



**International Civil Aviation Organization**

**THE SIXTH MEETING OF AERONAUTICAL  
TELECOMMUNICATION NETWORK (ATN)  
IMPLEMENTATION CO-ORDINATION GROUP  
OF APANPIRG (ATNICG/6)**



Seoul, Republic of Korea, 16 - 20 May 2011

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**Agenda Item 6: Applications**

**DISCUSSIONS ON XML BASED APPLICATIONS**

(Presented by the Secretariat)

**SUMMARY**

This paper presents outcome of the Ninth Meeting of the ASIA/PAC OPMET Management Task Force (OPMET/M TF/9) of the CNS/MET Sub-group of APANPIRG and the Sixth Meeting of ICAO AIS-AIM Implementation Task Force (AAITF/6). It also discusses the need to support XML based AIM and MET traffic by AMHS in the near future.

**1. INTRODUCTION**

1.1 The Ninth Meeting of the ASIA/PAC OPMET Management Task Force (OPMET/M TF/9) of the CNS/MET Sub-group of APANPIRG was held in Bangkok, Thailand, from 21 to 23 March 2011. The meeting was attended by 35 experts from Australia, Cambodia, China, Indonesia, Japan, Lao PDR, Malaysia, New Zealand, Philippines, Singapore, Thailand, United States, Viet Nam and ICAO.

1.2 The Sixth Meeting of ICAO AIS-AIM Implementation Task Force (AAITF/6) was held at ICAO Asia and Pacific Office from 15 to 17 March 2011. The meeting was attended by 59 experts from Australia, Cambodia, China, Hong Kong China, Macao China, Fiji, India, Indonesia, Japan, Lao PDR, Malaysia, Mongolia, Myanmar, Pakistan, Papua New Guinea, Philippines, Singapore, Sri Lanka, Thailand, United States, Viet Nam and IFALPA.

1.3 Both meetings discussed the requirements for exchange of XML based traffic or information.

## 2. DISCUSSIONS

### 2.1 **OPMET/M TF/9 update on XML coded OPMET information**

2.1.1 The meeting was informed of the 2010 Extraordinary Session of the WMO Commission for Basic Systems (CBS), held in Windhoek, Namibia from 17 to 24 November 2010. The ICAO observer ensured support, in principle, for the transition to the use of extensible markup language (XML) for OPMET information in the future net-centric environment. Milestones were reported in the CNS/MET SG/14 meeting which referenced section 2.4.1 and 2.4.2 of the report on ICAO attendance to the WMO Commission for Aeronautical Meteorology (CAEM)/Commission for Basic Systems (CBS) Expert Team on OPMET Data Representation meeting held in Paris, France on 26 October 2009 (<http://www.wmo.int/pages/prog/www/WDM/ET-ODR-2/Documents.html>). These milestones include pilot project conducted by WMO in 2009, possible endorsement of the future use of Weather Information Exchange Model (WXXM) by the planned conjoint ICAO/WMO MET/AIM Divisional Meeting in 2014 and the possible implementation of WXXM in 2016.

2.1.2 The meeting learned about the transit of XML-based OPMET messages over Air Traffic Service Message Handling System (AMHS), and by extension, over Aeronautical Fixed Telecommunication Network (AFTN). Determining parameters for the entry of this type of data into the AFTN/AMHS network as well as determining the impact of transit of data through this network will determine the capability of AFTN/AMHS for transmission of XML-based OPMET messages and provide feedback to WMO/ICAO regarding this capability. Due to the existing infrastructure of AFTN, the meeting noted that both technologies will need to co-exist for some time and would be done through AFTN/AMHS gateways. Current limitations on transmitting XML on AFTN include: full IA-5 character set not implemented in many States, line length capability limited to 69 characters and message size limitation of 1800 characters. These limitations are not associated with transmitting XML over AMHS. Due to these differences and the time duration both AFTN and AMHS are expected to co-exist, RODBs will need to accept either AFTN or AMHS data. The AFTN/AMHS gateways will provide the necessary format and character conversion required for these systems to operate in parallel. The following is expected from the AMHS gateway:

- convert all non-Annex 10 ASCII (ITA2) characters to “?” before passing to AFTN, if required by lack of support for full IA-5 character set;
- part messages of greater than 1800 characters before passing to AFTN, conversion of each IA5IRV character, if it is in lower case, into the equivalent upper case character; and
- folding of any line longer than 69 characters.

