LEARN

Lone Star Education and Research Network

Project Status Report
9/29/2005

Overview

LEARN is a not-for-profit 501c3 corporation supported and governed by its members. LEARN is building a next-generation, fiber-based network in Texas. Rather than lease circuits from traditional providers, LEARN will own the underlying fiber optic infrastructure. The dark fiber is "owned" for 20 years – the useful life of the fiber. The technology allows for unprecedented future capacity. The initial LEARN deployment will utilize only a small fraction of the total capacity of the fiber. Our initial deployment is in units of 1 and 10 Gigabits/second. With current technology, and with incremental, marginal investment, we can expand that more than 30 times. We expect future generations of optronics to more than double that.

LEARN will enable connections to major research and education networks. Our members will use LEARN to connect to the Internet, Abilene (Internet2) and the National Lambda Rail (NLR). Each of these US based networks have International connections. In addition, a number of government agencies (e.g. Department of Energy, NASA) have plans to use NLR for various applications and when appropriate, LEARN will have the ability to connect member institutions to those services. LEARN is not providing "last mile" services to campuses but is locating points of presence (POPs) for connection in key cities in Texas. Individual campuses and extant networks serving multiple campuses will connect to the LEARN network for "backbone" services.

LEARN received $7,281,000 million from the Texas Enterprise Fund to capitalize the initial network. As part of the agreement, LEARN may provide services to the State of Texas. LEARN members and other users will provide funding for the ongoing operation of the organization and network.

This is LEARN's first annual report to the State as required by the AGREEMENT ON FUNDING FOR AN OPTICAL RESEARCH AND EDUCATION NETWORK dated February 28, 2005 between the The State of Texas and Texas GigaPOP d/b/a LEARN: Lonestar Education And Research Network.

The LEARN Mission

LEARN is a non-profit collaboration of Texas higher education institutions that support their research, education, health care, and public service missions through the innovative development, operation and utilization of advanced statewide networking, access to global resources, and related services.

The LEARN Vision

To be the premier organization providing network services for research, education, health care and economic development through advanced communication services throughout Texas. LEARN will be a national model for organizations that serve institutions of higher education. We will provide leadership in creating global networking initiatives.

LEARN Network

Cities to be served by the LEARN

The following cities are expected to have a LEARN point-of-presence to serve multiple institutions in the region.

Austin, Beaumont, College Station, Corpus Christi, Dallas/Fort Worth, Denton, El Paso, Houston, Longview, Lubbock, San Antonio, Waco and Waller

In Lubbock and El Paso, LEARN is likely only able to provide service to the current member institutions in the area because we are acquiring leased lambda service rather than dark fiber with greater capacity.

Waller was not part of our original deployment plan but our contract with WilTel included this as an option. An additional pair of fiber was deemed desirable by the institutions in the area. Texas A & M University and Blinn Community College will provide the capital for this connection. Waco was on our original deployment map, but not included in our capital request as an OADM site (i.e., a site where we can connect services). Baylor University and Texas A & M will provide the incremental capital to allow connections to institutions in that area.

Institutions expected to connect to LEARN

At this writing, the following institutions are expected to connect to the LEARN network as it becomes available in their area:

Baylor University
Baylor College of Medicine
Lamar University
Prairie View A&M University
Rice University
Southern Methodist University
Texas A&M University
Texas A&M University System Health Science Center
Texas A&M University - Corpus Christi
Texas Christian University
Texas State Technical College - Waco
Texas State University - San Marcos
Texas Tech University in Lubbock
University of Houston System
University of North Texas Health Science Center
University of North Texas
University of Texas at Arlington
University of Texas at Austin

University of Texas at Dallas
University of Texas at El Paso
University of Texas Health Science Center at Houston
University of Texas Health Science Center at San Antonio
University of Texas Health Center Tyler
University of Texas MD Anderson Cancer Center
University of Texas Medical Branch
University of Texas at San Antonio
University of Texas Southwestern Medical Center

