Project Summary

Texas Department of Transportation

0-5586: Next Generation Communications Architecture for TxDOT ATMS

Background

Through the Traffic Operations Division, the Texas Department of Transportation (TxDOT) has been deploying intelligent transportation system (ITS) solutions for a number of years in various districts across the state. These deployments have been constructed with a software system known as Advanced Traffic Management System (ATMS). Developed in-house to deliver a core set of services, both the software and the supporting physical infrastructure are legacy systems that are not amenable to expansion, either in terms of additional services, or current technologies and/or products for supplying data from the roadside.

Since ITS deployments started, a number of significant changes have taken place, including:

- rewriting ATMS to utilize network communications, support open interface standards, and enhance its capability to work in a distributed physical infrastructure,
- development of a Core Technology Architecture by TxDOT recognizing the need for ITS services,
- a marked increase in the interest and participation of external partners in TxDOT ITS deployments, and
- numerous shifts in industry trends and solutions that have significant market and deployment consequences.

What was missing was a comprehensive examination of how future ITS deployments should be planned and implemented to take advantage of the latest trends in communications and the changes in information technology requirements.

What the Researchers Did

Researchers performed an extensive review of current ATMS deployments within the state, examined industry trends, and assessed the needs of external agencies which partner with TxDOT for information sharing. In addition, the research team analyzed the core technology architecture with respect to ITS services, and facilitated round-table discussions with TxDOT on how to provide ITS services. Together, this information led to the development of a five-layer conceptual network model to provide ITS services in the future. The five layers are:

- TxDOT Business Network,
- ITS Business Network,
- ITS Field Network,
- ITS Partner Network, and
- Outside Network.

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The conceptual model for ITS deployments developed in this project was applied to the El Paso District traffic management center, TransVista, as a case study. TransVista was shown to conform nicely to the conceptual network model, although not without its own unique properties and implementations.

What They Found

The ITS deployment model has several features that are worth noting, including:

- uses a distributed physical system recognizing the strengths of network communications,
- supports legacy environments in terms of both communications and equipment without compromising security,
- provides support for the next generation ATMS products which require network connectivity and the TCP/IP protocol,
- fits within the TxDOT Core Technology Architecture,
- recognizes security as a critical issue and segments off various networks as a means of controlling security,
- is adaptable for future network developments, such as wireless connections to external sites or offices,
- provides a defined pathway for communication to/from external partners, including data providers,
- supports future ITS efforts, such as Vehicle Infrastructure Integration (VII) or contracted ITS services, and
- recognizes and provides for the consolidation of ITS information services to the public through the statewide data center.

What This Means

While the TxDOT Core Technology Architecture document recognizes an "ITS Site" as a component of the statewide network, it does not provide additional detail as to how these services should be planned and deployed. The model developed in this research provides significant detail and guidance for planning future ITS deployments. The model adheres to the TxDOT Core Technology Architecture and addresses critical constraints such as security and access while supporting external partners and future ITS developments. It is recommended that this conceptual model be included in the TxDOT Core Technology Architecture as a means of documenting, explaining, and providing for future ITS deployments.

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