KAJIAN PELAN INDUK SISTEM PENGANGKUTAN PINTAR

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TABLE OF CONTENTS

Physical Architecture Framework Volume III - Terminators

1 TERMINATORS

1.1 Introduction

Terminators define the boundary of the Malaysian ITS System Architecture. The Terminators represent the humans, systems, and general environment that interface to ITS. The interfaces between terminators and the subsystems and processes within the Malaysian ITS System Architecture are defined, but no functional requirements are allocated to terminators.

1.2 Terminator Classifications

There are seventy-one terminators in the Malaysian ITS System Architecture, which are grouped into four general terminator classes as described below:

- **Environment** - refers to the physical world of pavement, air and obstacles which are sensed by ITS subsystems.
- **Human** - the personnel at ITS Centre and Roadside Subsystems as well as Drivers and Travellers who interact with ITS subsystems.
- **Other Systems** – refers to other institutions that are outside of the ITS which interact with ITS subsystems.
- **Systems** – includes the non-ITS Centers, Roadside systems, and Vehicle systems that ITS interacts with.

Table 1 provides a summary of the Terminator classifications.

ENVIRONMENT	
1. Environment	5. Secure Area Environment
2. Potential Obstacles	6. Traffic
3. Roadway	7. Vehicle Characteristics
4. Roadway Environment	

Table 1 - Terminator Classification

HUMAN	
1. Archived Data Administrator	12. Maintenance Vehicle Driver
2. Commercial Vehicle Driver	13. Parking Operator
3. Commercial Vehicle Manager	14. Pedestrians
4. Commuter	15. Public Transport Vehicle Driver
5. CVO Inspector	16. Public Transport Fleet Manager
6. Driver	17. Public Transport Maintenance Personnel
7. Emergency Response Personnel	18. Public Transport System Operators
8. Emergency System Operator	19. Toll Administrator
9. Information Service Provider Operator	20. Toll Operator
10. Intermodal Terminal Operator	21. Traffic Operations Personnel
11. Maintenance Management Operator	22. Traveller
OTHER SYSTEMS	
1. Other Archives	6. Other Parking
2. Other Commercial Vehicle Administration Subsystem	7. Other Public Transport Management
3. Other Emergency Management	8. Other Roadside
4. Other Information Service Provider	9. Other Traffic Management
5. Other Intermodal Fleet Management System	10. Other Vehicle

Table 1 - Terminator Classification (cont.)

SYSTEMS	
1. Archived Data User Systems	17. Maintenance Vehicle
2. Basic Vehicle	18. Malaysian Meteorological Services
3. Commercial Vehicle	19. Mapping Service Provider
4. CVO Information Requestor	20. Media
5. Disaster Command Agency	21. Medical Facility
6. Emergency Telecommunications System	22. Meteorological Service Provider
7. Enforcement Agency	23. Multimodal Crossings
8. Event Organisers	24. Multimodal Transportation Service Provider
9. Financial Institution	25. Other Data Sources
10. Freight Consolidation Station	26. Payment Instrument
11. Government Administrators	27. Public Transport Vehicle
12. Government Reporting Systems	28. Rail Operations
13. Intermodal Chassis	29. Railside Equipment
14. Intermodal Customer	30. Road Transport Department
15. Location Data Source	31. Royal Customs Malaysia
16. Logistics Solutions Provider	32. Yellow Pages Service Providers

Table 1 - Terminator Classification (cont.)

2 TERMINATOR DESCRIPTIONS

2.1 Environment

2.1.1 Environment

This terminator is the operational setting in which the ITS interfaces and operates. This setting consists of weather effects such as strong winds, rain, haze, pollution, dust, temperature, humidity, solar radiation, and man-made electromagnetic effects. The setting also includes environmental hazards such as flooding, poor visibility, landslides and mudslides. Environmental conditions must be monitored by the ITS Architecture so that Travellers may be informed and control strategies can reflect adverse environmental conditions in a timely fashion.

Related Communications and Associated Architecture Flows are as follows:

Environment ==> Environment Management Subsystem
environmental levels

Environment ==> Roadway Subsystem
environmental hazards
environmental levels

2.1.2 Potential Obstacles

Any object that possesses the potential of being sensed and struck and thus also possesses physical attributes. Potential Obstacles include roadside obstructions, other vehicles, pedestrians, fallen trees, fallen utility lines, infrastructure elements or any other element which is in a potential path of the vehicle. This external represents the physical obstacles which possess properties which enable detection using sensory functions included as part of the ITS Architecture. These

physical attributes are represented as a data input to the system.

Related Communications and Associated Architecture Flows are as follows:

Potential Obstacles ==> Roadway Subsystem
physical presence

Potential Obstacles ==> Vehicle Subsystem
physical presence

2.1.3 Roadway

This terminator represents the physical conditions and geometry of the surface on which vehicles travel from an origin to a destination. Roadways can vary in type, such as municipal streets, arteries, state roads, federal roads, two-lane rural roads, expressways, or any other vehicle travel surface.

The condition of the roadway must be monitored by the Architecture to enable corrective action and information dissemination regarding roadway conditions, which may adversely affect travel. Roadways can also depict travel networks, such as municipal street networks, arterial networks, or expressway networks. The roadway interface to the system carries the physical condition and geometry attributes which must be sensed, interpreted, and processed by functions internal to the system to achieve ITS user-service functionality.

Related Communications and Associated Architecture Flows are as follows:

Roadway ==> Maintenance Vehicle Subsystem
roadway characteristics

Roadway ==> Roadway Subsystem
roadway characteristics

Roadway ==> Vehicle Subsystem
roadway characteristics

2.1.4 Roadway Environment

This terminator represents the physical conditions surrounding the roadway itself. These may include emissions, haze, poor visibility, strong winds, rain, etc., which will influence the way in which a vehicle can be safely operated on the roadway.

Related Communications and Associated Architecture Flows are as follows:

Roadway Environment ==> Maintenance Vehicle Subsystem
environmental hazards
weather conditions

Roadway Environment ==> Roadway Subsystem
environmental hazards
weather conditions

Roadway Environment ==> Vehicle Subsystem
weather conditions

2.1.5 Secure Area Environment

This terminator comprises public access areas that commuters frequent during trips. Areas include bus stops, park-and-ride facilities, kiosks, and public transport transfer and multimodal transfer locations. These environments are monitored as part of the ITS Architecture functions to promote public transport safety.

Related Communications and Associated Architecture Flows are as follows:

Secure Area Environment ==> Remote Traveller Support Subsystem
secure area characteristics

2.1.6 Traffic

This terminator represents the collective body of vehicles that travel on municipal streets, arteries, state roads, federal roads, expressways, or any other vehicle travel surface. Traffic depicts the vehicle population from which traffic flow surveillance information is collected (average occupancy, average speed, total volume, average delay, etc.), and to which traffic control indicators are applied (intersection signals, stop signs, ramp meters, lane control barriers, variable speed limit indicators, etc.). All sensory and control elements that interface to this vehicle population are internal to ITS.

