TRI-COUNTY TCRPC REGIONAL PLANNING COMMISSION

PennState College of Engineering

TRANSPORTATION ENGINEERING AND SAFETY CONFERENCE

# DSRC Coordination Plan

Implementing DSRC Technology

# The Team

Tri-County Regional Planning Commission

*Our mission is to foster the long-term livability and vitality of our communities, counties and region.*

pennsylvania DEPARTMENT OF TRANSPORTATION

PENNA TURN PIKE

ADAMS COUNTY

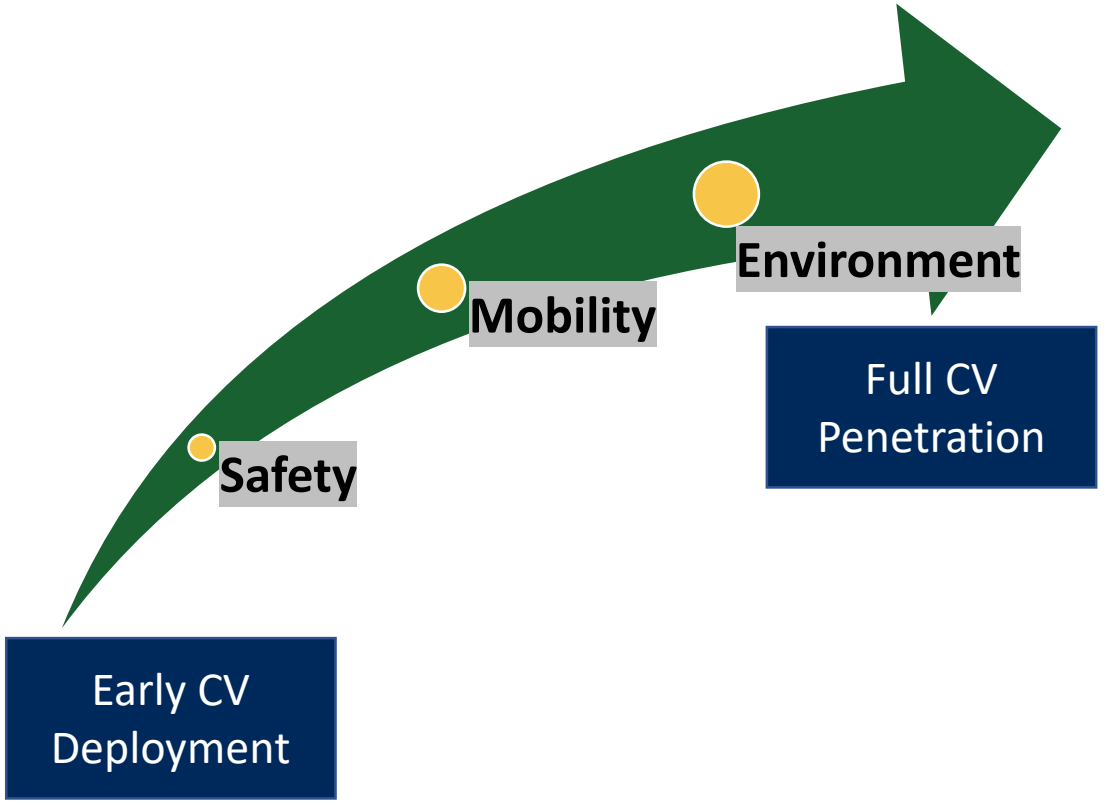
FRANKLIN COUNTY PENNSYLVANIA

# MPO Guide for Implementing DSRC Technology in PennDOT District 8-0

- Section 1 – Defining the Technology
  - Technology Background
  - Role of Communication Technologies for Connected Vehicles (DSRC & 5G)
- Section 2 – V2I Deployment Impacts & Priorities
  - Priority Applications
  - Projected Penetration Rate Scenarios & Anticipated Impacts
  - Corridor Prioritization
  - Long Range Plan Integration
- Section 3 – Cost & Design Considerations
  - Project Selection
  - Design Considerations
  - Cost Overview
  - Ownership and Maintenance Responsibilities

