

5.7 Recommendation on Basic Technologies

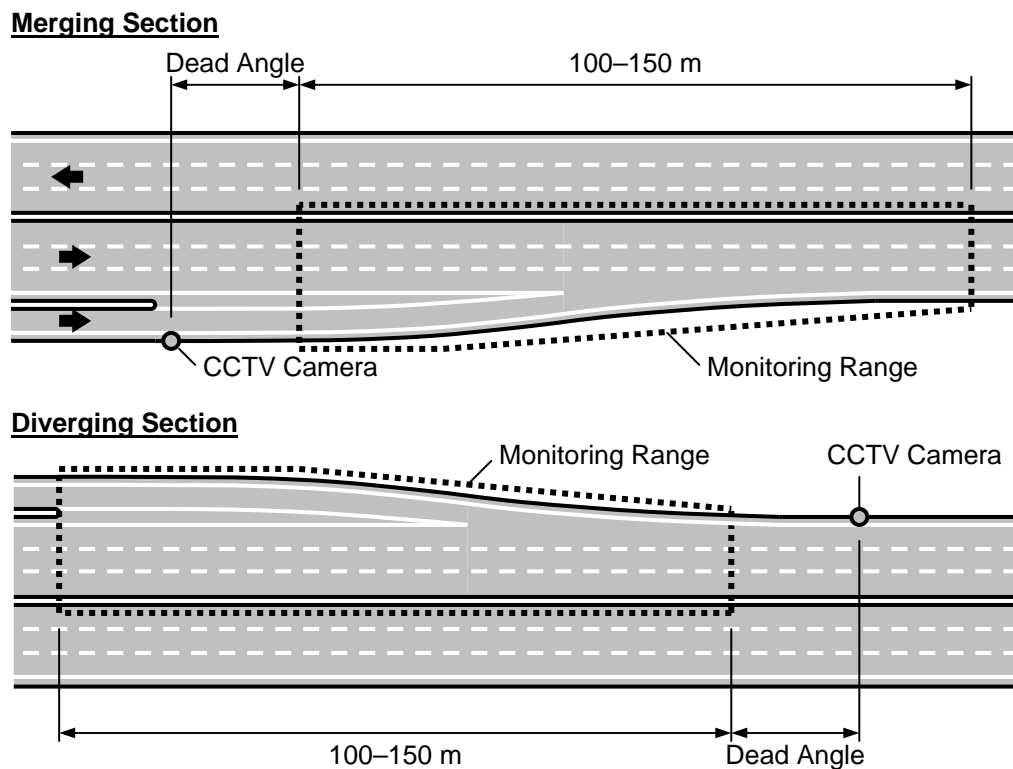
1) CCTV Camera

CCTV camera is to be installed to provide accurate surveillance of traffic conditions on the road network by monitoring at roadside, and that allows prompt action at the occurrence of incidents. The subsystem needs to secure the following major functions.

(1) Monitoring Range

CCTV camera needs to be installed at the appropriate viewpoint on the roadside around the merging section (or on the median around the diverging section), and sufficient monitoring range needs to be secured as shown in the figure below. The CCTV camera shoots the vehicles from behind for avoiding the influence of strong beam of the headlights.

Figure 5.7.1 Monitoring Range of CCTV Camera

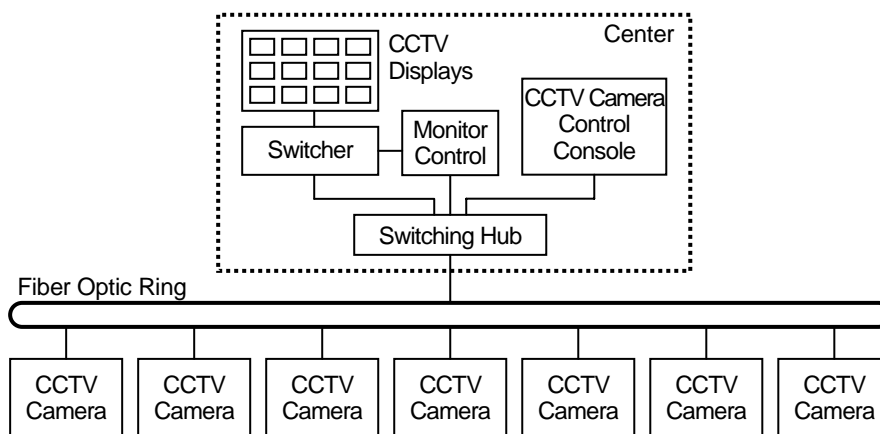


Source: VITRANSS 2 Study Team

(2) Monitoring System

CCTV cameras with the function of zooming and panning are to be controlled remotely and respectively from the center. Video images shall be put up on many sets of the colour displays in the center, being selected automatically by turns by a switcher under normal conditions or being selected manually in case that an event takes place. The manual control shall have precedence over the automatic selection by the switcher.

Figure 5.7.2 Conceptual Illustration of CCTV System



Source: VITRANSS 2 Study Team

20-inch display with a resolution more than 600x450 dpi is required for recognising the vehicle 1.5 m wide at the maximum distance of monitoring range. The operator with normal eyesight can recognize the vehicles shown on the screen.

(3) Performance of CCTV Camera

The followings are typical performance of the CCTV camera.

- (i) Resolution: CCTV camera needs to have resolution to recognize the vehicle 1.5m wide at the maximum distance of monitoring range.
- (ii) Sensitivity: CCTV camera needs to have sensitivity to focus/shoot the objects in the light levels of the road illumination and the rear light of the vehicle.
- (iii) Transmission: Video images from CCTV cameras are to be compressed by MPEG4 and transmitted at the same time being, and shall be distinguished by using IP (Internet Protocol).

There are two major types of the image sensor of CCTV camera. These are CCD (Charge Coupled Device) image sensor and CMOS (Complementary Metal Oxide Semiconductor) image sensor, and CCD image sensor is recommended for ITS as shown below.

Table 5.7.1 Comparison on Image Sensor of CCTV Camera

	CCD Image Sensor	CMOS Image Sensor
Resolution	High	Low
Sensitivity	High	Low
Focusing for moving subject	Average	Slow
Power consumption	Average	Small
Cost	Average	Low
Grading	Recommended	Not Suitable

Source: VITRANSS 2 Study Team

2) Vehicle Detection

(1) Summary of Discussion

The following policies for vehicle detection are recommended in the Master Plan:

- (i) “Supersonic type” vehicle detector is to be installed in the long bridge sections
- (ii) “Loop-coil type” vehicle detector is to be installed in the road sections excluding long bridges.

There are three types of vehicle detection: “Loop-coil type”, “Supersonic type” and “Image recognition type”. The three types are discussed comparing the advantages/disadvantages in the followings.

(2) Technical Notes

(a) for Vehicle Detection

Loop-coil type is to detect vehicles passing by the magnetic response. Therefore, unlike supersonic system, if the body does not have a magnetic variation then it is not respond. To detect the number of transit vehicles that is considered relatively applicable. However, it should be buried and can not be used in the magnetic structures such as Metal Bridge.

Supersonic type is from transmitter to transmit supersonic, a mechanism to detect the presence of an object by detecting the time difference and reflected from the surface to come. Therefore, if there are any objects that will block the supersonic to detect, regardless of whether the vehicle.

Image recognition type is the detection mechanism to detect moving objects in images captured from video cameras. Also allows set the size and speed of the object to be detected. However, the accuracy of image analysis is needed high-quality images compared to images for visual inspection. Currently, the resolution of network cameras is commonly used for more than 640dpi × 480dpi, MPEG compression. It is a necessary to detect the number of vehicles.

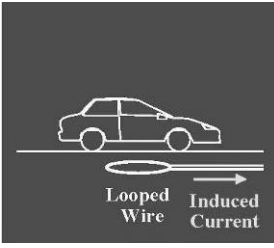
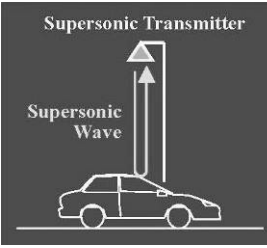
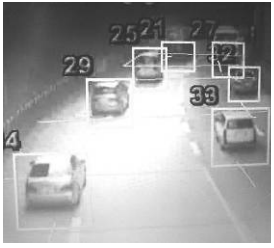
(b) for Incident Detection

When incident detection by image recognition, it is important to image resolution. At lower resolution, it will be difficult to detect and capture a small movement from afar. Therefore, when adopting the image recognition system for incident detection, there is a need to select the resolution according to the target detection range.

For information, indicate the example that camera specification for image recognition as follows,

- (i) Visual Imagery Sensor : CCD sensor is better
- (ii) Shutter speed : more than 1/1500
- (iii) Functions required : Day / Night
- (iv) General hints : Zoom / Pan function is not used

Table 5.7.2 Comparison of Vehicle Detectors

	a) Loop-coil type	b) Supersonic type	c) Image Recognition type
Outline			
Installation	Being buried in a sufficient distance from steels	Being fixed on the structure securing clearance of the road	Being fixed on the stable structure securing sight path
Endurance	Average	High	Average
Maintenance	Necessary to work on the pavement for mechanical trouble caused by heat	Very rare and not necessary to work on the pavement	Average and not necessary to work on the pavement
Implementation Cost	Low	Average	High

Source: VITRANSS 2 Study Team

3) VMS/SGM

Traffic information is to be provided through the VMS (Variable Message Sign) and SGM (Simple Graphical Message Sign) on the roadside as shown in the figure below, which are performed by LED (Light Emitting Diodes) on a matte black board and are controlled remotely and respectively from the center.

Figure 5.7.3 VMS/SGM on Roadside



Source: VITRANSS 2 Study Team

4) Road-to-vehicle Communication for ETC

(1) Summary of Discussion

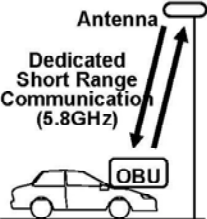
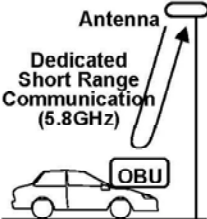
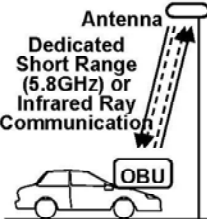
According to the comparison of the six types of road-to-vehicle communication in this section, it is concluded that Active-DSRC, Passive-DSRC and DSRC/IR are competitive and Active-DSRC has the largest number of advantages among them. The most appropriate road-to-vehicle communication for ETC shall be selected from among these three methods through the competitive experimental test.

(2) Technical Notes

The advantage/disadvantages of the following six types of road-to-vehicle communication are shown in the table below, where abbreviations are DSRC (Dedicated Short Range Communication), IR (Infrared ray), GPS (Global Positioning System) and GSM (Global System for Mobile Communications).

