

**REQUEST FOR PROPOSALS FOR  
STUDY TO ASSESS AND RATIONALIZE  
COMMUNICATIONS INFRASTRUCTURE PORTFOLIO (STAARCIP)  
FOR THE  
PENNSYLVANIA TURNPIKE COMMISSION**

**ISSUING OFFICE**

**Pennsylvania Turnpike Commission  
Information Technology Department**

**RFP NUMBER**

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**TABLE OF CONTENTS**

|                    |                                                                              |                |
|--------------------|------------------------------------------------------------------------------|----------------|
| <b>Part I</b>      | <b>GENERAL INFORMATION FOR PROPOSERS</b>                                     | <b>Page 1</b>  |
| <b>Part II</b>     | <b>INFORMATION REQUIRED FROM PROPOSERS</b>                                   | <b>Page 8</b>  |
| <b>Part III</b>    | <b>CRITERIA FOR SELECTION</b>                                                | <b>Page 11</b> |
| <b>Part IV</b>     | <b>WORK STATEMENT</b>                                                        | <b>Page 12</b> |
| <b>Part V</b>      | <b>DESCRIPTION OF CURRENT INSTALLED BASE OF<br/>COMMUNICATIONS PLATFORMS</b> | <b>Page 17</b> |
| <b>Part VI</b>     | <b>SPECIFIC TECHNOLOGY PLATFORMS TO INCLUDE IN STUDY</b>                     | <b>Page 18</b> |
| <b>APPENDIX A:</b> | <b>BACKGROUND INFORMATION ON COMMISSION'S<br/>COMMUNICATIONS SYSTEMS</b>     | <b>Page 20</b> |

## PART I

### GENERAL INFORMATION FOR PROPOSERS

**I-1. Purpose.** This request for proposals (RFP) provides interested Proposers with sufficient information to enable them to prepare and submit proposals for consideration by the Pennsylvania Turnpike Commission (Commission) to satisfy a need for an assessment and rationalization study of its Communications Infrastructure portfolio. **The Communications Infrastructure is defined within the context of this RFP to encompass Voice (telephone, VOIP, radio) plus Computer Communications (networking platform).**

**I-2. Issuing Office.** This RFP is issued for the Commission by the Information Technology Department.

Contact:  
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Director of Technology Infrastructure  
Pennsylvania Turnpike Commission

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Harrisburg, PA 17106

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Street Address  
700 South Eisenhower Blvd.  
Middletown, PA 17057

The Issuing Office is the sole point of contact in the Commission for this RFP.

**I-3. Scope.** This RFP contains instructions governing the proposals to be submitted and the material to be included therein; a description of the service to be provided; requirements which must be met to be eligible for consideration; general evaluation criteria; and other requirements to be met by each proposal.

**I-4. Problem Statement.** The Commission intends to undertake an initial project to identify a limited subset (as outlined in section IV-3) of the Commission's current inventory of Communications Infrastructure assets and to fully document those assets and assess/outline the current state of those assets. The anticipated results of this project should provide the Commission and the IT department with some comprehensive and valuable information about its current complement and state of Communications Infrastructure technology assets. Specifically, the Commission is seeking proposals from qualified firms to provide a comprehensive assessment and rationalization study of its Communications Infrastructure portfolio. The purpose of this study is to provide an independent, objective assessment of the Turnpike's current Communications Infrastructure posture and direction to help the IT department rationalize a mix of communications technologies currently being deployed and to advise a future way forward to evolve this infrastructure and its associated support staff.

**I-5. Prime Contractor Responsibilities.** The selected contractor will be required to assume responsibility for all services offered in its proposal whether or not it produces them. Further, the Commission will consider the selected contractor to be the sole point of contact with regard to contractual matters.

**I-6. Minimum Contractor Background Checks.** The contractor must, at its expense, arrange for a background check for each of its employees, as well as the employees of any of its subcontractors, who will have access to Commission IT facilities, either through on-site access or through remote access. Background checks are to be conducted via the Request for Criminal Record Check form and procedure found at <http://www.psp.state.pa.us/psp/lib/psp/sp4-164.pdf>. The background check must be conducted prior to initial access and on an annual basis thereafter.

Before the Commission will permit access to the contractor, the contractor must provide written confirmation that the background checks have been conducted. If, at any time, it is discovered that a contractor employee has a criminal record that includes a felony or misdemeanor involving terroristic behavior, violence, use of a lethal weapon, or breach of trust/fiduciary responsibility or which raises concerns about building, system or personal security or is otherwise job-related, the contractor shall not assign that employee to any Commission facilities, shall remove any access privileges already given to the employee and shall not permit that employee remote access unless the agency consents to the access, in writing, prior to the access. The agency may withhold its consent in its complete discretion. Failure of the contractor to comply with the terms of this paragraph may result in default of the contractor under its contract.

**I-7. Resources.** The Commission will provide a work area within the designated work location for the selected contractor resource(s) along with access to a Commission standard personal computer system(s) and Commission standard desktop software. The contractor will be responsible for providing any other needed equipment, desktop software, supplies, clerical assistance and/or administrative support.

The work location and location for project coordination will be:

PA Turnpike Commission  
Central Administration Building, 2<sup>nd</sup> Floor  
700 South Eisenhower Blvd.  
Middletown, PA 17057

**I-8. Policies, Procedures and IT Code of Professional Ethics.** The contractor awarded this contract will be responsible for adhering to all applicable Commission Policies and Procedures including, but not limited too, the Commission's policies on Electronic Communications Acceptable Use and Sexual Harassment and Sexual Discrimination. Contractor staff will also be responsible for adhering to the IT Department's Code of Professional Ethics. These policies and procedures will be provided to the contractor and their resources prior to commencement of actual work under this contract. Violation of any of these policies and procedures by the contractor resources, while performing work under this contract, may result in immediate termination of the contract.

**I-9. Information Handling.** The nature of this project requires handling of sensitive information. All staff assigned to the project by the selected contractor will be required to sign a confidentiality statement to ensure this information is not used by the selected contractor or given to another contractor for the purpose of competitive advantage in current and future business activities with the Turnpike Commission. The selected contractor is responsible for ensuring that adequate measures are in place to minimize the access, copying and distribution of such information during work on this project. The selected contractor is responsible for proper disposal (i.e. shred, surrender) of both hard and electronic

working copies of such sensitive information during work on this project, as well as any remaining information upon the completion of the project.

**I-10. Type of Contract.** It is proposed that if a contract is entered into as a result of this RFP, it will be a cost plus (time and materials) fee for services contract. The Commission may in its sole discretion undertake negotiations with contractors whose proposals as to price and other factors show them to be qualified, responsible, and capable of performing the work.

