Regional Multi-Jurisdictional Integrated Traffic Management

International Seminar on ITS in Road Network Operations

August 14–15, 2006

Joseph K. Lam, P.Eng.
President, Systems Business
Delcan

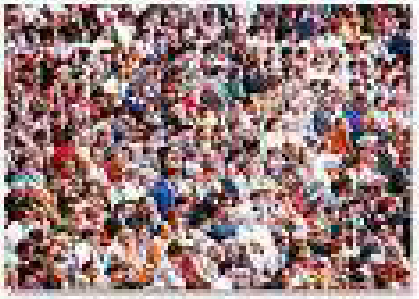
Chairman
ITS Canada

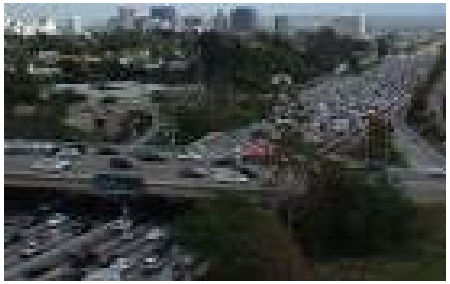
Need for Regional Integrated Traffic Management

- Continuous Growth in:

Economics

Population





Traffics

Geographical Coverage of Urban Cities

Need for Regional Integrated Traffic Management

~SOLUTION~

Regional Multi-Jurisdictional Integrated Traffic Management

Delcan
TRANSPORTATION • INFORMATION TECHNOLOGY • WATER

Regional Integration of Intelligent Transportation System (RIITS)

Integrated Regional Signal System (IRSS)

Regional Traffic Management Centre (RTMC)

Regional Advanced Traveller Information System (RATIS)

Regional Integration of Intelligent Transportation System (RIITS)

RIITS Network Objectives

- Provide Multi-Modal Real-Time Information
- Facilitate Multi-Jurisdictional co-operation and data sharing

RIITS for Los Angeles

Participating Agencies:

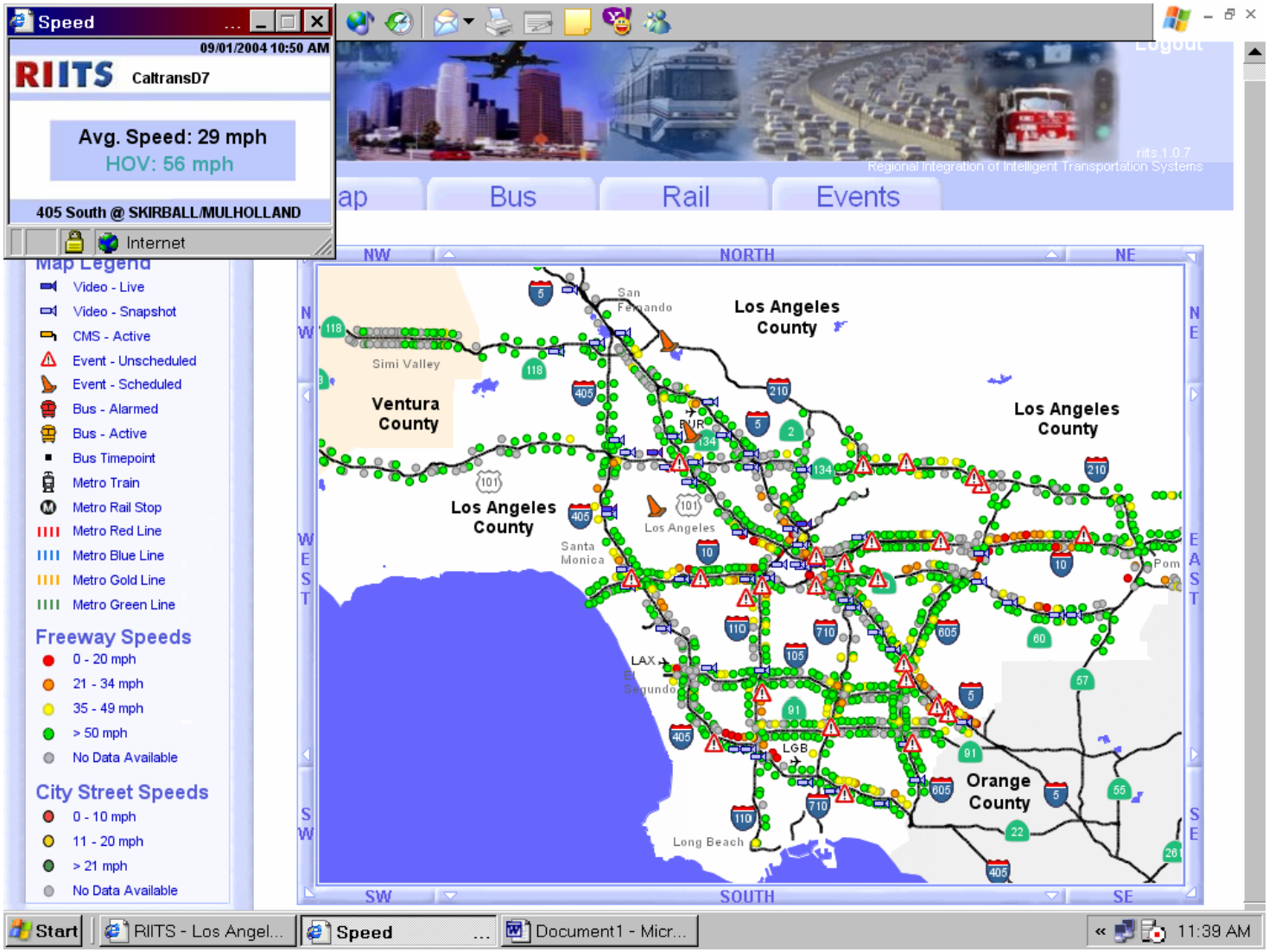
- MTA Bus Operations
- Port of Long Beach
- LADOT
- LAX Airport
- Access Services, Inc
- Santa Monica Big Blue Bus
- Caltrans District 7
- LA County Fire Dept.
- MTA Rail Operations
- LA County Public Works
- Long Beach Transit
- LA County Sheriff Dept.
- CHP
- LAPD
- Port of LA

Types of Traffic Information Collected

- Traffic Flow Conditions
- CCTV Camera Video Images
- Changeable Message Sign Displays
- Events (Scheduled and Unscheduled)
- MTA Bus Locations
- MTA Train Locations

