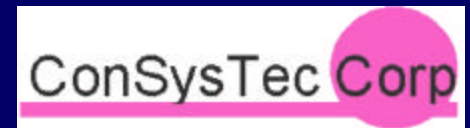


Hartford Area Regional ITS Architecture Workshop



April 15, 2004



Workshop Objective

- Define a Regional ITS Architecture and Deployment Plan (Vision and Integration Strategy)
- Iterative Method:
 - Training
 - Regional ITS Architecture Development
 - Strategic Plan
 - Stakeholder Review
- Key Characteristic:

Achieve Stakeholder Consensus

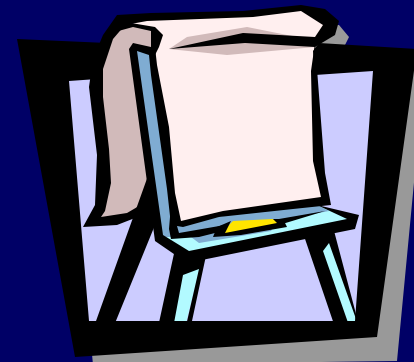
Agenda:

April 15, 2004

- 9:00 Introductions and Administration
- 9:15 Training: Introduction to Regional ITS Architecture
- 10:15 Discussion of Regional Scope
- 10:30 BREAK
- 10:45 Map Stakeholder ITS Elements to the National ITS Architecture
- Noon LUNCH
- 1:00 Customize Market Packages to reflect Regional Operational Concepts
- 2:00 BREAK
- 2:15 (Continue)
- 4:15 Training: Website
- 4:30 ADJOURN

Introductions and Administration

- Welcome
- Brief Stakeholder Introductions
 - Name
 - Organization
 - Role – in the context of Intelligent Transportation Systems
 - For Yourself
 - For Your Organization
- Safety and Comfort Announcements
 - Exits
 - Breaks and Lunch
 - Today's Adjournment



Introduction to Regional ITS Architecture



Introduction and Discussion

- What is ITS?
- What is a *Regional ITS Architecture*
- Who is an *ITS Stakeholder*?
- What is and *Isn't* Part of a Regional ITS Architecture?
- What Benefits Accrue From a Uniform ITS Architecture?
- Hartford Area Regional ITS Architecture and Deployment Plans:
 - Purpose
 - Process
 - Connection to the *National ITS Architecture*

What is ITS?

- Intelligent Transportation System

Could be:

- Integrated Transportation System

- One Definition:

- “The application of *data processing* and *data communications* to surface transportation, to increase *safety* and *efficiency*.”

What is a Regional ITS Architecture?

- A plan for deployment of ITS in a region
- Focus on Integration of ITS in a region

What does Regional ITS Architecture Include?

- The scope of the region
- Who the stakeholders are
- What the current and future ITS elements are
- What information goes between the ITS elements (including ITS elements outside of the region)
- An operational concept for the ITS services delivered in the region
- The functions of each of the ITS elements in the region
- Applicable ITS Standards
- Project Sequencing
- List of Agreements

Who is an ITS Stakeholder?

- Technical Definition:
 - Someone who sends or receives ITS information to/from other stakeholders either directly or with their equipment
- Institutional Definition:
 - Someone who builds, operates or maintains ITS equipment

What Is and Isn't Part of a Regional ITS Architecture?

■ Is:

- Identifying all the ITS stakeholders in a region
- Identifying the information or control to be exchanged between ITS stakeholder elements
 - Making *policy* decisions by including or not including specific information flows between stakeholder elements
- Selecting standards for information exchange

■ Isn't:

- Selecting specific technologies or design
- How projects are selected or funded

What Benefits Accrue From a Regional ITS Architecture?

- Institutional Agreement:
 - The Problem: Time consuming when information crosses institutional boundaries
 - Regional ITS Architecture: Establish a consensus based foundation for agreements – to get the process started
- Avoid patchwork deployments that make sharing information difficult:
 - Where there is need for a seamless ITS, plan to achieve it
 - Identify open ITS standards: reduce long term risk/cost

What Benefits Accrue From a Uniform ITS Architecture? (cont.)

- Get early insight into what ITS information others have that can help you do your job better (or you can provide to others)
- Reduce risk of conflicting ITS standards in the future
- Get a handle on where we are going with our Intelligent Transportation System

ITS Architecture and Standards Rule/Policy

- Requires development of Regional ITS Architecture
- FHWA Rule and FTA Policy intended to foster integration of ITS Systems
- Defines requirements for Regional ITS Architectures
- Defines requirements for ITS Projects
 - Includes mapping to Regional ITS Architecture
- This workshop continues the process of creating a Regional ITS Architecture for your region

Hartford Area Regional ITS Architecture and Deployment Plans Project - Process

- Initial Individual Meetings
- Architecture Development Workshop (April 15, 2004)
- Review Meeting for Draft Architecture
- Documentation
 - Paper
 - CDROM
 - Hypertext (ConnDOT web site)



Hartford Area Regional ITS Architectures and Deployment Plans Project - Connection to the National ITS Architecture

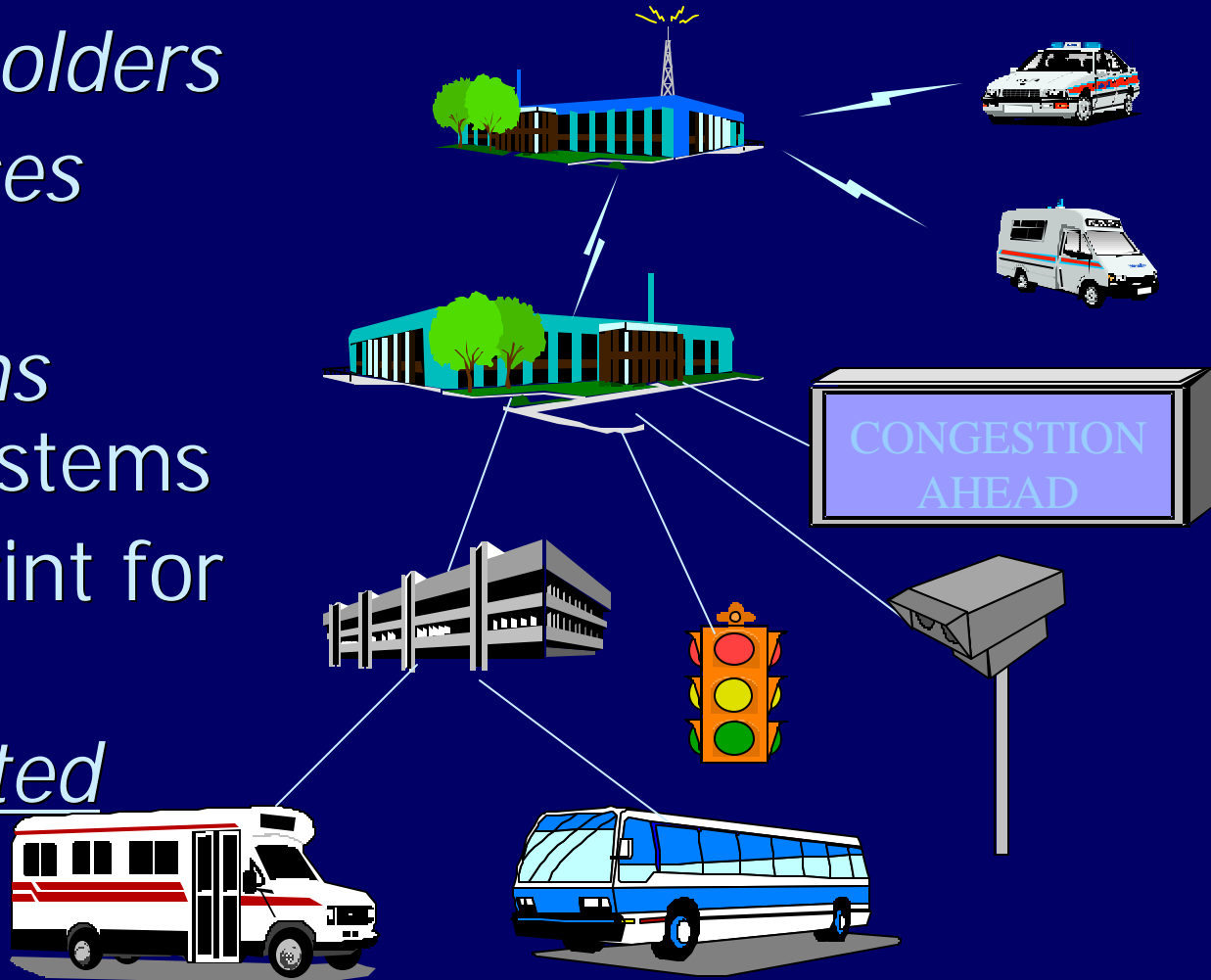
- Regional ITS Architectures draw from the National ITS Architecture
 - But customized for Hartford Regional needs
- Extensions made where locally needed

