minutes of data; M60\_OPMET files contain the latest hour of data.

<sup>3</sup> The subdirectory structure of the GRIB data is shown in Figure 2.

<sup>4</sup> The subdirectory structure of the GRIB2 data is shown in Figure 3.



**Figure 2 GRIB Edition 1 Directory Structure**

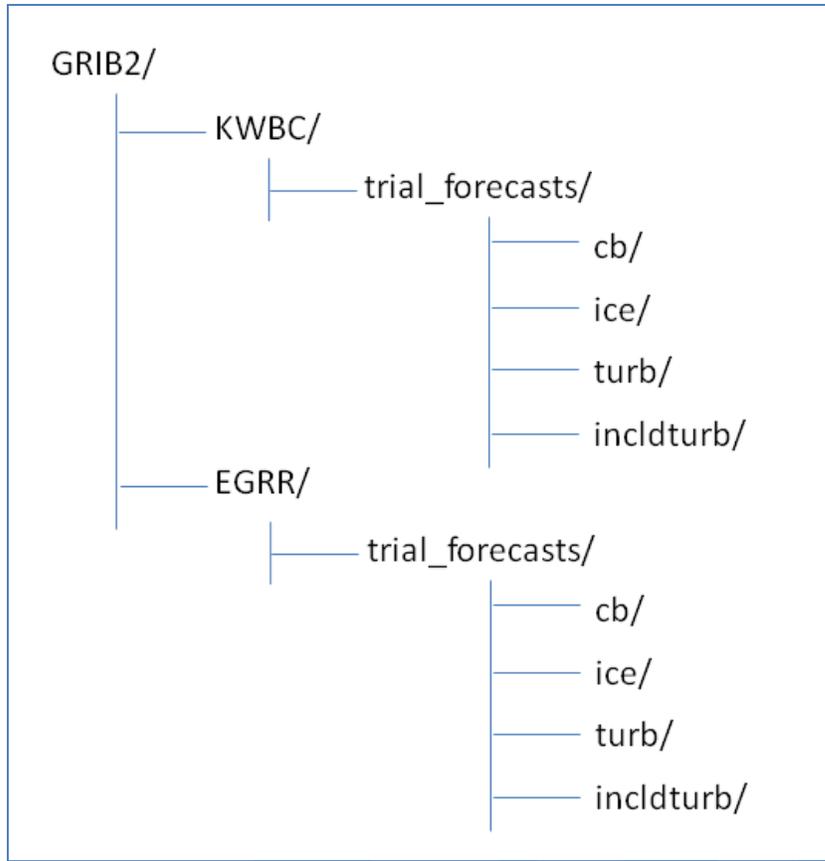


Figure 3 GRIB Edition 2 Directory Structure

## Data Formats

All files follow World Meteorological Organization (WMO) standards. Category-specific format details are shown below.

### Concatenated ASCII Data Files

OPMET-MINUTE file naming convention:  
 YYYYMMDD\_hhmm\_OPMET

OPMET-ROLLING file naming convention:

*Five minute file = "M05\_OPMET"*

*Thirty minute file = "M30\_OPMET"*

*Sixty minute file = "M60\_OPMET"*

### Concatenated ASCII file format:

^Cmessage Length

Bulletin Number

Bulletin Header  
Actual Data

The first line of each concatenation begins with a **^C** character *except the very first line* in a concatenated file which does not have the **^C** character but follows the rest of the format detailed above. The example below contains the first three concatenated files from an OPMET file.

```
^A^M
000^M
SACN94 CWA0 162045^M
WSK SA 2045 AUTO8 M M M M/07/05/0000/M/M M 52MM=^M
^M
^M
^C^A^M
000^M
SPCN48 CWA0 162045^M
SPECI CYHA 162045Z 32015KT 3/8SM -SG DRSN -FZDZ OVC006 RMK ST8=^M
^M
^M
^C^A^M
000^M
SPCN43 CWA0 162047^M
SPECI CYBU 162047Z AUTO 18002KT 1SM -SN FEW002 BKN010 BKN025
OVC069^M
M05/M06 A3005=^M
^M
^M
```

## GRIB

WIFS will offer upper-air gridded forecasts in two formats, GRIB1 and GRIB2. GRIB1 is the format that has been used for many years. Due to a need to expand the data sets and increase the resolution, the ICAO approved the use of GRIB2 for encoding WAFS data sets. Forecasts encoded in GRIB1 are expected to be phased out in 2013. GRIB2 offers significant advantages over GRIB1 including increased self-description, flexibility, and expandability. In addition, GRIB2 supports more compression schemes, including JPEG 2000 which is the scheme used by the National Centers for Environmental Prediction (NCEP) and used in the GRIB2 products on WIFS. The appropriate decoders and associated libraries needed to decode the WIFS GRIB2 files can be found on the NCEP web page (<http://www.nco.ncep.noaa.gov/pmb/codes/GRIB2/>). Both GRIB1 and GRIB2 files available on WIFS are concatenated together according to the forecast valid time.

