Taiwan RFID-based ETC Total Solution

The largest multi-lane free flow and distance-based system in the world

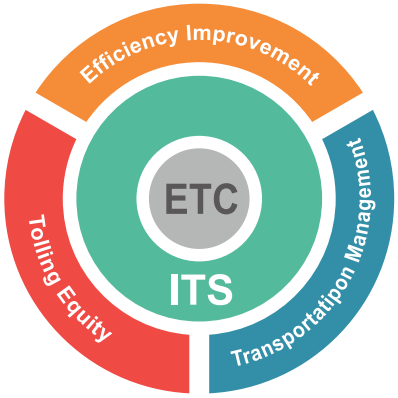
The Policy

For the purpose that freeway road users can pay tolls more effectively and equally neither stopping cars, nor using cash, Taiwan Area National Freeway Bureau (TANFB) programs a BOT/PPP project which is called "Private Sector Involvement in Development of Electronic Toll Collection System" with Far Eastern Electronic Toll Collection Co. (FETC). Considering the public acceptance issue, TANFB planned two stages to achieve these goals. First, ETC lanes were launched in every toll station since 2006, and then we migrated from that to a multi-lane free flow and distance-based ETC system.

TANFB

The Objectives

- Efficiency Improvement
- Tolling Equity
- Transportation Management



The Achievements

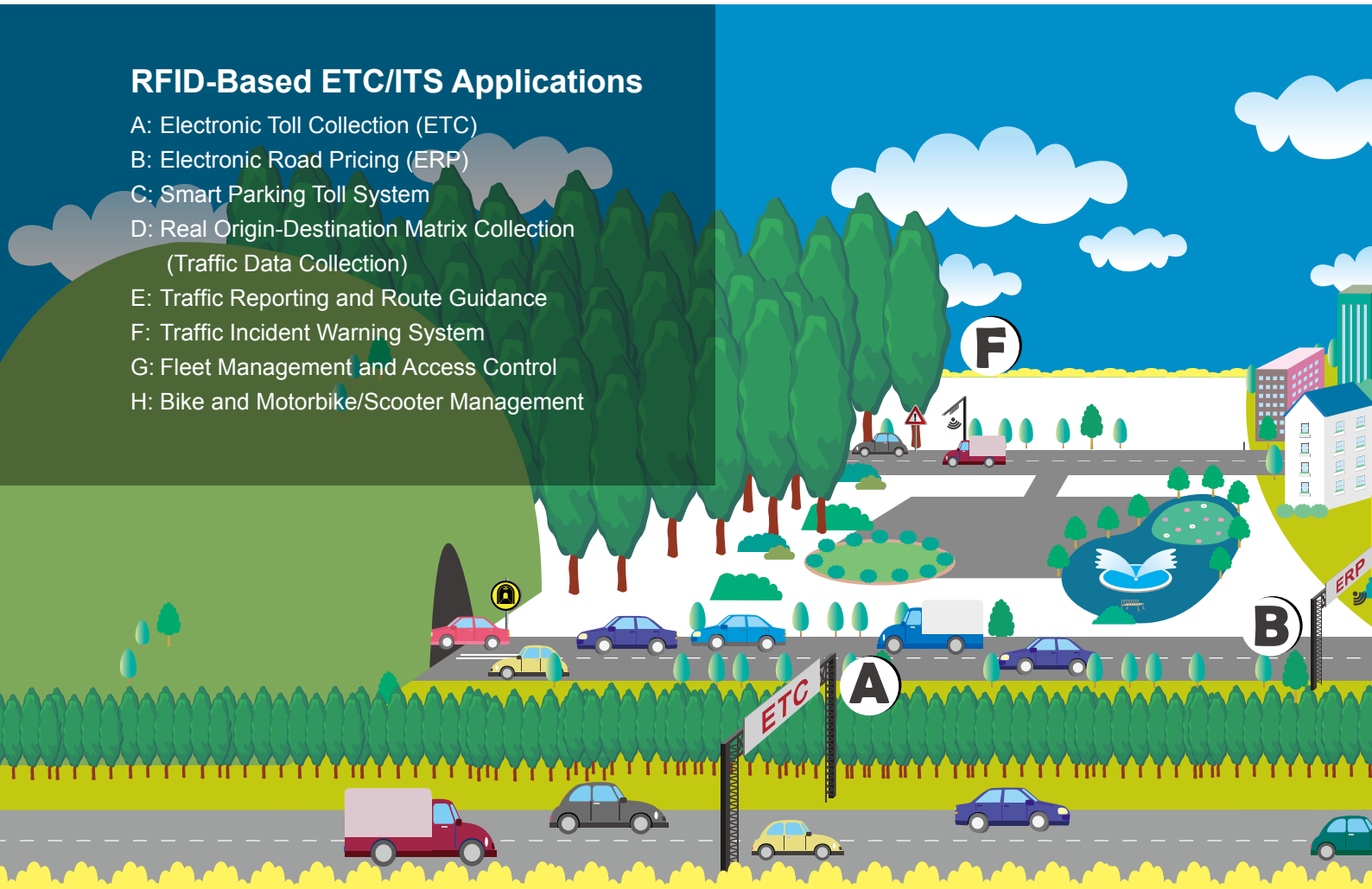
Manual toll	Pure ETC
Toll booth	Open road tolling
Pass-based charging	Distance-based pricing

