NATIONAL WEATHER SERVICE PRODUCT/SERVICE DESCRIPTION DOCUMENT (SDD) TYPE: Operational Service

National Digital Forecast Database
**Extensible Markup Languag**e

Part 1 – Mission Connection

1. **Service Description**: National Digital Forecast Database (NDFD) Extensible Markup Language (XML) is a service providing the public, government agencies, and commercial enterprises with user selected components for point locations of the National Weather Service's (NWS) data embedded in XML elements.

   NDFD XML provides users the ability, using a machine-to-machine paradigm, to retrieve the XML-wrapped data via the Internet. This web service is provided using the SOAP protocol.

   The weather parameters contained in NDFD XML are the same as those in the NDFD (maximum, minimum, 3-hourly, and dewpoint temperatures, probability of precipitation, precipitation amount, sky cover, wind direction and speed, weather, and wave height). A description of NDFD data, including weather parameter temporal and spatial resolution, is available at the following URL:

   http://www.nws.noaa.gov/ndfd/

2. **Purpose/Intended Use**: NDFD XML will allow NWS customers to maximize the economic value of NDFD data by making it available in a convenient and understandable form. NDFD XML makes this possible because XML is a widely accepted World Wide Web Consortium (W3C) standard for data exchange via the internet. Additionally, XML and related technologies are commonly used in developing internet applications that can add value to and further disseminate NWS data. Through the use of web services, NDFD XML will allow machine-tomachine distribution of NWS data (**Figure 1**). This automated access will make the process of data discovery and integration into user operations more efficient.
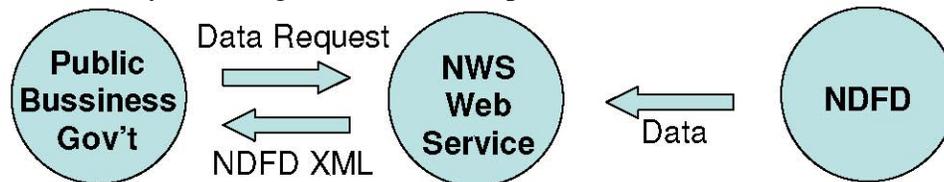
Figure 1: **NDFD XML Data Flow**

By virtue of its support of machine-to-machine transfer and reliance on the XML standard, NDFD XML supports the *National Weather Service Strategic Plan for FY2003 – FY2008* by contributing to "…evolving our services from a text-based paradigm to one based on making NWS information available quickly, efficiently, and in convenient and understandable forms…" and "…by taking advantage of existing and emerging technologies to disseminate this information…"

1   **Audience**: NDFD XML is intended primarily for web applications developers requiring the weather information contained in the NDFD. These users represent members of the public, government agencies, and private sector entities.

2   **Presentation Format**: The service is presented as a stream of character data sent over the internet. These characters represent the XML elements and attributes and the NDFD data they wrap. A sample of NDFD XML is contained in Appendix A. NDFD XML will conform to the language's schema (Appendix B)

3   **Feedback Method**: Users of NDFD XML are encouraged to provide feedback using the OMB approved Customer Survey for Experimental Products/Services at:

    http://weather.gov/survey/nws-survey.php?code=xmlsoap

This survey can be also mailed to the following address:

Meteorological Development Laboratory
Attn: John Schattel, W/OST24
1325 E-W Highway, SSMC2
Silver Spring, MD 20910

Comments will be accept until August 1, 2004.

Part 2 – Technical

1.   **Format and Science Basis**: Strictly speaking, NDFD XML has no format. This is one of the underlying principles of XML that formatting information has been removed from a document leaving only content. However, the elements and attributes that can appear in an NDFD XML document and their order are restricted. These constraints, which constitute NDFD XML's vocabulary and grammar, are defined in its schema. The schema is used in conjunction with a validator to ensure the NDFD XML adheres to the language specification. This conformance with an agreed to specification allows a user to parse the document in order to make use of the data it contains.

A technical description of the NDFD data contained in the NDFD XML is available at http://www.nws.noaa.gov/ndfd/technical/technical.htm.

2   **Availability**: NDFD XML is continuously available from the NWS web site using the NDFD XML web service at the following URL:

    http://weather.gov/forecasts/xml/SOAP_server/ndfdXMLserver.php

The NDFD data that gets contained in NDFD XML is revised at the local Weather Forecast Office on an event-driven basis. The updated information is then uploaded to the NDFD server shortly after the top of each hour.

The web service is implemented using SOAP and it has a Web Services Description Language (WSDL) document (see URL below) to facilitate access by web applications:

http://weather.gov/forecasts/xml/DWMLgen/wsdl/ndfdXML.wsdl

3. **Additional Information**: The following tools and references are provided to assist developers wishing to make use of NDFD XML:

PowerPoint Presentation describing the NDFD XML data model.
http://www.nws.noaa.gov/mdl/XML/Design/MDL_XML_Design.ppt

NDFD XML Specification:
http://www.nws.noaa.gov/mdl/XML/Design/MDL_XML_Design.doc

Sample SOAP client:
http://weather.gov/forecasts/xml/SOAP_server/ndfdXML.htm

Sample Web Application Using NDFD XML:
http://weather.gov/forecasts/xml/sample_products/meteogram/DWML_graph.htm

Download the Sample SOAP Client and Web Application
http://weather.gov/forecasts/xml/sample_products/ndfdXML.tar

