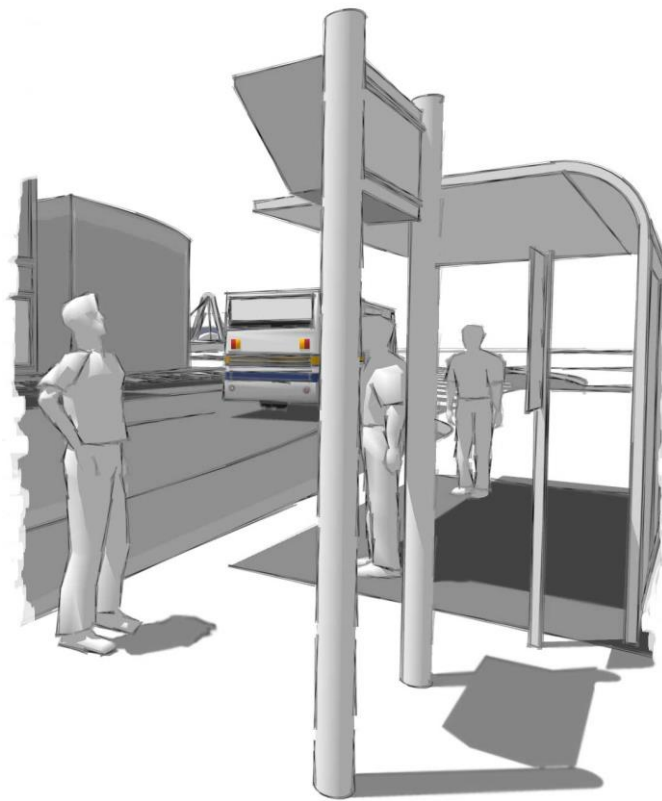




# ITS4mobility SIRI-SX Client

**Service Interface for Real Time Information  
Situation Exchange (SX) Client**





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## Terms, Acronyms and Abbreviations

Abbreviation	Description
<b>SIRI</b>	Service Interface for Real Time Information, CEN/TS 15531.
<b>Transmodel</b>	An abstract general purpose model for public transport information (CEN TC278, Reference Data Model For Public Transport, ENV12896 revised, June 2001).
<b>I4M</b>	ITS4Mobility
<b>HTTP</b>	Hypertext Transfer Protocol.
<b>Service</b>	The program (process) that implements one or more of the SIRI functions.
<b>Subscriber</b>	A client that receives data from a Service using HTTP.
<b>Client</b>	A subscriber that receives data from a Service using HTTP.
<b>Server</b>	A computer that hosts one or more Services.
<b>SX</b>	Situation Exchange, a SIRI functional service interface.



# 1. Introduction

This document contains a description of the ITS4mobility SIRI Situation Exchange (SX) client implementation.

The primary intended use of the ITS4mobility SIRI/SX client implementation is for integration with external systems (machine-to-machine).

The SIRI/SX client is used to receive traffic information (text messages) and disturbances (cancellation of planned traffic) from external systems.



## 2. Scope and Purpose

SIRI as a standard has a large number of features and several optional capabilities. This document is intended to give developers the information needed to use the SIRI/SX functional service supplied with ITS4mobility. The capabilities and features of the ITS4mobility implementation are specified in detail.



## 3. SIRI/SX and the ITS4mobility System

The SIRI/SX client module is used to receive *traffic change* and *traffic information*.

### 3.1. Traffic Change

A *traffic change* is when part or all of the planned traffic is cancelled. Planned traffic can be cancelled in a number of ways, for example:

- 1) Selecting one or more journeys.
- 2) Selecting one or more lines.
- 3) Selecting one or more stop points.

In SIRI/SX the *Progress* element decides whether the traffic change is added (open) or revoked (closed).

### 3.2. Traffic Information

Textual information aimed at commuters is often supplied in connection with a *traffic change*. At other times an operator may wish to make other information available to passengers.

The textual information can be attached to a number of elements of the planned traffic, for example:

- 1) Selecting one or more journeys.
- 2) Selecting one or more lines.
- 3) Selecting one or more stop points.

In the current version of ITS4mobility, these conditions are always translated into stop points. For example, attaching a text to a journey means that the text is attached to every stop point within that journey.

As soon as the traffic information has been entered into the system it is published to all SIRI/SX clients without delay. The *Progress* element is set to “open”. If the information is revoked, the same SIRI/SX document will be sent again but with the *Progress* element set to “closed”.