**I-11. Rejection of Proposals.** The Commission reserves the right to reject any and all proposals received as a result of this request, or to negotiate separately with competing Proposers.

**I-12. Subcontracting.** Any use of subcontractors by a Proposer must be identified in the proposal. During the contract period, use of any subcontractors by the selected Proposer, which were not previously identified in the proposal, must be approved in advance in writing by the Commission.

A firm that responds to this solicitation as a prime may not be included as a designated subcontractor to another firm that responds to the same solicitation and will result in **rejection of all responses of the firm or firms involved**. This does not preclude a firm from being set forth as a designated subcontractor to more than one prime contractor responding to the project advertisement.

**I-13. Incurring Costs.** The Commission is not liable for any costs the Proposer incurs in preparation and submission of its proposal, in participating in the RFP process or in anticipation of award of contract.

**I-14. Questions and Answers.** There will be no pre-proposal conference. Written questions may be submitted to clarify any points in the RFP which may not have been clearly understood. Written questions should be submitted to the Issuing Office at the mailing or e-mail address indicated above to be received no later than **4:00 PM on September 14, 2009**. All questions and written answers will be issued as an addendum to and become part of this RFP.

**I-15. Addenda to the RFP.** If it becomes necessary to revise any part of this RFP before the proposal response date, addenda will be posted to the Commission's website under the original RFP document. It is the responsibility of the Proposer to periodically check the website for any new information or addenda to the RFP.

The Commission may revise a published advertisement. If the Commission revises a published advertisement less than ten days before the RFP due date, the due date will be extended to maintain the minimum ten-day advertisement duration if the revision alters the project scope or selection criteria. Firms are responsible to monitor advertisements/addenda to ensure the submitted proposal complies with any changes in the published advertisement.

**I-16. Response.** To be considered, proposals must be delivered to the Pennsylvania Turnpike Commission's Contracts Administration Department, Attention: Fran Furjanic, Contracts Supervisor, on or before **12:00 Noon, local time, October 6, 2009**. The Pennsylvania Turnpike Commission is located at 700 South Eisenhower Boulevard, Middletown, PA 17057 (Street address). Our mailing Address is P. O. Box 67676, Harrisburg, PA 17106.

Please note that use of **U.S. Mail delivery does not guarantee delivery to this address by the above-listed time for submission**. Proposers mailing proposals should allow sufficient delivery time to

**ensure timely receipt of their proposals.** If the Commission office location to which proposals are to be delivered is closed on the proposal response date due to inclement weather, natural disaster, or any other cause, the deadline for submission shall be automatically extended until the next Commission business day on which the office is open. Unless the Proposers are otherwise notified by the Commission, the time for submission of proposals shall remain the same.

**I-17. Proposals.** To be considered, Proposers should submit a complete response to this RFP, using the format provided in PART II. Each proposal should be submitted in **seven (7) copies and one (1) CD-ROM** containing a PDF version of the entire proposal to the Contracts Administration Department. No other distribution of proposals will be made by the Proposer. Each proposal page should be numbered for ease of reference. Proposals must be signed by an official authorized to bind the Proposer to its provisions and include the Proposer's Federal Identification Number. For this RFP, the proposal must remain valid for at least **120** days. Moreover, the contents of the proposal of the selected Proposer will become contractual obligations if a contract is entered into.

Each and every Proposer submitting a proposal specifically waives any right to withdraw or modify it, except as hereinafter provided. Proposals may be withdrawn by written notice received at the Commission's address for proposal delivery prior to the exact hour and date specified for proposal receipt. A proposal may also be withdrawn in person by a Proposer or its authorized representative, provided its identity is made known and it signs a receipt for the proposal, but only if the withdrawal is made prior to the exact hour and date set for proposal receipt. A proposal may only be modified by the submission of a new sealed proposal or submission of a sealed modification which complies with the requirements of this RFP.

**I-18. Economy of Preparation.** Proposals should be prepared simply and economically, providing a straightforward, concise description of the Proposer's ability to meet the requirements of the RFP

**I-19. Discussions for Clarification.** Proposers who submit proposals may be required to make an oral or written clarification of their proposals to the Issuing Office to ensure thorough mutual understanding and Proposer responsiveness to the solicitation requirements. The Issuing Office will initiate requests for clarification.

**I-20. Best and Final Offers.** The Issuing Office reserves the right to conduct discussions with Proposers for the purpose of obtaining "best and final offers." To obtain best and final offers from Proposers, the Issuing Office may do one or more of the following: a) enter into pre-selection negotiations; b) schedule oral presentations; and c) request revised proposals. The Issuing Office will limit any discussions to responsible Proposers whose proposals the Issuing Office has determined to be reasonably susceptible of being selected for award.

**I-21. Proposal Contents.** Proposals will be held in confidence and will not be revealed or discussed with competitors, unless disclosure is required to be made (i) under the provisions of any Commonwealth or United States statute or regulation; or (ii) by rule or order of any court of competent jurisdiction. If a contract is executed, however, the successful proposal submitted in response to this RFP shall be subject to disclosure. All material submitted with the proposal becomes the property of the Pennsylvania Turnpike Commission and may be returned only at the Commission's option. Proposals submitted to the Commission may be reviewed and evaluated by any person other than competing Proposers at the discretion of the Commission. The Commission has the right to use any or all ideas presented in any proposal. Selection or rejection of the proposal does not affect this right.

In accordance with the Pennsylvania Right-to-Know Law (RTKL), 65 P.S. § 67.707 (Production of Certain Records), Proposers shall identify any and all portions of their Proposal that contains confidential proprietary information or is protected by a trade secret. Proposals shall include a written statement signed by a representative of the company/firm identifying the specific portion(s) of the Proposal that contains the trade secret or confidential proprietary information.

Proposers should note that “trade secrets” and “confidential proprietary information” are exempt from access under Section 708(b)(11) of the RTKL. Section 102 defines both “trade secrets” and “confidential proprietary information” as follows:

Confidential proprietary information: Commercial or financial information received by an agency: (1) which is privileged or confidential; **and** (2) the disclosure of which would cause substantial harm to the competitive position of the person that submitted the information.

Trade secret: Information, including a formula, drawing, pattern, compilation, including a customer list, program, device, method, technique or process that: (1) derives independent economic value, actual or potential, from not being generally known to and not being readily ascertainable by proper means by other persons who can obtain economic value from its disclosure or use; **and** (2) is the subject of efforts that are reasonable under the circumstances to maintain its secrecy. The term includes data processing software by an agency under a licensing agreement prohibiting disclosure.