2.1.3 CNS requested the group to provide information necessary for implementation of XML, such as file size, target timeline and interface needed. Requirements would assist in planning implementation as well as continued testing (e.g. Hong Kong, China and the United States and Singapore). The meeting also noted that XML is commercial off-the-shelf package which should assist in implementation.

2.1.4 RODBs will consider optimizing the RODB structure in the APAC region considering global developments such as the implementation of XML. Recommendations for structural improvement of the RODB system should be raised in future OPMET/M TF meetings.

2.1.5 The OPMET/M TF/7 meeting in 2008 considered that new code (BUFR at that time) based format for the exchange of OPMET and noted the following:

- (1) Parts of the AFS network that have implemented AMHS will carry both “BUFR-coded” and character-based OPMET data. It will be necessary to distinguish between these types of data (for example, by destination address);
- (2) Parts of the AFS network that implement only AFTN will carry only character-based data;
- (3) In the event of failure in the AMHS network, because OPMET data will also be carried as character-based data on the AFTN network, the entire region will be able to receive the data through alternate paths and so there will be no problem; and
- (4) Until the entire AFS network is able to handle BUFR-coded data, it will be necessary to consider conversion between BUFR-coded and character-based data, or measures such as the simultaneous transmission of the same data in both BUFR and character formats.

## **2.2 AAITF/6 update on XML based AIM Information**

2.2.1 The meeting noted the progress made by EUROCONTROL and the United States Federal Aviation Administration (FAA) in the development of a technical specification for Digital NOTAM using Aeronautical Information Exchange Model (AIXM) version 5.1. The concept of Digital NOTAM was supported and some elements of the specification should be considered for inclusion in Amendment 38 of Annex 15 or another suitable document.

2.2.2 The group noted that the FAA and EUROCONTROL would continue to develop the specification and validate it through trials and pioneer implementations with initial operational availability from 2012.

### **2.2.3 Annex 15 Amendment 38**

With respect to the draft Annex 15, Amendment 38, the meeting noted:

- AIS-AIM Divisional Meeting is scheduled in 2014;
- a substantive chapter on digital services; and
- incorporate a requirement to enable digital data exchange (AICM/AIXM).

### **2.2.4 WebEx Conference with Eurocontrol on the AIXM 5.1 and Digital NOTAM**

The meeting had a teleconference with Mr. Eduard Porosnicu, EUROCONTROL, through the WebEx. The meeting was informed of the current development going on in Europe including the following topics:

- AIXM 5.1 objectives and scope;
- differences from AIXM 4.5;
- digital NOTAM; and
- current Status.

2.2.5 Discussion on AMHS to support XML based xNOTAM

There were further discussions with Mr. Eduard Porosnicu regarding the difference in size between a text NOTAM message and a Digital NOTAM message which is important for considerations by ATNICG. It was told that the Digital NOTAM is a deeply structured XML message. The compliance with the GML standard also contributes to growing the size of the message. The benefit is interoperability i.e. software which understands GML is able to understand the geographical/geometrical information contained in the Digital NOTAM message. It was further advised that on average, the Digital NOTAM encoded in AIXM 5.1 is 20 times larger than the equivalent ICAO text NOTAM sent by AFTN, when number of characters is counted. One of such examples provided by Eurocontrol is placed in Attachment to this paper. It was further discussed that larger size of Digital NOTAM should not be a real problem for AMHS transmissions on the ground. File size based on a normal NOTAM within 10-20 KB should not be a problem for a modern communication network. By comparison, it is also required to exchange static data, where the size of the file containing the changes for an AIRAC cycle AMDT is in the range of 10-50 MB which may be very changeling for exchange by AMHS network.

Inclusion, the AFS is expected to support xNOTAM using XML (planned in 2012 – 2016) and XML based OPMET (planned in 2012/2013).

**3. ACTION BY THE MEETING**

3.1 The meeting is invited to note the information provided in this paper and discuss how to support emerging XML based MET and AIM applications by AMHS.

3.2 Members of ATNICG are requested to coordinate with their counterpart in their Administrations for collection of information necessary for implementation of XML, such as file size, target timeline and interface needed. Understanding of the requirements would assist in planning implementation of XML based applications supported by AMHS.

