Instructions for accessing MBTA Real-Time XML Trial Feed

November 13, 2009

Included are steps for accessing and utilizing information supplied within the MBTA Real-Time XML Trial Feed. The XML feed data is accessed using URLs with parameters specified in the query string. This document provides the URLs that can be used and examples of the XML that is returned. The feed is hosted by the MBTA's partner, NextBus Inc.

Before proceeding you should be familiar with XML and URL strings or RESTful web services.

For a brief introduction to XML please visit the sites listed below:
http://www.w3schools.com/xml/xml_whatis.asp
http://www.codeguru.com/java/article.php/c13529

For a brief introduction to RESTful web services please visit the sites listed below:
http://www.infoq.com/articles/rest-introduction
http://en.wikipedia.org/wiki/REST

Terms & Conditions

Access to the MBTA Real-Time XML Trial Feed is governed by the language in the MassDOT Developers License Agreement in addition to the following conditions:

- The MBTA reserves the right to suspend the XML data feed, modify the feed, or modify elements of the feed at any time in the MBTA's sole and absolute discretion.
- The MBTA will not guarantee any technical support of any kind to users.
- No user may execute polling commands more often than every 10 seconds. A user that polls more often than that or otherwise overtaxes the MBTA's system may be suspended or terminated from the data feed.

Comments and suggestions regarding the data feed may be posted to the MassDOT Developers Google Group: http://groups.google.com/group/massdotdevelopers

Stability of XML Feed
This is a trial project. The commands and the resulting XML data change may change in the future. Please refer to the MassDOT Developers License Agreement for more information on MassDOT's guarantees.

Commands
The commands can be broken into several categories. There are configuration requests, prediction requests, and a vehicle location request. The format of the URL command is:

```
http://webservices.nextbus.com/service/publicXMLFeed?command=commandName&a=mbta
&additionParams...
```

Error Messages
Commands can return an Error XML object if there is some type of problem, e.g., the system has not been initialized yet or bad parameters were used in the URL. When an Error XML object is returned, it has an attribute called shouldRetry. If the error was returned only because the server was initializing, then shouldRetry will be set to true. For this case, the application should try the URL again after waiting 10 seconds. If the shouldRetry attribute is set to false, there is an error due to the URL and simply retrying the URL again will not fix the problem.

An error message looks like:

```
<body>
  <Error shouldRetry="true">
    Agency server cannot accept client while status is: agency
    name = mbta,status = UNINITIALIZED, client count = 0, last
    even t = 0 seconds ago Could not get route list for agency tag "mbta".
    Either the route tag is bad or the system is initializing.
   </Error>
</body>
```

Configuration Requests

Note: For all commands below an agency tag, “a” should be included in the query string and set to ***mbta*** (i.e., a=mbta).

Command "routeList"
To obtain a list of routes for an agency, use the "routeList" command. The agency is specified by the "a" parameter in the query string. The tag for the agency as obtained from the agencyList command should be used.

The format of the command is:

```
http://webservices.nextbus.com/service/publicXMLFeed?command=routeList&a=mbta
```

The resulting XML is in the form:

```
<body copyright="All data copyright MBTA 2009.">
<route tag="39" title="39"/>
<route tag="111" title="111"/>
<route tag="114" title="114"/>
<route tag="116" title="116"/>
<route tag="117" title="117"/>
```

```
</body>
```

Command "routeConfig"
To obtain details about one or more routes for an agency, use the "routeConfig" command. The agency is specified by the "a" parameter in the query string. The tag for the agency as obtained from the agencyList command should be used. The route is optionally specified by the "r" parameter. The tag for the route is obtained using the routeList command. If the "r" parameter is not specified, XML data for all routes for the agency is returned.