Social Benefits

- Petrol Saving > 120 million liters
- CO_2 reduction > 290,000 tons
- Time Saving > 375,000 hrs/ Day

RFID-Based ETC/ITS Applications

A: Electronic Toll Collection (ETC)
B: Electronic Road Pricing (ERP)
C: Smart Parking Toll System
D: Real Origin-Destination Matrix Collection (Traffic Data Collection)
E: Traffic Reporting and Route Guidance
F: Traffic Incident Warning System
G: Fleet Management and Access Control
H: Bike and Motorbike/Scooter Management

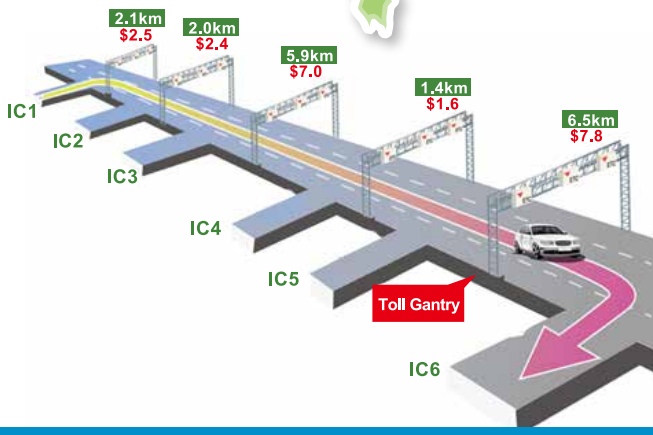


Total Solution

FETC is responsible for the Taiwan freeway ETC total solution, including front-end and back-end systems as well as business model, from planning, designing, building, testing, and operation.

