Mobile Devices for Telematics

Chung-Min Chen
Chief Scientist & Managing Director
Outline

- Mobile Devices for Telematics
- Standardized Interface to Vehicle
- Looking Ahead
We are adopting technologies faster than ever

- Devices for Digital World

- Web: 4 years
- Cell phone: 11 years
- TV: 13 years
- Radio: 38 years

Social networks: 100M users in 9 months
Network Impact by Telematics

- Media
- Content
  - Data
  - Multimedia
- Traffic
  - Real time: emergency
  - Constant bit rate: location
  - Bursty: dynamic navigation, etc.

Future telematics network traffic estimate
- Cellular/4G – 60%
- DSRC – 20%
- Others (WiFi, Satellite, etc) – 20%
Telematics System

- Built-in
- Brought-in
- Beamed-in
**Fully Home Grown**

- **Basic**
  - Automatic Crash Notification (airbag deployment, roll-over)
  - Emergency Assistance ("red" button)
  - Roadside Assistance ("blue" button)
  - Remote Door Unlock
  - Vehicle Diagnostics Email

- **Premium**
  - All the above plus
  - Turn-by-Turn Navigation
  - Information

- **Additional (pre-paid)**
  - Hands-Free Calling
Why customers renew?

<table>
<thead>
<tr>
<th>Why Users Renew</th>
<th>Or Not</th>
</tr>
</thead>
<tbody>
<tr>
<td>View as an insurance policy</td>
<td>Cost</td>
</tr>
<tr>
<td>Want latest features/technology</td>
<td>Don’t get value for money</td>
</tr>
<tr>
<td>Use telephone capability</td>
<td>Don’t need service</td>
</tr>
<tr>
<td>Use often to get to unfamiliar places</td>
<td>Didn’t want to begin with</td>
</tr>
<tr>
<td>IT helps get to destination</td>
<td>Other</td>
</tr>
<tr>
<td>Others</td>
<td>Not satisfied with service</td>
</tr>
<tr>
<td>Use for business travel</td>
<td>Service is difficult to use</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>95%</td>
<td>69%</td>
</tr>
<tr>
<td>20%</td>
<td>53%</td>
</tr>
<tr>
<td>20%</td>
<td>31%</td>
</tr>
<tr>
<td>17%</td>
<td>23%</td>
</tr>
<tr>
<td>17%</td>
<td>10%</td>
</tr>
<tr>
<td>6%</td>
<td>8%</td>
</tr>
<tr>
<td>4%</td>
<td>3%</td>
</tr>
</tbody>
</table>
Mobile Phone for Telematics

- User already has mobile phone
- Not willing to pay extra for OBU & 2nd SIM subscription
- User not willing to pay extra for (emergency) services that may never or rarely use
- Younger generation like connectivity and Web 2.0
SYNC Features

- Basic Option – one time charge
  - Assist 911
  - Vehicle Health Reports
  - Voice-activated, hands-free calling
  - Audible text messages
  - Advanced calling features on display.
  - iPod played on audio
  - Voice-activated music
  - Instant voice recognition
  - Ring tone support
  - Automatic phonebook transfer

- 3-Year free, low monthly fee afterwards
  - Navigation
  - Traffic Information
  - Voice portal
  - Music Profile
- **Best of Breed**

  - Adopts best-of-breed vendors/solutions

  ![Diagram]

  - deCarta: Map Routing, Navi
  - TeleNav: Traffic Info
  - Inrix
  - Gracenote: Music info
  - airbiquity
  - MGW
  - Voice Portal
  - Tellme
  - OBU
  - 911

  - MS WinAuto
  - ARM
  - M/A-Com
  - SiRF GPS
  - Nuance
  - Continental
  - airbiquity
Outline

- Mobile Devices for Telematics
- **Standardized Interface to Vehicle**
- Looking Ahead
<table>
<thead>
<tr>
<th>Work Item Number</th>
<th>Title</th>
<th>Lead Country</th>
<th>Track</th>
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<tbody>
<tr>
<td>10992</td>
<td>“The use of Nomadic Devices to Support ITS Services and Multimedia Provision in Vehicles”</td>
<td>Korea</td>
<td>TR</td>
</tr>
<tr>
<td>13111</td>
<td>”The Use of Nomadic and Mobile Devices to Support ITS Service Provision for Travelers”</td>
<td>Vacant</td>
<td>TR</td>
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<tr>
<td>13184</td>
<td>“Real-time Decision Support System for Stop &amp; Guide Control via Nomadic Device”</td>
<td>Korea</td>
<td>TR (IS Optional)</td>
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<tr>
<td>13185</td>
<td>”Vehicle Interface for Provisioning and Support of ITS Services”</td>
<td>Korea, Germany</td>
<td>TR (IS Optional)</td>
</tr>
</tbody>
</table>
NP 13185, Part 2 – “VMG Protocol Requirements and Specification”

