Digital Infrastructure for Smart Mobility City

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Far Eastern Electronic Toll Collection Co., Ltd.
Table of Contents

- Mobile IoT and Smart City
- Taiwan ETC Overview
- Digital Transformation Opportunities
- Road to the Future
Smart City

- Digitalization
- Personalization
- Mobility

- medicine
- housing
- traffic
- education
- clothing
- eating
- entertainment

Smart City
Mobile IoT and Smart City

- **Infrastructure**
- **Penetration**
- **Integration**

- **Individual**
  - Smart Phone
- **Family**
  - Cable TV
- **Office**
  - Internet
- **Vehicle**
  - eTag

**Online Shopping/Games/Video/Information**

**Mobile Shopping/Video/Information**

**Television shopping/TV Program**

**Online Shopping/Games/Video/Information**

**Toll/Parking/Traffic Management**
Digital Transformation in ITS

Identity Validation

Transaction Validation  Location Validation
Taiwan ITS provides the “seamless, sharing, safe, smooth and sustainable” intelligent transportation services.

**Taiwan ITS 5S Strategies**

- **Transportation Options**
  - Private/Rental Car
  - Motorcycle Scooter
  - Public Transportation

- **Departure**
  - Smart Scooter/Gogoro
  - Vehicle Sharing

- **On the Go**
  - Real-time dynamic path planning & navigation services
  - Charger Station
  - Multi-card e-ticketing
  - Real-time traffic and transportation info.

- **Arrival**
  - Electronic Toll Collection (ETC)
  - Integrated real-time parking info. service
  - Intelligence bus safety service
  - Smart Railway Service System

※sources from IDB, compiled by MIC
Digital Transformation in ITS
Identity Validation (e-ID)
Digital Transformation in ITS
Transaction & Location Validation
Evolution of Taiwan ETC 1.0 – 4.0

» Manual toll

» Phase I: Y2006
   SLFF ETC

» Phase II: Y2014

Manual → Phase I
- Manual toll & ETC toll
- Extend ETC Lane by usage

Phase I → Phase II
- Construct 319 new gantries
- Full ETC without manual toll
IR DSRC OBU system started in Feb 2006
- IR OBU was paid by vehicle owner ($40 USD)
- Only accumulated 1.2M of vehicles until 2012

Passive RFID system introduced in May 2012
- eTag (RFID) for free
- IR OBU and eTag co-exist operation
- Reach 5M of vehicles by only spending 16 months
- 100% eTag and full distance-based MLFF started from Jan, 2014

ETC Card + IR OBU

Virtual Account = License Plate + ID of Car Owner
Each eTag links to a Virtual Account
# Evolution of Taiwan ETC 1.0 – 4.0

<table>
<thead>
<tr>
<th>ETC Customer</th>
<th>6.6M</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ETC Daily Transactions</strong></td>
<td>Daily Average: 16 M Historical Daily High: 22.7 M</td>
</tr>
<tr>
<td>eTag Usage Rate</td>
<td>94%</td>
</tr>
<tr>
<td>ETC Usage Rate</td>
<td>100%</td>
</tr>
<tr>
<td>Successful Tolling Rate</td>
<td>99.97%</td>
</tr>
</tbody>
</table>
## Evolution of Taiwan ETC 1.0 – 4.0

### ETC 1.0 (Speed 0km)

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Toll Detection</th>
<th>Country/Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>yes</td>
<td>stop and go to pay tolls</td>
<td>Malaysia ETC, Taipei MRT (easycard)</td>
</tr>
</tbody>
</table>
## Evolution of Taiwan ETC 1.0 – 4.0

### ETC 2.0 (Speed 20km)

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Toll Detection</th>
<th>Country/Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>yes</td>
<td>slow down to pay tolls</td>
<td>Malaysia, Japan, Korea, Hong Kong, China/ETC</td>
</tr>
</tbody>
</table>
## Evolution of Taiwan ETC 1.0 – 4.0

### ETC 3.0 (Speed 70km)

<table>
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<tr>
<th>Barrier</th>
<th>Toll Detection</th>
<th>Country/Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>no</td>
<td>single lane free flow</td>
<td>Taiwan per-entry-based ETC</td>
</tr>
</tbody>
</table>
## Evolution of Taiwan ETC 1.0 – 4.0

### ETC 4.0 (Speed ≥110km)

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Toll Detection</th>
<th>Country/Application</th>
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<tbody>
<tr>
<td>no</td>
<td>multi-lane free flow</td>
<td>Taiwan distance-based ETC</td>
</tr>
</tbody>
</table>
Technology Innovation of Taiwan ETC

MLFF single-gantry solution
Technology Innovation of Taiwan ETC

- MLFF single-gantry solution

- Industry collaboration

...... hundreds more vendors
Technology Innovation of Taiwan ETC

- MLFF single-gantry solution
- Industry Collaboration
- Open Standard Technology (ISO 18000-6C)
Technology Innovation of Taiwan ETC

- MLFF single-gantry solution
- Industry Collaboration
- Open Standard Technology (ISO 18000-6C)
- Flexible Charging Services
### Flexible charging services

