The 28th STAG Board Meeting

Session II: Intelligent Infrastructure

Topic I：

Development Strategy for Intelligent Transportation Systems (ITS) in Taiwan

Ministry of Transportation and Communications

November 17, 2008

Contents

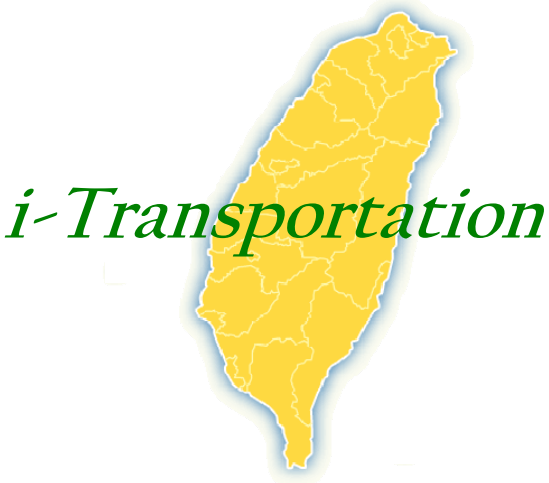
I. Introduction

- In the aspect of transportation hardware constructions in Taiwan at this moment, the main infrastructures and networks (e.g. Freeway and Taiwan High Speed Rail) are almost completed.
- Following focuses of policy implementation will be on multiple system functionality integration and intelligent management.
- Intelligent Transportation System (ITS) is an integrated establishment and service adopting information and communication technology to enhance the efficiency of transportation system operation management and the quality of service as well as to gradually decrease the investment on hardware construction and to assist energy efficiency and carbon reduction. All of which have become the major development trend in all countries worldwide.

II. Research & Analysis

1. Objectives of Development

- Based on the vision providing full-scale "Intelligent Transportation Service" in Year 2011, integral traffic network and inter-modal ITS project is to be implemented to offer smooth traffic network services and seamless public transportation services.



II. Research & Analysis

1. Objectives of Development

   a. Smooth Traffic Network Services

   - Enhance the intelligent transportation system of freeways/expressways and major provincial/county highways, and plan and manage intelligent transportation services.
   - Integrate intelligent roads with intelligent vehicles to achieve the objectives set for traffic information service and intelligent transportation management.
   - Have road-users fully grasp real time traffic information of all roads such as freeways/expressways, provincial/county highways, city roads as their basis of decision making or routes changing to avoid traffic congestion before they get on the roads or while they are on the roads. Meanwhile, it also benefits the development of domestic intelligent transportation system and vehicle-based information and communication technology.

II. Research & Analysis

1. Objectives of Development

b. Seamless Public Transportation Services

- Construct the transportation service network based on public transportation (Taiwan Railways, Taiwan High Speed Rail, Highway Buses, City Buses and High Speed Rail Shuttles).
- Coordinate the timetables of public bus and highway bus based on the regular timetables of rail transportation such as Taiwan High Speed Rail and Taiwan Railways, and apply real time communication methods to provide passengers accurate highway bus movement information for transfer/pick-up. In this way, intercity busses and local busses are able to provide timely service for "end-to-end" public transportation transfer/pick-up services nationwide.

II. Research & Analysis

1. Objectives of Development

- Scope of Real Time Traffic Information (till Year 2011)
  - Freeway/Expressway：include Freeways and 12 Expressways. Average vehicle detector installation density is one every 2 km on main lines, and one every 300-500m at the entrances/exits of interchanges, system interchanges and tunnels.
  - Provincial Highway：include all provincial highways. Average vehicle detector installation density is one vehicle detector or traffic camera one every 10 km.
  - County/City Road：22 counties/cities are equipped with intelligent traffic control functionality and 24 counties/cities are equipped with smart bus service.
- Information Update Frequency：increase from every 5 minutes to at least every 3 minutes.
- Information Accuracy Rate：The accuracy rate of vehicle detector is above 90%.

II. Research & Analysis

2. Domestic and oversea examination of status quo

a. Oversea

- ITS has been advocated and promoted for almost 30 years. Countries at Europe, America and Asia have developed and constructed different intelligent transportation systems and environments according to their characteristics and needs of national development.

9 ITS Service Fields

II. Research & Analysis

2. Domestic & oversea examination of status quo

a. Oversea

- USA: Traffic signals, freeway management, public transportation management, electronic toll collection (ETC), TravInfo (511),VII
- UK: London Congestion charge
- Japan: VICS, ETC, Smartway
- Singapore: ERP (Electric Road Pricing), PGS (Parking Guidance System)
- Korea: U City
- China: 10 cities, such as Beijing, Shanghai, Guangzhou and Chungking and so on, are listed as the model city of "10 1 5" ITS Construction.