Process to Define a *Consensus* Regional ITS Architecture

- 1). Identify existing and future physical inventory
- 2). Select high priority services (a.k.a. *Market Packages*)
- 3). Customize the high priority Market Packages to meet local needs

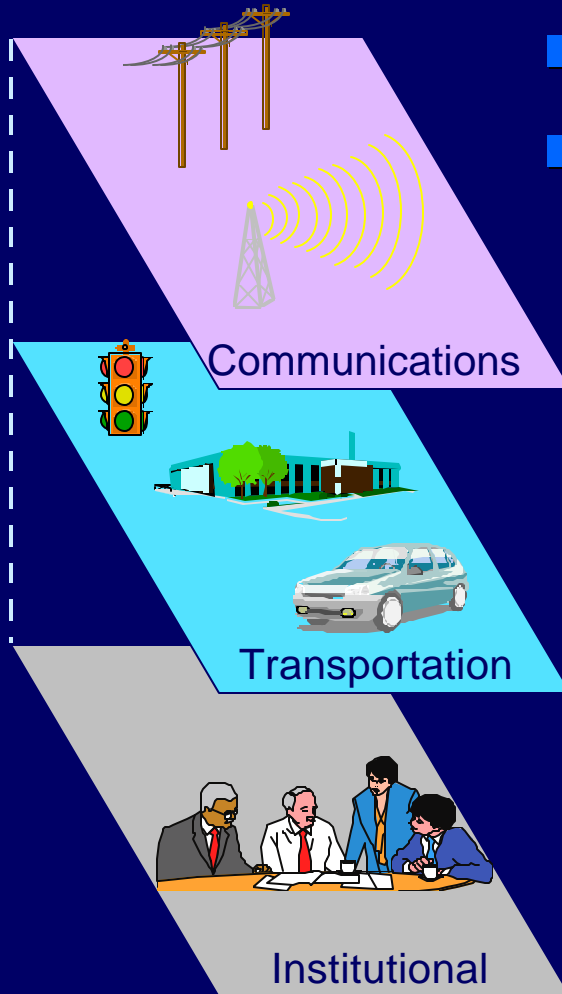
The National ITS Architecture is a Framework to Help:

- Identify *stakeholders*
- Describe *services*
- Define *interconnections* between subsystems
- Develop blueprint for *integration*
- Deploy *integrated* systems



Focus on Physical Architecture

- Defines physical entity interfaces
- Distributes functionality
- 3 layers



- *Communications Layer*
 - How information is transferred between transportation systems

- *Transportation Layer*
 - What transportation systems transfer what information

- *Institutional Layer*
 - Supporting institutional structure, policy, and strategies