65 P.S. §67.102 (emphasis added).

The Office of Open Records has determined that a third party must establish a trade secret based upon factors established by the appellate courts, which include the following:

- the extent to which the information is known outside of his business;
- the extent to which the information is known by employees and others in the business;
- the extent of measures taken to guard the secrecy of the information;
- the value of the information to his business and to competitors;
- the amount of effort or money expended in developing the information; and
- the ease of difficulty with which the information could be properly acquired or duplicated by others.

*See Crum v. Bridgestone/Firestone North Amer. Tire.*, 907 A.2d 578, 585 (Pa. Super. 2006).

The Office of Open Records also notes that with regard to “confidential proprietary information the standard is equally high and may only be established when the party asserting protection shows that the information at issue is either ‘commercial’ or ‘financial’ and is privileged or confidential, and the disclosure **would** cause substantial competitive harm.” (emphasis in original).

For more information regarding the RTKL, visit the Office of Open Records’ website at [www.openrecords.state.pa.us](http://www.openrecords.state.pa.us).

**I-22. Debriefing Conferences.** Proposers whose proposals are not selected will be notified of the name of the selected Proposer and given the opportunity to be debriefed, at the Proposer’s request. The Issuing Office will schedule the time and location of the debriefing. The Proposer will not be compared with other Proposers, other than the position of its proposal in relation to all other proposals. The debriefing will consist of an explanation of the strengths and weaknesses of the proposal only.

**I-23. News Releases.** News releases pertaining to this project will not be made without prior Commission approval, and then only in coordination with the Issuing Office.

**I-24. Commission Participation.** Unless specifically noted in this section, Proposers must provide all services to complete the identified work.

**I-25. Cost Submittal.** The cost submittal shall be placed in a separately sealed envelope within the sealed proposal and kept separate from the technical submittal. **Failure to meet this requirement may result in disqualification of the proposal.**

**I-26. Term of Contract.** The term of the contract will commence on the Effective Date (as defined below) and will continue for a period of one year for Stage 1 and Stage 2 work, with two optional one year extensions. The Commission shall fix the Effective Date after the contract has been fully executed by the Contractor and by the Commission and all approvals required by Commission contracting procedures have been obtained.

**I-27. Proposer's Representations and Authorizations.** Each Proposer by submitting its proposal understands, represents, and acknowledges that:

- a. All information provided by, and representations made by, the Proposer in the proposal are material and important and will be relied upon by the Issuing Office in awarding the contract(s). Any misstatement, omission or misrepresentation shall be treated as fraudulent concealment from the Issuing Office of the true facts relating to the submission of this proposal. A misrepresentation shall be punishable under 18 Pa. C.S. 4904.
- b. The price(s) and amount of this proposal have been arrived at independently and without consultation, communication or agreement with any other potential Proposer.
- c. Neither the price(s) nor the amount of the proposal, and neither the approximate price(s) nor the approximate amount of this proposal, have been disclosed to any other firm or person who is a Proposer or potential Proposer, and they will not be disclosed on or before the proposal submission deadline specified in the cover letter to this RFP.
- d. No attempt has been made or will be made to induce any firm or person to refrain from submitting a proposal on this contract, or to submit a proposal higher than this proposal, or to submit any intentionally high or noncompetitive proposal or other form of complementary proposal.
- e. The proposal is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary or other noncompetitive proposal.
- f. To the best knowledge of the person signing the proposal for the Proposer, the Proposer, its affiliates, subsidiaries, officers, directors, and employees are not currently under investigation by any governmental agency and have not in the last four (4) years been convicted or found liable for any act prohibited by State or Federal law in any jurisdiction, involving conspiracy or collusion with respect to bidding or proposing on any public contract, except as disclosed by the Proposer in its proposal.

- g. To the best knowledge of the person signing the proposal for the Proposer and except as otherwise disclosed by the Proposer in its proposal, the Proposer has no outstanding, delinquent obligations to the Commonwealth including, but not limited to, any state tax liability not being contested on appeal.
- h. The Proposer is not currently under suspension or debarment by the Commonwealth, or any other state, or the Federal Government, and if the Proposer cannot certify, then it shall submit along with the proposal a written explanation of why such certification cannot be made.
- i. The Proposer has not, under separate contract with the Issuing Office, made any recommendations to the Issuing Office concerning the need for the services described in the proposal or the specifications for the services described in the proposal.
- j. Each Proposer, by submitting its proposal, authorizes all Commonwealth agencies to release to the Commission information related to liabilities to the Commonwealth including, but not limited to, taxes, unemployment compensation, and workers' compensation liabilities.

## PART II

### INFORMATION REQUIRED FROM PROPOSERS

Proposals must be submitted in the format, including heading descriptions, outlined below. To be considered, the proposal must respond to all requirements in this part of the RFP. Any other information thought to be relevant, but not applicable to the enumerated categories, should be provided as an appendix to the proposal. Each proposal shall consist of two (2) separately sealed submittals. The submittals are as follows: (i) Technical Submittal, in response to Sections II-1 through II-6 hereof; (ii) Cost Submittal, in response to Section II-7 hereof.

The Commission reserves the right to request additional information which, in the Commission's opinion, is necessary to assure that the Proposer's competence, number of qualified employees, business organization, and financial resources are adequate to perform according to the RFP.

The Commission may make such investigations as deemed necessary to determine the ability of the Proposer to perform the work, and the Proposer shall furnish to the Issuing Office all such information and data for this purpose as requested by the Commission. The Commission reserves the right to reject any proposal if the evidence submitted by, or investigation of, such Proposer fails to satisfy the Commission that such Proposer is properly qualified to carry out the obligations of the agreement and to complete the work specified.

**II-1. Statement of the Problem.** State in succinct terms your understanding of the problem presented or the service required by this RFP and as addressed by you in your proposal.

**II-2. Management Summary.** Include a narrative description of the proposed effort and a list of the items to be delivered or services to be provided.

**II-3. Work Plan.** Describe in narrative form your methodology for conducting the study and technical plan for accomplishing the work. Use the task and deliverable descriptions in Part IV and Part VI of this RFP as your reference point. Modifications of these descriptions are permitted; however, reasons for changes should be fully explained.

**II-4. Prior Experience.** Consulting experience in IT infrastructure technologies for voice, data and video communications is required. Experience shown should be work done by individuals who will be assigned to this project as well as that of your company. Programs or projects referred to should be identified and the name of the customer shown, including the name, address, and telephone number of the responsible official of the customer, company, or agency who may be contacted.

