# ULTRA ELECTRONICS

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**ABSTRACT**

This document describes DATEX II Publications that are produced by the Highways Agency Meteorological Subsystem. The Highways Agency operates a Meteorological Subsystem at each of its seven regional control centres (RCCs). The RCCs control traffic within the UK / England motorway network.

The publications are available to registered users at http://www.met.halogenonline.co.uk.

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## LIST OF CONTENTS

# 1. INTRODUCTION

## 1.1 SCOPE OF DOCUMENT

This document is intended to provide enough information regarding DATEX II publications to allow subscribers to set up receiver applications with which the publications can be received and processed.

Information regarding the publication content and examples of the data they may contain are laid out within the document for this purpose.

## 1.2 INTENDED AUDIENCE

This document is intended to be a guide for all potential subscribers to the DATEX II publications feed.

## 1.3 DOCUMENT STRUCTURE

The structure of this document is as follows:

a) Section 1, this section, details the document scope and structure.

b) Section 2 gives an overview of the Meteorological Subsystem.

c) Section 3 explains the general format of DATEX publications, the method by which they are published and their locations, and describes the publications in detail.

d) Section 4 gives XML examples of the Highways Agency Meteorological Subsystem DATEX II feed.

# 2. METEOROLOGICAL SUBSYSTEM OVERVIEW

## 2.1 PURPOSE

The primary purpose of the Meteorological (MET) Subsystem is to help Motorway Control Offices provide traffic management, under adverse weather conditions, to warn of potential hazards and thereby improve safety for all road users.

The MET Subsystem sets predetermined traffic plans in response to input from sensors measuring visibility and wind speed. Motorists can be warned in advance of poor driving conditions via text on message signs and advisory speed restrictions on matrix signals.

As the conditions change, the messages, advisory speed restrictions and the area covered change with them, so the road user receives clear and consistent information.

## 2.2 FUNCTIONS

The main functions performed by the MET Subsystem are as follows:

a) it monitors and collects measurements such as visibility ranges and wind speeds and direction from MET detectors which reside on the NMCS network or a Third Party Data System;

b) it processes measurements from MET detectors and generates alerts to inform operators of the changing meteorological conditions if necessary;

c) it generates signal and sign setting requests either automatically (i.e. without operator intervention) or semi-automatically (i.e. after approval from operator only);

d) it provides integrated menu facilities for Control Office operators to control MET related functions and to update graphical displays with up-to-date status information and measurements from MET detectors;

e) it provides status data to other HATMS Subsystems or Third Party Data Systems with registered interests in measurements by MET detectors;

f) it provides a secured means by which a third party data system can request signal/sign settings based on plans stored on the MET Subsystem;

g) it generates the status of the system to the Highways Agency's central logging facility (HALOGEN).

In order to provide all of the above functions, the MET Subsystem is designed to meet certain criteria on interoperability and performance. The criteria are common to all HATMS Subsystems.

Additionally, the MET Subsystem is also equipped with a communication link to Third Party Data Systems which is based on established communication standards and practices. Appropriate authentication measures are deployed for all data transfer outside the NMCS network.

# 3. DATEX II PUBLICATIONS

The MET Subsystem produces DATEX II V2 Measured Data publications conforming to the schema - see reference 1.

## 3.1 VALUES PROVIDED

The units used by the publications are given within the DATEX II platform independent model – see reference 2.

### 3.1.1 Present Weather Sensors

*Temperature Information (measured Value index = 1)*

The temperature, where supported.

*Precipitation Information (measured Value index = 2)*

The type of precipitation and precipitation intensity, where supported.

*Visibility Information (measured Value index = 3)*

The meteorological optical range.

### 3.1.2 Anemometers

Note that the parameters are in separate measured values as they can have different averaging periods.

*Wind Information (measured Value index = 1)*

The average wind speed.

*Wind Information (measured Value index = 2)*

The wind direction.

*Wind Information (measured Value index = 3)*

The maximum gust speed.

## 3.2 WEB SERVER DIRECTORY STRUCTURE

The web server at http://www.met.halogenonline.co.uk provides seven directories, one for each regional control centre. Within each control centre directory, there are sub-directories for each sensor. These sub-directories are named using the sensor's Highways Agency geographic address.

There are two files within each sub-directory: *content.xml*, and *metadata.xml*.

