Next Generation Advanced Traffic Management System
Request For Proposals

Pre-Proposal Conference

September 19, 2011

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Disclaimer

- Next Gen ATMS RFP takes precedence over any information in this presentation.

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PennDOT Traffic Management Centers Statewide Operations Overview

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PENNDOT REGIONAL TRAFFIC MANAGEMENT CENTERS
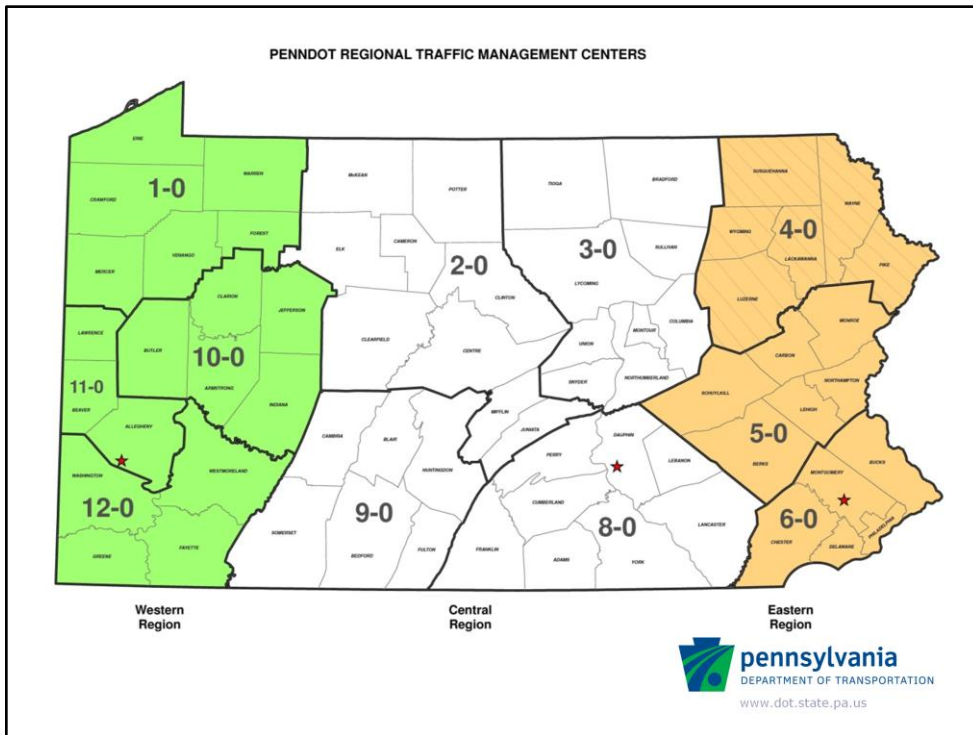
PennDOT has 11 engineering districts that provide engineering, maintenance, construction, traffic and related services for the state transportation system. PennDOT's Central Office provides administrative, technical, and professional support for all 11 Engineering Districts.

Each District maintains ITS devices, varying widely from a few DMS to a fully integrated ITS network. There are currently three (3) 24x7 Regional Traffic Management Centers (RTMCs) and six (6) District TMCs that operate Monday through Friday at varying business hours. RTMCs are represented by the red stars on the map, located in Districts 6 (Eastern RTMC), 8 (Central RTMC), and 11 (Western RTMC). The RTMCs take over for member Districts on nights, weekends, and Holidays and are able to operate all ITS devices for their member Districts. Districts 1, 2, 4, 5, 9, and 10 maintain regular TMC hours of operation. The map shown in this slide reflects RTMC regions during non-winter months. During Winter months, Districts 2 and 9 become 24x7 and District 8 RTMC provides off-hours coverage for District 4.

ITS Device and Software Counts by District

District	Current count of ITS Devices	Current count of software used	Future software
D1	15	2	
D2	77	6	
D3	6	2	
D4	88	9	
D5	83	7	
D6	407	3	1
D8	122	6	
D9	77	2	
D10	45	3	
D11	324	2	
D12	18	3	
Total	**1262**	**45**	

Information is based on Appendix Q ITS Equipment Inventory

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This slide shows the current ITS Device counts and number of software that is currently used to operate PennDOT's ITS assets. The totals shown include DMS, HAR, CCTV, and detectors. One of the major goals of this project is to achieve interoperability statewide, thus reducing the total number of software needed from 45 down to 1 common platform.

