The Role of ITS in City Logistics

Assoc. Prof. Russell G. Thompson
Department of Infrastructure Engineering
rgthom@unimelb.edu.au
Outline

Background Concepts
Global Position Systems (GPS)
Intelligent Access Program (IAP)
Electronic Toll Collection (ETC)
Parking booking systems
References
What is Intelligence?

- **Analysing**
  - sensing & analysing environment
  - detecting changes, perceiving problems

- **Making decisions**
  - acting rationally, choosing options to solve problems

- **Learning**
  - using experience to make improvements: identifying new problems & decision making
Those that are:

Clever
- successful in coping with new situations & solving problems

Alert
- fast in perceiving & understanding problems & finding answers to challenges
Global Position Systems (GPS)

Provides accurate & inexpensive data for urban freight planning and operations

Applications

- Vehicle tracking & monitoring (speeds, stops & paths used)
- Signal priority
- Management Bridge (Speeds and Headways)
- Dynamic Vehicle Routing & Scheduling
- Fatigue Management (Electronic logs)
Common information platform in Public-Private Partnerships

Administrators

Traffic management server

VICS

Decision making system

Real time traffic information

Freight information

Freight carriers

Company A
Freight management Server

Decision making system

Company B
Freight management Server

Decision making system

Company C
Freight management Server

Decision making system

Taniguchi, Thompson & Yamada, 2006
Intelligent Access Program (IAP) Overview

• IAP is a new approach to road freight management
• Uses GPS to monitor heavy vehicles’ compliance with access conditions
• Gives transport operators flexible access to Australian roads to suit their business and operational needs
• Increases regulators’ confidence heavy vehicles are complying with agreed access conditions
IAP Concepts

- General Access (1\textsuperscript{st} Generation)
- Restricted Access (2\textsuperscript{nd} Generation)
- Intelligent Access (3\textsuperscript{rd} Generation)

IAP is a voluntary program that allows access or improved access to the road network in return for compliance monitoring using GPS

The right vehicle, on the right road at the right time
IAP Model

• IAP operating model represents a unique public private initiative
• Brings together road authorities, telematics service providers and transport operators in a cooperative arrangement
• Multiple service provider approach ensures competition between IAP Service Providers (competitive market driven environment)
IAP Features

• IAP technical requirements are performance based

• Model provides for national coverage of a vehicle by a single IAP Service Provider who can provide both regulatory and commercial telematics services as a bundled package (ie. one box)

• Highest order privacy obligations applicable to participants
IAP Concepts

• Caters for both *off-the-shelf* and *unique* IAP Applications

• Transport operator decides benefits of joining IAP Application

• Only non-compliance is reported to road authorities

• A non-compliance report (NCR) not necessarily an offence

• Model is very cost effective
Parameters & Functions

• Parameters
  – Vehicle and Trailer identification
  – Vehicle position (spatial/route compliance)
  – Time (temporal compliance)*
  – Vehicle speed (gross speed compliance)*
  – Tamper evident

• Functions
  – Self-Declaration Function*
    (eg. declaration of vehicle configuration, general comments)

• Future parameters/functions - driven by policy makers

* based on need of actual IAP Application
Non-Compliant behaviour
• States and Territories can choose how they use the IAP
• IAP Applications being established include:
  – Higher Mass Limits (HML) route compliance application (New South Wales and Queensland)
  – AB and B-triple route compliance application (New South Wales)
  – Mobile Crane route and hours compliance application (Victoria)
• Road authorities are free to develop tailored IAP Applications which meet their own policy needs
• Operating model permits additional parameters

• Possible future parameters/functions
  – Vehicle configuration (including trailer identification)
  – Evidentiary on-board mass
  – Fatigue management
  – Driving hours (electronic log books)
  – Incremental road pricing
Incremental Pricing Scheme

- GML
- CML
- HML

Parameters
- Mass
- Distance
- Location

Pricing
- Mass
- Distance
- Road type

IAP the road forward//
Main pricing components

Source: NTC Incremental Pricing Scheme Feasibility Jan 2009, p15
IAP is a compliance monitoring tool that can provide:

- improved productivity
- improved road safety
- reduction in infrastructure wear
- reduction in environmental effects
- better management of public expectations
- optimisation of the road freight policy and operations tasks
Melbourne’s City Project

- Linked 3 urban freeways
- BOOT project
- Multi-lane electronic tolling with *free flow* traffic
- E-tag: RFID
- OCR used for enforcement
- Very popular with freight carriers

Lay and Daley (2002)
Melbourne City Link Route

**Western Link**

**Southern Link**

**CBD**

**Melbourne’s Freeways (After City Link)**

- Existing Freeways
- City Link Route
- Exhibition Street Extension
- City Link Tunnels
Benefits

- Travel time savings
- No traffic signals
- Freight transport economies
- Traffic removed from CBD
- Environmental
  - air quality
  - Yarra River precinct
Significance of ETC to City Link

- Travel Time Benefits
- Reduced Land Requirements
  - Cost to Government
  - Negative Urban Amenity
- Improved Access of Toll Road to Road Network
Challenges of ETC

– Free Flow Traffic at Highway Speeds
– Enforcement
– The Occasional User
Toyota City, Japan

Aim
To create a safer environment for pedestrians & traffic by reducing on-street parking of freight vehicles for loading/unloading operations

Problems
Illegally parked freight vehicles reduce air quality: exhaust gas while idling & increase traffic congestion
System Overview

• Problem
  – Illegally parked freight vehicles reduce air quality: exhaust gas while idling, traffic congestion

• Features
  – Off street parking place (3 spaces)
  – Pre-reservation system by cell phone
  – Open to registered vehicles with an ETC system or special ID card
  – Fee 10 yen/minute

PIARC 2012
• On-street parking near the parking lot reduced by 56%

• Estimated reduction in emissions of 1,262 tonnes of CO2 per year

• Problems to overcome: demand exceeded capacity (need 6 spaces)

• More lots (4) required to service area
Monitoring and Access Control Systems