## 4. SIRI Communication and Protocols

### 4.1. HTTP

HTTP using the POST method is the application level protocol that is used to transfer data between the ITS4mobility SIRI client and servers. The HTTP response code is used by both the services and the clients to acknowledge message transfer as well as raise errors. The payload is the XML documents as specified in the SIRI standard, and the HTTP content-type is "text/xml". A successful transfer is acknowledged using the HTTP 200 response code.

The HTTP communication takes place over TCP/IP connections and the default port is usually TCP 80.

ITS4mobility does not support packaging the SIRI XML documents in SOAP.

### 4.2. The Publish/Subscribe Communication Pattern

The ITS4mobility SIRI client uses the Publish/Subscribe communication pattern. It allows for an efficient event driven exchange of data.

The client starts its subscription by sending *SubscriptionRequests* to the server.

The service must regularly send *HeartbeatNotification* (HB) messages.

### 4.3. Passive Mode

For testing purposes the SIRI/SX client can run in passive mode. The client will not start a subscription with the server, and the client will not monitor *HeartbeatNotification* messages.

In this mode it is possible to use command line tools to post documents to the SIRI/SX client, for example *curl*. To post the document "doc.xml" to the SIRI/SX client, *curl* can be used as:

```
curl -X POST -d @doc.xml <url>
```

To enable passive mode the server configuration has to be changed.

### 4.4. Error Handling and Recovery Considerations

The Publish/Subscribe interaction pattern is stateful and consideration must be given to failure of the service, the client or the communications connection between them.

Once a subscription has been started it is kept active by the service. It is the responsibility of the client to monitor whether the subscription and the connection to the service are still active. This is implemented by the client through monitoring received messages and especially *HeartbeatNotification* messages.

Attempt to restart the subscription by sending one or more *SubscriptionRequests* to the service.

### 4.5. SIRI Version

The ITS4mobility client implementation of the SIRI-SX functional interface adheres to the SIRI 1.4 specification published 2011-04-09.





# 5. Document Exchange

## 5.1. Introduction

The ITS4mobility SIRI/SX client starts a subscription with the SIRI/SX server and listens for incoming SX documents. More specifically, these are the steps that are followed:

- 1) The client sends a *SubscriptionRequest* to the server.
- 2) The server posts a *SubscriptionResponse* to the client.
- 3) The servers posts *SituationExchangeDelivery* and *HeartbeatNotification* documents to the client.
- 4) The server or the client can terminate the connection at any time.

## 5.2. SubscriptionRequest

The *SubscriptionRequest* is specified below.

Element	Description
RequestTimestamp	The date and time that the client submits the subscription request.
RequestorRef	A reference used to identify the client.
ConsumerAddress	The URL to the client. The SIRI XML documents must be posted to this URL.
SubscriptionContext	See below.
SituationExchangeSubscriptionRequest	See below.

The *SubscriptionContext* element contains the following element.

Element	Description
HeartbeatInterval	How often the server should send a <i>HeartbeatNotification</i> . The recommended setting is 1 minute (PT1M).

These are the elements of the *SituationExchangeSubscriptionRequest* that are used in the ITS4mobility implementation. Please refer to the appendix for an example document.

Element	Description
SubscriberRef	A client reference, which can be any string. Must be returned in the <i>SituationExchangeDelivery</i> .
SubscriptionIdentifier	An identifier that must be returned as <i>SubscriptionRef</i> in the <i>SituationExchangeDelivery</i> .
InitialTerminationTime	How long this subscription will last before it is terminated by the server.
SituationExchangeRequest	See below.



The *SituationExchangeRequest* element contains the following elements.

Element	Description
RequestTimestamp	The date and time that the client posted this request.
PreviewInterval	How far ahead data will be delivered. The default setting is 1 year (P1Y) which in practice means to receive all data.

### 5.3. SubscriptionResponse

The client expects a subscription response similar to the example in the appendix. The client does not parse the *SubscriptionResponse* for any data but it must be a valid document.

### 5.4. SituationExchangeDelivery

The server must post *SituationExchangeDelivery* documents with opened or closed situations to the client. If there are no situations *HeartbeatNotifications* must be posted.

These are the elements of the *SituationExchangeDelivery* that are used in the ITS4mobility client implementation. Please refer to the appendix for example documents.

Element	Description
ResponseTimestamp	The date and time that the server sent this document.
SubscriberRef	The subscriber (client) reference.
SubscriptionRef	The subscription reference which is the <i>SubscriptionIdentifier</i> that the client supplied in the <i>SituationExchangeSubscriptionRequest</i> .
Situations	A list of one or more <i>PtSituationElement</i> . See below.