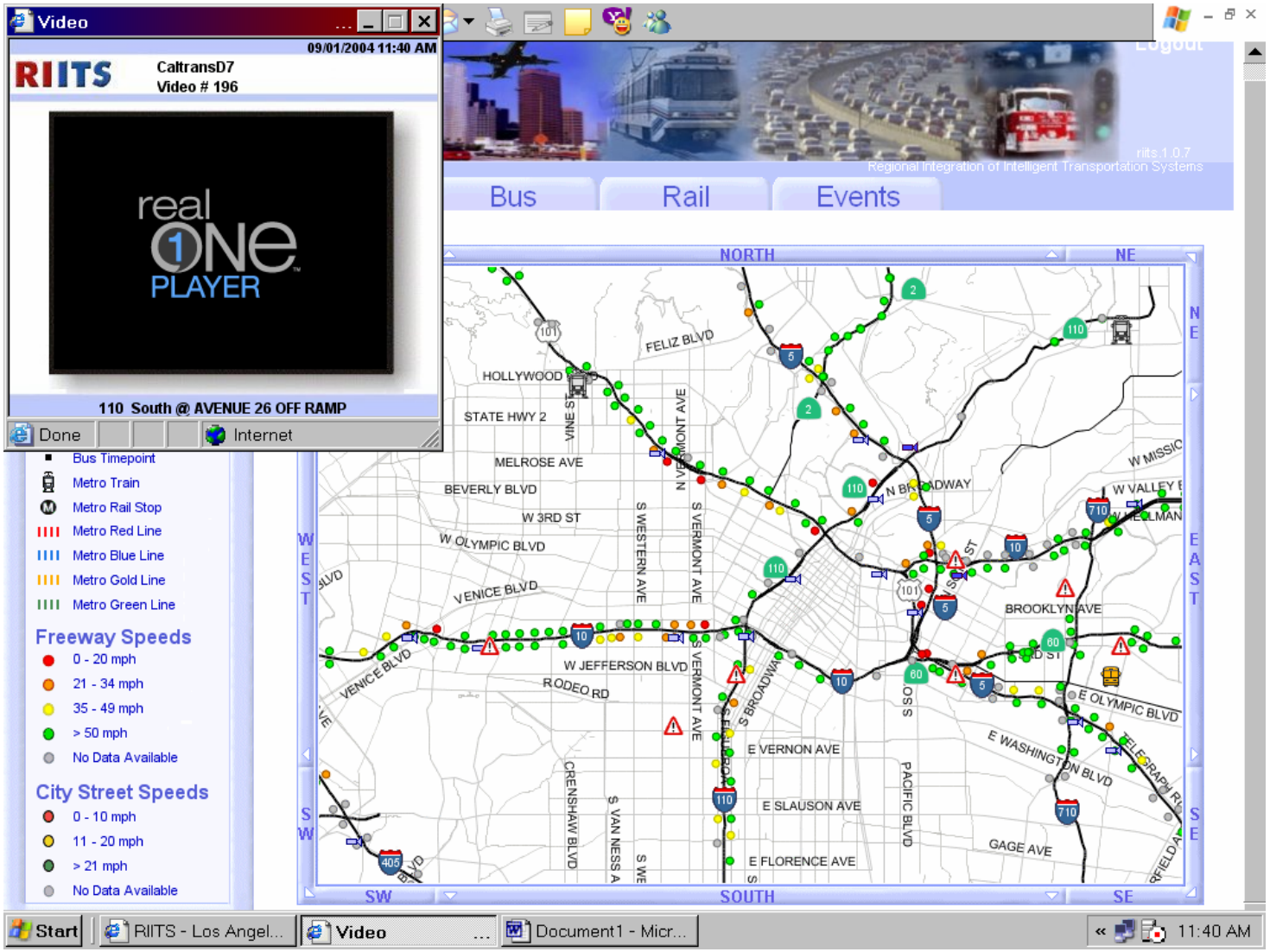
Traffic Data Flow

- Arterial Streets in the City of LA
- Freeways in LA County (Caltrans District 7)
- Typically derived from In-pavement loops
- Collected at regular intervals
- Data consists of volumes, occupancies, and average speeds
- Displayed as colour-coded average speeds at points along roadways on map
- Data is useful to assess the impact of incidents on agencies operations


Speed
09/01/2004 10:50 AM
RIITS
CaltransD7
Avg. Speed: 29 mph
HOV: 56 mph
405 South @ SKIRBALL/MULHOLLAND
Internet
riits.1.0.7
Regional Integration of Intelligent Transportation Systems
Bus
Rail
Events
Map Legend
Video - Live
Video - Snapshot
CMS - Active
Event - Unscheduled
Event - Scheduled
Bus - Alarmed
Bus - Active
Bus Timepoint
Metro Train
Metro Rail Stop
Metro Red Line
Metro Blue Line
Metro Gold Line
Metro Green Line
Freeway Speeds
0 - 20 mph
21 - 34 mph
35 - 49 mph
> 50 mph
No Data Available
City Street Speeds
0 - 10 mph
11 - 20 mph
> 21 mph
No Data Available
NW
NORTH
NE
WEST
EAST
SW
SOUTH
SE
Ventura County
Los Angeles County
Simi Valley
San Fernando
Santa Monica
Los Angeles
Long Beach
Orange County
LAX
LGB
Pom
Start
RIITS - Los Angel...
Speed
Document1 - Micr...
11:39 AM

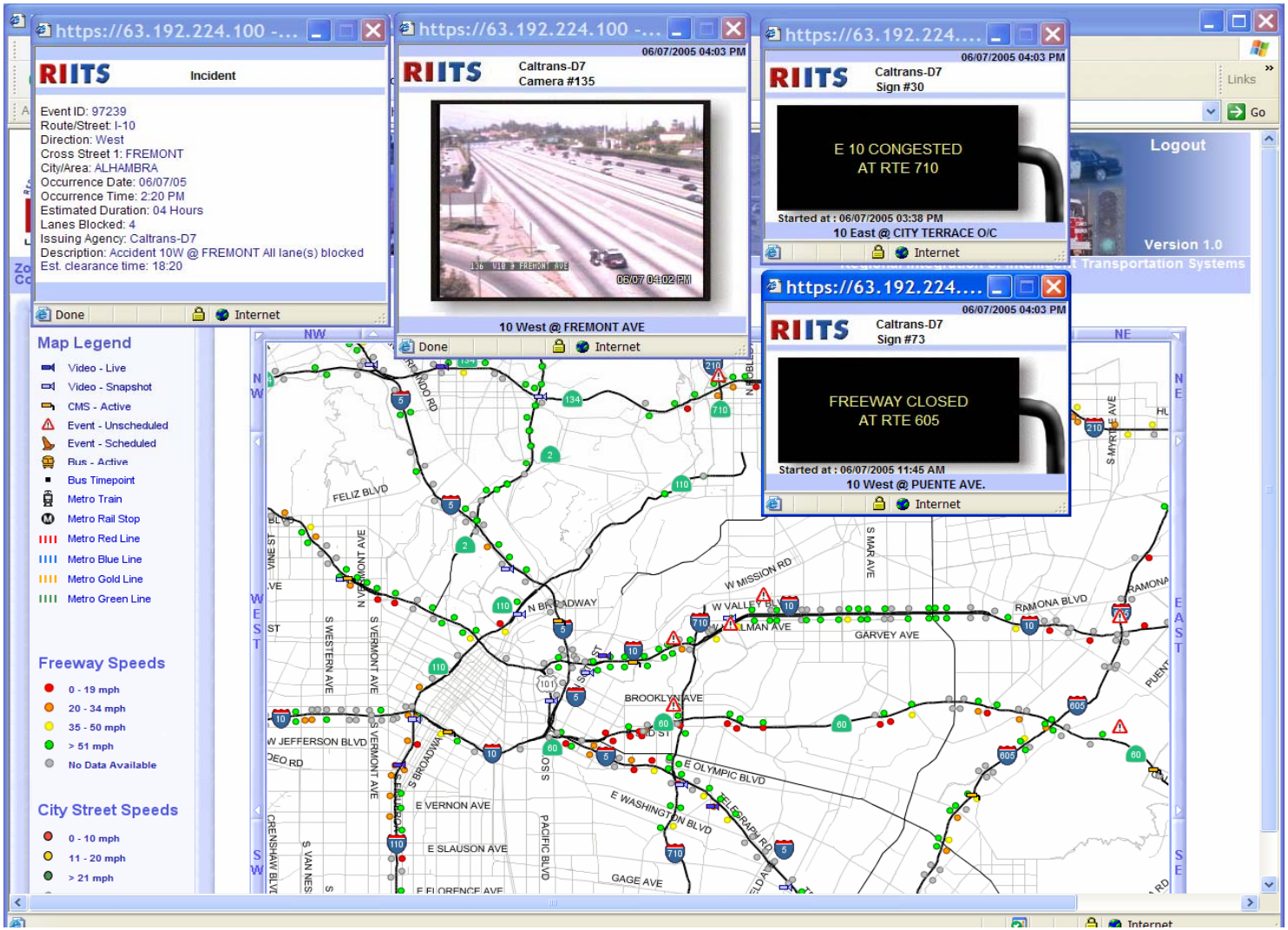
Closed-Circuit TV (CCTV)