Additional institutions will benefit indirectly through services provided by THEnet (www.the.net), TTVN (ttvn.tamu.edu) or NETnet (`www.netnet.org`)

Status of the network deployment

The LEARN network is composed of a number of segments as shown in Figure 1. WilTel and Level 3 communications are our major providers of long haul fiber through IRU (Indefeasible Right of Use) agreements. WilTel provides the "Eastern Leg" serving Dallas, College Station, Houston, Austin and San Antonio. Level 3 will provide the "Western Leg" serving San Antonio, Waco and Fort Worth. We also have an IRU with Level 3 for an inter-city link between WilTel and Level 3 in the Dallas Ft. Worth area. We anticipate that we will acquire an IRU for a short segment of fiber from Grande Communications for the inter-city link between WilTel and Level 3 in San Antonio, but that agreement is not final as of this writing. We have also concluded a prepaid 5 year, 10 Gigabit lease for service between El Paso and San Antonio through our membership in the the National Lambda Rail (NLR)

The first passage of light over the LEARN network occurred between College Station and Houston on June 24, 2005. Since that time, Texas A&M has been evaluating a one Gigabit Ethernet over that path for connection to a commercial Internet service provider in Houston. Initial reports suggest adequate performance and reliability.

As of this month, we have 5 legs of the fiber backbone completed and have optical service to the following cities: Dallas, College Station, Houston, Austin and San Antonio.

We are now focused on the "Western leg" and continue working toward solutions for the rest of the committed network. The contracts for the Level 3 components of the network, between San Antonio, Waco, Ft. Worth and Dallas are in place and that work is underway. The San Antonio inter-city connection to be provided by Grande will require a build and may delay that connection for an additional two months. We cannot do final evaluation and acceptance of much of the optronics equipment form Nortel until the entire initial LEARN "ring" is completed.

At present, we have not finalized paths or vendors for the rest of the network but are aggressively pursuing solutions and expect completion by next year. We have created a

"Next Light" committee to help us identify other cities and institutions we might serve. LEARN has engaged a consultant on that committee's behalf to assist us in finding options for our remaining committed cities on our initial plan as well as those identified as possible locations for future LEARN infrastructure.

Current projected time line

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Route                                  Estimated Completion date
---------------------------------------------------------------------------------------------
College Station to Houston:            Completed
College Station to Dallas:             Completed
Houston to Austin:                     Completed
Austin to San Antonio:                 Completed

Austin to Dallas:                      January 2006
San Antonio to Austin:                 January 2006
Dallas to Lubbock:                     January 2006
Dallas to Denton:                      March 2006 (August 2005/UNT)
Dallas to Longview:                    March 2006
Dallas to Tyler:                       March 2006
Houston to Galveston:                  March 2006
Houston to Corpus Christi:             March 2006
National Lambda Rail through Texas:    Completed
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Current LEARN availability

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Location                                        Service
College Station – Houston                       8 X 1 Gigabit
College Station - Dallas
Waller – College Station                        2 X 1 Gigabit
Houston – Austin                                1 X OC12(48)
                                                8 X 1 Gigabit
Austin – San Antonio                            2 X 1 Gigabit
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In use / under evaluation

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User           Location                    Service
TTVN (TAMU)    College Station - Houston   1 Gigabit
THENet (UT)    Houston - Austin            1 OC12
THEnet         Houston – Austin            1 Gigabit
TTVN           Houston – Austin            1 Gigabit
TTVN           Dallas – College Station    1 Gigabit
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Relationship to the National Lambda Rail (NLR)

Texas is one of several states and regions involved in the development of Regional Optical Networks (RONs) over a next generation fiber infrastructure that will interconnect to a variety of national networks including NLR. LEARN members collectively contribute $1,000,000 per year to help develop and participate in this national infrastructure. Figure 2 shows the evolution of the current RONs and their relationship to the NLR. LEARN is a member of NLR and we will have access to services that become available on that network as it is completed. The completion of the NLR ring is will likely be near the time the initial LEARN topology is deployed.

