



International Civil Aviation Organization

**THE EIGHTH MEETING OF AERONAUTICAL
TELECOMMUNICATION NETWORK (ATN)
IMPLEMENTATION CO-ORDINATION GROUP
OF APANPIRG (ATNICG/8)**

Jakarta, Indonesia, 18 - 21 March 2013



Ministry Of Transportation
Republic of Indonesia

Agenda Item 9: Review and update Subject/Tasks List and Action Items List

**REPORT ON REVIEW OF TESTING OF XML BASED OPMET DELIVERY OVER AMHS
INVOLVING THE UNITED STATES, SINGAPORE AND UNITED KINGDOM**

(Presented by United States and Singapore)

SUMMARY

This information paper presents the review of testing the delivery of XML-based OPMET messages over AMHS between the United States of America, Singapore and the United Kingdom.

This paper relates to –

Strategic Objective:

C: Environmental Protection and Sustainable Development of Air Transport – Foster harmonized and economically viable development of international civil aviation that does not unduly harm the environment

Global Plan Initiatives:

GPI-17 Data link applications
GPI-19 Meteorological Systems
GPI-22 Communication infrastructure

1. INTRODUCTION

1.1 In the last ATNICG/WG11 held from 26 – 28 September 2012 in Bangkok, Thailand, USA updated the meeting that the plan for testing the delivery of XML-based OPMET messages over AMHS between the United States of America, Singapore and the United Kingdom had been rescheduled for November 2012 as a result of the London summer Olympics dictated that the activity be deferred. Four proposed test configurations over the operational AMHS network was presented to the meeting. Five different test messages extracted from FAA/EUROCONTROL WXXM 1.1 Primer (February 2010) will be used for the testing. The intent of the test is to simulate a tripartite configuration spanning all three regions. This paper serves to provide an update of the current testing process.

2. TESTING

2.1 This test activity was jointly developed, planned and conducted by representatives of the USA, SIN and the UK. Test procedures and test data used were incorporated and adapted from previous tri-partite testing between USA, SIN and HKG. Further to that, MET in SIN has agreed to assist to provide sample OPMET data in XML format. This can be found in **Attachment 1A**.

2.2 It has been agreed by all three states that the operational AMHS network will be used for the test messages, with all proper precautions being taken to ensure no impact to operational traffic. This will eliminate the need to establish test connections for this activity, which is a time-consuming task that typically requires significant staff resources.

2.3 For integrity and security purposes, only test addresses and operator positions were entered for these test messages. However, there was still a need to make some slight configuration changes on our system to affect the routing for these test messages. (for instance, US highlighted that Atlanta AMHS would not normally route SIN-destined messages to the UK)

2.4 Testing proceeded in November and continued in Jan to February 2013. There were some observations made and this is discussed in Para 5 of this paper.

3. TEST CONFIGURATIONS

3.1 Testing was conducted using the test configurations pictured in **Attachment 1B**.

4. TEST MESSAGES

4.1 Testing was conducted using 6 different test messages as well as test messages created by MET in SIN to simulate actual data send and received to and from SIN – US terminals.

4.2 Message 1 is a simple, manually created message containing a small subset of the ASCII character set. Following successful exchange of this data, messages 2-6 will be introduced to the data set. These messages were extracted from the WXXM Primer (1) as well as from MET in SIN and contained more realistic data with expanded use of the ASCII character set. Details regarding these messages are provided in **Attachment 1A**.

5. OBSERVATIONS AND TEST RESULTS

5.1 Testing was conducted using the configurations depicted and the test messages agreed. The following observations were made:

5.2 The intent of this testing phase was to establish end-to-end AMHS interoperability with an intermediate system (ie UK) providing the routing function to facilitate the exchange of XML-based OPMET messages. This phase is still considered to be on-going. Most of the messages were successfully exchanged between each combination of AFTN terminal and AMHS UA as described pictorially in Attachment 1B. There were some issues that we need to investigate further such as NDR received as well as AFTN terminals not receiving those messages as intended. For AMHS terminals to AMHS terminals, no adverse observations were made.

5.3 During this test phase, each party in the testing captured and logged the incoming test messages and reported the results via email to one another. Some testing was able to be conducted by each party establishing system connectivity during their daytime hours and sending test messages to the other end, who would then examine the incoming data upon beginning their own working day. (In this manner, minimal disruption to each party’s regular work activity was achieved.)