3.3 States capable to do so are encouraged to conduct trials for transmitting XML based application over AMHS. The result of such trials conducted should be shared at meetings of ATN implementation Coordination Group and its working group meetings.

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**NOTAM message (476 characters):**

(A1064/07 NOTAMN  
Q) EKDK/QRCA/IV/BO /W /000/600/5606N01130E012  
A) EKDK B) 0711010800 C) 0711011100  
E) TEMPORARY RESTRICTED AREA (DANGER AREA WITHIN THE  
PORTION  
OF AIRSPACE OVER THE HIGH SEA) IS ESTABLISHED AS FOLLOWS  
NORTH OF SJAELLANDS ODDE:  
560028N 0111656E - 560643N 0111026E - 561500N 0112400E -  
561500N 0113600E -560112N 0114736E - 555730N 0113830E -  
560028N 0111656E.  
RELEVANT ATS UNITS REF. AIP DENMARK ENR 5.1 ITEM 3:  
AARHUS APP/TWR, ACC KOEBENHAVN.  
F) SFC G) 60000FT AMSL)

**Equivalent Digital NOTAM message (8526 characters):**

Note that this message also includes the text NOTAM message, but in a “tagged” form. See the information highlighted in yellow below. This is not mandatory needed in the Digital NOTAM encoding. It is just provided for convenience, to be used by legacy systems which are not able to process the pure digital information.

```
<?xml version="1.0" encoding="UTF-8"?>
<message:AIXMBasicMessage
xmlns:message="http://www.aixm.aero/schema/5.1/message"
xmlns:aixm="http://www.aixm.aero/schema/5.1"
xmlns:event="http://www.aixm.aero/schema/5.1/event"
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:gmd="http://www.isotc211.org/2005/gmd"
xmlns:gco="http://www.isotc211.org/2005/gco"
xsi:schemaLocation="http://www.aixm.aero/schema/5.1/message
message/AIXM_BasicMessage.xsd" gml:id="M00001">
  <message:hasMember>
    <event:Event gml:id="uuid.ceaf5141-3d55-4769-88f2-a578189f27ff">
      <gml:identifier codeSpace="urn:uuid:">ceaf5141-3d55-4769-88f2-
a578189f27ff"</gml:identifier>
      <event:timeSlice>
        <event:EventTimeSlice gml:id="e01-1">
          <gml:validTime>
            <!-- Note that this time should be the same as for the associated feature, see
element with gml:id=AS01_TS01 -->
            <gml:TimePeriod gml:id="e01-2">
              <gml:beginPosition>2009-11-07T08:00:00</gml:beginPosition>
```

```

    <gml:endPosition>2009-11-17T17:00:00</gml:endPosition>
  </gml:TimePeriod>
</gml:validTime>
<aixm:interpretation>BASELINE</aixm:interpretation>
<aixm:sequenceNumber>1</aixm:sequenceNumber>
<aixm:featureLifetime>
  <gml:TimePeriod gml:id="e01-3">
    <gml:beginPosition>2009-11-07T08:00:00</gml:beginPosition>
    <gml:endPosition>2009-11-17T17:00:00</gml:endPosition>
  </gml:TimePeriod>
</aixm:featureLifetime>
<event:name>TEMPORARY RESTRICTED AREA NORTH OF
SJAELLANDS ODDE</event:name>
<event:encoding>DIGITAL</event:encoding>
<event:revision>2009-11-06T15:30:00</event:revision>
<event:textNOTAM>
  <event:NOTAM gml:id="e01-4">
    <event:series>M</event:series>
    <event:number>0667</event:number>
    <event:year>2009</event:year>
    <event:type>N</event:type>
    <event:issued>2009-11-07T04:00:00</event:issued>
    <event:selectionCode>QRRCA</event:selectionCode>
    <event:traffic>IV</event:traffic>
    <event:purpose>BO</event:purpose>
    <event:scope>W</event:scope>
    <event:minimumFL>000</event:minimumFL>
    <event:maximumFL>600</event:maximumFL>
    <event:coordinates>5606N01130E</event:coordinates>
    <event:radius>012</event:radius>
    <event:location>EKDK</event:location>
    <event:effectiveStart>0911070800</event:effectiveStart>
    <event:effectiveEnd>0911171700</event:effectiveEnd>
    <event:schedule>DAILY 0800-1700</event:schedule>
    <event:text>TEMPORARY RESTRICTED AREA ESTABLISHED
AS FOLLOWS NORTH OF SJAELLANDS ODDE:
560028N 0111656E - 560643N 0111026E - 561500N 0112400E - 561500N
0113600E -560112N 0114736E - 555730N 0113830E - 560028N 0111656E
FROM GND TO 60000 FT MSL.
RELEVANT ATS UNITS REF. AIP DENMARK ENR 5.1 ITEM 3: AARHUS
APP/TWR, ACC KOEBENHAVN</event:text>
    <event:lowerLimit>GND</event:lowerLimit>
    <event:upperLimit>60 000 FT MSL</event:upperLimit>
    <event:publisherNOF xlink:href="urn:faa:gov:nasr:a82b3fc9-4aa4-4e67-
8def-aaea1ac595j" xlink:title="EKCHYNYX"/>
  </event:NOTAM>
</event:textNOTAM>
</event:EventTimeSlice>
</event:timeSlice>
</event:Event>

