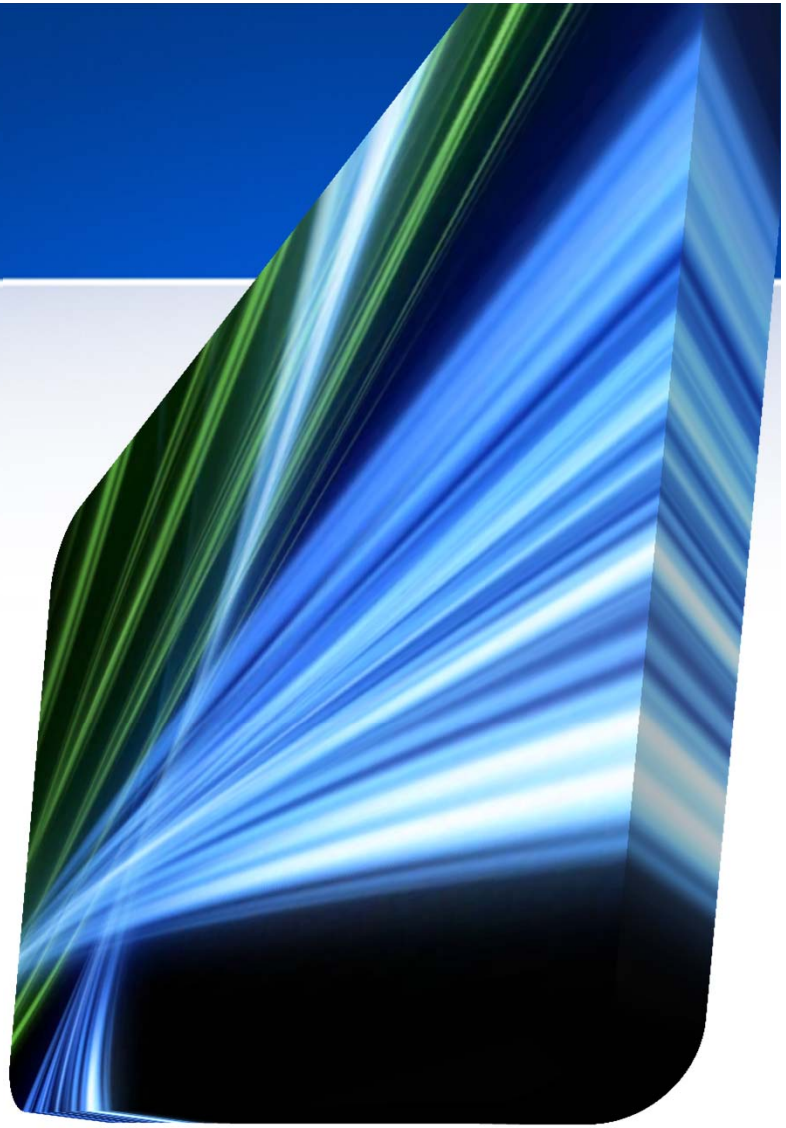
Guidelines for Virtual Transportation Management Center Development



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T3 Webinar

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Project Purpose

- To develop a guidebook that provides technical guidance on planning and development of a Virtual TMC
- Virtual TMC Guidebook will serve as a key resource for developing a virtual TMC, including:
  - Examples of various TMC models
  - Guidance for business planning
  - Procedures for addressing common technical, operational, and institutional issues (e.g., data needs, communications, collaboration agreements)

Presentation Outline

1. Guidebook Overview
   - Introduction & Background
   - Current TMC Operational Practices
   - Virtual TMC Implementation Guidelines
   - Benefits and Challenges
2. Questions

Introduction and Background

Definition of a "Virtual TMC":

A Virtual TMC is the function of monitoring, controlling and managing the functional elements of a transportation management system through the use of computers and computer networks without being present at a physical nerve center or without the existence of such a physical nerve center. This includes the functions of monitoring, collecting, processing and fusing transportation system data; disseminating transportation information to outside entities; implementing control strategies that affect changes in the transportation system; and coordinating responses to traffic situations and incidents.

