DEVELOPMENT OF COMMON COMMUNICATION PLATFORM FOR VARIOUS SERVICES USING ETC TECHNOLOGY

Hideaki Nakayama (Research Engineer)

Intelligent Transport systems Division, Research Center for Advanced Information Technology, National Institute for Land and Infrastructure Management (NILIM), Ministry of Land, Infrastructure and Transport, Japan
Contents

1. Present and Future of ITS developments
2. The requirements for common platform
3. Experiment to realize common platform at an early stage
4. Conclusion
5. Announcement of Demonstration
1. Present and Future of ITS Development

At present: ITS services are assimilating into our communities

- The increasing number of shipped units of in-car navigation, VICS and ETC
- Positive impact on reducing congestion at tollgates.

(Ten thousand units, cumulative)

<table>
<thead>
<tr>
<th>Year</th>
<th>Car Navigation Systems</th>
<th>VICS Units</th>
<th>ETC Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>100</td>
<td>50</td>
<td>10</td>
</tr>
<tr>
<td>1997</td>
<td>200</td>
<td>100</td>
<td>20</td>
</tr>
<tr>
<td>1998</td>
<td>300</td>
<td>200</td>
<td>30</td>
</tr>
<tr>
<td>1999</td>
<td>400</td>
<td>300</td>
<td>40</td>
</tr>
<tr>
<td>2000</td>
<td>500</td>
<td>400</td>
<td>50</td>
</tr>
<tr>
<td>2001</td>
<td>600</td>
<td>500</td>
<td>60</td>
</tr>
<tr>
<td>2002</td>
<td>700</td>
<td>600</td>
<td>70</td>
</tr>
<tr>
<td>2003</td>
<td>800</td>
<td>700</td>
<td>80</td>
</tr>
<tr>
<td>2004 (Aug)</td>
<td>900</td>
<td>800</td>
<td>90</td>
</tr>
</tbody>
</table>
1. Present and Future of ITS Development

Future: Various ITS services are being developed and combined

- Diversified ITS services will be a solution to the current issues

Basic ITS Service
- Vehicular information transmission
- Fee payment
- Guidance and warning
- Information supply

Solution
- Development
- Combination

The current issues
- Reduction of accidents, environmental impact and congestion due to road traffic
- Preparing for the aging society, etc
2. The requirements for Common platform

A single on-board unit to deal with diversified services

- If each service requires an individual unit
  - A mass of unit
  - Various service action individually

A solution is ...

to process diversified services using a single on-board unit

Various service

- II'S SERVICE 1
- II'S SERVICE 2
- II'S SERVICE 3

A poor serviceability and inconvenience
2. The requirements for Common platform

The requirements for common platform

- A communication platform
  - Use DSRC 5.8 GHz active mode, road-to-vehicle radio communication technology used for ETC

- The needs to develop a common platform
  - A processing technology for communication is indispensable

A processing technology, which is called Application Sub Layer (ASL) is required.
2. The requirements for common platform

ASL (Application Sub Layer)

- The centerpiece of common platform
- Present between DSRC and applications
- Activates some types of applications

NILIM confirm effectiveness of the common platform with ASL
3. Experiment to realize common platform at an early stage

Experiment on IP service family for a halted vehicle

- Time & Date: 5 days in January and February, 2003
- Location: Moriya service area in outbound of Joban expressway
- Test items:
  1. Effectiveness of common platform
  2. Questionnaire survey on the offered service contents

Describe the various service

- Display
- On-board unit
- Antenna
3. Experiment to realize common platform at an early stage

**Service contents offered**

- **Public service**: Vehicle operational service, etc
- **Private vendor service**: Information or communication service using Internet

**Info services offered by the public**
- Real-time weather condition in mountainous section
- Detailed information on lane restrictions
- Detailed information on rest areas on routes ahead
- Seat reservation of the restaurants in service areas

**Info service offered by Vender**
- E-mail
- Internet connection
- Live image from remote camera
- IP phone
3. Experiment to realize common platform at an early stage

**Test on effectiveness of common platform**

- Confirm the following contents activation using roadside and on-board unit
  - Radio communication
  - Application activation
  - Interlink among devices

**Identifying effectiveness of the common platform**

Roadside Unit

- Company A
- Company B

On-board unit

- Company A
- Company B
- Company C
- Company D
3. Experiment to realize common platform at an early stage

A questionnaire survey on offered services

• More than 300 drivers have experienced the services

- Snow accumulating conditions in a form of live video
  - Not attractive: 1%
  - Attractive: 87%
  - Don’t know: 4%
  - No answer: 0%

- On Internet connection
  - Not attractive: 13%
  - Attractive: 83%
  - Don’t know: 0%
  - No answer: 0%

- On information acquisition in response to driver’s request
  - Not attractive: 1%
  - Attractive: 9%
  - Don’t know: 0%
  - No answer: 0%

- On information acquisition in a car
  - Not attractive: 0%
  - Attractive: 100%
  - No answer: 0%

Road users are expecting the simply and understandable information.
3. Experiment to realize common platform at an early stage

Experiment on non-IP service for running vehicle

- Time & Date: March, 2004
- Location: Test-Course in NILIM
- Test items: 1. Effectiveness of common platform
  2. Communication capacity

A communication range is set to 20m

A message display board, message contents

On-board unit
3. Experiment to realize common platform at an early stage

An effective common platform of a running vehicle

- Confirm the following contents activation using roadside and on-board unit
  - Radio communication
  - Application activation
  - Interlink among devices

Identifying effectiveness of the common platform

A maximum capacity

- Confirm a maximum data capacity that transmitted to a running vehicle

<table>
<thead>
<tr>
<th>Date capacity</th>
<th>100 [KB]</th>
<th>150 [KB]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Judge of data reception in operating vehicle</td>
<td>Running at 80[Km/h]</td>
<td>Possible</td>
</tr>
<tr>
<td></td>
<td>Running at 100[Km/h]</td>
<td>Possible</td>
</tr>
</tbody>
</table>

Transferred about 100KB to an operational vehicle at 100km/h
4. Conclusion

Summary

• Effectiveness and function of the common platform has been proved both for IP and non-IP related services

Future

• Diversified ITS services will be available in 2007.
5. Announcement of Demonstration

Demonstration : Date and Site

- Duration: till October 24th, (Sunday), 2004
- Location: Meijyo Park, Parking area

Demonstration on

- Parking control for IN/OUT
- Virtual shopping using an ETC card
- Information service

Welcome your visits