Related Communications and Associated Architecture Flows are as follows:

Traffic ==> Roadway Subsystem
traffic characteristics

2.1.7 Vehicle Characteristics

This terminator represents the external view of an individual vehicle. It includes vehicle characteristics such as height, width, length, weight, and other properties (e.g., magnetic properties, number of axles) that allow an individual vehicle to be detected and measured or classified. This external view of an individual vehicle is also used as a source of visible data that supports individual vehicle imaging requirements in the Architecture. The vehicles represented by this terminator include automobiles, trucks, buses, motorcycles, bicycles, and any other form of motorised vehicle (e.g., trencher, golf carts, etc).

ITS subsystems at the roadside sense these characteristics and generate ITS data flows. These individual vehicle characteristics are important for toll collection, parking management, and other applications that identify and measure individual vehicles.

Related Communications and Associated Architecture Flows are as follows:

Vehicle Characteristics ==> Parking Management Subsystem
vehicle characteristics

Vehicle Characteristics ==> Roadway Subsystem
vehicle characteristics
vehicle signal violation
vehicle speed violation
vehicular presence

Vehicle Characteristics ==> Toll Collection Subsystem
vehicle characteristics

2.2 Human

2.2.1 Archived Data Administrator

This terminator represents the human operator who provides overall data management, administration, and monitoring duties for the ITS data archive. Unlike the manager of the operational databases, this terminator's role is focused on the archive and covers areas such as establishing user authentication controls, monitoring data quality, and initiating data import requests.

Related Communications and Associated Architecture Flows are as follows:

Archived Data Administrator ==> Archived Data Management Subsystem
archive management requests

Archived Data Management Subsystem ==> Archived Data Administrator
archive management data

2.2.2 Commercial Vehicle Driver

This terminator represents the human entity that operates vehicles transporting goods including long-haul trucks, local

pickup and delivery vans. This terminator is complementary to the Driver terminator in that it represents those interactions, which are unique to Commercial Vehicle Operations (CVO). In general, a "real world" commercial vehicle driver will interact as both a Driver and a CVO Driver.

Data flowing from this terminator will include those system inputs specific to Commercial Vehicle Operations, such as information back to the Commercial Vehicle Manager. Data flowing to this terminator may include system outputs such as commands to pull into a roadside safety inspection facility. Showing the Driver terminator as the external interface includes the user interface devices within the ITS Architecture boundary. The CVO Driver will be expected to interact with the ITS with interface devices designed to provide support for their usage.

Related Communications and Associated Architecture Flows are as follows:

Commercial Vehicle Check Subsystem ==> Commercial Vehicle Driver
CVO Pull in Message

Commercial Vehicle Driver ==> Commercial Vehicle Subsystem
CVO driver initialisation

Commercial Vehicle Subsystem ==> Commercial Vehicle Driver
alerts, messages
CVO Pull in Message
intermodal dispatch
log information

2.2.3 Commercial Vehicle Manager

This terminator represents the human entities that are responsible for the dispatching and management of Commercial Vehicle fleets (e.g. traditional Fleet Managers). It may be many people in a large tracking organisation but it can also be a single

person (owner driver) in the case of single vehicle fleets. This terminator provides instructions and co-ordination for Commercial Vehicles, including electronic clearance and tax filing, and receives the status of the Vehicles in the fleet that they manage. This terminator is expected to interface with ITS on a regular basis to enhance productivity. Many interfaces with the system are also provided through normal user interfaces. This interface is specific to CVO and is intended to complement these other interfaces.

Related Communications and Associated Architecture Flows are as follows:

Commercial Vehicle Manager ==> Fleet and Freight Management Subsystem

fleet manager inquiry

Fleet and Freight Management Subsystem ==> Commercial Vehicle Manager

fleet status

2.2.4 Commuter

This terminator represents the human entities using Public Transport Vehicles. They may be in the act of embarking or debarking the vehicles and are thus sensed for the purpose of determining passenger loading and fares, or on the vehicles and able to request and receive information.

Related Communications and Associated Architecture Flows are as follows:

Commuter ==> Public Transport Vehicle Subsystem

emergency request

commuter inputs

Commuter ==> Remote Traveller Support Subsystem

commuter inputs

Public Transport Vehicle Subsystem ==> Commuter
commuter fare status
commuter outputs

Remote Traveller Support Subsystem ==> Commuter
commuter fare status
commuter outputs

2.2.5 CVO Inspector

This terminator represents the human entities who perform regulatory inspection of Commercial Vehicles in the field. CVO Inspectors support the roadside inspection, weighing, and checking of credentials either through automated preclearance or manual methods. This terminator is an inspection and enforcement arm of the regulatory agencies, such as Commercial Vehicle Licensing Board (CVLB-LKPP), Royal Malaysian Police, Royal Customs Malaysia, or Road Transport Department (RTD-JPJ) with frequent direct interface with the Commercial Vehicles and their Drivers.

Related Communications and Associated Architecture Flows are as follows:

CVO Inspector ==> Commercial Vehicle Check Subsystem
Commercial Vehicle Check override mode
CVO inspector input

Commercial Vehicle Check Subsystem ==> CVO Inspector
CVO inspector information

2.2.6 Driver

This terminator represents the human entity that operates a vehicle on the roadway. Included are operators of public transport vehicles, commercial vehicles, maintenance vehicles, emergency vehicles and other vehicles, where the data being

sent or received is not particular to the type of vehicle. This general description of the person who operates a vehicle could apply even to riders of motorcycles or bicycles. Thus this terminator originates driver requests and receives driver information that reflects the interactions that might be useful to all drivers, regardless of vehicle classification.

The Driver terminator is the operator of the Basic Vehicle terminator. Information and interactions which are unique to drivers of a specific vehicle type (e.g., fleet interactions with public transport, commercial, maintenance, or emergency vehicle drivers) are covered separately.

Related Communications and Associated Architecture Flows are as follows:

Driver ==> Vehicle Subsystem
- driver inputs
- request for service

Parking Management Subsystem ==> Driver
- roadside transaction status

Roadway Subsystem ==> Driver
- driver information
- driver roadway warning
- variable speed limit

Toll Collection Subsystem ==> Driver
- roadside transaction status

Vehicle Subsystem ==> Driver
- driver updates
- in-vehicle transaction status

2.2.7 Emergency Response Personnel

This terminator represents personnel that are responsible for police, fire and rescue services, emergency medical services,

towing, and other special response team (e.g., hazardous material clean-up) activities at an incident site. These personnel are associated with the Emergency Vehicle Subsystem during dispatch to the incident site, but often work independently of the Emergency Vehicle Subsystem, while providing their incident response services. Emergency response personnel may include an Officer-in-Charge (OIC) and a crew. When managing an incident following standard Incident Command System practices, the on-site emergency response personnel form an organisational structure under the auspices of an Incident Commander. For a typical privatised highway, these emergency response personnel form part of its Traffic Control and Surveillance Team.

