Annex 11.1 USER SUB-SERVICE

This section describes in detail the thirty six (36) user sub-services. The contents of user sub-service are as follows:

- Objective of user sub-service
- Physical model of user sub-service
- Number of ITS items/equipment
- Proposed equipment and how to assume the geometry
- System configuration, equipment list and estimated cost

1. Traffic Signal Control Sub-service

1.1 Objectives of User Sub-service

- To performs precise signal phase control for safety and smooth traffic both for pedestrians and vehicles at intersection, arterial road and area.
- To perform real-time measurement of traffic demand as well as appropriate signal control corresponding to traffic condition.

1.2 Physical model of User Sub-service

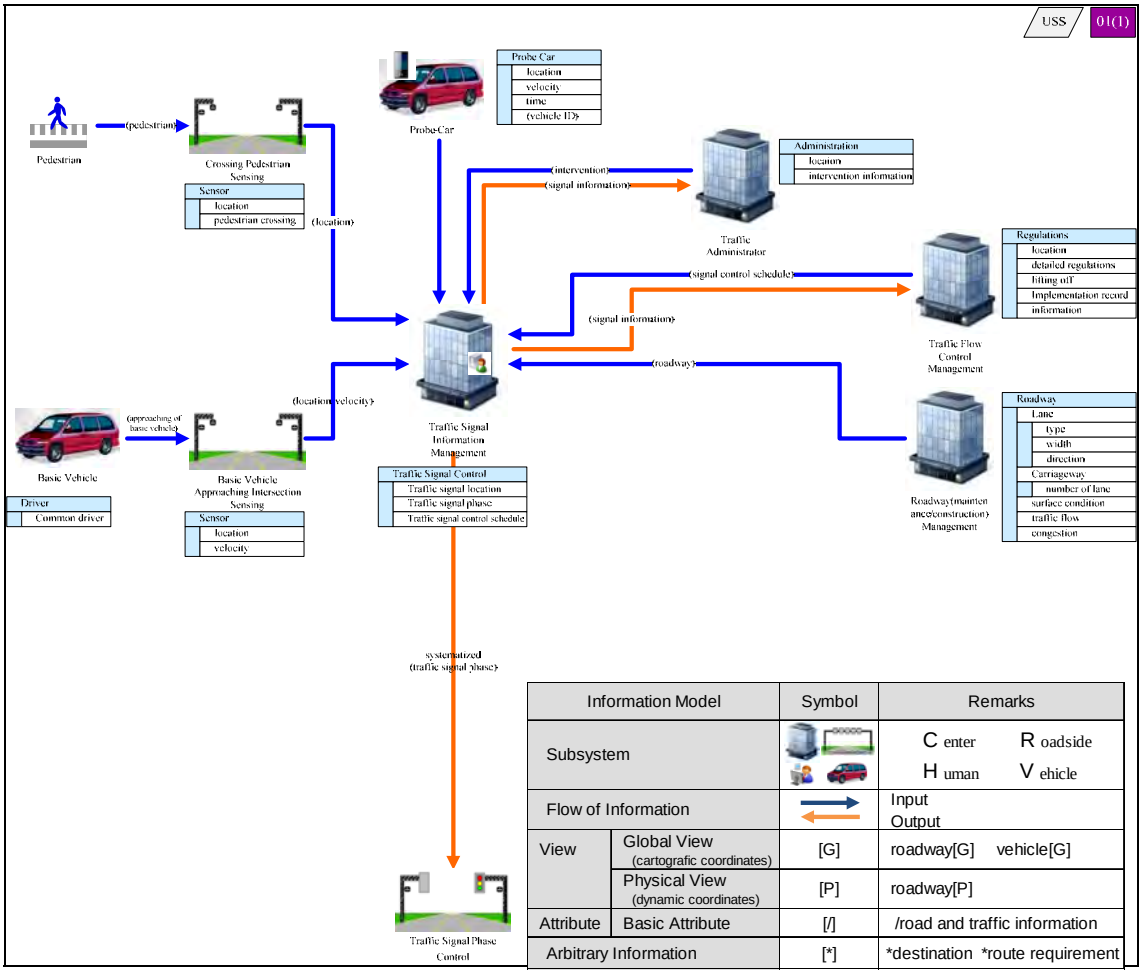


Figure 1-1 Physical Model of Traffic Signal Control

1.3 Implementation

(1) Metro Manila

1st Stage: 85 intersections

(Number of Signalized in Region 1 (98) without Phase 1 (22))

2nd Stage : 120 intersections

(Number of Signalized in Region2 (98) and Region3 (72) without Phase1 (85))

3rd Stage : 295 intersections (to be implemented in 500 intersections in Metro Manila)
(without Phase 1 (85) and Phase 2 (120))

Table 1-1 Number of Signalized Intersection under MMDA

REGION 1
Number of Signalized Intersection : 89
Cover Area : North part of Manila including Caloocan and a part of Quezon City
(Implementation Project of Phase 1: 15 in Caloocan)

REGION 2
Number of Signalized Intersection : 98
Cover Area : West/South part of Manila
(Implementation Project of Phase 1: 22 in Manila)

REGION 3
Number of Signalized Intersection : 72
Cover Area : East part of Manila, San Juan, Quezon City and Marikina City
(Implementation Project of Phase 1: 19 in Quezon)

REGION 4
Number of Signalized Intersection : 72
Cover Area : Makati, Pasay, Parañaque, Pasig, Mandaluyong and Muntinlupa
(Implementation Project of Phase 1: 26 in Caloocan)

Source: MMDA

(2) Mega Manila

A total of 112 intersections spread in the regions as shown in the table below.

Table 1-2 Estimated Number of Signalized Intersection control by DPWH

Targeted Road and Area	Estimated Number of intersections
Manila North Road	66
Region III	42
Region IV-A	4
Total	112

Source : DPWH

1.4 Implementation Method

1) Data Collection of Equipment

a) Vehicle Detector: To assume Image Recognition type. Vehicle Detector installed at four locations of each signalized intersection.

b) CCTV: One unit of PTZ Camera installed per signalized intersection.

c) OBU (for FCD collection) :

It is assumed that a driver and the private company that arrange Flooding Car

Data Equipment in themselves basically, but arrange Patrol Car of MMDA/DPWH. MMDA owns six (6) Patrol Cars for enforcement. DPWH assume Patrol Car to be twenty because they do not hold it for transportation management.

2) Data Processing of Equipment

a) Traffic Flow Control: Collection of floating car data and traffic volume data. This is installed at the centre.

b) Traffic Signal Information Management: Controls signal based on floating car data, traffic volume data and CCTV image. This is installed at the centre.

c) Roadway Management: Database for road inventory. This is installed at the centre.

d) CCTV Monitoring: Monitoring of CCTV image. This is installed at the centre.

3) Information Provision Equipments

a) Traffic Signal: Traffic signal is installs at four locations according to direction to each signalized intersection.

b) Traffic Light Controller: Traffic light controller is installed at each signalized intersection.

c) Pedestrian Signal: Pedestrian signal is installed to eight signalized intersection.

d) Countdown Timer: Countdown timer is installed at four locations of each signalized intersection.

e) Floating Car Data Collection: Smartphone application for collection of floating car data distributed by internet website.

1.5 System Configuration and Equipment List

The system configuration to provide appropriate signal control according to a traffic condition and the list of requirement specifications of the equipment and software is shown in Figure 1-2.

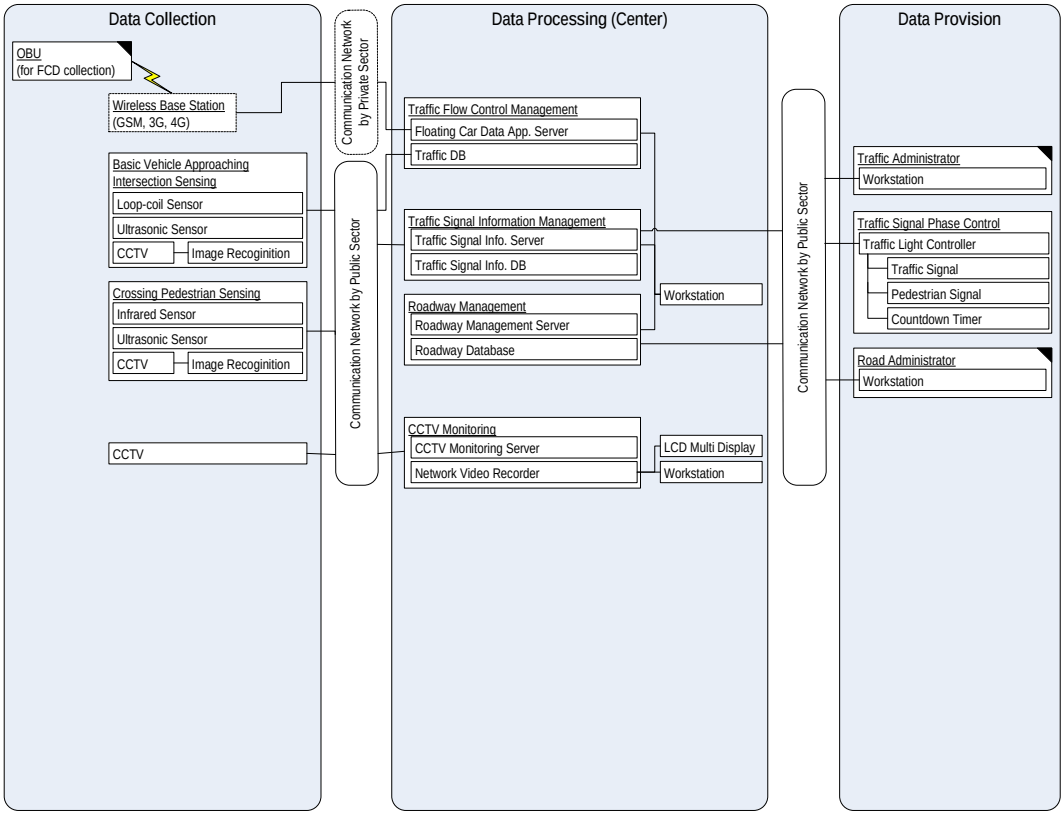


Figure 1-2 System communication diagram of Traffic Signal Control

Table 1-2 List of equipment and functions of Traffic Signal Control

No.	Equipment Component	Requirements Specification	Unit	Qty. (Metro)	Qty. (Mega)
Centre Equipment					
C-1	Application Server	Shall be redundant system Shall be able to process the gathered data from all roadside equipment Shall have Web Application Server Service Shall have high availability Shall be low incident of morbidity rate as the service stop Shall be able to quick recovery Shall be support for secure communication Shall be able to act the several programming language	Pcs	4	4
C-2	Database Server	Shall be redundant system Shall be able to the data storage Shall be RDBMS Shall be able to associate with other database	Pcs	3	3
C-3	Workstation	Shall be able to startup and display each software Shall be able to operate each software Shall be OS the Windows or Linux Shall have Graphical User Interface	Pcs	2	2
C-4	Network Video Recorder	Shall be able to recording CCTV image Shall be support for multiple file format Shall have high capacity Shall be easy to the export of data	Pcs	1	1
C-5	LCD Multi Display	Shall be able to display on image Shall be support for multi display	Pcs	4	4
Center Software					
S-1	Traffic Signal Information Management	Shall be able to analyze of the various gathering data Shall have the automatic processes of the traffic signal Shall be able to system control of the multi traffic signal Shall be able to area control of the multi traffic signal Shall have the hand-operated control process of the traffic signal	Set	1	1
S-2	Traffic Flow Control Management	Shall be able to analyze of traffic flow Shall have capability the management of traffic flow Shall be able to set up a signal control schedule Shall be able to management of regulation information	Set	1	1

No.	Equipment Component	Requirements Specification	Unit	Qty. (Metro)	Qty. (Mega)
S-3	Roadway Management	Shall be able to input road inventory data Shall be able to input road condition survey data Shall be able to input road construction data Shall be able to browse road inventory data Shall be able to browse congestion information	Set	1	1
S-4	CCTV Monitoring	Shall be able to real-time play to image Shall be able to recording image automatically Shall be able to display on multi image simultaneously Shall be able to play image which was recorded Shall be able to operate camera which was selected	Set	1	1
Roadside Equipment					
R-1	Infrared Sensor	Shall be able to sense the movement of the person Shall have data conversion by perception information	Pcs		
R-2	Ultrasonic Sensor	Shall be able to sense a vehicle or person by ultrasonic Shall be able to count a vehicle or person･Shall be able to send to data	Pcs		
R-3	CCTV (FIX Type)	Shall be able to film as an image Shall be able to send image to a processor	Pcs	304	112
R-4	Image Recognition Processor	Shall have data conversion by image recognition Shall be able to send to data	Pcs	304	112
R-5	Loop-coil Sensor	Shall be able to sense a vehicle or person by loop-coil Shall be able to count a vehicle or person Shall be able to send to data	Pcs		
R-6	Traffic Signal	Shall light three color of red and yellow and green Shall light according to instructions from a panel	Pcs	304	448
R-7	Traffic Light Controller	Shall be able to receive control pattern from Centre Shall change lighting of the traffic signal according to control pattern	Pcs	76	112
R-8	Pedestrian Signal	Shall light two color of red and green Shall blink green light Shall light according to instructions from panel	Pcs	608	896
R-9	Countdown Timer	Shall be able to display on countdown before changing in green	Pcs	304	448
R-10	CCTV (PTX Type)	Shall be able to film as an image Shall be able to send image on internet connection Shall be able to Pan and Tilt and Zoom Shall be support for multi codec	Pcs	76	112
Human Equipment					
H-1	Floating Car Data Collection	Shall be able to sense the movement of the car Shall have data conversion by perception information	Set	1	1
Vehicle Equipment					
V-1	OBU	Shall be able to positioning by GPS Shall be able to send a vehicle data Shall be able to receive information	Pcs	6	20

Table 1-3 Cost Estimated of Traffic Signal in Metro Manila (Phase-1)

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
									-
	Roadside Equipment								-
R-6	Traffic Signal	pcs	387,125.00	58,068.75	445,193.75	820.00	365,058,875.00	-	365,058,875.00
R-7	Traffic Light Controller	pcs	248,126.75	37,219.01	285,345.76	205.00	58,495,881.31	-	58,495,881.31
R-8	Pedestrian Signal	pcs	198,534.00	29,780.10	228,314.10	680.00	155,253,588.00	-	155,253,588.00
R-9	Countdown Timer	pcs	277,915.00	41,687.25	319,602.25	410.00	131,036,922.50	-	131,036,922.50
	Total						**709,845,266.81**	-	**709,845,266.81**

Table 1-4 Cost Estimate of Traffic Signal in Metro Manila (Phase-2)

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TPTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-3	Workstation	pcs	256,725.00	38,508.75	295,233.75	2.00		590,467.50	590,467.50
C-4	Network Video Recorder	pcs	694,787.50	104,218.13	799,005.63	1.00		799,005.63	799,005.63
C-5	LCD Monitor	pcs	94,458.50	14,168.78	108,627.28	4.00		434,509.10	434,509.10
									-
	Centre Software								-
S-1	Traffic Signal Information Management	set	39,702,847.25		39,702,847.25	1.00	39,702,847.25		39,702,847.25
									-
	Roadside Equipment								-
R-5	Image Recognition Processor	pcs	1,091,814.75	163,772.21	1,255,586.96	1,324.00	1,662,397,138.35		1,662,397,138.35
R-6	Traffic Signal	pcs	387,125.00	58,068.75	445,193.75	1,324.00	589,436,525.00		589,436,525.00
R-7	Traffic Light Controller	pcs	248,126.75	37,219.01	285,345.76	331.00	94,449,447.39		94,449,447.39
R-8	Pedestrian Signal	pcs	198,534.00	29,780.10	228,314.10	2,648.00	604,575,736.80		604,575,736.80
R-9	Countdown Timer	pcs	277,915.00	41,687.25	319,602.25	1,324.00	423,153,379.00		423,153,379.00
R-10	CCTV Camera (PTZ Type)	pcs	282,886.50	42,432.98	325,319.48	331.00	-	107,680,746.23	107,680,746.23

Table 1-5 Cost Estimate of Traffic Signal in Mega Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-3	Workstation	pcs	256,725.00	38,508.75	295,233.75	2.00		590,467.50	590,467.50
C-4	Network Video Recorder	pcs	694,787.50	104,218.13	799,005.63	1.00		799,005.63	799,005.63
C-5	LCD Monitor	pcs	94,458.50	14,168.78	108,627.28	4.00		434,509.10	434,509.10
									-
	Centre Software								-
S-1	Traffic Signal Information Management	set	39,702,847.25		39,702,847.25	1.00	39,702,847.25		39,702,847.25
									-
	Roadside Equipment								-
R-5	Image Recognition Processor	pcs	1,091,814.75	163,772.21	1,255,586.96	112.00	140,625,739.80		140,625,739.80
R-6	Traffic Signal	pcs	387,125.00	58,068.75	445,193.75	448.00	199,446,800.00		199,446,800.00
R-7	Traffic Light Controller	pcs	248,126.75	37,219.01	285,345.76	112.00	31,958,725.40		31,958,725.40
R-8	Pedestrian Signal	pcs	198,534.00	29,780.10	228,314.10	448.00	102,284,716.80		102,284,716.80
R-9	Countdown Timer	pcs	277,915.00	41,687.25	319,602.25	448.00	143,181,808.00		143,181,808.00
R-10	CCTV Camera (PTZ Type)	pcs	282,886.50	42,432.98	325,319.48	112.00	-	36,435,781.20	36,435,781.20
R-2	CCTV Camera (FIX Type)	pcs	282,886.50	42,432.98	325,319.48	112.00	-	36,435,781.20	36,435,781.20
	Total						**657,200,637.25**	**98,126,794.63**	**755,327,431.88**

2. Priority Signal to PUVs Sub-service

2.1 Objectives of User Sub-service

- To detect intersection proximity of PUVs (buses, jeepneys, etc.) and enables priority passage of such vehicles, in order to support enhancement of public transportation efficiency as well as safe and smooth vehicle operation management.

2.2 Physical model of User Sub-service

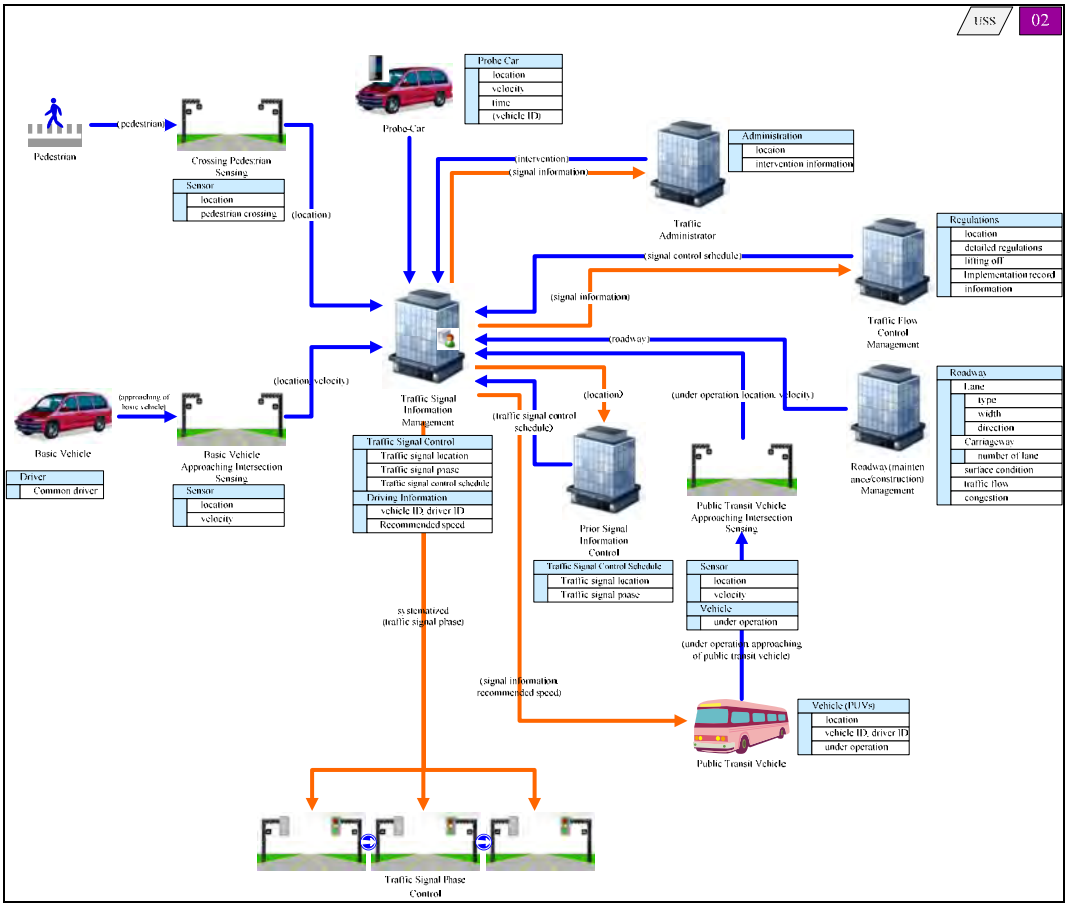


Figure 2-1 Physical/Control model of Priority Signal to PUVs

2.3 Implementation

(1) Metro Manila

415 intersections (Targeted number of signalized (500) without Phase 1 (85))

(2) Mega Manila

112 intersections as shown in the table below.

Table 1-3 Estimated Number of Signalized Intersection under DPWH

Targeted Road and Area	Estimated Number of intersections
Manila North Road	66
Reigion III	42
Region IV-A	4
Total	112

Source : DPWH

2.4 Implementation Method

1) Data Collection of Equipment

a) RFID Reader: RFID Reader installed at four locations of each signalized intersection. 415 intersections x 4 pcs = 1660 pcs

2) Data Processing of Equipment

a) Traffic Signal Information Management: Controls signal based on Floating Car Data, Traffic Volume Data and CCTV image. This is installed at the centre.

b) Traffic Flow Control: Collection of Floating Car Data and Traffic Volume Data. This is installed at the centre.

c) Roadway Management: Database for road inventory. This is installed at the centre.

d) CCTV Monitoring: Monitoring of CCTV image. This is installed at the centre.

3) Information Provision Equipments

a) Traffic Light Controller: To receive information provided by RFID Reader and affect the signal to be controllable. One unit of traffic light controller installed per signal intersection. 415 intersections x 1 pcs = 415 pcs

2.5 System Configuration and Equipment List

The system configuration to conduct the signal control that PUV's can pass preferentially and the list of requirement specifications of the equipment and software is shown below.

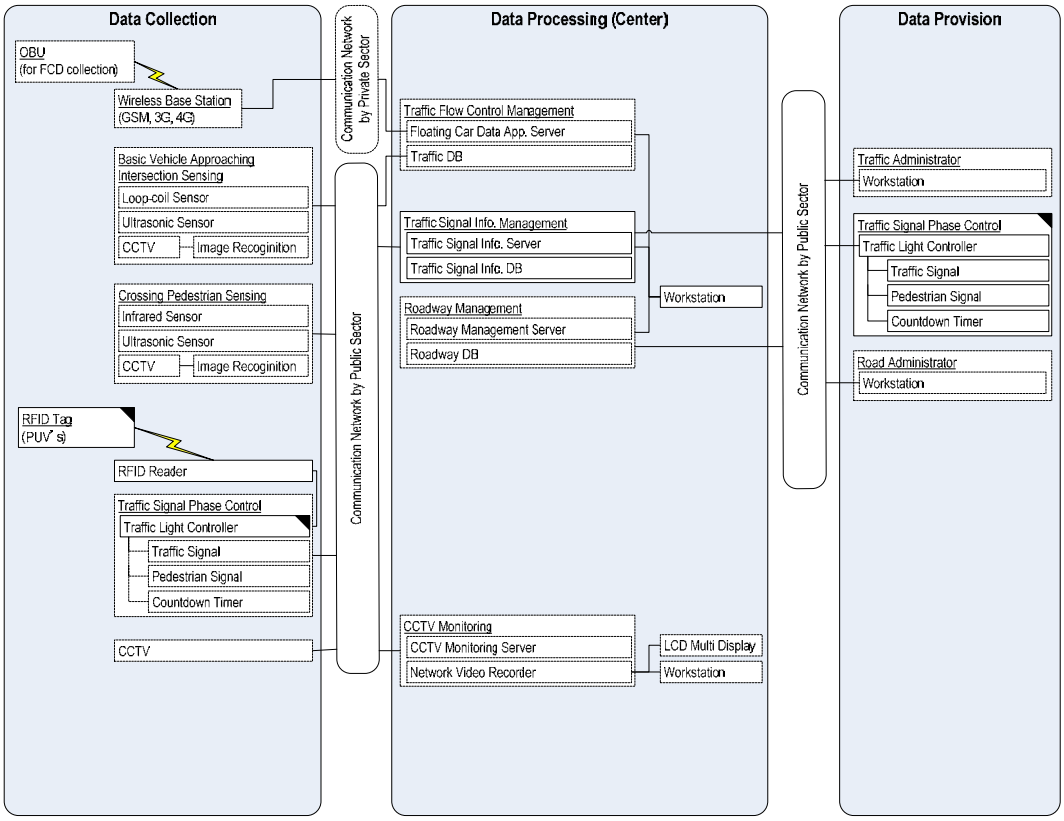


Figure 2-2 System Configuration of Priority Signal to PUV's

Table 2-1 System Requirement Priority Signal to PUV's

No.	Equipment Component	Requirements Specification	Unit	Qty. (Metro)	Qty. (Mega)
Centre Equipment					
C-1	Application Server	Shall be redundant system Shall be able to process the gathered data from all roadside equipment Shall have Web Application Server Service Shall have high availability Shall be low incident of morbidity rate as the service stop Shall be able to quick recovery Shall be support for secure communication Shall be able to act the several programming language	Pcs	4	4
C-2	Database Server	Shall be redundant system Shall be able to the data storage Shall be RDBMS Shall be able to associate with other database	Pcs	3	3
C-3	Workstation	Shall be able to startup and display each software Shall be able to operate each software Shall be OS the Windows or Linux Shall have Graphical User Interface	Pcs	2	2
C-4	Network Video Recorder	Shall be able to recording CCTV image Shall be support for multiple file format Shall have high capacity Shall be easy to the export of data	Pcs	1	1
C-5	LCD Multi Display	Shall be able to display on image Shall be support for multi display	Pcs	4	4
Center Software					
S-1	Traffic Signal Information Management	Shall be able to analyze of the various gathering data Shall have the automatic processes of the traffic signal Shall be able to system control of the multi traffic signal Shall be able to area control of the multi traffic signal Shall have the hand-operated control process of the traffic signal	Set	1	1
S-2	Traffic Flow Control Management	Shall be able to analyze of traffic flow Shall have capability the management of traffic flow Shall be able to set up a signal control schedule	Set	1	1

No.	Equipment Component	Requirements Specification	Unit	Qty. (Metro)	Qty. (Mega)
		Shall be able to management of regulation information			
S-3	Roadway Management	Shall be able to input road inventory data Shall be able to input road condition survey data Shall be able to input road construction data Shall be able to browse road inventory data Shall be able to browse congestion information	Set	1	1
S-4	CCTV Monitoring	Shall be able to real-time play to image Shall be able to recording image automatically Shall be able to display on multi image simultaneously Shall be able to play image which was recorded Shall be able to operate camera which was selected	Set	1	1
Roadside Equipment					
R-1	CCTV (FIX Type)	Shall be able to film as an image Shall be able to send image to a processor	Pcs		
R-2	Image Recognition Processor	Shall have data conversion by image recognition Shall be able to send to data	Pcs		
R-3	Loop-coil Sensor	Shall be able to sense a vehicle or person by loop-coil Shall be able to count a vehicle or person Shall be able to send to data	Pcs		
R-4	Ultrasonic Sensor	Shall be able to sense a vehicle or person by ultrasonic Shall be able to count a vehicle or person Shall be able to send to data	Pcs		
R-5	Infrared Sensor	Shall be able to sense the movement of the person Shall have data conversion by perception information	Pcs		
R-6	Traffic Signal	Shall light three color of red and yellow and green Shall light according to instructions from a panel	Pcs		
R-7	Traffic Light Controller	Shall be able to receive control pattern from Centre Shall change lighting of the traffic signal according to control pattern	Pcs	195	112
R-8	Pedestrian Signal	Shall light three color of red and yellow and green Shall light according to instructions from a panel	Pcs		
R-9	Countdown Timer	Shall be able to receive control pattern from Centre Shall change lighting of the traffic signal according to control pattern	Pcs		
R-10	RFID Reader	Shall be able to receive RFID tag information Shall be able to send RFID tag information`	Pcs	780	448
R-11	CCTV	Shall be able to film as an image Shall be able to send image on internet connection Shall be able to Pan and Tilt and Zoom Shall be support for multi codec	Pcs		
Vehicle Equipment					
V-1	OBU	Shall be able to positioning by GPS Shall be able to send a vehicle data Shall be able to receive information	Pcs		
	PUV				
V-2	RFID Tag	Shall be able to hold information Shall be able to write information	Pcs		

Table 2-2 Estimate Cost of Priority Signal to PUV's in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TPTAL COST
	Roadside Equipment								-
R-7	Traffic Light Controller	pcs	248,126.75	37,219.01	285,345.76	195.00	55,642,423.69		55,642,423.69
R-10	RFID Reader (with Gantry)	pcs	17,930.00	2,689.50	20,619.50	780.00	-	16,083,210.00	16,083,210.00
Total							**55,642,423.69**	**16,083,210.00**	**71,725,633.69**

Table 2-3 Estimate Cost of Priority Signal to PUV's in Mega Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-3	Workstation	pcs	256,725.00	38,508.75	295,233.75	1.00		295,233.75	295,233.75
									-
	Roadside Equipment								-
R-10	RFID Reader (with Gantry)	pcs	17,930.00	2,689.50	20,619.50	448.00	-	9,237,536.00	9,237,536.00
Total							-	**9,532,769.75**	**9,532,769.75**

3. Signal Control for Emergency Vehicles Sub-service

3.1 Objectives of User Sub-service

- To performs detection of emergency vehicle proximity to intersections for traffic signal control which enables priority passage of such vehicles, in order to support rapid, safe emergency vehicle mobility which contributes to life-saving rescue operations.

3.2 Physical model of User Sub-service

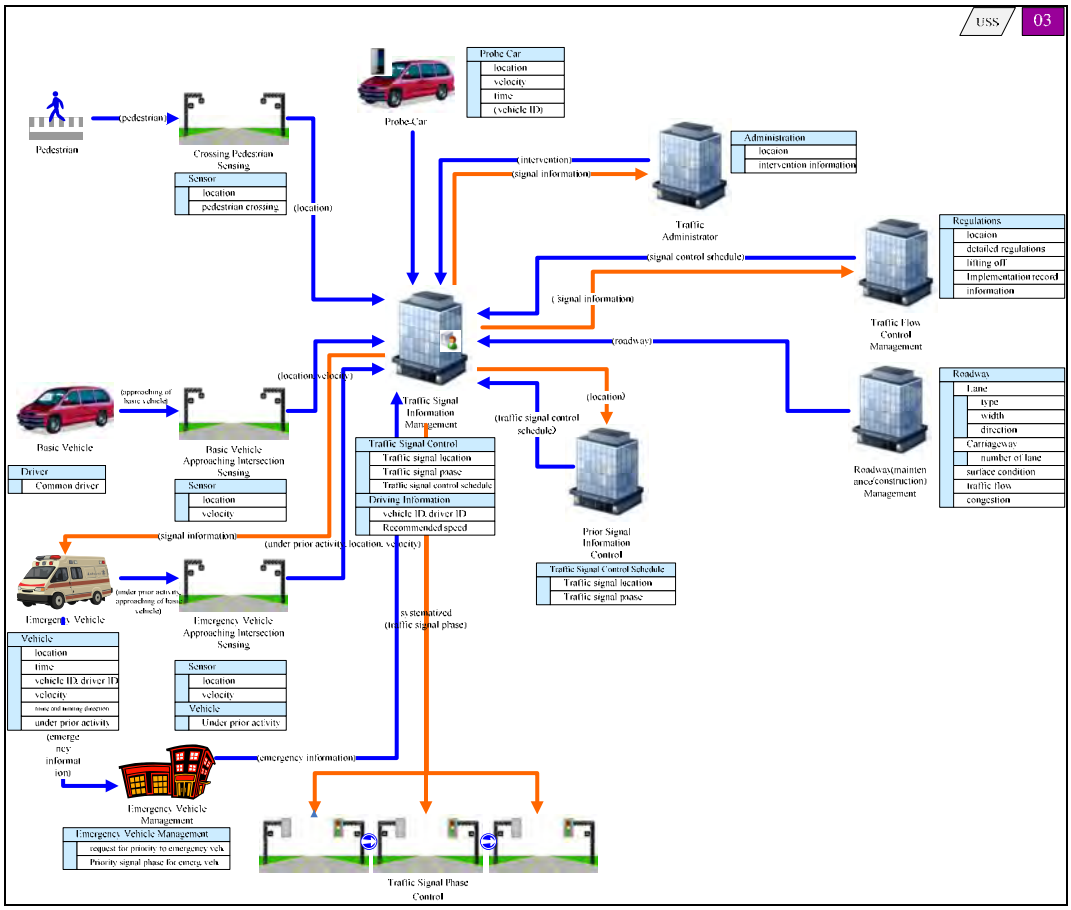


Figure 3-1 Physical/Control model of Signal Control for Emergency Vehicles

3.3 Implementation

415 intersections (Targeted number of signalized (500) without Phase1 (85)

3.4 Implementation Method

1) Data Collection Equipments

a) RFID Reader: RFID Reader installed at four locations of each signalized intersection. 415 intersections x 4 pcs = 1660 pcs

b) RFID Tag: We assume a target of 1,000 vehicles under the jurisdiction of MMDA.

2) Data Processing Equipments

a) Traffic Signal Information Management: Controls signals based on Floating Car Data, Traffic Volume Data and CCTV image. This is installed at the centre.

b) Traffic Flow Control: Collection of Floating Car Data and Traffic Volume Data. This is installed at the centre.

c) Roadway Management: Database for road inventory. This is installed at the centre.

d) CCTV Monitoring: Monitoring of CCTV image. This is installed at the centre.

3) Information Provision Equipments

a) Traffic Light Controller: To receive information provided by RFID Reader and affect the signal to be controllable. Traffic light controller installed at one location per signalized intersection. 415 intersections x 1 pcs = 415 pcs

3.5 System Configuration and Equipment List

The system configuration to conduct the signal control that an emergency vehicle can pass preferentially and the list of requirement specifications of the equipment and software is shown Figure 3-2 and Table 3-2.

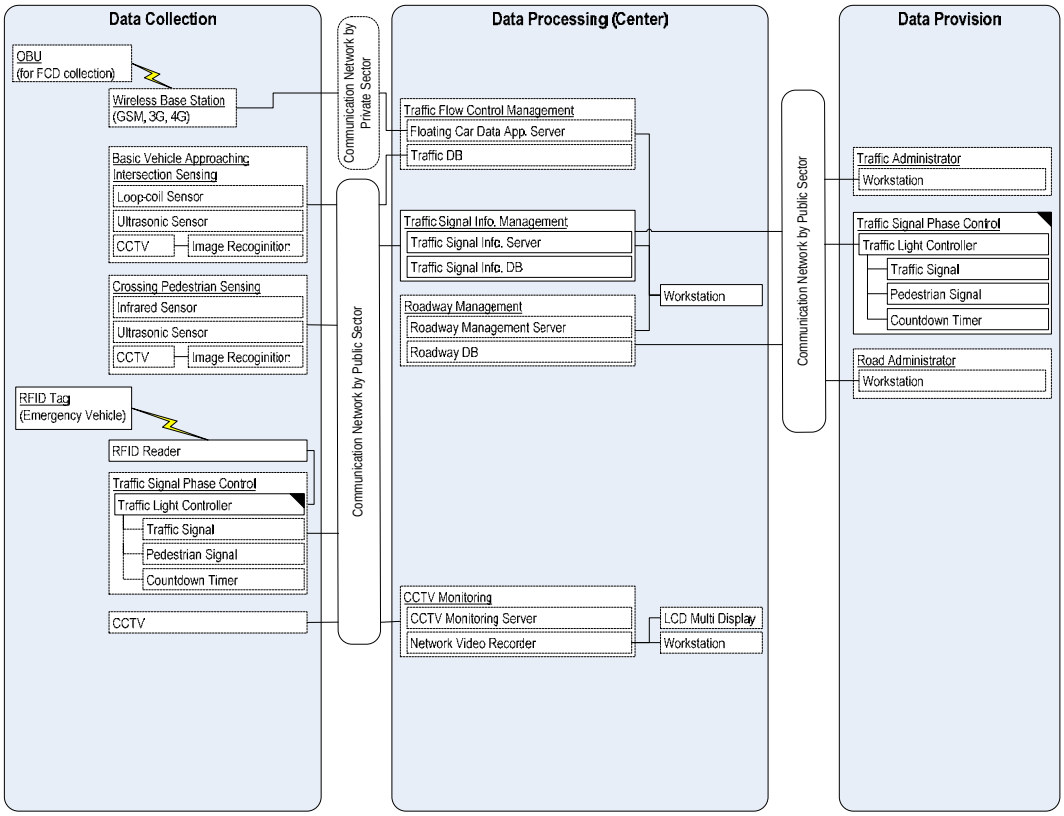


Figure 3-2 System Configuration of Signal control for Emergency Vehicles

Table 3-2 System Requirement for Signal control for Emergency Vehicles

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	Shall be redundant system Shall be able to process the gathered data from all roadside equipment Shall have Web Application Server Service Shall have high availability Shall be low incident of morbidity rate as the service stop Shall be able to quick recovery Shall be support for secure communication Shall be able to act the several programming language	Pcs	4
C-2	Database Server	Shall be redundant system Shall be able to the data storage Shall be RDBMS Shall be able to associate with other database	Pcs	3
C-3	Workstation	Shall be able to startup and display each software Shall be able to operate each software Shall be OS the Windows or Linux Shall have Graphical User Interface	Pcs	2
C-4	Network Video Recorder	Shall be able to recording CCTV image Shall be support for multiple file format Shall have high capacity Shall be easy to the export of data	Pcs	1
C-5	LCD Multi Display	Shall be able to display on image Shall be support for multi display	Pcs	4
Center Software				
S-1	Traffic Signal Information Management	Shall be able to analyze of the various gathering data Shall have the automatic processes of the traffic signal Shall be able to system control of the multi traffic signal Shall be able to area control of the multi traffic signal Shall have the hand-operated control process of the traffic signal	Set	1
S-2	Traffic Flow Control Management	Shall be able to analyze of traffic flow Shall have capability the management of traffic flow Shall be able to set up a signal control schedule Shall be able to management of regulation information	Set	1
S-3	Roadway Management	Shall be able to input road inventory data Shall be able to input road condition survey data Shall be able to input road construction data Shall be able to browse road inventory data Shall be able to browse congestion information	Set	1
S-4	CCTV Monitoring	Shall be able to real-time play to image Shall be able to recording image automatically Shall be able to display on multi image simultaneously Shall be able to play image which was recorded Shall be able to operate camera which was selected	Set	1
Roadside Equipment				
R-1	CCTV (FIX Type)	Shall be able to film as an image Shall be able to send image to a processor	Pcs	
R-2	Image Recognition Processor	Shall have data conversion by image recognition Shall be able to send to data	Pcs	
R-3	Loop-coil Sensor	Shall be able to sense a vehicle or person by loop-coilShall be able to count a vehicle or personShall be able to send to data	Pcs	
R-4	Ultrasonic Sensor	Shall be able to sense a vehicle or person by ultrasonic Shall be able to count a vehicle or person Shall be able to send to data	Pcs	
R-5	Infrared Sensor	Shall be able to sense the movement of the person Shall have data conversion by perception information	Pcs	
R-6	Traffic Signal	Shall light three color of red and yellow and green Shall light according to instructions from a panel	Pcs	
R-7	Traffic Light Controller	Shall be able to receive control pattern from Centre Shall change lighting of the traffic signal according to control pattern	Pcs	415
R-8	Pedestrian Signal	Shall light two color of red and green Shall blink green light Shall light according to instructions from panel	Pcs	
R-9	Countdown Timer	Shall be able to display on countdown before changing in green	Pcs	
R-10	RFID Reader	Shall be able to receive RFID tag information Shall be able to send RFID tag information`	Pcs	1660
R-11	CCTV	Shall be able to film as an image Shall be able to send image on internet connection Shall be able to Pan and Tilt and Zoom Shall be support for multi codec	Pcs	

No.	Equipment Component	Requirements Specification	Unit	Qty.
Vehicle Equipment				
V-1	OBU	Shall be able to positioning by GPS Shall be able to send a vehicle data Shall be able to receive information	Pcs	
V-2	RFID Tag	Shall be able to hold information Shall be able to write information	Pcs	1000

Table 3-3 Estimated Cost of Control for Emergency Vehicles in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TPTAL COST
	Centre Equipment								
C-3	Workstation	pcs	256,725.00	38,508.75	295,233.75	2.00		590,467.50	590,467.50
									-
	Roadside Equipment								-
R-7	Traffic Light Controller	pcs	248,126.75	37,219.01	285,345.76	195.00	55,642,423.69		55,642,423.69
R-10	RFID Reader (with Gantry)	pcs	17,930.00	2,689.50	20,619.50	780.00	-	16,083,210.00	16,083,210.00
Total							**55,642,423.69**	**16,673,677.50**	**72,316,101.19**

4 Road Traffic Information Sub-service

4.1 Objectives of User Sub-service

- To disseminate traffic information such as traffic congestion, traffic restriction for improvement of convenience of any driver using On-Board-Unit and information provision equipment.
- To disseminate the required time and compared between Expressway and Parallel road for optimum route selection.

4.2 Physical model of User Sub-service

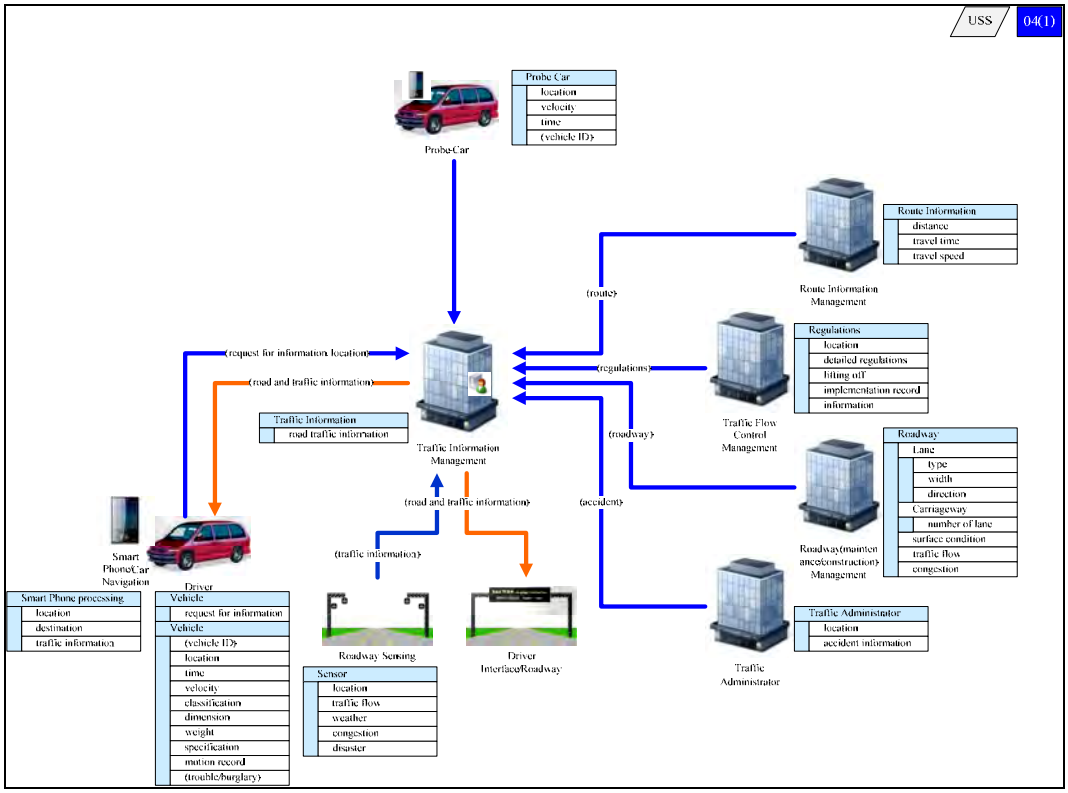


Figure 4-1 Physical/Control model of Road Traffic Information

4.3 Implementation

(1) Metro Manila

113 sections

To detect and monitor vehicles on Radial Road and Circumferential Road per 2.0 km section.
Total length of Radial Road and Circumferential Road is 225.94 km in NCR.
Therefore, 225.94 km / 2.0 km = approximately 113 (cross-sections).

27 intersections

To assume that the route selection decisions will be carried out at near side of intersections of Radial Road and Circumferential Road, it is estimated approximately 27 intersections.
Therefore, information provision equipment is installed at near side of intersection.

(2) Mega Manila

431 sections

To detect and monitor vehicles on National Road per 10.0km section.
Total length of paved national road is 745.29 km in Region III and IV-A.
Therefore, 745.29 km / 10.0 km = approximately 75 (cross-sections).

112 intersections

According to DPWH Planning Office, information provision equipment is to be installed at 89 signalized intersections in future.

4.4 Implementation Method

1) Data Collection Equipments

a) Vehicle Detection: This is installed at upper stream and down stream of each location. 75sections x 2 pcs = 150 pcs

b) CCTV Camera (PTZ Type): One unit is installed per location. 75sections x 1 pcs = 75 pcs

2) Data Processing Equipments

a) Web Information: Information sharing through the Internet. This is installed at the centre.

b) Spot Information Management: Collection of positional information on the roadside equipment and OBU. This is installed at the centre.

c) Traffic Flow Control Management: Collection of Floating Car Data and Traffic Volume Data. This is installed at the centre.

d) Traffic Accident / Incident Information Management: Collection of incident information including road crash. This is installed at the centre.

e) Traffic Information Management: Manage any transportation information provided in Traffic Flow Control Management and Traffic Accident / Incident Information Management. This is installed at the centre.

f) Roadway Management: Database for road inventory. This is installed at the centre.

g) VMS Controller: Management and control of VMS. This is installed at the centre.

h) CCTV Monitoring: Monitoring of CCTV image. This is installed at the centre.

3) Information Provision Equipments

a) VMS: Traffic information is provided by road users. VMS installs just before 27 intersections of Circumferential Road and Radial Road of the MMDA jurisdiction. One unit is installed per intersection by direction of flow into Metro Manila. 27 intersections x 1pcs = 27 pcs

b) Traffic Information Management: Smartphone application to provide transportation information for driver distributed via internet website.

4.5 System Configuration and Equipment List

The system configuration to provide an optimum route and the time required and the information of the fare based on traffic condition and the list of requirement specifications of equipment and software are shown below.

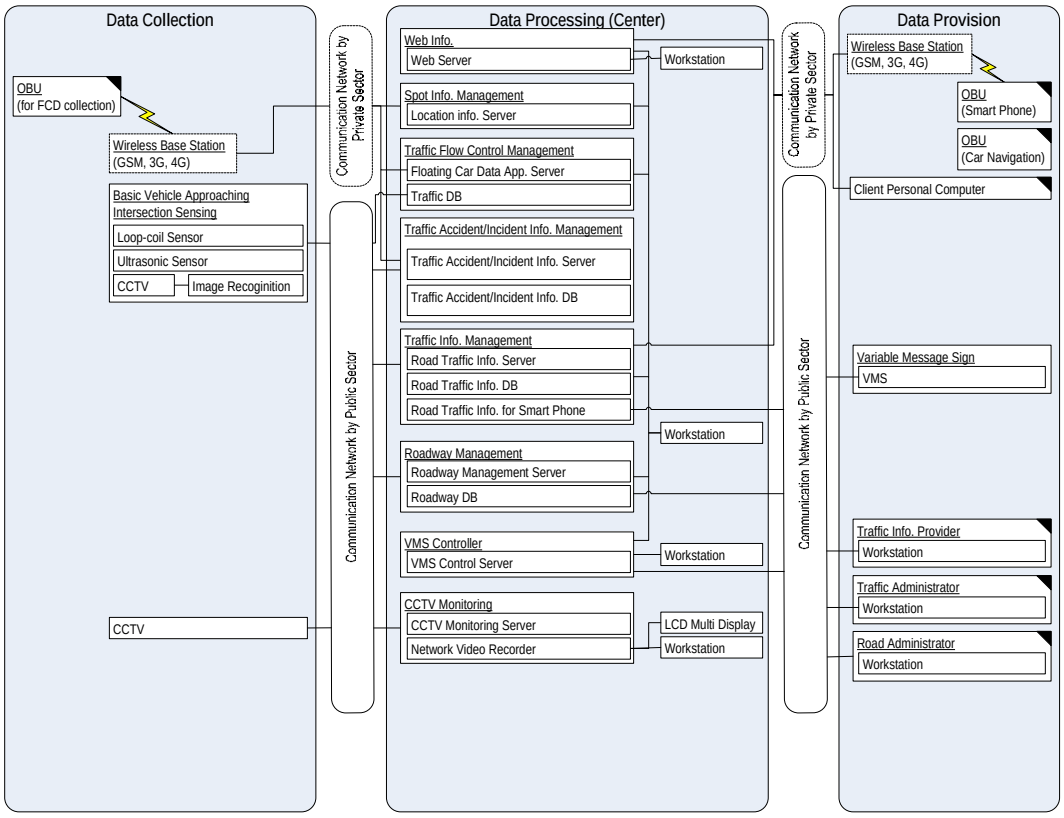


Figure 4-2 System Configuration for Road Traffic Information

Table 4-1 System Requirement for Road Traffic Information

No.	Equipment Component	Requirements Specification	Unit	Qty. (Metro)	Qty. (Mega)
Centre Equipment					
C-1	Application Server	Shall be redundant system Shall be able to process the gathered data from all roadside equipment Shall have Web Application Server Service Shall have high availability Shall be low incident of morbidity rate as the service stop Shall be able to quick recovery Shall be support for secure communication Shall be able to act the several programming language	Pcs	8	8
C-2	Database Server	Shall be redundant system Shall be able to the data storage Shall be RDBMS Shall be able to associate with other database	Pcs	4	4
C-3	Workstation	Shall be able to startup and display each software Shall be able to operate each software Shall be OS the Windows or Linux Shall have Graphical User Interface	Pcs	4	4
C-4	Network Video Recorder	Shall be able to recording CCTV image Shall be support for multiple file format Shall have high capacity Shall be easy to the export of data	Pcs	1	1
C-5	LCD Multi Display	Shall be able to display on image Shall be support for multi display	Pcs	4	4
Center Software					
S-1	Traffic Information Management	Shall be able to analysis traffic condition Shall be able to shortest path search Shall be able to travel time prediction Shall be able to management traffic condition Shall be able to create provided information	Set	1	1
S-2	Traffic Flow Control Management	Shall be able to analyze of traffic flow Shall have capability the management of traffic flow Shall be able to set up a signal control schedule Shall be able to management of regulation information	Set	1	1
S-3	Roadway Management	Shall be able to input road inventory data Shall be able to input road condition survey data Shall be able to input road construction data Shall be able to browse road inventory data Shall be able to browse congestion information	Set	1	1
S-4	Spot Information Management	Shall be able to input spot information data Shall be able to management to spot information data	Set	1	1
S-5	Web Information	Shall operate Web server service Shall be able to support for multi access Shall be able to process html or xml language Shall be able to access control Shall be able to security settings Shall be able to packet filtering	Set	1	1
S-6	VMS Controller	Shall be able to control for VMS Shall be able to input message for VMS display Shall be able to send message data Shall be able to management VMS	Set	1	1
S-7	Traffic Accident/Incident Information Management	Shall be able to input traffic accident information Shall be able to management traffic accident information Shall be able to analyze traffic accident statistics	Set	1	1
S-8	CCTV Monitoring	Shall be able to real-time play to image Shall be able to recording image automatically Shall be able to display on multi image simultaneously Shall be able to play image which was recorded Shall be able to operate camera which was selected	Set	1	1
Roadside Equipment					
R-1	VMS	Shall be able to receive message data Shall be able to display message data Shall be able to display in English	Pcs	27	75
R-2	CCTV (FIX Type)	Shall be able to film as an image Shall be able to send image to a processor	Pcs	226	150
R-3	Image Recognition Processor	Shall have data conversion by image recognition Shall be able to send to data	Pcs	226	150
R-4	Loop-coil Sensor	Shall be able to sense a vehicle or person by loop-coil Shall be able to count a vehicle or person Shall be able to send to data	Pcs		

No.	Equipment Component	Requirements Specification	Unit	Qty. (Metro)	Qty. (Mega)
R-5	Ultrasonic Sensor	Shall be able to sense a vehicle or person by ultrasonic Shall be able to count a vehicle or person Shall be able to send to data	Pcs		
R-6	CCTV	Shall be able to film as an image Shall be able to send image on internet connection Shall be able to Pan and Tilt and Zoom Shall be support for multi codec	Pcs	113	75
Vehicle Equipment					
V-1	Navigation System	Shall be able to receive traffic data Shall be able to receive shortest path data Shall process shortest path data in map display Shall be able to display map information Shall display route for navigate on map Shall display traffic condition Shall display fare information	Pcs		
V-2	OBU	Shall be able to positioning by GPS Shall be able to send a vehicle data Shall be able to receive information	Pcs	6	20
Human Equipment					
H-1	Smart phone application Traffic Information	Shall provide traffic condition Shall provide shortest path Shall provide travel time	Set	1	1

Table 4-2 Estimated Cost of Road Traffic Informant in Metro Manila (2nd Stage)

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	3.00		35,146,875.00	35,146,875.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-3	Workstation	pcs	256,725.00	38,508.75	295,233.75	2.00		590,467.50	590,467.50
C-4	Network Video Recorder	pcs	694,787.50	104,218.13	799,005.63	1.00		799,005.63	799,005.63
C-5	LCD Monitor	pcs	94,458.50	14,168.78	108,627.28	4.00		434,509.10	434,509.10
									-
	Centre Software								-
S-5	Traffic Information Management	set	39,702,847.25		39,702,847.25	1.00	39,702,847.25		39,702,847.25
S-8	VMS Controller	set	19,851,403.25		19,851,403.25	1.00	19,851,403.25		19,851,403.25
S-4	CCTV Monitoring	set	5,583,198.25		5,583,198.25	1.00	5,583,198.25		5,583,198.25
									-
	Roadside Equipment								-
R-5	Image Recognition Processor	pcs	1,091,814.75	163,772.21	1,255,586.96	16.00	20,089,391.40		20,089,391.40
R-10	CCTV Camera (PTZ Type)	pcs	282,886.50	42,432.98	325,319.48	8.00	-	2,602,555.80	2,602,555.80
R-1	VMS (with Gantry)	pcs	7,444,291.50	1,116,643.73	8,560,935.23	8.00	68,487,481.80		68,487,481.80
R-2	CCTV Camera (FIX Type)	pcs	282,886.50	42,432.98	325,319.48	16.00	-	5,205,111.60	5,205,111.60
H-4	Traffic Information Management (Smart Phone Application)	set	4,962,861.00		4,962,861.00	1.00	4,962,861.00		4,962,861.00
V-2	OBU	pcs	4,075.00	611.25	4,686.25	6.00		28,117.50	28,117.50
	Total						**158,677,182.95**	**56,522,267.13**	**215,199,450.08**

Table 4-3 Estimated Cost of Road Traffic Informant in Metro Manila (3rd Stage)

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	2.00		23,431,250.00	23,431,250.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	2.00		23,431,250.00	23,431,250.00
									-
	Centre Software								-
S-1	Pedestrian Navigation Management	set	20,375,000.00		20,375,000.00	1.00	20,375,000.00		20,375,000.00
									-
	Roadside Equipment								-
H-8	Pedestrian Support	set	3,722,145.75		3,722,145.75	1.00	3,722,145.75		3,722,145.75
	Total						**24,097,145.75**	**46,862,500.00**	**70,959,645.75**

Table 4-4 Estimated Cost of Road Traffic Informant in Mega Manila (1st Stage)

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Roadside Equipment								
I-1	**Others**	set	16,014,750.00		16,014,750.00	1.00		16,014,750.00	16,014,750.00
	Total						-	**16,014,750.00**	**16,014,750.00**

Table 4-5 Estimated Cost of Road Traffic Informant in Mega Manila (2nd Stage)

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	8.00		93,725,000.00	93,725,000.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	4.00		46,862,500.00	46,862,500.00
C-3	Workstation	pcs	256,725.00	38,508.75	295,233.75	2.00		590,467.50	590,467.50
C-4	Network Video Recorder	pcs	694,787.50	104,218.13	799,005.63	1.00		799,005.63	799,005.63
C-5	LCD Monitor	pcs	94,458.50	14,168.78	108,627.28	4.00		434,509.10	434,509.10
									-
	Centre Software								-
S-2	Traffic Flow Control Management	set	19,851,403.25		19,851,403.25	1.00	19,851,403.25		19,851,403.25
S-3	Roadway Management	set	24,814,264.25		24,814,264.25	1.00	24,814,264.25		24,814,264.25
S-5	Traffic Information Management	set	39,702,847.25		39,702,847.25	1.00	39,702,847.25		39,702,847.25
S-6	Spot Information Management	set	19,851,403.25		19,851,403.25	1.00	19,851,403.25		19,851,403.25
S-9	Traffic Accident Incident Information Mangement	set	19,851,403.25		19,851,403.25	1.00	19,851,403.25		19,851,403.25
S-7	Web Information	set	7,444,291.50		7,444,291.50	1.00	7,444,291.50		7,444,291.50
S-8	VMS Controller	set	19,851,403.25		19,851,403.25	1.00	19,851,403.25		19,851,403.25
S-4	CCTV Monitoring	set	5,583,198.25		5,583,198.25	1.00	5,583,198.25		5,583,198.25
									-
	Roadside Equipment								-
R-5	Image Recognition Processor	pcs	1,091,814.75	163,772.21	1,255,586.96	60.00	75,335,217.75		75,335,217.75
R-1	VMS (with Gantry)	pcs	7,444,291.50	1,116,643.73	8,560,935.23	30.00	256,828,056.75		256,828,056.75
R-2	CCTV Camera (FIX Type)	pcs	282,886.50	42,432.98	325,319.48	60.00	-	19,519,168.50	19,519,168.50
R-5	CCTV (PTZ Type)	pcs	282,886.50	42,432.98	325,319.48	30.00	-	9,759,584.25	9,759,584.25
H-4	Traffic Information Management (Smart Phone Application)	set	4,962,861.00		4,962,861.00	1.00	4,962,861.00		4,962,861.00
V-2	OBU	pcs	4,075.00	611.25	4,686.25	20.00		93,725.00	93,725.00
	Total						**494,076,349.75**	**171,783,959.98**	**665,860,309.73**

Table 4-6 Estimated Cost of Road Traffic Informant in Mega Manila (3rd Stage)

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Roadside Equipment								-
R-5	Image Recognition Processor	pcs	1,091,814.75	163,772.21	1,255,586.96	90.00	113,002,826.63		113,002,826.63
R-10	CCTV Camera (PTZ Type)	pcs	282,886.50	42,432.98	325,319.48	45.00	-	14,639,376.38	14,639,376.38
R-1	VMS (with Gantry)	pcs	7,444,291.50	1,116,643.73	8,560,935.23	45.00	385,242,085.13		385,242,085.13
R-2	CCTV Camera (FIX Type)	pcs	282,886.50	42,432.98	325,319.48	90.00	-	29,278,752.75	29,278,752.75
	Total						**498,244,911.75**	**43,918,129.13**	**542,163,040.88**

5 Optimum Route Information Sub-service

5.1 Objectives of User Sub-service

- To disseminate traffic information such as optimum route information, required time and toll fee for improvement of convenience of any driver using On-Board-Unit and information provision equipment.