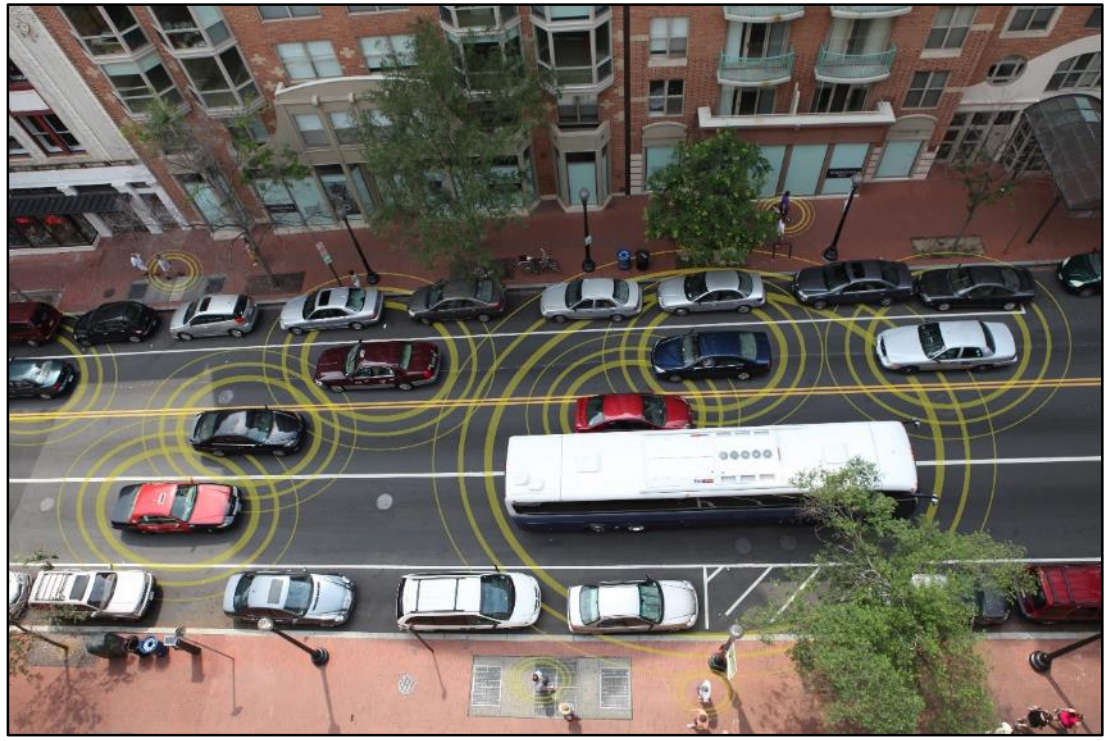
Defining the Technology

# Benefits of Connected Vehicles




Defining the Technology

# Means of Connection

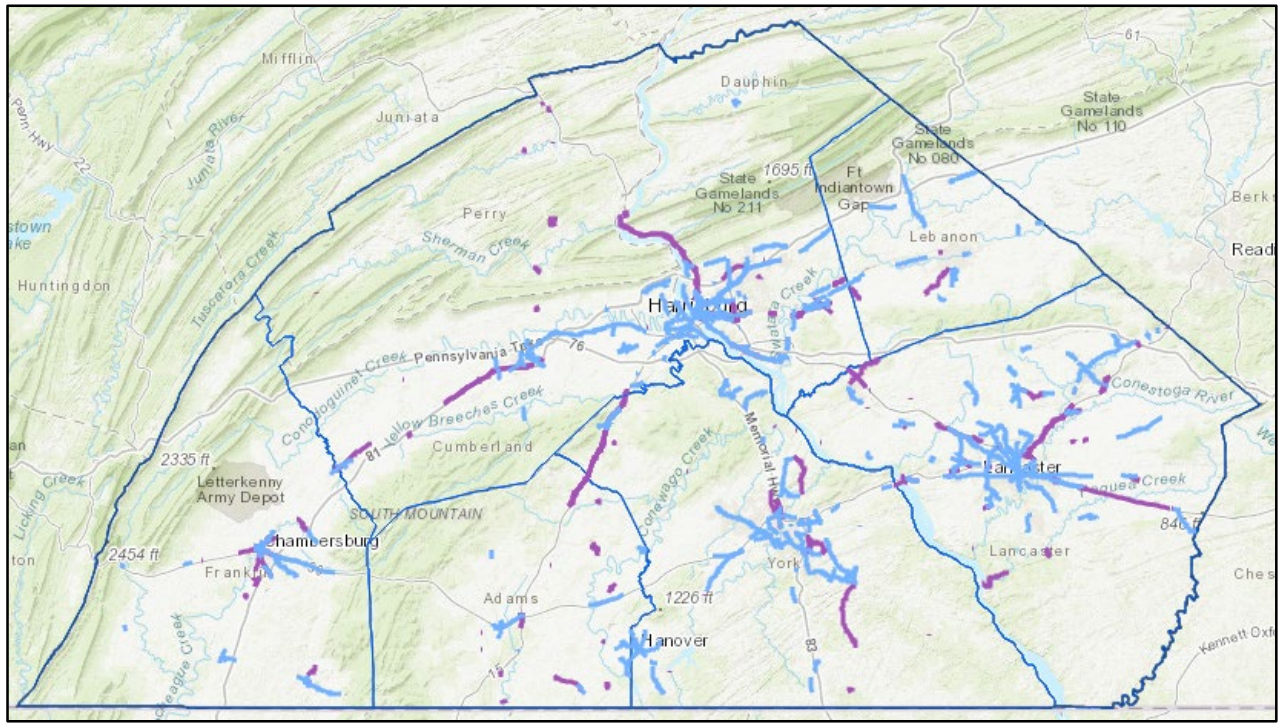


Dedicated Short Range Communication (DSRC)

5G Communication

# Section 2 – V2I Deployment Impacts & Priorities

- Identified Priority Vehicle to Infrastructure (V2I) CV applications
  - Safety
  - Environment
  - Mobility
  - Agency Data
- Projected Penetration Rate Scenarios & Anticipated Impacts
  - Rural and Urban Corridors
- Corridor Prioritization
  - Interactive GIS Map to assist in the preliminary selection of corridors in PennDOT District 8
- Long Range Plan Integration




DSRC Corridor Selection Interactive Map

V2I Deployment Impacts & Priorities

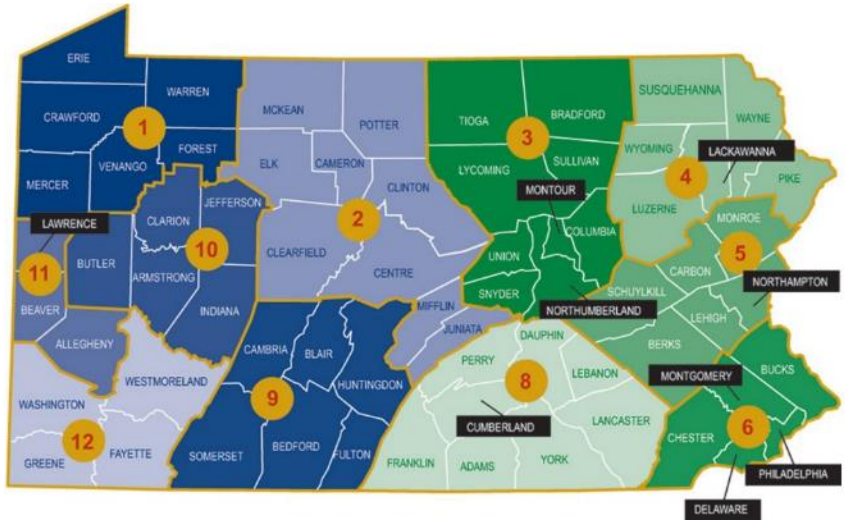
# Long Range Plan Integration

- Priority Corridor Identification
- Stakeholder Engagement
  - Ensure operational interests are represented on the plan steering committee
  - Emphasize DSRC and operations in scenario planning
- Plan Integration
  - Incorporate DSRC as part of the LRTP's multimodal transportation profile and strategic direction
  - Create a line item for DSRC-related improvements
  - Ensure operations are considered and incorporated into the project prioritization process

V2I Deployment Impacts & Priorities

# Future of DSRC Coordination Plans

- Immediate Benefit
  - Helping MPOs in District 8-0 with identifying potential DSRC projects for their Congestion Management Process and Long-Range Plans
- Potential Benefit
  - Being replicated in other PennDOT districts
  - Being implemented into the Statewide Long-Range Plan