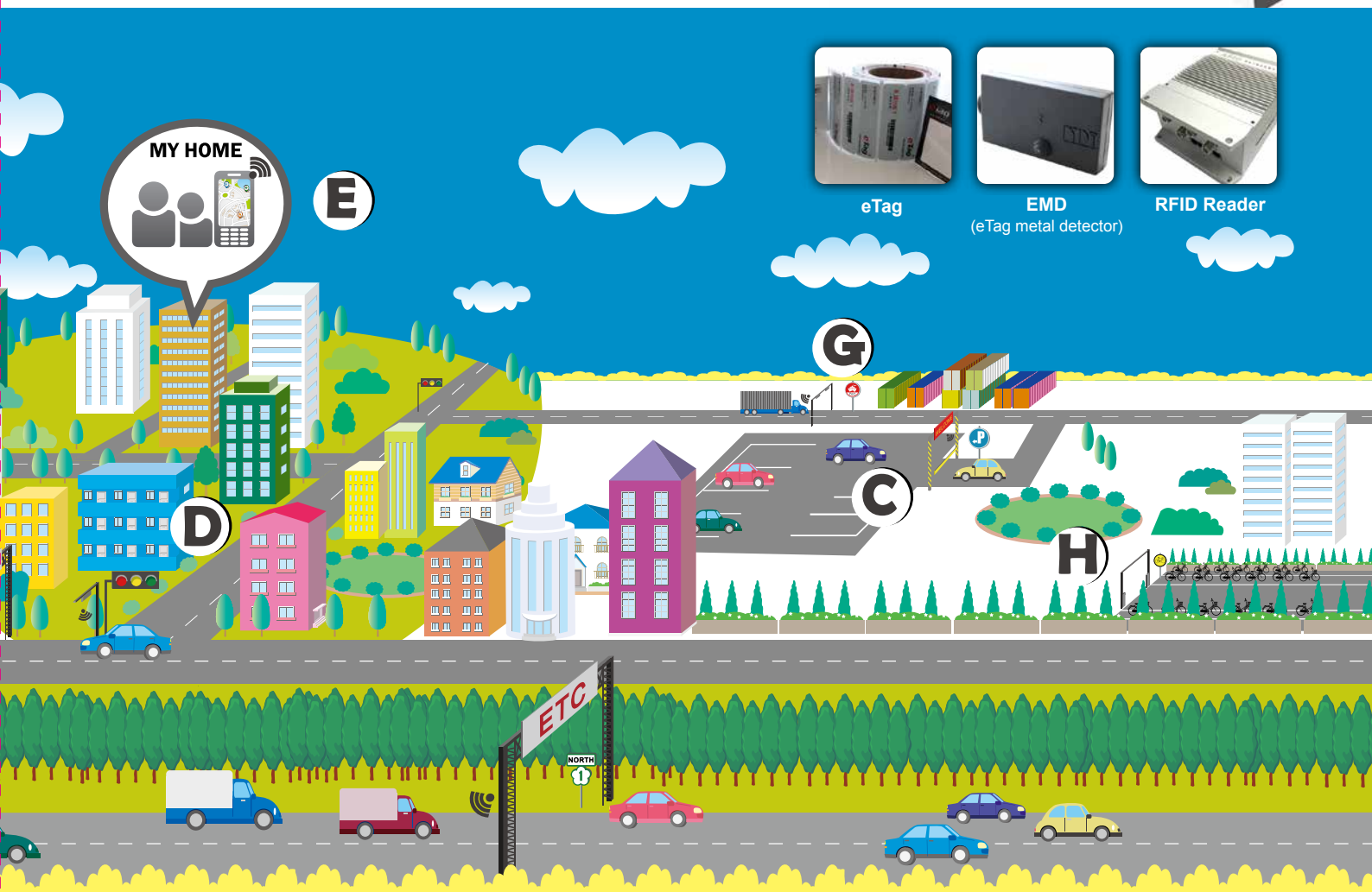
Electronic Road Pricing

This is a multi-lane free flow and distance-based ETC system which supports road pricing and various charging models are based on toll zones, transaction time, trip distances or a combination of the above.