The *PtSituationElement* element contains the following elements.

Element	Description
CreationTime	The date and time the situation was created.
ParticipantRef	The string ITS4mobility. Will always be the same.
SituationNumber	A unique number identifying the situation.
Source	See below.
Progress	<i>open</i> or <i>closed</i> . When the progress is set to <i>open</i> , the situation is added. When the progress is set to <i>closed</i> , the situation is removed.
ValidityPeriod	The period that the situation is valid.
UndefinedReason	Not used. Contains a timestamp and will be ignored.
Severity	Set to <i>slight</i> , <i>normal</i> or <i>severe</i> which maps to “low”, “normal” and “high” in the ITS4mobility IMFace application.
Audience	Always set to <i>public</i> .
ReportType	Always set to <i>unknown</i> .



Description	Text information describing the situation. Used to display information to passengers etc.
Affects	See below.
Consequences	A list of <i>Consequence</i> elements. See below.

The *Affects* element can contain **one** of the following elements.

Element	Description
StopPoints	A list of stop points that the situation is valid for. See below.
VehicleJourneys	A list of journeys that the situation is valid for. See below.
Networks	Can contain a list of affected lines that the situation is valid for. See below.

The *Consequence* element contains the following elements.

Element	Description
Condition	Always set to <i>unknown</i> or <i>cancelled</i> . If it is set to <i>cancelled</i> it means that the situation is a traffic change and that the stop points or the journeys or the lines have been cancelled. If it set to <i>unknown</i> it means the situation contains a traffic information message.
Severity	Set to <i>slight</i> , <i>normal</i> or <i>severe</i> which maps to “low”, “normal” and “high” in the ITS4mobility IMFace application.
Blocking	Not used but must be present as shown in the examples.

The *StopPoints* element contains the following elements.

Element	Description
AffectedStopPoint	Placeholder.
.StopPointRef	The stop point that the situation applies to.

The *VehicleJourneys* element contains the following elements.

Element	Description
AffectedVehicleJourney	Placeholder.
.VehicleJourneyRef	The journey that the situation applies to.
.Route	Not used but must be present.

The *Networks* element contains the following elements.

Element	Description
Networks	Placeholder.
. AffectedNetwork	PlaceHolder.
. AffectedNetwork.VehicleMode	Not used.
. AffectedNetwork.AffectedLine	Placeholder for a single <i>LineRef</i> element that specifies the affected line.



## 6. Server Configurations

Some settings are configurable that will affect the function of the client:

### 6.1. EnableFreeTexts

Allow the client to handle traffic information messages. The default value is “true”.

### 6.2. EnableDisturbances

Allow the client to handle traffic changes. The default value is “true”.

### 6.3. PassiveMode

Enable the passive mode. The default value is “false”. In this mode the client will simply wait for documents posted and not try to start a continuous subscription. It is a way to allow for simple usage and testing.



## 7. References

CEN/TS 15531-1:2007 Service interface for real-time information relating to public transport operations: Context and framework.

CEN/TS 15531-2:2007 Service interface for real-time information relating to public transport operations: Communications infrastructure.

CEN/TS 15531-3:2007 Service interface for real-time information relating to public transport operations: Functional service interfaces.

CEN/TS 15531-4:2011 Service interface for real-time information relating to public transport operations: Functional service interfaces - Facility Monitoring

CEN/TS 15531-5:2011 Service interface for real-time information relating to public transport operations: Functional service interfaces - Situation Exchange



## 8. Document history

Revision	Date	Comment
1	2014-02-14	Version 1.



## 9. Appendix

### 9.1. Example SituationExchangeSubscriptionRequest

```
<?xml version="1.0"?><AE:Siri xmlns:AE="http://www.siri.org.uk/siri" version="1.4">
  <AE:SubscriptionRequest>
    <AE:RequestTimestamp>2014-02-19T10:15:01</AE:RequestTimestamp>
    <AE:RequestorRef>ITS4mobilityTestClient</AE:RequestorRef>
    <AE:MessageIdentifier>1</AE:MessageIdentifier>
    <AE:ConsumerAddress>http://192.168.4.15:80/siri/client/</AE:ConsumerAddress>
    <AE:SubscriptionContext>
      <AE:HeartbeatInterval>PT1M</AE:HeartbeatInterval>
    </AE:SubscriptionContext>
    <AE:SituationExchangeSubscriptionRequest>
      <AE:SubscriberRef>ITS4mobilityTestClient</AE:SubscriberRef>
      <AE:SubscriptionIdentifier>ITS4mobilityTestClient</AE:SubscriptionIdentifier>
      <AE:InitialTerminationTime>9999-12-31T23:59:59.999</AE:InitialTerminationTime>
      <AE:SituationExchangeRequest version="1.4">
        <AE:RequestTimestamp>2014-02-19T10:15:01</AE:RequestTimestamp>
        <AE:PreviewInterval>PT24H</AE:PreviewInterval>
      </AE:SituationExchangeRequest>
    </AE:SituationExchangeSubscriptionRequest>
  </AE:SubscriptionRequest>
</AE:Siri>
```