II. Research & Analysis

2. Domestic and oversea examination of status quo

b. Domestic

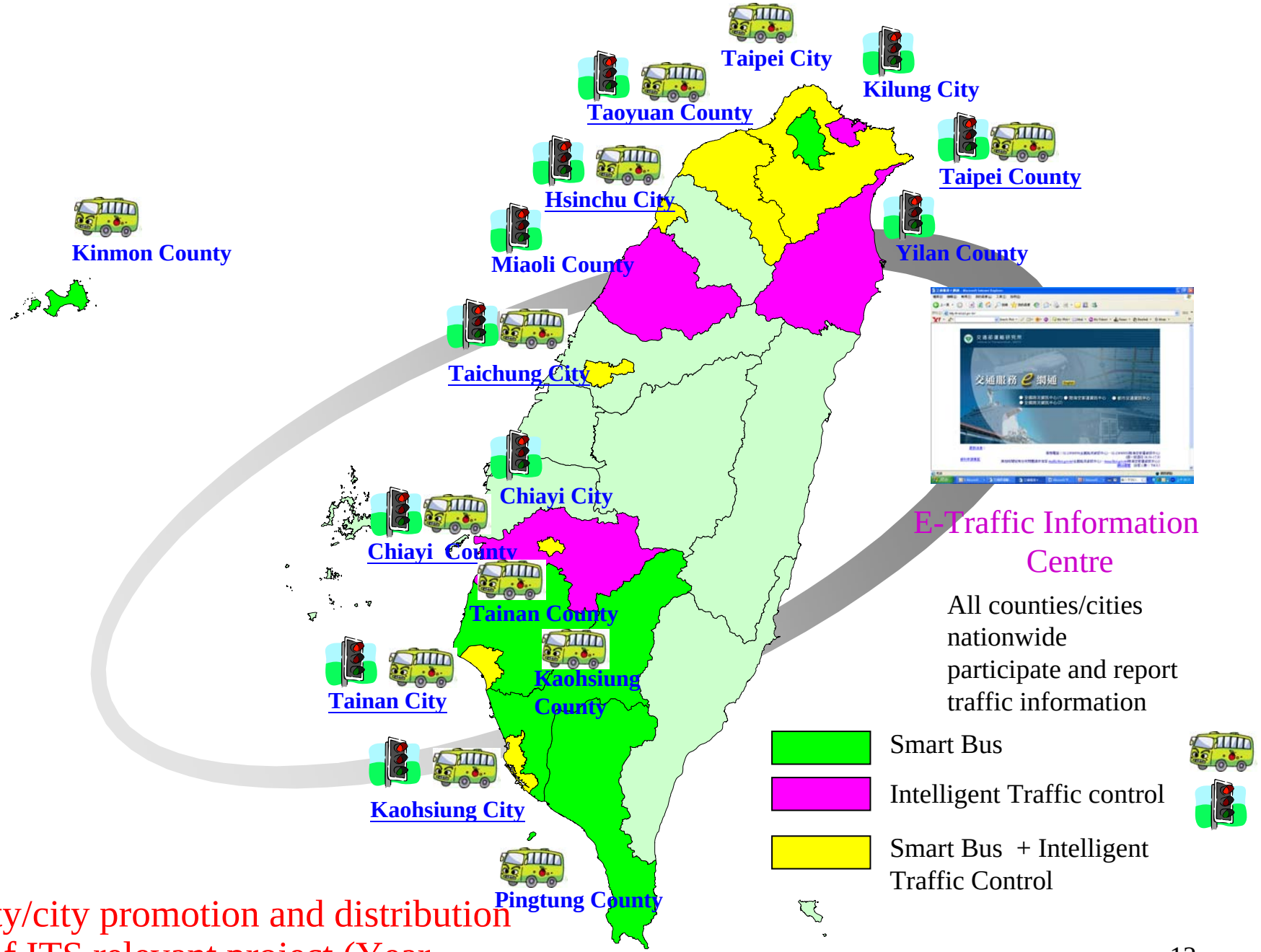
- Has promoted to the level that 12 counties and cities are equipped with intelligent traffic control functionality to increase travel speed, to ease traffic lagging and to improve energy efficiency and carbon reduction effectively.
- Has promoted to the level that 11 counties and cities are equipped with smart bus service to effectively decrease waiting time, to increase passenger's willingness to take buses, and to collect real time traffic situation by vehicle detection functionality.
- Integrate real time traffic information of national expressways, provincial highways and county/city roads and intercity ground, sea and air transportation information in order to advance the application of road-user information service (navigation, logistics, etc.)

II. Research & Analysis

2. Domestic and oversea examination of status quo

b. Domestic

- ETC was activated in February 2006. It has been implemented on National Expressway No. 1, No. 3 and No. 5. The usage rate of ETC is 28.48%. Average traffic volume is 412,000 vehicles per day (August 2008).
- Ever since the government started subsidizing county and city promotion of E-Card system in 2003, 16,710,000 cards have been issued by the end of September 2008 nationwide (about 14,000,000 Easy Cards; about 730,000 Taiwan Easy Go at Taoyuan, Hsinchu, Miaoli, Taichung, Changhwa and Nantou; about 250,000 Taiwan Money Cards at 7 Southern counties/cities; about 830,000 Kaohsiung MetroCards; about 900,000 ETC of FETC, etc).