5.2 Physical Model of User Sub-service

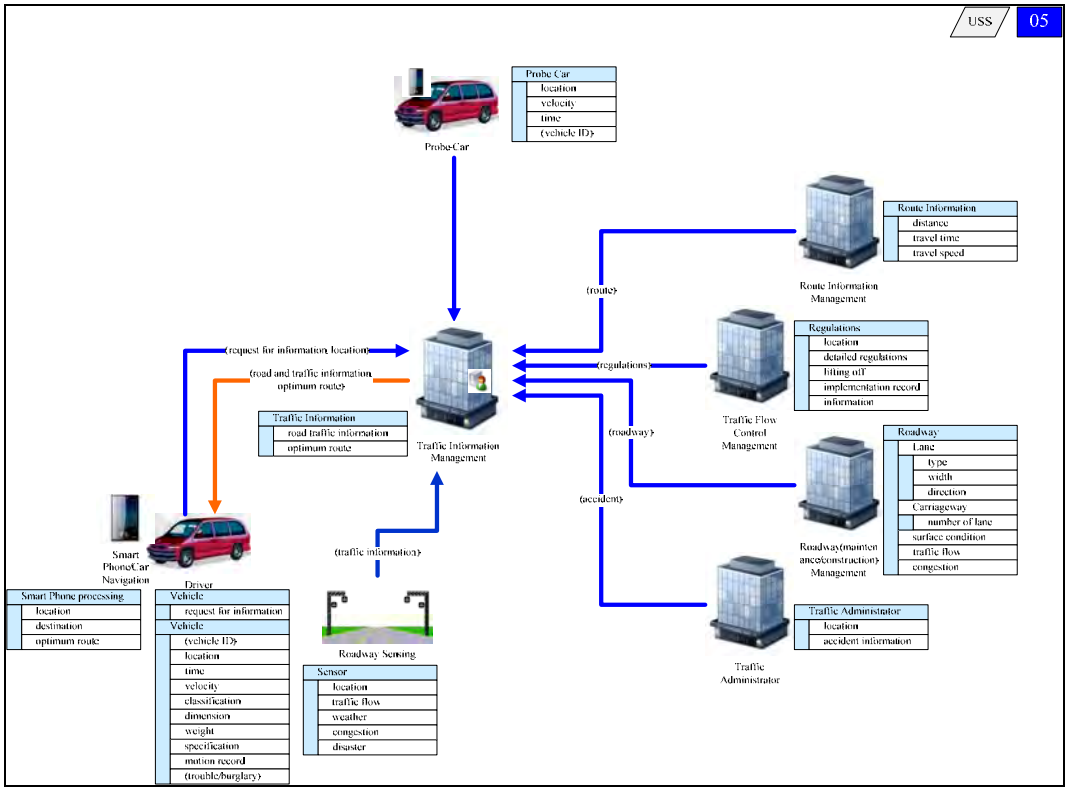


Figure 5-1 Physical/Control model for Optimum Route Information

5.3 Implementation

113 sections

To detect and monitor vehicles on Radial and Circumferential Road per 2.0km section. Total length of Radial and Circumferential Road is 225.94km in NCR. Therefore, 225.94 km / 2.0 km = approximately 113 (cross-sections).

5.4 Implementation Method

1) Data Collection Equipments

a) Vehicle Detection: One unit is installed up stream and one unit down stream. 113 sections x 2 pcs = 226 pcs

b) CCTV Camera (PTZ Type): One unit is installed per location. 113sections x 1 pcs = 113 pcs

c) OBU (for FCD collection):

It is assumed that a driver and the private company arrange Flooding Car Data Equipment in themselves basically, but arrange Patrol Car of MMDA/DPWH. MMDA holds Patrol Car six for Enforcer. DPWH assume Patrol Car to be twenty because they do not hold it for transportation management.

2) Data Processing Equipment

a) Web Information: Information sharing through the Internet. This is installed the centre.

b) Spot Information Management: Collection of positional information on the roadside equipment and OBU. This is installed at the centre.

c) Traffic Flow Control Management: Collection of Floating Car Data and Traffic Volume Data. This is installed at the centre.

d) Traffic Accident / Incident Information Management: Collection of incident information which includes road crash. This is installed at the centre.

e) Traffic Information Management: Manage any transportation information provided in Traffic Flow Control Management and Traffic Accident / Incident Information Management. This is installed at the centre.

f) Roadway Management: Database for road inventory. This is installed at the centre.

g) Route Information Management: Based on vehicle information in Traffic Information Management, it provides the optimum route with according to the request from a road user. This is installed at the centre.

h) CCTV Monitoring: Monitoring of CCTV image. This is installed at the centre.

3) Information Provision Equipment

a) Traffic Information Management: Smartphone application to provide transportation information for the driver and distributed through internet.

5.5 System Configuration and Equipment List

The system configuration to provide an optimum route and the time required and the information of the fare based on traffic condition and the list of requirement specifications of the equipment and software are shown in Figure 5-2 and Table 5-1.

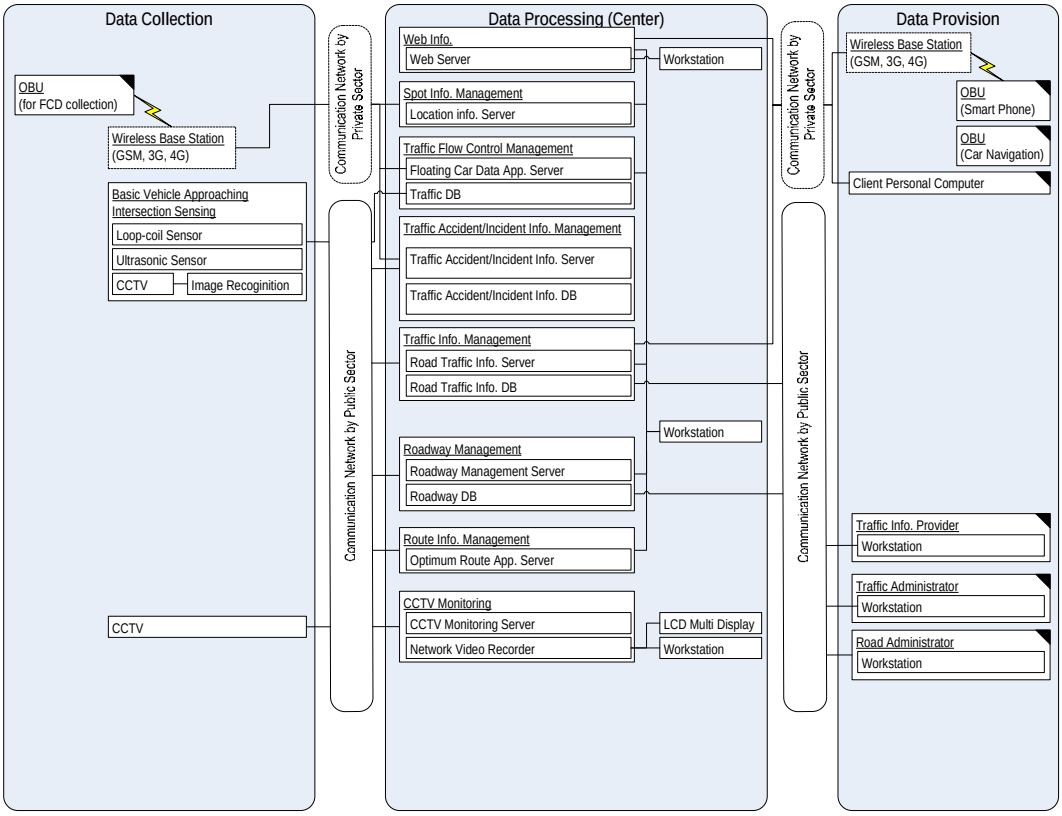


Figure 5-2 System Configuration for Road Traffic Information

Table 5-1 System Requirement for Optimum Route Information

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	Shall be redundant system Shall be able to process the gathered data from all roadside equipment Shall have Web Application Server Service Shall have high availability Shall be low incident of morbidity rate as the service stop Shall be able to quick recovery Shall be support for secure communication Shall be able to act the several programming language	Pcs	8
C-2	Database Server	Shall be redundant system Shall be able to the data storage Shall be RDBMS Shall be able to associate with other database	Pcs	4
C-3	Workstation	Shall be able to startup and display each software Shall be able to operate each software Shall be OS the Windows or Linux Shall have Graphical User Interface	Pcs	3
C-4	Network Video Recorder	Shall be able to recording CCTV image Shall be support for multiple file format Shall have high capacity Shall be easy to the export of data	Pcs	1
C-5	LCD Multi Display	Shall be able to display on image	Pcs	4

No.	Equipment Component	Requirements Specification	Unit	Qty.
		Shall be support for multi display		
Center Software				
S-1	Traffic Information Management	Shall be able to analysis traffic condition Shall be able to shortest path search Shall be able to travel time prediction Shall be able to management traffic condition Shall be able to create provided information	Set	1
S-2	Traffic Flow Control Management	Shall be able to analyze of traffic flow Shall have capability the management of traffic flow Shall be able to set up a signal control schedule Shall be able to management of regulation information	Set	1
S-3	Roadway Management	Shall be able to input road inventory data Shall be able to input road condition survey data Shall be able to input road construction data Shall be able to browse road inventory data Shall be able to browse congestion information	Set	1
S-4	Spot Information Management	Shall be able to input spot information data Shall be able to management to spot information data	Set	1
S-5	Web Information	Shall operate Web server service Shall be able to support for multi access Shall be able to process html or xml language Shall be able to access control Shall be able to security settings Shall be able to packet filtering	Set	1
S-6	Route Information Management	Shall be able to input route information Shall be able to management route information	Set	1
S-7	Traffic Accident/Incident Information Management	Shall be able to input traffic accident information Shall be able to management traffic accident information Shall be able to analyze traffic accident statistics	Set	1
S-8	CCTV Monitoring	Shall be able to real-time play to image Shall be able to recording image automatically Shall be able to display on multi image simultaneously Shall be able to play image which was recorded Shall be able to operate camera which was selected	Set	1
Roadside Equipment				
R-1	CCTV (FIX Type)	Shall be able to film as an image Shall be able to send image to a processor	Pcs	226
R-2	Image Recognition Processor	Shall have data conversion by image recognition Shall be able to send to data	Pcs	226
R-3	Loop-coil Sensor	Shall be able to sense a vehicle or person by loop-coil Shall be able to count a vehicle or person Shall be able to send to data	Pcs	
R-4	Ultrasonic Sensor	Shall be able to sense a vehicle or person by ultrasonic Shall be able to count a vehicle or person Shall be able to send to data	Pcs	
R-5	CCTV (PTZ Type)	Shall be able to film as an image Shall be able to send image on internet connection Shall be able to Pan and Tilt and Zoom Shall be support for multi codec	Pcs	113
Vehicle Equipment				
V-1	Navigation System	Shall be able to receive traffic data Shall be able to receive shortest path data Shall process shortest path data in map display Shall be able to display map information Shall display route for navigate on map Shall display traffic condition Shall display fare information	Pcs	
V-2	OBU	Shall be able to positioning by GPS Shall be able to send a vehicle data Shall be able to receive information	Pcs	6
Human Equipment				
H-1	Smart phone application Traffic Information	Shall provide traffic condition Shall provide shortest path Shall provide travel time	Set	1

Table 5-2 Estimated Cost of Optimum Route Information in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-6	Route Information Management	set	19,851,403.25		19,851,403.25	1.00	19,851,403.25		19,851,403.25
									-
	Total						**19,851,403.25**	**11,715,625.00**	**31,567,028.25**

6 Detour Route Information Sub-service

6.1 Objectives of User Sub-service

- In case of traffic restriction, this system aims to disseminate detour route information taking into account the whole road network for secure and reliable road traffic.

6.2 Physical model of User Sub-service

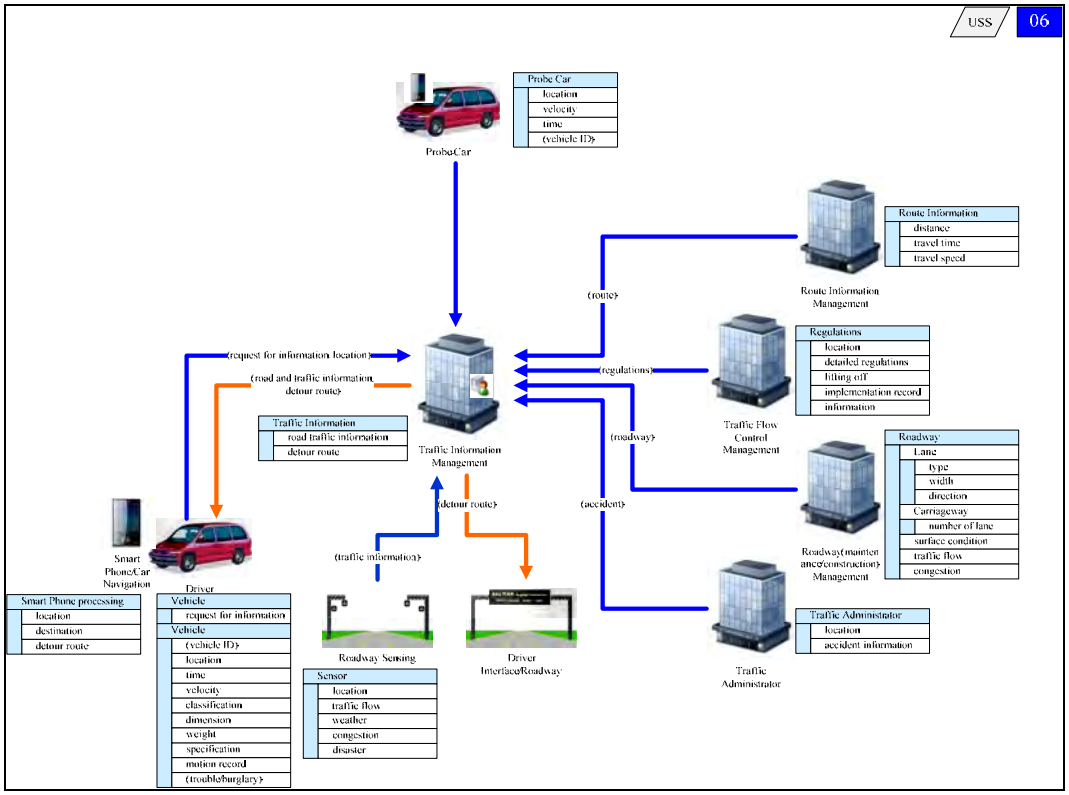


Figure 6-1 Physical/Control model of Detour Route Information

6.3 Implementation

(1) Metro Manila

113 sections

To detect and monitor the vehicle on Radial and Circumferential Road per 2.0km section. The total length of Radial and Circumferential Road is 225.94km in NCR. Therefore, 225.94 km / 2.0 km = 113 (cross-sections) approximate.

27 intersections

To assume that the route selection decisions will be carried out at near side of intersections of Radiation Road and Circle Road, it is estimated approx 27 intersections.

Therefore, information provision equipment is installed at near side of intersection.

(2) Mega Manila

75 sections

To detect and monitor vehicle on National Road per 10.0 km section. Total length of paved national road is 745.29 km in Region III and Region IV-A.
Therefore, 745.29 km / 10.0 km = 75 (cross-sections) approx.

89 intersections

According to DPWH Planning Office, information provision equipment is to be installed at 89 signalized intersections in future.

6.4 Implementation Method

1) Data Collection Equipments

a) Vehicle Detection: Installed up stream and down stream line each in one place. 113 sections x 2 pcs = 226 pcs

b) CCTV Camera (PTZ Type): Installed per location. 113sections x 1 pcs = 113 pcs

2) Data Processing Equipments

a) Web Information: Information sharing through the Internet. This is installed at the centre.

b) Spot Information Management: Collection of positional information on the roadside equipment and OBU. This is installed at the centre.

c) Traffic Flow Control Management: Collection of Floating Car Data and Traffic Volume Data. This is installed at the centre.

d) Traffic Accident / Incident Information Management: Collection of incident information including road crash. This is installed at the centre.

e) Traffic Information Management: Manage any transportation information
Provided in the Traffic Flow Control Management and Traffic Accident / Incident Information Management. This is installed at the centre.

f) Detour Information Management: Analyze a detour route based on any restriction information provided in Traffic Accident / Incident Information Management and Roadway Management. This is installed at the centre.

g) VMS Controller: Management and control of VMS. This is installed at the centre..

h) Roadway Management: Database for road inventory. This is installed at the centre.

i) CCTV Monitoring: Monitoring of CCTV image. This is installed at the centre.

3) Information Provision Equipments

a) VMS: Traffic information is provided by road user. VMS installs just before 27 intersections of Circumferential Road and Radial Road of the MMDA jurisdiction. This is installed at one location per intersection by a direction to flow into the Metro Manila. 27 intersections x 1pcs = 27 pcs

6.5 System Configuration and Equipment List

The system configuration to provide the detour in consideration of a regional network for the driver appropriately and the list of requirement specifications of the equipment and software are shown below.

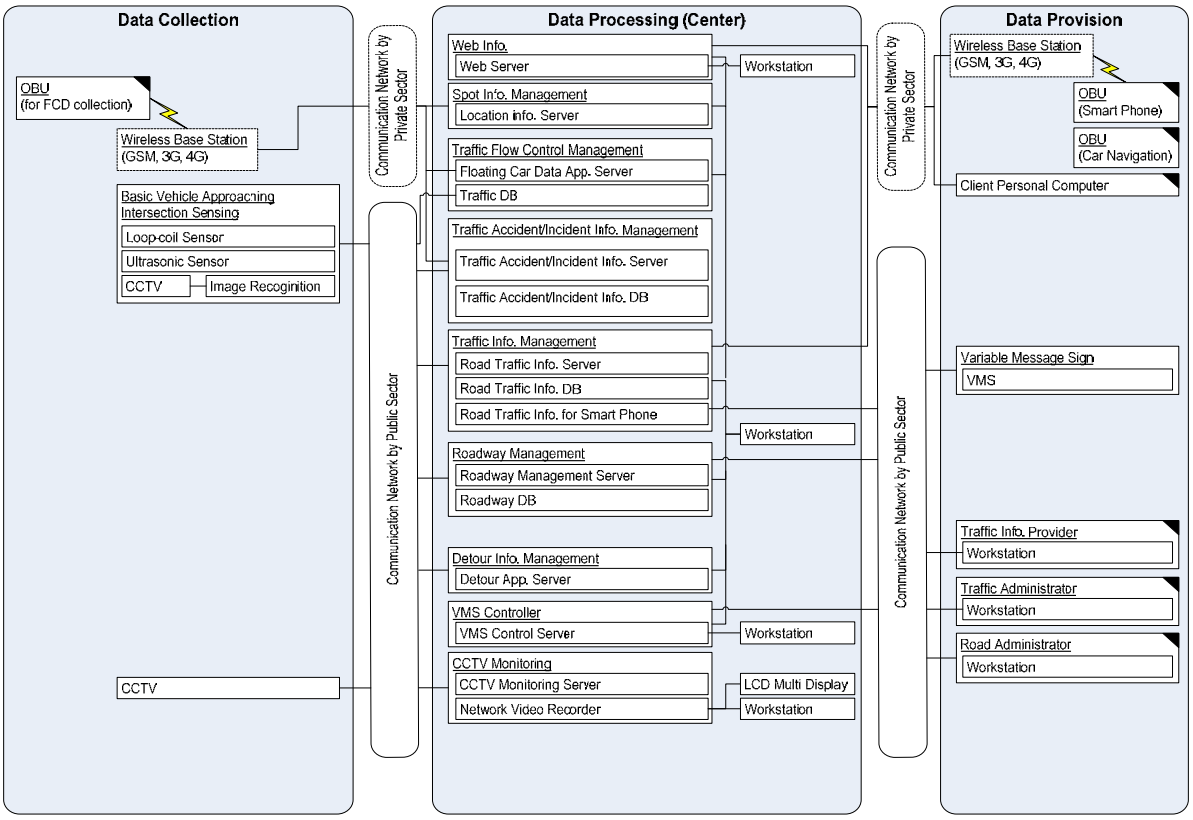


Figure 6-2 System Configuration of Detour Route Information

Table 6-1 System Requirement of Detour Route Information

No.	Equipment Component	Requirements Specification	Unit	Qty. (Metro)	Qty. (Mega)
Centre Equipment					
C-1	Application Server	Shall be redundant system Shall be able to process the gathered data from all roadside equipment Shall have Web Application Server Service Shall have high availability Shall be low incident of morbidity rate as the service stop Shall be able to quick recovery Shall be support for secure communication Shall be able to act the several programming language	Pcs	9	9
C-2	Database Server	Shall be redundant system Shall be able to the data storage Shall be RDBMS Shall be able to associate with other database	Pcs	4	4
C-3	Workstation	Shall be able to startup and display each software Shall be able to operate each software Shall be OS the Windows or Linux Shall have Graphical User Interface	Pcs	4	4
C-4	Network Video Recorder	Shall be able to recording CCTV image Shall be support for multiple file format Shall have high capacity Shall be easy to the export of data	Pcs	1	1
C-5	LCD Multi Display	Shall be able to display on image Shall be support for multi display	Pcs	4	4
Center Software					
S-1	Traffic Information Management	Shall be able to analysis traffic condition Shall be able to shortest path search Shall be able to travel time prediction Shall be able to management traffic condition Shall be able to create provided information	Set	1	1
S-2	Roadway Management	Shall be able to input road inventory data Shall be able to input road condition survey data Shall be able to input road construction data Shall be able to browse road inventory data Shall be able to browse congestion information	Set	1	1
S-3	Traffic Flow Control Management	Shall be able to analyze of traffic flow Shall have capability the management of traffic flow Shall be able to set up a signal control schedule Shall be able to management of regulation information	Set	1	1
S-4	Spot Information Management	Shall be able to input spot information data Shall be able to management to spot information data	Set	1	1
S-5	Detours Information Management	Shall be able to input detour information Shall be able to search optimum detour Shall be able to management detour information	Set	1	1
S-6	Web Information	Shall operate Web server service Shall be able to support for multi access Shall be able to process html or xml language Shall be able to access control Shall be able to security settings Shall be able to packet filtering	Set	1	1
S-7	VMS Controller	Shall be able to control for VMS Shall be able to input message for VMS display Shall be able to send message data Shall be able to management VMS	Set	1	1
S-8	Traffic Accident/Incident Information Management	Shall be able to input traffic accident information Shall be able to management traffic accident information Shall be able to analyze traffic accident statistics	Set	1	1
S-9	CCTV Monitoring	Shall be able to real-time play to image Shall be able to recording image automatically Shall be able to display on multi image simultaneously Shall be able to play image which was recorded Shall be able to operate camera which was selected	Set	1	1
Roadside Equipment					
R-1	VMS	Shall be able to receive message data Shall be able to display message data Shall be able to display in English	Pcs	27	89
R-2	CCTV (FIX Type)	Shall be able to film as an image Shall be able to send image to a processor	Pcs	226	150
R-3	Image Recognition Processor	Shall have data conversion by image recognition Shall be able to send to data	Pcs	226	150

No.	Equipment Component	Requirements Specification	Unit	Qty. (Metro)	Qty. (Mega)
R-4	Loop-coil Sensor	Shall be able to sense a vehicle or person by loop-coil Shall be able to count a vehicle or person Shall be able to send to data	Pcs		
R-5	Ultrasonic Sensor	Shall be able to sense a vehicle or person by ultrasonic Shall be able to count a vehicle or person Shall be able to send to data	Pcs		
R-6	CCTV	Shall be able to film as an image Shall be able to send image on internet connection Shall be able to Pan and Tilt and Zoom Shall be support for multi codec	Pcs	113	75
Vehicle Equipment					
V-1	Navigation System	Shall be able to receive traffic data Shall be able to receive shortest path data Shall process shortest path data in map display Shall be able to display map information Shall display route for navigate on map Shall display traffic condition Shall display fare information	Pcs		
V-2	OBU	Shall be able to positioning by GPS Shall be able to send a vehicle data Shall be able to receive information	Pcs	6	20
Human Equipment					
H-1	Smart phone application Traffic Information	Shall provide traffic condition Shall provide shortest path Shall provide travel time	Set	1	1

Table 6-2 Estimated Cost of Detour Route Information in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TPTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	2.00		23,431,250.00	23,431,250.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-3	Workstation	pcs	256,725.00	38,508.75	295,233.75	1.00		295,233.75	295,233.75
									-
	Centre Software								-
S-3	Bus Lane Control Management	set	39,702,847.25		39,702,847.25	1.00	39,702,847.25		39,702,847.25
S-8	VMS Controller	set	19,851,403.25		19,851,403.25	1.00	19,851,403.25		19,851,403.25
									-
	Roadside Equipment								-
R-1	VMS (Lane Guidance)	pcs	2,481,430.50	372,214.58	2,853,645.08	32.00	91,316,642.40		91,316,642.40
Total							**150,870,892.90**	**35,442,108.75**	**186,313,001.65**

Table 6-3 Estimated Cost of Detour Route Information in Mega Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-6	Detours Information Management	set	20,375,000.00		20,375,000.00	1.00	20,375,000.00		20,375,000.00
									-
Total							**20,375,000.00**	**11,715,625.00**	**32,090,625.00**

7 Information Provision and Request to/from other Organizations

7.1 Objectives of User Sub-service

- To share traffic information such as construction, accident, incident and fire disaster among road users such as public transportation carriers, private sector (logistic company) and other related users.

7.2 Physical model of User Sub-service

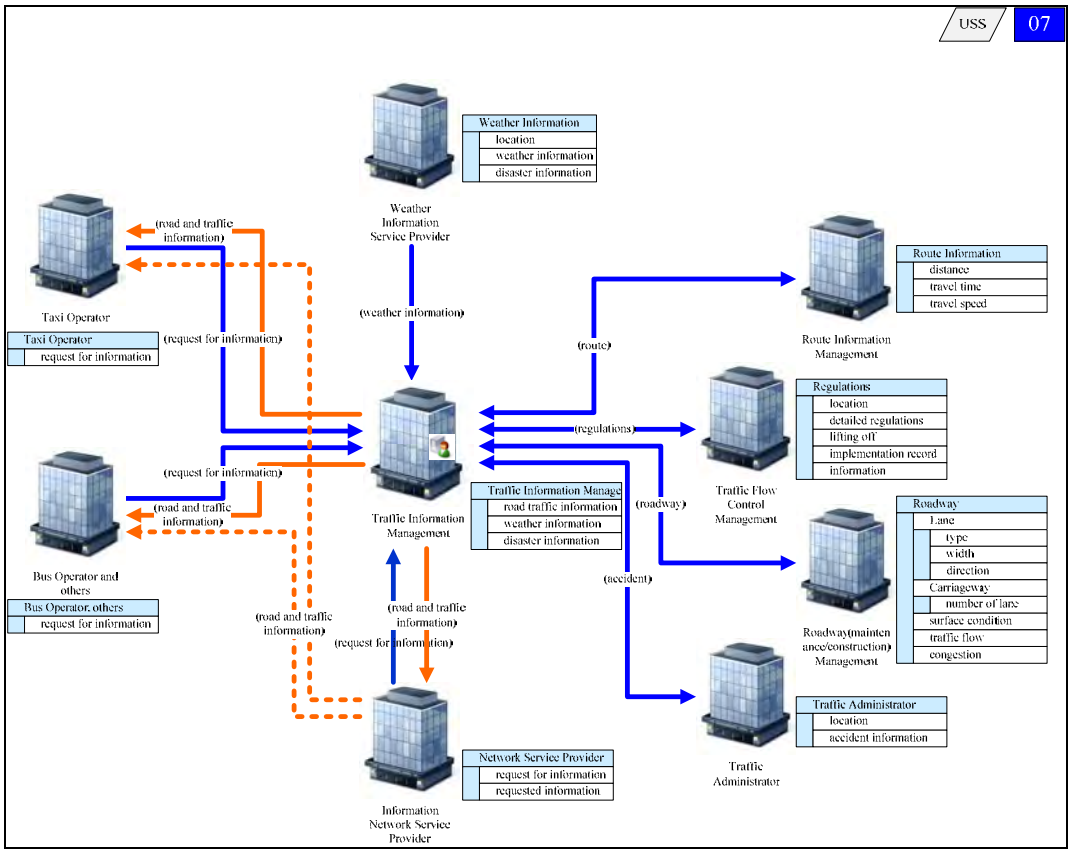


Figure 7-1 Physical/Control model Information Provision and Request to/from other Organizations

7.3 Implementation

1 center

Information such as construction, accident, incident and fire disaster among road users such as public transportation carriers, private sector (logistic company) and other related users.

7.4 Implementation Method

1) Data Processing Equipments

a) Web Information: Information sharing through the Internet. This is installed at the centre.

b) Spot Information Management: Collection of positional information on the roadside equipment and OBU. This is installed at the centre.

c) Traffic Flow Control Management: Collection of Floating Car Data and Traffic Volume Data. This is installed at the centre.

d) Traffic Accident / Incident Information Management: Collection of incident information including road crash. This is installed at the centre.

e) Traffic Information Management: Manage any transportation information provided in Traffic Flow Control Management and Traffic Accident / Incident Information Management. This is installed at the centre.

f) Roadway Management: Database for road inventory. This is installed at the centre.

g) Route Information Management: Based on vehicle information in Traffic Information Management, it provides the optimum route with analysis according to the request from a road user. This is installed at the centre.

h) Road Traffic and Incident Information Intelligence Sharing Management: It is related to institution and information sharing in traffic information managed in Traffic Information Management. This is installed at the centre.

7.5 System Configuration and Equipment List

The system configuration to share information with government offices and a private enterprise about transportation information and the list of requirement specifications of the equipment and software are shown below.

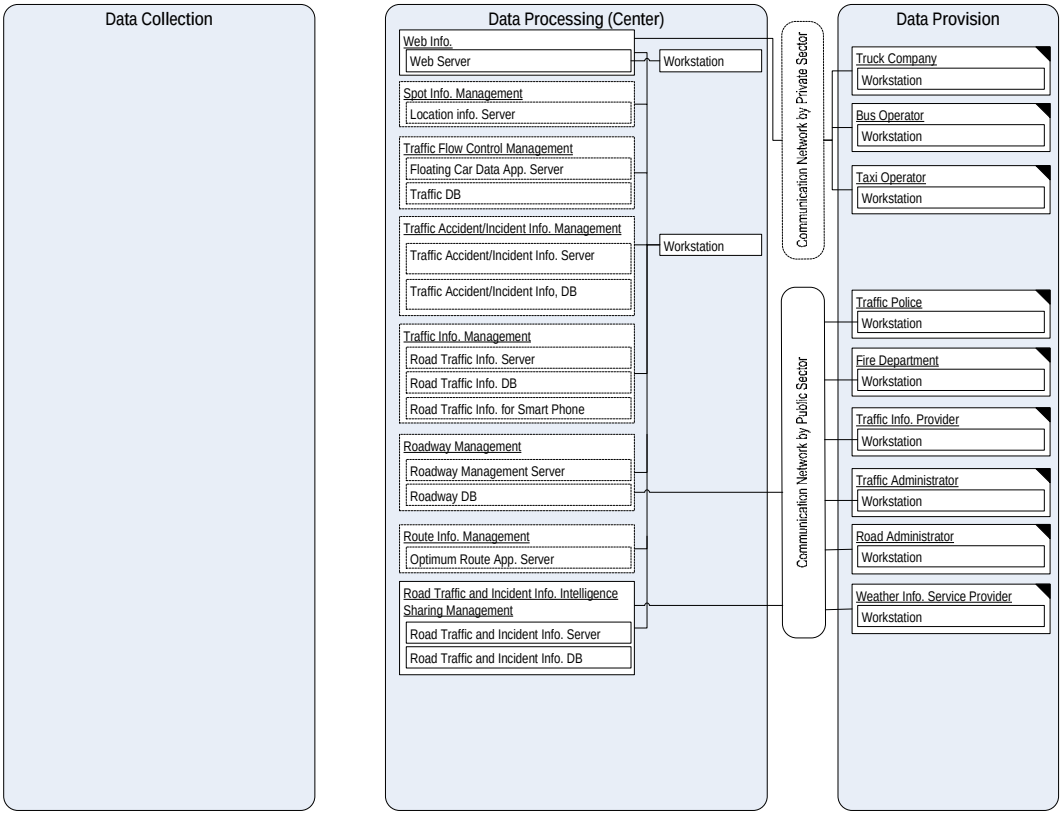


Figure 7-2 System Configuration of Information Provision and Request to/from other Organizations

Table 7-1 Equipment List of Information Provision and Request to/from other Organizations

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	8
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	5
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	2
Center Software				
S-1	Traffic Information Management	・Shall be able to analysis traffic condition ・Shall be able to shortest path search ・Shall be able to travel time prediction ・Shall be able to management traffic condition ・Shall be able to create provided information	Set	1
S-2	Traffic Flow Control Management	・Shall be able to analyze of traffic flow ・Shall have capability the management of traffic flow ・Shall be able to set up a signal control schedule ・Shall be able to management of regulation information	Set	1

No.	Equipment Component	Requirements Specification	Unit	Qty.
S-3	Route Information Management	・Shall be able to input route information ・Shall be able to management route information	Set	1
S-4	Roadway Management	・Shall be able to input road inventory data ・Shall be able to input road condition survey data ・Shall be able to input road construction data ・Shall be able to browse road inventory data ・Shall be able to browse congestion information	Set	1
S-5	Spot Information Management	・Shall be able to input spot information data ・Shall be able to management to spot information data	Set	1
S-6	Web Information	・Shall operate Web server service ・Shall be able to support for multi access ・Shall be able to process html or xml language ・Shall be able to access control ・Shall be able to security settings ・Shall be able to packet filtering	Set	1
S-7	Traffic Accident/Incident Information Management	・Shall be able to input traffic accident information ・Shall be able to management traffic accident information ・Shall be able to analyze traffic accident statistics	Set	1
S-8	Road Traffic and Incident Information Intelligence Sharing Management	・Shall be able to information sharing with other institution ・Shall be able to input data from outside agency	Set	1

Table 7-2 Estimated Cost of Information Provision and Request to/from other Organization in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-8	Road Traffic and Incident Information Intelligence Sharing	set	10,187,500.00		10,187,500.00	1.00	10,187,500.00		10,187,500.00
									-
	Total						**10,187,500.00**	**23,431,250.00**	**33,618,750.00**

Table 7-3 Estimated Cost of Information Provision and Request to/from other Organization in Mega Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	2.00		23,431,250.00	23,431,250.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-6	Route Information Management	set	19,851,403.25		19,851,403.25	1.00	19,851,403.25		19,851,403.25
S-8	Road Traffic and Incident Information Intelligence Sharing	set	10,187,500.00		10,187,500.00	1.00	10,187,500.00		10,187,500.00
	Total						**30,038,903.25**	**35,146,875.00**	**65,185,778.25**

8 Parking Availability Information Sub-system

8.1 Objectives of User Sub-service

- To disseminate parking information such as operation time, fee and space availability for convenience of any driver using On-Board-Unit and information provision equipment.

8.2 Physical model of User Sub-service

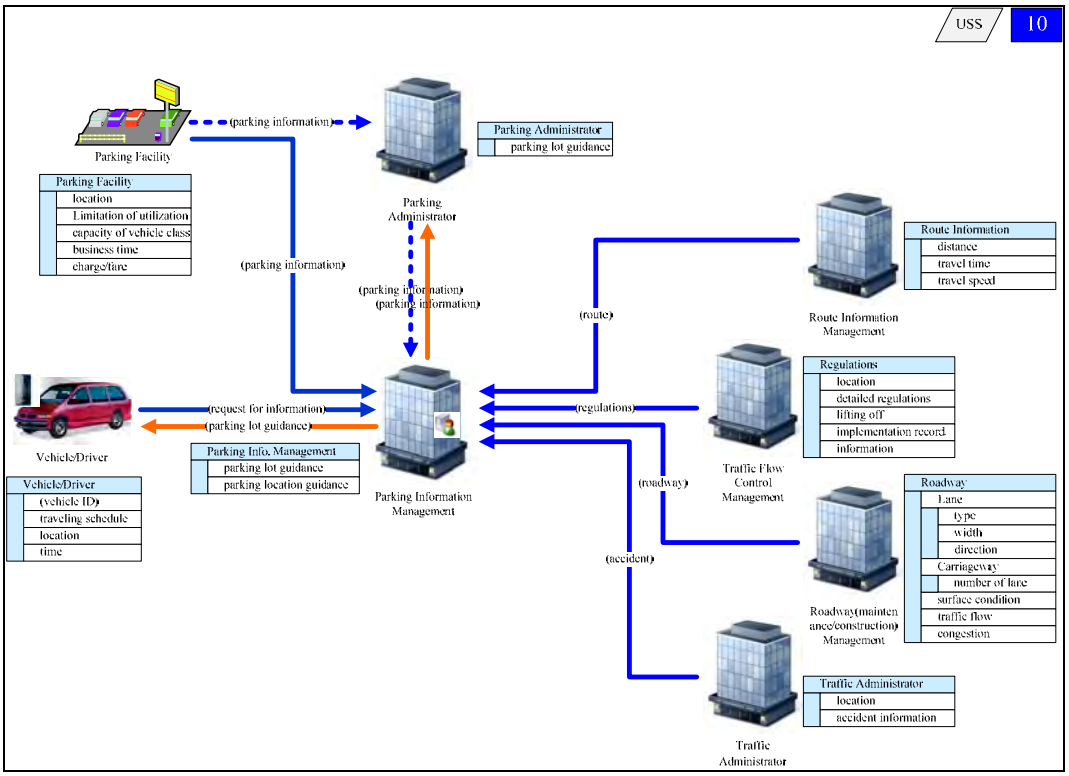


Figure 8-1 Physical/Control model of Parking Availability Information

8.3 Implementation

50 parking places

(Intended to be developed for 50 public parking places)

8.4 Implementation Method

1) Data Collection Equipments

a) Loop-coil Sensor: Installed to each two pcs at the entrance, the exit. 50 parking x 2 gate x 2 pcs = 200 pcs

b) Toll barrier: Installed to at the entrance and exit. 50 parking x 2 gate x 1 pcs = 100 pcs

c) CCTV (PTZ Type): Installed one pcs at the gateway. 50 parking x 1 pcs = 50 pcs

2) Data Processing Equipments

a) Web Information: Information sharing through the Internet. This is installed at the centre.

b) Parking Information Management: To Collect and manage information on parking availability and, in addition to the static information of the fare, maximum storage capacity and business hours. This is installed at the centre.

c) VMS Controller: Management and control of VMS. This is installed at the centre.

3) Information Provision Equipments

a) VMS (Parking Information): To provide parking availability information near each parking lot. Installed one pcs at each parking lot. 50 parking x 1 pcs = 50 pcs

b) Parking Lot Information Management: Smartphone application to provide parking information for the driver distributed by internet web site.

8.5 System Configuration and Equipment List

The system configuration to provide the information about available parking lot by OBU and information provision equipment and the list of requirement specifications of the equipment and software are shown below.

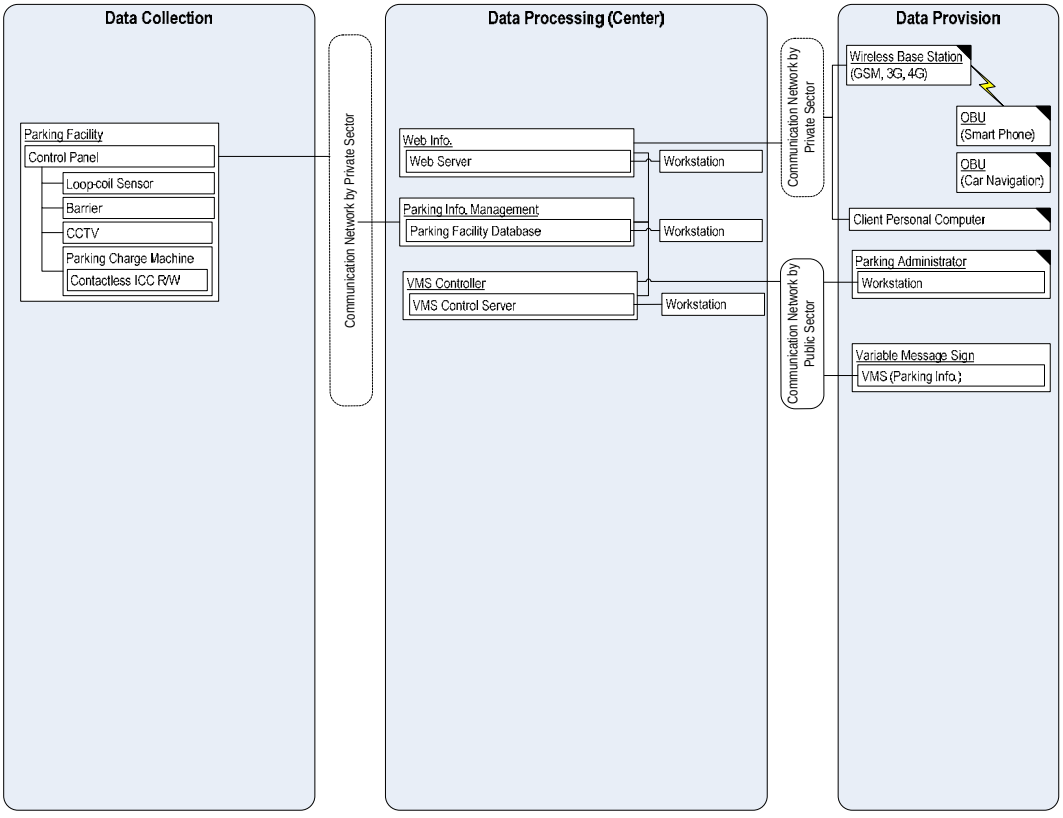


Figure 8-2 System Configuration of Parking Availability Information

Table 8-1 Equipment List of Parking Availability Information

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	3
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	1
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	3
Center Software				
S-1	Parking Information Management	・Shall be able to register parking lot information ・Shall be able to gather situation of utilization on parking lot ・Shall be able to display situation of management on parking lot ・Shall be able to gather preference information of user ・Shall be able to analyze preference information of user ・Shall be able to provide parking lot information based on the user's preference ・Shall be able to route guidance to the parking lot	Set	1
S-2	Web Information	・Shall operate Web server service ・Shall be able to support for multi access ・Shall be able to process html or xml language ・Shall be able to access control ・Shall be able to security settings ・Shall be able to packet filtering	Set	1
S-3	VMS Controller	・Shall be able to control for VMS ・Shall be able to input message for VMS display ・Shall be able to send message data ・Shall be able to management VMS	Set	1
Roadside Equipment				
R-1	VMS (Parking)	・Shall be able to receive message data ・Shall be able to display message data ・Shall be able to display in English	Pcs	50
R-2	Control Panel	・Shall be able to control barrier ・Shall send and receive of data with parking information server ・Shall be able to control ICC R/W ・Shall be able to control parking charge machine	Pcs	50
R-3	Parking Charge Machine	・Shall be able to payment of the parking fare ・Shall be able to display parking fare	Pcs	
R-4	Contactless ICC R/W	・Shall be able to receive IC-card information ・Shall be able to send IC-card information	Pcs	
R-5	Loop-coil Sensor	・Shall be able to sense a vehicle or person by loop-coil ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	200
R-6	Toll barrier	・Shall be able to control start of vehicle ・Shall being few shocks when the vehicle crashed	Pcs	100
R-7	CCTV	・Shall be able to film as an image・Shall be able to send image on internet connection・Shall be able to Pan and Tilt and Zoom・Shall be support for multi codec	Pcs	50
Human Equipment				
H-1	Smart phone application Parking Lot Information	・Shall provide parking lot congestion situation ・Shall support for various smart phone OS	Set	1

Table 8-2 Estimated Cost of Parking Availability Information in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-3	Workstation	pcs	256,725.00	38,508.75	295,233.75	2.00		590,467.50	590,467.50
	Roadside Equipment								
R-1	VMS (Parking)	pcs	2,481,430.50	372,214.58	2,853,645.08	50.00	142,682,253.75		142,682,253.75
R-2	Control Panel	pcs	407,500.00	61,125.00	468,625.00	50.00	-	23,431,250.00	23,431,250.00
Total							**142,682,253.75**	**24,021,717.50**	**166,703,971.25**

9 Parking Lot Guidance Sub-system

9.1 Objectives of User Sub-service

- To disseminate parking information such as size of vehicle, parking fee and etc for improvement of the convenience of drivers using On-Board-Unit and information provision equipment.
- To disseminate the optimum route to the parking place.

9.2 Physical model of User Sub-service

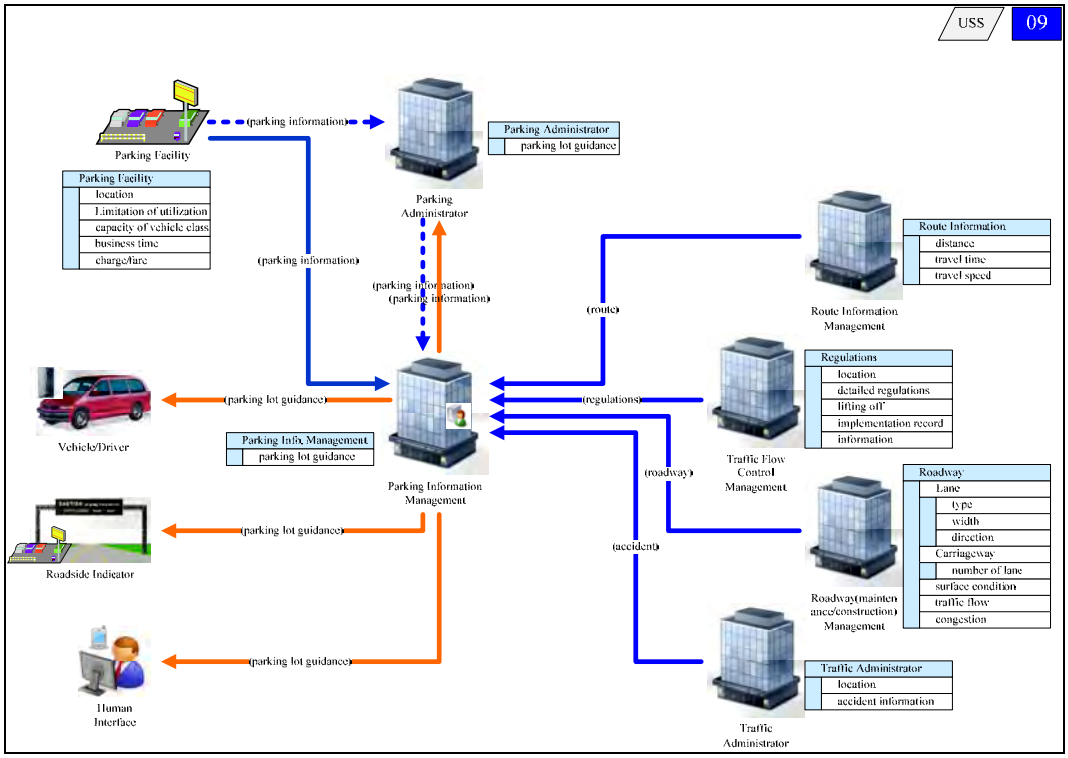


Figure 9-1 Physical/Control model of Parking Lot Guidance

9.3 Implementation

50 parking places

(Intended to be developed at 50 public parking locations)

9.4 Implementation Method

1) Data Collection Equipments

a) Loop-coil Sensor: Installed two units at entrance and two units at exit. 50 parking x 2 gate x 2 pcs = 200 pcs

b) Toll barrier: Installed one unit at entrance and one unit at exit. 50 parking x 2 gate x 1 pcs = 100 pcs

c) CCTV (PTZ Type): Installed one unit at gateway. 50 parking x 1 pcs = 50 pcs

2) Data Processing Equipments

a) Web Information: Information sharing through the Internet. This is installed at the centre.

b) Parking Information Management: To collect and manage information on parking availability including static information such as fare, maximum storage capacity and business hours. This is installed at the centre.

c) Parking Guidance Management: To analyse and manage route to the parking lot based on parking lot information from Parking Information Management. This is installed at the centre.

d) Route Information Management: Based on vehicle information in Traffic Information Management, it provides the optimum route according to the request from a road user. This is installed at the centre.

e) Traffic Information Management: Manage any transportation information provided in Traffic Flow Control Management and Traffic Accident / Incident Information Management. This is installed at the centre.

f) Roadway Management: Database for road inventory. This is installed at the centre.

3) Information Provision Equipments

a) Parking Lot Information Management: Smartphone application to provide parking information for the driver distribute by internet web site.

9.5 System Configuration and Equipment List

The system configuration extracts parking lot information according to the preference information that a driver set up in advance and the list of requirement specifications of the equipment and software are shown below.