The format of the command is:

```
http://webservices.nextbus.com/service/publicXMLFeed?command=routeConfig&a=mbta
&r=<route tag>
```

The resulting XML will be in the following form (note: the shortTitle element for the stops is provided only if it is different than the standard title element. If no shortTitle element is provided, simply use the standard title element). For example:

```
http://webservices.nextbus.com/service/publicXMLFeed?command=routeConfig&a=mbta
&r=39
```

The resulting XML is in the form:

```
<body copyright="All data copyright MBTA 2009.">
<route tag="39" routeCode="0" title="39" color="006600" oppositeColor="ffffff">
<stop tag="8750" title=" Forest Hills Station - Departure (Stop 8750)"
dirTag="in" lat="42.30139" lon="-71.1139304" stopId="08750"/>
<stop tag="1935" title=" South St @ St Mark St (Stop 1935)" dirTag="in"
lat="42.3024471" lon="-71.1144193" stopId="01935"/>
<stop tag="1936" title=" South St @ Rosemary St (Stop 1936)" dirTag="in"
lat="42.3041378" lon="-71.1146401" stopId="01936"/>
<stop tag="1937" title=" South St @ Child St (Stop 1937)" dirTag="in"
lat="42.3065574" lon="-71.1151387" stopId="01937"/>
<stop tag="1938" title=" South St @ Carolina Ave (Stop 1938)" dirTag="in"
lat="42.3078874" lon="-71.1154498" stopId="01938"/>
...

<direction tag="out" title="Outbound" name="" useForUI="true">
  <stop tag="11780" />
  <stop tag="23391" />
  <stop tag="173" />
  <stop tag="178" />
  <stop tag="1793" />
       ...
</direction>
<direction tag="in" title="Inbound" name="" useForUI="true">
  <stop tag="8750" />
  <stop tag="1935" />
  <stop tag="1936" />
  <stop tag="1937" />
  <stop tag="1938" />
  <stop tag="1128" />
       ...
</direction>
```

```
<path>
<tag id="39_loupast_d"/>
<point lat="42.33735" lon="-71.10299"/>
<point lat="42.33858" lon="-71.10214"/>
</path>
<path>
<tag id="39_huntop_huntlong"/>
<point lat="42.34041" lon="-71.0891"/>
<point lat="42.33988" lon="-71.0904"/>
<point lat="42.3396" lon="-71.09108"/>
<point lat="42.33948" lon="-71.0913999"/>
<point lat="42.33914" lon="-71.09222"/>
<point lat="42.33903" lon="-71.09251"/>
<point lat="42.33856" lon="-71.09368"/>
<point lat="42.33813" lon="-71.09477"/>
<point lat="42.33785" lon="-71.0955199"/>
<point lat="42.33768" lon="-71.09593"/>
</path>
<path>
<tag id="39_dalboy_boydart"/>
<point lat="42.34751" lon="-71.08532"/>
<point lat="42.34769" lon="-71.08541"/>
<point lat="42.34774" lon="-71.08542"/>
<point lat="42.3478" lon="-71.08541"/>
<point lat="42.34786" lon="-71.08537"/>
<point lat="42.34791" lon="-71.0853"/>
<point lat="42.3481499" lon="-71.08433"/>
<point lat="42.34833" lon="-71.08366"/>
<point lat="42.3485" lon="-71.08306"/>
<point lat="42.34866" lon="-71.08251"/>
<point lat="42.34875" lon="-71.08216"/>
<point lat="42.34886" lon="-71.08179"/>
<point lat="42.34896" lon="-71.08134"/>
<point lat="42.34917" lon="-71.08059"/>
<point lat="42.3494699" lon="-71.07948"/>
<point lat="42.34963" lon="-71.0789099"/>
<point lat="42.3499" lon="-71.07786"/>
</path>
...

</route>
</body>
```

Prediction Requests

Prediction requests are used to obtain arrival/departure predictions for a stop or a set of stops.

Command "predictions"
To obtain predictions associated with a stop, use the "predictions" command. The agency is specified by the "a" parameter in the query string. The tag for the agency as obtained from the agencyList command should be used.

There are two ways to specify the stop: 1) using a stopId or 2) by specifying the route, direction, and stop tags. The "stopId" is specified in the form "stopId=00001". The route is specified by the "r" parameter. The direction tag is only needed if you want directions for only particular trip patterns. But usually you can simply not specify the direction tag and get predictions for all trip patterns. The tag for the route is obtained using the

routeList command. The stop is specified by the "s" parameter. The tag for the stop is obtained using the routeConfig command. One can also specify the useShortTitles=true parameter so that shorter names for the agency, route, direction, and stop are returned if shorter names are available. Shorter names can be useful for smaller displays such as with wireless devices.

The predictions are returned in both seconds and minutes. The minute value is what should currently be displayed. The second value can be used to determine when the minute value will change requiring an update. Predictions should only be displayed in minutes, rounding down the number of seconds. If a stop is a departure then the additional tag isDeparture="true" is provided as part of the prediction.

