INTELLIGENT TRANSPORT SYSTEM (ITS) AT PROJEK LEBUHRAYA UTARA SELATAN (PLUS)

PILOT IMPLEMENTATION

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PLUS EXPRESSWAYS BERHAD

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PLUS form the longest expressway system in Malaysia

The 846km PLUS Expressways comprise :

- **773km North South Expressway ("NSE")**
- **35km New Klang Valley Expressway ("NKVE")**
- **16km Federal Highway Route 2: Subang to Klang**
- **22km Seremban – Port Dickson Highway ("SPDH")**

PLUS Concession

- On 18 March 1988, the Government signed the Concession Agreement with UEM
- On 20 July 1988, a Novation Agreement was signed between UEM and PLUS
- Granted the rights to finance, design, construct, operate and maintain the expressways
- Construction started 30 Nov 1988, completed 7 February 1994
- Concession extended to 2038

Brief Profile

FACILITIES	NO
Interchanges	80
Toll Plazas	71
Toll Lanes	647
Bridges & Overpasses	371
Rest & Service Area (RSA)	18
Lay By	44
Overhead Bridge Restaurant (OBR)	2
Vista Point	3

ISSUES

Implementation of projects is based on

1. Financial
2. Operational requirement
3. Current technology

1) CCTV Surveillance

- 2002 - 2005, PLUS initiated staggered implementation of digital CCTV system replacing the analog system at all toll plazas and selected interchanges

- PLUS has expanded the surveillance technology to the mainline with the installation of additional 20 nos PTZ camera.

1) CCTV Surveillance

	Location of camera	Quantity (nos)
1	Mainline (PTZ)	24
2	Interchanges & Bridges	36
3	Toll Plaza :	
	* lanes	646
	* canopy	138
	* inside toll booth	105
	* control room	42
	* CSA room	36
	* TOD room	42
	* Plaza surrounding (PTZ)	14
4	Tunnel	11

2) Network System Upgrade

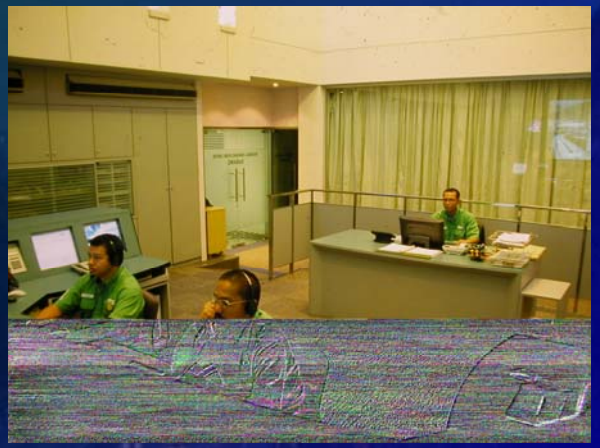
- Initial Stage - PLUS has established PDH network infrastructure for data and voice communication system between Toll Plazas, Section Offices, Region Offices and PLUS HQ.

2) Network System Upgrade

- In 2002, Gigabit Ethernet Network System has been implemented in addition to the PDH system to support requirements on higher bandwidth and transmission speed of ITS system.

3) Control Centers Upgrade

- The operation of traffic monitoring and surveillance is controlled and coordinated by PLUS Regional Control Centers (RCC) and Traffic Monitoring Center (TMC).



3) Control Centers Upgrade

- PLUS upgraded the Control Centers in 2001 to fulfill the demand of ITS system.
- Video wall system has been installed to improve the monitoring of CCTV surveillance system

4) Variable Message Signage (VMS)

- **Pilot implementation – 2002**:

  2 units gantry structured full matrix VMS were placed at Bangi (KM297.7 SB) and Tanjung Malim (KM396.4 SB)

4) Variable Message Signage (VMS)

- In 2003, PLUS had further expanded its VMS implementation – additional of six(6) VMS (TOTAL 8) installed at selected locations throughout NSE (between Subang & Sg. Buloh) controlled and monitored from Central Regional Control Center (RCC) located at Seafield

