# THALES

**National Traffic**
**Information Service**

## PROJECT WA119
## NATIONAL TRAFFIC INFORMATION SERVICE
## TRANSFORMATION PROJECT

## EXTERNAL INTERFACE DESIGN DOCUMENT

### Publish Services: DATD

### E33-PublishDATD

WA119-08-007-002-03-02-33 v1.00          25 March 2014
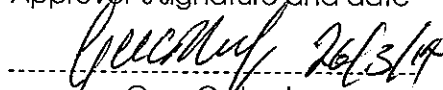
Originator's signature & date

Mark McMullen          26/3/14

Approver's signature and date

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## ISSUE RECORD

| Issue | Date | Purpose |
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| V0.01 | 25/10/2013 | First draft issue.  Some TBDs and TBCs remain; to be resolved in future issues.<br><br>Mark McMullen |
| V0.02 | 28/11/2013 | Changed text to reflect design change: the website provided by this interface is no longer dedicated/stanalone, but shares a website with the Publish NTIS Model interface.<br><br>Refined the design for published TAME data.<br><br>Updated document to address comments on v0.01.<br><br>Some minor TBDs/TBCs remain.<br><br>Mark McMullen |
| V0.03 | 04/02/14 | Completed Internet Addresses section – Annex C.<br><br>Included name and ID of Event collection interface, plus associated reference document (sections 2 and 3.1).<br><br>Added text to clarify the date of the oldest MIDAS catch-up data included in the DATD (section 4.4.3).<br><br>Annexes reordered, to be consistent with other EIDD documents.<br><br>Mark McMullen |
| V1.00 | 25/03/14 | All comments on v0.03 addressed:<br><br>- Minor typos, corrections.<br><br>- E49-MIDASCatchUp interface added to the Interface Overview and References Sections; for information/completness only, as it does not affect the rest of the document.<br><br>None of the changes require further comment/review; document issued at v1.00.<br><br>Mark McMullen |
| | | |

# APPROVAL RECORD

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**EXTERNAL INTERFACE DESIGN DOCUMENT**
**PUBLISH SERVICES: DATD**
**E33-PUBLISHDATD**

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# 1. Scope

## 1.1 Identification

This External Interface Design Document (EIDD) specifies the Daily Aggregated Traffic Data (DATD) publishing interface between the National Traffic Information Service (NTIS) system and Subscriber systems. The document defines the characteristics of the interface in sufficient detail to provide a common understanding across the interface boundary.

The interface is uniquely identified within the NTIS system as E33-PublishDATD and referred to throughout this document, for brevity, as 'the interface'.

## 1.2 System Overview

The NTIS system is described in the NTIS SSDD [ref 3].

The NTIS system includes a Publish Services subsystem. The primary operation of the Publish Services subsystem is to publish real-time data to Subscribers and to provide a reference data set, in the form of the NTIS Model, for subscribers to relate the real-time data to the NTIS road network. Additionally, a daily payload of all network events and traffic data is published.

The E33-PublishDATD interface is a component of the Publish Services subsystem; responsible for delivering the DATD publication to Subscribers. The DATD publication comprises a daily payload of all network events and traffic data for a particular date.

## 1.3 Document Overview

This document is based on the Interface Control Document Template [ref 14] and Interface Control Document Writing Guide [ref 15], components of the Thales Chorus 2.0 process management system. The document is tailored to accommodate NTIS-specific documentation guidelines.

The document is structured as follows:

Section 1:     Scope and introduction

Section 2:     References – documents and resources referenced from this document

Section 3:     Interface Overview – basic function and context of the interface

Section 4:     Interface Details – protocols, messages, operation and message sequences

Section 5:     Message Definitions – message content listings and descriptions

Section 6:       Qualification of the interface

Section 7: List of Annexes

Annex A:  DATEXII v2.0 Schema – NTIS extensions

Annex B:  Subscription Information – Subscriber options, system requirements and on-line resources

Annex C:  Internet addresses utilised by the NTIS system

Annex D:  Abbreviations and Glossary

## 1.4  Relationship to Other Documents

This EIDD documents the interface design based on the system requirements specified in the corresponding interface requirements specification [ref 5].  The EIDD is one of a suite of EIDDs describing the design of the external interfaces of the NTIS system.

## 2. References

The following table lists the documents and resources referenced from this document.

| Ref | Title | Document ID/Reference | Originator |
|-----|-------|----------------------|------------|
| 1 | Traffic Information 2011 Taxonomy | V4.0 20/09/2010 | HA |
| 2 | NTIS Test Strategy | WA119-08-008-001 | Thales |
| 3 | System/Subsystem Design Description for NTIS | WA119-08-007-002-02-02-04 | Thales |
| 4 | NTIS Infrastructure – Architecture Definition | WA119-08-007-008-01 | Thales |
| 5 | NTIS E33 Publish DATD External Interface Requirements Specification | WA119-08-006-03-02-33 | Thales |
| 6 | NTIS External Interface Design Document Publish Services: NTIS Model Download E18-PublishNTISModel | WA119-08-007-002-03-02-18 | Thales |
| 7 | NTIS External Interface Design Document Publish Services: Email E46-EmailSubscribers | WA119-08-007-002-03-02-46 | Thales |
| 8 | NTIS External Interface Design Document Publish Services: DATEXII Webservice E21-DATEXIISubscribers | WA119-08-007-002-03-02-21 | Thales |
| 9 | TMU Handler Interface Specification | RFC01421 | Serco |
| 10 | NTIS HATMS Gateway Service Functional Specification | Project ref: 1240/001 Document ref: FS007 | IPL |
| 11 | NTIS Traffic Data Service Functional Specification | Project ref: 1240/001 Document ref: FS006 | IPL |
| 12 | RFC01419 – JTMS Handler Interface Specification | IFS00001 | Serco |
| 13 | Traffic Control Centre TAME Project | TCC-TAME-0006 | Serco |

| | | | |
|---|---|---|---|
| | Data Extraction | | |
| 14 | Chorus 2.0 Interface Control Document (ICD) Template | 83510877-DDQ-GBR-EN-001 | Thales |
| 15 | Chorus 2.0 Interface Control Document (ICD) Writing Guide | 83511164-DDQ-GBR-EN-001 | Thales |
| 16 | DATEXII website | http://www.datex2.eu | DG MOVE |
| 17 | DATEXII v2.0 Schema | No identifier, located at:<br><br>http://www.datex2.eu/content/datex-ii-xml-schema-20 | DG MOVE |
| 18 | IEEE 802.3 Standard for Ethernet | http://standards.ieee.org/about/get/802/802.3.html | IEEE |
| 19 | Transmission Control Protocol: DARPA Internet Program Protocol Specification | http://www.ietf.org/rfc/rfc793.txt | Network Working Group |
| 20 | Internet Protocol: DARPA Internet Program Protocol Specification (IPv4) | http://www.ietf.org/rfc/rfc791.txt | Network Working Group |
| 21 | Hypertext Transfer Protocol -- HTTP/1.1 | http://www.w3.org/Protocols/rfc2616/rfc2616.html | Network Working Group |
| 22 | Extensible Markup Language (XML) 1.0 (Fifth Edition) | http://www.w3.org/TR/2008/REC-xml-20081126/ | W3C |
| 23 | .ZIP File Format Specification | http://www.pkware.com/documents/APPNOTE/APPNOTE-6.3.0.TXT | PKWARE |
| 24 | The TLS Protocol Version 1.0 | http://www.rfc-editor.org/rfc/rfc2246.txt | Network Working Group |
| 25 | NTIS External Interface Design Document Event Collection E35-EventsInput | WA119-08-007-002-03-02-35 | Thales |
| 26 | NTIS External Interface Design Document MIDAS Catch-Up E49-MIDASCatchUp | WA119-08-007-002-03-02-49 | Thales |

## 3.  Interface Overview

### 3.1  System Interfaces

Figure 3-1 illustrates the context of the interface (E33-PublishDATD) within the overall operation of the NTIS system.

The boundary of the interface is defined as the network interface on which the NTIS system sends and receives data to and from Subscriber systems.