- IAM (Independent After Market) “Off-Board” configuration: VMG and a CALM-compliant ND (vehicle station)
- VM (Vehicle Manufacturer) “ON-Board” configuration: Vehicle Mobile Gateway and a CALM-compliant Vehicle Station

source: ISO TC-204 WG17
XML Based Protocol

- **Request document:**
  - `<VMG_COM_TEL type="xyz_call">`
  - `<XYZ_CALL longMode=false|true>`
  - `...`
  - `</XYZ_CALL>`
  - `</VMG_COM_TEL>`

- **Response document:**
  - `<VMG_COM_TEL type="xyz_reply">`
  - `<XYZ_REPLY longMode=false|true>`
  - `...`
  - `</XYZ_REPLY>`
  - `</VMG_COM_TEL>`

source: ISO TC-204 WG17
PWI 13184 “Guidance Protocol via Nomadic Device for Advisory Safety Systems”

- ND communicates with Local Server to guide drivers/vehicles to maneuver through different environments

source: ETRI
Recent Development

“GM to use Google’s Android for in-vehicle telematics”, May 12, 2010.

Nokia’s “Terminal Mode”, May 20, 2010

- Nokia and CE4A (Audi, BMW, Daimler, Porsche, VW), have released a Terminal Mode technology specification that they are pitching as an industry standard to integrate mobile applications into cars.

source: www.nokia.com/terminalmode
Outline

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Green

- Industry driven
  - Better fuel efficiency – or more mileage you’ll drive?
  - Hybrid/Electrical vehicle – or “coal” vehicle?
  - Massive transit – no greener than vehicles (per passenger mile)

- Community driven
  - Share the Rides!
    - Smart Jitney
    - Univ. campus
  - Share the Cars!
    - Zipcar

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**Fleet Growth**
Global stock of cars and light trucks, in millions

**Fueling Up**
Global use of petroleum-based fuel in cars and light trucks, in billions of gallons of gasoline equivalent

Note: Among key assumptions underlying these projections are that present trends continue, that no new policies be implemented, that consumer behaviors do not change significantly, and that alternative fuels and radical technological innovations do not significantly penetrate the market. Limits in oil availability are also not considered in the projections.

Challenges

- Routing issues
  - Fixed route with de tour buffer zone and time constraint
  - Multiple pick-ups, drop-offs (shortest path, in what sense?)
  - Time constraints (individual tolerance of delay)
- Fairness (a classical CS problem)
  - Cost sharing
  - Riding distance
- Security
  - Riders matching
  - Tracking (pick-up, riding, drop-off)
  - Peer rating
  - Social networks
Electrical Vehicles

- Battery restriction – 100 mile per charge
- Find charge stations
- Reservation system
- Route selections (with nearby charge stations)
- Solar charged
  - Panel angle
Telcordia telematics solutions

- Staging and managing real-time location & probe data from OBU, PND, smart phone
- Facilitates development and hosting of various LBS & telematics applications
The “i” Craze

- iPhone, iPad, App Store
- Android phone, Android Market
- Facebook, Twitter

### Number of iPhone App Downloads

<table>
<thead>
<tr>
<th>Date</th>
<th># of Apps</th>
<th># of Downloads</th>
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<tbody>
<tr>
<td>11/7/2008</td>
<td>500</td>
<td>0</td>
</tr>
<tr>
<td>9/9/2009</td>
<td>3000</td>
<td>100,000,000</td>
</tr>
<tr>
<td>8/4/2010</td>
<td>&gt;185,000</td>
<td>4,000,000,000</td>
</tr>
</tbody>
</table>

Source: NPD Group
Mobile Device for ITS

Current Parking Availability

Very low
Low
Medium to High

Go to: Fisherman’s Wharf

Source: Streetline Networks
Looking Ahead

- OEM vs. AM
  - The full blossom of telematics will require cooperation between car and mobile device OEMs
- Built-in vs. Brought-in
  - Two SIM cards will not fly
  - An integrated approach is the key
- Beamed-in
  - Value proposition will be in the Cloud applications
  - On-line algorithms are essential (not O.R. not Graph Theory algorithms)