5.4 Other than the observations made as mentioned above and upon further testing to confirm those findings, the parties involved in this activity generally agree that AMHS provides a suitable platform for the exchange of XML-based OPMET data.

6. ACTION BY THE MEETING

6.1 The meeting is invited to:

- a) note on the testing progress, observations during the testing and test results; and
- b) provide comments

ATTACHMENT 1A

Test Message #1: 782 Characters

Note: This message is approximately 782 characters and contains an overlong line.

THIS IS TEST MESSAGE #1 - OVERLONG LINE -
PLEASE DISREGARD

```
<?xml version="1.0" encoding="UTF-8"?>
<dataroot xmlns:od="urn:schemas-microsoft-com:officedata"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="test%202.xsd" generated="2009-06-22T11:03:38">
<M1>
<Sequence>307051</Sequence>
<F0>1</F0>
<M2>
<F0>1</F0>
<F1>1</F1>
<E0>EBBR</E0>
<E1>METAR</E1>
<E6>250</E6>
<E11>10</E11>
<E19>25</E19>
<E20>15</E20>
<E22>1025</E22>
<E23>CAVOK</E23>
<M3>
<F1>1</F1>
<F2>1</F2>
<E0>2009</E0>
<E1>06</E1>
<E2>22</E2>
</M3>
<M4>
<F1>1</F1>
<F3>1</F3>
<E0>08</E0>
<E1>50</E1>
</M4>
</M2>
<M22>
<F0>1</F0>
<F21>1</F21>
<M23>
<F21>1</F21>
<F22>1</F22>
<E0>NOSIG</E0>
</M23>
</M22>
</M1>
</dataroot>
END OF TEST MESSAGE
```

Test Message #2: 2505 Characters

Note: This message is extracted from the WXXM Primer, paragraph 4.2.1.

```
<?xml version="1.0" encoding="UTF-8"?>
<wx:FeatureCollection gml:id="id0"
xmlns:wx="http://www.eurocontrol.int/wx/1.1"
xmlns:om="http://www.opengis.net/om/1.0/gml32"
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"
xsi:schemaLocation="http://www.eurocontrol.int/wx/1.1 ../schemas/1.1/wx/wx.xsd">

  <!--
  Weather feature collection containing a single observation whose result
  is a PointCoverage containing air_temperature, dewpoint, and visibility
  measurements.
  -->
  <wx:featureMember>

    <wx:Observation gml:id="id1">
      <om:samplingTime>
        <gml:TimePeriod gml:id="id2">
          <gml:beginPosition>20071107T150708Z</gml:beginPosition>
          <gml:endPosition>20071107T150708Z</gml:endPosition>
        </gml:TimePeriod>
      </om:samplingTime>

      <om:procedure xlink:href="urn:fdc.noaa.gov:Sensor:ASOS"/>

      <!--
      'Parent' observed property in this example is 'weather'
      More specific observed properties described in the range
      portion of the coverage result.
      -->

      <om:observedProperty xlink:href="http://wmo.org/ont/wx/1.1/wx.owl#weather"/>

      <!--
      Feature of interest in this case is the city of Boston.
      -->
      <om:featureOfInterest>
        <wx:AreaOfInterest gml:id="id3">
          <gml:description>Boston, Massachusetts</gml:description>
          <!-- Following GML spec example w/respect to splitting of URN for codeSpace attr
          below -->
          <gml:identifier
          codeSpace="urn:fdc.noaa.gov:AreaOfInterest:City:">BOS</gml:identifier>
          <gml:name>BOS</gml:name>
          <gml:location>
            <gml:Point gml:id="id4">
              <gml:pos>45.20 -77.02</gml:pos>
            </gml:Point>
          </gml:location>
        </wx:AreaOfInterest>
      </om:featureOfInterest>

      <om:result>
```

```
<wx:PointCoverage gml:id="id6">
  <wx:domainSet>
    <wx:PointDomain gml:id="id7">
      <wx:time>20071107T150708Z</wx:time>
      <wx:location>45.20 -77.02</wx:location>
    </wx:PointDomain>
  </wx:domainSet>
  <gml:rangeSet>
    <gml:ValueArray gml:id="id8">
      <gml:valueComponent
xlink:href="http://wmo.org/ont/wx/1.1/wx.owl#air_temperature">
        <gml:Quantity uom="deg">30.0</gml:Quantity>
      </gml:valueComponent>
      <gml:valueComponent
xlink:href="http://wmo.org/ont/wx/1.1/wx.owl#dewpoint">
        <gml:Quantity uom="deg">25.0</gml:Quantity>
      </gml:valueComponent>
      <gml:valueComponent
xlink:href="http://wmo.org/ont/wx/1.1/wx.owl#visibility">
        <gml:Category>clear</gml:Category>
      </gml:valueComponent>
    </gml:ValueArray>
  </gml:rangeSet>
</wx:PointCoverage>
</om:result>

</wx:Observation>

</wx:featureMember>
</wx:FeatureCollection>
```