The context diagram also includes the NTIS system external interfaces that are related to, or impact on, the function of this interface.  The E<number>-<descriptor> ID is a unique external interface identifier within the NTIS system.

Note that the diagram omits any interface or external system that does not directly affect the Publish Services provided by the NTIS system.
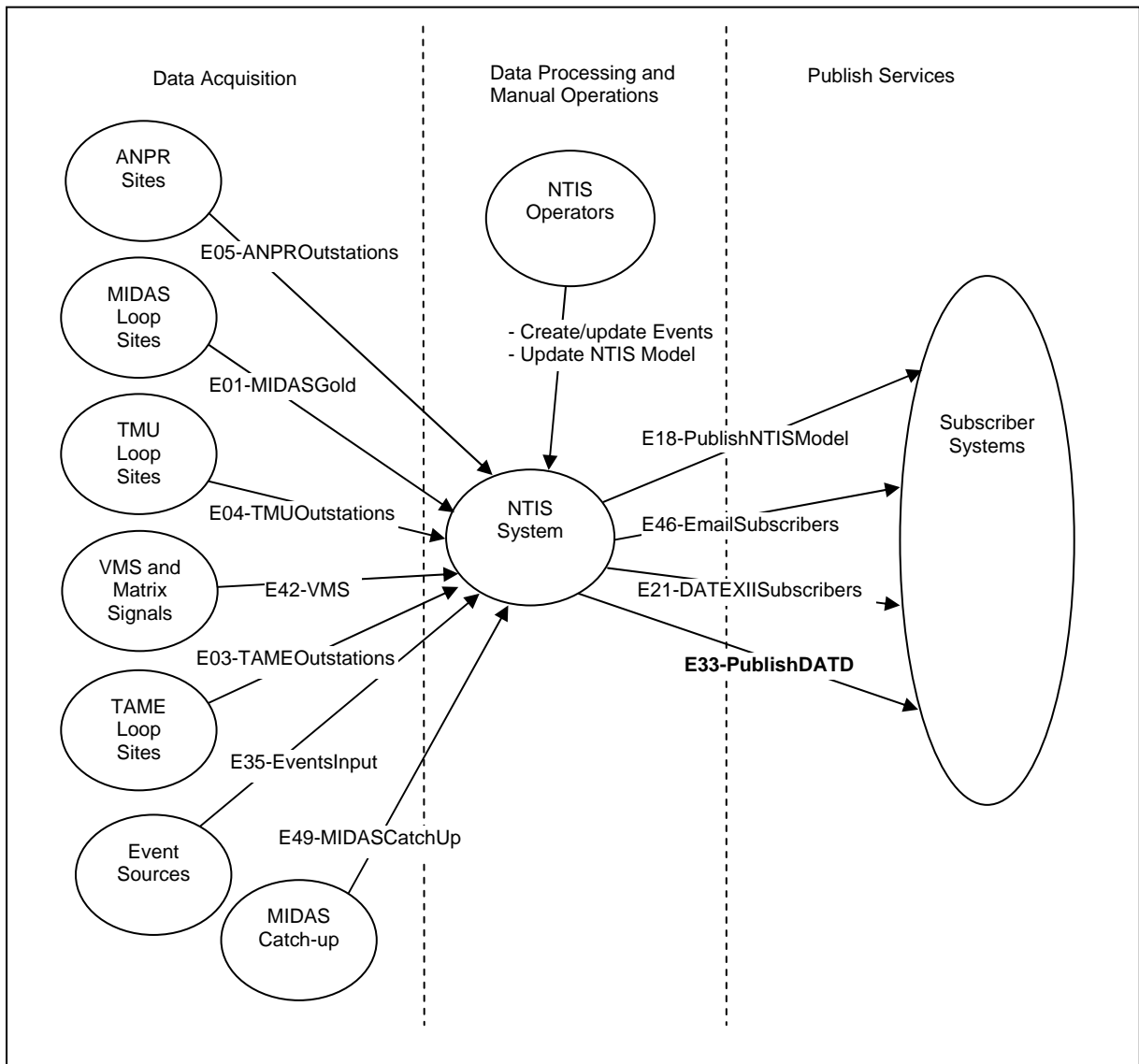


**Figure 3-1 : Publish Services Context Diagram**

Data Acquisition External Interfaces:

- E01-MIDASGold: the interface used to collect real-time traffic data from MIDAS Gold outstations. The interface is documented in [ref 11].

- E03-TAMEOutstations: the interface is used to collect daily traffic data from TAME outstations. The interface is documented in [ref 13].

- E04-TMUOutstations: the interface used to collect real-time traffic data from TMU outstations. The interface is documented in [ref 9].

- E05-ANPROutstations: the interface is used to collect real-time travel times from ANPR outstations. The interface is documented in [ref 12].

- E42-VMS: the interface is used to collect real-time VMS and Matrix Signal display status information. The interface is documented in [ref 10].

- E35-EventsInput : the interface is used to collect Events data and information from external sources. The interface is documented in [ref 25].

- E49-MIDASCatchUp : the interface is used to collect catch-up data from the MIDAS historical data repository [ref 26].

Publish Services External Interfaces:

- E18-PublishNTISModel: this interface is utilised to publish the NTIS Model to Subscribers. The NTIS Model contains reference data that is required to interpret the real-time data published on the E21-DATEXIISubscribers interface and is documented in [ref 6].

- E21-DATEXIISubscribers: this interface is utilised to publish real-time data to Subscribers via a DATEXII-compliant [ref 16] web service. [ref 8].

- E46-EmailSubscribers: this interface is utilised to publish data via email and is documented in [ref 7].

The data acquisition source systems and interfaces, and the facilities provided to operators, are outside the scope of this document and are only detailed in this document where this affects the functionality of the interface.

## 3.2  Description of the Interface between the NTIS System and Subscriber Systems

The interface is utilised to publish DATD data to Subscriber systems via the internet.

The DATD data is an accumulation of traffic and network event data for a particular day.

The DATD publication includes the types of data listed in the table, below.

| Published Data Type | Description |
|---|---|
| ANPR Travel Times | Raw travel times, measured using number plate recognition between pairs of ANPR camera sites. |
| Events | Events affecting the traffic status of the road network; manually created and modified by operators of the NTIS system or received from external systems. |
| MIDAS Loop Data | Traffic data, measured from roadside loop sensors monitored by MIDAS Gold outstations. |
| Processed Traffic Data – Fused FVD and Sensor Data | Traffic data, derived from fusing and processing raw FVD and sensor (MIDAS/TMU loop, ANPR) traffic data. |
| Processed Traffic Data – Fused Sensor-only Data | Traffic data, derived from fusing and processing raw sensor (MIDAS/TMU loop, ANPR) traffic data. |
| TAME Loop Data | Traffic data, measured from roadside loop sensors monitored by TAME outstations. |
| TMU Loop Data | Traffic data, measured from roadside loop sensors monitored by TMU outstations. |
| VMS and Matrix Signal Data | VMS and Matrix signal display and status information. |
| NTIS Model | The NTIS Network and Asset Model.  The NTIS Model contains reference data that enables the traffic and event data included in the DATD to be mapped to the road network. |

**Table 3-1 : Data Types Included in the DATD**

The content, format and packaging of the published data are described in Section 5.

The interface employs the following on-request mechanisms to publish the DATD:

1. A DATD download website, providing Subscribers with a manual interface to the data.  Subscribers can view, select and download a specific version of the DATD.

    a. *Note: this is the same website that is used by Subscribers to download the NTIS Model [ref 6].*

2. A web service, providing Subscribers with an automated interface to the data.  This service enables a simple HTTP Request, from a Subscriber system, to download a specific version of the DATD.

Both mechanisms publish the same data package.

The URLs for NTIS web services and sites are listed in Section 7.3.

### 3.3  Description of the NTIS System

The NTIS system function and operations are described in the NTIS SSDD [ref 3].

## 3.4  Description of the Subscriber System

A Subscriber system is any system employed by a registered NTIS Publish Services Subscriber to receive published data.  The Subscriber system must be capable interfacing to the web service or web site via the internet and host software capable of requesting and downloading the DATD publication.