Cost & Design Considerations

# Project Types & Funding


- Potential Projects Types
  - ITS deployment
  - Traffic signal upgrades
  - Widening/redesigning intersections
  - Safety improvements
- Project Selection → Already on TIP
  - “Add to, instead of add new”
- Project Timing → Before Environmental Clearance Submitted
- Projects Funding → Congestion Mitigation and Air Quality Improvement Program (CMAQ) if addresses capacity/efficiency to reduce emissions

# Design Considerations

- Unit Placement
  - Good line of sight → 1 unit per intersection
  - Urban area may need 2nd unit/repeater
  - Install 25’-35’ above the roadway
  - DSRC antennas down, GPS antennas up

# Element cost breakdown for the deployment of one DSRC unit

- Planning and Design
  - $10,500
- Equipment and Installation
  - $19,500
- Total cost for One DSRC unit
  - $30,000

| | Element | Description | Cost |
|---|---|---|---|
| Planning and Design | Radio Survey per site | Identification of radio interference and determination of the optimal location for the DSRC radio(s) | $700 |
| | Map Generation | Highly accurate mapping of the intersection/location (as-built plans, Mobile LIDAR, survey crew, etc.) | $1,000 |
| | Planning | Development of a general regional plan (data plan, security plan, and privacy requirements) for deploying a CV environment (5% of Construction) | $800 |
| | Design | Design associated with deploying the DSRC infrastructure at a specific location | $8,000 |
| | Total Planning and Design Cost | | $10,500 |
| Equipment and Installation (Completely Installed) | DSRC RSU Kit | DSRC radio unit, DSRC antennas, unit mounting hardware, PoE injector, wiring, mounting hardware, and configuration of the RSU | $3,500 |
| | Communication Connection Equipment | Equipment necessary to connect to the current communication network - Fiber patch panel, manage switch | $1,800 |
| | Power Connection Equipment | Service disconnect, meter socket | $500 |
| | Additional Equipment and Installation | Device field enclosure and associated mounting hardware, etc., installation of all site components | $7,000 |
| | Communication system integration & License | Communication to back office | $3,000 |
| | Traffic Control | Basic traffic control during deployment of a DSRC radio unit 10% of Equipment and Installation | $1,500 |
| | Mobilization | 5% of Equipment and Installation | $700 |
| | Total Equipment and Installation Cost | | $18,000 |
| | Construction Inspection | 8% of Equipment and Installation Cost | $1,500 |
| | Total Equipment and Installation Cost with Inspection | | $19,500 |

# Deployment Cost Scalability

- The more units deployed on a signal project may greatly reduce design costs per device
- Equipment costs are less variable

| Element | Number of DSRC Units | | | | |
|---|---|---|---|---|---|
| | 1 to 9 | 10 to 24 | 25 to 49 | 50 to 99 | 100+ |
| **Planning and Design** | $10,000 | $9,000 | $8,000 | $6,000 | $4,000 |
| **Equipment** | $15,000 | $15,000 | $14,500 | $14,500 | $14,000 |
| **Installation** | $5,000 | $4,500 | $4,000 | $3,000 | $2,000 |
| **Total Cost per DSRC Unit** | **$30,000** | **$28,500** | **$26,500** | **$23,500** | **$20,000** |

## Cost & Design Considerations

# Ownership & Maintenance

| Ownership Scenarios | | | Data Sharing Agreement Need | MOU Need | TE-160 Mod. | TE-972 TE-973 Mod. | Additional Municipal Maintenance Cost |
|---|---|---|---|---|---|---|---|
| | Element | Owner | | | | | |
| 1 | DSRC Equipment | Municipality | High | Low | High | High | High |
| | Equipment Cabinet | Municipality | | | | | |
| | Power/Communication Source | Municipality | | | | | |
| 2 | DSRC Equipment | PennDOT | Medium | High | High | Low | Low (Reimbursement from PennDOT) |
| | Equipment Cabinet | Municipality | | | | | |
| | Power/Communication Source | Municipality | | | | | |
| 3* | DSRC Equipment | PennDOT | Medium | High | Low | Low | Low (Reimbursement from PennDOT) |
| | Equipment Cabinet | PennDOT | | | | | |
| | Power/Communication Source | Municipality | | | | | |
| 4 | DSRC Equipment | PennDOT | Low ** | Medium | Low | Low | None |
| | Equipment Cabinet | PennDOT | | | | | |
| | Power/Communication Source | PennDOT | | | | | |