Please note that a detailed ITS device inventory is provided as Appendix Q to this RFP.

Project Goals and Objectives

- Next Gen ATMS system will:
  - **work with PennDOT's existing field equipment**
  - **collect, maintain, and display real-time data from field devices and external sources**
  - improve statewide coordination by providing **a single statewide platform** for sharing information among PennDOT Engineering Districts and PennDOT Central Office
  - **facilitate consistent and planned responses to planned and unplanned events**
  - **interface with PennDOT's existing software systems**
  - **be capable of continuing operation even after the failure of any single component**
  - **enable PennDOT to administer and maintain the system**
  - **provide an asset management component**

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These are the goals and objectives included in the RFP.

| **NEXT GEN ATMS PROPOSED PHASING**					
Proposed phasing:	Phase 1: D4, D5, D6, CO	Phase 2: D2, D3, D8, D9	Phase 3: D1, D10, D11, D12	Phase 4: Planned Enhancements	Phase 5: PA Turnpike Commission
Module/Item					
DMS	x	x	x		
Travel Time module	x	x	x		
CCTV	x	x	x		
HAR	x	x	x		
RCRS Interface	Statewide data integrated in Phase 1				
Vehicle Probe data	Statewide data integrated in Phase 1				
Incident response plan	x	x	x		
Incident detection/alarm module/vehicle detectors	x	x	x		
Queue detection	x	x			
HMI - Regional operations requirements	Statewide map and access to available data in Phase 1				
Administration	x	x	x		
Asset Management	x	x	x		
Data warehouse	x	x	x		
Performance measures	x	x	x		
HOV module			x		
Interface to RIMIS (D6)		x			
Ramp meter interface				x	
Interface to 511				x	
AVL Interface				x	
Traffic signal systems				x	
MDSS / RWIS Interface				x	
Planned enhancements		x	x	x	
PA Turnpike Commission Deployment					x

Notes:
1. Modules/items are listed in no particular order.
2. The Next Generation ATMS system will be deployed statewide in Phases 1 through 3.
3. The Department reserves the right to request enhancements, currently identified as Phase 4, to be completed in earlier phases of this contract.
4. Specific tasks for Phase 5 will be established in accordance with Appendix B, Special Terms and Conditions, Paragraph 7, Additional Work

This matrix provides a high level glance at the various modules/items that will be implemented with this project; it also identifies the phasing for each item. Each region will be integrated in Phases, starting in the East and finishing in the West. There are certain modules that will be integrated **statewide** in **Phase 1**, such as the Road Condition Reporting System (RCRS) interface, INRIX probe data, and Human Machine Interface (HMI) regional operations requirements (mapping).

Next Gen ATMS must be successfully deployed in District 5 prior to installing in Districts 4 and 6. The Next Gen ATMS system will be deployed statewide for use in all regions in Phases 1, 2, and 3 of the project. Enhancements, currently identified as Phase 4 may be requested to be completed as part of releases identified in RFP Task I-4, Release Management. In the event that enhancements do not fit into a release, the enhancements may be completed in accordance with **Appendix B**, Special Terms and Conditions, Paragraph 7, Additional Work.

Phase 5 is reserved for the Pennsylvania Turnpike Commission (PTC) to deploy the PennDOT Next Gen ATMS software at a PTC facility or facilities. Phase 5 may include, but is not limited to the software design, development, implementation, testing, maintenance, and enhancement deliverables. PennDOT and the Selected Offeror shall mutually agree upon the scope, specific tasks, and schedule for completion of Phase 5 as provided for in **Appendix B**, Special Terms and Conditions, Paragraph 7, Additional Work.

