BusTime® Developer API Version 1 Guide

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BusTime® Developer API Guide
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Contents

1   Overview

1.1   *What is the BusTime® Developer API?*

The BusTime® Developer API allows you to request and retrieve real-time data directly from BusTime®. Registered third-party developers can make HTTP requests for data and receive XML responses from the BusTime® web server.

1.2   *What data is available through the API?*

Data available through the API includes:

- Vehicle locations
- Route data (route lists, stop lists geo-positional route definitions, stop lists, etc.)
- Prediction Data
- Service Bulletins

1.3   *Will my application break if changes are made to the API?*

No. The API is backward compatible allowing time for developers to upgrade their applications to make use of new API features. Note that occasionally new parameters may be added to an existing request or its response. However, existing parameters will never be removed or stop accepting previously legal values.

If an existing request has a new parameter added, any calls made without that parameter will act the same as the previous version of the API.

If a new field is added to the response, all other fields will continue to exist and contain the same values as before the new field was added.

1.4   *How does the Developer API work?*

In order to use the API, you must sign in to your BusTime® account and request an API key using the following steps.

- Create an account on the website.
- Sign into your account
- Select "My Account" from the top menu.
- Click on the "Developer API" link and fill out the form.

Only one key will be available per account. Once your request has been approved, an e-mail will be sent to you, containing the API key.

After receiving the key, you will be able to make calls to the API, entering the key as part of the data request.

1.5   *Is there a limit to the number of requests I can make to the Developer API?*

Yes. By default, one API key can make a maximum of 10,000 requests per day. If you believe that you will require more than 10,000 daily requests, you must request that the cap on your key be raised to handle the additional traffic.

1.6　*Is there support for different languages?*

Yes. A list of supported languages can be requested over the API, and each request can include the language to be used.

2   Web Service

The BusTime® Developer API is a web service that uses HTTP/1.1 as its application protocol. Each type of call or request that can be made to the API is represented by a unique URL. Requests are made to the API using HTTP GET calls to the appropriate URL. Parameters are encoded in the HTTP GET request by following the URL with a "?" and "argument=value" pairs separated by "&".

A response is returned as a well-formed XML document with a Content-Type of "text/xml". Get vehicles also supports a response as a JSON document with a Content-Type of "application/json".

For example, to request the current system time through the developer API, a program or script will make a HTTP/1.1 GET request to the following URL with parameters:

http://[host:port]/bustime/api/v1/gettime?key=89dj2he89d8j3j3ksjhdue93j

The **[host:port]** is the host and port on which the Developer API is servicing HTTP requests. The port is not required if requests are being serviced on port 80.

The version of the API that is being accessed is built into the URL. In the above example, "**v1**" represents version 1.0 of the API.

The "**key**" parameter represents the API key assigned to the developer making the request. All requests to the API must be accompanied by a valid API key.

3   Reference

This section describes all possible requests that can be made to the BusTime® Developer API. For every request, a complete set of possible arguments is specified, along with the response. For XML responses, the schema is specified.

Definitions

- **Delayed Vehicle** – The state entered by a vehicle when it has been determined to be stationary for more than a pre-defined time period.
- **Direction** – Common direction of travel of a route.
- **Format** – The document type of the response. Currently XML is supported for all responses, and JSON is supported solely for getvehicles.
- **Locale** – A string that represents the language to be used for the request. A list of valid locales can be retrieved used getLocaleList. They are in ISO-xxx form, such as "en" and "en_US", which would be English, and US English respectively.
- **Off-route Vehicle** – State entered by a transit vehicle when it has strayed from its scheduled pattern.
- **Pattern** – A unique sequence of geo-positional points (waypoints and stops) that combine to form the path that a transit vehicle will repetitively travel. A route often has more than one possible pattern.
- **Route** – One or more set of patterns that together form a single service.
- **Service Bulletin** – Text-based announcements affecting a set of one or more services (route, stops, etc.).
- **Stop** – Location where a transit vehicle can pick-up or drop-off passengers. Predictions are only generated at stops.
- **Waypoint** – A geo-positional point in a pattern used to define the travel path of a transit vehicle.

3.1 *Common Parameters*

All request URLs have these parameters in common:

Name	Supported Versions	Required?	Example	Description
version	All	Yes	/v1/	The version of the API being used. This should be v1 to access the API described in this document.
locale	All	No	locale=en	The language that the response should be in. See "List Supported Languages" for more details on how to use this field.

3.2 *Time*

Base URL: http://[host:port]/bustime/api/[version]/gettime

Parameters

Name	Value	Description
key	string (required)	25-digit BusTime Developer API access key.

Response:

A well-formed XML document, containing the current system time, will be returned as a response to **gettime**.

Response Fields

Name	Description
bustime-response	Root element of the response document.
error	Child element of the root element. Contains a message if the processing of the request resulted in an error.
tm	Child element of the root element containing the current system date and time (local). Date and time are represented in the following format: YYYYMMDD HH:MM:SS. Month is represented as two digits where January is "01" and December is "12". Time is represented using a 24-hour clock.

Remarks:

Use the **gettime** request to retrieve the current system date and time. Since BusTime® is a time-dependent system, it is important to synchronize your application with BusTime's system date and time.

The time given in the schema below is the local time.

XML Schema:

```
<?xml version="1.0" encoding="utf-8" ?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
      <xs:element name="bustime-response" type=" bustime-response" />
      <xs:complexType name="bustime-response">
            <xs:sequence>
```

```
                    <xs:element name="error" type="error" minOccurs="0"
                    maxOccurs="unbounded"/>
                    <xs:element name="tm" type="xs:string" minOccurs="0" maxOccurs="1"/>
            </xs:sequence>
        </xs:complexType>
        <xs:complexType name="error">
                <xs:sequence>
                    <xs:element name="msg" type="xs:string" minOccurs="1" maxOccurs="1"/>
                </xs:sequence>
        </xs:complexType>
</xs:schema>
```

Example:

The XML document below is a response to the following request:

Request:

http://localhost:8080/bustime/api/v1/gettime?key=89dj2he89d8j3j3ksjhdue93j

Response:

```
<?xml version="1.0"?>
<bustime-response>
        <tm>20090611 14:42:32</tm>
</bustime-response>
```