Operation Status

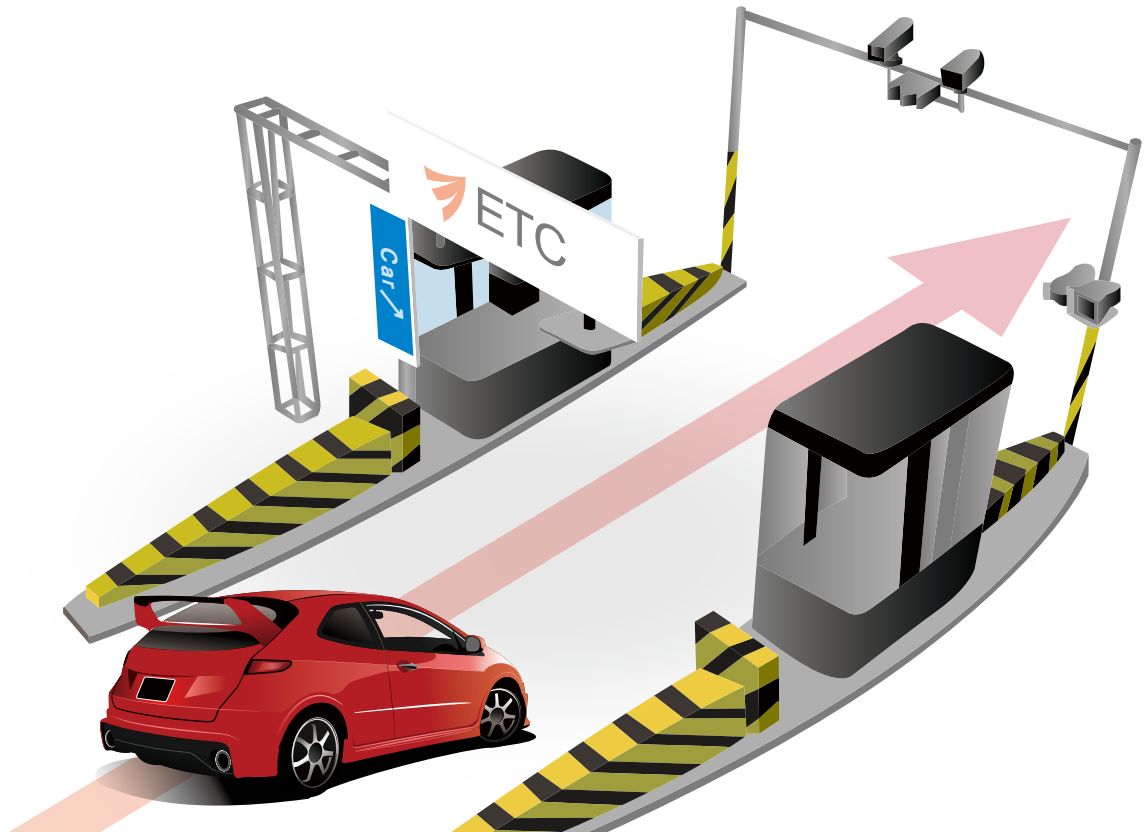
ETC Customers	6.10 million (~2015/Apr.) (Total registered vehicles: 7.10m)
ETC Daily Transactions	Daily average:14 million Daily high:21.9 million (2015/Feb./21)
ETC Operation Scope	Freeway No. 1, 3, 3A, 5 1,837 kilometers (one way) 321 toll sites (one way)
eTag Usage Rate	94.14%(~ 2015/Apr.)
Toll Collection Rate	Above 99.8%
System Availability Rate	Above 99.992%



Stage 1

SLFF Tolling since 2006

- 144 ETC lanes within 23 toll plaza stations
- The ETC lanes were launched with Infrared OBUs in 2006.
- In May 2012, it was migrated to RFID and eTags system by which the ETC usage rate was raised to about 94% in Jan. 2014.