**II-5. Personnel.** Include the number, and names where practicable, of executive and professional personnel, analysts, auditors, researchers, programmers, consultants, etc., who will be engaged in the work. Show where these personnel will be physically located during the time they are engaged in the work. Include through a resume or similar document education and experience in IT or communication infrastructure portfolio assessment consulting services, and any training and certifications in this area. Indicate the responsibilities each will have in this project and how long each has been with your company. Identify subcontractors (if any) you intend to use and the services they will perform. **(See additional requirements in section IV-4.)**

**II-6. D/M/WBE/ Participation.** The Turnpike Commission is committed to the inclusion of disadvantaged, minority, and woman firms in contracting opportunities. Responding firms shall clearly identify DBE/MBE/WBE firms, expected to participate in this contract, in their Proposal. Proposed DBE/MBE/WBE firms must be certified by the Pennsylvania Department of General Services ([www.dgs.state.pa.us](http://www.dgs.state.pa.us)) or the Pennsylvania Unified Certification Program ([www.paucp.com](http://www.paucp.com)) at the time of the submission of the proposal. While D/M/WBE participation is not a requirement for this RFP, inclusion of D/M/WBEs will be a factor in the evaluation determination. If further information is desired concerning DBE/MBE/WBE participation, direct inquiries to the Pennsylvania Turnpike Commission's Contracts Administration Department by calling (717) 939-9551 Ext. 4241.

**II-7. Cost Submittal.** The information requested in this section shall constitute your cost submittal. Proposers should provide a detailed outline of the proposed fee structure. **The Cost Submittal shall be placed in a separate sealed envelope within the sealed proposal, separate from the technical submittal.** The total cost you are proposing must be broken down into the following components:

- a. **Direct Labor Costs.** Direct labor charges should be itemized by task within deliverable; **Stage 1** Assessment and Rationalization work document and **Stage 2** Integration and Implementation Roadmap work. Itemize so as to show the following for each category of personnel with a different rate per hour. Sub-totals should also be shown for each deliverable:
  - (1) Category: e.g., partner, project manager, analyst, programmer, research associate.
  - (2) Estimated hours.
  - (3) Rate per hour.
  - (4) Total cost for each category and for all direct labor costs.
- b. **Labor Overhead.** Specify what is included and rate used. If there is no labor overhead costs in your quote, so state.
- e. **Travel and Subsistence.** Itemize transportation, lodging and meals per diem costs separately. If there are no travel and subsistence costs in your quote, so state.
- d. **Subcontract Costs.** Itemize as in (a) above. If there are no subcontract costs in your quote, so state.
- e. **Cost of Supplies and Materials.** Itemize. If there are no supplies and materials costs in your quote, so state.
- f. **Other Direct Costs.** Itemize. If there are no other direct costs in your quote, so state.
- g. **Fee or Profit.** If there are no fee or profit costs in your quote, so state.
- h. **Total Cost.**

Proposers should **not** include any assumptions in their cost submittals. If the proposer includes assumptions in its cost submittal, the Issuing Office may reject the proposal. Proposers should direct in writing to the Issuing Office pursuant to Part I-14 of this RFP any questions about whether a cost or other component is included or applies. All Proposers will then have the benefit of the Issuing Office's written answer so that all proposals are submitted on the same basis.

**Any costs not provided in the cost proposal will be assumed as no charge to the Commission.**

**The selected Proposer shall only perform work on this contract after the Effective Date is affixed and the fully-executed contract sent to the selected Proposer. The Commission shall issue a written Notice to Proceed to the selected Proposer authorizing the work to begin on a date which is on or after the Effective Date. The selected Proposer shall not start the performance of any work prior to the date set forth in the Notice of Proceed and the Commission shall not be liable to pay the selected Proposer for any service or work performed or expenses incurred before the date set forth in the Notice to Proceed. No Commission employee has the authority to verbally direct the commencement of any work under this Contract.**

## PART III

### CRITERIA FOR SELECTION

**III-1. Mandatory Responsiveness Requirements.** To be eligible for selection, a proposal should be (a) timely received from a Proposer; (b) properly signed by the Proposer; and (c) formatted such that all cost data is kept separate from and not included in the Technical Submittal. Failure to comply will result in rejection of the proposal.

**III-2. Selection Process.** Proposals will be reviewed and evaluated by a committee of qualified personnel selected by the Commission. This committee will recommend for selection the proposal that most closely meets the requirements of the RFP and satisfies Commission needs. Award will only be made to a Proposer determined to be responsive and responsible in accordance with Commonwealth Management Directive 215.9, Contractor Responsibility Program.

**III-3. Evaluation Criteria.** The following criteria will be used, in order of relative importance from the highest to the lowest, in evaluating each proposal:

**a. Understanding the Problem.** This refers to the Proposer's understanding of the Commission needs that generated the RFP, of the Commission's objectives in asking for the services, and of the nature and scope of the work involved.

**b. Proposer Qualifications and IT Infrastructure Technologies Experience.** This refers to the ability of the Proposer to meet the requirements of the RFP and the quality, relevancy, and recentness of programs and projects completed by the Proposer. This also includes the Proposer's financial ability to undertake a project of this size.

**c. Soundness of Approach.** Emphasis here is on the techniques and methodology for collecting and analyzing data, sequence and relationships of major steps, methods for managing the study and the substance and utility quality of its content. Of equal importance is whether the technical approach is completely responsive to all written specifications and requirements contained in the RFP and if it appears to meet Commission objectives. Method of delivery and access to collected information will be considered.

**d. Personnel Qualifications.** This refers to the competence of professional personnel who would be assigned to the job by the Proposer. Qualifications of professional personnel will be measured by experience and education, with particular reference to experience on programs/services similar to that described in the RFP. **See additional requirements in Section IV-4.**

**e. Cost.** While this area may be weighted, it will not normally be the deciding factor in the selection process. The Commission reserves the right to select a proposal based upon all the factors listed above, and will not necessarily choose the firm offering the best price. The Commission will select the firm with the proposal that best meets its needs, at the sole discretion of the Commission.

**f. DBE/MBE/WBE Participation.** This refers to the inclusion of D/M/WBE firms, as described in Part II-6, and the extent to which they are expected to participate in this contract. Participation will be measured in terms of total dollars committed to certified D/M/WBE firms.

## PART IV

### WORK STATEMENT

#### IV-1. Objectives

The Commission is seeking proposals from qualified firms to provide a comprehensive assessment and rationalization study of the Commission's Communications Infrastructure **[The Communications Infrastructure is defined within the context of this RFP to encompass Voice (telephone, VOIP, radio) plus Computer Communications (networking platform)]** technology platforms. The need for this study is a reflection of the rapid pace of communication infrastructure technology advancements, increasing system complexities, the crowded, confusing and ever-changing communications marketplace and significant increases in communication systems acquisition, implementation and maintenance costs. The main objective of this study will be to assess and rationalize the Commission's current installed base of Communications Infrastructure supporting voice, data and video and give direction on how best to evolve this infrastructure and associated support staffing over the next three years to ensure enterprise alignment, capability, flexibility, scalability, interoperability, sustainability and affordability.

