Present Situation & Future Prospect of ETC Services Used in Japan

September 9, 2014
Cobo Center in Detroit

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ITS-TEA

—ITS Technology Enhancement Association—
(ORSE Organization of Road Service Enhancement)
We were... are... will be...

ETC: was operated by ORSE

DSRC (ITS-SPOT): was operated by ISPA

Merged

March 2001~
1500 ETC TOLL Gates

August 2011~
1700 ITS-SPOT Antennas

We'd like to be helpful to a world by Comprehensive service

Operated by ITS-TEA (ORSE+ISPA) from September 2014~

ETC: Toll Collection

DSRC (ITS-SPOT): ITS-SPOT Service

α: Multipurpose uses of ETC system

ETC2.0
The History of ITS World Congress & ITS-TEA

ITS-TEA (the former “ORSE”) has joined ITS World Congress since 2001

<table>
<thead>
<tr>
<th>Year</th>
<th>City</th>
<th>Country</th>
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<td>USA</td>
<td>2020</td>
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ORSE (ITS-TEA) has established 1999 & ETC Service started on March 2001 in Japan.

**Presented Papers by ORSE (ITS-TEA)**

- **2010**: Setup of ETC/DSRC on-board unit
- **2012**: EVOLUTION OF ETC SETUP SYSTEM
- **2013**: Dissemination of ETC in Japan and Its Ripple Effects
- **2014**: Present Situation & Future Prospect of ETC Services Used in Japan
1. Overview of ETC System in Japan

2. Vehicle ID information service
   -1 Mechanism
   -2 Service in operation
   -3 Challenges

3. Examples for commercial vehicles of Vehicle ID information Service
   -1 Management of waiting taxi queues
   -2 Management of entrance/exit in construction site
   -3 Optimization of logistics vehicle management

4. Future Development

5. Future Prospect for 2020 Olympic Games in Tokyo
1. Overview of ETC System in Japan

One of the most important social infrastructure supporting the road transportation

- **Unit Year**
- **Cumulative**

- **Yearly (million units)**
- **Cumulative (million units)**

- **50,000 cars / day**
  - 0.9% using ETC

- **7.4 mil cars / day**
  - 90% using ETC

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- **2000-2014**
  - **2000**: 0.03
  - **2001**: 0.18
  - **2002**: 0.53
  - **2003**: 0.7
  - **2004**: 1.8
  - **2005**: 4.5
  - **2006**: 4.5
  - **2007**: 4.3
  - **2008**: 5.2
  - **2009**: 6.3
  - **2010**: 31
  - **2011**: 34
  - **2012**: 38
  - **2013**: 42
  - **2014**: 46

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**ETC**

**Overview**

**Unit Year**

**Cumulative**
1. Overview of ETC System in Japan

Mechanism & Features of Japanese ETC

< Distinctive Points >
1. Non stop payment transactions.
2. Nationwide standardized ETC OBU allows various toll rates & toll discount programs by various road operators.
3. High level of security to protect users’ private information
4. ETC OBU are available in aftermarket by users.
### 1. Overview of ETC System in Japan

Having been widely installed to commercial vehicles, ETC OBU could be used in wider purpose.

#### Number of ETC onboard units installed & Percentage of ETC used by type of vehicle

<table>
<thead>
<tr>
<th>Category</th>
<th>Daily average in March, 2014 (vehicle/day)</th>
<th>March, 2014 (vehicle/month)</th>
<th>ETC Utilization rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vehicle with ETC (Thousand)</td>
<td>Total vehicles (Thousand)</td>
<td>Vehicle with ETC (A) (Thousand)</td>
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<tr>
<td>Standard-sized vehicle</td>
<td>1,149</td>
<td>1,241</td>
<td>35,608</td>
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<tr>
<td>Large-sized vehicle</td>
<td>152</td>
<td>154</td>
<td>4,709</td>
</tr>
<tr>
<td>Extra-large vehicle</td>
<td>22</td>
<td>22</td>
<td>674</td>
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<tr>
<td>Medium-sized vehicle</td>
<td>148</td>
<td>158</td>
<td>4,583</td>
</tr>
<tr>
<td>Light vehicle</td>
<td>155</td>
<td>202</td>
<td>4,814</td>
</tr>
<tr>
<td>Total</td>
<td>1,625</td>
<td>1,776</td>
<td>50,388</td>
</tr>
</tbody>
</table>

*Source: ETC Handbook by ORSE*
2. Vehicle ID information service

How to get Vehicle ID

![Diagram of Vehicle ID information service]

- **On-boarding management number** is described in the instruction manuals and others of ETC on-board units.
2. Vehicle ID information service

70,000 users utilize at 21 locations

Payment System

☆ Toll parking lot
☆ Ferry terminal
☆ Construction site
☆ Waste disposal facility

Non-Payment System

☆ Wholesale Market of food
  Ex. “Tsukiji”
☆ Taxi stand & ☆ Parking lot
☆ Automobile dealer
2. Vehicle ID information service

Since ETC OBU has spread, we can suggest this kind of unique Multipurpose service.