- Video is live and in colour
- Video is viewable on PC monitors
- Selectable on a map display
- Viewable as streams and “snapshots”


Video
09/01/2004 11:40 AM
RIITS
CaltransD7
Video # 196
real ONE PLAYER
110 South @ AVENUE 26 OFF RAMP
Done
Internet
riits.1.0.7
Regional Integration of Intelligent Transportation Systems
Bus
Rail
Events
Bus Timepoint
Metro Train
Metro Rail Stop
Metro Red Line
Metro Blue Line
Metro Gold Line
Metro Green Line
Freeway Speeds
0 - 20 mph
21 - 34 mph
35 - 49 mph
> 50 mph
No Data Available
City Street Speeds
0 - 10 mph
11 - 20 mph
> 21 mph
No Data Available
NORTH
NE
SW
SOUTH
SE
HOLLYWOOD BLVD
FELIZ BLVD
STATE HWY 2
MELROSE AVE
BEVERLY BLVD
W 3RD ST
W OLYMPIC BLVD
VENICE BLVD
W JEFFERSON BLVD
RODEO RD
E VERNON AVE
E SLAUSON AVE
E FLORENCE AVE
GAGE AVE
BROOKLYN AVE
E OLYMPIC BLVD
E WASHINGTON BLVD
S WESTERN AVE
S VERMONT AVE
S BROADWAY
CRENSHAW BLVD
S VAN NESS A
PACIFIC BLVD
Start
RIITS - Los Angel...
Video
Document1 - Micr...
11:40 AM

Changeable Message Sign (CMS)

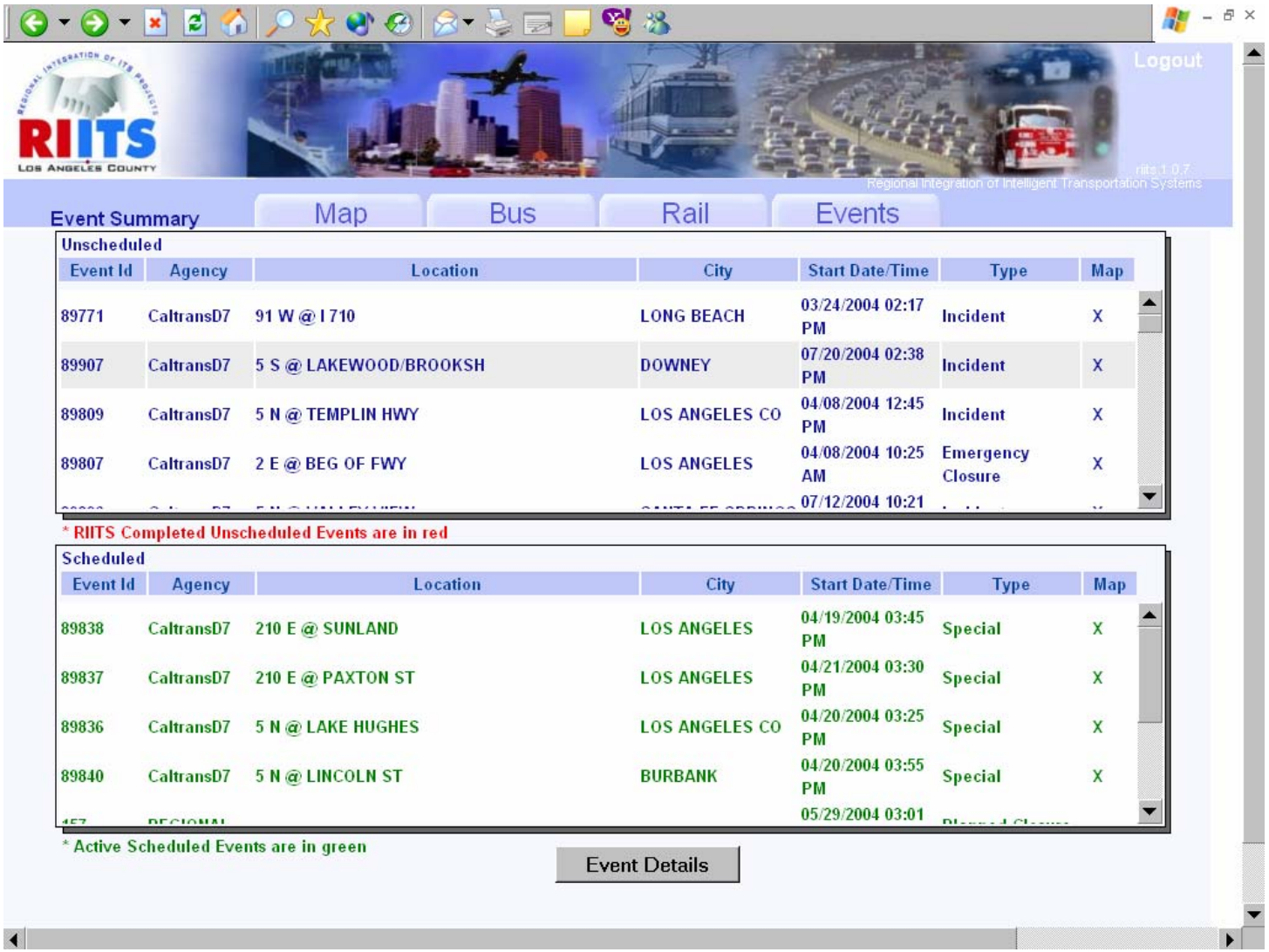
- Displays message content on sign as a part of freeway incident response
- Selectable on a map display


RIITS
Incident
Event ID: 97239
Route/Street: I-10
Direction: West
Cross Street 1: FREMONT
City/Area: ALHAMBRA
Occurrence Date: 06/07/05
Occurrence Time: 2:20 PM
Estimated Duration: 04 Hours
Lanes Blocked: 4
Issuing Agency: Caltrans-D7
Description: Accident 10W @ FREMONT All lane(s) blocked
Est. clearance time: 18:20
RIITS
Caltrans-D7
Camera #135
06/07/2005 04:03 PM
10 West @ FREMONT AVE
RIITS
Caltrans-D7
Sign #30
E 10 CONGESTED
AT RTE 710
Started at : 06/07/2005 03:38 PM
10 East @ CITY TERRACE O/C
RIITS
Caltrans-D7
Sign #73
FREEWAY CLOSED
AT RTE 605
Started at : 06/07/2005 11:45 AM
10 West @ PUENTE AVE.
Logout
Version 1.0
Map Legend
Video - Live
Video - Snapshot
CMS - Active
Event - Unscheduled
Event - Scheduled
Bus - Active
Bus Timepoint
Metro Train
Metro Rail Stop
Metro Red Line
Metro Blue Line
Metro Gold Line
Metro Green Line
Freeway Speeds
0 - 19 mph
20 - 34 mph
35 - 50 mph
> 51 mph
No Data Available
City Street Speeds
0 - 10 mph
11 - 20 mph
> 21 mph
FELIZ BLVD
W MISSION RD
N BROADWAY
W VALLEY BLVD
GARVEY AVE
RAMONA BLVD
BROOKLYN AVE
E OLYMPIC BLVD
E WASHINGTON BLVD
E VERNON AVE
E SLAUSON AVE
GAGE AVE
S VERMONT AVE
S WESTERN AVE
S BROADWAY
PACIFIC BLVD
TELEGRAPH RD
W JEFFERSON BLVD