Map Stakeholder ITS *Elements* to the National ITS Architecture *Entities*

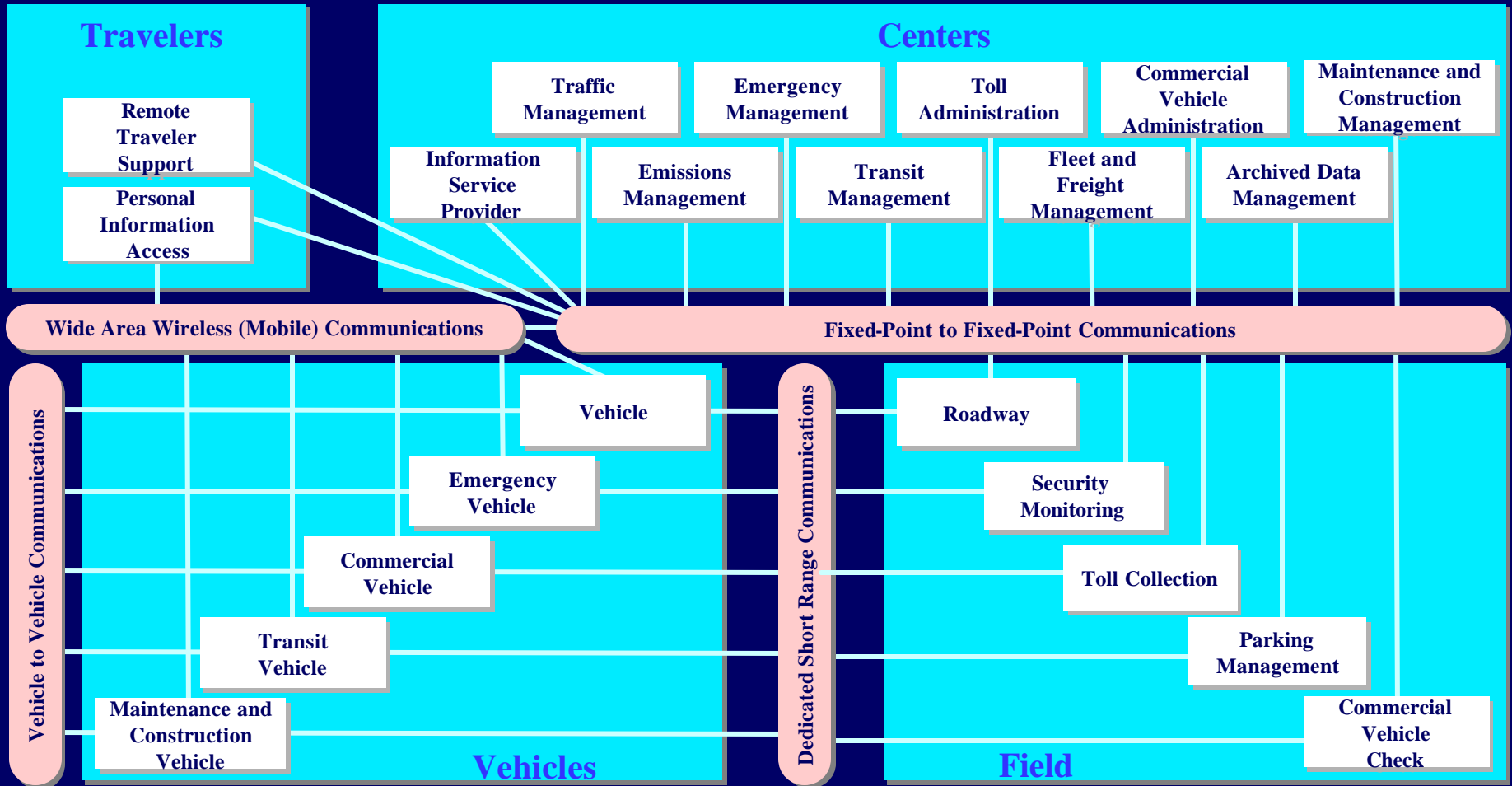
■ Identify and Map

Agency Elements <--> National ITS Architecture Entities
Current or Future Subsystems and/or Terminators

■ Moderator-Analyst roles:

- Assist in mapping
- Construct a Regional ITS Architecture Interconnect Diagram (a.k.a. *Sausage Diagram*)

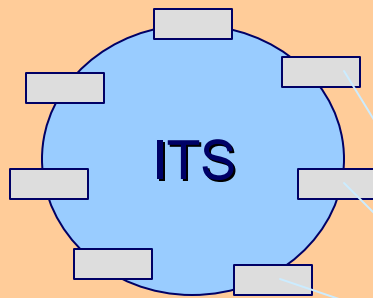
Physical Architecture Subsystems in the National ITS Architecture



But what about connections
to the rest of the world?

Terminators Establish the Architecture External Connections

The Rest of the World



Users

19 Terminators:

- Driver
- ISP Operator
- Traveler
- etc.



Terminators

Environment

6 Terminators:

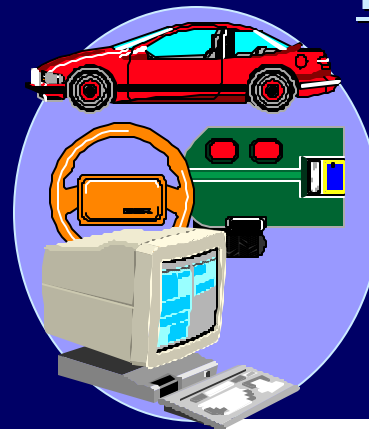
- Environment
- Roadway
- etc.



Related Systems

48 Terminators:

- Media
- Financial Inst.
- Other Vehicle
- etc.

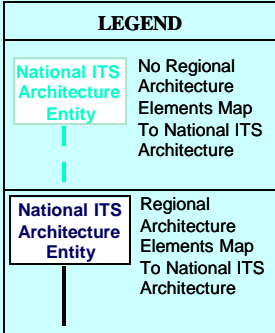


Terminators

(Focus on Related Systems)

RELATED SYSTEMS

- Alerting and Advisory Systems
- Archive Data User Systems
- Asset Management
- Basic Commercial Vehicle
- Basic Maint and Const Vehicle
- Basic Transit Vehicle
- Basic Vehicle
- Care Facility
- CVO Information Requester
- DMV
- Emergency Telecommunications System
- Enforcement Agency
- Equipment Repair Facility
- Event Promoters
- Financial Institution
- Freight Equipment
- Government Reporting Systems
- Intermodal Freight Depot
- Intermodal Freight Shipper
- Location Data Source
- Maint and Constr Admin Systems
- Map Update Provider
- Media
- Multimodal Crossings
- Multimodal Transportation Service Provider
- Other Data Sources
- Rail Operations
- Shelter Providers
- Storage Facility
- Surface Trans Weather Service
- Telecommunications System for Traveler Info
- Trade Regulatory Agencies
- Traveler Card
- Wayside Equipment
- Weather Service
- Yellow Pages Service Providers
- Other Archives
- Other CVAS
- Other Emer Mgmt
- Other ISP
- Other MCM
- Other MCV
- Other Parking
- Other Roadway
- Other Toll Admin
- Other Traffic Mgmt
- Other Transit Mgmt
- Other Vehicle



Remote Traveler Support Subsystem
*ODOT Rest Stop Kiosks
*RTA Kiosks
Personal Information Access Subsystem
Traveler Information Devices

Emergency Vehicle Subsystem
City of Cleveland Emergency Vehicles
County Emergency Vehicles
GCRTA Police Vehicles
Municipal Emergency Vehicles
ODOT Road Crewzers
Ohio State Highway Patrol Vehicles

Maint & Const Vehicle Subsystem
Cuyahoga County Maintenance Vehicles
Municipal/County Maintenance Vehicles
ODOT District 12 Maintenance Vehicles
ODOT District 3 Maintenance Vehicles

Vehicle Subsystem
*Commercial Vehicles
Traveler Vehicles
Commercial Vehicle Subsystem
*Commercial Vehicles

Transit Vehicle Subsystem
Geauga County Transit Vehicles
Laketrans Vehicles
LCT Transit Vehicles
Medina County Transit Vehicles
RTA Fixed Route Vehicles
RTA Paratransit Vehicles
School Buses

Archived Data Management Subsystem
*Cuyahoga County Traffic Count Data Archive
Cuyahoga Regional Information System (CRIS)
Municipal Traffic Count Data Archives
*ODOT Traffic Data Archive System
*Ohio DPS Crash Records Database
Regional Transportation Data Archive

Information Service Provider Subsystem
*Cellular Probe Data Provider
GCRTA Transit Traveler Information System
Local Transit Traveler Information Systems
Mayday/Concierge Services
Metro Information Systems
*ODOT 511 Information System
ODOT District 12 Public Information Office
*ODOT District 12 Traveler Information Radio Station
ODOT District 12 Web Based Services
ODOT District 3 Web Based Services

Emergency Management Subsystem
311 Non-Emergency Information System
CECOMS - Emergency Communications
City of Cleveland Operation Snowbird EOC
City of Cleveland Police, Fire, and EMS Dispatch County EOCs
County Public Safety Dispatch
County/ Municipal Community Notification System
Cuyahoga County Emergency Operations Center
GCRTA Police
Mayday/Concierge Services
Metro Information Systems
Mobile Command and Communications Vehicle (Mobile One)
Municipal Public Safety Dispatch
ODOT District 12 Freeway Management Center
Ohio State Highway Patrol Posts
Ohio Statewide EOC
Other County Public Safety Dispatch
Private Tow and Wrecker Dispatch
Special Police Dispatch
USCG District HQ Bridge Office