Another note worth mentioning – Task H within the RFP allows for the integration of new devices. Reference appendix R for a list of programmed ITS Projects. The Department anticipates adding 1,385 new devices through June 2013.
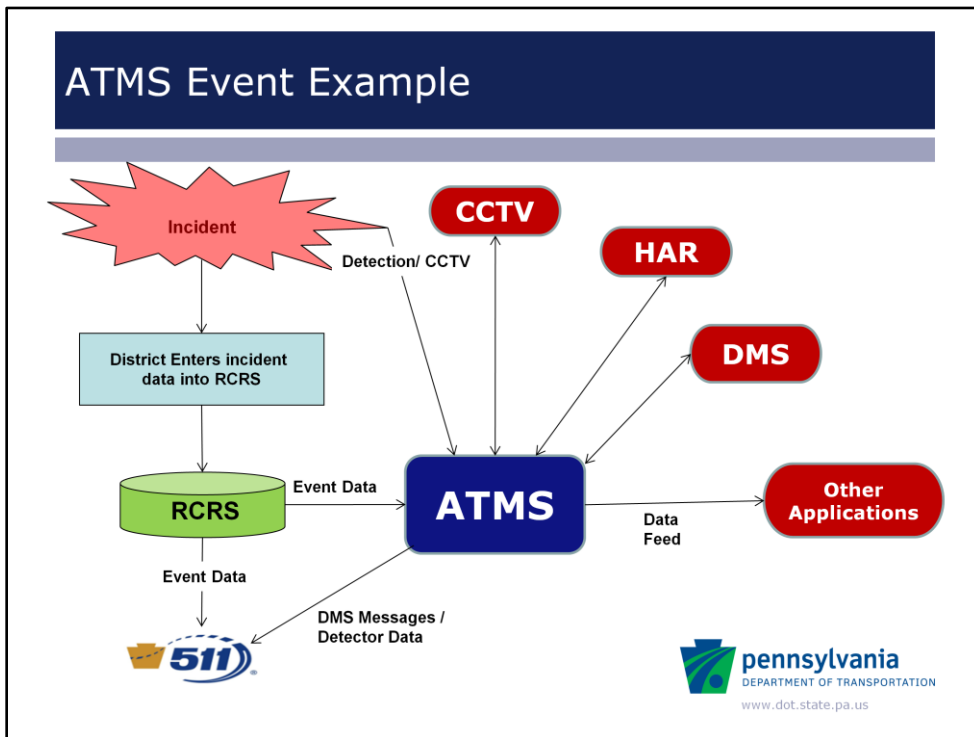
ATMS Event Example

This slide shows an example of how an event may be managed utilizing Next Gen ATMS and how Next Gen ATMS may interface with other applications. The example is built utilizing multiple scenarios presented in Appendix O – Statewide ATMS Software Concept of Operations.

Example:
An Incident occurs on a road where detectors and CCTV are present. The TMC operator is alerted first by ATMS via detection and able to verify the event using CCTV. The TMC Operator will enter the event information into PennDOT's Road Condition Reporting System (RCRS). The RCRS data will also be viewable from ATMS. The TMC operator will use ATMS to deploy required messaging to DMS and HAR. Data feeds from ATMS may also be shared with other applications as needed, such as sharing DMS and/or detector data with 511PA.

RCRS Overview:
RCRS is PennDOT's standard for reporting Roadway information on state roads. It is a web-based GIS application that was developed in-house and has been in use since early 2007. We currently have approximately 2000 RCRS Users. Currently, RCRS can only be accessed from a PennDOT PC. As part of the Next Generation ATMS project, an interface must be developed to share RCRS data with ATMS. Appendix Z provides detailed RCRS / ATMS interface requirements. RCRS data is currently shared with PennDOT's 511 system via an XML feed.

Eastern RTMC Presentation

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This is a view of the District 6-0 RTMC operations floor. The wall is comprised of 20 – 50" Mitsubishi cubes and the floor accommodates 6 work stations.

PennDOT District 6-0

Each work station has a main monitor for allowing the operators to view selected CCTV images, a joystick controller for switching images and dual screens connected to a personal computer which is part of the RTMC network for viewing the regional map and measures of effectiveness and controlling the dynamic message signs and all other applications of the Dynac system. The controller for the Video wall utilizes the Jupiter software.

PennDOT Eastern RTMC Operations

- RTMC operates 24/7 and is the regional coordinator for after hours operations in Eastern PA
- CCTV Philips switcher is integrated, which allows command and control from the Transdyn GUI.
- All system control occurs through Dynac central software platform developed by Transdyn, Inc.
  - CCTV
  - DMS
  - Automatic Incident Detection
  - Travel Times

Eastern Region ITS Devices

ITS Devices	District 4-0	District 5-0	District 6-0	Total
Permanent CCTV	22	34	222	**278**
Portable CCTV	4	0	0	**4**
Permanent DMS	7	5	61	**73**
Portable DMS *	45	29	22	**96**
Permanent HAR	10	9	0	**19**
Portable HAR	0	6	0	**6**
Microwave Detectors	0	0	90	**90**
Video Detectors	0	0	12	**12**

* Portable DMS include all semi-permanent DMS.