3.3   *Vehicles*

<u>Base URL</u>: **http://[host:port]/bustime/api/[version]/getvehicles**

Parameters

Name	Value	Description
key	string (required)	25-digit BusTime Developer API access key.
vid	Comma-delimited list of vehicle IDs (not available with **rt** parameter)	Set of one or more vehicle IDs whose location should be returned. For example: 509,392,201,4367 will return information for four vehicles (if available). A maximum of 10 identifiers can be specified.
rt	Comma-delimited list of route designators (not available with the **vid** parameter)	A set of one or more route designators for which matching vehicles should be returned. For example: **X3,4,20** will return information for all vehicles currently running on those three routes (if available). A maximum of 10 identifiers can be specified.
tmres	string (optional)	Resolution of time stamps. Set to "s" to get time resolution to the second. Set to "m" to get time resolution to the minute. If omitted, defaults to "m". Date and time is represented in the following format: If specified as "s" YYYYMMDD HH:MM:SS If specified as "m" YYYYMMDD HH:MM Month is represented as two digits where January is equal to "01" and December is equal to "12". Time is represented using a 24-hour clock.
format	string (optional)	The format of the response. Legal values are xml and json. XML is the default format, and will be used if this parameter is not present in the request.

Response:

A well-formed XML or JSON document will be returned as a response to **getvehicles**. The response will include the most-recent status for each vehicle.

Response Fields:

Name	Description
bustime-response	Root element of the response document.
error	Child element of the root element. Message if the processing of the request resulted in an error.
vehicle	Child element of the root element. Encapsulates all information available for a single vehicle in the response.
vid	Child element of the **vehicle** element. Alphanumeric string representing the vehicle ID (ie. bus number)
tmstmp	Child element of the **vehicle** element. Date and local time of the last positional update of the vehicle. Date and time is represented in the following format: YYYYMMDD HH:MM. Month is represented as two digits where January is equal to "01" and December is equal to "12". Time is represented using a 24-hour clock.
lat	Child element of the **vehicle** element. Latitude position of the vehicle in decimal degrees (WGS 84).
lon	Child element of the **vehicle** element. Longitude position of the vehicle in decimal degrees (WGS 84).
hdg	Child element of the **vehicle** element. Heading of vehicle as a 360º value, where 0º is North, 90º is East, 180º is South and 270º is West.
pid	Child element of the **vehicle** element. Pattern ID of trip currently being executed.
pdist	Child element of the **vehicle** element. Linear distance in feet that the vehicle has traveled into the pattern currently being executed.
rt	Child element of the **vehicle** element. Route that is currently being executed by the vehicle (ex. "20").
des	Child element of the **vehicle** element. Destination of the trip being executed by the vehicle (ex. "Austin").
dly	Child element of the **vehicle** element. The value is "true" if the vehicle is delayed. The **dly** element is only present if the vehicle is delayed.
spd	Child element of the **vehicle** element. Speed as reported from the vehicle expressed in miles per hour (MPH).
tablockid	Child element of the **vehicle** element. TA's version of the scheduled block identifier for the work currently being performed by the vehicle.
tatripid	Child element of the **vehicle** element. TA's version of the scheduled trip identifier for the vehicle's current trip.
zone	Child element of the **prd** element. The zone name if the vehicle has entered a defined zone, otherwise blank.

Remarks:

Use the **getvehicles** request to retrieve vehicle information (i.e., locations) of all or a subset of vehicles currently being tracked by BusTime.

Use the **vid** parameter to retrieve information for one or more vehicles currently being tracked.

Use the **rt** parameter to retrieve information for vehicles currently running one or more of the specified routes.

> **Note:** The **vid** and **rt** parameters cannot be combined in one request. If both parameters are specified on a request to **getvehicles,** only the first parameter specified on the request will be processed.

XML Schema:

```
<?xml version="1.0"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
<xs:element name="bustime-response" type="bustime-response"/>
        <xs:complexType name="bustime-response">
                <xs:sequence>
                        <xs:element name="error" type="error" minOccurs="0"
                        maxOccurs="unbounded"/>
                        <xs:element name="vehicle" type="vehicle" minOccurs="0"
                        maxOccurs="unbounded"/>
                </xs:sequence>
        </xs:complexType>
        <xs:complexType name="error">
                <xs:sequence>
                        <xs:element name="vid" type="xs:string" minOccurs="0" maxOccurs="1"/>
                        <xs:element name="rt" type="xs:string" minOccurs="0" maxOccurs="1"/>
                        <xs:element name="msg" type="xs:string" minOccurs="1" maxOccurs="1"/>
                </xs:sequence>
        </xs:complexType>
        <xs:complexType name="vehicle">
                <xs:sequence>
                        <xs:element name="vid" type="xs:string" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="tmpstmp" type="xs:string" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="lat" type="xs:double" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="lon" type="xs:double" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="hdg" type="xs:int" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="pid" type="xs:int" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="pdist" type="xs:int" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="rt" type="xs:string" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="des" type="xs:string" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="dly" type="xs:boolean" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="srvtmstmp" type="xs:string" minOccurs="0"
                        maxOccurs="1"/>
                        <xs:element name="spd" type="xs:int" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="blk" type="xs:int" minOccurs="0" maxOccurs="1"/>
                        <xs:element name="tablockid" type="xs:string" minOccurs="1"
                        maxOccurs="1"/>
                        <xs:element name="tatripid" type="xs:string" minOccurs="1"
                        maxOccurs="1"/>
                        <xs:element name="zone" type="xs:string" minOccurs="1" maxOccurs="1"/>
                </xs:sequence>
```

Example:
The XML document below is a response to the following request:

Request:
http://localhost:8080/bustime/api/v1/getvehicles?key=89dj2he89d8j3j3ksjhdue93j&vid=509,392

Response:

```
<?xml version="1.0"?>
<bustime-response>
        <vehicle>
                <vid>509</vid>
```

```
                <tmstmp>20090611 10:28</tmstmp>
                <lat>41.92124938964844</lat>
                <lon>-87.64849853515625</lon>
                <hdg>358</hdg>
                <pid>3630</pid>
                <pdist>5678</pdist>
                <rt>8</rt>
                <des>Waveland/Broadway</des>
                <spd>27</spd>
                <tablockid>2 -701</tablockid>
                <tatripid>108</tatripid>
                <zone>Bay 1</zone>
        </vehicle>
        <vehicle>
                <vid>392</vid>
                <tmstmp>20090611 10:28</tmstmp>
                <lat>41.91095733642578</lat>
                <lon-87.64120713719782</lon>
                <hdg>88</hdg>
                <pid>1519</pid>
                <pdist>11203</pdist>
                <rt>72</rt>
                <des>Clark</des>
                <spd>36</spd>
                <tablockid>3 -703</tablockid>
                <tatripid>108156</tatripid>
                <zone>Bay 2</zone>
        </vehicle>
</bustime-response>
```