Maintenance & Construction Management
City of Cleveland Maintenance Dispatch
Cuyahoga County Maintenance Garages
Lake County Maintenance Dispatch
Municipal/County Maintenance Garages
ODOT District 12 Freeway Management Center
ODOT District 12 Maintenance Garages
ODOT District 12 Office
ODOT District 3 Maintenance Garages
ODOT District 3 Office
ODOT District 4 Maintenance Garages
*ODOT Portable Freeway Management System
OTC Central Dispatch
Other County Maintenance Garages
Private Maintenance Dispatch
Emissions Management
Ozone Action Day System
Fleet and Freight Management
*Fleet and Freight Management

Traffic Management Subsystem
City of Cleveland Signal Control System
GCRTA Administration
Hopkins International Airport and Burke Lakefront Airport
*Lift Bridge Information System
Municipal Signal Control Systems
ODOT Akron Canton Freeway Management Center
*ODOT Central Office
ODOT District 12 Freeway Management Center
ODOT District 3 Office
*ODOT Portable Freeway Management System
OTC Central Dispatch
*Other Municipal Signal Control Systems

Transit Management Subsystem
Akron METRO Dispatch
GCRTA Administration
GCRTA Communications Center
Geauga County Transit Operations
Kent State Bus Operations Center
Laketrans Operations Center
LCT Bus Operations Center
Medina County Transit Operations Center
METRO Administration
*Regional Smart Card Reconciliation Network
School District Dispatch

Archived Data User Systems
*Crash Records Database Users
CRIS Data Users
*Traffic Data Users

Care Facility
Regional Hospitals and Trauma Centers

Equipment Repair Facility
ODOT District 3 Equipment Repair Facility
ODOT District 12 Equipment Repair Facility

Event Promoters
City of Cleveland Special Events Management
Event Operators Information Systems

Financial Institution
Financial Institutions

Intermodal Freight Provider
Port of Cleveland

Media
TV and Radio Stations

Multimodal Transp. Service Provider
Hopkins International Airport and Burke Lakefront Airport
Regional Airport

Other EM
*Cleveland Regional Incident and Mutual Aid Network

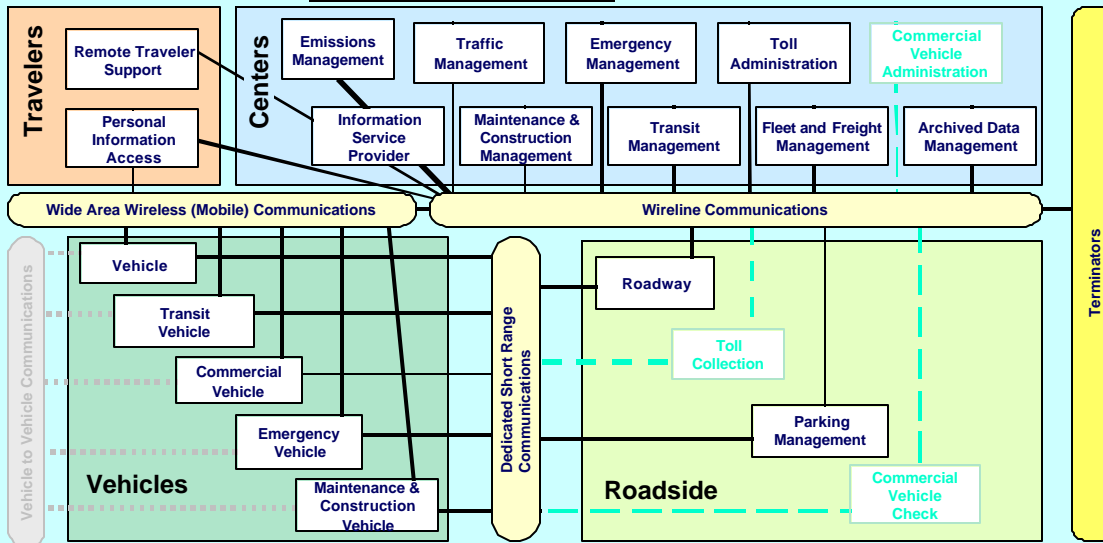
Rail Operations
*Railroad Operations Center

Surface Transportation Weather Service
*Private Weather Service Systems

Traveler Card
*Regional Traveler Smartcard

Wayside Equipment
Railroad Wayside Equipment

Weather Service
National Weather Service



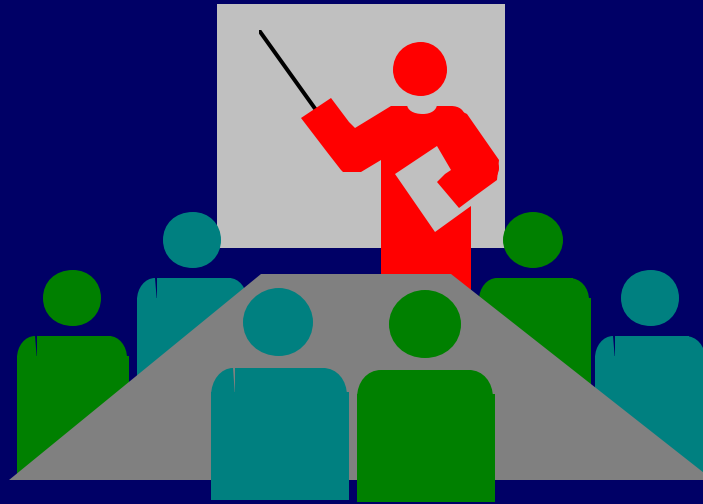
Roadway Subsystem
City of Cleveland Field Equipment
*County Field Elements
*Cuyahoga County Field Equipment
Municipal Field Equipment
ODOT Field Equipment
OTC Field Equipment

Parking Management Subsystem
*City of Cleveland Parking Management

Cleveland Regional ITS Architecture
"Sausage Diagram"

* Elements are *planned*, not *existing*.