Event Data

- Major types of freeway or arterial events
  - Incidents (accidents)
  - Planned construction and maintenance activities
  - Special events
  - Emergency closures
  - Weather and other disasters

- Factors of interest
  - Location, type, estimated duration, impact
  - Data must be updated as event transpires
  - Starting and ending times; starting and ending locations


RIITS
Los Angeles County
Logout
riits.1.0.7
Regional Integration of Intelligent Transportation Systems
Event Summary
Map
Bus
Rail
Events
Unscheduled
Event Id | Agency | Location | City | Start Date/Time | Type | Map
89771 | CaltransD7 | 91 W @ I 710 | LONG BEACH | 03/24/2004 02:17 PM | Incident | X
89907 | CaltransD7 | 5 S @ LAKEWOOD/BROOKSH | DOWNEY | 07/20/2004 02:38 PM | Incident | X
89809 | CaltransD7 | 5 N @ TEMPLIN HWY | LOS ANGELES CO | 04/08/2004 12:45 PM | Incident | X
89807 | CaltransD7 | 2 E @ BEG OF FWY | LOS ANGELES | 04/08/2004 10:25 AM | Emergency Closure | X
07/12/2004 10:21
* RIITS Completed Unscheduled Events are in red
Scheduled
Event Id | Agency | Location | City | Start Date/Time | Type | Map
89838 | CaltransD7 | 210 E @ SUNLAND | LOS ANGELES | 04/19/2004 03:45 PM | Special | X
89837 | CaltransD7 | 210 E @ PAXTON ST | LOS ANGELES | 04/21/2004 03:30 PM | Special | X
89836 | CaltransD7 | 5 N @ LAKE HUGHES | LOS ANGELES CO | 04/20/2004 03:25 PM | Special | X
89840 | CaltransD7 | 5 N @ LINCOLN ST | BURBANK | 04/20/2004 03:55 PM | Special | X
05/29/2004 03:01
* Active Scheduled Events are in green
Event Details

Transit Information (Bus)

- Bus Routes (updated twice per year)
- Bus Schedules (updated twice per year)
- Bus Locations (real-time)
- Schedule Adherence (real-time)
- Bus Incidents (updated as needed)

Delcan
TRANSPORTATION • INFORMATION TECHNOLOGY • WATER

RIITS
LOS ANGELES COUNTY

Logout

riits.1.0.7

Regional Integration of Intelligent Transportation Systems

Bus Selection | Map | Bus | Rail | Events

09/01/2004 10:49 AM

Select Zone from Map or List

Select Up to 4 Buses to Display

C | All Agencies

Bus Id	Line	Direction	Line Description	Zone
161	30	East	West Pico Bl./E. 1st St./Floral Dr.	B,C,D
165	30	East	West Pico Bl./E. 1st St./Floral Dr.	B,C,D
5	460	East	Disneyland/Fullerton/Knott's Berry Farm/Norwalk/LA Express	C,E
295	30	East	West Pico Bl./E. 1st St./Floral Dr.	B,C,D
12	460	East	Disneyland/Fullerton/Knott's Berry Farm/Norwalk/LA Express	C,E

Selected Buses

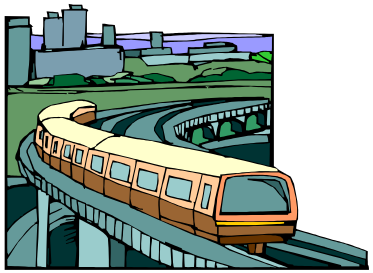
Bus Id	Line	Direction	Line Description	Status	Arrival Time	Timepoint Desc
161	30	East	West Pico Bl./E. 1st St./Floral Dr.	3 min late	10:49 AM	GAAR GARFLD HI ARR
780	180		Hollywood Bl./Los Feliz Bl./Colorado Bl./North Lake Av.	Off Route		
347	180	East	Hollywood Bl./Los Feliz Bl./Colorado Bl./North Lake Av.	On-Time	10:53 AM	COFO COLORADO FAIR OAKS
5	460	East	Disneyland/Fullerton/Knott's Berry Farm/Norwalk/LA Express	7 min early	10:59 AM	KNBY KNOTBER RYFARM

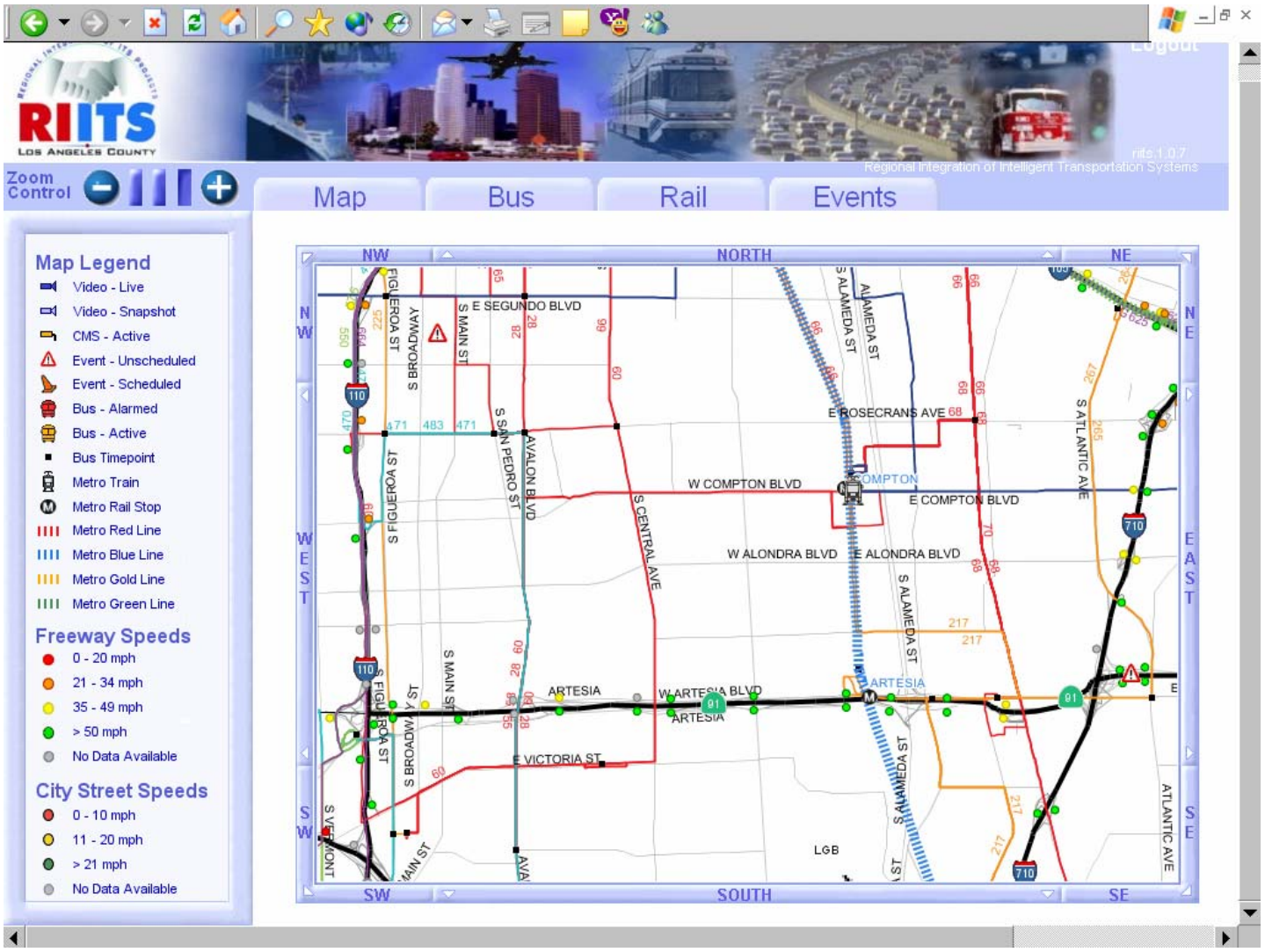
* On Time Buses are in blue
* Late Arrival Buses are in red
* Early Arrival Buses are in green
* Off Route Buses are in black

