XML Projected Bandwidth

Agenda Item 6: Review and update the AMHS/ATN/AIDC Implementation Status
6.2 Readiness of AMHS to support IWXXM

Prepared for: ACSICG-10

From: United States

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Location: Bangkok, Thailand

Federal Aviation Administration

Overview

- **ICAO Annex 3 defines requirements for international exchange of aviation weather information**
- **Recent amendments to Annex 3 define requirements that member states shall transmit their weather data in ICAO Meteorological Information Exchange Model (IWXXM) vs. the current use of Traditional Alphanumeric Code (TAC) data**

XML Distribution

- **OpMet data exchange is required to traverse the Aeronautical Telecommunications Network (ATN)**
- **IWXXM messages are lengthy and contain characters not supported by AFTN, so cannot use AFTN equipment**
- **IWXXM requires the use of AMHS for international exchange**

TAC vs. IWXXM Data

- **Here is the TAC version of a METAR, with color coding added to show how major sections of the TAC version correspond to sections in the IWXXM version:**

METAR KAPA 201453Z 31016G30KT 10SM FEW040 FEW075 SCT140 M04/M17 A2990 RMK AO2 PK WND 31030/1431 SLP149 VIRGA DSNT SW SHSN OMTNS DSNT W-NW T10441167 51027=

- **The same METAR coded in IWXXM format is shown on the following 5 slides (yes, 5):**

TAC vs. IWXXM Data (cont'd)

<iwxxm:METAR xmlns:aixm="http://www.aixm.aero/schema/5.1.1"
xmlns:iwxxm="http://icao.int/iwxxm/3.0"
xmlns:gml="http://www.opengis.net/gml/3.2"
xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:iwxxm-us="http://www.weather.gov/iwxxm-us/3.0"
xsi:schemaLocation="http://icao.int/iwxxm/3.0 http://schemas.wmo.int/iwxxm/3.0/iwxxm.xsd
http://www.weather.gov/iwxxm-us/3.0 https://nws.weather.gov/schemas/iwxxm-us/3.0/metarSpeci.xsd"
reportStatus="NORMAL" automatedStation="false"
permissibleUsage="OPERATIONAL"translationCentreName="NCEP Central Operations"
translationCentreDesignator="KWNO"
translationTime="2020-05-25T21:36:55Z"
translatedBulletinReceptionTime="2020-05-25T21:36:55Z"
translatedBulletinID="SAUS42KWBC210000"
gml:id="uuid.3dfa67a3-7065-4957-b397-b749bec0165b">
<iwxxm:issueTime>
<gml:TimeInstant gml:id="uuid.3fb76b3d-a3ed-49bf-8d6b-384346e061d6">
<gml:timePosition>2020-05-20T14:53:00Z</gml:timePosition>
</gml:TimeInstant>
</iwxxm:issueTime>

TAC vs. IWXXM Data (cont'd)

```
<iwxxm:aerodrome>
<aixm:AirportHeliport gml:id="uuid.e3564abe-39c4-4271-8c84-1c37b4caa2d3">
<aixm:timeSlice>
<aixm:AirportHeliportTimeSlice gml:id="uuid.a165b910-e61c-4f06-bc24-bd9a11e32ce9">
<gml:validTime/>
<aixm:interpretation>SNAPSHOT</aixm:interpretation>
<aixm:designator>KAPA</aixm:designator>
<aixm:name>DENVER/ARAPAHOE</aixm:name>
<aixm:locationIndicatorICAO>KAPA</aixm:locationIndicatorICAO>
<aixm:ARP>
<aixm:ElevatedPoint srsDimension="2" srsName="http://www.opengis.net/def/crs/EPSG/0/4326" axisLabels="Lat Long" gml:id="uuid.7c395f98-b4b7-4324-894b-4402e6b73493">
<gml:pos>39.57 -104.85</gml:pos>
</aixm:ElevatedPoint>
</aixm:ARP>
</aixm:AirportHeliportTimeSlice>
</aixm:timeSlice>
</aixm:AirportHeliport>
</iwxxm:aerodrome>
<iwxxm:observationTime xlink:href="#uuid.3fb76b3d-a3ed-49bf-8d6b-384346e061d6"/>
```