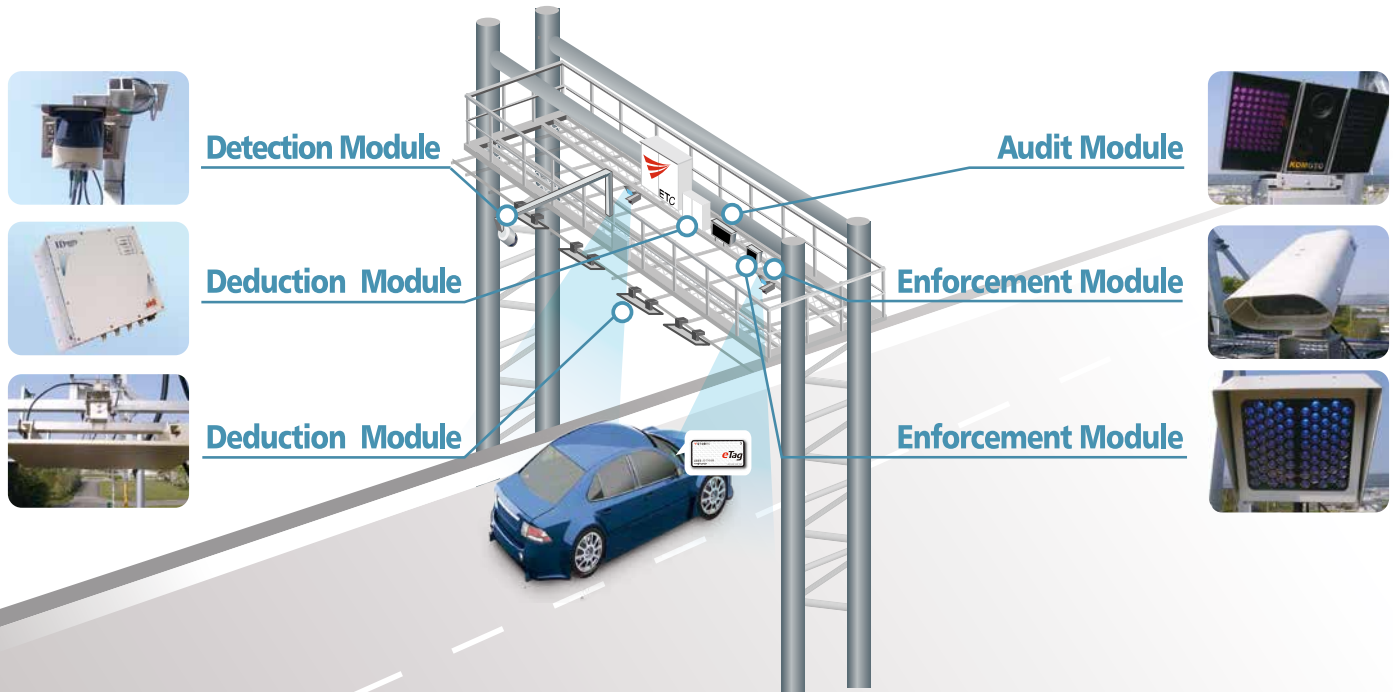


Stage 2

MLFF Tolling since 2014

- 321 gantries (1,307 ETC lanes) on mainlines.
- FETC combines all the devices you need on single gantry -- from open standard ISO 18000 6C and multi-protocol RFID systems, enforcement modules and ALPR systems, and audit modules.