The interface messages and content are detailed in Section 4.3.

The NTIS system maintains a number of Subscription Options for each Subscriber.  The Subscription Options relevant to this interface are detailed in Section 7.2.

## 4. Interface Details

### 4.1 Physical

The NTIS system exchanges data with Subscriber systems via the internet.

The physical interface comprises standard networking components and transport mechanisms and protocols. The system network components provide a virtualised connection to the internet in a single interface.

This infrastructure provides a transparent communication path for the interface that requires no direct management from the interface itself. Hence, the physical make-up of the interface is not detailed further in this document. The networking components and system infrastructure are described in detail in [ref 4].

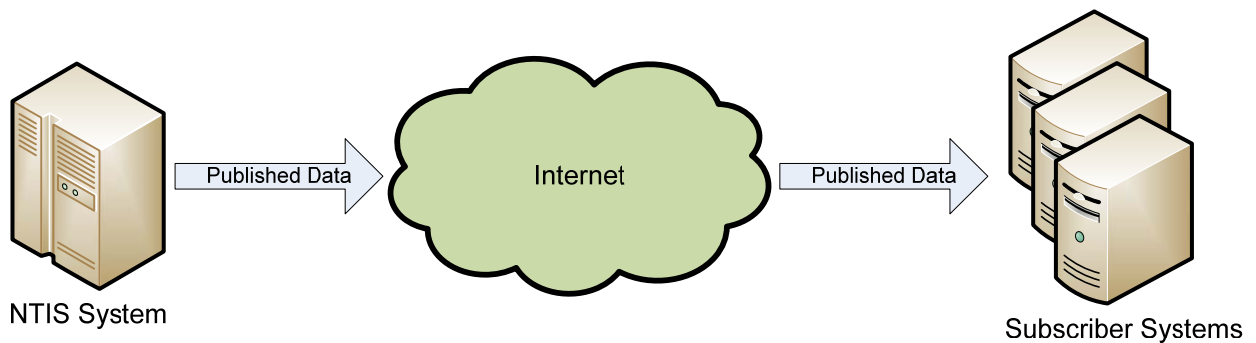A simplified schematic representation of the physical interface is illustrated below.



**Figure 4-1 : Physical Interface Schematic**

## 4.2 Interface Protocols

The interface employs the protocols and specifications listed below.

| Network Layer | Protocol | Utilisation |
|---|---|---|
| Link | Ethernet [ref 18] | Utilised for all network communications by the NTIS system; refer to the system infrastructure document [ref 4]. |
| Transport | TCP [ref 19] | |
| Internet | IPv4 [ref 20] | |
| Application | HTTP v1.1 [ref 21] | HTTP is utilised for all communications on the interface.  HTTP is layered over TLS to enable secure HTTP (HTTPS) to be utilised between the NTIS system and Subscriber systems. |
| | TLS v1.0 [ref 24] | The Transport Layer Security protocol is utilised to implement the HTTPS data exchange for this interface. The TLS layer ensures that the data exchanged over the interface is encrypted and secure. |
| | XML v1.0 [ref 22] | DATEXII, utilised to format the data content, uses XML for data content formatting. |
| | DATEXII v2.0 Schema [ref 17] | The standard DATEXII schema is used to format the data content of the messages communicated over the interface. This interface applies Level B extensions to the standard schema; as listed in Section/appendix 7.1. |
| | .ZIP [ref 23] | Industry standard, interoperable file compression specification.  The files that comprise the DATD payload are ZIP-compressed to minimise the size of the publication. |

**Table 4-1 : Interface Protocols**

## 4.3  Interface Messages/Data Exchange

### 4.3.1  Web Service

The web service utilises HTTP messages layered over TLS to provide a HTTPS data exchange.  The standard TLS exchange, between the Subscriber and the NTIS systems, is transparent to the interface, and hence outside the influence or scope of this document.  The messages listed in the following sections describe only the HTTP request and response messages.

#### 4.3.1.1  DATD Request Message

The DATD Request Message is used by the Subscriber system to request the download of a specific DATD publication from the NTIS system.  The message utilises a HTTP GET request method.

Message Header:

```
GET <target Request-URI> HTTP/1.1
Authorisation: Basic <username/password>
User-Agent: <Subscriber HTTP client>
Host: <target Host>
Accept: */*
```

Notes:

1. The header contents listed are a typical HTTP GET request as expected by the NTIS system; some details may differ, depending on the HTTP client and implementation employed by the Subscriber system.

2. The *<username/password>* included in the header, as an encrypted string, are the username and password specified for the Subscriber in the corresponding Subscription Options (refer to Section 7.2 for details).  If the *<username/password>* does not match a registered Subscriber in the NTIS system, the request is rejected; refer to the response message, detailed below.

3. *<target Host>* is the NTIS service domain name.  URLs hosted and serviced by the NTIS system are listed in Section 7.3.

4. The *<target Request-URI>* specifies the NTIS-hosted endpoint of the web service. The NTIS system provides a RESTful web service and hence this local path/URI is used to specify the DATD publication that is being requested.  The format of the URI is as follows:

   service/datd/<yyyy>-<mm>-<dd>/<n>

   where <yyyy>, <mm> and <dd> specify the date for which the requested DATD applies and <n> is the Day N specifier: '1', '5' or '8'.  Note that, for consistency, this addressing system is designed to be similar to the DATD publication filename (refer to Section 5.2).

Message Body:

None.

## 4.3.1.2  DATD Response Message

The response to the DATD Request Message depends on whether the request was successfully serviced and, if not, what type of error condition was encountered.  The following sections detail the successful response and the expected\*\* error condition responses.

Note\*\*: that is, those errors that are expected and handled purposefully by the NTIS system.

### 4.3.1.2.1  Success Condition

Message Header:

```
HTTP/1.1 200 OK
Date: <response message transmission date/time>
X-Server: <NTIS host name>
Content-Disposition: attachment;filename=<DATD package filename>
Content-Type: application/octet-stream
Content-Length: <message content size>
Vary: Accept-Encoding,User-Agent
```

Notes:

1.  The header includes a reference to the file name of the DATD package: `<DATD package filename>`.  The file naming convention for DATD publications is described in Section 5.2.

2.  `<message content size>` is the size, in bytes, of the attached DATD package, as the DATD package is the only content within the message.

Message Body:

```
<DATD package>
```

Notes:

1.  The body of the message contains a single item, the `<DATD package>` file, as an attachment.  The composition and contents of the DATD package are detailed in Section 5.2.

### 4.3.1.2.2  Failure Conditions

### 4.3.1.2.2.1  Unauthorised Access

This response message is returned by the NTIS system if the *<username>* and *<password>* included in the request message do not validate against a known Subscriber in the NTIS system.

Message Header:

```
HTTP/1.1 403 Forbidden
```

```
Date: <response message transmission date/time>
X-Server: <NTIS host name>
Content-Type: text/plain;charset=ISO-8859-1
Content-Length: <message content size>
Vary: Accept-Encoding,User-Agent
```

Message Body:

```
The username and password supplied with the request are invalid – a
matching Subscription could not be found in the system.  Request
rejected.
```

### 4.3.1.2.2.2  Package Not Found

This response message is returned by the NTIS system if the requesting *<target Request-URI>*
is of the correct format, but the URI does not specify a valid DATD package resident on the
NTIS system.

Message Header:

```
HTTP/1.1 404 Not Found
Date: <response message transmission date/time>
X-Server: <NTIS host name>
Content-Type: text/plain;charset=ISO-8859-1
Content-Length: <message content size>
Vary: Accept-Encoding,User-Agent
```

Message Body:

```
The download request of the DATD package <DATD package filename> has
failed.  There is no such DATD package available on the system.
```

Notes:

1. The error message includes a reference to the file name of the requested DATD
   package: *<DATD package filename>*. The file naming convention for DATD
   publications is described in Section 5.2.

### 4.3.1.2.2.3  Request Too Frequent

This response message is returned by the NTIS system if the request originates from a
Subscriber system too soon after a previous request.  Refer to Section 4.4.6 for details of this
operation.