- Types of information provided: traffic info, incident notification, informative messages as well as weather condition

4) Variable Message Signage (VMS)

- Portable type of VMS (PVMS) is used for operational contingencies purposes such as during emergency situation and under-progress work notification

5) Automatic Vehicle Detection System (AVDS)

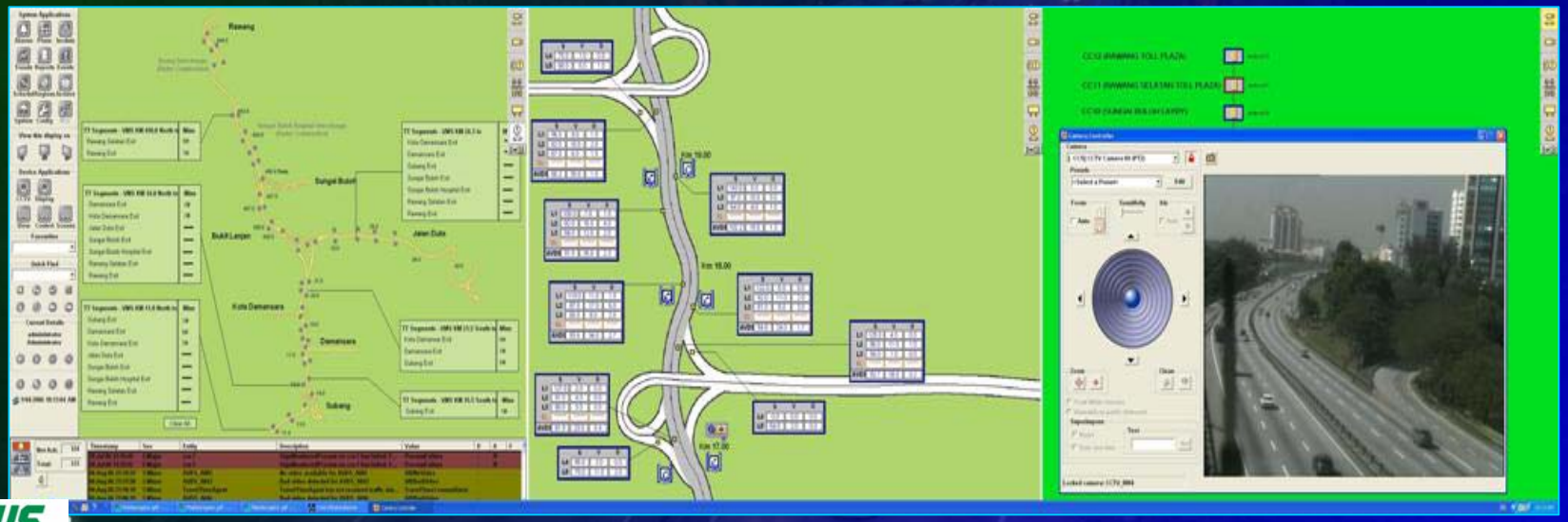
- **Initial Implementation:** involves 55 locations of AVDS Sensors linked to RCC through the Gigabit Ethernet Networks system
- Traffic detection using Video Image Processing

5) Automatic Vehicle Detection System (AVDS)

- Video Image Processing – traffic detection using virtual loops
- Collect traffic count, speed, volume & occupancy for traffic analysis
- Detect incident and stopping vehicle at Emergency Lane

6) CENTRAL COMPUTER SYSTEM

An ITS software system that integrates ITS components i.e. AVDS, CCTV and VMS to provide centralised management, surveillance and monitoring of PLUS Highway.