## Concatenated GRIB Edition 1 file format:

**^C^A^M^M**

**000^M^M**

WMO Header

GRIB Data (*see WMO Publication FM92 GRIB Edition 1*)

The first line of each concatenation begins with a **^C** character **except the very first line** in a concatenated file which does not have the **^C** character but follows the rest of the format detailed above. The example below contains samples of two concatenated GRIB files.

^A^M^M

000^M^M

HTPF85 KWBC 051200^M^M

GRIB^@^Q^A^@^@^B^G`,<80>^Kd^CR

^C^E^L^@^A^@^A

... ..

^C^A^M^M

000^M^M

HTPF25 KWBC 051200^M^M

GRIB^@^N^A^@^@^B^G`,<80>^Kd^@Ã°

^C^E^L^@^A^@^A

... ..

File naming convention: *YYYYMMDD\_HHffFF.grib*

*where YYYY = 4-digit year*

*MM = 2-digit month*

*DD = 2-digit day*

*HH = 2-digit hour of model run*

*FF = 2-digit forecast hour*

The GRIB1 files are retained in the WIFS system for 8 hours.

## Concatenated GRIB Edition 2 file format:

**^C^A^M^M**

**000^M^M**

WMO Header

GRIB2 Data (*see WMO Publication FM92 GRIB Edition 2*)

The first line of each concatenation begins with a **^C** character **except the very first line** in a concatenated file which does not have the **^C** character but follows the rest of the format detailed above. The example below contains samples of two concatenated GRIB2 files.



## BUFR

File naming convention:

*YYYYMMDD\_HHMM\_TTAAii\_CCCC.bufr*

For details on the format of the BUFR products see *WMO Publication FM94 BUFR*. BUFR files are maintained in the WIFS system for 36 hours.

## ISCS\_ADMIN\_MSG

File naming convention:

*YYYYMMDD\_HHMM\_TTAAii\_CCCC.adm*

Administrative messages with the following WMO headers are available on the WIFS:

*NOUSii CCCC*

where *ii* is a two digit numeric string (e.g., 41) and *CCCC* is the ICAO location identifier (e.g., KWBC).

Administrative messages are retained on WIFS for 36 hours.

## PNG

File naming convention:

*YYYYMMDD\_HHMM\_TTAAii\_CCCC.png*

Portable Network Graphic (PNG) images of the Significant Weather ICAO area charts are stored in the PNG directory of the WIFS file system. The WMO messages in Table 3 are retained in the PNG directory for 36 hours.

Table 2 Significant Weather PNG files

<i>WMO Header</i>	<i>Area</i>
PGEE05 KKCI	ICAO A
PGIE05 KKCI	ICAO B1
PGGE05 KKCI	ICAO F
PGAE05 KKCI	ICAO H
PGBE05 KKCI	ICAO I
PGJE05 KKCI	ICAO J
PGDE29 KKCI	ICAO M
PGNE14 KKCI	North Atlantic Ocean Region

For more detailed information on the PNG format, see the W3C Portable Network Graphics (PNG) Specification (Second Edition) (<http://www.w3.org/TR/PNG>).

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## Appendix A: Wget Description

GNU Wget is a free software package for retrieving files using HTTP, HTTPS and FTP, the most widely-used Internet protocols. It is a non-interactive command-line tool that can be executed from programs, scripts, and cron jobs. GNU Wget has many features to make retrieving large files easy, including:

- Can resume aborted downloads, using `REST` and `RANGE`
- Can use filename wild cards and recursively mirror directories
- NLS-based message files for many different languages
- Optionally converts absolute links in downloaded documents to relative, so that downloaded documents may link to each other locally
- Runs on most UNIX-like operating systems as well as Microsoft Windows
- Supports HTTP proxies
- Supports HTTP cookies
- Supports persistent HTTP connections
- Unattended / background operation
- Uses local file timestamps to determine whether documents need to be re-downloaded when mirroring
- GNU Wget is distributed under the GNU General Public License.

To download Wget, navigate to <http://ftp.gnu.org/gnu/wget/>.

Detailed GNU Wget documentation can be found at <http://www.gnu.org/software/wget/manual/>. For other manuals, please see <http://www.gnu.org/manual/>.