Send To Map

Transit Information (Rail)

- Rail Lines (updated twice per year)
- Rail Schedules (updated twice per year)
- Train Locations for Green Line (real-time)
- Schedule Adherence for Green Line (real-time)
- Rail Incidents (updated as needed)




RIITS
Los Angeles County
Logout
rits 1.0.7
Regional Integration of Intelligent Transportation Systems
Zoom Control
Map
Bus
Rail
Events
Map Legend
Video - Live
Video - Snapshot
CMS - Active
Event - Unscheduled
Event - Scheduled
Bus - Alarmed
Bus - Active
Bus Timepoint
Metro Train
Metro Rail Stop
Metro Red Line
Metro Blue Line
Metro Gold Line
Metro Green Line
Freeway Speeds
0 - 20 mph
21 - 34 mph
35 - 49 mph
> 50 mph
No Data Available
City Street Speeds
0 - 10 mph
11 - 20 mph
> 21 mph
No Data Available
NW
NORTH
NE
WEST
EAST
SW
SOUTH
SE
E SEGUNDO BLVD
S BROADWAY
S MAIN ST
S FIGUEROA ST
S SAN PEDRO ST
AVALON BLVD
S CENTRAL AVE
ALAMEDA ST
S ALAMEDA ST
E ROSECRANS AVE
W COMPTON BLVD
COMPTON
E COMPTON BLVD
S ATLANTIC AVE
W ALONDRA BLVD
E ALONDRA BLVD
ARTESIA
W ARTESIA BLVD
E VICTORIA ST
LGB
ATLANTIC AVE
110
91
710

Benefits

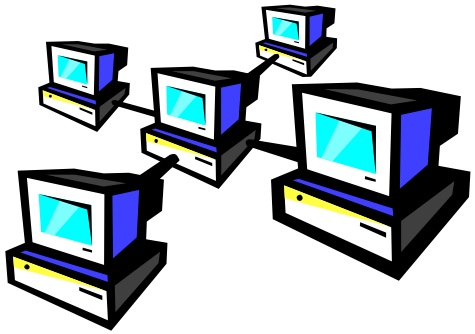
- Encourages Multi-Jurisdictional co-operation
- Enables sharing of real-time information
- Provides single data source for public and private participants
- Improves traveller information dissemination on a regional basis

Integrated Regional Signal System (IRSS)

IRSS

IS

- High Level System
- System of Systems



IRSS

NOT

- Centralized Traffic Signal Management System
- Set of Computer or Traffic Signal Controller Specifications

Objectives of IRSS

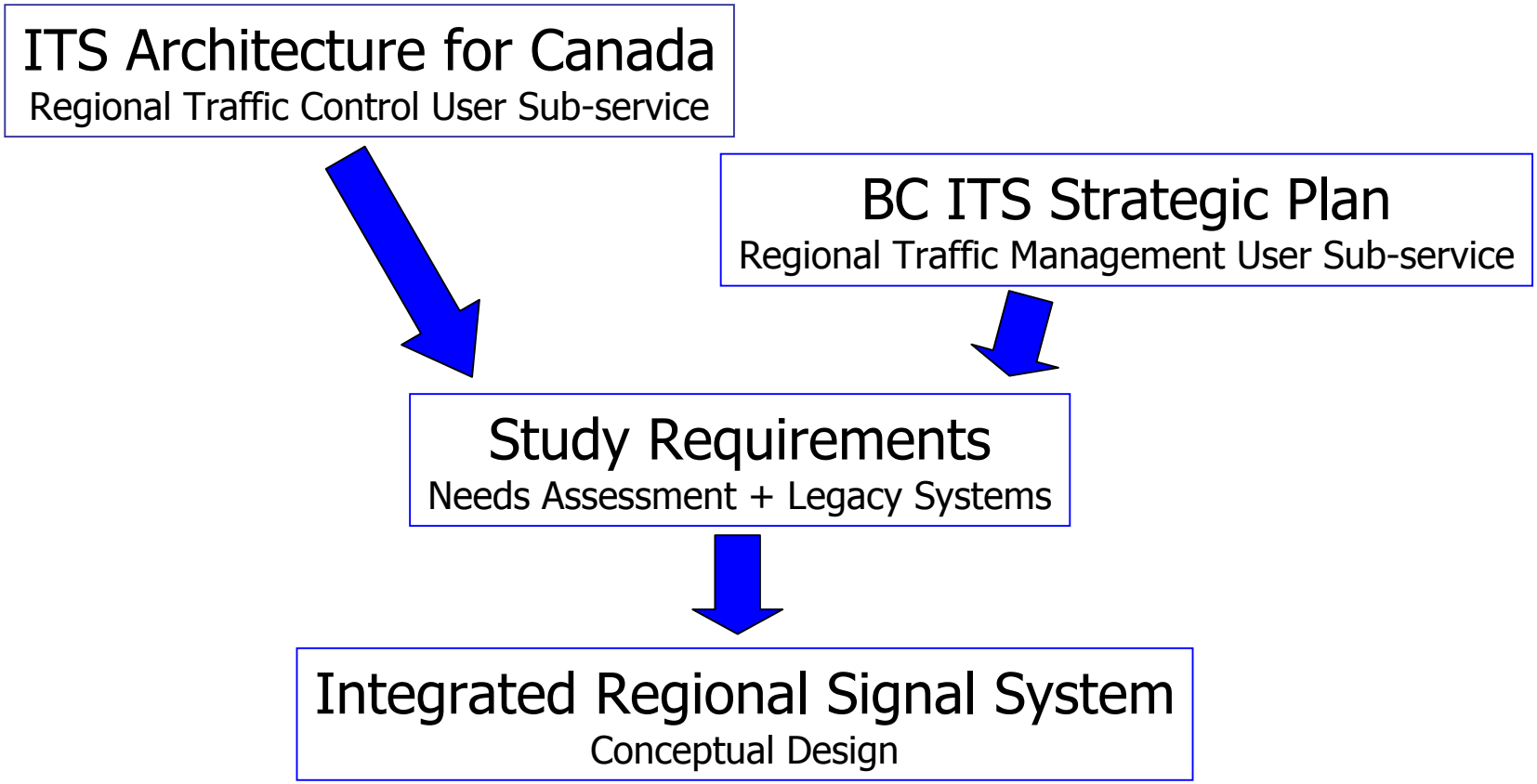
- Provides means to coordinate traffic signal operations within the control region
- Allows individual agencies to still maintain autonomy over their roadways and traffic signals

