STEP (Short TErm Prediction)

Traffic Data Interface Specification

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Executive summary

This document details the interface between the Mott MacDonald Common Database system located in the UK South West Regional Control Centre (SWRCC) and the Fileradar predictive analysis system located in their offices in Delft (Netherlands). The interface supports the passing of near real-time traffic count data collected across the area of interest over an internet connection for predictive data analysis and the subsequent return of predictive data for display to users (operators) within the SWRCC.

The specification details both the transport mechanism and data formats for both directions of information transfer.

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1 Introduction

"ERA-NET ROAD – Coordination and Implementation of Road Research in Europe" was a Coordination Action funded by the 6th Framework Programme of the EC. The partners in ERA-NET ROAD (ENR) were United Kingdom, Finland, Netherlands, Sweden, Germany, Norway, Switzerland, Austria, Poland, Slovenia and Denmark (www.road-era.net). Within the framework of ENR this joint research project was initiated. The funding National Road Administrations (NRA) in this joint research project are Belgium, Switzerland, Germany, Netherlands Norway and United Kingdom.

This document supports the UK pilot of the STEP project in detailing the programmatic and data interface to be developed between the Mott MacDonald Common Database system (CDB) located in the regional control office of the English South West regional control office (SWRCC) and the Fileradar data analysis and prediction system located in Delft.

Near real-time traffic count data will be received by the CDB from the Highways Agency MIDAS Gold data service, filtered and the appropriate subset of data made available to the data analysis system. In return, predictive data created by the Fileradar data analysis system will be copied to the CDB for presentation to regional control office operators and users.

The two directions of this interface are described in sections 2 and 3 respectively.

1.1 References

[1] MIDAS Traffic Data File Decoder User Guide
UK Highways Agency Ref: 206/007/REP/022 Issue 'C' dated 5th August 2008.

1.2 Acronyms

CDB	Common Database system
MIDAS	Motorway Incident Detection and Automatic Signalling
SWRCC	UK Highways Agency : South West Regional Control Office
TCD	Traffic Count Data
XML	eXtensible Markup Language
JSON	JavaScript Object Notation

2 Raw Data Supply

This section defines the interface for the supply of filtered traffic count data from the SWRCC CDB to the Fileradar data analysis system.

The general architecture of the data supply capability is as follows:

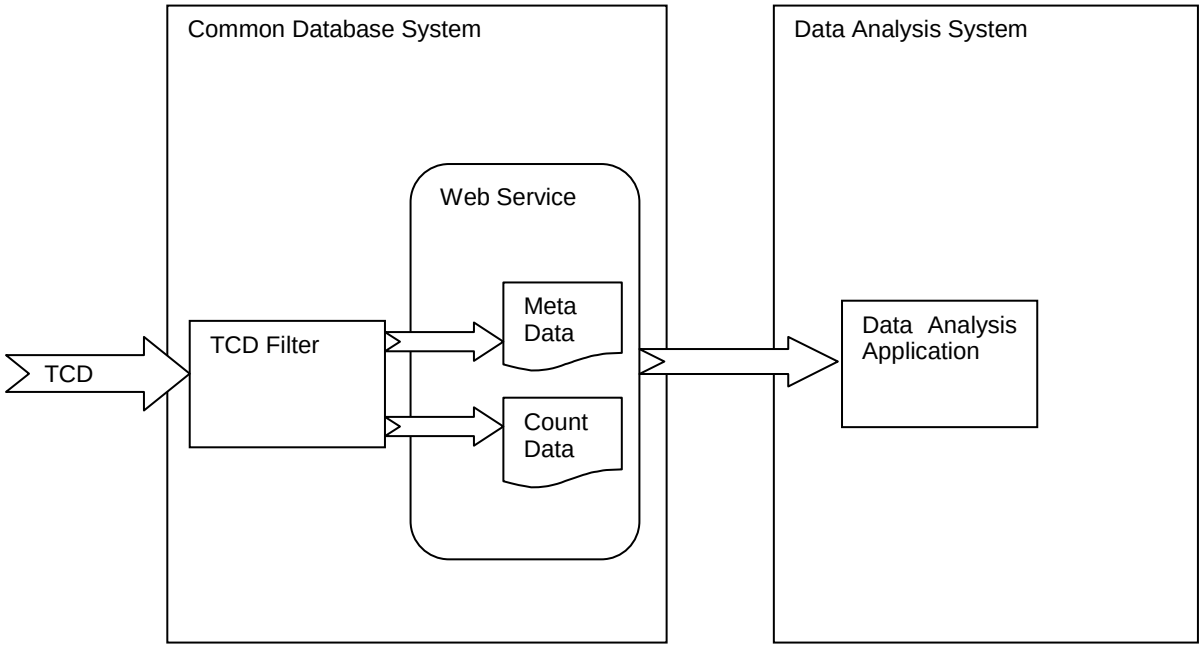

Figure 1 Raw Data Supply Interface components

The components of this interface are as follows:

- TCD Filter
- Web Service
- Meta Data file
- Count Data file
- Data Analysis Application

2.1 TCD Filter

The TCD Filter functionality accepts MIDAS Gold data, extracts all data relating to sites within the SWRCC region and formats a Count Data file for retrieval by the Fileradar Data Analysis Application. A Meta Data file is updated with the date/time stamp of the creation of the latest Count Data file. The file set (Count Data and Meta Data) will be written at nominally 1 minute intervals.

The application will retain a minimum of 1 day of Count Data files in the web folder.

2.2 Web Service

A web service will be installed on the CDB server with connectivity to the internet to allow incomming requests from a configured fixed IP address to request read-only access to the Meta Data and Count Data files. The Data Analysis system will issue HTTP Get commands with an agreed username and password to retrieve these files as required.

The URL to access these files will be:

<path>/countdata

Where <path> will be a folder structure to be agreed.

2.2.1 Errors

An HTTP authentication failure will return a “401 Unauthorized” error.

An HTTP request for a file which does not exist will return a “404 Not Found” error.

2.3 Meta Data file

This file will be an XML file named as (MetaData.XML) and configured as demonstrated by the following example:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- Generated by Mott MacDonald -->
<MetaData xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
          xsi:noNamespaceSchemaLocation="metadata.xsd"
          confirmedTime="2012-01-15T13:15:00+00:00"
/>
```

The ’ConfirmedTime’ attribute will contain the date and time of when the latest Count Data file was last written.

This file will only be updated as long as the data collection process is functioning correctly.

2.4 Count Data file

The count data file will be named (countdata_ddmmyy_hhmm.csv) and formatted as a CSV (comma separated variables) text file as per Reference [1] “TCD Converter User Manual”. The filename contains the date/time of when the file was created as follows:

ddmmyy = day, month and year as 2-digit numbers with leading zeros.

hhmm = hour (24-hour clock) and minute as 2-digit numbers with leading zeros.

The date/time in the filename will correspond to the time period of collection of the data contained in the file.

The first text line of each file will contain the column headers and subsequent lines of text the traffic count data received since the last file was created.

2.5 Data Analysis Application

The Data Analysis application will poll the web service at appropriate intervals reading the Meta Data file until a Meta Data file is read containing a newer date than that previously read. At that time the relevant Count Data file or files will be read from the web service.

3 Predictive Data Supply

This section defines the interface for the supply of predictive data from the Fileradar data analysis system to the common database system in SWRCC.

The general architecture of the predictive data supply capability is as follows:

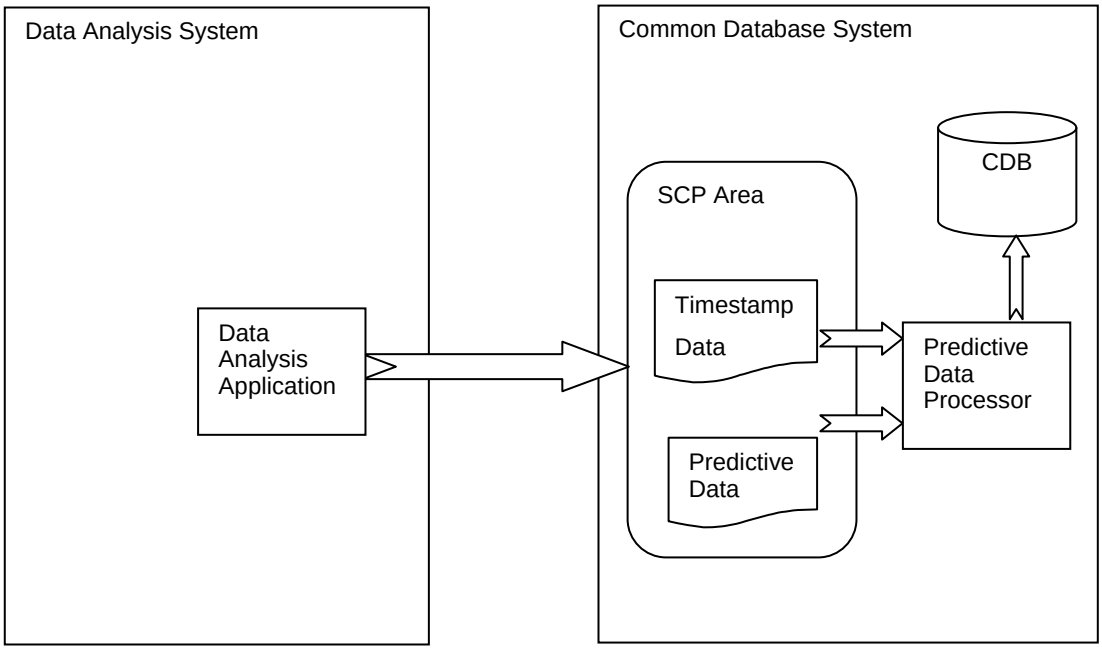

Figure 2 Predictive Data Supply Interface components

The components of this interface are as follows:

- Data Analysis Application
- Predictive Data Processor
- Web Service
- Timestamp Data file
- Predictive Data file

3.1 Data Analysis Application