## 9.2. Example SubscriptionResponse

```
<?xml version="1.0"?>
<AA:Siri xmlns:AA="http://www.siri.org.uk/siri" version="1.4">
  <AA:SubscriptionResponse xs:type="AA:SubscriptionResponseStructure">
    <AA:ResponseTimestamp>2014-02-17T23:17:49.001</AA:ResponseTimestamp>
    <AA:ResponderRef>ITS4mobility</AA:ResponderRef>
    <AA:RequestMessageRef>MessageIdentifier</AA:RequestMessageRef>
    <AA:ResponseStatus>
      <AA:ResponseTimestamp>2014-02-17T23:17:49.007</AA:ResponseTimestamp>
      <AA:SubscriberRef>ITS4mobilityTestClient</AA:SubscriberRef>
      <AA:SubscriptionRef>ITS4mobilityTestClient</AA:SubscriptionRef>
      <AA:Status>true</AA:Status>
      <AA:ShortestPossibleCycle>PT1S</AA:ShortestPossibleCycle>
    </AA:ResponseStatus>
    <AA:ServiceStartedTime>2014-02-17T23:17:49.008</AA:ServiceStartedTime>
  </AA:SubscriptionResponse>
</AA:Siri>
```





### 9.3. SituationExchangeDelivery - FreeText

```

<?xml version="1.0"?>
<AA:Siri xmlns:AA="http://www.siri.org.uk/siri" version="1.4">
  <AA:ServiceDelivery>
    <AA:ResponseTimestamp>2014-01-29T23:38:49.482</AA:ResponseTimestamp>
    <AA:ProducerRef>ITS4mobility-SX</AA:ProducerRef>
    <AA:Status>true</AA:Status>
    <AA:SituationExchangeDelivery version="1.4">
      <AA:ResponseTimestamp>2014-01-29T23:38:49.482</AA:ResponseTimestamp>
      <AA:SubscriberRef>ITS4mobilityTestClient</AA:SubscriberRef>
      <AA:SubscriptionRef>ITS4mobilityTestClient</AA:SubscriptionRef>
      <AA:Situations>
        <AA:PtSituationElement>
          <AA:CreationTime>2014-01-29T23:38:49.482</AA:CreationTime>
          <AA:ParticipantRef>ITS4mobility</AA:ParticipantRef>
          <AA:SituationNumber>1349366</AA:SituationNumber>
          <AA:Source>
            <AA:SourceType>directReport</AA:SourceType>
            <AA:Name>i4m</AA:Name>
          </AA:Source>
          <AA:Progress>open</AA:Progress>
          <AA:ValidityPeriod>
            <AA:StartTime>2014-01-29T23:38:00</AA:StartTime>
            <AA:EndTime>2014-01-30T03:59:00</AA:EndTime>
          </AA:ValidityPeriod>
          <AA:UndefinedReason>23:38:49</AA:UndefinedReason>
          <AA:Severity>normal</AA:Severity>
          <AA:Audience>public</AA:Audience>
          <AA:ReportType>unknown</AA:ReportType>
          <AA:Description overridden="true">Information text.</AA:Description>
          <AA:Affects>
            <AA:StopPoints>
              <AA:AffectedStopPoint>
                <AA:StopPointRef>12011138</AA:StopPointRef>
              </AA:AffectedStopPoint>
              <AA:AffectedStopPoint>
                <AA:StopPointRef>12011137</AA:StopPointRef>
              </AA:AffectedStopPoint>
              <AA:AffectedStopPoint>
                <AA:StopPointRef>12011135</AA:StopPointRef>
              </AA:AffectedStopPoint>
              <AA:AffectedStopPoint>
                <AA:StopPointRef>12011135</AA:StopPointRef>
              </AA:AffectedStopPoint>
            </AA:StopPoints>
          </AA:Affects>
          <AA:Consequences>
            <AA:Consequence>
              <AA:Condition>unknown</AA:Condition>
              <AA:Severity>normal</AA:Severity>
            </AA:Consequence>
          </AA:Consequences>
        </AA:PtSituationElement>
      </AA:Situations>
    </AA:SituationExchangeDelivery>
  </AA:ServiceDelivery>
</AA:Siri>