The stop for which predictions will be returned can be specified using either a unique numerical stop ID that corresponds to the physical stop, or by a route tag, direction tag, and stop tag. The stop ID and route, direction, and stop tags can all be determined using the command "routeConfig".

The format of the command for obtaining predictions for a particular stop using a stop tag is as follows. Note: for some large agencies such as MBTA there are multiple trip patterns/directions that serve the stop. In order to get predictions for all trip patterns that serve the stop you should not specify the direction.

```
http://webservices.nextbus.com/service/publicXMLFeed?command=predictions&a=mbta
&r=<route tag>&d=<direction tag>&s=<stop tag>
```

The two URLs to obtain predictions for a physical stop identified by a numerical stop ID are shown below. The first example does not specify a route tag so predictions for all routes that serve the stop will be returned. If predictions are desired for only a single route then the optional routeTag should be specified in the URL as shown in the second example.

1) `http://webservices.nextbus.com/service/publicXMLFeed?command=predictions&a=mbta&stopId=<stop id>`

or

2) `http://webservices.nextbus.com/service/publicXMLFeed?command=predictions&a=mbta&stopId=<stop id>&routeTag=<route tag>`

Note: Can also use the query string option useShortTitles=true to have the XML feed return short titles intended for display devices with small screens.

An example of obtaining predictions by specifying a route, direction, and stop tag is shown below.

```
http://webservices.nextbus.com/service/publicXMLFeed?command=predictions&a=mbta
&r=39&s=22365&useShortTitles=true
```

The resulting XML is in the form:

```
<body copyright="All data copyright MBTA 2009.">
```

```
<predictions agencyTitle="MBTA" routeTitle="39" routeTag="39" stopTitle="105 S
Huntington (Stop 22365)">
<direction title="Outbound">
<prediction seconds="232" minutes="3" epochTime="1258124910796"
isDeparture="false" dirTag="out" block="S393_7"/>
<prediction seconds="972" minutes="16" epochTime="1258125650646"
isDeparture="false" dirTag="out" block="S393_10"/>
<prediction seconds="1627" minutes="27" epochTime="1258126306107"
isDeparture="false" dirTag="out" block="S393_16"/>
<prediction seconds="2347" minutes="39" epochTime="1258127026107"
isDeparture="false" dirTag="out" block="S393_20"/>
<prediction seconds="3067" minutes="51" epochTime="1258127746107"
isDeparture="false" dirTag="out" block="S393_21"/>
</direction>
</predictions>
</body>
```

Note: the predictions are grouped by direction. For situations where buses on a line have different destinations because some turn back earlier than others, the predictions presented to the user can provide this important piece of information.

Command "predictionsForMultiStops"

To obtain predictions associated with multiple stops, use the "predictionsForMultiStops" command. The agency is specified by the "a" parameter in the query string. The tag for the agency as obtained from the agencyList command should be used. The stops are specified by using the "stops" parameter multiple times. Each stop is separated by the "|" character and each stop is represented by a route, direction, and stop identifier, concatenated together. One can also specify the useShortTitles=true parameter so that shorter names for the agency, route, direction, and stop are returned if shorter names are available. Shorter names can be useful for smaller displays such as with wireless devices.

Predictions should only be displayed in minutes, rounding down the number of seconds.

The format of the command for obtaining predictions for a list of stops is (where a stop specified is a route tag and a stop tag separated by the "|" character):

```
http://webservices.nextbus.com/service/publicXMLFeed?command=predictions&a=mbta
&stops=<stop 1>&stops=<stop 2>&stops=<stop 3>
```

For the example URL:

```
http://webservices.nextbus.com/service/publicXMLFeed?command=predictionsForMult
iStops&a=mbta&stops=39|null|6570&stops=39|null|6571
```