Allocation of Texas Enterprise Fund resources

LEARN has received the entire $7,281,000 as agreed from the State of Texas. Receipt of the funds were necessary for LEARN to commit to any financing of the project. At this writing, $6,985,039.15 remains. Figure 4. is an analysis of fund activity to date.

The University of Texas at Austin and the Texas A&M System committed to support an early start to the project on the assumption that the State funding would be forthcoming and LEARN would reimburse those institutions for monies expended in direct support of the LEARN initiative. The University of Texas at Austin secured the IRU with WilTel. The contracts necessary for LEARN to acquire those assets and ongoing responsibility are expected soon. Most of the optronics equipment, although encumbered, ordered or installed by the University of Texas at Austin and Texas A&M University, has not yet undergone final acceptance. Once that is done, LEARN will acquire those inventories and reimburse the two institutions for their expenditures. LEARN does have direct agreements with WilTel for network planning and assistance with the initial operation.

Since the agreements with Level 3 were concluded after the receipt of the TEF funding, LEARN was able to enter into those agreements directly. Final payment for the Level 3 IRU awaits final acceptance of the fiber by LEARN.

Figure 3 details the expected distribution of Texas Enterprise Funds.

Aggregate Cost Savings / Cost avoidance

Since the project is still being deployed, we cannot demonstrate any cost savings at this writing. Our Technical Advisory Committee is working on recommendations for aggregation alternatives for current services such as Internet and Internet2 services and we expect to support some aggregation within the coming year.

Appendix A. LEARN members

Baylor University	**Texas Tech University System**
Baylor College of Medicine	**University of Houston System**
Lamar University	**University of North Texas System**
Northeast Texas Consortium (NETnet)	**University of Texas at Arlington**
Prairie View A&M	**University of Texas at Austin**
Rice University	**University of Texas at Dallas**
Sam Houston State University	**University of Texas at El Paso**
Southern Methodist University	**University of Texas Health Science Center at Houston**
Stephen F. Austin State	**University of Texas Health Science Center at San Antonio**
Texas A&M University	**University of Texas Health Center at Tyler**
Texas A&M University System	**University of Texas M. D. Anderson Cancer Center**
Texas A&M University System Health Science Center	**University of Texas Medical Branch at Galveston**
Texas A&M University – Corpus Christi	**University of Texas – Pan American**
Texas Association of Community Colleges	**University of Texas at San Antonio**
Texas Christian University	**University of Texas Southwestern Medical Center at Dallas**
Texas State University – San Marcos	**University of Texas System**
Texas Tech University	