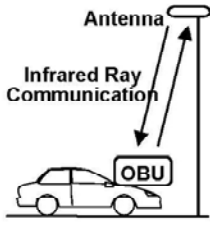
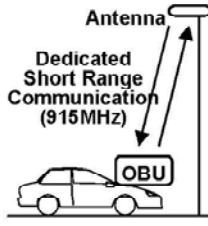
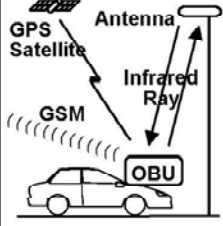
- (i) Active-DSRC
- (ii) Passive-DSRC
- (iii) DSRC/IR
- (iv) IR
- (v) Tag
- (vi) GPS/GSM/IR,

Table 5.7.3 Comparison of Road-to-Vehicle Communication for ETC (1)

	Active-DSRC	Passive-DSRC	DSRC/IR
Outline			
Accuracy	High (99.9999%)	High (No regulation)	Lowering by sunlight
Vehicle Deceleration	Not necessary	Not necessary	Not necessary
Shared use by Different Operators	Many experiences	Many experiences	A few experiences
2-piece Type OBU	Many experiences	Few experiences	Many experiences
Cost of OBU	Average	Low	High
Prepayment	Capable	Difficult	Capable
Balance-in-Card	Capable	Not capable	Capable
Combined Use with Touch&Go	Capable	Not capable	Capable
Application to Multi-lane Free-flow	Capable	Capable (1-piece type OBU)	Not capable
Cost of Roadside Equipment	Low	Average	High
International Standard	Established	Established	Established
Number of Shared Suppliers on Actual Road	12 (In Japan)	3 (In France)	7 (In Korea)
Grading (#Advantages)	Competitive (11)	Competitive (4)	Competitive (6)

Source: VITRANSS 2 Study Team

Table 5.7.4 Comparison of Road-to-Vehicle Communication for ETC (2)

	IR	Tag	GPS/GSM/IR
Outline			
Accuracy	Lowering by sunlight	Low (No regulation)	Average(No regulation)
Vehicle Deceleration	Necessary	Not necessary	Not necessary
Shared use by Different Operators	No experience	A few experiences	No experience
2-piece Type OBU	Many experiences	No experience	No experience
Cost of OBU	Average	Very Low	Very High
Prepayment	Capable	Difficult	Difficult
Balance-in-Card	Capable	Not capable	Not capable
Combined Use with Touch&Go	Capable	Not capable	Not capable
Application to Multi-lane Free-flow	Not capable	Capable (1-piece type OBU)	Capable (1-piece type OBU)
Cost of Roadside Equipment	Average	Average	Average
International Standard	Prepared but Patented	None	None
Number of Shared Suppliers on Actual Road	1 (Not shared)	1 (Not shared)	1 (Not shared)
Grading	Not suitable	Not suitable	Not suitable

Source: VITRANSS 2 Study Team

(a) Accuracy

The accuracy of ETC based on Active-DSRC is defined as 99.9999% in the general specification of the expressways in Japan; however, there is no other specification on the accuracy of ETC using the other types of road-to-vehicle communication.

(b) Vehicle Deceleration

Each type of the road-to-vehicle communication provides the capacity shown below, and the large capacity of Active-DSRC allows the vehicles to pass through the tollgate without deceleration.

- (i) Active-DSRC: 1.0 – 4.0 Mbps both for downlink and uplink,
- (ii) Passive-DSRC: 1.0 Mbps for downlink and 0.25 Mbps for uplink,
- (iii) IR: 0.5 Mbps for downlink and 0.125 Mbps uplink,
- (iv) Tag: 0.5 Mbps both for downlink and uplink.

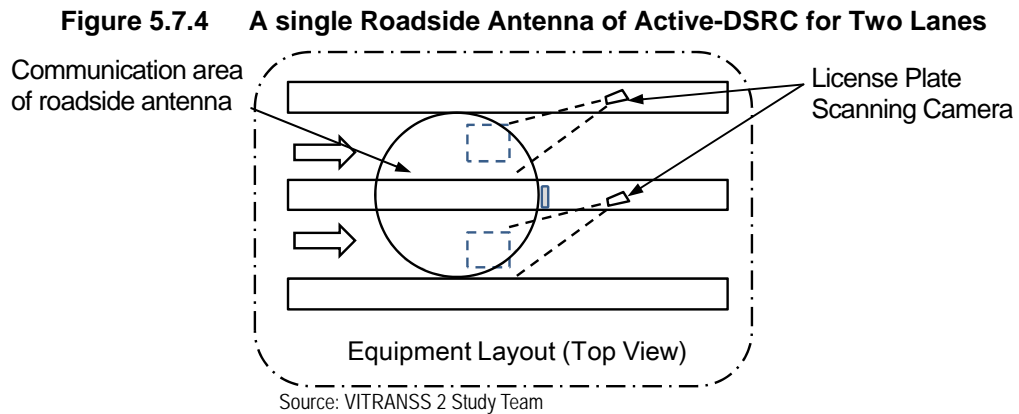
The capacity of Active-DSRC is sufficient for the multi-lane free-flow as well.

(c) 2-piece Type OBU

2 piece type OBU is adopted for the toll collection systems in many Asian countries, such as Active-DSRC in Japan, DSRC/IR in Korea and IR in Malaysia and Vietnam.

(d) Cost of Roadside Equipment

In the case of Active-DSRC, a single roadside antenna allows the data communication with two OBUs installed in the vehicles on the different tollgate lanes as shown below.



This feature is achieved by the combined use with the license plate scanning camera for vehicle identification, and that can be easily extended to the ETC on multi-lane free-flow. The feature provides the cost-cutting for implementing roadside equipment.

(e) Number of Shared Suppliers on Actual Road

- (i) **Active-DSRC in Japan:** In the case of Active-DSRC in Japan, even though OBUs are manufactured by six suppliers and the roadside antennas are manufactured by eight suppliers, OBUs manufactured by different suppliers are shared on the whole road network. In addition, the road network includes the sections operated by more than five different road operators.
- (ii) **Passive-DSRC in France:** In the case of Passive-DSRC in France, OBUs and the roadside antennas are manufactured by five suppliers, and OBUs manufactured by three different suppliers are shared on the specific road sections. However, OBUs manufactured by the other two suppliers are not shared and need to be used separately.
- (iii) **DSRC/IR in Korea:** In the case of DSRC/IR in Korea, two roadside antennas for DSRC and IR are installed together on the same toll island, and the antenna for use is selected by the OBU installed in the vehicle. OBUs of DSRC are manufactured by three suppliers, and OBUs manufactured by different suppliers are shared on the same road.
- (iv) **IR in Malaysia:** In the case of IR in Malaysia, OBUs and the roadside antennas are manufactured by only one supplier who has the patent of IR system. There is no sharing and no competition of OBU among the suppliers.
- (v) **Tag in USA:** In the case of Tag in USA, primary track records of ETC installation are monopolistic as shown in the following table. The system in each state is manufactured exclusively by a single supplier that has some advantage in the target state. There is no sharing and no competition of OBU among the different suppliers.

Such monopolistic ETC installation never requires the discussion on the standards; however, this way of ETC installation requires the road user travels over many states, where different ETC system is installed, to install two or more OBUs in his vehicle to pass through the tollgates. And the price of equipment can be controlled by the single supplier. Such monopolistic way of installation is allowable only in the country with the wide land and with the social custom to boycott undesirable manufacturers, such as USA.

Table 5.7.5 Track Records of Tag in USA

Installed ETC System	Target States	Supplier
E-Z Pass	New York, New Jersey, Pennsylvania, Delaware, Maryland, Maine	MarkIV
Fast Lane	Massachusetts	MarkIV
I-Pass	Illinois	TransCore
Smart Tag	Virginia	TransCore
SunPass	Florida	TransCore
K-Tag	Kansas	TransCore
PIKEPASS	Oklahoma	TransCore
EZ TAG	Texas	TransCore
PAL PASS	South Carolina	SIRIT
FASTRAK	California	SIRIT

Source: VITRANSS 2 Study Team

- (a) **GPS/GSM/IR in Germany:** In the case of GPS/GSM/IR in Germany, vehicle passage at the tollgate is tracked by using GPS and the roadside antenna of IR. OBU and the roadside antennas are manufactured by two suppliers; however, there is no sharing of OBU among the different suppliers.

5) Contact-less IC-cards

(1) Summary of Discussion

“TYPE-A (MIFARE DESfire)” and “Felica” are recommended as the contact-less IC-card choice for the toll collection in Vietnam, which provide high security and sufficient operation experience.

There are three types of contact-less IC-cards: “TYPE-A”, “TYPE-B” and “Felica” in the world. “TYPE-A” has two different levels of security: “MIFARE classic” and “MIFARE DESfire”; however, the weakness of security has been warned for “MIFARE classic” by the experts. The three types are discussed comparing the advantages/disadvantages in the followings.

(a) Transaction Speed >> “Felica” has advantage than others

“Felica” has about twice of its transaction speeds than other system.

(b) Conformance to International Standards

For ISO/IEC14443 (standardized in 2001) >> “TYPE-A” and “TYPE-B”

For ISO/IEC18092 (standardized in 2003) >> “Felica” and “TYPE-A”, not “TYPE-B”

(c) Cards Production Costs >> “Felica” has advantage than others

In general, “Felica” can be made in lowest cost than others, next is “TYPE-B”. “TYPE-A (MIFARE)” is high costs than others.

Note that “TYPE-A” has 2 types which are “TYPE-A (MIFARE)” and “TYPE-A (Non-MIFARE)”. Although “TYPE-A (Non-MIFARE)” is cheaper than “TYPE-A (MIFARE)”, it is reported that “TYPE-A (Non-MIFARE)” has been faced the security problem recently.

(d) Operational Experiences

For regional experiences in Asia >> “Felica” and “TYPE-A” are popularized

For Europe, TYPE-A and TYPE-B are popularized.

For experiences of ETC and Touch & Go System >> only “TYPE-A”

There are many IC-card experiences for Transportation cards at various regions and card types. In case of regional experiences, Asia region has many experiences for Felica and TYPE-A, and Europe has TYPE-A and TYPE-B.

Experiences for ETC and Touch & Go system at this moment is limited to TYPE-A.

However, major type of TYPE-A (Non-MIFARE) is faced security problem, so that it will be problem for multi-purpose card usage in future. TYPE-A (MIFARE) is developed for more strict security.

(2) Technical Notes

(a) Comparison for Contact-less IC-card and Contact IC-card

Contact-less IC-card what many advantages as follows,

- (i) Convenience
- (ii) Fault tolerance



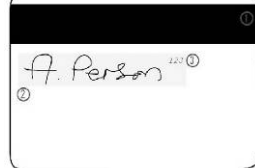
For convenience, authentication by using wireless communication, without purse or get out of every season-ticket holder to use hands-free. Is that very easily can be authenticated.

For fault tolerance, the difference between contact-less IC-card and contact IC-card, do not need to touch the reader directly. Therefore, difficult to scratch IC chip that also indestructible data. There is miscommunication case due to IC chip is scratched.

However, contact-less IC-card is not adherence within EMV specs, so it can be use for slave card in post-paid credit use.

For information, a magnetic stripe card is mostly used for credit card. It is a type of card capable of storing data by modifying the magnetism of tiny iron-based magnetic particles on a band of magnetic material on the card. However, this type of card is not difficult to forgery therefore, Contact IC-card is becoming mainstream.

Table 5.7.6 Comparison of Contact and Contact-less IC-cards

	Contact-less IC-card	Contact IC-card	Magnetic Stripe Card
Appearance			
Convenience	High	Average	Usable
Fault tolerance	High	Usable	Average
Against forgery	High	High	Low
Within EMV Standards	Not adherence	Adherence	Adherence

EMV standard: With the EMV standard, IC card reader specifications, trade execution procedures established by the IC card terminal is a unified standard. Each IC card, if the reader different specifications, and preventing the spread will be expected to happen before use. By this standard, the world will be able to use IC is the common card reader. In addition, EMV and EMV standards, the European Europay, MasterCard International, Visa International has been named three companies take the first letter.