Message Header:

```
HTTP/1.1 409 Conflict
Date: <response message transmission date/time>
X-Server: <NTIS host name>
Content-Type: text/plain;charset=ISO-8859-1
Content-Length: <message content size>
Vary: Accept-Encoding,User-Agent
```

Message Body:

```
The request for a DATD download has been rejected.  The minimum
interval between DATD downloads is <request timeout>.  Please try
again later.
```

Notes:

1. The request frequency timeout, *<request timeout>*, is a system configurable time and cannot be explicitly stated in this document.  However, the timeout is included in the message body, as part of the error message.

### 4.3.2 Website

The website is designed to be accessed via a standard browser and hence utilises standard TLS and HTTP messages, the details of which are dependent on the browser and navigation of the site.  Therefore, the individual messages utilised to access the website are not detailed in this document.

## 4.4  Interface Functionality

### 4.4.1  Overview

The DATD publication contains an aggregation of the traffic data, network events and supporting data that describe the road network conditions for a specific calendar day.

As some data (detailed later) can be received after the end of the day, the following packages are published for each calendar day:

1. Day 1 package: contains all data received or generated by the system for the previous day (the subject day of the publication).

2. Day 5 package: contains all the data in the Day 1 package, augmented with additional data received for the subject day in the 4 days that follow the subject day.

3. Day 8 package: contains all the data in the Day 4 package (and hence also the Day 1 package), augmented with additional data received for the subject day in the 5th – 7th days (inclusive) that follow the subject day.

### 4.4.2  Data Content

#### 4.4.2.1  Published Data Types

Each DATD publication contains the following data:

1. Real-Time Data**:

   a. ANPR Travel Times: individual travel times, derived from timing measurements reported, on occurrence, from twinned pairs of ANPR sites. All reported travel times are included in the DATD.

   b. Events: network Events affecting the road network.  New and updated Events can be received from external systems or generated by the NTIS system; either automatically or manually by system operators.  All instances of new Events or Event updates are included in the DATD.

   c. MIDAS Loop Data: measured traffic data reported for a specific MIDAS site on a periodic basis.  All individual traffic data reports are included in the DATD.

   d. Processed Traffic Data – Fused FVD and Sensor: the data is derived periodically by the NTIS system by fusing an accumulated period of raw, measured traffic data from FVD sources and Sensors.  The derived data is specified for each Network Link.  All individual derived data items are included in the DATD.

   e. Processed Traffic Data – Fused Sensor-only: the data is derived periodically by the NTIS system by fusing an accumulated period of raw, measured traffic data from Sensors.  The derived data is specified for each Network Link.  All individual derived data items are included in the DATD.

f. TAME Loop Data: measured traffic data reported for a specific TAME site on a periodic basis. All individual traffic data reports are included in the DATD.

g. TMU Loop Data: measured traffic data reported for a specific TMU site on a periodic basis. All individual traffic data reports are included in the DATD.

h. VMS and Matrix Signal Data: status information is reported, on change, for an individual Sign or Signal. All individual state changes are included in the DATD.

2. Snapshot Data:

a. Events – Full Refresh****: Event data is stateful and can be updated infrequently; often not within the timeframe of a DATD publication. Hence, a Full Refresh of all Events in the NTIS system, reflecting the current status at the end of the day, is included in the DATD.

b. VMS and Matrix Signal Data – Full Refresh****: VMS/Matrix data is stateful and can be updated infrequently; often not within the timeframe of a DATD publication. Hence, a Full Refresh of all VMS/Matrix information in the NTIS system, reflecting the current status at the end of the day, is included in the DATD.

c. NITS Model: the NTIS Model includes network and asset information and contains all the reference data required to relate the traffic data, Events and VMS/Matrix information to the road network. The NTIS Model can change, and hence an up-to-date Model is included in each DATD.

Note**: these data items are normally received by the NTIS system in real time. However, some data items may be reported in non-real time. Refer to the next section for details.

Note****: a Full Refresh comprises a snapshot of the current state of all items of a particular type within the NTIS system (in this case Events or VMS and Matrix states). It should be noted that only currently incomplete/undeleted Events are included in the Events Full Refresh; not all historic Events. The package added to the DATD publication is identical to that published, in real time, on the DATEXII Webservice Delivery Channel; refer to [ref 8] for details.

### 4.4.2.2 Format and Content

The data content of the published data adheres to the standard DATEXII v2.0 Schema [ref 17] with extensions applied specifically for the NTIS Publish Services interfaces (refer to Section 7.1).

It should be noted that, for consistency, the format and content of the data contained within the DATD publication is identical in content and structure to that published in real time on the E21-DATEXIISubscribers interface [ref 8].

### 4.4.3 Non-Real Time Data

The following data is received or generated by the NTIS system after the end of the calendar day to which the data applies:

1. Catch-up data: a number of data acquisition outstations, sites and collection systems, external to the NTIS system, can store real-time data and release this data to the NTIS system at a later time. Catch-up data is typically received by the NTIS system following the recovery of a communication failure in the data supply chain. Catch-up data applies to the following received data (including the maximum amount of catch-up data stored in the outstation/site/system):

    a. ANPR Travel Times: 6 hours

    b. MIDAS Loop Data: 7 days (Note: The NTIS system may not retrieve 7 days of MIDAS catch-up data; the maximum age of retrieved data is a system-configurable parameter. Any data older than 7 days would not be collected in time for inclusion into the final Day8 DATD publication.)

    c. TAME Loop Data: 3 days

    d. TMU Loop Data: 7 days

2. TAME data: data is received from TAME outstations on a daily basis; the outstations connect to the NTIS system and transfer a full day's data in a single payload. This data is normally received the following day, but may be received later if there is a communications failure at the scheduled time of data transferral (refer to catch-up data, above).

3. In-fill data: the NTIS system automatically analyses data received from data acquisition outstations and systems. If there is any missing data, the system augments the raw data with 'in-fill' data, wherever an approximation of the missing data can be determined. In-fill data applies to:

    a. MIDAS Loop Data

    b. TAME Loop Data

    c. TMU Loop Data

   In-fill data is generated once per day in a single batch operation, prior to the publication time; so that the batch operation is complete before the data is published.

### 4.4.4 Processing Received and Generated Data

Whenever an item of data is received or generated by the NTIS system, it is allocated a DATD package into which it is included for publication. The target DATD package depends on the date to which the data applies and the time it is received/generated by the NTIS system.

If the data is received/generated on the same day to which it applies, then it will be included in the Day 1 DATD package. If the data is received/generated the following day, then it will be included in the Day 5 package and so on.

Determining the calendar day, and hence DATD package, to which a data item is allocated, differs depending on the type of data:

1. Data with a Source Timestamp: where data includes a source timestamp, from the originating outstation, site or system, the data applies to the calendar day specified in the timestamp. The following received data always includes a source timestamp:

    a. ANPR Travel Times

    b. MIDAS Loop Data

    c. TAME Loop Data

    d. TMU Loop Data

    e. VMS/Matrix Signal Data

2. Processed Traffic Data (both 'FVD and Sensor' and 'Sensor-only'): each item of Processed Traffic Data includes a 'derived time'; the time at which the value(s) in the data item were derived from the raw data. This 'derived time' is used to specify the calendar day to which the data item applies.

3. Events: all Events in the NTIS system contain a 'last modified time'; referring to the time that the Event was created or last updated in the NTIS system. This 'last modified time' is used to specify the calendar day to which the Event creation/update instance applies.

4. In-fill Data: in-fill data is assigned an appropriate 'source timestamp' by the NTIS system; to specify the time and date that the data should have been received by the system. The applicable calendar day is that specified in the assigned 'source timestamp'.

### 4.4.5  Publication Schedule

The publication schedule, listed below, is performed every day at the same times. In this instance, the publication is being performed on Date X.