Information is based on Appendix Q ITS Equipment Inventory

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This is a list of ITS devices in the Eastern Region. Please reference Appendix Q for further details.

DISTRICT 6-0 ADDITIONAL ITS DEVICES

SECTION	LOCATION	CAMERA	PERMANENT DMS	PORTABLE DMS	RTMS	E-Z PASS READER
ITB	I-95	31	14	0	48	48
ITB	I-676	0	3	0	0	0
ITB	SR 0132	0	1	0	0	0
ITB	SR 0413	0	2	0	0	0
ITC	I-95	20	4	0	30	30
ITC	I-476	0	8	0	0	23
ITC	US 1	0	1	0	0	0
ITC	I-95	7	4	0	14	5
ITC	US 1	17	9	0	48	14
ITC	PA 0063	4	2	0	12	5
ITC	PA 0332	0	2	0	0	0
ITC	PA-309	21	9	3	0	0
TOTAL:		100	59	3	152	125

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The above projects are expected to be completed by the end of 2011 and will be under a two year operational support period by the contractors involved.

District 6-0 Equipment Photos

Video Decoders for T1 service

Cisco VSOM video sharing servers

Equipment Room

Axis Video Encoders

Fiber Optic Media Converters

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This is a view of the equipment room and some of the components that make up the system.
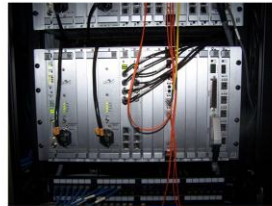
District 6-0 Equipment Photos cont.
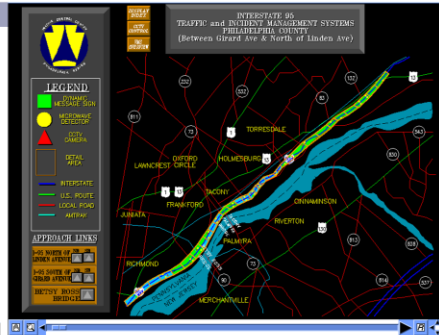
Analog Matrix Switch

Axis Video Encoders

Dynac Servers

OTN Sonet Network

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Equipment room with additional views of components.

This is a view of the Dynac software and how it allows operators to select down to individual highways and field elements of the system.

The system field components are comprised of Dynamic Message signs, CCTV, detectors, field communications equipment and service patrol vehicles.

Tag Reader: Mast Arm Mounted

- Tag readers are mounted overhead to collect point to point data from E-ZPass tag holders

- The information is used to determine travel times between interchanges

In addition, the current system in District 6 utilizes EZ pass readers to calculate and display travel times to the motorists.

We also use RTMS detectors (quick incident detection) to collect and display speeds on the regional map so operations can quickly identify areas of concern and focus the cameras in the areas where speeds appear to degrade.

DMS: Structure and Pole Mounted

- Dynamic Message Signs (DMS) are used to provide incident, detour, and travel time information to drivers

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The DMS are used to display travel times, safety massages, warn the public of reduced speed requirements during inclement weather and display specific guidance during incidents, construction or maintenance work.

PDMS: Concrete Pad Mounted

- Portable DMS can be made semi-permanent through the installation of power and communication lines and a concrete pad foundation

We have a number of locations where we utilize portable DMS on concrete pads and thus use as permanent connected to the RTMC; we also require contractors on construction projects to integrate the portable DMS on the projects with the RTMC software thus providing control to the operators of the DMS during the entire duration of construction.

Video Sharing…
Partnering For Success

- Partners have access to all PENNDOT CCTV images through the Broadware (currently Cisco) server or are directly connected to the Dynac software and the switcher.

- Creates stronger communication links between Police dispatchers, the media, and other first responders.

- Allows more immediate assessment of incident, enabling proper resources to be dispatched and directed.

- Monitors traffic queues to create efficient traffic flow patterns around incidents.

- Allows media outlets to provide true, real-time traveler information to TV viewers and radio listeners.