W3C XML Recommendation:
http://www.w3.org/XML/

W3C SOAP Recommendation:
http://www.w3.org/TR/SOAP/

W3C XML Validator
http://www.w3.org/2001/03/webdata/xsv

Information on XML parsers
http://www.google.com/search?q=XML+parser

Appendix A

Sample NDFD XML

This example of NDFD XML was generated using the following URL:
http://weather.gov/forecasts/xml/sample_products/browser_interface/ndfdXML.htm

```xml
<?xml version='1.0' ?>
<dwml version='1.0'
xmlns:xsd="http://www.w3.org/2001/XMLS
chema"
xmlns:xsi="http://www.w3.org/2001/XMLS
chema-instance"

xsi:noNamespaceSchemaLocation="http://www.nws.noa
a.gov/forecasts/xml/DWMLgen/sc
hema/DWML.xsd">
<head>

    <product concise-name="time-series" operational-mode="developmental">
        <title>National Digital Forecast Database Time Series Data</title>
        <field>meteorological</field>
        <category>forecast</category>
        <creation-date refresh-frequency='P1H'>2004-05-07T18:32:08Z</creation
date>
    </product>
    <source>

        <moreinformation>http://onestop.noaa3.awips.noaa.gov/ndfd/index.h
tml</moreinformation>

        <production-center>Meteorological Development Laboratory <sub
center>Product Generation Branch</sub-center></production-center>
        <disclaimer>http://www.nws.noaa.gov/disclaimer.html</disclaimer>
        <credit>http://weather.gov/</credit>
        <credit-logo>http://weather.gov/images/noaaleft.jpg</credit-logo>
        <feedback>http://weather.gov/feedback.php</feedback>

    </source>
  </head>
  <data>

    <location>
        <location-key>point1</location-key>
        <point latitude="38.99" longitude="-77.99" />

    </location>
    <time-layout time-coordinate="local"
    summarization="none">
    <layout-key>k-p24h-n7-1</layout-key>

                <start-valid-time>2004-05-07T08:00:00-04:00</start-valid-time>
                    <end-valid-time>2004-05-07T20:00:00-04:00</end-valid-time>
                <start-valid-time>2004-05-08T08:00:00-04:00</start-valid-time>
                    <end-valid-time>2004-05-08T20:00:00-04:00</end-valid-time>
                <start-valid-time>2004-05-09T08:00:00-04:00</start-valid-time>
                    <end-valid-time>2004-05-09T20:00:00-04:00</end-valid-time>
                <start-valid-time>2004-05-10T08:00:00-04:00</start-valid-time>
                    <end-valid-time>2004-05-10T20:00:00-04:00</end-valid-time>
                <start-valid-time>2004-05-11T08:00:00-04:00</start-valid-time>
                    <end-valid-time>2004-05-11T20:00:00-04:00</end-valid-time>
                <start-valid-time>2004-05-12T08:00:00-04:00</start-valid-time>
                    <end-valid-time>2004-05-12T20:00:00-04:00</end-valid-time>
                <start-valid-time>2004-05-13T08:00:00-04:00</start-valid-time>

                <end-valid-time>2004-05-13T20:00:00-04:00</end-valid-time>
    </time-layout>
    <parameters applicable-location="point1">
```

```
        <temperature type='maximum' units="Fahrenheit" time-layout="k-p24h-n7
1">
            <name>Daily Maximum Temperature</name>
            <value>79</value>

            <value>65</value>
            <value>77</value>
            <value>75</value>
            <value>79</value>
            <value>79</value>
            <value>80</value>

        </temperature>
    </parameters>
    </data>
    </dwml>
```

Appendix B

NDFD XML SCHEMA

This schema can be found at the following URL:
http://www.nws.noaa.gov/forecasts/xml/DWMLgen/schema/DWML.xsd

<?xml version="1.0"?>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema">

<xsd:include
schemaLocation="http://www.nws.noaa.gov/forecasts/xml/DWMLgen/schema/meta_dat
a.xsd" />
<xsd:include
schemaLocation="http://www.nws.noaa.gov/forecasts/xml/DWMLgen/schema/ndfd_data
.xsd" />

<xsd:element name="dwml">
  <xsd:complexType>
    <xsd:sequence> <xsd:element name="head" type="headType" minOccurs="1"
      maxOccurs="1" /> <xsd:element name="data" type="dataType" minOccurs="1"
      maxOccurs="1">
        <xsd:keyref name="applicable-locationKey" refer="locationKey"> <xsd:selector
          xpath="data/parameters" /> <xsd:field xpath="@applicable-location" />
        </xsd:keyref>
        <xsd:key name="locationKey">
          <xsd:selector xpath=".//location" />
          <xsd:field xpath="location-key" />

        </xsd:key>
        <xsd:keyref name="applicable-timeKey" refer="timeKey"> <xsd:selector
```

```xml
            xpath="parameters/*" /> <xsd:field xpath="@time-layout" />
         </xsd:keyref>
         <xsd:key name="timeKey">
            <xsd:selector xpath=".//time-layout" />
            <xsd:field xpath="layout-key" />

         </xsd:key>
      </xsd:element>
   </xsd:sequence>
   <xsd:attribute name="version" type="xsd:string" default="1.0" />

   </xsd:complexType>
</xsd:element>

</xsd:schema>
```