For example:

```
NWRCC
   M6-8290A
      content.xml
      metadata.xml
   M6-8290A1
      content.xml
      metadata.xml
```

The *content.xml* file contains the DATEX II publication – the measurement site reference of the publication is the sensor's geographic address.

The *metadata.xml* is formatted according to the following schema:

```
<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema">
 <xsd:element name="MetaData" type="MetadataType"/>
 <xsd:complexType name="MetadataType">
  <xsd:attribute name="confirmationTime" type="xsd:dateTime" use="required"/>
  <xsd:attribute name="confirmedTime" type="xsd:dateTime" use="required"/>
 </xsd:complexType>
</xsd:schema>
```

The *metadata.xml* file enables a user of the data to check whether the data has been updated or not - and therefore avoids the necessity of downloading the larger file if content has not changed.

It is updated approximately every minute and contains 2 timestamps:

a) Confirmed Time – the time the *content.xml* file was last updated.

b) Confirmation Time – the time the *metadata.xml* file was last updated. This also serves as a “heartbeat” to enable data users to know whether or not the system is functioning.

In order to be interoperable with clients using Web Services, both of the files have been enclosed with a static SOAP wrapper as described in the DATEX II Software Developers Guide – see reference 3.

# 4. XML EXAMPLES

## 4.1 VISIBILITY

### 4.1.1 Valid Data

```
<soapenv:Envelope xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soapenv:Body>
    <d2LogicalModel xmlns="http://datex2.eu/schema/2/2_0"
xsi:schemaLocation="http://datex2.eu/schema/2/2_0
http://datex2.eu/schema/2/2_0/DATEXIISchema_2_2_0.xsd" modelBaseVersion="2">
      <exchange>
        <supplierIdentification>
          <country>gb</country>
          <nationalIdentifier>ha-uec</nationalIdentifier>
        </supplierIdentification>
      </exchange>
      <payloadPublication lang="gb" xsi:type="MeasuredDataPublication">
        <publicationTime>2012-04-04T11:19:25</publicationTime>
        <publicationCreator>
          <country>gb</country>
          <nationalIdentifier>ha-uec</nationalIdentifier>
        </publicationCreator>
        <measurementSiteTableReference targetClass="MeasurementSiteTable" version="1"
id="M6-6301B"/>
        <headerInformation>
          <confidentiality>noRestriction</confidentiality>
          <informationStatus>real</informationStatus>
        </headerInformation>
        <siteMeasurements>
          <measurementSiteReference targetClass="MeasurementSiteRecord" version="1"
id="M6-6301B"/>
          <measurementTimeDefault>2012-04-04T11:19:25</measurementTimeDefault>
          <measuredValue index="2">
            <measuredValue>
              <basicData xsi:type="PrecipitationInformation">
                <noPrecipitation>true</noPrecipitation>
              </basicData>
            </measuredValue>
          </measuredValue>
          <measuredValue index="3">
            <measuredValue>
              <basicData xsi:type="VisibilityInformation">
                <measurementOrCalculationPeriod>30</measurementOrCalculationPeriod>
                <visibility>
                  <minimumVisibilityDistance>
                    <integerMetreDistance>66450</integerMetreDistance>
                  </minimumVisibilityDistance>
                </visibility>
              </basicData>
            </measuredValue>
          </measuredValue>
        </siteMeasurements>
      </payloadPublication>
    </d2LogicalModel>
  </soapenv:Body>
</soapenv:Envelope>
```