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Directly connected to the RTMC are the regional Emergency Operation Centers, the State Police Dispatch Center, the City of Philadelphia Traffic Control Center, the State of Delaware, the Airport, the Philadelphia Police Department, the Delaware River Port Authority and multiple other municipalities.

Central RTMC Presentation

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The Central Regional Traffic Management Center is located in Harrisburg, Pennsylvania. Specifically, our home is on the first floor of the Engineering District 8-0 Office at 2140 Herr Street. The video wall is comprised of 14 – 50" Mitsubishi cubes and the floor accommodates 5 work stations.
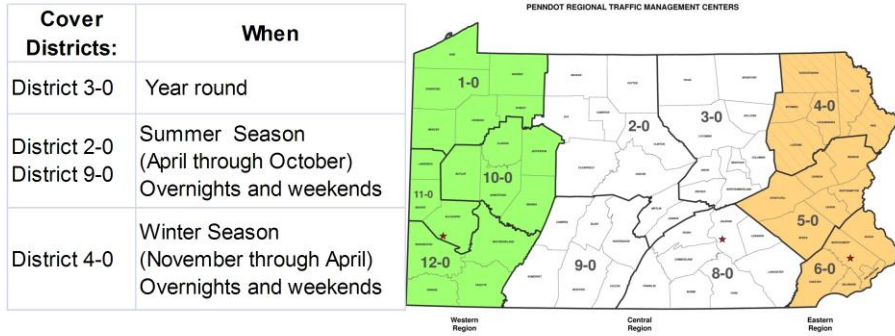
Central RTMC - Operations overview

- RTMC operates 24/7 and we are the regional coordinator for after hours for the 32 counties in Central Pennsylvania
- District 8-0 does not have a central software (i.e. Dynac or D11 ATMS)
- System control and management occurs through multiple software packages
  - CCTV
  - DMS
  - HAR
  - RCRS
  - 511PA
  - MS Office products

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We operate 24 hours a day, seven days a week year round and are considered the regional coordinator after normal business hours. We do not have a central software such as Dynac (by Transdyn) in District 6 or the District 11 ATMS and are looking forward to the final product of this project. We do have individual software packages to control our ITS devices, including: closed circuit television cameras, dynamic message signs and highway advisory radio. Additionally, we interact with the Road Condition Reporting System, 511PA and other assorted software including Microsoft Office.

Hours of Coverage for other TMC's

Cover Districts:	When
District 3-0	Year round
District 2-0 District 9-0	Summer Season (April through October) Overnights and weekends
District 4-0	Winter Season (November through April) Overnights and weekends

PENNDOT REGIONAL TRAFFIC MANAGEMENT CENTERS

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As the regional coordinator we respond and enter appropriate information into RCRS for planned and unplanned events in Districts 3-0 year round and Districts 2-0 and 9-0 during the summer season. During winter operations, Districts 2-0 and 9-0 cover for themselves and we take over for District 4-0 to help balance the work load.

Primarily, RCRS is used to enter road construction work, lane restrictions, crashes and winter restrictions. RCRS feeds 511PA. We have various software packages used to program our dynamic message signs, including Vanguard, Precision Solar Control, Mercure and Easy Host. The Platinum software is used for putting messages on our Highway Advisory Radio. Currently, the District 8-0 RTMC is responsible for entering statewide alerts and tickers in 511PA for AMBER Alerts and other events as requested. Additionally, we use many other tools to maintain situational awareness, such as monitoring PA State Police Webcad, PEMA PIERS, weather websites and others; and we use 800 MHz radios to contact our maintenance forces, and Nextel walkie-talkies to contact our Service Patrol Vehicles and our two District Incident Response Teams.

Central Region ITS Devices

ITS Device	District 2-0	District 3-0	District 8-0	District 9-0	Total
Permanent CCTV	30	0	56	41	127
Portable CCTV	0	0	0	0	0
Permanent DMS	23	1	36	34	94
Portable DMS *	3	5	15	0	23
Permanent HAR	21	0	15	2	38
Portable HAR	0	0	0	0	0
Microwave Detectors	0	0	0	0	0
Video Detectors	0	0	0	0	0

* Portable DMS include all semi-permanent DMS.