Date X @ 00:00:

1. Date X-1 data (that is, data applicable to the previous day):

    a. The accumulation of real time data into the Day 1 package is concluded (any new data received/generated for Date X-1 is placed in the Day 5 package).

    b. The Full Refresh snapshot of Events is created and included in the Day 1 package.

    c. The Full Refresh snapshot of VMS/Matrix data is created and included in the Day 1 package.

    d. The latest version of the NTIS Model is included in the Day 1 package.

    e. Real time and catch-up data from the Day 1 package is copied into the Day 5 package. Note: in-fill data is not copied; this is generated fresh for each DATD publication, to avoid duplication with subsequently-received catch-up data.

  f. Snapshot data from the Day 1 package is copied into the Day 5 package.

2. Date X-5 data:

  a. The accumulation of real time data into the Day 5 package is concluded (any new data received/generated for Date X-5 is placed in the Day 8 package).

  b. Real time and catch-up data from the Day 5 package is copied into the Day 8 package.  Note: in-fill data is not copied; this is generated fresh for each DATD publication, to avoid duplication with subsequently-received catch-up data.

  c. Snapshot data from the Day 5 package is copied into the Day 8 package.

  *Note: no new snapshot data is created for this package; the snapshot data created for the Day 1 package, and subsequently copied into this package, still applies to this date.*

3. Date X-8 data:

  a. The accumulation of received/generated data into the Day 8 package (other than in-fill data, see below) is concluded; any new data received/generated for Date X-8 is assumed to be erroneous and is discarded.

Date X @ 01:00:

1. Date X-1 data:

  a. In-fill data is generated for the Day 1 package.

2. Date X-5 data:

  a. In-fill data is generated for the Day 5 package.

3. Date X-8 data:

  a. In-fill data is generated for the Day 8 package.

Date X @ 04:00:

1. Date X-1 data:

  a. The Day 1 package is released for publication.  The package is now available for download on this interface.

2. Date X-5 data:

  a. The Day 5 package is released for publication.  The package is now available for download on this interface.

3. Date X-8 data:

  a. The Day 8 package is released for publication.  The package is now available for download on this interface.

It should be noted that, although for a particular date the Day N packages are accumulative in nature, all packages are retained and available for publication.  That is, when a Day 5 package is released for publication is does not overwrite or replace the Day 1 package.

The following table illustrates the same operation from the perspective of the data processing and publishing for data received/generated for a single calendar day (in this example, October 1ˢᵗ).

| Day | Date | Newly received/generated data included in each Day N package during the day. | | | Notes |
|---|---|---|---|---|---|
| | | **Day 1 Package** | **Day 5 Package** | **Day 8 Package** | |
| 1 | Oct 1 | All data: RT | | | |
| 2 | Oct 2 | MIDAS: IF<br>TAME: IF<br>TMU: IF | All data: RT*<br>ANPR: CU<br>MIDAS: CU<br>TAME: CU<br>TMU: CU | | In-fill generated @ 01:00<br>**Day 1 Published @ 04:00**<br>All ANPR catch-up data received by end of the day. |
| 3 | Oct 3 | | MIDAS: CU<br>TAME: CU<br>TMU: CU | | |
| 4 | Oct 4 | | MIDAS: CU<br>TAME: CU<br>TMU: CU | | All TAME catch-up data received by end of the day. |
| 5 | Oct 5 | | MIDAS: CU<br>TAME: CU<br>TMU: CU | | |
| 6 | Oct 6 | | MIDAS: IF<br>TAME: IF<br>TMU: IF | MIDAS: CU<br>TMU: CU | In-fill generated @ 01:00<br>**Day 5 Published @ 04:00** |
| 7 | Oct 7 | | | MIDAS: CU<br>TMU: CU | |
| 8 | Oct 8 | | | MIDAS: CU<br>TMU: CU | All TMU/MIDAS catch-up data received by end of the day. |
| 9 | Oct 9 | | | MIDAS: IF<br>TMU: IF | In-fill generated @ 01:00<br>**Day 8 Published @ 04:00** |

*Note*: *some real time data may miss the 00:00 deadline for inclusion in the Day 1 package, due to the time it takes for the outstations, sites and collection systems to collect and send the data to the NTIS system.*

Key:
RT = real time data
IF = in-fill data
CU = catch-up data

### 4.4.6  Publication Operation

DATD packages are published utilising 2 mechanisms: a website and a web service, both described in the following sections.  The DATD payload is identical in content and format for both publication mechanisms.

### 4.4.6.1 Web Service

The DATD web service enables a Subscriber to request a single DATD package using a secure HTTP (HTTPS) request, submitted to the appropriate URL. The NTIS system includes the requested DATD package in the HTTPS response.

To restrict unauthorised access, the request utilises simple HTTP authentication; a valid Subscriber username and password is required in the HTTPS request.

The web service enables the Subscriber to request a specific Day N package (Day 1, Day 5, Day 8) for a specific date. Historic DATD packages are retained for publication for a period of time. This retention period is a system configurable parameter and hence cannot be explicitly defined in this document.

Refer to Section 4.3 for details of the request/response messages and content.

Note that the web service is intended primarily for, but is not limited to, automated systematic retrieval of DATD publications.

#### 4.4.6.1.1 Error Conditions

The following error conditions are expected and managed by the NTIS system:

1. The requested DATD does not exist. The specific DATD is included in the request message does not correctly identify a DATD package resident on the NTIS system.

2. Authentication failure – the username/password combination sent with the request is invalid.

3. The request has been made too soon after a previously successful request for a DATD publication. The interface ensures that Subscribers do not request DATD publications too frequently; the DATD packages are very large and this protection mechanism ensures that system resources and bandwidth are not overloaded by excessively frequent requests. The timeout for repeated requests is a system configurable parameter and cannot be explicitly defined in this document.

Refer to Section 4.3 for details of the data contained in the request message and the response messages returned for these error conditions.

### 4.4.6.2 Website

The DATD website enables a Subscriber to view, select and download a DATD package manually to a local machine.

To restrict unauthorised access, the website includes a login page; requiring the user to enter the username and password of the Subscription to gain access to the DATD download page.

After gaining access to the download page, the Subscriber is presented with a list of DATD packages available for download. The Subscriber can then select a specific Day N package (Day 1, Day 5, Day 8) for a specific date and request that the package be downloaded to the local Subscriber machine.

Historic DATD packages are retained for download for a period of time. This retention period is a system configurable parameter and hence cannot be explicitly defined in this document.

The website is intended for manual downloads and is designed to be accessed through a browser only. The login page cannot be bypassed and the supplied download facility cannot be accessed directly without navigating the login page. If direct access to DATD publications is required, then the web service should be used.

The address of the website is listed in Section 7.3.

### 4.4.7  Message Sequences

Note that this document does not describe the underlying TLS or TCP messages or message sequences; these are standard messages and data exchanges, transparent to the interface and outside the scope of this document.

#### 4.4.7.1  Web Service

The interface employs a simple, single request/response transaction, initiated by the Subscriber system.

1. The Subscriber system issues a DATD Request Message to the NTIS system to request a specific DATD publication.

2. The NTIS system replies with a DATD Response Message.  The content of the message is dependent on the success/failure state on servicing the request:

    a. Success: the DATD publication is included in the response message.

    b. Failure: an appropriate error is returned with the response message.

Refer to Section 4.3 for details of the request/response messages.

#### 4.4.7.2  Website

The website is designed to be accessed via a standard browser and hence utilises standard TLS and HTTP messages, the details of which are dependent on the browser and navigation of the site.  Therefore, the individual messages and message sequences utilised to access the website are not detailed in this document.