Test Message #3: 1325 Characters

Note: This message is extracted from the WXXM Primer, paragraph 4.3.1.

```
<?xml version="1.0" encoding="UTF-8"?>
<wx:Observation
xmlns:avwx="http://www.eurocontrol.int/avwx/1.1"
xmlns:wx="http://www.eurocontrol.int/wx/1.1"
xmlns:om="http://www.opengis.net/om/1.0/gml32"
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"
gml:id="id0">

<!--
Sample of a simple stand-alone Runway weather observation with
RVR information.
-->

  <om:samplingTime>
    <gml:TimeInstant gml:id="id2">
      <gml:timePosition>2008-11-04T12:00:00Z</gml:timePosition>
    </gml:TimeInstant>
  </om:samplingTime>
  <om:procedure xlink:href="urn:fdc.noaa.gov:Sensor:WeatherStation:01234"/>
  <om:observedProperty xlink:href="wxont:runwayWeather"/>
  <om:featureOfInterest>
    <!-- Runway feature. Stand-in for AIXM Runway class -->
    <avwx:Runway gml:id="id4">
      <gml:identifier codeSpace="urn:icao:code:Aerodrome:Runway:DEN">20A</gml:identifier>
      <avwx:runwayDesignator>20A</avwx:runwayDesignator>
    </avwx:Runway>
  </om:featureOfInterest>

  <om:result>
    <avwx:RunwayWx gml:id="id6">
      <avwx:rvr>
        <avwx:RVR gml:id="id8">
          <avwx:range uom="NM">6</avwx:range>
          <avwx:rangeVariesTo uom="NM">10</avwx:rangeVariesTo>
          <avwx:pastTendency>NO CHANGE</avwx:pastTendency>
        </avwx:RVR>
      </avwx:rvr>
    </avwx:RunwayWx>
  </om:result>
</wx:Observation>
```