IRSS

- Based on Centre-to-Centre (C2C) Communications Protocol
  - Share information
  - Facilitate coordinated operations
  - Send/Receive event notices
  - Provide links for other regional ITS initiatives

IRSS for Vancouver

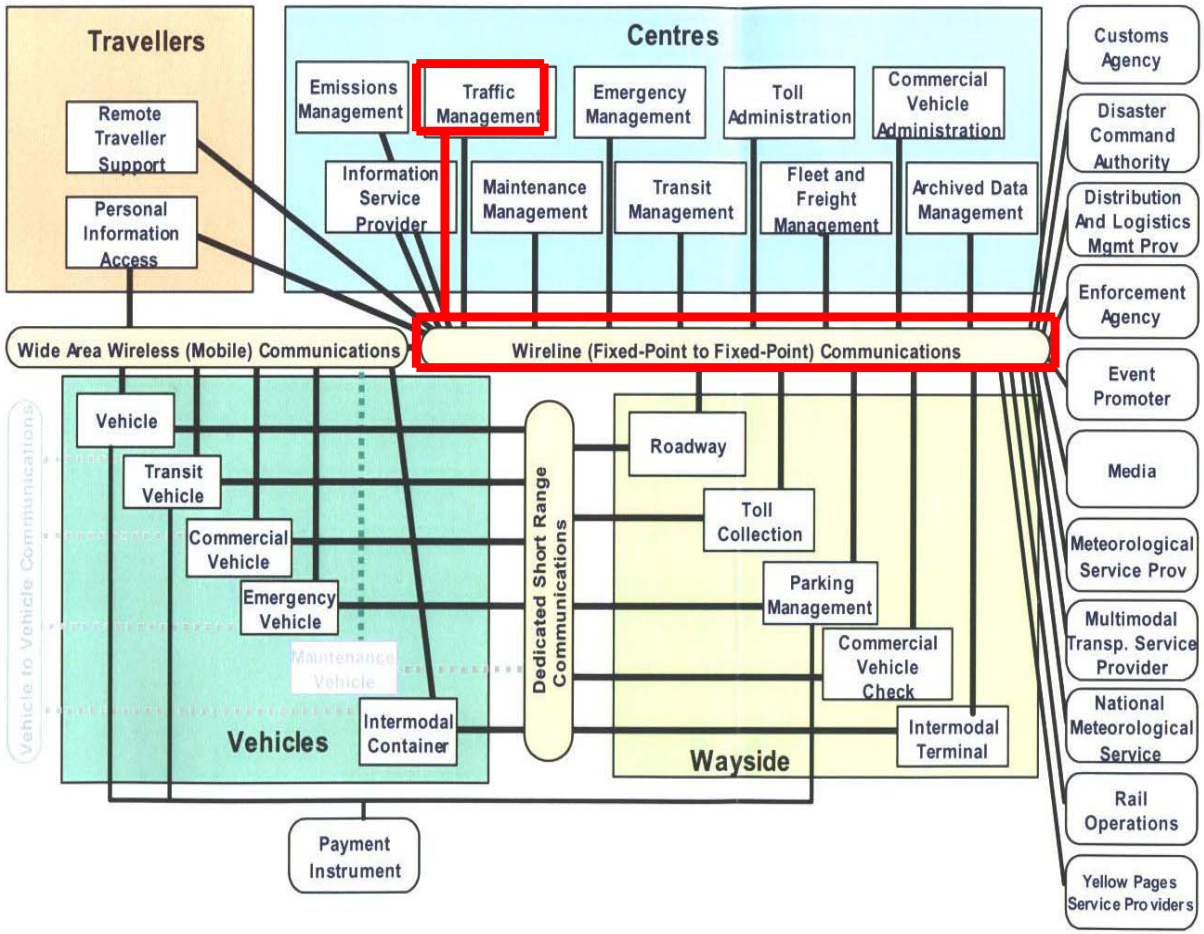
Preliminary System Concept



Definition of ITS Architecture

- Physical representation:
  - Important ITS interfaces
  - Major system components
- Provides a high-level structure:
  - Processes
  - Data flows
- Not a detailed design

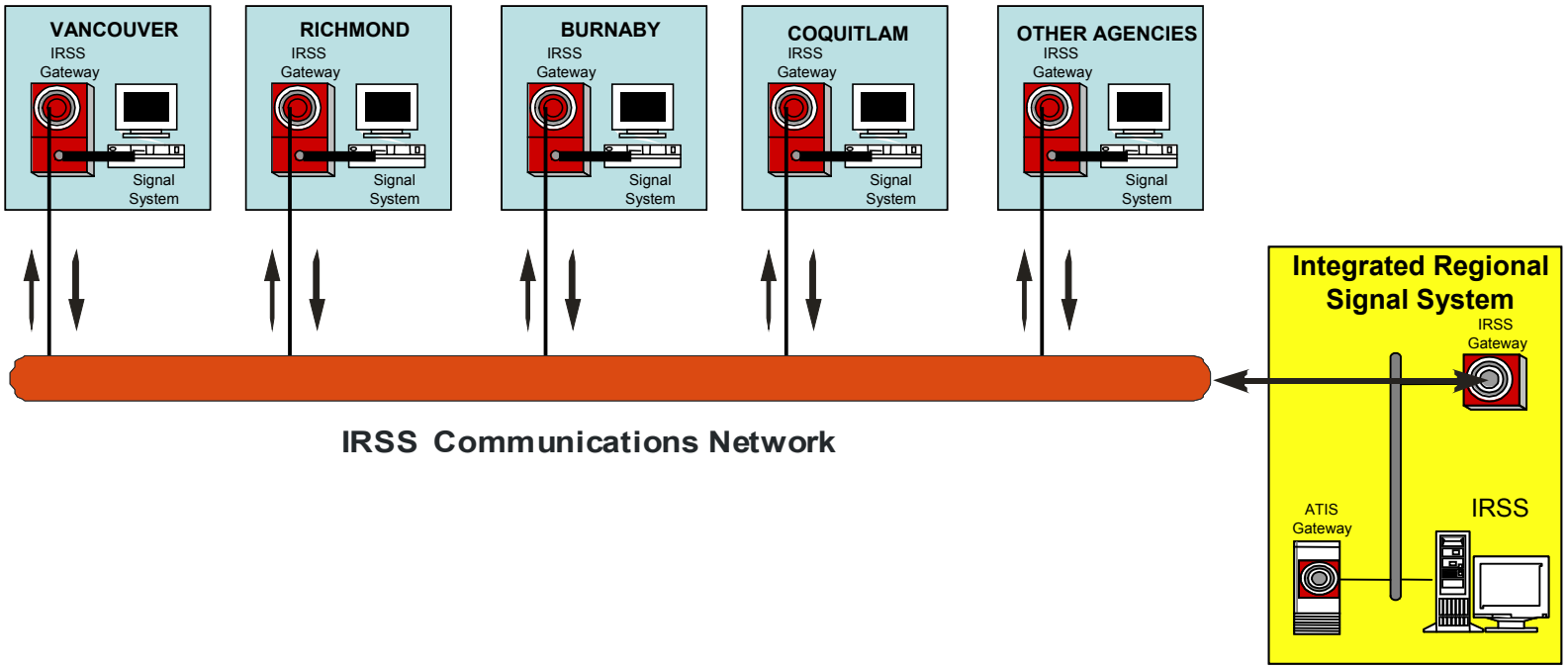
Provincial ITS Architecture



BC ITS Strategic Plan

- Identified 23 ITS Initiatives
  - 66 Distinct Projects
- Initiative 1 – Regional Traffic Management
  - Freeway Incident Management System
    - Integrated Regional Signal System
  - Arterial Traffic Management System
  - Portable Traffic Management for Construction Zones
  - Adaptive Traffic Signal Control System