Related Communications and Associated Architecture Flows are as follows:

Emergency Response Personnel ==> Emergency Vehicle Subsystem
emergency response personnel inputs

Emergency Vehicle Subsystem ==> Emergency Response Personnel
dispatch information
incident command information presentation

2.2.8 Emergency System Operator

This terminator represents the human entity that monitors all ITS emergency requests, and sets up pre-defined responses to be executed by an emergency management system. The operator may also override pre-defined responses where it is observed that they are not achieving the desired result. This terminator includes dispatchers, who manage an emergency fleet (police, fire, ambulance, HAZMAT, etc.) or higher order emergency managers who provide response coordination during emergencies.

Related Communications and Associated Architecture Flows are as follows:

Emergency Management Subsystem ==> Emergency System Operator
emergency operations status

Emergency System Operator ==> Emergency Management Subsystem
emergency operations request
emergency response personnel inputs

2.2.9 Information Service Provider Operator

This terminator is the human entity that may be physically present at the ISP to monitor the operational status of the facility and provide human interface capabilities to Travellers and other ISP subsystems.

Related Communications and Associated Architecture Flows are as follows:

Information Service Provider Operator ==> Information Service Provider Subsystem
ISP operating parameter updates

Information Service Provider Subsystem ==> Information Service Provider Operator
ISP operating parameters

2.2.10 Intermodal Terminal Operator

This terminator is the personnel that operate the Intermodal Terminal subsystem.

Related Communications and Associated Architecture Flows are as follows:

Intermodal Terminal Operator ==> Intermodal Terminal Subsystem
intermodal terminal operator inputs

Intermodal Terminal Subsystem ==> Intermodal Terminal Operator
intermodal terminal operator data

2.2.11 Maintenance Management Operator

This terminator represents the human entity that directly interfaces with the systems in the Maintenance Management subsystem. These personnel interact with fleet dispatch and management systems, incident management systems, and work zone management systems. They provide operator data and command inputs to direct systems' operations to varying degrees depending on the type of system and the deployment scenario. All functionality associated with these services that might be automated in the course of ITS deployment is modelled as internal to the Architecture.

Related Communications and Associated Architecture Flows are as follows:

Maintenance Management Subsystem ==> Maintenance Management Operator

maintenance management operator data

Maintenance Management Operator ==> Maintenance Management Subsystem

maintenance management operator inputs

2.2.12 Maintenance Vehicle Driver

This terminator represents the human entity that operates any maintenance vehicle. This terminator is complementary to the Driver terminator in that it represents those interactions that are unique to Operations and Maintenance. In general, a "real world" this terminator will interact as both a Driver (for things like general route guidance and vehicle safety features) and a Maintenance Vehicle Driver. Data flowing from the Maintenance Vehicle Driver terminator will include those system inputs specific to Operations and Maintenance, such as information regarding work zone status, or the status of maintenance

actions. Data flowing to this terminator may include system outputs such as dispatching commands and maintenance actions to be performed.

Related Communications and Associated Architecture Flows are as follows:

Maintenance Vehicle Driver ==> Maintenance Vehicle Subsystem
maintenance vehicle driver inputs

Maintenance Vehicle Subsystem ==> Maintenance Vehicle Driver
maintenance vehicle driver data

2.2.13 Parking Operator

This terminator is the human entity that may be physically present at the parking lot facility to monitor the operational status of the facility.

Related Communications and Associated Architecture Flows are as follows:

Parking Management Subsystem ==> Parking Operator
parking status

Parking Operator ==> Parking Management Subsystem
parking operator inputs
request for performance data

2.2.14 Pedestrians

This terminator provides input (e.g. a request for right of way at an intersection) from a specialised form of the Traveller, who is not using any type of vehicle (including bicycles) as a form of transport. Pedestrians may comprise those on foot and those in wheelchairs.

Related Communications and Associated Architecture Flows are as follows:

Pedestrians ==> Roadway Subsystem
crossing call
non-vehicular presence

Roadway Subsystem ==> Pedestrians
crossing permission

2.2.15 Public Transport Vehicle Driver

This terminator represents the human entity that is a special form of the Driver terminator that receives and provides additional information that is specific to Public Transport (including demand responsive public transport) operations. This information will not be received by other types of Driver.

This terminator operates the Public Transport Vehicle terminator and represents random route drivers, flexible fixed route drivers and fixed route drivers. The fixed route drivers require minimal information such as run times and passenger loading. The flex fixed and random route drivers require additional information such as dynamically changing routes.

Related Communications and Associated Architecture Flows are as follows:

Public Transport Management Subsystem ==> Public Transport Vehicle Driver
route assignment

Public Transport Vehicle Driver ==> Public Transport Management Subsystem
public transport vehicle driver availability

Public Transport Vehicle Driver ==> Public Transport Vehicle Subsystem
public transport vehicle driver inputs

Public Transport Vehicle Subsystem ==> Public Transport Vehicle Driver
public transport vehicle driver display

2.2.16 Public Transport Fleet Manager

This terminator represents the human entity that is responsible for planning the operation of public transport fleets, including monitoring and controlling the public transport fleet route schedules and the public transport fleet maintenance schedules. This comprises planning routes and schedules for either daily use or for special occasions as distinct from making day to day variations to schedules and routes.

Related Communications and Associated Architecture Flows are as follows:

Public Transport Fleet Manager ==> Public Transport Management Subsystem

public transport fleet manager inputs

Public Transport Management Subsystem ==> Public Transport Fleet Manager

public transport operations planning data

2.2.17 Public Transport Maintenance Personnel

The terminator represents the human entity that is actively responsible for monitoring, controlling, and planning the schedules for the maintenance of public transport fleets.

Related Communications and Associated Architecture Flows are as follows:

Public Transport Maintenance Personnel ==> Public Transport Management Subsystem

maintenance status

Public Transport Management Subsystem ==> Public Transport Maintenance Personnel

public transport work schedule

2.2.18 Public Transport System Operators

This terminator represents the human entities that are responsible for all aspects of the Public Transport Management subsystem operation including planning and management. They actively monitor, control, and modify the public transport fleet routes and schedules on a day to day basis. The modifications will be to take account of abnormal situations such as vehicle breakdown, vehicle delay, etc. These personnel may also be responsible for demand responsive public transport operation and for managing emergency situations within the public transport network.

Related Communications and Associated Architecture Flows are as follows:

Public Transport Management Subsystem ==> Public Transport System Operators

public transport operator display

Public Transport System Operators ==> Public Transport Management Subsystem

public transport operator management data

2.2.19 Toll Administrator

The Toll Administrator is the human entity that manages the back office payment administration systems for a electronic toll system. This terminator monitors the systems that support the electronic transfer of authenticated funds from the customer to the system operator. The terminator monitors customer enrolment and supports the establishment of escrow accounts depending on the clearinghouse scheme and the type of payments involved. The terminator also establishes and administers the pricing structures and policies.