Information is based on Appendix Q ITS Equipment Inventory

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This is a list of ITS devices in the Central Region. Please reference Appendix Q for further details.

Western RTMC Presentation

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PennDOT District 11-0
Western Regional Traffic Management Center
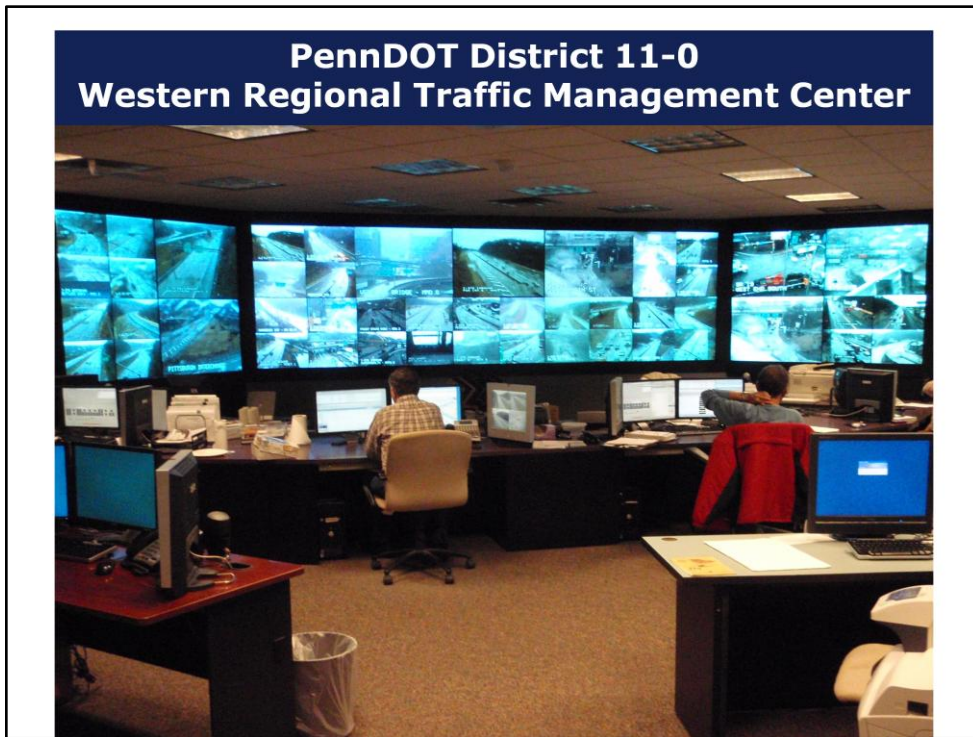
Located in Bridgeville, PA off of State Route 50.
We have 18 – 50" Mitsubishi front access video display cubes and seven workstations inside the control room. There are also two media workstations just off the control room in which KDKA and Metro Networks broadcast live on AM radio right from the TMC.
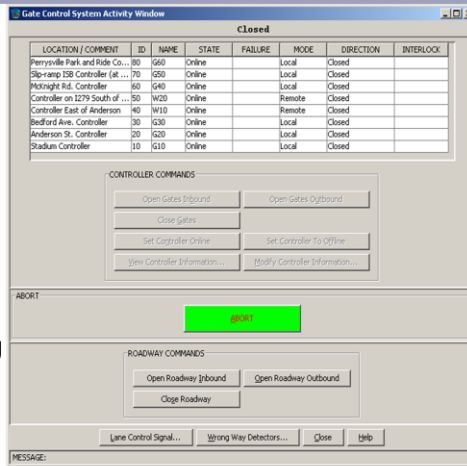
Western RTMC - Operations overview

- Provide 24/7 Coverage for the 18 Western Counties
- Hours of coverage for other TMC's
  - District 1-0
    - Off Hours, during non-winter operations
  - District 10-0
    - RCRS 24/7
    - ITS during off hours, year-round
 - District 12-0
    - ITS/RCRS 24/7

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The HOV Activity Window is shown here, which shows the operator the current "state" of the HOV.