Discussion of Regional Scope

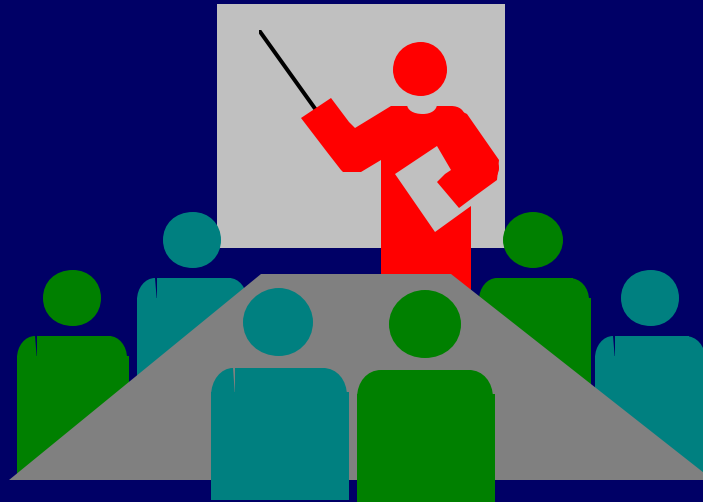


Map Stakeholder ITS Elements to National ITS Architecture Entities

- Review and Update Draft Inventory already developed from existing documentation
 - For existing stakeholder ITS elements
 - For planned/future stakeholder ITS elements



Introduction to Market Packages and Regional Prioritization



Moving Standardized Information between Subsystems and Terminators: *Architecture Flows*



■ *Architecture Flows*

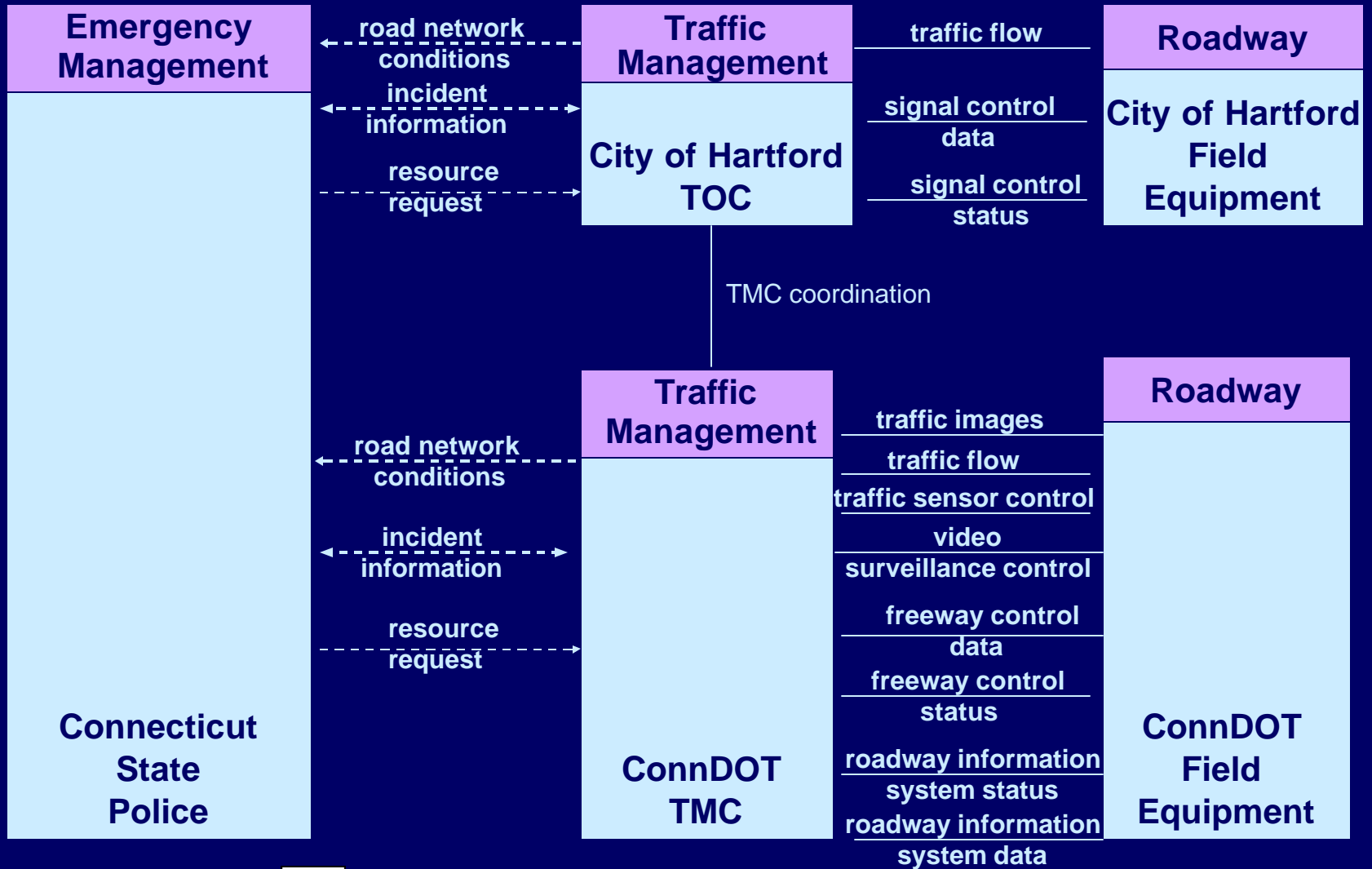
- Identify the kind of information that flows:

Subsystem <--> Subsystem

or

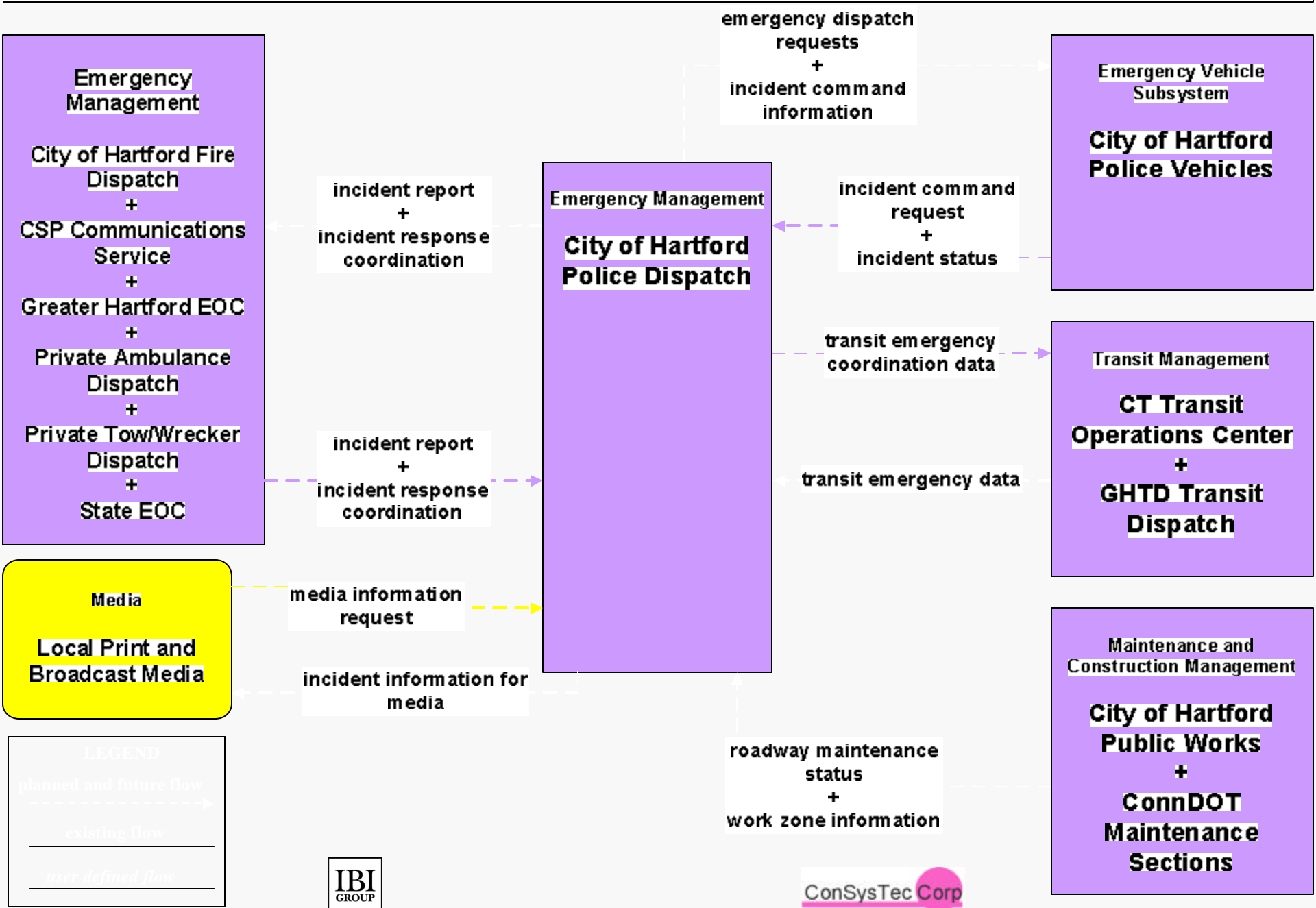
Subsystem <--> Terminator

Example Possible Architecture Flows between Individual Agencies

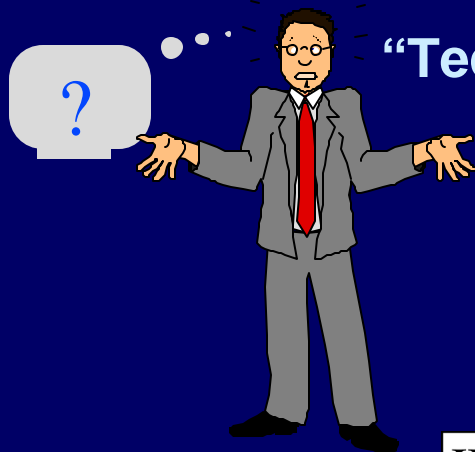
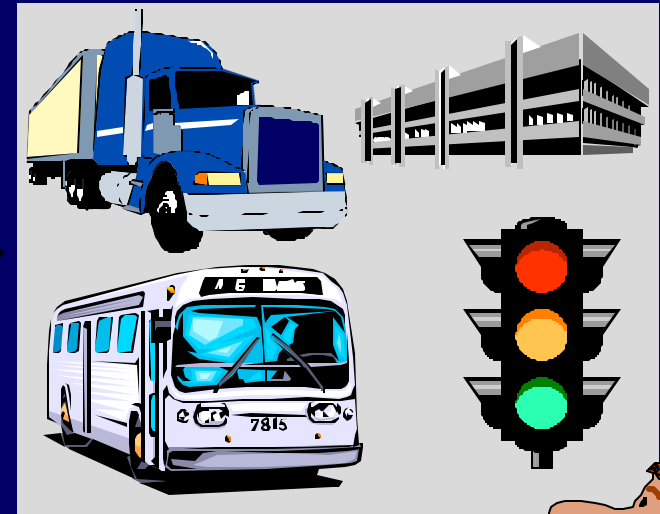
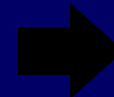
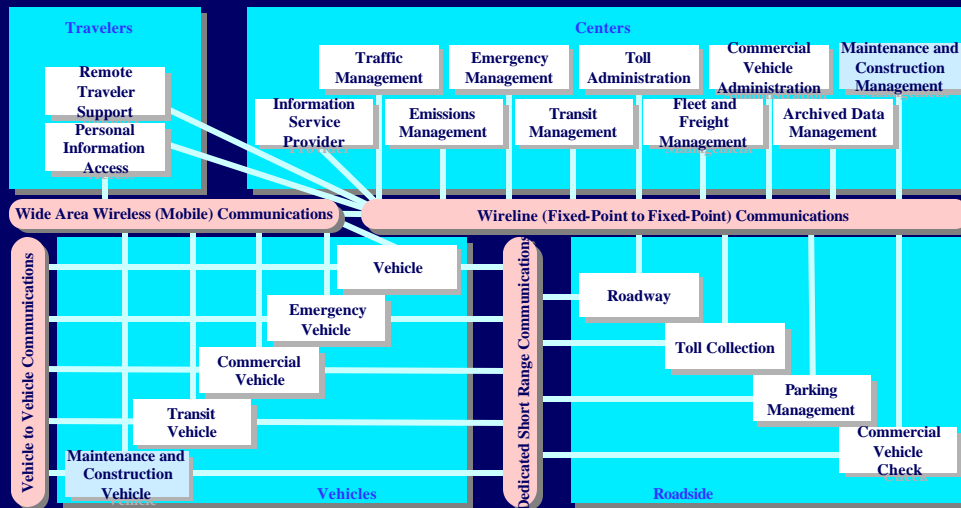


EM1 - Emergency Response

City of Hartford Dispatch



Focused Architecture Views

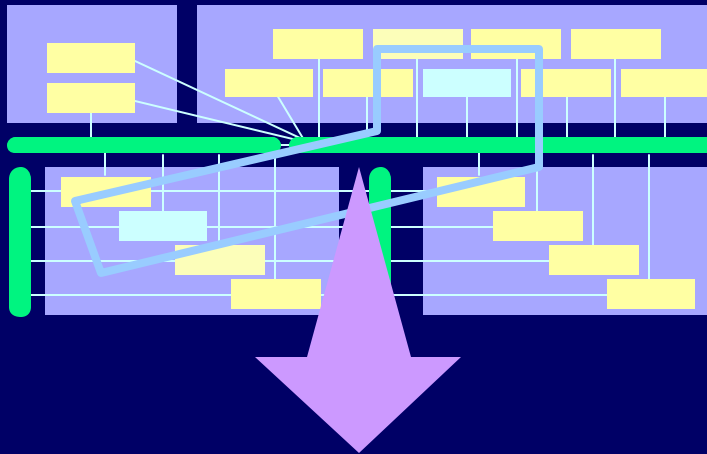


“Technical Framework”

“Transportation Services”