County/city promotion and distribution map of ITS relevant project (Year 2003 till 2007)

II. Research & Analysis

2. Domestic and oversea examination of status quo

b. Domestic

- Follow-up development subjects
  - Results of promoting relevant project prove that it is able to achieve the objectives of enhancing efficiency of traffic network operation, improving satisfaction of public transportation service and integrating traffic information for inquiry service, and to actualize the visions of effective energy saving and pollution reduction, and solid implementation of intelligent transportation service. However, there are counties and cities yet implemented such project due to limitation of budget. There is great expectation to continue such promotion.
  - Domestic real time traffic information automatic data collection mostly adopts oversea products (such as vehicle detectors) at this moment. Those products are unable to completely fit local traffic characteristics. Prices and maintenance are also refrained by their importation from other countries, which affect the universality of real time traffic information .

III. Promotion Strategy

1. Blueprint and schedule of development

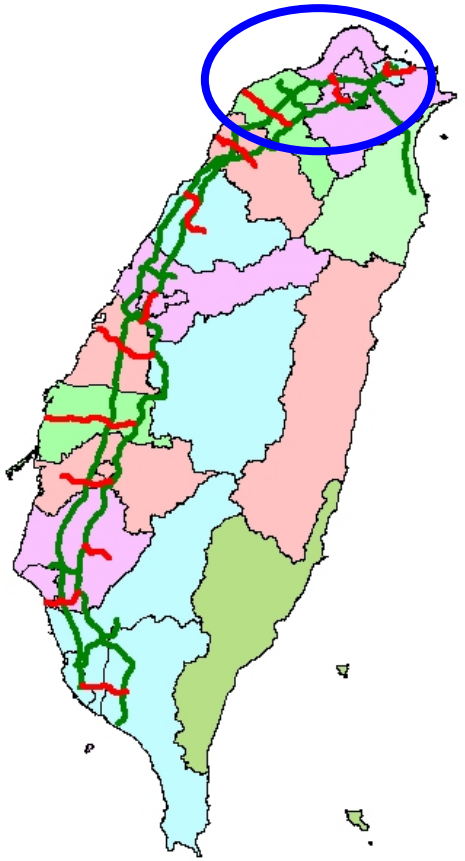
Performance Index	Expected Target Level			
	2008	2009	2010	2011
Accumulated number of counties and cities equipped with smart bus service	14	16	19	24[*1]
Accumulated number of counties and cities equipped with intelligent traffic control functionality	16	18	20	22[*2]
Efficiency improvement number of signal management at major intersection	500	500	500	500
Number of people served by internet traffic information inquiry annually	1,850,000	1,900,000	1,950,000	2,000,000
Number of newly increased equipments for establishing traffic volume detector at easily congested or easily causing car accidents locations, or normal provincial highways.	40	130	90	90
Scope of Intelligent Freeway/Expressway traffic management	National Expressway	National Expressway +7 Highways	National Expressway +12 Highways	National Expressway +12 Highways
Accumulated number of intelligent highway buses	—	1000	4000	7000

＊1：Not yet include Penghu County, Kinmon County and Lienchiang County because their local governments haven't proposed such establishment project.
＊2：Not yet include Lienchiang County because the local government has not proposed such establishment project.

III. Promotion Strategy

2. Development strategy and tangible action plan

- Development Strategy
  a. Apply mature and stable techniques on existing foundation to continue expanding ITS service scope to all counties and cities nationwide to provide full-scale intelligent transportation services.
  b. Simultaneously develop ITS services with freeways/expressways, provincial highways and county/city roads.
  c. Move forward to cross-regional and cross-systematic integration.



III. Promotion Strategy

2. Development strategy and tangible action plan

- Action plan (expected construction plan from 2008 till 2011)

a. Intelligent Taiwan – construction and promotion plan of traffic management and information service system (includes 5 sub-plans)

b. Construction of integral traffic network management system of freeway/expressway.