TAC vs. IWXXM Data (cont'd)

```
<iwxxm:observation>
<iwxxm:MeteorologicalAerodromeObservation gml:id="uuid.3ebbc7e6-6901-4959-98b9-5a8a93cc185c"
cloudAndVisibilityOK="false">
<iwxxm:airTemperature uom="Cel">-4.4</iwxxm:airTemperature>
<iwxxm:dewpointTemperature uom="Cel">-16.7</iwxxm:dewpointTemperature>
<iwxxm:qnh uom="hPa">1012.5</iwxxm:qnh>
<iwxxm:surfaceWind>
<iwxxm:AerodromeSurfaceWind variableWindDirection="false">
<iwxxm:meanWindDirection uom="deg">310</iwxxm:meanWindDirection>
<iwxxm:meanWindSpeed uom="[kn_i]">16</iwxxm:meanWindSpeed>
<iwxxm:windGustSpeed uom="[kn_i]">30</iwxxm:windGustSpeed>
<iwxxm:extension>
<iwxxm-us:AerodromePeakWind>
<iwxxm-us:windDirection uom="deg">310</iwxxm-us:windDirection>
<iwxxm-us:windSpeed uom="[kn_i]">30</iwxxm-us:windSpeed>
<iwxxm-us:timeOfOccurrence>
<gml:TimeInstant gml:id="uuid.71210b46-82dc-429c-9afc-4d6cf5de087f">
<gml:timePosition>2020-05-20T14:31:00Z</gml:timePosition>
</gml:TimeInstant>
</iwxxm-us:timeOfOccurrence>
</iwxxm-us:AerodromePeakWind>
</iwxxm:extension>
```

TAC vs. IWXXM Data (cont'd)

```
</iwxxm:AerodromeSurfaceWind>
</iwxxm:surfaceWind>
<iwxxm:visibility>
<iwxxm:AerodromeHorizontalVisibility>
<iwxxm:prevailingVisibility uom="m">10000</iwxxm:prevailingVisibility>
<iwxxm:prevailingVisibilityOperator>ABOVE</iwxxm:prevailingVisibilityOperator>
</iwxxm:AerodromeHorizontalVisibility>
</iwxxm:visibility>
<iwxxm:cloud>
<iwxxm:AerodromeCloud>
<iwxxm:layer>
<iwxxm:CloudLayer>
<iwxxm:amount xlink:href="http://codes.wmo.int/49-2/CloudAmountReportedAtAerodrome/FEW"/>
<iwxxm:base uom="[ft_i]">4000</iwxxm:base>
</iwxxm:CloudLayer>
</iwxxm:layer>
<iwxxm:layer>
<iwxxm:CloudLayer>
<iwxxm:amount xlink:href="http://codes.wmo.int/49-2/CloudAmountReportedAtAerodrome/FEW"/>
<iwxxm:base uom="[ft_i]">7500</iwxxm:base>
</iwxxm:CloudLayer>
```

TAC vs. IWXXM Data (cont'd)

```
</iwxxm:layer>
<iwxxm:layer>
<iwxxm:CloudLayer>
<iwxxm:amount xlink:href="http://codes.wmo.int/49-2/CloudAmountReportedAtAerodrome/SCT"/>
<iwxxm:base uom="[ft_i]">14000</iwxxm:base>
</iwxxm:CloudLayer>
</iwxxm:layer>
</iwxxm:AerodromeCloud>
</iwxxm:cloud>
<iwxxm:extension>
<Addendum xmlns="http://www.weather.gov/iwxxm-us/3.0">
<observingSystemType xlink:href="https://codes.nws.noaa.gov/FMH-1/ObservingSystemType/AO2"/>
<humanReadableText>VIRGA DSNT SWSHSN OMTNS DSNT W-NW</humanReadableText>
<seaLevelPressure uom="hPa">1014.9</seaLevelPressure>
<pressureTendency3hr uom="hPa">2.7</pressureTendency3hr>
<pressureTendencyCharacteristic3hr xlink:href="http://codes.wmo.int/bufr4/codeflag/0-10-063/1"/>
</Addendum>
</iwxxm:extension>
</iwxxm:MeteorologicalAerodromeObservation>
</iwxxm:observation>
</iwxxm:METAR>
```

Bandwidth Requirement Projection

1. IWXXM/XML message without compression is expected to be 68 times of current message formats used by AMHS. This is representative of what we can expect for SWIM exchanges.

2. For AMHS transport, the IWXXM message will be compressed. This will result in 8 times of the bandwidth required to carry TAC format.

3. As recommended by ICAO Annex X, States managing AFS should consider upgrading their respective bandwidth if the bandwidth used to support AFTN/AMHS exceeds 50% during peak hours.