### 4.1.2 Invalid Data

```
<soapenv:Envelope xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soapenv:Body>
    <d2LogicalModel xmlns="http://datex2.eu/schema/2/2_0"
xsi:schemaLocation="http://datex2.eu/schema/2/2_0
http://datex2.eu/schema/2/2_0/DATEXIISchema_2_2_0.xsd" modelBaseVersion="2">
      <exchange>
        <supplierIdentification>
          <country>gb</country>
          <nationalIdentifier>ha-uec</nationalIdentifier>
        </supplierIdentification>
      </exchange>
      <payloadPublication lang="gb" xsi:type="MeasuredDataPublication">
        <publicationTime>2012-04-03T10:30:04</publicationTime>
        <publicationCreator>
          <country>gb</country>
          <nationalIdentifier>ha-uec</nationalIdentifier>
        </publicationCreator>
        <measurementSiteTableReference targetClass="MeasurementSiteTable" version="1"
id="M25-5325A"/>
        <headerInformation>
          <confidentiality>noRestriction</confidentiality>
          <informationStatus>real</informationStatus>
        </headerInformation>
        <siteMeasurements>
          <measurementSiteReference targetClass="MeasurementSiteRecord" version="1"
id="M25-5325A"/>
          <measurementTimeDefault>2012-04-03T10:30:04</measurementTimeDefault>
          <measuredValue index="2">
            <measuredValue>
              <measurementEquipmentFault>
                <faultIdentifier>UNOBTAINABLE</faultIdentifier>
                <faultDescription>UNOBTAINABLE</faultDescription>
                <faultCreationTime>2012-04-03T10:30:04</faultCreationTime>
                <faultLastUpdateTime>2012-04-03T10:30:04</faultLastUpdateTime>
                <measurementEquipmentFault>spuriousUnreliableDataValues</measurementEquip
mentFault>
              </measurementEquipmentFault>
            </measuredValue>
          </measuredValue>
          <measuredValue index="3">
            <measuredValue>
              <measurementEquipmentFault>
                <faultIdentifier>UNOBTAINABLE</faultIdentifier>
                <faultDescription>UNOBTAINABLE</faultDescription>
                <faultCreationTime>2012-04-03T10:30:04</faultCreationTime>
                <faultLastUpdateTime>2012-04-03T10:30:04</faultLastUpdateTime>
                <measurementEquipmentFault>spuriousUnreliableDataValues</measurementEquip
mentFault>
              </measurementEquipmentFault>
            </measuredValue>
          </measuredValue>
        </siteMeasurements>
      </payloadPublication>
    </d2LogicalModel>
  </soapenv:Body>

</soapenv:Envelope>
```

## 4.2 ANEMOMETER

### 4.2.1 Valid Data

```
<soapenv:Envelope xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soapenv:Body>
    <d2LogicalModel xmlns="http://datex2.eu/schema/2/2_0"
xsi:schemaLocation="http://datex2.eu/schema/2/2_0
http://datex2.eu/schema/2/2_0/DATEXIISchema_2_2_0.xsd" modelBaseVersion="2">
      <exchange>
        <supplierIdentification>
          <country>gb</country>
          <nationalIdentifier>ha-uec</nationalIdentifier>
        </supplierIdentification>
      </exchange>
      <payloadPublication lang="gb" xsi:type="MeasuredDataPublication">
        <publicationTime>2012-04-04T11:24:24</publicationTime>
        <publicationCreator>
          <country>gb</country>
          <nationalIdentifier>ha-uec</nationalIdentifier>
        </publicationCreator>
        <measurementSiteTableReference targetClass="MeasurementSiteTable" version="1"
id="M6-8403A"/>
        <headerInformation>
          <confidentiality>noRestriction</confidentiality>
          <informationStatus>real</informationStatus>
        </headerInformation>
        <siteMeasurements>
          <measurementSiteReference targetClass="MeasurementSiteRecord" version="1"
id="M6-8403A"/>
          <measurementTimeDefault>2012-04-04T11:24:24</measurementTimeDefault>
          <measuredValue index="1">
            <measuredValue>
              <basicData xsi:type="WindInformation">
                <measurementOrCalculationPeriod>75</measurementOrCalculationPeriod>
                <wind>
                  <windSpeed computationalMethod="movingAverageOfSamples">
                    <speed>35.28</speed>
                  </windSpeed>
                </wind>
              </basicData>
            </measuredValue>
          </measuredValue>
          <measuredValue index="2">
            <measuredValue>
              <basicData xsi:type="WindInformation">
                <measurementOrCalculationPeriod>75</measurementOrCalculationPeriod>
                <wind>
                  <windDirectionBearing computationalMethod="movingAverageOfSamples">
                    <directionBearing>38</directionBearing>
                  </windDirectionBearing>
                </wind>
              </basicData>
            </measuredValue>
          </measuredValue>
          <measuredValue index="3">
            <measuredValue>
              <basicData xsi:type="WindInformation">
                <measurementOrCalculationPeriod>300</measurementOrCalculationPeriod>
                <wind>
                  <maximumWindSpeed>
                    <speed>50.40</speed>
                  </maximumWindSpeed>
```

```
                </wind>
              </basicData>
            </measuredValue>
          </measuredValue>
        </siteMeasurements>
      </payloadPublication>
    </d2LogicalModel>
  </soapenv:Body>
</soapenv:Envelope>
```