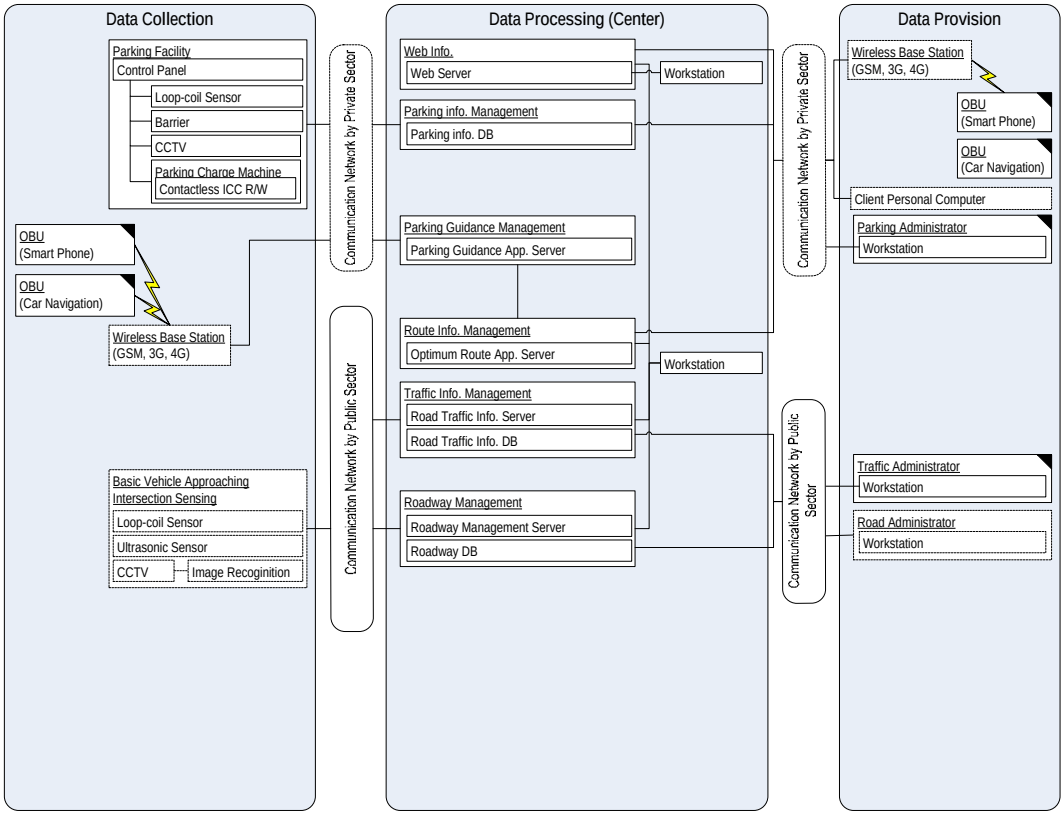


Figure 9-2 System Configuration of Parking Lot Guidance

Table 9-1 Equipment List of Parking Lot Guidance

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	5
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	3
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	2
Center Software				
S-1	Parking Information Management	・Shall be able to register parking lot information ・Shall be able to gather situation of utilization on parking lot ・Shall be able to display situation of management on parking lot ・Shall be able to gather preference information of user ・Shall be able to analyze preference information of user ・Shall be able to provide parking lot information based on the user's preference ・Shall be able to route guidance to the parking lot	Set	1
S-2	Web Information	・Shall operate Web server service ・Shall be able to support for multi access ・Shall be able to process html or xml language ・Shall be able to access control ・Shall be able to security settings ・Shall be able to packet filtering	Set	1

No.	Equipment Component	Requirements Specification	Unit	Qty.
S-3	Traffic Information Management	・Shall be able to analysis traffic condition ・Shall be able to shortest path search ・Shall be able to travel time prediction ・Shall be able to management traffic condition ・Shall be able to create provided information	Set	1
S-4	Roadway Management	・Shall be able to input road inventory data ・Shall be able to input road condition survey data ・Shall be able to input road construction data ・Shall be able to browse road inventory data ・Shall be able to browse congestion information	Set	1
S-5	Route Information Management	・Shall be able to input route information ・Shall be able to management route information	Set	1
Roadside Equipment				
R-1	Control Panel	・Shall be able to control barrier・Shall send and receive of data with parking information server・Shall be able to control ICC R/W・Shall be able to control parking charge machine	Pcs	50
R-2	Parking Charge Machine	・Shall be able to payment of the parking fare ・Shall be able to display parking fare	Pcs	
R-3	Contactless ICC R/W	・Shall be able to receive IC-card information ・Shall be able to send IC-card information	Pcs	
R-4	Loop-coil Sensor	・Shall be able to sense a vehicle or person by loop-coil ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	200
R-5	Toll barrier	・Shall be able to control start of vehicle ・Shall being few shocks when the vehicle crashed	Pcs	100
R-6	CCTV	・Shall be able to film as an image ・Shall be able to send image on internet connection ・Shall be able to Pan and Tilt and Zoom ・Shall be support for multi codec	Pcs	50
R-7	CCTV (FIX Type)	・Shall be able to film as an image ・Shall be able to send image to a processor	Pcs	
R-8	Image Recognition Processor	・Shall have data conversion by image recognition ・Shall be able to send to data	Pcs	
R-9	Loop-coil Sensor	・Shall be able to sense a vehicle or person by loop-coil ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	
R-10	Ultrasonic Sensor	・Shall be able to sense a vehicle or person by ultrasonic ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	
Vehicle Equipment				
V-1	OBU	・Shall be able to positioning by GPS ・Shall be able to send a vehicle data ・Shall be able to receive information	Pcs	
V-2	Navigation System	・Shall be able to receive traffic data ・Shall be able to receive shortest path data ・Shall process shortest path data in map display ・Shall be able to display map information ・Shall display route for navigate on map ・Shall display traffic condition ・Shall display fare information	Pcs	
Human Equipment				
H-1	Smart phone application Parking Lot Information	・Shall provide parking lot congestion situation ・Shall support for various smart phone OS	Set	1

Table 9-2 Estimated Cost of Parking Lot Guidance in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-1	Parking Information Management	set	74,442,833.50		74,442,833.50	1.00	74,442,833.50		74,442,833.50
									-
	Roadside Equipment								-
H-5	Parking Lot Information Management	set	2,481,430.50		2,481,430.50	1.00	2,481,430.50		2,481,430.50
Total							**76,924,264.00**	**23,431,250.00**	**100,355,514.00**

10 Location Identification of Patrol Vehicle Sub-system

10.1 Objectives of User Sub-service

- To disseminate and collect the location of emergency vehicle at command center to realize fastest and accurate rescue effort.
- To assist/dispatch appropriate control considering the location of emergency vehicle and accident occurrence.

10.2 Physical model of User Sub-service

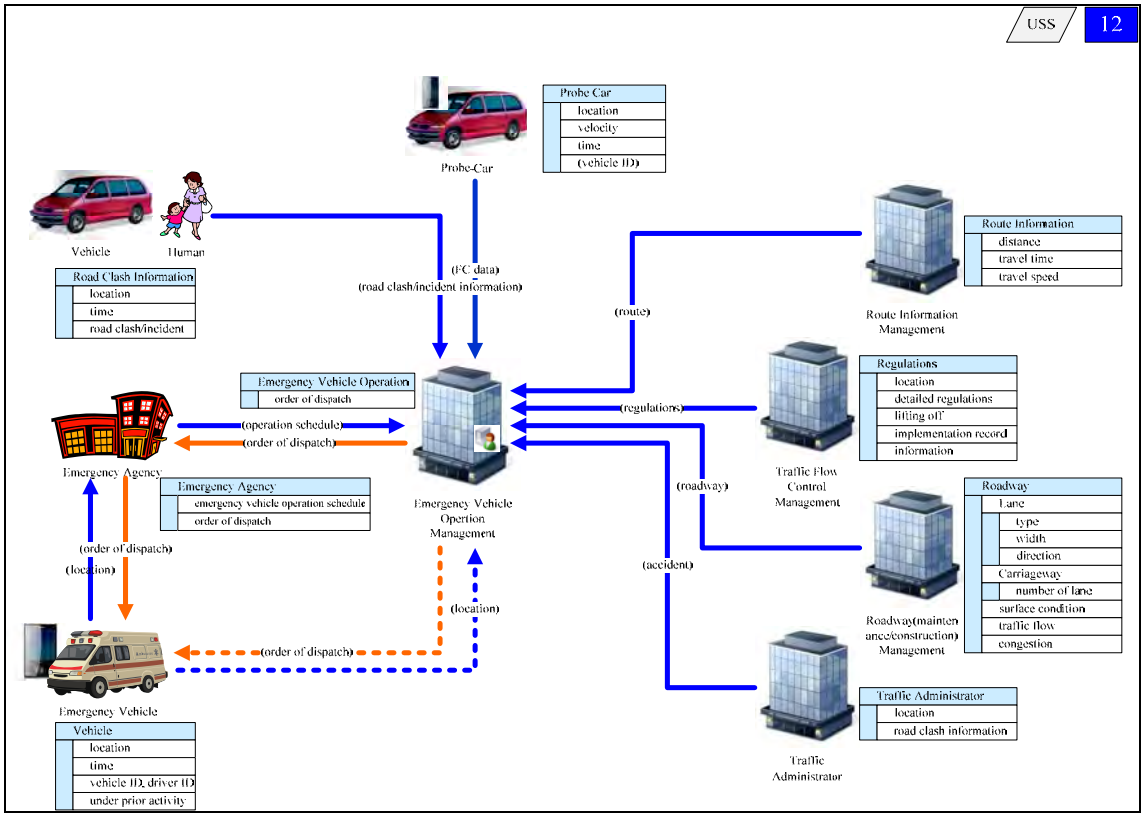


Figure 10-1 Physical/Control model of Location Identification of Patrol Vehicle

10.3 Implementation

6 vehicles

(According to the number of MMDA enforcer's patrol car)

10.4 Implementation Method

1) Data Collection Equipments

a) OBU: Collect and send FCD. Introduce it into Patrol Car for Enforcer of MMDA.

6pcs

2) Data Processing Equipments

a) Spot Information Management: Collection of positional information on the roadside equipment and OBU. This is installed at the centre.

b) Traffic Flow Control Management: Collection of Floating Car Data and Traffic Volume Data. This is installed at the centre.

c) Patrol Vehicle Operation Management: To manage the movement of Patrol Car. This is installed at the centre.

d) Traffic Information Management: Manage any transportation information provided in Traffic Flow Control Management and Traffic Accident / Incident Information Management. This is installed at the centre.

e) Roadway Management: Database for road inventory. This is installed at the centre.

10.5 System Configuration and Equipment List

The system configuration to collect the positional information of the patrol vehicle in real time and the list of requirement specifications of the equipment and software are shown below.

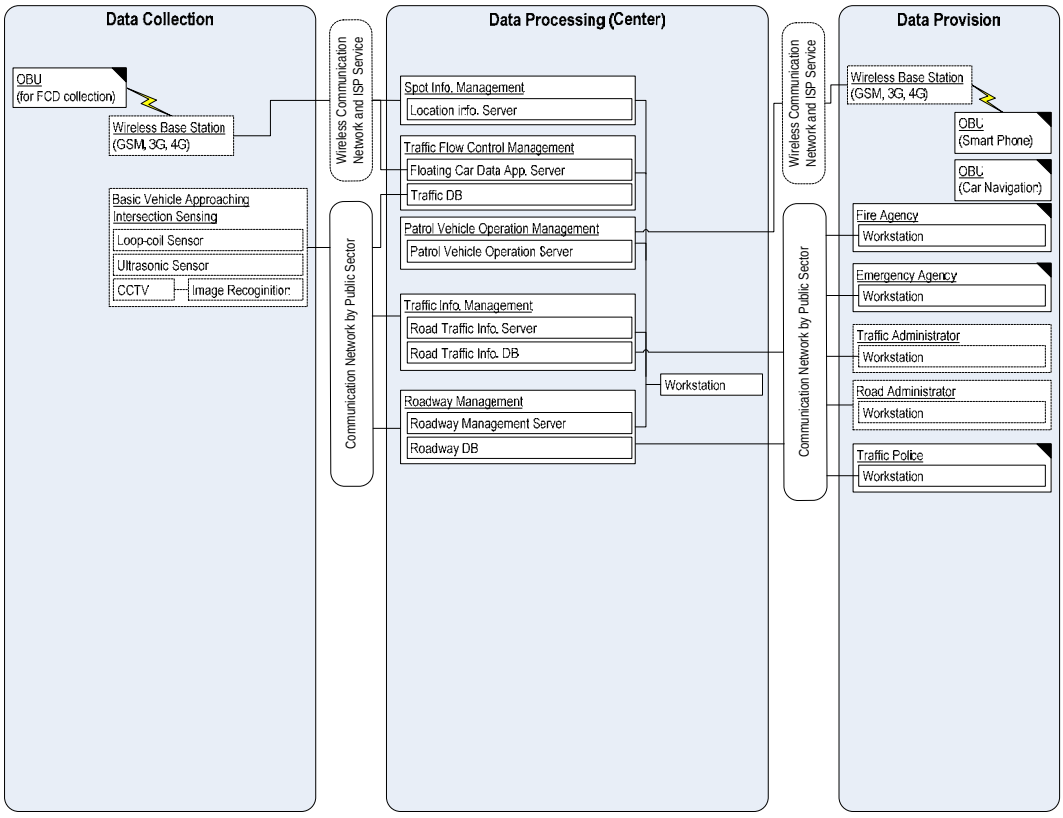


Figure 10-2 System Configuration of Location Identification of Patrol Vehicle

Table 10-1 Equipment List of Location Identification of Patrol Vehicle

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	5
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	3
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	1
Center Software				
S-1	Patrol Vehicle Operation Management	・Shall be able to management patrol vehicle dispatch situation ・Shall be able to management traveling route of patrol vehicle	Set	1
S-2	Traffic Flow Control Management	・Shall be able to analyze of traffic flow ・Shall have capability the management of traffic flow ・Shall be able to set up a signal control schedule ・Shall be able to management of regulation information	Set	1
S-3	Roadway Management	・Shall be able to input road inventory data ・Shall be able to input road condition survey data ・Shall be able to input road construction data ・Shall be able to browse road inventory data ・Shall be able to browse congestion information	Set	1
S-4	Traffic Information Management	・Shall be able to analysis traffic condition ・Shall be able to shortest path search ・Shall be able to travel time prediction ・Shall be able to management traffic condition ・Shall be able to create provided information	Set	1
S-5	Spot Information Management	・Shall be able to input spot information data ・Shall be able to management to spot information data	Set	1
Roadside Equipment				
R-1	CCTV (FIX Type)	・Shall be able to film as an image ・Shall be able to send image to a processor	Pcs	
R-2	Image Recognition Processor	・Shall have data conversion by image recognition・Shall be able to send to data	Pcs	
R-3	Loop-coil Sensor	・Shall be able to sense a vehicle or person by loop-coil ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	
R-4	Ultrasonic Sensor	・Shall be able to sense a vehicle or person by ultrasonic ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	
Vehicle Equipment				
V-1	Navigation System	・Shall be able to receive traffic data ・Shall be able to receive shortest path data ・Shall process shortest path data in map display ・Shall be able to display map information ・Shall display route for navigate on map ・Shall display traffic condition ・Shall display fare information	Pcs	
V-2	OBU	・Shall be able to positioning by GPS ・Shall be able to send a vehicle data ・Shall be able to receive information	Pcs	6
Human Equipment				
H-1	Smart phone application Traffic Information	・Shall provide traffic condition ・Shall provide shortest path ・Shall provide travel time	Set	1

Table 10-2 Estimated Cost of Location Identification of Patrol Vehicles in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-1	Patrol Vehicle Operation Management	set	24,814,264.25		24,814,264.25	1.00	24,814,264.25		24,814,264.25
									-
Total							**24,814,264.25**	**11,715,625.00**	**36,529,889.25**

11 Commercial Vehicles Operation Sub-system

11.1 Objectives of User Sub-service

- To communicate, supervise, disseminate the information to driver in consideration of information of vehicle location, travel speed and etc for the management of driver and the promotion of logistic efficiency.

11.2 Physical model of User Sub-service

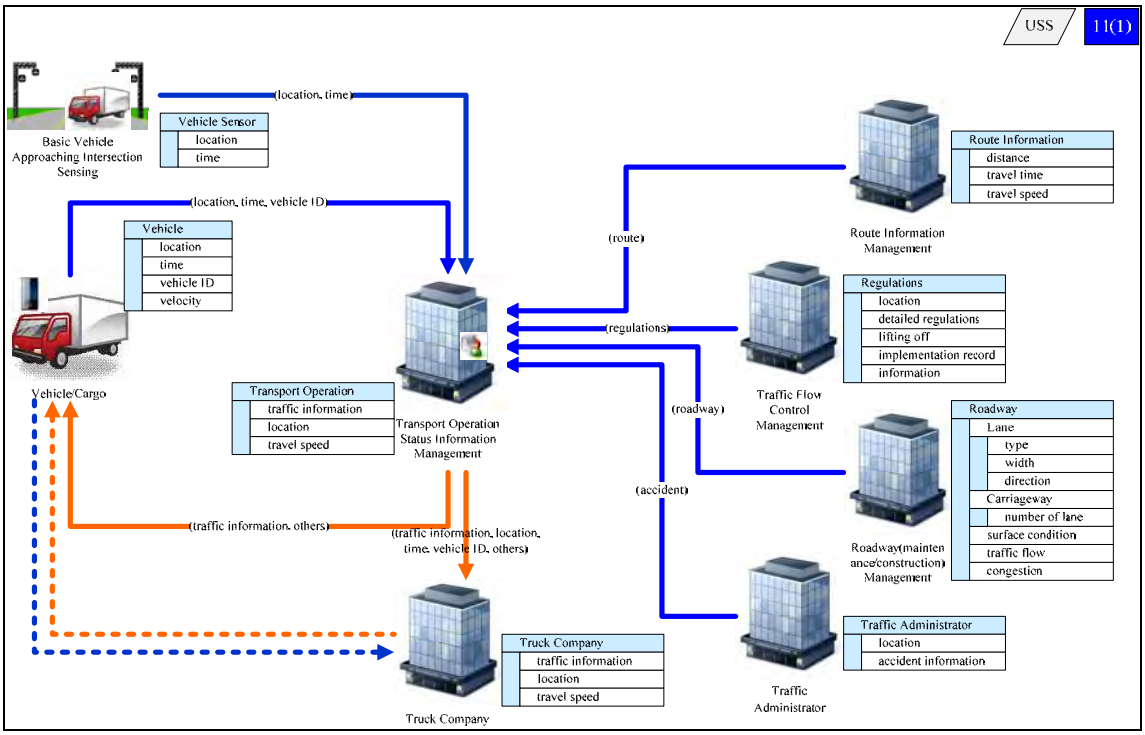


Figure 11-1 Physical/Control model of Commercial Vehicles Operation

11.3 Implementation

1 center (for Data Processing Equipments)

(The service shall be implemented by private sector. However, the Floating Car Data of logistic vehicle is useful for the generation of traffic information. Therefore, the Data Processing Equipment is implemented by public sector at the center.)

11.4 Implementation Method

Data Processing Equipments

a) Spot Information Management: Collection of positional information on the roadside equipment and OBU. This is installed at the centre.

b) Traffic Flow Control Management: Collection of Floating Car Data and Traffic Volume Data. This is installed at the centre.

c) Transport Operation Status Information Management: To manage the movement of Commercial Vehicle. This is installed at the centre.

d) Traffic Information Management: Manage any transportation information provided in Traffic Flow Control Management and Traffic Accident / Incident Information Management. This is installed at the centre.

e) Roadway Management: Database for road inventory. This is installed at the centre.

11.5 System Configuration and Equipment List

The system configuration to collect the positional information of the commercial vehicle in real time and the list of requirement specifications of the equipment and software are shown below.

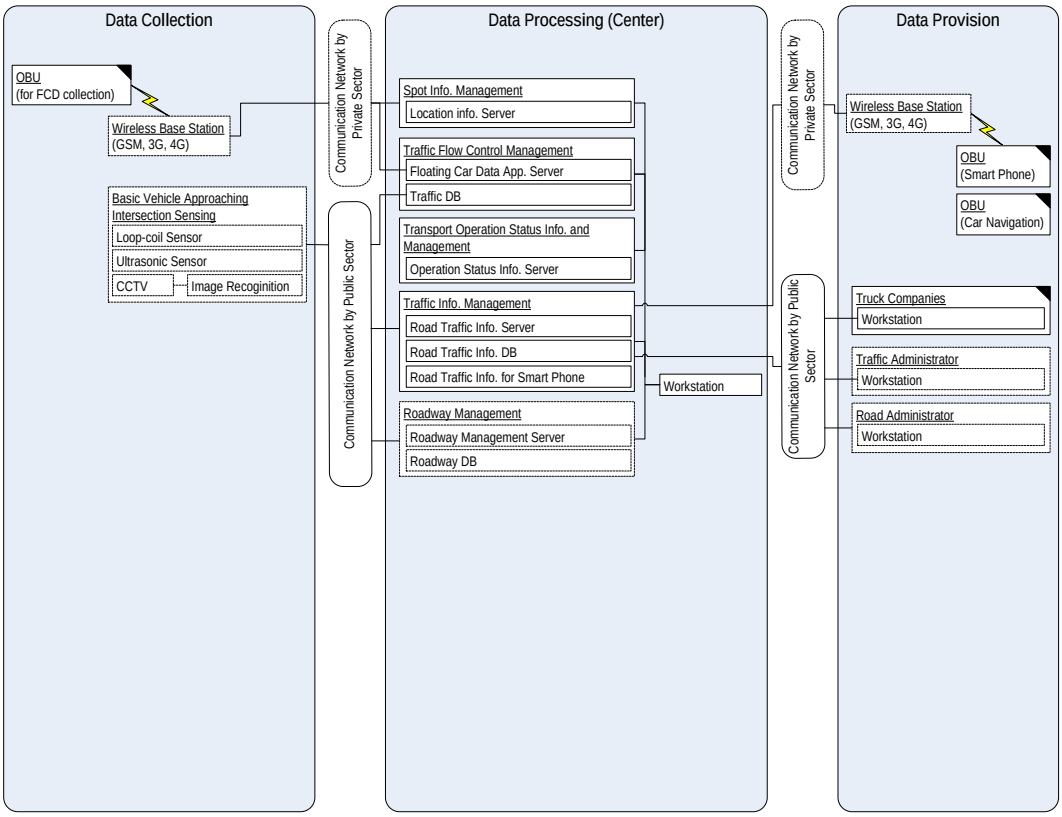


Figure 11-2 System Configuration of Commercial Vehicles Operation

Table 11-1 Equipment List of Commercial Vehicles Operation

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	5
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	3
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	1
Center Software				
S-1	Transport Operating Status Information Management	・Shall be able to generate service information ・Shall be able to forecast estimated time of arrival ・Shall be able to display various information by Web ・Shall be able to display present location information of public transportation ・Shall be able to supervise service route	Set	1
S-2	Traffic Information Management	・Shall be able to analysis traffic condition ・Shall be able to shortest path search ・Shall be able to travel time prediction ・Shall be able to management traffic condition ・Shall be able to create provided information	Set	1
S-3	Traffic Flow Control Management	・Shall be able to analyze of traffic flow ・Shall have capability the management of traffic flow ・Shall be able to set up a signal control schedule ・Shall be able to management of regulation information	Set	1
S-4	Spot Information Management	・Shall be able to input spot information data ・Shall be able to management to spot information data	Set	1
S-5	Roadway Management	・Shall be able to input road inventory data ・Shall be able to input road condition survey data ・Shall be able to input road construction data ・Shall be able to browse road inventory data ・Shall be able to browse congestion information	Set	1
Roadside Equipment				
R-1	CCTV (FIX Type)	・Shall be able to film as an image ・Shall be able to send image to a processor	Pcs	
R-2	Image Recognition Processor	・Shall have data conversion by image recognition ・Shall be able to send to data	Pcs	
R-3	Loop-coil Sensor	・Shall be able to sense a vehicle or person by loop-coil ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	
R-4	Ultrasonic Sensor	・Shall be able to sense a vehicle or person by ultrasonic ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	
Vehicle Equipment				
V-1	Navigation System	・Shall be able to receive traffic data ・Shall be able to receive shortest path data ・Shall process shortest path data in map display ・Shall be able to display map information ・Shall display route for navigate on map ・Shall display traffic condition ・Shall display fare information	Pcs	
V-2	OBU	・Shall be able to positioning by GPS ・Shall be able to send a vehicle data ・Shall be able to receive information	Pcs	

No.	Equipment Component	Requirements Specification	Unit	Qty.
Human Equipment				
H-1	Smart phone application Traffic Information	・Shall provide traffic condition ・Shall provide shortest path ・Shall provide travel time	Set	1

Table 11-2 Estimated Cost of Commercial Vehicles Operation in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Software								-
S-1	Transport Operation Status Information Management	set	39,702,847.25		39,702,847.25	0.25	9,925,711.81		9,925,711.81
Total							**9,925,711.81**	-	**9,925,711.81**

Table 11-3 Estimated Cost of Commercial Vehicles Operation in Mega Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-1	Transport Operation Status Information Management	set	39,702,847.25		39,702,847.25	1.00	39,702,847.25		39,702,847.25
Total							**39,702,847.25**	**23,431,250.00**	**63,134,097.25**

12 Network Access While Traveling Sub-system

12.1 Objectives of User Sub-service

- To allow access to the information network such as internet on the road for improvement of convenience of information collection and information dissemination by user.

12.2 Physical model of User Sub-service

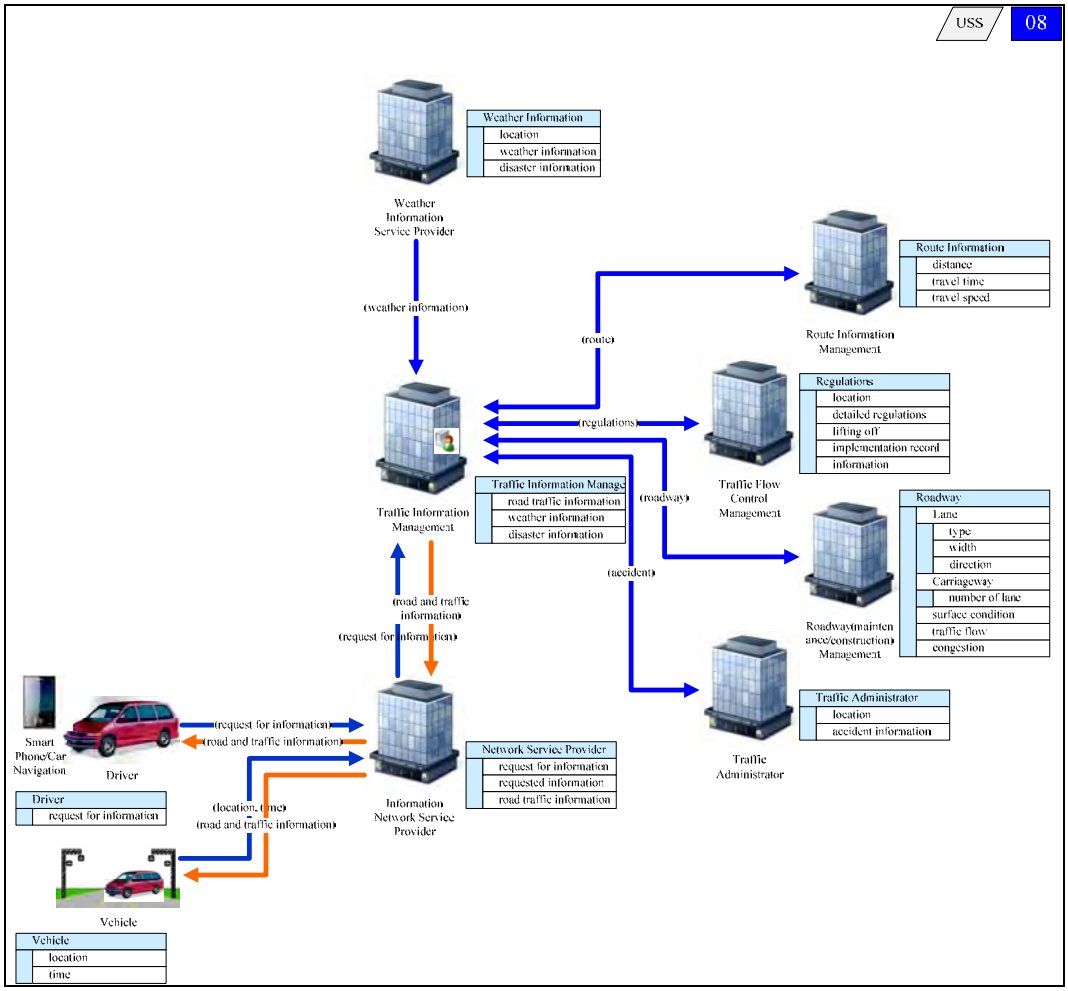


Figure 12-1 Physical/Control model of Network Access While Traveling

12.3 Implementation

113 sections

To detect and monitor the vehicle on Radial Road and Circumferential Road per 2.0km section. Total length of Radial Road and Circumferential Road is 225.94km in NCR.

Therefore, 225.94 km / 2.0 km = 113 (cross-sections) approx.

12.4 Implementation Method

1) Data Processing Equipments

a. Network Management: To monitor and manage the condition of communication network. This is installed at the centre.

b. Access Controller: To monitor and manage the external access to communication network. This is installed at the centre.

2) Information Provision Equipments

c. WiMAX Antenna: Install on National Road per 2.0 km. 225.94 km / 2.0 km □ 113 pcs

12.5 System Configuration and Equipment List

The system configuration to enable access to the universal communication network on the road and the list of requirement specifications of the equipment and software are shown below.

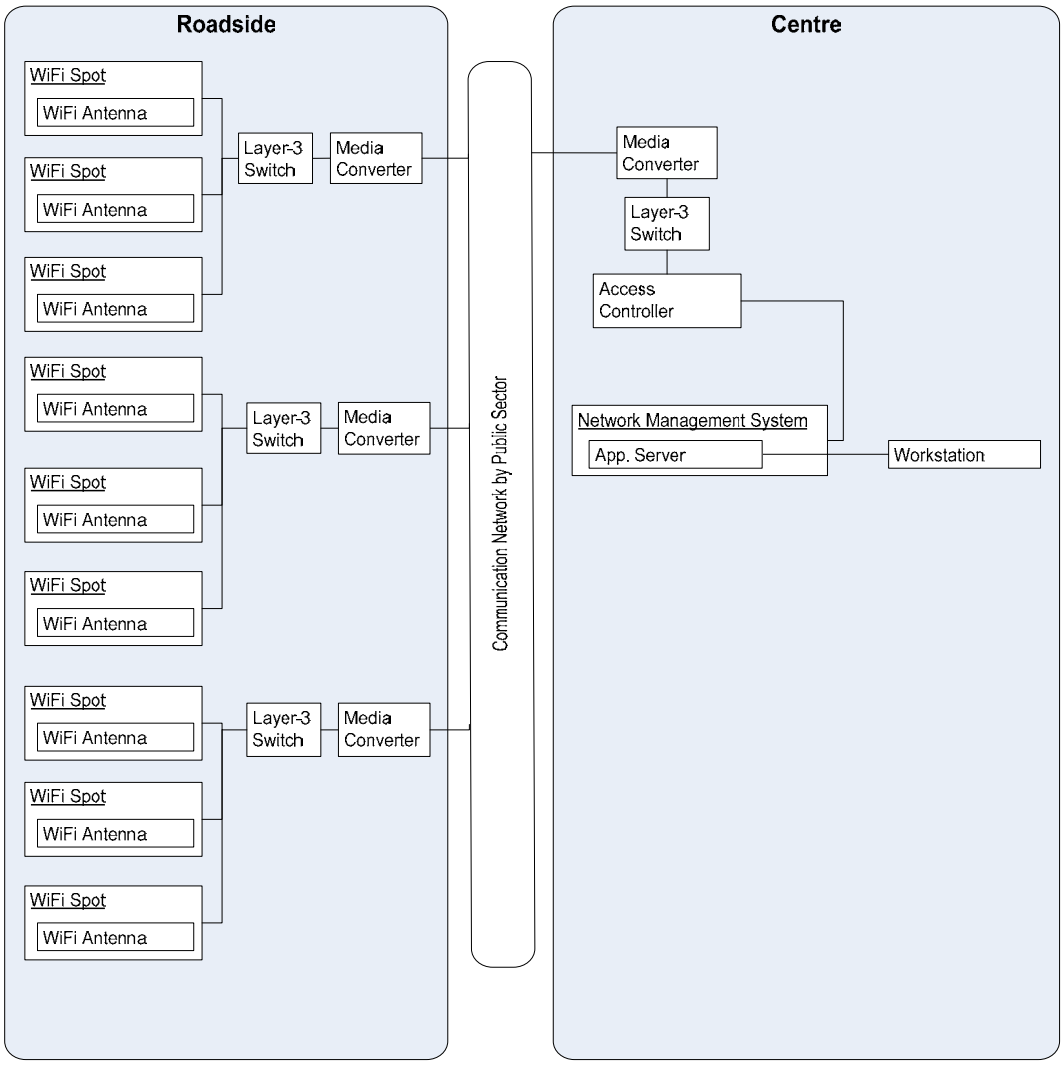


Figure 12-2 System Configuration of Network Access While Traveling

Table 12-1 Equipment List for Network Access While Traveling

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	1
C-2	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	1
Communication Network				
C-3	Layer 3 Switch	・Shall be able to data transfer process of network layer ・Shall be able to routing ・Shall be able to protocol conversion	Pcs	
C-4	Media Converter	・Shall be able to inter conversion of signal ・Shall be able to long distance transmission	Pcs	
Center Software				
S-1	Network Management	・Shall be able to confirmation of the situation in network connection ・Shall display on alert for plague ・Shall be replaced by plague automatically	Set	1
S-2	Access Controller	・Shall be able to setting for access control ・Shall be able to confirmation of the situation in access control ・Shall be able to setting of detail authentication	Set	1
Roadside Equipment				
R-1	WiMAX Antenna	・Shall be able to send and receive on 2.5GHz band	Pcs	
R-2	Base station	・Shall have function gateway ・Shall be able to conversion of wired and wireless ・Shall be able to connect various antenna	Pcs	113
R-3	Optical Fiber Cable	・Shall have 42 core	m	
R-4	Cable Termination	・Shall be support until 42 core	Pcs	
R-5	Cable Duct	・Shall be able to storage 42 core	m	

Table 12-2 Estimated Cost of Network Access While Travelling in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-1	Network Management	set	9,925,722.00		9,925,722.00	1.00	9,925,722.00		9,925,722.00
S-1	Access Controller	set	14,888,583.00		14,888,583.00	1.00	14,888,583.00		14,888,583.00
									-
	Roadside Equipment								-
R-2	Base Station	pcs	611,250.00	91,687.50	702,937.50	113.00	-	79,431,937.50	79,431,937.50
R-3	Optical Fiber Cable	pcs	10,146.75		10,146.75	226.00	-	2,293,165.50	2,293,165.50
V-2	OBU	pcs	4,075.00	611.25	4,686.25			-	-
Total							**24,814,305.00**	**105,156,353.00**	**129,970,658.00**

13 Weather Information Sub-system

13.1 Objectives of User Sub-service

- To disseminate the weather information such as wind, fog, heavy rain and flood by using On-Board-Unit and the information provision equipment to support the safety driving such as preventative of accidents caused by climate change.

13.2 Physical model of User Sub-service

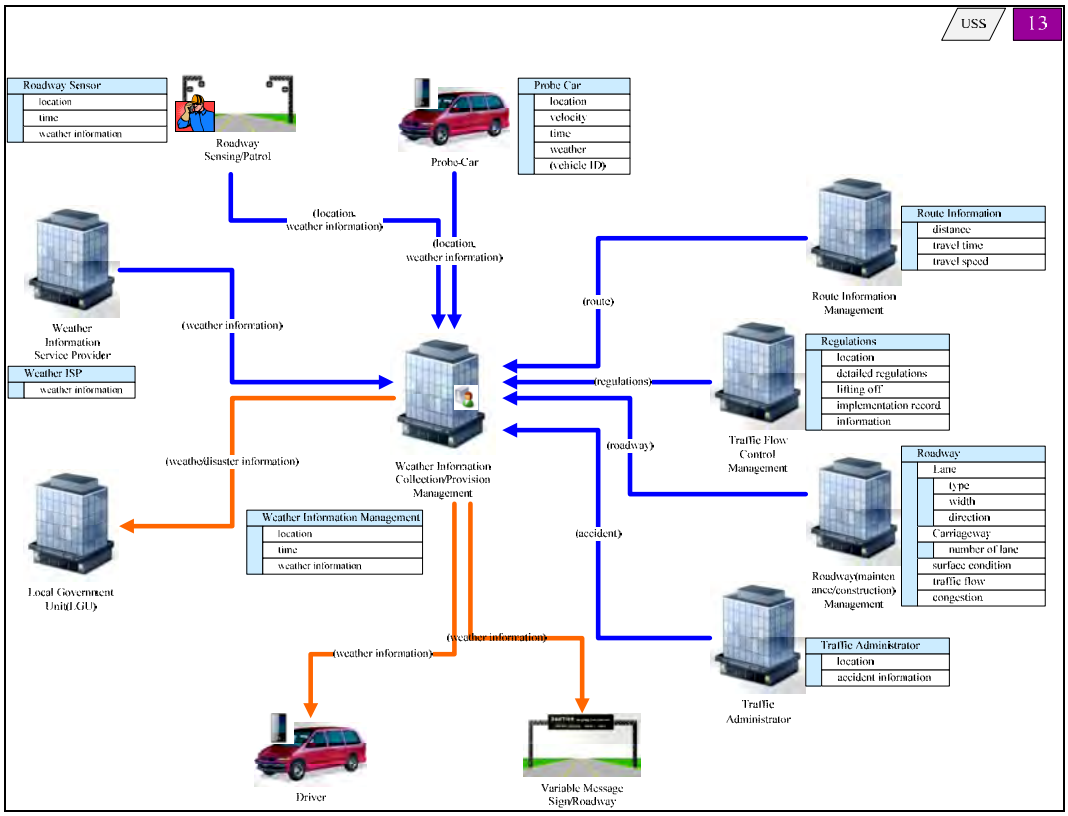


Figure 13-1 Physical/Control model of Weather Information

13.3 Implementation

(1) Metro Manila

24 points

(According to historical data of flood at Radial Road and Circumferential Road provided by NOAH Project)

Weather information is provided by Philippine Atmospheric, Geophysical & Astronomical Services Administration (PAGASA). To monitor flood on Radial Road and Circumferential Road by using CCTV.

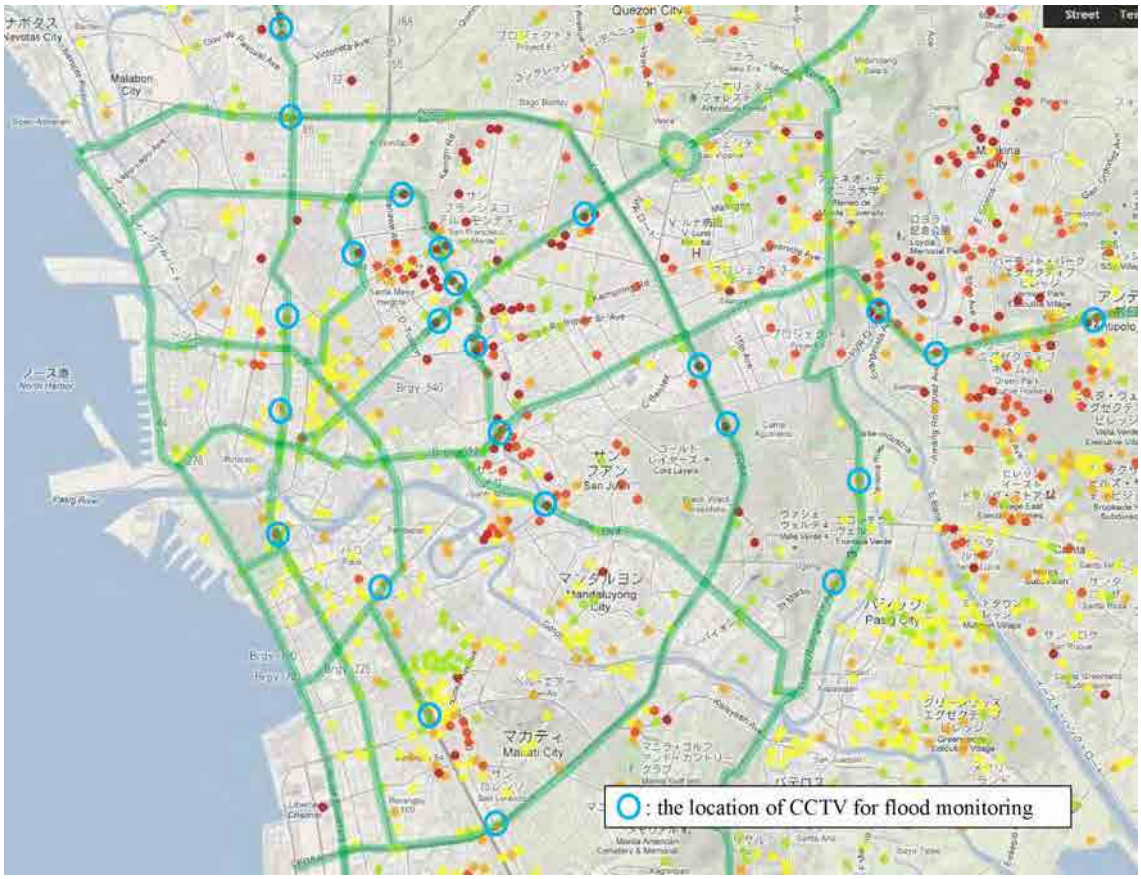


Figure 13-2 Location plan of CCTV for flood monitoring

(2) Mega Manila

79 points

The ratio of flood point is 1120.26 km (Length of National Road in NCR) / 24 (No. of flood point in MMDA area) = 46.67

The length of National Road in Region 3 and Region 4-A is 745.29 km.

745.29 / 9.41 = 79 points

13.4 Implementation Method

1) Data Collection Equipments

a) CCTV (PTZ Type): Flooded place/neighborhood near a radial road and circumferential road in the past. CCTV installs 24 places.

2) Data Processing Equipments

a) Web Information: Information sharing through the Internet. This is installed at the centre.

b) Spot Information Management: Collection of positional information on the roadside equipment and OBU. This is installed at the centre.

c) Traffic Flow Control Management: Collection of Floating Car Data and Traffic Volume Data. This is installed at the centre.

d) Weather Information Collection and Provision: To collect and manage weather information. This is installed at the centre.

e) VMS Controller: Management and control of VMS. This is installed at the centre.

f) CCTV Monitoring: Monitoring of CCTV image. This is installed at the centre.

13.5 System Configuration and Equipment List

The system configuration to provide the weather information such as a heavy rain, flooded area, dense fog and string wind by OBU and information provision equipment and the list of requirement specifications of the equipment and software are shown below.

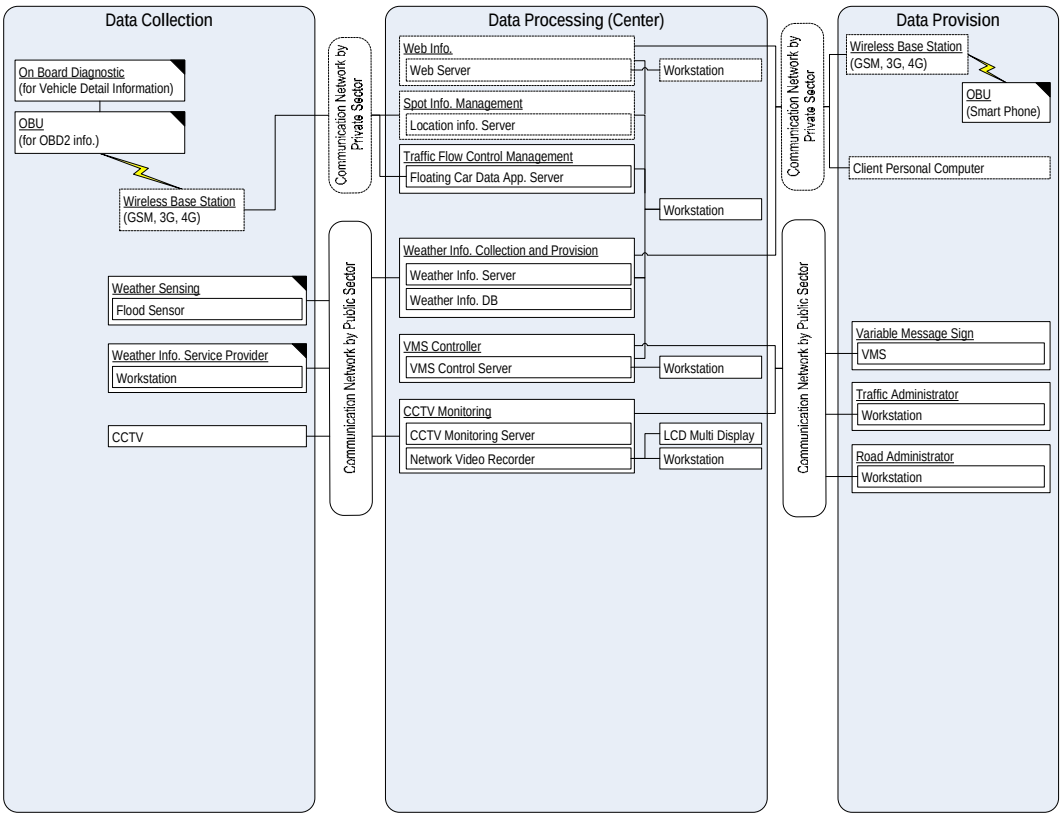


Figure 13-2 System Configuration of Weather Information

Table 13-1 Equipment List for Weather Information

No.	Equipment Component	Requirements Specification	Unit	Qty. (Metro)	Qty. (Mega)
Centre Equipment					
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	6	6
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	1	1
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	4	4
C-4	Network Video Recorder	・Shall be able to recording CCTV image ・Shall be support for multiple file format ・Shall have high capacity ・Shall be easy to the export of data	Pcs	1	1
C-5	LCD Multi Display	・Shall be able to display on image ・Shall be support for multi display	Pcs	4	4
Center Software					
S-1	Weather Information Collection and Provision	・Shall be able to gather weather data of outside ・Shall be able to conversion data format ・Shall be able to gather road traffic information data ・Shall be able to management weather data ・Shall be able to send weather data	Set	1	1
S-2	Traffic Flow Control Management	・Shall be able to analyze of traffic flow ・Shall have capability the management of traffic flow ・Shall be able to set up a signal control schedule ・Shall be able to management of regulation information	Set	1	1
S-3	Spot Information Management	・Shall be able to input spot information data ・Shall be able to management to spot information data	Set	1	1
S-4	Web Information	・Shall operate Web server service ・Shall be able to support for multi access ・Shall be able to process html or xml language ・Shall be able to access control ・Shall be able to security settings ・Shall be able to packet filtering	Set	1	1
S-5	VMS Controller	・Shall be able to control for VMS ・Shall be able to input message for VMS display ・Shall be able to send message data ・Shall be able to management VMS	Set	1	1
S-6	CCTV Monitoring	・Shall be able to real-time play to image ・Shall be able to recording image automatically ・Shall be able to display on multi image simultaneously ・Shall be able to play image which was recorded ・Shall be able to operate camera which was selected	Set	1	1
Roadside Equipment					
R-1	CCTV	・Shall be able to film as an image ・Shall be able to send image on internet connection ・Shall be able to Pan and Tilt and Zoom ・Shall be support for multi codec	Pcs	24	79
R-2	Flood Sensor	・Shall be able to sense situation of flood	Pcs		
R-3	VMS	・Shall be able to receive message data ・Shall be able to display message data ・Shall be able to display in English	Pcs		
Vehicle Equipment					

No.	Equipment Component	Requirements Specification	Unit	Qty. (Metro)	Qty. (Mega)
V-1	Navigation System	・Shall be able to receive traffic data ・Shall be able to receive shortest path data ・Shall process shortest path data in map display ・Shall be able to display map information ・Shall display route for navigate on map ・Shall display traffic condition ・Shall display fare information	Pcs		
V-2	OBU	・Shall be able to positioning by GPS ・Shall be able to send a vehicle data ・Shall be able to receive information	Pcs		

Table 13-2 Estimated Cost of Weather Informant in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-1	Weather Information Collection and Provision	set	29,777,125.25		29,777,125.25	1.00	29,777,125.25		29,777,125.25
									-
	Roadside Equipment								-
R-10	CCTV Camera (PTZ Type)	pcs	282,886.50	42,432.98	325,319.48	24.00	-	7,807,667.40	7,807,667.40
	Total						**29,777,125.25**	**31,238,917.40**	**61,016,042.65**

Table 13-3 Estimated Cost of Weather Informant in Mega Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-1	Weather Information Collection and Provision	set	29,777,125.25		29,777,125.25	1.00	29,777,125.25		29,777,125.25
S-1	Traffic Signal Information Management	set	39,702,847.25		39,702,847.25		-		-
									-
	Roadside Equipment								-
R-10	CCTV Camera (PTZ Type)	pcs	282,886.50	42,432.98	325,319.48	79.00	-	25,700,238.53	25,700,238.53
	Total						**29,777,125.25**	**49,131,488.53**	**78,908,613.78**

14 Weather and Disaster Information Sub-service

14.1 Objectives of User Sub-service

- To realize smooth exchange of information for the assessment of road traffic situation that are not safe and smooth caused by extreme weather and disasters.

14.2 Physical model of User Sub-service

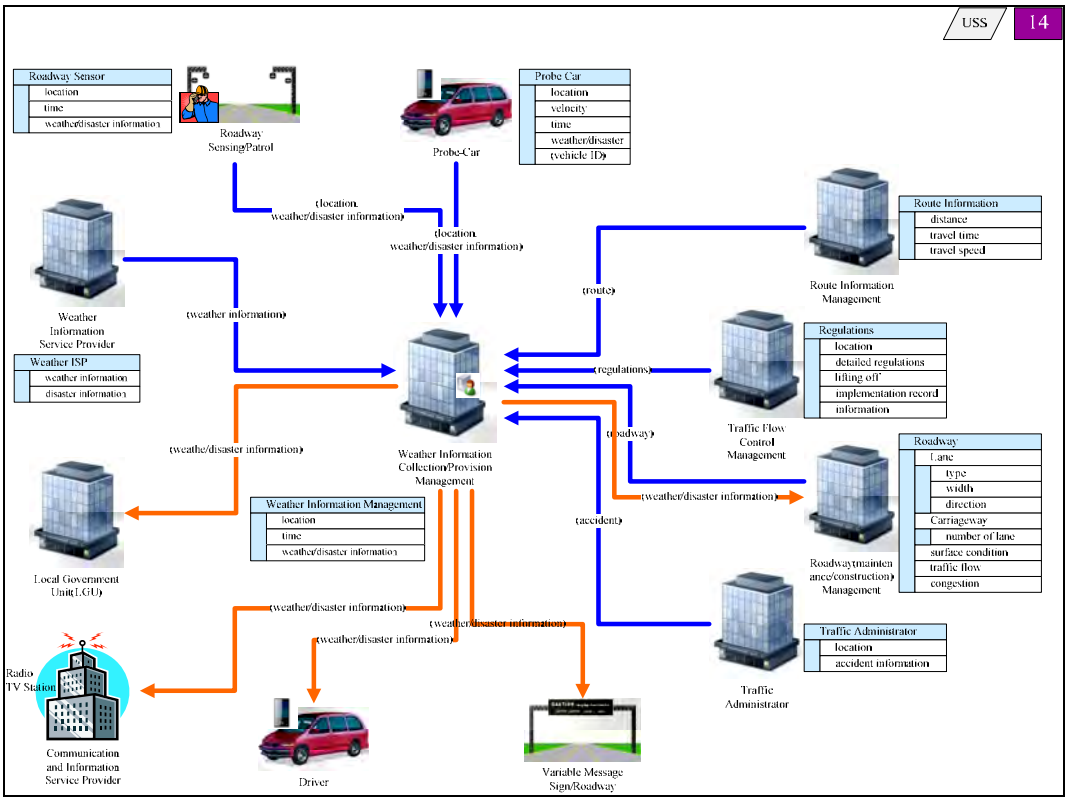


Figure 14-1 Physical/Control model of Weather and Disaster Information

14.3 Implementation

1 center (for data sharing of extreme weather and disaster information)

14.4 Implementation Method

1) Data Processing Equipments

a) Web Information: Information sharing through the Internet. This is installed at the centre.

b) Spot Information Management: Collection of positional information on the roadside equipment and OBU. This is installed at the centre.

c) Traffic Flow Control Management: Collection of Floating Car Data and Traffic Volume Data. This is installed at the centre.

d) Weather Information Collection and Provision: To collect and manage weather information. This is installed at the centre.

e) Weather and Disaster Information Management: To collect and manage disaster information and extreme weather. This is installed at the centre.

f) Roadway Management: Database for road inventory. This is installed at the centre.

g) VMS Controller: Management and control of VMS. This is installed at the centre.

h) CCTV Monitoring: Monitoring of CCTV image. This is installed at the centre.

14.5 System Configuration and Equipment List

The system configuration to enable smooth information exchange of related institutions to grasp the situation by extreme weather or the disaster appropriately and the list of requirement specifications of the equipment and software are shown below.