TMC General Definition

- Transportation Management Center (TMC)
  - The nucleus for collecting, monitoring, verifying, and responding to traffic conditions
  - Disseminating important information to other agencies and the public
  - Staffing: TMC operators and emergency responders (highway patrol, etc.)
  - Typically a single or multi-agency facility
  - Physical/operational model:
    - Centralized
    - Distributed
    - Virtual
    - Hybrid of the above

Most prevalent current models

TMC Model Shift

- Less Emphasis on physical facilities (very expensive)
- More emphasis on data communications (decreasing in costs)
- More use of advanced web-based software solutions, cloud computing and Software as a Service (SaaS)
- Not constrained geographically

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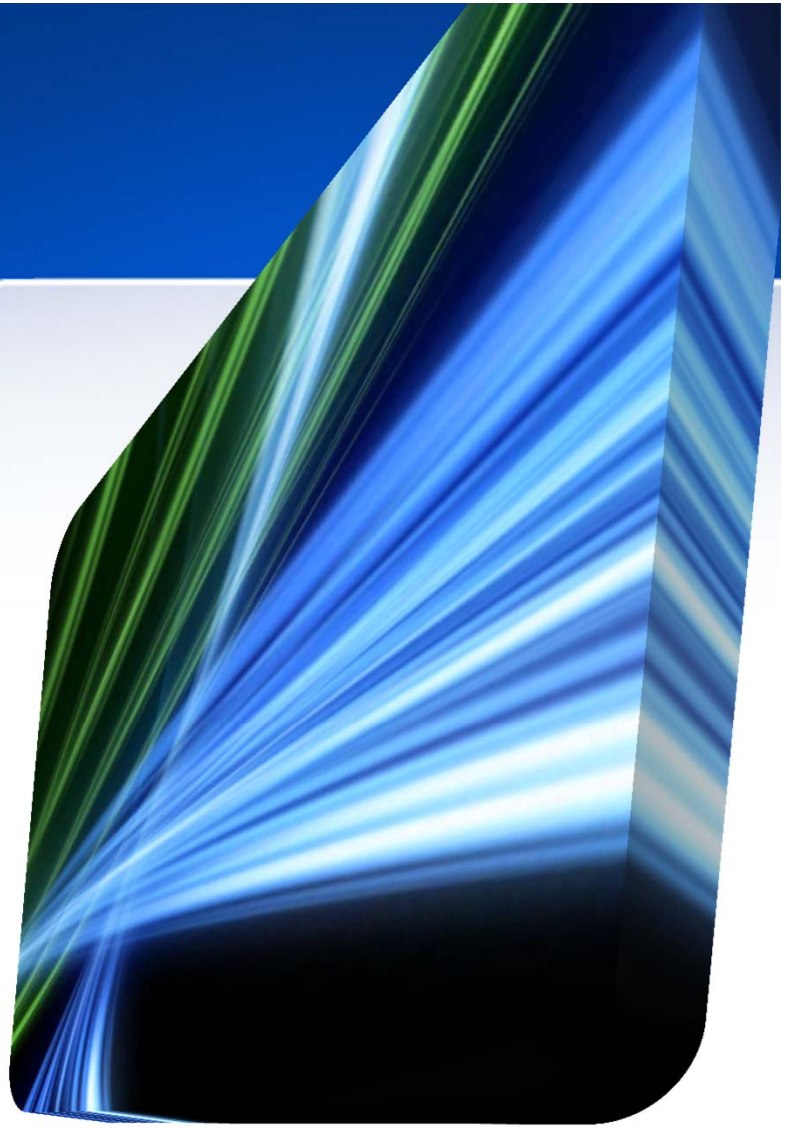
GUIDEBOOK OVERVIEW