Agenda Item 9

18/03/13

Test Message #4: 2,709 Characters METAR Message

Note: This message is extracted from the Singapore MET Services.

```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<avwx:METAR xmlns:avwx="http://www.eurocontrol.int/avwx/1.1"
xmlns:gml="http://www.opengis.net/gml/3.2" xmlns:om="http://www.opengis.net/om/1.0/gml32"
xmlns:wx="http://www.eurocontrol.int/wx/1.1" xmlns:wxont="http://wmo.int/ontologies/wx.owl#"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
gml:id="id0">
  <avwx:rawText>METAR WSSS 150400Z 22005KT 190V270 2500 R20R/1800D R20C/1400U +SHRA
FEW010 FEW015CB BKN017TCU 26/25 Q1012 BECMG FM0415 TL0430 6000 NSW</avwx:rawText>
  - <!-- Aerodrome weather Observation -->
  <avwx:aerodromeWxObservation>
  <wx:Observation gml:id="id6">
  <om:samplingTime>
  <gml:TimeInstant gml:id="id8">
  <gml:TimePosition>20121115T040000Z</gml:TimePosition>
  </gml:TimeInstant>
  </om:samplingTime>
  <om:procedure xlink:href="urn:fdc:faa.gov:Sensor:WeatherStation:48698" />
  <om:observedProperty xlink:href="http://www.eurocontrol.int/ont/avwx/1.1/wx.owl#AerodromeWx" />
  <om:featureOfInterest xlink:href="#id2" />
  <om:result>
  <avwx:AerodromeWx gml:id="id10">
  <avwx:airPressure uom="mBar">Q1011</avwx:airPressure>
  <avwx:airTemperature uom="C">26</avwx:airTemperature>
  <avwx:dewpointTemperature uom="C">25</avwx:dewpointTemperature>
  <avwx:verticalVisibility uom="NM">2</avwx:verticalVisibility>
  <avwx:windDirection uom="deg">VRB</avwx:windDirection>
  <avwx:horizontalVisibility gml:id="hv1">
  <avwx:minimumVisibility uom="NM">5</avwx:minimumVisibility>
  <avwx:directionMinimum>NW</avwx:directionMinimum>
  </avwx:horizontalVisibility>
  <avwx:windSpeed uom="kt">02</avwx:windSpeed>
  <avwx:qnh uom="mBar">Q1011</avwx:qnh>
  <avwx:qfe uom="mBar">-</avwx:qfe>
  <avwx:cloudCondition gml:id="cc1">
  <wx:base uom="ft">1000</wx:base>
  <wx:cloudType>CB</wx:cloudType>
  </avwx:cloudCondition>
  <avwx:cloudCondition gml:id="cc2">
  <wx:base uom="ft">1500</wx:base>
  <wx:cloudType>TCU</wx:cloudType>
  </avwx:cloudCondition>
  <avwx:seaWx>
  <avwx:SeaWx gml:id="id18">
  <avwx:surfaceTemperature uom="C">-</avwx:surfaceTemperature>
  <avwx:seaState>-</avwx:seaState>
  </avwx:SeaWx>
  </avwx:seaWx>
  </avwx:AerodromeWx>
  </om:result>
  </wx:Observation>
  </avwx:aerodromeWxObservation>
  <avwx:appliesTo>
  <avwx:Aerodrom gml:id="id2">
  <gml:identifier codeSpace="urn:icao:code:Aerodrome:">SIN</gml:identifier>
```



```
<gml:name>SIN</gml:name>  
<gml:location>  
<gml:Point gml:id="id4" srsDimension="3" srsName="urn:ogc:crs:WSSS:48698">  
<gml:pos>1.359 - 103.989</gml:pos>  
</gml:Point>  
</gml:location>  
</avwx:Aerodrom>  
</avwx:appliesTo>  
<avwx:stationId codeSpace="urn:icao:code:weatherStation:">WSSS</avwx:stationId>  
<avwx:automated>true</avwx:automated>  
<avwx:missing>false</avwx:missing>  
</avwx:METAR>
```

Agenda Item 9

18/03/13

Test Message #5: 1,703 Characters AIREP_Report

Note: This message is extracted from the Singapore MET Services.

```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<avwx:AIREP xmlns:avwx="http://www.eurocontrol.int/avwx/1.1"
xmlns:gml="http://www.opengis.net/gml/3.2" xmlns:om="http://www.opengis.net/om/1.0/gml32"
xmlns:wx="http://www.eurocontrol.int/wx/1.1" xmlns:wxont="http://www.wmo.int/ontologies/wx.owl"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
gml:id="id0">
<avwx:process>
<wx:ReportProcess gml:id="rp1">
<wx:system>
<wx:System gml:id="SIN">
<gml:name codeSpace="urn:fdc:gov:faa:wsss:Circuit:Id">SIN</gml:name>
</wx:System>
</wx:system>
<wx:system>
<wx:System gml:id="wsss">
<gml:name codeSpace="urn:fdc:gov:faa:System:Id">WSSS</gml:name>
</wx:System>
</wx:system>
</wx:ReportProcess>
</avwx:process>
<avwx:rawText>AXM5111 0415N 10935E 0330 F330 MS37 095/18KT</avwx:rawText>
<avwx:airspaceWxObservation>
<wx:Observation gml:id="id6">
<om:procedure xlink:href="urn:fdc:icao:procedure:AircraftReport" />
<om:observedProperty xlink:href="http://wmo.eurocontrol.int/ont/avwx/1.1/wx.owl#AirspaceWx" />
<om:featureOfInterest>
<avwx:Airspace gml:id="id4">
<gml:location>
<gml:Point gml:id="id5" srsName="run:ogc:def:crs:WSSS::48698">
<gml:pos>0415N 10935E</gml:pos>
</gml:Point>
</gml:location>
</avwx:Airspace>
</om:featureOfInterest>
<om:result>
<avwx:AirSpaceWx gml:id="id10">
<avwx:FlightInfo>
<avwx:FlightNo>AXM5194</avwx:FlightNo>
<avwx:FlightLevel>MS37</avwx:FlightLevel>
<avwx:ReportTime>0330</avwx:ReportTime>
</avwx:FlightInfo>
<avwx:airTemperature uom="C">095</avwx:airTemperature>
<avwx:windSpeed uom="KT">18</avwx:windSpeed>
</avwx:AirSpaceWx>
</om:result>
</wx:Observation>
</avwx:airspaceWxObservation>
</avwx:AIREP>
```