Example:

The JSON document below is a response to the following request:

Request:

http://localhost:8080/bustime/api/v1/getvehicles?key=89dj2he89d8j3j3ksjhdue93j&vid=6438,1295&tmres=s&format=json

Response:

```
{"bustime-response": {"vehicle": [
    {
        "des": "Michigan/Chicago",
        "lon": "-87.61421203613281",
        "tablockid": "3 -712",
        "tatripid": "105797",
        "hdg": "177",
        "rt": "3",
        "pid": 5342,
        "spd": 16,
        "tmstmp": "20120620 13:02:38",
        "vid": "6438",
        "lat": "41.72489577073317",
        "pdist": 2950,
        "zone": ""
    },
    {
        "des": "Michigan/Chicago",
        "lon": "-87.61560402664483",
        "tablockid": "3 -714",
        "tatripid": "105801",
        "hdg": "179",
        "rt": "3",
        "pid": 5342,
        "spd": 0,
        "tmstmp": "20120620 13:02:52",
        "vid": "1295",
        "lat": "41.779821508071",
        "zone": "Bay 1"
    }
```

```
]}}
```

3.4   *Routes*

<u>Base URL</u>: **http://[host:port]/bustime/api/[version]/getroutes**

Parameters

Name	Value	Description
key	string (required)	25-digit BusTime Developer API access key.

Response:

A well-formed XML or JSON document will be returned as a response to **getroutes**.

Response Fields:

Name	Description
bustime-response	Root element of the response document.
error	Child element of the root element. Message if the processing of the request resulted in an error.
route	Child element of the root element. Encapsulates a route serviced by the system.
rt	Child element of the **route** element. Alphanumeric designator of a route (ex. "20" or "X20").
rtnm	Child element of the **route** element. Common name of the route (ex. "Madison" for the 20 route).
rtclr	Child element of the **route** element. Color of the route line used in map (ex. "#ffffff")
rtdd	Child element of the **route** element. Language-specific route designator meant for display.

Remarks:

Use the **getroutes** request to retrieve the set of routes serviced by the system.

XML Schema:

```xml
<?xml version="1.0"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
      <xs:element name="bustime-response" type="bustime-response"/>
      <xs:complexType name="bustime-response">
            <xs:sequence>
                  <xs:element name="error" type="error" minOccurs="0"
                  maxOccurs="unbounded"/>
                  <xs:element name="route" type="route" minOccurs="0"
                  maxOccurs="unbounded"/>
            </xs:sequence>
      </xs:complexType>
      <xs:complexType name="error">
            <xs:sequence>
                  <xs:element name="msg" type="xs:string" minOccurs="1" maxOccurs="1"/>
            </xs:sequence>
      </xs:complexType>
      <xs:complexType name="route">
            <xs:sequence>
                  <xs:element name="rt" type="xs:string" minOccurs="1" maxOccurs="1"/>
                  <xs:element name="rtnm" type="xs:string" minOccurs="1" maxOccurs="1"/>
                  <xs:element name="rtclr" type="xs:string" minOccurs="1" maxOccurs="1"/>
```

```
                    <xs:element name="rtdd" type="xs:string" minOccurs="1" maxOccurs="1"/>
            </xs:sequence>
        </xs:complexType>
</xs:schema>
```

Example:

The XML document below is a response to the following request:

Request

http://localhost:8080/bustime/api/v1/getroutes?key=89dj2he89d8j3j3ksjhdue93j

Response

```
<?xml version="1.0"?>
<bustime-response>
        <route>
                <rt>1</rt>
                <rtnm>Indiana/Hyde Park</rtnm>
                <rtclr>#000000</rtclr>
                <rtdd>1</rtdd>
        </route>
        <route>
                <rt>2</rt>
                <rtnm>Hyde Park Express</rtnm>
                <rtclr>#ff0000</rtclr>
                <rtdd>2</rtdd>
        </route>
        <route>
                <rt>3</rt>
                <rtnm>King Drive</rtnm>
                <rtclr>#00ff00</rtclr>
                <rtdd>3</rtdd>
        </route>
        <route>
                <rt>X3</rt>
                <rtnm>King Drive Express</rtnm>
                <rtclr>#ffffff</rtclr>
                <rtdd>X3</rtdd>
        </route>
.
.
.
</bustime-response>
```

3.5   *Route Directions*

Base URL: http://[host:port]/bustime/api/[version]/getdirections

Parameters

Name	Value	Description
key	string (required)	25-digit BusTime Developer API access key.
rt	single route designator (required)	Alphanumeric designator of a route (ex. "20" or "X20") for which a list of available directions is to be returned.

Response:

A well-formed XML or JSON document will be returned as a response to **getdirections**.

Response Fields:

Name	Description

bustime-response	Root element of the response document.
error	Child element of the root element. Message if the processing of the request resulted in an error.
dir	Child element of the root element. Direction that is valid for the specified route designator. For example, "East Bound".

Remarks:

Use the **getdirections** request to retrieve the set of directions serviced by the specified route.

XML Schema:

```
<?xml version="1.0"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
        <xs:element name="bustime-response" type="bustime-response"/>
        <xs:complexType name="bustime-response">
                <xs:sequence>
                        <xs:element name="error" type="error" minOccurs="0"
                        maxOccurs="unbounded"/>
                        <xs:element name="dir" type="xs:string" minOccurs="0"
                        maxOccurs="unbounded"/>
                </xs:sequence>
        </xs:complexType>
        <xs:complexType name="error">
                <xs:sequence>
                        <xs:element name="rt" type="xs:string" minOccurs="0" maxOccurs="1"/>
                        <xs:element name="msg" type="xs:string" minOccurs="1" maxOccurs="1"/>
                </xs:sequence>
        </xs:complexType>
</xs:schema>
```

Example:

The XML document below is a response to the following request:

http://localhost:8080/bustime/api/v1/getdirections?key=89dj2he89d8j3j3ksjhdue93j&rt=20

Response

```
<?xml version="1.0"?>
<bustime-response>
        <dir>East Bound</dir>
        <dir>West Bound</dir>
</bustime-response>
```

3.6 *Stops*

Base URL: http://[host:port]/bustime/api/[version]/getstops

Parameters:

Name	Value	Description
key	string (required)	25-digit BusTime Developer API access key.
rt	single route designator (required)	Alphanumeric designator of the route (ex. "20" or "X20") for which a list of available stops is to be returned.
dir	single route direction (required)	Direction of the route (ex. "East Bound") for which a list of available stops is to be returned. This needs to match the direction in the **getdirections** call. When using multiple languages, it must match the direction for that language.
stpid	single stop id (required if rt and dir are not provided)	Numeric ID number for a specific stop (ex. "305") for which a single stop is to be returned. Can send up to 10 stop parameters.

