Product Description Document

eXtensible Markup Language (XML) Format for the Graphical AIRman's METeorological Information (G-AIRMET)

April 2021

Part 1 – Mission Connection

1. Product Description:

The National Weather Service (NWS), as part of its mission, creates and disseminates aviation-related meteorological data, including Meteorological Aerodrome Reports (METAR), Terminal Aerodrome Forecast (TAF), Special Meteorological Observations (SPECI), Significant Meteorological Information (SIGMET) and other products, many of which are designed and required for domestic aviation.

The International Civil Aviation Organization (ICAO) is working with the World Meteorological Organization (WMO) to transition aviation weather information to machine-readable eXtensible Markup Language (XML) from Traditional Alphanumeric Code (TAC). The ICAO Meteorological Information Exchange Model (IWXXM) data standard includes XML-based representations for products standardized in ICAO Annex 3, *Meteorological Service for International Air Navigation*, and WMO No. 49 Vol II, *Meteorological Service for International Air Navigation*. IWXXM satisfies the international requirement for machine-to-machine operational exchange of aviation meteorological information.

NWS, in conjunction with the Federal Aviation Administration (FAA), has developed additional products to support aviation operations in the U.S. and its territories, as documented in the NWS 10-8 Aviation Weather series of directives. Similar to IWXXM, NWS and FAA are working to transition aviation weather products documented in NWS directives to XML from TAC. Because the domestic aviation weather products share XML attributes, NWS collects these products into a group of XML schema referred to as the "USWX" namespace.

Similar to IWXXM, USWX messages are not intended to be directly read by humans; they are designed to be consumed by software acting on behalf of the data user, such as display software or web feature services. Each USWX message contains all of the components that completely describe the product; *e.g.*, issue time, issue status (routine, amendment, etc), and the specific meteorological parameters, including units of measure, that constitute the specific product being disseminated.

With appropriate user notification, NWS may extend the use of XML formatted data to other existing operational NWS products.

2. Purpose/Intended Use:

USWX and IWXXM represent the first step in moving to an environment where systems handling this data can make use of standard applications and techniques. The development of processes and systems which provide and support digital Operational Meteorological (OPMET) information require initial investment, but the use of enabling data exchange standards for other domains such as AIXM (Aeronautical Information Exchange Model) and FIXM (Flight Information eXchange Model) along with

USWX and IWXXM will lead to cost reductions due to automated, on-demand data exchange and communications, rather than today's constant information "push". Users have opportunities to create new, tailored products at a lower cost by fusing this data.

WMO and ICAO mandated dissemination of IWXXM-formatted aviation weather information by 5 November 2020. NWS and FAA are following up that international requirement by also transitioning domestic aviation weather products to be interoperable with the new data standard.

3. Audience/Users:
Federal Aviation Administration (FAA), commercial airlines, international, private and commercial companies.

4. Presentation Format:
The data are meant for machine-to-machine use. The information is available from the National Weather Service Tele-Communications Gateway (NWSTG) under WMO defined T_1T_2 (from T_1T_2AAii):

USWX data type	T_1T_2
Graphical Airmen's Meteorological Advisory (G-AIRMET)	LWGE86 KKCI (SIERRA)
	LWHE00 KKCI (TANGO)
	LWIE00 KKCI (ZULU)

5. Feedback Method:
The NWS is constantly soliciting comments on the provision of aviation and other existing operational NWS products in USWX format. Comments may be provided via email to:

mark.zettlemoyer@noaa.gov

Comments constituting proposed changes to the USWX data standard format will necessarily be coordinated with other U.S. Government agencies, including the FAA.

For further information, please contact:

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Part 2 – Technical Description

1. Format and Science Basis:
A sample portion of a USWX Graphical Airmen's Meteorological Information (G-AIRMET):

```
<G-AIRMET xmlns="http://nws.weather.gov/schemas/USWX/1.0"
xmlns:aixm="http://www.aixm.aero/schema/5.1.1"
xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:metce="http://def.wmo.int/metce/2013"
xmlns:om="http://www.opengis.net/om/2.0"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
gml:id="uuid.59f09456-a6c4-4727-8aa4-208e13f4a7a7"
xsi:schemaLocation="http://nws.weather.gov/schemas/USWX/1.0
http://nws.weather.gov/schemas/USWX/1.0/G-Airmet.xsd">
  <airmetStatus
  xlink:href="https://codes.nws.noaa.gov/NWSI-10-811/ProductStatus/Normal"
  xlink:title="Normal"/>
  <occurrence>
    <om:OM_Observation gml:id="G-AIRMET201910012045">
      <om:type
      xlink:href="https://www.faa.gov/regulations_policies/advisory_circulars/in
      dex.cfm/go/document.information/documentID/215166" xlink:title="AVIATION
      WEATHER SERVICES Advisory Circular, AC 00-45H"/>
      <om:phenomenonTime>
        <gml:TimeInstant gml:id="G-AIRMETISSUETIME">
          <gml:timePosition>2019-10-01T20:45:00</gml:timePosition>
        </gml:TimeInstant>
      </om:phenomenonTime>
      <om:resultTime xlink:href="#G-AIRMETISSUETIME"/>
      <om:validTime>
        <gml:TimePeriod gml:id="G-AIRMETTIMEPERIOD">
          <gml:begin>
            <gml:TimeInstant gml:id="G-AIRMETVALIDFROM">
…
…
<icing>
  <AirmetIcing gml:id="ICING-TAG-1C-R1-DETAILS">
    <geometry>
      <aixm:AirspaceVolume gml:id="ICING-TAG-1C-R1-AIRSPACE">
        <aixm:upperLimit>18000</aixm:upperLimit>
        <aixm:upperLimitReference>MSL</aixm:upperLimitReference>
        <aixm:lowerLimit>0</aixm:lowerLimit>
        <aixm:lowerLimitReference>SFC</aixm:lowerLimitReference>
      </aixm:AirspaceVolume>
    </geometry>
    <icingRangeStart
    xlink:href="http://codes.wmo.int/bufr4/codeflag/0-11-030/10"
    xlink:title="MODERATE"/>
    <freezingLevelUpperLimit>false</freezingLevelUpperLimit>
    <freezingLevelLowerLimit>false</freezingLevelLowerLimit>
  </AirmetIcing>
</icing>
…
```

...

To see G-AIRMET on the NWS Gateway FTP server, please go here.

2. Training:
See this link to examine the schema, official examples, and documentation on USWX.

For data consumers wanting to check the validity of USWX products, there are numerous XML validation tools available, both open source and commercial. A rudimentary command-line validator for USWX products, more suitable for operational purposes, can be downloaded from here for use on Windows and Linux based systems.

3. Availability:
The USWX product availability is the same as the TAC product issuance and availability.

1) Products are sent from Weather Forecast Offices, Center Weather Service Units, and National Centers to the NCEP Central Operations' (NCO) Next Generation Information Technology Web Services (NGITWS). From NGITWS, USWX products are sent securely to the FAA for use in System Wide Information Management (SWIM) and also to the Aeronautical Message Handling System (AMHS) for international distribution.

2) Another avenue for distribution is the National Weather Service Telecommunications Gateway (NWSTG) to store and forward via the NWS Satellite Broadcast Network (SBN).

3) The World Area Forecast Center (WAFC Washington) will store USWX and IWWXM data for flight planning via the FAA-funded WAFC Internet File Service (WIFS).