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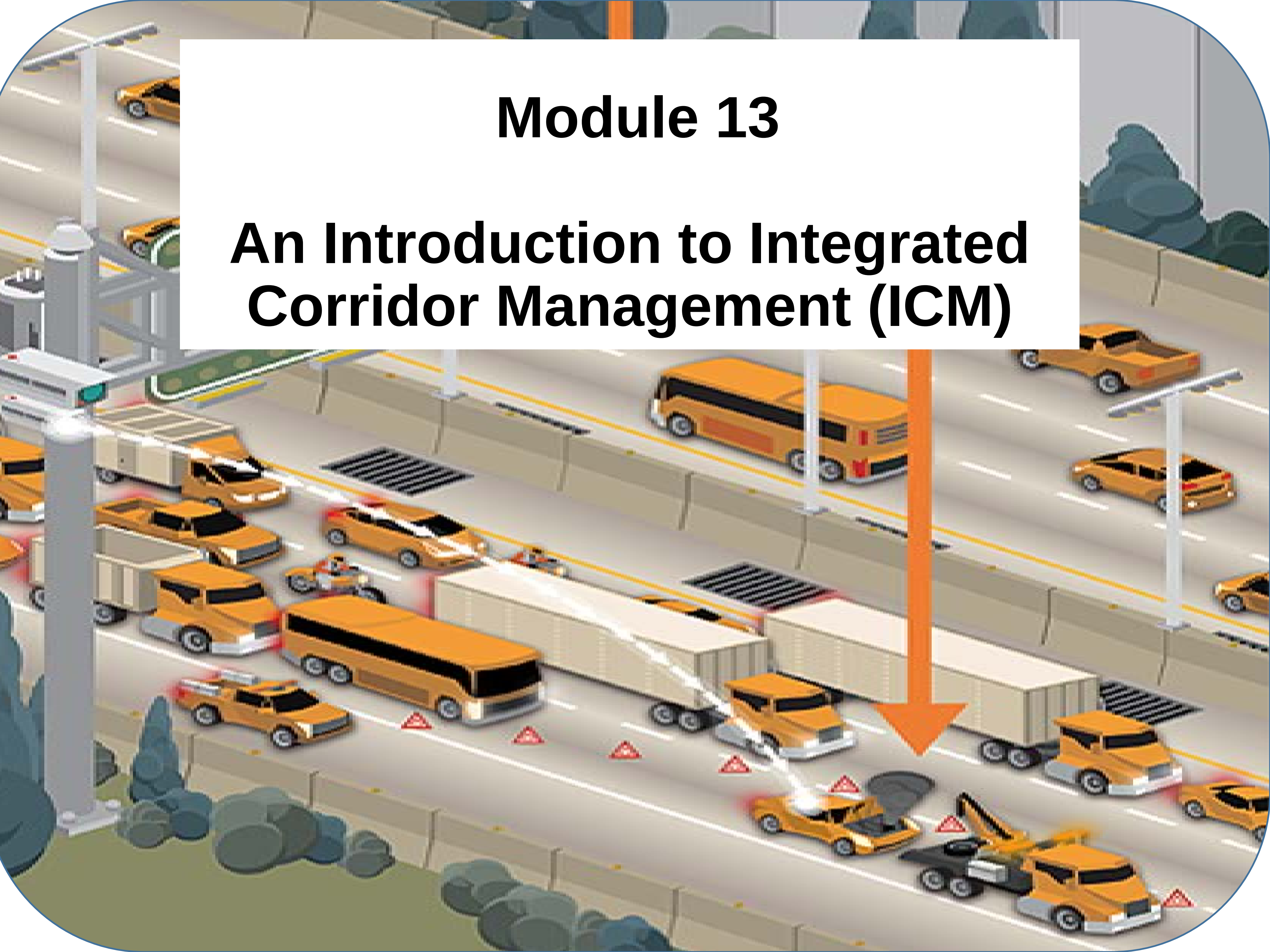
U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

Module 13

An Introduction to Integrated Corridor Management (ICM)



Instructor

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Learning Objectives

Describe **Integrated Corridor Management** (ICM)

Identify and describe standards associated with ICM

Describe actual **ICM deployments**, the role(s) of standards, and the use of standards

Learning Objective 1

Describe
Integrated Corridor Management
(ICM)

ICM Concepts

What is Integrated Corridor Management (ICM)?

- **Next logical step** in multimodal congestion management
- **Leverages and optimizes** existing transportation infrastructure
- Enables travelers to make **informed travel decisions** and dynamically **shift modes**
- **Reduces** travel time, delays, fuel consumption, emissions, and incidents
- Improves travel time **reliability and predictability**

ICM Concepts (continued)

Four Basic ICM Concepts

1. Corridor modes of operation

How ICM manager and/or transportation network operators are operating transportation networks

ICM Concepts (continued)

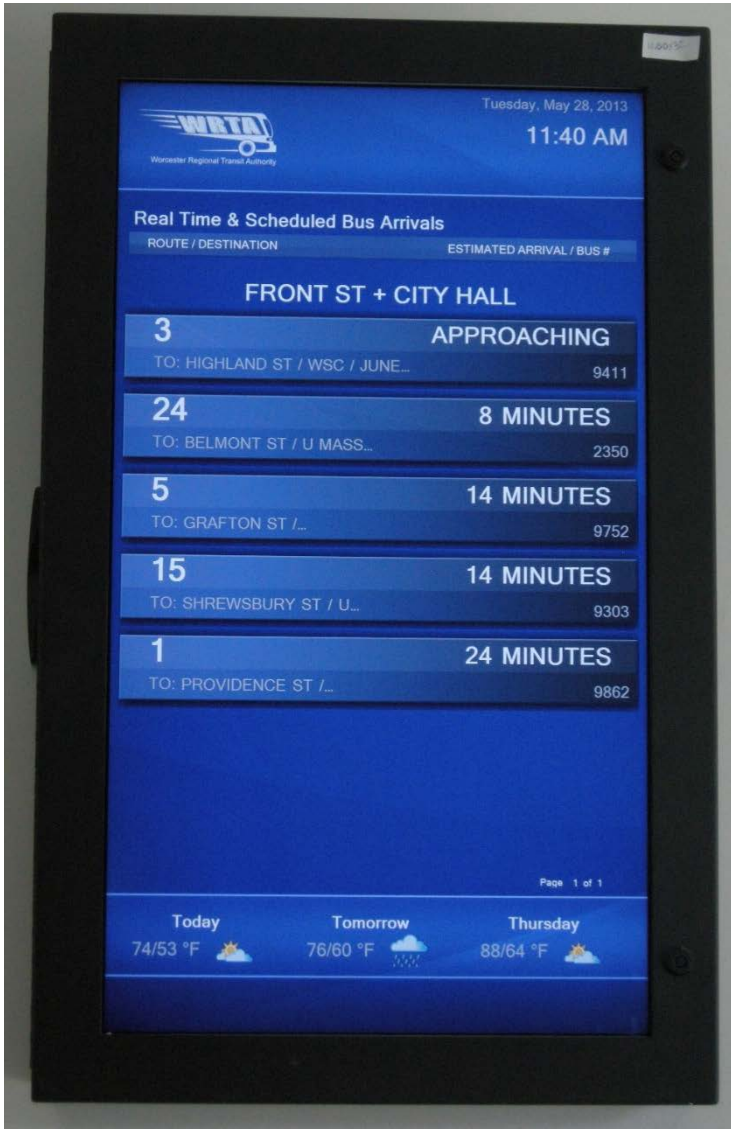
Four Basic ICM Concepts

1. Corridor modes of operation
2. **Strategic areas for ICM**
   - Demand Management
   - Load Balancing
   - Event Response
   - Capital Improvement

ICM Concepts (continued)

Four Basic ICM Concepts

1. Corridor modes of operation
2. Strategic areas for ICM
3. **Conceptual Levels within the corridor**
   - Physical
   - Information processing
   - Execution or decision-making



ICM Concepts (continued)

Four Basic ICM Concepts

1. Corridor modes of operation
2. Strategic areas for ICM
3. Conceptual Levels within the corridor
4. **ICM environment**
   - Four strategic areas
   - Three conceptual levels

ICM Concepts (continued)

Corridor Modes of Operations

- **Normal mode**: constitutes all actions to ensure day-to-day transportation needs are addressed
- **Event mode**:
  - Planned Event mode
  - Unplanned Event mode

ICM Concepts (continued)

Corridor Modes of Operations

- Can shift between **Normal** mode and **Event** several times during one day
- Can operate in single mode for entire day
- If event continues for extended period, mode can transition into "Normal" mode
- Corridor manager assesses **severity**, **impact** on entire corridor, and **expected duration** of event before switching from Normal to Event
- Ability of existing systems to support shift is another factor affecting decision to shift from one operational mode to another

ICM Concepts (continued)

Strategic Areas for ICM

ICM Concepts (continued)

Strategic Areas for ICM

Demand Management

- Addresses patterns of usage of transportation networks
- Demand changes by time of day, day of week, and time of year
- Actions involve changing or addressing changes in demand patterns
- Type of demand management action depends on mode of operation

ICM Concepts (continued)

Strategic Areas for ICM

Load Balancing

Addresses how travelers use transportation networks

- During Normal mode operation
- To address Event mode operation

ICM Concepts (continued)

Strategic Areas for ICM

Event Response

Events categorized by duration or effect.

Effects include:

- Reduction of capacity
- Increase in demand
- Change in demand pattern

ICM Concepts (continued)

Strategic Areas for ICM

Capital Improvements to Mitigate Transportation Problems

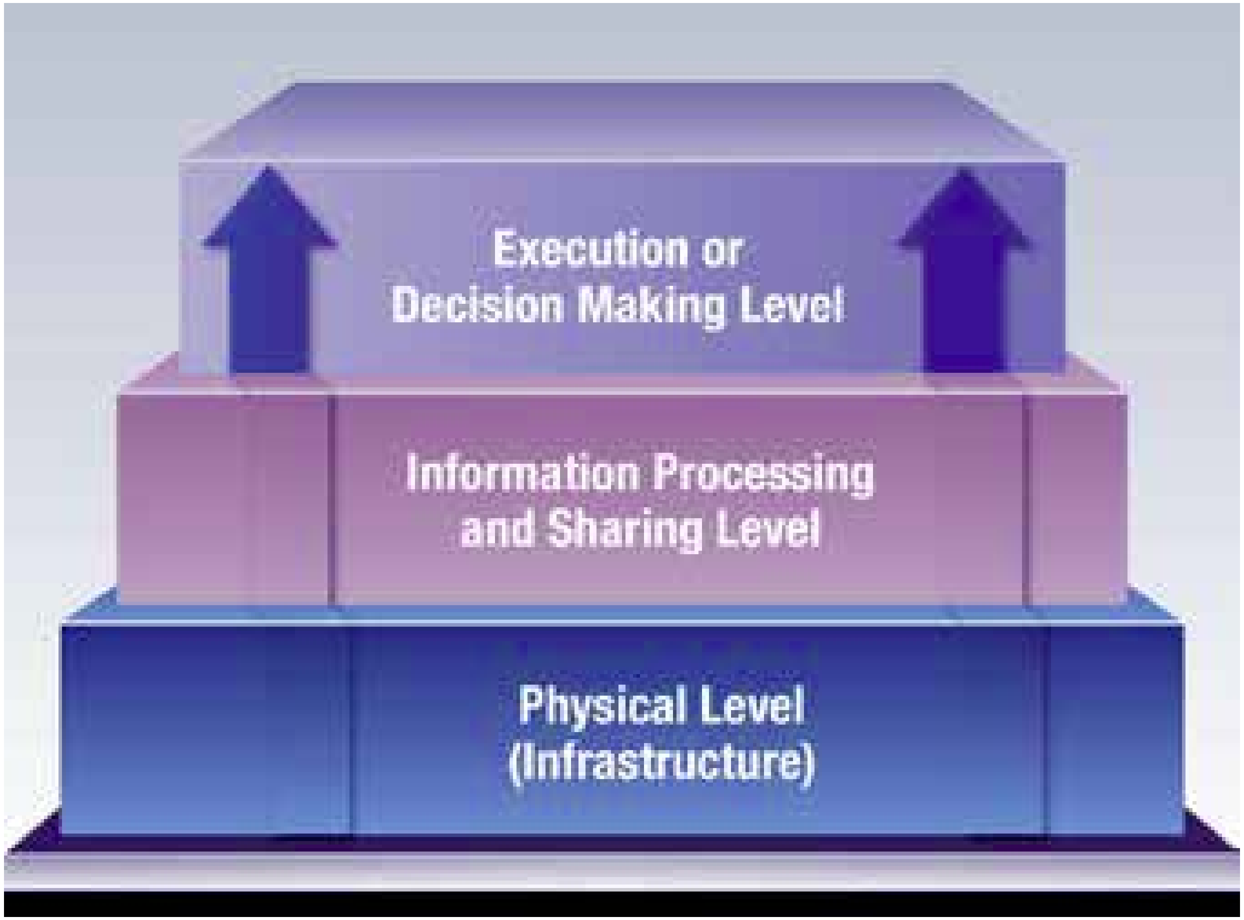
- Construction of additional capacity on existing networks
- Addition of networks
- Use of technology on new or existing facilities