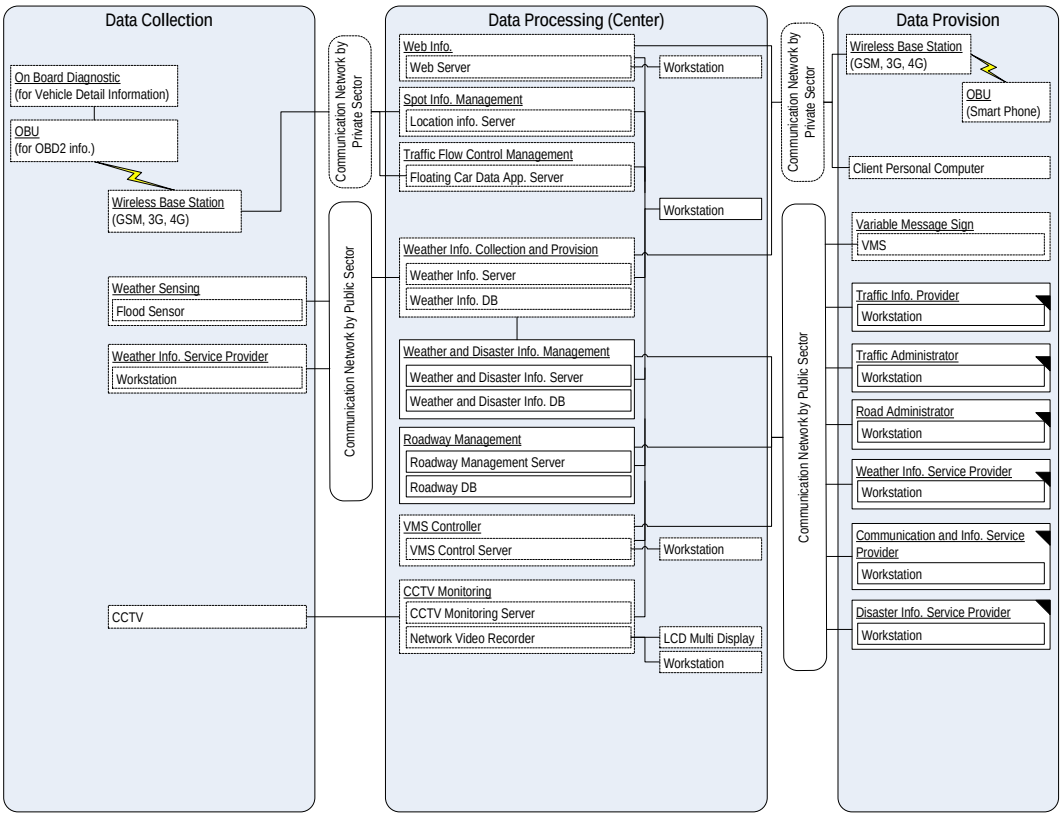


Figure 14-2 System Configuration of Weather and Disaster Information

Table 14-1 Equipment List for Weather and Disaster Information

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	8
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	3
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	4
C-4	Network Video Recorder	・Shall be able to recording CCTV image ・Shall be support for multiple file format ・Shall have high capacity ・Shall be easy to the export of data	Pcs	1
C-5	LCD Multi Display	・Shall be able to display on image ・Shall be support for multi display	Pcs	4
Center Software				
S-1	Weather Information Collection and Provision	・Shall be able to gather weather data of outside ・Shall be able to conversion data format ・Shall be able to gather road traffic information data ・Shall be able to management weather data ・Shall be able to send weather data	Set	1
S-2	Weather and Disaster Information Management	・Shall be able to input disaster information ・Shall be able to management disaster information	Set	1
S-3	Traffic Flow Control Management	・Shall be able to analyze of traffic flow ・Shall have capability the management of traffic flow ・Shall be able to set up a signal control schedule ・Shall be able to management of regulation information	Set	1
S-4	Roadway Management	・Shall be able to input road inventory data ・Shall be able to input road condition survey data ・Shall be able to input road construction data ・Shall be able to browse road inventory data ・Shall be able to browse congestion information	Set	1
S-5	Spot Information Management	・Shall be able to input spot information data ・Shall be able to management to spot information data	Set	1
S-6	Web Information	・Shall operate Web server service ・Shall be able to support for multi access ・Shall be able to process html or xml language ・Shall be able to access control ・Shall be able to security settings ・Shall be able to packet filtering	Set	1
S-7	CCTV Monitoring	・Shall be able to real-time play to image ・Shall be able to recording image automatically ・Shall be able to display on multi image simultaneously ・Shall be able to play image which was recorded ・Shall be able to operate camera which was selected	Set	1
S-8	VMS Controller	・Shall be able to control for VMS ・Shall be able to input message for VMS display ・Shall be able to send message data ・Shall be able to management VMS	Set	1
Roadside Equipment				
R-1	CCTV	・Shall be able to film as an image ・Shall be able to send image on internet connection ・Shall be able to Pan and Tilt and Zoom ・Shall be support for multi codec	Pcs	

No.	Equipment Component	Requirements Specification	Unit	Qty.
R-2	VMS	・Shall be able to receive message data ・Shall be able to display message data ・Shall be able to display in English	Pcs	
R-3	Flood Sensor	・Shall be able to sense situation of flood	Pcs	
Vehicle Equipment				
V-1	OBU	・Shall be able to positioning by GPS ・Shall be able to send a vehicle data ・Shall be able to receive information	Pcs	
V-2	Navigation System	・Shall be able to receive traffic data ・Shall be able to receive shortest path data ・Shall process shortest path data in map display ・Shall be able to display map information ・Shall display route for navigate on map ・Shall display traffic condition ・Shall display fare information	Pcs	

Table 14-2 Estimated Cost of Weather Disaster Information in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-1	Weather and Disaster Information Management	set	5,348,437.50		5,348,437.50	1.00	5,348,437.50		5,348,437.50
Total							**5,348,437.50**	**23,431,250.00**	**28,779,687.50**

Table 14-3 Estimated Cost of Weather Disaster Information in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-1	Weather and Disaster Information Management	set	5,348,437.50		5,348,437.50	1.00	5,348,437.50		5,348,437.50
Total							**5,348,437.50**	**23,431,250.00**	**28,779,687.50**

15 Traffic Management under Disaster Condition Sub-service

15.1 Objectives of User Sub-service

- To involve the use of a database concerning disaster magnitude and anticipated damages for the performance of preliminary traffic simulations. To support traffic management such as temporary traffic regulation measures and information provision, in order to carry out activities such as support for emergency first-aid efforts, disaster recovery operations.

15.2 Physical model of User Sub-service

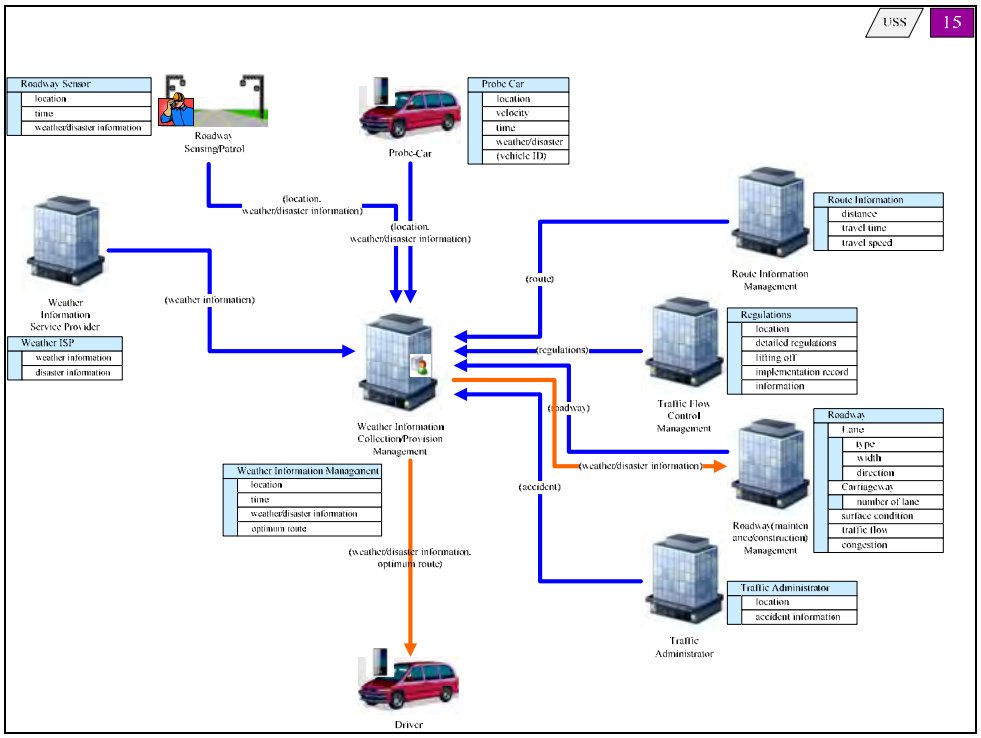


Figure 15-1 Physical/Control model of Network Traffic Management under Disaster Condition Sub-service

15.3 Implementation

1 center (for data sharing of extreme weather and disaster information)

(For conduct of guidance of traffic control related to the treatment of temporary traffic restriction based on the weather information and the location of disaster occurrence.)

15.4 Implementation Method

1) Data Processing Equipments

a) Web Information: Information sharing through the Internet. This is installed at the centre.

b) Spot Information Management: Collection of positional information on the roadside equipment and OBU. This is installed at the centre.

c) Traffic Flow Control Management: Collection of Floating Car Data and Traffic Volume Data. This is installed at the centre.

d) Traffic Accident / Incident Information Management: Collection of incident information including road crash. This is installed at the centre.

e) Traffic Information Management: Manage any transportation information provided in Traffic Flow Control Management and Traffic Accident / Incident Information Management. This is installed at the centre.

f) Roadway Management: Database for road inventory. This is installed at the centre.

g) Route Information Management: Based on vehicle information in Traffic Information Management, it provides the optimum route according to the request from a road user. This is installed at the centre.

h) Weather Information Collection and Provision: To collect and manage weather information. This is installed at the centre.

i) Weather and Disaster Information Management: To collect and manage disaster information and extreme weather. This is installed at the centre.

j) VMS Controller: Management and control of VMS. This is installed at the centre.

k) CCTV Monitoring: Monitoring of CCTV image. This is installed at the centre.

15.5 System Configuration and Equipment List

The system configuration to support traffic management such as temporary traffic regulation or information provision based on the traffic simulation using a database of the scale of the disaster and estimated damage previously and the list of requirement specifications of the equipment and software are shown below.

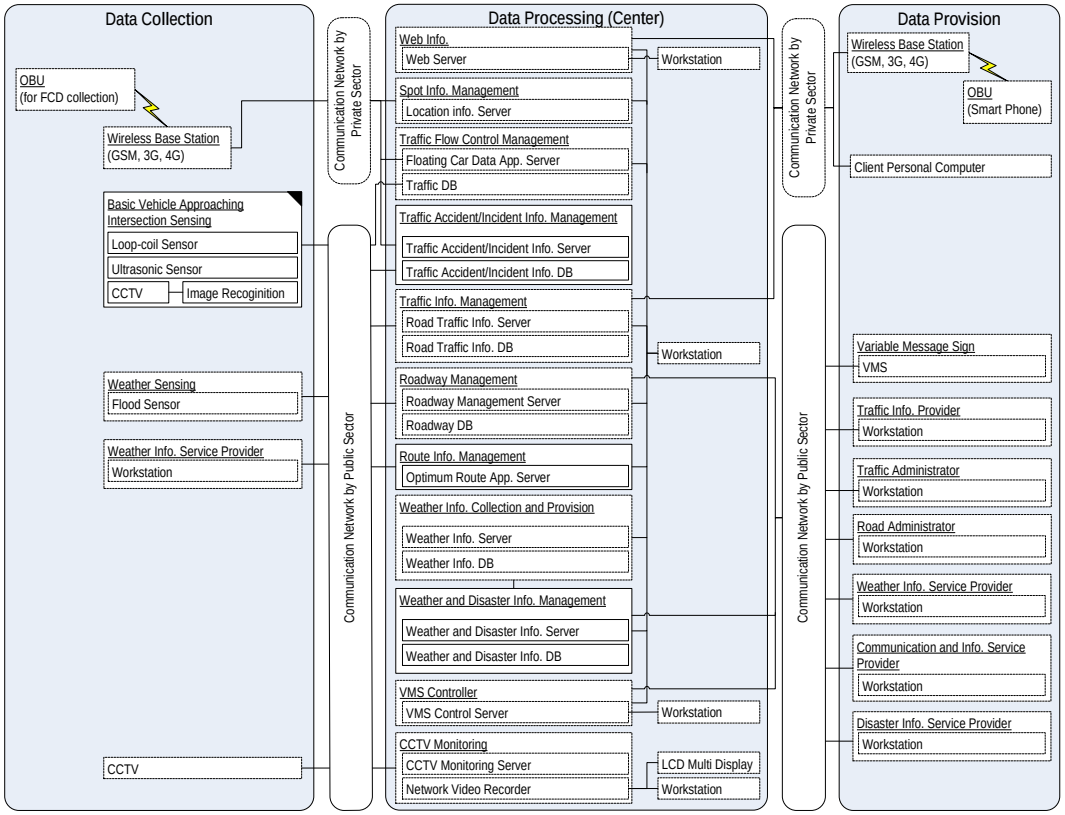


Figure 15-2 System Configuration of Network Traffic Management under Disaster Condition Sub-service

Table 15-1 Equipment List for Network Traffic Management under Disaster Condition Sub-service

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	11
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	6
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	4
C-4	Network Video Recorder	・Shall be able to recording CCTV image ・Shall be support for multiple file format ・Shall have high capacity ・Shall be easy to the export of data	Pcs	1
C-5	LCD Multi Display	・Shall be able to display on image ・Shall be support for multi display	Pcs	4
Center Software				
S-1	Traffic Information Management	・Shall be able to analysis traffic condition ・Shall be able to shortest path search	Set	1

No.	Equipment Component	Requirements Specification	Unit	Qty.
		・Shall be able to travel time prediction ・Shall be able to management traffic condition ・Shall be able to create provided information		
S-2	Roadway Management	・Shall be able to input road inventory data ・Shall be able to input road condition survey data ・Shall be able to input road construction data ・Shall be able to browse road inventory data ・Shall be able to browse congestion information	Set	1
S_3	Traffic Flow Control Management	・Shall be able to analyze of traffic flow ・Shall have capability the management of traffic flow ・Shall be able to set up a signal control schedule ・Shall be able to management of regulation information	Set	1
S-4	Route Information Management	・Shall be able to input route information ・Shall be able to management route information	Set	1
S-5	Spot Information Management	・Shall be able to input spot information data ・Shall be able to management to spot information data	Set	1
S-6	Traffic Accident/Incident Information Management	・Shall be able to input traffic accident information ・Shall be able to management traffic accident information ・Shall be able to analyze traffic accident statistics	Set	1
S-7	Weather Information Collection and Provision	・Shall be able to gather weather data of outside ・Shall be able to conversion data format ・Shall be able to gather road traffic information data ・Shall be able to management weather data ・Shall be able to send weather data	Set	1
S-8	Weather and Disaster Information Management	・Shall be able to input disaster information ・Shall be able to management disaster information	Set	1
S-9	VMS Controller	・Shall be able to control for VMS ・Shall be able to input message for VMS display ・Shall be able to send message data ・Shall be able to management VMS	Set	1
S-10	Web Information	・Shall operate Web server service ・Shall be able to support for multi access ・Shall be able to process html or xml language ・Shall be able to access control ・Shall be able to security settings ・Shall be able to packet filtering	Set	1
S-11	CCTV Monitoring	・Shall be able to real-time play to image ・Shall be able to recording image automatically ・Shall be able to display on multi image simultaneously ・Shall be able to play image which was recorded ・Shall be able to operate camera which was selected	Set	1
Roadside Equipment				
R-1	VMS	・Shall be able to receive message data ・Shall be able to display message data ・Shall be able to display in English	Pcs	
R-2	CCTV (FIX Type)	・Shall be able to film as an image ・Shall be able to send image to a processor	Pcs	
R-3	Image Recognition Processor	・Shall have data conversion by image recognition ・Shall be able to send to data	Pcs	
R-4	Loop-coil Sensor	・Shall be able to sense a vehicle or person by loop-coil ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	
R-5	Ultrasonic Sensor	・Shall be able to sense a vehicle or person by ultrasonic ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	
R-6	CCTV	・Shall be able to film as an image ・Shall be able to send image on internet connection ・Shall be able to Pan and Tilt and Zoom ・Shall be support for multi codec	Pcs	
R-7	Flood Sensor	・Shall be able to sense situation of flood	Pcs	
Vehicle Equipment				
V-1	OBU	・Shall be able to positioning by GPS ・Shall be able to send a vehicle data ・Shall be able to receive information	Pcs	

No.	Equipment Component	Requirements Specification	Unit	Qty.
V-2	Navigation System	・Shall be able to receive traffic data ・Shall be able to receive shortest path data ・Shall process shortest path data in map display ・Shall be able to display map information ・Shall display route for navigate on map ・Shall display traffic condition ・Shall display fare information	Pcs	

Table 15-2 Estimated Cost of Network Traffic Management under Disaster Condition in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-3	Workstation	pcs	256,725.00	38,508.75	295,233.75	2.00		590,467.50	590,467.50
									-
	Centre Software								-
S-1	Weather and Disaster Information Management	set	5,348,437.50		5,348,437.50	0.25	1,337,109.38		1,337,109.38
Total							**1,337,109.38**	**590,467.50**	**1,927,576.88**

Table 15-3 Estimated Cost of Network Traffic Management under Disaster Condition in Mega Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Software								-
S-1	Weather Information Collection and Provision	set	29,777,125.25		29,777,125.25	0.25	7,444,281.31		7,444,281.31
S-1	Weather and Disaster Information Management	set	5,348,437.50		5,348,437.50	0.50	2,674,218.75		2,674,218.75
Total							**10,118,500.06**	-	**10,118,500.06**

16 Enhanced Driver Assistance Sub-system

16.1 Objectives of User Sub-service

- To disseminate the notice such as lane departure warning, vehicular gap warning and etc to support careful driving of the driver.
- To diagnose Driver's propensity from Driving Record Data for safe driving training and support the advancement of training.

16.2 Physical model of User Sub-service

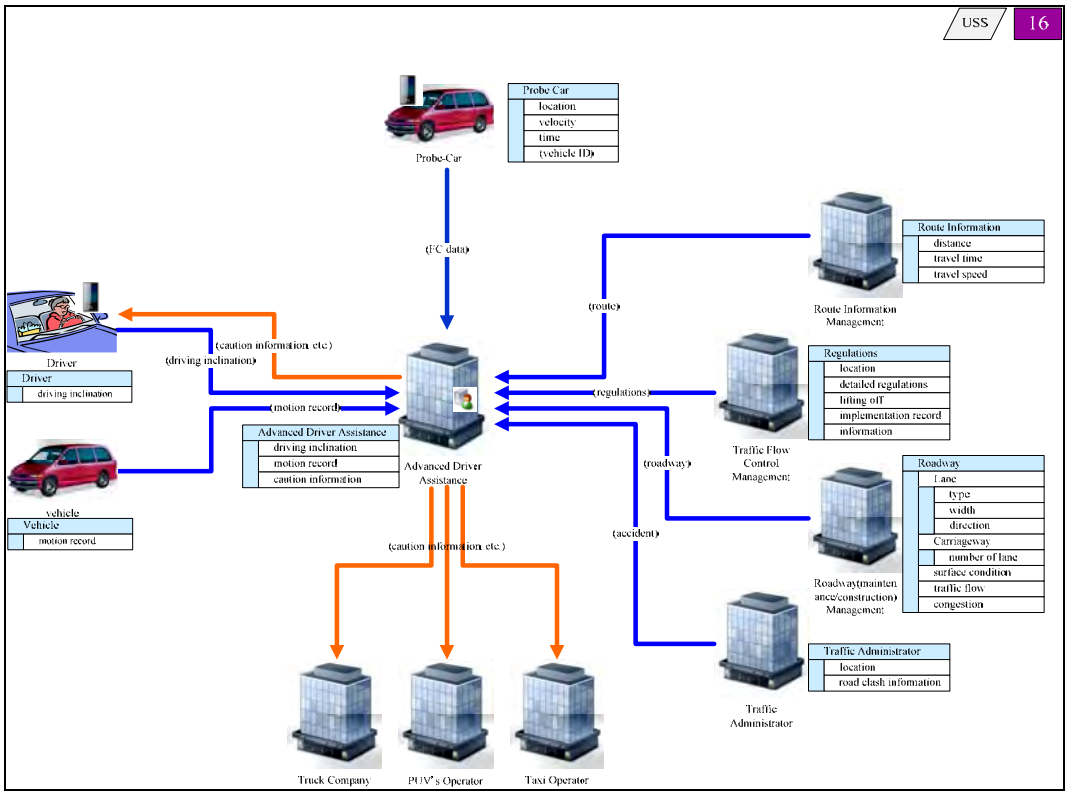


Figure 16-1 Physical/Control model of Advanced Driver Assistance Sub-system

16.3 Implementation

1 center (for the management of the smart phone application)

(Develop and provide the smart phone application for departure warning, vehicular gap warning)

16.4 Implementation Method

1) Data Processing Equipments

a) Web Information: Information sharing through the Internet. This is installed at the centre.

b) Spot Information Management: Collection of positional information on the roadside equipment and OBU. This is installed at the centre.

c) Traffic Flow Control Management: Collection of Floating Car Data and Traffic Volume Data. This is installed at the centre.

d) Advanced Driver Assistance: To provide traffic lane deviation warning or distance between the cars warning. To monitor action situation of the smartphone application. This is installed at the centre.

e) Traffic Accident / Incident Information Management: Collection of incident information including road crash. This is installed at the centre.

f) Traffic Information Management: Manage any transportation information provided in Traffic Flow Control Management and Traffic Accident / Incident Information Management. This is installed at the centre.

g) Roadway Management: Database for road inventory. This is installed at the centre.

2) Information Provision Equipments

a) Enhanced Driver Support: Smartphone application to provide traffic lane deviation warning or distance between the cars warning for the driver distribute by internet web site.

16.5 System Configuration and Equipment List

The system configuration to provide information such as warning on traffic lane deviation or warning on distance between the cars and the list of requirement specifications of the equipment and software are shown below.

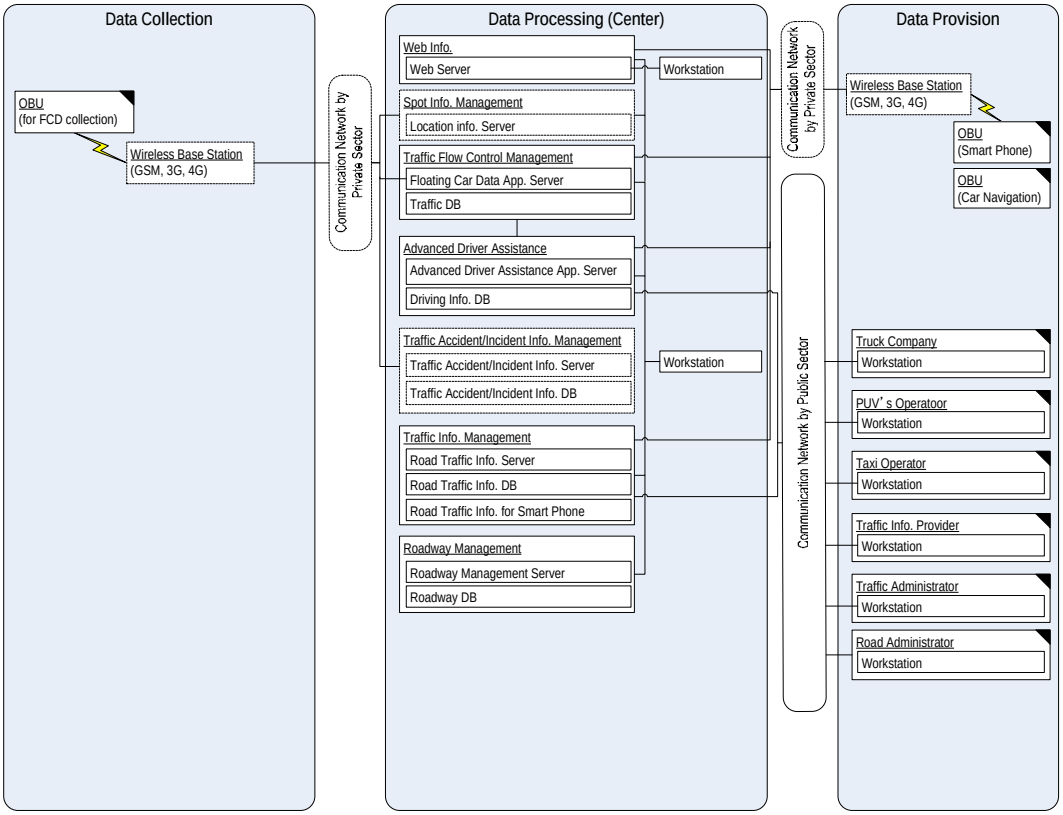


Figure 16-2 System Configuration of Advanced Driver Assistance

Table 16-1 Equipment List of Advanced Driver Assistance

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	7
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	5
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	2
Center Software				
S-1	Advanced Driver Assistance	・Shall be able to gather FCD data ・Shall be able to analyze situation of lane departure ・Shall be able to analyze situation of vehicular gap ・Shall be able to analyze situation of safety driving ・Shall be able to analyze situation of eco-drive diagnosis ・Shall be able to display lane departure warning ・Shall be able to display vehicular gap warning ・Shall be able to display diagnosis result of safety driving ・Shall be able to display result of eco-drive diagnosis	Set	1

No.	Equipment Component	Requirements Specification	Unit	Qty.
S-2	Traffic Information Management	・Shall be able to analysis traffic condition ・Shall be able to shortest path search ・Shall be able to travel time prediction ・Shall be able to management traffic condition ・Shall be able to create provided information	Set	1
S-3	Traffic Flow Control Management	・Shall be able to analyze of traffic flow ・Shall have capability the management of traffic flow ・Shall be able to set up a signal control schedule ・Shall be able to management of regulation information	Set	1
S-4	Spot Information Management	・Shall be able to input spot information data ・Shall be able to management to spot information data	Set	1
S-5	Roadway Management	・Shall be able to input road inventory data ・Shall be able to input road condition survey data ・Shall be able to input road construction data ・Shall be able to browse road inventory data ・Shall be able to browse congestion information	Set	1
S-6	Web Information	・Shall operate Web server service ・Shall be able to support for multi access ・Shall be able to process html or xml language ・Shall be able to access control ・Shall be able to security settings ・Shall be able to packet filtering	Set	1
S-7	Traffic Accident/Incident Information Management	・Shall be able to input traffic accident information ・Shall be able to management traffic accident information ・Shall be able to analyze traffic accident statistics	Set	1
Vehicle Equipment				
V-1	OBU	・Shall be able to positioning by GPS ・Shall be able to send a vehicle data ・Shall be able to receive information	Pcs	
V-2	Navigation System	・Shall be able to receive traffic data ・Shall be able to receive shortest path data ・Shall process shortest path data in map display ・Shall be able to display map information ・Shall display route for navigate on map ・Shall display traffic condition ・Shall display fare information	Pcs	
Human Equipment				
H-1	Smart phone application Traffic Information	・Shall provide traffic condition ・Shall provide shortest path ・Shall provide travel time	Set	1

Table 16-2 Estimated Cost of Enhanced Driver Support in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-1	Advanced Driver Assistance	set	5,093,750.00		5,093,750.00	1.00	5,093,750.00		5,093,750.00
									-
	Roadside Equipment								-
H-7	Enhanced Driver Support	pcs	2,481,430.50		2,481,430.50	1.00	2,481,430.50		2,481,430.50
Total							**7,575,180.50**	**23,431,250.00**	**31,006,430.50**

Table 16-3 Estimated Cost of Enhanced Driver Support in Mega Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-1	Advanced Driver Assistance	set	5,093,750.00		5,093,750.00	1.00	5,093,750.00		5,093,750.00
									-
	Roadside Equipment								-
H-7	Enhanced Driver Support	pcs	2,481,430.50		2,481,430.50	1.00	2,481,430.50		2,481,430.50
	Total						**7,575,180.50**	**23,431,250.00**	**31,006,430.50**

17 Vehicle in the Opposite Lane Information Sub-system

17.1 Objectives of User Sub-service

- To disseminate notice such as information of oncoming vehicle at blind section by using the information provision equipment for safety driving.

17.2 Physical model of User Sub-service

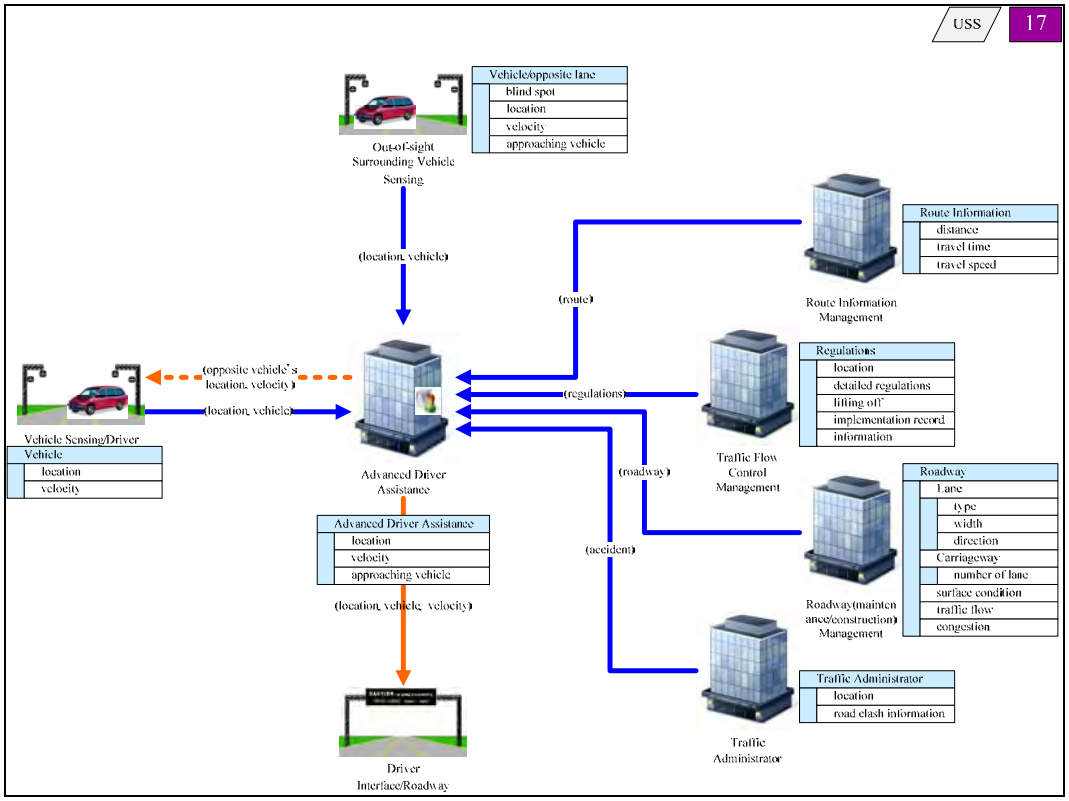


Figure 17-1 Physical/Control model of Vehicle in the Opposite Lane Information

17.3 Implementation

(1) Metro Manila

5 intersections

(Assume the intersection where traffic accidents occur frequently while passing another at blind curve)

(2) Mega Manila

5 intersections

(Assume the intersection where traffic accidents occur frequently while passing another at blind curve)

17.4 Implementation Method

1) Data Collection Equipments

a) Vehicle Detection: Installed at each intersection. 5 intersections x 4 pcs = 20 pcs

2) Data Processing Equipments

a) Vehicle Warning Information: Monitor the working situation of Vehicle Warning. This is installed at the centre.

b) Roadway Management: Database for road inventory. This is installed at the centre.

c) VMS Controller: Management and control of VMS. This is installed at the centre.

3) Information Provision Equipments

a) VMS (Warning): Traffic warning is provided by road user. Installed one unit per intersection. 5 intersections x 4 pcs = 20 pcs

17.5 System Configuration and Equipment List

The system configuration to provide the approach information of the oncoming car by information provision equipment and the list of requirement specifications of the equipment and software are shown below.

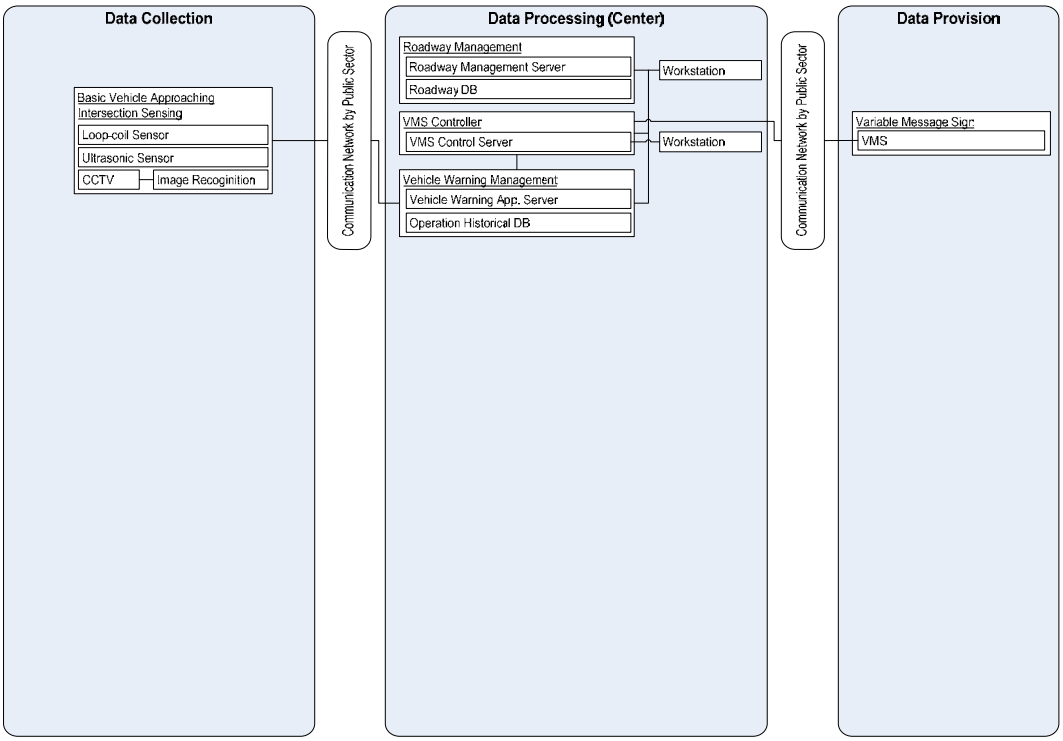


Figure 17-2 System Configuration of Vehicles in the Opposite Lane Information

Table 17-1 Equipment List for Vehicles in the Opposite Lane Information

No.	Equipment Component	Requirements Specification	Unit	Qty. (Metro)	Qty. (Mega)
Centre Equipment					
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	3	3
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	2	2
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	2	2
Center Software					
S-1	Vehicle Warning Management	・Shall be able to gather indicated warning information ・Shall be able to management history of indicated warning information	Set	1	1
S-2	Roadway Management	・Shall be able to input road inventory data ・Shall be able to input road condition survey data ・Shall be able to input road construction data ・Shall be able to browse road inventory data ・Shall be able to browse congestion information	Set	1	1
S-3	VMS Controller	・Shall be able to control for VMS ・Shall be able to input message for VMS display ・Shall be able to send message data ・Shall be able to management VMS	Set	1	1
Roadside Equipment					
R-1	VMS（Warning）	・Shall be able to receive message data ・Shall be able to display message data ・Shall be able to display in English	Pcs	20	10
R-2	CCTV (FIX Type)	・Shall be able to film as an image ・Shall be able to send image to a processor	Pcs	20	10
R-3	Image Recognition Processor	・Shall have data conversion by image recognition ・Shall be able to send to data	Pcs	20	10
R-4	Loop-coil Sensor	・Shall be able to sense a vehicle or person by loop-coil ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs		
R-5	Ultrasonic Sensor	・Shall be able to sense a vehicle or person by ultrasonic ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs		

Table 17-2 Estimated Cost of Vehicles Passing in the Opposite Lane in Metro Manila

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-1	Vehicle Warning Information	set	5,093,750.00		5,093,750.00	1.00	5,093,750.00		5,093,750.00
									-
	Roadside Equipment								-
R-5	Image Recognition Processor	pcs	1,091,814.75	163,772.21	1,255,586.96	20.00	25,111,739.25		25,111,739.25
R-2	CCTV Camera (FIX Type)	pcs	282,886.50	42,432.98	325,319.48	20.00	-	6,506,389.50	6,506,389.50
R-1	VMS (Warning)	pcs	6,947,997.25	1,042,199.59	7,990,196.84	20.00	159,803,936.75		159,803,936.75
	Total						**190,009,426.00**	**29,937,639.50**	**219,947,065.50**

Table 17-2 Estimated Cost of Vehicles Passing in the Opposite Lane in Mega Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-1	Vehicle Warning Information	set	5,093,750.00		5,093,750.00	1.00	5,093,750.00		5,093,750.00
									-
	Roadside Equipment								-
R-5	Image Recognition Processor	pcs	1,091,814.75	163,772.21	1,255,586.96	10.00	12,555,869.63		12,555,869.63
R-2	CCTV Camera (FIX Type)	pcs	282,886.50	42,432.98	325,319.48	10.00	-	3,253,194.75	3,253,194.75
R-1	VMS (Warning)	pcs	6,947,997.25	1,042,199.59	7,990,196.84	10.00	79,901,968.38		79,901,968.38
	Total						**97,551,588.00**	**26,684,444.75**	**124,236,032.75**

18 Pedestrian Guidance Information Sub-system

18.1 Objectives of User Sub-service

- To disseminate the optimum route guidance taking into account condition and flatness of sidewalks by using mobile terminal for improvement of safety and convenience of pedestrian traffic.
- To collect information about the condition and flatness of sidewalks by providing from users.

18.2 Physical model of User Sub-service

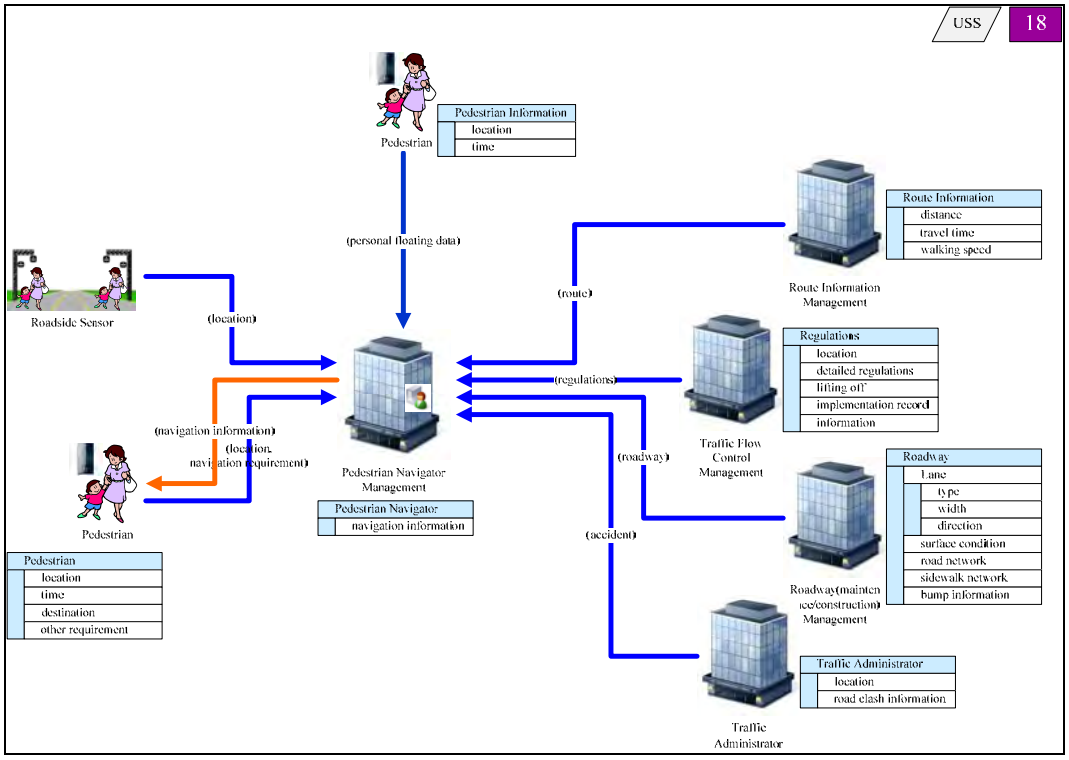


Figure 18-1 Physical/Control model of Pedestrian Guidance Information

18.3 Implementation

1 center (for the management of the smart phone application)

(Develop and provide the smart phone application for dissemination the information and optimum route guidance.)

18.4 Implementation Method

1) Data Processing Equipments

a) Web Information: Information sharing through the Internet. This is installed at the centre.

b) Spot Information Management: Collection of positional information on the roadside equipment and OBU. This is installed at the centre.

c) Pedestrian Navigation Management: Monitor the action / situation of the smartphone application. This is installed at the centre.

d) Roadway Management: Database for road inventory. This is installed at the centre.

2) Information Provision Equipments

a) Pedestrian Support: Smartphone application to provide route instruction information for pedestrians and distribute by internet web site.

18.5 System Configuration and Equipment List

The system configuration to provide route instruction and the list of requirement specifications of the equipment and software are shown below.

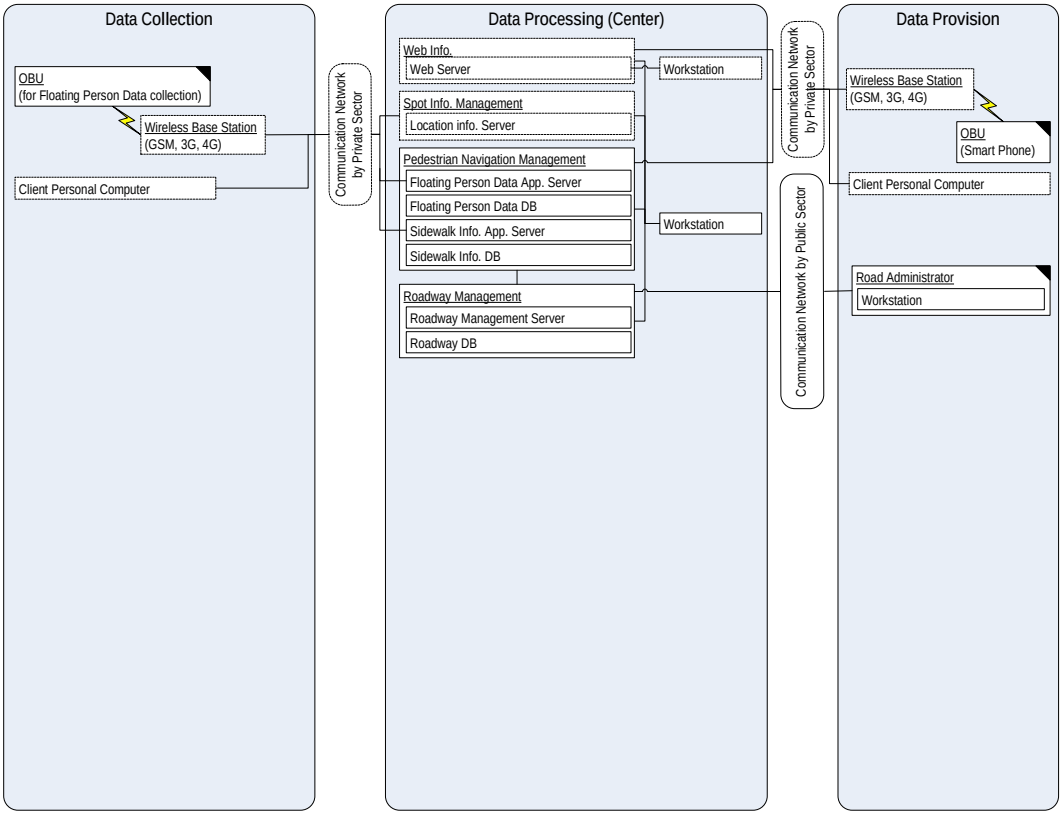


Figure 18-2 System Configuration of Pedestrian Guidance Information

Table 18-1 Equipment List for Pedestrian Guidance Information

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	4
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	2
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	2
Center Software				
S-1	Pedestrian Navigation Management	・Shall be able to gather FCD data ・Shall be able to grasp position of pedestrian ・Shall be able to management situation of sidewalk maintenance ・Shall be able to gather twitter data ・Shall be able to route guidance of pedestrian	Set	1
S-2	Roadway Management	・Shall be able to input road inventory data ・Shall be able to input road condition survey data ・Shall be able to input road construction data ・Shall be able to browse road inventory data ・Shall be able to browse congestion information	set	1
S-3	Spot Information Management	・Shall be able to input spot information data ・Shall be able to management to spot information data	Set	1
S-4	Web Information	・Shall operate Web server service ・Shall be able to support for multi access ・Shall be able to process html or xml language ・Shall be able to access control ・Shall be able to security settings ・Shall be able to packet filtering	Set	1
Human Equipment				
	Smart phone application Pedestrians support	・Shall be able to tweet sidewalk risk information ・Shall be able to send positioning information ・Shall be able to route guidance	Set	1

Table 18-2 Estimated Cost for the Guidance to Pedestrian to the Given Destination in Metro Manila

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	2.00		23,431,250.00	23,431,250.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	2.00		23,431,250.00	23,431,250.00
									-
	Centre Software								-
S-1	Pedestrian Navigation Management	set	20,375,000.00		20,375,000.00	1.00	20,375,000.00		20,375,000.00
									-
	Roadside Equipment								-
H-8	Pedestrian Support	set	3,722,145.75		3,722,145.75	1.00	3,722,145.75		3,722,145.75
	Total						**24,097,145.75**	**46,862,500.00**	**70,959,645.75**

19. Pedestrian Warning of Approaching Vehicle Sub-system

19.1 Objectives of User Sub-service

- To disseminate notice such as information on approaching vehicle of the vehicle close to pedestrian at the narrow street and blind intersection for improvement of safety of pedestrian traffic.

19.2 Physical model of User Sub-service

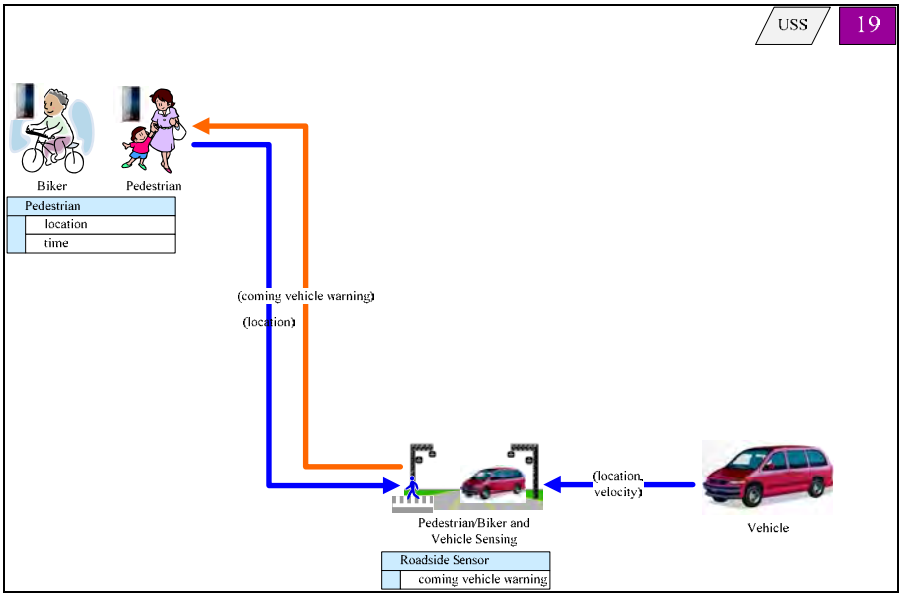


Figure 19-1 Physical/Control model of Pedestrian Warning of Approaching Vehicle

19.3 Implementation

10 sections

(Assume the intersection and road sections where traffic accident involving pedestrian and vehicle frequently.)

19.4 Implementation Method

1) Data Collection Equipments

a) Vehicle Detection: Installed one unit per intersection. 10 intersections x 1 pcs = 10 pcs

b) Infrared Sensor: Installed one unit per intersection. 10 intersections x 1 pcs = 10 pcs

2) Data Processing Equipments

a) Vehicle Warning Information: Monitor the working situation of Vehicle Warning. This is installed at the centre.

b) Roadway Management: Database for road inventory. This is installed at the centre.

c) VMS Controller: Management and control of VMS. This is installed at the centre.

3) Information Provision Equipments

a) VMS (Warning): Traffic warning is provided to pedestrian. One unit is installed per intersection.10 intersections x 1 pcs = 10 pcs

19.5 System Configuration and Equipment List

The system configuration to provide vehicle approach information for the pedestrian and step or not and the list of requirement specifications of the equipment and software are shown below.

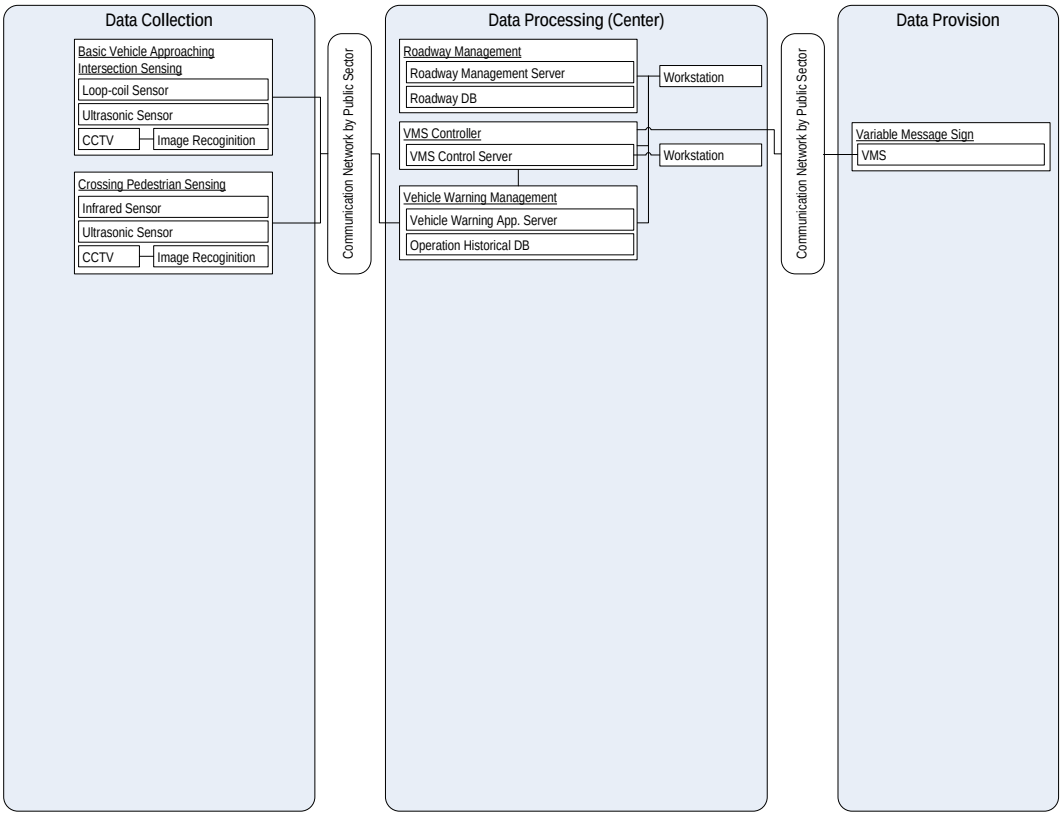


Figure 19-2 System Configuration of Pedestrian Warning of Approaching Vehicle

Table 19-1 Equipment List of Pedestrian Warning of Approaching Vehicle

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	3
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	2
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	2
Center Software				
S-1	Vehicle Warning Management	・Shall be able to gather indicated warning information ・Shall be able to management history of indicated warning information	Set	1
S-2	Roadway Management	・Shall be able to input road inventory data ・Shall be able to input road condition survey data ・Shall be able to input road construction data ・Shall be able to browse road inventory data ・Shall be able to browse congestion information	Set	1
S-3	VMS Controller	・Shall be able to control for VMS ・Shall be able to input message for VMS display ・Shall be able to send message data ・Shall be able to management VMS	set	1
Roadside Equipment				
R-1	VMS	・Shall be able to receive message data ・Shall be able to display message data ・Shall be able to display in English	Pcs	10
R-2	Infrared Sensor	・Shall be able to sense the movement of the person ・Shall have data conversion by perception information	Pcs	10
R-3	Ultrasonic Sensor	・Shall be able to sense a vehicle or person by ultrasonic ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	10
R-4	CCTV (FIX Type)	・Shall be able to film as an image ・Shall be able to send image to a processor	Pcs	10
R-5	Image Recognition Processor	・Shall have data conversion by image recognition ・Shall be able to send to data	Pcs	
R-6	Loop-coil Sensor	・Shall be able to sense a vehicle or person by loop-coil ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	

Table 19-2 Estimated Cost of Pedestrian of Approaching Vehicles and Others in Metro Manila

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Roadside Equipment								-
R-5	Image Recognition Processor	pcs	1,091,814.75	163,772.21	1,255,586.96	10.00	12,555,869.63		12,555,869.63
R-2	CCTV Camera (FIX Type)	pcs	282,886.50	42,432.98	325,319.48	10.00	-	3,253,194.75	3,253,194.75
R-1	VMS (Warning)	pcs	6,947,997.25	1,042,199.59	7,990,196.84	10.00	79,901,968.38		79,901,968.38
R-4	Infrared Sensor	pcs	1,488,842.00	223,326.30	1,712,168.30	10.00	17,121,683.00		17,121,683.00
	Total						**109,579,521.00**	**3,253,194.75**	**112,832,715.75**

20. Public Transport Operation Sub-system

20.1 Objectives of User Sub-service

- To provide public transport information such as the time of arrival what is generated from the location information, travel speed of PUV's for improvement the management and operation of public transport efficiency.
- To provide public transport information such as suspended, delay, alternative transportation by using internet, information provision equipments at the terminal in case of suspended and delay due to accidents, it is for support the decisions and action of the user.