#### IV-2. Nature and Scope of Services and Deliverables

The Commission's Communications Infrastructure has evolved over a long period of time. The Communications Infrastructure is a complex fabric of old and new equipment utilizing different types of transmission media and equipment from several different carriers and vendors. With such a complex environment, the Commission expects the assessment and rationalization study to look at everything with fresh eyes and build a composite picture of what its infrastructure looks like. The Commission is seeking a qualified firm with core competencies in IT infrastructure portfolio assessment consulting services to help the Commission assess the current state of its installed base of Communication Infrastructure technologies in terms of technology mix, staffing levels and skill sets and to prescribe a specific, course of action, pertaining to the technology selections, and associated staffing needs. The expected benefits to come from this assessment study are the identification of functional improvements, marginal and/or technically obsolete equipment and systems, systems and equipment unaligned with the business needs, unnecessary redundancies, resource optimization and voice/data integration.

The deliverables called for by this RFP are two staged. Specifically, **Stage 1** calls for the **Assessment and Rationalization Study** work on the installed base of Communications Infrastructure and the planned platform improvement technologies currently under consideration by the Commission as outlined in part **VI-1.** and **Table 1. (Estimate one overnight visit to each of the five Turnpike districts.)** The Assessment and Rationalization Study must be documented into a final formal report and submitted to the Commission at the conclusion of the contract period in order to satisfy Stage 1 work deliverables. The Stage 1 contract period is 60 days after notice to proceed. The fundamental questions the Commission is seeking answers to from the Stage 1 work are, but not limited to, as follows:

- Is the enterprise effectively utilizing voice communications technology from a functional viewpoint?
- Is the enterprise spending too much money for moves, adds and changes?

- Are there problems with the present communications infrastructure that need to be addressed?
- How can the enterprise reduce costs by sharing voice and data communications resources?
- How can the enterprise improve the productivity of its people through better Communications Infrastructure?
- Are the communications resources appropriate for the needs of the enterprise?
- Are communications resources being utilized effectively and efficiently?
- Is the enterprise utilizing a best practices approach in its communications operations?
- Are there benefits available to the enterprise in voice and data communications convergence that are not being utilized?
- Can the business leverage new functions and features in voice communications that can reduce the enterprise's costs?

**Stage 2** draws from the Stage 1 body of work and calls for a **Comprehensive Integration Strategy and Implementation Plan** that articulates the integration of the installed infrastructure base with the new technology platform improvements including the needed training and skill sets as well as total staffing requirements required to implement and manage these technologies. To satisfactorily complete the tentative Stage 2 deliverables requires submission of a fully developed integration plan including roadmap document. The length needed to complete this stage will be determined by the contractor as reflected in their plan.

The selected contractor for Stage 1 work automatically qualifies for the Stage 2 work with the caveat that the decision to execute Stage 2 work is provisional and not guaranteed and is at the sole discretion of the Commission. The Commission will notify the selected contractor in writing after satisfactory completion of Stage 1 of its decision regarding the awarding of the Stage 2 work. The plan for both Stage 1 and tentative Stage 2 work should be included in the Technical Submittal and cost for both Stage 1 and tentative Stage 2 work should be included in the Cost Submittal.

In addition to the above 2 stages, the Commission may request the contractor to implement some of the suggested modifications or improvements to the communications infrastructure. Such work would be in the form of work orders with specific deliverables at a fixed price to be negotiated between the contractor and the Commission.

**IV-3 Tasks. Specific tasks required for the Stage 1 work include the following bottom-up approach including a thorough inventory of the major voice components and a traffic analysis including:**

- Telephone private branch exchange (PBX) switches
- Telephone company (Telco) transmission facilities and demarks
- Voice processing equipment including voice mail and call center equipment
- End-user devices including telephone sets, modems, faxes and specialized devices
- Identification of lightly used trunks within each trunk group
- VHF high band conventional analog two way radio hardware

The communications inventory should minimally include spreadsheets that include:

- Telephone system configuration inventory
- PBX interface card configuration inventory by carrier shelf within each PBX
- Telco circuit inventory for T-carrier and ISDN PRI lines
- Telco circuit inventory for dial-up lines
- Wide area network facilities inventory by site location

The voice assessment should also include a traffic analysis. Traffic should be quantified from two perspectives: aggregate usage and load per trunk group. Aggregate usage quantifies the number of calls and total usage minutes for local, domestic long-distance.

Call volumes for inbound toll-free usage should also be quantified. This usage should be quantified by the number of calls and number of usage minutes per toll-free number.

Call volumes should be quantified for intra-LATA (local access transport area) and inter-LATA traffic that is not considered long-distance traffic. Traffic quantification should include number of calls and total usage per month for each type of calling.

Examine and evaluate the loads on each trunk group within each telephone switch. At a minimum, each of these trunk groups should be measured during peak periods for: In addition, each of these trunk groups should be measured during peak periods for the load of the five least used trunk group members. This data reveals whether there are unused or underutilized trunks in each trunk group.

- Total usage
- Group overflow
- Queue overflow
- Percentage of all trunk members blocked
- Percentage of blocked outbound calls

Relative to the **networking platform** aspect of the Communications Infrastructure, identify alternatives to reduce cost, increase network capacity and improve network performance. For assessing this infrastructure piece focus on the LAN/WAN components as a methodology framework to reevaluate this facet of the computer communications infrastructure. The assessment must consider the LAN/WAN environment and the administration of and interactions among these environments.

- Assess the infrastructure pieces for Strengths, Weaknesses, Opportunities and Threats
- Document and assess the infrastructure architecture environment, and associated standards, procedures and policies
- Provide a gap and impact analysis that identifies the difference(s) between the current communications infrastructure architecture and the future technology architecture in the areas of Data, Applications and Technology
- Prescribe an approach that addresses how best to provide and deploy UPS devices to backstop VOIP from power outages

**For the Stage 2 Integration Strategy and Implementation Plan and Roadmap to bridge installed base to new infrastructure platforms:**

- Develop key plan implementation steps, critical success factors and a methodology for monitoring and assessing progress towards the goals and principles defined in the plan.
- Develop a vision and an approach for the Commission's Communication Infrastructure architecture, supported by technology standards that will allow for maximum accessibility, flexibility, and maneuverability of Commission information, data and voice.
- Develop new Communications Infrastructure architecture standards, policies, procedures and architecture planning and management processes based upon the Stage 1 assessment of the current environment and architecture.
- Identify key next steps to assist the enterprise in the adoption of the stated future communications architecture in the areas of voice, data, applications and technology

**IV-4. Work Skill Requirements.** This RFP requires selected contractor to provide a senior practitioner on site at Commission headquarters over the time period of the contract. The selected contractor must provide professional and technical staff dedicated to this project. Staff assigned to this project must be able to work in a cooperative fashion with various Commission staff and other designated contractors during all phases of the project. Staff must be able to coordinate and receive direction from designated Commission staff during the Stage 1 and the tentative Stage 2 work.