ICM Concepts (continued)

Strategic Areas for ICM

ICM Concepts (continued)

Three Conceptual Levels

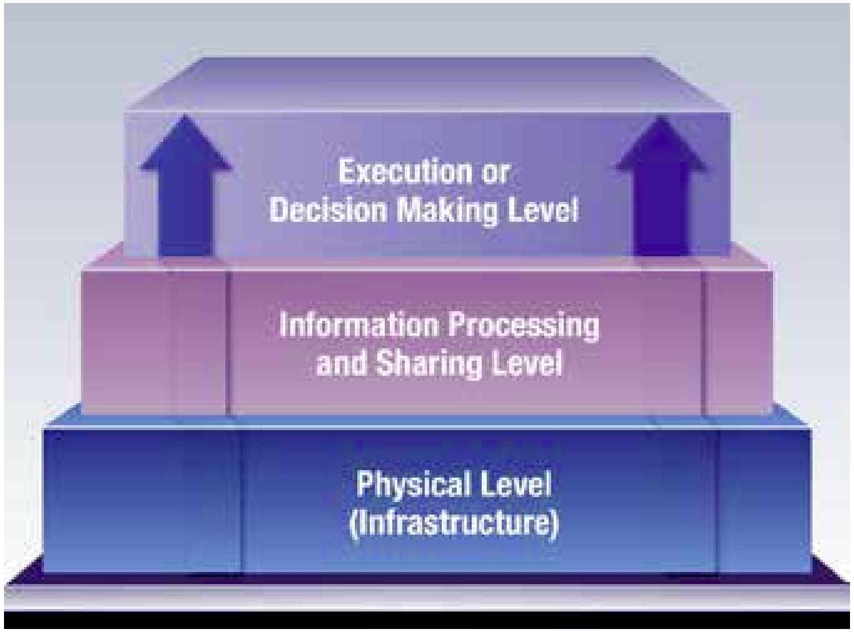


ICM Concepts (continued)

Four Basic ICM Concepts

4. ICM environment

- Four strategic areas
- Three conceptual levels



Benefits of ICM

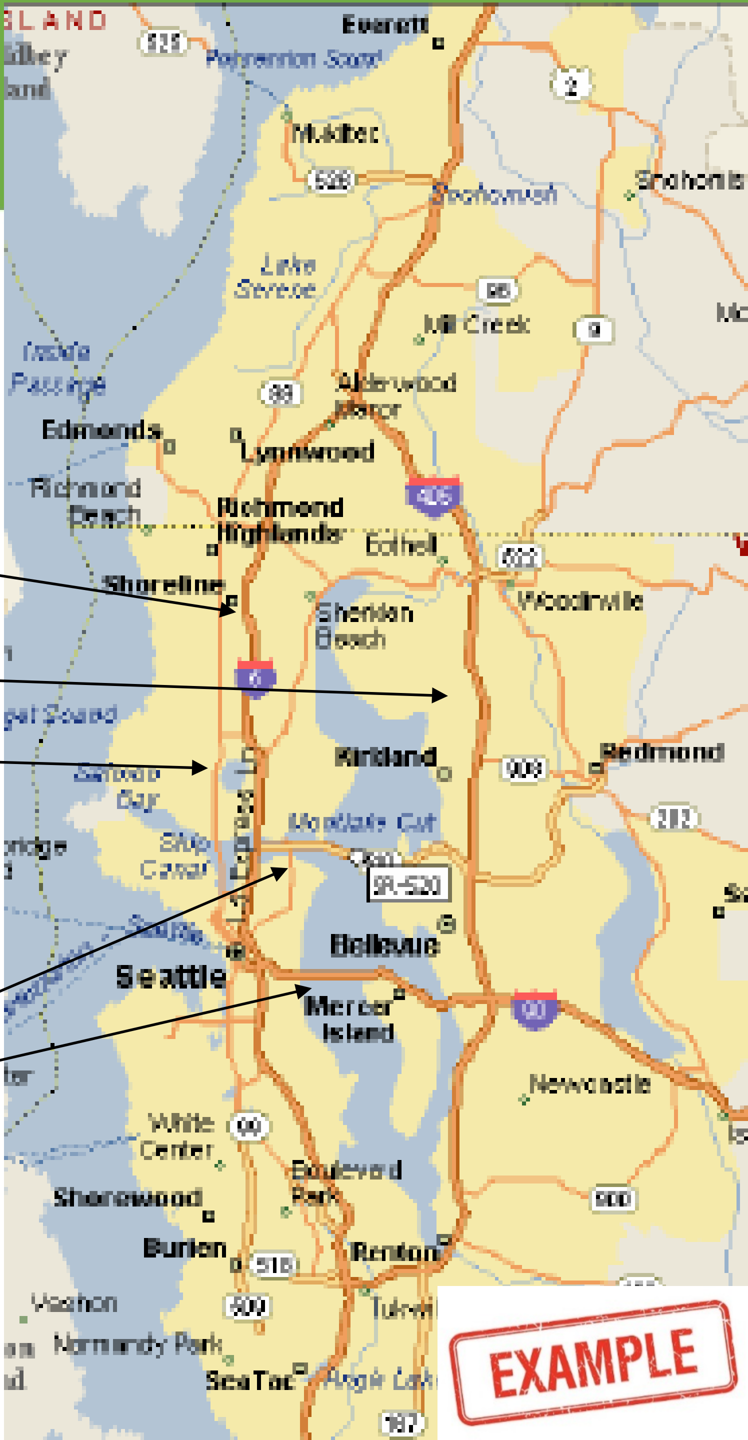
Benefits of ICM

- Reduced travel times
- Improved travel time reliability
- Reduced fuel consumption
- Reduced emissions
- Annual savings of vehicle-hours of travel
- Reduced travel time variability
- Better utilization of transit excess capacity
- Improved productivity of transportation system as a whole

ICM: An Operational Scenario

I-5 Corridor

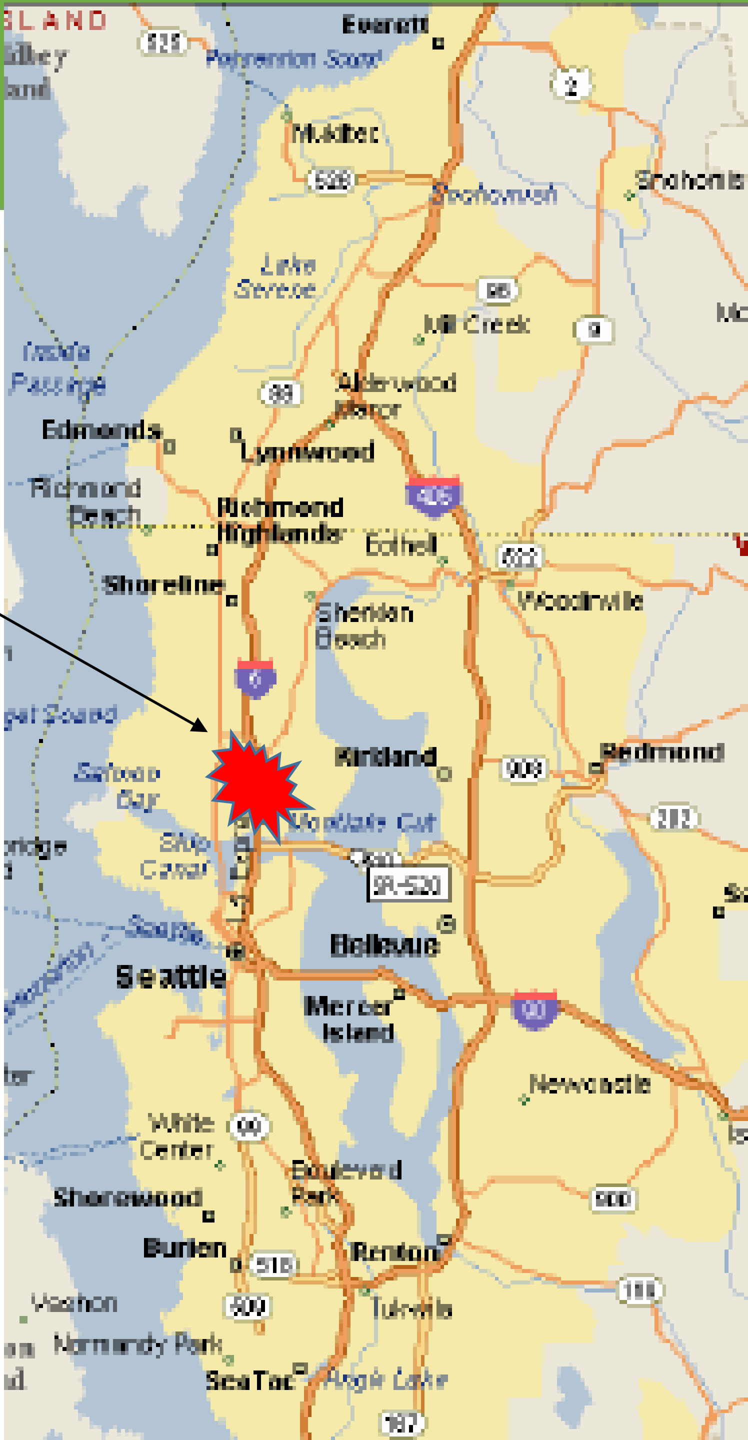
- 30 miles of Interstate 5 (I-5), with reversible high occupancy vehicle (HOV) lanes in median
- 20 miles of Interstate 405 (I-405), with HOV lanes
- 24 miles of State Road 99 (SR 99)
- Sounder Commuter Rail line, with 4 trips daily between Everett, WA and Seattle
- Cross roads
  - State Roads 520 and 522 (SR 520 and SR 522)
  - Interstate 90 (I-90)