Related Communications and Associated Architecture Flows are as follows:

Toll Administration Subsystem ==> Toll Administrator
toll revenues and summary reports

Toll Administrator ==> Toll Administration Subsystem
toll administration requests

2.2.20 Toll Operator

This terminator is the human entity that may be physically present at the toll plaza to monitor the operational status of the plaza.

Related Communications and Associated Architecture Flows are as follows:

Toll Collection Subsystem ==> Toll Operator
toll transaction reports

Toll Operator ==> Toll Collection Subsystem
toll operator requests

2.2.21 Traffic Operations Personnel

This terminator represents the human entity that directly interfaces with vehicle traffic operations. This terminator interacts with traffic control and surveillance systems, incident management systems, work-zone management systems, and travel demand management systems to accomplish ITS services. They provide operator data and command inputs to direct systems' operations to varying degrees depending on the type of system and the deployment scenario. All functionality associated with these services that might be automated in the course of ITS deployment is modelled as internal to the Architecture.

Related Communications and Associated Architecture Flows are as follows:

Environment Management Subsystem ==> Traffic Operations Personnel
environmental data display

Traffic Management Subsystem ==> Traffic Operations Personnel
traffic operator data

Traffic Operations Personnel ==> Environment Management Subsystem
environmental data parameters

Traffic Operations Personnel ==> Traffic Management Subsystem
traffic operator inputs

2.2.22 Traveller

This terminator represents any individual (human) who uses transportation services. At the time that data is passed to or from the terminator, the individual is neither a driver, pedestrian, nor commuter. This means that the data provided is that for pre-trip planning or multi-modal personal guidance and includes their requests for assistance in an emergency. Subsequent to receipt of pre-trip information, a Traveller may become a vehicle driver, passenger, commuter, or pedestrian.

Related Communications and Associated Architecture Flows are as follows:

Personal Information Access Subsystem ==> Traveller
traveller interface updates

Remote Traveller Support Subsystem ==> Traveller
traveller interface updates

Traveller ==> Personal Information Access Subsystem
traveller inputs

Traveller ==> Remote Traveller Support Subsystem
traveller inputs

2.3 Other Systems

2.3.1 Other Archives

This terminator represents distributed archived data systems or Centres whose data can be accessed and shared with a local archive. The interface between this terminator and the Archived Data Management Subsystem allows data from multiple archives to be accessed on demand or imported and consolidated into a single repository.

Related Communications and Associated Architecture Flows are as follows:

Archived Data Management Subsystem ==> Other Archives
archive coordination

Other Archives ==> Archived Data Management Subsystem
archive coordination

2.3.2 Other Commercial Vehicle Administration Subsystem

This terminator is intended to provide a source and destination for ITS data flows between peer (e.g. inter-regional/corridor) commercial vehicle administration functions. It enables commercial vehicle administration activities to be coordinated across different jurisdictional areas. In the physical architecture, this terminator is a reciprocal Commercial Vehicle Administration Subsystem.

Related Communications and Associated Architecture Flows are as follows:

Commercial Vehicle Administration Subsystem ==> Other Commercial Vehicle Administration Subsystem
Commercial Vehicle Administration Subsystem information exchange
credentials and safety information request

Other Commercial Vehicle Administration Subsystem ==> Commercial Vehicle Administration Subsystem

Commercial Vehicle Administration Subsystem information exchange

credentials and safety information response

2.3.3 Other Emergency Management

Representing other Emergency Management Centres, systems or subsystems, this terminator provides a source and destination for ITS data flows between various communications Centres operated by public safety agencies as well as Centres operated by other allied agencies and private companies that participate in coordinated management of highway-related incidents. The interface represented by this terminator enables emergency management activities to be coordinated across jurisdictional boundaries and between functional areas. In the physical architecture this terminator is a reciprocal Emergency Management Subsystem (EM) implying the requirements for general networks connecting many allied agencies. The interface between this terminator and the EM supports coordination of incident management information between many different Centres providing Public Safety Answering Point (both public or private sector implementations), Public Safety Dispatch, Emergency Operations, and other functions that participate in the detection, verification, response, and clearance of highway incidents. This terminator also supports interface to other allied agencies like utility companies that also participate in the coordinated response to selected highway-related incidents.

Related Communications and Associated Architecture Flows are as follows:

Emergency Management Subsystem ==> Other Emergency Management
- incident report
- incident response coordination

Other Emergency Management ==> Emergency Management Subsystem
- incident report
- incident response coordination

2.3.4 Other Information Service Provider

Representing other distinct Information Service Providers, this terminator is intended to provide a source and destination for ITS data flows between peer information and service provider functions. It enables cooperative information sharing between providers as conditions warrant. In the physical architecture this terminator is a reciprocal Information Service Provider (ISP) Subsystem.

Related Communications and Associated Architecture Flows are as follows:

Information Service Provider Subsystem ==> Other Information Service Provider
- ISP coordination

Other Information Service Provider ==> Information Service Provider Subsystem
- ISP coordination

2.3.5 Other Intermodal Fleet Management System

This terminator represents the management systems for individual fleets of intermodal transport companies. These fleets may be trucks, rail, aeroplanes, helicopters, container vessels, barges, etc. However, the terminator is broader than this and is primarily intended to show the interface between intermodal

roadway trucking operators (haulage companies) and other mode shipping companies.

Related Communications and Associated Architecture Flows are as follows:

Fleet and Freight Management Subsystem ==> Other Intermodal Fleet Management System
intermodal CVO co-ordination

Other Intermodal Fleet Management System ==> Fleet and Freight Management Subsystem
intermodal CVO co-ordination

Other Intermodal Fleet Management System ==> Intermodal Terminal Subsystem
container release status

2.3.6 Other Parking

Representing another parking facility, system or subsystem, this terminator provides a source and destination for information that may be exchanged between peer parking systems. This terminator enables parking management activities to be coordinated between different parking operators or systems in a region. In the physical architecture this terminator is a reciprocal Parking Management Subsystem.

Related Communications and Associated Architecture Flows are as follows:

Other Parking ==> Parking Management Subsystem
parking coordination

Parking Management Subsystem ==> Other Parking
parking coordination

2.3.7 Other Public Transport Management

Representing another Public Transport Management Centre, system or subsystem, this terminator is intended to provide a source and destination for ITS data flows between peer (e.g. inter-regional) public transport management functions. It enables traffic management activities to be coordinated across geographic boundaries or different jurisdictional areas. In the physical architecture this terminator represents a reciprocal Public Transport Management Subsystem (PTMS).

Related Communications and Associated Architecture Flows are as follows:

Other Public Transport Management ==> Public Transport Management Subsystem
Public Transport Management System Co-ordination

Public Transport Management Subsystem ==> Other Public Transport Management
Public Transport Management System Co-ordination

2.3.8 Other Roadside

Representing another Roadside element or system, this terminator provides a source and destination for information that may be exchanged between peer roadside elements. For example, a surveillance system (sensors and processor) may directly interface to a portable dynamic message sign to display real-time information to drivers approaching a work zone.