Response:

A well-formed XML document will be returned as a response to **getstops**.

Response Fields:

Name	Description
bustime-response	Root element of the response document.
error	Child element of the root element. Message if the processing of the request resulted in an error.
stop	Child element of the root element. Encapsulates all descriptive information about a particular stop.
stpid	Child element of the **stop** element. Unique identifier representing this stop.
stpnm	Child element of the **stop** element. Display name of this stop (ex.

	"Madison and Clark")
lat	Child element of the **stop** element. Latitude position of the stop in decimal degrees (WGS 84).
lon	Child element of the **stop** element. Longitude position of the stop in decimal degrees (WGS 84).

Remarks:

Use the **getstops** request to retrieve the set of stops for the specified route and direction.

Stop lists are only available for a valid route/direction pair. In other words, a list of all stops that service a particular route (regardless of direction) cannot be requested.

XML Schema:

```
<?xml version="1.0"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
        <xs:element name="bustime-response" type="bustime-response"/>
        <xs:complexType name=" bustime-response">
                <xs:sequence>
                        <xs:element name="error" type="xs:string" minOccurs="0
                        maxOccurs="unbounded"/>
                        <xs:element name="stop" type="stop" minOccurs="0" maxOccurs="unbounded"/>
                </xs:sequence>
        </xs:complexType>
        <xs:complexType name="error">
                <xs:sequence>
                        <xs:element name="rt" type="xs:string" minOccurs="0" maxOccurs="1"/>
                        <xs:element name="dir" type="xs:string" minOccurs="0" maxOccurs="1"/>
                        <xs:element name="msg" type="xs:string" minOccurs="1" maxOccurs="1"/>
                </xs:sequence>
        </xs:complexType>
        <xs:complexType name="stop">
                <xs:sequence>
                        <xs:element name="stpid" type="xs:int" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="stpnm" type="xs:string" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="lat" type="xs:double" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="lon" type="xs:double" minOccurs="1" maxOccurs="1"/>
                </xs:sequence>
        </xs:complexType>
</xs:schema>
```

Example:

The XML document below is a response to the following request:

Request

http://localhost:8080/bustime/api/v1/getstops?key=89dj2he89d8j3j3ksjhdue93j&rt=20&dir=East%20Bound

Response

```
<?xml version="1.0"?>
<bustime-response>
        <stop>
                <stpid>4727</stpid>
                <stpnm>1633 W Madison</stpnm>
                <lat>41.881265</lat>
                <lon>-87.66849</lon>
        </stop>
        <stop>
                <stpid>9604</stpid>
                <stpnm>Austin & Pleasant/Fulton</stpnm>
                <lat>41.885206667</lat>
                <lon>-87.7748733333333</lon>
        </stop>
        <stop>
                <stpid>9605</stpid>
                <stpnm>Austin & Randolph/West End</stpnm>
                <lon>41.8838633333333</lon>
                <lat>-87.7748566666667</lat>
        </stop>
        <stop>
                <stpid>9603</stpid>
                <stpnm>Austin & South Blvd/Corcoran</stpnm>
                <lat>41.886908333</lat>
                <lon>-87.77493667</lon>
        </stop>
.
.
.
</bustime-response>
```

3.7 *Patterns*

<u>Base URL</u>: **http://[host:port]/bustime/api/[version]/getpatterns**

Parameters

Name	Value	Description
key	string (required)	25-digit BusTime Developer API access key.
pid	comma-delimited list of pattern IDs (not available with **rt** parameter)	Set of one or more pattern IDs whose points should be returned. For example: 56,436,1221 will return points from three (3) patterns. A maximum of 10 identifiers can be specified.
rt	single route designator (not available with **pid** parameter)	Route designator for which all active patterns should be returned.

<u>Response</u>

A well-formed XML or JSON document will be returned as a response to **getpatterns**.

Response Fields:

Name	Description
bustime-response	Root element of the response document.
error	Child element of the root element. Message if the processing of the request resulted in an error.
ptr	Child element of the root element. Encapsulates a set of points which define a pattern.
pid	Child element of the **ptr** element. ID of pattern.
ln	Child element of the **ptr** element. Length of the pattern in feet.
rtdir	Child element of the **ptr** element. Direction that is valid for the specified route designator. For example, "East Bound".
pt	Child element of the **ptr** element. Child element of the root element. Encapsulates one a set of geo-positional points (including stops) that when connected define a pattern.
seq	Child element of the **pt** element. Position of this point in the overall sequence of points.
typ	Child element of the **pt** element. 'S' if the point represents a Stop, 'W' if the point represents a waypoint along the route.
stpid	Child element of the **pt** element. If the point represents a stop, the unique identifier of the stop.
stpnm	Child element of the **pt** element. If the point represents a stop, the display name of the stop.
pdist	Child element of the **pt** element. If the point represents a stop, the linear distance of this point (feet) into the requested pattern.
lat	Child element of the **pt** element. Latitude position of the point in decimal degrees (WGS 84).
lon	Child element of the **pt** element. Longitude position of the point in decimal degrees (WGS 84).

Remarks:

Use the **getpatterns** request to retrieve the set of geo-positional points and stops that when connected can be used to construct the geo-positional layout of a pattern (i.e., route variation).

Use **pid** to specify one or more identifiers of patterns whose points are to be returned. A maximum of 10 patterns can be specified.

Use **rt** to specify a route identifier where all active patterns are returned. The set of active patterns returned includes: one or more patterns marked as "default" patterns for the specified route and all patterns that are currently being executed by at least one vehicle on the specified route.

> **Note:** The **pid** and **rt** parameters cannot be combined in one request. If both parameters are specified on a request to **getpatterns**, only the first parameter specified on the request will be processed.