ICM: An Operational Scenario

I-5 Corridor

- Truck fire on NB I-5
- All NB lanes closed
- Lanes closed at least 12 hours
- HOV closed on I-5



ICM: An Operational Scenario

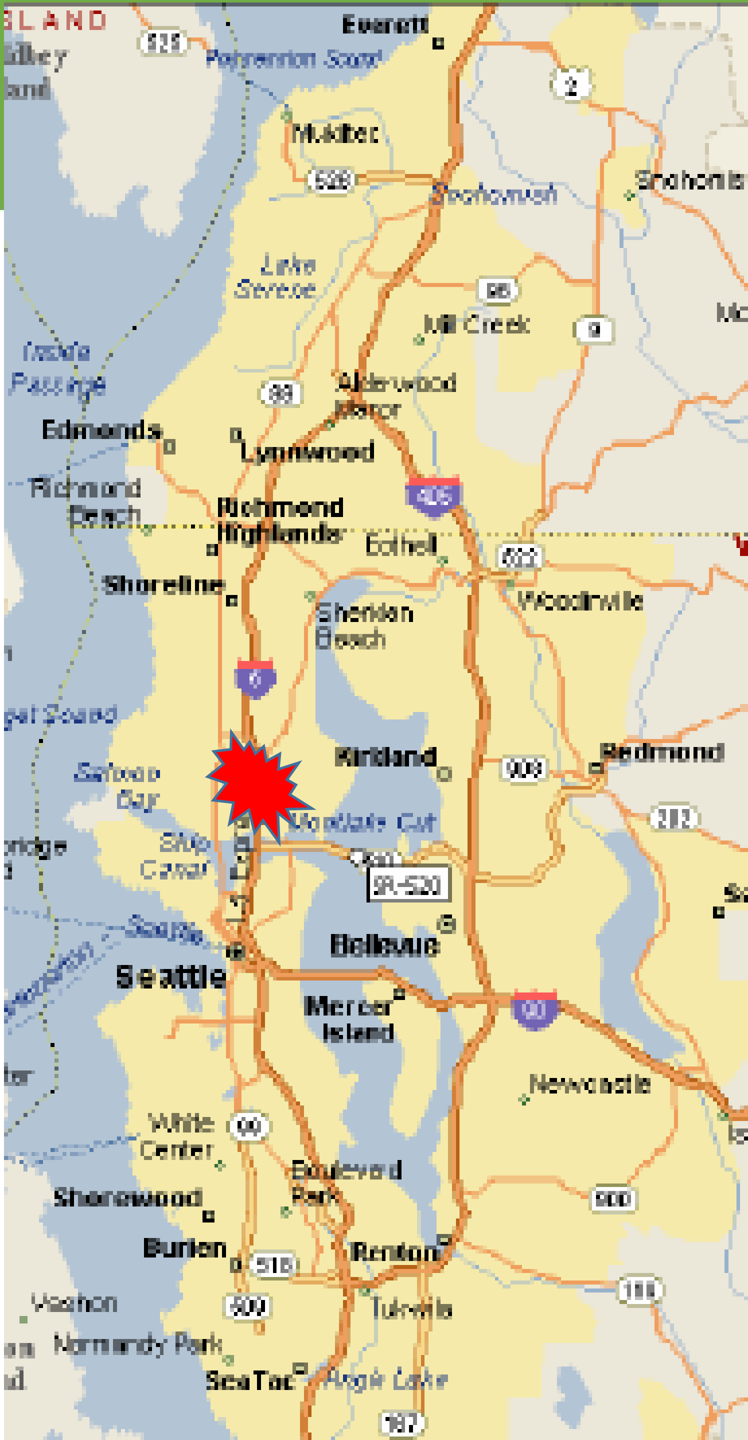
Operational Scenario

- Network operators want to:
  - Ensure traveler safety
  - Prevent catastrophic incidents that strand road users
  - Provide viable alternatives to road users
  - Keep travelers informed
- Current commuter rail ridership about 1,000 people per day
- Without ICM and ICMS, operator reacts to incident in manner permitted by operator’s network management system

How ICM works: An Operational Scenario

Operational Scenario

- Signal timing plans
- Ramp meters
- Detour signage
- Law enforcement to facilitate traffic at intersections
- Advise commuters via broadcast media, email alerts, and other mechanisms
- Suggest staggered trip departure times
- Lift HOV lane restrictions
- Eliminate parking restrictions
- Change bus schedules and routes
- Free shuttle service
- Add commuter rail service



The Role of Standards in ICM

Control and Real-time Management Standards

- Traffic Signal Standards:
  - National Transportation Communications for ITS Protocol (NTCIP)
  - Actuated Traffic Signal Controller (ASC) Units
  - NTCIP Signal Systems Masters
  - NTCIP Signal Control and Prioritization (SCP)
  - Advanced Transportation Controller (ATC)
  - ATC Cabinet
  - ATC Application Programming Interface (API)
- Device Standards:
  - NTCIP Dynamic Message Signs (DMS)
  - NTCIP Ramp Metering
  - NTCIP Transportation Sensor System (TSS)

The Role of Standards in ICM

Data Sharing Standards

- NTCIP Center-to-Center (C2C)
- Society of Automotive Engineers (SAE) Advanced Traveler Information System (ATIS) message sets
- SAE Location Referencing Message Specification (LRMS)
- NTCIP TSS
- NTCIP CCTV Camera Control

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Question

Which of these is NOT a benefit of Integrated Corridor Management?

Answer Choices

a) Reduced fuel consumption

b) Improved customer service

c) Reduced travel time variability

d) Better utilization of transit excess capacity

Review of Answers

a) Reduced fuel consumption

Incorrect. ICM is expected to save hundreds of thousands of gallons of fuel annually.

b) Improved customer service

Correct! While there could be improved customer service, it is not a direct benefit of ICM.

c) Reduced travel time variability

Incorrect. ICM is expected to improve travel time reliability from a reduction in travel time variance.

d) Better utilization of transit excess capacity

Incorrect. ICM is expected to utilize any excess transit capacity.

Learning Objective 2

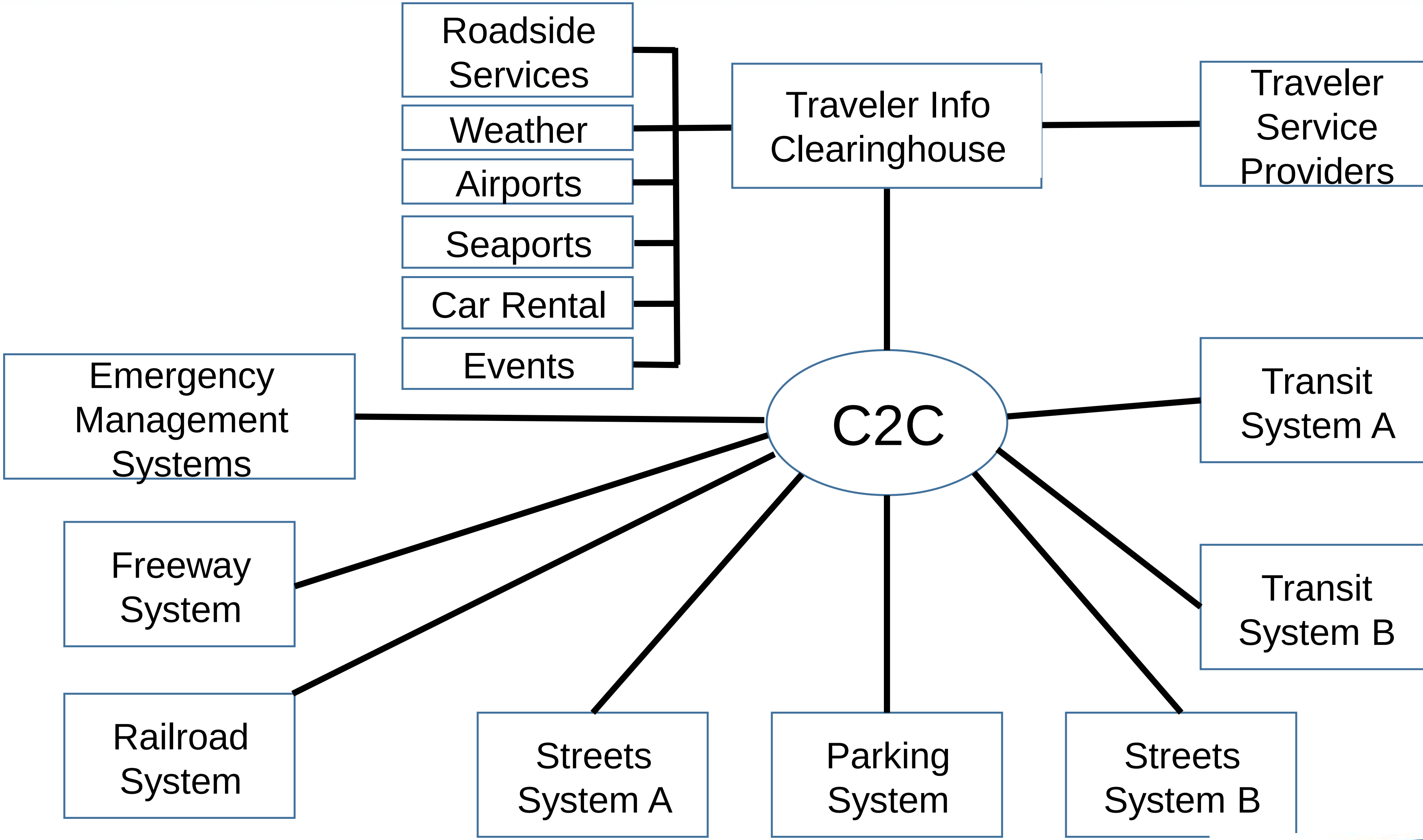
Identify and **describe** standards associated with ICM

Traffic Signal Standards for Control and Real Time Management

Traffic Signal Standards

- National Transportation Communications for ITS Protocol (NTCIP)
- Actuated Traffic Signal Controller Units (ASC)
- NTCIP Signal Systems Masters
- NTCIP Signal Control and Prioritization (SCP)
- Advanced Transportation Controller (ATC)
- ATC Cabinet
- ATC Application Programming Interface (API)

National Transportation Communications for ITS Protocol (NTCIP): Example of ITS Integration Using NTCIP



SUPPLEMENT

Traffic Signal Standards for Control and Real Time Management

Actuated Traffic Signal Controller (ASC) Units

- **NTCIP 1202 v02** - Object Definitions for Actuated Traffic Signal Controller (ASC) Units
- **Vocabulary** (commands, responses and information) necessary to control, manage and monitor ASC Units
- **Object definitions** to support functionality of ASC units
- **Conformance group requirements** and **conformance statements** to support compliance with standard

Traffic Signal Standards for Control and Real Time Management

NTCIP Signal Systems Masters (SSMs)

- **NTCIP 1210 v01** - Field Management Stations - Part 1: Object Definitions for Signal System Masters (SSMs):
  - **Vocabulary** to control, manage and monitor SSMs and signal system locals (SSLs)
  - Means for **pass-through communications** from traffic management system to local device
- SSMs used when infeasible to provide reliable, full-time communications from SSLs to transportation management center
- SSM device acts as surrogate for traffic management system
- SSM provides various methods of managing set of SSLs, which may include ASCs or other devices

Traffic Signal Standards for Control and Real Time Management

NTCIP Signal Control and Prioritization (SCP)

