

Regional Integrated Transportation Information System



# RITIS VWS Interface Control Document

**Version 2.0**

**August 21, 2017**



# REVISION INFORMATION

Revision	Description	Pages Affected	Date
0	Initial release	All	2017-08-21

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## 1 Introduction

The purpose of this document is to define an interface used to exchange Virtual Weigh Station (VWS) collected data with Regional Integrated Transportation Information System (RITIS). Virtual Weigh Station sites push data in real-time in XML format using a web service hosted by RITIS. Access is controlled using credentials and individual site identification.

VWS data consists of real-time vehicle data and site metadata. Site metadata is shared manually on one time basis during the site deployment. The metadata consists primarily of site identification information, location information, and observed lane information. Real-time vehicle data is shared asynchronously as it is collected by the sensors and cameras on site. Real-time vehicle data consists of timestamp information, class and speed data, violation flags for multiple types of violations, and vehicle images captured by an on-site camera.

The rest of this document provides details on the specification required to push VWS data to RITIS.

## 2 Responsible Entities and Assumptions

### 2.1 Responsible Entities

The CATT Lab RITIS team is responsible for development and maintenance of the RITIS web service that accepts site data.

Any system may implement data provider side of this interface. However, data providers must obtain connection credentials and request IP address whitelisting to successfully connect to the RITIS web service.

### 2.2 Assumptions

The following assumptions are made regarding this interface:

- The intent of this specification is to allow external systems to push VWS site data to RITIS in real-time. The system is designed to handle up to 30 sites pushing data in real-time.
- Only well formed POST messages will be processed. Messages not conforming to the specification will be rejected with standard HTTP error codes. No custom error handlings will be implemented on the interface.

## 3 Transmission Method

### 3.1 Transmission Endpoints

REST web service is available to accept data transmission from remote sites. To transmit site data to RITIS, the client site must connect and use POST method to one of the two endpoints:

**<hostname>:[port]/vws/vehicle/data**

This endpoint accepts real-time vehicle data including site reference, timestamp, class and speed, and violation flags in XML format.

**<hostname>:[port]/vws/vehicle/image**

This endpoint accepts real-time vehicle images encoded in XML format and including a timestamp and site reference.

Each incoming vehicle is transmitted individually with two separate XML messages, one containing vehicle data and one containing vehicle image.

The POST Header Content-Type must be set to application/xml.

## 4 Content

XML message definitions for vehicle data and images are defined in attached XML schema.

### 4.1 Vehicle Data Definition

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:jaxb="http://java.sun.com/xml/ns/jaxb"
  jaxb:version="2.1" elementFormDefault="qualified">
  <xs:element name="veh">
    <xs:annotation>
      <xs:appinfo><jaxb:class name="Vehicle"/></xs:appinfo>
    </xs:annotation>
    <xs:complexType>
      <xs:sequence>
        <xs:element name="datetime" type="xs:string"/>
        <xs:element name="grossWt" type="xs:integer"/>
        <xs:element name="class" type="xs:integer"/>
        <xs:element name="speed" type="xs:decimal"/>
        <xs:element name="violation" type="xs:boolean"/>
        <xs:element name="offScale" type="xs:boolean"/>
        <xs:element name="overHeight" type="xs:boolean"/>
        <xs:element name="wrongDir" type="xs:boolean"/>
        <xs:element name="stopped" type="xs:boolean"/>
        <xs:element name="tooClose" type="xs:boolean"/>
        <xs:element name="overWtGross" type="xs:boolean"/>
        <xs:element name="overWtAxle" type="xs:boolean"/>
        <xs:element name="overWtTandems" type="xs:boolean"/>
        <xs:element name="overWtBridge" type="xs:boolean"/>
        <xs:element name="overSpeed" type="xs:boolean"/>
        <xs:element name="speedChange" type="xs:boolean"/>
        <xs:element name="unbalanced" type="xs:boolean"/>
        <xs:element name="random" type="xs:boolean"/>
        <xs:element name="overLength" type="xs:boolean"/>
        <xs:element name="vehFlags" type="xs:integer"/>
        <xs:element name="numAxles" type="xs:integer"/>
        <xs:element name="axle" maxOccurs="unbounded">
          <xs:complexType>
            <xs:sequence>
              <xs:element name="wt" type="xs:integer"/>
              <xs:element name="overWtAxle" type="xs:boolean"/>
              <xs:element name="overWtTandems" type="xs:boolean"/>
              <xs:element name="overWtBridge" type="xs:boolean"/>
              <xs:element name="unbalanced" type="xs:boolean"/>
            </xs:sequence>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

```

        <xs:element name="axleFlags" type="xs:integer"/>
        <xs:element name="spacing" type="xs:decimal"/>
    </xs:sequence>
    <xs:attribute name="item" use="required" type="xs:integer"/>
</xs:complexType>
</xs:element>
</xs:sequence>
<xs:attribute name="distanceUnits" use="required" type="xs:NCName"/>
<xs:attribute name="id" use="required" type="xs:integer"/>
<xs:attribute name="lane" use="required" type="xs:integer"/>
<xs:attribute name="speedUnits" use="required" type="xs:NCName"/>
<xs:attribute name="station" use="required"/>
<xs:attribute name="wtUnits" use="required" type="xs:NCName"/>
</xs:complexType>
</xs:element>
</xs:schema>