The Assessment and Rationalization Study, the Stage 1 work, must be performed by staff with a minimum of ten-to-fifteen years experience in the principles and methodologies of communications infrastructure technology for companies equivalent in size and revenue to that of the Commission.

The Integration Strategy and Implementation Plan, the Stage 2 work, must be performed by staff with a minimum of ten-to-fifteen years experience in the principles and methodologies of integrating and implementing communication infrastructure architectures for companies equivalent in size and revenue to that of the Commission.

**IV-5. Specific Requirements for Document Formats. Specific requirements include:**

1. Develop documents in a Microsoft Office 2000 Professional Suite environment.
2. Provide documents in Adobe Acrobat (PDF) format.

**IV-6. Reports and Project Control**

1. **Task Plan.** A work plan for each task that identifies the work elements of each task, the resources assigned to the task, and the time allotted to each element and the deliverable items to be produced.
2. **Status Report.** A periodic progress report covering activities, problems, and recommendations. The report should be keyed to the work plan developed by the contractor in its proposal, as amended or approved by the Commission.

3. **Problem Identification Report.** An “as required” report, identifying problem areas. The report should describe the problem and its impact on the overall project and on each affected task. It should list possible courses of action with advantages and disadvantages of each, and include contractor recommendations with supporting rationale.
4. **Final Report.** A final, formal report on Stage 1 and tentative Stage 2 work respectively to permit the Commission to satisfy itself as to the projects completeness and acceptance of deliverables. The final report should specify the following information:
  - Executive summary as to the result of the project in terminology that will be meaningful to executive management and others generally familiar with the subject areas.
  - A description of techniques used during the study.
  - A Summarization of any findings, conclusions, or recommendations developed in each task for each deliverable.
  - Any and all supporting documentation; e.g., flow charts, forms, questionnaires, etc. associated with findings, conclusions, or recommendations
  - A recommended time-phased work plan for implementing any recommendations.

### **Proposed Implementation Schedule**

The Commission seeks rapid development and implementation of this initiative and has targeted a timeframe of two months for the successful completion of the identified **Stage 1** deliverables and components.

## PART V

### DESCRIPTION OF CURRENT INSTALLED BASE OF COMMUNICATIONS PLATFORMS

**V-1.** The Pennsylvania Turnpike Commission is a State-affiliated entity of the Commonwealth with roughly 2,200 employees comprised of both non-union management and union employees stationed at various points along the Turnpike's footprint of approximately 570 linear miles of tolled roadway with (55) fare collection facilities, twenty-two (22) service plazas and two (2) traveler information centers, twenty (20) maintenance facilities, eight (8) State Police Barracks and five (5) tunnels. The Pennsylvania Turnpike is a key transportation route within the Commonwealth of Pennsylvania and a vital link in the roadway network of the eastern United States. The Commission's communication systems run on top of an IP based Wide Area Network (WAN) which supports the following services vital to the operation and maintenance of the Turnpike:

- Fare collection/toll data
- IT apps(SAP,E-Mail, calendar, file, print, Internet)
- PA State Police CADS system
- Building security systems (HIRSCH)
- HVAC management systems
- VOIP phones and voicemail
- ITS devices (CCTV,RWIS,TFDS, TRWS, VMS, Fog System)
- VHF two way radio, call box, telephone(TDM)

The overarching objectives the Commission seeks to realize regarding the communications system are privacy, security, standardization, centralized management, high capability, flexibility, complete internal control, timely maintenance/repair response, high reliability and availability, and minimal dependence on commercial carrier leased lines and dial up services. **(See additional background information on the communications systems in Appendix A.).**

## PART VI

**VI -1.** In preparation of this study, focus on and take into consideration the specific technology platforms itemized in **Table 1.** below:

Column three (Existing Technology) represents the Commission's existing installed base of Communications Infrastructure technologies. The fourth and fifth columns ((A) and (B) Alternative Technology) indicate alternative sets of technologies the Commission is considering migrating towards but is not limited to this set. The last column (Potential Companion Technologies) contains companion technologies under consideration that can be bolted on to the existing installed base to enhance performance, expand capabilities or improve operating efficiencies.

**Table 1. SPECIFIC TECHNOLOGY PLATFORMS TO INCLUDE IN STUDY**

| <b>Item #</b> | <b>Infrastructure Element</b> | <b>Existing Technology (Installed Base)</b>                                      | <b>(A)Alternative Technology (Considered but not limited to)</b> | <b>(B)Alternative Technology (Considered but not limited to)</b> | <b>Potential Companion* Technologies</b> |
|---------------|-------------------------------|----------------------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------|
| <b>1.</b>     | WAN                           | Alcatel MDR 4000<br>SONET Digital Microwave OC-3<br>CISCO (routing)              | Alcatel MDR 8000<br>Ethernet Radio<br>CISCO(routing)             | Fiber Optic Backbone **                                          | MPLS<br>DWDM                             |
| <b>2.</b>     | Last Mile Connections         | Leased lines<br>Dial up<br>Copper(private)<br>Fiber (private)<br>802.11 Wireless | 4.9 GHz<br>WIMAX                                                 | Fiber Optic cable                                                | 800 MHz                                  |
| <b>3.</b>     | VHF Radio                     | Conventional Analog                                                              | Narrowband to 12.5 kHz (FCC Mandate)                             | 800 MHz Digital<br>IP Open Sky<br>PA StarNet network             | Harris Unity xg-100<br>Multiband Radio   |
| <b>4.</b>     | Telephone                     | Nortel Meridian EPABX<br>81C,61C,11                                              | CISCO VOIP                                                       |                                                                  | 800 MHz<br>VOIP<br>SIP Trunks            |
| <b>5.</b>     | Unified Communications***     |                                                                                  |                                                                  |                                                                  | Microsoft and or CISCO                   |
| <b>6.</b>     | Highway Advisory Radio        | 1640 AM DTMF tones                                                               | 4.9 GHz<br>WIMAX                                                 |                                                                  |                                          |
| <b>7.</b>     | ITS Devices                   | Leased lines                                                                     | 4.9 GHz<br>WIMAX                                                 |                                                                  | 800 MHz                                  |
| <b>8.</b>     | Cellular Phone                | Verizon Wireless                                                                 |                                                                  |                                                                  | 800 MHz<br>VOIP                          |

