New Advances in Electronic Toll Collection Systems

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1. State of ETC in Japan
   1) State of ETC
   2) Effects of spread of ETC
   3) Introduction and effectiveness of Smart Interchanges
   4) Start of motorcycle ETC service

2. Efforts to promote the increased use of ETC
   1) Multi-purpose use
   2) Field trials of ETC at public parking areas
   3) Examples of expected multi-purpose uses of ETC
1. State of ETC in Japan

1) State of ETC

- ETC is an advanced automatic toll collection system that enables nonstop tollgate transitions.
- In Japan, ETC service started in March 2001, installing 19 million automobiles by August 2007.
- Used by about 5.5 million automobiles/day, the utilization rate has soared to reach about 66%.
- The target utilization rate is 80% by next spring.

State of ETC use (early report) August 30, 2007

(Vehicle used: 10,000 units/day)

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<tbody>
<tr>
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<td>0.9%</td>
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<td>8.1%</td>
<td>8.4%</td>
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After nationwide introduction in December 2001
Approx. 50,000/day
Utilization rate 0.9%

Source: Mitsubishi Electric
1. State of ETC in Japan

2) Effects of spread of ETC

• About 30% of congestion on expressways is caused by a shortage of toll gate capacity.
• ETC displays its congestion elimination effectiveness by enabling automobiles to pass through without stopping, increasing the processing capacity of toll gates.
• Congestion at tollgates on the Metropolitan Expressway has been eliminated through an increased ETC utilization rate.

<table>
<thead>
<tr>
<th>Status of congestion (Metropolitan Expressway)</th>
<th>ETC utilization rate (%)</th>
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<tbody>
<tr>
<td>Mar. 2003</td>
<td>6.1</td>
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<tr>
<td>Mar. 2004</td>
<td>21.2</td>
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<tr>
<td>Mar. 2005</td>
<td>38.9</td>
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<td>Mar. 2006</td>
<td>5.3</td>
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<td>Mar. 2007</td>
<td>73.0</td>
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</table>

ETC utilization rate and reduction of CO2 emissions:
- Before introduction of ETC: 140,000t CO2/year reduction
- ETC utilization rate 60%
1. State of ETC in Japan

3) Introduction and effectiveness of Smart Interchanges

- Reducing personnel costs of toll collectors resolves the problem of the high operating cost of toll gates at the same time as installation costs are cut by the simplified IC structure.
- Smart IC that were tested by field trials beginning in 2004 gradually came into full use beginning in October 2006, and are in operation at 31 locations nationwide on April 1, 2007.

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Change Number of users of Komayose PA (Gunma Prefecture) Smart IC

- Maximum daily traffic volume (vehicles/day)
- Average daily traffic volume (vehicles/day)

Road side radio equipment (DSRC Antenna)
The introduction of Smart IC cut transportation time to an advanced medical treatment institution and contributes to the economic revitalization of the surrounding region.

Reduction of transportation time to an advanced medical treatment institution

Transportation in medical emergencies (using Smart IC)
642 times (end of Sept. 2006)
Ave. 1.0 times/day

Before opening of Smart IC: 16 min.
After opening of Smart IC: 13 min.
3 min. reduction

Contribution to stimulation of surrounding region

Location decisions
13 factories etc.
1 large commercial facility
1 hotel

Callers life saving curve

30 sec. 1 min. 3 min. 1 hour
Heart stopped, Respiration stops, Heavy bleeding

Before opening of Smart IC: 16 min.
After opening of Smart IC: 13 min.
3 min. reduction

Contribution to emergency life-saving
Beginning on November 1, 2006, full-scale operation of this service started on expressways nationwide, installing the system on about 50,000 motorcycles (the end of August 2007).

The results of the trial involving 200,000 motorcycles have confirmed the safety of the service and good operation of the communication equipment. It was also confirmed that the ETC service has a lot of benefits to use and that 96% of the users want to continue using it.

4) Start of motorcycle ETC service

- Shortening the bar (gap approx. 1.5m)

<table>
<thead>
<tr>
<th>Percentage</th>
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<th>10%</th>
<th>20%</th>
<th>30%</th>
<th>40%</th>
<th>50%</th>
<th>60%</th>
<th>70%</th>
<th>80%</th>
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</table>

No need to take out wallet
Can pass through without stopping
Do not have to receive a ticket
Can obtain an ETC discount
Short payment waiting time
Do not have to worry about carrying enough cash
Others

Desire to use motorcycle ETC after completion of public trial
Q. Do you still want to use ETC on your motorcycle after the trial?

- I definitely want to use it 96%
- I probably want to use it 3%
- Can’t say 1%
- I probably don’t want to use it (0%)
- I definitely do not want to use it (0%)

Source: Highway Industry Development Organization
2. Efforts to promote the increased use of ETC

1) Multi-purpose use (overall service image)

- Since April 2006, private companies etc. can use ETC on-board systems that had formerly only been useable on public toll roads.