XML Schema:

```xml
<?xml version="1.0"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
        <xs:element name="bustime-response" type="bustime-response"/>
        <xs:complexType name="bustime-response">
                <xs:sequence>
                        <xs:element name="error" type="error" minOccurs="0"
                        maxOccurs="unbounded"/>
                        <xs:element name="ptr" type="ptr" minOccurs="0" maxOccurs="10"/>
                </xs:sequence>
        </xs:complexType>
        <xs:complexType name="error">
                <xs:sequence>
                        <xs:element name="pid" type="xs:string" minOccurs="0" maxOccurs="1"/>
                        <xs:element name="rt" type="xs:string" minOccurs="0" maxOccurs="1"/>
                        <xs:element name="msg" type="xs:string" minOccurs="1" maxOccurs="1"/>
                </xs:sequence>
        </xs:complexType>
        <xs:complexType name="ptr">
                <xs:element name="pid" type="xs:int" minOccurs="1" maxOccurs="1"/>
                <xs:element name="ln" type="xs:int" minOccurs="1" maxOccurs="1"/>
                <xs:element name="rtdir" type="xs:string" minOccurs="1" maxOccurs="1"/>
                <xs:element name="pt" type="pt" minOccurs="1" maxOccurs="unbounded"/>
        </xs:complexType>
        <xs:complexType name="pt">
                <xs:sequence>
                        <xs:element name="seq" type="xs:int" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="typ" type="xs:string" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="stpid" type="xs:int" minOccurs="0" maxOccurs="1"/>
                        <xs:element name="stpnm" type="xs:string" minOccurs="0" maxOccurs="1"/>
                        <xs:element name="pdist" type="xs:float" minOccurs="0" maxOccurs="1"/>
                        <xs:element name="lat" type="xs:double" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="lon" type="xs:double" minOccurs="1" maxOccurs="1"/>
                </xs:sequence>
        </xs:complexType>
</xs:schema>
```

Example:
The XML document below is a response to the following request:

Request
http://localhost:8080/bustime/api/v1/getpatterns?key=89dj2he89d8j3j3ksjhdue93j&rt=20&pid=954

Response

```xml
<?xml version="1.0"?>
<bustime-response>
        <ptr>
                <pid>954</pid>
                <ln>35569</ln>
                <rtdir>East Bound</rtdir>
                <pt>
                        <seq>1</seq>
                        <typ>S</typ>
                        <stpid>409</stpid>
                        <stpnm>Madison & Pulaski</stpnm>
                        <lat>41.880641167057</lat>
                        <lon>-87.725835442543</lon>
                        <pdist>0.0</pdist>
                </pt>
                <pt>
                        <seq>2</seq>
                        <typ>W</typ>
                        <lat>41.880693089146</lat>
                        <lon>-87.725765705109</lon>
                </pt>
                <pt>
                        <seq>3</seq>
                        <typ>W</typ>
```

```
            <lat>41.880693089146</lat>
            <lon>-87.725674510002</lon>
            <pdist>97.0</pdist>
        </pt>
            .
            .
            .
    </ptr>
</bustime-response>
```

3.8   *Predictions*

<u>Base URL</u>: **http://[host:port]/bustime/api/[version]/getpredictions**

Parameters:

Name	Value	Description
key	string (required)	25-digit BusTime Developer API access key.
stpid	comma-delimited list of stop IDs (not available with **vid** parameter)	Set of one or more stop IDs whose predictions are to be returned. For example: 5029,1392,2019,4367 will return predictions for the four stops. A maximum of 10 identifiers can be specified.
rt	comma-delimited list of route designators (optional, available with **stpid** parameter)	Set of one or more route designators for which matching predictions are to be returned.
vid	comma-delimited list of vehicle IDs (not available with **stpid** parameter)	Set of one or more vehicle IDs whose predictions should be returned. For example: 509,392,201,4367 will return predictions for four vehicles. A maximum of 10 identifiers can be specified.
top	number (optional)	Maximum number of predictions to be returned.
tmres	string(optional)	Resolution of time stamps. Set to "s" to get time resolution to the second. Set to "m" to get time resolution to the minute. If omitted, defaults to "m". Date and time is represented in the following format: If specified as "s" YYYYMMDD HH:MM:SS If specified as "m" YYYYMMDD HH:MM Month is represented as two digits where January is equal to "01" and December is equal to "12". Time is represented using a 24-hour clock.

Response:

A well-formed XML or JSON document will be returned as a response to **getpredictions**.

Response Fields:

Name	Description
bustime-response	Root element of the response document.
error	Child element of the root element. Message if the processing of the request resulted in an error.
prd	Child element of the root element. Encapsulates a predicted arrival or departure time for the specified set of stops or vehicles.
tmstmp	Child element of the **prd** element. Date and time (local) the prediction was generated. Date and time is represented based on the tmres parameter.
typ	Child element of the **prd** element. Type of prediction. 'A' for an arrival prediction (prediction of when the vehicle will arrive at this stop). 'D' for a departure prediction (prediction of when the vehicle will depart this stop, if applicable). Predictions made for first stops of a route or layovers are examples of departure predictions.
stpid	Child element of the **prd** element. Unique identifier representing the stop for which this prediction was generated.
stpnm	Child element of the **prd** element. Display name of the stop for which this prediction was generated.
vid	Child element of the **prd** element. Unique ID of the vehicle for which this prediction was generated.
dstp	Child element of the **prd** element. Linear distance (feet) left to be traveled by the vehicle before it reaches the stop associated with this prediction.
rt	Child element of the **prd** element. Alphanumeric designator of the route (ex. "20" or "X20") for which this prediction was generated.
rtdd	Child element of the **prd** element. Language-specific route designator meant for display.
rtdir	Child element of the **prd** element. Direction of travel of the route associated with this prediction (ex. "East Bound").
des	Child element of the **prd** element. Final destination of the vehicle associated with this prediction.
prdtm	Child element of the **prd** element. Predicted date and time (local) of a vehicle's arrival or departure to the stop associated with this prediction. Date and time is represented based on the tmres parameter.

Name	Description
dly	Child element of the **prd** element. "true" if the vehicle is delayed. The **dly** element is only present if the vehicle that generated this prediction is delayed.
tablockid	Child element of the **prd** element. TA's version of the scheduled block identifier for the work currently being performed by the vehicle.
tatripid	Child element of the **prd** element. TA's version of the scheduled trip identifier for the vehicle's current trip.
zone	Child element of the **prd** element. The zone name if the vehicle has entered a defined zones, otherwise blank.

Remarks:

Use the **getpredictions** request to retrieve predictions for one or more stops or one or more vehicles. Predictions are always returned in ascending order according to **prdtm**.