Source: VITRANSS 2 Study Team

(b) Specification of Contact-less IC-card

The characteristics for specification of Contact-less IC card which is major 3 types based on 13.56MHz are summarized below.

- (i) TYPE A: wider spread for use in world wide, especially in Europe
- (ii) TYPE B: not so much popular than TYPE A
- (iii) Felica: high transaction system, applied in Japan and Asia for use of transport and electrical money services

(c) International Operational Experience

(i) Asian Region

Asian region is one of the global advanced examples to spread Contact-less IC-card, such as “Octopus Card” in China and Hong Kong and “ez-link” in Singapore.

In Soul, Korea, “T-money” IC-card was introduced as a new concept based on the revision of urban transport system in July, 2004.

Recently, the city of Shenzhen, Guangzhou, Shanghai, Dalian in China where are the rapid economic development, promote Contact-less IC-card as a transportation card.

In Asia, TYPE A or Felica techniques are applied at many cities.

Table 5.7.7 Specification Comparison for Contact-less IC-cards

	Type A	Type B	Felica
Characteristics	International Standard	High Security International Standard	High Transaction Speed International Standard
Transaction Speed in initiate stage	+ 106kbps	+ 106kbps	++ 212kbps
International Standard	++ ISO/IEC14443 & ISO/IEC18092	+ ISO/IEC14443	+ ISO/IEC18092
Production Cost	high	medium	low
Major area	Asia, Europe	Asia, Europe	Asia
Communication Range	+ 10 cm	+ 10 cm	+ 10 cm
Communication Quality (Anti-noise)	+ Manchester Method	+ NRZ-L Method	+ Manchester Method
Required Electric Power	+ ASK100%	++ ASK10%	++ ASK10%
Security	+ Original (MIFARE classic) ++ RSA, T-DES (MIFARE DESfire)	++ RSA, T-DES	+ T-DES
Multi-Reaction (Anti-Collision)	++ Bit Collision /or/ Time Slot method	+ Slot Marker method	++ Bit Collision /or/ Time Slot method

Note: Multi-Reaction (Anti-Collision)

Anti-collision method is meant how to process IC-cards when two or more IC-cards exist in the area of read/write system (R/W). There are 3 major different methods.

1. Time Slot method: Each IC-card creates the random number based on R/W's request, and then IC-card will response in accordance with created number. R/W can identify the each IC-card based on their response timing.
2. Bit Collision method: R/W can identify the each card based on their response with their unique series of "Bit" such as "1" or "0" until R/W recognizes without any duplication of their bits.
3. Slot Marker method: R/W requests random number to IC-card to identify each card.

Followings show their characteristics.

Table 5.7.8 Anti-Collision Methods

Anti-Collision Method	Characteristics
Time Slot method	Only one request from R/W at initiation stage is needed, therefore, it is less number of transactions.
Bit Collision method	It takes time because R/W requires judging the all of Bit series.
Slot Marker method	It takes time because R/W requests all of cards.

Source: VITRANSS 2 Study Team

Table 5.7.9 Experiences on Contact-less IC-card in Asia

Type	Country/City	Name of IC-card	Applied Area
TYPE A	Malaysia	Touch'n Go Card (since 1997)	Transportation (Bus, LRT, Expressway, Parking, etc.) , 2 million cards issued
	Korea, Seoul	T Money (since 1996)	For Transportation (Subway, Bus) 15 million cards issued
	Korea, Pusan	HANARO card	Later, electrical money added 3.6 million cards issued
	Korea, Incheon		For Transportation
	China, Shanghai	Jude card (since 1998)	For Transportation (Subway, Bus) 3.2 million cards issued
	China, Dalian, Beijing, Guangzhou, Shangsha		
	Taiwan, Taipei	Yuyoo card, Easy Card	For Transportation
	India, New Delhi	Travel/Tourist Card (since 2002)	
	Australia, Perth, Sydney	(since 2005)	
Felica	Hong Kong	OCTPUS card (since 1997)	For Transportation (Bus, Subway, Ferry, Light rail)
	Shingapol	ez-link card (since 2002)	For Transportation (Bus, Subway, Railway), 9 million cards issued
	China, Shenzhen	Trans Card	For Transportation (Subway, Bus, Taxi) 1 million cards issued
	India, Delhi	Travel Card	
	Thai, Bangkok	Subway card (since 2004)	For Transportation, 200,000 cards issued 200,000 token issued

Source: VITRANSS 2 Study Team

(ii) European Region

In European region, IC-card is popularized as a additional function with Debit Card (ATM card) in order to be realized “Coin-less Payment”, such as “Geldkarte” in Germany, “Danmont” in Denmark, “Proton” in Belgium, “Moneo” in France, and “Chipkaart” in Netherland.

The transport agencies in France, Italy, Portugal and Germany are under study on introduction of contact/contact-less IC-card and box type terminal units for exchange from contact IC card to contact-less IC card.

In European region, TYPE A and TYPE B are applied at many cities.

Table 5.7.10 Experiences on Contact-less IC-card in Europe

Type	Country	City	Name of Card	Notes
TYPE A	England	London	Oyster Card	Operated since 2004 for Subway, Bus, Kiosk Aiming to be Multi-purpose card
	Finland		Koskijoinjat OY Bus card	
	Russia	St. Petersburg, Moscow		
	England	Manchester, Glasgow		
TYPE B	France	Paris, etc.	RATP Project	Target to Subway, Bus and Tram operated by Paris transport agency (RATP)
	Portugal	Lisbon		Common card for Subway, Bus and Tram. 500,000 cards issued
	Italy	Milano, Roma, Capri		Since 2003 at Roma 420,000 cards issued
	Germany	Frankfurt, Westferia	Geldkarte	One of multi application of Debit card Most famous electrical money in Europe
	Belgium	Brussels	STIB	
Other electrical money	Norway	Oslo		
	Sweden	Stockholm		
	Poland	Warszawa		
	Netherland		Chipkaart	One of multi application of Debit card
	Denmark		Danmont	
	Belgium	Brussels	Proton	One of multi application of Debit card
	Greece	Athens		
Turkey	Izmir			

Source: VITRANSS 2 Study Team

(d) WTO Agreements

According to article 6 “Technical Specification” of Agreement on government procurement, ANNEX 4 Plurilateral Trade Agreements, WTO agreement, procurements by government or public agencies are required to purchase products satisfied by international standard.

Technical specifications prescribed by procuring entities shall, where appropriate:

- (i) be in terms of performance rather than design or descriptive characteristics; and
- (ii) be based on international standards, where such exist; otherwise, on national technical regulations, recognized national standards, or building codes.

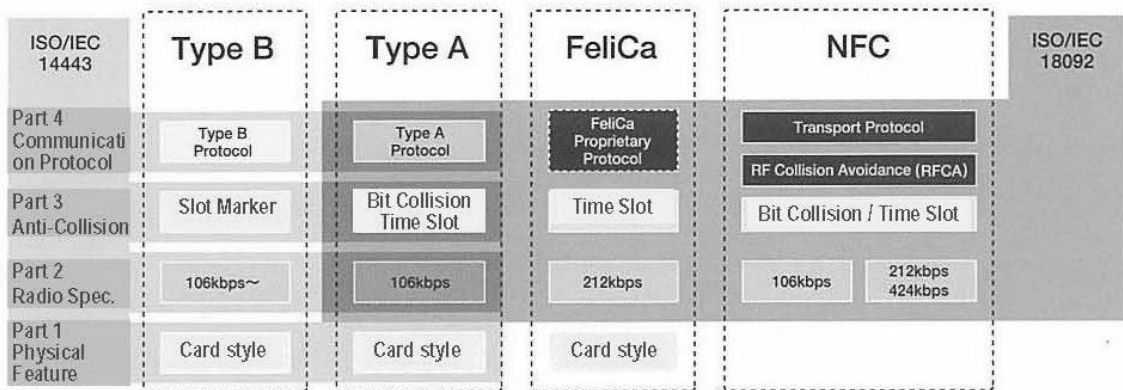
Note that “entities” are defined by WTO agreements. It covers not only ministry but also public cooperation and state agencies.

International standards for contact-less IC-card are ISO/IEC1443 and ISO/IEC18092 issued in 2003. ISO/IEC18902 covers “Felica” and “TYPE-A”. These are compatible for communication with each other. However, Felica’s standard for upper-level protocol/API is still closed, therefore, there are issues for commercializes and wide use.

ISO/IEC18902 realizes contact-less IC-card to communicate of data transaction each other by 13.56MHz radio wave within 10 cm of each IC chip. Transaction speed can be selected from 106K/212K/424Kbps.

ISO/IEC18092 defines only standards for communication method between equipments, not specific physical figure and sizes. Therefore, there are flexibility for products figure and sizes.

Figure 5.7.5 Relationship between ISO/IEC14443 and ISO/IEC18902



Source: VITRANSS 2 Study Team

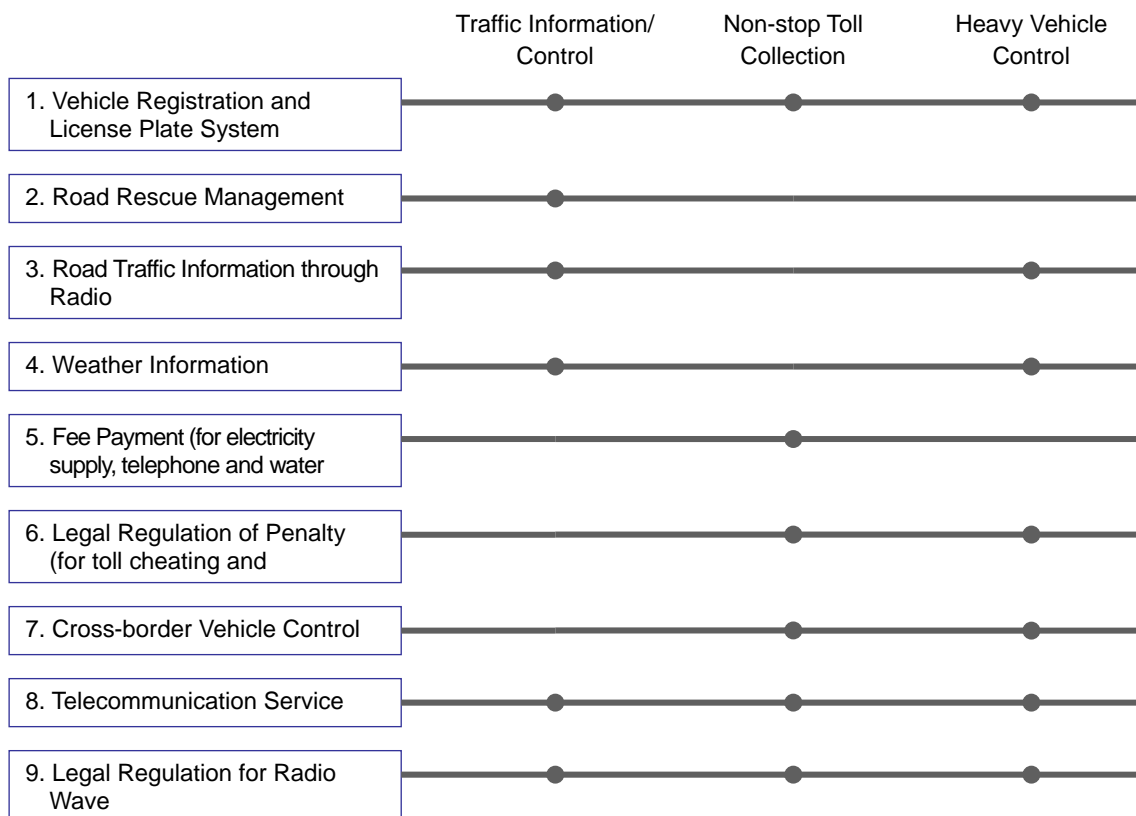
6 RELEVANT SOCIAL SYSTEMS

6.1 General

This chapter aims to clarify the current conditions of the following social systems relevant to the ITS user services discussed in Chapters 3 and 5.