20.2 Physical model of User Sub-service

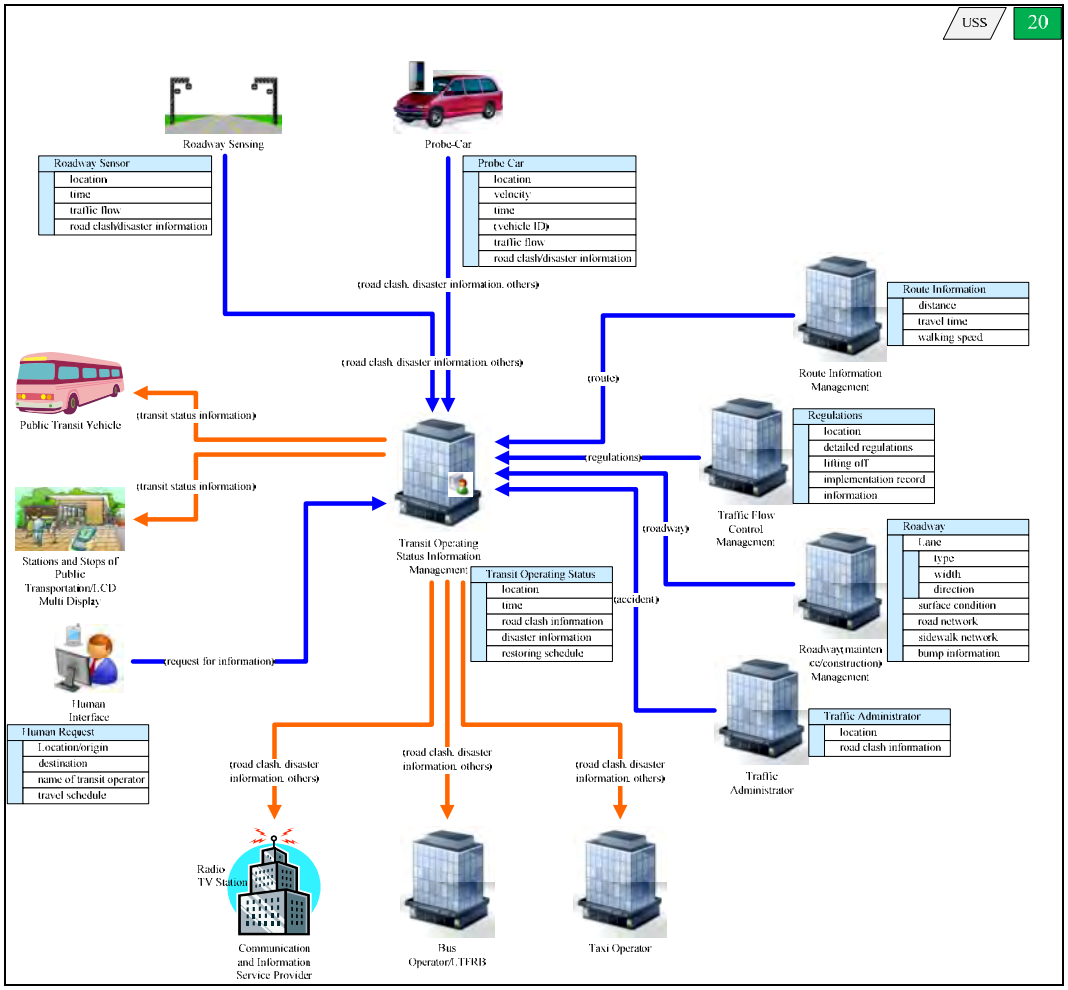


Figure 20-1 Physical/Control model of Public Transport Operation

20.3 Implementation

4 terminals

(According to the implementation plan of the Integrated Terminal System in Metro Manila.)

20.4 Implementation Method

1) Data Processing Equipments

a) Web Information: Information sharing through the Internet. This is installed at the centre.

b) Spot Information Management: Collection of positional information on the roadside equipment and OBU. This is installed at the centre.

c) Traffic Flow Control Management: Collection of Floating Car Data and Traffic Volume Data. This is installed at the centre.

d) Traffic Accident / Incident Information Management: Collection of incident information including road crash. This is installed at the centre.

e) Roadway Management: Database for road inventory. This is installed at the centre.

f) Transit Operating Status Information Management: Collect the service conditions of public transport and forecast estimated arrival time. This is installed at the centre.

2) Information Provision Equipments

a) Information Board: Provide service conditions of the public transport in a bus terminal. Ten (10) units are installed per bus terminal. 4 terminal x 10 pcs = 40 pcs

b) Public Transportation: Smartphone application to provide service conditions of the public transportation for the user distribute by internet web site.

20.5 System Configuration and Equipment List

The system configuration to provide estimated arrival time and the list of requirement specifications of the equipment and software are shown below.

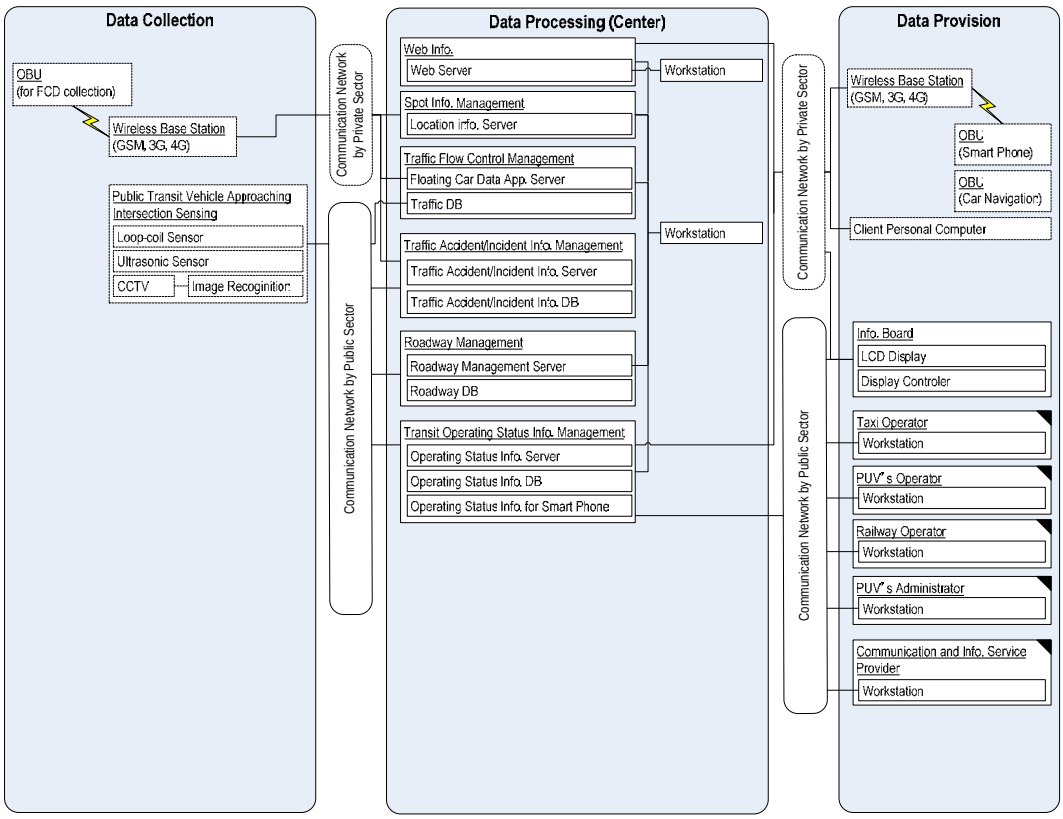


Figure 20-2 System Configuration of Public Transport Operation

Table 20-1 Equipment List of Public Transport Operation

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	6
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	4
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	2
Center Software				
S-1	Transport Operating Status Information Management	・Shall be able to generate service information ・Shall be able to forecast estimated time of arrival ・Shall be able to display various information by Web ・Shall be able to display present location information of public transportation ・Shall be able to supervise service route	Set	1
S-2	Traffic Flow Control Management	・Shall be able to analyze of traffic flow ・Shall have capability the management of traffic flow ・Shall be able to set up a signal control schedule ・Shall be able to management of regulation information	Set	1

No.	Equipment Component	Requirements Specification	Unit	Qty.
S-3	Roadway Management	・Shall be able to input road inventory data ・Shall be able to input road condition survey data ・Shall be able to input road construction data ・Shall be able to browse road inventory data ・Shall be able to browse congestion information	Set	1
S-4	Spot Information Management	・Shall be able to input spot information data ・Shall be able to management to spot information data	Set	1
S-5	Traffic Accident/Incident Information Management	・Shall be able to input traffic accident information ・Shall be able to management traffic accident information ・Shall be able to analyze traffic accident statistics	Set	1
S-6	Web Information	・Shall operate Web server service ・Shall be able to support for multi access ・Shall be able to process html or xml language ・Shall be able to access control ・Shall be able to security settings ・Shall be able to packet filtering	Set	1
Roadside Equipment				
R-1	Information Board	・Shall be able to display operation condition of bus ・Shall be able to receive information of server periodic ・Shall be updated automatically	Pcs	40
R-2	CCTV (FIX Type)	・Shall be able to film as an image ・Shall be able to send image to a processor	Pcs	
R-3	Image Recognition Processor	・Shall have data conversion by image recognition ・Shall be able to send to data	Pcs	
R-4	Loop-coil Sensor	・Shall be able to sense a vehicle or person by loop-coil ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	
R-5	Ultrasonic Sensor	・Shall be able to sense a vehicle or person by ultrasonic ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	
Human Equipment				
H-1	Smart phone application Public transportation	・Shall be able to display operation condition of bus ・Shall support for various smart phone OS	Set	1

Table 20-2 Estimated Cost of Information on Public Transport Information in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TPTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	5.00		58,578,125.00	58,578,125.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	3.00		35,146,875.00	35,146,875.00
C-3	Workstation	pcs	256,725.00	38,508.75	295,233.75	2.00		590,467.50	590,467.50
									-
	Centre Software								-
S-2	Traffic Flow Control Management	set	19,851,403.25		19,851,403.25	1.00	19,851,403.25	-	19,851,403.25
S-3	Roadway Management	set	24,814,264.25		24,814,264.25	1.00	24,814,264.25	-	24,814,264.25
S-6	Spot Information Management	set	19,851,403.25		19,851,403.25	1.00	19,851,403.25	-	19,851,403.25
S-9	Traffic Accident Incident Information Mangement	set	19,851,403.25		19,851,403.25	1.00	19,851,403.25	-	19,851,403.25
S-7	Web Information	set	7,444,291.50		7,444,291.50	1.00	7,444,291.50		7,444,291.50
									-
	Roadside Equipment								-
H-3	Public Transportation	Set	3,722,145.75		3,722,145.75	1.00	3,722,145.75		3,722,145.75
R-1	Information Board	pcs	248,126.75	37,219.01	285,345.76	40.00		11,413,830.50	11,413,830.50
	Total						**95,534,911.25**	**105,729,298.00**	**201,264,209.25**

Table 20-3 Estimated Cost of Information on Public Transport Information in Mega Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-3	Workstation	pcs	256,725.00	38,508.75	295,233.75	1.00		295,233.75	295,233.75
									-
	Roadside Equipment								-
R-4	Information Board	pcs	248,126.75	37,219.01	285,345.76	40.00	-	11,413,830.50	11,413,830.50
	Total						-	**11,709,064.25**	**11,709,064.25**

21. Provide information on other public transportation service while on-board Public transportation

21.1 Objectives of User Sub-service

- To disseminate the public transport information such as time table, operation status, connection way and station number using the information provision equipments for mode sharing of multi transportation.

21.2 Physical model of User Sub-service

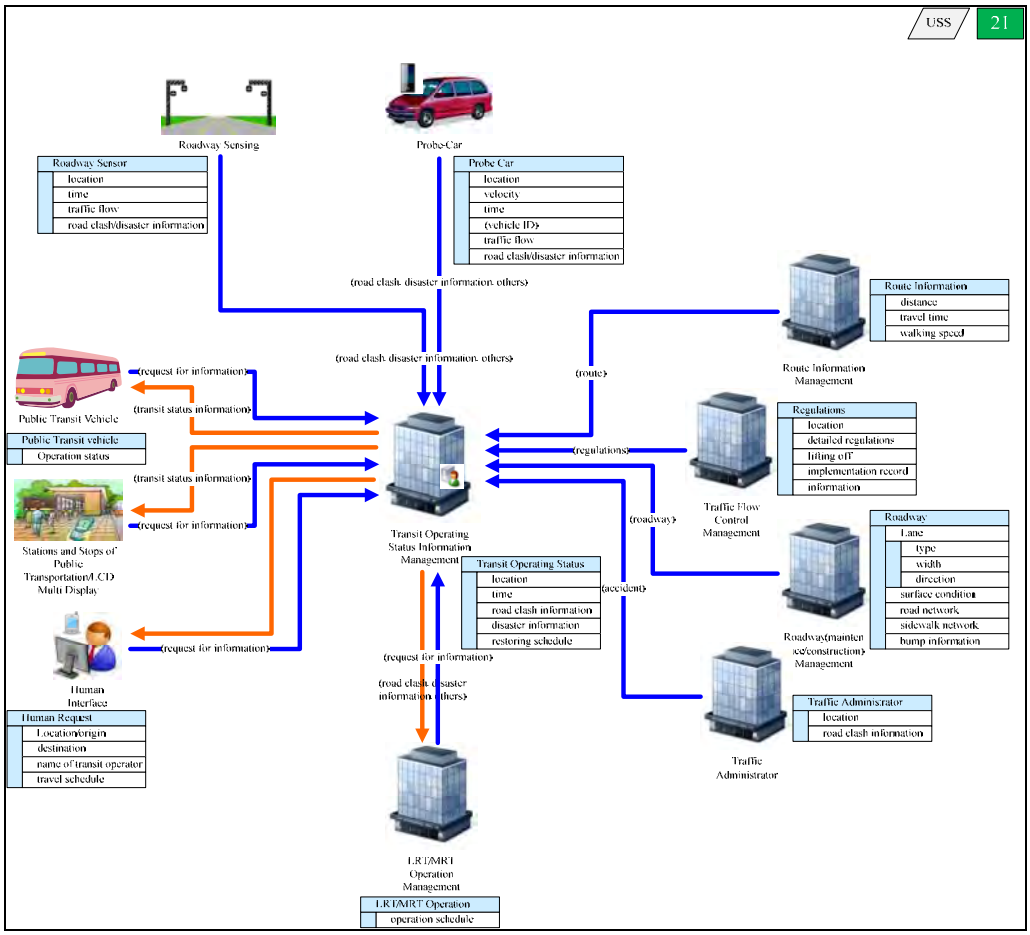


Figure 21-1 Physical/Control model of "Provide information on other public transportation service while on-board public transportation"

21.3 Implementation

1 center (for management of the smart phone application)

(Develop and provide the smart phone application for dissemination of information such as time table, operation status, connection way, station number and optimum route guidance.)

21.4 Implementation Method

1) Data Processing Equipments

a) Web Information: Information sharing through the Internet. This is installed at the centre.

b) Spot Information Management: Collection of positional information on the roadside equipment and OBU. This is installed at the centre.

c) Traffic Flow Control Management: Collection of Floating Car Data and Traffic Volume Data. This is installed at the centre.

d) Traffic Accident / Incident Information Management: Collection of incident information including road crash. This is installed at the centre.

e) Roadway Management: Database for road inventory. This is installed at the centre.

f) Transit Operating Status Information Management: Collect the service conditions of the public transport and forecast estimated arrival time. This is installed at the centre.

2) Information Provision Equipments

a) Public Transportation: Smartphone application to provide service conditions of the public transportation for the user distributed by internet web site.

21.5 System Configuration and Equipment List

The system configuration to provide service scheduled information, service conditions, transit method and station number of the public transportation by information provision equipment and the list of requirement specifications of the equipment and software are shown below.

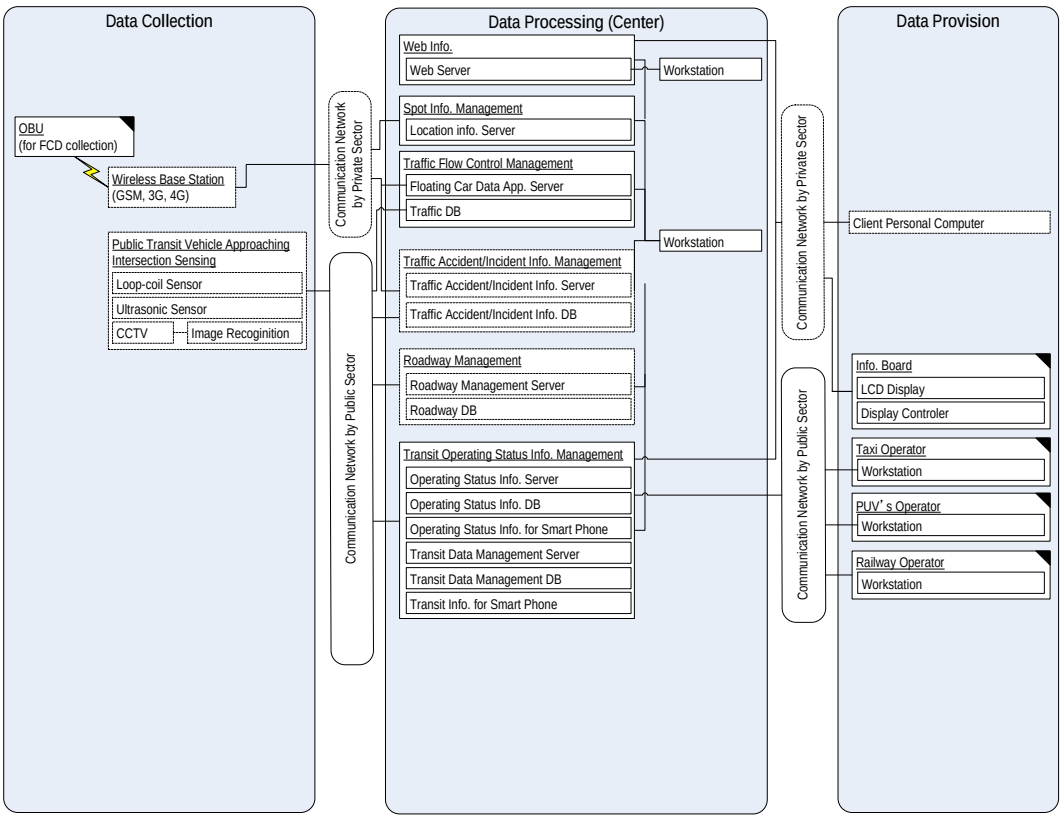


Figure 21-2 System Configuration of Provide Information on Public Transport Operations

Table 21-1 Equipment List for Provide Information on Public Transport Operations

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	6
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	4
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	2
Center Software				
S-1	Transport Operating Status Information Management	・Shall be able to generate service information ・Shall be able to forecast estimated time of arrival ・Shall be able to display various information by Web ・Shall be able to display present location information of public transportation ・Shall be able to supervise service route	Set	1
S-2	Traffic Flow Control Management	・Shall be able to analyze of traffic flow ・Shall have capability the management of traffic flow ・Shall be able to set up a signal control schedule ・Shall be able to management of regulation information	Set	1

No.	Equipment Component	Requirements Specification	Unit	Qty.
S-3	Roadway Management	・Shall be able to input road inventory data ・Shall be able to input road condition survey data ・Shall be able to input road construction data ・Shall be able to browse road inventory data ・Shall be able to browse congestion information	Set	1
S-4	Spot Information Management	・Shall be able to input spot information data ・Shall be able to management to spot information data	Set	1
S-5	Web Information	・Shall operate Web server service ・Shall be able to support for multi access ・Shall be able to process html or xml language ・Shall be able to access control ・Shall be able to security settings ・Shall be able to packet filtering	Set	1
S-6	Traffic Accident/Incident Information Management	・Shall be able to input traffic accident information ・Shall be able to management traffic accident information ・Shall be able to analyze traffic accident statistics	Set	1
Roadside Equipment				
R-1	Information Board	・Shall be able to display operation condition of bus ・Shall be able to receive information of server periodic ・Shall be updated automatically	Pcs	
R-2	CCTV (FIX Type)	・Shall be able to film as an image ・Shall be able to send image to a processor	Pcs	
R-3	Image Recognition Processor	・Shall have data conversion by image recognition ・Shall be able to send to data	Pcs	
R-4	Loop-coil Sensor	・Shall be able to sense a vehicle or person by loop-coil ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	
R-5	Ultrasonic Sensor	・Shall be able to sense a vehicle or person by ultrasonic ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	
Human Equipment				
H-1	Smart phone application Public transportation	・Shall be able to display operation condition of bus ・Shall support for various smart phone OS	Set	1

Table 21-2 Estimated Cost of Information on Other Public Transportation Service while on Board Public Transportation in Metro Manila (1st Stage)

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TPTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-3	Workstation	pcs	256,725.00	38,508.75	295,233.75	2.00		590,467.50	590,467.50
									-
	Centre Software								-
S-12	Transport Operation Status Information Management	set	39,702,847.25		39,702,847.25	1.00	39,702,847.25		39,702,847.25
	Total						**39,702,847.25**	**24,021,717.50**	**63,724,564.75**

Table 21-3 Estimated Cost of Information on Other Public Transportation Service while on Board Public Transportation in Mega Manila (1st Stage)

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Roadside Equipment								-
H-9	Public Transportation	set	3,722,145.75		3,722,145.75	1.00	3,722,145.75		3,722,145.75
	Total						**3,722,145.75**	-	**3,722,145.75**

22 Dynamically Control Bus Lane Sub-system

22.1 Objectives of User Sub-service

- To support the smooth operation and the on-time operation of the bus due to changing operation of bus lane dynamically considering traffic demand and operation delay.

22.2 Physical model of User Sub-service

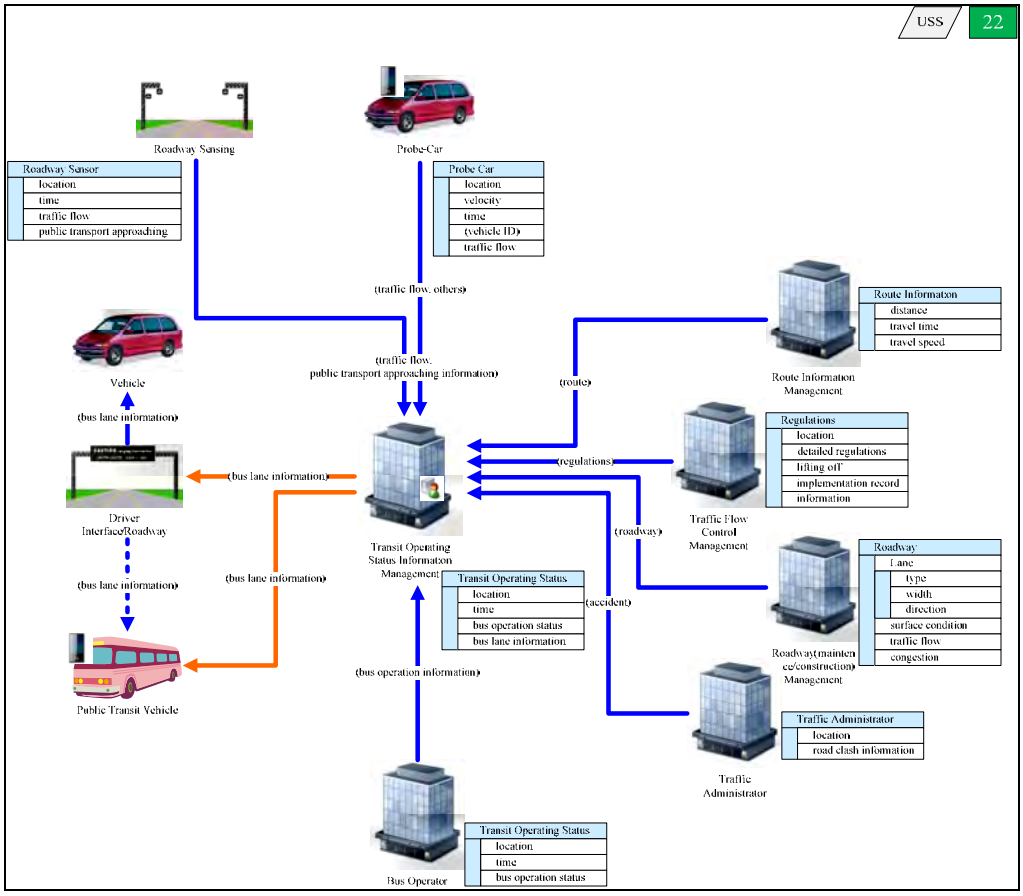


Figure 22-1 Physical/Control model of "Dynamically control bus lane"

22.3 Implementation

8 stations (along EDSA)

(Assume the station based on the number of ridership of MRT, for transit from/to MRT and Bus)

22.4 Implementation Method

1) Data Processing Equipments

a) Web Information: Information sharing through the Internet. This is installed at the centre.

b) Spot Information Management: Collection of positional information on the roadside equipment and OBU. This is installed at the centre.

c) Traffic Flow Control Management: Collection of Floating Car Data and Traffic Volume Data. This is installed at the centre.

d) Traffic Accident / Incident Information Management: Collection of incident information including road crash. This is installed at the centre.

e) Traffic Information Management: Manage any transportation information provided in Traffic Flow Control Management and Traffic Accident / Incident Information Management. This is installed at the centre.

f) Transit Operating Status Information Management: Collect the service conditions of public transport and forecast estimated arrival time. This is installed at the centre.

g) Dynamic Bus Lane Management/Control: Analysis and management the operation of the bus lane. This is installed at the centre.

h) VMS Controller: Management and control of VMS. This is installed at the centre.

2) Information Provision Equipments

a) VMS (Lane Guidance): Provide the operation status of the bus lane on road. Four (4) units are installed on eight (8) locations. 8 route x 4 pcs = 32 pcs

22.5 System Configuration and Equipment List

The system configuration to support smooth operation of the bus by changing the operation of the lane for exclusive use of bus and the list of requirement specifications of the equipment and software are shown below.

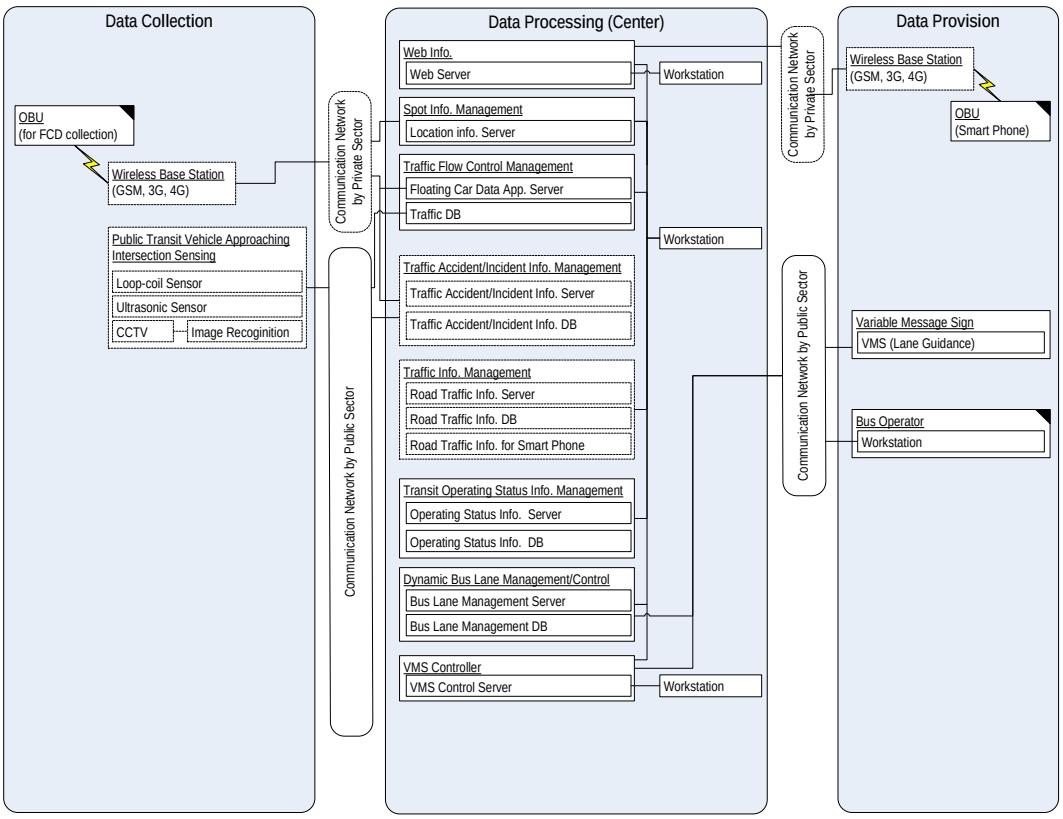


Figure 22-2 System Configuration of Dynamically Control Bus Lane

Table 22-1 Equipment List for Dynamically Control Bus Lane

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	8
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	5
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	3
Center Software				
S-1	Transport Operating Status Information Management	・Shall be able to generate service information ・Shall be able to forecast estimated time of arrival ・Shall be able to display various information by Web ・Shall be able to display present location information of public transportation ・Shall be able to supervise service route	Set	1
S-2	Traffic Information Management	・Shall be able to analysis traffic condition ・Shall be able to shortest path search ・Shall be able to travel time prediction ・Shall be able to management traffic condition ・Shall be able to create provided information	Set	1

No.	Equipment Component	Requirements Specification	Unit	Qty.
S-3	Bus Lane Control Management	・Shall be able to gather operation information of bus ・Shall be able to gather road traffic information ・Shall be able to management bus lane control ・Shall be able to change bus lane dynamically ・Shall be able to send bus lane information	set	1
S-4	Traffic Flow Control Management	・Shall be able to analyze of traffic flow ・Shall have capability the management of traffic flow ・Shall be able to set up a signal control schedule ・Shall be able to management of regulation information	Set	1
S-5	Spot Information Management	・Shall be able to input spot information data ・Shall be able to management to spot information data	Set	1
S-6	Web Information	・Shall operate Web server service ・Shall be able to support for multi access ・Shall be able to process html or xml language ・Shall be able to access control ・Shall be able to security settings ・Shall be able to packet filtering	Set	1
S-7	VMS Controller	・Shall be able to control for VMS ・Shall be able to input message for VMS display ・Shall be able to send message data ・Shall be able to management VMS	Set	1
S-8	Traffic Accident/Incident Information Management	・Shall be able to input traffic accident information ・Shall be able to management traffic accident information ・Shall be able to analyze traffic accident statistics	Set	1
Roadside Equipment				
R-1	VMS	・Shall be able to receive message data ・Shall be able to display message data ・Shall be able to display in English	Pcs	32
R-2	CCTV (FIX Type)	・Shall be able to film as an image ・Shall be able to send image to a processor	Pcs	
R-3	Image Recognition Processor	・Shall have data conversion by image recognition ・Shall be able to send to data	Pcs	
R-4	Loop-coil Sensor	・Shall be able to sense a vehicle or person by loop-coil ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	
R-5	Ultrasonic Sensor	・Shall be able to sense a vehicle or person by ultrasonic ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	
Human Equipment				
	Smart phone application Public transportation	・Shall be able to display operation condition of bus ・Shall support for various smart phone OS	Set	1

Table 22-2 Estimated Cost for Dynamically Control Bus Lane in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TPTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	2.00		23,431,250.00	23,431,250.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-3	Workstation	pcs	256,725.00	38,508.75	295,233.75	1.00		295,233.75	295,233.75
									-
	Centre Software								-
S-3	Bus Lane Control Management	set	39,702,847.25		39,702,847.25	1.00	39,702,847.25		39,702,847.25
S-8	VMS Controller	set	19,851,403.25		19,851,403.25	1.00	19,851,403.25		19,851,403.25
									-
	Roadside Equipment								-
R-1	VMS (Lane Guidance)	pcs	2,481,430.50	372,214.58	2,853,645.08	32.00	91,316,642.40		91,316,642.40
	Total						**150,870,892.90**	**35,442,108.75**	**186,313,001.65**

23. Assistance in Enforcement of Colorum Vehicle Sub-system

23.1 Objectives of User Sub-service

- To assist the enforcement of colorum vehicles by collection of the location of vehicles and operation status of vehicles using any monitoring equipments.

23.2 Physical model of User Sub-service

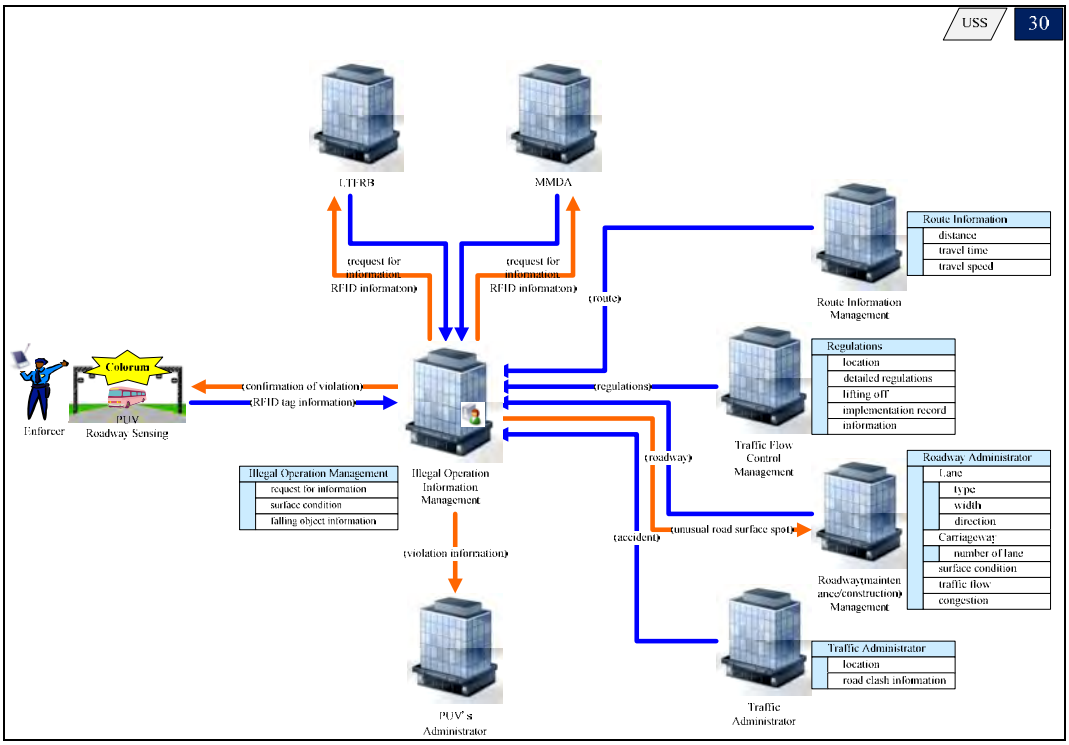


Figure 23-1 Physical/Control model of "Assistance in enforcement of Colorum vehicles"

23.3 Implementation

113 sections

To detect and monitor the vehicle on Radial Road and Circunferential Road per 2.0km section.

Total length of Radial Road and Circunferential Road is 225.94km in NCR.

Therefore, 225.94 km / 2.0 km = 113 (cross-sections) approx.

23.4 Implementation Method

1) Data Collection Equipments

a) CCTV (PTZ Type): One unit is installed per location. 57sections x 1 pcs = 57 pcs

2) Data Processing Equipments

a) Spot Information Management: Collection of positional information on the roadside equipment and OBU. This is installed at the centre.

b) Transit Operating Status Information Management: Collect the service conditions of the public transport and forecast estimated arrival time. This is installed at the centre.

c) Illegal Operation Management: Manage the traveling route other than the designation of non-authorization vehicle. This is installed at the centre.

d) CCTV Monitoring: Monitoring of CCTV image. This is installed at the centre.

23.5 System Configuration and Equipment List

The system configuration to grasp the traveling of the route of the PUV's non-authorization vehicle out of the designation and the list of requirement specifications of the equipment and software are shown below.

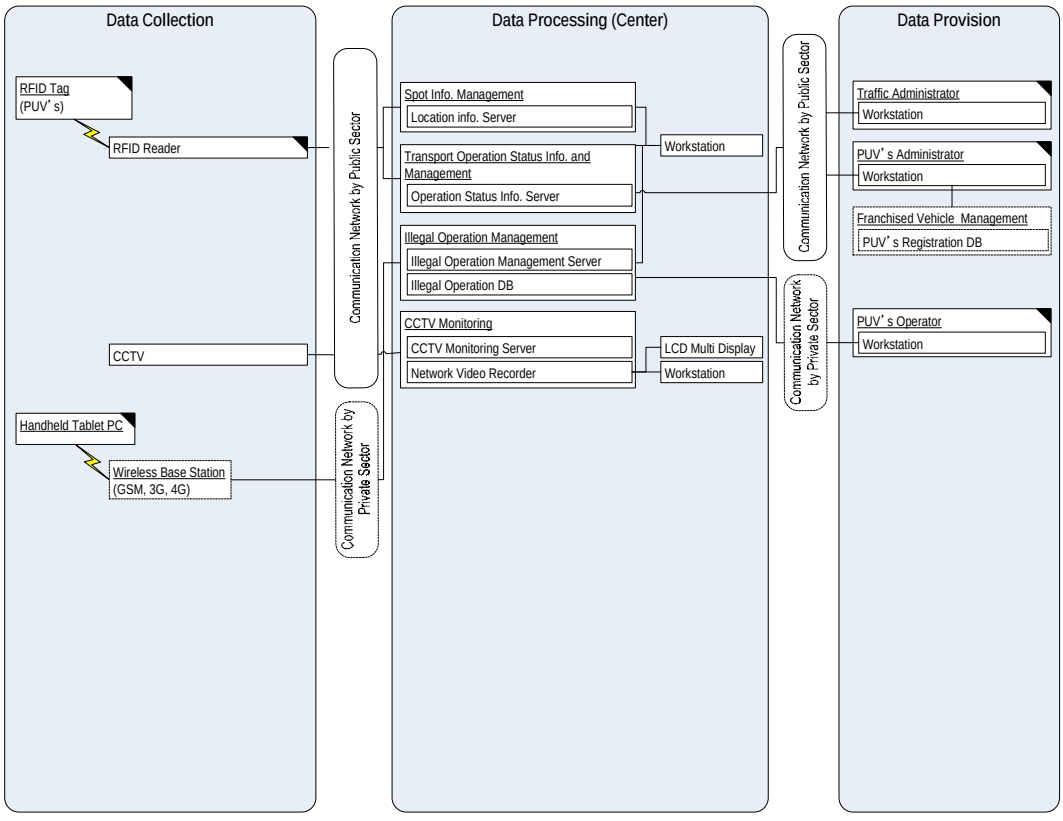


Figure 23-2 System Configuration of Assistance in Enforcement of Colorum Vehicles

Table 23-1 Equipment List for Assistance in Enforcement of Colorum Vehicles

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	4
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	1
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	2
C-4	Network Video Recorder	・Shall be able to recording CCTV image ・Shall be support for multiple file format ・Shall have high capacity ・Shall be easy to the export of data	Pcs	1
C-5	LCD Multi Display	・Shall be able to display on image ・Shall be support for multi display	Pcs	4
Center Software				
S-1	Transport Operating Status Information Management	・Shall be able to generate service information ・Shall be able to forecast estimated time of arrival ・Shall be able to display various information by Web ・Shall be able to display present location information of public transportation ・Shall be able to supervise service route	Set	1
S-2	Spot Information Management	・Shall be able to input spot information data ・Shall be able to management to spot information data	Set	1
S-3	Illegal Operation Management	・Shall be able to gather traveling route information ・Shall be able to generate unapproved vehicle list ・Shall be able to generate unspecified traveling route list	Set	1
S-4	CCTV Monitoring	・Shall be able to real-time play to image ・Shall be able to recording image automatically ・Shall be able to display on multi image simultaneously ・Shall be able to play image which was recorded ・Shall be able to operate camera which was selected	Set	1
Roadside Equipment				
R-1	RFID Reader	・Shall be able to receive RFID tag information ・Shall be able to send RFID tag information`	Pcs	
R-2	CCTV	・Shall be able to film as an image ・Shall be able to send image on internet connection ・Shall be able to Pan and Tilt and Zoom ・Shall be support for multi codec	Pcs	57
Vehicle Equipment				
V-1	RFID Tag	・Shall be able to hold information ・Shall be able to write information	Pcs	

Table 23-2 Estimated Cost for Assistance in Enforcement of Colorum Vehicles in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TPTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-3	Workstation	pcs	256,725.00	38,508.75	295,233.75	2.00		590,467.50	590,467.50
C-4	Network Video Recorder	pcs	694,787.50	104,218.13	799,005.63	1.00		799,005.63	799,005.63
									-
	Centre Software								-
S-22	Illegal Operation Management	set	10,187,500.00		10,187,500.00	1.00	10,187,500.00		10,187,500.00
S-4	CCTV Monitoring	set	5,583,198.25		5,583,198.25	1.00	5,583,198.25		5,583,198.25
									-
Total							**15,770,698.25**	**24,820,723.13**	**40,591,421.38**

24. Assistance in Apprehending Illegal Parking Sub-system

24.1 Objectives of User Sub-service

- To assist enforcement of illegal parking by identifying specific location and owner of the vehicle for organized street parking and smooth traffic.
- To assist enforcement such as apprehending illegal parking particularly repeat offender using the database of illegal parking.

24.2 Physical model of User Sub-service

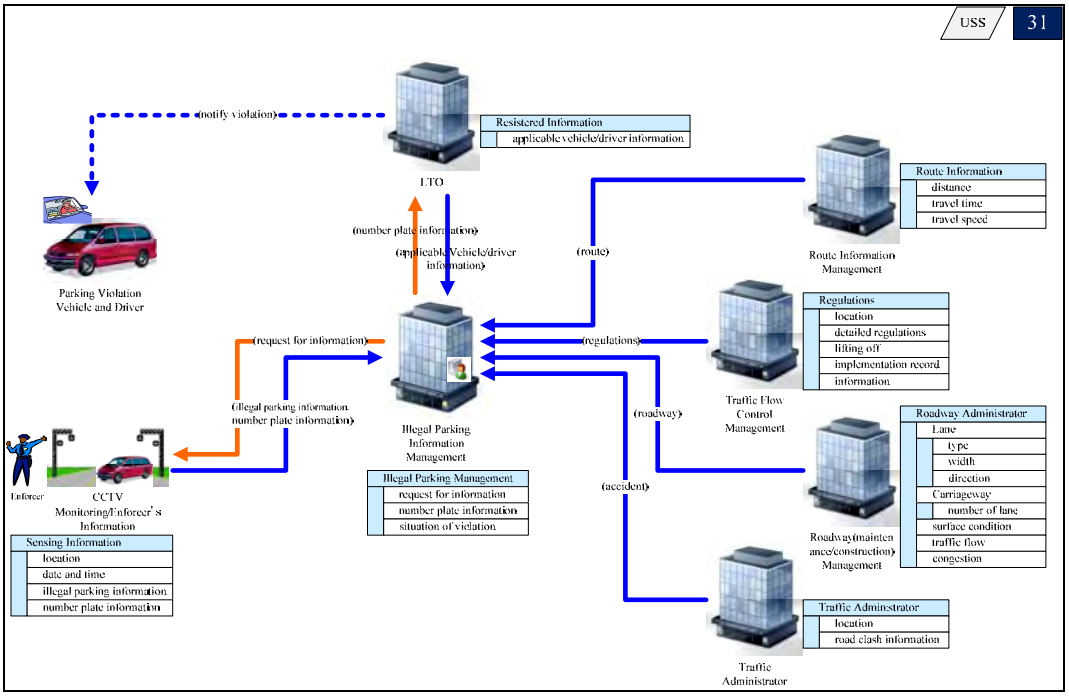


Figure 24-1 Physical/Control model of Assistance in Apprehending Illegal Parking Sub-system

24.3 Implementation

113 sections

To detect and monitor the vehicle on Radial Road and Circumferential Road per 2.0km section. Total length of Radial Road and Circumferential Road is 225.94km in NCR.

Therefore, 225.94 km / 2.0 km = 113 (cross-sections) approx.

100 motorcycles

Number of motorcycle for MMDA's enforcer is 100 motorcycles.

24.4 Implementation Method

1) Data Collection Equipments

a) CCTV (PTZ Type): One unit is installed per location. 113sections x 1 pcs = 113 pcs

b) Handheld Tablet PC: Assume the number of enforcer to be 100 persons. 100person x 1 pcs = 100 pcs

2) Data Processing Equipments

a) Automated Number Plate Recognition: Number plate recognition. This is installed at the centre.

b) Illegal Parking Information Management: Management of illegally parked vehicle. This is installed at the centre.

c) Roadway Management: Database for road inventory. This is installed at the centre.

d) CCTV Monitoring: Monitoring of CCTV image. This is installed at the centre.

24.5 System Configuration and Equipment List

The system configuration to identify illegally parked vehicles, their location and the list of requirement specifications of the equipment and software are shown below.

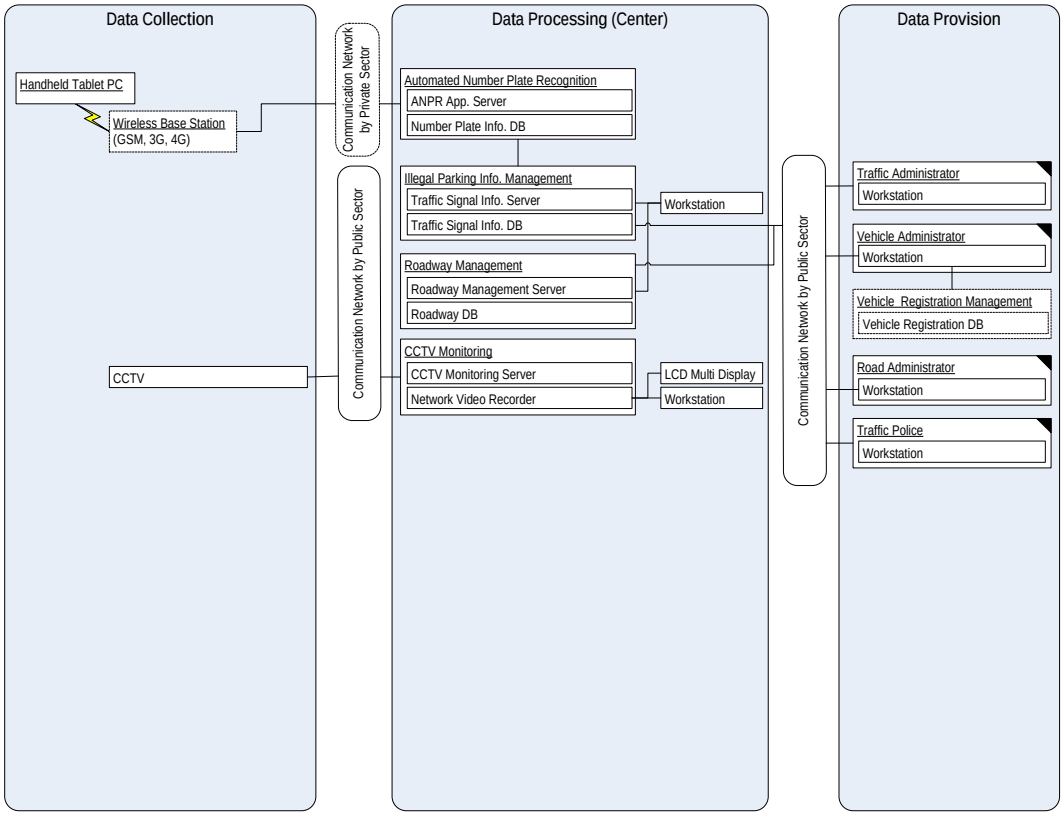


Figure 24-2 System Configuration of Assistance in Apprehending Illegal Parking Sub-system

Table 24-1 Equipment List of Assistance in Apprehending Illegal Parking Sub-system

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	4
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	3
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	2
C-4	Network Video Recorder	・Shall be able to recording CCTV image ・Shall be support for multiple file format ・Shall have high capacity ・Shall be easy to the export of data	Pcs	1
C-5	LCD Multi Display	・Shall be able to display on image ・Shall be support for multi display	Pcs	4
Center Software				
S-1	Illegal Parking Information Management	・Shall be able to gather illegal parking information ・Shall be able to management illegal parking information	Set	1
S-2	Roadway Management	・Shall be able to input road inventory data ・Shall be able to input road condition survey data ・Shall be able to input road construction data ・Shall be able to browse road inventory data ・Shall be able to browse congestion information	Set	1
S-3	CCTV Monitoring	・Shall be able to real-time play to image ・Shall be able to recording image automatically ・Shall be able to display on multi image simultaneously ・Shall be able to play image which was recorded ・Shall be able to operate camera which was selected	Set	1
S-4	Automated Number Plate Recognition	・Shall have data conversion by number plate recognition ・Shall be able to send and receive to data	Set	1
Roadside Equipment				
R-1	CCTV	・Shall be able to film as an image ・Shall be able to send image on internet connection ・Shall be able to Pan and Tilt and Zoom ・Shall be support for multi codec	Pcs	113
R-2	Handheld Tablet PC	・Shall be easy carrying ・Shall be able to startup application ・Shall be able to display application	Pcs	100

Table 24-2 Estimated Cost for Assistance Efficiency of Illegal Parking in Metro Manila

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)
	Centre Equipment							
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00
	Centre Software							
S-1	Illegal Parking Information Management	set	10,187,500.00		10,187,500.00	1.00	10,187,500.00	
	Total						**10,187,500.00**	**23,431,250.00**

25. Assistance in Apprehending Over-loaded Vehicle Sub-system

25.1 Objectives of User Sub-service

- To assist in apprehending overloaded vehicles based on the information of vehicle weight and license plate to protect road structure, and promote smooth and safe traffic.

25.2 Physical model of User Sub-service

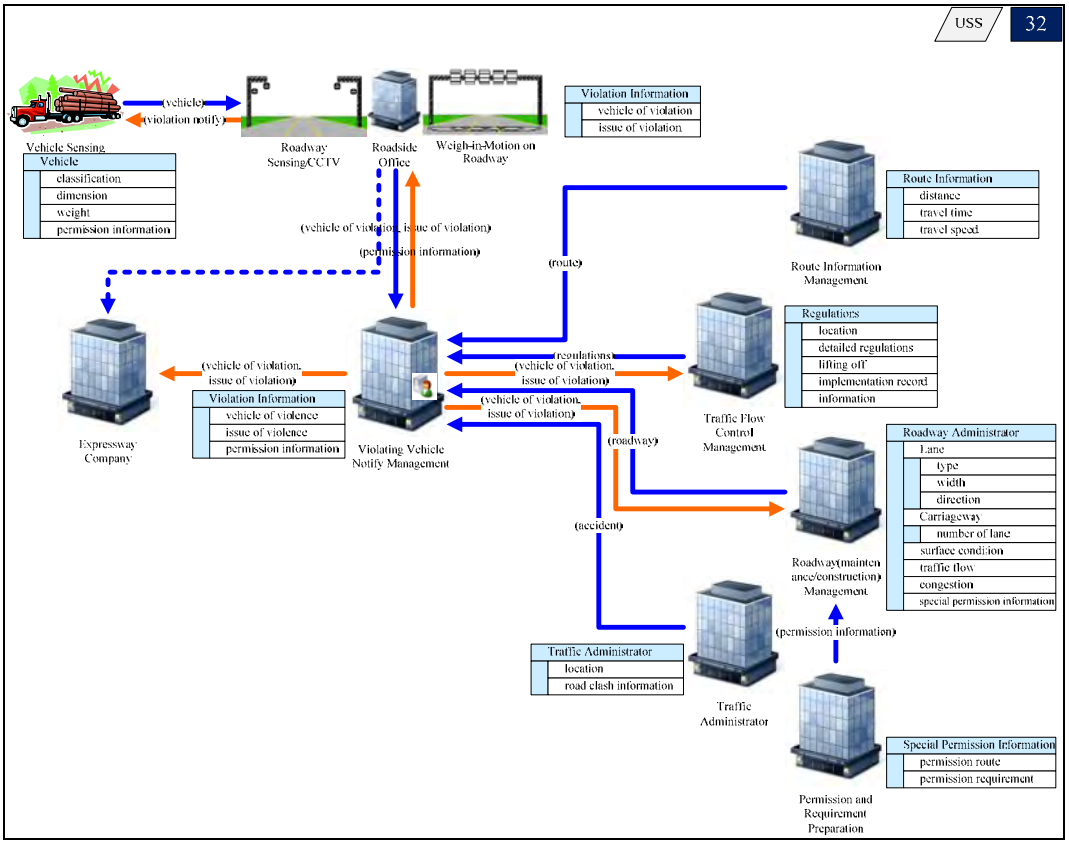


Figure 25-1 Physical/Control model of Assistance in Apprehending Over-loaded Vehicle Sub-system

25.3 Implementation

(1) Metro Manila

11 stations

(According to the number of present truck scale/weight station)

Table 25-1 Truck scale station in NCR

No.	Station
1	Pacheco St., R-10
2	Bonifacio Drive
3	25th Street
4	Roxas Blvd.
5	MSR-Qurino Ave.
6	Alabang Viaduct / Alabang Town Center
7	Ortigas Ave.
8	Commonwealth Ave. / Litex, Camp Atienza
9	Batasan (JBP Road) / Mindanao Ave. Ext'n
10	San-Jose-Novaliches Br.
11	Mc Arthur Highway Valaezuela City

Source: DPWH

(2) Mega Manila

5 stations

(According to the number of present truck scale/weigh station)

Table 25-2 Truck scale station in Region3 and Region4A

No.	Region	Station	Status
1.	III	Cabanaluan City	Operational
2.	III	Tabang, Guiguinto, Bulacan	Non-operational
3.	III	Capas, Tarlac	Non-operational
4.	IV-A	Brgy, Tulo, Calamba, Laguna	
5.	IV-A	Famy, Laguna	For decommissioning

Source: DPWH

25.4 Implementation Method

1) Data Collection Equipments

a) CCTV (ANPR): Install 2 pcs in the measured points. 11 station x 2 pcs = 22 pcs

b) LED Light: Install 2 pcs in the measured points. 11 station x 2 pcs = 22 pcs

c) Weight-in-Motion: Install 1pcs in the measured points. 11 station x 1 pcs = 11 pcs

d) Tablet PC: Install 1 pcs in the measured points. 11 station x 1 pcs = 11 pcs

e) CCTV (PTZ Type): Install 1 pcs in the measured points. 11 station x 1 pcs = 11 pcs

f) Axle Load Sensor: Install 1 pcs in the measured points. 11 station x 1 pcs = 11 pcs

2) Data Processing Equipments

a) Automated Number Plate Recognition: Number plate recognition and collection. This is installed at the centre.

b) Violating Vehicle Notifying: Managing overloaded vehicles. This is installed at the centre.

c) Roadway Management: Database for road inventory. This is installed at the centre.

d) CCTV Monitoring: Monitoring of CCTV image. This is installed at the centre.

25.5 System Configuration and Equipment List

The system configuration to support the overloading control and the list of requirement specifications of the equipment and software are shown below.