Related Communications and Associated Architecture Flows are as follows:

Other Roadside ==> Roadway Subsystem
device control data

Roadway Subsystem ==> Other Roadside
roadside display data

2.3.9 Other Traffic Management

Representing another Traffic Management Centre, system or subsystem, this terminator is intended to provide a source and destination for ITS data flows between peer (e.g. inter-regional) traffic management functions. It enables traffic management activities to be coordinated across different jurisdictional areas. In the physical architecture this terminator is a reciprocal Traffic Management Subsystem (TMS).

Related Communications and Associated Architecture Flows are as follows:

Other Traffic Management ==> Traffic Management Subsystem
traffic control coordination
traffic information coordination

Traffic Management Subsystem ==> Other Traffic Management
traffic control coordination
traffic information coordination

2.3.10 Other Vehicle

This terminator represents a vehicle that is neighbouring the Basic Vehicle, where the Basic Vehicle is equipped to support vehicle-to-vehicle communication and coordination. These features are associated with advanced vehicle safety user-service implementations. These high-end vehicle control services may involve vehicles coordinating their activities.

Related Communications and Associated Architecture Flows are as follows:

Other Vehicle ==> Vehicle Subsystem
vehicle to vehicle coordination

Vehicle Subsystem ==> Other Vehicle
vehicle to vehicle coordination

2.4 Systems

2.4.1 Archived Data User Systems

This terminator represents the systems users employ to access archived data. The general interface provided from this terminator allows a broad range of users (e.g. planners, researchers, analysts, operators) and their systems (e.g. databases, models, analytical tools, user interface devices) to acquire data and analyses results from the archive.

Related Communications and Associated Architecture Flows are as follows:

Archived Data Management Subsystem ==> Archived Data User Systems
- archive analysis results
- archive request confirmation
- archived data products

Archived Data User Systems ==> Archived Data Management Subsystem
- archive analysis requests
- archived data product requests

2.4.2 Basic Vehicle

This terminator represents the basic vehicle platform that interfaces with and hosts ITS electronics. This terminator provides an interface to drive train, driver convenience and entertainment systems, and other non-ITS electronics on-board the vehicle. This interface allows general vehicle systems (e.g., the stereo speaker system) to be shared by ITS and non-ITS systems. It also allows monitoring and control of the vehicle platform for advanced vehicle control system applications.

Related Communications and Associated Architecture Flows are as follows:

Basic Vehicle ==> Vehicle Subsystem
basic vehicle measures

Roadway Subsystem ==> Basic Vehicle
broadcast advisories

Vehicle Subsystem ==> Basic Vehicle
vehicle control

2.4.3 Commercial Vehicle

The actual commercial vehicle along with the special aspects of large commercial vehicles and vehicles designed to carry cargo that extend beyond the characteristics defined for the Basic Vehicle. This terminator thus represents a special type of Basic Vehicle that is used to transport goods or services which are operated by professional drivers, typically administered as part of a larger fleet, and regulated by a Commercial Vehicle Manager. This classification applies to all such vehicles ranging from small panel vans used in local pick-up and delivery services to large, multi-axle tractor trailer rigs operating on long haul routes.

Related Communications and Associated Architecture Flows are as follows:

Commercial Vehicle ==> Commercial Vehicle Check Subsystem
CVO weight and presence

Commercial Vehicle ==> Commercial Vehicle Subsystem
commercial vehicle measures

Commercial Vehicle Subsystem ==> Commercial Vehicle
lock tag data request

2.4.4 CVO Information Requestor

This terminator represents any organisation requesting CVO information. It typically represents insurance companies requesting safety information on carriers etc.

Related Communications and Associated Architecture Flows are as follows:

CVO Information Requestor ==> Commercial Vehicle Administration Subsystem

credentials and safety information request

Commercial Vehicle Administration Subsystem ==> CVO Information Requestor

credentials and safety information response

2.4.5 Disaster Command Agency

The Disaster Command Agency Terminator represents the systems used by authorities that provide command-and-control leadership for coordinated disaster response. Disasters may be natural or man-made, but are civil emergencies that require multi-agency response and coordination on a massive scale. Depending on the nature and scale of the emergency, the Disaster Command Agency may be the highway concessionaire, Royal Malaysian Police, Fire and Rescue Services Department, a municipality-level agency, a state-level agency, or a national-level organisation. In the case of a major disaster, the Crisis and Disaster Management Unit of the National Security Division under the Prime Minister's Department shall take charge of the operations, which will be handled by its Special Malaysian Disaster Assistance and Rescue Team (SMART).

This terminator provides information and status on facilities that provide shelter and protection for people during emergency and disaster situations. Key aspects of the shelter are its location, suitability for the current situation, and the available capacity.

Related Communications and Associated Architecture Flows are as follows:

Disaster Command Agency ==> Emergency Management Subsystem
- disaster response coordination
- disaster response status
- shelter availability
- shelter location

Disaster Command Agency ==> Information Service Provider Subsystem
- disaster advisories
- shelter availability
- shelter location

Disaster Command Agency ==> Maintenance Management Subsystem
- disaster advisories
- maintenance support request

Disaster Command Agency ==> Public Transport Management Subsystem
- disaster advisories
- evacuation support request
- shelter availability
- shelter location

Disaster Command Agency ==> Traffic Management Subsystem
- disaster advisories
- road network status request

Emergency Management Subsystem ==> Disaster Command Agency
- disaster response coordination
- incident information for disaster

Maintenance Management Subsystem ==> Disaster Command Agency
- maintenance response status

Public Transport Management Subsystem ==> Disaster Command Agency

evacuation status

shelter status request

Traffic Management Subsystem ==> Disaster Command Agency

traffic information

2.4.6 Emergency Telecommunications System

This terminator represents the human entity that monitors all ITS emergency requests, and sets up pre-defined responses to be executed by an emergency management system. The operator may also override predefined responses where it is observed that they are not achieving the desired result. This terminator includes dispatchers who manage an emergency fleet (police, fire and rescue, ambulance, HAZMAT, etc.) or higher order emergency managers, who provide response co-ordination during emergencies.

This terminator represents the telecommunications systems that connect a caller with a Public Safety Answering Point (PSAP). A PSAP refers to a call centre for call-taking and dispatch for an individual emergency service provider. These systems transparently support priority wireline and wireless caller access to the PSAP through 9-1-1 and other access mechanisms, and motorist aid call boxes. The calls are routed to the appropriate PSAP, based on caller location when this information is available. When available, the caller's location and call-back number are also provided to the PSAP by this interface.

Related Communications and Associated Architecture Flows are as follows:

Emergency Management Subsystem ==> Emergency Telecommunications System
incident notification response

Emergency Telecommunications System ==> Emergency Management Subsystem
incident notification

2.4.7 Enforcement Agency

This terminator represents an external entity which receives reports of violations detected by various ITS facilities, e.g. individual vehicle emissions, toll violations, speed or red light running violation, CVO violations, etc.