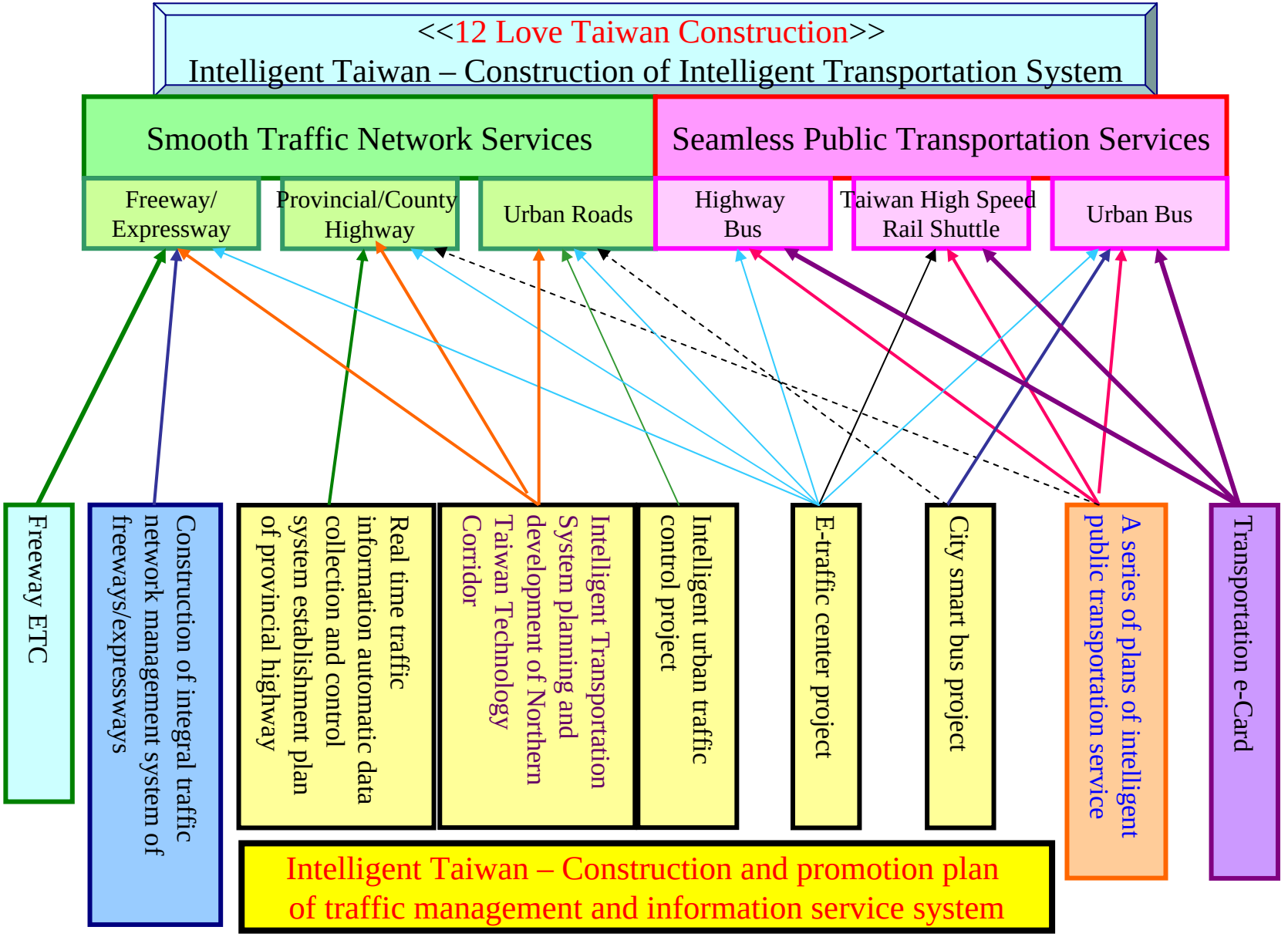
c. A series of plans of intelligent public transportation services.

d. Continuous promotion of ETC and Transportation E-Card.

Budget chart of ITS relevant projects from 2008 till 2011
Ministry of Transportation and Communication

Unit: NT$1000

Item \ Year	97	98	99	100	Sub-total	Budget Source
Intelligent Taiwan – construction and promotion plan of traffic management and information service system (Ministry of Transportation and Communication/Institute of Transportation, MOTC/Directorate General of Highways, MOTC/County and city governments)	293,750	493,000	488,000	489,000	1,763,750	Infrastructure (Communi-cation)
Construction of integral network traffic management system of freeway/expressway (Taiwan Area National Freeway Bureau, MOTC)	906,427	782,000	2,608,667		4,297,094	Infrastructure (Highway)
A series of plans of intelligent public transportation service (Directorate General of Highways, MOTC)		200,000	200,000	200,000	600,000	Budget of Public Affair
Total	1,200,177	1,475,000	3,296,667	689,000	6,660,844	17



Objectives and key points of Intelligent transportation related establishment plan

Construction plan of integral traffic network management system of freeways/expressways

- Objectives of Year 2010 Plan
  - Improve integral traffic control functionality of freeway.
  - Complete construction of traffic control system of 12 east-west expressways.
  - Provide network navigation and traveling time estimation for road-user's reference.
  - Install one vehicle detector every 2km at main lines and every 300-500m at entrances/exits of interchanges, system interchanges and tunnel.
- Objectives of year 2009 Plan
  - Provide real time traffic information and traveling time estimation of national highways and 7 east-west expressways (based on the connection of system interchanges and national highways) for road-users.