Market Packages



Architecture

Framework spanning all of ITS

Transit Vehicle



Transit Management



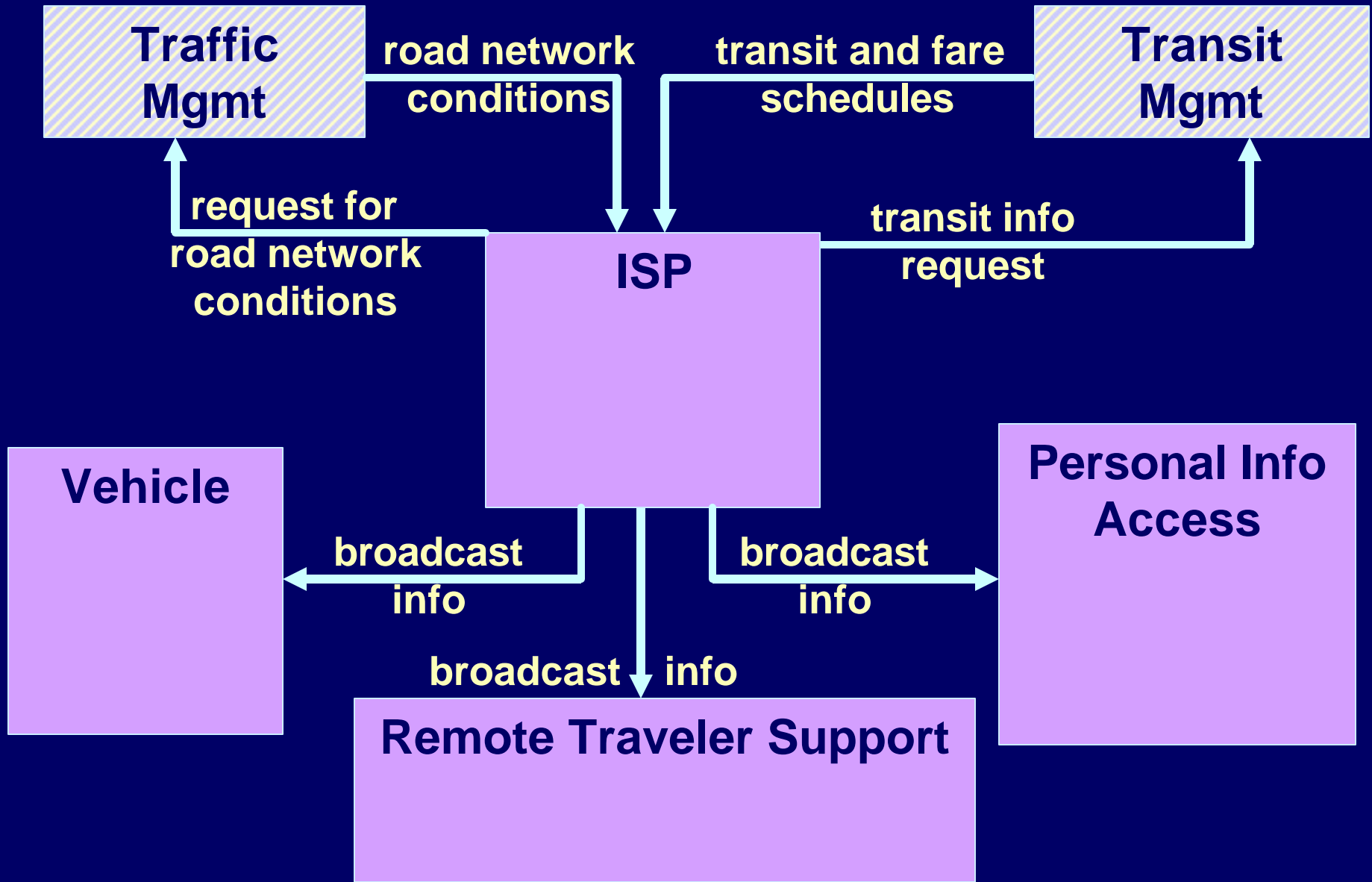
Market Packages

Pieces of the architecture that provide a particular transportation service.

Network Surveillance



Broadcast Traveler Information



Determine Future Needs/ Select Market Packages

ATMS

- Network Surveillance**
- Probe Surveillance**
- Surface Street Control**
- Freeway Control**
- HOV Lane Management
- Traffic Information Dissemination**
- Regional Traffic Control
- Incident Management System*
- Traffic Forecast and Demand Management
- Electronic Toll Collection*
- Emissions Monitoring and Management
- Virtual TMC and Smart Probe Data
- Standard Railroad Grade Crossing*
- Advanced Railroad Grade Crossing
- Railroad Operations Coordination
- Parking Facility Management***
- Regional Parking Management
- Reversible Lane Management
- Speed Management
- Drawbridge Management

MCO

- Maint and Const Vehicle Tracking**
- Maint and Const Vehicle Maintenance
- Road Weather Data Collection*
- Weather Information Processing and Distribution*
- Roadway Automated Treatment
- Winter Maintenance
- Roadway Maintenance and Construction**
- Work Zone Management
- Work Zone Safety Monitoring
- Maint and Const Activity Coordination*

APTS

- Transit Vehicle Tracking***
- Transit Fixed-Route Operations**
- Demand Response Transit Operations
- Transit Passenger and Fare Management
- Transit Security
- Transit Maintenance
- Multi-modal Coordination*
- Transit Traveler Information*

Bold - Existing
Market Packages
Italics - Future Market
Packages

Determine Future Needs/ Select Market Packages

ATIS

- Broadcast Traveler Information**
- Interactive Traveler Information
- Autonomous Route Guidance
- Dynamic Route Guidance***
- ISP Based Route Guidance
- Integrated Transportation Management/Route Guidance
- Yellow Pages and Reservation
- Dynamic Ridesharing
- In Vehicle Signing

AD

- ITS Data Mart
- ITS Data Warehouse
- ITS Virtual Data Warehouse

EM

- Emergency Response**
- Emergency Routing**
- Mayday Support
- Roadway Service Patrols

CVO

- Fleet Administration
- Freight Administration
- Electronic Clearance
- CV Administrative Processes
- International Border Electronic Clearance
- Weigh-In-Motion
- Roadside CVO Safety
- On-board CVO Safety
- CVO Fleet Maintenance
- HAZMAT Management