Use the **vid** parameter to retrieve predictions for one or more vehicles currently being tracked. A maximum of 10 vehicles can be specified.

Use the **stpid** parameter to retrieve predictions for one or more stops. A maximum of 10 stops can be specified.

> **Note:** The **vid** and **stpid** parameters cannot be combined in one request. If both parameters are specified on a request to **getpredictions,** only the first parameter specified on the request will be processed.

Calls to **getpredictions** without specifying the **vid** or **stpid** parameters are not allowed.

Use the **top** parameter to specify the maximum number of predictions to return. If **top** is not specified, then all predictions matching the specified parameters will be returned.

XML Schema

```xml
<?xml version="1.0"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
      <xs:element name="bustime-response" type="bustime-response"/>
      <xs:complexType name="bustime-response">
            <xs:sequence>
                  <xs:element name="error" type="error" minOccurs="0"
                  maxOccurs="unbounded"/>
                  <xs:element name="prd" type="prediction" minOccurs="0"
                  maxOccurs="unbounded"/>
            </xs:sequence>
      </xs:complexType>
      <xs:complexType name="error">
            <xs:sequence>
                  <xs:element name="stpid" type="xs:int" minOccurs="0" maxOccurs="1"/>
                  <xs:element name="vid" type="xs:string" minOccurs="0" maxOccurs="1"/>
                  <xs:element name="msg" type="xs:string" minOccurs="1" maxOccurs="1"/>
            </xs:sequence>
      </xs:complexType>
      <xs:complexType name="prediction">
            <xs:sequence>
                  <xs:element name="tmstmp" type="xs:string" minOccurs="1" maxOccurs="1"/>
                  <xs:element name="typ" type="xs:string" minOccurs="1" maxOccurs="1"/>
                  <xs:element name="stpid" type="xs:int" minOccurs="1" maxOccurs="1"/>
                  <xs:element name="stpnm" type="xs:string" minOccurs="1" maxOccurs="1"/>
                  <xs:element name="vid" type="xs:int" minOccurs="1" maxOccurs="1"/>
```

```
                    <xs:element name="dstp" type="xs:int" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="rt" type="xs:string" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="rtdd" type="xs:string" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="rtdir" type="xs:string" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="des" type="xs:string" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="prdtm" type="xs:string" minOccurs="1" maxOccurs="1"/>
                    <xs:element name="dly " type="xs:boolean" minOccurs="0" maxOccurs="1"/>
                    <xs:element name="tablockid" type="xs:string" minOccurs="1"
                    maxOccurs="1"/>
                    <xs:element name="tatripid" type="xs:string" minOccurs="1"
                    maxOccurs="1"/>
                    <xs:element name="zone" type="xs:string" minOccurs="1" maxOccurs="1"/>
            </xs:sequence>
        </xs:complexType>
</xs:schema>
```

Example:
The XML document below is a response to the following request:

Request
http://localhost:8080/bustime/api/v1/getpredictions?key=89dj2he89d8j3j3ksjhdue93j&rt=20&stpid=456

Response
```
<?xml version="1.0"?>
<bustime-response>
        <tm></tm>
        <prd>
                <tmstmp>20090611 14:34</tmstmp>
                <typ>A</typ>
                <stpid>456</stpid>
                <stpnm>Madison & Jefferson</stpnm>
                <vid>2013</vid>
                <dstp>891</dstp>
                <rt>20</rt>
                <rtdd>20</rtdd>
                <rtdir>West Bound</rtdir>
                <des>Austin</des>
                <prdtm>20090611 14:40</prdtm>
                <tablockid>3 -701</tablockid>
                <tatripid>106</tatripid>
                <zone></zone>

        </prd>
        <prd>
                <tmstmp>20090611 14:34</tmstmp>
                <typ>A</typ>
                <stpid>456</stpid>
                <stpnm>Madison & Jefferson</stpnm>
                <vid>6435</vid>
                <dstp>1587</dstp>
                <rt>20</rt>
                <rtdd>20</rtdd>
                <rtdir>West Bound</rtdir>
                <des>Austin</des>
                <prdtm>20090611 14:48</prdtm>
                <tablockid>3 -706</tablockid>
                <tatripid>108</tatripid>
                <zone>Bay 1</zone>
        </prd>
</bustime-response>
```

3.9   *Service Bulletins*

Base URL: http://[host:port]/bustime/api/[version]/getservicebulletins

Parameters

Name	Value	Description
key	string (required)	25-digit BusTime Developer API access key.
rt	comma-delimited list of route designators (required if **stpid** not specified)	Alphanumeric designator of the route(s) (ex. "20" or "X20") for which a list of service bulletins is to be returned. If combined with **rtdir**, only one route can be specified.
rtdir	single route direction (optional)	Direction of travel of the route specified in the **rt** parameter. The **rt** parameter is required when using the **rtdir** parameter. This needs to match the direction seen in the getdirections call. When using multiple languages, it must match the direction for that language.
stpid	comma-delimited list of stop IDs (required if **rt** not specified)	Set of one or more stop IDs for which service bulletins are to be returned. For example: 5029,1392,2019,4367 will return predictions for the four stops (if available). If combined with **rt** and **rtdir**, only one stop can be specified.

Response:

A well-formed XML or JSON document will be returned as a response to **getservicebulletins**.

Response Fields:

Name	Description
bustime-response	Root element of the response document.
error	Child element of the root element. Message if the processing of the request resulted in an error.
sb	Child element of the root element. Encapsulates all data about a service bulletin.
nm	Child element of the **sb** element. Unique name/identifier of the service bulletin.
sbj	Child element of the **sb** element. Service bulletin subject. A short title for this service bulletin.
dtl	Child element of the **sb** element. Service bulletin detail. Full text of the service bulletin.
brf	Child element of the **sb** element. Service bulletin brief. A short text alternative to the service bulletin detail.
prty	Child element of the **sb** element. Service bulletin priority. The possible values are "High," "Medium," and "Low".
srvc	Child element of the **sb** element. Each **srvc** element represents one or a combination of route, direction and stop for which this service bulletin is valid. If the **srvc** element is not present, the service bulletin affects all routes and stops.
rt	Child element of **srvc**. Alphanumeric designator of the route (ex. "20" or "X20") for which this service bulletin is in effect.

rtdir	Child element of **srvc**. Direction of travel of the route for which this service bulletin is in effect.
stpid	Child element of **srvc**. ID of the stop for which this service bulletin is in effect.
stpnm	Child element of **srvc**. Name of the stop for which this service bulletin is in effect.