Figure 1. LEARN Status Map
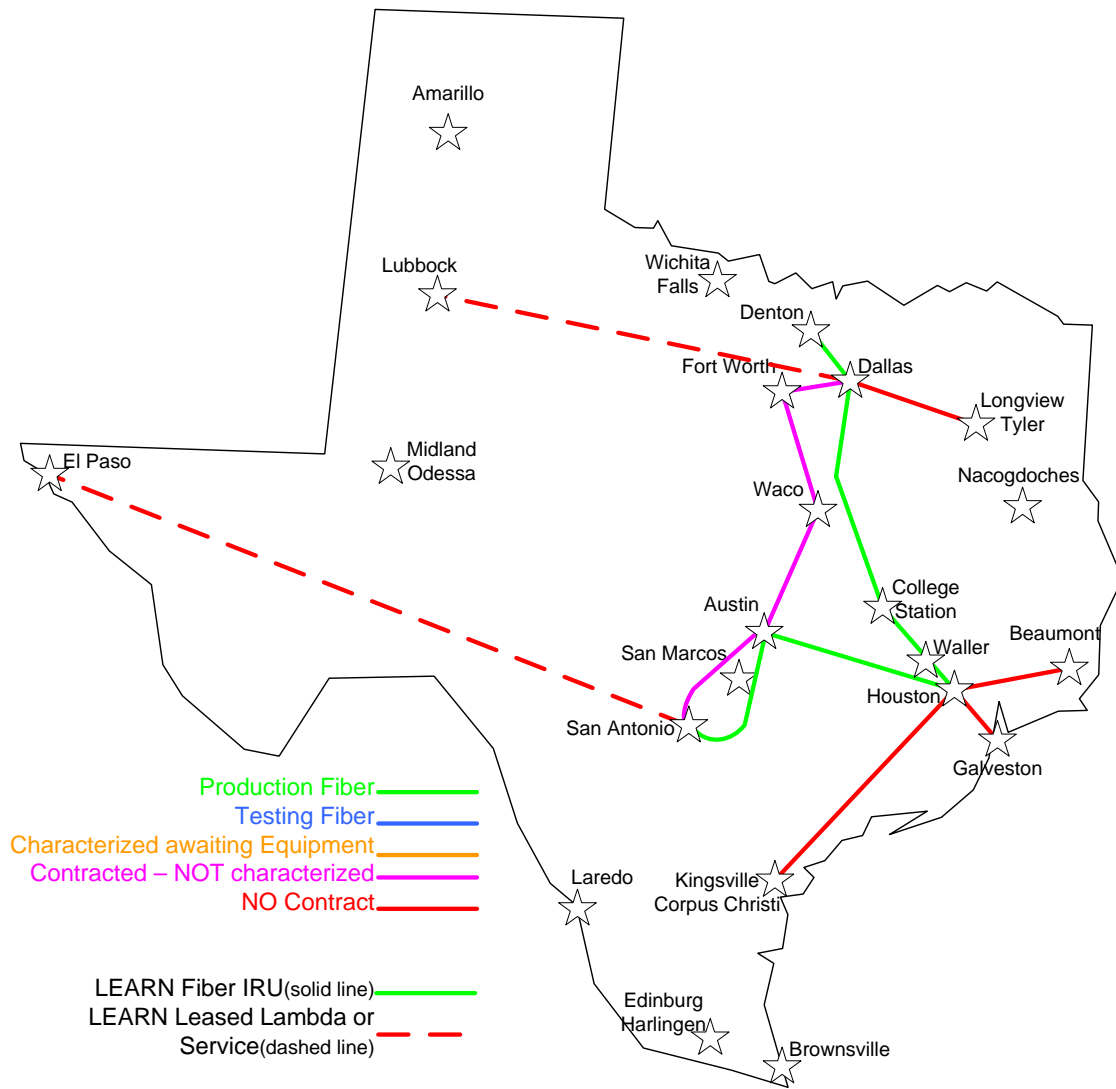
Figure 2. US Regional Optical Networks and the NLR