```

```

</message:hasMember>
<message:hasMember>
  <aixm:Airspace gml:id="uuid.74efb6ba-a52a-46c0-a16b-03860d356882">
    <gml:identifier codeSpace="urn:uuid:">74efb6ba-a52a-46c0-a16b-
03860d356882</gml:identifier>
    <aixm:timeSlice>
      <aixm:AirspaceTimeSlice gml:id="AS01_TS01">
        <gml:validTime>
          <gml:TimePeriod gml:id="AS01_TS02_TP01">
            <gml:beginPosition>2009-11-07T08:00:00</gml:beginPosition>
            <gml:endPosition>2009-11-17T17:00:00</gml:endPosition>
          </gml:TimePeriod>
        </gml:validTime>
        <aixm:interpretation>BASELINE</aixm:interpretation>
        <aixm:sequenceNumber>1</aixm:sequenceNumber>
        <aixm:type>R</aixm:type>
        <aixm:geometryComponent>
          <aixm:AirspaceGeometryComponent gml:id="GC01">
            <aixm:theAirspaceVolume>
              <aixm:AirspaceVolume gml:id="AV01">
                <aixm:upperLimit uom="FT">60000</aixm:upperLimit>
                <aixm:upperLimitReference>MSL</aixm:upperLimitReference>
                <aixm:lowerLimit uom="FT">GND</aixm:lowerLimit>
                <aixm:lowerLimitReference>MSL</aixm:lowerLimitReference>
                <aixm:horizontalProjection>
                  <aixm:Surface gml:id="S01"
srsName="urn:ogc:def:crs:EPSG::4326" srsDimension="2">
                    <gml:patches>
                      <gml:PolygonPatch>
                        <gml:exterior>
                          <gml:LinearRing>
                            <gml:posList>11.282222 56.007778 11.173889 56.111944
11.4 56.25 11.6 56.25 11.793333 56.02 11.793333 56.958333 11.282222
56.007778</gml:posList>
                            </gml:LinearRing>
                          </gml:exterior>
                        </gml:PolygonPatch>
                      </gml:patches>
                    </aixm:Surface>
                  </aixm:horizontalProjection>
                </aixm:AirspaceVolume>
              </aixm:theAirspaceVolume>
            </aixm:AirspaceGeometryComponent>
          </aixm:geometryComponent>
        <aixm:activation>
          <aixm:AirspaceActivation gml:id="AA01">
            <aixm:timeInterval>
              <aixm:Timesheet gml:id="TS01">
                <aixm:day>ANY</aixm:day>
                <aixm:startTime>08:00</aixm:startTime>
              </aixm:Timesheet>
            </aixm:timeInterval>
          </aixm:AirspaceActivation>
        </aixm:activation>
      </aixm:AirspaceTimeSlice>
    </aixm:timeSlice>
  </aixm:Airspace>
</message:hasMember>