- (i) Vehicle registration and license plate system
- (ii) Road rescue management
- (iii) Traffic information through radio
- (iv) Weather information
- (v) Fee payment system (for electricity supply, telephone and water supply)
- (vi) Legal regulations of penalties (for toll cheating and overloading)
- (vii) Cross-border vehicle control
- (viii) Telecommunication service
- (ix) Legal regulations of radio waves.

Figure 6.1.1 Correlation between Social Systems and Priority ITS User Services



Source: VITRANSS 2 Study Team

6.2 Vehicle Registration and License Plate System

1) Vehicle Registration System

Vehicle registration and issue of vehicle number plate is conducted by the Ministry of Public Security under the Circular 01/2002/TT-BCA and Circular No 12/2008/TT-BCA-C11, and Circular No 34/2003/TT-BTC of the Ministry of Finance for registration fee. The provincial land road police division is in charged for vehicle registration of normal passenger, private firm and government agency, and the land/railway road police department is in charged for diplomatic vehicle registration.

The procedure for vehicle registration is required to submit following documents in order to issue registration certificate. (Normally, it is required within 5 working days in Hanoi, 7 working days in HCMC)

- (i) Owner's Identification Document
- (ii) Registration Form
- (iii) Vehicle's ownership transfer document
- (iv) Receipt of Registration Fee
- (v) Documents showing the vehicle's original: imported as whole vehicle, domestic assembled vehicle, converted vehicles, etc. (included inspection certificate for domestic assembled vehicles)

In the registration certificate, name of owner, address, vehicle type (color), engine number, chassis number, number plate are described (the registration certificate for truck is also required to indicate the loading capacity (kg)). The figure below shows the sample of registration certification form.

Figure 6.2.1 Registration Certification (Left: Passenger Car, Right: Truck)

The figure shows two registration certification forms. The left form is for a passenger car (DaeWoo) and the right form is for a truck (Tr / Hải). Both forms include fields for owner name, address, engine number, chassis number, brand, type, color, year of manufacture, dimensions, weight, and registration date. The truck form also includes fields for load capacity and seat capacity.

Source: VITRANSS 2 Study Team

According to the vehicle classification under the Circular No60/2004/TT-BTC of Ministry of Finance, there are 7 types as below.

- (a) **Type 1:** Motorbikes, motorbikes with 3 wheel and similar types
- (b) **Type 2:** Lambretta, rudimentary trucks, tractors
- (c) **Type 3:** Cars of under 12 seats, trucks of a tonnage of under 2 tons and mass transit buses
- (d) **Type 4:** Cars of between 12 and 30 seats, trucks of a tonnage of between 2 tons and under 4 tons

- (e) **Type 5:** Cars of 31 seats or more; trucks of a tonnage of between 4 and under 10 tons
- (f) **Type 6:** Trucks of a tonnage of between 10 and under 18 tons and 20 ft-container lorries
- (g) **Type 7:** Trucks of a tonnage of 18 tons or over and 40 ft-container lorries

2) License Plate System

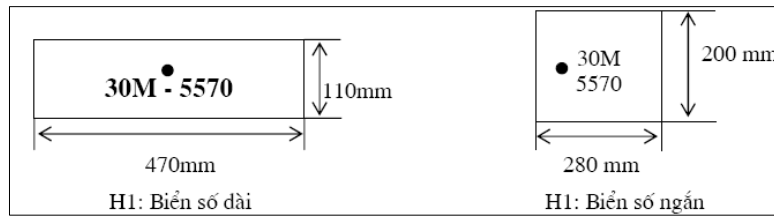
The vehicle number plate is issued same as vehicle registration, by the Ministry of Public and Security under Circular No 06/2009/TT-BCB (C11). The regulation of Number plate is as follows.

- (a) Vehicles for Non-business Administrative Offices or Government Agencies
 - Background of Plate: Blue
 - Characters & number: White
 - Region code: followed by Table 6.2.1
 - Series no: Use 1 of 5 symbols below: A, B, C, D, E
- (b) Vehicles for All Economic Sectors and Individuals
 - Background of Plate : White
 - Characters & number: Black
 - Region code: followed by Table 6.2.1
 - Series no: Use 1 of 5 symbols below: F, H, K, L, M, N, P, R, S, T, U, V, X, Y, Z (and some symbols for special cases)
- (c) Vehicles for Diplomatic Organizations, Consulates, Individuals of Foreigner
 - Background of Plate: White
 - Characters & number: Black
 - Series no: "NG" in red
- (d) Vehicles for International Organizations, Individuals of Foreigner:
 - Background of Plate: White
 - Characters & number: Black
 - Series no: "QT" in red
- (e) Vehicles for Representative Office, Representative Organizations, Individuals of Foreigner and Student learning abroad
 - Background of Plate: White
 - Characters & number: Black
 - Series no: "NN" in red

The material of plate should be made by metal. And there are two type of size at one for front, the other is in behind of vehicle in Figure 6.2.2.

- Type 1 Short Plate: Height 200 mm, Length 280 mm,
- Type 2 Long Plate: Height 110 mm, Length 470 mm

Figure 6.2.2 Size and Dimension of Number Plate



Source: VITRANSS 2 Study Team

Table 6.2.1 Region Code List of Number Plate

TT	TÊN ĐỊA PHƯƠNG	KÝ HIỆU	TT	TÊN ĐỊA PHƯƠNG	KÝ HIỆU
1	Cao Bằng	11	34	Cần Thơ	65
2	Lạng Sơn	12	35	Đồng Tháp	66
3	Quảng Ninh	14	36	An Giang	67
4	Hải Phòng	15-16	37	Kiên Giang	68
5	Thái Bình	17	38	Cà Mau	69
6	Nam Định	18	39	Tây Ninh	70
7	Phú Thọ	19	40	Bến Tre	71
8	Thái Nguyên	20	41	Bà Rịa-Vũng Tàu	72
9	Yên Bái	21	42	Quảng Bình	73
10	Tuyên Quang	22	43	Quảng Trị	74
11	Hà Giang	23	44	Thừa Thiên Huế	75
12	Lào Cai	24	45	Quảng Ngãi	76
13	Lai Châu	25	46	Bình Định	77
14	Sơn La	26	47	Phú Yên	78
15	Điện Biên	27	48	Khánh Hòa	79
16	Hòa Bình	28	49	Cục CSGT ĐB-ĐS	80
17	Hà Nội	29-32	50	Gia Lai	81
18	Hà Tây	33	51	Kon Tum	82
19	Hải Dương	34	52	Sóc Trăng	83
20	Ninh Bình	35	53	Trà Vinh	84
21	Thanh Hóa	36	54	Ninh Thuận	85
22	Nghệ An	37	55	Bình Thuận	86
23	Hà Tĩnh	38	56	Vĩnh Phúc	88
24	TP.Đà Nẵng	43	57	Hưng Yên	89
25	Đắk Lắk	47	58	Hà Nam	90
26	Đắk Nông	48	59	Quảng Nam	92
27	Lâm Đồng	49	60	Bình Phước	93
28	TP.Hồ Chí Minh	50-59	61	Bạc Liêu	94
29	Đồng Nai	60	62	Hậu Giang	95
30	Bình Dương	61	63	Bạc Cạn	97
31	Lạng An	62	64	Bạc Giang	98
32	Tiền Giang	63	65	Bắc Ninh	99
33	Vĩnh Long	64			

Source: VITRANSS 2 Study Team

Figure 6.2.3 Example of Number Plate



Source: VITRANSS 2 Study Team

Number plate for temporally registered vehicle is made by paper with the same design of above categories.

3) Vehicle Inspection System

MOT has a responsibility for vehicle inspection as the function of vehicle technical safety environmental protection (VTSEP) since 1995. MOT assigned this inspection to the Vietnam Register (VR) and VA is the agency for conducting vehicle inspection with local TUPWS and DOT. Law and regulation for vehicle inspection are as follows.

- (i) Decision No. 4105/2001/QĐ-BGTVT (December 04, 2001): Regulations on periodical inspection in terms of technical safety and environment protection for Motor Vehicles.
- (ii) Decision No. 39/2007/QĐ-BGTVT (August 22, 2007): Amending and Supplementing of Decision No. 4105/2001/QĐ-BGTVT: The Regulation on Periodical Inspection of Technical Safety and Environmental Protection of Motor Vehicles
- (iii) Decision 4134/2001/QĐ-BGTVT: Technical Standards for inspection based on 22TCN/224-2001: Technical safety and Environmental protection of land road motor vehicles dated 2001
- (iv) Decision 065/QĐ-DK (14 March 2006): Vietnam Register guiding the inspection on technical safety and environmental protection of land road motor vehicles.

Inspection is divided into the “Initial Inspection” conducted just after purchasing and “Periodical Inspection”.

(1) Initial Inspection

Following documents are required for issuing certification record of motor vehicle inspection.

- (i) Original copy of “Registration Certificate” or the registration application receipt note, or copy of valid registration certificate certified by the lending Bank, or the valid confirmation note of leasing company
- (ii) Original copy of import certificate or original copy note of notification on inspection exemption for imported vehicle, or vehicle quality certificate manufacturer (domestic produced, assembled or converted vehicles)
- (iii) License for transportation business (for the case that the vehicle is registered for transportation business.)

(2) Routine Inspection

Following documents are required for routine inspection.

- (i) Certification record of periodical motor vehicle inspection
- (ii) Vehicle Registration Certificate
- (iii) Business Registration Certificate (for the case that the vehicle is registered for transportation business.)

The Table 6.2.2 shows the inspection item and its frequency. Items are regulated by Decision No.4134/QĐ-BGTVT, and there are 55 items for general passenger vehicle and 75 items for motor cycle. That table shows also the main items to be inspected.