**[\*Companion technologies are those that can be superimposed on top of our existing installed base platforms to enhance performance, capabilities and efficiencies.]**

**[\*\* Provide an analysis on current market demand conditions for fiber optic bandwidth and the potential for leasing bandwidth from a fiber optic backbone particularly from the Carlisle Interchange to the Pittsburgh Interchange. ]**

**[\*\*\* Include in the study a comparative analysis and best fit recommendation of Unified Communications technology. Both Microsoft and CISCO have their own versions of this technology type and are being considered for use. ]**

## **APPENDIX A**

### **BACKGROUND INFORMATION ON COMMISSION'S COMMUNICATIONS SYSTEMS**

#### **WAN**

The IP WAN network continues to be the foundation to increasingly more and more critical applications. When the IP WAN network was established it was designed and implemented using basic services and carrying very limited applications. This has changed substantially as IP networks became the standard for communications. The utilization of the IP network continues to expand. This is requiring enhanced services to be installed to further improve the utilization of its limited bandwidth resource. Some of these new technologies include MPLS and WAAS. More applications are expected to be carried over this network in the near future. Driving this growth are things like bringing the Commission's DR in house, phone and radio system interoperability, i.e. CISCO IPICS, and extending phone services to more users. New locations coming on line in the near term such as the new data center in the Turnpike Industrial Park Building (TIP Building), and possibly the tolling of already existing roads in the future create more demand for more services and capabilities.

The digital microwave system provides the basic transport service for all of the communications functions. The system tracks in parallel the entire expanse of the Turnpike roadbed traversing a very diverse terrain and is configured into two distinct digital microwave systems extending east and west from the Central Administration Building (CAB) in Highspire. The west system has a backbone that runs from the CAB to Thompson's Run Relay, ten links total, while the east system has a backbone that runs from the CAB to Wyoming Relay on the Northeast Extension, eight links total. There are digital microwave links that connect additional Commission facilities into the microwave backbone. These links are known as spurs. These spur links vary in capacity. There are a total of 23 spur links into the West's system's backbone. There are a total of 18 spur links into the East system's backbone. There is one spur link that connects New Cumberland Maintenance and another that connects the turnpike Industrial Park (TIP) Building directly to the CAB without sending traffic over the main backbone of the microwave system.

The high capacity portions of the microwave system will be referred to as "primary route" links. Primary route links extend from the site named Thompson's Run, near milepost T16.0, to Plymouth Meeting Maintenance at milepost T333.59. Although the primary route links pass the CAB, the system is split at the CAB in connectivity. Another primary route leaves a site named Valley Forge, at milepost T317.4 and extends north to a site named Wyoming, near milepost A105.1. A third primary route leaves a site named Beacon, near milepost T62.8, and extends south to a site named Redstone, near milepost M18.2 of the Mon Fayette Expressway. A fourth primary route leaves a site named Laurel, near milepost T100.2, and extends to a site named Tyson's Corner, near the Western Regional Office (WRO) in New Stanton, Pennsylvania. All four of these primary routes have the traffic carrying capacity of an Optical Carrier Level 3 (OC-3). There are also two additional primary routes between a radio site named Bunches, near milepost T242.0, and the CAB in Highspire. Each of these two primary routes connecting Highspire to the communication system has the traffic carrying capacity of an OC-3.

Each OC-3 is divided into three STS-1 groups. One STS-1 is utilized by the Commission for call box circuits, phone trunks, off premise telephone extensions. The WAN utilizes a second third of the OC-3. This STS-1 provides a 45 Mb/s high speed backbone for nearly all data applications of the turnpike including both administrative and fare collection data, plus streaming video from several ITS closed circuit cameras. The last third of the capacity of the primary routes is allocated exclusively to the

Commonwealth of Pennsylvania's Office of Public-Safety Radio Services (OPRS) for use in the statewide 800 MHz radio network known as PA StarNet. This is part of an agreement between the Commission and the Commonwealth of PA.

The primary routes also have the additional capacity of 3 DS-1s, which are known as "wayside DS-1s". The wayside DS-1s use some of the excess capacity in the overhead of the digital bit stream. These DS-1s are used for two-way radio communications and system-wide network management applications.

There are a total of 23 links or paths of primary route equipment in the system. A link or microwave path includes transmitters and receivers at both ends of the path along with associated antenna systems that allow the transmitters and receivers to communicate with each other. The lengths of these links or paths may be less than one mile or as long as 35 miles. 21 of the primary route links operate in the 6GHz frequency band. Two primary route links near Blue Mountain Tunnel operate in the 11 GHz frequency band. The primary route equipment is manufactured by Alcatel and they are model MDR-4000s radios. In addition to the primary route links there are 38 other digital microwave spur links. Spur links are used to connect an additional microwave site into one of the primary route sites. 27 of the spur links operate in the licensed 6 GHz frequency band and possess a capacity of 16 DS-1s. Many of these links have 25% of their capacity allocated to the OPRS for use by PA StarNet. Eleven spur links operate in the unlicensed 5.8 GHz frequency band. The spur link equipment is also manufactured by Alcatel. The 5.8 and 6 GHz equipment is model MDR-8000.

#### **LAST MILE CONNECTIONS**

The Western Regional Office (WRO) is connected to the microwave system via fiber optic cable from the WRO to Tyson's corner Relay. Tyson's Corner Relay is a microwave site located on the hill behind the WRO. The fiber provides direct OC-3 access into the microwave system. Several other locations utilize fiber optic cable to connect to a microwave facility providing DS-1 or multiple DS-1 service. M4 and M5 interchanges on the Mon-Valley Expressway are connected to the MFE South microwave site. Jefferson Hills Maintenance, Jefferson Hills State Police and M52 interchange on the Mon-Valley Expressway are connected to the MFE North site. Allegheny Tunnel is connected to the Allegheny Relay site. Tuscarora Tunnel is connected to Burnt Cabins Maintenance. Blue Mountain Tunnel is connected to Kittatiny Tunnel. Harrisburg East interchange and the TIP Building are connected to the CAB. Devault Maintenance is connected to Valley Forge Relay. The Eastern Regional Office (ERO) is connected to the microwave system through the use of leased DS-1 and DS-3 circuits. There are four leased DS-1 circuits utilized for telephone trunks, two-way radio circuits, call box circuits and roadway video. The leased DS-3 circuit provides 45 Mb/s bidirectional data transfer for the WAN. Connectivity to other Turnpike facilities is via one or two leased T1 circuits from each location to a microwave site.