Western RTMC - Operations overview

- **District 11-0 ATMS control**
  - Vicon, Pelco, Cohu, Bosch & Squira CCTV Cameras
    - Cohu 3940, Bosch VG4 & are NTCIP compliant over TCP/IP
    - We are Beta testing the Squira HSD626 for NTCIP
  - Display Solutions, LEDStar, Daktronics, Adaptive, ADDCO & SES America DMS
  - Pittsburgh (bi-directional) HOV control
  - EIS & Wavetronix Microwave Detectors
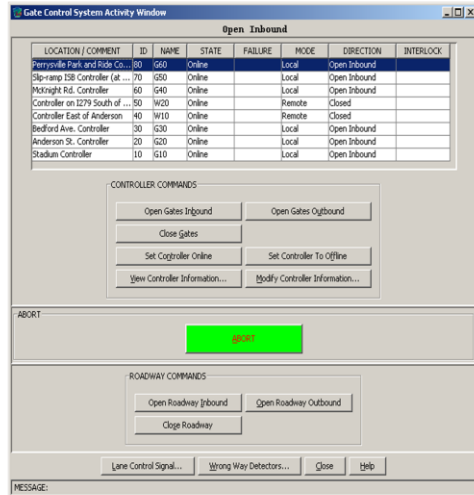 - Jupiter Controller is also integrated into CCTV Subsystem
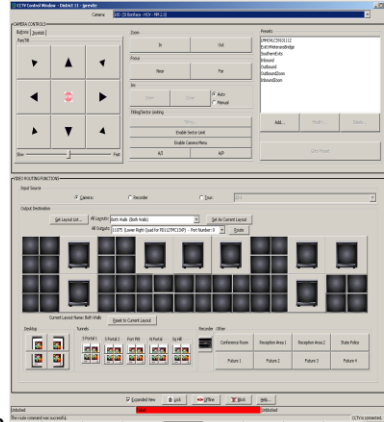
As you can see, the CCTV control window allows for full control of the camera as well as how the video can be routed to the TMC video wall and to other partners. Using the Control Window, we can also change the layout of the video wall by selecting a preprogrammed layout from the Jupiter controller. There is currently a physical RS-232 connection between the CCTV Server and the Jupiter Controller which allows for this.

From the HOV Activity Window, an operator can select a certain controller on the HOV and perform the necessary functions to open or close a particular site. At the bottom of the window, there are buttons that take the operator to the Lane Control Signs as well as configuration of the Wrong Way Detectors.

Western RTMC – Equipment/Communication

- PennDOT owned Fiber Optics (FO)
  - 70 miles in District 11
  - Being expanded along I-79/I-70 in District 12-0
- Wireless Radio Communications
  - Used as "Last mile" in District 11
    - Links to FO Backbone
  - Used to link FO in District 12
  - Used as main communication in District 1
- POTS/Cellular/Static IP
  - Used in remote locations within the Western Region

The 70 miles of Fiber Optic (FO) Cable are primarily located along the Interstate/Expressway routes in Allegheny County.

The "Last mile" concept for the wireless communications has enabled us to provide CCTV in areas where physical/budgetary constraints would not allow for FO cable placement.

Throughout most of District 10, we still have POTS lines to the DMS/HAR, but those will be transitioned to cellular or Static IP modems in the future.

On the picture to the right, you see some of the racks in the TMC Equipment room. There is the Vicon Video Matrix Switch on the left, the fiber optic patch panel, video distribution amplifiers and analog multiplexers shown in the center and right racks.

Western RTMC – Equipment/Communication

- Legacy Analog System
  - Vicon Video Matrix Switch
  - Fiber Optic Multiplexers
  - Self-Healing Ring/Star configuration
- Transitioning to Digital
  - Ethernet Switches are replacing Multiplexers
  - Using Encoders/Decoders
  - IP CCTV Cameras
  - IP DMS
  - IP HAR Transmitters/Signs
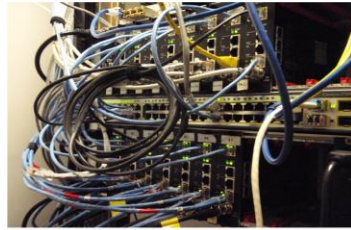
Vicon Video Matrix Switch allows for 190 inputs and 112 outputs
There are 16 Fiber Optic Multiplexers throughout Allegheny County.
The self healing ring is provided through the FO Multiplexers, but from each multiplexer, there is a star topology to the devices.