```



## 9.4. SituationExchangeDelivery – Journey Cancellation

```

<?xml version="1.0"?>
<AA:Siri xmlns:AA="http://www.siri.org.uk/siri" version="1.4">
  <AA:ServiceDelivery>
    <AA:ResponseTimestamp>2014-01-29T20:30:48.918</AA:ResponseTimestamp>
    <AA:ProducerRef>ITS4mobility-SX</AA:ProducerRef>
    <AA:Status>>true</AA:Status>
    <AA:SituationExchangeDelivery version="1.4">
      <AA:ResponseTimestamp>2014-01-29T20:30:48.918</AA:ResponseTimestamp>
      <AA:SubscriberRef>ITS4mobilityTestClient</AA:SubscriberRef>
      <AA:SubscriptionRef>ITS4mobilityTestClient</AA:SubscriptionRef>
      <AA:Situations>
        <AA:PtSituationElement xs:type="AA:PtSituationElementStructure">
          <AA:CreationTime>2014-01-29T20:30:48.918</AA:CreationTime>
          <AA:ParticipantRef>ITS4mobility</AA:ParticipantRef>
          <AA:SituationNumber>1</AA:SituationNumber>
          <AA:Source>
            <AA:SourceType>directReport</AA:SourceType>
            <AA:Name>i4m</AA:Name>
          </AA:Source>
          <AA:Progress>open</AA:Progress>
          <AA:ValidityPeriod>
            <AA:StartTime>2014-01-29T20:29:00</AA:StartTime>
            <AA:EndTime>2014-01-30T03:59:00</AA:EndTime>
          </AA:ValidityPeriod>
          <AA:UndefinedReason>20:30:48</AA:UndefinedReason>
          <AA:Severity>normal</AA:Severity>
          <AA:Audience>public</AA:Audience>
          <AA:ReportType>unknown</AA:ReportType>
          <AA:Affecteds>
            <AA:VehicleJourneys>
              <AA:AffectedVehicleJourney>
                <AA:VehicleJourneyRef>3786972</AA:VehicleJourneyRef>
                <AA:Route/>
              </AA:AffectedVehicleJourney>
              <AA:AffectedVehicleJourney>
                <AA:VehicleJourneyRef>3786959</AA:VehicleJourneyRef>
                <AA:Route/>
              </AA:AffectedVehicleJourney>
            </AA:VehicleJourneys>
          </AA:Affecteds>
          <AA:Consequences>
            <AA:Consequence>
              <AA:Condition>cancelled</AA:Condition>
              <AA:Severity>normal</AA:Severity>
              <AA:Blocking>
                <AA:JourneyPlanner>>false</AA:JourneyPlanner>
                <AA:RealTime>>false</AA:RealTime>
              </AA:Blocking>
            </AA:Consequence>
          </AA:Consequences>
        </AA:PtSituationElement>
      </AA:Situations>
    </AA:SituationExchangeDelivery>
  </AA:ServiceDelivery>
</AA:Siri>