Table 6.2.2 Vehicle Inspection Item and Frequency

Type of Vehicle	Period (month)	
	Initial	Periodic
Truck (cargo)		
• Brand-new imported vehicle; domestic manufactured or assembled vehicle	24	12
• Modified/repaired vehicle	12	06
Small car (including working car) up to 9 seats incl. driver		
• Brand-new imported vehicle; domestic manufactured or assembled vehicle		
(i) for transportation business	24	12
(ii) not for transportation business	30	18
• Modified/repaired vehicle		
(i) for transportation business	18	06
(ii) not for transportation business	24	12
Passenger car with more than 9 seats including driver		
• Brand-new imported vehicle; domestic manufactured or assembled vehicle		
(i) for transportation business	18	06
(ii) not for transportation business	24	12
• Modified/repaired vehicle		
(i) for transportation business	12	06
(ii) not for transportation business	18	12
Motorized three-wheelers vehicle		
• Brand-new imported vehicle; domestic manufactured or assembled vehicle		
(i) for transportation business	24	12
(ii) not for transportation business	30	24
• Modified/repaired vehicle		
(i) for transportation business	18	06
(ii) not for transportation business	24	12
All the vehicle after manufacture date more than 7 years		06
<p>All passenger cars from 15 years and truck from 20 years since from manufacture date should have inspection every 3 months at the Inspection Center, where the inspection record of that car is recorded. All required items should be checked up as stipulated in Standards.</p> <p>If the inspection result meets the Standard, the Inspection Certificate will be issued with 3 month effectuation.</p> <p>If the inspection result doesn't meet the Standard, the vehicle should be repaired/ improved for re-inspection. If the second inspection result doesn't meet its standard again, such vehicle can't have further repairing for joining the traffic.</p>		
1. General Observation - Number plate, outside details - Number of engine and body - Form, general layout, size limit - Body, cap - Coach, boot - Drag hook - Drag disk and bolt - Container lock - Windscreens and door screen - Windscreen wiper, water spray - Mirrors - Driver seat, rear seats - Fire protection equipment 2. Engine and other systems for vehicle operation 3. Power train 4. Tire	5. Suspension system 6. Steering system - Flywheel - Steering column - Driving rod and arm - Coupling - Center shaft - Angle travel of flywheel - Power steering - Strike slip of guide wheels 7. Break system 8. Lighting and signaling system - Front lamps - Signaling lamps - Horn 9. Environment Standards: follows the current regulations of MOT.	

Source: VITRANSS 2 Study Team

The sample shows the vehicle registration and inspection results. These registered information can be used for toll fare system based on different vehicle type if these data had been input in on board unit for ETC.

6.3 Road Rescue Management

1) Law and Regulation for Road Rescue Management

There are law and regulations for traffic accidents clearance and emergency medical managements as below.

- (i) Law on Land Road Traffic No.26/2001/QH10 (June 29, 2001)
- (ii) Decision No.18/2007/QD-BCA (C11) (January 5, 2007)
- (iii) Decision No.1/2008/QD-BYT (January 21, 2008)

Outline of above regulations are summarized below.

Table 6.3.1 Law and Regulation related to Road Rescue Management

Law and Regulation	Land Road Traffic No.26/2001/QH10 (June 29, 2001)	Decision No.18/2007/QD-BCA(C11) (January 5, 2007)	Decision No.1/2008/QD-BYT (January 21, 2008)
Related chapter of articles for traffic accidents clearance	Article 38: Responsibilities of individuals, agencies and organizations when traffic accidents occur - Drivers and persons directly involved in the accidents - Persons present at the places where accidents occur - Other drivers, when passing the places of accidents - Police officers - People's Committees of the localities where the accidents occur	Ministry of Public Security 113 force and traffic police Chapter 2 Steps of Investigating and Dealing with road traffic accidents Article 3: Receiving information of accident and processing information Article 4: Actions should be conducted at once when the force comes to the accident site	Ministry of Health 115 force Chapter II Out-of-Hospital First Aid (115 Emergency Medical Dispatch Centre) Article 3: Organization of Out-of-Hospital First-Aid Article 4: Function, Duty Article 5: Resources of 115 Emergency Medical Dispatch Centers/Teams Article 6: Handling activities of 115 Emergency Medical Dispatch Centers/Teams
	Article 8: Prohibited acts related to accident		

Source: VITRANSS 2 Study Team

For instance, Decision No.18/2007/QD-BCA(C11) was regulated by Ministry of Public Security, and described that "Procedure of Investigating and Dealing with Road Traffic Accident Procedure of Investigating and Dealing with Road Traffic Accident by Traffic Police". On the other hand, Decision No.1/2008/QD-BYT was regulated by Ministry of Health, and described that "Promulgating the regulation on first-aid, active recuperation and anti-toxification, the information related to first-aid out-of-hospital (115 Emergency medical dispatch centre).

2) Ambulance System

Ambulance Services (First Aid) belong to Ministry of Health, according to the Decision No. 01/2008/QD-BYT dated January 21, 2008 issuing the Regulation of first aid, active recuperation and anti-toxification, the provinces and cities under central management must have their Ambulance Services Centers.

The provinces, where such center is not available due to some lacking conditions, must have Ambulance Team belonging to provincial general hospital. Districts and townships must have first aid team outside hospitals (outside hospital means that team will come to the patient).

The peoples can call to Telephone Number 115 to ask for First Aid services with very small cost. After receiving calls for first aid services, the permanent staff will verify the accuracy of information, locate the address and send the ambulance car, which are nearest to the required place.

Figure 6.3.1 Ambulance in Hanoi



Source: VITRANSS 2 Study Team

For example in Hanoi city, there are divided into 4 areas operated by 12 ambulances accompanied with doctor and nurse.

The photo below shows the ambulance services center in Hanoi for receiving of 115 calls and sending ambulance team. There are 4 telephone lines and two operators. Operators belong to as a permanent staff who verify the accuracy of information, locate the address and send the ambulance car, which are nearest to the required place.

The communication between first aid team and ambulance is done by intercom telecommunication system using same as radio transmitting.

Figure 6.3.2 Center for Receiving of 115 Calls and Dispatching Ambulance Teams



Source: VITRANSS 2 Study Team

This ambulance system is started under quite new decision, so that the ambulance system is available only in several cities, not in every cities and provinces. Because the first aid facilities such as the number of ambulance cars are very limited, it is reported that even in Hanoi and HCMCC the service can meet only 10% of demand. In future, when provincial 115 center will be arranged, all calls for first aid will transfer to provincial 115 center, and the center will assign district first aid team to go to patient.

According to the interview survey, the service level of 115 center of Hanoi is said that it is averaged about 2 minutes required after receiving the call to dispatch ambulance in daytime, about 3 minutes in night time. However, it could not be secured because of

depending on the available of ambulance, and the traffic conditions. Normally, the averaged time to arrivals at the point requested is about 10 to 15 minutes after receiving the call.

It is also mentioned in the above decision that the 115 center should be area administrative and transport maps and GPS if it is available. Note that it is not functioned of GPS system at this moment.

This system has not been familiar with people due to lack of dissemination.

Also, it is not allowed the calls from mobile phone, only fixed land line phone, because of preventing from untrue information.

In rural areas, this emergency service is connected by the number of “area code + 115” or 1080 which is information service for telephone number to find the provincial and district hospital. Most major case is thought to be the calls from medical clinic at commune level.

The current situation of hospitals in Vietnam is as below.

- (i) Although there are a lot of hospitals managed by public and private in Hanoi and HCMC, there are only public hospitals in rural area.
- (ii) Even the provincial hospital does not have the facilities of CT/MRT scan
- (iii) People should pay for ambulance services at its distance based, and pay for the medical examinations. (Note that appointed hospital for each residents is free charged)
- (iv) Problem is that some people gave up to calling ambulance if they recognize injured person to be died by their decision.

For private services, some hospitals provide their own emergency medical services by their own ambulance. Although some air-services are existed, it is not suitable for emergency service because it takes one or more hours to get the permission for flight, especially helicopter service.

Note that VRA is conducting the project for creating the “Road Rescue Centre” for 9 regional road centers to provide Rescue Vehicle, Ambulance, Stretcher, Mobile phone with the budget of 130 million VND in total.

6.4 Traffic Information through Radio

In order to cut down the situations of traffic congestion and accident in cities nationwide, General Director of VOV (Voice of Vietnam) has issued a decision to set up "Traffic VOV". In the short term, the channel broadcasts 18 hours per day (from 6:00 to 24:00) and be available in Hanoi area providing information of traffic condition for the capital. The trial broadcasting started from 11:00 on 18th May 2009 to the official broadcasting time on 21st June 2009.

The main content of Traffic VOV is traffic information and guidance to drivers as well as road authorities. The live broadcasting of traffic information and guidance is on rush hours from Monday to Friday weekly: 6:30–8:30, 11:00–12:00 and 16:30–19:00 (the duration

Figure 6.4.1 Sound Recording Room for Traffic VOV



Source: VITRANSS 2 Study Team

is more than 30% of total broadcasting time). On Sunday, the live broadcasting starts from 17:00 to 18:00. The remaining time is for providing traffic related information such as transport culture, urban transport, transport means and information related to politics, economic, culture, social, sport, music and advertisements. Road users can access traffic information via Radio, SMS, or direct call to Information Center. The hot line of Traffic VOV (04) - 6.272.9191/ 6.282.9191/ 6.292.9191.

With the continuing broadcasting daily, Traffic VOV mostly satisfies drivers about traffic information in their trips. General news of traffic issue, on-time announcement of traffic situation as well as weather condition in routes, warnings of accident possibility, guide of optimal routes for drivers will be broadcasted lively via voice broadcasting wave to listeners based upon the actual information in site.

Figure 6.4.2 Traffic Monitoring Centre



Source: VITRANSS 2 Study Team

At this moment, Hanoi city has installed 40 cameras at major intersections since April of this year, to provide traffic information to Traffic Signal Controlling Center to manage and control traffic for reducing congestion and accident. Hanoi Public Security has assigned the task to Department of Traffic Police in combination with Voice of Vietnam.

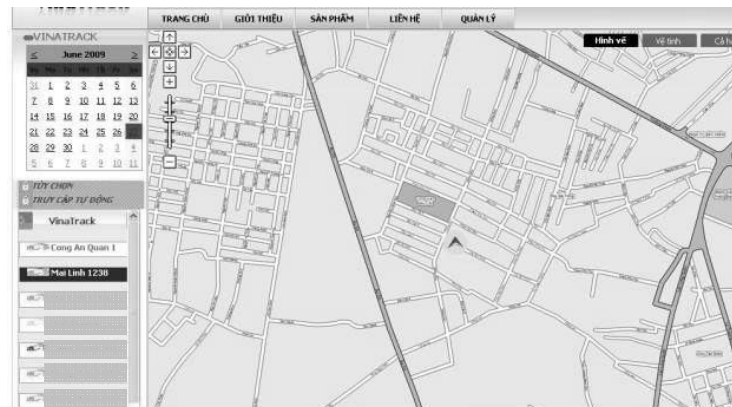
According to the plan of VOV, 100 cameras will be installed at 60 stations in the center of Hanoi for continuing recording traffic situation to transmit to National Voice Broadcasting Center.

With high significance, the project of Traffic VOV has been added to the list of major programs towards Festival of 1000 years Thang Long–Hanoi.

And more, as it discussed section before, some bus and taxi company have already installed the GPS monitoring system for their driving location at their own operation centre. (Figure 6.4.3 shows the sample of GPS trucking application software for Vina Track)

If actual traffic conditions is able to be acquired from these systems, more reliable and systematic traffic data will be provided in future.

Figure 6.4.3 Sample of GPS Tracking Application Software



Source: Vinatrack JSC

6.5 Weather Information

1) Current Conditions of Weather Observation Station

National Hydro-Meteorological Services (NHMS) directly under Ministry of Natural Resources & Environments (MONRE) that management, exploiting network meteorological, hydrographic countries (including the Baseline survey, forecasting, data from meteorological, hydrographic), environmental monitoring air and water environment and to serve, disaster prevention, economic development, social, security and defense in the country.

Followings are current conditions of main weather observation stations. Note that, comparing with international standard for observation station (one station for each 50 square-km), the northern region has one station per 138 square-km and highland in middle region is only one station per 1,000 square-km.

(1) Observation for meteorological surface

This network consists of 168 stations, including 57 stations of 1st Category, 65 stations of 2nd Category and 46 stations of 3rd Category. In this network there are 122 synoptic stations, 46 climate stations, 13 radiation stations and 25 stations included in the Global Telecommunication System (GTS). Apart from above-mentioned stations there are 393 public rain gauges.