```

## 4.2 Vehicle Image Definition

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:jaxb="http://java.sun.com/xml/ns/jaxb"
    jaxb:version="2.1" elementFormDefault="qualified">
    <xs:element name="veh">
        <xs:annotation>
            <xs:appinfo><jaxb:class name="Image"/></xs:appinfo>
        </xs:annotation>
        <xs:complexType>
            <xs:sequence>
                <xs:element name="datetime" type="xs:string"/>
                <xs:element name="image" type="xs:base64Binary"/>
            </xs:sequence>
            <xs:attribute name="id" use="required" type="xs:integer"/>
            <xs:attribute name="lane" use="required" type="xs:integer"/>
            <xs:attribute name="station" use="required"/>
        </xs:complexType>
    </xs:element>
</xs:schema>

```

## 4.3 Sample Vehicle Data

```

<?xml version="1.0" encoding="UTF-8"?>
<veh id="11446" station="I95N" lane="1" wtUnits="lb" speedUnits="mph"
distanceUnits="ft">
    <datetime>2017-08-03T08:23:23-06:00</datetime>
    <grossWt>38480</grossWt>
    <class>5</class>
    <speed>34</speed>
    <violation>false</violation>
    <offScale>false</offScale>
    <overHeight>false</overHeight>
    <wrongDir>false</wrongDir>
    <stopped>false</stopped>
    <tooClose>false</tooClose>

```

```

<overWtGross>>false</overWtGross>
<overWtAxle>>false</overWtAxle>
<overWtTandems>>false</overWtTandems>
<overWtBridge>>false</overWtBridge>
<overSpeed>>false</overSpeed>
<speedChange>>false</speedChange>
<unbalanced>>false</unbalanced>
<random>>false</random>
<overLength>>false</overLength>
<vehFlags>0</vehFlags>
<numAxles>2</numAxles>
<axle item="1">
  <wt>19240</wt>
  <overWtAxle>>false</overWtAxle>
  <overWtTandems>>false</overWtTandems>
  <overWtBridge>>false</overWtBridge>
  <unbalanced>>false</unbalanced>
  <axleFlags>0</axleFlags>
  <spacing>15.8</spacing>
</axle>
<axle item="2">
  <wt>19240</wt>
  <overWtAxle>>false</overWtAxle>
  <overWtTandems>>false</overWtTandems>
  <overWtBridge>>false</overWtBridge>
  <unbalanced>>false</unbalanced>
  <axleFlags>0</axleFlags>
  <spacing>4.8</spacing>
</axle>
</veh>

```

#### 4.4 Sample Vehicle Image

```

<?xml version="1.0" encoding="UTF-8"?>
<veh id="476039" station="I95N" lane="1">
  <datetime>2013-04-29 00:44:27</datetime>
  <image>...</image>
</veh>

```