- **NTCIP 1211 v02** - Object Definitions for Signal Control and Prioritization (SCP)
- **Vocabulary** necessary to interact with, control, manage, and monitor transportation signal controllers implementing vehicle prioritization schemes
- Description of SCP **scenarios** and possible **configurations**
- **Object definitions** to support functionality of each scenario, conformance group requirements and conformance statements to support compliance with standard

Traffic Signal Standards for Control and Real Time Management

Advanced Transportation Controller (ATC)

- ITE/AASHTO/NEMA ATC Family of standards:
  - Defines **field controller devices** used in traffic management applications, particularly (but not exclusively) for traffic signal control
  - Has two types of users: **Operational and Developers**
- Three components of ATC are:
  - Controller
  - Cabinet (next slide)
  - Software
- Standards define initial modular ATC software platform for Applications Programming Interface (API) (see slide 42), Cabinet and Controller
- ITE/AASHTO/NEMA ATC Family describes open architecture field control devices and software applications that run on them

Traffic Signal Standards for Control and Real Time Management

ATC Cabinet

- Functional physical design requirements for cabinet that supports deployment of multiple ITS functions in single cabinet
- Major components installed in a cabinet:
    - Controller
    - Input Assembly(s)
    - Output Assembly(s)
    - Power Distribution Assembly
    - Service Panel Assembly
    - DC Power/Communications Assembly & Extension
    - Raw/Clean AC Power Assembly & Extension
    - Cabinet Monitoring System
    - Optionally, a Fiber Optic Splice Tray
- Includes other components
- Three standard cabinet assemblies are defined

Traffic Signal Standards for Control and Real Time Management

ATC Application Programming Interface (API)

- Specifies interface for application programs designed to operate on ATC controllers
- Allows multiple applications to be interoperable on single controller by sharing fixed resources of controller
- Software Requirements Specification (SRS) defines:
  - Five-layer structure
  - User needs and requirements of ATC software
  - Further defines API layer
- Provides basis for Board Support Package, the layer underneath API that is part of ATC controller standard

Device Standards Providing Control and Real Time Management

Device Standards

- NTCIP Dynamic Message Signs (DMS)
- NTCIP Ramp Metering
- NTCIP Transportation Sensor System (TSS)

Device Standards Providing Control and Real Time Management

NTCIP Dynamic Message Signs (DMS)

Device Standards Providing Control and Real Time Management

NTCIP Dynamic Message Signs (DMS)

- **NTCIP 1203 v03** - **Object Definitions** for Dynamic Message Signs (DMS)
- DMS can **change the message** presented to the viewer
- **Vocabulary** to advise and inform vehicle operators of current highway conditions by using DMS
- Message syntax, called **MULTI** (Mark-Up Language for Transportation Information), which allows objects to be grouped into message object
- Message object is analogous to **sentence** - both message object and sentence **require syntax** or ordering of information objects (words) to be understood

Device Standards Providing Control and Real Time Management

NTCIP Ramp Metering

Device Standards Providing Control and Real Time Management

NTCIP Ramp Metering

- **NTCIP 1207 v02 - Object Definitions** for Ramp Meter Control (RMC) Units
- Ramp meter is a controller (Type 170, 2070, ATC) equipped with software/firmware and algorithms for freeway ramp
- Assumes model of operation:
  - RMC units possess **intelligence**
  - Data for ramp management and data collection **resident at RMC unit**
- RMC unit's status, control and configuration data as "**controller database**“
- Specifies **interfaces** so data can be manipulated by central system

Device Standards Providing Control and Real Time Management

NTCIP Transportation Sensor System (TSS)

- **NTCIP 1209 v02** - **Object Definitions** for Transportation Sensor Systems (TSS)
- Provides vocabulary necessary to control, manage, and monitor TSS devices
- Devices include:
  - Smart inductive loop amplifiers
  - Machine vision video detection
  - Microwave radar monitoring systems
- Provide various methods of sensing the presence and other characteristics of vehicle traffic
- Includes overview of TSS architecture and operations

TCIP for Control and Real Time Management of Transit

Transit Communications Interface Profiles (TCIP)

American Public Transportation Association (APTA) Standard

Provides library of information exchange building blocks to allow transit agencies and transit suppliers to create standardized tailored interfaces

TCIP for Control and Real Time Management of Transit

TCIP

- NTCIP 1400-series standards
- Provides building blocks for interfaces for business areas:
  - Common Public Transport
  - Scheduling
  - Passenger Information
  - Transit Signal Priority

  - Control Center
  - Onboard Systems
  - Spatial Referencing
  - Fare Collection

- See Modules 3 and 4 of ITS PCB Standards Transit Training Modules (https://www.pcb.its.dot.gov/stds_modules_transit.aspx)

Data Sharing Standards

Data Sharing Standards

- NTCIP Center-to-Center (C2C)
- Society of Automotive Engineers (SAE) Advanced Traveler Information System (ATIS) message sets
- SAE Location Referencing Message Specification (LRMS)
- NTCIP TSS (covered previously)
- NTCIP CCTV Camera Control

Data Sharing Standards

NTCIP Center-to-Center (C2C)

- C2C communications is type of communication involving messages sent between two or more center systems
- Involves peer-to-peer communications between any number of center systems in many-to-many network
- Type of communication similar to Internet

SUPPLEMENT

Data Sharing Standards

Society of Automotive Engineers (SAE) Advanced Traveler Information System (ATIS) Message Sets - SAE J2354

- Messages and data elements exchanged among traveler information providers (data providers) and travelers (data consumers)
- Includes:
  - Integrated use of International Traveler Information System (ITIS) phrase lists
  - XML-based versions of each entry
  - Reuse of data elements from other functional area data dictionaries (e.g., Traffic Management Data Dictionary)
- Defines messages for general use
- Consists of data elements (DEs) formerly defined in companion standard SAE J2353

Data Sharing Standards

SAE J2266 - Location Referencing Message Specification (LRMS)

- Describes the following LRMS profiles:
  - *Address*
  - *Area Location*
  - *Chain*
  - *Cross Streets*
  - *Geographic Coordinate*
  - *Geometry*
  - *Grid*
  - *Group Location*
  - *Linear Reference*
  - *Link Location*
  - *Node Attribute*
  - *Point Location*
  - *Pre-Coded*
  - *Public Grid*
  - *Route Location*
  - *Spatial Object*
  - *Transition*

Data Sharing Standards

NTCIP CCTV Camera Control

- **NTCIP 1205 Amendment 1 to v01** - Object Definitions for Closed Circuit Television (CCTV) Camera Control
- **Vocabulary** necessary to control, manage and monitor cameras, lenses and pan/tilt units
- **Object definitions** to support functionality of these devices as used for transportation and traffic monitoring applications
- Includes conformance group requirements and conformance statements to support **compliance** with the standard

Standards Associated with Monitoring Conditions Along a Corridor

Monitoring Conditions Standards

- NTCIP TSS
- Signal
- CCTV standards

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Question

Which one of these device standards <u>does not</u> provide control and real time management?

Answer Choices

a) NTCIP Ramp Metering

b) ATC Application Programming Interface (API)

c) NTCIP Transportation Sensor System (TSS)

d) NTCIP Dynamic Message Signs (DMS)

Review of Answers

a) NTCIP Ramp Metering

Incorrect. This device standard is used to provide control and real time management – a ramp meter is a traffic controller specific to freeway ramp to control traffic flow entering freeway lanes.

b) ATC Application Programming Interface (API)

Correct! The ATC API standard is in the category of traffic signal standards for control and real time management.

c) NTCIP Transportation Sensor System (TSS)

Incorrect. This standard is used to provide control and real time management – it provides vocabulary necessary to control, manage, and monitor TSS devices.

d) NTCIP Dynamic Message Signs (DMS)

Incorrect. This standard is used to provide control and real time management – it provides vocabulary necessary to advise and inform vehicle operators of current highway conditions.

Learning Objective 3

Describe actual **ICM deployments**, how each ICM works, and the role and use of standards

