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1. Report No. FHWA/TX-01/1752-6		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle Status of TransLink® TMC Connections				5. Report Date October 2000	
				6. Performing Organization Code	
7. Author(s) Robert E. Brydia				8. Performing Organization Report No. Report 1752-6	
9. Performing Organization Name and Address Texas Transportation Institute The Texas A&M University System College Station, Texas 77843-3135				10. Work Unit No. (TRAIS)	
				11. Contract or Grant No. Project No. 0-1752	
12. Sponsoring Agency Name and Address Texas Department of Transportation Construction Division Research and Technology Transfer Section P.O. Box 5080 Austin, Texas 78763-5080				13. Type of Report and Period Covered Letter Report September 1999 – August 2000	
				14. Sponsoring Agency Code	
15. Supplementary Notes Research performed in cooperation with the Texas Department of Transportation and the U.S. Department of Transportation, Federal Highway Administration. Research Project Title: TransLink Research Program					
16. Abstract As part of the activities associated with its research focus areas, TransLink® has developed laboratories within the Texas Transportation Institute as well as connections with external Transportation Management Centers (TMC). This letter report describes the current laboratory facilities and TMC connections.					
17. Key Words TransLink®, Transportation Management Center, Laboratory			18. Distribution Statement No restrictions. This document is available to the public through NTIS: National Technical Information Service 5285 Port Royal Road Springfield, Virginia 22161		
19. Security Classif.(of this report) Unclassified		20. Security Classif.(of this page) Unclassified		21. No. of Pages 6	22. Price

Report 1752-6
STATUS OF TRANSLINK[®] TMC CONNECTIONS

by
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Introduction

The TransLink Research Center is a multi-modal, public/private research program founded by METRO, Rockwell, the Texas Department of Transportation (TxDOT), the Texas Transportation Institute (TTI), and the United State Department of Transportation (US DOT). TransLink's mission is to investigate new concepts in linking elements of the surface transportation system together for the purpose of improving the overall efficiency and operations of the system and to transfer these concepts into practice.

Within the center, research projects take place in the four areas of:

- Emergency services,
- Rail monitoring,
- Transit operations, and
- Automation.

As part of the activities associated with these research areas, TransLink developed laboratories within the Texas Transportation Institute. TransLink also established connections with external Transportation Management Centers (TMC). This letter report describes the current laboratory facilities and TMC connections.

Laboratories

As a supporting mechanism for the research program, TransLink developed research laboratories using funding from the Texas Transportation Institute. The primary research laboratory is located in the Gibb Gilchrist Building in the Texas A&M University (TAMU) Research Park. Dedicated on November 17, 1999, the laboratory provides a state-of-the-art facility for research, professional development, and showcasing activities.

The laboratory features state-of-the-art computer and telecommunications capabilities. As a result of being modeled after existing TMCs, the laboratory also incorporates a high fidelity video display system that can display both computer and video images. Numerous pieces of field hardware equipment are in use in the laboratory and provide real data to the simulation and visualization models using the hardware-in-the-loop functions. Any image from any source can be captured in real time and recorded to tape for instructional purposes.

The laboratory is also the starting point for all field deployments for the center. Field-based efforts such as rail monitoring, sensor deployment, and field-based data and video communications are all staged from the Gilchrist facility.

The laboratory also serves as an instructional facility for classes, graduate student research, workshops, seminars and professional development. Equipped with classroom style seating and individual computing resources, the laboratory marries the physical infrastructure of computers, telecommunications, audio, and video with the instructor to create a premier area for advanced learning.

TransLink also maintains the research laboratory on the third floor of the Civil Engineering/Texas Transportation Institute (CE/TTI) Building in College Station. As one of TTI's first laboratories of this type, the third floor area served an important role in the development and testing of new concepts. Today, the laboratory serves as a resource for investigating significant issues such as center-to-center communications and distance learning.

Status of Connections

Throughout the project time frame, TransLink has developed numerous connections with various TMCs and data sources. Over the past several years, many of these connections, which were originally done via dial-up or proprietary connections, have been migrated to Internet protocols. This change reflects the ever-increasing importance of Internet communications in transportation management and highlights a path for future research efforts.

TranStar – The connection to Houston TranStar has always been Internet based. The available data show the traffic speeds on links in and around the city using Automatic Vehicle Identification (AVI) technology. The data made available at the Internet site have been expanded many times over the years and now includes travel time, incidents, construction closures, route builders and even public surveys. Recent discussions with TTI-Houston have also led to the AVI data stream being made available in eXtensible Markup Language (XML). This format allows for the data stream to be self describing and holds promise to reduce data preparation and integration costs for third party information suppliers.

TransGuide – TransLink has worked closely with the San Antonio TransGuide center to establish data and video communication links between the centers. TransLink has exhibited in the laboratories the same management software that is used on the floor of TransGuide and in use by the operators. This software has also been in use within the TTI-San Antonio offices. As the TransGuide deployments grew, additional information was incorporated into the data feed and map set. Due to the maintenance and security considerations of broadcasting the live data feed on the Internet for reception, this method of connection is no longer available.