Related Communications and Associated Architecture Flows are as follows:

Commercial Vehicle Administration Subsystem ==> Enforcement Agency
request for information on violators
violation notification

Enforcement Agency ==> Commercial Vehicle Administration Subsystem
information on violators

Parking Management Subsystem ==> Enforcement Agency
violation notification

Public Transport Management Subsystem ==> Enforcement Agency
violation notification

Toll Administration Subsystem ==> Enforcement Agency
violation notification

Traffic Management Subsystem ==> Enforcement Agency
violation notification

2.4.8 Event Organisers

This terminator represents external Special Event Organisers that have knowledge of events that may impact travel on roadways or other modal means. Examples of special event organisers include sporting events, conventions, motorcades, parades, public or political events, religious celebrations and funeral processions. These organisers interface to the ITS to provide event information such as date, time, estimated duration, location, and any other information pertinent to traffic movement in the surrounding area.

Related Communications and Associated Architecture Flows are as follows:

Emergency Management Subsystem ==> Event Organisers
event confirmation

Event Organisers ==> Emergency Management Subsystem
event plans

Event Organisers ==> Traffic Management Subsystem
event plans

Traffic Management Subsystem ==> Event Organisers
event confirmation

2.4.9 Financial Institution

This terminator represents the organisation that handles all electronic fund transfer requests to enable the transfer of funds from the user of the service to the provider of the service. The functions and activities of financial clearinghouses are subsumed by this entity.

Related Communications and Associated Architecture Flows are as follows:

Archived Data Management Subsystem ==> Financial Institution
payment request

Commercial Vehicle Administration Subsystem ==> Financial Institution
payment request

Financial Institution ==> Archived Data Management Subsystem
transaction status

Financial Institution ==> Commercial Vehicle Administration Subsystem
transaction status

Financial Institution ==> Information Service Provider Subsystem
transaction status

Financial Institution ==> Parking Management Subsystem
transaction status

Financial Institution ==> Public Transport Management Subsystem
transaction status

Financial Institution ==> Toll Administration Subsystem
transaction status

Information Service Provider Subsystem ==> Financial Institution
payment request

Parking Management Subsystem ==> Financial Institution
payment request

Public Transport Management Subsystem ==> Financial Institution
payment request

Toll Administration Subsystem ==> Financial Institution
payment request

2.4.10 Freight Consolidation Station

An intermediate point (usually an intermodal terminal located at a port) prior to (or after) container-based shipping, where less-than-container load or less-than-truckload cargoes are

consolidated into full container loads (or full containers are disbursed), for cost-effective intermodal shipping.

Related Communications and Associated Architecture Flows are as follows:

Commercial Vehicle Subsystem ==> Freight Consolidation Station

container transfer location request

entry request

exit request

vehicle identification

Fleet and Freight Management Subsystem ==> Freight Consolidation Station

container delivery request

container pickup confirmation

Freight Consolidation Station ==> Commercial Vehicle Subsystem

container transfer location

entry permission

exit permission

Freight Consolidation Station ==> Fleet and Freight Management Subsystem

container delivery confirmation

container pickup request

2.4.11 Government Administrators

This terminator represents those Government agencies responsible for regulating commercial vehicle operations, e.g., Road Transport Department (RTD-JPJ), Royal Customs Malaysia, Commercial Vehicle Licensing Board (CVLB-LKPP), Royal Malaysian Police and the land offices. Regulatory Agencies are envisioned to be an integral part of the ITS Commercial Vehicle Operations (CVO) as they will be directly involved with issuance of licences, permits and other credentials for preclearance, provide database information to support most

CVO services, and will receive, distribute, and audit CVO related taxes.

Related Communications and Associated Architecture Flows are as follows:

Commercial Vehicle Administration Subsystem ==> Government Administrators

tax-credentials-fees request

Government Administrators ==> Commercial Vehicle Administration Subsystem

regulations

2.4.12 Government Reporting Systems

This terminator represents the system and associated personnel that prepare the inputs to support the various municipal, district, state, and federal government transportation data reporting requirements using data collected by ITS systems. This terminator represents a system interface that would provide access to the archived data that is relevant to these reports. This terminator would combine data collected from the ITS archives with data from non-ITS sources to assemble and submit the required information.

Related Communications and Associated Architecture Flows are as follows:

Archived Data Management Subsystem ==> Government Reporting Systems

government reporting system data

Government Reporting Systems ==> Archived Data Management Subsystem

government reporting data receipt

2.4.13 Intermodal Chassis

A chassis is the frame on wheels that an intermodal container is secured to for roadway transport by a truck. This terminator includes the capabilities to provide chassis safety data for the brakes, container fasteners, and other systems.

Related Communications and Associated Architecture Flows are as follows:

Intermodal Chassis ==> Commercial Vehicle Subsystem
- chassis data
- chassis status

2.4.14 Intermodal Customer

The originator of an order to move cargo (the consignor or shipper) or the final recipient of a cargo shipment (the consignee, technically the cargo owner).

Related Communications and Associated Architecture Flows are as follows:

Fleet and Freight Management Subsystem ==> Intermodal Customer
- consignment contract
- shipment status

Intermodal Customer ==> Fleet and Freight Management Subsystem
- container delivery confirmation
- freight consignment request
- shipment status request

2.4.15 Location Data Source

This terminator represents an external entity, which provides accurate position information. External systems, which use GPS, terrestrial trilateration, or driver inputs, are potential examples. This terminator contains sensors such as radio

position receivers (e.g. GPS) and/or dead reckoning sensors (e.g. odometer, differential odometer, magnetic compass, gyro, etc.). This external implies that some additional functionality associated with developing an absolute position is outside the system and will not be directly modelled by the logical or physical architecture representations of the system.

Related Communications and Associated Architecture Flows are as follows:

Location Data Source ==> Personal Information Access Subsystem
position fix

Location Data Source ==> Vehicle Subsystem
position fix

2.4.16 Logistics Solutions Provider

A system that provides intermodal logistics support and support for the efficient distribution of freight across transport systems and modes. This can include cargo consolidation arrangements, warehousing, and consignor-to-consignee intermodal shipping arrangements. These capabilities may be provided as part of intermodal fleet management activities, or can be provided by an independent logistics specialist.

Related Communications and Associated Architecture Flows are as follows:

Fleet and Freight Management Subsystem ==> Logistics Solutions Provider
container delivery confirmation
container location
container pickup confirmation
container status

Intermodal Container Subsystem ==> Logistics Solutions Provider
cargo data
container location
container status

Intermodal Terminal Subsystem ==> Logistics Solutions Provider
container availability status

Logistics Solutions Provider ==> Fleet and Freight Management Subsystem
container location request
container pickup request
container status request

Logistics Solutions Provider ==> Intermodal Container Subsystem
cargo data request
container location request
container status request

Logistics Solutions Provider ==> Intermodal Terminal Subsystem
container availability request

2.4.17 Maintenance Vehicle

This terminator represents a specialised form of the Basic Vehicle used by maintenance fleets. It supports the on-board equipment that control the non-ITS systems such as the actual operation of the power brooms, as well as any non-ITS sensor equipment that monitors the amount of sand or salt on-board. The monitoring of the Maintenance Vehicle mechanical condition and mileage provides the major inputs for maintenance vehicle activity scheduling.