### 4.2.2 Invalid Data

```
<soapenv:Envelope xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <soapenv:Body>
    <d2LogicalModel xmlns="http://datex2.eu/schema/2/2_0"
xsi:schemaLocation="http://datex2.eu/schema/2/2_0
http://datex2.eu/schema/2/2_0/DATEXIISchema_2_2_0.xsd" modelBaseVersion="2">
      <exchange>
        <supplierIdentification>
          <country>gb</country>
          <nationalIdentifier>ha-uec</nationalIdentifier>
        </supplierIdentification>
      </exchange>
      <payloadPublication lang="gb" xsi:type="MeasuredDataPublication">
        <publicationTime>2012-04-04T10:24:28</publicationTime>
        <publicationCreator>
          <country>gb</country>
          <nationalIdentifier>ha-uec</nationalIdentifier>
        </publicationCreator>
        <measurementSiteTableReference targetClass="MeasurementSiteTable" version="1"
id="M62-1715A"/>
        <headerInformation>
          <confidentiality>noRestriction</confidentiality>
          <informationStatus>real</informationStatus>
        </headerInformation>
        <siteMeasurements>
          <measurementSiteReference targetClass="MeasurementSiteRecord" version="1"
id="M62-1715A"/>
          <measurementTimeDefault>2012-04-04T10:24:28</measurementTimeDefault>
          <measuredValue index="1">
            <measuredValue>
              <measurementEquipmentFault>
                <faultIdentifier>FAULTY</faultIdentifier>
                <faultDescription>FAULTY</faultDescription>
                <faultCreationTime>2012-04-04T10:24:28</faultCreationTime>
                <faultLastUpdateTime>2012-04-04T10:24:28</faultLastUpdateTime>
                <measurementEquipmentFault>spuriousUnreliableDataValues</measurementEquip
mentFault>
              </measurementEquipmentFault>
            </measuredValue>
          </measuredValue>
          <measuredValue index="2">
            <measuredValue>
              <measurementEquipmentFault>
                <faultIdentifier>FAULTY</faultIdentifier>
                <faultDescription>FAULTY</faultDescription>
                <faultCreationTime>2012-04-04T10:24:28</faultCreationTime>
                <faultLastUpdateTime>2012-04-04T10:24:28</faultLastUpdateTime>
                <measurementEquipmentFault>spuriousUnreliableDataValues</measurementEquip
mentFault>
              </measurementEquipmentFault>
            </measuredValue>
          </measuredValue>
```

```
            <measuredValue index="3">
              <measuredValue>
                <measurementEquipmentFault>
                  <faultIdentifier>FAULTY</faultIdentifier>
                  <faultDescription>FAULTY</faultDescription>
                  <faultCreationTime>2012-04-04T10:24:28</faultCreationTime>
                  <faultLastUpdateTime>2012-04-04T10:24:28</faultLastUpdateTime>
                  <measurementEquipmentFault>spuriousUnreliableDataValues</measurementEquip
mentFault>
                </measurementEquipmentFault>
              </measuredValue>
            </measuredValue>
          </siteMeasurements>
        </payloadPublication>
      </d2LogicalModel>
    </soapenv:Body>
  </soapenv:Envelope>
```

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## AMENDMENT RECORD

| Issue Status | Date | Reason for Change | Sections Amended | Rel. Change Notices | Recorded Signature |
|---|---|---|---|---|---|
| 1 | 04/04/12 | First Release | | | A.McConnell |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

## REFERENCES AND RELATED DOCUMENTS

| No | TITLE | REFERENCE | ISSUE |
|---|---|---|---|
| 1. | DATEX II Schema | http://www.datex2.eu/content/datex-ii-xml-schema-20 | 2 |
| 2. | DATEX II Platform Independent Model | http://www.datex2.eu/content/datex-ii-pim-v20 | 2 |
| 3. | DATEX II v2.0 Software Developers Guide | http://www.datex2.eu/sites/www.datex2.eu/files/DATEXIIv2.0-DevGuide.pdf | 1.2 |

**ABBREVIATIONS**

| | |
|---|---|
| DATEX II | DATa EXchange II |
| HALOGEN | Highways Agency LOGging ENvironment |
| HATMS | Highways Agency Traffic Management System |
| HTTP | Hyper Text Transfer Protocol |
| MET | Meteorological Subsystem |
| NMCS | National Motorway Control System |
| RCC | Regional Control Centre |
| SOAP | Simple Object Access Protocol |
| XML | eXtensible Markup Language |

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