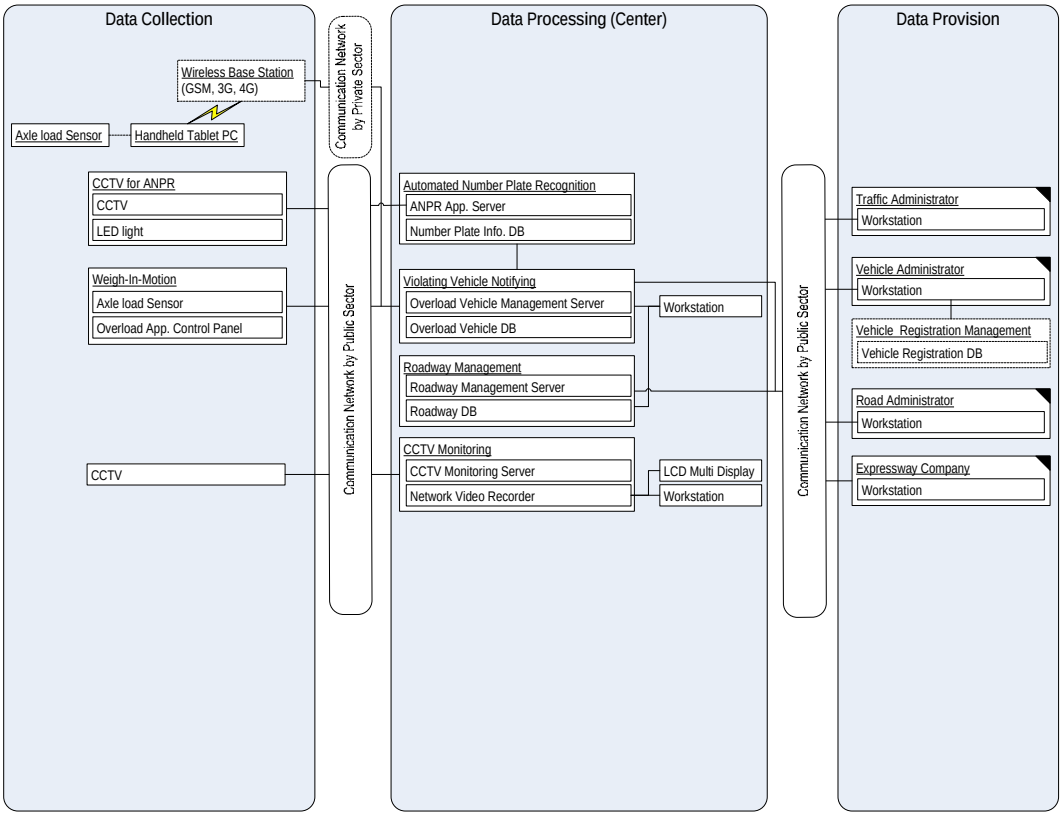


Figure 25-2 System Configuration of Assistance in Apprehending Over-loaded Vehicle Sub-system

Table 25-3 Equipment List of Assistance in Apprehending Over-loaded Vehicle Sub-system

No.	Equipment Component	Requirements Specification	Unit	Qty. (Metro)	Qty. (Mega)
Centre Equipment					
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	4	4
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	3	3
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	2	2
C-4	Network Video Recorder	・Shall be able to recording CCTV image ・Shall be support for multiple file format ・Shall have high capacity ・Shall be easy to the export of data	Pcs	1	1
C-5	LCD Multi Display	・Shall be able to display on image ・Shall be support for multi display	Pcs	4	4
Center Software					
S-1	Violating Vehicle Notifying	・Shall be able to management violation data ・Shall be able to send and receive violation data	Set	1	1
S-2	Roadway Management	・Shall be able to input road inventory data ・Shall be able to input road condition survey data ・Shall be able to input road construction data ・Shall be able to browse road inventory data ・Shall be able to browse congestion information	Set	1	1
S-3	CCTV Monitoring	・Shall be able to real-time play to image ・Shall be able to recording image automatically ・Shall be able to display on multi image simultaneously ・Shall be able to play image which was recorded ・Shall be able to operate camera which was selected	Set	1	1
S-4	Automated Number Plate Recognition	・Shall have data conversion by number plate recognition ・Shall be able to send and receive to data	Set	1	1
Roadside Equipment					
R-1	CCTV (ANPR)	・Shall be able to film as an image ・Shall be able to send image ・Shall support several codec ・Shall be able to save a static image	Pcs	22	10
R-2	LED Light	・Shall light a LED ・Shall flicker a LED	Pcs	22	10
R-3	Weight-in-Motion	・Shall be able to measure axle load of vehicle ・Shall be able to measure gross weight of vehicle ・Shall be able to measure up to six axles	Pcs	11	5
R-4	Tablet PC	・Shall be able to startup and display weight-in-motion software ・Shall be able to operate weight-in-motion software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	11	5
R-5	CCTV	・Shall be able to film as an image ・Shall be able to send image on internet connection ・Shall be able to Pan and Tilt and Zoom ・Shall be support for multi codec	Pcs	11	5
R-6	Axle load Sensor	・Shall be able to measure axle load of vehicle ・Shall be able to measure up to six axles	Pcs	11	5

Table 25-4 Estimated Cost for Assistance Enforcement of Overloaded Vehicles in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	2.00		23,431,250.00	23,431,250.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	2.00		23,431,250.00	23,431,250.00
									-
	Centre Software								-
S-2	Violating Vehicle Notifying	set	19,851,403.25		19,851,403.25	1.00	19,851,403.25		19,851,403.25
S-3	Aotomated Number Plate Recognition	set	5,583,198.25		5,583,198.25	1.00	5,583,198.25		5,583,198.25
									-
	Roadside Equipment								-
R-1	CCTV (ANPR)	pcs	282,886.50	42,432.98	325,319.48	22.00	-	7,157,028.45	7,157,028.45
R-2	LED Light	pcs	124,083.75	18,612.56	142,696.31	22.00	-	3,139,318.88	3,139,318.88
R-3	Weight-in-Motion	pcs	1,630,000.00	244,500.00	1,874,500.00	11.00	20,619,500.00		20,619,500.00
R-4	Tablet PC	pcs	3,123,487.50	468,523.13	3,592,010.63	11.00	-	39,512,116.88	39,512,116.88
R-5	CCTV (PTZ Type)	pcs	282,886.50	42,432.98	325,319.48	11.00	-	3,578,514.23	3,578,514.23
R-6	Axle load sensor	pcs	7,444,291.50	1,116,643.73	8,560,935.23	11.00	94,170,287.48		94,170,287.48
	Total						**140,224,388.98**	**100,249,478.43**	**240,473,867.40**

Table 25-5 Estimated Cost for Assistance Enforcement of Overloaded Vehicles in Mega Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-2	Violating Vehicle Notifying	set	19,851,403.25		19,851,403.25	1.00	19,851,403.25		19,851,403.25
									-
	Roadside Equipment								-
R-1	CCTV (ANPR)	pcs	282,886.50	42,432.98	325,319.48	10.00	-	3,253,194.75	3,253,194.75
R-2	LED Light	pcs	124,083.75	18,612.56	142,696.31	10.00	-	1,426,963.13	1,426,963.13
R-3	Weight-in-Motion	pcs	1,630,000.00	244,500.00	1,874,500.00	5.00	9,372,500.00		9,372,500.00
R-4	Tablet PC	pcs	3,123,487.50	468,523.13	3,592,010.63	5.00	-	17,960,053.13	17,960,053.13
R-5	CCTV (PTZ Type)	pcs	282,886.50	42,432.98	325,319.48	5.00	-	1,626,597.38	1,626,597.38
	Total						**29,223,903.25**	**47,698,058.38**	**76,921,961.63**

26. Assistance in Apprehending Over-speeding Vehicle Sub-system

26.1 Objectives of User Sub-service

- To assist apprehending over-speeding vehicles by capturing speed of vehicle and specific over-speeding vehicle for smooth and safe traffic.
- To assist apprehending repeat offender of over-speeding vehicle using the database of over-speed vehicles.

26.2 Physical model of User Sub-service

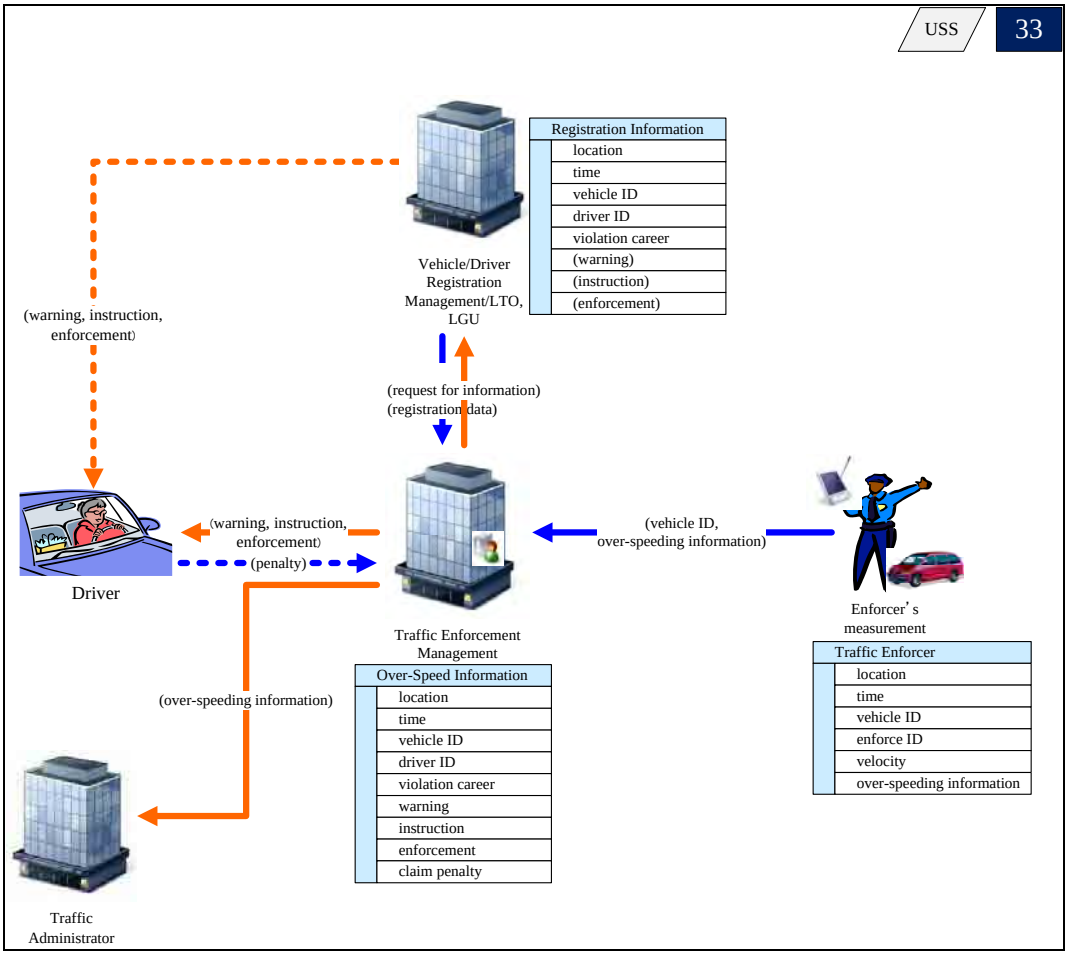


Figure 26-1 Physical/Control model of "Assist enforcement of over-speed vehicles"

26.3 Implementation

(1) Metro Manila

100 motorcycles

Number of motorcycle of MMDA's enforcer is 100 motorcycles.

(2) Mega Manila

29 offices

Number of DPWH District Office Region III and Region IV-A is 29 offices
(Region III: 14 offices, Region IV-A : 15 offices)

26.4 Implementation Method

1) Data Collection Equipments

a) Handheld Tablet PC: Assumed number of enforcer to be 100 persons. 100person x 1 pcs = 100 pcs

b) Over-Speed Sensor: Assumed number of enforcer to be 100 persons. 100person x 1 pcs = 100 pcs

2) Data Processing Equipments

a) Automated Number Plate Recognition: Number plate recognition and collection. This is installed at the centre.

b) Over-Speed Information Management: Managing the regulation of over-speeding vehicles. This is installed at the centre.

3) Information Provision Equipments

a) Administrator: Smartphone application for enforcer to input violation data.

26.5 System Configuration and Equipment List

The system configuration to identify and regulation over-speed violation and the list of requirement specifications of the equipment and software are shown below.

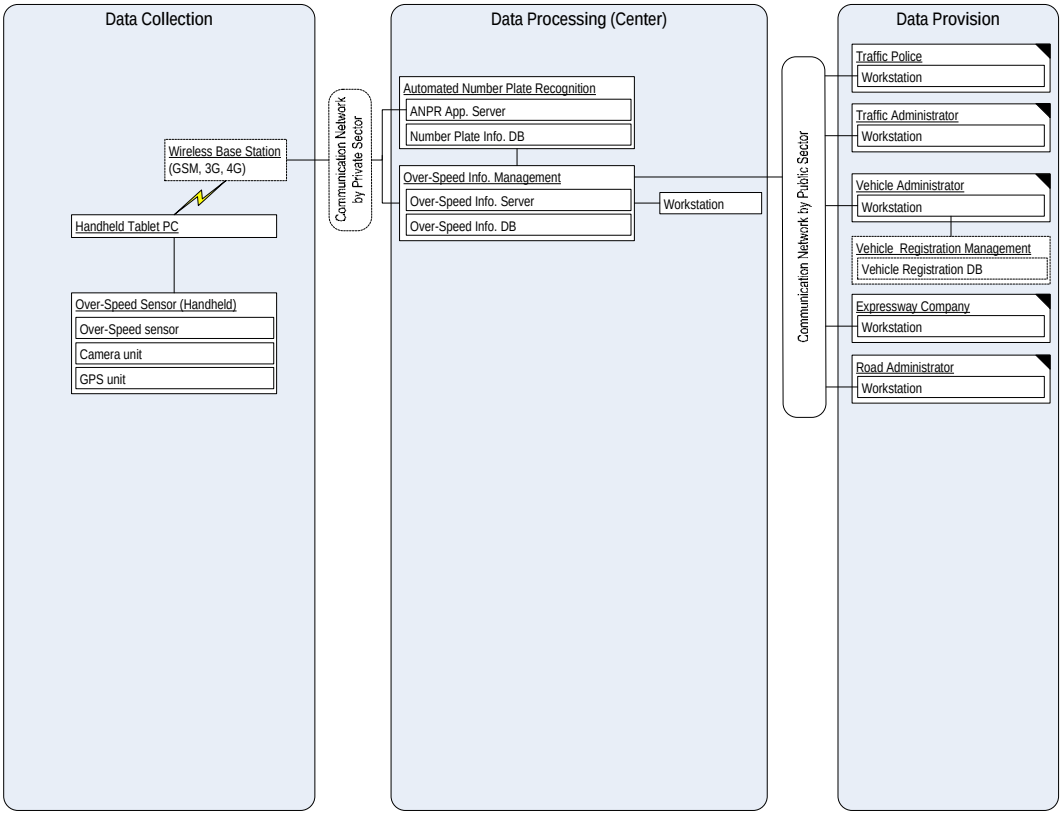


Figure 26-2 System Configuration of Assist Enforcement of Over-speed Vehicles

Table 26-1 Equipment List for Assist Enforcement of Over-speed Vehicles

No.	Equipment Component	Requirements Specification	Unit	Qty. (Metro)	Qty. (Mega)
Centre Equipment					
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	2	2
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	2	2
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	1	1
Center Software					
S-1	Automated Number Plate Recognition	・Shall have data conversion by number plate recognition ・Shall be able to send and receive to data	Set	1	1
S-2	Over-Speed Information Management	・Shall be able to management Over-Speed Information ・Shall be able to generate Over-Speed vehicle list	Set	1	1
Human Equipment					
H-1	Handheld Tablet PC	・Shall be easy carrying ・Shall be able to startup application ・Shall be able to display application	Pcs	100	29
H-2	Smart phone application administrator	・Shall be able to input traffic violation data ・Shall be able to send a inputting data ・Shall be possible secure communication	Set	1	1

No.	Equipment Component	Requirements Specification	Unit	Qty. (Metro)	Qty. (Mega)
H-3	Over-Speed Sensor	・Shall be able to measure vehicle speed	Pcs	100	29

Table 26-2 Estimated Cost for Assistance Enforcement of Over-Speed Vehicles in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-3	Over-Speed Information Management	set	10,187,500.00		10,187,500.00	1.00	10,187,500.00		10,187,500.00
									-
	Roadside Equipment								-
H-1	Handheld Tablet PC	pcs	24,816.75	3,722.51	28,539.26	100.00	-	2,853,926.25	2,853,926.25
H-2	Over-Speed Sensor	pcs	24,816.75	3,722.51	28,539.26	100.00	-	2,853,926.25	2,853,926.25
H-6	Administrator	set	2,481,430.50		2,481,430.50	1.00	2,481,430.50		2,481,430.50
	Total						**12,668,930.50**	**29,139,102.50**	**41,808,033.00**

Table 26-3 Estimated Cost for Assistance Enforcement of Over-Speed Vehicles in Mega Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	2.00		23,431,250.00	23,431,250.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	2.00		23,431,250.00	23,431,250.00
									-
	Centre Software								-
S-1	Automated Number Plate Recognition	set	5,583,198.25		5,583,198.25	1.00	5,583,198.25		5,583,198.25
S-2	Over-Speed Information Management	set	10,187,500.00		10,187,500.00	1.00	10,187,500.00		10,187,500.00
									-
	Roadside Equipment								-
H-1	Handheld Tablet PC	pcs	24,816.75	3,722.51	28,539.26	29.00	-	827,638.61	827,638.61
H-2	Over-Speed Sensor	pcs	24,816.75	3,722.51	28,539.26	29.00	-	827,638.61	827,638.61
H-6	Administrator	set	2,481,430.50		2,481,430.50	1.00	2,481,430.50		2,481,430.50
	Total						**18,252,128.75**	**48,517,777.23**	**66,769,905.98**

27. Post-crash Inspection Enhancement Sub-system

27.1 Objectives of User Sub-service

- To assist and speed-up the inspection of traffic accident based on collection of three-dimensional data of accident sight to perform recovery of traffic flow at traffic accident point.

27.2 Physical model of User Sub-service

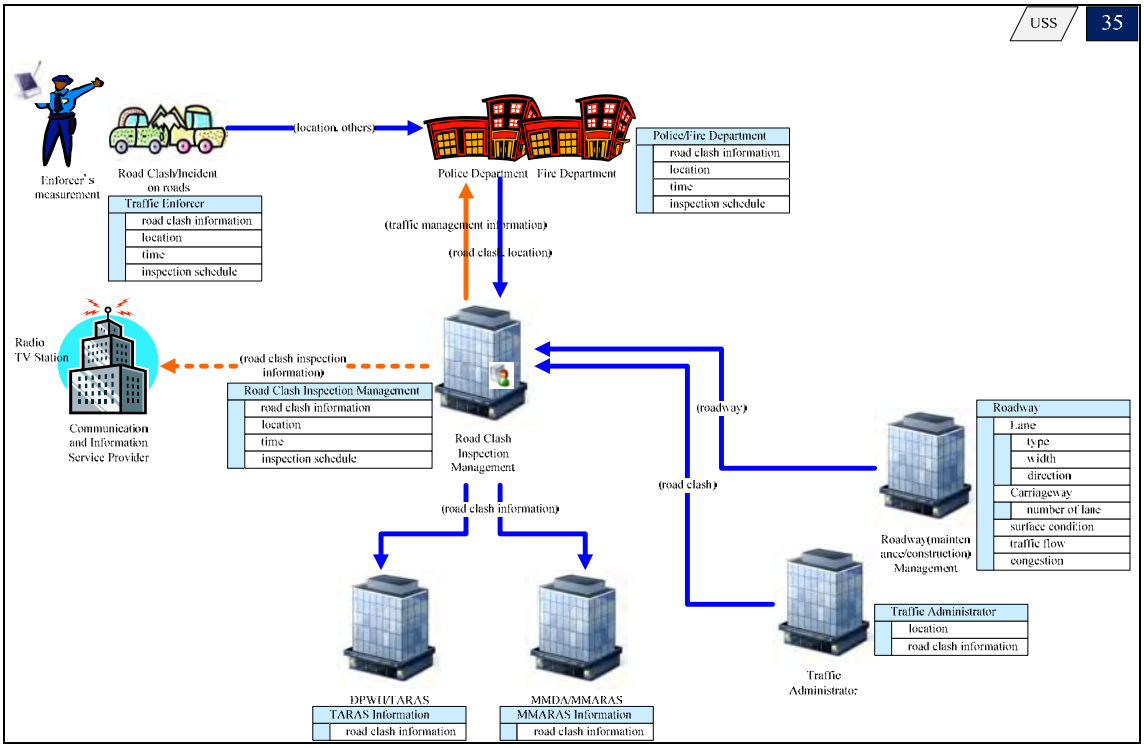


Figure 27-1 Physical/Control model of Post-crash Inspection Enhancement Sub-system

27.3 Implementation

(1) Metro Manila

100 motorcycles

Number of motorcycle for MMDA's enforcer is 100 motorcycles.

9 offices

Number of DPWH District Office in NCR is 9 offices

(2) Mega Manila

29 offices

Number of DPWH District Office in Region III and Region IV-A is 29 offices

(Region III : 14 offices, Region IV-A : 15 offices)

27.4 Implementation Method

1) Data Collection Equipments

a) Handheld Tablet PC: Assumed number of enforcer is 100 persons. 100person x 1 pcs = 100 pcs

b) 3D Laser Scanner: Provide one pcs in DPWH District Office. 9 office x 1 pcs = 9 pcs

2) Data Processing Equipments

a) Road Crash Inspection Management: Managing accident inspection data recorded as 3D data. This is installed at the centre.

3) Information Provision Equipments

a) Administrator: Smartphone application for enforcer to input violation data install at handheld tablet PC.

27.5 System Configuration and Equipment List

The system configuration to record three dimensions of conditions at that time of the accident occurrence as data and the list of requirement specifications of the equipment and software are shown below.

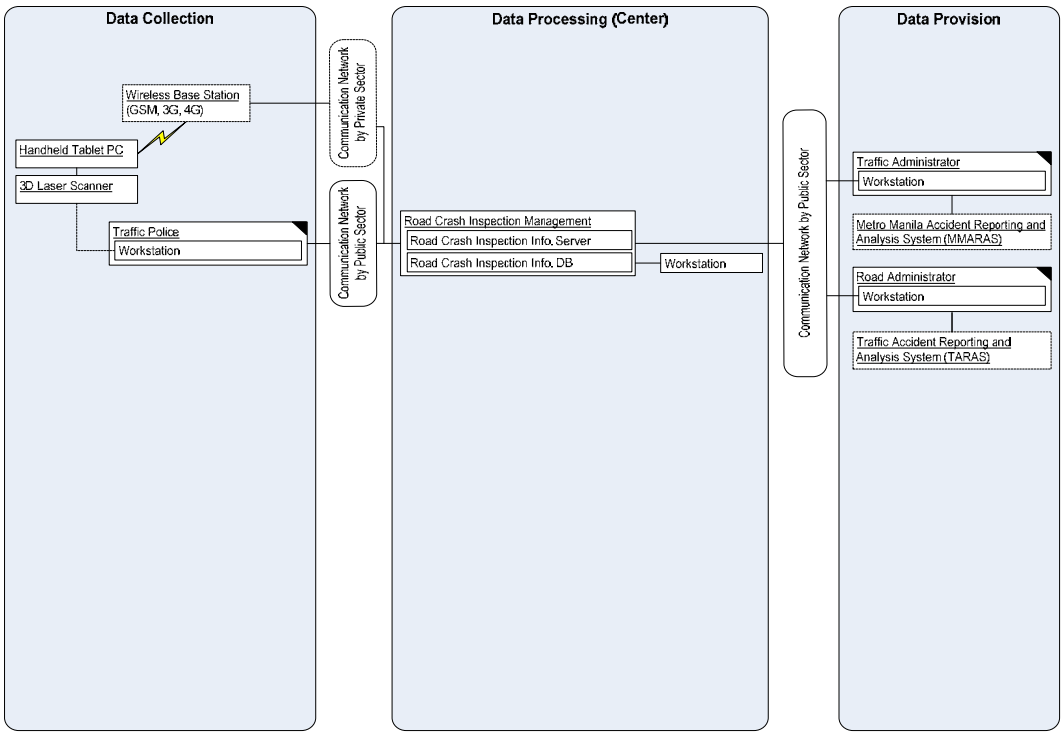


Figure 27-2 System Configuration of Post-crash Inspection Enhancement Sub-system

Table 27-1 Equipment List Post-crash Inspection Enhancement Sub-system

No.	Equipment Component	Requirements Specification	Unit	Qty. (Metro)	Qty. (Mega)
Centre Equipment					
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	1	1
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	1	1
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	1	1
Center Software					
S-1	Road Crash Inspection Management	・Shall be able to input accident occurrences ・Shall be able to save 3D data for accident occurrences ・Shall be able to management accident information	Set	1	1
Human Equipment					
H-1	Handheld Tablet PC	・Shall be easy carrying ・Shall be able to startup application ・Shall be able to display application	Pcs	100	29
H-2	Smart phone application administrator	・Shall be able to input traffic violation data ・Shall be able to send a inputting data ・Shall be possible secure communication	Set	1	1

Table 27-2 Estimated Cost for Improve Conduction after Road Crush Procedure in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TPTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-17	Road Crash Inspection Management	set	10,187,500.00		10,187,500.00	1.00	10,187,500.00		10,187,500.00
									-
	Roadside Equipment								-
H-3	3D Laser Scanner	pcs	2,977,724.75	446,658.71	3,424,383.46	9.00	30,819,451.16		30,819,451.16
Total							**41,006,951.16**	**23,431,250.00**	**64,438,201.16**

Table 27-3 Estimated Cost for Improve Conduction after Road Crush Procedure in Mega Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-17	Road Crash Inspection Management	set	10,187,500.00		10,187,500.00	1.00	10,187,500.00		10,187,500.00
									-
	Roadside Equipment								-
H-3	3D Laser Scanner	pcs	2,977,724.75	446,658.71	3,424,383.46	29.00	99,307,120.41		99,307,120.41
Total							**109,494,620.41**	**23,431,250.00**	**132,925,870.41**

28. Assistance in Apprehending Traffic Signal Violator Sub-system

28.1 Objectives of User Sub-service

- To assist the enforcement of traffic signal violators based on the detection of signal violation by vehicles for smooth and safe traffic.

28.2 Physical model of User Sub-service

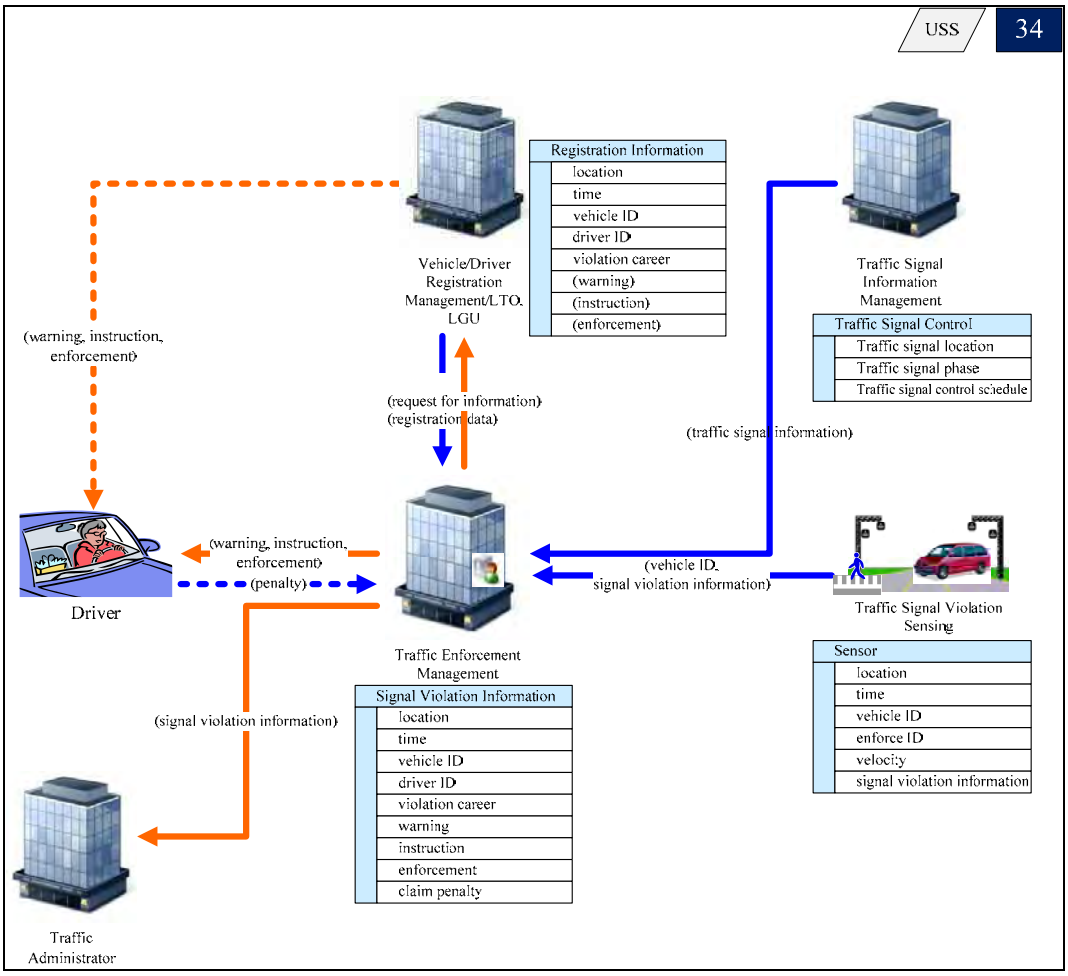


Figure 28-1 Physical/Control Model of Assistance in Apprehending Traffic Signal Violator Sub-system

28.3 Implementation

(1) Metro Manila

27 intersections

To assume that the route selection decisions will be carried out at the short of intersections of Radiation Road and Circle Road, it is estimated approx 27 intersections.

Therefore, information provision equipment is installed at the short of intersection.

(2) Mega Manila

112 intersections

Table 28-1 Estimated Number of Signalized Intersection under control by DPWH

Targeted Road and Area	Estimated Number of intersections
Manila North Road	66
Region III	42
Region IV-A	4
Total	112

Source : DPWH

28.4 Implementation Method

1) Data Collection Equipments

a) Vehicle Detector: Assumed Image Recognition type. Four (4) units are installed per intersection. 27 intersections x 4pcs = 108 pcs

b) Traffic Light Controller: One (1) unit is installed per intersection. 27 intersections x 1pcs = 27 pcs

2) Data Processing Equipments

a) Traffic Signal Information Management: Controls signal based on Floating Car Data, Traffic Volume Data and CCTV image. This server installs one place to Centre.

b) Signal Violation Information Management: Manages signal violation of vehicle. This is installed at the centre.

28.5 System Configuration and Equipment List

The system configuration to detect signal disregard by vehicle and to identify the violation of vehicle and the list of requirement specifications of the equipment and software are shown below.

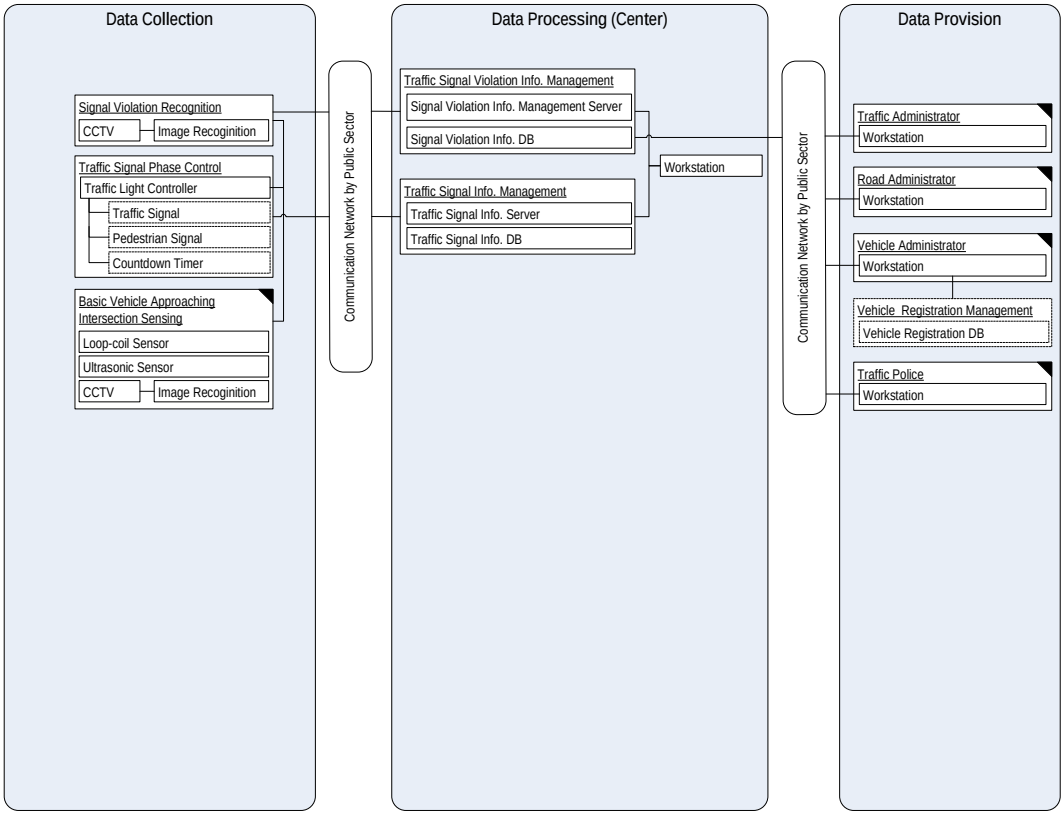


Figure 28-2 System Configuration of Assistance in Apprehending Traffic Signal Violator Sub-system

Table 28-2 Equipment List for Assistance in Apprehending Traffic Signal Violator Sub-system

No.	Equipment Component	Requirements Specification	Unit	Qty. (Metro)	Qty. (Mega)
Centre Equipment					
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	2	2
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	2	2
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	1	1
Center Software					
S-1	Traffic Signal Information Management	・Shall be able to analyze of the various gathering data ・Shall have the automatic processes of the traffic signal ・Shall be able to system control of the multi traffic signal ・Shall be able to area control of the multi traffic signal ・Shall have the hand-operated control process of the traffic signal	Set	1	1
S-2	Signal Violation Information Management	・Shall be able to gather vehicle information of signal violation ・Shall be able to management vehicle information of signal violation ・Shall be able to generate vehicle list of signal violation	Set	1	1
Roadside Equipment					
R-1	CCTV (FIX Type)	・Shall be able to film as an image	Pcs	108	356

No.	Equipment Component	Requirements Specification	Unit	Qty. (Metro)	Qty. (Mega)
		・Shall be able to send image to a processor			
R-2	Image Recognition Processor	・Shall have data conversion by image recognition ・Shall be able to send to data	Pcs	108	356
R-3	Loop-coil Sensor	・Shall be able to sense a vehicle or person by loop-coil ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs		
R-4	Ultrasonic Sensor	・Shall be able to sense a vehicle or person by ultrasonic ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs		
R-5	Traffic Signal	・Shall light three color of red and yellow and green ・Shall light according to instructions from a panel	Pcs		
R-6	Traffic Light Controller	・Shall be able to receive control pattern from Centre ・Shall change lighting of the traffic signal according to control pattern	Pcs	27	89
R-7	Pedestrian Signal	・Shall light two color of red and green ・Shall blink green light ・Shall light according to instructions from panel	Pcs		
R-8	Countdown Timer	・Shall be able to display on countdown before changing in green	Pcs		
R-9	CCTV	・Shall be able to film as an image ・Shall be able to send image on internet connection ・Shall be able to Pan and Tilt and Zoom ・Shall be support for multi codec	Pcs		

Table 28-3 Estimated Cost for Assistance Enforcement of Signal Violation in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TPTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-2	Signal Violation Information Management	set	10,187,500.00		10,187,500.00	1.00	10,187,500.00		10,187,500.00
									-
	Roadside Equipment								-
R-5	Image Recognition Processor	pcs	1,091,814.75	163,772.21	1,255,586.96	108.00	135,603,391.95		135,603,391.95
R-7	Traffic Light Controller	pcs	248,126.75	37,219.01	285,345.76	27.00	7,704,335.59		7,704,335.59
R-2	CCTV Camera (FIX Type)	pcs	282,886.50	42,432.98	325,319.48	108.00	-	35,134,503.30	35,134,503.30
	Total						**153,495,227.54**	**58,565,753.30**	**212,060,980.84**

Table 28-4 Estimated Cost for Assistance Enforcement of Signal Violation in Mega Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-2	Signal Violation Information Management	set	10,187,500.00		10,187,500.00	1.00	10,187,500.00		10,187,500.00
									-
	Roadside Equipment								-
R-5	Image Recognition Processor	pcs	1,091,814.75	163,772.21	1,255,586.96	356.00	446,988,958.65		446,988,958.65
R-7	Traffic Light Controller	pcs	248,126.75	37,219.01	285,345.76	89.00	25,395,772.86		25,395,772.86
R-2	CCTV Camera (FIX Type)	pcs	282,886.50	42,432.98	325,319.48	356.00	-	115,813,733.10	115,813,733.10
	Total						**482,572,231.51**	**139,244,983.10**	**621,817,214.61**

29. Network Traffic Management under Large-Scale Traffic Accident and Disaster Condition Sub-system

29.1 Objectives of User Sub-service

- In the event of large-scale traffic accidents and disasters, this service employs the use of traffic accident databases such as TARAS and MARAS and preliminary performance of traffic accident response simulations, etc. to carry out support emergency rescue activities/accident, restoration of operations, etc. and prevention/early resolution, etc. of traffic congestion caused by accidents. Following a pre-configured program based on the abovementioned simulations, etc., traffic flow direction/dispersion and provisional traffic regulation processing is then performed in conjunction with comprehensive and coordinated efforts for provision of information, etc.

29.2 Physical model of User Sub-service

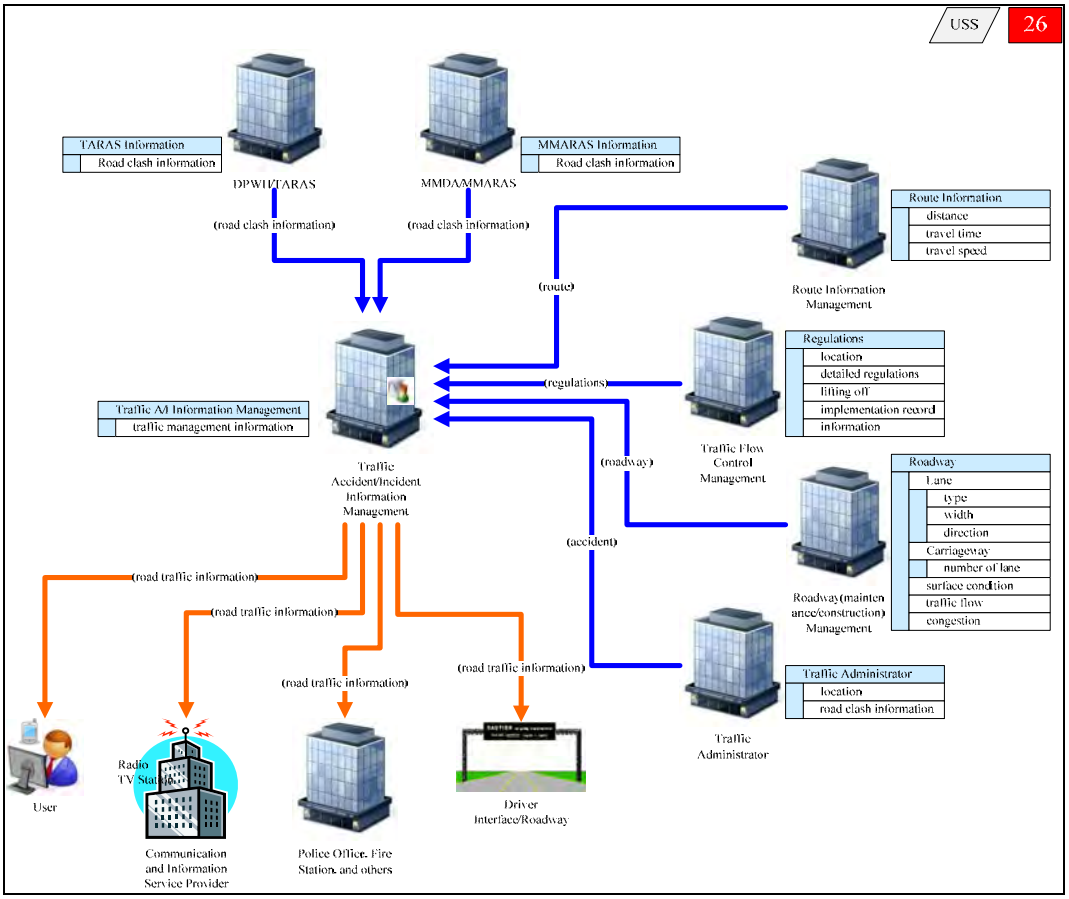


Figure 29-1 Physical/Control Model of Network Traffic Management under Large-Scale Traffic Accident and Disaster Condition Sub-system

29.3 Implementation

1 center (for management of traffic under such traffic conditions)

29.4 Implementation Method

1) Data Processing Equipments

a) Traffic Accident / Incident Information Management: Collection of incident information including road crash. This is installed at the centre.

b) Traffic Information Management: Manages any transportation information provided in Traffic Flow Control Management and Traffic Accident / Incident Information Management. This is installed at the centre.

c) Roadway Management: Database for road inventory. This is installed at the centre.

d) Route Information Management: Based on vehicle information in Traffic Information Management, it provides the optimum route according to the request from a road user. This is installed at the centre.

29.5 System Configuration and Equipment List

The system configuration to conduct traffic restriction and information provision when a large-scale traffic accident and disaster occurred by a traffic simulation in consideration of information of the traffic accident database and the list of requirement specifications of the equipment and software are shown below.

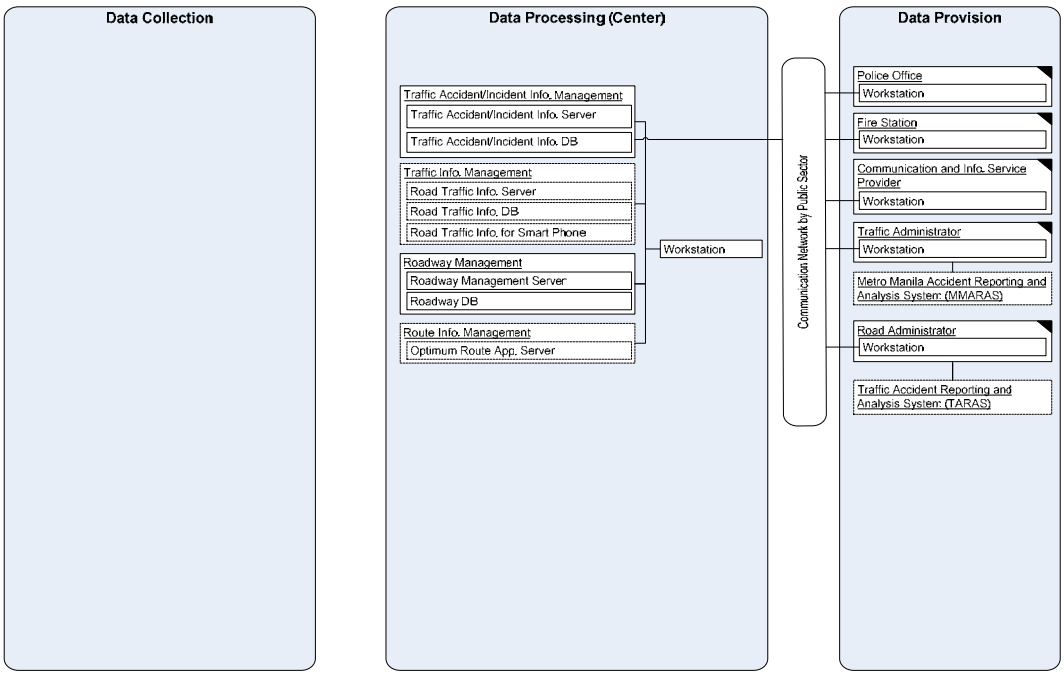


Figure 29-2 System Configuration of Network Traffic Management under Large-Scale Traffic Accident and Disaster Condition Sub-system

Table 29-1 Equipment List Network of Traffic Management under Large-Scale Traffic Accident and Disaster Condition Sub-system

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	4
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	3
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	1
Center Software				
S-1	Traffic Information Management	・Shall be able to analysis traffic condition ・Shall be able to shortest path search ・Shall be able to travel time prediction ・Shall be able to management traffic condition ・Shall be able to create provided information	Set	1
S-2	Roadway Management	・Shall be able to input road inventory data ・Shall be able to input road condition survey data ・Shall be able to input road construction data ・Shall be able to browse road inventory data ・Shall be able to browse congestion information	Set	1
S-3	Traffic Accident/Incident Information Management	・Shall be able to input traffic accident information ・Shall be able to management traffic accident information ・Shall be able to analyze traffic accident statistics	Set	1
S-4	Route Information Management	・Shall be able to input route information ・Shall be able to management route information	Set	1

Table 29-2 Estimated Cost of Traffic Management when under Incidental Traffic Conditions in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Software								-
S-9	Traffic Accident Incident Information Mangement	set	19,851,403.25		19,851,403.25	0.50	9,925,701.63		9,925,701.63
Total							**9,925,701.63**	-	**9,925,701.63**

Table 29-3 Estimated Cost of Traffic Management when under Incidental Traffic Conditions in Mega Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Software								-
S-5	Traffic Information Management	set	39,702,847.25		39,702,847.25	0.25	9,925,711.81		9,925,711.81
S-9	Traffic Accident Incident Information Mangement	set	19,851,403.25		19,851,403.25	0.50	9,925,701.63		9,925,701.63
Total							**19,851,413.44**	-	**19,851,413.44**

30. Road Maintenance Information Sub-system

30.1 Objectives of User Sub-service

- To disseminate the information about traffic restriction caused by construction to reduce traffic congestions that would lead to shift in time of leaving and route selection.
- To share information of construction works such as location, start time, end time, period, agency, contractor and etc, among DPWH, LGU and the relevant organizations.

30.2 Physical model of User Sub-service

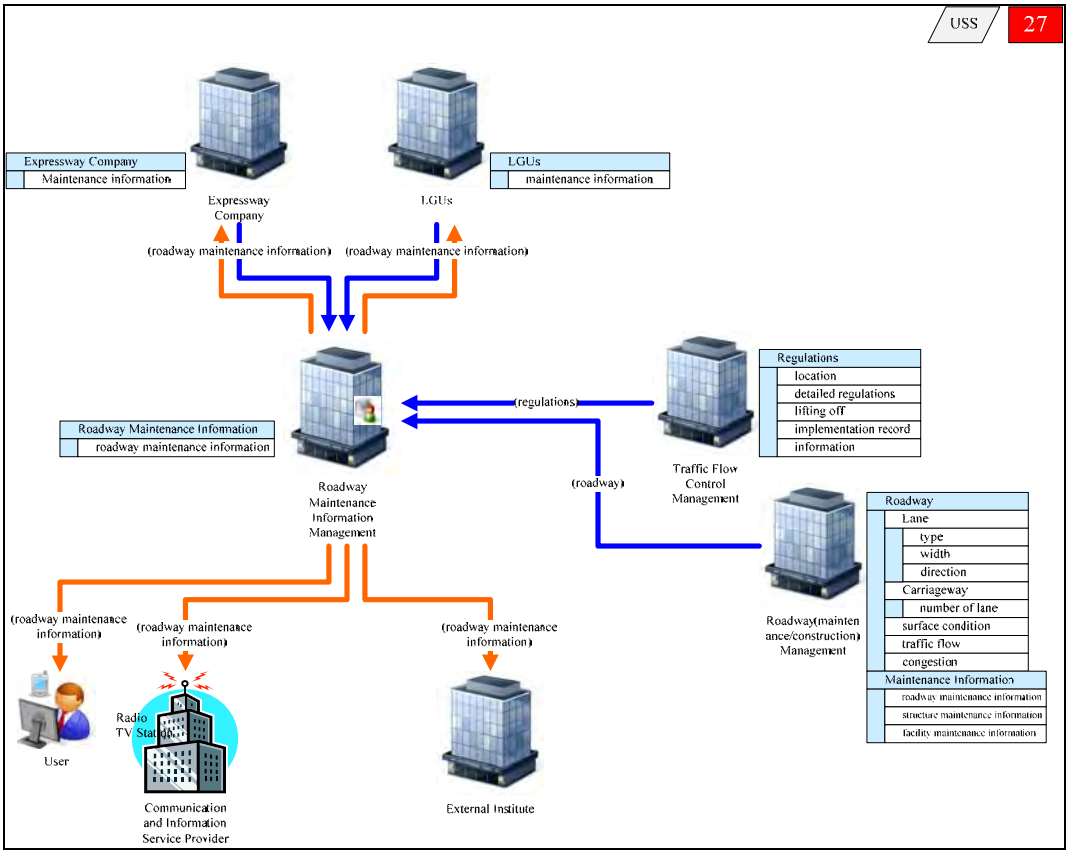


Figure 30-1 Physical/Control Model of Road Maintenance Information Sub-system

30.3 Implementation

1 center (for management of the information of construction)

30.4 Implementation Method

1) Data Processing Equipments

a) Roadway Management: Database for road inventory. This is installed at the centre.

b) Road Facilities Information: Database for road facilities. This is installed at the centre.

c) Road Structures Information: Database for road Structures. This is installed at the centre.

30.5 System Configuration and Equipment List

The system configuration to share information about construction works related institution and the list of requirement specifications of the equipment and software are shown below.

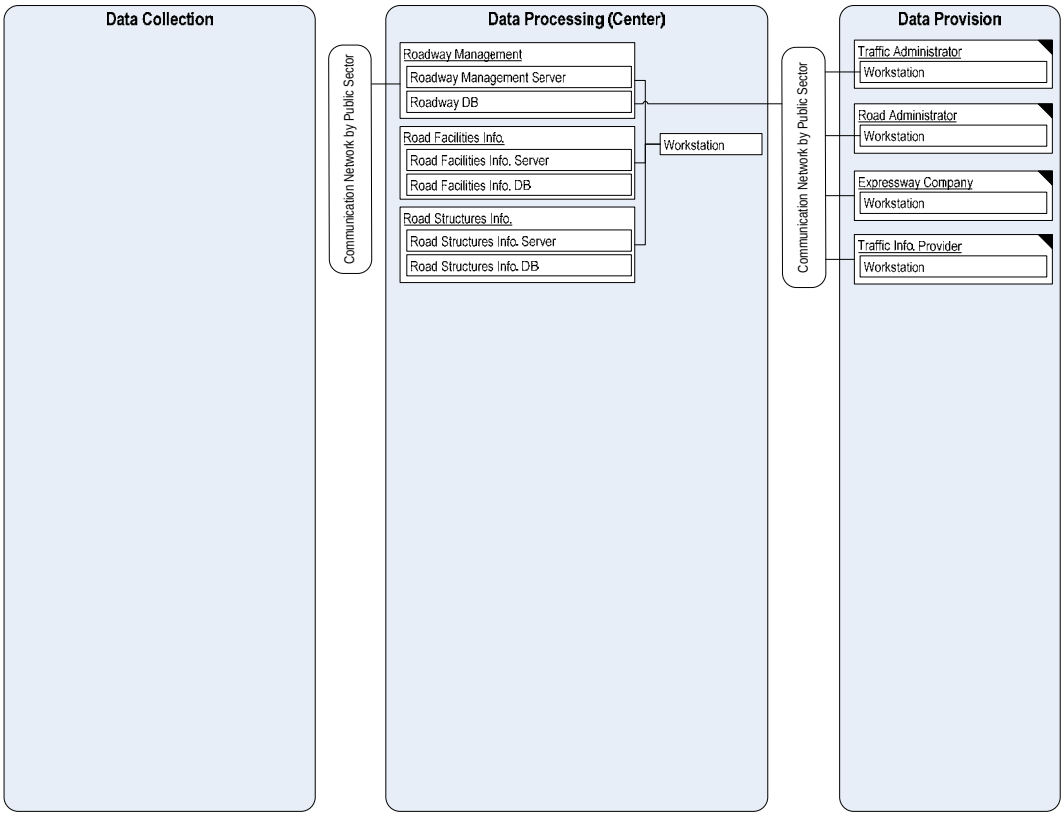


Figure 30-2 System Configuration of Road Maintenance Information Sub-system

Table 30-1 Equipment List of Road Maintenance Information Sub-system

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	3
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	3

No.	Equipment Component	Requirements Specification	Unit	Qty.
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	1
Center Software				
S-1	Roadway Management	・Shall be able to input road inventory data ・Shall be able to input road condition survey data ・Shall be able to input road construction data ・Shall be able to browse road inventory data ・Shall be able to browse congestion information	Set	1
S-2	Road Facilities Information Collection	・Shall be able to input road facilities information data ・Shall be able to browsing road facilities information data	Set	1
S-3	Road Structures Information Collection	・Shall be able to input road structures information data ・Shall be able to browsing road structures information data	Set	1

Table 30-2 Estimated Cost for Management Information on Road Maintenance in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-3	Road Facilities Information Collection	set	14,888,583.00		14,888,583.00	1.00	14,888,583.00		14,888,583.00
	Total						**14,888,583.00**	**23,431,250.00**	**38,319,833.00**

31. Advanced Traffic Survey Sub-system

31.1 Objectives of User Sub-service

- To collect traffic information by using various sensors, on-board-units and nomadic devices to perform integrated format collection/accumulation of precise road traffic information such as traffic volume, travel speed, etc. to be used for realization of safe, smooth travel, environments as well as for city planning, road development plans, policy evaluation, academic research, economic analysis, etc.