1. Front-End System



2. Back-end System

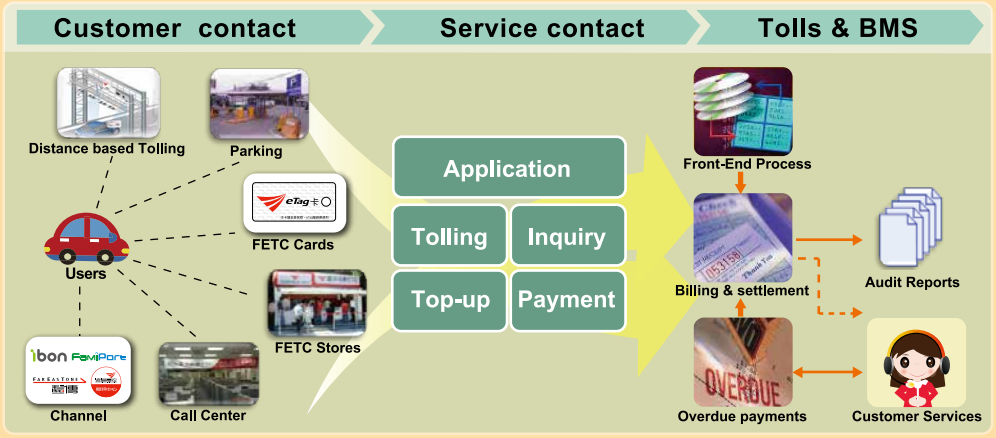
CRM	Store Portal	CSR Call Center	Portal	Customer Self System	Corporate Portal	Security AAA	Network
	Admin Portal			Dealer Portal	Service Mgt.Platform		
Mediation	Data Collection	Violation	BMS	Account Mgt.	Profile Mgt.		
	LPR	Monitoring		Product Mgt.	Rating & Billing		

3. Customer Service

Windshield eTag

- Each eTag links to a Virtual Account
- Tag's cost is much lower than OBU's

Headlamp eTag



4. Automatic License-Plate Recognition (ALPR) & Manual License-Plate Recognition (MLPR)

- Daily 14 million transactions, 99.2% identified by eTag & ALPR, only 0.8% identified by MLPR
- MLPR process the plates which are unclear, invalid, modified, improperly located, bending, glare, and so on.

Plate number ADX-09XX ?
Correct plate number **ABX- 09XX**

5. Implementation & Project Management

- Gantry Construction
- Electromechanical Engineering
- Transmission Network
- Road Side Unit (RSU) Installation
- Front-End to Back-End System Integration

6. Validation & Audit Result

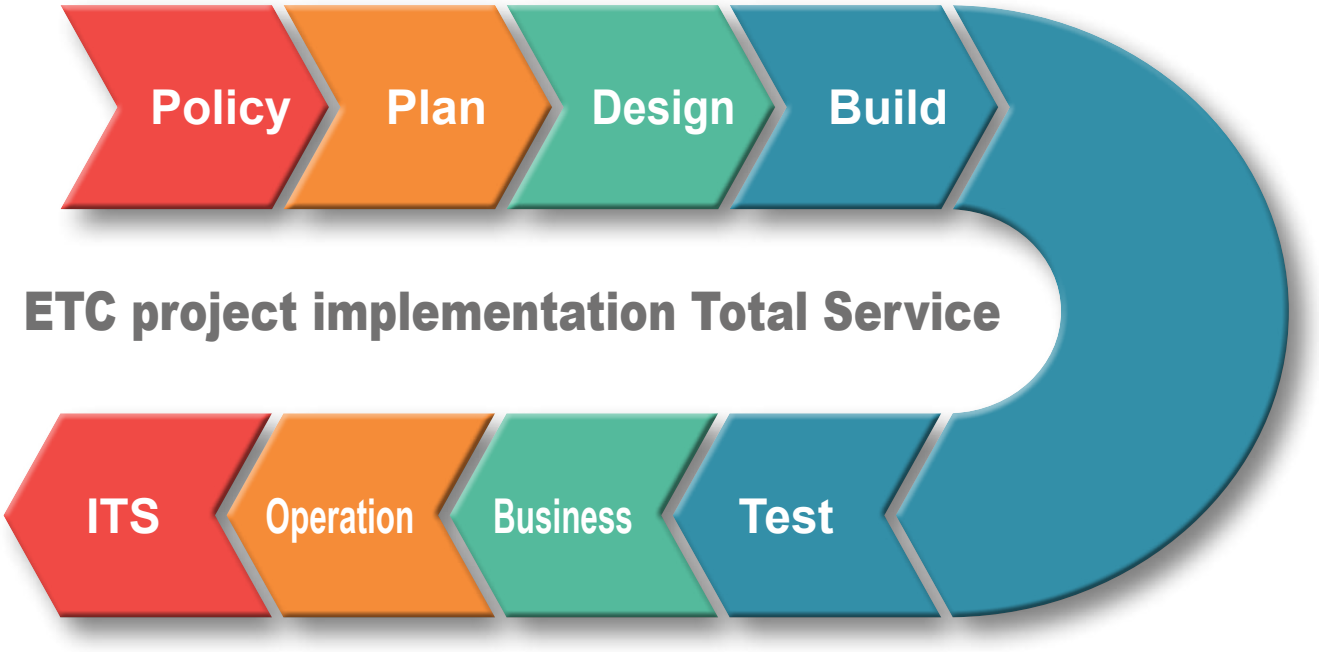
The system was certified by TÜV Rheinland.