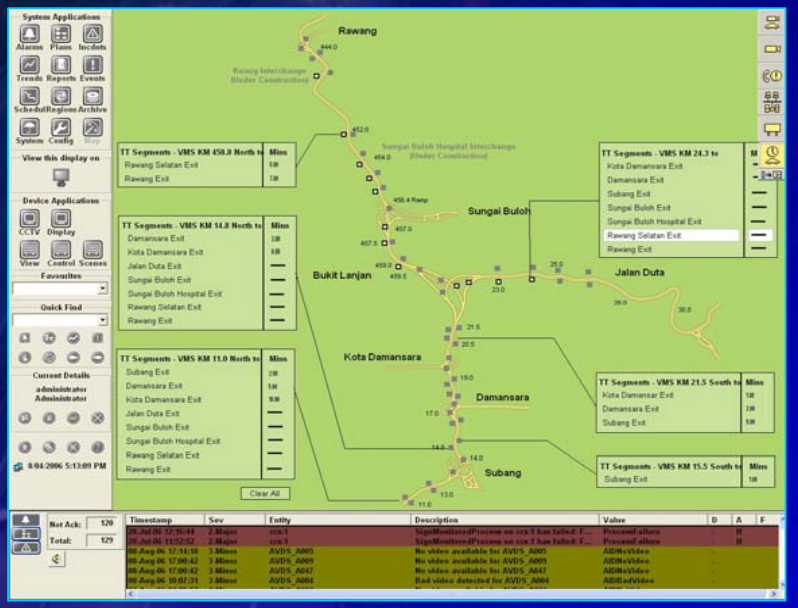
6) CENTRAL COMPUTER SYSTEM

- **Traffic Data Collection** from AVDS sensors
- **Travel Times** for predefined routes on real-time basis
- **CCTV Control** for selection and control of CCTV camera
- **VMS Display** for selection and control VMS messages
- **Alarms & Events** for automatic notification of pre-defined alarms and events
- **Incident** for management of manual or/ and automatic incidents
- **Action Plan** – Management and execution of action plans

6) CENTRAL COMPUTER SYSTEM

AVDS Data – Speed, Volume & Occupancy for each lane and average

Display of Travel Times - Travel Time information will be shown on VMS panels



7) Electronic Toll Collection (ETC) System

- PLUS ETC System: Touch ‘n Go and SmartTAG systems which features infra-red technology

7) Electronic Toll Collection (ETC) System

- **Pilot Implementation – 1998:** As part of PLUS effort to increase user convenience, facilitate speedier transactions, increase throughput at Toll Plazas and in optimizing man-power cost

PLUSTAG 1994 - 1998

Touch 'n GO 1998 - present

SmartTAG 1999 - present

7) Electronic Toll Collection (ETC) System

- By mid-year 2006, Touch ‘n GO system is available at **69** Toll Plazas while SmartTAG system could be found at **45** Toll Plazas throughout PLUS expressways

8) GPS Implementation On PLUSRonda Vehicle

- **Pilot implementation – 2002**: 32 nos of PLUSRonda vehicles have been installed with GPS Tracking System

- Automatic Vehicle Location (AVL)

  - combination of GPS, communication and geo- spatial system technology

  - features computer-based vehicle tracking system that function by measuring the real-time position of each vehicle and relaying back to a central location

8) GPS Implementation On PLUSRonda Vehicle

- By year 2005, all **91** PLUSRonda vehicles have been installed with the system as the services have been extended to ELITE (North-South Expressway Central Link), LINKEDUA (Malaysia-Singapore Second Crossing) and Penang Bridge

PLUS ITS SUBSYSTEM

- ✓ CCTV Surveillance
- ✓ Network Infrastructure Upgrade
- ✓ Control Centers Upgrade
- ✓ Variable Message Signage (VMS)
- ✓ Automatic Vehicle Detection System (AVDS)
- ✓ Central Computer System
- ✓ Electronic Toll Collection (ETC) System
- ✓ GPS Implementation

CLOSED CIRCUIT TELEVISION (CCTV)

PTZ control, video feed

VARIABLE MESSAGE SIGN (VMS)