We now have 4 switch locations, with 5 more in construction.
We have transitioned from straight analog to using Encoders on-site and Decoders at the TMC.
We are also beginning to replace the analog cameras with Digital cameras for a purely digital solution.
We have successfully integrated four IP CCTV Cameras as well as using Ethernet communications straight from the TMC out to our field devices.

Western Region ITS Devices

ITS Device	District 1-0	District 10-0	District 11-0	District 12-0	Total
Permanent CCTV	0	0	148	0	**148**
Portable CCTV	1	0	0	0	**1**
Permanent DMS	9	32	26	2	**69**
Portable DMS *	1	0	0	12	**13**
Permanent HAR	4	13	10	4	**31**
Portable HAR	0	0	0	0	**0**
Microwave Detectors	0	0	140	0	**140**
Video Detectors	0	0	0	0	**0**

* Portable DMS include all semi-permanent DMS.

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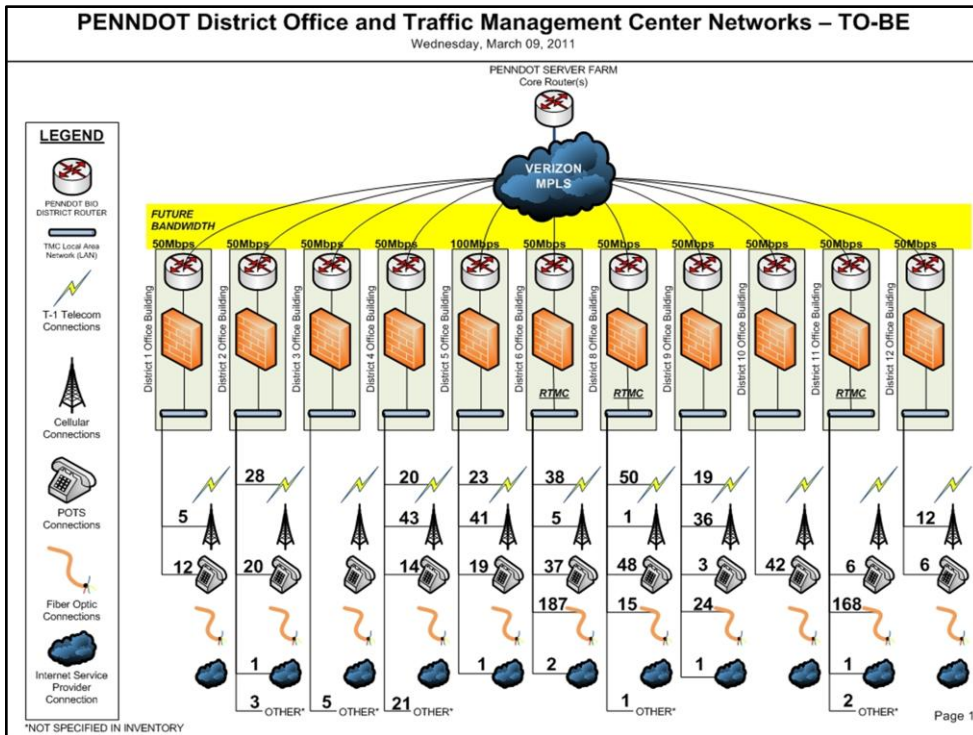DEPARTMENT OF TRANSPORTATION
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This is a list of ITS devices in the Western Region. Please reference Appendix Q for further details.

Bureau of Infrastructure and Operations Presentation

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PENNDOT District Office and Traffic Management Center Networks – TO-BE

PENNDOT BIO is currently engaged with Verizon Business to replace all existing WAN circuits. This conversion changes services from ATM to MPLS.

Firewalls will be established at several TMCs to provide network security for the TMC LAN as well as the PENNDOT BIO Core Network. This change will allow for all TMCs to inter-operate and access internal PENNDOT resources – thus improving efficiency for TMC operators and adding support for the TMC IT infrastructure through existing BIO services.

Please note, not all TMC's will require a firewall given that some connect through an RTMC with private fiber.

Answer Session:
Answers to Questions Received By 09/09/11

RFP committee will read answers to the questions received by 09/09/11. The official answers to the questions will be posted to the DGS e-marketplace web site (http://www.emarketplace.state.pa.us) on 9/26/11.

Additional Questions

Vendors participating in the pre-proposal conference can submit additional questions at this time.

Please use the question forms that are provided.

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Conclusion

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