Vehicle Navigation Service Based on Real-Time Traffic Information

Demo of a service based on OMA Dynamic Navigation Enabler

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Introduction

Vehicle navigation services, based on satellite positioning systems, are nowadays very common. However, most of those services are delivered through proprietary technologies and also often fall short in flexibility because of their limited capability to couple road information with real-time traffic information.

The OMA Dynamic Navigation Enabler (OMA DynNav) aims to provide a flexible solution to access to optimal routing functionalities based on real time and forecasted traffic information. OMA DynNav is built over a client-server model, with the client (residing in the navigation device) getting from the server real-time traffic information on a specific area or directly optimal routes to a destination, through an open interface based on REST NetAPI approach. An additional value brought by OMA DynNav is that mobile operators can generate real-time traffic information by exploiting their own assets, e.g. passive tracking of mobile calls or tracking of GPS-enabled devices.

The demo (implemented jointly by Telecom Italia and the Politecnico di Torino) shows a DynNav client (developed for an Android OS) receiving route information from the DynNav server taking into account (simulated but realistic) traffic information; during the navigation along the route, a web portal allows the demoer to simulate an accident, so the DynNav server immediately notifies the DynNav client of such accident and contextually provide an alternative route in order for the vehicle to avoid the accident area.
OMA DynNav Enabler Architecture

Navigation Device
- DynNav Client
- Location Client (e.g. SUPL SET)

Navigation AppServer
- DynNav Server
- Traffic Info
- POI DB
- Routing Info

3rd party AppServer
- DynNav Client

Location Server (e.g. SUPL)

POI: Point of Interest

In scope of DynNav

Out-of-scope of DynNav
Traffic Information

- Performance parameters on road network segments:
  - Average speed, delays

- Mobile operators can estimate traffic parameters by:
  - Tracking of mobile calls
    - Positioning based on signal strength measurements
  - Tracking of GPS users (and DynNav users)
Functionalities of OMA DynNav

- Proposal of a set of routes based on:
  - journey parameters
  - updated traffic information
    - traffic events and performance parameters
- Real time traffic events and performance parameters updates:
  - Routes and Areas
- Re-routing
  - performance of current route become degraded
  - user diverts from the proposed route
- Complementary information (POI)
Why REST for DynNav

- Client-server
- Stateless
- Uniform interface with HTTP operations
  - Get, Post, Put and Delete
- Resources are retrieved with its complete representation
  - XML Message Content-Type
- Notification mechanisms
  - Long polling
DynNav Data Format: reuse of available standard

- **DynNav.XSD**
  - `Poi.xsd`
  - `CivicAddress.xsd`
  - `RestNetapi Common.xsd`

**Infomobility data**
- `Tpeg-rtm.xsd`
- `Tpeg-loc.xsd`
Demo Architecture
Sequence Diagram of the Demo

1. Journey parameter definition
2. Submit route information request
3. Route(s) estimation (Full schema)
4. Estimation of traffic info. Related to estimated routes
5. Propose of routes (full format) and traffic information
6. Route selection among the proposed routes
7. Subscription to notification service (traffic info and alternative routes)
8. Traffic data estimation
9. Traffic information notification
10. Alternative route estimation
11. Alternative route notification

accident
DynNav Server classes structure of the prototype

Rest Interface J axs-RS

DynNav Server

- Trip Mng (location & geocoding)
- Route Mng
- Event Mng
- Subscription & notification Manager
- Area Manager
- POI Manager

DataBase

- Trip
- Route
- Area
- Event
- Subscription
- POI

db4o
The graphical interfaces of Demo application