Construction plan of integral traffic network management system of freeways/expressways

Intelligent Taiwan – Construction and promotion plan of traffic management and information service system

Construction plan of real time traffic information automatic data collection and control system of provincial highways

- Objectives of Year 2011 Plan
  - Install traffic data collection and video surveillance system at bottleneck sections of major provincial highways.
  - Install one road vehicle detector or traffic camera every 10km. The distance between actual installation will be adjusted according to the needs.
  - Provide real time information of traffic congestion, traffic obstruction and route change for road-users.
- Objectives of Year 2009 Plan
  - Improve and add 5 provincial highway traffic control centers.
  - Provide real time traffic information for alternative routes of 6 National Highway congested sections and 170 easily congested or easily causing car accident sections province-wide.
  - Enhance sectional information at popular tourist spots.

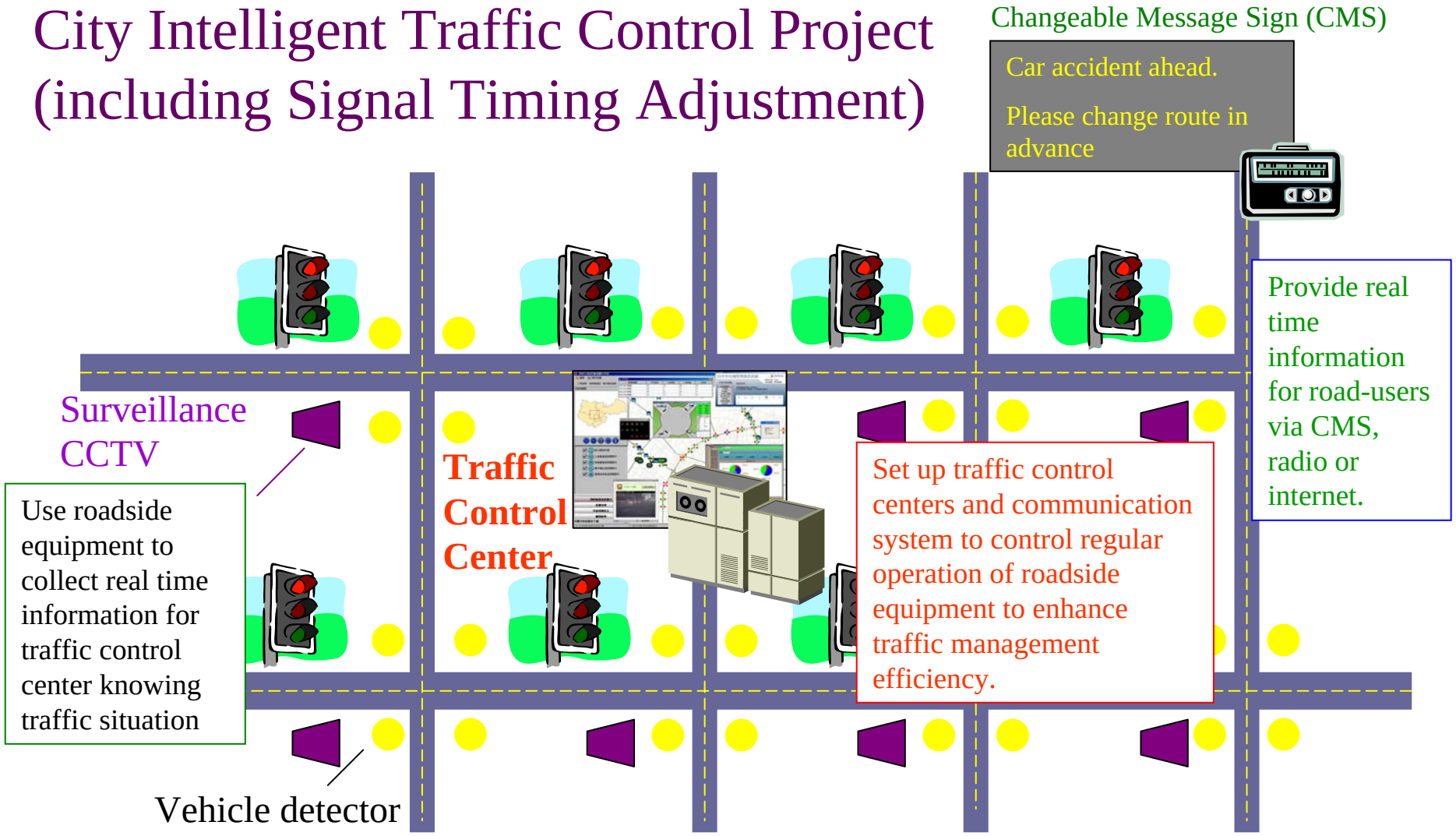
Construction plan of real time traffic information automatic data collection and control system of provincial highways

Roadside Detector

Traffic Camera

Intelligent Taiwan – Construction and promotion plan of traffic management and information service system

City Intelligent Traffic Control Project (including Signal Timing Adjustment)