Related Communications and Associated Architecture Flows are as follows:

Maintenance Vehicle ==> Maintenance Vehicle Subsystem
maintenance vehicle measures

Maintenance Vehicle Subsystem ==> Maintenance Vehicle
maintenance vehicle controls

2.4.18 Malaysian Meteorological Services

This terminator provides weather, hydrologic, and climate information and warnings of hazardous weather including thunderstorms, flooding, monsoon, and hazy weather. It provides current and forecast weather data that is collected and derived by its network of meteorological stations, private sector providers, and various research organisations. The interface provides formatted weather data and forecasts products suitable for on-line processing and integration with other ITS data products as well as Doppler radar images, satellite images, severe storm warnings, and other products that are formatted for presentation to various ITS users.

Related Communications and Associated Architecture Flows are as follows:

Archived Data Management Subsystem ==> Malaysian Meteorological Services
archive requests
archive status

Maintenance Management Subsystem ==> Malaysian Meteorological Services
road and weather data

Malaysian Meteorological Services ==> Archived Data Management Subsystem
volume weather information

Malaysian Meteorological Services ==> Emergency Management Subsystem
volume weather information

Malaysian Meteorological Services ==> Information Service Provider Subsystem
volume weather information

Malaysian Meteorological Services ==> Maintenance Management Subsystem
volume weather information

Malaysian Meteorological Services ==> Public Transport Management Subsystem
volume weather information

Malaysian Meteorological Services ==> Traffic Management Subsystem
volume weather information

2.4.19 Mapping Service Provider

This terminator represents a service developer and provider of digitised map databases used to support ITS services. It supports the provision of the databases that are required exclusively for route guidance as well as those that are used exclusively for display by operators and at traveller information points, e.g. kiosks.

Related Communications and Associated Architecture Flows are as follows:

Archived Data Management Subsystem ==> Mapping Service Provider
map update request

Emergency Management Subsystem ==> Mapping Service Provider
map update request

Environment Management Subsystem ==> Mapping Service Provider
map update request

Information Service Provider Subsystem ==> Mapping Service Provider
map update request

Mapping Service Provider ==> Archived Data Management Subsystem
map updates

Mapping Service Provider ==> Emergency Management Subsystem
map updates

Mapping Service Provider ==> Environment Management Subsystem
map updates

Mapping Service Provider ==> Information Service Provider Subsystem
map updates

Mapping Service Provider ==> Personal Information Access Subsystem
map updates

Mapping Service Provider ==> Public Transport Management Subsystem
map updates

Mapping Service Provider ==> Remote Traveller Support Subsystem
map updates

Mapping Service Provider ==> Traffic Management Subsystem
map updates

Mapping Service Provider ==> Vehicle Subsystem
map updates

Personal Information Access Subsystem ==> Mapping Service Provider
map update request

Public Transport Management Subsystem ==> Mapping Service Provider
map update request

Remote Traveller Support Subsystem ==> Mapping Service Provider
map update request

Traffic Management Subsystem ==> Mapping Service Provider
map update request

Vehicle Subsystem ==> Mapping Service Provider
map update request

2.4.20 Media

This terminator represents the information systems that provide traffic reports, travel and weather conditions, and other transportation-related news services to the travelling public through radio, TV, and other media. Traffic and travel advisory information that are collected by ITS are provided to this

terminator. It is also a source for traffic flow information, incident and special event information, and other events which may have implications for the transportation system.

Related Communications and Associated Architecture Flows are as follows:

Emergency Management Subsystem ==> Media
incident information for media

Environment Management Subsystem ==> Media
environmental information

Information Service Provider Subsystem ==> Media
traveller information for media

Media ==> Emergency Management Subsystem
media information request

Media ==> Information Service Provider Subsystem
external reports
media information request

Media ==> Public Transport Management Subsystem
media information request

Media ==> Traffic Management Subsystem
external reports
media information request

Public Transport Management Subsystem ==> Media
public transport incidents for media
public transport information for media

Traffic Management Subsystem ==> Media
traffic information for media

2.4.21 Medical Facility

The Medical Facility terminator represents hospitals, trauma centres, field emergency treatment facilities and any other location capable of receiving injured persons and providing emergency care.

Related Communications and Associated Architecture Flows are as follows:

Emergency Management Subsystem ==> Medical Facility
medical facility request

Medical Facility ==> Emergency Management Subsystem
medical facility availability

2.4.22 Meteorological Service Provider

This terminator represents the providers of value-added sector specific meteorological services. These privatised service providers utilise Malaysian Meteorological Services data and predictions, road condition information and local environmental data provided by the traffic management or maintenance management organisations, and their own models to provide specialised detailed forecasts of local weather conditions.

Related Communications and Associated Architecture Flows are as follows:

Maintenance Management Subsystem ==> Meteorological Service Provider
road and weather data

Meteorological Service Provider ==> Emergency Management Subsystem
road weather prediction

Meteorological Service Provider ==> Information Service Provider Subsystem
road weather prediction

Meteorological Service Provider ==> Maintenance Management Subsystem

road weather prediction

roadway micro prediction

Meteorological Service Provider ==> Public Transport Management Subsystem

road weather prediction

Meteorological Service Provider ==> Traffic Management Subsystem

road weather prediction

roadway micro prediction

Traffic Management Subsystem ==> Meteorological Service Provider

road and weather data

2.4.23 Multimodal Crossings

This terminator represents the control equipment that interfaces to a non-road based transportation system at an interference crossing with the roadway. The majority of these crossings are railroad grade crossings that are more specifically addressed by the "Railside Equipment" terminator. This terminator addresses similar interface requirements, but for other specialised intersections like draw bridges at rivers and waterways. Like highway-rail intersections, these other multimodal crossings carry traffic that may take priority over the road traffic at the intersection. The data provided will in its basic form be a simple "stop road traffic" indication. However more complex data flows may be provided that give the time at which right-of-way will be required and the duration of that right-of-way requirement.

Related Communications and Associated Architecture Flows are as follows:

Multimodal Crossings ==> Roadway Subsystem

multimodal crossing status

Roadway Subsystem ==> Multimodal Crossings
highway control status

2.4.24 Multimodal Transportation Service Provider

This terminator provides the interface through which transportation service providers can exchange data with ITS. They are the operators of non-roadway transportation systems (e.g. airlines, ferry services, passenger carrying heavy rail). This two-way interface enables coordination for efficient movement of people across multiple transportation modes. It also enables the traveller to efficiently plan itineraries which include segments using modes not directly included in the ITS user-services.