CURRENT TMC OPERATIONAL PRACTICES



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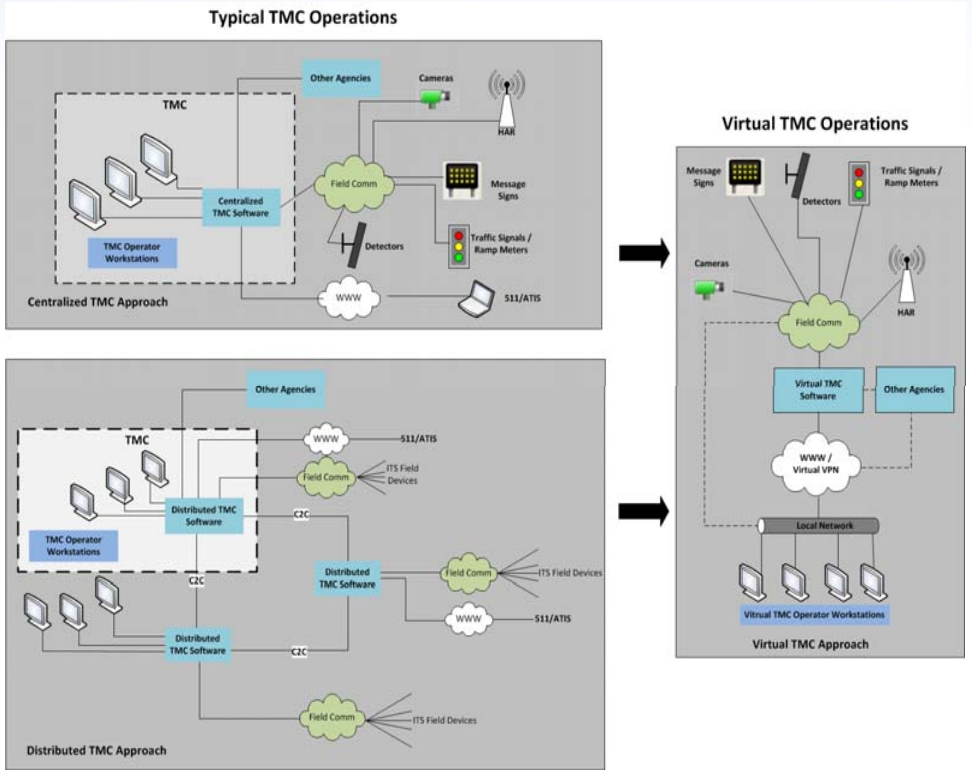
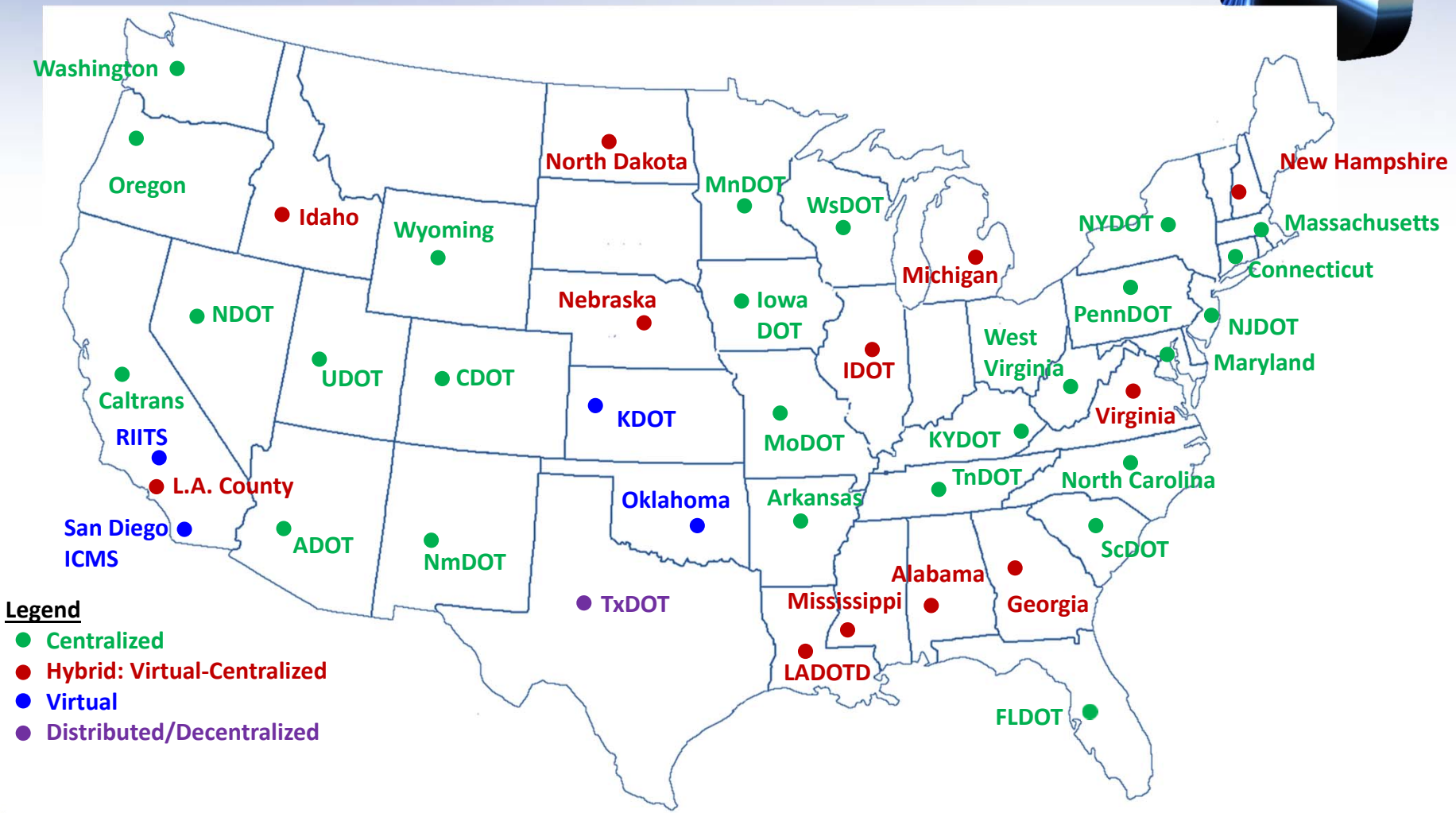
TMC Models