Preliminary System Concept



Barriers to Integration

- Consensus building among agencies
  - Multiple agencies involved
- Proprietary technology of legacy systems
  - Dependent on supplier cooperation
- 'Isolated' MoT intersections
  - Need for system integration

Opportunities

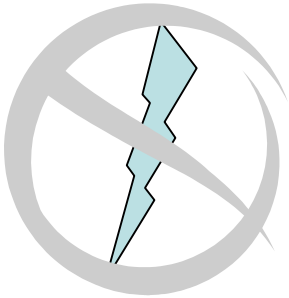
- Improve inter-agency cooperation and coordination
- Improve accessibility to timely and accurate traffic data
- Reduce vehicle delays and congestion
- Linking is first step to achieving regional traffic management benefits through:
  - Traveller Information
  - Incident Management
  - Transit Signal Priority
  - etc.

Regional Traffic Management Centre (RTMC)

RTMC

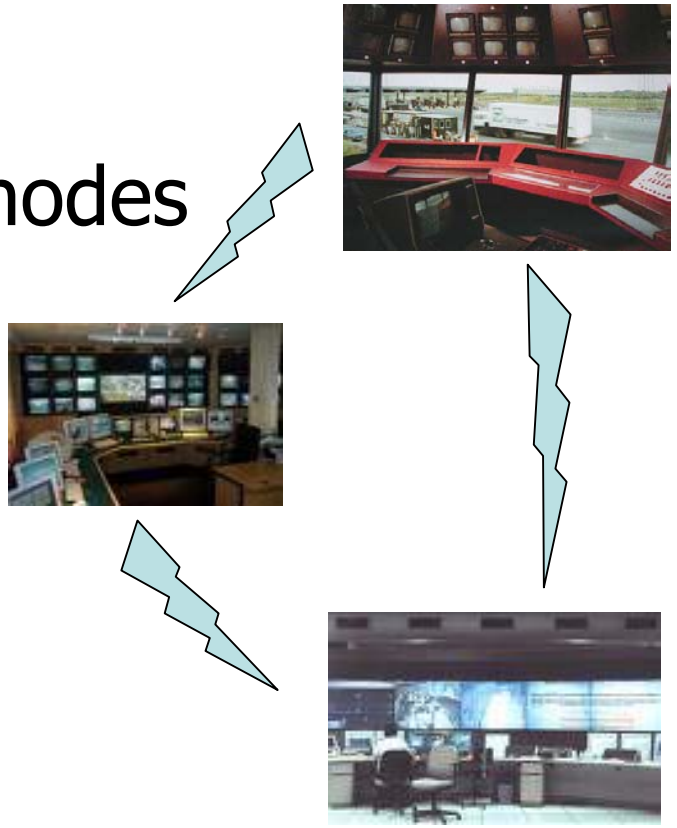
Traditional TMC

- Standalone systems
- Lack of interoperability between agencies
- Adoption of different standards and protocols



RTMC Objectives

- Improves coordination
- Supports multiple centres/nodes
- Multiple agencies/vendors
- Encourages data sharing
- Open system – scalable, interoperable



RTMC Roles

- Centre for monitoring and traffic control
- Clearinghouse for data / information exchange
- Provides coordination between travel modes
- Provides support for other transportation programs

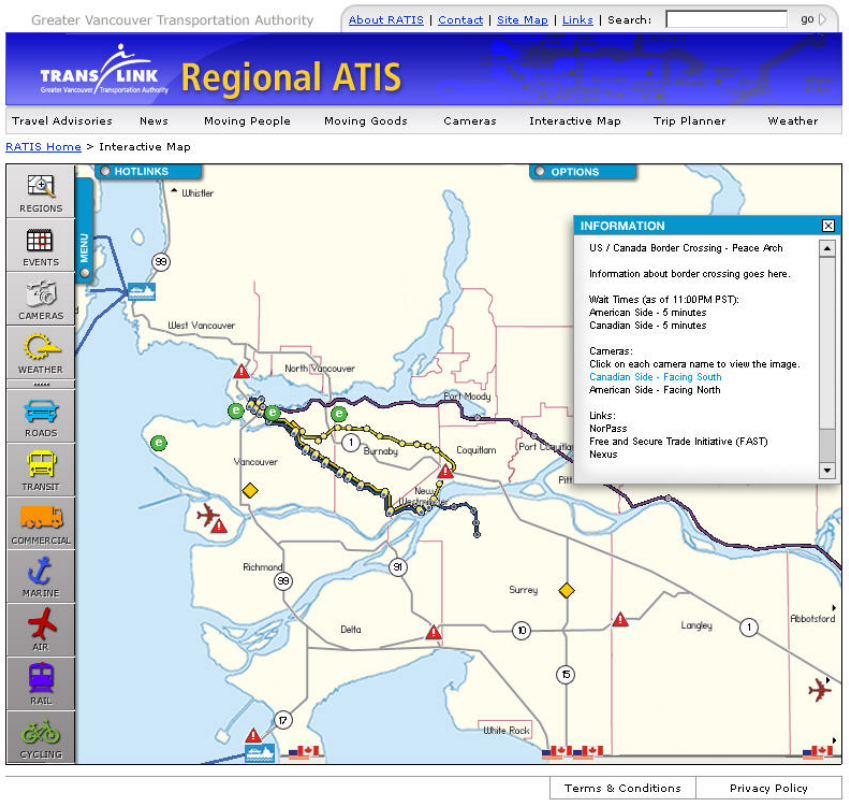
Regional Advanced Traveller Information System (RATIS)

What is RATIS?