TTI is currently working on an alternate method of retrieving and displaying the real-time information feed from TransGuide. By bridging the networks and keeping the information secure, the data feed can be displayed on a real-time map on a Windows®-based workstation in both the TTI offices and the TransLink laboratory. This method

will simply provide for real-time viewing—there is no control associated with these data feeds.

TransLink and TransGuide have entertained discussions many times on the feasibility of transmitting video to the TransLink laboratory. However, this endeavor would require a significant amount of funds, both in capital equipment and link operation. While key advances have been made over the past several years, long-haul video transmission is still a very expensive proposition.

TransGuide also serves as the data source for the DataLink (<http://datalink.cs.tamu.edu>) web site, which pioneered large-scale data storage and retrieval capabilities for transportation management purposes. The development efforts on DataLink had a direct impact on the both the Archive Data User Service (ADUS) being incorporated into the National Architecture and the nature of the guidelines.

Dallas – TransLink has routinely served in an important capacity as a testing ground for new releases of the Dallas software. In this role, the operations software such as the operator client, the administrative client and the incident management client packages are running in the TransLink laboratory. The software can be used to connect to the TransLink network, the test network in Dallas, or the operational network at the TMC. Since the Dallas data feed has always been Internet based with appropriate user-id and password protections, the extensibility of the software and the ability to provide remote linkages is virtually unlimited. Experimentation has also been done with clients on laptops to ensure mobile operability.

Dallas has also been an important testbed for video sharing and distribution concepts using low-bandwidth links. By utilizing low-cost Integrated Services Digital Network (ISDN) equipment, the Dallas and TransLink facilities can transmit video and share scarce resources. Experimentation has also been performed with streaming video software such as Real Player™.

Austin – The Traffic Operations Division in Austin has developed and deployed a standard package for traffic management. Currently in Version 2, the Advanced Traffic Management System (ATMS) represents the statewide deployment package for small and medium sized cities. TransLink has deployed ATMS Version 2 in the laboratory and is in the process of obtaining live data to feed the operations software. Information gained in the process of installing and deploying ATMS will be utilized to prepare a letter report covering recommendations for the software suite.

Field Testbeds – The field testbeds have always been an important component of the TransLink Research Center's capabilities. By utilizing field deployments and live data, information on how equipment and sensors work under live traffic conditions can be obtained in a controlled setting. This information can then be utilized to improve algorithms, methodology, and procedures before full-scale deployments are performed. The information below describes some of the advances that have resulted from the use of field testbeds in the TransLink Research Center.

Wellborn Road Rail Corridor – The Wellborn corridor experiences significant rail traffic, in the range of fifteen to twenty trains per day. Depending on the length of the train, three to four at-grade intersections may be blocked simultaneously. This blockage has a detrimental effect on roadway operations in the corridor as it impedes normal progression of motorists, transit vehicles, emergency services, pedestrians and bicyclists. Information gained from monitoring rail operations at the affected intersections has the potential to increase the safety and efficiency of the traffic network. The Wellborn corridor has utilized advanced wireless communications for data and video snapshots.

Highway 6 – As a freeway testbed, the facility on State Highway 6 is a proving ground for both new sensor technologies and data communications. Transforming the data feeds from vendor proprietary formats to an Internet protocol standard is an important task for future interoperability. The use of XML holds promise for this as it allows the data to be self-describing. The use of streaming media for low bandwidth deployment is also being investigated. This and other information gained from the testbed have been fed back into the operations program and will continue to be a valuable source of information and testing capabilities in the future.

Automatic Vehicle Location (AVL) – The TransLink Research Center, in cooperation with the Federal Highway Administration Intelligent Transportation Systems Research Center of Excellence (FHWA ITS RCE), deployed a low-cost AVL system geared for rural operations. Used primarily as a testbed for equipment and technologies, the deployment produced significant knowledge in terms of the concepts and the pitfalls of location technology. Through this process, TransLink worked closely with equipment and software vendors to identify problems and find solutions. Significant progress was seen during the course of the deployment in terms of the software solutions available for these efforts. Currently, TransLink has software in the laboratory that allows for the tracking of several vehicle fleets, including Houston METRO.

Future Activities

As the research program continues, the concepts of sharing information and data become increasingly important for proper deployment and use in operations. Linking the TransLink Research Center and the laboratories with other centers and deployments investigating and utilizing ITS technologies provides a vital resource for the ITS community. Future activities will undoubtedly focus on data sharing by open standard protocols and archiving capabilities for feedback into operations. The continuance of investigations on video communications using emerging broadband technologies with significantly lower costs will also be important for increasing the capability of future ITS deployments. These activities and others will allow TransLink and its sponsors to remain at the forefront of ITS issues and deployments.