The photos in below show the observation equipments of Hanoi observation centre.

Figure 6.5.1 Observation Equipments on Hanoi Observation Centre



Source: VITRANSS 2 Study Team

(2) Observation for Agro-meteorology

There are 27 agro-meteorological stations including 15 principal and 12 ordinary stations.

(3) Observation for Aero-meteorological

There are 3 radiosonde DIGICORA (VAISALA) stations located in Ha Noi, Da Nang and Ho Chi Minh City. Upper air observations record geo-potential height, temperature, humidity, wind speed and direction. Hanoi station conducts twice observations per day while the rest - one observation. This network also includes 8 pilot stations, 3 ozone and ultraviolet radiation stations.

(4) Weather Radar Observation Network

There are 6 weather radars operating for detecting and observing severe weather phenomena such as tropical cyclones, thunderstorms and heavy rainfalls. Three French radars are located in Phu Lien (Hai Phong), Viet Tri (Vinh Phuc), and Vinh (Nghe An). The

American Doppler radars are located in Tam Ky (Quang Nam), Nha Trang (Khanh Hoa) and Nha Be (Ho Chi Minh City).

(5) Satellite Observation

A high-resolution satellite image receiving station in Ha Noi receives images from geo-stationary and polar meteorological satellites.

(6) Observation for Hydrographic

This network maintains 232 stations, including 60 stations of 1st Category, 20 stations of 2nd Category and 152 stations of 3rd Category. In this network there are 88 automatic stations and 100 stations in tidal areas.

(7) Marine Hydro-meteorological Observation Network

Seventeen (17) stations located along Vietnamese coastline and in islands observe waves, sea level height and tides together with hydro-meteorological elements. In addition, there is one scientific research ship for sea expeditions.

(8) Water and Air Quality Observation Network

This network consists of 154 stations and observation points, including 6 air quality automatic observation stations, 22 stations for control dust and chemical concentration of precipitation, 48 river water quality control stations, 9 lake water quality control stations, 6 sea water quality control stations taking and analyzing sea water samples one time a month and 68 observation points for recording river salinity concentration.

(9) Hydro-meteorological Equipment Calibration

NHMS has an advanced laboratory for hydro-meteorological equipment calibration. Barometers, anemometers, thermometers and other hydro-meteorological equipments in observation network are regularly calibrated to ensure the quality of meteorological and hydrological collected data.

(10) Environmental Quality Control

There are 3 well-equipped laboratories located in Ha Noi, Da Nang and Ho Chi Minh City for analyzing the samples collected from 9 regional hydro-meteorological centers.

The organization with NHMS, each province has observation station and provincial forecasting centre and there are 9 regional hydrometeorological centers in the role of upper level. The figure below shows the organization chart of NHMS.

2) Transmission of Weather Information

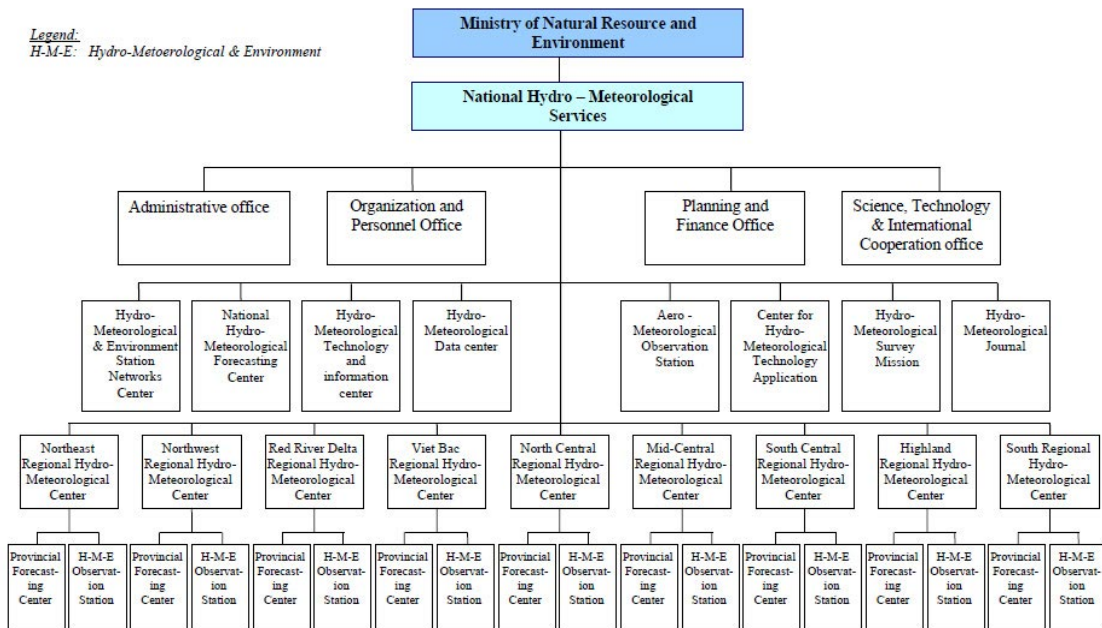
In general, weather condition is observed every 6 hours and transmitted to NHMS with following methods.

Observation station [Observation Results] >> (by telephone) >> Provincial Centre [coding to regulated Message Style] >> (by WAN) >> National Center [into Software] >> Summary Table

For the process of message, it is regulated in "94TCN11-94 for Message Code for Hydro Meteorological" dated in 1994, under the international standards. The figure 6.5.3 shows guides for coding.

Even there is a plan for installation of more rain observation station, there is not any plan for strengthen of networking for data transmission.

Figure 6.5.2 Organization Chart for National Hydro-Meteorological Services (NHMS)



Source: National Hydro-Meteorological Services (NHMS)

Figure 6.5.3 Message Code for Hydro Meteorological



Source: VITRANSS 2 Study Team

3) Forecasting System

NHMS is responsible for providing various hydro-meteorological and marine forecasts to meet the growing requirements of socio-economic activities. This system consists of 3 levels:

- (i) Central Hydro-Meteorological Forecasting Center is responsible for the national level in order to supply forecasts for the whole country.
- (ii) Each Regional Hydro-Meteorological Center is responsible for the regional level in order to issue forecasts for the respective region.
- (iii) Provincial Hydro-Meteorological Forecasting Center is responsible for the provincial level in order to issue forecasts for the respective province.

Following shows the variation of weather forecasting and

(1) Short-Range Weather Forecasting

A daily weather forecast is one of the most important and popular kinds of forecasts for the public. Weather bulletins are issued based on analyzing synoptic charts, satellite images, radar observations and numerical weather prediction products of other

hydro-meteorological centers such as Japan Meteorological Agency (JMA), Australian Bureau of Meteorology (BOM), etc.

(2) Tropical Cyclone and North East Monsoon Invasion Forecasting

Tropical cyclones and North East monsoon invasion are hazardous weather phenomena that often cause serious human and material damages in Vietnam, especially for the population living near the coastline. Tropical cyclone and North East monsoon invasion forecasts are issued several times a day according to special regulations.

(3) Hydrological Forecasting

During the flooding season river water level and flood warnings in main river systems are issued for each river system according to various alarming categories.

(4) Marine Hydro-meteorological Forecasting

Vietnamese sea waters and vicinity are divided into some areas for forecasting purpose. Daily marine hydro-meteorological forecasts are broadcasted via national and local radio, television programs, also via special channels for fisherman and ships.

(5) Medium Range Hydro-meteorological Forecasting

Medium range hydro-meteorological forecasts (5 day, 10 day, monthly and seasonal forecasts) are provided for some concerned ministries and offices.

4) Provision of Weather Information

Weather forecasting information are broadcasted via national and local radio, television, and published in daily newspapers. Also, it provide in internet. NHMS started providing to the company for Petrol Company, Railway and Waterway Company, however, not yet stating providing to private companies.

6.6 Fee Payment System (Telephone Service and Electric/Water Supply)

1) Fee Payment Method

The post-paid method is applied for electric fee, telephone fee and water supply fee. These will be a reference for toll road fare system.

Most of the cases, the payment is made in cash. Each service provider issues his own invoice and sends their staff to collect the fee separately during first 10 days of following month. Many bank started providing payment service for electricity, telephone, water supply, cable TV, etc. (may from 2004). However, the number of users is still limited.

Followings are some information on non-cash payment

(1) Electricity Fee: Reported in EVN Website on Dec. 1, 2009

Recently, 6 electricity units belonging to EVN, i.e. Hanoi Electricity, HCMCC Electricity, Dong Nai Electricity, Da Nang Electricity, Binh Thuan Electricity and Gia Lai electricity accept payment for electricity fee through the bank. In coming time, such payment method will be introduced through the country with various banks.

Following are the banks who cooperate with Electricity in electricity fee collection:

- (i) VCB: through ATM
- (ii) VietinBank: through ATM
- (iii) VIB: at bank transaction points
- (iv) BIDV: at bank transaction points; ATM or payment order
- (v) An Binh Bank: at bank transaction points; ATM or payment order, POS
- (vi) Citibank: internet banking

(2) Water Fee

Phu Hoa Tan water supply JSC (in Ho Chi Minh City) accepted the payment of water fee through bank as follows:

- (i) By payment order: The customer should request the bank to pay to water fee by issuing payment order.
- (ii) By the service of Call Center 247 of Asia Commercial Bank: Call Center 247 of ACB receives the call and makes the payment by order of customer on the basis of agreement between customer with the Bank made before. Firstly, customer should register for such service with Call Center of the Bank providing basic information of customer as mentioned in Monthly Water Fee Invoice (this step will be made one time). Every month, after receiving the invoice from water supply company, customer makes call to Call Center to instruct the payment, the Bank will make debit such customer's account to Water supply company account.
- (iii) By Dong A Bank debit card: based on the agreement between the bank and customer, every month the bank will automatically debit the water fee amount to water supply company.

Gia Dinh water supply company and Dong A Bank made agreement to deploy the e-banking transaction for water fee since May 28, 2009. Using internet banking, SMS banking and Mobile banking the customer can make the payment for water fee. Before that, Dong A Bank already provides the automatic debit services for water fee with Gia

Dinh water supply company.

Dong A Bank is deploying the payment services for electricity, water, telephone, internet, Manulife insurance premium in many provinces and city, such as HCMCC, Da Nang, Can Tho, Dak Lad, Hue, Binh Duong, Kien Giang, etc. In coming time, the Bank will widen their payment services with much more service providers.

(3) For Other Utilities

The situation may be the same with electricity and water supply fee collection because most of commercial banks in Vietnam provide such services.

2) Pre-paid System

According to the Decision No: 20/2007/QD-NHNN, which is "Promulgating the Regulation on issuance, payment, use of bank cards and provision of bank card operation support services (May 15, 2007), various cards including pre-paid card are identified as below.

(i) "Bank card" is an instrument issued by a card-issuing organization for conducting card transactions under the conditions and terms agreed upon by the involved parties.

Based on the scope of territory in which cards are used, cards are classified into domestic cards and international cards. And, based on financial sources to ensure the use of cards, cards are classified into debit cards, credit cards and pre-paid cards.

(ii) "Debit card" is a card permitting its holder to conduct card transactions within the amount of money available on the payment deposit account of the cardholder opened at a payment service-providing organization permitted to accept non-term deposits.

(iii) "Credit card" is a card permitting its holder to conduct card transactions within the credit limit granted under the agreement with the card-issuing organization.