The application will carry out the data prediction function and generate results files based on a processing interval “intervalInMinutes” and generate Predictive Data files formatted as described below. Interval data files and an updated Meta Data file will be delivered to the STEP server via SCP (secure copy) where they will be picked up by the predictive data processor.

The “intervalInMinutes” attribute will apply to the frequency at which files are written to the Web Service and also to the interval between data samples within the predictive data file.

3.2 SCP Area

A SCP account will be set up on the server machine which will allow interval data and meta data to be delivered to a secure location on the server. This mechanism ensures security for the wire and tight control of access since the client must hold the appropriate SSL certificates to ensure connection.

The files will be stored in the folder structure:

<path>/predictivedata/ddmmyy_hhmm.json

Where <path> will be a folder structure to be agreed and the ddmmyy_hhmm represents a date and times value which matches the associated values in the timestamp file.

3.2.1 Timestamp Data file

This file will be an text file named as (latest.txt) and configured as follows:

ddmmyy_hhmm.json

The time will be in 24 hour format.

The value represent the date and time contained in the filename of the latest Predictive Data file written to the web folder by the Data Analysis application.

3.2.2 Predictive Data file

The Predictive data file will be named (predictive_ddmmyy_hhmm.json) and formatted as a JSON text file as described below. The filename contains the date/time of when the file was created as follows:

ddmmyy = day, month and year as 2-digit numbers with leading zeros.

hhmm = hour and minute (24-hour clock) as 2-digit numbers with leading zeros.

The date/time in the filename will correspond to the date/time of the first data interval contained in the file.

The number of successive intervals in the data is contained in the “nIntervals” attribute within the file.

The number of minutes between each data sample within the data file is given in the attribute “intervalInMinutes”.

The file format will conform to JSON notation as demonstrated by the following example:


```
{
"intervalInMinutes": 5,
"nIntervals": 6,
"data": [
  {"linkID":"4000000021627163A","segmentID":0,
"speeds": [107,103,78,45,30,31], "flows": [60,360,420,600,120,180]},
  { "linkID":"4000000021616229B","segmentID":0,
"speeds": [98,101,63,34,39,29], "flows": [240,240,300,360,120,60]},
```

]
}

Note: The first data value provided for each of Speed and Flow in the JSON formatted data will be taken as the estimated actual speed and flow values for the time given in the filename.

3.3 Predictive Data Processor

The Predictive Data Processor functionality will periodically monitor the timestamp text file in the relevant SCP data folder and do nothing until a file containing a date/time that is newer than that last processed by the application. When a newer date/time is detected, the file will be decoded and the data written to the common database.

The time interval of Predictive Data files will be contained in the file attribute "intervalInMinutes“. This will be consistent across successive files but included to allow flexibility during the trial operation of the service. The first speed and flow vaule received will be stored in the common database as the estimated actual vaules for the timestamp of the file and the remaining values will be stroed as predicted vaules as of the timestamp.

The application will retain a minimum of 1 day of Predictive Data files in the web folder.