There are four (4) typical TMC models:

1. Centralized
2. Distributed
3. Virtual
4. Hybrid



Current TMC Deployments



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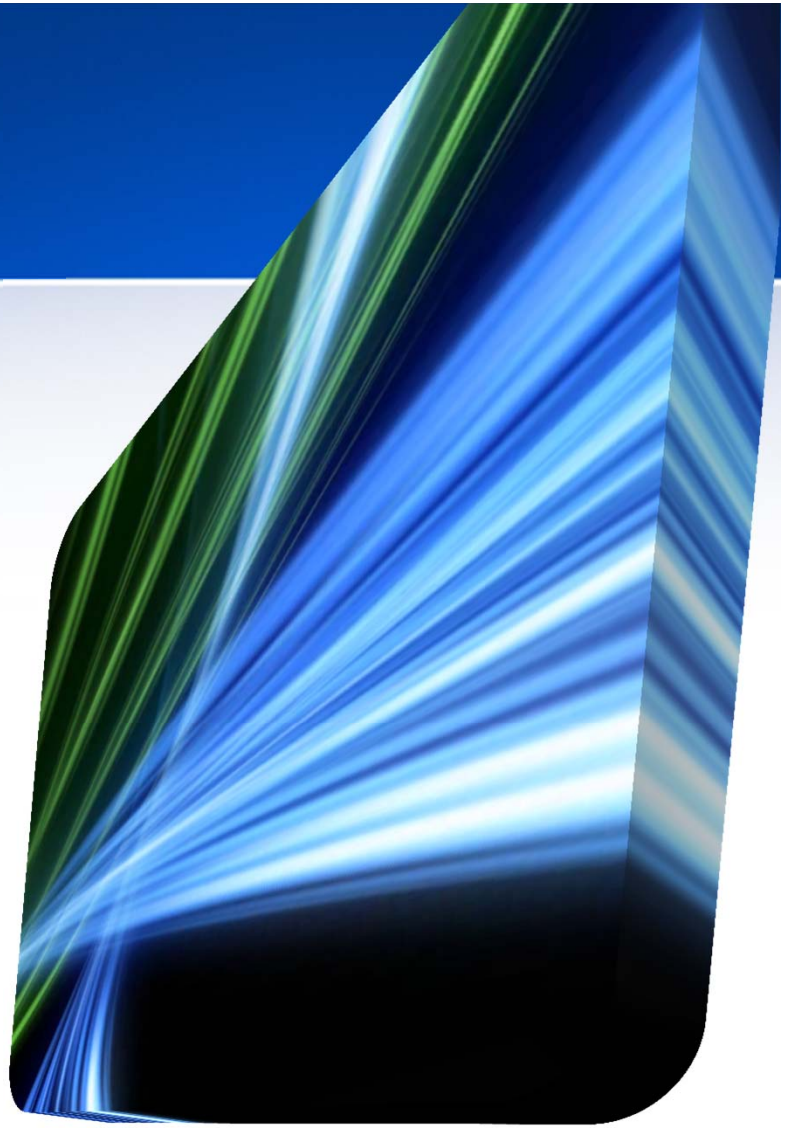
Interviewed Agencies