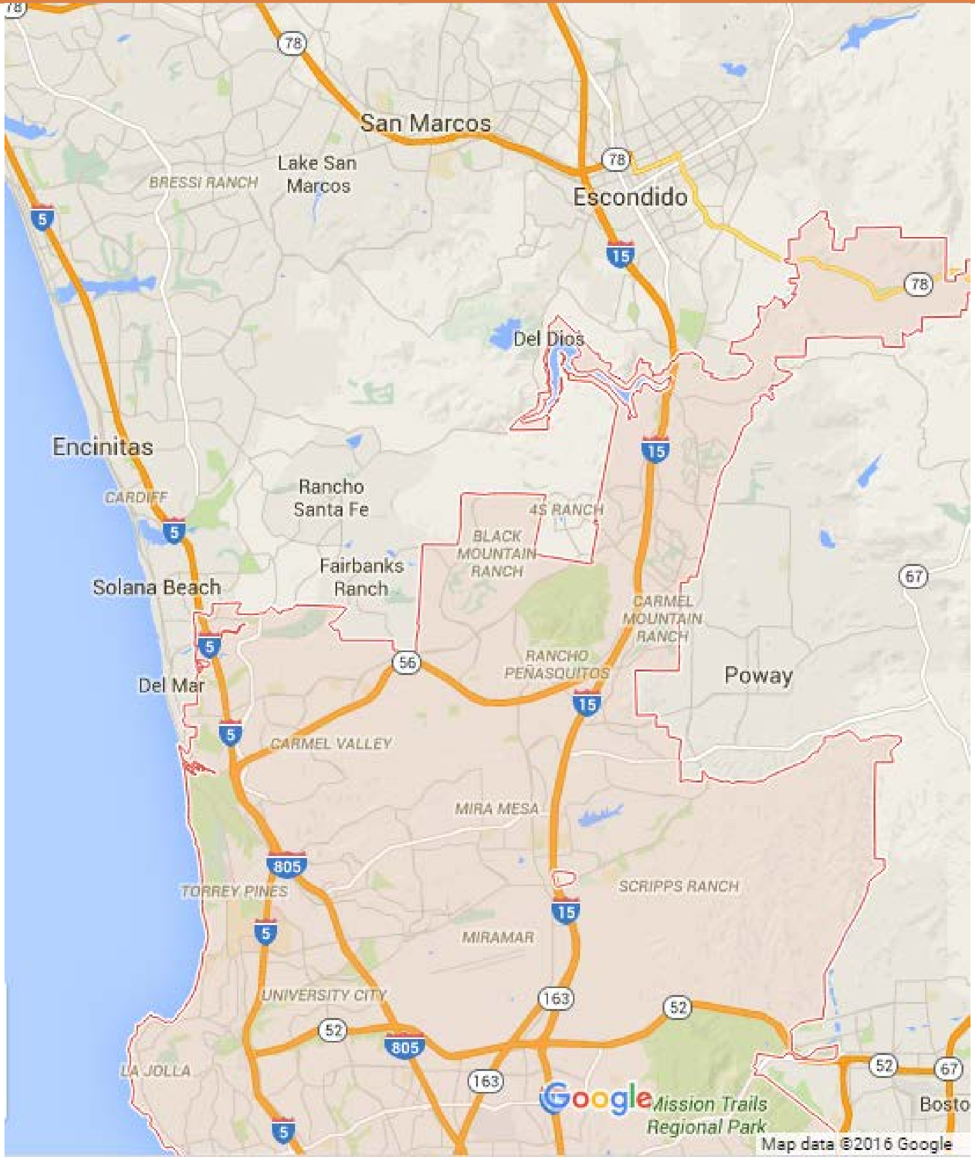
San Diego – Demonstration Site

Basic Components

Vision

Proactively and collaboratively manage I-15 corridor

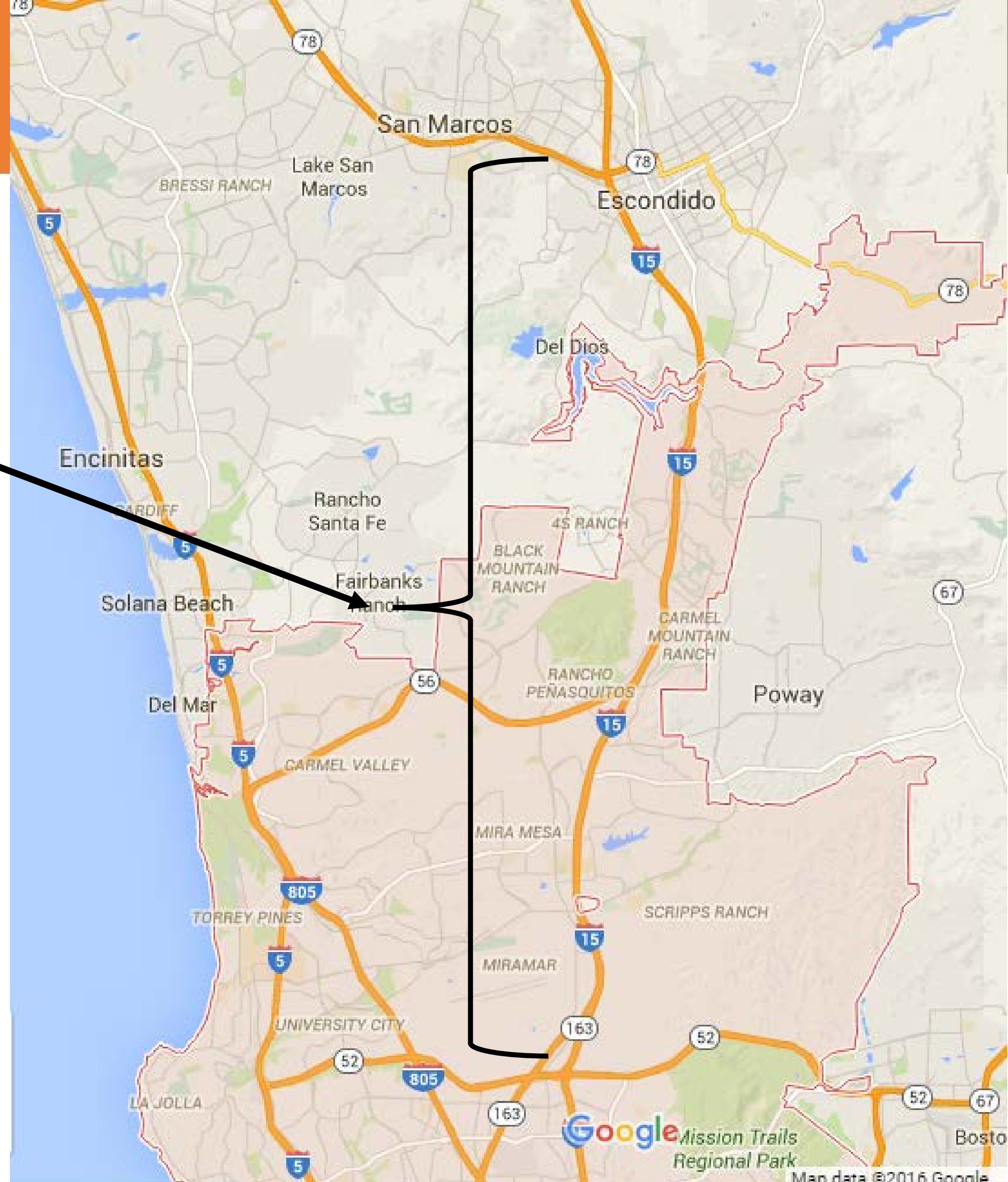
- Maximize system performance
- Enable opportunity to shift among modes and routes



San Diego – Demo Site

Basic Components

- 21-mile segment of I-15
- Serves commuter, goods movement from northern San Diego to downtown
- Weekday traffic volumes 170,000 to 290,000 vehicles
- Managed Lanes and Bus Rapid Transit (BRT)
- Dynamic variable pricing in Managed Lanes



San Diego – Demonstration Site

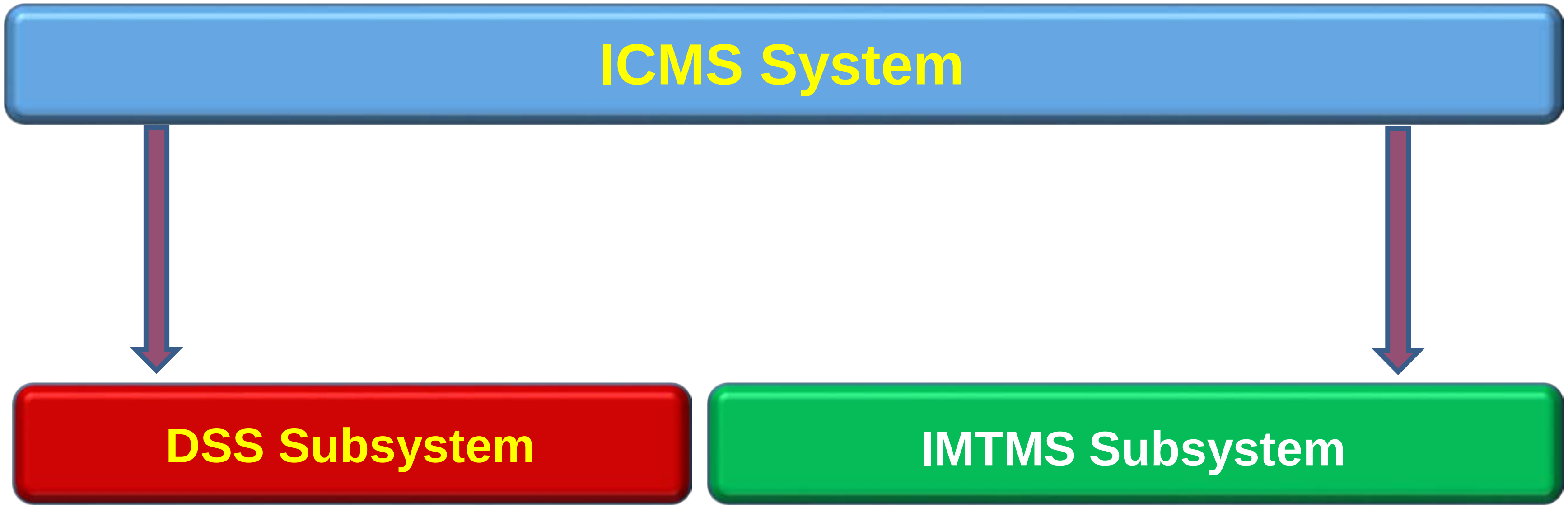
Basic Components of San Diego ICMS (continued)

- Improve mobility achieved by:
  - Improving system integration
  - Continued collaboration among corridor's partners and their systems

- Actions taken by individual agencies made based on condition of and impact on entire corridor:
  - All corridor operations coordinated through ICMS

Stakeholders: San Diego Association of Governments (SANDAG), USDOT, California Department of Transportation (Caltrans), Metropolitan Transit System, North County Transit District, and cities of San Diego, Poway and Escondido

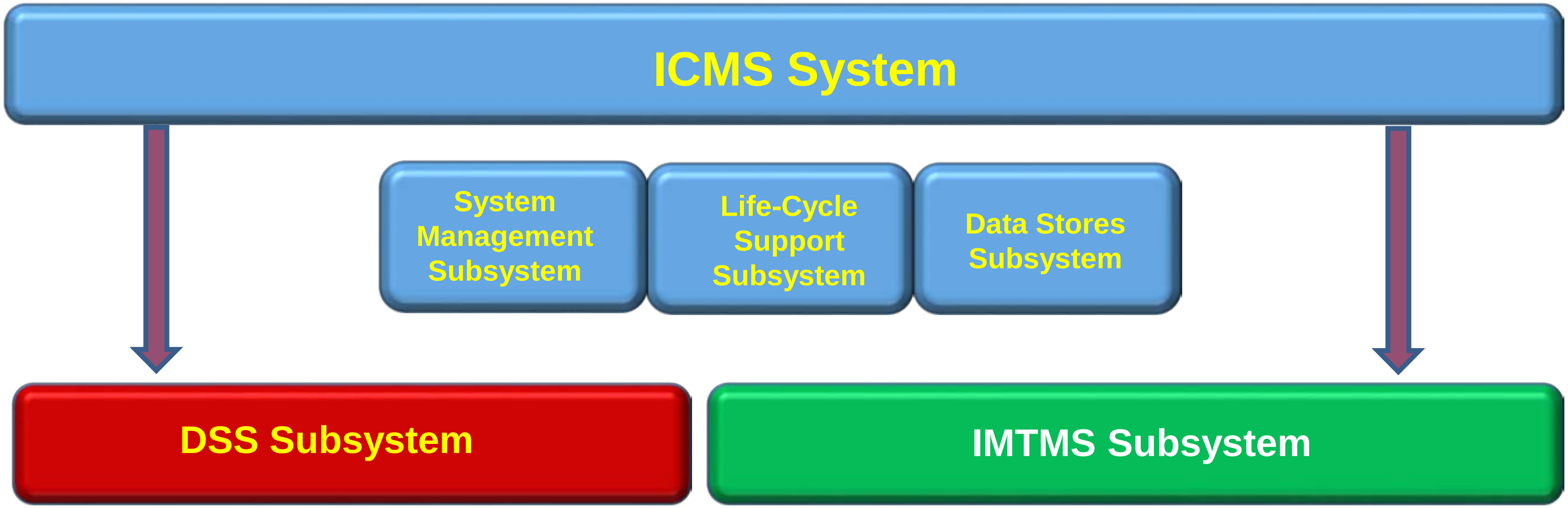
San Diego – Demonstration Site



RAMS — **Existing or partially existing capability (white lettering)**

Modeling — **Future capability (yellow lettering)**

San Diego – Demonstration Site



RAMS — Existing or partially existing capability (white lettering)

Modeling — Future capability (yellow lettering)