Intelligent Traffic Control Functionality Diagram

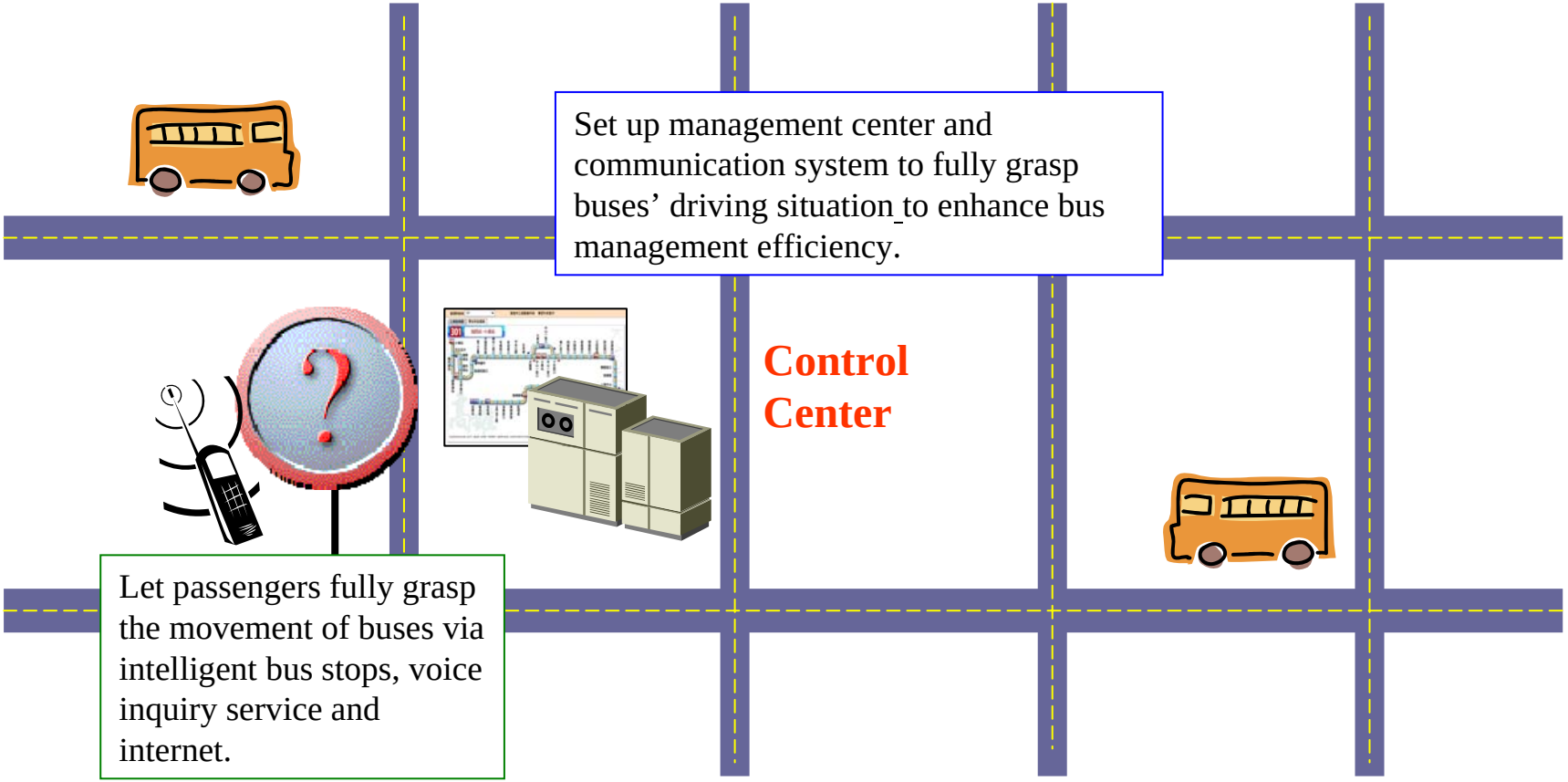
Intelligent Taiwan – Construction and promotion plan of traffic management and information service system

City Intelligent Traffic Control Project (including Signal Timing Adjustment)

- Objectives of year 2011 Plan
  - All counties and cities are equipped with intelligent traffic control functionality nationwide.
  - Accumulatively complete Signal Timing Adjustment at 2000 intersections.
  - Complete traffic control coordination among cities.
  - Complete traffic control coordination among freeways/expressways.
- Objectives of Year 2009
  - Accumulate 18 counties/cities to be equipped with traffic control centers and intelligent surveillance management functionality.
  - Accumulatively complete Signal Timing Adjustment at 1200 intersections.
  - Be able to decrease waiting and delaying time at intersections (15%), save traffic time (5%) and save consumed energy (3%).
  - Provide multiple integrated real time traffic information for road-users.