- Alabama DOT
- Idaho Transportation Department
- LA County
- LA Metro
- Michigan DOT
- Kansas DOT
- Minnesota DOT
- New Hampshire DOT
- Oklahoma DOT
- Oregon DOT
- San Diego Association of Governments (SANDAG)

GUIDEBOOK OVERVIEW

VIRTUAL TMC IMPLEMENTATION GUIDELINES



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1) Existing Systems and Needs Assessment

- A high level needs assessment should be prepared to describe the following areas:
  - Physical Communications
  - Logical Communications
  - Data and Information Needs
  - Operational Needs
  - Software System Needs
- A high-level logical architecture should be prepared during this stage.

2) VTMC ConOps

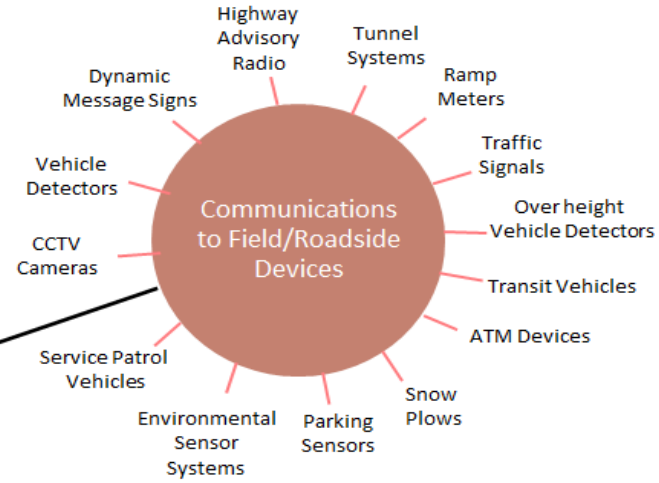
Section	Section Purpose
Scope	What is the scope of the VTMC project, What is to be developed and documented
CURRENT SYSTEM AND SITUATION	What is the current state of practice related to TMC applications or systems that may or may not be performing the functions expected from a virtual TMC.
JUSTIFICATION FOR AND NATURE OF CHANGES	Why does a VTMC need to be developed and what will it do, at a high level.
CONCEPTS FOR PROPOSED OPERATION	Who are the users of the VTMC and where will it/can it be deployed, and under what constraints
OPERATIONAL SCENARIOS	What are the operational scenarios of the VTMC system, What systems and/or subsystems are involved, How do they operate, When do the sequence of events occur within the VTMC system
ANALYSIS OF PROPOSED OPERATION	What improvements will be realized through the VTMC development, What Trade-offs were considered