San Diego – Demonstration Site

DSS Subsystem

Response Plan Subsystem

Conferencing Subsystem

Event Management Subsystem

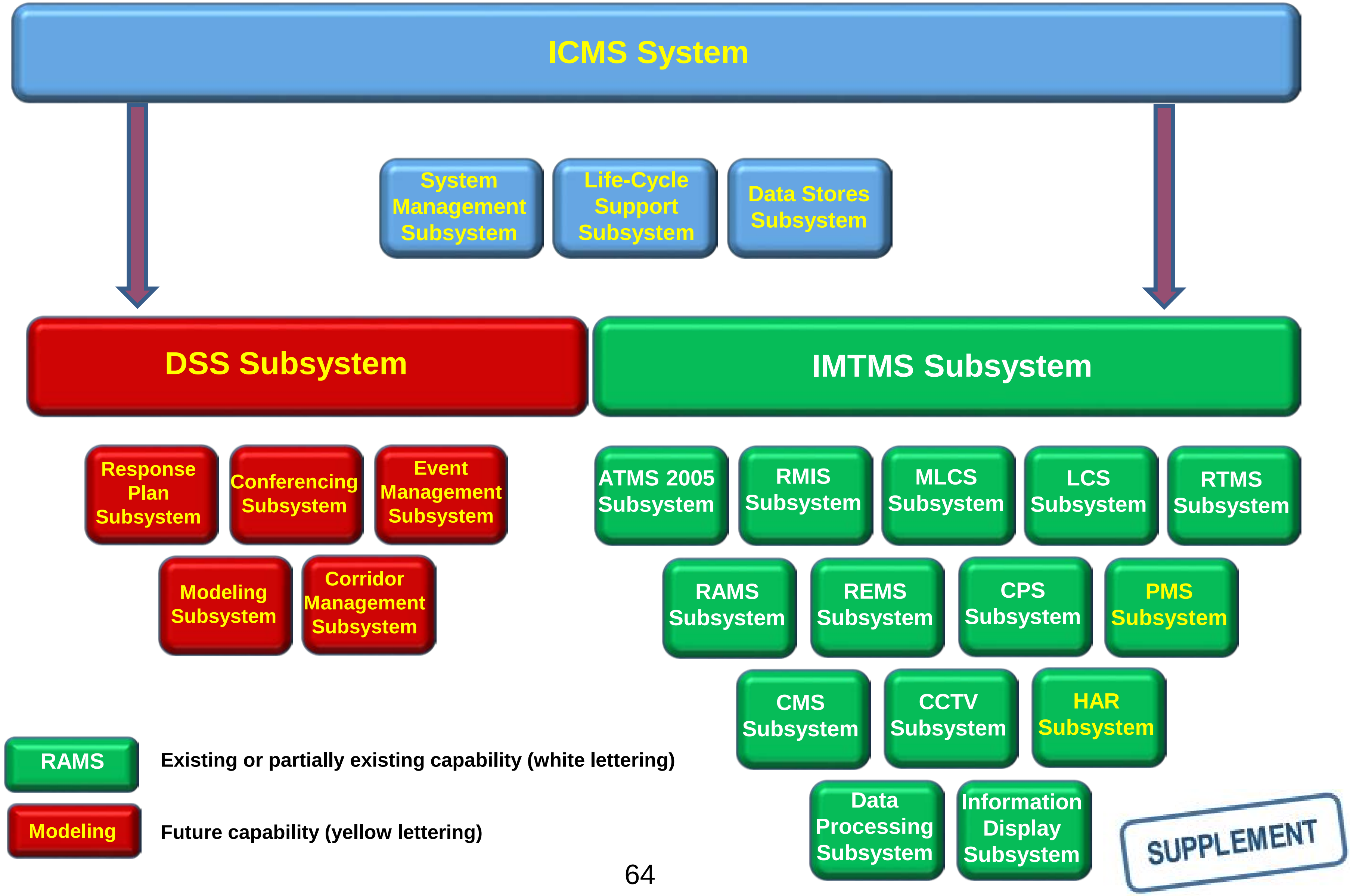
Modeling Subsystem

Corridor Management Subsystem

RAMS — Existing or partially existing capability (white lettering)

Modeling — Future capability (yellow lettering)

San Diego – Demonstration Site



San Diego – Demonstration Site

How the I-15 ICM System Works

- Uses **ITS networks** to measure and manage performance
- Enables systems to "talk" to each other to **coordinate operations and maximize efficiency** regardless of ownership
- Monitors changing conditions and congestion using **real-time information**
- Generates **automated response plans**
- Generates **new response plans** as traffic conditions change
- Operations in corridor managed using **Decision Support System (DSS)**

San Diego – Demonstration Site

Standards Used in the San Diego I-15 ICM System

- **Intermodal Transportation Management System (IMTMS) Distribution Interface uses:**
  - Traffic Management Data Dictionary (TMDD) Version 2.1 for data definitions
  - NTCIP 2306 for Center-to-Center (C2C) message interfaces
  - IMTMS Systems Design Document (SDD), Section 4, Draft 1.0
- **511 Dissemination Interface uses:**
  - TMDD, Version 2.1 for data definitions
  - NTCIP 2306 for C2C message interfaces
  - IMTMS-511 Interface Design Document (IDD), Draft 1.0
- **OrbCAD (Regional Transit Management System [RTMS]) Interface** uses Interface Control Document (ICD) FE-ICD202, Version 1.0

San Diego – Demonstration Site

Evaluation of the San Diego I-15 ICM System

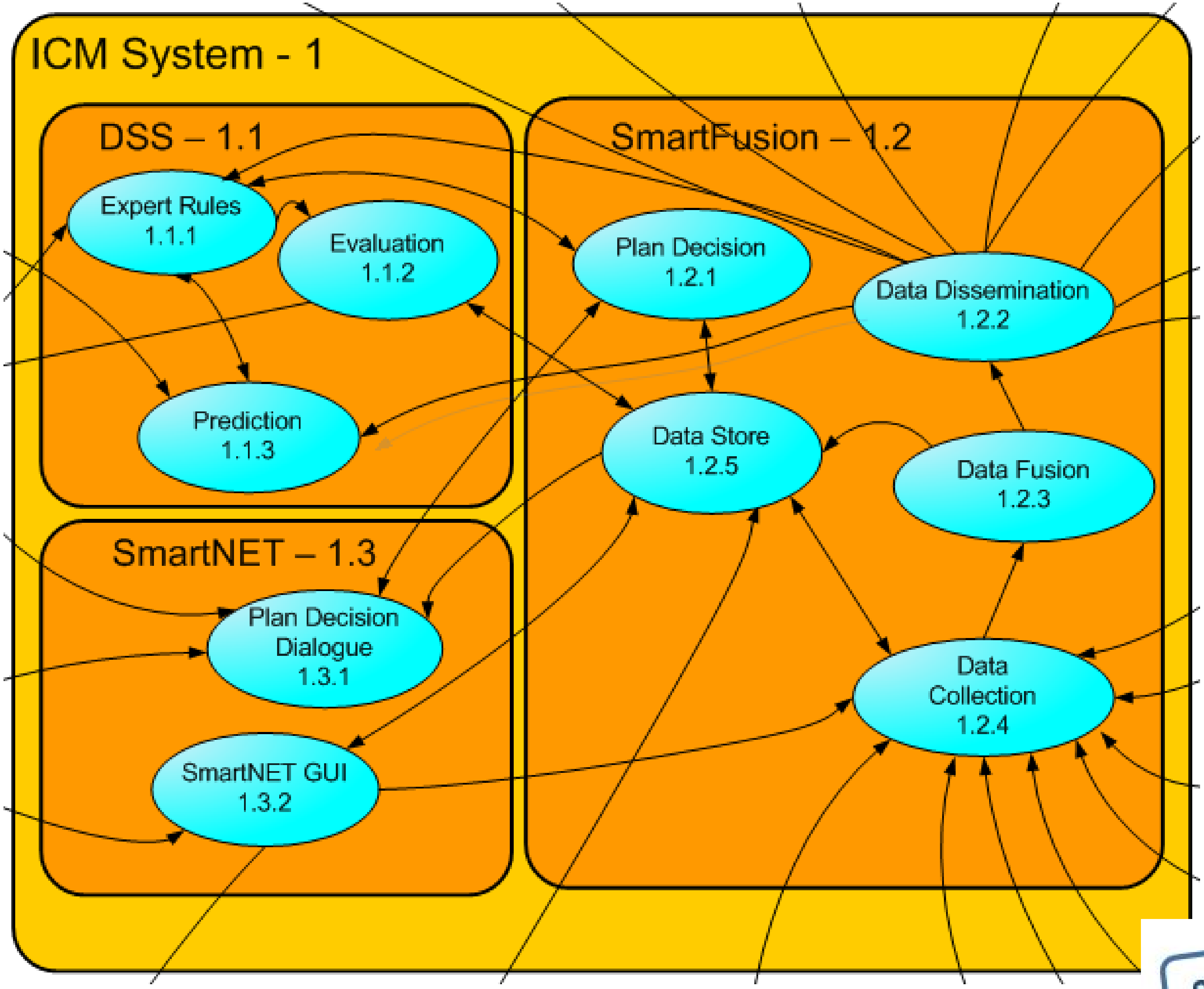
- Demonstrated ability to:
  - Identify incidents and unusual congestion events
  - Develop traffic management strategies integrating freeway, arterial, and transit operational elements
  - Implement recommended strategies automatically or following approval by relevant system operators
- Demonstrated feasibility of using microscopic traffic simulation model in real-time operational environment to forecast corridor operations under alternative scenarios
- Simulation evaluations shown operational benefits exceeding deployment costs

Dallas – Demonstration Site

Basic Components of Dallas ICM System (ICMS)

- Vision: Operate US-75 Corridor in multimodal, integrated, efficient, and safe fashion where focus is on transportation customer:
  - Increase corridor throughput
  - Improve travel time reliability
  - Improved incident management
  - Enable intermodal travel decisions
- ICM Corridor covers:
  - US-75 Corridor - cantilevered frontage roads and eight general-purpose lanes:
    - Freeway main lanes carry over 330,000 vehicles a day
    - Another 20,000-30,000 on the frontage roads
  - Concurrent-flow, HOV lanes operated by TxDOT
  - Light-rail lines in Dallas