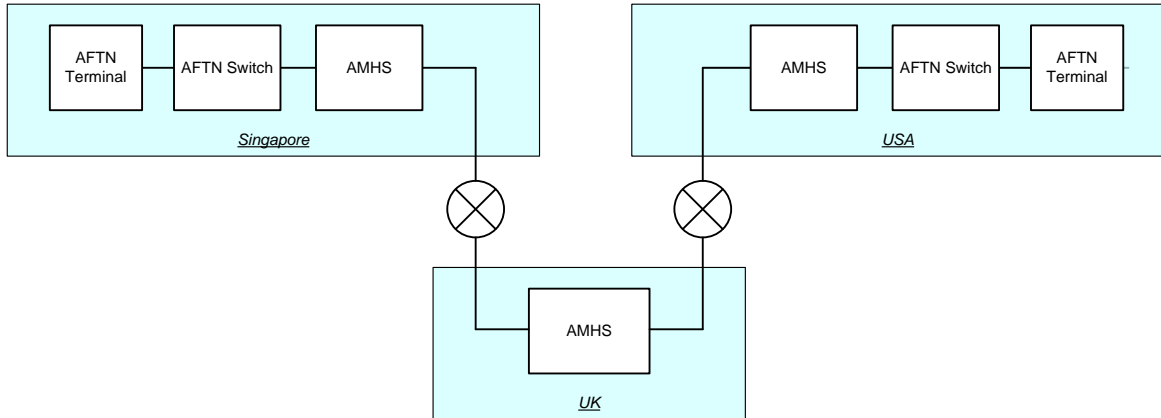
Test Message #6: 2,039 Characters TAF Message

Note: This message is extracted from the Singapore MET Services.