Intelligent Taiwan – Construction and promotion plan of traffic management and information service system

City Smart Bus Project



Smart Bus Service Diagram

Intelligent Taiwan – Construction and promotion plan of traffic management and information service system

City Smart Bus Project

- Objectives of Year 2011 Plan
  - All counties and cities are equipped with smart bus service nationwide.
  - Complete integrated information service of bus movement with neighboring county/city.
  - Complete integrated information service of highway buses.
- Objectives of Year 2009 Plan
  - Accumulate 16 counties/cities to be equipped with smart bus service.
  - Know bus' real time movement via mobile, internet and intelligent bus stops.
  - Shorten waiting time and increase the willingness to take buses.
  - For bus companies to effectively allocate buses, increase operating efficiency and decrease operating cost.

Intelligent Taiwan – Construction and promotion plan of traffic management and information service system

E-Traffic Center Project

- Annual number of people browsing are 2,000,000 at this moment.
- 130 additional usage units
- Average satisfaction of using internet is 90%.

E-Traffic Information Center

http://e-iot.iot.gov.tw

National Traffic Information Center

- Police Radio Station, 7 radio stations nationwide
- 23 country/city governments.
- Taiwan Area National Freeway Bureau, MOTC.
- Directorate General of Highways, MOTC.
- National Highway Police Bureau, 9 branches.
- Environmental Protection Administration, Waste Clearance Vehicles and other non-governmental logistics team.

Ground, sea and air transportation Information Center

- Taiwan Railways
- Taiwan High Speed Rail
- 29 National Expressway/Provincial Highway Bus Companies
- 4 Airline Companies
- 28 Marine Companies.

City Traffic Information Center

Bus Movement

- Taipei City
- Taipei County
- Taoyuan County
- Hsinchu City
- Taichung City
- Tainan City
- Kaohsiung City
- Kaohsiung County

Traffic Information

- Taipei City
- Taipei County
- Taoyuan County
- Miaoli County
- Taichung City
- Chiayi City
- Chiayi County
- Tainan City
- Kaohsiung City

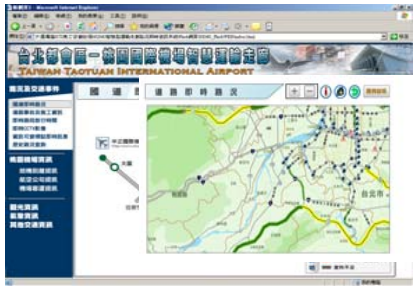
Intelligent Taiwan – Construction and promotion plan of traffic management and information service system

E-Traffic Information Center Project

- Objectives of Year 2011 Plan
  - Provide complete traffic network information website service (national traffic information center).
  - Provide seamless public transportation information website service (Ground, sea and air tranportation information center).
  - Universalize Vehicle Information & Communication Service and drive industrial development.
- Objectives of Year 2009 Plan
  - Continue to expand and integrate cross-road management organizations and communication information of ground, sea and air transportation companies.
  - Promote RDS traffic information broadcast service to provide more versatile and convenient on-the-road traffic information service for public.
  - Enhance integrated information service of inter-city buses and city buses.

Intelligent Taiwan – Construction and promotion plan of traffic management and information service system

Intelligent Transportation System planning and development of Northern Taiwan Technology Corridor



Intelligent Taiwan – Construction and promotion plan of traffic management and information service system

Intelligent Transportation System planning and development of Northern Taiwan Technology Corridor

- Objectives of Year 2011 Plan
  - Complete traveling time estimation model of the freeway section between Taipei and Hsinchu and regional roads by Year 2008, and set up road-user information system of provincial/county highways between Year 2009 and Year 2011.
  - Provide integrated application of multiple traffic situation and network guidance information for road-users, and apply it as ITS demonstration display window.
- Objectives of Year 2009 Plan
  - Proceed in advance with Taoyuan county alternative route of road-user information system according to the plan.
  - Provide road-users real time traffic and guidance informational inquiry via CMS, mobile phones, On-Board Unit and internet to avoid traffic congestion and make timely route changes.

A series of plans of intelligent public transportation service

- 3 Projects in total

1.Intelligent Highway Bus

- Set up highway supervision, fleet monitoring, public-friendly information system for information sharing of regional bus movement.
- Equipped with traffic detection functionality on provincial/county highway.

2.Intelligent Taiwan High Speed Rail Shuttle

- Set up Taiwan High Speed Rail shuttle movement information service to provide real time shuttle arrival information.