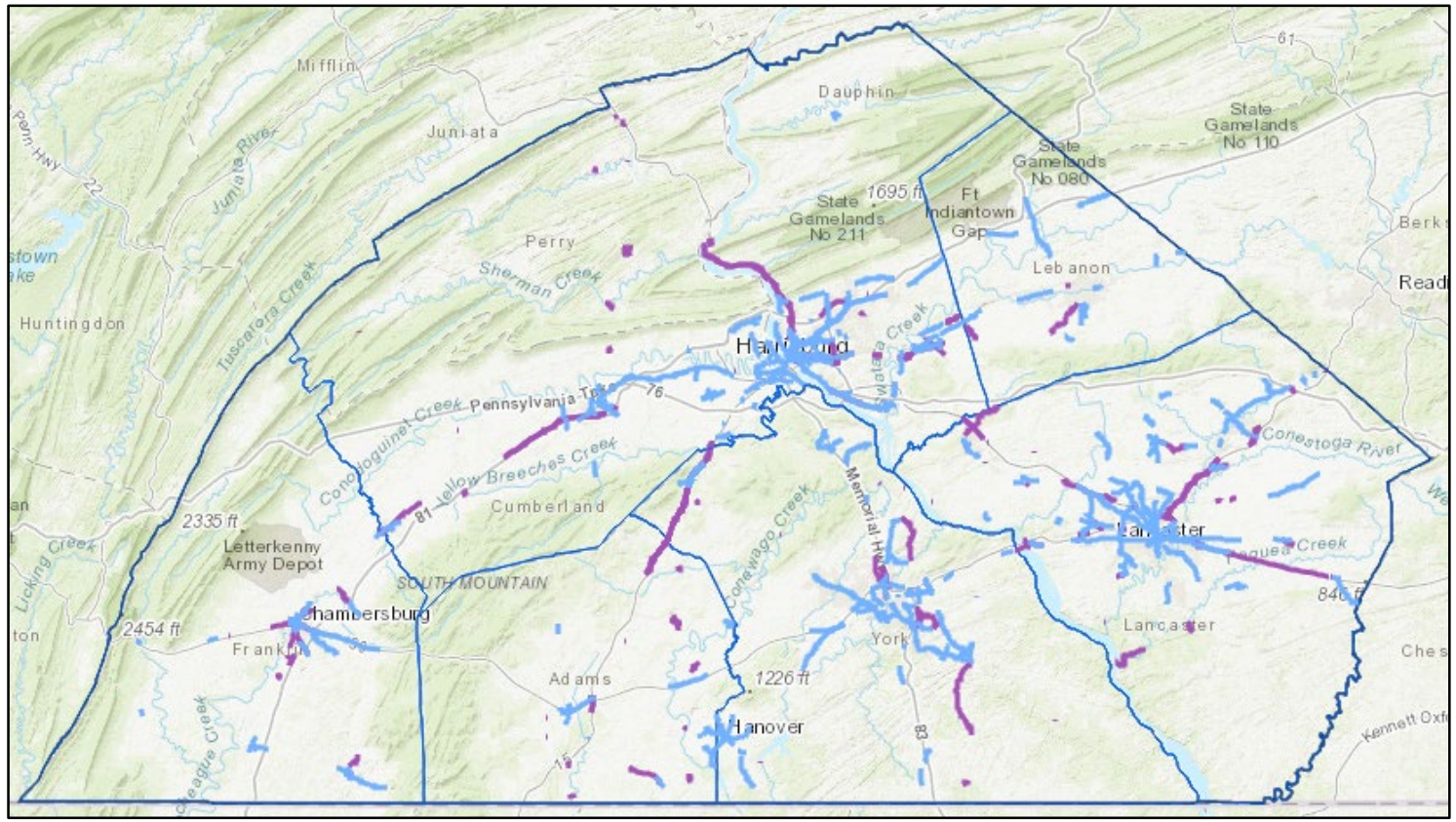
***Scenario 3 will likely be the most preferred typical installation situation between PennDOT and the Municipality**

****If the municipality requests data access, the need/effort would be medium**

TE Forms:

- TE 160 – Application for Traffic Signal Approval
- TE-972 & TE 973 – Responsive and Preventative Maintenance Records

# Priority Corridor Identification Tool

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[DSRC Corridor Selection Interactive Map]

# Contact Info

**Tri-County Regional Planning Commission**

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