## 4.5  Sequence Diagrams

The sequence diagram, below, illustrates the message sequence utilised by the interface; for both the website and web service publication mechanisms.  The message sequences and the scenarios in which they are used are described in Section 4.4.7
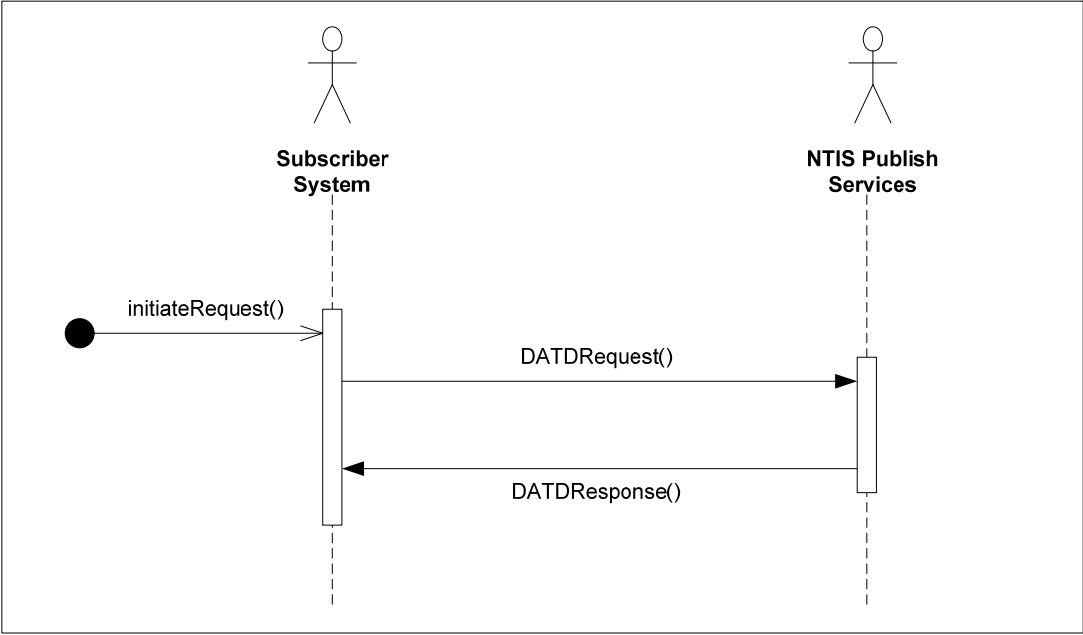


**Figure 4-2 : DATD Publication Sequence Diagram**

## 5. Message Definitions

### 5.1 Message Transfer

Message transfer is automated by the standard network components and transport and data exchange protocols employed by the interface.

The request/response messages that are employed to perform the publication are detailed in Section 4.3.

### 5.2 Message Lists

This section details the data included in the DATD publication included in the DATD Response Message (Section 4.3).

The overall publication package and its components are described in Section 5.2.1, the individual data items (termed publication messages) included in the packages are detailed in Section 5.2.2.

### 5.2.1 Publication Package

The DATD publication package comprises a single ZIP file, named:

NTISDATD-<yyyy>-<mm>-<dd>-Day<n>.zip

where <yyyy>, <mm> and <dd> are the year, month and date, respectively, of the date to which the contained data applies.  <n> is the Day N specifier: '1', '5' or '8'.

The DATD ZIP file contains the following files DATD-specific files:

1. NTISDATD-ANPR-<yyyy>-<mm>-<dd>-Day<n>.dat

2. NTISDATD-Events-<yyyy>-<mm>-<dd>-Day<n>.dat

3. NTISDATD-Events-FullRefresh-<yyyy>-<mm>-<dd>-Day<n>.dat

4. NTISDATD-MIDAS-<yyyy>-<mm>-<dd>-Day<n>.dat

5. NTISDATD-MIDAS-InFill-<yyyy>-<mm>-<dd>-Day<n>.dat

6. NTISDATD-PTD-<yyyy>-<mm>-<dd>-Day<n>.dat

7. NTISDATD-TAME-<yyyy>-<mm>-<dd>-Day<n>.dat

8. NTISDATD-TAME-InFill-<yyyy>-<mm>-<dd>-Day<n>.dat

9. NTISDATD-TMU-<yyyy>-<mm>-<dd>-Day<n>.dat

10. NTISDATD-TMU-InFill-<yyyy>-<mm>-<dd>-Day<n>.dat

11. NTISDATD-VMS-Matrix-<yyyy>-<mm>-<dd>-Day<n>.dat

12. NTISDATD-VMS-Matrix-FullRefresh-<yyyy>-<mm>-<dd>-Day<n>.dat

where the <yyyy>, <mm>, <dd> and <n> substitutable parameters are the same values as those for the containing ZIP file. This ensures that the DATD publication to which the individual files are associated can be identified after extraction from the ZIP file.

The DATD ZIP file also contains the latest version (at the time of publication) of the NTIS Model file:

1. NTISModel-<yyyy>-<mm>-<dd>-v<version>.zip

the format of the NTIS Model file name is detailed in [ref 6].

Each DATD file contains a single type of data. The data types included in the DATD are described in Section 4.4.2.

Catch-up data items are contained in the same file as the corresponding data items acquired in real time. Catch-up data items are identical in content and format to the real time data included in the files.

In-fill data items are contained in separate files to the real time and catch-up data items. This is to ensure that the Subscriber can differentiate between data received from external systems and the in-fill data produced by the NTIS system. In-fill data items are identical in content and format to the real time data included in the files.

The NTIS Model file is also published, with identical content format and filename, via the E18-PublishNTISModel interface. Details of the file and its contents can be found in the associated interface specification [ref 6] and hence the file is not described further in this document.

The *.dat* files have the same format. Each line of the file comprises a single DATEXII [ref 17] *<d2LogicalModel>* element, containing a single DATEXII/XML-based publication. For consistency, the content and format of each line is identical to that published in real time on the E21-DATEXIISubscribers interface [ref 8], where applicable (not all data included in the DATD is published in real time). The individual data items contained in each *.dat* file are termed 'publication messages'.

All whitespace and control characters are removed from each *<d2LogicalModel>* element, to ensure the minimum uncompressed size for each *.dat* file.

### 5.2.2  Publication Messages

The following sub-sections detail the data content in each publication message included in the DATD package component files.

Content detail common to all messages:

1. The XML content of the message comprises a single *<d2LogicalModel>* top-level element.

2. The *<d2LogicalModel>* element contains a single *<feedType>* element. This element is used to uniquely identify the type of published data contained within the message; each message instance contains only one type of published data.

3. The content within the messages refers to reference data contained in the published NTIS Model. To fully interpret the data contained within the messages, the Subscriber requires a copy of the appropriate version of the NTIS Model. The content and format of the NTIS Model, and the interface employed to distribute the Model to Subscribers, are detailed in [ref 6].

4. Unless otherwise stated in the message description, time and date values are presented in the following ISO 8601-compliant format:

              \<date>T\<local time, to milliseconds>\<timezone>

where \<timezone> takes one of the following values and indicates the timezone offset that has been applied to UTC to generate the \<local time>:

            '+01:00'        (BST)

            'Z'              (GMT)

Example:2013-04-26T10:24:31.071+01:00

Notes on interpreting XML listings:

Each message section contains an XML listing detailing the data content of the message. The key for the XML listing is as follows:

| | |
|---|---|
| \<element>*text*\</element> | *text* is static and is included, as listed, in all messages. |
| \<element>*[text]*\</element> | *[text]* is variable in value and uniquely identifies a data item that is described in the Data Item Descriptions section, following the XML listing. |
| \<!-- *text* --> | XML comment text is included to add in-line context or explanation to the XML listing. These comments are not included in the message. |
| \<!—x N *text* --> | Indicates that the previous element can be repeated 'N' times (accompanied by a description in the *text*). |

### 5.2.3 ANPR Travel Times

This data is published with identical content, structure and format to the corresponding data published, in real time, on the E21-DATEXIISubscribers interface. Refer to the E21-DATEXIISubscribers interface specification [ref 8] for details.

### 5.2.4 Events

This data is published with identical content, structure and format to the corresponding data published, in real time, on the E21-DATEXIISubscribers interface. Refer to the E21-DATEXIISubscribers interface specification [ref 8] for details.

### 5.2.5 MIDAS Loop Data

This data is published with identical content, structure and format to the corresponding data published, in real time, on the E21-DATEXIISubscribers interface. Refer to the E21-DATEXIISubscribers interface specification [ref 8] for details.

### 5.2.6 Processed Traffic Data – Fused FVD and Sensor Data

This data is published with identical content, structure and format to the corresponding data published, in real time, on the E21-DATEXIISubscribers interface. Refer to the E21-DATEXIISubscribers interface specification [ref 8] for details.