(iv) "Pre-paid card" is a card permitting its holder to conduct card transactions within the value limit loaded on the card corresponding to the amount of money already prepaid by its holder to the card-issuing organization. Pre-paid cards include bearer pre-paid card and non-bearer pre-paid card (anonymous prepaid cards).

And, there are also regulated, (i) issuance of cards, (ii) use of cards, (iii) card payment, (iv) organization of card payment systems, (v) rights and responsibilities of parties, (vi) reporting, supply of information, and handling of breaches and (vii) implementation provisions.

After this decision, there are decision of the governor of the state bank of Vietnam No.32/2007/QD-NHNN (July 3, 2007) which shows the "Balance Limit of bearer pre-paid cards" regulated, it is regulated to be not in excess of 5,000,000 VND.

Other legal regulations for e-transaction are listed below.

(i) Law No.51/2005/QH11: Law of E-transaction

(ii) Decree No.57/2006/ND-CP: e-commerce/ transaction

(iii) Circular No.9/2008/TT-BTC: It is for guiding Decree No.57/2006/ND-CP

These are discussed as the issues when the transaction errors and lost of identification data.

Based on the results of interview, some bank has a plan to introduce the contactless IC card for multi-purpose in Vietnam.

6.7 Legal Regulations of Penalties (Toll Cheating and Overloading)

1) Law and regulations regarding to protecting a fraud

Relating to road traffic, the following regulations are used for the penalty for violating traffic rules.

- (i) Land road traffic Law on 2001, amended 2008
- (ii) Decree No.146/2007/ND-CP (Regulating the sanctioning of administrative violations in road traffic)
- (iii) Circular No.90/2004/TT-BTC (Guiding the collection, submission, management and utilization of toll road)
- (iv) Decision No.318/2003/QĐ-BGTVT (Regulating the responsibility and handling of organizations and individuals on management and administration of activities of toll collection on national highways managed by the state)

2) Penalty for Illegal Parking

This is regulated in Decree No.146/2007/ND-CP, which has warning notice, monetary penalty and supplementary sanctions (expropriating the permit, license, certificate forever or for a certain period; to confiscate exhibits, means which were used for such violations), for administrative violation.

Followings are fine rate for penalty of illegal stopping and/or parking.

Table 6.7.1 Fine Rates for Illegal Parking/ Stopping

Fine Rate	100,000–200,000 VND	200,000–600,000 VND	600,000–1,000,000 VND
Case	<ul style="list-style-type: none"> • stopping, parking the vehicle without giving signals to operators of other means en route; • stopping, parking vehicles on the carriageway of non-urban roads, which have with broad roadsides; temporary stopping, parking the vehicle not closely to roadside on the right along to running direction where the roadsides are narrow or not available; stopping, parking the vehicle in inappropriate places on the road where car stops and/or are available; parking the vehicle on the slope without chocking the wheels. • stopping, parking the vehicle at the sports: on the left side of one-way road, on winding road sections and near slope heads where visibility is restricted; on bridges, under flyovers, in parallel with other stopping or parking vehicles; at cross-sections; at bus stops; on road wide enough only for one lane; covering the road signboards; • stepping down from the car when stopping the car; opening car door or leaving the door open without safety conditions. • illegal stopping, parking vehicles urban road; on the electric railways • If all above violations cause accidents but not at serious level supplementary penalty would be given, i.e. expropriating driving licenses for 90 days, at serious level – timeless revoking driving licenses. 	<ul style="list-style-type: none"> • illegal stopping, parking vehicles on the road bed and roadside • If above violations cause accidents but not at serious level supplementary penalty would be given, i.e. expropriating driving licenses for 90 days, at serious level – timeless revoking driving licenses. 	<ul style="list-style-type: none"> • Stopping, parking vehicles causing traffic congestions . • stopping, parking vehicles, opening car doors causing accident (If violations cause accidents but not at serious level supplementary penalty would be given, i.e. expropriating driving licenses for 90 days, at serious level – timeless revoking driving licenses)

Source: VITRANSS 2 Study Team

3) Overloaded Truck

This is also regulated in Decree No.146/2007/ND-CP. The fines and supplementary

penalty will be given to the operator of cargo truck, tractor and other similar means.

Followings are fine rate for penalty of overloading.

Table 6.7.2 Fine Rates for Overloading

Fine Rate	500,000–1,000,000 VND	1,000,000–2,000,000 VND
Case	<ul style="list-style-type: none"> Volume of cargo exceeds from 10% to 40% of designed tonnage for the case of vehicles having designed tonnage under 5 tones, from 5% to 30% of the vehicle having designed tonnage from 5 tones Following supplementary penalties will given: i) to unload the exceed weight and expropriating driving license for 30 days 	<ul style="list-style-type: none"> Volume of cargo exceeds from 40% or more of designed tonnage for the case of vehicles having designed tonnage under 5 tones, from 30% or more of the vehicle having designed tonnage from 5 tones Following supplementary penalties will given: i) to unload the exceed weight and expropriating driving license for 30 days.

Source: VITRANSS 2 Study Team

Also, supper heavy and supper long freight transpiration is applied different regulation as below.

Table 6.7.3 Fine Rates for Supper Heavy and Long Vehicle

Fine Rate	500,000–1,000,000 VND	1,000,000–2,000,000 VND
Case	<ul style="list-style-type: none"> Transporting super-heavy or super-long goods not in accordance with circulation permit; without signs signaling sizes of goods Supplementary penalty: expropriating driving license for 30 days 	<ul style="list-style-type: none"> Transporting super-heavy or super-long goods without circulation permit Supplementary penalty: expropriating driving license for 60 days

Source: VITRANSS 2 Study Team

4) Toll Payment Fraud

There are not regulated by numerous penalty when the driver cheating the toll rate. It is only described that violations should be forced fully paying of toll amount and be according to current provisions of laws.

6.8 Cross-border Vehicle Control

1) Bilateral Agreements

Vietnam is located surrounded the neighbor countries, so that the demands of communication has been increased. Since late of 1990's, the bilateral agreements are developed in step by step. The table below shows the summary of bilateral agreements for cross-border transportation.

Table 6.8.1 Fine Rates for Supper Heavy and Long Vehicle

	Vietnam - China	Vietnam - Lao	Vietnam - Cambodia
Legal Document	<ul style="list-style-type: none"> • Agreement between Vietnam and China on road transport dated Nov. 22, 1994; • Protocol of implementation of above agreement was signed between VN MOT and China MOT on June 3, 1997; • Circular No. 258/1998/TT-BGTVT dated Aug. 18. 1998 of VN MOT on guiding the implementation of above agreement and protocol. 	<ul style="list-style-type: none"> • Agreement between Vietnam and Lao on road transport dated Feb. 24, 1996; • Protocol of implementation of above agreement dated May 1st, 1996. • Agreement for cross border transport was concluded on Apr. 23, 1994 replacing the above agreement, however it didn't come into force because the Protocol of its implementation was not available yet; • Agreement between Vietnam and Lao on cross border movement of peoples, vehicles and goods dated Sep. 14, 2007. • Protocol of implementation of Agreement for transport for amending and supplementing the Agreement dated July 18, 2001. • Circular No. 17/2005/TT-BGTVT of Vietnam MOT dated Dec. 22, 2005 providing guideline on implementation of Protocol 2001 dated July 18, 2001 between Vietnam MOT and Lao Ministry of Transport, Post and Construction. 	<ul style="list-style-type: none"> • Agreement between Vietnam and Cambodia on road transport dated June 1, 1998; • Protocol of implementation of above agreement dated Oct. 10, 2005. • Circular No. 10/2006/TT-BGTVT of Vietnam MOT dated Nov. 1, 2006 providing guideline on implementation of above mentioned Agreement.
Allowable Operation Area/ Route	<ul style="list-style-type: none"> • Freight and passenger vehicles (including tourist ones) and luggage are admitted to pass borders from picking up points of home country to setting down points of host country and vice versa. • Picking up points (transfer point) are located at border provinces of two countries (This is the different point to the agreements with other countries.) 	<ul style="list-style-type: none"> • Freight and peoples transportation vehicle should run directly from picking up point to setting down point. • Scheduled passenger transportation vehicles between Vietnam and Lao should depart and arrive at bus terminals in accordance with the regulation. (Vehicles are admitted to operate on the routes specified in its transportation permit) 	<ul style="list-style-type: none"> • Scheduled passenger vehicles are admitted to run from Vietnamese bus terminals to Cambodian bus terminals and vice versa. • Contracted passenger (incl. tourist) vehicles and taxi are admitted to run from inside territory of Vietnam to inside territory of Cambodia and vice versa. • Freight vehicles are admitted to run from picking up point in Vietnam to setting down point in Cambodia and vice versa.
Nos. of allowed vehicles	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • Non limited 	<ul style="list-style-type: none"> • 150 vehicles
Required Document	<ul style="list-style-type: none"> - Registration certificate • Label of Certification record of periodical inspection. • Driving license • Evidence of third-party motor vehicle liability • Vietnam–China transportation permits and badge. • Typical badge of Vietnam: VMT (Vietnam Motor Transportation) • Typical badge of China: CMT (China Motor Transportation) 	<ul style="list-style-type: none"> - 	<ul style="list-style-type: none"> • Registration certificate and number plate issued by Vietnam or Cambodia. • National special plate (For Vietnam: VN, For Cambodia: KH) • National special plate should be hanged on back side of vehicle separately from number plate.

Source: VITRANSS 2 Study Team

Followings show the formalities and procedures for entry and exit at international border gates for Vietnam, Lao, Cambodia and China.

(a) Required Documents

- (i) Procedure for peoples: passport, visa, driving license, health inspection.
- (ii) Procedure for vehicle: registration certificate, certification record for periodical inspection, pass - border transport permit.
- (iii) Procedure for goods transport: custom formalities, quarantine, consignment note, bill of lading
- (iv) Procedure for passenger transport: list of passengers and luggage

(b) Document Verification

- (i) For vehicles
 - Valid registration certificate;
 - Badge and valid certification record for periodical inspection;
 - Pass border transportation permit;
 - Special plate

Figure 6.8.1 Sample of Badge to be Passed at the above Right Conner of Front Glass



Source: VITRANSS 2 Study Team

- (ii) For crew and passengers
 - Valid original driving license and its translation
 - Valid passport or equivalent documents and valid visa (if required)
 - (iii) Other requirements
 - Above mention documents should have original and notarized translation if bilingual version is not available.
 - Freight and passenger (incl. tourist) vehicles of one contracting party when operating in the territory of the other contracting party, shall be prohibited to pick-up goods, passengers (incl. tourists) from any point for setting down or delivery at any point in latter contracting party's territory except for those authorized by the Government of one contracting party to operate in its territory.
- (c) Supplementary documents
- (i) For schedule passenger vehicles
 - List of passenger
 - Itinerary records and badge of scheduled passenger vehicles as regulated by MOT.
 - Number of luggage
 - (ii) For contracted passenger vehicles (incl. tourists) and taxi
 - List of passengers (not applicable to taxi);

- Badge as regulated by MOT.
- Taxi vehicle should have “Taxi” board on the top of vehicle.

Figure 6.8.2 Sample of Pass Border Permit for Vietnam–Lao



Source: VITRANSS 2 Study Team

(iii) For freight transportation

- Consignment note in stipulated Format

2) GMS International Corridors

It is now hottest discussion with GMS international corridors. For Vietnam, there are North–South Economic Corridor (NSEC) and East-West Economic Corridor (EWEC).