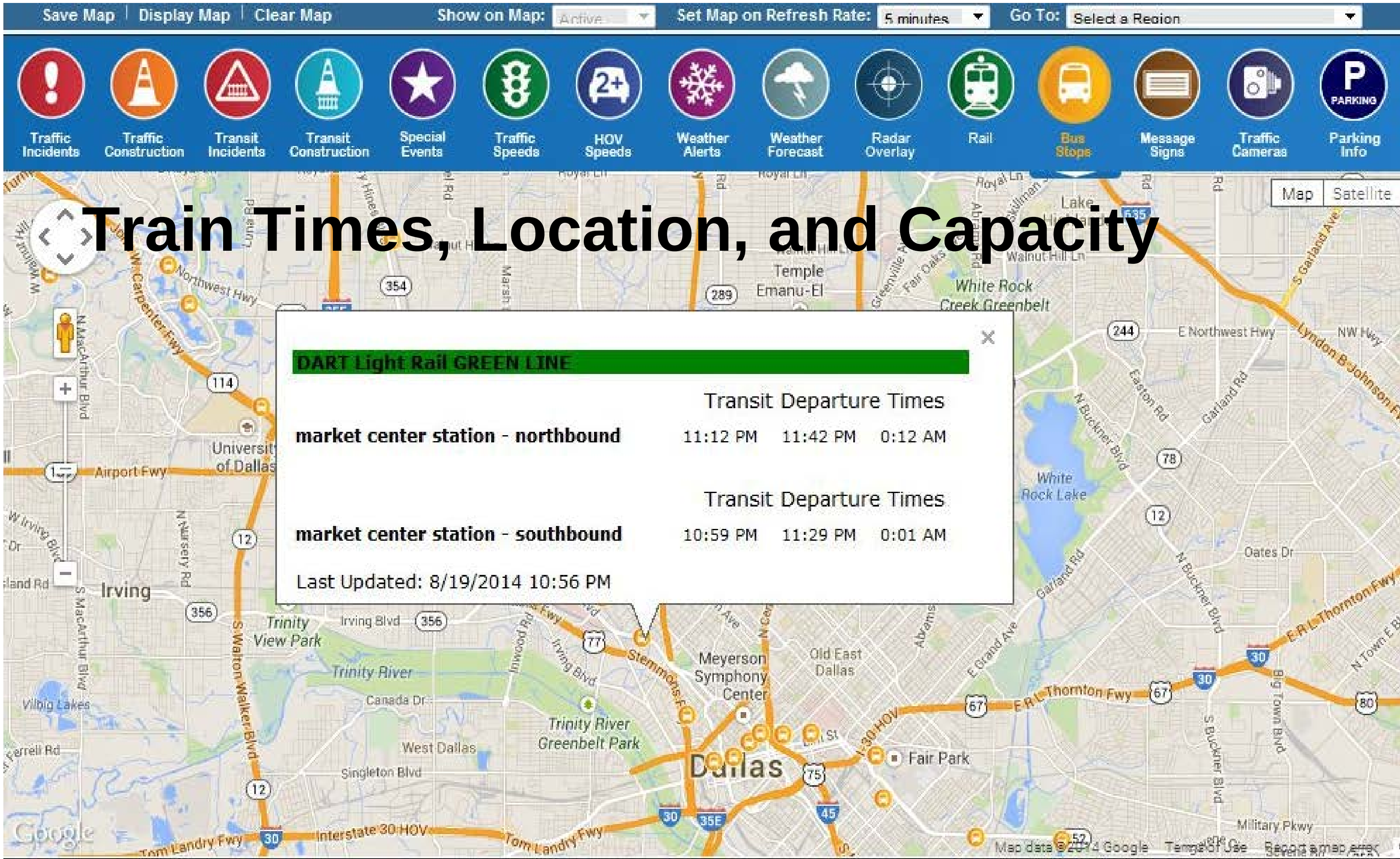
Dallas – Demonstration Site



SUPPLEMENT

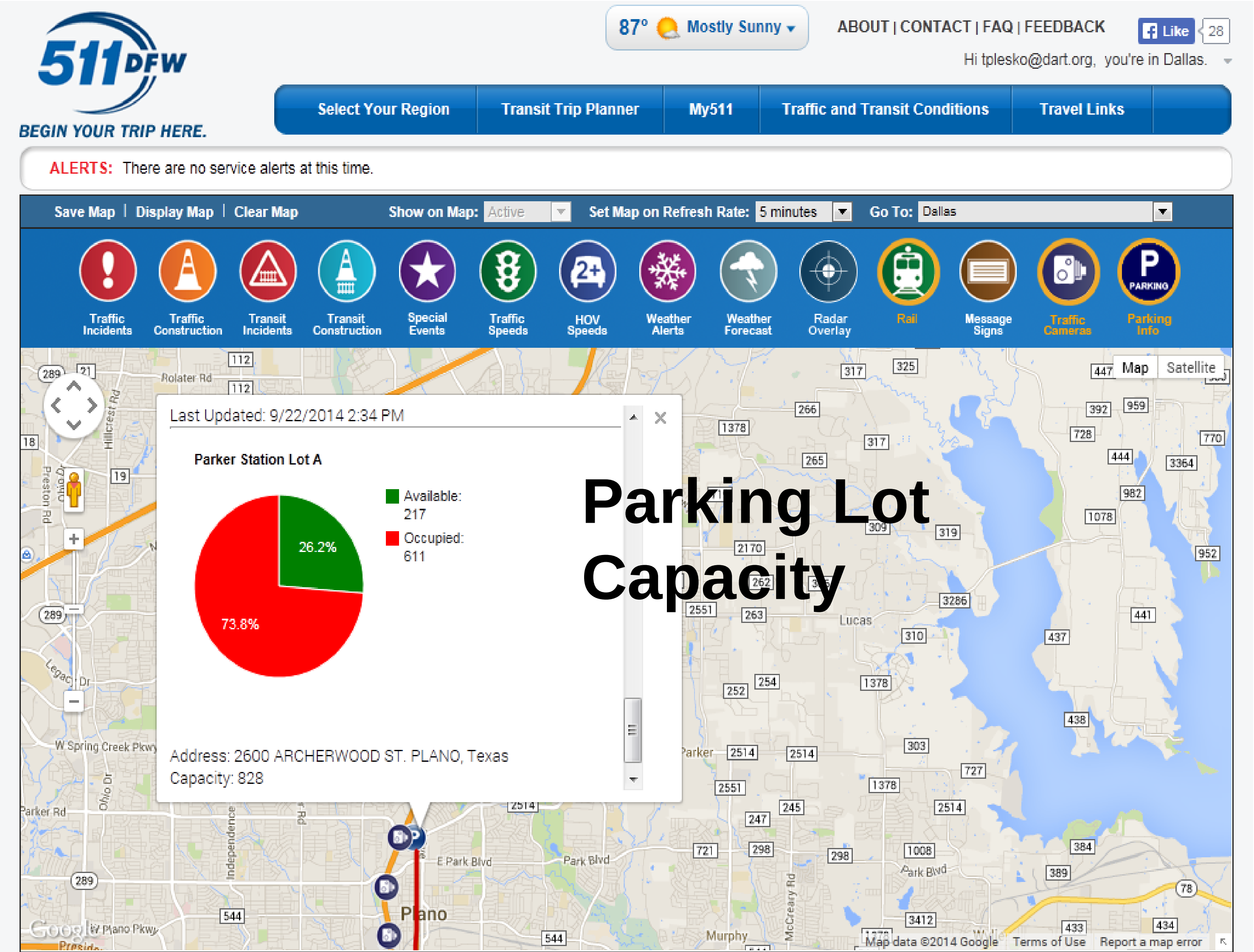
Dallas – Demonstration Site

Real Time Transit Data Used for ICM and 511DFW



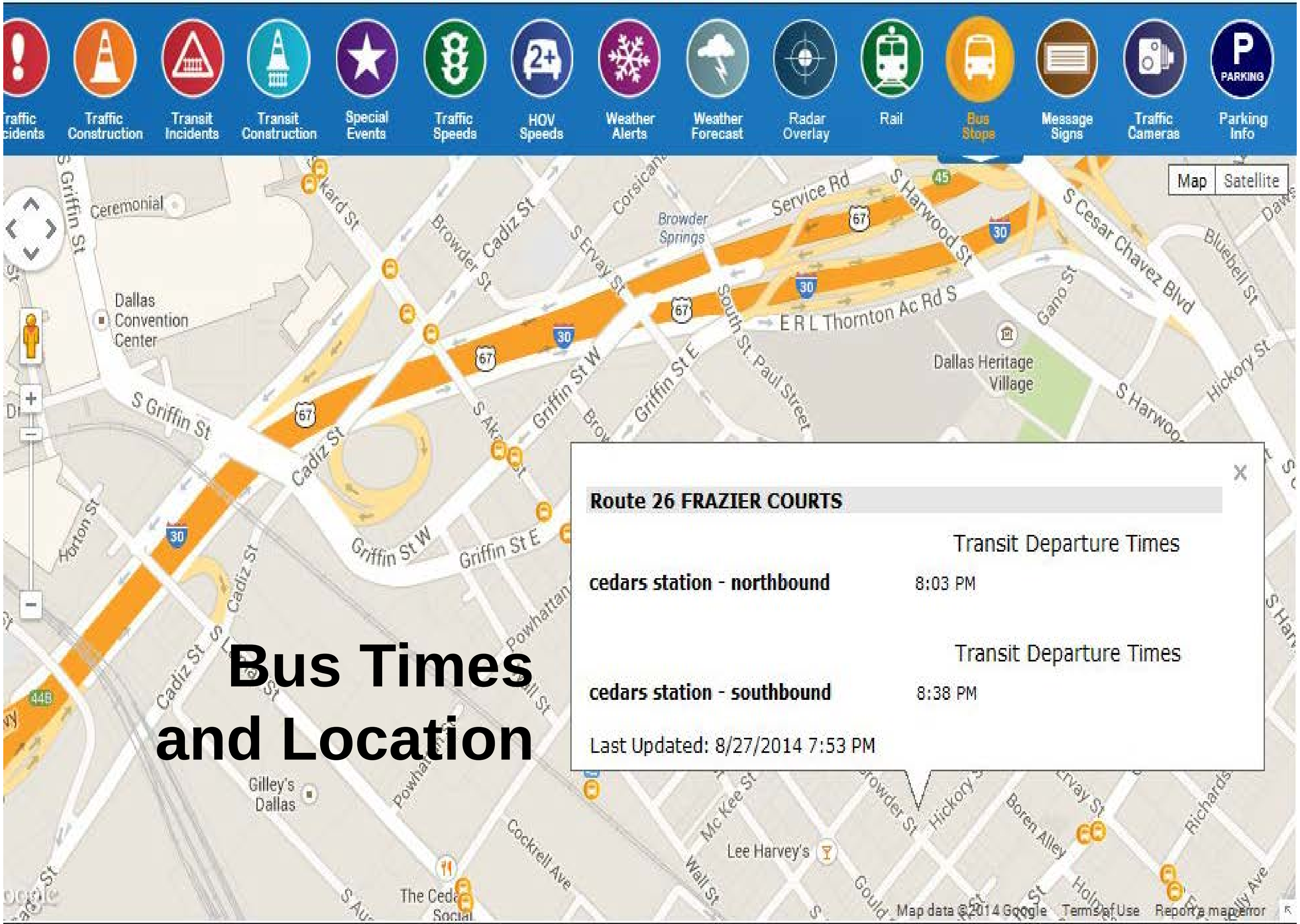
Dallas – Demonstration Site

Real Time Transit Data Used for ICM and 511DFW



Dallas – Demonstration Site

Real Time Transit Data Used for ICM and 511DFW



Bus Times and Location

Dallas – Demonstration Site

Standards Used in the Dallas ICM System

- **Traffic Management Data Dictionary (TMDD)** – SmartNET utilizes TMDD version 2.1 as basis of data dictionary. Dallas Regional C2C system based on TMDD version 2.1, with some localization
- **Message Sets for External TMC to TMC Communication** (MS/ETMCC) - SmartNET and Dallas Regional C2C system utilize this standard
- **Transit Communication Interface Protocol (TCIP)** – DART Data Portal envisioned to utilize TCIP for some of its data elements

Dallas – Demonstration Site

Concept Validation Through Simulation

- Reduced congestion **740,000 person-hours** saved/year
- Travel time reliability improved by **3%**
- Fuel savings of **981,000 gallons** annually
- Emissions reduction of **9,400 tons** annually

Benefit/Cost ratio of **20:1**

I-80 Integrated Corridor Mobility (ICM)/ Smart Corridor Project

Basic Components of I-80 ICM Project

Vision:

- Create a **Well-Balanced System**
- Maintain **Optimal Operational Viability**
- Proactively **Avoid Flow Breakdown**
- **Detect and Respond to Congestion** Events Faster
- Improve **Safety**
- **Manage Congested Flow** When it Does Occur
- Promote Transit Ridership and **Mode Shifts**
- **Clear Local Arterials** from Diversion

I-80 Integrated Corridor Mobility (ICM)/ Smart Corridor Project

Basic Components of I-80 ICM Project (continued)

ICM Corridor covers:

- 20 mile corridor from Bay Bridge to the Carquinez Bridge
- Major corridor for commuters and transit
- National freight corridor
- Link to 2 international airports and the Port of Oakland
- Connects significant job centers (Alameda County ranked 2nd largest in Region)
- Spans across 2 counties and 9 cities