### 5.2.7 Processed Traffic Data – Fused Sensor-only Data

This data is published with identical content, structure and format to the corresponding data published, in real time, on the E21-DATEXIISubscribers interface. Refer to the E21-DATEXIISubscribers interface specification [ref 8] for details.

### 5.2.8 TAME Loop Data

#### 5.2.8.1 Message Content

```xml
<d2lm:d2LogicalModel xmlns:d2lm="http://datex2.eu/schema/2/2_0" modelBaseVersion="2">
  <d2lm:exchange>
    <d2lm:supplierIdentification>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:supplierIdentification>
  </d2lm:exchange>
  <d2lm:payloadPublication xmlns:xsi=http://www.w3.org/2001/XMLSchema-instance
      xsi:type="d2lm:MeasuredDataPublication" lang="en" >
    <d2lm:feedType>TAME Loop Traffic Data</d2lm:feedType>
    <d2lm:publicationTime>[publication time]</d2lm:publicationTime>
    <d2lm:publicationCreator>
      <d2lm:country>gb</d2lm:country>
      <d2lm:nationalIdentifier>NTIS</d2lm:nationalIdentifier>
    </d2lm:publicationCreator>
    <d2lm:measurementSiteTableReference targetClass="MeasurementSiteTable"
      version="[NTIS Model version]" id="NTIS_TAME_Measurement_Sites" />
    <d2lm:headerInformation>
      <d2lm:confidentiality>restrictedToAuthoritiesTrafficOperatorsAndPublishers
      </d2lm:confidentiality>
      <d2lm:informationStatus>real</d2lm:informationStatus>
      <d2lm:urgency>normalUrgency</d2lm:urgency>
    </d2lm:headerInformation>
    <d2lm:siteMeasurements>
      <d2lm:measurementSiteReference version="="[NTIS Model version]"
        targetClass="MeasurementSiteRecord" id="[TAME site ID]" />
      <d2lm:measurementTimeDefault>[default measurement time]</d2lm:measurementTimeDefault>
      <d2lm:measuredValue index="0">
        <d2lm:measuredValue>
          <d2lm:basicData xsi:type="d2lm:TrafficFlow">
            <d2lm:vehicleFlow>
              <d2lm:dataError>[data error flag]</d2lm:dataError>
              <d2lm:reasonForDataError>
                <d2lm:values>
                  <d2lm:value>[data error reason]</d2lm:value>
                </d2lm:values>
              </d2lm:reasonForDataError>
              <d2lm:vehicleFlowRate>[flow - total]</d2lm:vehicleFlowRate>
            </d2lm:vehicleFlow>
          </d2lm:basicData>
        </d2lm:measuredValue>
      </d2lm:measuredValue>

      <!-- The following data items are supplied by Classified TAME outstations only -->
      <d2lm:measuredValue index="1">
        <d2lm:measuredValue>
          <d2lm:basicData xsi:type="d2lm:TrafficFlow">
            <d2lm:vehicleFlow>
              <d2lm:dataError>[data error flag]</d2lm:dataError>
              <d2lm:reasonForDataError>
                <d2lm:values>
                  <d2lm:value>[data error reason]</d2lm:value>
                </d2lm:values>
              </d2lm:reasonForDataError>
              <d2lm:vehicleFlowRate>[flow - length categorised]</d2lm:vehicleFlowRate>
            </d2lm:vehicleFlow>
          </d2lm:basicData>
        </d2lm:measuredValue>
      </d2lm:measuredValue>
      <!-- x 4 : flow is categorised into 4 vehicle length-specific measurements -->
      <!-- The <d2lm:measuredValue> index is incremented by 1 for each measurement -->
      <d2lm:measuredValue index="5">
        <d2lm:measuredValue>
          <d2lm:basicData xsi:type="d2lm:TrafficFlow">
            <d2lm:vehicleFlow>
              <d2lm:dataError>[data error flag]</d2lm:dataError>
              <d2lm:reasonForDataError>
                <d2lm:values>
                  <d2lm:value>[data error reason]</d2lm:value>
                </d2lm:values>
```

```
            </d2lm:reasonForDataError>
            <d2lm:vehicleFlowRate>[flow - speed categorised]</d2lm:vehicleFlowRate>
          </d2lm:vehicleFlow>
        </d2lm:basicData>
      </d2lm:measuredValue>
    </d2lm:measuredValue>
    <!-- x 14 : flow is categorised into 14 vehicle speed-specific measurements -->
    <!-- The <d2lm:measuredValue> index is incremented by 1 for each measurement -->

  </d2lm:siteMeasurements>
    <!-- x N - multiple <d2lm:siteMeasurements> elements can exist in the same message -->
  </d2lm:payloadPublication>
</d2lm:d2LogicalModel>
```

### 5.2.8.2  General Notes

1. Reference data, contained in the published NTIS Model, is required to interpret the traffic data contained in the message:

   a. The *<d2lm:measurementSiteTableReference>* element references the version of the NTIS Model to use and specifies that TAME site data is contained in the *NTIS_TAME_Measurement_Sites* table within the NTIS Model.

   b. The TAME site is uniquely identified within the *NTIS_TAME_Measurement_Sites* NTIS Model table by the [TAME site ID] attribute of the *<d2lm:measurementSiteReference>* element.  The location of the TAME site on the road network, and any other site-specific characteristics, are contained in the NTIS Model.

   c. The characteristics of each site measurement are included in the NTIS Model. Specifically, the *index* attribute of the *<d2lm:measuredValue>* element, unique per TAME site, maps the measurements contained in this traffic data message to the measurement characteristics contained in the NTIS Model.  The NTIS Model contains:

      i. The speed ranges for the [flow - speed categorised] data items.

      ii. The vehicle length ranges for the [flow – length categorised] data items.

2. TAME outstations/sites are statically configured as either Volumetric or Classified.

   a. Classified outstations provide a total vehicular flow value plus a number of categorised flow values, based on: a) vehicle length and b) vehicle speed.

   b. Volumetric outstations only provide a total vehicular flow value.

3. The traffic data values contained in the message are received by the NTIS system, and subsequently published, on a per-TAME site basis: data values apply to all lanes monitored by the TAME site.

4. Each individual traffic data value is reported by a TAME outstation in a single byte with a value of 0-255.  Any subsequent processing, conversion or range validation on this raw data is described in the Data Item Descriptions section, below.

### 5.2.8.3 Data Item Descriptions

| Data Item | Description |
|---|---|
| [data error flag] | Boolean flag indicating whether the data value is valid (false) or known to be in error/suspect (true).<br><br>Refer to the Data Validation and Error Handling section, below, for further information. |
| [data error reason] | Text describing the reason for the data error.<br><br>This data item, and the containing <*d2lm:reasonForDataError*> element, is omitted from the message if the corresponding [data error flag] is false.<br><br>Values:<br>  "out of range" : determined by the NTIS system<br>  "suspect equipment" : specified at the NTIS system.<br><br>Refer to the Data Validation and Error Handling section, below, for further information. |
| [default measurement time] | The time and date of all the measurements within the containing <*d2lm:siteMeasurements*> element; as recorded by the source TAME outstation. |
| [flow – total] | Vehicular flow rate, measured in vehicles/hour (the value is converted from the vehicles/minute value reported by the site/outstation).<br><br>The value represents the total flow of all vehicle types and characteristics (see also categorised data items [flow – length categorised] and [flow – speed categorised]).<br><br>Valid range: 0-[system configurable parameter].<br>(Note: the system configurable parameter can be modified by NTIS operations, so this value cannot be explicitly declared in this document) |
| [flow – length categorised] | Vehicular flow rate, measured in vehicles/hour (the value is converted from the vehicles/minute value reported by the site/outstation).<br><br>There are multiple [flow – length categorised] data items; each describing the flow for vehicles with a length within a specific range. Refer to General Notes for details.<br><br>Valid range: 0-[system configurable parameter].<br>(Note: the system configurable parameter can be modified by NTIS operations, so this value cannot be explicitly declared in this document) |

| Data Item | Description |
|---|---|
| [flow – speed categorised] | Vehicular flow rate, measured in vehicles/hour (the value is converted from the vehicles/minute value reported by the site/outstation).<br><br>There are multiple [flow – speed categorised] data items; each describing the flow for vehicles with a speed within a specific range. Refer to General Notes for details.<br><br>Valid range: 0-[system configurable parameter].<br>(Note: the system configurable parameter can be modified by NTIS operations, so this value cannot be explicitly declared in this document) |
| [NTIS Model version] | Version of the published NTIS Model against which this message is published.<br><br>Format: <major version>.<minor version>, e.g. "17.0" |
| [publication time] | The time and date that the message was published by the NTIS system. |
| [TAME site ID] | The unique ID of the TAME measurement site; used to reference the TAME site in the published NTIS Model. |