Related Communications and Associated Architecture Flows are as follows:

Archived Data Management Subsystem ==> Multimodal Transportation Service Provider
archive requests
archive status

Information Service Provider Subsystem ==> Multimodal Transportation Service Provider
multimodal information request
service request

Multimodal Transportation Service Provider ==> Archived Data Management Subsystem
multimodal archive data

Multimodal Transportation Service Provider ==> Information Service Provider Subsystem
multimodal information
service response

Multimodal Transportation Service Provider ==> Public Transport Management Subsystem

multimodal information

public transport multimodal information

service response

Public Transport Management Subsystem ==> Multimodal Transportation Service Provider

service request

public transport information

public transport multimodal information

2.4.25 Other Data Sources

This terminator represents the myriad systems and databases containing data not generated from subsystems and terminators represented in the Malaysian ITS System Architecture that can provide predefined data sets to the ITS archive. The terminator can provide economic, cost, demographic, land use, law enforcement, and other data that is not collected by ITS systems and would otherwise be unavailable within an ITS data archive.

Related Communications and Associated Architecture Flows are as follows:

Archived Data Management Subsystem ==> Other Data Sources

archive requests

archive status

Other Data Sources ==> Archived Data Management Subsystem

other data source archive data

2.4.26 Payment Instrument

This terminator represents the entity that enables the actual transfer of funds from the user of a service to the provider of the service. This terminator can be as abstract as an account

number in the logical architecture, or as real as the electronic tag in the physical architecture.

Related Communications and Associated Architecture Flows are as follows:

Fleet and Freight Management Subsystem ==> Payment Instrument
request for payment

Payment Instrument ==> Fleet and Freight Management Subsystem
payment

Payment Instrument ==> Personal Information Access Subsystem
payment

Payment Instrument ==> Public Transport Vehicle Subsystem
payment

Payment Instrument ==> Remote Traveller Support Subsystem
payment

Payment Instrument ==> Vehicle Subsystem
payment

Personal Information Access Subsystem ==> Payment Instrument
request for payment

Public Transport Vehicle Subsystem ==> Payment Instrument
request for payment

Remote Traveller Support Subsystem ==> Payment Instrument
request for payment

Vehicle Subsystem ==> Payment Instrument
request for payment

2.4.27 Public Transport Vehicle

This terminator represents a specialised form of the Basic Vehicle used by public transport service providers. It supports equipment to collect fares, monitor activities, request priority at signals, and provide information to Travellers. It may be a bus,

LRT vehicle, or other vehicle specially designed for the carriage of passengers, such as those used by demand responsive public transport operators. The monitoring of the Public Transport Vehicle mechanical condition and mileage provides the major inputs for public transport vehicle maintenance scheduling.

Related Communications and Associated Architecture Flows are as follows:

Public Transport Vehicle ==> Public Transport Vehicle Subsystem
public transport vehicle measures

2.4.28 Rail Operations

This is roughly the railroad equivalent to a highway, Traffic Management Centre. It is (usually) a centralised control point for a substantial segment of a railroad's operations. It is the source and destination of information that can be used to coordinate rail and highway traffic management. This terminator would also represent a railroad's management information system, if that system is the source or destination for this information. The use of a single terminator for multiple sources and destination for information exchange with the railroad entity is meant to imply the need for a single, consistent interface between a given railroad's operations and ITS traffic management. In any given implementation of ITS there may be multiple instantiations of this interface.

Related Communications and Associated Architecture Flows are as follows:

Rail Operations ==> Traffic Management Subsystem
railroad advisories
railroad schedules

Traffic Management Subsystem ==> Rail Operations
HRI advisories

2.4.29 Railside Equipment

This terminator represents train interface equipment maintained and operated by the railroad and physically located at or near a grade crossing. This terminator is the source and destination for Highway-Rail Intersection (HRI) information for, or about, approaching trains and their crews (e.g. the time at which the train will arrive and the time it will take to clear a crossing, crossing status or warnings, etc.). Generally one railside equipment interface would be associated with one highway rail intersection. However, multiple crossings may be controlled.

Related Communications and Associated Architecture Flows are as follows:

Railside Equipment ==> Roadway Subsystem
arriving train information
track status

Roadway Subsystem ==> Railside Equipment
HRI operational status
intersection blockage notification

2.4.30 Road Transport Department

This terminator represents a specific public agency responsible for registering and licensing vehicles, e.g., Road Transport Department (RTD-JPJ). RTD-JPJ is a special case of the Government Administrators Terminator, but in some areas are identified separately to emphasise the specific nature of the data being exchanged, i.e. vehicle identification.

Related Communications and Associated Architecture Flows are as follows:

Commercial Vehicle Administration Subsystem ==> Road Transport Department
licence request

Parking Management Subsystem ==> Road Transport Department
licence request

Road Transport Department ==> Commercial Vehicle Administration Subsystem
registration

Road Transport Department ==> Parking Management Subsystem
registration

Road Transport Department ==> Traffic Management Subsystem
registration

Road Transport Department ==> Toll Administration Subsystem
registration

Traffic Management Subsystem ==> Road Transport Department
licence request

Toll Administration Subsystem ==> Road Transport Department
licence request

2.4.31 Royal Customs Malaysia

Royal Customs Malaysia, or Royal Customs and Excise Department is principally a revenue collecting agency under the Ministry of Finance entrusted to administrate and enforce matters relating to customs, sales tax, excise duty, and service tax. Royal Customs Malaysia performs the primary regulatory inspection function at an international point of entry, as well as at the points of exit for manufactured goods.

This border inspection agency is traditionally stationed at the Customs, Immigration and Quarantine (CIQ) Complexes at international points of entry. In Malaysia, this is generally the Royal Customs Malaysia, but can also include Immigration, Agriculture, and other inspection agencies.

Related Communications and Associated Architecture Flows are as follows:

Intermodal Container Subsystem ==> Royal Customs Malaysia
container manifest
container seal status

Intermodal Container Subsystem ==> Royal Customs Malaysia
container arrival information

Royal Customs Malaysia ==> Intermodal Container Subsystem
container seal interrogation
manifest request

Royal Customs Malaysia ==> Intermodal Terminal Subsystem
container release status

2.4.32 Yellow Pages Service Providers

This terminator represents the individual organisations that provide any service oriented towards the Traveller. Example services that could be included are gas, food, lodging, vehicle repair, points of interest, and recreation areas. The Service Providers may pay a fee to have their services advertised to Travellers. The interface with the Service Provider is necessary so that accurate, up-to-date service information can be provided to the Traveller and to support electronic reservation capabilities included in the ITS User-Services.

Related Communications and Associated Architecture Flows are as follows:

Information Service Provider Subsystem ==> Yellow Pages Service Providers

provider profile confirmation

travel service request

Yellow Pages Service Providers ==> Information Service Provider Subsystem

provider profile data

travel service information