I-80 Integrated Corridor Mobility (ICM)/ Smart Corridor Project

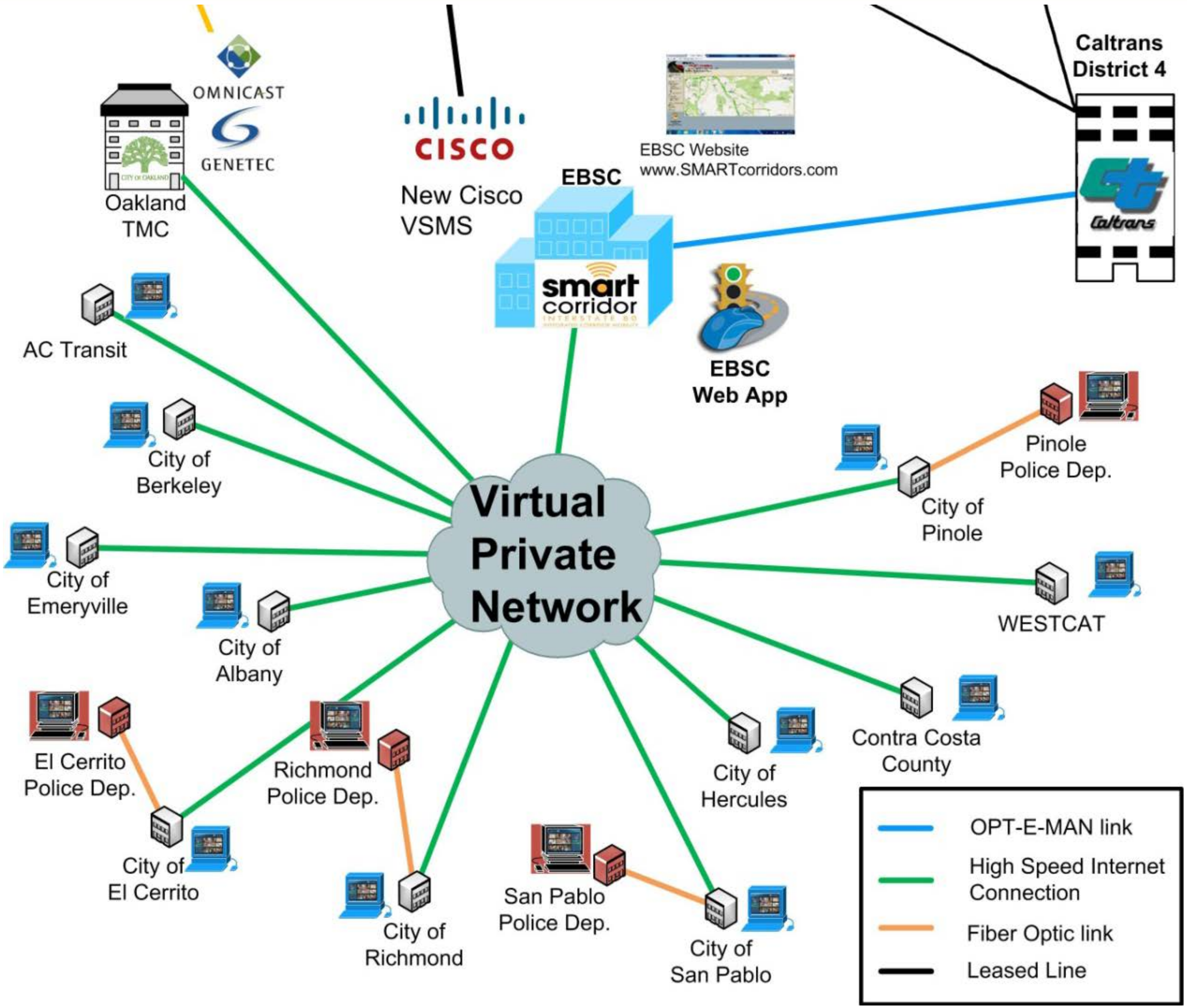
Project Concepts Deployed

- Freeway and Incident Management
- Adaptive Ramp Metering
- Arterial Management
- Traveler Information
- Traffic Monitoring

- Transit Management:
  - Preferential Treatment for Transit
    - Transit Signal Priority
    - Ramp Meter Bypass
  - Park and Ride Facilities (future)
    - Provide Real-time information
  - Transit Traveler Information
    - Travel times
    - Directions to transit facilities
    - Real time Transit Departure Times

I-80 Integrated Corridor Mobility (ICM)/ Smart Corridor Project

System Integration



I-80 Integrated Corridor Mobility (ICM)/ Smart Corridor Project

Status of I-80 ICM Project

As of April 29, 2015:

- Construction completed
- Signs being tested on Westbound I-80:
  - Installation of overhead signs across westbound I-80 between Richmond and Emeryville completed
  - Signs are being tested
  - Testing continuing through the summer when traffic volumes are lowest
  - Roadside electronic speed limit signs are also being tested

Basic Components of ICM- 495 Project

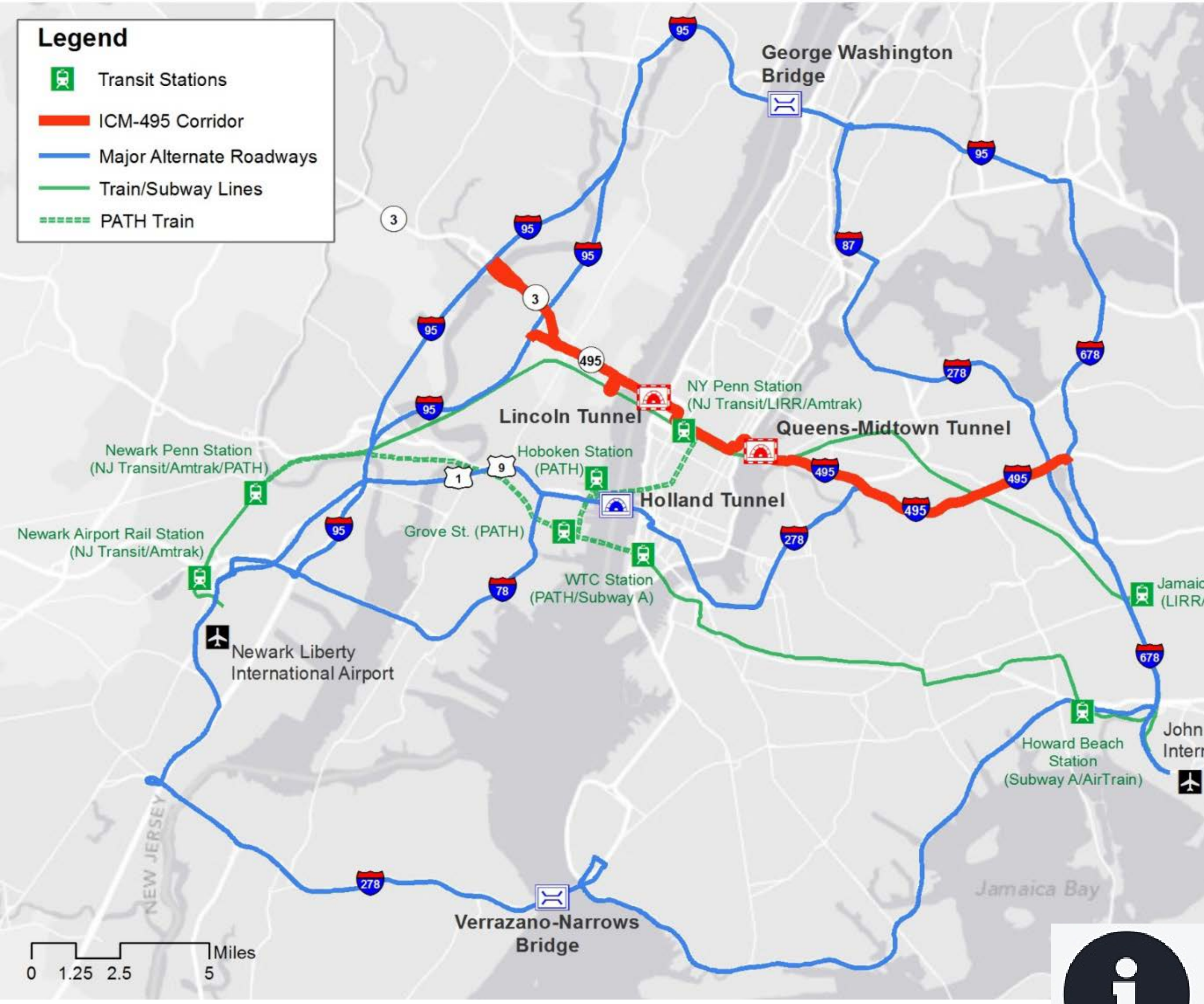
Vision

- Enhance current transportation management systems of ICM-495 Corridor
- Solutions and resources create balanced network reflecting integration of pre-existing programs and systems with modified and new deployments
- Improving overall Corridor performance will be a priority by providing better knowledge about real-time conditions and alternative travel options within practical operational, institutional, and financial constraints

NY/NJ ICM - 495 Project

Basic Components

- NY/NJ metro area
- Connects NJ Turnpike to Van Wyck Expwy and traverses Midtown Manhattan
- Diverse residential, commercial, and industrial uses
- 2 key facilities – Lincoln Tunnel and Queens-Midtown Tunnel
- Extensive highway network



NY/NJ ICM - 495 Project

Leverage Existing Infrastructure and Standards

- CCTV surveillance cameras and Fiber
- Weather System covering all bridge facilities with both surface and atmospheric sensors
- NTCIP compliant VMS and VSLS
- TRANSMIT System
- Lane Use Signal Control System
- Video Incident Detection
- Advanced Traffic Information System
- MTA B&T Operations Central Command Center (OCCC)
- Dynamic Message Signs
- Lane-Use Control Signals
- Changeable Speed Limit Signs
- Video-based vehicle detection system stations
- TRANSMIT readers

NY/NJ ICM - 495 Project

Leverage and Build upon Ongoing Programs

- Congestion Management Process
- Drivers First Initiative
- Drive Smart & Bike Share
- I-495 Managed Use Lane
- Midtown in Motion
- New York and New Jersey 511 and Rideshare
- New York and New Jersey ITS Programs
- Off-Hour Deliveries
- PARK Smart
- Select Bus Service
- Smart Move Program
- Truck Routing and Bridge Strike Mitigation

ACTIVITY

STANDARDS ITS TRAINING TRANSIT

U.S. Department of Transportation
Office of the Assistant Secretary for
Research and Technology

Question

Which one of these standards is NOT used in the Dallas ICM system?

Answer Choices

a) Message Sets for External TMC to TMC Communication (MS/ETMCC)

b) Transit Communication Interface Protocol (TCIP)

c) 511 Dissemination Interface

d) Traffic Management Data Dictionary (TMDD)

Review of Answers

a) Message Sets for External TMC to TMC Communication (MS/ETMCC)

Incorrect. SmartNET and the Dallas Regional Center-to-Center system utilize the MS/ETMCC in the Dallas ICM system.

b) Transit Communication Interface Protocol (TCIP)

Incorrect. The DART Data Portal utilizes the TCIP for some of its data elements in the Dallas ICM system.

c) 511 Dissemination Interface

Correct! 511 Dissemination Interface is not used in the Dallas ICM system.

d) Traffic Management Data Dictionary (TMDD)

Incorrect. SmartNET utilizes TMDD version 2.1 as the basis of its data dictionary. The Dallas Regional Center-to-Center system is based on TMDD version 2.1, with some localization.

Module Summary

What We Have Learned

1. Defined Integrated Corridor Management (ICM) and ICM concepts and described the benefits of ICM, how ICM works, and the role of standards in ICM
2. Identified and described the standards associated with ICM
3. Learned about four actual ICM deployments

Thank you for completing this module.

Feedback

Please use the Feedback link below to provide us with your thoughts and comments about the value of the training.

Thank you!