**ETC Services**
- Toll payments on public toll roads
- Registration
- Service provider

**New ETC based Services**
- Expansion of methods of using ETC from toll roads to premises.

- Vehicle number system (advance registration system)

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**Contents of major services**

- **Transmission of information to ETC linked cell phones**
- **ETC linked electronic toll payment service**
- **Advancing customer control by obtaining customer information**

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**Examples of service development**

- Providing information about neighborhood stores
- Providing discount information
- Cashless payment at parking areas
- Simplification of ferry boarding procedures
- Other specific customer services
2. Efforts to promote the increased use of ETC

1) Multi-purpose use (service development image)

• Services using ETC at parking areas, gas stations, and at ferries are being developed.

- Applying ETC to control taxis waiting for customers in front of a station
- Improvement in the efficiency of a system that reduces congestion by waiting taxis

- Quick clarification of customers’ visits
- Specialized handling of best customers.

- Sharply shortening ferry boarding time
- Eliminates need to prepare coins
- Transmits information about neighborhood stores.

- Eliminates need to pull to the side and prepare coins to pay fees.
- Transmits information about neighborhood stores.
2. Efforts to promote the increased use of ETC

2) Field trials of ETC at public parking areas

- Public trials of fee payment service using ETC on-board equipment have been carried out since 2005 at public parking areas in four locations (Tokyo, Osaka, Nagoya, and Sapporo).
- Almost all users state that the ticketless payment service is convenient.

No. 4 Parking Area in Nishi-shinjuku in Tokyo

Sakura-bashi Parking Area in Osaka

Handicapped parking space guidance system

Evaluations of ticketless payment service

<table>
<thead>
<tr>
<th>City</th>
<th>Extremely convenient</th>
<th>Somewhat convenient</th>
<th>Not very convenient</th>
<th>Inconvenient</th>
<th>No response</th>
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<tbody>
<tr>
<td>Nagoya</td>
<td>71</td>
<td>27</td>
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<td>Osaka</td>
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<td>Sapporo</td>
<td>61</td>
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<td>2</td>
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<tr>
<td>Tokyo</td>
<td>59</td>
<td>38</td>
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<td>2</td>
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</tbody>
</table>

Source: Japan Parking Facility Provision Organization

Legend:
- Extremely convenient
- Somewhat convenient
- Not very convenient
- Inconvenient
- No response
2. Efforts to promote the increased use of ETC

2) Field trials of ETC at public parking areas

- Reduction in the burden on elderly drivers.
- Strong expectations of more convenient use of parking areas.

Points considered to be a burden when using parking areas

- Pulling vehicle over to ticket issuing machine and calculating machine
- Leaning out of the car to operate the machines
- Receiving tickets and pushing buttons
- Preparation of parking ticket and coins when settling the payment
- Ticket issuing and calculation time
- Waiting to exit parking area

Reasons for wanting ETC use to spread to parking areas

- It would be convenient if vehicles could enter/exit the area more quickly
- It would be convenient if drivers did not have to pull their cars over to the ticket issuing and calculation machines.
- Cashless payment would be convenient
- It would be convenient if it could be used at more parking areas in addition to expressways
- In the future, when I am elderly, it will be easier to enter/exit parking areas
- Others
- No response

(Nagoya n=88, Osaka n=136, Tokyo n=127)
2. Efforts to promote the increased use of ETC

3) Examples of expected multi-purpose uses of ETC (parking areas, gas stations)

- Development of parking area payment services and gas station payment services etc. by private sector service providers

**Department store etc. parking area payment service**
- Controlling entrance/exit of vehicles in parking areas at departments stores or shopping centers
- Automatic parking fee discount services

**Gas station payment service**
- Payment for refueling or car washing, etc.
- Provision of stamp rally, campaign information etc.
3) Examples of expected multi-purpose uses of ETC (Private toll road)

- A service will be introduced to collect tolls on this private toll roads and at the same time to transmit information about discount rates at nearby hotels etc. and discount admission fees to tourist facilities to user’s pre-registered cell phones.

Privately operated toll road payment service and information distribution service

Discount information for users of a privately operated toll road service
- Gasoline discount 3yen/l
- Lodging cost discount 1,000yen
- Same-day return hot spring discount 100yen
- Museum admission discount 50~200yen

Discount information and coupons are transmitted to cell-phone mail address registered when the user first used the service
2. Efforts to promote the increased use of ETC

3) Examples of expected multi-purpose uses of ETC (car ferry)

- ETC ferry boarding procedures has been carried out on a car ferry.
- Using pre-registered ETC information sharply simplifies procedures.

**Sharply shortening procedure time**

**Conventional boarding procedures**
- Stopping temporarily at boarding gate
- Parking in the waiting lane as instructed by attendant
- Leaving the car to perform boarding procedures at the counter (vehicle information verification etc.)
- Paying fee at the counter
- Receiving boarding ticket at counter
- Returning to car and boarding ferry

**Ferry boarding procedure with ETC**
- Advanced registration (1 time only)
- Temporarily stopping at entrance gate
- Immediately receiving boarding ticket

**Simplified procedures**

- **15 to 20 min. (at busy times)**
- **About 10 seconds**
• The Technical Tour (TT-5) will be held from October 15 to 17, 2007
Thank You!