3.Elevation of smart bus service

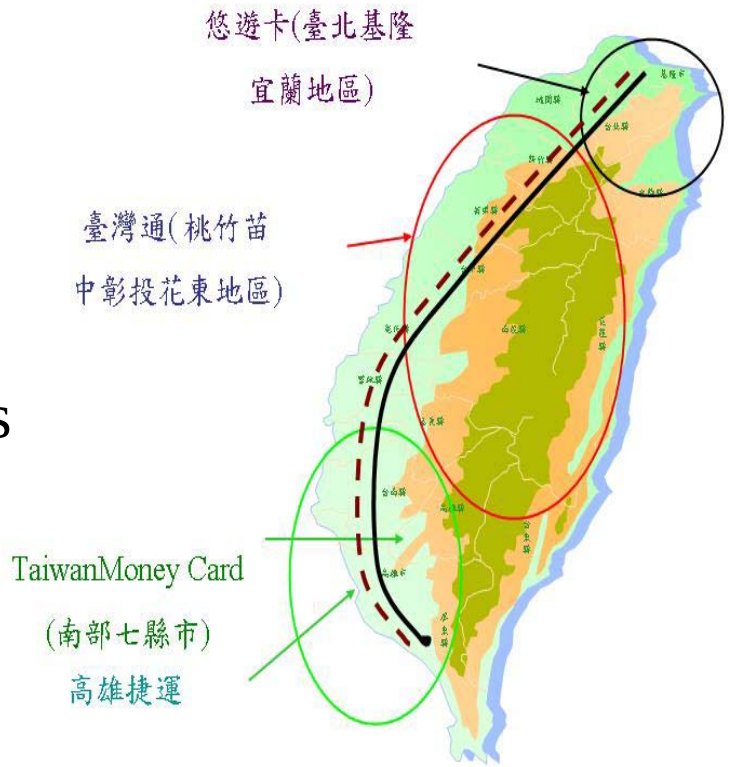
- Expand existing functionality and intelligent bus stops, assist to renew bus models for bus companies, and combine driving behavior of engine speed sensor management in order to decrease waste of gas and emission of carbon dioxide.

ETC

- Expect to change the toll method to ETC by distance by Dec. 22, 2012. The establishment and operation plan is proposed by FETC and to be approved by Taiwan Area National Freeway Bureau, MOTC.
- If the date of launching ETC by distance is advanced, the usage rate of ETC by frequency should be increased to 65% and more.

Transportation e-Card

- Policy objective of the Ministry of Transportation and Communication: I Pass
- Work focuses in the future
  - Expand the service of transportation e-Card in all areas of life under current foundation.
  - Guide and satisfy cross-system deals among different transportation e-Card systems.
  - Enroll long-distance public transportation service to join transportation e-Card application scope.



IV. Conclusion

1. Preliminary conclusion

a. The result of domestic ITS related projects promotion has proven to enhance the efficiency of traffic network operation and the satisfaction of public transportation service, and to integrate traffic information for convenient inquiry service. Meanwhile, it effectively saves energy and reduces carbon, and solidly fulfills vision of intelligent transportation service implementation.

b. The project has only been carried out at some counties/cities. Based on the existing foundation, it will continuously expand its scope to all counties/cities nationwide by adopting mature and solid technology to achieve full-scale intelligent traffic transportation service.

c. Should continuously gather and provide complete and accurate traffic information for additional application to benefit the development of Vehicle Information and Communication Industry in the future.

IV. Conclusion

d. The universal degree of real time traffic information automatic data collection system is the key factor of the completion level of relevant traffic information collection. They should collaborate with Ministry of Economic Affairs to speed up the counseling of domestic industry to commercialize relevant products and to accumulate relevant industrial energy for expansion of international market and output value.

e. Continuously maintain and announce stable and reliable traffic information service at reasonable cost, and unite with private companies to provide multiple traffic information service to create quality service and relevant industrial business opportunities.

IV. Conclusion

Suggestions of Following Promotion

Strategy Objectives	Action Programs	Authorities
Totally Automatic Data Collection of the Real-Time Traffic Information	■ **Speed up the research and development of domestic vehicle detectors** ■ **Speed up the promotion of traffic control center establishment, maintenance and operation at all counties/cities** ■ **Encourage private sectors to provide real time traffic information service** ■ **Promote sustainable providing of real time traffic information**	M.O.T.C. [M.O.E.A]
Promote Additional Application Services of Traffic Information	■ **Promote researches and applications of Telematics** ■ **Encourage private sectors to adopt other communication methods (such as WiMax) in order to provide real time traffic information service** ■ **Promote innovative application of real time traffic information**	M.O.E.A. [M.O.T.C.]

IV. Conclusion

2. Subject outline of Discussion:

   a. How to enhance the establishment of real time traffic information automatic data collection system and the development of domestic industry?

      Preliminary draft of guiding principles are as follows:

      i. To speed up the research and development of domestic vehicle detectors, and to establish and provide automatic real time traffic information in a widespread and full-scale manner.

      ii. To speed up the promotion of traffic control center establishment, maintenance and operation at all counties/cities.

      iii. To drive relevant industrial energy via domestic needs to open up international markets and market in mainland China.

IV. Conclusion

2. Subject outline of discussion:

   b. How to promote additional application service of traffic information?

      Preliminary draft of guiding principles are as follows?

      i. To encourage private sectors to provide real time traffic information and to develop a sustainable operation model based on the traffic information centers nationwide.

      ii. To encourage private sectors to adopt other communication methods (such as WiMax) in order to provide real time traffic information service and to enhance the establishment of real time traffic information automatic data collection system and the development of domestic industry.


End of Presentation
Please comment