```

```

    <aixm:endTime>17:00</aixm:endTime>
  </aixm:Timesheet>
</aixm:timeInterval>
<aixm:annotation>
  <aixm:Note gml:id="NOT01">
    <aixm:propertyName>status</aixm:propertyName>
    <aixm:purpose>REMARK</aixm:purpose>
    <aixm:translatedNote>
      <aixm:LinguisticNote gml:id="LN01">
        <aixm:note>RELEVANT ATS UNITS REF. AIP DENMARK
ENR 5.1 ITEM 3: AARHUS APP/TWR, ACC KOEBENHAVN</aixm:note>
      </aixm:LinguisticNote>
    </aixm:translatedNote>
  </aixm:Note>
</aixm:annotation>
<aixm:status>ACTIVE</aixm:status>
<aixm:levels>
  <aixm:AirspaceLayer gml:id="AL02">
    <aixm:upperLimit uom="OTHER">CEILING</aixm:upperLimit>
    <aixm:lowerLimit uom="OTHER">FLOOR</aixm:lowerLimit>
  </aixm:AirspaceLayer>
</aixm:levels>
</aixm:AirspaceActivation>
</aixm:activation>
<aixm:activation>
  <aixm:AirspaceActivation gml:id="AA02">
    <aixm:timeInterval>
      <aixm:Timesheet gml:id="TS02">
        <aixm:day>ANY</aixm:day>
        <aixm:startTime>00:00</aixm:startTime>
        <aixm:endTime>08:00</aixm:endTime>
      </aixm:Timesheet>
    </aixm:timeInterval>
    <aixm:timeInterval>
      <aixm:Timesheet gml:id="TS03">
        <aixm:day>ANY</aixm:day>
        <aixm:startTime>17:00</aixm:startTime>
        <aixm:endTime>24:00</aixm:endTime>
      </aixm:Timesheet>
    </aixm:timeInterval>
    <aixm:status>INACTIVE</aixm:status>
  </aixm:AirspaceActivation>
</aixm:activation>
<aixm:annotation>
  <aixm:Note gml:id="NOT02">
    <aixm:propertyName>geometryComponent</aixm:propertyName>
    <aixm:purpose>REMARK</aixm:purpose>
    <aixm:translatedNote>
      <aixm:LinguisticNote gml:id="LN02">
        <aixm:note>NORTH OF SJAELLANDS ODDE</aixm:note>
      </aixm:LinguisticNote>
    </aixm:translatedNote>
  </aixm:Note>
</aixm:annotation>

```



```

        </aixm:LinguisticNote>
        </aixm:translatedNote>
    </aixm:Note>
</aixm:annotation>
<aixm:extension>
    <!-- This associates the TimeSlice with the Event that has caused it -->
    <event:AirspaceExtension gml:id="ex01">
        <event:theEvent xlink:href="urn:uuid:ceaf5141-3d55-4769-88f2-
a578189f27ff"/>
        </event:AirspaceExtension>
    </aixm:extension>
</aixm:AirspaceTimeSlice>
</aixm:timeSlice>
</aixm:Airspace>
</message:hasMember>
<message:hasMember>
    <!-- Here are the details about the publishing NOF Unit, included for convenience
-->
    <aixm:Unit gml:id="uuid.a82b3fc9-4aa4-4e67-8def-aaea1ac595j">
        <gml:identifier codeSpace="urn:uuid:">a82b3fc9-4aa4-4e67-8def-
aaea1ac595j</gml:identifier>
        <aixm:timeSlice>
            <aixm:UnitTimeSlice gml:id="UNIT01_TS01">
                <gml:validTime>
                    <gml:TimePeriod gml:id="UNIT01_TS01_TP01">
                        <gml:beginPosition>2009-11-07T04:00:00</gml:beginPosition>
                        <gml:endPosition indeterminatePosition="unknown"/>
                    </gml:TimePeriod>
                </gml:validTime>
                <aixm:interpretation>SNAPSHOT</aixm:interpretation>
                <aixm:name>DENMARK NOF</aixm:name>
                <aixm:type>NOF</aixm:type>
                <aixm:contact>
                    <aixm:ContactInformation gml:id="CI01">
                        <aixm:networkNode>
                            <aixm:OnlineContact gml:id="CI02">
                                <aixm:network>AFTN</aixm:network>
                                <aixm:linkage>EKCHYNYX</aixm:linkage>
                            </aixm:OnlineContact>
                        </aixm:networkNode>
                    </aixm:ContactInformation>
                </aixm:contact>
            </aixm:UnitTimeSlice>
        </aixm:timeSlice>
    </aixm:Unit>
</message:hasMember>
</message:AIXMBasicMessage>

```