#### **VHF RADIO SYSTEM**

One of the primary uses of voice services that the microwave system is VHF conventional analog two way radio system. The Commission has close to 3,000 VHF radios and control points in service including base station repeaters, fixed control stations with multiple control points, mobile radios, portable radios, mobile vehicular repeaters and microwave connected control points. The communication services that these radios provide support to include Troop T PA State Police, Maintenance, Toll Collection, Safety, First-Responders (fire and EMS service providers), Customer Service and general commission operations. Because of the large number of users of the VHF radio system, the system has been divided into six geographic districts. This division allows six conversations; one in each district, to take place simultaneously without the use of additional RF frequencies above and beyond those frequencies currently licensed to the Commission. The statewide Open-Sky 800 MHz

radio system called PA StarNet is an IP based digital trunked two way radio system being utilized by the Commission for two way communications on the Finley Connector portion of the Mon Fayette Expressway. It is essentially VOIP technology. It interfaces to the Turnpike backbone at Beacon tower via an Open-Sky gateway. The five VHF radio districts also have an Open Sky gateway that can be used to communicate between both the Turnpike and PA StarNet systems. This capability can be utilized to facilitate a cutover to the Open Sky system if necessary.

## **TELEPHONE SYSTEM**

The Commission's telephone system is comprised of Nortel Meridian Electronic Private Automatic Branch eXchanges (EPABX). There is an Option 81 located at the Central Administration Building in Highspire. There is an Option 61 located at the WRO. There are also Option 11s located at New Castle Relay, Homewood Maintenance, Gibsonia Maintenance, Harrison city Maintenance, Jefferson Hills Maintenance, Donegal Maintenance, Somerset Maintenance, Everette Maintenance, Burnt Cabins Maintenance, Newville Maintenance, New Cumberland Maintenance, Mt. Gretna Maintenance, Bowmansville Maintenance, ERO, Plymouth Meeting Maintenance, Trevoise Maintenance, Quakertown Interchange maintenance, Slatington Maintenance Pocono Maintenance, and Wyoming Maintenance. All of these locations have direct access to the microwave system with the exception of ERO, Quakertown Interchange and Jefferson Hills Maintenance. Leased DS-1 circuits connect the ERO and Quakertown Interchange to Plymouth Meeting Maintenance. A fiber optic circuit connects Jefferson Hills Maintenance to MFE North tower where the connection continues to WRO via microwave.

The Commission is also presently using Meridian Norstar electronic key telephone systems at Kegg Maintenance, Allegheny Interchange, Greensburg Maintenance, Devault Maintenance, Gateway Interchange, North toll 60 Interchange, and Breezewood Interchange. At Harrisburg East Interchange, access to the Commission's EPABX telephone system is accomplished via commission owned fiber optic cable. All other locations get access via OPX or CISCO VOIP telephones.

Off Premise eXtension (OPX) circuits are used to provide remote access from remote facilities to one of the Commission's EPABXs via the microwave system and /or leased lines. Going forward OPXs will be phased out and replaced with CISCO VOIP telephony. The OPXs provide direct telephone access to the turnpike phone system at all Commission facilities that do not have an EPABX. Leased DS-1s are used to support the OPX applications whenever there is no cable, fiber or microwave connection to the Commission's communication system. The OPXs are generally connected to the nearest PBX. During the switch selection process, consideration was given to minimizing the number of Local Access Transport Areas (LATAs) through which the leased circuit would have to travel. At other Turnpike field locations, OPX circuits gain access to the Commission's field EPABXs via turnpike buried cables or leased telephone lines.

Buried phone cable connects Butler Valley Interchange to Gibsonia Maintenance, Devault Maintenance to Valley Forge Relay, Delaware Valley Interchange to Delaware Valley Relay, Delaware River Bridge to Delaware Valley Relay, and Pocono Interchange to Pocono Maintenance. Fiber optic cable is used to connect MFE North Relay to M52 Barrier Plaza, and M5 Barrier Plaza to M4 Ramp Plaza. The OPX applications share bandwidth on the DS-1s with WAN applications. This is accomplished using Telco Systems Access 60 channel banks at the remote sites to increase the communications capability at those sites. Harrisburg East Interchange, Lehigh tunnel, the District 5 Training Center, and Mid-County Interchange are testing VOIP telephones that allow expanded options that are not available via Foreign eXchange (FX) phone.

## **ITS SYSTEMS**

ITS systems is a collection of different application specific ITS equipment encompassing CCTV, Highway Advisory Radio (HAR), Variable Message Sign (VMS), Traffic Flow Detection (TFDS), Road and Runway Weather Information Systems (RWIS), Truck Rollover Warning system (TRWS), and Fog System.

**HAR** – There are 38 HAR units distributed across the Turnpike roadway. Computer generated voice messages are generated in the traffic operations center (TOC) in Highspire that are downloaded to the HAR AM transmitter units located in the vicinity of interchanges via telephone lines. The messages are then broadcast by the AM transmitters in the vicinity of the interchanges. The HAR units are used to warn motorists of accidents, traffic problems and construction zones. The HARs also have weather radio receivers that can be used to broadcast the weather. The HAR alert signs have flashing yellow beacon lights that flash when activated to inform motorists of the presence of important information being broadcast on the AM transmitter units. AM broadcast receivers have been installed at these alert sign locations that monitor the broadcast signal of the HAR transmitter unit. The receivers on the alert signs are equipped with DTMF signaling decoders that detect and decode DTMF signals embedded in the AM transmission. These DTMF codes are used to activate and deactivate the flashing beacon lights for the signs giving visible alert to motorists to tune into 1640 AM on the vehicle radio to hear the broadcast message.

**VMS**- These are large roadside signs that can display a variety of messages. There are 18 of these units installed at strategic locations near and along the Turnpike. Messages are downloaded to these signs via telephone.

**Traffic Flow Detection System (TFDS)**-Utilizes Remote Traffic Microwave sensors to calculate traffic flow, count(occupancy) and average speed on the turnpike at various locations. The units are dial-up via leased telephone lines.

**Road and Runway Weather Information systems (RWIS)**-Communications to the RWIS are dial-up leased telephone lines.

**Fog System**- Involves UPS systems, routers, network equipment, fiber optic modems, channel cards and spread spectrum microwave links. All data is sent via redundant wireless WAN access points back to the Traffic Control Center in Highspire.