Remarks:

Use the **getservicebulletins** for a list of service bulletins that are in effect for a route(s) (**rt**), route & direction (**rt & rtdir**), route & direction & stop (**rt & rtdir & stpid**), or stop(s) (**stpid**).

   Note: At a minimum, the **rt** or **stpid** parameter must be specified.

A service bulletin (**sb**) definition without a **srvc** element indicates a "system-wide" service bulletin. System-wide service bulletins are valid for all routes/stops in the system.

XML Schema:

```xml
<?xml version="1.0"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
        <xs:element name="bustime-response" type="bustime-response"/>
        <xs:complexType name="bustime-response">
                <xs:sequence>
                        <xs:element name="error" type="error" minOccurs="0"
                        maxOccurs="unbounded"/>
                        <xs:element name="sb" type="servicebulletin" minOccurs="1"
                        maxOccurs="unbounded"/>
                </xs:sequence>
        </xs:complexType>
        <xs:complexType name="error">
                <xs:sequence>
                        <xs:element name="rt" type="xs:string" minOccurs="0" maxOccurs="1"/>
                        <xs:element name="rtdir" type="xs:string" minOccurs="0" maxOccurs="1"/>
                        <xs:element name="stpid" type="xs:int" minOccurs="0" maxOccurs="1"/>
                        <xs:element name="msg" type="xs:string" minOccurs="1" maxOccurs="1"/>
                </xs:sequence>
        </xs:complexType>
        <xs:complexType name="servicebulletin">
                <xs:sequence>
                        <xs:element name="nm " type="xs:string" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="sbj" type="xs:string" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="dtl" type="xs:string" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="brf" type="xs:string" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="prty" type="xs:string" minOccurs="1" maxOccurs="1"/>
                        <xs:element name="srvc" type="affectedservice" minOccurs="0"
                        maxOccurs="unbounded"/>
                </xs:sequence>
        </xs:complexType>
        <xs:complexType name="affectedservice">
                <xs:sequence>
                        <xs:element name="rt" type="xs:string" minOccurs="0" maxOccurs="1"/>
                        <xs:element name="rtdir" type="xs:string" minOccurs="0" maxOccurs="1"/>
                        <xs:element name="stpid" type="xs:int" minOccurs="0" maxOccurs="1"/>
                        <xs:element name="stpnm" type="xs:string" minOccurs="1" maxOccurs="1"/>
                </xs:sequence>
        </xs:complexType>
</xs:schema>
```

Example:

The XML document below is a response to the following request:

Request:

http://localhost:8080/bustime/api/v1/getservicebulletins?key=89dj2he89d8j3j3ksjhdue93j&stpid=456

Response:

```xml
<?xml version="1.0"?>
<bustime-response>
        <sb>
                <sbj>Stop Relocation</sbj>
                <dtl>The westbound stop located at Madison/Lavergne has been moved to the
northeast corner at Madison/Lavergne.</dtl>
                <brf> The westbound stop located at Madison/Lavergne has been moved to the
northeast corner at Madison/Lavergne.</brf>
                <prty>low</prty>
                <srvc>
                        <rt>20</rt>
                </srvc>
        </sb>
        <sb>
                <sbj>Stop Relocations/Eliminations</sbj>
                <dtl>Bus stops are being changed to provide faster travel time.</dtl>
                <brf>Bus stops are being changed to provide faster travel time.</brf>
                <prty>low</prty>
```

```
        <srvc>
                <stpid>456</stpid>
        </srvc>
    </sb>
</bustime-response>
```

3.10   *Locales*

<u>Base URL</u>: **http://[host:port]/bustime/api/[version]/getlocalelist**

Parameters:

Name	Value	Description
key	string (required)	25-digit BusTime Developer API access key.
locale	string(optional)	The language to use for the response. Must match a supported locale id – See **localestring** below

Response:

A well-formed XML document will be returned as a response to **getlocalelist**.

Response Fields:

Name	Description
bustime-response	Root element of the response document.
error	Child element of the root element. Message if the processing of the request resulted in an error.
locale	Child element of the root element. Encapsulates all data about a locale (language).
localestring	Child element of the **locale** element. Unique name/identifier of the locale. This is what is passed as the locale parameter in all API calls. The **localestring** contains an ISO 639 language code. Optionally, it can be followed by '_' and an ISO 3166 country code. Examples are "es" and "en_US".
displayname	Child element of the **locale** element. The name of the language. If the locale parameter was included, then this will be in that language. For human-readable use only.

Remarks:

Use the **getlocalelist** to get a list of what languages can be used as the locale parameter. It can be called a second time with a locale parameter that matches one of the previously returned localestrings to see the human-readable language names in that given language.

> **Note:** The locale parameter in all requests is meant to match values in this list, but it does support the inheritance model of Java Locale. Thus if an unsupported locale is used, such as Mexican Spanish's "es_MX", then the base language will be used if possible (Spanish). If the given language is not supported then the default language of the Transit Authority is used. No indication of which language used is given in the response, so it is best to use a locale string out of the list returned by **getlocalelist**.

XML Schema:

```
<?xml version="1.0"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
      <xs:element name="bustime-response" type="bustime-response"/>
      <xs:complexType name="bustime-response">
            <xs:sequence>
                  <xs:element name="error" type="error" minOccurs="0"
                  maxOccurs="unbounded"/>
                  <xs:element name="locale" type="locale" minOccurs="1"
                  maxOccurs="unbounded"/>
            </xs:sequence>
      </xs:complexType>
      <xs:complexType name="error">
            <xs:sequence>
                  <xs:element name="msg" type="xs:string" minOccurs="1" maxOccurs="1"/>
            </xs:sequence>
      </xs:complexType>
      <xs:complexType name="locale">
            <xs:sequence>
                  <xs:element name="localestring" type="xs:string" minOccurs="1"
                  maxOccurs="1"/>
                  <xs:element name="displayname" type="xs:string" minOccurs="1"
                  maxOccurs="1"/>
            </xs:sequence>
      </xs:complexType>
</xs:schema>
```

Example:

The XML document below is a response to the following request:

Call #1, just to get a list of locales:

Request

http://localhost:8080/bustime/api/**v1**/getlocalelist?key=89dj2he89d8j3j3ksjhdue93j

Response
```
<?xml version="1.0"?>
<bustime-response>
      <locale>
     <localestring>en_US</localestring>
     <displayname>English</displayname>
   </locale>
   <locale>
     <localestring>es_ES</localestring>
     <displayname>Spanish</displayname>
   </locale>
</bustime-response>
```

Call #2, to see the list in a different language:

Request

http://localhost:8080/bustime/api/**v1**/getlocalelist?key=89dj2he89d8j3j3ksjhdue93j&locale=es_ES

Response
```
<?xml version="1.0"?>
<bustime-response>
      <locale>
     <localestring>en_US</localestring>
     <displayname>inglés</displayname>
   </locale>
   <locale>
     <localestring>es_ES</localestring>
     <displayname>español</displayname>
   </locale>
</bustime-response>
```

4   Error Descriptions

This section describes all possible error responses that can be received from the BusTime®
Developer API.