31.2 Physical model of User Sub-service

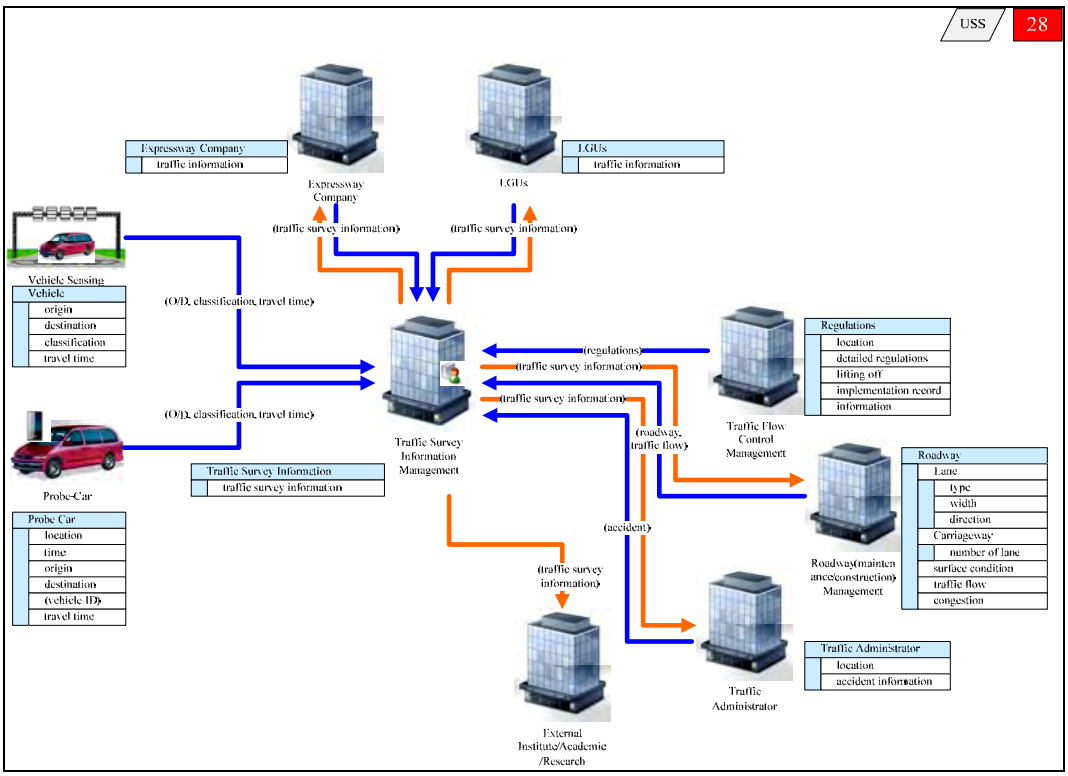


Figure 31-1 Physical/Control Model of Advanced Traffic Survey Sub-system

31.3 Implementation

1 center (for the management of the traffic information)

31.4 Implementation Method

1) Data Processing Equipments

a) Spot Information Management: Collection of positional information on the roadside equipment and OBU. This is installed at the centre.

b) Traffic Flow Control Management: Collection of Floating Car Data and Traffic Volume Data. This is installed at the centre.

c) Traffic Accident / Incident Information Management: Collection of incident information including road crash. This is installed at the centre.

d) Roadway Management: Database for road inventory. This is installed at the centre.

e) Traffic Survey Management: This is the database which manages the collected transport information. This is installed at the centre.

31.5 System Configuration and Equipment List

The system configuration to accumulate collected precise vehicle information and the list of requirement specifications of the equipment and software are shown below.

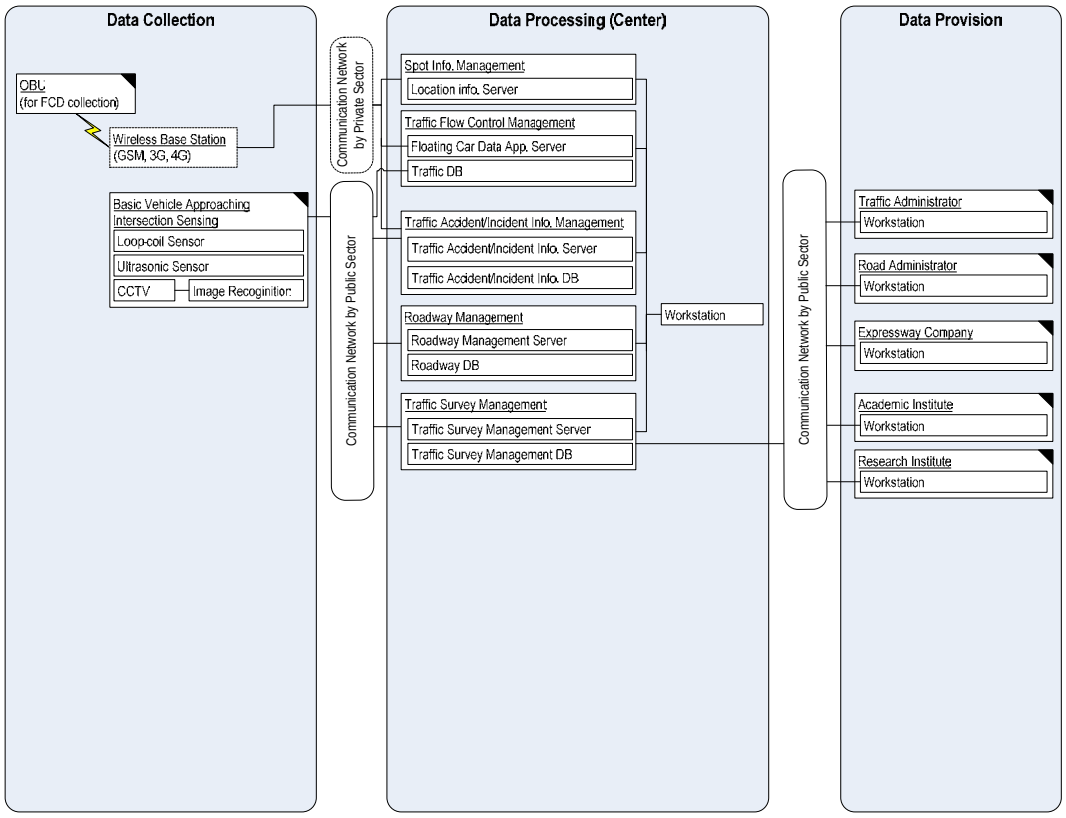


Figure 31-2 System Configuration of Advanced Traffic Survey Sub-system

Table 31-1 Equipment List of Advanced Traffic Survey Sub-system

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	5
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	4
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	1
Center Software				
S-1	Traffic Survey Management	・Shall be able to gather vehicle information ・Shall be able to generate traffic information	Set	1
S-2	Traffic Flow Control Management	・Shall be able to analyze of traffic flow ・Shall have capability the management of traffic flow ・Shall be able to set up a signal control schedule ・Shall be able to management of regulation information	Set	1
S-3	Roadway Management	・Shall be able to input road inventory data ・Shall be able to input road condition survey data ・Shall be able to input road construction data ・Shall be able to browse road inventory data ・Shall be able to browse congestion information	set	1
S-4	Spot Information Management	・Shall be able to input spot information data ・Shall be able to management to spot information data	Set	1
S-5	Traffic Accident/Incident Information Management	・Shall be able to input traffic accident information ・Shall be able to management traffic accident information ・Shall be able to analyze traffic accident statistics	Set	1
Roadside Equipment				
R-1	CCTV (FIX Type)	・Shall be able to film as an image ・Shall be able to send image to a processor	Pcs	
R-2	Image Recognition Processor	・Shall have data conversion by image recognition ・Shall be able to send to data	Pcs	
R-3	Loop-coil Sensor	・Shall be able to sense a vehicle or person by loop-coil ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	
R-4	Ultrasonic Sensor	・Shall be able to sense a vehicle or person by ultrasonic ・Shall be able to count a vehicle or person ・Shall be able to send to data	Pcs	
Vehicle Equipment				
V-1	OBU	・Shall be able to positioning by GPS ・Shall be able to send a vehicle data ・Shall be able to receive information	Pcs	

Table 31-2 Estimated Cost for Assistance of Traffic Survey in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-1	Traffic Survey Management	set	5,093,750.00		5,093,750.00	1.00	5,093,750.00		5,093,750.00
Total							**5,093,750.00**	**23,431,250.00**	**28,525,000.00**

Table 31-3 Estimated Cost for Assistance of Traffic Survey in Mega Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-1	Traffic Survey Management	set	5,093,750.00		5,093,750.00	1.00	5,093,750.00		5,093,750.00
									-
Total							**5,093,750.00**	**23,431,250.00**	**28,525,000.00**

32. Advanced Collection of Road Surface Information Sub-system

32.1 Objectives of User Sub-service

- To collect information of road surface condition such as abrasion, pot-holes, falling obstacle and etc, by using various sensors at road-side and vehicle to achieve smooth traffic and maintain the road structure effectively.

32.2 Physical model of User Sub-service

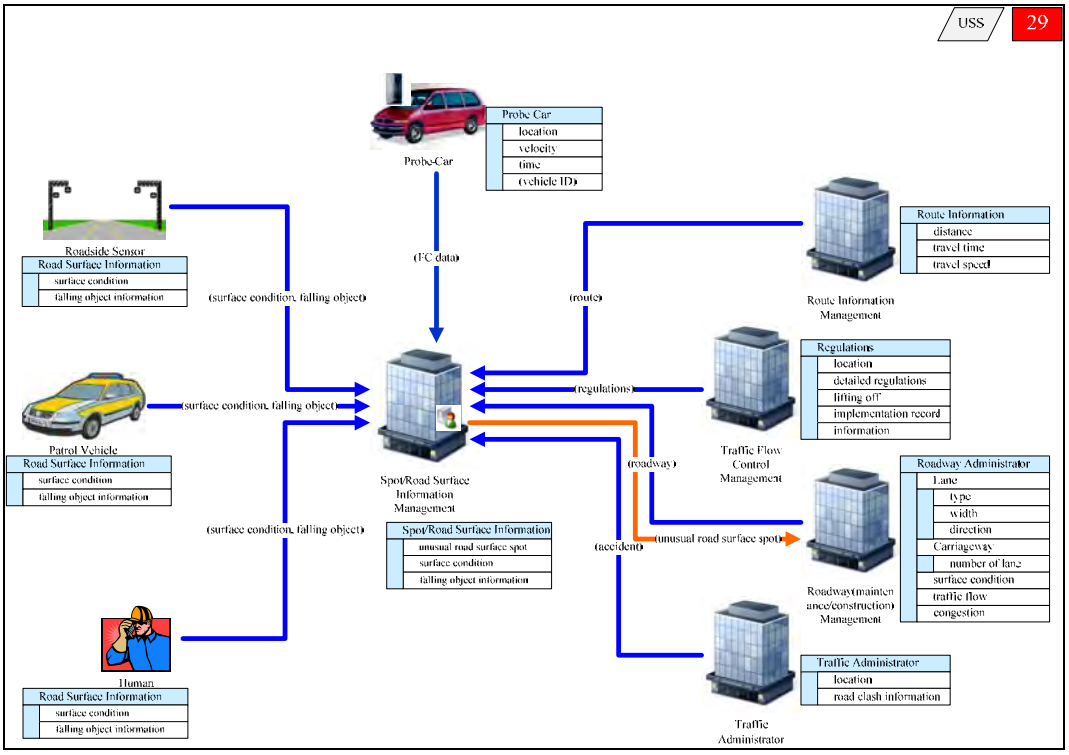


Figure 32-1 Physical/Control model of Advanced Collection of Road Surface Information Sub-system

32.3 Implementation

113 sections

To detect and monitor the vehicle on Radial Road and Circumferential Road per 2.0km section. Total length of Radial Road and Circumferential Road is 225.94km in NCR.

Therefore, 225.94 km / 2.0 km = 113 (cross-sections) approx.

32.4 Implementation Method

1) Data Collection Equipments

a) CCTV Camera (PTZ Type): One (1) unit is installed per location. 113sections x 1 pcs = 113 pcs

2) Data Processing Equipments

a) Spot Information Management: Collection of positional information on the roadside equipment and OBU. This is installed at the centre.

b) Traffic Flow Control Management: Collection of Floating Car Data and Traffic Volume Data. This is installed at the centre.

c) Traffic Accident / Incident Information Management: Collection of incident information including road crash. This is installed at the centre.

d) Roadway Management: Database for road inventory. This is installed at the centre.

e) Road Structures Information: Database for road Structures. This is installed at the centre.

f) CCTV Monitoring: Monitoring of CCTV image. This is installed at the centre.

32.5 System Configuration and Equipment List

The system configuration to capture road-surface condition correctly and the list of requirement specifications of the equipment and software are shown below.

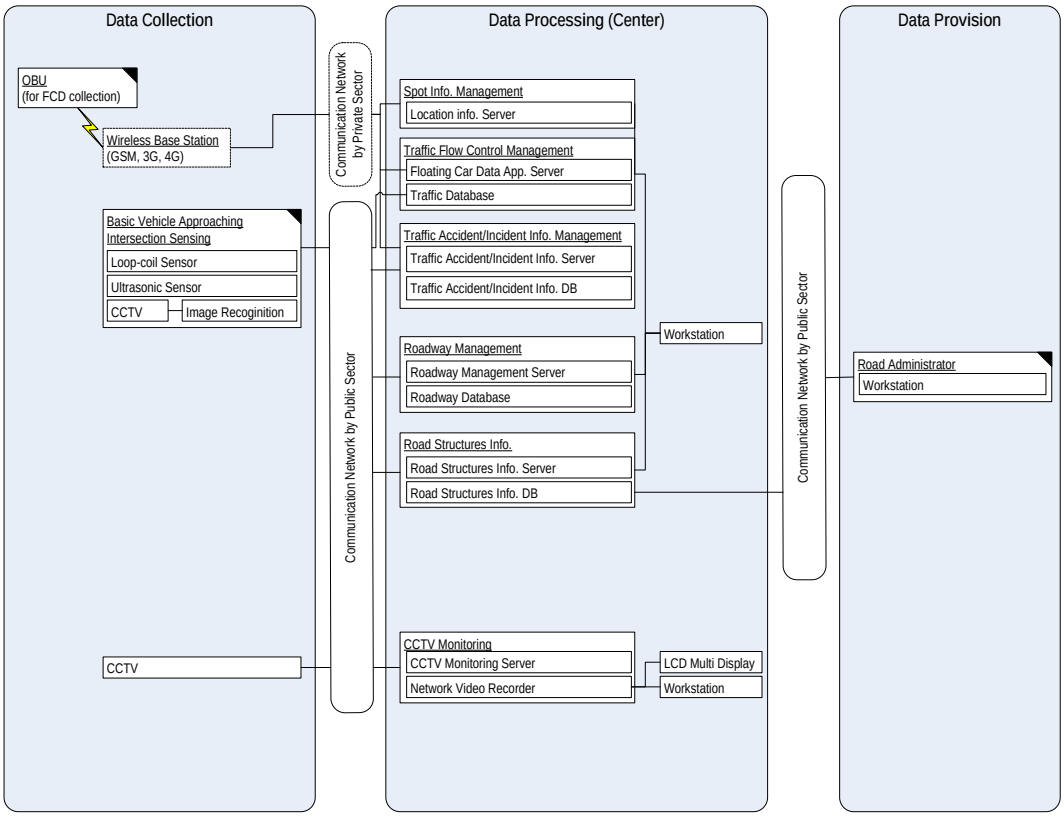


Figure 32-2 System Configuration of Advanced Collection of Road Surface Information Sub-system

Table 32-1 Equipment List of Advanced Collection of Road Surface Information Sub-system

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	·Shall be redundant system ·Shall be able to process the gathered data from all roadside equipment ·Shall have Web Application Server Service ·Shall have high availability ·Shall be low incident of morbidity rate as the service stop ·Shall be able to quick recovery ·Shall be support for secure communication ·Shall be able to act the several programming language	Pcs	6
C-2	Database Server	·Shall be redundant system ·Shall be able to the data storage ·Shall be RDBMS ·Shall be able to associate with other database	Pcs	4
C-3	Workstation	·Shall be able to startup and display each software ·Shall be able to operate each software ·Shall be OS the Windows or Linux ·Shall have Graphical User Interface	Pcs	2
C-4	Network Video Recorder	·Shall be able to recording CCTV image ·Shall be support for multiple file format ·Shall have high capacity ·Shall be easy to the export of data	Pcs	1
C-5	LCD Multi Display	·Shall be able to display on image ·Shall be support for multi display	Pcs	4
Center Software				
S-1	Roadway Management	·Shall be able to input road inventory data ·Shall be able to input road condition survey data ·Shall be able to input road construction data ·Shall be able to browse road inventory data ·Shall be able to browse congestion information	Set	1
S-2	Traffic Flow Control Management	·Shall be able to analyze of traffic flow ·Shall have capability the management of traffic flow ·Shall be able to set up a signal control schedule ·Shall be able to management of regulation information	set	1
S-3	Spot Information Management	·Shall be able to input spot information data ·Shall be able to management to spot information data	Set	1
S-4	Road Structures Information Collection	·Shall be able to input road structures information data ·Shall be able to browsing road structures information data	Set	1
S-5	Traffic Accident/Incident Information Management	·Shall be able to input traffic accident information ·Shall be able to management traffic accident information ·Shall be able to analyze traffic accident statistics	Set	1
S-6	CCTV Monitoring	·Shall be able to real-time play to image ·Shall be able to recording image automatically ·Shall be able to display on multi image simultaneously ·Shall be able to play image which was recorded ·Shall be able to operate camera which was selected	Set	1
Roadside Equipment				
R-1	CCTV (FIX Type)	·Shall be able to film as an image ·Shall be able to send image to a processor	Pcs	
R-2	Image Recognition Processor	·Shall have data conversion by image recognition ·Shall be able to send to data	Pcs	
R-3	Loop-coil Sensor	·Shall be able to sense a vehicle or person by loop-coil ·Shall be able to count a vehicle or person ·Shall be able to send to data	Pcs	
R-4	Ultrasonic Sensor	·Shall be able to sense a vehicle or person by ultrasonic ·Shall be able to count a vehicle or person ·Shall be able to send to data	Pcs	
R-5	CCTV	·Shall be able to film as an image ·Shall be able to send image on internet connection ·Shall be able to Pan and Tilt and Zoom ·Shall be support for multi codec	Pcs	113

No.	Equipment Component	Requirements Specification	Unit	Qty.
Vehicle Equipment				
V-1	OBU	・Shall be able to positioning by GPS ・Shall be able to send a vehicle data ・Shall be able to receive information	Pcs	

Table 32-2 Estimated Cost of Collection of Road Surface Information in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-4	Road Structures Information Collection	set	14,888,583.00		14,888,583.00	1.00	14,888,583.00		14,888,583.00
Total							**14,888,583.00**	**23,431,250.00**	**38,319,833.00**

Table 32-3 Estimated Cost of Collection of Road Surface Information in Mega Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	2.00		23,431,250.00	23,431,250.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	2.00		23,431,250.00	23,431,250.00
									-
	Centre Software								-
S-3	Road Facilities Information Collection	set	14,888,583.00		14,888,583.00	1.00	14,888,583.00		14,888,583.00
S-4	Road Structures Information Collection	set	14,888,583.00		14,888,583.00	1.00	14,888,583.00		14,888,583.00
Total							**29,777,166.00**	**46,862,500.00**	**76,639,666.00**

33. Electronic Toll Collection Sub-system

33.1 Objectives of User Sub-service

- To improve traffic congestion at toll-gate, convenient of driver and reduction of toll management cost by automatic toll collection payment using On-Board-Unit and IC-Card.

33.2 Physical model of User Sub-service

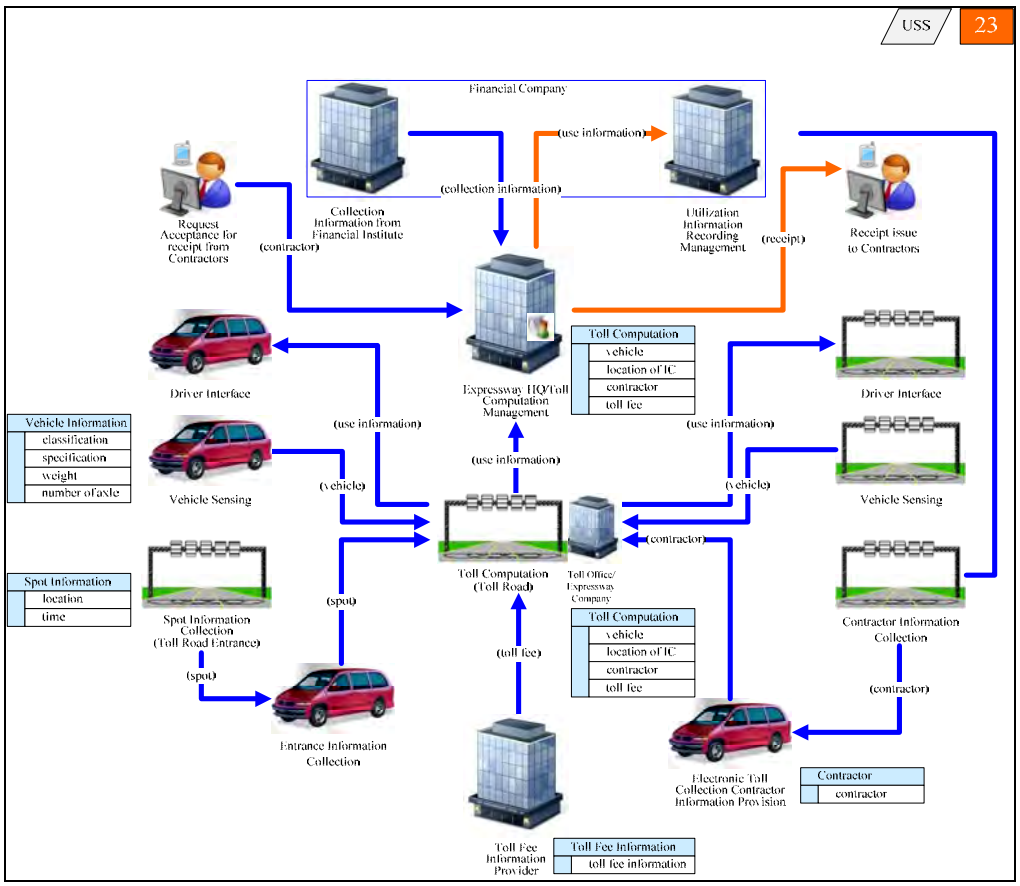


Figure 33-1 Physical/Control model of Electronic Toll Collection System Sub-system

33.3 Implementation

(1) Metro Manila (Road Pricing)

27 intersections

Radiation Road and Circle Road, it is estimated approx 27 intersections.

Therefore, toll collection equipment is installed at the near of intersection for road-pricing.

It is assumed that the route selection decisions will be carried out at the short of intersections of Radiation.

(2) Mega Manila

168 roadside antennas

330 IC-Card Reader /Writer

Table 33-1 Estimated of Electric Toll Collection equipment

	Existing							
Expressway	NLEX	SCTEX	SLEX	SKWAY	STAR	CAVITEX	Sub total 01	
Length	84	90	36	33	42	14		
IC	15	12	14		6	3		
Estimated No.of IC				8				
IC R/W (No.of IC x 4)	60	48	56	32	24	12	232	
Roadside Antenna (No.of IC x 2)	30	24	28	16	12	6	116	
Lane Server (No.of IC x 1)	15	12	14	8	6	3	58	
Toll Management Server	1	1	1	1	1	1	6	

	D/D, Under Const		Planning					
Expressway	TPLEX	Daan -Hari	NAIAX	CLEX (ph-1)	CALAX	C-6 (KOICA)	Sub total 02	Total 01 + 02
Length	89	4	7	31	47	60		
IC	8			4		7		
Estimated No.of IC		1	2		3			
IC R/W (No.of IC x 4)	32	2	8	16	12	28	98	**330**
Roadside Antenna (No.of IC x 2)	16	4	4	8	6	14	52	**168**
Lane Server (No.of IC x 1)	8	1	2	4	3	7	25	**83**
Toll Management Server	1	1	1	1	1	1	6	**12**

33.4 Implementation Method

1) Data Collection Equipments

a) Roadside Antenna: Two units (2) are installed per intersection. 27 intersections x 2pcs = 54 pcs

b) Antenna Controller: Two units (2) are installed per intersection. 27 intersections x 2pcs = 54 pcs

2) Data Processing Equipments

a) Toll Computation Management: Collect and manage charging information of Road Pricing based on information recorded in Lane Server. This is installed at the centre.

b) Lane Server: Record and manage the passage information of the vehicle. This is installed at the centre.

33.5 System Configuration and Equipment List

The system configuration to support the charging of road user via Road Pricing and the list of requirement specifications of the equipment and software are shown below.

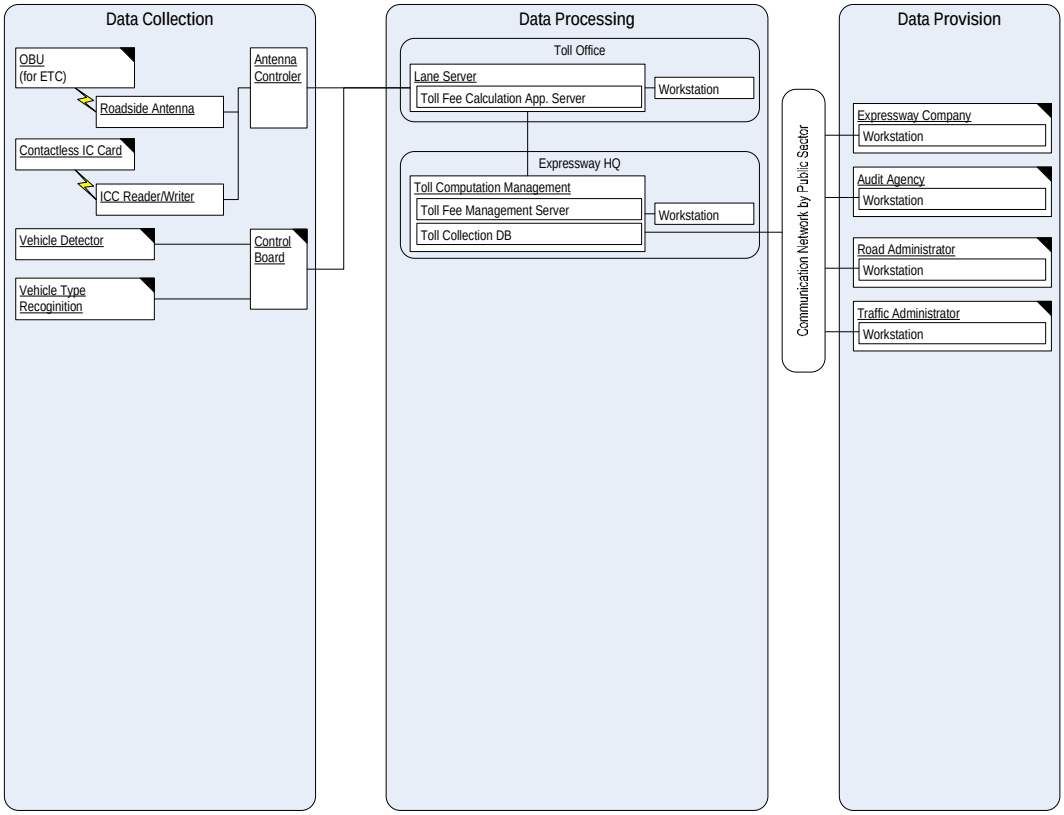


Figure 33-2 System Configuration of Electronic Toll Collection Sub-system

Table 33-2 Equipment List of Electronic Toll Collection Sub-system

No.	Equipment Component	Requirements Specification	Unit	Qty. (Metro)	Qty. (Mega)
Centre Equipment					
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	2	97
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	1	14
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	2	2
Center Software					
S-1	Toll Computation Management	・Shall be able to gather outside server information ・Shall be able to send information to outside server ・Shall be able to management toll fee data ・Shall be able to receive toll fee data	Set	1	1
S-2	Lane Server	・Shall be able to gather vehicle passage information ・Shall be able to process toll fee data ・Shall be able to send toll fee data	Set	1	1
Roadside Equipment					
R-1	Roadside Antenna	・Shall be able to receive wave of OBU	Pcs	54	168
R-2	Antenna Controller	・Shall be able to convert to data type from wave ・Shall be able to send data to server	Pcs	54	168

No.	Equipment Component	Requirements Specification	Unit	Qty. (Metro)	Qty. (Mega)
R-3	IC-Card Reader/Writer	・Shall be read IC-Card information ・Shall be write fee information to IC-Card	Pcs		330
R-4	Toll Gate VMS	・Shall be able to receive message data ・Shall be able to display message data ・Shall be support to English	Pcs		
R-5	Toll barrier	・Shall be able to control start of vehicle ・Shall being few shocks when the vehicle crashed	Pcs		
Vehicle Equipment					
V-1	OBU	・Shall be able to positioning by GPS ・Shall be able to send a vehicle data ・Shall be able to receive information	Pcs		

Table 33-3 Estimated Cost of Electronic Toll Collection in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	2.00		23,431,250.00	23,431,250.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	1.00		11,715,625.00	11,715,625.00
									-
	Centre Software								-
S-1	Toll Computation Management	set	19,851,403.25		19,851,403.25	1.00	19,851,403.25		19,851,403.25
S-2	Lane Server	set	6,112,500.00		6,112,500.00	1.00	6,112,500.00		6,112,500.00
									-
	Roadside Equipment								-
R-1	Roadside Antena	pcs	1,222,500.00	183,375.00	1,405,875.00	54.00	75,917,250.00		75,917,250.00
R-2	Antena Controller	pcs	483,702.50	72,555.38	556,257.88	54.00	30,037,925.25		30,037,925.25
Total							**131,919,078.50**	**35,146,875.00**	**167,065,953.50**

Table 33-4 Estimated Cost of Electronic Toll Collection in Mega Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	97.00		1,136,415,625.00	1,136,415,625.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	14.00		164,018,750.00	164,018,750.00
C-3	Workstation	pcs	256,725.00	38,508.75	295,233.75	2.00		590,467.50	590,467.50
									-
	Centre Software								-
S-1	Toll Computation Management	set	19,851,403.25		19,851,403.25	1.00	19,851,403.25		19,851,403.25
S-2	Lane Server	set	6,112,500.00		6,112,500.00	1.00	6,112,500.00		6,112,500.00
									-
	Roadside Equipment								-
R-1	Roadside Antena	pcs	1,222,500.00	183,375.00	1,405,875.00	168.00	236,187,000.00		236,187,000.00
R-2	Antena Controller	pcs	483,702.50	72,555.38	556,257.88	168.00	93,451,323.00		93,451,323.00
R-3	IC-card R/W	pcs	17,930.00	2,689.50	20,619.50	330.00	6,804,435.00		6,804,435.00
Total							**362,406,661.25**	**1,301,024,842.50**	**1,663,431,503.75**

34. Electronic Parking Charge Collection Sub-system

34.1 Objectives of User Sub-service

- To achieve automatic parking fee collection in accordance with parking duration time, for the convenient of driver and reduction of management cost.

34.2 Physical model of User Sub-service

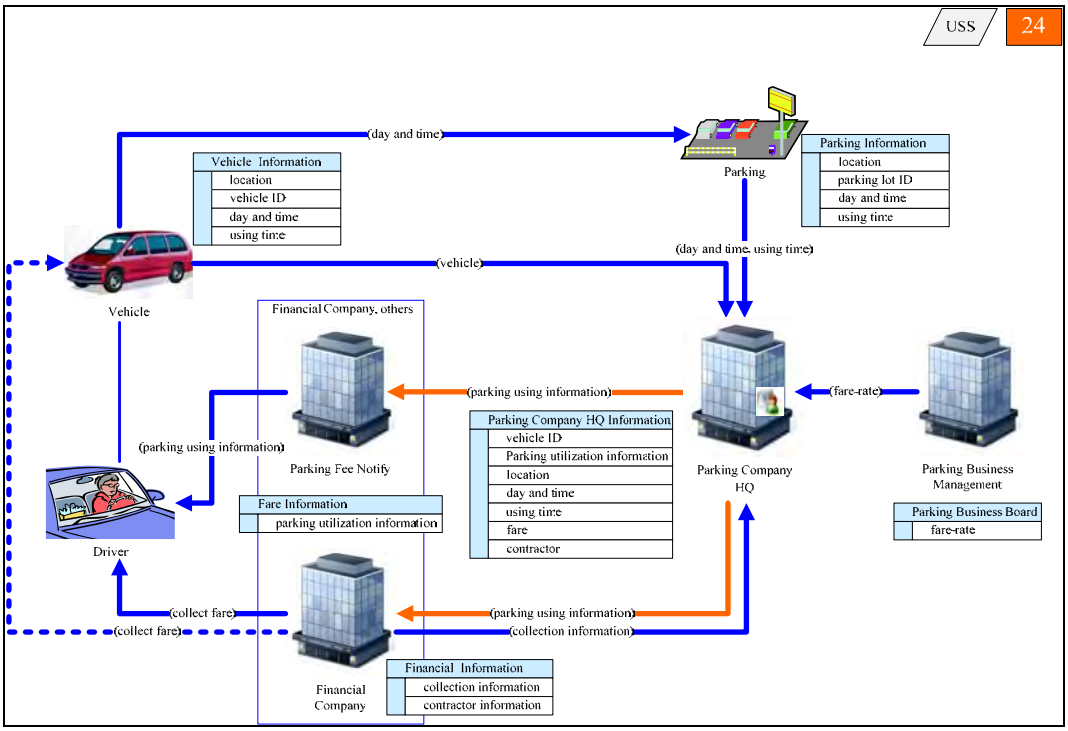


Figure 34-1 Physical/Control model of Electronic Parking Charge Collection Sub-system

34.3 Implementation

50 parking places

(Intended to be developed 50 public parking places)

34.4 Implementation Method

1) Data Collection Equipments

a) Roadside Antenna: One unit (1) is installed per location. 50 parking x 1pcs = 50 pcs

b) Antenna Controller: One unit (1) is installed per location. 50 intersections x 1pcs = 50 pcs

c) IC-Card R/W: One unit (1) is installed per location. 50 parking x 1 pcs = 50 pcs

2) Data Processing Equipments

a) Parking Fee Collection Management: Manages fare collection information of parking lot. This is installed at the centre.

b) Parking Fee Charger: Record fare collection information of each parking lot. This is installed at the centre.

c) Utilization Information Settlement: Settle the process of fare collection information of parking lot. This is installed at the centre.

3) Information Provision Equipments

a) Information Board: Four (4) units are installed per parking lot. 50 parking x 4 pcs = 200 pcs

34.5 System Configuration and Equipment List

The system configuration to enable the charging in the different parking lot company and the list of requirement specifications of the equipment and software are shown below.

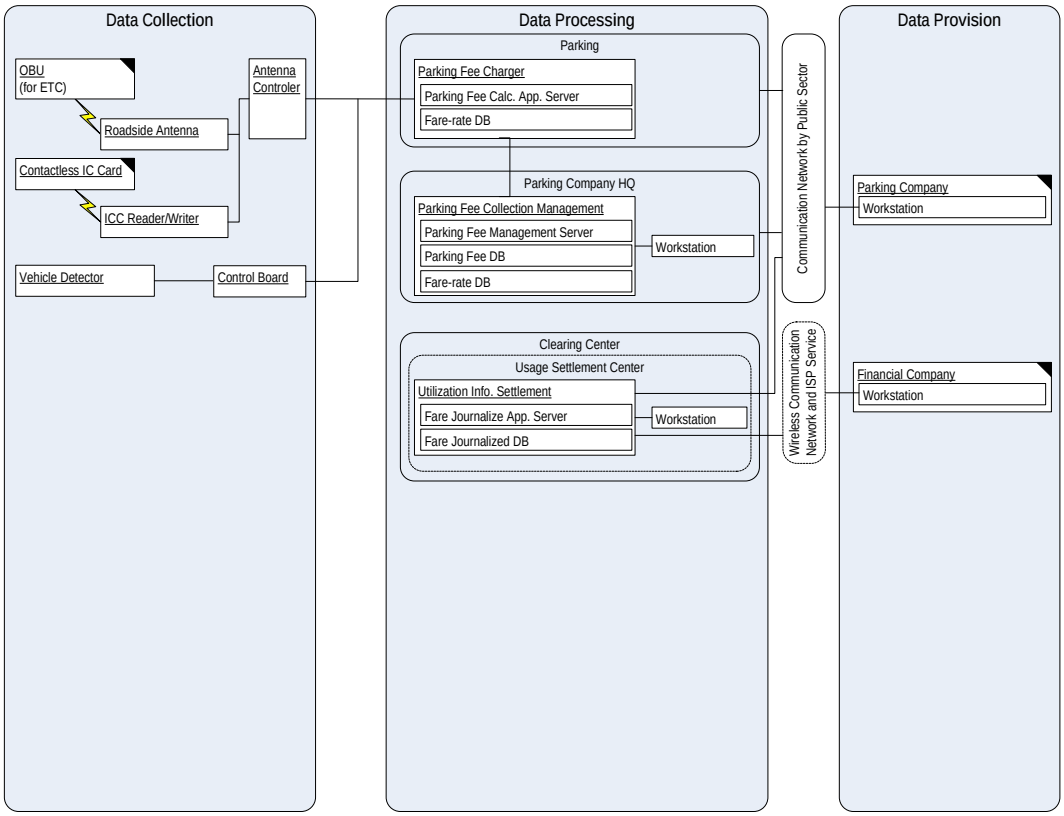


Figure 34-2 System Configuration of Electronic Parking Charge Collection Sub-system

Table 34-1 Equipment List Electronic Parking Charge Collection Sub-system

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	3
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	3
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	2
Center Software				
S-1	Parking Fee Collection Management	・Shall be able to gather parking fee information ・Shall be able to gather IC-Card information	Set	1
S-2	Parking Fee Charger	・Shall be able to calculate parking fee ・Shall be able to display parking fee ・Shall be able to send parking fee data	Set	1
S-3	Utilization Information Settlement	・Shall be able to receive fee data of IC-Card ・Shall be able to management fee data of IC-Card	Set	1
Roadside Equipment				
R-1	Roadside Antenna	・Shall be able to receive wave of OBU	Pcs	50
R-2	Antenna Controller	・Shall be able to convert to data type from wave ・Shall be able to send data to server	Pcs	50
R-3	IC-Card Reader/Writer	・Shall be read IC-Card information ・Shall be write fee information to IC-Card	Pcs	50
R-4	Information Board	・Shall be able to display operation condition of bus ・Shall be able to receive information of server periodic ・Shall be updated automatically	Pcs	200
Vehicle Equipment				
V-1	OBU	・Shall be able to positioning by GPS ・Shall be able to send a vehicle data ・Shall be able to receive information	Pcs	

Table 34-2 Estimated Cost of Electronic Parking Charge Collection in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TPTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	2.00		23,431,250.00	23,431,250.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	2.00		23,431,250.00	23,431,250.00
									-
	Centre Software								-
S-1	Parking Fee Collection Management	set	29,777,125.25		29,777,125.25	1.00	29,777,125.25		29,777,125.25
S-2	Parking Fee Charger	set	6,112,500.00		6,112,500.00	1.00	6,112,500.00		6,112,500.00
									-
	Roadside Equipment								-
R-1	Roadside Antena	pcs	1,222,500.00	183,375.00	1,405,875.00	50.00	70,293,750.00		70,293,750.00
R-2	Antena Controller	pcs	483,702.50	72,555.38	556,257.88	50.00	27,812,893.75		27,812,893.75
R-3	IC-card R/W	pcs	17,930.00	2,689.50	20,619.50	50.00	1,030,975.00		1,030,975.00
R-4	Information Board	pcs	248,126.75	37,219.01	285,345.76	200.00	-	57,069,152.50	57,069,152.50
	Total						**135,027,244.00**	**103,931,652.50**	**238,958,896.50**

35. Cashless Payment to Public Transportation Sub-system

35.1 Objectives of User Sub-service

- To achieve the efficient use of public transportation using the integrated cashless payment when in multi-use of public transport and for the convenient of users.

35.2 Physical model of User Sub-service

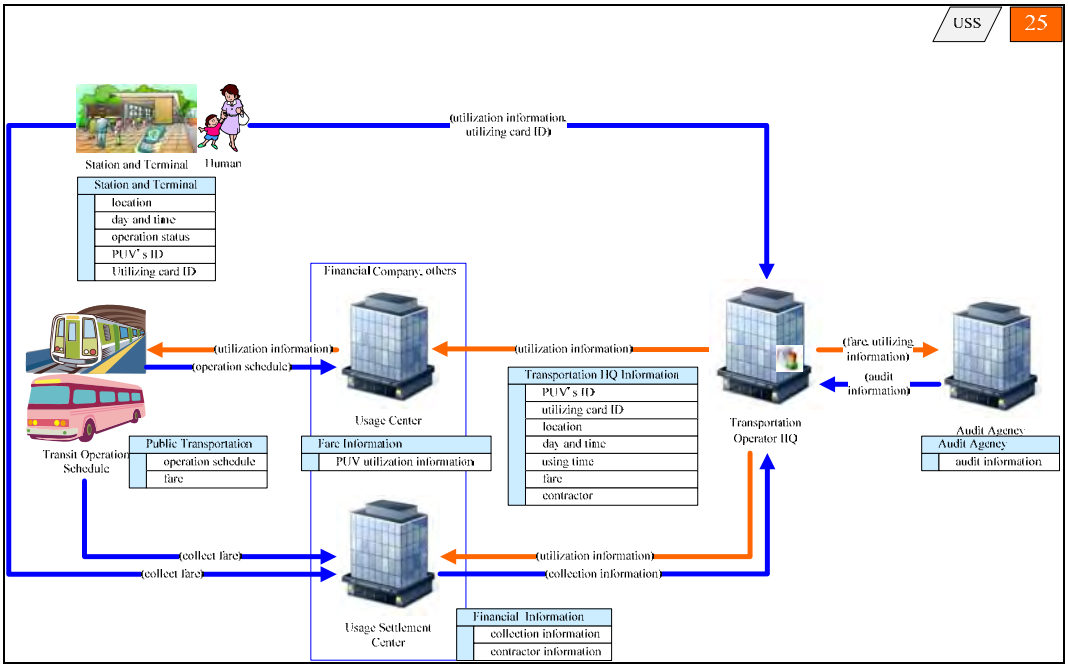


Figure 35-1 Physical/Control model of Cashless Payment to Public Transportation Sub-system

35.3 Implementation

1 center (for the management of the public transport fee (especially for bus))

35.4 Implementation Method

1) Data Processing Equipments

a) Gate Server: Record the information of the gate user. This is installed at the centre.

b) Fare Computation Management: Calculate fare information from gate user information. This is installed at the centre.

c) Utilization Information Recording Management: Manages gate user information and fare information of each public transport. This is installed at the centre.

d) Utilization Information Settlement: Process the fare collection information of several public transports. This is installed at the centre.

35.5 System Configuration and Equipment List

The system configuration to enable efficient public transport use and the list of requirement specifications of the equipment and software are shown below.

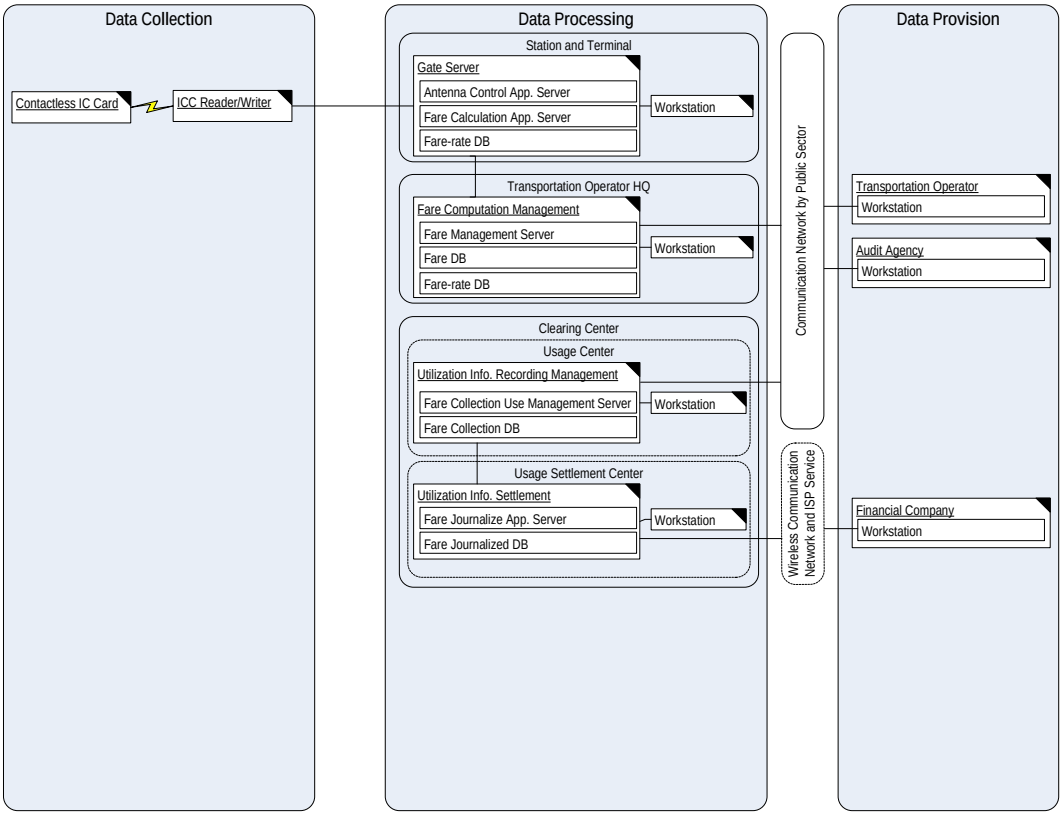


Figure 35-2 System Configuration of Cashless Payment to Public Transportation Sub-system

Table 35-1 Equipment List of Cashless Payment to Public Transportation Sub-system

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	4
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	4
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	4
Center Software				
S-1	Utilization Information Recording Management	・Shall be able to input information of IC-Card data ・Shall be able to receive IC-Card data ・Shall be able to management information of IC-Card data	Set	1

No.	Equipment Component	Requirements Specification	Unit	Qty.
S-2	Utilization Information Settlement	・Shall be able to receive fee data of IC-Card ・Shall be able to management fee data of IC-Card	Set	1
S-3	Fare Computation Management	・Shall be able to gather outside server information ・Shall be able to send information to outside server ・Shall be able to management fare data ・Shall be able to receive fare data	Set	1
S-4	Gate Server	・Shall be able to gather Passenger passage information ・Shall be able to process fare data ・Shall be able to send fare data	Set	1
Roadside Equipment				
	IC-Card Reader/Writer	・Shall be read IC-Card information ・Shall be write fee information to IC-Card	Pcs	

Table 35-2 Estimated Cost of Cashless Payment for Public Utilization in Metro Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TPTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	4.00		46,862,500.00	46,862,500.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	4.00		46,862,500.00	46,862,500.00
									-
	Centre Software								-
S-23	Utilization Information Recording Management	set	39,702,847.25		39,702,847.25	1.00	39,702,847.25		39,702,847.25
S-24	Utilization Information Settlement	set	19,851,403.25		19,851,403.25	1.00	19,851,403.25		19,851,403.25
S-25	Fare Computation Management	set	6,112,500.00		6,112,500.00	1.00	6,112,500.00		6,112,500.00
S-26	Gate Server	set	6,112,500.00		6,112,500.00	1.00	6,112,500.00		6,112,500.00
									-
	Roadside Equipment								-
Total							**71,779,250.50**	**93,725,000.00**	**165,504,250.50**

36. Toll Collection Inter-operability Sub-System

36.1 Objectives of User Sub-service

- To achieve the integrated toll fee collection system that integrated fee structure, collection method, fee allocation method and etc. among road operators.

36.2 Physical model of User Sub-service

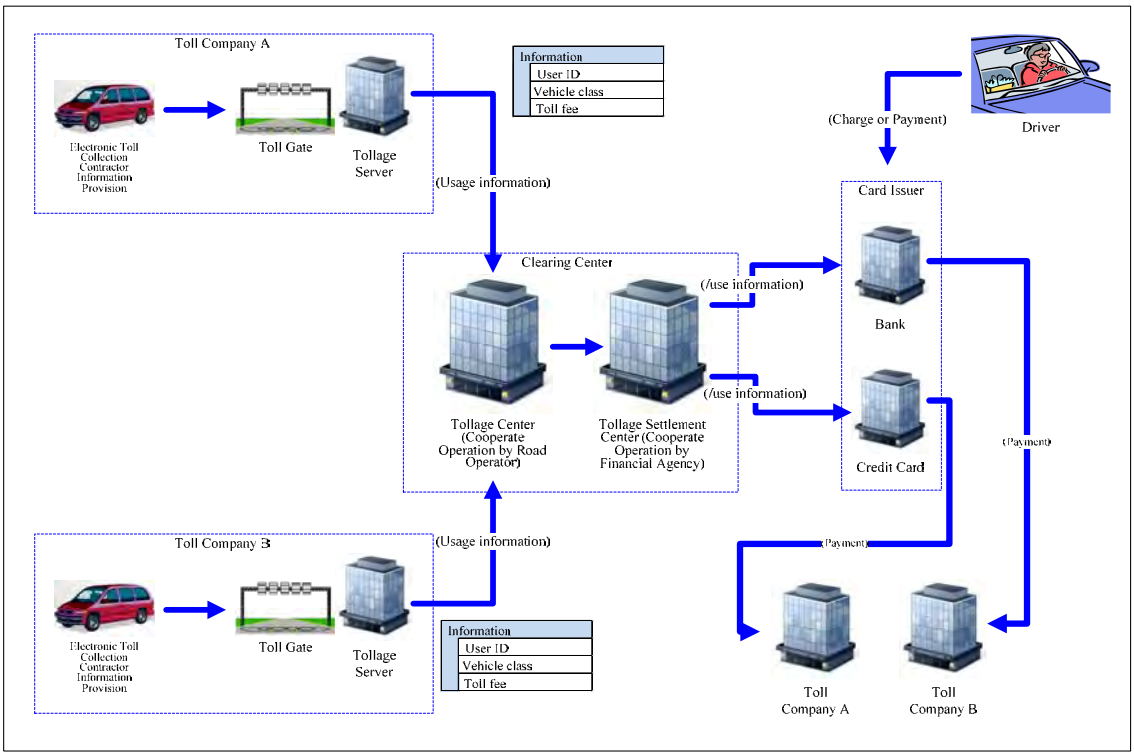


Figure 36-1 Physical/Control model of Toll Collection Inter-operability Sub-System

36.3 Implementation

1 center (for the management and integration of toll fee between with different road operators)

36.4 Implementation Method

1) Data Processing Equipments

a) Toll Computation Management: Collect and manage charging information of Road Pricing based on information recorded in Lane Server. This is installed at the centre.

b) Lane Server: Record, computer and manage the passage information of the vehicle. This is installed at the centre.

c) Utilization Information Recording Management: Compute and manage gate passage information and fare information of each toll road. This is installed at the centre.

d) Utilization Information Settlement: Process the fare collection information of several toll road. This is installed at the centre.

e) Web Information: Information sharing through the Internet. This is installed at the centre.

36.5 System Configuration and Equipment List

The system configuration to manage inter-operability of toll collection and the list of requirement specifications of the equipment and software are shown below.