(1) North–South Economic Corridor (NSEC)

Figure 6.8.3 North-South Economic Corridor



Source: Toward Sustainable and Balanced Development: a Strategy and Action Plan for the Gms, North-South Economic Corridor Revised Draft, 4 February 2009

The bottleneck for international transportation is pointed out the wasted time at border crossing. Following table is an example from China to Vietnam.

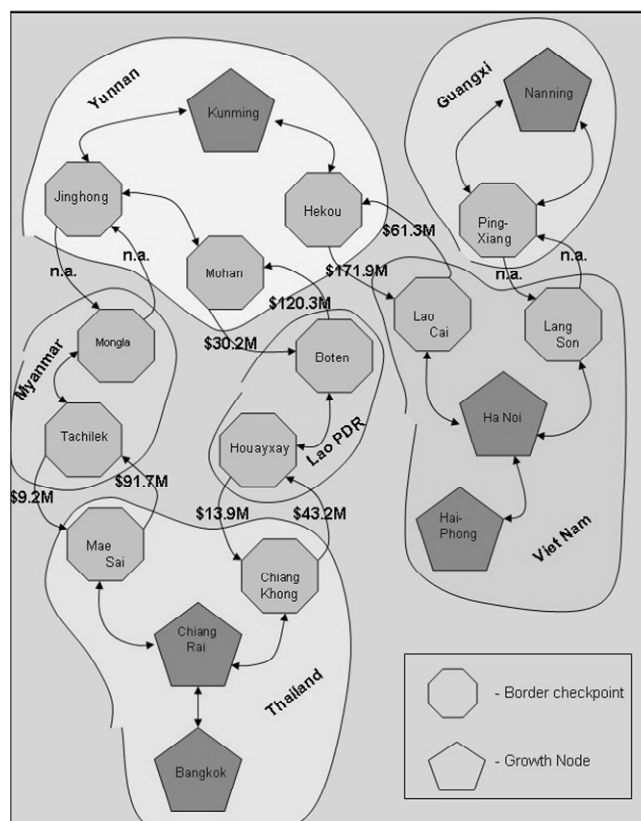
Table 6.8.2 Distance and Travel Time required from China to Vietnam

Nanning-Ha Noi Section	Distance	Travel Time
Nanning-Youyiguan Expressway	179 km	2 hours
Youyiguan - Lang Son (Huu Nghi) border crossing	-	> 48 hours
Lang Son-Ha Noi Highway (Future expressway)*	161 km (about 125 km)	3 hours (1.5 hours)
Total	340 km	> 53 hours (> 51.5 hours)

Source: 12th Meeting of the Subregional Transport Forum, 2008/08, ADB
 * The expressway will be opened in 2015 at an estimated cost of about \$750 million.

Even this situation, international trade is already activated and has been increasing. Therefore, future expressway in Vietnam will be faced not only Vietnamese vehicles but also other countries one. Figure right shows the volume of trade among GMS countries. Note that the volume of trade between Lao Cai and Hekou was summed up 233 million us\$ in 2005. It is biggest trade in GMS regions.

Figure 6.8.4 NSEC Cross-Border Trade, 2005



Source: M. Lord, "The North-South Economic Corridor: Progress Towards a Full-Fledged Economic Corridor", report prepared for the ADB, August 2007; R. Banomyong, "Logistics Development Study of the North-South Economic Corridor", report prepared for the ADB, May 2007.

Note: Figure for Mohan-Boten is for Yunnan-Chiang Rai trade.

(2) East–West Economic Corridor (EWEC)

The international transport on East-West Economic Corridor (EWEC) is boomed because of the open of international bridge named as Second Friendship Bridge.

Figure 6.8.5 East-West Economic Corridor



Source: Toward Sustainable and Balanced Development: a Strategy and Action Plan for the Gms, North–South Economic Corridor Revised Draft, 4 February 2009

The new Cross-Border Transport Agreement (CBTA) with Vietnam, Laos and Thailand has been started for the scheme allowing trucks to drive across the three countries without stopping on 11 June, 2009.

Permits have initially been granted for 1,200 commercial vehicles, 400 in each country, allowing them to be fast tracked at border-crossing check points, greatly reducing overland transport time.

Figure 6.8.6 New Cross-border Transport Agreement



Source: VRA magazine So 7, July, 2009

Apart from above agreement, in general, custom matters are regulated in Circular No. 47/2004/TT-BTC (May 31, 2004). It is guiding the customs procedures, the regime of customs inspection and supervision and the tax policies for goods traded across borders with the bordering countries under the prime minister's Decision No. 252/2003/QD-TTG (November 24, 2003).

6.9 Telecommunication Service

1) Target and Plan for Telecommunication Development in Vietnam

According to the Decision No 32/2006/QĐ-TTĐ, dated 07/02/2006 “approval planning development telecommunication and internet Vietnam to 2010”, there are 5 targets and plans toward the development of telecommunication and internet in Vietnam to 2010 as below.

- (i) Building & developed infrastructure telecommunications with modern technology across the countries in the regions, with the coverage throughout the country with the larger capacity, high quality, have provided services and activities effective.
- (ii) Telecommunications and Internet sectors to become key economic, that proportion of the contribution to GDP growth increased, creating more jobs in society. Growth reached 1.5 to 2 times higher than growth of the economy to 2010, total revenue telecommunications services and Internet reach about 55 thousand billion VND (3.5 billion USD)
- (iii) Provide telecommunications services and Internet with good quality, reasonable rates to meet the diverse needs of the user service.
- (iv) Ensuring safety and security information for the application and development of information technology and communications in all fields of political, economic, social.
- (v) Popularize telecommunications and Internet in the overall country, shorten the distance on service use among regions, domain, create conditions to promote economic development, society, and contribute to ensuring security and defense.

2) Government Management Bodies

The government management bodies for infrastructure for information/ communication network are two organizations with deferent roles.

Ministry of Information and Communication (MIC) is the Government implementing management state

Responsibilities: Press, publishing; Postal and delivery; Telecommunications and internet; Broadcast media to use; frequency hertz; Information technology, electronics; Radio and television, Infrastructure, information communication national

Duties: To instruct, guide, issued, a renewable, temporary suspension, the management of quality, price, charge, manage the connection, the appropriate certification standards, management of the service provider, operating, exploiting security, security system server domain country

Posts and Telemetric Quality Control Directorate (PTQC) is a functional administration under Ministry of Information and Communication (MIC) executing its nation-wide regulatory functions on testing, verifying, assessing and certifying standard conformity of networks, products and services in the fields of post, telecommunications, electronics, information technology and Internet.

3) Service Providers for Communication Network

There are various service providers for communication network for fixed network and mobile network. The summary of these providers are described in table below.

Table 6.9.1 List of Communication Service Providers

Type of Communication Network	Fix Network		Mobile Network	
Service Provider	Viettel VNPT EVN Telecom	These are holding Backbone Infrastructure and leasing business for it.	MobiFone (41%) VinaPhone (20%) Vittel (34%)	GSM
	CMC Telecom Saigon Postel VTC FPT Telecom	These are terminal service provider for internet.	S-Fone (3%) EVN Telecom (2%) HT Mobile	CDMA

Source: Study Team (%) is market share for 1st quarter in 2009

(1) Backbone Telecommunication Infrastructure

Regarding to the ITS solution on expressway, one of the possibility is creating the new backbone telecommunication infrastructure lying optical fiber cable under the expressway. Also, in the stage of development of expressway, if ITS solution requires the connection with whole country for use of information communication as traffic control and ETC, some sections where it is under connected should be used the backbone line of above companies one.

Therefore, in this report, study team had conducted several interviews to above three companies to acquire the current conditions for backbone infrastructure for each company. The results of interviews are summarized in table blow.

Table 6.9.2 Characteristics of Backbone Communication Infrastructure

	Viettel	VNPT	EVN Telecom
Current Network Length, Laying, Communication Type	<ul style="list-style-type: none"> • 58,000 km of optical fiber cable (International Connection with Cambodia and Laos) • 18,000 Bay Transmission Station (BTS), every 400 m in urban, 800 m-1 km in rural area • National Level: DWDM, Ethernet/IP (10-40Gbit) • Provincial Level: TDM/IP, STM64 • District Level: TDM/IP, STM16 • Laying: Overhead (Hanged) 	<ul style="list-style-type: none"> • 5,000 km of optical fiber cable for intercity and 30,000 km of Metal Network for district • Laying: underground in 1m depth on national highway • DWDM, 80 Gbit and 60 Gbit 	<ul style="list-style-type: none"> • 40,000 km of optical fiber cable • Laying: parallel with the 500 kV and 220 kV electricity lines • 10 Gbps
Plan for Development	<ul style="list-style-type: none"> • Not necessary to expand their network • Plan of satellite system for remote area connection • Improvement of quality • Easy to expand capacity 	<ul style="list-style-type: none"> • Expand of capacity to 200 and 240 Gbit • Expand of backbone network • Undersea cable along coastal area 	<ul style="list-style-type: none"> • Expand of capacity to 40 Gbps

Source: Interview conducted by Study Team

(2) Mobile Phone Coverage

For considering the availability for use mobile phone on expressway, study team collected the coverage of mobile phone of GSM system.

Table 6.9.3 Characteristics of Backbone Communication Infrastructure

	Coverage in Vietnam	Share %
Viettel GSM900		34%
Mobifone GSM900		41%
VINAPHONE GSM900		20%

Legend: ■ High, ■ Variable
 Source: GSM Coverage Website

6.10 Legal Regulations for Radio Waves

For the usage of ETC with 5.8 GHz radio communication, it is required to get permission by following procedure under the sets of law and regulations.

- (i) Order by President, No 13/2002/L/CTN, about ordinance "Ordinance postal, telecommunications" dated 07/06/2002
- (ii) Decree No. 24/2004/ND-CP of the Government "Regulation of implementation some terms of ordinances of Post and Telecommunications about radio frequency", dated 14/01/2004
- (iii) Decree of the government, no 42/2004/ND-CP, "Regulation of penalty about Post, telecommunications about radio frequency", dated 08/7/2004
- (iv) Decision by Minister of Finance No. 22/2005/QĐ-BTC "To release the level of fees to get a licensed radio frequency and cost of using radio frequency", dated 11/04 / 2005
- (v) Decision of the Prime Minister No. 336/2005/QĐ-TTg "About on approving the plan of national radio frequency", dated 16/12/2005
- (vi) Decision of the Ministry of Finance, no 61/2007/QĐ-BTC, "modification, addition decision 22/2005/QĐ-BTC dated 11/4/2005 by MOF issued the level of fees licensed radio frequency and free use of radio frequency" dated 12/07/2007
- (vii) Decision of Prime Minister, no 88/2008/QĐ-TTg, about "Defining the functions, duties, powers and organizational structure of the radio frequency Directorate, subordinate of Ministry of information and communications", dated 04/07/2008
- (viii) The draft "Law of radio frequency" of National Assembly, is expected through in 10/2009

All organizations and individuals (users) to use frequency band, radio frequency (frequency) and broadcasting equipment (devices) must be licensed by following procedure.

- (i) License application
- (ii) Copy notarized or certified according to the law "decide to establish the organization / certificate of business registration for domestic enterprises
- (iii) Copy notarized or certified by the law permit setting up the network and provide telecommunications services.
- (iv) Project established network of radio frequency (including: the purpose, scope and operation, network configuration, technology used"
- (v) Registered document of the radio frequency equipments (form regulated by the Ministry of Information and Communications).

Required time for permission is said to be about one month from submitting the application.