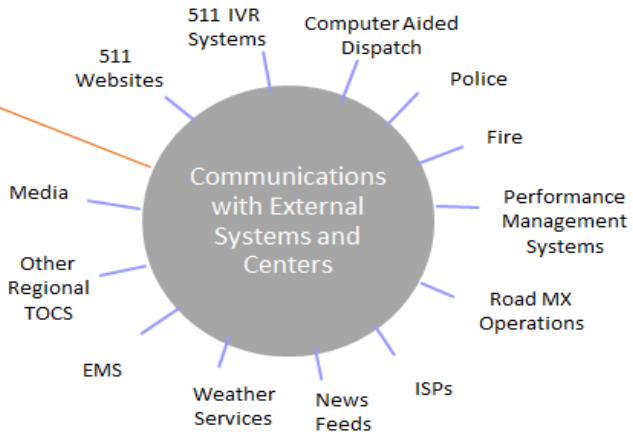
3) Virtual TMC Security Design

- Layered Security
- Secure Communications
- Log Management
- Audit Policies
- Alerts and Notifications
- Log Analysis and Reporting
- High Availability Systems

4) Design Virtual TMC Communication Architecture

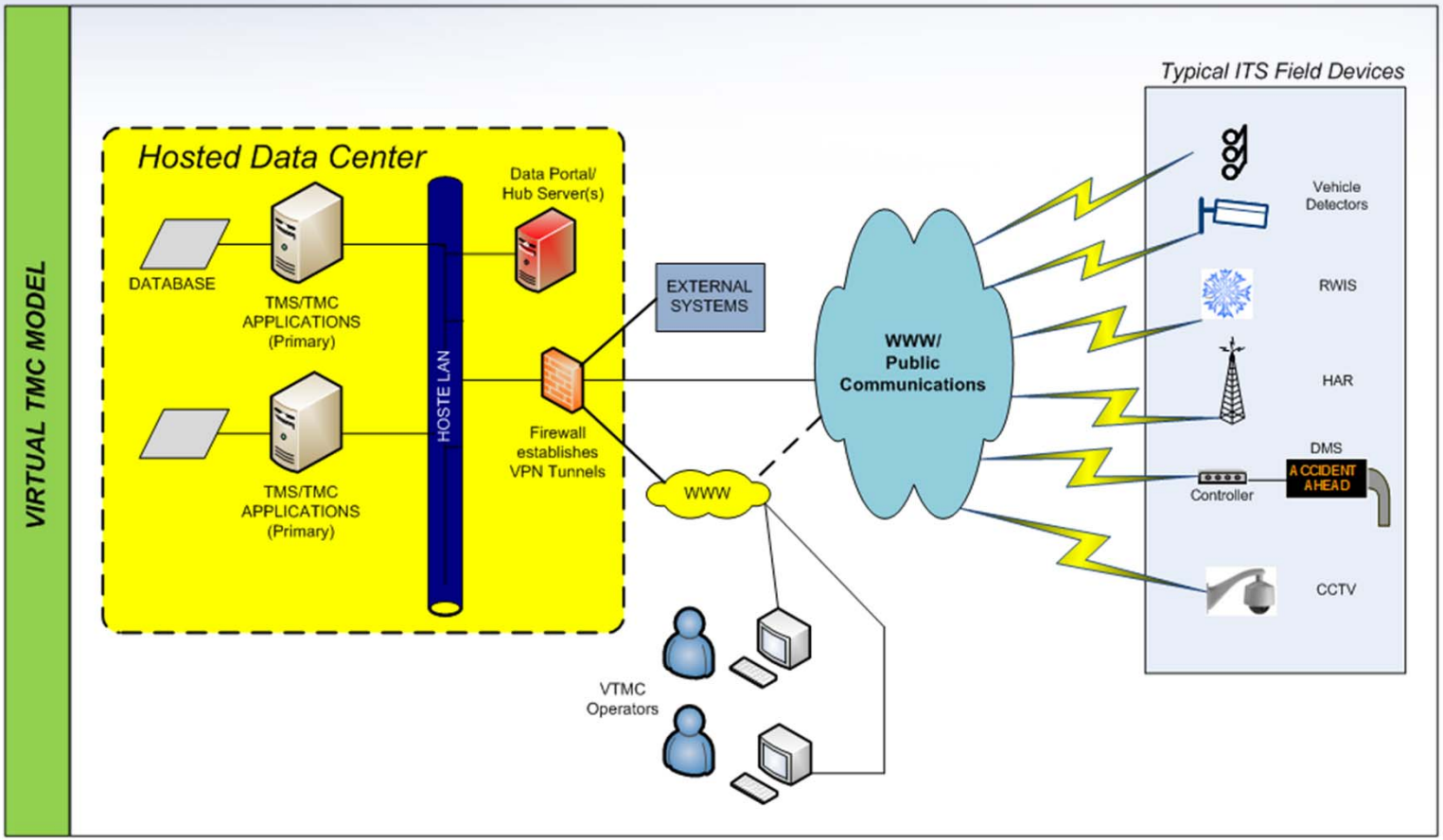
Transportation Management Center Hosting Facility/Location