### 5.2.8.4 Data Validation and Error Handling

1. General principles:

   a. Missing data items: measured values that are purposefully not included in traffic data sent from the reporting site/outstation are also omitted from the published data. The entire corresponding <*d2lm:measuredValue*> element is omitted from the published data.

   b. Erroneous data items: measured values determined to be in error by the NTIS system are included in the published data. The data items are marked as in error ([data error flag]=true) and the corresponding [data error reason] set to:

      i. out of range: the value received from the reporting outstation/site is determined by the NTIS system to be outside of an acceptable range.

      ii. suspect equipment: the source equipment has been set as suspect, following analysis of erroneous received data.

   Note: If more than one error reason is applicable to a data item, then all reasons are included in the publication. For example, if the equipment is set to suspect, but data is still being received and the out-of-range check fails for one of the data items, the following will be published:

   ```
   <d2lm:dataError>true</d2lm:dataError>
     <d2lm:reasonForDataError>
       <d2lm:values>
         <d2lm:value>suspect equipment</d2lm:value>
         <d2lm:value>out of range</d2lm:value>
       </d2lm:values>
     </d2lm:reasonForDataError>
   ```

2. Volumetric Sites:

a. Range checks.  Volumetric sites only supply one data value (total flow) and hence the only validation is an out-of-range check on the total flow value and the associated [data error flag] and [data error reason] data items set accordingly.

3. Classified Sites:

   a. Speed Counts Included Flag.  Classified sites specify a Speed Counts Included Flag in the supplied traffic data packet; indicating whether speed-categorised flow values are included in the supplied data packet:

      i. If the flag indicates that speed-specific flows are not included in the traffic data packet, then these data items (refer to [flow – speed categorised], above) are omitted from the publication.

      ii. If the flag indicates that speed-specific flows are included in the traffic data packet, then these data items are processed and included in the publication, along with the total and vehicle length-specific flow values.

      iii. Note: for Classified sites, the reason the Speed Counts Included Flag is set to false indicates a fault with the collection outstation and/or site.

   b. Range checks.

      i. All data items included in the publication are subject to out-of-range checks.  If the item fails the check, then the value is still included in the publication with the associated [data error flag] and [data error reason] data items set accordingly.

### 5.2.9  TMU Loop Data

This data is published with identical content, structure and format to the corresponding data published, in real time, on the E21-DATEXIISubscribers interface.  Refer to the E21-DATEXIISubscribers interface specification [ref 8] for details.

### 5.2.10  VMS and Matrix Signal Data

This data is published with identical content, structure and format to the corresponding data published, in real time, on the E21-DATEXIISubscribers interface.  Refer to the E21-DATEXIISubscribers interface specification [ref 8] for details.

## 5.3  Byte Ordering Policy

The interface utilises standard interoperable transport and application layer protocols; no specific byte ordering policy is required.

## 6.  Qualification

The interface is designed to meet the system requirements specified in [ref 5].

The validation and testing of this and all other system interfaces are described in the NTIS Test Strategy [ref 2].

# 7. List of Annexes

## 7.1 Annex A – DATEXII v2.0 Schema: Extensions

The XML-based data published on the DATD interface requires Level B Extensions to be applied to the standard DATEXII v2.0 Schema [ref 17].

The extensions used for this interface are identical to those employed by the E21-DATEXIISubscribers interface (the published data is identical in content and format). Refer to the E21-DATEXIISubscribers interface specification [ref 8] for details of the NTIS Publish Services-specific extensions applied to the standard schema.

## 7.2 Annex B – Subscription Information

### 7.2.1 Subscriber System

To receive data published on the interface, the Subscriber system is required to adhere to the following criteria:

1. The consumer is a registered Subscriber to the NTIS Published Services. A username and password are required to authenticate publication requests on this interface.

2. Internet access: the Subscriber system has network access to the internet.

3. Client software: the Subscriber system is able to employ:

   a. A standard browser to access the DATD website.

   b. Software to issue HTTPS requests and manage the returned DATD package via the web service.

Any registered Subscriber to the NTIS Published Services can access the interface to download the DATD publication.

### 7.2.2 Subscription Options

The following Subscription Options are utilised by the NTIS system to enable publication of data to Subscribers on this interface.

| Option | Values | Description |
|---|---|---|
| Username | A string, containing 5-20 characters, utilising only lowercase letters [a-z] and numeric characters [0-9] | The username of the Subscriber. The username is required, along with Subscription password, to authenticate requests on this interface.<br><br>The name is unique within the list of Subscribers maintained by the NTIS system.<br><br>The username is a mandatory Subscription Option, required to register for NTIS Published Services. |
| Password | A string, containing 8-12 characters, comprising the following character sets: a-z, A-Z, and 0-9. | The password of the Subscriber. The password is required, along with Subscription username, to authenticate requests on this interface.<br><br>The password is a mandatory Subscription Option, required to register for NTIS Published Services. |

### 7.2.3 On-line Resources

A number of on-line resources are available to Subscribers on the Traffic England website:

http://www.trafficengland.com/subscribers

General Information: information regarding the facilities and services provided by the NTIS Publish Services component.

Subscription Requests: a facility is provided to request a new Subscription or a modification to an existing Subscription.

## 7.3  Annex C – Internet Addresses

| Internet Address | Description |
|---|---|
| https://trafficengland.info/subscriberportal | The URL utilised by Subscribers to access the download website via a browser.<br><br>Note: the website is employed to download both DATD and NTIS Model [ref 6] data files. |
| https://trafficengland.info/subscriberportal/service/datd/*<yyyy>-<mm>-<dd>/<n>* | The URL utilised by Subscribers to access the web service to download individual DATD publications.<br><br>Note: the format of the last portion of the URI (*<yyyy>-<mm>-<dd>/<n>*) identifies the DATD publication and is detailed in Section 4.3.1. |

## 7.4 Annex D – Abbreviations and Glossary

Industry-standard and HA terms and abbreviations used within this document are listed in the HA Taxonomy [ref 1].

Terms and abbreviations specific to this document, or not included in the Taxonomy, are listed below.

| Term | Description |
|------|-------------|
| DATD | Daily Aggregated Traffic Data. A daily accumulation of traffic and road network event data, packaged and published to Subscribers. |
| DATEXII | European-wide 2nd generation Data Exchange specification for traffic information. Official website: http://www.datex2.eu |
| DG MOVE | European Commission Directorate-General for Mobility and Transport. The body that overseas the DATEXII specification. |
| EIDD | External Interface Design Document. A Thales document for describing an external system interface. |
| EIRS | External Interface Requirements Specification. A Thales document for defining the requirements of an external system interface. |
| FVD | Floating Vehicle Data. Traffic data acquired from the monitoring of vehicle-resident location determination systems. |
| HTTP | Hyper Text Transfer Protocol |
| HTTPS | Secure HTTP. Not a protocol in itself, it describes the layering of HTTP over a SSL or TLS security and encryption protocol. |
| Published Data Type | Published data is categorised into discrete Published Data Types. The different types of data are published in separate messages and are processed and managed separately by the system. |
| Subscriber | An individual, organisation or body that has registered to receive published data. The term is also applied to the system utilised by the Subscriber to receive published data. |
| SSDD | System/Subsystem Design Document. A Thales document for describing the function and overall design of a system. |
| TLS | Transport Layer Security. A standard protocol for security and encryption of internet messaging. |