Error Message	Related API Calls	Description
Internal server error - Unable to complete request at this time	All	The most general error message, given when we cannot find a more specific error message to send.
Invalid locale parameter	All	(Only in BusTime version 3.0+) The requested locale string is not in a proper format. The proper format is "la" or "la_CO" where la is a legal ISO 639 code and CO is a legal ISO 3166 code. Examples are "en" and "es_ES".
No API access permitted	All	The Developer API has been disabled by the Transit Authority.
No API access key supplied	All	The 'key=<DevKey>' parameter is missing from the API request.
Invalid API access key supplied	All	The given Developer key is not assigned to any users.
No version requested	All	The request URL is missing the version.
Unsupported version requested	All	The request URL contains an unsupported version. Currently 'v1' is supported.
Unsupported function	N/A	The request contains a function name that is not supported by the API.
Transaction limit for current day has been exceeded.	All	The user, identified by the Developer Key, has already reached the maximum number of API calls allowed for the day.
No data found for parameter(s)	All except **gettime**	No results were found that matched the given parameters.
No parameter provided	**getpattern**	Required 'rt' or 'pid' parameters are missing.
No parameter provided	**getpredictions**	The required 'stpid' or 'vid' parameters are missing.
No parameter provided	**getservicebulletins**	The required 'rt' or 'stpid' parameters are missing.
dir parameter missing	**getstops**	The required 'dir' parameter is missing.
rt parameter missing	**getdirections**, **getstops**, **getservicebulletins**	The required 'rt' parameter is missing.
Either rt or vid parameter must be specified	**getvehicles**	The request is required to contain either a 'rt' or 'vid' parameter.
Invalid parameter provided	**getpatterns**, **getpredictions**	The stop ID or pattern ID does not match any known ID.

Error Message	Related API Calls	Description
Maximum number of pid identifiers exceeded	**getpattern**	The 'pid' parameter contains more than 10 pattern IDs.
Invalid top parameter provided	**getpredictions**	The 'top' parameter is not an integer or contains extra characters. For instance "top=10" is legal but "top=10." is not.
Maximum number of <x> identifiers exceeded	**getpredictions**, **getvehicles**	The 'stpid' or 'vid' parameter contains too many IDs. <x> shows the maximum allowed in a single request.
No arrival times	**getpredictions**	The given stop has no scheduled arrival times.
No service scheduled	**getpredictions**	The given stop has no service scheduled.
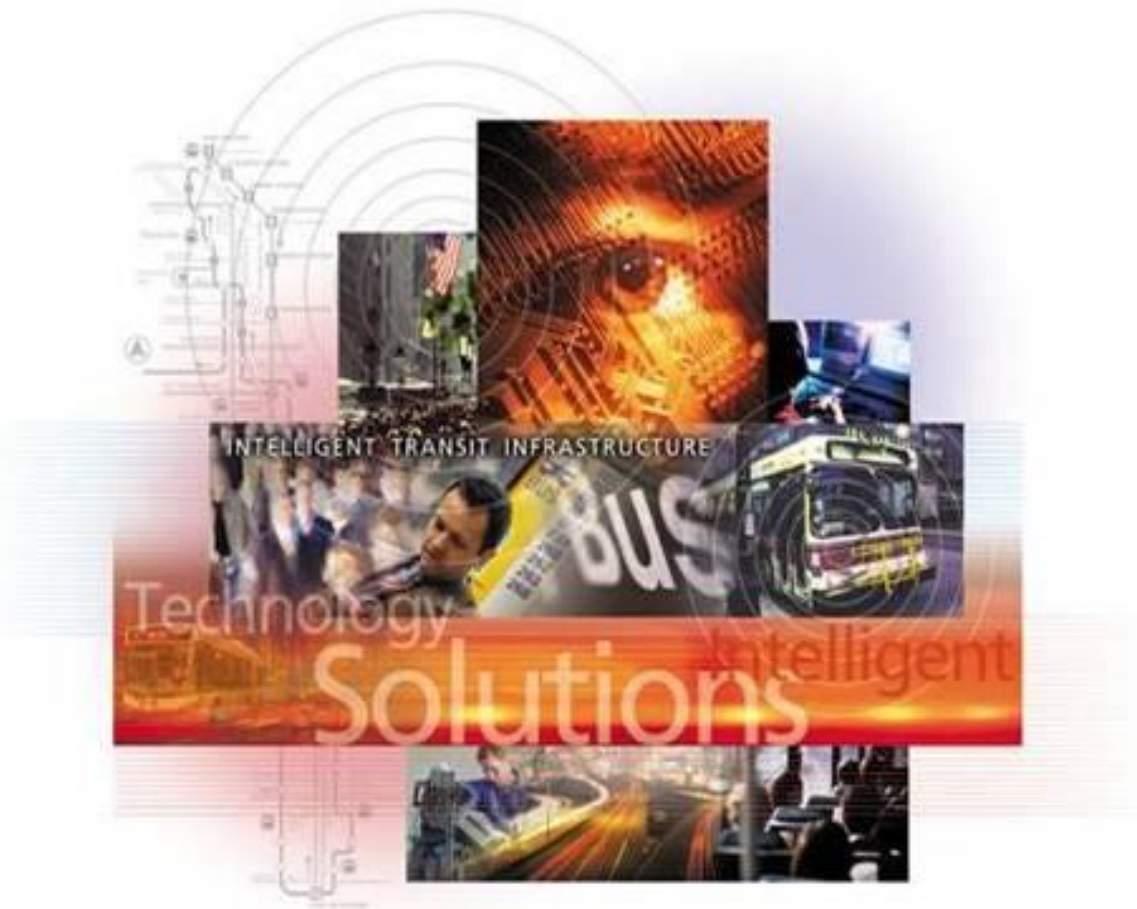
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