```



## 9.5. SituationExchangeDelivery – Line Cancellation

```

<?xml version="1.0"?>
<AA:Siri xmlns:AA="http://www.siri.org.uk/siri" version="1.4">
  <AA:ServiceDelivery>
    <AA:ResponseTimestamp>2014-01-29T20:22:53.193</AA:ResponseTimestamp>
    <AA:ProducerRef>ITS4mobility-SX</AA:ProducerRef>
    <AA:Status>true</AA:Status>
    <AA:SituationExchangeDelivery version="1.4">
      <AA:ResponseTimestamp>2014-01-29T20:22:53.193</AA:ResponseTimestamp>
      <AA:SubscriberRef>ITS4mobilityTestClient</AA:SubscriberRef>
      <AA:SubscriptionRef>ITS4mobilityTestClient</AA:SubscriptionRef>
      <AA:Situations>
        <AA:PtSituationElement>
          <AA:CreationTime>2014-01-29T20:22:53.193</AA:CreationTime>
          <AA:ParticipantRef>ITS4mobility</AA:ParticipantRef>
          <AA:SituationNumber>2</AA:SituationNumber>
          <AA:Source>
            <AA:SourceType>directReport</AA:SourceType>
            <AA:Name>i4m</AA:Name>
          </AA:Source>
          <AA:Progress>open</AA:Progress>
          <AA:ValidityPeriod>
            <AA:StartTime>2014-01-29T20:22:00</AA:StartTime>
            <AA:EndTime>2014-01-30T03:59:00</AA:EndTime>
          </AA:ValidityPeriod>
          <AA:UndefinedReason>20:22:53</AA:UndefinedReason>
          <AA:Severity>normal</AA:Severity>
          <AA:Audience>public</AA:Audience>
          <AA:ReportType>unknown</AA:ReportType>
          <AA:Affects>
            <AA:Networks>
              <AA:AffectedNetwork>
                <AA:VehicleMode>unknown</AA:VehicleMode>
                <AA:AffectedLine>
                  <AA:LineRef>5</AA:LineRef>
                </AA:AffectedLine>
              </AA:AffectedNetwork>
            </AA:Networks>
          </AA:Affects>
          <AA:Consequences>
            <AA:Consequence>
              <AA:Condition>cancelled</AA:Condition>
              <AA:Severity>normal</AA:Severity>
              <AA:Blocking>
                <AA:JourneyPlanner>false</AA:JourneyPlanner>
                <AA:RealTime>false</AA:RealTime>
              </AA:Blocking>
            </AA:Consequence>
          </AA:Consequences>
        </AA:PtSituationElement>
      </AA:Situations>
    </AA:SituationExchangeDelivery>
  </AA:ServiceDelivery>
</AA:Siri>

```



## 9.6. SituationExchangeDelivery – StopPoints Cancellation

```

<?xml version="1.0"?>
<AA:Siri xmlns:AA="http://www.siri.org.uk/siri" version="1.4">
  <AA:ServiceDelivery>
    <AA:ResponseTimestamp>2014-01-29T20:24:48.186</AA:ResponseTimestamp>
    <AA:ProducerRef>ITS4mobility-SX</AA:ProducerRef>
    <AA:Status>>true</AA:Status>
    <AA:SituationExchangeDelivery version="1.4">
      <AA:ResponseTimestamp>2014-01-29T20:24:48.186</AA:ResponseTimestamp>
      <AA:SubscriberRef>ITS4mobilityTestClient</AA:SubscriberRef>
      <AA:SubscriptionRef>ITS4mobilityTestClient</AA:SubscriptionRef>
      <AA:Situations>
        <AA:PtSituationElement>
          <AA:CreationTime>2014-01-29T20:24:48.186</AA:CreationTime>
          <AA:ParticipantRef>ITS4mobility</AA:ParticipantRef>
          <AA:SituationNumber>3</AA:SituationNumber>
          <AA:Source>
            <AA:SourceType>directReport</AA:SourceType>
            <AA:Name>i4m</AA:Name>
          </AA:Source>
          <AA:Progress>open</AA:Progress>
          <AA:ValidityPeriod>
            <AA:StartTime>2014-01-29T20:24:00</AA:StartTime>
            <AA:EndTime>2014-01-30T03:59:00</AA:EndTime>
          </AA:ValidityPeriod>
          <AA:UndefinedReason>20:24:48</AA:UndefinedReason>
          <AA:Severity>normal</AA:Severity>
          <AA:Audience>public</AA:Audience>
          <AA:ReportType>unknown</AA:ReportType>
          <AA:Affects>
            <AA:StopPoints>
              <AA:AffectedStopPoint>
                <AA:StopPointRef>12010050</AA:StopPointRef>
              </AA:AffectedStopPoint>
              <AA:AffectedStopPoint>
                <AA:StopPointRef>12010030</AA:StopPointRef>
              </AA:AffectedStopPoint>
            </AA:StopPoints>
          </AA:Affects>
          <AA:Consequences>
            <AA:Consequence>
              <AA:Condition>cancelled</AA:Condition>
              <AA:Severity>normal</AA:Severity>
              <AA:Blocking>
                <AA:JourneyPlanner>>false</AA:JourneyPlanner>
                <AA:RealTime>>false</AA:RealTime>
              </AA:Blocking>
            </AA:Consequence>
          </AA:Consequences>
        </AA:PtSituationElement>
      </AA:Situations>
    </AA:SituationExchangeDelivery>
  </AA:ServiceDelivery>
</AA:Siri>

```