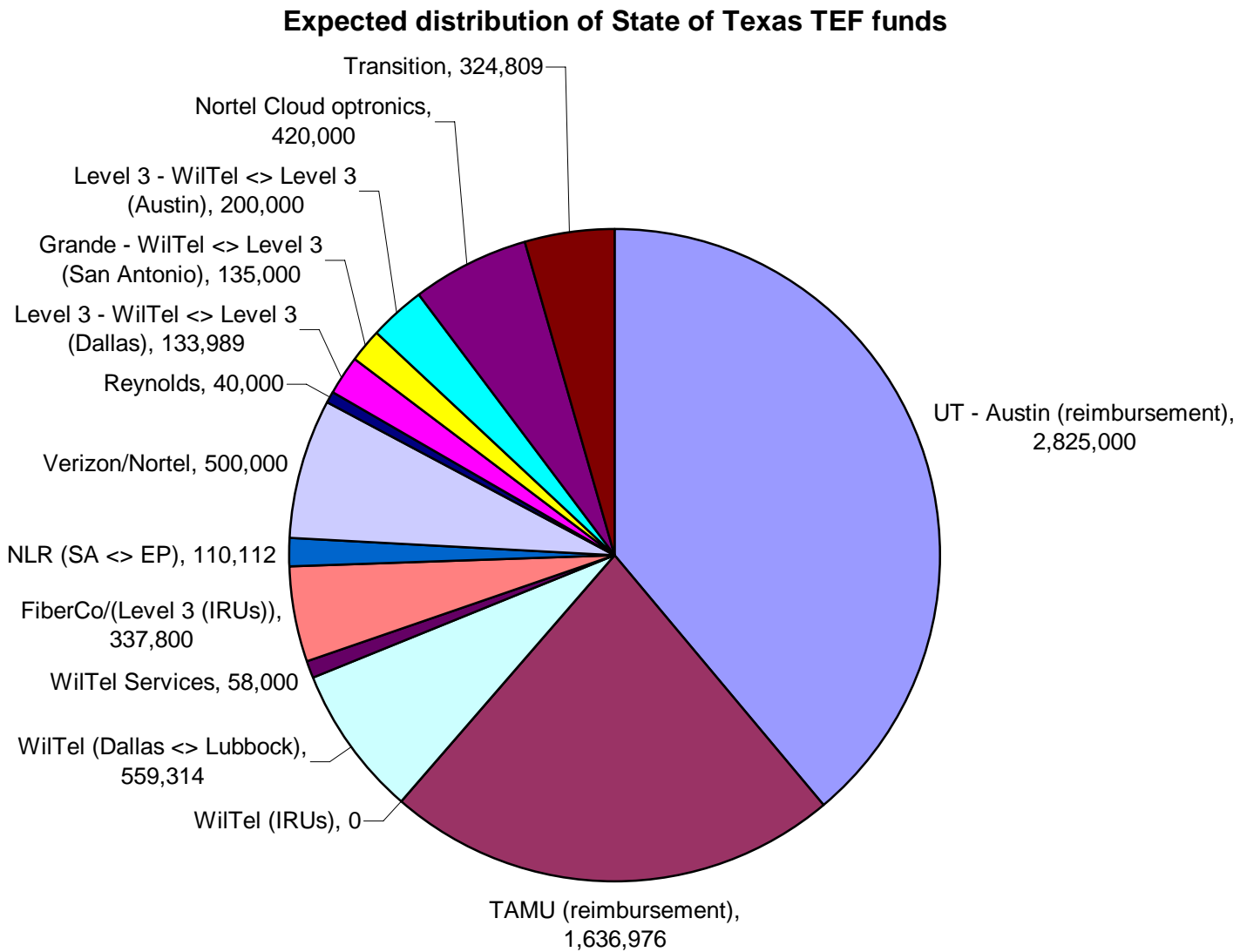## Figure 3. Anticipated distribution of Texas Enterprise Fund

Expected distribution of State of Texas TEF funds

- Transition, 324,809
- Nortel Cloud optronics, 420,000
- Level 3 - WilTel <> Level 3 (Austin), 200,000
- Grande - WilTel <> Level 3 (San Antonio), 135,000
- Level 3 - WilTel <> Level 3 (Dallas), 133,989
- Reynolds, 40,000
- Verizon/Nortel, 500,000
- NLR (SA <> EP), 110,112
- FiberCo/(Level 3 (IRUs)), 337,800
- WilTel Services, 58,000
- WilTel (Dallas <> Lubbock), 559,314
- WilTel (IRUs), 0
- UT - Austin (reimbursement), 2,825,000
- TAMU (reimbursement), 1,636,976

Figure 4. Analysis of Fund Activity

Disbursements

Bill Pmt -Check	07/08/2005	1002	National Research and Education Fiber Co.	-131,230.00
Bill Pmt -Check	07/19/2005	1003	The Reynolds Company	-11,887.14
Bill Pmt -Check	09/14/2005	1004	Level(3) Communications	-82,792.69
Bill Pmt -Check	09/14/2005	1005	The Reynolds Company	-12,551.02
				-238,460.85

Analysis of Fund Activitiy

Revenue

State of Texas	$7,281,000.00

Expenditures

Level(3) Communications	$82,792.69
The Reynolds Company	$24,438.16
Witel Communications,LLC	$57,500.00
National Research and Education Fiber Co.	$131,230.00
Total Vendor Disbursements	$295,960.85

TEF Fund Balance	$6,985,039.15