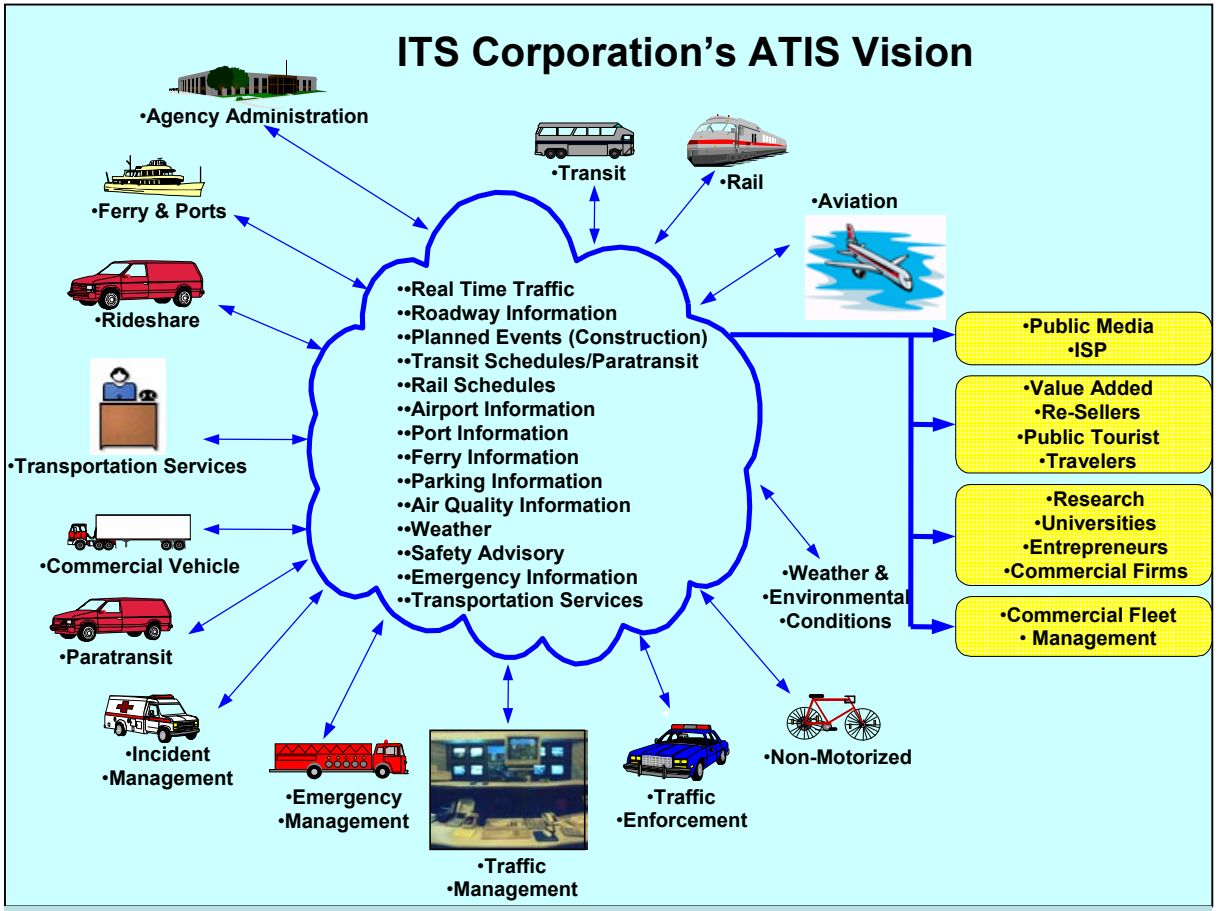
- Regional network to exchange multi-modal transportation information in real-time
- It is a privileged internet for transportation and emergency service agencies, provide multi-modal real time information at their fingertips
- Provides a data feed for information service providers (ISPs) to enable wide dissemination of traveler information

RATIS

- RATIS Provides:
  - Real-time traffic status
    - Incident/closure/events
    - CCTV images
    - Travel time
    - Border wait time
    - Service disruptions
    - Parking
  - Travel mode information
  - Travel planner / mode choice tool



RATIS

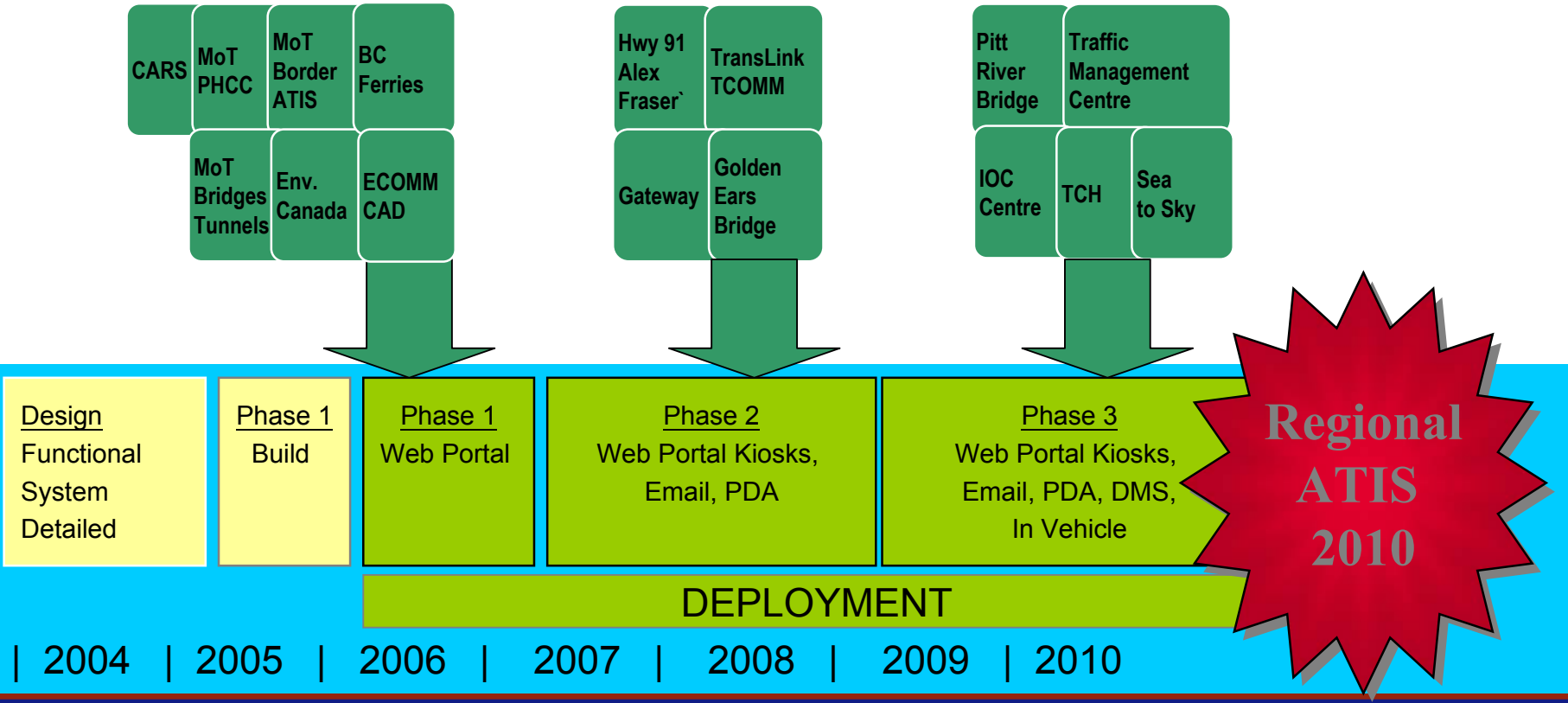


Fully Integrated - All Modes All Roads

RATIS for Greater Vancouver Area

RATIS for Greater Vancouver Area

- RATIS Deployment



RATIS for Greater Vancouver Area

- RATIS Promotes :
  - "One-Stop" transportation Portal
  - Multi-Jurisdiction Coordination and Dissemination of transportation information:
    - Local Municipalities
    - Public Transit Authorities
    - Airport Authority
    - Port Authority
    - Provincial Ministry of Transportation

Conclusion

~~Standalone Traffic Management~~

Regional Multi-Jurisdictional Integrated Traffic Management

- Innovative Concepts
- New Partnerships
- New Technologies
- Multi-Jurisdictional Co-operations
- Regional Integrations

TRANSPORTATION • INFORMATION TECHNOLOGY • WATER

www.delcan.net

Questions & Answers?

j.lam@delcan.com