Message, state of condition

PLUS

CENTRAL COMPUTER SYSTEM

VIDEO DISPLAY

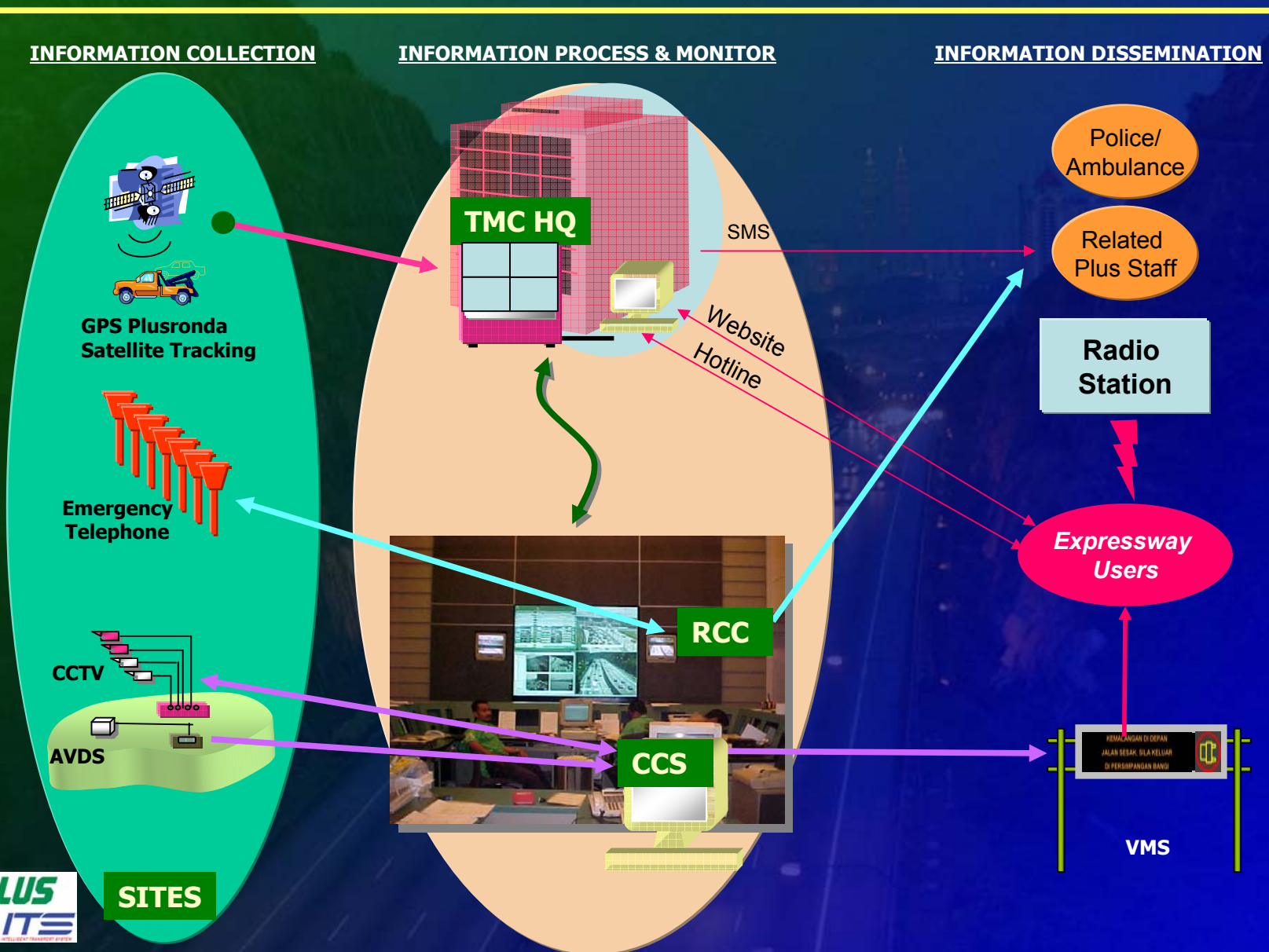
Display control, state of condition

Incident, speed, volume, occupancy

AUTOMATIC VEHICLE DETECTION SYSTEM (AVDS)

PLUS ITS

PLUS ITS INFRASTRUCTURE



ISSUES

Implementation of projects is based on

1. Financial
2. Operational requirement
3. Current technology
4. New HQ

WAY FORWARD

PLUS' biggest challenge in the ITS implementation plan:

the sustainability and reliability of the ITS network operation, coordination and interoperability of overall ITS systems

Thank You

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