<table>
<thead>
<tr>
<th>Structure</th>
<th>Variable 1</th>
<th>Variable 2</th>
<th>Variable 3</th>
<th>Variable 4</th>
<th>Variable 5</th>
<th>Variable 6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Category</td>
<td>Time</td>
<td>Section</td>
<td>Segment</td>
<td>Daily Charge</td>
<td>Account Balance</td>
</tr>
<tr>
<td></td>
<td>Vehicle type</td>
<td>Peak</td>
<td>Traffic direction</td>
<td>Daily discount mileage (&lt;20km)</td>
<td></td>
<td>sufficient</td>
</tr>
<tr>
<td>Applicant identity</td>
<td>Off-peak</td>
<td></td>
<td>Gantries</td>
<td>Standard rate (20-200km)</td>
<td></td>
<td>insufficient</td>
</tr>
<tr>
<td></td>
<td>No charge</td>
<td></td>
<td></td>
<td>Long distance driving discount (&gt;200km)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Rules of Charging

- **Vehicle type**
  - compact car
  - truck
  - trailer
  - Motorcycle (more than 500c.c)

- **Applicant identity**
  - eTag deposit account
  - Non-eTag deposit account
  - Non-eTag user
Service Model Innovation (PPP)

Service Channel

(account activation, top up, payment, inquiry)

(activation, top up, payment, inquiry)

Quality Monitor & Enforcement

Government (TANFB)

Bank Account

ETC Operator

3rd Party Auditor

Account & Tag Mgmt.

Cash$

Commission%

Deduction

Service Fee%

Toll Statements

IV&V
Social Benefit (2013/12/30 till to date)

Paper Tickets Reduced

10.6 billion cm$^3$ of paper tickets are equivalent to 3,477 Taipei 101s (508m)

※data sources from Institute of Transportation, MOTC and FETC
720 thousand metric tons of CO₂ are equivalent to the CO₂ captured by trees of 151 New York’s Central Park.

※data sources from Institute of Transportation, MOTC and FETC
Social Benefit (2013/12/30 till to date)

Fuel Saving

310 million liters of fuel are equivalent to 124 Olympic swimming pools

※data sources from Institute of Transportation, MOTC and FETC
Digital Transformation to Smart Nation

MaaS Infrastructure based on ETC

Business Sphere I. Smart City Service (SaaS)

Public Information Service

Personalized Mobility Service

Mobile Payment Service

Business Sphere II. Application Platform (PaaS)

API Gateway

Open Data Platform of Transportation

Google Map

eTag Data Service Platform

Business Sphere III. Sensor Network (IaaS)
Digital Transformation - Public Information Service

Smart Traffic
Digital Transformation to Smart Nation

MaaS Infrastructure based on ETC

Public Information Service

Personalized Mobility Service

Mobile Payment Service

Business Sphere I. Smart City Service (SaaS)

Business Sphere II. Application Platform (PaaS)

Business Sphere III. Sensor Network (IaaS)

API Gateway

Open Data Platform of Transportation

Google Map

eTag Data Service Platform

Data: Taipei
Digital Transformation – Personalized Mobile Service

Smart Safety
Dear Sir/Madame,

No. 5 typhoon is coming. The flood gate will be closed at 04:00 pm, please move your car out of the area before 03:00 pm.

Thank you for your cooperation!
Dear Mr. Wang,
your vehicle had been towed to Neihu tow pound because of parking violation. Please retrieve your vehicle. Thank you!
Digital Transformation to Smart Nation

MaaS Infrastructure based on ETC

Business Sphere I. Smart City Service (SaaS)

Business Sphere II. Application Platform (PaaS)

Business Sphere III. Sensor Network (IaaS)

Public Information Service

Personalized Mobility Service

Mobile Payment Service

API Gateway

Open Data Platform of Transportation

Google Map

eTag Data Service Platform

Data: Taipei

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Page 32
Dear Customer,
Welcome to Neihu parking lot at 08:06, 05/10/2015. Your account balance is $395. The parking rate will be charged by $5/hr.
Dear Customer,
The parking fee accumulates to $10 for 2 hours until 10:06, 05/10/2015. Your account balance is $385. Thank you!
Digital Transformation – Mobile Payment Service

Smart Payment

Antenna → eTag detection

24hr 得來速

Smile

100% 中途收益

+ +

eTag Payment Platform
Digital Transformation – Mobile Payment Service
Smart Payment (ERP)

- Taiwan ETC, Winner of 2017 WITSA Private Sector Excellence Award
- Taiwan ETC, Winner of 2016 IRF Global Road Achievement Awards
- 2015 Toll Excellence Award Winners Customer Service & Marketing Outreach
- Taiwan ETC, Winner of 2015 ITS World Congress Hall of Fame-Industry Award
- Taiwan ETC, Winner of 2015 eASIA Awards in private sector
Implementation of eTag, 4G, Cloud Computing, Big Data, IoT to **Smart City**

Embedded eTag to a **new business model**

Engaged eTag and smart city toward **DIGI+ (Digital Nation & Innovation Economy)**

eTag based ETC is a **sustainable PPP model**
Thank you