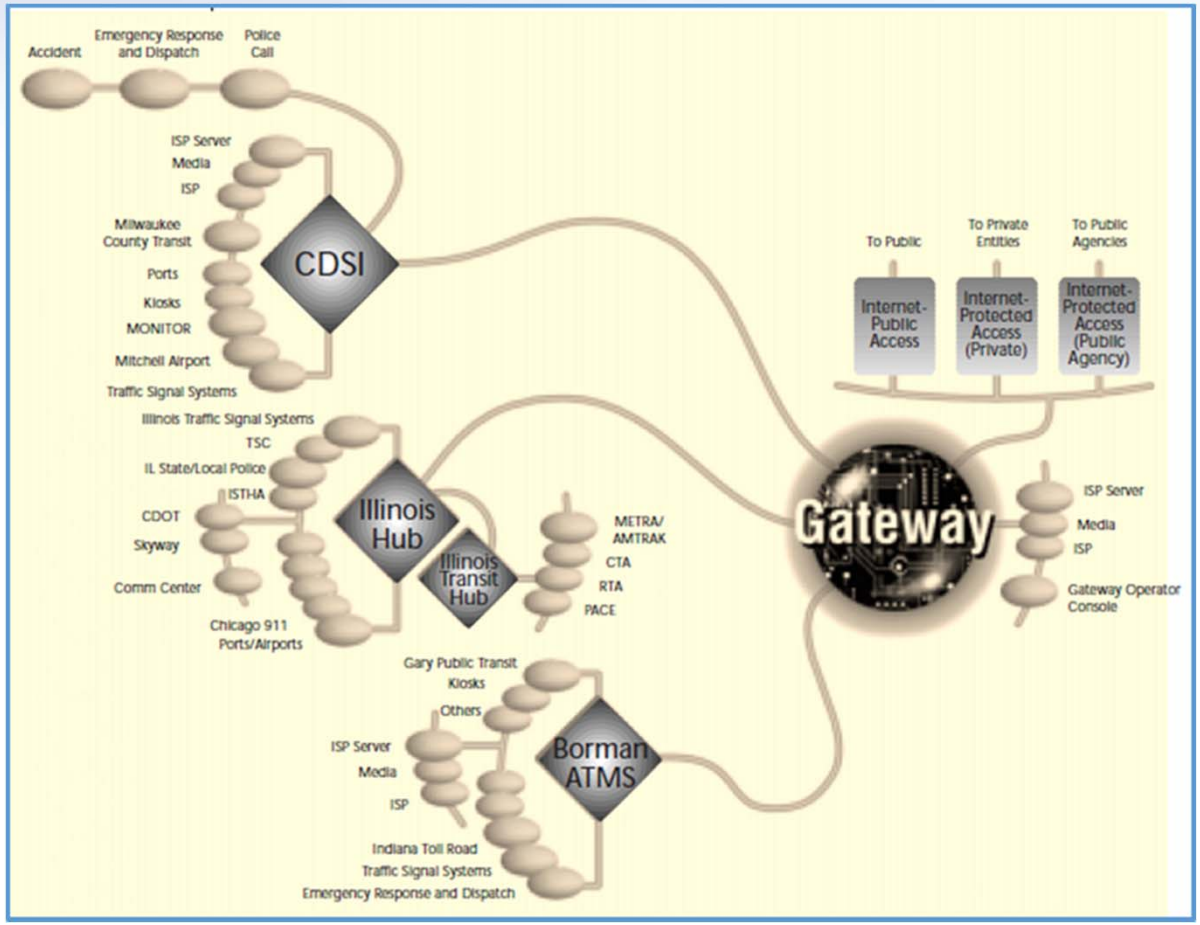
Communication Architecture

Virtual TMC Model



Communication Architecture

C2C Communications Hub or Gateway



5) Develop ATMS Implementation Plan

- ATMS Purpose
- Mission Statement
- ATMS Functionality Description
- Existing and Proposed ATMS Architectures
- Implementation Procedures/Steps
- Roles and responsibilities for executing the plan
- Implementation Schedule
- Costs

6) Standard Operating Procedures (SOPs)

- Virtual TMC Procedure Overview – Provides decryption of each individual procedure and its purpose.
- Area or Responsibility – Who is responsible for implementing this procedure given the new VTMC model; i.e., who is responsible for doing what.
- Procedure Steps – An actual description of the steps that will be followed in the new VTMC model.
- References – References to any other procedures that will be used in association with this specific Virtual TMC procedure.

7) Staffing Plan

- Currently, these are the most common staffing approaches for Virtual TMCs:
  - Staffed and operated by the managing entity—no dedicated TMC staff, rather the entity staff also perform TMC functions.
  - Staffed and operated by the managing entity—dedicated staff for TMC functions but not working in a typical physical TMC environment (i.e., staff working remotely).
  - Managed by a single entity with the operational support of partner agencies.
- The staffing plan should address each of these functions given the new Virtual TMC model.

8) VTMC Training Plan

- Operators, Administrators, Maintenance
- VTMC Operators can have “blurred” responsibilities
- One-on-one Training
- Scenario-Based

9) Risk Assessment

Mitigating Risk

Example of possible risks and risk level assignments.

Description of Risk	Likelihood	Impact	Actions/Mitigation
Agency partners do not have common operational concept	H	H	Establish common multi-agency Concept of Operations