The resulting XML will be in the form:

```
<body copyright="All data copyright MBTA 2009.">
<predictions agencyTitle="MBTA" routeTitle="39" routeTag="39" stopTitle=" S
Huntington Ave @ Perkins St (Stop 6570)">
<direction title="Inbound">
<prediction seconds="143" minutes="2" epochTime="1258125842054"
isDeparture="false" dirTag="in" block="S393_3"/>
```

```
<prediction seconds="902" minutes="15" epochTime="1258126601037"
isDeparture="false" dirTag="in" block="S393_7"/>
<prediction seconds="1622" minutes="27" epochTime="1258127321037"
isDeparture="false" dirTag="in" block="S393_10"/>
<prediction seconds="2339" minutes="38" epochTime="1258128037481"
isDeparture="false" dirTag="in" block="S393_16"/>
<prediction seconds="3045" minutes="50" epochTime="1258128744364"
isDeparture="false" dirTag="in" block="S393_20"/>
</direction>
</predictions>
<predictions agencyTitle="MBTA" routeTitle="39" routeTag="39" stopTitle=" S
Huntington Ave @ Bynner St (Stop 6571)">
<direction title="Inbound">
<prediction seconds="196" minutes="3" epochTime="1258125894976"
isDeparture="false" dirTag="in" block="S393_3"/>
<prediction seconds="955" minutes="15" epochTime="1258126653959"
isDeparture="false" dirTag="in" block="S393_7"/>
<prediction seconds="1675" minutes="27" epochTime="1258127373959"
isDeparture="false" dirTag="in" block="S393_10"/>
<prediction seconds="2388" minutes="39" epochTime="1258128086798"
isDeparture="false" dirTag="in" block="S393_16"/>
<prediction seconds="3095" minutes="51" epochTime="1258128793681"
isDeparture="false" dirTag="in" block="S393_20"/>
</direction>
</predictions>
</body>
```

Vehicle Location Requests

Vehicle locations are used to draw vehicles on a map or to simply store them in a database. The vehicle locations must not be polled more than once every 10 seconds.

Command "vehicleLocations"
To obtain a list of vehicle locations that have changed since the last time the vehicleLocations command was used, use the "vehicleLocations" command. The agency is specified by the "a" parameter in the query string. The tag for the agency as obtained from the agencyList command should be used. The route is specified by the "r" parameter. The tag for the route is obtained using the routeList command. The "t" parameter specifies the last time that was returned by the vehicleLocations command - the time in msec since the epoch. If you specify a time of 0, then data for the last 15 minutes is provided.

The format of the command for obtaining vehicle location is:

```
http://webservices.nextbus.com/service/publicXMLFeed?command=vehicleLocations&a
=mbta&r=<route tag>&t=<epoch time in msec>
```

For the example URL:

```
http://webservices.nextbus.com/service/publicXMLFeed?command=vehicleLocations&a
=mbta&r=39&t=1258125794429
```

The resulting XML is in the form:

```
<body copyright="All data copyright MBTA 2009.">
```

<vehicle id="1037" routeTag="39" dirTag="in" lat="42.3461974" lon="-71.084828"
secsSinceReport="44" predictable="true" heading="337"/>
<vehicle id="1034" routeTag="39" dirTag="out" lat="42.3368714" lon="-
71.0979924" secsSinceReport="43" predictable="true" heading="242"/>
<vehicle id="1032" routeTag="39" dirTag="out" lat="42.330611" lon="-71.1115015"
secsSinceReport="11" predictable="true" heading="163"/>
<vehicle id="2096" routeTag="39" dirTag="null" lat="42.3024006" lon="-
71.1101815" secsSinceReport="11" predictable="false" heading="-4"/>
<vehicle id="1043" routeTag="39" dirTag="out" lat="42.3475866" lon="-
71.0746142" secsSinceReport="10" predictable="true" heading="265"/>
<vehicle id="2017" routeTag="39" dirTag="null" lat="42.2860839" lon="-
71.1399575" secsSinceReport="44" predictable="false" heading="-4"/>
<vehicle id="1029" routeTag="39" dirTag="out" lat="42.3062216" lon="-
71.1151579" secsSinceReport="43" predictable="true" heading="161"/>
<vehicle id="1026" routeTag="39" dirTag="in" lat="42.3338047" lon="-71.1055036"
secsSinceReport="43" predictable="true" heading="63"/>
<vehicle id="1022" routeTag="39" dirTag="in" lat="42.321395" lon="-71.1119159"
secsSinceReport="10" predictable="true" heading="352"/>
<vehicle id="2056" routeTag="39" dirTag="null" lat="42.2545766" lon="-
71.1453868" secsSinceReport="43" predictable="false" heading="-4"/>
<lastTime time="1258125860311"/>
</body>