- High Speed eTag Deduction Module Test > 160 km/h
- High Speed Enforcement Module Test > 180 km/h
- Bumper to Bumper ETC Test < 60 cm
- High Speed Motorbike ETC Test >150 km/h

Audit period (2014/02/01~2014/04/30)	Audit result
Total Audit Transactions	4,805,610
Tolling Accuracy	99.9999%
Vehicle Detection Accuracy Rate	99.9800%

7. System Operation & Maintenance

- System Availability Rate > 99.992%
- 365 days * 24 hours operation
- 7 maintenance offices for 321 toll sites



About Taiwan ETC Team

Far Eastern Electronic Tolling Company (FETC) is one of 200 affiliated companies from Far Eastern Group (FEG). FEG has always taken "trustworthiness" as the guiding principle of the business management and enshrined "Sincerity, Diligence, Thrift, Prudence, and Innovation" as its founding motto. FEG successfully develops and manages variable businesses in communication and internet and innovative technology segments.

FETC was founded in 2004 and awarded by Taiwan National Freeway Bureau (TANFB) to build and operate the Electronic Toll Collection (ETC) system for the nationwide freeways. In early 2006, FETC successfully launched pass-based ETC lanes among 23 toll plazas. Later on, after RFID-based ETC technology was introduced to the public in 2012, the penetration was high enough for TANB and FETC to introduce distance-based and multi-lane free flow (MLFF) scheme with 319 gantries to the road users on December 30th 2013. Currently, more than 7 million car users are benefited from the ETC with more than 6 billion transactions. The Taiwan ETC system does not only enable the intelligent transportation environment and better services to the road users but also bring Taiwan to the new era of intelligent of transportation industry.

The Taiwan ETC total solution was mainly developed and provided by FETC and the other two affiliated companies from FEG, YDT Technology International Co. (YDT) and Ding & Ding Management Consultants Co. (DDMC) from front-end RFID supplies and lane controller to back-end solution integrations. YDT is also in a leading position on developing derivative ITS applications on eTag platform including traffic data collection, smart parking, access control, and etc. Besides YDT and DDMC, FETC has also worked with over 30 Taiwan local companies, including engineering design consultants, construction companies, electromechanical equipment suppliers and information & communications technology companies in order to complete this tremendous ETC project. Currently, this team has already started to support planning and designing RFID-based ETC systems overseas.

If you are interested in or have any questions about ETC, ITS, traffic data collection, automatic license plate recognition (ALPR), smart parking & access control, and surveillance system, please contact FETC Rachel Chen (TEL: +886-2-77106810 RachelChen@fetc.net.tw) and YDT Lynette Wu (TEL: +886-2-7721-2168 Lynettewu@ydt.feg.com.tw; YDTtech@ydt.feg.com.tw).

Far Eastern Electronic Toll Collection Co., Ltd.
2F., No. 419, Ruiguang Rd., Neihu Dist., Taipei City 114, Taiwan
TEL:+886-2-7710-6810
FAX:+886-2-7710-6886
Email: RachelChen@fetc.net.tw
Website: http://www.fetc.net.tw/en/