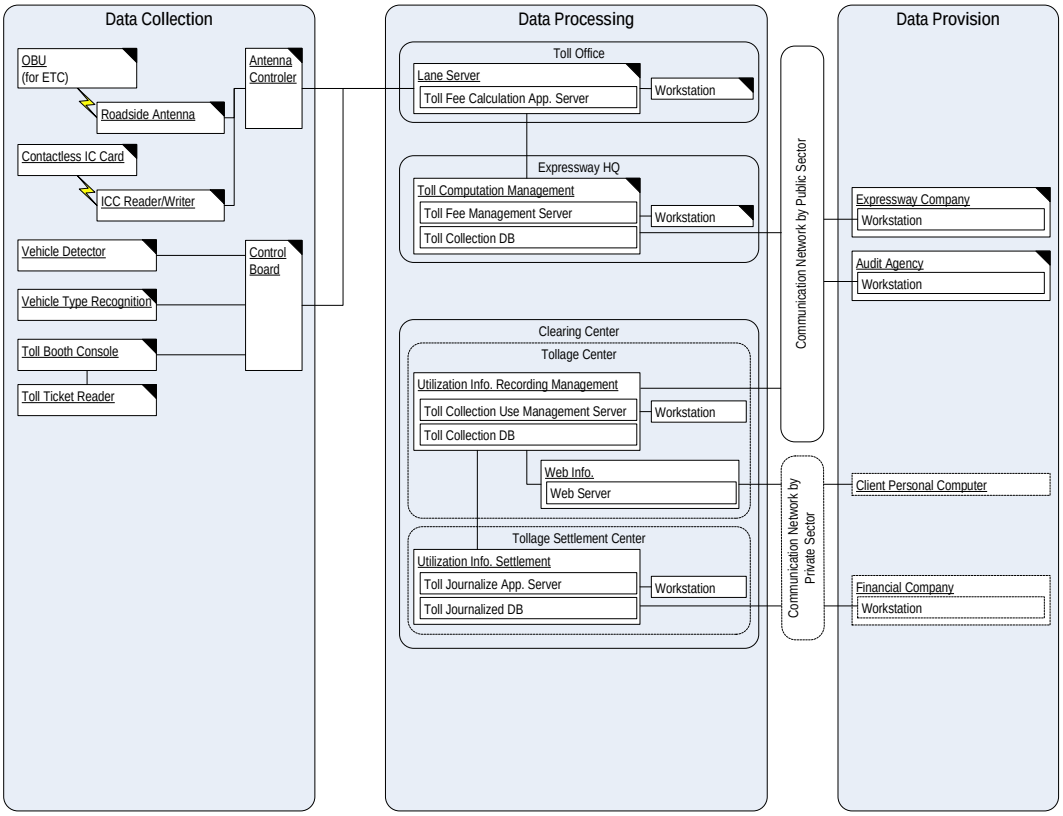


Figure 36-2 System Configuration of Toll Collection Inter-operability Sub-System

Table 36-1 Equipment List of Toll Collection Inter-operability Sub-System

No.	Equipment Component	Requirements Specification	Unit	Qty.
Centre Equipment				
C-1	Application Server	・Shall be redundant system ・Shall be able to process the gathered data from all roadside equipment ・Shall have Web Application Server Service ・Shall have high availability ・Shall be low incident of morbidity rate as the service stop ・Shall be able to quick recovery ・Shall be support for secure communication ・Shall be able to act the several programming language	Pcs	5
C-2	Database Server	・Shall be redundant system ・Shall be able to the data storage ・Shall be RDBMS ・Shall be able to associate with other database	Pcs	3
C-3	Workstation	・Shall be able to startup and display each software ・Shall be able to operate each software ・Shall be OS the Windows or Linux ・Shall have Graphical User Interface	Pcs	4
Center Software				
S-1	Toll Computation Management	・Shall be able to gather outside server information ・Shall be able to send information to outside server ・Shall be able to management toll fee data ・Shall be able to receive toll fee data	Set	1
S-2	Lane Server	・Shall be able to gather vehicle passage information ・Shall be able to process toll fee data ・Shall be able to send toll fee data	Set	1
S-3	Utilization Information Recording Management	・Shall be able to input information of IC-Card data ・Shall be able to receive IC-Card data ・Shall be able to management information of IC-Card data	Set	1
S-4	Utilization Information Settlement	・Shall be able to receive fee data of IC-Card ・Shall be able to management fee data of IC-Card	set	1
S-5	Web Information	・Shall operate Web server service ・Shall be able to support for multi access ・Shall be able to process html or xml language ・Shall be able to access control ・Shall be able to security settings ・Shall be able to packet filtering	Set	1
Roadside Equipment				
R-1	Roadside Antenna	・Shall be able to receive wave of OBU	Pcs	
R-2	Antenna Controller	・Shall be able to convert to data type from wave ・Shall be able to send data to server	Pcs	
R-3	IC-Card Reader/Writer	・Shall be read IC-Card information ・Shall be write fee information to IC-Card	Pcs	
R-4	CCTV (FIX Type)	・Shall be able to film as an image ・Shall be able to send image to a processor	Pcs	
R-5	Image Recognition Processor	・Shall have data conversion by image recognition ・Shall be able to send to data	Pcs	
Vehicle Equipment				
V-1	OBU	・Shall be able to positioning by GPS ・Shall be able to send a vehicle data ・Shall be able to receive information	Pcs	

Table 36-2 Estimated Cost of Toll Collection Interoperability on Toll Road in Mega Manila

Unit: Php

	Description	Unit	Price of Item	Instaration Cost (15% of Unit Cost)	Unit Rate	Quantity	Cost (International Supply)	Cost (Local Supply)	TOTAL COST
	Centre Equipment								
C-1	Application Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	2.00		23,431,250.00	23,431,250.00
C-2	Database Server	pcs	10,187,500.00	1,528,125.00	11,715,625.00	2.00		23,431,250.00	23,431,250.00
									-
	Centre Software								-
S-23	Utilization Information Recording Management	set	39,702,847.25		39,702,847.25	1.00	39,702,847.25		39,702,847.25
S-24	Utilization Information Settlement	set	19,851,403.25		19,851,403.25	1.00	19,851,403.25		19,851,403.25
									-
Total							**59,554,250.50**	**46,862,500.00**	**106,416,750.50**

Annex 15.1 LIST OF INTERSECTIONS FOR TRAFFIC SIGNAL INSTALLATION

No.	Location	No.	Location
1	A. Bonifacio - Apo St.	36	C4 - North Bay
2	A. Bonifacio - Balingasa St.	37	C4 - Saphire road
3	A. Mabini - 10th Avenue (P. Burgos)	38	Camarin - Zabarte- Bagong Silang
4	A. Maceda - Piy Margall	39	Camarin Road - Zabarte Road/Susano
5	A. Maceda - J. Pajardo	40	Carlos P. Garcia - Cruz na Ligas
6	A. Rodriguez Ave. - Evangelista	41	Central Avenue - Visayas Avenue-BAI
7	A. Rodriguez Ave. Manalo Bridge	42	Circumferential Rd. - ML Quezon Street
8	A. Rodriguez - Canley Road	43	Commerce - Acacia Ave.
9	A. Rodriguez - J. P. Rizal - Calderon	44	Commerce - Madrigal Ave.
10	A. Rodriguez - Infront of Litton Mills	45	Commerce - Mindanao Ave.
11	Aguirre - Pres. Ave.	46	Commowealth Ave. - Infront of UP/AIT/INNO
12	Alabang/Zapote Rd./ B.F. Executive	47	Commonwealth Ave. - Litex
13	Alabang/Zapote Rd./ B.F. Almanza	48	Concepcion - San Marcelino**
14	Alabang/Zapote Rd./ Casimiro	49	Congressional - Jupiter
15	Alabang/Zapote Rd./Manuela	50	Congressional - Pangilinan
16	Alabang/Zapote Rd./ Marcos Alvarez	51	Congressional - Shorthorn Village
17	Alabang/Zapote Rd./ Pilar Village	52	D. Tuazon - Mauban
18	Alabang/Zapote/Manila Times	53	Dapitan - M. dela Fuente
19	Anonas - Kabuli	54	Del monte - Corumi st.
20	Araneta/Kaliraya	55	Del monte - East Riverside
21	A-Z Road - Natyional Hway (near Metropolis)**	56	Dr. M. Carreon - Nagtahan Link
22	B. Morcilla - M. Almeda Street	57	E. Rodriguez Jr. Ave. - Eagle Plaridel
23	B. Morcilla - P. Herrera Street	58	E. Rodriguez Jr. Ave. - Laong Laan/D. Vargas
24	B. Serrano Ave. - fronting E. Aguinaldo HS	59	E. Rodriguez Jr. Ave. - Mercury Avenue
25	Baesa Rd. Sta. Quiteria	60	E. Rodriguez (C5) - infr. Of Acro. Green H.A
26	Bayani Rd. - Fort Bonifacio Gate D	61	E. Rodriguez - Infront of INK
27	C-3 - Baltazar St.	62	E. Rodriguez - Monte Piedad
28	C.M Recto - Asuncion	63	E. Rodriguez - Pasig Blvd.
29	C.P Garcia Avenue - E. Jacinto Street	64	East Ave. - Matalino St.
30	C.P Garcia Avenue - National Stud Farm	65	East Ave. - Kidney & Transplant Int.
31	C2- Juan Luna	66	East Bank Ramp A - Highway 2000
32	C3 - 8th Avenue	67	Eat Bank Ramp B - Highway 2000
33	C-3 - R10	68	East Capitol St. West Capoitol St.
34	C3 - Baloy Street	69	EDSA - Biglang Awa
35	C4 - Letre	70	EDSA - Urbano Plata
71	F.B Harrison - Galvez	108	Ma. Clara - Araneta/C3

No.	Location	No.	Location
72	F. Cayco - Jhocson	109	Makati Ave. - Kalayaan
73	F. Legaspi St. Stella maris St. - C. Raymundo	110	Malac St. - Del Monte
74	Fairline - Fairview (Dahlia)	111	Manila East Rd. - Hway 2000/Rodriguez Ave.
75	Fairview - Winston	112	Marcos Alvarez - Moonwalk
76	Filinvest Homes II - Northview C208	113	Marcos Highway - Vermont Park Subd.
77	Finlandia - Bautista	114	Maria Clara - Sto. Domingo
78	Finlandia - Dian	115	Market Ave. - Carucho Ave.
79	Finlandia - Filmore	116	Mauban Street - Banawe
80	Gamboa - Salcedo	117	Mayon - Cuenco Street
81	Gen. Alejo Santos - ML Quezon Street	118	Mendiola - C. Aguila
82	Herrera - Legaspi	119	Meralco - Tektite Roads
83	J.P. Rizal - Antipolo/Reposo	120	Mercedes - Market Ave.
84	J.P. Rizal Pasong Tamo	121	Mindanao - Pluto/Road 20
85	J. Vargas - Emerald Drive	122	Mindanao - Sauyo (Talipapa)
86	J.A Santos Avenue - Quiricada**	123	Mindanao - Sta. Charbel Subs.
87	J.A Santos - Batangas	124	Mindanao Avenue - Road 3
88	Javier Bridge - Floodway East Bank	125	Mindanao Avenue - Sauyo Road
89	Javier Bridge - Floodway West Bank	126	N. Domingo - Haig
90	Jordan - Jordan Planes - Quirino Ave.	127	National Highway - Putatan Rd.
91	Juan Luna - Solis	128	National H'way - Bayanan
92	Kalayaan - Matalino St.	129	National H'way - Soldiers Hall
93	Lkalayaan - Zapote	130	New Panaderos - P. Gil - Calderon
94	Kalayaan Ave. - P. Burgos	131	North Avenue - SM Access Road
95	Kalayaan Ave. - South Ave.	132	Ortigas Avenue - Dr. Sixto Antonio
96	Kalinagan - S. Antonio	133	P. Florentino - V.G Cruz
97	Katipunan - Escaber - Mangyan	134	P. Tuazon - C. Benitez
98	Katipunan - Pansol	135	P. Tuazon T. Castro
99	K-H/Matiisin - Ermin Garcia St.	136	Paseo de Roxas - Villar
100	Lakandula - P. Tuazon	137	Paseo de Roxas - Jupiter
101	Laong Laan - M. dela Fuente	138	Pasig Blvd. - Dr. Sixto Antonio
102	Legarda - San Rafael	139	Pasong Tamo - Don Bosco
103	Libertad - 9 de Pebrero	140	Pasong Tamo - Kalayaan
104	M.H. del Pilar - Remedios St.	141	Pasong Tamo - Malugay
105	M.L. Quezon - Montillano	142	Paz - Pedro Gil
106	M. Conception/Elisco Rd. - M. Almeda	143	Paz Street - San Gregorio
107	M.L. Quezon - Pio Felipe Street	144	Pioneer - United St.
145	Pioneer St. - Reliance	179	SSH - East service Rd. - New Link 1
146	Pioneer St. Sheridan	180	St. Francis - Lourdes

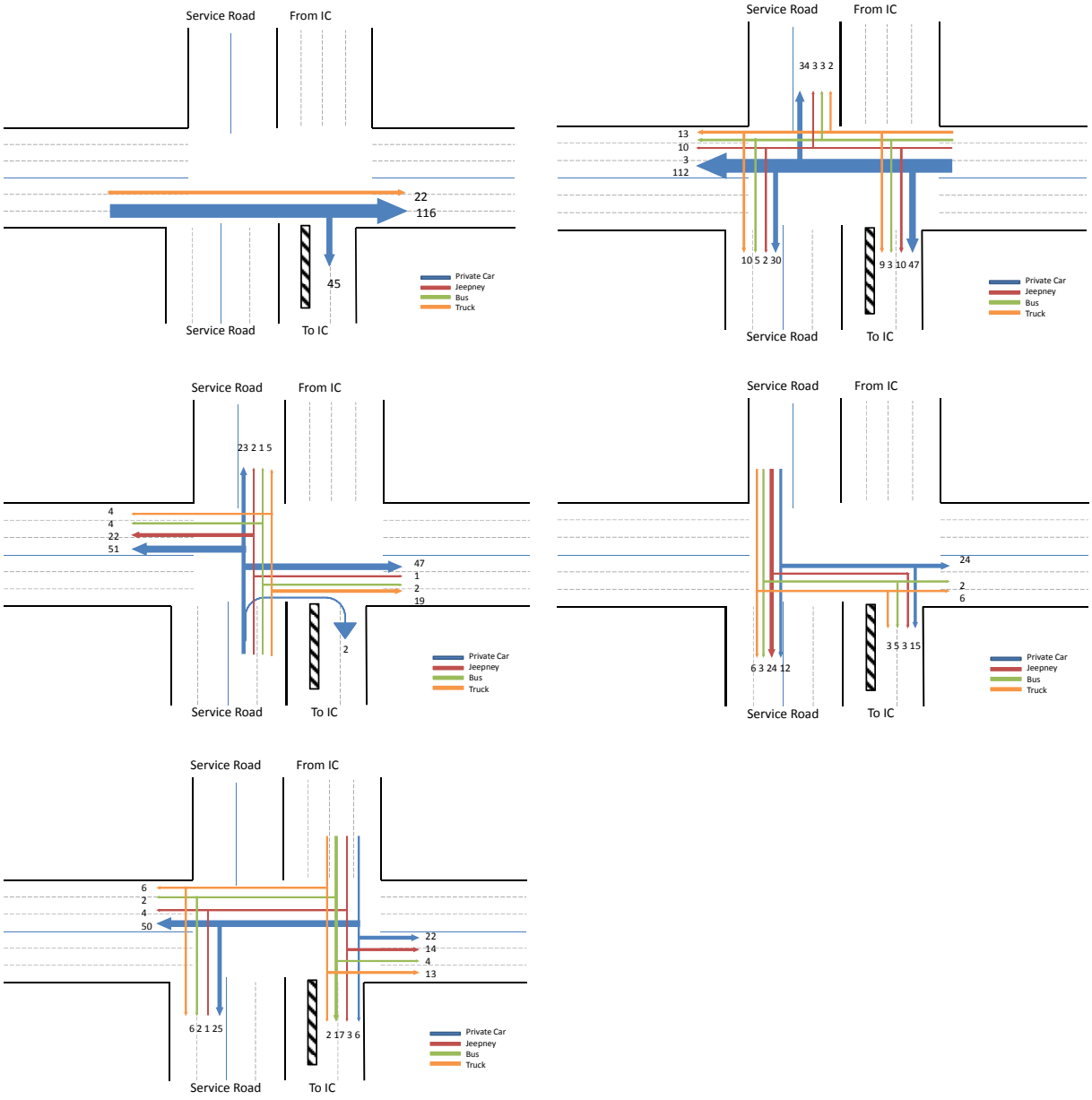
No.	Location	No.	Location
147	Piy Madrigal - V.G. Cruz	181	Sucat Road - Fourth Estate JCt.
148	Plaza Rizal - San Joaquin Junction	182	Sucat Road - Kabihasnan**
149	PNCC Junction - Upper Bicutan	183	Sumulong Highway - Angel Tuazon Ave.
150	Quirino Highway - Forest hills (Meralco)	184	Sumulong Highway - Katipunan Ext'n
151	Quirino Highway - Kingspoint	185	Tandang Sora - Banlat/Venus
152	Quirino Highway - Malaria	186	Tandang Sora - General Avenue
153	Quirino Highway - Maligaya	187	To Nichols Interchange/On/Off Ramp/New Link 2
154	Quirino Highway - Pangarap	188	Tuktukan Junction - General Luna St.
155	Quirino Highway - Sarmiento	189	V. Luna - Malakas St.
156	Quirino Highway - Gen. Luis	190	V. Mapa - Valenzuela
157	Regalado - Burbank	191	Visayas - Road I
158	Reina Regente - P. Ruiz	192	Visayas Avenue - Road 8
159	Rizal Avenue - E. Remegio	193	Wilson - Mabini - Barasoain
160	Rodriguez - Lanuza - St. Martin St.	194	Zamora - Protacio
161	Roosevelt Avenue - Batangas	195	Deporo Road and Camarin Road
162	Roosevelt - Baler	196	Quirino Highway and Commonwealth Avenue
163	San Marcelino - Escoda	197	Commonwealth Avenue and Fiarlane
164	Sct. Albano - Mother Ignacia	198	Commonwealth Avenue and Camaro Street
165	Sgt. Esguerra - Sct. Albano	199	N Doming and P Tuazon Blvd
166	Shaw Blvd. - Laurel St.	200	N Doming and Balete Dr.
167	Shaw Blvd. - Danilo Floro St./San Roque	201	Dr. A Santos Avenue and Filipinas Avenue
168	Shaw Blvd. - Samat	202	Dona Soledad Avenue and Russia
169	Shaw Blvd. - Wack wack Rd.	203	Alabang-Zapote Road and CV Starr Avenue
170	Shaw Blvd. - West capitol St.	204	Alabang-Zapote Road and Concha Cruz Dr.
171	Shaw Blvd. - Infront of Goldilocks/Ideal St.	205	C. A. A. and Tropical Avenue
172	Shaw Blvd. - L. Mencias	206	Mabini Street and Remedios
173	Shaw Blvd. - Pasig Blvd. - Hillcrest	207	M Adriatico and Pedro Gill
174	Shaw Blvd. Pilar St.	208	M Adriatico and Gen Malvar
175	Shaw Blvd. - Torres/Rodriguez- Calderon	209	Remedios and Luis Maria Guerero Street
176	SSH/East service Rd. Manalo Ave.	210	Julio Nalpil and Luis Maria Guerero Street
177	SSH/East Service Rd. New Link 2	211	A Mabini and Gen M Malvar
178	SSH - C-5		

Annex 16.1 BICUTAN AND SUCAT TRAFFIC SURVEY

The traffic volume according to the direction of each intersection is shown below.

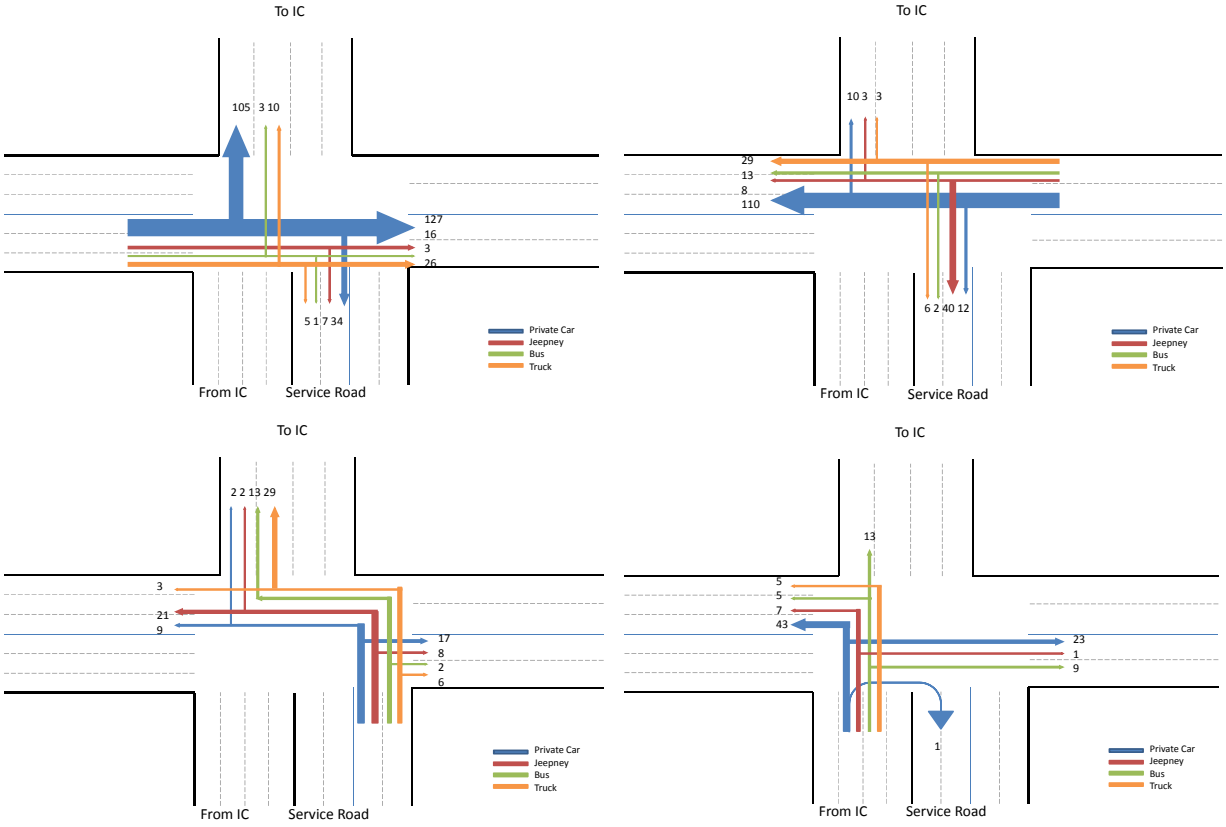
(1) Point A

There is the most traffic volume of the private car of East-West directions. For the feature according to the direction, traffic to go forward from the west to the east is only the private car and a truck.



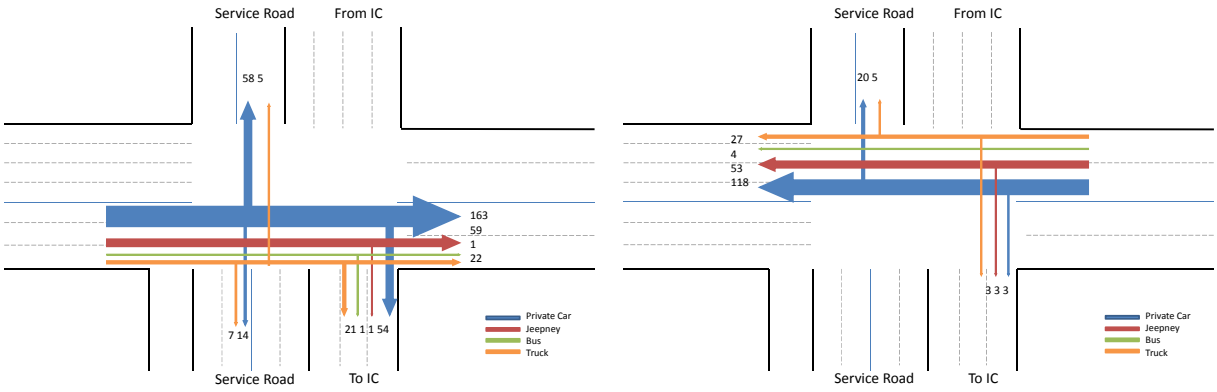
(2) Point B

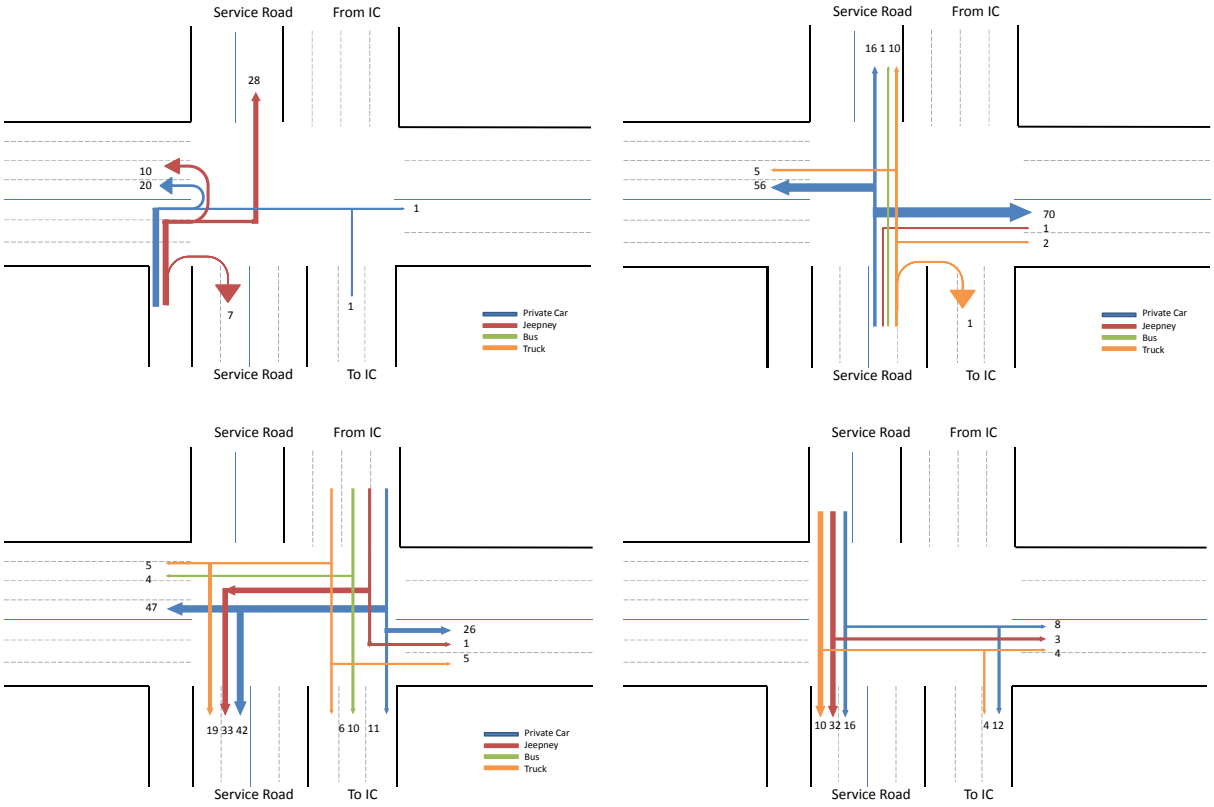
All types of vehicles go forward to all directions as a whole. There are many going straight vehicles of East-West directions same as Point A, and there is much traffic that the vehicle from the west enters the entrance of the IC.



(3) Point C

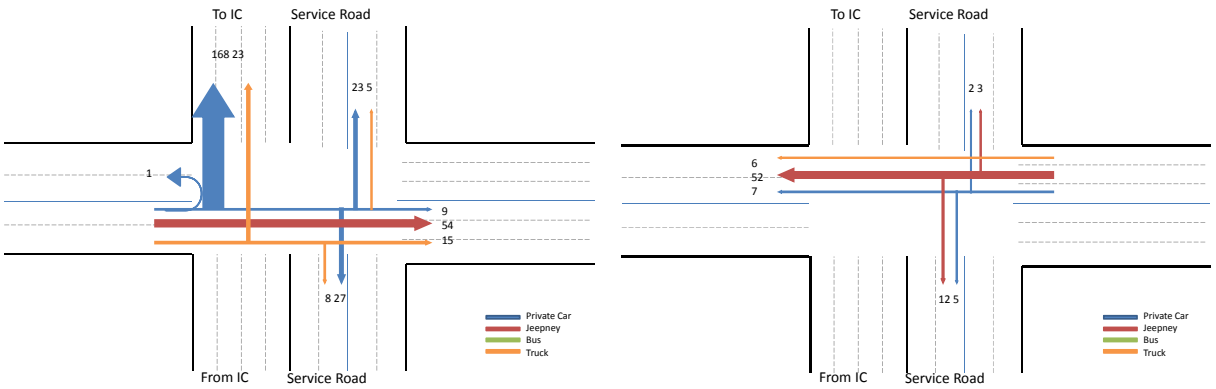
Traffic from the west to the east occupies most, and the most are composed with the private car. And for the feature according to direction, have the place where only private car and Jeepny flow in by the direction distinction and the direction is limited to.

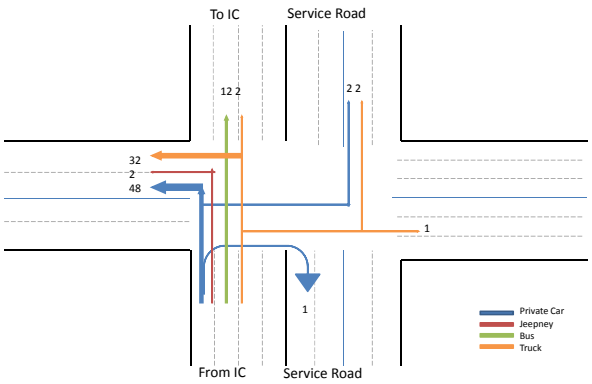


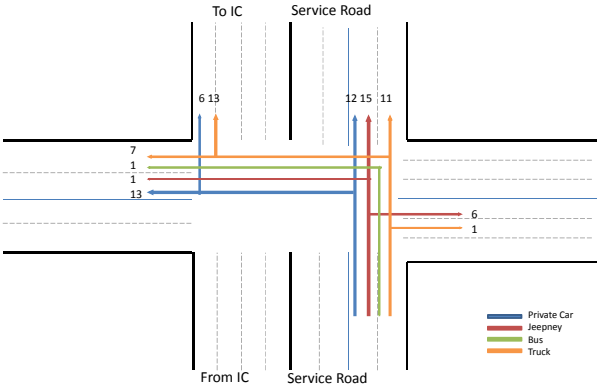


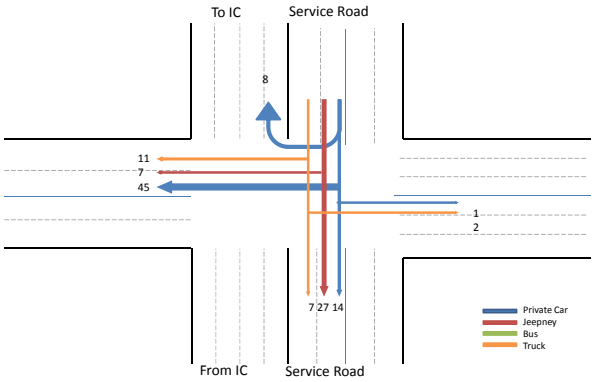
(4) Point D

In this intersection, most the traffic volume of the east direction from the west, most of the private cars enter the entrance of the IC at the west in that.




To IC
Service Road
12 2
2 2
32
2
48
1
1
From IC
Service Road
Private Car
Jeepney
Bus
Truck


To IC
Service Road
6 13
12 15 11
7
1
1
13
6
1
From IC
Service Road
Private Car
Jeepney
Bus
Truck


To IC
Service Road
8
11
7
45
1
2
7 27 14
From IC
Service Road
Private Car
Jeepney
Bus
Truck

Annex 20.1 ETCS IN VARIOUS COUNTRIES

1) Japan

Japan has developed the ETC system adopting DSRC active system at the frequency band of 5.8GHz and two-piece type OBU (the main body + contact type IC card) as nationally uniformed standard. Vehicles equipped with ETC-OBU can use ETC in common at any tollgates with the ETC system. In addition to automobiles, two-wheel vehicles can use ETC.

The communication speed is 1,024Kbps for both uplink and downlink.

The speed of OBU (vehicle) at which communication can be made is 80km/h in tollgates. In addition, IC card is a contact IC-card and readable and writable.

FIGURE 20.1-1 TOLLGATE ETC

Japanese ETC supports both distance based toll system/flat rate toll system. The payment method is a deferred payment method by credit cards.

The ETC usage rate has reached about 90% in the Tokyo Metropolitan Expressway in and around Tokyo.

Then, the system supports multi-lane free flow (MLFF) ETC. The speed of OBU (vehicle) at which communication can be made is 180km/h. MLFF ETC has been introduced mainly at exits of urban expressways since it is difficult to construct a toll plaza at exits due to space. This system is experiencing stable operation not only at tollgates but also at multiple lanes as MLFF ETC.

FIGURE 20.1-2 FREE FLOW ETC (ONE LANE AT EXIT)

FIGURE 20.1-3 FREE FLOW ETC (THREE MAIN LANES)

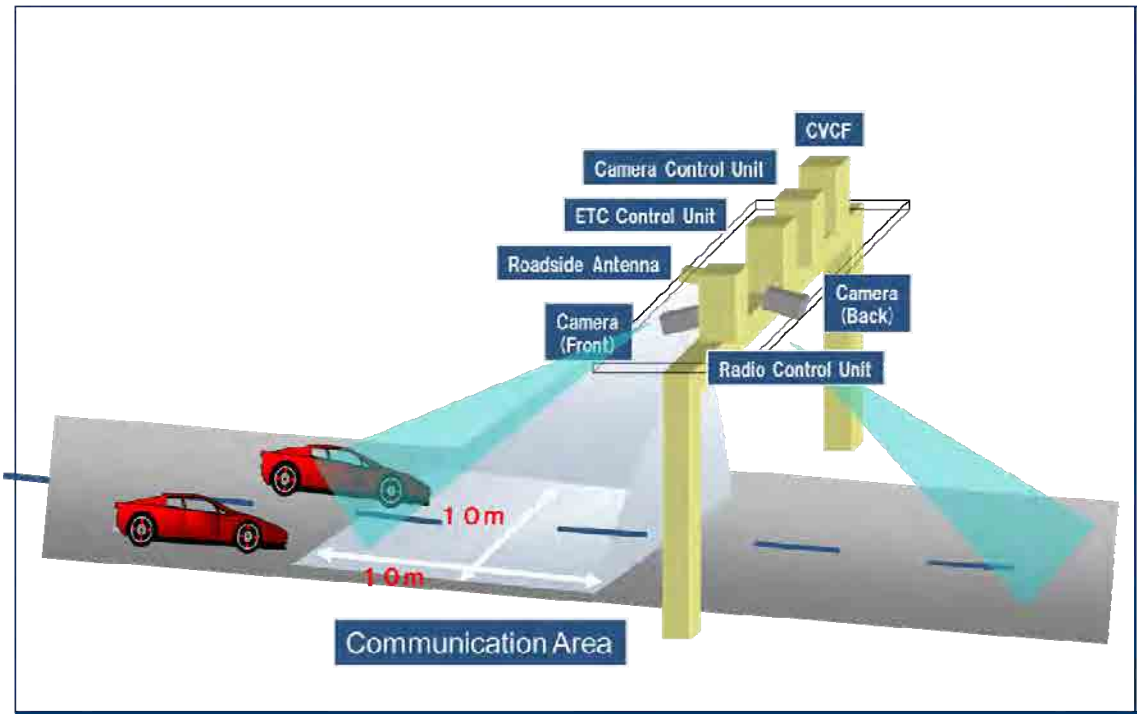


FIGURE 20.1-4 OUTLINE OF MLFF

2) Northeasthern USA

Twenty-four toll highways in 14 states of northeastern United States including New York State have adopted the ETC system with DSRC active method called E-ZPass. The frequency band is 915MHz. OBUs are manufactured by Kapsch (initially, a company called MRAK IV manufactured OBUs and Kapsch purchased the company) and have a sealed type battery. Users (purchasers) cannot replace this battery.

The road-to-vehicle communication speed is 500kbps for both uplink and downlink. The speed of OBUs (vehicles) at which communication can be made is 160km/h. The system supports MLFF. In addition, this OBU is readable and writable and supports both distance based toll system/flat rate toll system.

Prepayment system has been adopted. When account balance is low, users can automatically replenished by charging a credit card. Users can replenish their account with cash as well.

Twenty-two million E-Zpass OBU are used in the area. When using E-Zpass, the user can obtain discount of toll fees.

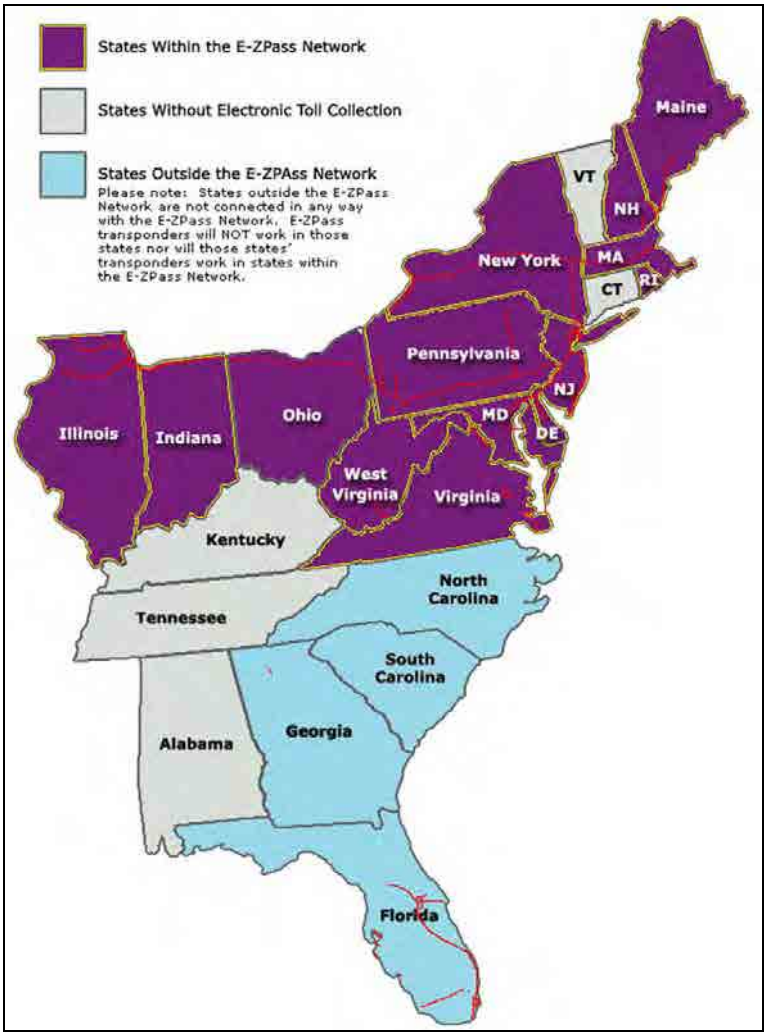


FIGURE 20.1-5　THE AREAS WHERE E-ZPASS HAS BEEN INTRODUCED

（Source：http://www.e-zpassiag.com/about-e-zpass）

3)　California, USA

California has adopted the ETC system with DSRC passive method called FASTRAK. The frequency band is 915MHz. OBUs are manufactured by Sirit.

Reliability of radio communication is higher than 99.6% at the speed of 160km/h. In addition, OBUs are readable only.

(Source　:　http://www.sirit.com/AVI_Products.asp, http://www.sirit.com/ETC_FAQ.asp)

FIGURE 20.1-6 FASTRAK OBU

4) Florida and others, USA

The ETC system in Florida is called SUNPASS and EPASS which have adopted RFID method. The “eGo Plus” OBU is manufactured by TransCore (ISO18000-6B compliant). The frequency band is 915MHz. The similar system has been adopted in turnpikes in Kansas, Pikepass in Oklahoma, and in Texas.

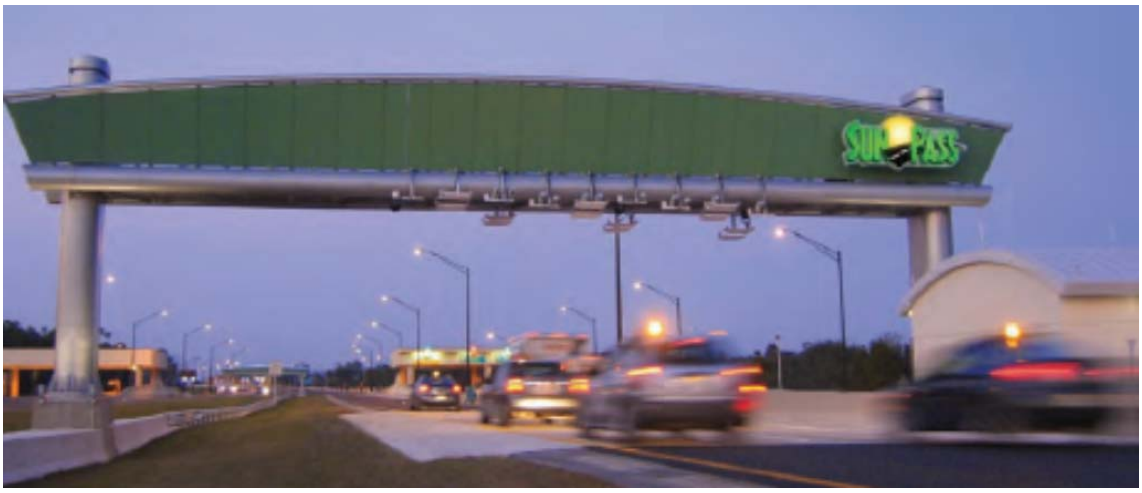


FIGURE 20.1-7 SUNPASS

5) Illinois, USA

The ETC system with RFID method (ISO18000-6C compliant) has been introduced at Wabash Bridge in Illinois. This system has no tollgates and is operated as a free flow ETC (FFETC) system.

FIGURE 20.1-8 FFETC IN WABASH BRIDGE

（Source：http://www.tollroadsnews.com/node/5059）

6) Summary of Representative ETC

Table 20.6-1 (found in Chapter 20 of the Main Report) are characteristics of each ETC. Each ETC description is based on specifications and actual results of Japanese DSRC active, European DSRC passive, American and Indian RFID and CAVITEX's Smart card, respectively.

Annex 20.2 INTERNATIONAL STANDARDS OF ETC AND FUTURE TREND OF ETC

1. International Standards

(1) DSRC Active

Standards developed within Japan (ARIB (Association of Radio Industries and Business) STD-T75) are adopted for the layers described below together with standards developed in Europe (CEN (European Committee for Standardization) TC278) as international standards.

- The first layer (Physical layer: rules for physical connection)

  ITU-R M.1453-2 Recommendation Approval of revision (2002)

  *ITU… International Telecommunications Union Radio Communications Sector

- The seventh layer (Application layer: rules for data exchange among applications)

  ISO15628 Approval (2004)

  *ISO… International Organization for Standardization

  5.88GHz of frequency band and 1,024Kbps of communication speed has been established in ITU-R, but 915MHz of frequency band utilized in U.S.A. has not been established in ITU-R.

(2) DSRC Passive

The first layer and seventh layer have been established as international standard. 5.8GHz of frequency band and communication speed (uplink 250Kbps, downlink 500Kbps) has been established in ITU-R, but 915MHz of frequency band utilized in U.S.A. has not been established in ITU-R.

(3) RFID

RFID adopts ISO18000-6B or ISO18000-6C standards established by ISO.

(4) Summary of International Standard

Fairness of markets and the principle of competition would be secured even though whichever ETC is adopted, because all of (1), (2), (3) ETC systems have international standards.

2. OBU

The structure of an OBU communicating with RSA is classified into the following two types:

(1) Two-piece Type OBU

It consists of the part for radio communication and record of vehicle data (the main body) and an IC card. One OBU is registered for one vehicle. Any vehicles equipped with ETC OBU can use ETC by one IC card. Toll fees are charged for IC card numbers (owners of IC cards) not for OBU numbers.

An IC card is inserted into the main body of an OBU when using ETC. ETC in Japan adopts this type. IC card utilized in ETC is available to buy something in shop, etc.

(2) One-piece Type OBU

It does not include an IC card and consists of only one-piece which is the part for radio communication and record of vehicle data (the main body). Any vehicles in the same class can use ETC with the same OBU. Toll fees are charged for OBU numbers (each account linked to OBU number). This type is mainly adopted in DSRC Passive and RFID method.

LEFT: TWO-PIECE TYPE (MAIN BODY + IC CARD)
RIGHT: ONE-PIECE TYPE (MAIN BODY)

(3) Summary of OBU

Technically, combination with any radio communication is possible. However, if DSRC Passive or RFID would be chosen, one-piece type is desirable. If DSRC Active would be chosen, one-piece or two-piece type is desirable considering the market penetration rates of these appliances.

Whether there is a plan to use the two-piece type IC cards for multipurpose uses (payment for shopping, public traffic fares such as railroads) is one of the important items when considering standardization of ETC.

3. Future Trend of ETC Related Technology

(1) Japan

1) Domestic

In Japan the common specifications for the ETC system has been established and relevant parties (O&M companies, ETC system manufacturers, OBU manufacturers and IC card issuers) manufacture, sell and introduce ETC equipment based on the common specifications.

As seen above, interoperability of the system and its operation is ensured throughout Japan. Therefore, users can use all ETC lanes in Japan with one IC card and one OBU.

From the perspective of adoption rate, the current system is prevailing across the country. As for system operation, since the reliability of the system is high because of high-speed and high-capacity road-to-vehicle communication, the system has no problems that require specification change.

Consequently, there is no move to change specifications of the existing ETC system.

2) Overseas ETC (Global ETC)

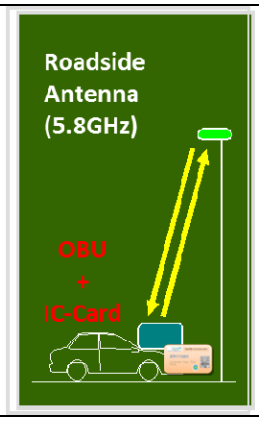
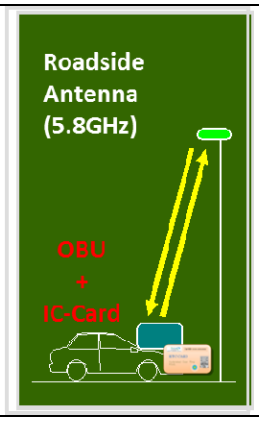
As described before, Japan has adopted the DSRC active method for its ETC system based on consideration to pursue establishment of an ETC system with high reliability and high security which is available on any expressways throughout Japan. As a result, the ETC system has stable operability and has become widely used at present.

On the other hand, however, expensive OBUs with high function and high performance are not easily accepted in foreign countries. As a result, in many cases the DSRC active method has not been adopted overseas.

Therefore, Japan has developed Global-ETC striving for price reduction of OBUs. The summary of comparison between Japanese ETC and Global ETC are shown below.

ETC IN JAPAN AND GLOBAL ETC

Sample	Japanese ETC	Global ETC
Place	Japan	Not introduced yet
Road-to-vehicle radio communication	DSRC active	DSRC active
International standard	ITU-R M.1453 ISO15628	ITU-R M.1453 ISO15628
Frequency band	5.8GHz	5.8GHz
Type of OBU	2pieces OBU + contact IC-Card	2pieces OBU + non-contact IC-Card

Image of the system		
Communication speed	Down link 1,024Kbps Up link 1,024Kbps	Down link 1,024Kbps Up link 1,024Kbps
Communication reliability	99.9999 % (specification in Japan)	99.9999 % (specification in Japan)
OBU Price (peso)	2,000 ~	2,000
Toll fee system	Distance based flat rate	Distance based flat rate
Payment method	deferred payment (credit card)	Prepaid/ deferred payment
Balance information recorded at	-	IC card

As shown in the Table, basic performance of Global ETC is not different from that of Japanese ETC. However, achieving the points below has led to the success of price reduction of OBUs.

- Determining the intensity of security to be the same level as that of other ETCs or higher.
- Adopting non-contact IC cards that have high reliability and durability, and are used for electronic money which is widely used in transportation such as railways and convenience stores.

In addition, since the Global ETC has the similar system as the electronic money system, balance information can be recorded in an IC card. Therefore, the system can support prepaid method which is widely adopted overseas. Furthermore, the system has an advantage that balance information can be updated promptly when paying toll fees and replenishing account balance.

(2) Europe

In Europe DSRC5.8GHz passive method (hereinafter CEN method) was established as European Prestandard (ENV) around 1997 and 1998 and as European Norm (EN) around 2003 and 2004. Since EN participants are obliged to adopt EN as their standard, the CEN method ETC has been widely introduced.

However, at this time, interoperability of the ETC system is not completely ensured in terms of

technology and operation. One OBU does not always support ETC at any tollgate in any country.

To deal with this situation, European Union announced on October 6, 2009 that it would start automatic fee collection system (ETC) across Europe within three years (COMMISSION DECISION of 6 October 2009 on the definition of the European Electronic Toll Service and its technical elements).

The new system adopts both DSRC and GNSS (Global Navigation satellite system). OBUs are determined to be a hybrid type which supports both systems. O&M companies will introduce a system that supports at least one of the two. If this plan is materialized, people can use ETC at any tollgate in any country with one OBU.

However, three years later, on September 7, 2012, by which the service was supposed to be initiated, Europe Commission (EC) announced significant delay of the plan. The future plan has not been clarified.

Although the plan has been delayed, there is a move to change specifications of the existing ETC. It is unclear that until when the currently-operated ETC of the DSRC passive method is continued to be used and whether a new system is introduced or not. Significant change may occur in the current supply market of OBUs depending on decision of EC.

However, basic stance to adopt DSRC remains unchanged as is shown in the plan. It is very unlikely that the radio communication method is changed from DSRC to RFID or other method.

(3) USA

As described before, some kinds of ETC systems have been introduced in U.S.A.

1) E-ZPass

On July 21, 2011, E-ZPass Interagency Group (Association of 24 toll agencies in 14 states) announced its selection of Kapsch as a technical service provider for the next 10 years. (http://www.tollroadsnews.com/node/5394). Therefore, the existing system seems to be used at least for 10 years.

2) RFID

The “eGo Plus” is mainly used for the ETC system with RFID based on ISO18000-6B. Its OBU is readable and writable. It also has interoperability. However, there are only two OBU manufacturers which comply with this standard; TransCore and 3M. There is a problem that since the two companies sometimes change specifications, they have a virtual monopoly over the market.

Therefore, 6C Toll Operators Committee (6CTOC) is now promoting adoption of EPC Gen2 RFID Tag based on ISO18000-6C as the national standard for fee collection. 6CTOC was established by State Road and Tollway Authority (SRTA) in Georgia, E-470Public Highway Authority in Denver, Department of Transportation (UDOT) in Utah and Department of Transportation (WashDOT) in Washington in 2011.

Although ETC based on ISO18000-6C has already been operated in some expressway as mentioned above, the system only reads data of OBUs but does not have function of writing in reality. In other words, there is no actual case where entry information is written in an OBU at the entry of expressway and the entry information written in the OBU is read at the exit for charging. Field experiments should be conducted sufficiently to support distance-based toll system.

Since ISO18000-6B and 6C belong to the same category by their nature, system compatibility is very high, and multiple reader antennas that support both systems can be manufactured. Therefore, both systems can operationally coexist and there is no significant barrier for transition from 6B to 6C.

3) Other Radio Wave Frequency Bands

As described above, a lot of ETC systems in the U.S.A. use radio waves at the frequency band of 915MHz. On the other hand, radio waves at the frequency band of 5.9GHz is allocated for ITS. There is no experience of use at present.

4) Summary

Consequently, although there is a move toward unifying ETC standard at the national level in the U.S.A., ETC standard has been unified and is under operation at the state level. It is unclear that what method U.S.A. will adopt at the national level. It is unclear whether the standard is unified or not in the first place. The possibility of significant change in the current OBU supply market depends on the unification policy including radio wave frequency bands to be used.

(4) India

The Ministry of Road Transport and Highway of India established national-level specifications of ETC system (Specifications Document For RFID Transceiver and Tag For Nationwide ETC System) in June 2011. The ETC system has adopted RFID passive method based on ISO18000-6C. The main reason for adoption of RFID is low cost of Tag.

The maximum capacity is 512Kbps, reliability of communication is higher than 99.5% and the speed of communicable OBU (automobile) is 40km/h.

In addition, distribution of IC cards is recommended as alternative payment method when radio communication trouble occurs.

In the future, the ETC system based on this specification will be introduced nationwide. In order to support distance based toll system, however, there are still problems to be solved such

as verification of writable function in OBU in field tests.

(5) Summary of Future Trend of ETC Related Technology

Summary of future trend of ETC related technology is shown in the table below.

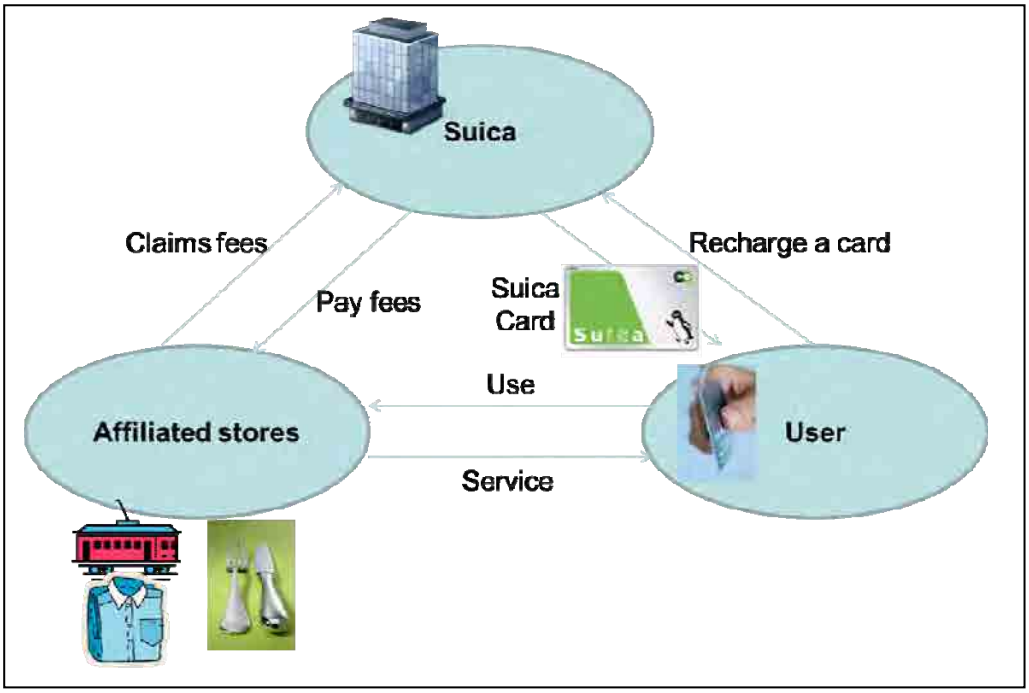
Summary of Trend of ETC Related Technology

Method	Future trend
DSRC Active	For a while, thanks to high reliability, there would not be a possibility to implement minor change.
DSRC Passive	There might be a possibility to change specifications like as introduction of hybrid type in the future.
RFID	Thanks to cheap price of OBU, there would be a possibility that RFID spreads. However, it is necessary to verify writable function in OBU when it is introduced in distance based toll road.

Annex 20.3 EXAMPLES OF CLEARING CENTER HOUSE

1) Suica

Suica is the electronic money system using non-contact IC cards which JR East, a Japanese railway corporation, has introduced. Suica was originally used as commuter passes or tickets. But, now, it can also be used for shopping or paying for meals.



CONCEPTUAL DIAGRAM FOR SUICA

The area with the words Suica is equivalent to the Clearing Center.

Usage flow is as follows:

- A person who wants to use Suica applies to Suica. Suica issues a Suica card.
- The user charges money on the Suica card.
- The user pays charges/fees for shopping or meals at Suica affiliated stores by Suica.
- Suica affiliated stores claim charges/fees to Suica.
- Suica pays charges/fees to affiliated stores.

2) ETC in Japan

For ETC in Japan, “the O&M company common system”, as shown in the figure below, is equivalent to CCH. The O&M company common system centrally manages all usage results of users per expressway and claims toll fees to each credit card company.

Usage flow is as follows:

a) A user buys an OBU at an auto dealer or an auto-supply shop and makes a contract with a credit card company to obtain an IC card for ETC.
b) When using expressway (1), a user inserts the IC card in OBU and passes a tollgate without stopping.
c) O&M companies collect date on use of the respective expressway managed by them (2) and send the date to the O&M company common system (3).
d) The O&M company common system sorts data of all O&M companies, sends the date to each credit card company (4) and charges fees to each credit card company (5).
e) Each credit card company makes payment to each O&M company based on the data sent from them (6) and charges fees to the users later (7).
f) The user makes deposit in the debit account for the credit cards (8). Each credit card company withdraws usage fees from the corresponding account (9).