Center-to-Center Communication System is not conducive for Virtual TMC Operations	H	M	Design common C2C communication gateway, portal or hub using agreed standard data exchange mechanism
Regional ITS Architecture does not support VTMC model	H	L	Begin process to update Regional ITS Architecture accordingly.

Virtual TMC Benefits

1. Remote system accessibility – provides operators and other users with the ability to operate the system(s) by establishing a remote access connection from any location
2. Shared control of the agency's existing (and future) ITS devices and data
3. Data sharing/exchange among partner agencies
4. Improved information collection and dissemination
5. Software alignment across partner agencies – use of same software applications across partner agencies facilitates information sharing
6. Ability for agencies to combine facility infrastructure and staffing resources to operate in a multi-agency coordinated manner
7. Operations alignment across partner agencies - use of Standard Operating Procedures (SOPs) during multi-agency events facilitates integrated response
8. Backup capabilities including systems and operations – anyone with appropriate privileges can access the system from anywhere

Virtual TMC Benefits

9. Regional Stakeholder buy-in – improved cooperation and collaboration among partner agencies
10. Improved communication among partner agencies. Coordinated response to multi-agency events
11. Improved relationships with partner agencies
12. Cost savings – capital and staffing cost savings may significantly lower in the Virtual TMC model vs. a traditional TMC
13. Innovative approach that requires coordination and cooperation between agencies
14. A Virtual TMC can be at the service of many agencies

Virtual TMC Challenges

- Regional Stakeholder Buy-In
- Legacy Systems
- Servicing Agreements
- Lines of Communication
- Risk Avoidance
- Security

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