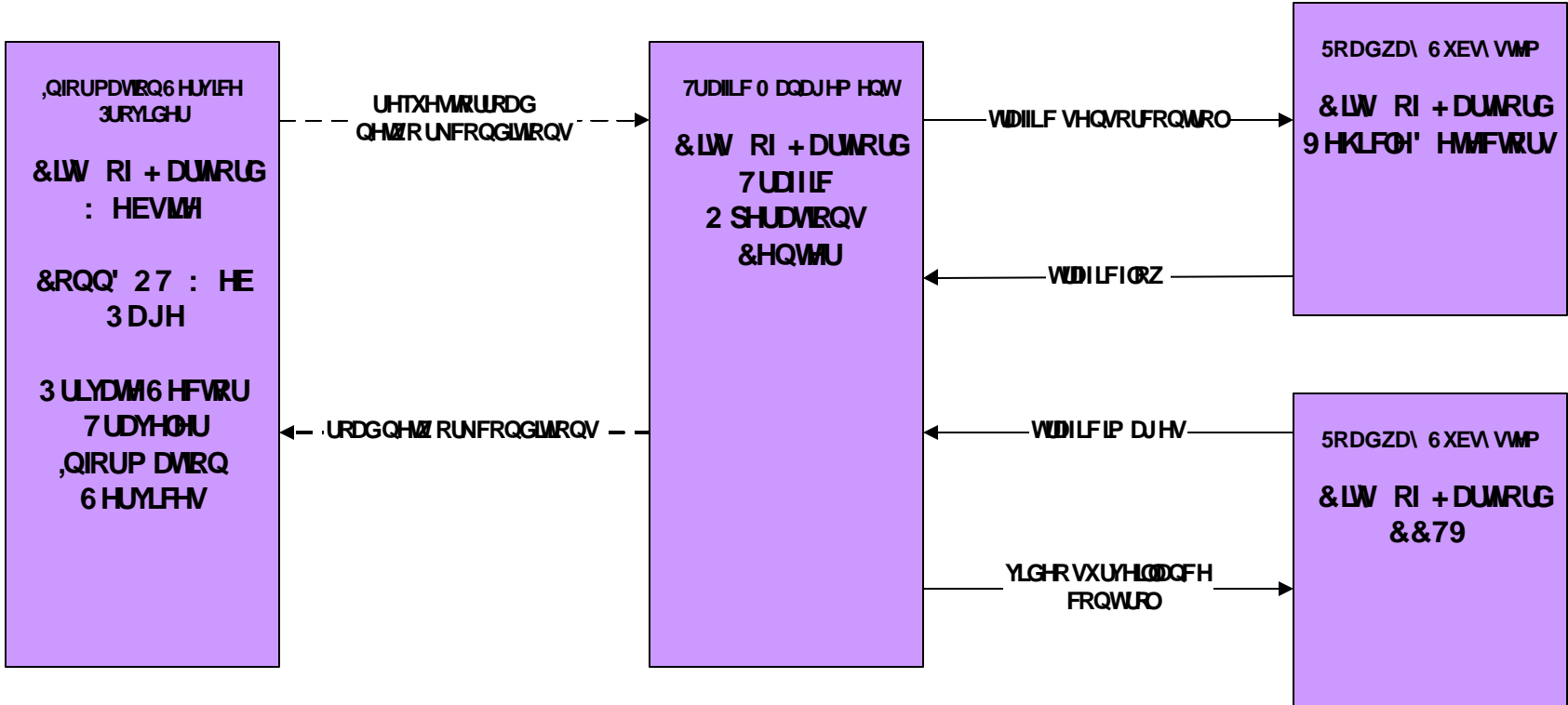
AVSS

- Vehicle Safety Monitoring
- Driver Safety Monitoring
- Longitudinal Safety Warning
- Lateral Safety Warning
- Intersection Safety Warning
- Pre-Crash Restraint Deployment
- Driver Visibility Improvement
- Advanced Vehicle Longitudinal Control
- Advanced Vehicle Lateral Control
- Intersection Collision Avoidance
- Automated Highway System

Introduction to Market Package Customization



\$ 7 0 6 1 HZ RUN 6 XU YH L O Q F H
& LW RI + DUARUG 7 UDILF 2 SHUDMRQV & HQMU



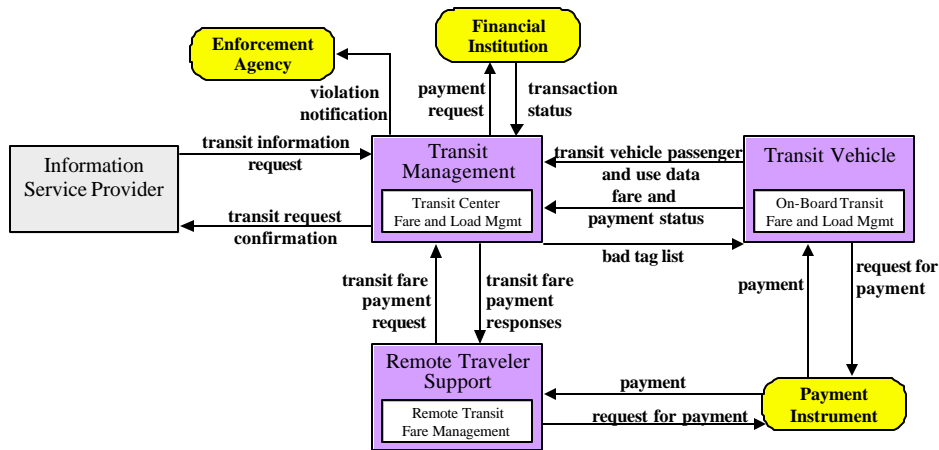
LEGEND
 planned and future flow
 ----->
 existing flow

 user defined flow

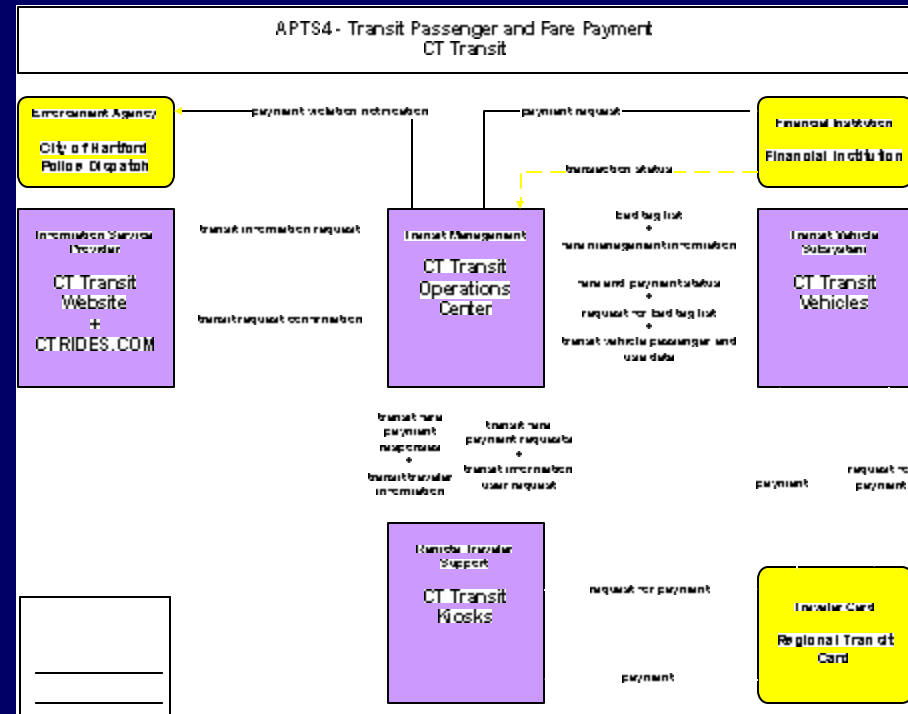
Original Market Package

--> Customized Market Package

APTS4 Transit Passenger and Fare Management



APTS4- Transit Passenger and Fare Payment
CT Transit



Customize Market Packages to Reflect Regional Operational Concepts

- Customize the Market Packages - Delete/Add:
 - Subsystems, Terminators, Architecture Flows
- Moderator-Analysts Assist by
 - Asking questions
 - Capturing results



Summary:

Regional ITS Architecture Development

- Engaged stakeholders for consensus
- Mapped stakeholder elements to Architecture entities
- Selected Market Packages
- Customized Market Packages
 - Subsystems, Terminators and Architecture Flows to local Stakeholder needs
- Temporarily hosted at www.consystec.com