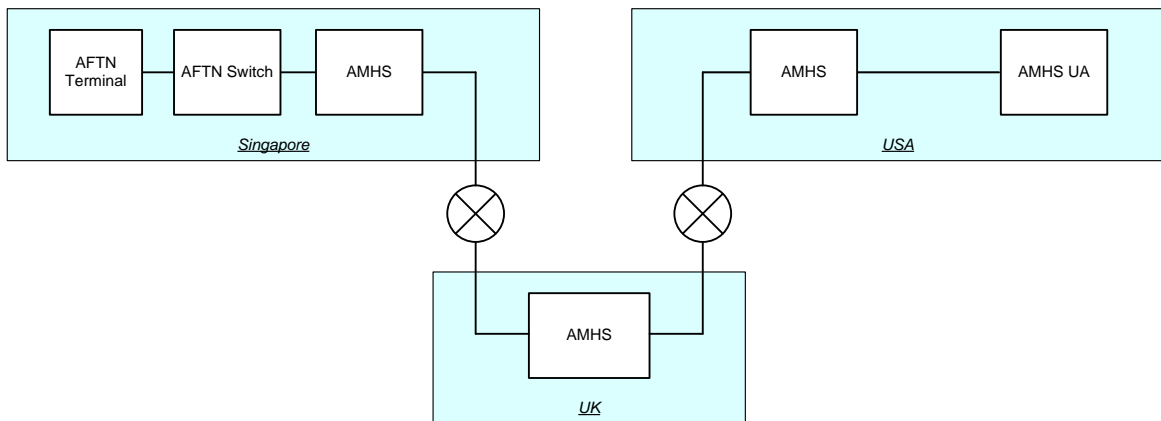
```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<avwx:METAR xmlns:avwx="http://www.eurocontrol.int/avwx/1.1"
xmlns:gml="http://www.opengis.net/gml/3.2" xmlns:om="http://www.opengis.net/om/1.0/gml32"
xmlns:wx="http://www.eurocontrol.int/wx/1.1" xmlns:wxont="http://wmo.int/ontologies/wx.owl#"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
gml:id="id0">
  <avwx:rawText>TAF WSSS 150500Z 1506/1612 VRB05KT 9999 FEW018CB SCT020 TEMPO
1605/1609 3000 TSRA FEW012CB BKN015</avwx:rawText>
  <!-- Aerodrome weather Observation -->
  <avwx:aerodromeWxObservation>
    <wx:Observation gml:id="id6">
      <om:samplingTime>
        <gml:TimeInstant gml:id="id8">
          <gml:TimePosition>20121115T050000Z</gml:TimePosition>
          </gml:TimeInstant>
        </om:samplingTime>
        <om:procedure xlink:href="urn:fdc:faa.gov:Sensor:WeatherStation:48698" />
        <om:observedProperty xlink:href="http://www.eurocontrol.int/ont/avwx/1.1/wx.owl#AerodromeWx" />
        <om:featureOfInterest xlink:href="#id2" />
      </om:result>
      <avwx:AerodromeWx gml:id="id10">
        <avwx:Visibility>9999</avwx:Visibility>
        <avwx:windDirection uom="deg">VRB</avwx:windDirection>
        <avwx:windSpeed uom="kt">05</avwx:windSpeed>
        <avwx:cloudCondition gml:id="cc1">
          <wx:base uom="ft">1800</wx:base>
          <wx:cloudType>CB</wx:cloudType>
        </avwx:cloudCondition>
        <avwx:cloudCondition gml:id="cc2">
          <wx:base uom="ft">2000</wx:base>
          <wx:cloudType>-</wx:cloudType>
        </avwx:cloudCondition>
      </avwx:AerodromeWx>
    </om:result>
  </wx:Observation>
</avwx:aerodromeWxObservation>
<avwx:appliesTo>
  <avwx:Aerodrom gml:id="id2">
    <gml:identifier codeSpace="urn:icao:code:Aerodrome:">SIN</gml:identifier>
    <gml:name>SIN</gml:name>
  </avwx:Aerodrom>
  <gml:location>
    <gml:Point gml:id="id4" srsDimension="3" srsName="urn:ogc:crs:WSSS:48698">
      <gml:pos>1.359 - 103.989</gml:pos>
    </gml:Point>
  </gml:location>
</avwx:Aerodrom>
</avwx:appliesTo>
  <avwx:stationId codeSpace="urn:icao:code:weatherStation:">WSSS</avwx:stationId>
  <avwx:automated>true</avwx:automated>
  <avwx:missing>false</avwx:missing>
</avwx:METAR>
```

ATTACHMENT 1B

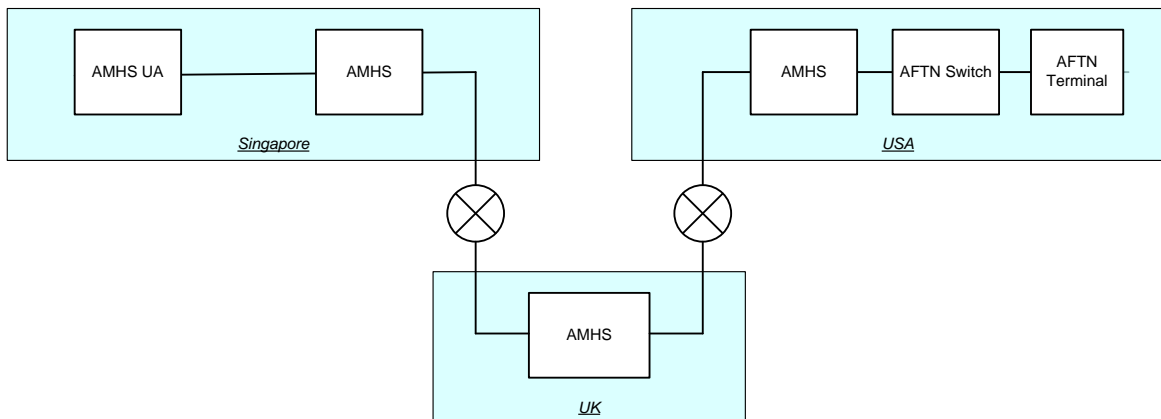
Configuration #1: Message Exchange Between SIN AFTN Terminal and USA AFTN Terminal



Configuration #2: Message Exchange Between SIN AFTN Terminal and USA AMHS UA UK



Configuration #3: Message Exchange Between SIN AMHS UA and USA AFTN Terminal UK



Configuration #4: Message Exchange Between SIN AMHS UA and USA AMHS UA UK