Example【1】
- Taxi stand & Parking lot
  - Key of success
    - A large number of taxis participated
    - Dissemination rate of ETC in taxi OBU 100%
    - There is a space by the taxi stand, where DSRC antenna could be installed with stable power supply

Example【2】
- Construction site
- Waste disposal facility

Example【3】
- Logistic center

Non-Payment System

Key of success
- Dissemination rate of ETC in truck OBU 100% or management can control them
- The institution which a lot of vehicles go in and out, and needs the vehicles
3.-1 Service example - Taxi

Management of waiting line of taxis

Example【1】 ☆Taxi stand & ☆Parking lot

Distance : 800m
3.1 Service example - Taxi

**Ginza Taxi-stand**

- ETC check on departure from the taxi stand
- Check that the taxi has come via taxi pool and taxi stand.

**Tsukiji Parking lot**

- Signal for dispatching corresponds with the ETC antenna at the taxi stand
- ETC check
- No engine idling

**Before experiment using taxi pool**

- DSRC Antenna
- Camera
- Outside signboard
- Certified taxi

**After experiment using taxi pool**

- Taxi stand

Source: Data by P & TEC Inc.
3.2 Service example - Construction site

Management of entrance/exit in construction site

【Example【2】】

☆ Construction site☆ Waste disposal facility

【Flow of Disaster Waste Disposal】

(1) Primary temporal depots
   (Unozumai, Mizuumi & Itagiyama)
   ↓ ↓

(2) Intermediate disposal facilities
   (Katagishi & Itagiyama)
   ↓ ↓

(3) Final disposal facilities

Acquisition of vehicle ID info. thru. ETC communications

Output of measurement sheet

Weighting

Exit management thru ETC
Management of entrance/exit in construction site

1. Communications through ETC

2. Acquisition of vehicle ID information

3. Calling vehicle ID information from DB

4. Relating vehicle ID information and following records:
   - Weight (measurement result)
   - Result of radiation measurement
   - Arrival time

5. Output of measurement sheet

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“Vehicle information (including vehicle number and name of transport company)” “Information on disaster waste (including weight and result of radiation measurement)” should be managed being related each other.

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ETC communications

Weighing

Acquisition of vehicle ID information through ETC communications

Output of measurement sheet

1. ETC
2. Acquisition of vehicle ID information
3. Registration with DB for management of vehicle information
   - Weight (measurement result)
   - Arrival time

Exit management through ETC
Utilization for logistics vehicles

1. Management of trucks
2. Waiting vehicles (unloading/loading)
3. Notice to long-waiting vehicles based on entrance/exit time
4. Recognition of number of vehicles in the facility

Advanced detection service on peripheral roads

Control center

Cloud ASP server

Exit management

Safety measures at the entrance and the exit

In-house vehicle management

Information provision to mobile phones

Exclusive space for non-registered vehicles to make registration

Departure guidance to vehicles

Waiting information

Vacant spaces on each floor

Entrance management

Entrance guidance

Light sign board for waiting spaces

Example【3】☆Logistic center

Scheduled arrival time
Soon, vehicle No. X of company A will enter!

Preparation jobs following information display to each tenant area

Entrance guidance

Entrance management

Entrance management

Entrance guidance

Entrance management

Entrance guidance
The two issues need more study for providing the vehicle ID information service:

- **Services no need for “pre-registration”**
  The services other than “tolling” will not degrade the security level
  → on study
  The services are expected to benefit the general drivers who have ETC OBU
  → payment in private parking lots, drive-through services, etc.

- **Services with “pre-registration”**
  The successful cases of vehicle operation management should be shared
  more actively among the business operators.

4. **Future development (Conclusion)**
5. Future Prospect

We believe accelerate the further innovation of ITS technologies for more livable society.

2020 Olympic Games in Tokyo impacts in transport:
Before the event: Employment of 1.2 mil workers.
During the event: Transportation 900,000 pax/day

**ETC OBU will support the optimal transport environment in the metropolitan area** such as:

- Optimization of traffic flow utilizing the road networks with traffic information and so on.
- Parking guidance using Vehicle-to-Infrastructure- and Vehicle-to-Vehicle communications
- Efficient operation of public transport
- Implementation of park-and-ride

The above services are expected to be implemented in operation in a few years.